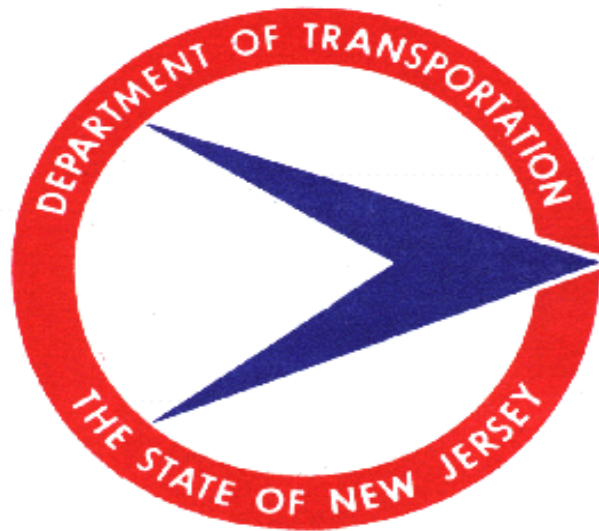


New Jersey Department of Transportation

PONTIS CODING GUIDE

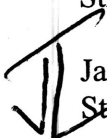


Manual

2003

**NEW JERSEY DEPARTMENT OF TRANSPORTATION
MEMORANDUM**

TO: All Bridge Inspection Staff,
Structural Evaluation

FROM:  James Lane, Manager
Structural Evaluation

DATE: June 13, 2008

PHONE: 5-3572

SUBJECT: Revision to the 2003 PONTIS Elemental Inspection of Bridges Guidelines Manual, Element No. 306, Asphaltic Plug Expansion Device.

The Department is now using the Asphaltic Plug Expansion Deck Joint system more frequently. In order to provide a means for coding of this joint in Pontis, we added Asphaltic Plug Expansion Device, Element No. 306 in our current 2003 PONTIS Elemental Inspection of Bridges Guidelines Manual.

A revised copy of page nos. 171 and 177 are attached for inclusion in your 2003 PONTIS Elemental Inspection of Bridges Guidelines Manual. Please substitute these pages with the existing pages in your copy of the Manual.

In addition, the revised document has been incorporated in the 2003 PONTIS Elemental Inspection of Bridges Guidelines Manual available on the Department's website.

If you have any questions regarding this, please contact Rajesh Patel, Project Engineer.

JL/RCP

c: Richard W. Dunne
Helene Bowman—FHWA

304 Open Expansion Joint

Units: Lineal Feet of Joint (LF)

This element defines only those joints that are open and not sealed. This joint may or may not be armored.

Condition State 1 The element shows minimal deterioration. Joint armor, if present, is secure and there are no bent, misaligned, or broken fingers. The adjacent deck and/or header is sound.

Feasible actions: 1) Do Nothing

Condition State 2 There may be deck cracking indicating armor anchor loosening. Minor spalls in the deck and/or header may be present adjacent to the joint. There may be corrosion on the joint armor steel plates. Bent or misaligned fingers are observed.

Feasible actions: 1) Do Nothing
2) Rehab unit

Condition State 3 There may be advanced corrosion of the joint armor steel plates. Major spalls may be present in the deck and/or header adjacent to the joint. Armor anchors have failed. There are missing or broken fingers.

Feasible actions: 1) Do Nothing
2) Rehab. unit
3) Replace unit

306 Asphaltic Plug Expansion Device

Units: Lineal Feet of Joint (LF)

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

Condition State 1 The element shows minimal deterioration. There are no significant cracks and no leakage.

Feasible actions: 1) Do Nothing

Condition State 2 There is significant cracking and leakage.

Feasible actions: 1) Do Nothing
2) Repair joint

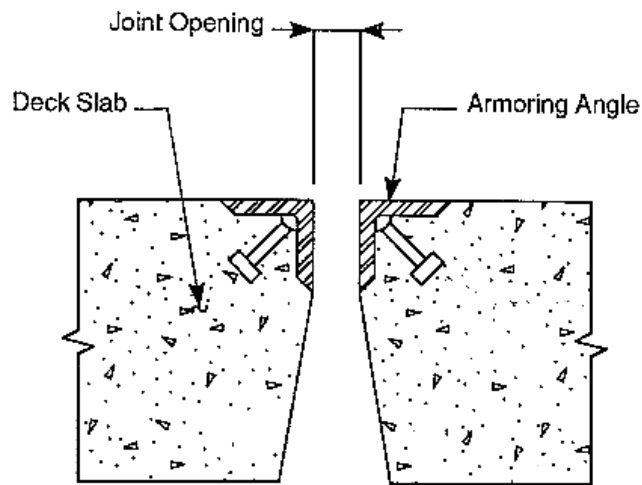
Condition State 3 Substantial cracking has caused the device to fail, allowing water to have significant impact on other elements.

Feasible actions: 1) Do Nothing
2) Repair joint
3) Replace joint

(Revised June 2008)

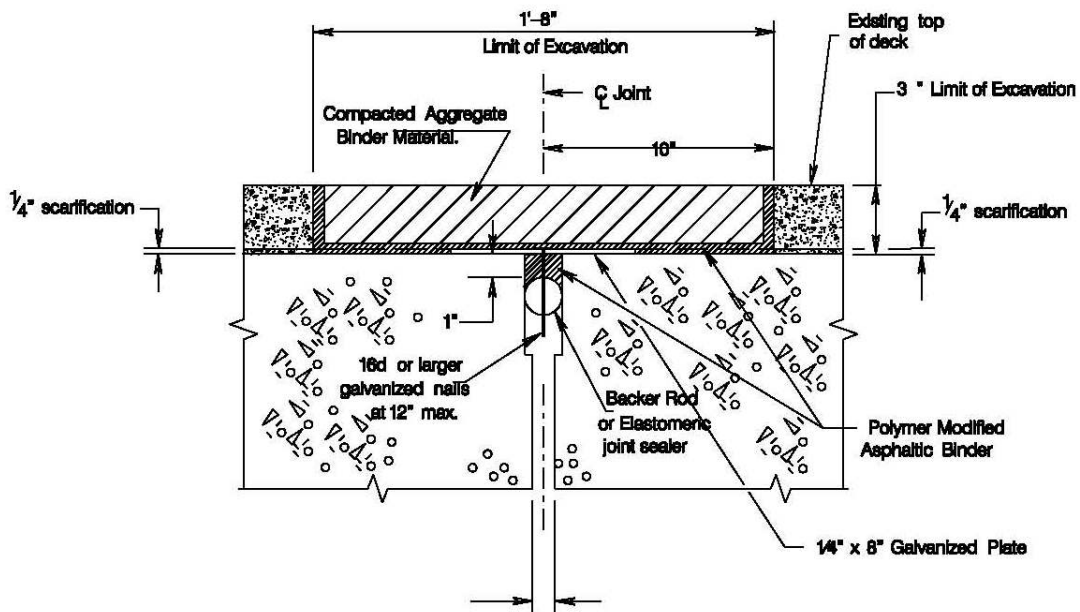
EXAMPLES OF JOINT TYPES (Continued)

Open Expansion Joint, Element No. 304:



Open Joint

Asphaltic Plug Expansion Device, Element No. 306:



Asphaltic Plug Expansion Device

(Revised June 2008)

**NEW JERSEY DEPARTMENT OF TRANSPORTATION
MEMORANDUM**

TO: All Bridge Inspection Staff
Structural Evaluation

FROM:  James Lane, Manager
Structural Evaluation

DATE: May 14, 2009

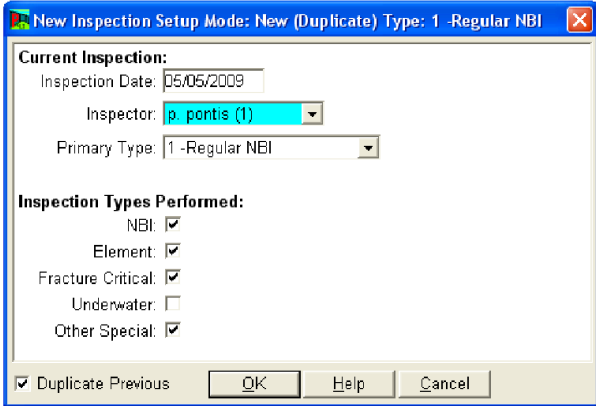
PHONE: 530-3572

SUBJECT: Pontis User Manual
Inspection Schedule - Clarifications to SI&A Items 90, 92, 93, FQ, FR, FS, & FT

Many Pontis users are having difficulties properly coding the Inspection Schedule section of the software. This memorandum will attempt to clarify the proper coding procedure to help reduce the amount of errors in the future.

Clarification to SI&A Items 90, 92, and 93:

When creating a new inspection in Pontis, the following dialog box appears:



In all cases, under the **Current Inspection** section, the **Primary Type** is coded as "1- Regular NBI" and the **Inspection Date** should correspond to the actual date of the Regular NBI Inspection performed. Under the **Inspection Types Performed** section, the user should only place checkmarks for those inspection types that took place on the SAME DATE as the Regular NBI. Any inspection type that was performed on a different date should not receive a checkmark.

The following points may help in coding these items properly:

1. **NBI** and **Element** are ALWAYS checked.
2. **Fracture Critical** is checked if FCM (Fracture Critical Member) is present and, therefore, inspection of that member is always a part of the Regular NBI. (For In-depth FCM Inspection, see Clarification to SI&A Items FQ, FR, FS and FT).

3. **Underwater** is checked if underwater inspection is performed on the SAME DATE as the Regular NBI.
4. **Other Special** is checked if Interim inspection is required and, therefore, inspected as a part of the Regular NBI. **It is unchecked only when Interim inspection is performed on a different date than Regular NBI, or when interim inspection is not required.**
5. For any Structure, if Fracture Critical, Underwater and/or Other Special (Interim) Inspections is NOT APPLICABLE, then the check boxes located under Schedule (as shown in the rectangle below) should be double clicked (checked and then unchecked) to show the default value of frequency as “-1”.

Bridge Inspection Mode: Edit Type: 1 -Regular NBI Key: DGWZ

Bridge: 0109156 Find... 6 Inspections: 06/14/2007 Metric English

1 CONDITION 2 NOTES 3 WORK 4 APPRAISAL 5 INVENTORY 6 AGENCY 7 SCHEDULE

Summary:
 Inspection Date: 06/14/2007
 Inspector: 81
 Primary Type: 1-Regular NBI
 Review Required:
 Inspection Group: ST7B

Types Of Inspections Performed:
 National Bridge Inventory:
 Element:
 Fracture Critical:
 Underwater:
 Other Special:

Schedule:	Required (Y/N)	Last Date	Frequency	Next Date
NBI (90):		07/26/2005	(91): 24 mos	06/14/2009
Fracture Critical (92A): <input type="checkbox"/>		(93A): 01/01/1901	(92A): -1 mos	01/01/1901
Underwater (92B): <input type="checkbox"/>		(93B): 01/01/1901	(92B): -1 mos	01/01/1901
Other Special (92C): <input type="checkbox"/>		(93C): 01/01/1901	(92C): -1 mos	01/01/1901
Element: NA			24 mos	06/14/2009

Bridge Inspection Resources:
 Next Inspector: p. pontis (1) Crew Hours: 0 Snooper Hours: 0
 Bridge Group: JBE061127vST7B_I03S Flagger Hours: 0 Special Crew Hours: 0
 Helper Hours: 0 Special Equip Hours: 0

6. A further clarification on this is given in detail in the attached [Examples 1 thru 3](#).

Clarification to SI&A Items FQ, FR, FS and FT:

If a Structure requires an In-depth Inspection for any Fracture Critical Member within the structure, then the State SI&A Items “FQ” thru “FT” should be coded according to 2003 SI&A coding guide page S-46.

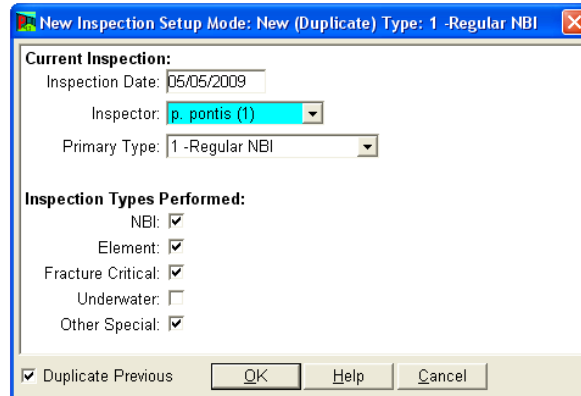
If you have any questions, please contact Rajesh C. Patel, Project Manager at (609) 530-5605.

JL/RCP:

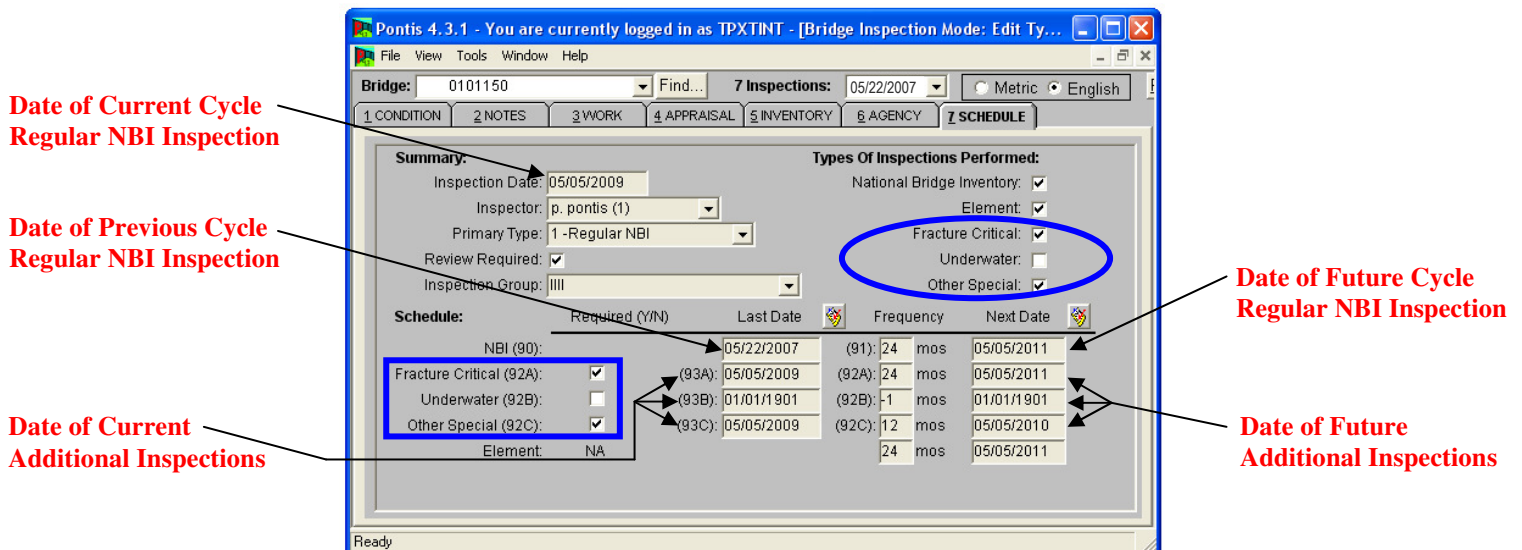
EXAMPLE 1:

In addition to a new Regular NBI inspection, the structure consists of fracture critical member, and an interim inspection is also required. The **Regular NBI**, **Fracture Critical** Inspection, and **Other Special** (Interim) Inspection were all performed on 5/5/2009.

Solution: In this instance, the user should complete the following dialog box, with checkmarks next to all inspection types EXCEPT Underwater. The **Primary Type** of the structure is a “1-Regular NBI”.



Once the new inspection has been generated in Pontis, the user may edit the Inspection Schedule information by selecting the **7 Schedule** tab as shown below:

Notes:

1. The checkbox items contained in the oval represent the same items as shown in **Types of Inspection Performed** (or **Inspection Types Performed** under the New Inspection dialog box).

2. **Fracture Critical** is checked in *oval* because the structure has a fracture critical member and FCM inspection is performed as a part of the Regular NBI.
3. **Other Special** in *oval* is checked because interim inspection is required and is performed as a part of the Regular NBI.
4. The checkbox items (**Items 92A, 92B, 92C**) contained in the *rectangle* are automatically checked off when the corresponding items in the **Type of Inspection Performed** are checked off.

EXAMPLE 2:

In addition to a **Regular NBI** inspection, a structure requires an underwater inspection. The **Regular NBI** and the **Underwater** Inspection are performed on different dates.

Solution: In this instance, no new inspection is generated in Pontis for underwater inspection. The user must edit the existing Inspection Schedule information by selecting the **S** **Schedule** tab as shown below. The **NBI** and **Element** are checked off and the **Underwater** is NOT Checked off under Type of Inspections Performed. The **Primary Type** is (always) selected as “*1-Regular NBI*”.

Bridge: 0103160 Find... 6 Inspections: 11/01/2007 Metric English

1 CONDITION 2 NOTES 3 WORK 4 APPRAISAL 5 INVENTORY 6 AGENCY 7 SCHEDULE

Summary:
 Inspection Date: 11/01/2007
 Inspector: S. SHU (32)
 Primary Type: 1-Regular NBI
 Review Required:
 Inspection Group: GGGG

Types Of Inspections Performed:
 National Bridge Inventory:
 Element:
 Fracture Critical:
 Underwater:
 Other Special:

Schedule:

	Required (Y/N)	Last Date	Frequency	Next Date
NBI (90):		11/30/2005	(91): 24 mos	11/01/2009
Fracture Critical (92A):	<input type="checkbox"/>	(93A): 01/01/1901	(92A): -1 mos	01/01/1901
Underwater (92B):	<input checked="" type="checkbox"/>	(93B): 10/12/2007	(92B): 48 mos	10/12/2011
Other Special (92C):	<input type="checkbox"/>	(93C): 01/01/1901	(92C): -1 mos	01/01/1901
Element: NA			24 mos	11/01/2009

Bridge Inspection Resources:
 Next Inspector: p. pontis (1) Crew Hours: -1 Snooper Hours: -1
 Bridge Group: JBE081204VllllgGGGG_ Flagger Hours: -1 Special Crew Hours: -1
 Helper Hours: -1 Special Equip Hours: -1

Notes:

1. **Underwater** receives a checkmark in the *rectangle* since an underwater inspection is required for the structure, but it DOES NOT receive a checkmark in the *oval* because the underwater inspection was performed on a different date than the **Regular NBI**.
2. **Enter** new underwater inspection date in **Item 93B** under “**Last**” and update “**Next**” date as shown in the red box above.

EXAMPLE 3:

A structure requires an interim inspection. The **Regular NBI** and the **Interim** Inspection are performed on different dates.

Solution: In this instance, no new inspection is generated in Pontis for interim inspection. The user must edit the existing Inspection Schedule information by selecting the **7 Schedule** tab as shown below:

Before Editing

Bridge Inspection Mode: Edit Type: 1 -Regular NBI Key: GAEH

Bridge: 3001169 Find... 8 Inspections: 10/12/2007 Metric English

1 CONDITION 2 NOTES 3 WORK 4 APPRAISAL 5 INVENTORY 6 AGENCY 7 SCHEDULE

Summary:
 Inspection Date: 10/12/2007
 Inspector: M. REDDY (27)
 Primary Type: 1-Regular NBI
 Review Required:
 Inspection Group: GGGG

Types Of Inspections Performed:
 National Bridge Inventory:
 Element:
 Fracture Critical:
 Underwater:
 Other Special:

Schedule:	Required (Y/N)	Last Date	Frequency	Next Date
NBI (90):		11/30/2005	(91): 24 mos	10/12/2009
Fracture Critical (92A):	<input type="checkbox"/>	(93A): 01/01/1901	(92A): -1 mos	01/01/1901
Underwater (92B):	<input checked="" type="checkbox"/>	(93B): 10/03/2007	(92B): 48 mos	10/03/2011
Other Special (92C):	<input checked="" type="checkbox"/>	(93C): 11/30/2005	(92C): 12 mos	10/12/2008
Element:	NA		24 mos	10/12/2009

Bridge Inspection Resources:
 Next Inspector: p. pontis (1) Crew Hours: -1 Snooper Hours: -1
 Bridge Group: JBE081204vlllgGGGG_ Flagger Hours: -1 Special Crew Hours: -1
 Helper Hours: -1 Special Equip Hours: -1

After adding Interim inspection

Bridge Inspection Mode: Edit Type: 1 -Regular NBI Key: GAEH

Bridge: 3001169 Find... 8 Inspections: 10/12/2007 Metric English

1 CONDITION 2 NOTES 3 WORK 4 APPRAISAL 5 INVENTORY 6 AGENCY 7 SCHEDULE

Summary:
 Inspection Date: 10/12/2007
 Inspector: M. REDDY (27)
 Primary Type: 1-Regular NBI
 Review Required:
 Inspection Group: GGGG

Types Of Inspections Performed:
 National Bridge Inventory:
 Element:
 Fracture Critical:
 Underwater:
 Other Special:

Schedule:	Required (Y/N)	Last Date	Frequency	Next Date
NBI (90):		11/30/2005	(91): 24 mos	10/12/2009
Fracture Critical (92A):	<input type="checkbox"/>	(93A): 01/01/1901	(92A): -1 mos	01/01/1901
Underwater (92B):	<input checked="" type="checkbox"/>	(93B): 10/03/2007	(92B): 48 mos	10/03/2011
Other Special (92C):	<input checked="" type="checkbox"/>	(93C): 10/17/2008	(92C): 12 mos	10/17/2009
Element:	NA		24 mos	10/12/2009

Bridge Inspection Resources:
 Next Inspector: p. pontis (1) Crew Hours: -1 Snooper Hours: -1
 Bridge Group: JBE081204vlllgGGGG_ Flagger Hours: -1 Special Crew Hours: -1
 Helper Hours: -1 Special Equip Hours: -1

Notes:

1. **Underwater** receives a checkmark in the rectangle since an underwater inspection is required for the structure, but it **DOES NOT** receive a checkmark in the oval because the underwater inspection was performed on a different date than the **Regular NBI**.
2. The fracture critical member is not present in this structure and therefore **Fracture Critical** is unchecked in both oval and rectangle.
3. **Other Special** was checked in oval **BEFORE EDITING** since interim inspection was required and was performed as a part of Regular NBI.
4. **Other Special** is NOT CHECKED in oval **AFTER ADDING INTERIM INSPECTION** information since it is performed on a different date than Regular NBI.
5. **Enter new interim inspection date** in **Item 93C under “Last”** and update **“Next”** date as shown in the red box above.

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BRIDGE MANAGEMENT SYSTEM

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PONTIS ELEMENT TABLE

DECK AND SLAB ELEMENTS

Decks / Slabs	Units	Decks	Slabs
Concrete Unprotected & Bare	SF	012	038
Concrete Unprotected w/ AC Overlay	SF	013	039
Concrete Protected w/ Membrane & AC Overlay	SF	014	040
* Concrete Protected w/ Membrane, AC Overlay, & Coated Bars - C.I.P.	SF	070	
* Concrete Protected w/ Membrane, AC Overlay, & Coated Bars - Precast	SF	071	
Concrete Protected w/ Thin Overlay	SF	018	044
* Concrete Protected w/ Thin Overlay & Coated Bars - C.I.P.	SF	073	
* Concrete Protected w/ Thin Overlay & Coated Bars - Precast	SF	074	
Concrete Protected w/ Rigid Overlay	SF	022	048
Concrete Protected w/ Coated Bars	SF	026	052
* Concrete Protected w/ Coated Bars & Rigid Overlay - C.I.P.	SF	076	
* Concrete Protected w/ Coated Bars & Rigid Overlay - Precast	SF	077	
Concrete Protected w/ Cathodic Protection	SF	027	053
Steel Deck - Open Grid	SF	028	
Steel Deck - Concrete Filled Grid	SF	029	
Steel Deck - Corrugated / Orthotropic / Etc.	SF	030	
Timber - Bare	SF	031	054
Timber - w/ AC Overlay	SF	032	055

Misc. Decks / Slabs	Units	Steel Unpainted	Steel Painted	P/S Concrete	Reinforced Concrete	Timber	Other
Approach Slab	Each			320	321		
Bridge Railing	LF	x 330	xx 334		331	332	333
** Curbs / Sidewalks	LF	501	502		503	504	

Notes:

- * - The asterisked items in the Deck and Slab Element Tables above are Sub-Elements of the CoRe Elements, which are listed above each asterisked item. In some cases, a CoRe Element may have more than one Sub-Element.
- ** - The double asterisked items in the Deck and Slab Element Tables above are Non-CoRe Elements.
- x - The element denoted with the **x**, no. 330, indicates that this item is for "Bridge Railing - Metal- Uncoated".
- xx - The element denoted with the **xx**, no. 334, indicates that this item is for "Bridge Railing - Metal- Coated".

SUPERSTRUCTURE ELEMENTS

Superstructure	Units	Steel Unpainted	Steel Painted	P/S Concrete	Reinforced Concrete	Timber	Other
Closed Web/Box Girder	LF	101	102	104	105		
Open Girder (Multi-Stringer)	LF	106	107	109	110	111	
* Open Girder (Multi-Stringer) – Conc. Encased Steel	LF		170				
Stringer (Floorbeam System)	LF	112	113	115	116	117	
*Stringer (Floorbeam System) – Conc. Encased Steel	LF		171				
Through Truss - Bottom Chord	LF	120	121				
*Through Truss – Bottom Chord – Conc. Encased Steel	LF		172				
Through Truss – Excluding Bottom Chord	LF	125	126				
Deck Truss	LF	130	131				
*Deck Truss – Concrete Encased Steel	LF		175				
Truss/Arch – Timber	LF					135	
Arch	LF	140	141	143	144		145
*Arch – Concrete Encased Steel	LF		173				
Steel Cable (not embedded in concrete)	Each	x146	xx147				
Floorbeam	LF	151	152	154	155	156	
*Floorbeam – Concrete Encased Steel	LF		174				
Pin and Hanger Assembly	Each	160	161				

Notes:

- * - The asterisked items in the Superstructure Element Table above are Sub-Elements of the CoRe Elements, which are listed above each asterisked item.
- x - The element denoted with the **x**, no. 146, indicates that this item is for "Steel Cable - Coated".
- xx - The element denoted with the **xx**, no. 147, indicates that this item is for "Steel Cable - Uncoated".

SUBSTRUCTURE ELEMENTS

Substructure	Units	Steel Unpainted	Steel Painted	P/S Concrete	Reinforced Concrete	Timber	Other
Column or Pile Extension	Each	201	202	204	205	206	
*Column or Pile Extension – Conc. Encased Steel	Each		270				
Pier Wall	LF				210		211
Abutment	LF				215	216	217
**Wingwall – Abutment – Concrete, Masonry, Timber	LF						506
Submerged Pile Cap/Footing	Each				220		
Submerged Pile	Each	225		226	227	228	
Pier Cap	LF	230	231	233	234	235	
*Pier Cap – Concrete Encased Steel	LF		271				
** Slope Protection	Each						505
** Headwall – Other – Concrete & Masonry	LF						507

Notes:

- * - The asterisked items in the Substructure Element Table above are Sub-Elements of the CoRe Elements, which are listed above each asterisked item.
- ** - The double asterisked items in the Substructure Element Table above are Non-CoRe Elements.

CULVERT ELEMENTS

Culverts	Units	Steel Unpainted	Concrete	Timber	Other
Culvert	LF	240	241	242	243
** Wingwall - Culvert -Concrete, Masonry, & Timber	LF				508
** Headwall - Culvert - Concrete & Masonry	LF				509

Notes:

** - The double asterisked items in the Culvert Element Table above are Non-CoRe Elements.

JOINT ELEMENTS

Joints	Units	Other
Strip Seal Expansion Joint	LF	300
* Elastomeric Flex-Type Joint	LF	305
* Modular Expansion Joint	LF	307
Pourable Joint Seal	LF	301
Compression Joint Seal	LF	302
Assembly Joint / Seal	LF	303
Open Expansion Joint	LF	304

Notes:

* - The asterisked items in the Joint Element Table above are Sub-Elements of the CoRe Elements, which are listed above each asterisked item. In some cases, a CoRe Element may have more than one Sub-Element.

BEARING ELEMENTS

Bearings	Units	
Elastomeric Bearing	Each	310
* Elastomeric Bearing w/ Teflon	Each	370
Expansion/Moveable Bearing - Roller, Etc.	Each	311
* Sliding Plate Bearing - Expansion/Moveable	Each	372
* Bond Breaker Bearing - Expansion/Moveable	Each	373
* Rocker Bearing - Expansion/Moveable	Each	374
Enclosed / Concealed Bearing	Each	312
Fixed Bearing	Each	313
* Pinned Bearing - Fixed	Each	375
Pot Bearing	Each	314
Disc Bearing	Each	315
* Spherical Bearing	Each	376
** Isolation Bearing	Each	520
** Bearing - Other	Each	521

Notes:

- * - The asterisked items in the Bearing Element Table above are Sub-Elements of the CoRe Elements, which are listed above each asterisked item. In some cases, a CoRe Element may have more than one Sub-Element.
- ** - The double asterisked items in the Bearing Element Table above are Non-CoRe Elements.

SMART FLAGS

Bearings	Units	
Steel Fatigue (Steel Members)	Each	356
Pack Rust (Steel Members)	Each	357
Deck Cracking (Deck)	Each	358
Soffit (or undersurface) of deck or slab (Deck)	Each	359
Settlement (Substructure)	Each	360
Scour (Substructure)	Each	361
Traffic Impact Damage (Superstructure)	Each	362
Section Loss (Steel Members)	Each	363
**Deterioration of Pin & Hanger Assembly (Superstructure)	Each	

Notes:

- ** - The double asterisked items in the Smart Flags Table above are Non-CoRe Elements.

SUPPLEMENTARY NOTES

CoRe Elements

CoRe elements are those that are common to all bridges nationwide. A sub-element relates directly to a specific CoRe element. Non-CoRe elements are items that do not relate to a CoRe element. All the NJDOT non-CoRe elements are denoted with element numbers equal to or greater than 500. If no sub-element accurately represents your element, then code the applicable CoRe element. The FHWA will automatically convert the sub-elements to their respective CoRe elements, while the more specific sub-elements will be used internally.

NBI Translator

The NBI translator is an FHWA computer program for converting the Pontis data elements to the NBI condition ratings for Items 58, 59, 60, and 62. The NBI translator is not currently in place. However, it is expected that it will be implemented in the future. The non-CoRe elements will not be used by NBI translator.

Smart Flags

Smart flags are defined, at this time, as "each". They are considered a "Yes/No" ("all or nothing") condition rather than a quantitative item. Smart flags do not have actual quantities defined since it was determined that it is inappropriate to use quantities for some types of smart flags (e.g., fatigue and scour).

Both sub-elements and smart flags can affect the NBI ratings. Sub-elements are rolled into the parent CoRe element in the translation process. A Smart flag can affect the NBI condition rating by lowering the rating in appropriate cases. It is also possible to have sub-elements and smart flags that have no effect on the NBI conversion.

The "Traffic Impact Damage" smart flag, element no. 362, should only be used on superstructure hits. If there are traffic hits on the substructure or railings, record the condition of the element by taking into account the damage caused by the impact (for example rebars exposed).

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 floorbeams on a structure and the bridge is 40 feet wide, you can estimate the total quantity as $10 \times 40' = 400'$.

Note that estimates of quantities can be made by formula files in Pontis. However, these 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 (+/- 1%) is sufficient.

Recording and Inputting Pontis element data

Record and enter the estimated total unit quantity for each element in each of Condition States 2 through 3, 4, or 5 (the total number of Condition States depends upon the element). The number of units in Condition State 1 will be the remainder of the units after deducting those reported in Condition States 2 through 3, 4, or 5.

Conventions for Quantities

- Quantity for **Culverts** is the length of the barrel (measured headwall to headwall) times the number of barrels.
- 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.
- Quantity for **Box Girders** is the number of cells times the bridge length.
- Quantity for **Railing** is the length of each railing measured from backwall to backwall.
- 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.
- 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).
- Quantity for **Truss** is measured in linear feet along the truss (a horizontal projection of the measurement). Do not add web member lengths.
- 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.
- Quantity for **Beams and Girders** is measured from beam or girder end to beam or girder end, not bearing to bearing.

Deck

When coding the deck, the total square footage of the deck must be recorded in the one Condition State that best represents the overall condition of the deck. Code the total square footage in only one Condition State. The deck width is measured out-to-out (fascia to fascia).

Condition States for decks are based on the percentage of unsound area, which includes delaminations, spalls, and patched areas.

CoRe Element Nos. 038 to 055, are structural slabs that are not supported by superstructure framing. Conversely, CoRe Element Nos. 012 to 032 are decks that are supported by superstructure framing.

There are additional Smart Flags that are used to help determine deck condition. These are "Deck Cracking" and "Soffit (or undersurface) of Decks and Slabs", element nos. 358 and 359 respectively. To use these flags, record the condition which most accurately reflects the condition of the bridge deck as a general rule. If stay-in-place forms are used, the use of Smart Flags is not appropriate.

Bearings

Elastomeric bearings can be identified for all bearings with elastomeric pads that are used as expansion bearings. Code fixed bearings that have a small elastomeric pad as fixed.

Moveable Bearings - use the correct sub-element relating to the CoRe element otherwise use this element for all unidentified movable bearing devices.

Fixed Bearings - use this element or it's sub-elements if the bearing device allows only rocking action but no longitudinal movement.

Joints

Joints are measured in lineal feet, from fascia to fascia. If a different type of joint is used in the sidewalk and the deck, code the lineal feet of each type of joint used. When partial repairs and/or uneven damage to joints are encountered, the total quantity of the joint should be divided into the appropriate Condition States.

Also, if a joint was originally constructed using a compression seal, for example, but the seal is now gone, do not call this an open joint. It should still be called a compression seal joint, but it will have a very low condition rating.

Pourable Joint Seal - use this element if the joint has been sealed with a hot poured or a silicon joint sealer.

Assembly Joint Seal - use this element for all sliding plate roadway devices and modular joints.

Open Expansion Joint - use this element on all open joints which have not been designed to be waterproof.

Bridge Railings

If a railing has been retrofit, there are two possible scenarios: (1) a new, stand-alone railing system has been placed in front of the original railing system and operates independently; or (2) the original railing system has been strengthened with an additional system that is considered part of the original system. For the first example (a new system), the railing element should reflect the new, primary, railing system. If a strengthened rail system is used, the railing system would then be considered a hybrid system and be recorded using element no. 333, "Bridge Railing - Miscellaneous". Note that the controlling deteriorated condition of the entire railing system would probably be due to the original system rather than the new, strengthened system.

Curbs and Walkways

The condition of the curbs and walkways will be handled with Non-CoRe element nos. 501 to 504.

Concrete Encased Steel

If a concrete encased member is encountered, refer to Sub-elements 170, 171, 172, 173, 174, 270, and 271.

For concrete encased members which have been repaired with concrete, use great care in evaluating the member because the repair may have been cosmetic only, and any section loss to the underlying steel may still be present.

When evaluating concrete encased members, it is important to remember which defects are indicative of corrosion of the underlying structural steel member, and which are not. For example:

Not a Problem:

Shear cracks, vertical cracks, scaling, spalls, and cracks at the bearings due to binding, and exposed rebars (except as they relate to the concrete encasement protection). These defects are not indicative of corrosion of the structural steel.

Problem:

Spalls, rust staining, horizontal or longitudinal cracks, and hollow sounding areas (also called dummy areas). These defects are indicative of rusting or corrosion of the underlying steel member.

Trusses

Bottom chords of trusses are considered as separate elements since they will typically deteriorate more rapidly than other parts of the truss. Tension in the chord is not the reason for treating as a separate element.

If there is deterioration of a vertical member you would code the LF quantity of deterioration equal to the distance between panel points at the affected location.

Pin and Hanger Retrofit

Pin and hanger retrofit (catcher beams, hanger rods, etc.) will be included in the overall evaluation of the pin and hanger assembly. Condition State language to address Pin and Hanger Retrofit will be added in the future.

Substructure Units

Submerged Elements

A submerged pile is one requiring an underwater inspection. However, do not divide an element which is partially submerged into two elements.

Abutment/Bulkhead Elements

An abutment/bulkhead unit is usually constructed of timber components and can be more accurately modeled in a BMS by breaking the substructure unit down into elements for the pile cap, columns, and abutment (bulkhead). However, if the bulkhead was steel sheet piling or prestressed concrete pile, the cap and piles should be modeled as the one above, and the bulkhead could be coded under element no. 217, "Abutment - Other".

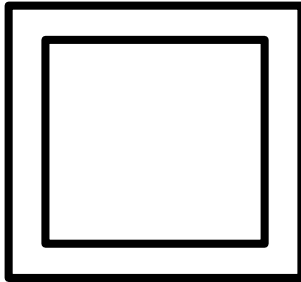
Environment Codes

Code

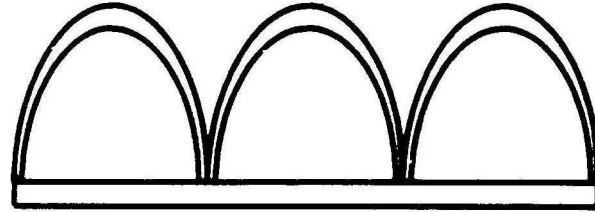
- 1 A benign environment - Neither likely environmental factors nor operating practices are likely to change the condition of the element over time. **Not used in New Jersey.**
- 2 A low environment - Environmental factors or operating practices do not adversely affect condition of the element. **Not used in New Jersey.**
- 3 A moderate environment - Changes in element condition are normal as measured against environmental factors and/or operating factors. **Used for typical environment in New Jersey.**
- 4 A severe environment - Environmental factors or operating practices contribute to the rapid decline in the condition of the element. **Used for severe environmental conditions in New Jersey such as saltwater (marine), brackish water (part saltwater) or industrial.**

Element Determination

• **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 $75' \times 2 = 150'$.

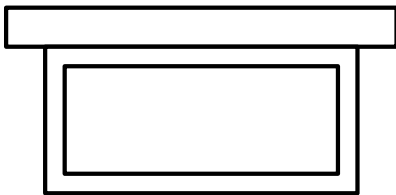


Qty = 1 x Barrel Length

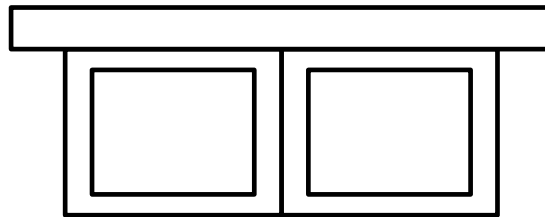


Qty = 3 x Barrel Length

• **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:

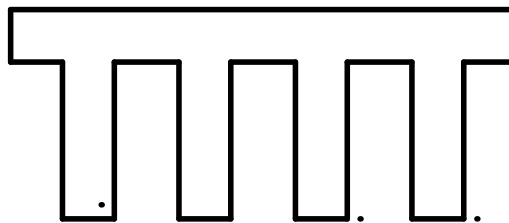


Qty = 1 x Length



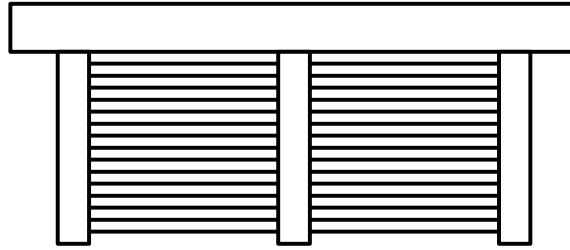
Qty = 2 x Length

• **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.



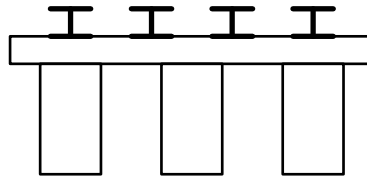
Qty = 4 x Length

- **Timber Abutments:** These type 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.



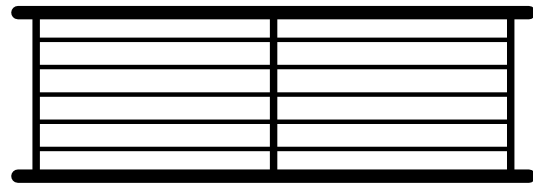
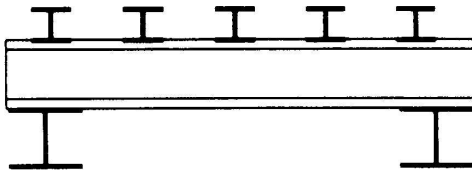
Qty: timber piles = 3, timber cap = 1 x width, timber abutment = 1 x width

- **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.



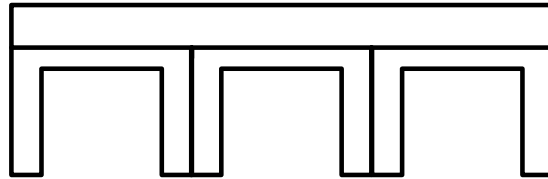
Qty: columns = 3, cap = 1 x width

- **Stringers/Floorbeams/Girders:** Stringers are the small elements which run longitudinally to the deck and carry the load from the deck to the floorbeams. 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. See diagram below:



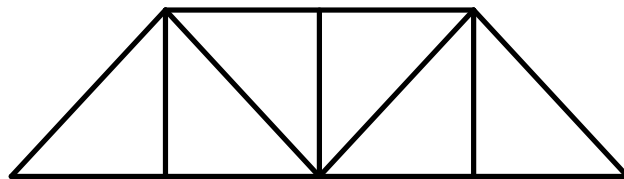
Qty: girders = 2 x length, floorbeam = 3 x width, stringers = 5 x length

- **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.



Qty = 3 x length

- **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.



Qty = 2 x length (one for each side of the bridge)

PONTIS FORMS

Blank Pontis Input Form

New Jersey Department of Transportation SUPPLEMENTAL BRIDGE INSPECTION FORM: ITEMS 58-62

Bridge No.	Bridge Name.	Inspection Date
		<input style="width: 20px; height: 20px;" type="text"/> <input style="width: 20px; height: 20px;" type="text"/> <input style="width: 20px; height: 20px;" type="text"/> <input style="width: 20px; height: 20px;" type="text"/> <input style="width: 20px; height: 20px;" type="text"/>

ELE #	ELEMENT DESCRIPTION	E N V	TOTAL QUANTITY	UNITS	QUANT CONDITION STATE 1	QUANT CONDITION STATE 2	QUANT CONDITION STATE 3	QUANT CONDITION STATE 4	QUANT CONDITION STATE 5
	PAGE #: _____ Accumulation								
	PAGE #: _____ Accumulation								
	PAGE #: _____ Accumulation								
	PAGE #: _____ Accumulation								
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	PAGE #: _____ Accumulation								

CoRe Element Remarks

Produced By: _____

Inspected By: _____

Report Name: _____

Completed Pontis Form

New Jersey Department of Transportation

Date Printed: 03/27/03

SUPPLEMENTAL BRIDGE INSPECTION FORM: ITEMS 58-62

Bridge No. 0324-163	Bridge Name. MAIN ST (RT 543) OVER US RT 206	Inspection Date 12/30/02	Cycle No. 13
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ELE #	ELEMENT DESCRIPTION	ENV	TOTAL QUANTITY	UNITS	QUANT CONDITION STATE 1	QUANT CONDITION STATE 2	QUANT CONDITION STATE 3	QUANT CONDITION STATE 4	QUANT CONDITION STATE 5
012	CONCRETE DECK	3	007192	SF	000000	007192	000000	000000	000000
107	OPEN GIRDER STEEL	3	000977	LF	000977	000000	000000	000000	000000
205	COLUMN OR PILE EXTENSION	3	000005	EA	000004	000000	000001	000000	000000
215	ABUTMENT REINFORCED	3	000156	LF	000126	000000	000030	000000	000000
234	PIER CAP REINFORCED	3	000060	LF	000057	000003	000000	000000	000000
301	POURABLE JOINT SEAL	3	000186	LF	000000	000186	000000	000000	000000
331	BRIDGE RAILING	3	000232	LF	000228	000004	000000	000000	000000
359	SOFFIT (UNDERSUR) OF	3	000001	EA	000000	000001	000000	000000	000000
374	STEEL ROCKERS MOVEABLE	3	000018	EA	000000	000018	000000	000000	000000
375	PINNED BEARING - FIXED	3	000018	EA	000018	000000	000000	000000	000000
503	CURBS/SIDEWALKS	3	000232	LF	000232	000000	000000	000000	000000
506	WINGWALLS ABUTMENT	3	000116	LF	000116	000000	000000	000000	000000

TRAFFIC AND ACCIDENTS	ON STRUCTURE	UNDER STRUCTURE
Avg Bypass Detour Speed	MPH	MPH
Avg Travel Speed	25 MPH	55 MPH
Avg Annual Accident Count		
School Bus Route		
Public Transit Route		
Critical Travel Facility		

CoRe Element Remarks

Produced By:

Inspected By: _____

Report Name : Pontis4

DECK ELEMENTS

012 Concrete Deck - Unprotected and Bare

Units: Total Square Footage (SF)

This element defines those concrete bridge decks that are not protected with a membrane of any type and are constructed with uncoated reinforcement bars. These decks are not covered with an overlay of any type and may be constructed of either cast-in-place or precast concrete.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Add a protective system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Add a protective system

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations, and/or add a protective system on the entire deck
 - 3) Replace deck

012 Concrete Deck - Unprotected and Bare

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

013 Concrete Deck - Unprotected w/AC Overlay

Units: Total Square Footage (SF)

This element defines those concrete bridge decks that are not protected with a membrane of any type and are constructed with uncoated reinforcement bars. These decks are covered with an asphaltic concrete overlay and may be constructed of either cast-in-place or precast concrete. These decks may or may not be protected with a cathodic system.

Condition State 1 The surfacing on the deck has no repaired areas and there are no potholes in this surfacing.

Feasible actions: 1) Do Nothing

Condition State 2 Repaired areas and/or potholes or impending potholes exist. Their combined area is less than or equal to 10% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes

Condition State 3 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 4 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 5 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and replace overlay
 3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

014 Concrete Deck - Protected w/Membrane and AC Overlay

Units: Total Square Footage (SF)

This element defines those concrete bridge decks that are protected with a membrane and constructed with uncoated reinforcement bars. The membrane is covered with an asphaltic concrete overlay. These decks may be constructed of either cast-in-place or precast concrete.

Condition State 1 The surfacing on the deck has no repaired areas and there are no potholes in this surfacing.

Feasible actions: 1) Do Nothing

Condition State 2 Repaired areas and/or potholes or impending potholes exist. Their combined area is less than or equal to 10% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes

Condition State 3 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 4 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 5 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and replace overlay
 3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.
- Refer to Sub-Element No. 070 for cast-in-place construction with coated reinforcement bars.
- Refer to Sub-element No. 071 for precast construction with coated reinforcement bars.

**070 Concrete Deck - Protected w/Membrane, AC Overlay, and Coated Bars - Cast-In-Place
(Sub-element of CoRe 014)**

Units: Total Square Footage (SF)

This element defines those concrete bridge decks that are protected with a membrane and constructed with coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars. The membrane is covered with an asphaltic concrete overlay. These decks are constructed of cast-in-place concrete.

Condition State 1 The surfacing on the deck has no repaired areas and there are no potholes in this surfacing.

Feasible actions: 1) Do Nothing

Condition State 2 Repaired areas and/or potholes or impending potholes exist. Their combined area is less than or equal to 10% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes

Condition State 3 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 4 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 5 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and replace overlay
 3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

**071 Concrete Deck - Protected w/Membrane, AC Overlay, and Coated Bars - Precast
(Sub-Element of CoRe 014)**

Units: Total Square Footage (SF)

This element defines those precast prestressed concrete panel type bridge decks or those precast reinforced concrete panel type bridge decks. In both cases a cast-in-place slab may or may not be placed upon them, and these decks are covered with an asphaltic concrete overlay. These decks are constructed with coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars and a protective membrane.

Condition State 1 The surfacing on the deck has no repaired areas and there are no potholes in this surfacing.

Feasible actions: 1) Do Nothing

Condition State 2 Repaired areas and/or potholes or impending potholes exist. Their combined area is less than or equal to 10% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes

Condition State 3 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 4 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 5 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and replace overlay
 3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

018 Concrete Deck - Protected w/Thin Overlay

Units: Total Square Footage (SF)

This element defines those concrete bridge decks that are protected with a thin (less than or equal to one inch) overlay (low slump portland cement, epoxy, polymer, LMC, etc.) and constructed with uncoated reinforcement bars. These decks may be constructed of either cast-in-place or precast concrete and are not protected with a membrane of any type.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface. No wear-out is visible.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations
3) Replace overlay

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Replace overlay
3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.
- Refer to Sub-Element No. 073 for cast-in-place construction with coated reinforcement bars.
- Refer to Sub-Element No. 074 for precast construction with coated reinforcement bars.

**073 Concrete Deck - Protected w/Thin Overlay and Coated Bars - Cast-In-Place
(Sub-element of CoRe 018)**

Units: Total Square Footage (SF)

This element defines those concrete bridge decks that are protected with a thin (less than or equal to one inch) overlay (low slump portland cement, epoxy, polymer, LMC, etc.) and constructed with coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars. These decks are constructed of cast-in-place concrete and are not protected with a membrane of any type.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface. No wear-out is visible.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations
3) Replace overlay

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Replace overlay
3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

**074 Concrete Deck - Protected w/Thin Overlay and Coated Bars - Precast
(Sub-element of CoRe 018)**

Units: Total Square Footage (SF)

This element defines those precast prestressed concrete panel type bridge decks or those precast reinforced concrete panel type bridge decks. These decks are protected with a thin (less than or equal to one inch) overlay (low slump portland cement, epoxy, polymer, LMC, etc.) and constructed with coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars. These decks are not protected with a membrane of any type.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface. No wear-out is visible.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations
3) Replace overlay

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Replace overlay
3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

022 Concrete Deck - Protected w/Rigid Overlay

Units: Total Square Footage (SF)

This element defines those concrete bridge decks that are protected with a rigid (greater than one inch) overlay (low slump portland cement, epoxy, polymer, LMC, etc.) and constructed with uncoated reinforcement bars. These decks may be constructed of either cast-in-place or precast concrete and are not protected with a membrane of any type.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface. No wear-out is visible.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations
3) Replace overlay

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Replace overlay
3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

026 Concrete Deck - Protected w/Coated Bars

Units: Total Square Footage (SF)

This element defines those concrete bridge decks that are not covered with an overlay of any type and are constructed with coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars. These decks may be constructed of either cast-in-place or precast concrete and are not protected with a membrane of any type.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Add a protective system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Add a protective system

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations, and/or add a protective system on the entire deck
 - 3) Replace deck

026 Concrete Deck - Protected w/Coated Bars

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.
- Refer to Sub-Element No. 076 for cast-in-place construction with coated bars.
- Refer to Sub-Element No. 077 for precast construction with coated bars.

**076 Concrete Deck - Protected w/Coated Bars and Rigid Overlay - Cast-In-Place
(Sub-element of CoRe 026)**

Units: Total Square Footage (SF)

This element defines those concrete bridge decks that are protected with a rigid (greater than one inch) overlay (low slump portland cement, epoxy, polymer, LMC, etc.) and constructed with coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars. These decks are constructed of cast-in-place concrete and are not protected with a membrane of any type.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface. No wear-out is visible.

- Feasible actions:
- 1) Do Nothing
 - 2) Add a protective system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Add a protective system

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations, and/or add a protective system on the entire deck
 - 3) Replace deck

**076 Concrete Deck - Protected w/Coated Bars and Rigid Overlay - Cast-In-Place
(Sub-element of CoRe 026)**

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

**077 Concrete Deck - Protected w/Coated Bars and Rigid Overlay - Precast
(Sub-element of CoRe 026)**

Units: Total Square Footage (SF)

This element defines those precast prestressed concrete panel type bridge decks or those precast reinforced concrete panel type bridge decks. These decks are protected with a rigid (greater than one inch) overlay (low slump portland cement, epoxy, polymer, LMC, etc.) and constructed with coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars. These decks are not protected with a membrane of any type.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface. No wear-out is visible.

- Feasible actions:
- 1) Do Nothing
 - 2) Add a protective system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Add a protective system

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations, and/or add a protective system on the entire deck
 - 3) Replace deck

**077 Concrete Deck - Protected w/Coated Bars and Rigid Overlay - Precast
(Sub-element of CoRe 026)**

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

027 Concrete Deck - Protected w/Cathodic Protection

Units: Total Square Footage (SF)

This element defines those concrete bridge decks protected with a cathodic system. These decks usually are not covered with an asphalt overlay, however they may have a thin or rigid overlay. These decks are not protected with a membrane of any type.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Add a protective system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Add a protective system

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations, and/or add a protective system on the entire deck
 - 3) Replace deck

027 Concrete Deck - Protected w/Cathodic Protection

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

028 Steel Deck - Open Grid

Units: Total Square Footage (SF)

This element defines those bridge decks that are constructed of steel grids that are open and unfilled.

Condition State 1 There is no corrosion. The paint system, if any, is sound and functioning as intended. The connectors (welds, rivets, etc.) are sound.

Feasible actions: 1) Do Nothing

Condition State 2 There is little or no corrosion. The paint system, if any, may be showing early signs of distress. The connectors are still sound.

Feasible actions: 1) Do Nothing
2) Surface clean

Condition State 3 Surface or freckled rust has formed. The paint system, if any, is no longer fully effective. There is no loss of section. The connectors may be starting to show signs of distress (cracked welds, broken rivets, etc.).

Feasible actions: 1) Do Nothing
2) Surface clean and restore top coat
3) Rehab connectors

Condition State 4 Corrosion is moderate. The paint system, if any, is no longer fully effective. Surface pitting may be present but any section loss is incidental. Numerous connectors are failing at scattered locations. The strength or serviceability of the section is not yet affected.

Feasible actions: 1) Do Nothing
2) Spot blast, clean and paint
3) Rehab connectors

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

Feasible actions: 1) Do Nothing
2) Rehab connectors and replace paint system
3) Replace unit

029 Steel Deck - Concrete Filled Grid

Units: Total Square footage (SF)

This element defines those bridge decks that are constructed of steel grids with either all of the openings or just those openings in the wheel tracks filled with concrete.

Condition State 1 There is no corrosion. The paint system, if any, is sound and functioning as intended. The connectors (welds, rivets, etc.) are sound. The concrete filler is sound.

Feasible actions: 1) Do Nothing

Condition State 2 There is little or no corrosion. The paint system, if any, may be showing early signs of distress. The connectors are still sound. The concrete filler is sound.

Feasible actions: 1) Do Nothing
2) Surface clean

Condition State 3 Surface or freckled rust has formed. The paint system, if any, is no longer fully effective. There is no loss of section. The connectors may be starting to show signs of distress (cracked welds, broken rivets, etc.). The concrete filler may have broken out at scattered locations.

Feasible actions: 1) Do Nothing
2) Surface clean and restore top coat
3) Rehab connectors and concrete filler

Condition State 4 Corrosion is moderate. The paint system, if any, is no longer fully effective. Surface pitting may be present but any section loss is incidental. Numerous connectors are failing at scattered locations. The strength or serviceability of the section is not yet affected. Small areas of concrete are missing.

Feasible actions: 1) Do Nothing
2) Spot blast, clean and paint
3) Rehab connectors and concrete filler

Condition State 5 Corrosion is advanced. Numerous connectors have failed. Section loss and/or connectivity is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge. Much of the concrete filler is missing.

Feasible actions: 1) Do Nothing
2) Rehab connectors and concrete filler, and replace paint system
3) Replace unit

030 Steel Deck - Corrugated/Orthotropic/Etc.

Units: Total Square Footage (SF)

This element defines those bridge decks that are constructed of corrugated metal filled with portland cement concrete or asphaltic concrete. This element also includes orthotropic steel decks. These decks may be covered with an asphaltic or other type of concrete.

Condition State 1 There is no evidence of corrosion. The paint system, if any, is sound and functioning as intended to protect the metal surface. The surfacing, if any, on the deck has no repaired areas and there are no potholes.

Feasible actions: 1) Do Nothing

Condition State 2 There is little or no corrosion. The paint system, if any, may be showing early signs of distress. Minor cracking or potholes may exist in the surfacing.

Feasible actions: 1) Do Nothing
2) Seal cracks and/or repair potholes

Condition State 3 Surface or freckle rust has formed. The paint system, if any, is no longer fully effective. There is no loss of section. Potholes exist in the surfacing and there may be significant cracking.

Feasible actions: 1) Do Nothing
2) Surface clean and restore top coat of paint
3) Repair potholes and cracks

Condition State 4 Corrosion is moderate. The paint system, if any, is no longer fully effective. Surface pitting may be present but any section loss is incidental. The strength or serviceability of the section is not yet affected. Potholes may be large and expose the metal decking.

Feasible actions: 1) Do Nothing
2) Spot blast, clean and paint, and repair potholes
3) Replace paint system and/or replace surfacing

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

Feasible actions: 1) Do Nothing
2) Rehab element, replace paint system, and replace surfacing
3) Replace unit

Notes:

- This element is not for decks designed with stay-in-place forms. It is intended for steel corrugated decks with an asphalt or concrete riding surface.

031 Timber Deck - Bare

Units: Total Square Footage (SF)

This element defines those bridge decks that are constructed of timber and are not overlaid. These decks may be longitudinally or transversely laminated, or constructed of planks. These decks may or may not be constructed with runners of metal or wood.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect deck

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

Feasible actions: 1) Do Nothing
2) Rehab deck
3) Replace deck

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

Feasible actions: 1) Do Nothing
2) Replace deck

032 Timber Deck - w/AC Overlay

Units: Total Square Footage (SF)

This element defines those bridge decks that are constructed of timber and are overlaid with asphaltic concrete. These decks may be longitudinally or transversely laminated, or constructed of planks.

Condition State 1 Investigation indicates no decay. There may be cracks, splits, or checks having no effect on strength or serviceability. There are no potholes in the surfacing.

Feasible actions: 1) Do Nothing

Condition State 2 Decay, insect infestation, splitting, cracking, or crushing may exist, but none is sufficiently advanced to affect strength or serviceability of the element. There may be minor potholes or impending potholes in the surfacing.

Feasible actions: 1) Do Nothing
2) Repair potholes
3) Rehab and/or protect deck

Condition State 3 Decay, insect infestation, splitting, cracking, or crushing has produced loss of strength or deflection of the element, but not of sufficient magnitude to affect the serviceability of the bridge. There may be major potholes or impending potholes in the surfacing.

Feasible actions: 1) Do Nothing
2) Rehab deck and repair or replace surfacing
3) Replace deck and surfacing

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

Feasible actions: 1) Do Nothing
2) Replace deck and surfacing

038 Concrete Slab - Unprotected and Bare

Units: Total Square Footage (SF)

This element defines those concrete slab bridges that are not protected with a membrane of any type and are constructed with uncoated reinforcement bars. These decks are not covered with an overlay of any type and may be constructed of either cast-in-place or precast concrete.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Add a protective system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Add a protective system

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations, and/or add a protective system on the entire deck
 - 3) Replace deck

038 Concrete Slab - Unprotected and Bare

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

039 Concrete Slab - Unprotected w/AC Overlay

Units: Total Square Footage (SF)

This element defines those concrete slab bridges that are not protected with a membrane of any type and are constructed with uncoated reinforcement bars. These decks are covered with an asphaltic concrete overlay and may be constructed of either cast-in-place or precast concrete. These decks may or may not be protected with a cathodic system.

Condition State 1 The surfacing on the deck has no repaired areas and there are no potholes in this surfacing.

Feasible actions: 1) Do Nothing

Condition State 2 Repaired areas and/or potholes or impending potholes exist. Their combined area is less than or equal to 10% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes

Condition State 3 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 4 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 5 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and replace overlay
 3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

040 Concrete Slab - Protected w/ Membrane and AC Overlay

Units: Total Square Footage (SF)

This element defines those concrete slab bridges that are protected with a membrane. These decks may be constructed with either uncoated or coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars. The membrane is covered with an asphaltic concrete overlay. Also, these decks may be constructed of either cast-in-place or precast concrete.

Condition State 1 The surfacing on the deck has no repaired areas and there are no potholes in this surfacing.

Feasible actions: 1) Do Nothing

Condition State 2 Repaired areas and/or potholes or impending potholes exist. Their combined area is less than or equal to 10% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes

Condition State 3 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Replace overlay

Condition State 4 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and potholes
 3) Repair substrate and replace overlay

Condition State 5 Repaired areas and/or potholes or impending potholes exist. Their combined area is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
 2) Repair substrate and replace overlay
 3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

044 Concrete Slab - Protected w/Thin Overlay

Units: Total Square Footage (SF)

This element defines those concrete slab bridges that are protected with a thin (less than or equal to one inch) overlay (low slump portland cement, epoxy, polymer, LMC, etc.). These decks are not covered with a membrane of any type and may be constructed of either uncoated or coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars. Also, these decks may be constructed of either cast-in-place or precast concrete.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface. No wear-out is visible.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations
3) Replace overlay

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Replace overlay
3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

048 Concrete Slab - Protected w/Rigid Overlay

Units: Total Square Footage (SF)

This element defines those concrete slab bridges that are protected with a rigid (greater than one inch) overlay (low slump portland cement, epoxy, polymer, LMC, etc.) and constructed with uncoated reinforcement bars. These decks may be constructed of either cast-in-place or precast concrete and are not protected with a membrane of any type.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface. No wear-out is visible.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Repair spalls and delaminations
3) Replace overlay

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

Feasible actions: 1) Do Nothing
2) Replace overlay
3) Replace deck

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

052 Concrete Slab - Protected w/Coated Bars

Units: Total Square Footage (SF)

This element defines those concrete slab bridges that are not covered with an overlay of any type and are constructed with coated (epoxy, galvanized, stainless steel, etc.) reinforcement bars. These decks may be constructed of either cast-in-place or precast concrete and are not protected with a membrane of any type.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Add a protective system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Add a protective system

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 5 Repaired areas and/or spalls/delaminations exist. The combined area of distress is greater than 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations, and/or add a protective system on the entire deck
 - 3) Replace deck

052 Concrete Slab - Protected w/Coated Bars

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

053 Concrete Slab - Protected w/Cathodic Protection

Units: Total Square Footage (SF)

This element defines those concrete slab bridges protected with a cathodic system. These decks usually are not covered with an asphalt overlay, however they may have a thin or rigid overlay. These decks are not protected with a membrane of any type.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Add a protective system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Add a protective system

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 10% but less than or equal to 25% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 25% but less than or equal to 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations
 - 3) Repair spalls and delaminations, and add a protective system on the entire deck

Condition State 5 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is greater than 50% of the total deck area.

- Feasible actions:
- 1) Do Nothing
 - 2) Repair spalls and delaminations, and/or add a protective system on the entire deck
 - 3) Replace deck

053 Concrete Slab - Protected w/Cathodic Protection

Notes:

- Only Rate the TOP or WEARING SURFACE, any full depth deterioration is taken care of with the "Soffit or Underside of Deck" Smart Flag, Element No. 359. Also, the deck rating only includes spalls/delaminations. Both top and bottom of deck cracking are tracked as smart flags.

054 Timber Slab - Bare

Units: Total Square Footage (SF)

This element defines those slab span bridges that are constructed of timber and are not overlaid. These decks may be longitudinally or transversely laminated, or constructed of planks. These decks may or may not be constructed with runners of metal or wood.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect deck

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

Feasible actions: 1) Do Nothing
2) Rehab deck
3) Replace deck

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

Feasible actions: 1) Do Nothing
2) Replace deck

055 Timber Slab - w/AC Overlay

Units: Total Square Footage (SF)

This element defines those slab span bridges that are constructed of timber and are overlaid with asphaltic concrete. These decks may be longitudinally or transversely laminated, or constructed of planks.

Condition State 1 Investigation indicates no decay. There may be cracks, splits, or checks having no effect on strength or serviceability. There are no potholes in the surfacing.

Feasible actions: 1) Do Nothing

Condition State 2 Decay, insect infestation, splitting, cracking, or crushing may exist, but none is sufficiently advanced to affect strength or serviceability of the element. There may be minor potholes or impending potholes in the surfacing.

Feasible actions: 1) Do Nothing
2) Repair potholes
3) Rehab and/or protect deck

Condition State 3 Decay, insect infestation, splitting, cracking, or crushing has produced loss of strength or deflection of the element, but not of sufficient magnitude to affect the serviceability of the bridge. There may be major potholes or impending potholes in the surfacing.

Feasible actions: 1) Do Nothing
2) Rehab deck and repair or replace surfacing
3) Replace deck and surfacing

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

Feasible actions: 1) Do Nothing
2) Replace deck and surfacing

320 Approach Slab - Prestressed Concrete

Units: Each (EA)

This element defines those structural sections, with or without asphalt overlay, between the bridge abutment and the approach pavement that are constructed of prestressed concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Perform mudjacking operations

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

Feasible actions: 1) Do Nothing
2) Place overlay
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Replace unit

Notes:

- These structural sections may be separated into multiple slabs by longitudinal joints. There may be one approach slab per traffic lane or there may only be one approach slab for the entire bridge approach.

321 Approach Slab - Reinforced Concrete

Units: Each (EA)

This element defines those structural sections, with or without asphalt overlay, between the bridge abutment and the approach pavement that are constructed of reinforced concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Perform mudjacking operations

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

Feasible actions: 1) Do Nothing
2) Place overlay
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Replace unit

Notes:

- These structural sections may be separated into multiple slabs by longitudinal joints. There may be one approach slab per traffic lane or there may only be one approach slab for the entire bridge approach.

330 Bridge Railing - Metal - Uncoated

Units: Lineal Feet of Rail (LF)

This element defines all types and shapes of uncoated metal bridge railing. Steel, aluminum, metal beam, rolled shapes, etc. are all included in this element. The railing is neither coated nor painted.

Condition State 1 There is no evidence of active corrosion of the uncoated metal.

Feasible actions: 1) Do Nothing

Condition State 2 Surface or freckled rust has formed or is forming on the uncoated metal.

Feasible actions: 1) Do Nothing
 2) Clean and coat

Condition State 3 Corrosion may be present but any section loss due to active corrosion does not affect the strength or serviceability of the element.

Feasible actions: 1) Do Nothing
 2) Clean and coat
 3) Replace unit

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

Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

Notes:

- If the serviceability of the rail is affected by damaged posts or unsupported rail, code as Condition State 4. Record the lineal feet of rail affected by the defective or missing post(s).
- Combination rails are coded as "Bridge Railing - Miscellaneous", Element No. 333.
- This element does not include any type of fencing.

331 Bridge Railing - Reinforced Concrete

Units: Lineal Feet of Rail (LF)

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

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- If the serviceability of the rail is affected by damaged posts or unsupported rail, code as Condition State 4. Record the lineal feet of rail affected by the defective or missing post(s).
- Combination rails are coded as "Bridge Railing - Miscellaneous", Element No. 333.
- This element does not include any type of fencing.
- Use this element for NJ barrier curbs. For split NJ barrier curbs, use two (2) times the length of regular barrier curbs.

332 Bridge Railing - Timber

Units: Lineal Feet of Rail (LF)

This element defines all types and shapes of timber bridge railing. All elements of the railing (except connectors) must be timber.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
 2) Rehab and/or apply surface treatment

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

Feasible actions: 1) Do Nothing
 2) Replace unit

Notes:

- If the serviceability of the rail is affected by damaged posts or unsupported rail, code as Condition State 3. Record the lineal feet of rail affected by the defective or missing post(s).
- Combination rails are coded as "Bridge Railing - Miscellaneous", Element No. 333.
- This element does not include any type of fencing.

333 Bridge Railing - Miscellaneous

Units: Lineal Feet of Rail (LF)

This element defines all types and shapes of bridge railing except those defined as metal, concrete, or timber (element numbers 330, 331, 332, and 334). This element may include combinations of materials (such as cable rails; combinations of timber, concrete, and metal; etc.). Metal portions may be either coated or uncoated.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
 2) Rehab unit

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

Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

Notes:

- If the serviceability of the rail is affected by damaged posts or unsupported rail, code as Condition State 3. Record the lineal feet of rail affected by the defective or missing post(s).
- This element does not include any type of fencing.
- Use this element for concrete balustrade bridge railing where supplemental galvanized steel w-beam guide rail has been attached. If galvanized steel w-beam guide railing is attached to steel posts bolted to the deck, use Element #334, Bridge Railing-Metal-Coated. Use the same criteria for reinforced concrete parapets or steel through girders with supplemental galvanized steel w-beam guide rails.

334 Bridge Railing - Metal - Coated

Units: Lineal Feet of Rail (LF)

This element defines all types and shapes of coated metal bridge railing. Steel, aluminum, metal beam, rolled shapes, etc. are all included in this element. The railing is either coated with paint, protected with galvanizing, or protected with some other type of coating.

Condition State 1 There is no evidence of active corrosion. The protective coating is sound and functioning as intended to protect the element.

Feasible actions: 1) Do Nothing

Condition State 2 There is little or no active corrosion. Surface or freckled rust has formed or is forming. The protective coating may have minor areas of deterioration.

Feasible actions: 1) Do Nothing
2) Clean and restore coating

Condition State 3 Surface or freckled rust is prevalent. The protective coating is no longer effective. There may be exposed metal but there is no active corrosion causing loss of section.

Feasible actions: 1) Do Nothing
2) Clean and restore coating

Condition State 4 Corrosion may be present but any section loss due to active corrosion is measurable and does not affect the strength or serviceability of the element.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- If the serviceability of the rail is affected by damaged posts or unsupported rail, code as Condition State 5. Record the lineal feet of rail affected by the defective or missing post(s).
- Combination rails are coded as "Bridge Railing - Miscellaneous", Element No. 333.
- This element does not include any type of fencing.

501 Curbs/Sidewalks - Steel - Unpainted (Non-CoRe Element)

Units: Lineal Feet (LF)

This element defines only those steel curbs and/or sidewalks on the bridge deck that are either not painted or are constructed of weathering steel.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture. There is slight deterioration in the sidewalk, but it poses no hazard to pedestrians.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter). There is sufficient deterioration in the sidewalk which does pose a hazard to pedestrians.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of the element. There is advanced deterioration of the sidewalk and it should be closed to pedestrians.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- Do not use this Element for reinforced concrete curbs/sidewalks with steel nose angles attached. Use Element #503-Curbs/Sidewalks-Concrete.

502 Curbs/Sidewalks - Steel - Painted
(Non-CoRe Element)

Units: Lineal Feet (LF)

This element defines only those steel curbs and/or sidewalks on the bridge deck that are painted.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section. There is slight deterioration in the sidewalk, but it poses no hazard to pedestrians.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of the element. There is sufficient deterioration in the sidewalk which does pose a hazard to pedestrians.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

Condition State 5 Corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of the element. There is advanced deterioration of the sidewalk and it should be closed to pedestrians.

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

502 Curbs/Sidewalks - Steel - Painted **(Non-CoRe Element)**

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Curbs/sidewalks are inspected per lineal foot of curb/sidewalk. Poor condition paint on one portion of the curb/sidewalk means the entire lineal foot of curb/sidewalk in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.
- Do not use this Element for reinforced concrete curbs/sidewalks with steel nose angles attached. Use Element #503 - Curbs/Sidewalks-Concrete.

503 Curbs/Sidewalks - Concrete (Non-CoRe Element)

Units: Lineal Feet (LF)

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

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

Feasible actions: 1) Do Nothing

Condition State 2 Minor cracks, delaminations, scale, and/or spalls may be present, but there is no exposed reinforcing or surface evidence of rebar corrosion. There is slight deterioration in the sidewalk, but it poses no hazard to pedestrians.

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

Condition State 3 Some delaminations, scale, and/or spalls may be present and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of the element. There is sufficient deterioration in the sidewalk which does pose a hazard to pedestrians.

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

Condition State 4 Advanced deterioration. Heavy scale, spalls, corrosion of reinforcement, and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element. There is advanced deterioration of the sidewalk and it should be closed to pedestrians.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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 analysis...". Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

504 Curbs/Sidewalks - Timber

Units: Lineal Feet (LF)

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

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

Feasible actions: 1) Do Nothing

Condition State 2 Decay, insect infestation, abrasion, splitting, cracking, checking, crushing, or splintering from collision may exist but none is sufficiently advanced to affect strength or serviceability of the element. There is slight deterioration in the sidewalk, but it poses no hazard to pedestrians.

Feasible actions: 1) Do Nothing
2) Rehab and/or protect unit

Condition State 3 Decay, insect infestation, abrasion, splitting, cracking, crushing, or splintering and/or broken/missing portions from collision has produced loss of strength or deflection of the element, but not of a sufficient magnitude to affect the serviceability of the element. There is sufficient deterioration in the sidewalk which does pose a hazard to pedestrians.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Condition State 4 Advanced deterioration, decay, insect infestation, abrasion, splitting, cracking, crushing, splintering, or broken/missing portions has produced loss of strength or deflection that affects the serviceability of the element. There is advanced deterioration of the sidewalk and it should be closed to pedestrians.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

CONCRETE DECK SELECTION TABLE

Slab	038	039	040	-	-	-	-	-	044	048	052	-	-	053
Deck	012	013	014	<i>070</i>	<i>071</i>	018	<i>073</i>	<i>074</i>	-	022	026	<i>076</i>	<i>077</i>	027
No Overlay	X										X			X
w/ Overlay		X	X	X	X									
w/ Thin Overlay						X	X	X	X					P
w/ Rigid Overlay										X		X	X	P
No Coated Bars	X	X	X			X				X				
w/ Coated Bars				X	X		X	X			X	X	X	
No Membrane	X	X				X	X	X	X	X	X	X	X	X
w/ Membrane			X	X	X									
w/ Cathodic Protection		P												X
C.I.P. Construction				X			X					X		X
Precast Construction					X			X					X	

Notes:

- X in the above table indicates that this criteria does apply to that element selection
- P in the above table indicates that this criteria may or may not apply to that element selection.
- Shading in the above table indicates that one of the two shaded options will apply to that element selection.
- Element numbers that are italicized in the above table indicate Sub-Elements.

SUPERSTRUCTURE ELEMENTS

101 Closed Web/Box Girder - Steel - Unpainted

Units: Lineal Feet of Girder (LF)

This element defines only those steel closed web/box girder units that are either not painted or are constructed of weathering steel.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
 2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
 2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

102 Closed Web/Box Girder - Steel - Painted

Units: Lineal Feet of Girder (LF)

This element defines only those steel closed web/box girder units that are painted.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.

102 Closed Web/Box Girder - Steel - Painted

Notes (Cont.):

- Girders are inspected per lineal foot of girder. This includes the top flange, web, and bottom flange. Poor condition paint on one portion of the girder (such as the bottom flange) means the entire lineal foot of girder in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

104 Closed Web/Box Girder - Prestressed Concrete

Units: Lineal Feet of Girder (LF)

This element defines only those closed web/box girder units that are constructed of prestressed concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure of the prestress system but there is not any deterioration of this system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Clean steel, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

105 Closed Web/Box Girder - Reinforced Concrete

Units: Lineal Feet of Girder (LF)

This element defines only those closed web/box girder units that are constructed of reinforced concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

106 Open Girder - Steel - Unpainted

Units: Lineal Feet of Girder (LF)

This element defines only those steel open girder units that are either not painted or are constructed of weathering steel. This element includes two girder systems as well as rolled beams on multiple beam spans.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
 2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
 2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

107 Open Girder - Steel - Painted

Units: Lineal Feet of Girder (LF)

This element defines only those steel open girder units that are painted. This element includes two girder systems as well as rolled beams on multiple beam spans.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

107 Open Girder - Steel - Painted

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. 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. Poor condition paint on one portion of the girder (such as the bottom flange) means the entire lineal foot of girder in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

170 Open Girder - Concrete Encased Steel (Sub-element of CoRe 107)

Units: Lineal Feet of Girder (LF)

This element defines only those steel open girder units that are encased in concrete. This element includes two girder systems as well as concrete encased beams on multiple beam spans.

Condition State 1 The encasement is sound with no significant defects and is functioning as intended to protect the structural steel surface. If portions of the structural steel member are exposed, there is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean any exposed steel

Condition State 2 The concrete encasement exhibits minor cracking, efflorescence, scaling, and/or spalling which is indicative of surface or freckled rust forming on the underlying structural steel. If portions of the structural steel are exposed, there is little or no active corrosion. Surface or freckled rust has formed or is forming. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement; and/or surface clean any exposed steel
 - 3) Remove loose/unsound encasement, clean and paint; and/or clean and paint any exposed steel

Condition State 3 The concrete encasement exhibits moderate cracking, efflorescence, scaling, and/or spalling which is indicative of prevalent surface or freckled rust on the underlying structural steel. Minor rust staining may be evident. If portions of the structural steel are exposed, surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel

Condition State 4 The concrete encasement has failed due to active corrosion of the underlying structural steel but any section loss does not yet warrant structural analysis. If portions of the structural steel are exposed, corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Remove encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel
 - 3) Replace paint system on any exposed steel

170 Open Girder - Concrete Encased Steel (Sub-element of CoRe 107)

Condition State 5 The concrete encasement has failed due to corrosion of the underlying structural steel with section loss that is sufficient to warrant structural analysis. If portions of the steel are exposed, corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Notes:

- If any exposed steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Poor condition on one portion of a girder (such as the bottom flange) means that the entire linear foot of beam in that area can be rated to the condition of the worst portion.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a steel member has 10% or more section loss, consider that portion to be Condition State 5.
- If all of the concrete encasement has been removed from a member, that member should be changed to the related CoRe element and it should be evaluated as such. The total quantity of this sub-element will also have to be revised.
- 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.
- For further clarification on the evaluation of deteriorated areas of concrete encasement as it relates to the underlying structural steel, see the Supplementary Notes.

109 Open Girder - Prestressed Concrete

Units: Lineal Feet of Girder (LF)

This element defines only those open girder units that are constructed of prestressed concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure of the prestress system but there is not any deterioration of this system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Clean steel, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

110 Open Girder - Reinforced Concrete

Units: Lineal Feet of Girder (LF)

This element defines only those open girder units that are constructed of reinforced concrete. This element includes deck girders, T-girders, through girders, etc.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

111 Open Girder - Timber

Units: Lineal Feet of Girder (LF)

This element defines only those open girders of timber construction. This element includes solid timbers, glue-lam timbers, nail-lam timbers, etc.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

112 Stringer - Steel - Unpainted

Units: Lineal Feet of Stringer (LF)

This element defines all those steel stringers which support the deck in a stringer-floorbeam (or truss) system. These stringers are either not painted or are constructed of weathering steel.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

113 Stringer - Steel - Painted

Units: Lineal Feet of Stringer (LF)

This element defines all those painted steel stringers which support the deck in a stringer-floorbeam (or truss) system.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

113 Stringer - Steel - Painted

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Stringers are inspected per lineal foot of stringer. This includes the top flange, web, and bottom flange. Poor condition paint on one portion of the stringer (such as the bottom flange) means the entire lineal foot of stringer in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

171 Stringer - Concrete Encased Steel (Sub-element of CoRe 113)

Units: Lineal Feet of Stringer (LF)

This element defines all those concrete encased steel stringers which support the deck in a stringer-floorbeam (or truss) system.

Condition State 1 The encasement is sound with no significant defects and is functioning as intended to protect the structural steel surface. If portions of the structural steel member are exposed, there is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean any exposed steel

Condition State 2 The concrete encasement exhibits minor cracking, efflorescence, scaling, and/or spalling which is indicative of surface or freckled rust forming on the underlying structural steel. If portions of the structural steel are exposed, there is little or no active corrosion. Surface or freckled rust has formed or is forming. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement; and/or surface clean any exposed steel
 - 3) Remove loose/unsound encasement, clean and paint; and/or clean and paint any exposed steel

Condition State 3 The concrete encasement exhibits moderate cracking, efflorescence, scaling, and/or spalling which is indicative of prevalent surface or freckled rust on the underlying structural steel. Minor rust staining may be evident. If portions of the structural steel are exposed, surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel

Condition State 4 The concrete encasement has failed due to active corrosion of the underlying structural steel but any section loss does not yet warrant structural analysis. If portions of the structural steel are exposed, corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Remove encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel
 - 3) Replace paint system on any exposed steel

171 Stringer - Concrete Encased Steel **(Sub-element of CoRe 113)**

Condition State 5 The concrete encasement has failed due to corrosion of the underlying structural steel with section loss that is sufficient to warrant structural analysis. If portions of the steel are exposed, corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Notes:

- If any exposed steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Poor condition on one portion of a girder (such as the bottom flange) means that the entire linear foot of beam in that area can be rated to the condition of the worst portion.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a steel member has 10% or more section loss, consider that portion to be Condition State 5.
- If all of the concrete encasement has been removed from a member, that member should be changed to the related CoRe element and it should be evaluated as such. The total quantity of this sub-element will also have to be revised.
- 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.
- For further clarification on the evaluation of deteriorated areas of concrete encasement as it relates to the underlying structural steel, see the Supplementary Notes.

115 Stringer - Prestressed Concrete

Units: Lineal Feet of Stringer (LF)

This element defines only those prestressed concrete stringers which support the deck in a stringer-floorbeam (or truss) system.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure of the prestress system but there is not any deterioration of this system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Clean steel, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

116 Stringer - Reinforced Concrete

Units: Lineal Feet of Stringer (LF)

This element defines only those reinforced concrete stringers which support the deck in a stringer-floorbeam (or truss) system.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

117 Stringer - Timber

Units: Lineal Feet of Stringer (LF)

This element defines only those timber stringers which support the deck in a stringer-floorbeam (or truss) system.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

120 Through Truss - Bottom Chord - Steel - Unpainted

Units: Lineal Feet of Truss (LF)

This element defines the bottom chord of all those steel trusses that are either not painted or are constructed of weathering steel. This element includes through trusses and pony trusses.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

121 Through Truss - Bottom Chord - Steel - Painted

Units: Lineal Feet of Truss (LF)

This element defines the bottom chord of all those steel trusses that are painted. This element includes through trusses and pony trusses.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

121 Through Truss - Bottom Chords - Steel - Painted

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Trusses are inspected per lineal foot of truss. Poor condition paint on one portion of the truss means the entire lineal foot of truss in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

172 Through Truss - Bottom Chord - Concrete Encased Steel (Sub-element of CoRe 121)

Units: Lineal Feet of Truss (LF)

This element defines the bottom chord of all those steel trusses in which the bottom chord is encased in concrete.

Condition State 1 The encasement is sound with no significant defects and is functioning as intended to protect the structural steel surface. If portions of the structural steel member are exposed, there is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean any exposed steel

Condition State 2 The concrete encasement exhibits minor cracking, efflorescence, scaling, and/or spalling which is indicative of surface or freckled rust forming on the underlying structural steel. If portions of the structural steel are exposed, there is little or no active corrosion. Surface or freckled rust has formed or is forming. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement; and/or surface clean any exposed steel
 - 3) Remove loose/unsound encasement, clean and paint; and/or clean and paint any exposed steel

Condition State 3 The concrete encasement exhibits moderate cracking, efflorescence, scaling, and/or spalling which is indicative of prevalent surface or freckled rust on the underlying structural steel. Minor rust staining may be evident. If portions of the structural steel are exposed, surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel

Condition State 4 The concrete encasement has failed due to active corrosion of the underlying structural steel but any section loss does not yet warrant structural analysis. If portions of the structural steel are exposed, corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Remove encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel
 - 3) Replace paint system on any exposed steel

172 Through Truss - Bottom Chord - Concrete Encased Steel (Sub-element of CoRe 121)

Condition State 5 The concrete encasement has failed due to corrosion of the underlying structural steel with section loss that is sufficient to warrant structural analysis. If portions of the steel are exposed, corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Notes:

- If any exposed steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Poor condition on one portion of a girder (such as the bottom flange) means that the entire linear foot of beam in that area can be rated to the condition of the worst portion.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a steel member has 10% or more section loss, consider that portion to be Condition State 5.
- If all of the concrete encasement has been removed from a member, that member should be changed to the related CoRe element and it should be evaluated as such. The total quantity of this sub-element will also have to be revised.
- 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.
- For further clarification on the evaluation of deteriorated areas of concrete encasement as it relates to the underlying structural steel, see the Supplementary Notes.

125 Through Truss - Excluding Bottom Chord - Steel - Unpainted

Units: Lineal Feet of Truss (LF)

This element defines all truss elements, except the bottom chord, of all those steel trusses that are either not painted or are constructed of weathering steel.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

126 Through Truss - Excluding Bottom Chord - Steel - Painted

Units: Lineal Feet of Truss (LF)

This element defines all truss elements, except the bottom chord, of all those steel trusses that are painted.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

126 Through Truss - Excluding Bottom Chord - Steel - Painted

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Trusses are inspected per lineal foot of truss. Poor condition paint on one portion of the truss means the entire lineal foot of truss in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

130 Deck Truss - Steel - Unpainted

Units: Lineal Feet of Truss (LF)

This element defines all members of those steel deck trusses that are either not painted or are constructed of weathering steel.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

131 Deck Truss - Steel - Painted

Units: Lineal Feet of Truss (LF)

This element defines all members of painted steel deck trusses.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Sand blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

131 Deck Truss - Steel - Painted

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Trusses are inspected per lineal foot of truss. Poor condition paint on one portion of the truss means the entire lineal foot of truss in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

175 Deck Truss - Concrete Encased Steel (Sub-element of CoRe 131)

Units: Lineal Feet of Truss (LF)

This element defines the bottom chord of all those steel trusses in which the bottom chord is encased in concrete.

Condition State 1 The encasement is sound with no significant defects and is functioning as intended to protect the structural steel surface. If portions of the structural steel member are exposed, there is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean any exposed steel

Condition State 2 The concrete encasement exhibits minor cracking, efflorescence, scaling, and/or spalling which is indicative of surface or freckled rust forming on the underlying structural steel. If portions of the structural steel are exposed, there is little or no active corrosion. Surface or freckled rust has formed or is forming. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement; and/or surface clean any exposed steel
 - 3) Remove loose/unsound encasement, clean and paint; and/or clean and paint any exposed steel

Condition State 3 The concrete encasement exhibits moderate cracking, efflorescence, scaling, and/or spalling which is indicative of prevalent surface or freckled rust on the underlying structural steel. Minor rust staining may be evident. If portions of the structural steel are exposed, surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel

Condition State 4 The concrete encasement has failed due to active corrosion of the underlying structural steel but any section loss does not yet warrant structural analysis. If portions of the structural steel are exposed, corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Remove encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel
 - 3) Replace paint system on any exposed steel

175 Deck Truss - Concrete Encased Steel (Sub-element of CoRe 131)

Condition State 5 The concrete encasement has failed due to corrosion of the underlying structural steel with section loss that is sufficient to warrant structural analysis. If portions of the steel are exposed, corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Notes:

- If any exposed steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Poor condition on one portion of a girder (such as the bottom flange) means that the entire linear foot of beam in that area can be rated to the condition of the worst portion.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a steel member has 10% or more section loss, consider that portion to be Condition State 5.
- If all of the concrete encasement has been removed from a member, that member should be changed to the related CoRe element and it should be evaluated as such. The total quantity of this sub-element will also have to be revised.
- 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.
- For further clarification on the evaluation of deteriorated areas of concrete encasement as it relates to the underlying structural steel, see the Supplementary Notes.

135 Truss/Arch - Timber

Units: Lineal Feet of Truss/Arch (LF)

This element defines all members of trusses and arches that are constructed of timber. This includes any truss/arch combination that is constructed of timber.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

140 Arch - Steel - Unpainted

Units: Lineal Feet of Arch (LF)

This element defines all members of those steel arches (open/closed spandrel, earth filled, bowstring, etc.) that are either not painted or are constructed of weathering steel.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

141 Arch - Steel - Painted

Units: Lineal Feet of Arch (LF)

This element defines all members of those steel arches (open/closed spandrel, earth filled, bowstring, etc.) that are painted.

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

- Feasible actions: 1) Do Nothing
 2) Surface clean

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

- Feasible actions: 1) Do Nothing
 2) Surface clean
 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions: 1) Do Nothing
 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions: 1) Do Nothing
 2) Spot blast, clean and paint
 3) Replace paint system

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

- Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

141 Arch - Steel - Painted

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Poor condition paint on one portion of the arch means the entire lineal foot of arch in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

173 Arch - Concrete Encased Steel **(Sub-element of CoRe 141)**

Units: Lineal Feet of Arch (LF)

This element defines all members of those steel arches (open/closed spandrel, earth filled, bowstring, etc.) that are encased in concrete.

Condition State 1 The encasement is sound with no significant defects and is functioning as intended to protect the structural steel surface. If portions of the structural steel member are exposed, there is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean any exposed steel

Condition State 2 The concrete encasement exhibits minor cracking, efflorescence, scaling, and/or spalling which is indicative of surface or freckled rust forming on the underlying structural steel. If portions of the structural steel are exposed, there is little or no active corrosion. Surface or freckled rust has formed or is forming. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement; and/or surface clean any exposed steel
 - 3) Remove loose/unsound encasement, clean and paint; and/or clean and paint any exposed steel

Condition State 3 The concrete encasement exhibits moderate cracking, efflorescence, scaling, and/or spalling which is indicative of prevalent surface or freckled rust on the underlying structural steel. Minor rust staining may be evident. If portions of the structural steel are exposed, surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel

Condition State 4 The concrete encasement has failed due to active corrosion of the underlying structural steel but any section loss does not yet warrant structural analysis. If portions of the structural steel are exposed, corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Remove encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel
 - 3) Replace paint system on any exposed steel

173 Arch - Concrete Encased Steel

(Sub-element of CoRe 141)

Condition State 5 The concrete encasement has failed due to corrosion of the underlying structural steel with section loss that is sufficient to warrant structural analysis. If portions of the steel are exposed, corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Notes:

- If any exposed steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Poor condition on one portion of a girder (such as the bottom flange) means that the entire linear foot of beam in that area can be rated to the condition of the worst portion.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a steel member has 10% or more section loss, consider that portion to be Condition State 5.
- If all of the concrete encasement has been removed from a member, that member should be changed to the related CoRe element and it should be evaluated as such. The total quantity of this sub-element will also have to be revised.
- 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.
- For further clarification on the evaluation of deteriorated areas of concrete encasement as it relates to the underlying structural steel, see the Supplementary Notes.

143 Arch - Prestressed Concrete

Units: Lineal Feet of Arch (LF)

This element defines all members of those arches (open/closed spandrel, earth filled, bowstring, etc.) that are constructed of prestressed concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure of the prestress system but there is not any deterioration of this system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Clean steel, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

144 Arch - Reinforced Concrete

Units: Lineal Feet of Arch (LF)

This element defines all members of those arches (open/closed spandrel, earth filled, bowstring, etc.) that are constructed of reinforced concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

145 Arch - Other

Units: Lineal Feet of Arch (LF)

This element defines all members of those arches (open/closed spandrel, earth filled, bowstring, etc.) that are constructed of masonry or any other material except steel, concrete, or timber.

Condition State 1 There is little or no deterioration. Only surface defects are in evidence.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
 2) Rehab unit

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

Feasible actions: 1) Do Nothing
 2) Rehab unit

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

Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

146 Steel Cable (not embedded in concrete) - Uncoated

Units: Each Cable (EA)

This element defines only those steel cables which are not embedded in concrete. They are not coated with any type of material.

Condition State 1 There is little or no corrosion of the uncoated steel. Strand and anchor sockets show no signs of distress.

Feasible actions: 1) Do Nothing

Condition State 2 Surface or freckled rust has formed or is forming. Strand and anchor sockets show no signs of distress.

Feasible actions: 1) Do Nothing
 2) Clean and coat

Condition State 3 Corrosion may be present but any section loss is incidental and does not affect the strength or serviceability of either the element or the bridge. Cable banding, if any, may show some loosening or slipping. Cable anchor devices may be loosening.

Feasible actions: 1) Do Nothing
 2) Clean and coat

Condition State 4 Corrosion is advanced. Cable strands or wires may be broken or severely abraded. Anchors may show signs of slippage. Section loss or other deterioration is sufficient to warrant analysis for strength and/or serviceability of both the element and the bridge.

Feasible actions: 1) Do Nothing
 2) Rehab unit and coat
 3) Replace unit

147 Steel Cable (not embedded in concrete) - Coated

Units: Each Cable (EA)

This element defines only those steel cables which are not embedded in concrete. They are coated with paint, galvanizing, etc.

Condition State 1 There is little or no evidence of active corrosion. The protective coating is sound and functioning as intended to protect the metal surface. Strand and anchor sockets show no signs of distress.

Feasible actions: 1) Do Nothing

Condition State 2 There is little or no evidence of active corrosion. Surface or freckled rust has formed or is forming. The protective coating may be peeling, chalking, curling, or showing other early evidence of distress but there is no exposure of metal. Strand and anchor sockets show no signs of distress.

Feasible actions: 1) Do Nothing
2) Clean and restore coating

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section. The protective system is no longer effective. Strand and anchor sockets show no signs of distress.

Feasible actions: 1) Do Nothing
2) Clean and restore coating

Condition State 4 Corrosion may be present but any section loss is incidental and does not affect the strength or serviceability of either the element or the bridge. Cable banding, if any, may show some loosening or slippage. Cable anchor devices may be loosening.

Feasible actions: 1) Do Nothing
2) Rehab unit and replace coating system
3) Replace unit

Condition State 5 Corrosion is advanced. Cable strands or wires may be broken or severely abraded. Anchors may show signs of slippage. Section loss or other deterioration is sufficient to warrant analysis for strength and/or serviceability of both the element and the bridge.

Feasible actions: 1) Do nothing
2) Rehab unit and replace coating system
3) Replace unit

151 Floorbeam - Steel - Unpainted

Units: Lineal Feet of Floorbeam (LF)

This element defines only those steel floorbeams that are either not painted or are constructed of weathering steel.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

152 Floorbeam - Steel - Painted

Units: Lineal Feet of Floorbeam (LF)

This element defines only those steel floorbeams that are painted.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

152 Floorbeam - Steel - Painted

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Floorbeams are inspected per lineal foot of floorbeam. This includes the top flange, web, and bottom flange. Poor condition paint on one portion of the floorbeam (such as the bottom flange) means the entire lineal foot of floorbeam in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

174 Floorbeam - Concrete Encased Steel (Sub-element of CoRe 152)

Units: Lineal Feet of Floorbeam (LF)

This element defines only those steel floorbeams that are encased in concrete.

Condition State 1 The encasement is sound with no significant defects and is functioning as intended to protect the structural steel surface. If portions of the structural steel member are exposed, there is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean any exposed steel

Condition State 2 The concrete encasement exhibits minor cracking, efflorescence, scaling, and/or spalling which is indicative of surface or freckled rust forming on the underlying structural steel. If portions of the structural steel are exposed, there is little or no active corrosion. Surface or freckled rust has formed or is forming. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement; and/or surface clean any exposed steel
 - 3) Remove loose/unsound encasement, clean and paint; and/or clean and paint any exposed steel

Condition State 3 The concrete encasement exhibits moderate cracking, efflorescence, scaling, and/or spalling which is indicative of prevalent surface or freckled rust on the underlying structural steel. Minor rust staining may be evident. If portions of the structural steel are exposed, surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel

Condition State 4 The concrete encasement has failed due to active corrosion of the underlying structural steel but any section loss does not yet warrant structural analysis. If portions of the structural steel are exposed, corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Remove encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel
 - 3) Replace paint system on any exposed steel

174 Floorbeam - Concrete Encased Steel (Sub-element of CoRe 152)

Condition State 5 The concrete encasement has failed due to corrosion of the underlying structural steel with section loss that is sufficient to warrant structural analysis. If portions of the steel are exposed, corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Notes:

- If any exposed steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Poor condition on one portion of a girder (such as the bottom flange) means that the entire linear foot of beam in that area can be rated to the condition of the worst portion.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a steel member has 10% or more section loss, consider that portion to be Condition State 5.
- If all of the concrete encasement has been removed from a member, that member should be changed to the related CoRe element and it should be evaluated as such. The total quantity of this sub-element will also have to be revised.
- 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.
- For further clarification on the evaluation of deteriorated areas of concrete encasement as it relates to the underlying structural steel, see the Supplementary Notes.

154 Floorbeam - Prestressed Concrete

Units: Lineal Feet of Floorbeam (LF)

This element defines only those floorbeams that are constructed of prestressed concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure of the prestress system but there is not any deterioration of this system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Clean steel, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

155 Floorbeam - Reinforced Concrete

Units: Lineal Feet of Floorbeam (LF)

This element defines only those floorbeams that are constructed of reinforced concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

156 Floorbeam - Timber

Units: Lineal Feet of Floorbeam (LF)

This element defines only those floorbeams that are constructed of timber.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

160 Pin and Hanger Assembly - Steel - Unpainted

Units: Each Pin and Hanger Set (EA)

This element defines only those steel pin and hanger assemblies that are either not painted or are constructed of weathering steel.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

161 Pin and Hanger Assembly - Steel - Painted

Units: Each Pin and Hanger Set (EA)

This element defines only those steel pin and hanger assemblies that are painted.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Intentionally Blank

SUBSTRUCTURE ELEMENTS

201 Column or Pile Extension - Steel - Unpainted

Units: Each (EA)

This element defines only those columns or pile extensions that are either not painted or are constructed of weathering steel. These elements are either partially submerged or are seasonally submerged.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

202 Column or Pile Extension - Steel - Painted

Units: Each (EA)

This element defines only those columns or pile extensions that are painted. These elements are either partially submerged or are seasonally submerged.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

202 Column or Pile Extension - Steel - Painted

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Columns or pile extensions are inspected per lineal foot of column or pile extension. Poor condition paint on one portion of the column or pile extension means the entire lineal foot of column or pile extension in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

270 Column or Pile Extension - Concrete Encased Steel **(Sub-element of CoRe 202)**

Units: Each (EA)

This element defines only those steel columns or pile extensions that are encased in concrete. These elements are either partially submerged or are seasonally submerged.

Condition State 1 The encasement is sound with no significant defects and is functioning as intended to protect the structural steel surface. If portions of the structural steel member are exposed, there is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean any exposed steel

Condition State 2 The concrete encasement exhibits minor cracking, efflorescence, scaling, and/or spalling which is indicative of surface or freckled rust forming on the underlying structural steel. If portions of the structural steel are exposed, there is little or no active corrosion. Surface or freckled rust has formed or is forming. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement; and/or surface clean any exposed steel
 - 3) Remove loose/unsound encasement, clean and paint; and/or clean and paint any exposed steel

Condition State 3 The concrete encasement exhibits moderate cracking, efflorescence, scaling, and/or spalling which is indicative of prevalent surface or freckled rust on the underlying structural steel. Minor rust staining may be evident. If portions of the structural steel are exposed, surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel

Condition State 4 The concrete encasement has failed due to active corrosion of the underlying structural steel but any section loss does not yet warrant structural analysis. If portions of the structural steel are exposed, corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Remove encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel
 - 3) Replace paint system on any exposed steel

270 Column or Pile Extension - Concrete Encased Steel **(Sub-element of CoRe 202)**

Condition State 5 The concrete encasement has failed due to corrosion of the underlying structural steel with section loss that is sufficient to warrant structural analysis. If portions of the steel are exposed, corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Notes:

- If any exposed steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Poor condition on one portion of a girder (such as the bottom flange) means that the entire linear foot of beam in that area can be rated to the condition of the worst portion.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a steel member has 10% or more section loss, consider that portion to be Condition State 5.
- If all of the concrete encasement has been removed from a member, that member should be changed to the related CoRe element and it should be evaluated as such. The total quantity of this sub-element will also have to be revised.
- 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.
- For further clarification on the evaluation of deteriorated areas of concrete encasement as it relates to the underlying structural steel, see the Supplementary Notes.

204 Column or Pile Extension - Prestressed Concrete

Units: Each (EA)

This element defines only those columns or pile extensions that are constructed of prestressed concrete. These elements are either partially submerged or are seasonally submerged.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure of the prestress system but there is not any deterioration of this system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Clean steel, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

205 Column or Pile Extension - Reinforced Concrete

Units: Each (EA)

This element defines only those columns or pile extensions that are constructed of reinforced concrete. These elements are either partially submerged or are seasonally submerged.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

206 Column or Pile Extension - Timber

Units: Each (EA)

This element defines only those columns or pile extensions that are constructed of timber. These elements are either partially submerged or are seasonally submerged.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

210 Pier Wall - Reinforced

Units: Lineal Feet (LF)

This element defines only those pier walls (shafts) that are constructed of reinforced concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

211 Pier Wall - Other

Units: Lineal Feet (LF)

This element defines those pier walls (shafts) that are constructed of material other than reinforced concrete. This includes masonry pier walls.

Condition State 1 There is little or no deterioration. Only surface defects are in evidence.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
 2) Rehab unit

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

Feasible actions: 1) Do Nothing
 2) Rehab unit

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

Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

215 Abutment - Reinforced Concrete

Units: Lineal Feet (LF)

This element defines only those abutments that are constructed of reinforced concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

216 Abutment - Timber

Units: Lineal Feet (LF)

This element defines only those abutments that are constructed of timber.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

217 Abutment - Other

Units: Liner Feet (LF)

This element defines those abutments that are constructed of masonry or any material other than reinforced concrete or timber. This includes masonry abutments.

Condition State 1 There is little or no deterioration. Only surface defects are in evidence.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
 2) Rehab unit

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

Feasible actions: 1) Do Nothing
 2) Rehab unit

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

Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

Notes:

- In all cases, masonry wingwalls are not to be considered “integral”.

220 Submerged Pile Cap/Footing - Reinforced Concrete

Units: Each (EA)

This element defines only those reinforced concrete pile caps and/or footings that are continuously submerged and are visible for inspection. The exposure may be intentional or caused by scour. This element is not to be confused with elements in a seasonably submerged situation or a splash zone.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

225 Submerged Pile - Steel - Unpainted

Units: Each (EA)

This element defines only those steel piles that are continuously submerged and are visible for inspection. These piles are either not painted or are constructed of weathering steel. The exposure may be intentional or caused by scour. This element is not to be confused with piles in a seasonably submerged situation or a splash zone.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
 2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
 2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

226 Submerged Pile - Prestressed Concrete

Units: Each (EA)

This element defines only those prestressed concrete piles that are continuously submerged and are visible for inspection. The exposure may be intentional or caused by scour. This element is not to be confused with piles in a seasonably submerged situation or a splash zone.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure of the prestress system but there is not any deterioration of this system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the Bridge.

Feasible actions: 1) Do Nothing
2) Clean steel, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

227 Submerged Pile - Reinforced Concrete

Units: Each (EA)

This element defines only those reinforced concrete piles that are continuously submerged and are visible for inspection. The exposure may be intentional or caused by scour. This element is not to be confused with piles in a seasonably submerged situation or a splash zone.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

228 Submerged Pile - Timber

Units: Each (EA)

This element defines only those timber piles that are continuously submerged and are visible for inspection. The exposure may be intentional or caused by scour. This element is not to be confused with piles in a seasonably submerged situation or a splash zone.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

230 Pier Cap - Steel - Unpainted

Units: Lineal Feet (LF)

This element defines only those steel pier caps that are either not painted or are constructed of weathering steel.

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coated uniformly and remains in excellent condition. Oxide film is tightly adhered.

Feasible actions: 1) Do Nothing

Condition State 2 Surface rust and/or surface pitting has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown. Oxide film has a dusty to granular texture.

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black. Oxide film is flaking (one half inch in diameter).

Feasible actions: 1) Do Nothing
2) Clean and paint

Condition State 4 Corrosion is advanced. Oxide film has a laminar texture with thin sheets of rust. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

231 Pier Cap - Steel - Painted

Units: Lineal Feet (LF)

This element defines only those steel pier caps that are painted.

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean

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

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean
 - 3) Clean and paint

Condition State 3 Surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint

Condition State 4 Corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Spot blast, clean and paint
 - 3) Replace paint system

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

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

231 Pier Cap - Steel - Painted

Notes:

- If steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Pier caps are inspected per lineal foot of pier cap. Poor condition paint on one portion of the pier cap means the entire lineal foot of pier cap in that area is rated based on the worst condition.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a painted steel member has 10% or more section loss, consider that portion to be in Condition State 5.

271 Pier Cap - Concrete Encased Steel
(Sub-element of CoRe 231)

Units: Lineal Feet (LF)

This element defines only those steel pier caps that are encased in concrete.

Condition State 1 The encasement is sound with no significant defects and is functioning as intended to protect the structural steel surface. If portions of the structural steel member are exposed, there is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

- Feasible actions:
- 1) Do Nothing
 - 2) Surface clean any exposed steel

Condition State 2 The concrete encasement exhibits minor cracking, efflorescence, scaling, and/or spalling which is indicative of surface or freckled rust forming on the underlying structural steel. If portions of the structural steel are exposed, there is little or no active corrosion. Surface or freckled rust has formed or is forming. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement; and/or surface clean any exposed steel
 - 3) Remove loose/unsound encasement, clean and paint; and/or clean and paint any exposed steel

Condition State 3 The concrete encasement exhibits moderate cracking, efflorescence, scaling, and/or spalling which is indicative of prevalent surface or freckled rust on the underlying structural steel. Minor rust staining may be evident. If portions of the structural steel are exposed, surface or freckled rust is prevalent. There may be exposed metal but there is no active corrosion which is causing loss of section.

- Feasible action:
- 1) Do Nothing
 - 2) Remove loose/unsound encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel

Condition State 4 The concrete encasement has failed due to active corrosion of the underlying structural steel but any section loss does not yet warrant structural analysis. If portions of the structural steel are exposed, corrosion may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Remove encasement, spot blast, clean and paint; and/or spot blast, clean and paint any exposed steel
 - 3) Replace paint system on any exposed steel

271 Pier Cap - Concrete Encased Steel **(Sub-element of CoRe 231)**

Condition State 5 The concrete encasement has failed due to corrosion of the underlying structural steel with section loss that is sufficient to warrant structural analysis. If portions of the steel are exposed, corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

- Feasible actions:
- 1) Do Nothing
 - 2) Rehab unit
 - 3) Replace unit

Notes:

- If any exposed steel was pitted but was thoroughly cleaned and repainted, and the paint is holding up well, the condition code can be increased to a better code. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem.
- Poor condition on one portion of a girder (such as the bottom flange) means that the entire linear foot of beam in that area can be rated to the condition of the worst portion.
- Condition State 5 refers to "warrants structural analysis...". For this condition code, if a steel member has 10% or more section loss, consider that portion to be Condition State 5.
- If all of the concrete encasement has been removed from a member, that member should be changed to the related CoRe element and it should be evaluated as such. The total quantity of this sub-element will also have to be revised.
- 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.
- For further clarification on the evaluation of deteriorated areas of concrete encasement as it relates to the underlying structural steel, see the Supplementary Notes.

233 Pier Cap - Prestressed Concrete

Units: Lineal Feet (LF)

This element defines only those pier caps that are constructed of prestressed concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure of the prestress system but there is not any deterioration of this system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Clean steel, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

234 Pier Cap - Reinforced Concrete

Units: Lineal Feet (LF)

This element defines only those pier caps that are constructed of reinforced concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls

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

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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.

235 Pier Cap - Timber

Units: Lineal Feet (LF)

This element defines only those pier caps that are constructed of timber.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab and/or protect unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

505 Slope Protection **(Non-CoRe Element)**

Units: Each (EA)

This element defines the slope (embankment or fill) protection under the bridge. It includes slope paving, rip rap, gabions, rock filled baskets, sub-abutments, etc.

Condition State 1 The element may have little or no settlement and/or it may have separated away from the backwall by a distance of less than or equal to one inch. There may be an insignificant amount of erosion beneath the edges. Any cracks or displacements are insignificant.

Feasible actions: 1) Do Nothing

Condition State 2 There may be moderate settlement and/or separation away from the backwall by a distance greater than one inch. The concrete may have moderate structural cracks. There may be moderate voids beneath sections. The majority of the slope protection is still in place and functional.

Feasible actions: 1) Do Nothing
2) Repair unit

Condition State 3 There may be major settlement and the slabs may be buckled or broken. There may be major erosion beneath the slope paving. Slope protection is missing, causing the slope to be substantially unprotected.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace slope protection

506 Wingwalls - Abutment - Concrete, Masonry, and Timber (Non-CoRe Element)

Units: Lineal Feet (LF)

This element defines those walls that are non-integral with the abutments. The walls are usually flared to support the roadway embankment.

Condition State 1 The element shows little or no deterioration or decay. There may be surface defects, discoloration, efflorescence, superficial cracking, splitting, and/or checking but without affect on strength and/or serviceability.

Feasible actions: 1) Do Nothing

Condition State 2 There may be minor deterioration, cracking, spalling, weathering, decay, insect infestation, marine borer infestation, abrasion, splitting, checking, and/or crushing, but none is sufficiently advanced to affect strength and/or serviceability of the element. There is no exposed reinforcing or surface evidence of rebar corrosion. Mortar in joints may show minor deterioration.

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls; or rehab and/or protect unit

Condition State 3 There may be moderate deterioration, cracking, and/or spalling. There may be some delaminations and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge. Timber elements may show deterioration, decay, insect infestation, marine borer infestation, abrasion, splitting, cracking, or crushing which has produced loss of strength or deflection of the element, but not of sufficient magnitude to affect strength and/or serviceability. Mortar in joints may show major deterioration.

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal; or rehab unit
3) Replace unit

Condition State 4 There may be advanced deterioration, spalling, cracking, corrosion of reinforcement, and/or loss of concrete section which is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge. Timber elements show advanced deterioration, decay, insect infestation, marine borer infestation, abrasion, splitting, cracking, or crushing which has produced loss of strength or deflection of the element that affects serviceability of the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

**506 Wingwalls - Abutment - Concrete, Masonry, and Timber
(Non-CoRe Element)**

Notes:

- 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 analysis...". Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.
- Gabion walls are not to be included in this element.

507 Headwalls - Other - Concrete and Masonry (Non-CoRe Element)

Units: Lineal Feet (LF)

This element describes those concrete or masonry units at the ends of most structures, other than culverts, that have fill material over them (arches, frames, concrete slabs, etc.). The purpose of the headwall is to maintain the fill material. The headwalls are primarily vertical.

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

Feasible actions: 1) Do Nothing

Condition State 2 There may be minor deterioration, cracking, spalling, and/or weathering, but there is no exposed reinforcing or surface evidence of rebar corrosion. Mortar in joints may show minor deterioration.

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls; or rehab unit

Condition State 3 There may be moderate deterioration, cracking, and/or spalling. There may be some delaminations and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge. Mortar in joints may show major deterioration.

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal; or rehab unit

Condition State 4 There may be advanced deterioration, spalling, cracking, corrosion of reinforcement, and/or loss of concrete section which is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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 analysis...". Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

CULVERT ELEMENTS

240 Culvert - Steel - Unpainted

Units: Lineal Feet along Length of Barrel (LF)

This element defines all metal (steel, aluminum, galvanized, etc.) culverts, including arches, round or elliptical pipes, etc. These culverts are not painted.

Condition State 1 The element show little or no deterioration. Some discoloration or surface corrosion may exist but there is no metal pitting. There is little or no deterioration or separation of seams.

Feasible actions: 1) Do Nothing

Condition State 2 There may be minor to moderate corrosion and pitting, especially at the barrel invert. Little or no distortion exists. There may be minor deterioration and/or separation of seams.

Feasible actions: 1) Do Nothing
2) Rehab unit

Condition State 3 Significant corrosion, deep pitting, or some holes in the invert may exist. Minor to moderate distortion and deflection may exist. Minor cracking or abrasion of the metal may exist. There may be considerable deterioration and/or separation of seams.

Feasible actions: 1) Do Nothing
2) Rehab unit

Condition State 4 Major corrosion, extreme pitting, or holes in the barrel may exist. Major distortion, deflection, or settlement may be evident. Major cracking or abrasion of the metal may exist. Major separation of seams may have occurred.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- Wingwalls are not included in this element.
- This element includes galvanized metal culverts.

241 Culvert - Concrete

Units: Lineal Feet along Length of Barrel (LF)

This element defines all precast and cast-in-place concrete arch, pipe, and box culverts. These culverts may be constructed of either reinforced or prestressed concrete.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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 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.

242 Culvert - Timber

Units: Lineal Feet along Length of Barrel (LF)

This element defines all timber box culverts.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
 2) Rehab unit

Condition State 3 There may be significant decay, weathering, and warped or broken timbers. Significant decay and corrosion at fasteners and connections may be evident. Minor to moderate distortion of the culvert may exist.

Feasible actions: 1) Do Nothing
 2) Rehab unit

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

Feasible actions: 1) Do Nothing
 2) Rehab unit
 3) Replace unit

Notes:

- Wingwalls 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.

243 Culvert - Other

Units: Lineal Feet along Length of Barrel (LF)

This element defines all culverts not included under the steel, concrete, or timber culvert elements. It will include masonry construction and combinations of other materials.

Condition State 1 There is little or no deterioration. Only surface defects are in evidence. There are no misalignment problems.

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab unit

Condition State 3 Moderate to major deterioration, abrasion, cracking, and/or minor to moderate distortion or deflection has occurred.

Feasible actions: 1) Do Nothing
2) Rehab unit

Condition State 4 Major cracking, abrasion, distortion, deflection, settlement or misalignment, and/or major deterioration affecting structural integrity may have occurred.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- Wingwalls are not included in this element.

508 Wingwalls - Culvert - Concrete, Masonry, and Timber (Non-CoRe Element)

Units: Lineal Feet (LF)

This element defines those walls that are non-integral with the culvert ends. The walls are usually flared to support the roadway embankment.

Condition State 1 The element shows little or no deterioration or decay. There may be surface defects, discoloration, efflorescence, superficial cracking, splitting, and/or checking but without affect on strength and/or serviceability.

Feasible actions: 1) Do Nothing

Condition State 2 There may be minor deterioration, cracking, spalling, weathering, decay, insect infestation, marine borer infestation, abrasion, splitting, checking, and/or crushing, but none is sufficiently advanced to affect strength and/or serviceability of the element. There is no exposed reinforcing or surface evidence of rebar corrosion. Mortar in joints may show minor deterioration.

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls; or rehab and/or protect unit

Condition State 3 There may be moderate deterioration, cracking, and/or spalling. There may be some delaminations and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge. Timber elements may show deterioration, decay, insect infestation, marine borer infestation, abrasion, splitting, cracking, or crushing which has produced loss of strength or deflection of the element, but not of sufficient magnitude to affect strength and/or serviceability. Mortar in joints may show major deterioration.

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal; or rehab unit
3) Replace unit

Condition State 4 There may be advanced deterioration, spalling, cracking, corrosion of reinforcement, and/or loss of concrete section which is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge. Timber elements show advanced deterioration, decay, insect infestation, marine borer infestation, abrasion, splitting, cracking, or crushing which has produced loss of strength or deflection of the element that affects serviceability of the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

508 Wingwalls - Culvert - Concrete, Masonry, and Timber (Non-CoRe Element)

Notes:

- 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 analysis...". Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.
- Gabion walls are not to be included in this element.

509 Headwalls - Culvert - Concrete and Masonry (Non-CoRe Element)

Units: Lineal Feet (LF)

This element describes those concrete or masonry units at the ends of most culverts. The purpose of the headwall is to maintain the fill material. The headwalls are primarily vertical.

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

Feasible actions: 1) Do Nothing

Condition State 2 There may be minor deterioration, cracking, spalling, and/or weathering, but there is no exposed reinforcing or surface evidence of rebar corrosion. Mortar in joints may show minor deterioration.

Feasible actions: 1) Do Nothing
2) Seal cracks and/or patch minor spalls; or rehab unit

Condition State 3 There may be moderate deterioration, cracking, and/or spalling. There may be some delaminations and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge. Mortar in joints may show major deterioration.

Feasible actions: 1) Do Nothing
2) Clean rebar, and then patch and/or seal; or rehab unit

Condition State 4 There may be advanced deterioration, spalling, cracking, corrosion of reinforcement, and/or loss of concrete section which is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- 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 analysis...". Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

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JOINT ELEMENTS

300 Strip Seal Expansion Joint

Units: Lineal Feet of Joint Seal (LF)

This element defines only those expansion joint devices which utilize a neoprene type water proof gland with some type of steel extrusion or other system to anchor the gland. This joint may or may not be armored.

Condition State 1 The element shows minimal deterioration. There is no leakage at any point along the joint. The gland is secure and has no defects. Any debris in the joint is not causing any problems. The adjacent deck and/or header is sound. If the joint is armored, there are no signs of anchorage looseness.

Feasible actions: 1) Do Nothing

Condition State 2 Signs of seepage along the joint may be present. The gland may be punctured, ripped, or partially pulled out of the extrusion. Significant debris is in all or part of the joint. Minor spalls in the deck and/or header may be present adjacent to the joint. If the joint is armored, looseness of the anchorage may be present.

Feasible actions: 1) Do Nothing
2) Patch, reset, and clean joint

Condition State 3 Signs or observance of leakage along the joint may be present. The gland may have failed from abrasion or tearing. The gland has pulled out of the extrusion. Major spalls may be present in the deck and/or header adjacent to the joint. If the joint is armored, the anchorage has failed.

Feasible actions: 1) Do Nothing
2) Replace gland and/or patch concrete
3) Replace joint

Notes:

- 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.
- If reflective cracking through the asphalt overlay is evident, this indicates an anchorage problem and the joint should be coded in Condition State 3.
- Also refer to "Elastomeric Flex-type Joint" and "Modular Expansion Joint", Sub-element No. 305 and 307 respectively.

305 Elastomeric Flex-Type Joint (Sub-element of CoRe 300)

Units: Lineal Feet of Joint (LF)

This element defines only those joints made of elastomeric seal assemblies which are bolted down to the supports. These joints may or may not be armored. These joints go by the proprietary names of Waboflex, General Tire, etc.

Condition State 1 The element shows minimal deterioration. There is no leakage at any point along the joint. The gland is secure and has no defects. Any debris in the joint is not causing any problems. The adjacent deck and/or header is sound. If the joint is armored, there are no signs of anchorage looseness.

Feasible actions: 1) Do Nothing

Condition State 2 Signs of seepage along the joint may be present. The gland may show signs of abrasion, gouging, or minor tearing. There may be loose sections of gland and/or missing gland anchors. Significant debris is in all or part of the joint. Minor spalls in the deck and/or header may be present adjacent to the joint. If the joint is armored, looseness of the anchorage may be present.

Feasible actions: 1) Do Nothing
2) Repair joint

Condition State 3 Signs or observance of leakage along the joint may be present. The gland may have failed due to abrasion, gouging, or tearing. There may be missing sections of gland. Major spalls may be present in the deck and/or header adjacent to the joint. If the joint is armored, the anchorage has failed.

Feasible actions: 1) Do Nothing
2) Repair joint
3) Replace joint

Notes:

- 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.
- If reflective cracking through the asphalt overlay is evident, this indicates an anchorage problem and the joint should be coded in Condition State 3.

307 Modular Expansion Joint (Sub-element of CoRe 300)

Units: Lineal Feet of Joint (LF)

This element defines only those joints made up of modules of continuous elastomeric strip or box seals. These joints may or may not be armored. These devices are usually found on long span bridges that have been constructed since the mid-eighties.

Condition State 1 The element shows minimal deterioration. There is no leakage at any point along the joint. All seals are secure and have no defects. Any debris in the joint is not causing any problems. The adjacent deck and/or header is sound. If the joint is armored, there are no signs of anchorage looseness.

Feasible actions: 1) Do Nothing

Condition State 2 Signs of seepage along the joint may be present. The seals may show signs of abrasion or minor tearing. There may be loose seals and/or seal anchors. Significant debris is in all or part of the joint. Minor spalls in the deck and/or header may be present adjacent to the joint. If the joint is armored, looseness of the anchorage may be present.

Feasible actions: 1) Do Nothing
2) Repair joint

Condition State 3 Signs or observance of leakage along the joint may be present. The seals may have failed due to abrasion or tearing. Seals may be missing. Major spalls may be present in the deck and/or header adjacent to the joint. If the joint is armored, the anchorage has failed.

Feasible actions: 1) Do Nothing
2) Repair joint
3) Replace joint

Notes:

- 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.
- If reflective cracking through the asphalt overlay is evident, this indicates an anchorage problem and the joint should be coded in Condition State 3.

301 Pourable Joint Seal

Units: Lineal Feet of Joint Seal (LF)

This element defines only those joints filled with a pourable sealant. This element includes joints which are constructed with layers of filler material, such as cork, etc., and covered with a pourable sealant.

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

Feasible actions: 1) Do Nothing

Condition State 2 Minor adhesion and/or cohesion failures may be present. Signs of seepage along the joint may be present. The joint may be slightly impacted with debris. Minor spalls in the deck and/or headers may be present adjacent to the joint.

Feasible actions: 1) Do Nothing
2) Clean joint and replace seal

Condition State 3 Major adhesion and/or cohesion failures may be present. Signs or observance of leakage along the joint may be present. The joint may be heavily impacted with debris and/or stones. Major spalls may be present in the deck and/or header adjacent to the joint.

Feasible actions: 1) Do Nothing
2) Clean joint, patch spalls, and replace seal

Notes:

- 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.

302 Compression Joint Seal

Units: Lineal Feet of Joint Seal (LF)

This element defines only those joints filled with a preformed compression type seal. This joint may or may not be armored.

Condition State 1 The element shows minimal deterioration. Adhesion is sound with no signs of leakage. There are no cohesion cracks. The adjacent deck and/or header is sound. If the joint is armored, there are no signs of anchorage looseness.

Feasible actions: 1) Do Nothing

Condition State 2 Signs of seepage along the joint may be present. There may be small adhesion failures. The gland may show signs of abrasion or minor tearing. Significant debris is in all or part of the joint. Minor spalls in the deck and/or headers may be present adjacent to the joint. If the joint is armored, looseness of the anchorage may be present.

Feasible actions: 1) Do Nothing
2) Patch /remove and reseal/clean joint

Condition State 3 Major adhesion failures may be present. The gland may have failed from abrasion or tearing. Signs or observance of leakage along the joint may be present. Major spalls may be present in the deck and/or headers adjacent to the joint. If the joint is armored, the anchorage has failed.

Feasible actions: 1) Do Nothing
2) Replace gland and/or patch spalls
3) Replace joint

Notes:

- 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.
- If reflective cracking through the asphalt overlay is evident, this indicates an anchorage problem and the joint should be coded in Condition State 3.

303 Assembly Joint/Seal

Units: Lineal Feet of Joint/Seal (LF)

This element defines only those joints filled with an assembly mechanism that may or may not have a seal.

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

Feasible actions: 1) Do Nothing

Condition State 2 The element shows minor deterioration or damage. The paint system, if present, may show some corrosion with slight pitting. There may be minor weld cracking. The joint anchorage system may be loose. Minor spalls in the deck and/or header may be present adjacent to the joint. Signs of seepage along the joint may be present.

Feasible actions: 1) Do Nothing
2) Rehab unit

Condition State 3 The element shows major deterioration or damage. Corrosion is advanced. The joint anchorage system has failed. Major spalls may be present in the deck and/or header adjacent to the joint. Signs or observance of leakage along the joint may be present.

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- Approach slab expansion joints are not included in this element.
- Evidence of mechanism failures, such as loose or broken springs, bolts, or support bars shall be coded as Condition State 3.
- If a joint is not visible due to an asphalt overlay, code it in Condition State 3.
- If reflective cracking through the asphalt overlay is evident, this indicates an anchorage problem and the joint should be coded in Condition State 3.

304 Open Expansion Joint

Units: Lineal Feet of Joint (LF)

This element defines only those joints that are open and not sealed. This joint may or may not be armored.

Condition State 1 The element shows minimal deterioration. Joint armor, if present, is secure and there are no bent, misaligned, or broken fingers. The adjacent deck and/or header is sound.

Feasible actions: 1) Do Nothing

Condition State 2 There may be deck cracking indicating armor anchor loosening. Minor spalls in the deck and/or header may be present adjacent to the joint. There may be corrosion on the joint armor steel plates. Bent or misaligned fingers are observed.

Feasible actions: 1) Do Nothing
2) Rehab unit

Condition State 3 There may be advanced corrosion of the joint armor steel plates. Major spalls may be present in the deck and/or header adjacent to the joint. Armor anchors have failed. There are missing or broken fingers.

Feasible actions: 1) Do Nothing
2) Rehab. unit
3) Replace unit

306 Asphaltic Plug Expansion Device

Units: Lineal Feet of Joint (LF)

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

Condition State 1 The element shows minimal deterioration. There are no significant cracks and no leakage.

Feasible actions: 1) Do Nothing

Condition State 2 There is significant cracking and leakage.

Feasible actions: 1) Do Nothing
2) Repair joint

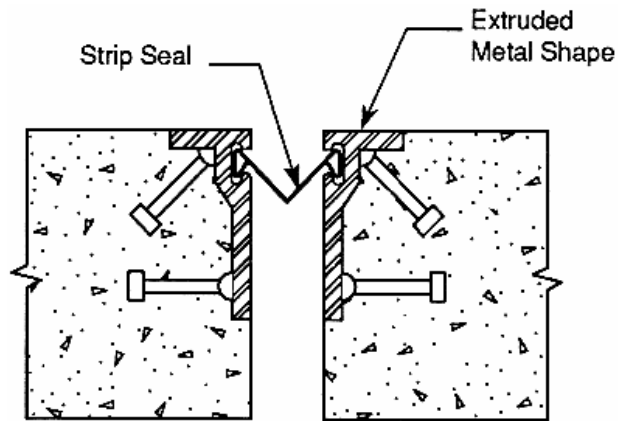
Condition State 3 Substantial cracking has caused the device to fail, allowing water to have significant impact on other elements.

Feasible actions: 1) Do Nothing
2) Repair joint
3) Replace joint

(Revised June 2008)

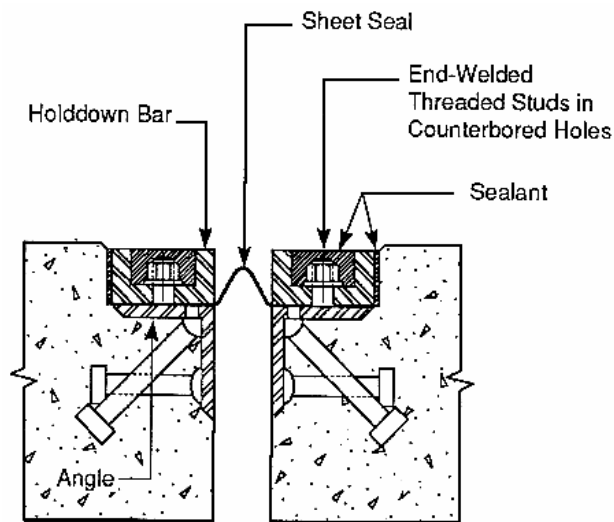
EXAMPLES OF JOINT TYPES

Strip Seal Expansion , Element No. 300:



Strip Seal Joint

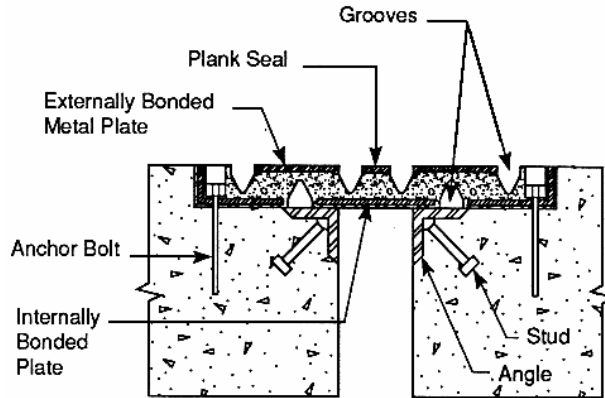
Elastomeric Flex-Type Joint, Element No. 305:
(Sub-Element of CoRe No. 300)



Sheet Seal Joint

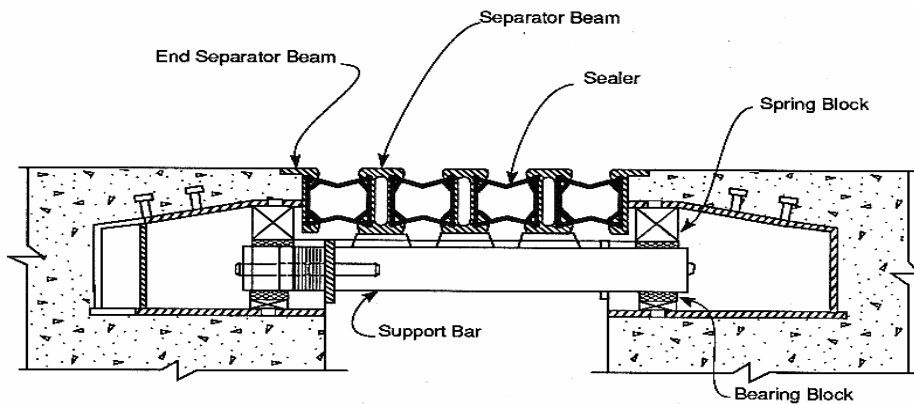
EXAMPLES OF JOINT TYPES (Continued)

Elastomeric Flex-Type Joint, Element No. 305 (Continued):
(Sub-Element of CoRe No. 300)



Plank Seal Joint (Waboflex)

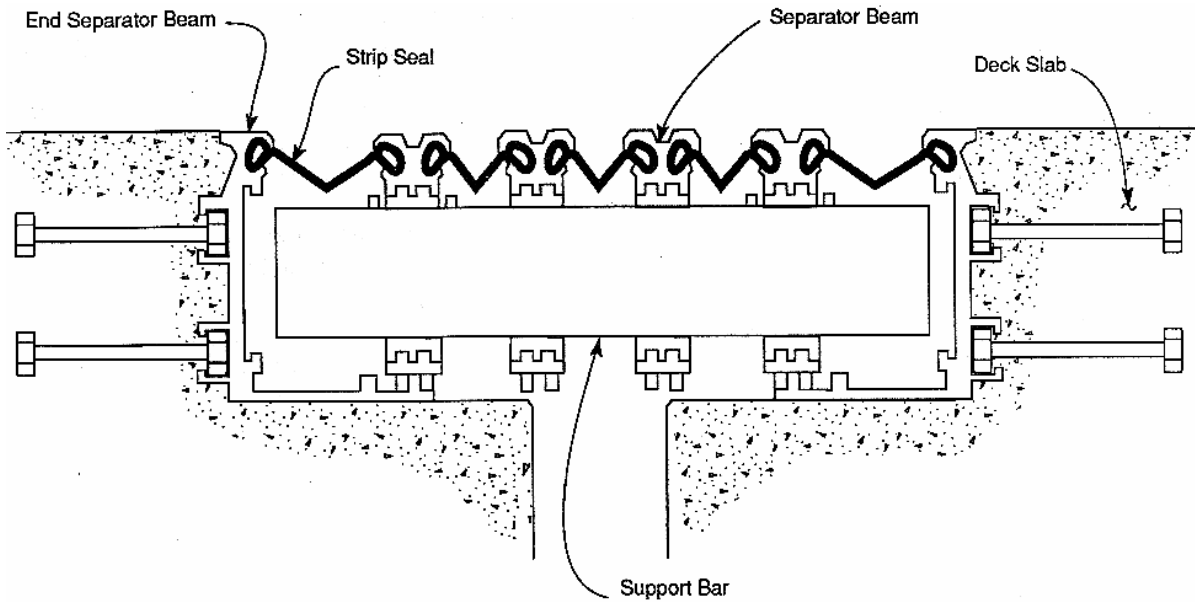
Modular Expansion Joint , Element No. 307:
(Sub-Element of CoRe No. 300)



Modular Joint with Multiple Support Bar Control

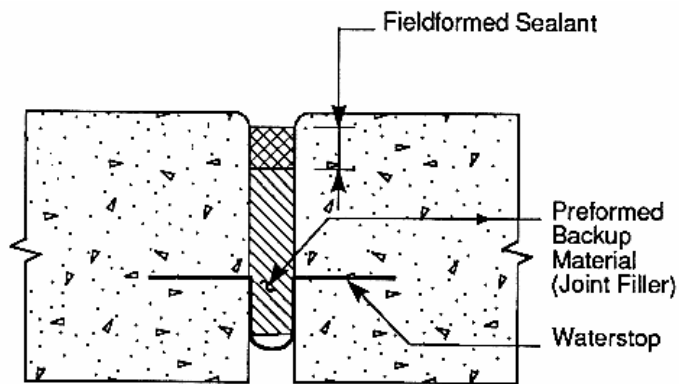
EXAMPLES OF JOINT TYPES (Continued)

Modular Expansion Joint, Element No. 307 (Continued):
(Sub-Element of CoRe No. 300)



Modular Joint with Single Support Bar

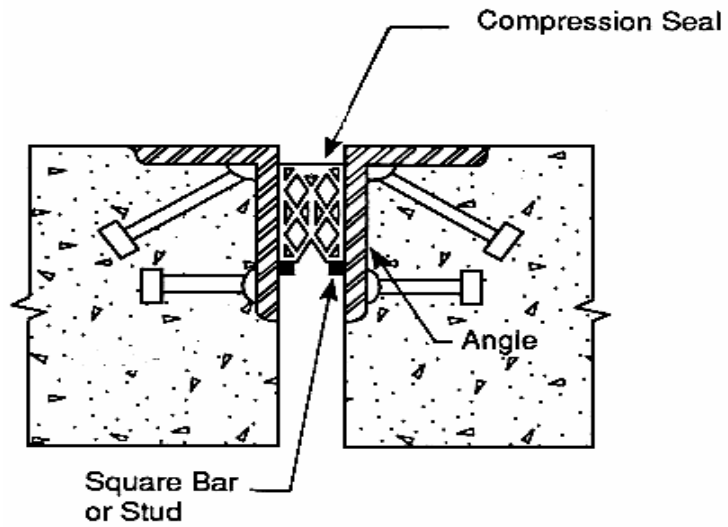
Pourable Joint Seal, Element No. 301:



Filled Joint with Field formed Sealant

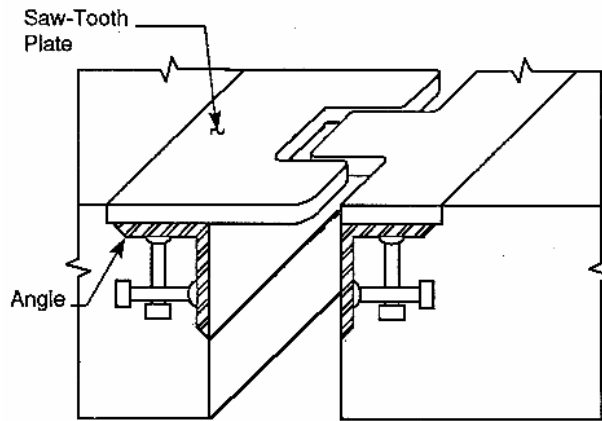
EXAMPLES OF JOINT TYPES (Continued)

Compression Joint Seal, Element No. 302:



Compression Seal Joint

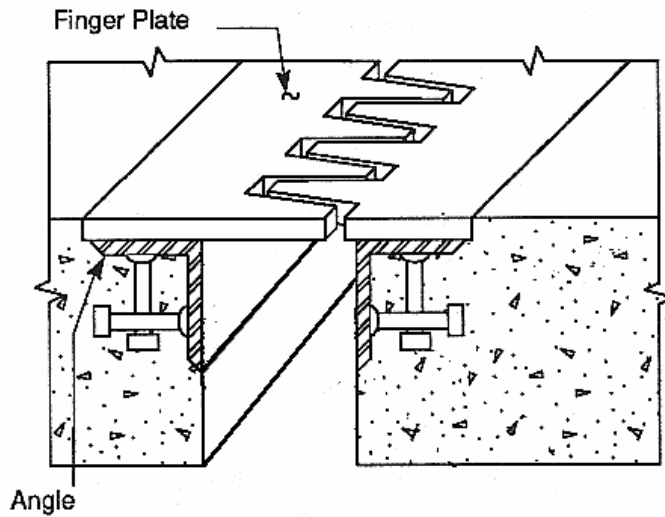
Assembly Joint/Seal , Element No. 303:



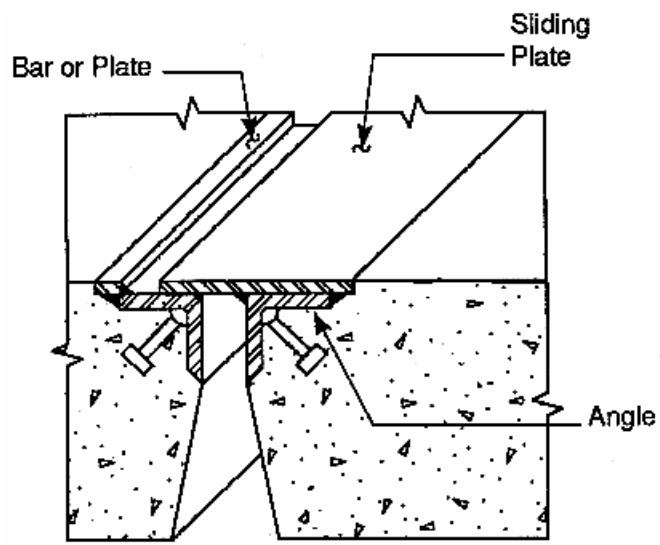
Sawtooth Plate Joint

EXAMPLES OF JOINT TYPES (Continued)

Assembly Joint/Seal, Element No. 303 (Continued):



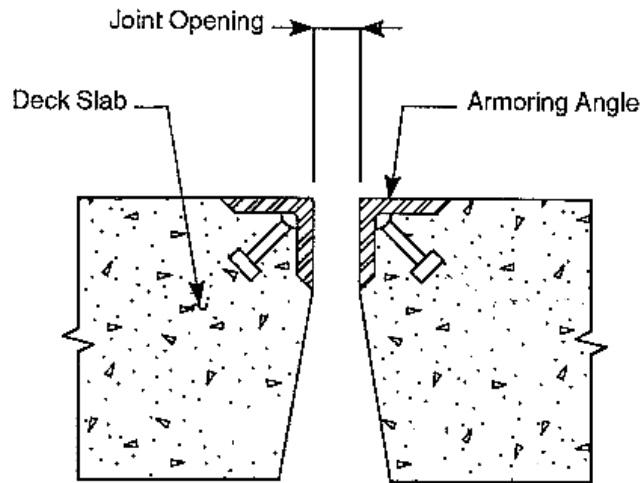
Finger Plate Joint



Sliding Plate Joint

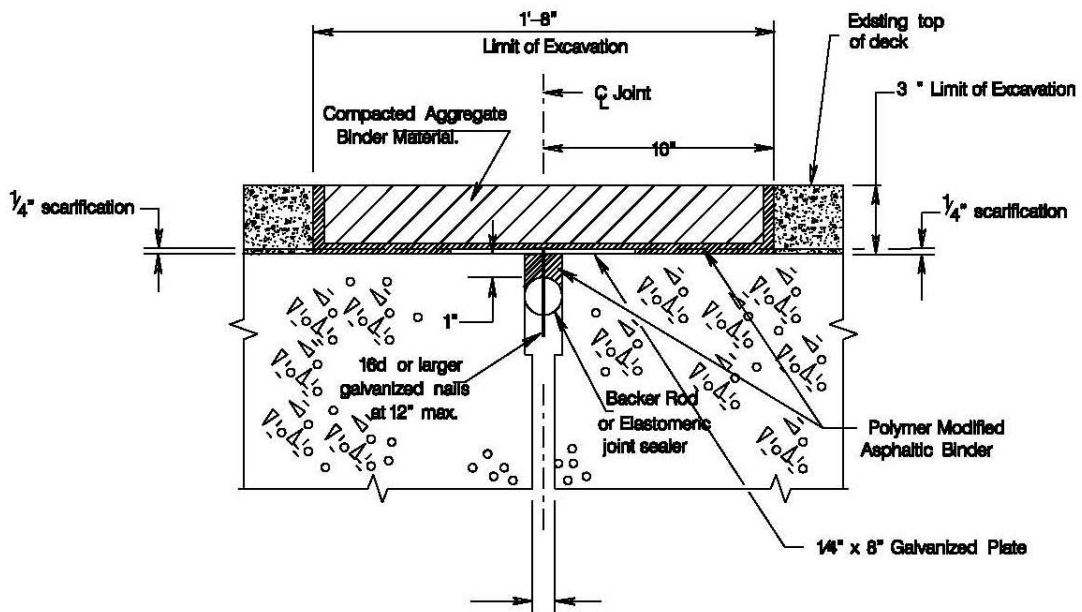
EXAMPLES OF JOINT TYPES (Continued)

Open Expansion Joint, Element No. 304:



Open Joint

Asphaltic Plug Expansion Device, Element No. 306:



Asphaltic Plug Expansion Device

(Revised June 2008)

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BEARING ELEMENTS

310 Elastomeric Bearing

Units: Each (EA)

This element defines only those bridge bearings that are constructed primarily of elastomers, with or without fabric or metal reinforcement in the elastomeric pads. This element should be coded for expansion (moveable) or fixed bearings.

Condition State 1 The element shows little or no deterioration. Shear deformations are correct for existing temperatures. *The vertical slope is equal to or less than 30 degrees.

Feasible actions: 1) Do Nothing

Condition State 2 Minor cracking, splitting or other deterioration may be present. Shear deformation may be slightly excessive. Strength and/or serviceability are not affected. *The vertical slope is greater than 30 degrees but less than or equal to 45 degrees.

Feasible actions: 1) Do Nothing
2) Reset bearings

Condition State 3 Advanced deterioration. Shear deformations may be excessive. Top and bottom surfaces may no longer be parallel. Loss of bearing may be imminent. The vertical slope is greater than 45 degrees.

Feasible actions: 1) Do Nothing
2) Reset bearings
3) Replace unit and reset girders

Notes:

- *The slope information is for guidance only.
- Code steel fixed bearings that have a small elastomeric pad as "Fixed Bearings", CoRe Element No. 313.
- Also refer to "Elastomeric Bearing with Teflon", Sub-element No. 370.

370 Elastomeric Bearing with Teflon (Sub-element of CoRe 310)

Units: Each (EA)

This element defines only those bridge bearings that are constructed primarily of elastomers, with or without fabric or metal reinforcement in the elastomeric pads, which have a metal sole plate with a polytetrafluorethylene (PTFE) sliding surface (teflon is a brand name of the PTFE material). This element should be coded for expansion (moveable) or fixed bearings.

Condition State 1 The element shows little or no deterioration. Shear deformations are correct for existing temperatures. *The vertical slope is equal to or less than 30 degrees.

Feasible actions: 1) Do Nothing

Condition State 2 Minor cracking, splitting or other deterioration may be present. Shear deformation may be slightly excessive. Strength and/or serviceability are not affected. *The vertical slope is greater than 30 degrees but less than or equal to 45 degrees.

Feasible actions: 1) Do Nothing
2) Reset bearings

Condition State 3 Advanced deterioration. Shear deformations may be excessive. Top and bottom surfaces may no longer be parallel. Loss of bearing may be imminent. The vertical slope is greater than 45 degrees.

Feasible actions: 1) Do Nothing
2) Reset bearings
3) Replace unit and reset girders

Notes:

- *The slope information is for guidance only.
- Code steel fixed bearings that have a small elastomeric pad as "Fixed Bearings", CoRe Element No. 313.

311 Expansion/Moveable Bearing - Roller, Etc.

Units: Each (EA)

This element defines only those bridge bearings which provide for both deflection and longitudinal movement by means of roller or other type mechanisms. This element does not include the following types of expansion (moveable) bearings; sliding plate bearings, bond breaker bearings, rocker bearings, elastomeric bearings, pot bearings, disc bearings, spherical bearings, enclosed/concealed bearings, and isolation bearings.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Clean and paint or reset bearings, and/or rehab supports

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

Feasible actions: 1) Do Nothing
2) Rehab supports or bearings
3) Replace unit

Notes:

- Also refer to "Sliding Plate Bearing - Expansion/Moveable", "Bond Breaker Bearing - Expansion/Moveable", and "Rocker Bearing - Expansion/Moveable", Sub-element No. 372, 373, and 374 respectively.

372 Sliding Plate Bearing - Expansion/Moveable (Sub-element of CoRe 311)

Units: Each (EA)

This element defines only those bridge bearings that provide for both deflection 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.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Clean and paint or reset bearings, and/or rehab supports

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

Feasible actions: 1) Do Nothing
2) Rehab supports or bearings
3) Replace unit

373 Bond Breaker Bearing - Expansion/Moveable (Sub-element of CoRe 311)

Units: Each (EA)

This element defines only those bridge bearings that provide for longitudinal movement by means of a 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.

Condition State 1 There is little or no deterioration and a minimal amount of debris at the interface. Vertical and horizontal alignment at the interface are within limits. The bearing support member is sound. Any lubrication system is functioning properly.

Feasible actions: 1) Do Nothing

Condition State 2 The interface components may have shifted enough to cause minor cracking in the bearing support. Debris buildup is affecting movement at the interface. Vertical and horizontal alignment at the interface are still tolerable.

Feasible actions: 1) Do Nothing
2) Reset bearings, and/or rehab supports

Condition State 3 There may be loss of section of the bearing support member sufficient to warrant supplemental supports or load restrictions. Vertical and horizontal alignment at the interface may be beyond tolerable limits. The lubrication system, if any, may have failed.

Feasible actions: 1) Do Nothing
2) Rehab supports or bearings
3) Replace unit

Notes:

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

374 Rocker Bearing - Expansion/Moveable (Sub-element of CoRe 311)

Units: Each (EA)

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.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Clean and paint or reset bearings, and/or rehab supports

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

Feasible actions: 1) Do Nothing
2) Rehab supports or bearings
3) Replace unit

312 Enclosed/Concealed Bearing

Units: Each Bearing/Seat (EA)

This element defines only those bridge bearings or bearing systems that are enclosed so that they are not open for detailed inspection. These bearings may be used in both fixed and expansion (moveable) applications.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab unit

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

Feasible actions: 1) Do Nothing
2) Rehab unit
3) Replace unit

Notes:

- The potential for catastrophic failure due to reduction of bearing area because of prestress shortening should be considered when rating this element.

313 Fixed Bearing

Units: Each (EA)

This element defines only those bridge bearings that provide for deflection only. This element does not include the following types of fixed bearings; elastomeric bearings, pinned bearings, pot bearings, disc bearings, spherical bearings, enclosed/concealed bearings, and isolation bearings.

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

Feasible actions: 1) Do Nothing

Condition State 2 The paint system, if present, may show moderate to heavy corrosion with some pitting, but it is still functioning as intended. The assemblies may have moved enough to cause minor cracking in the supporting concrete.

Feasible actions: 1) Do Nothing
2) Clean and paint or reset bearings, and/or rehab supports

Condition State 3 Advanced corrosion with section loss. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Shear keys may have failed.

Feasible actions: 1) Do Nothing
2) Rehab supports or bearings
3) Replace unit

Notes:

- Also refer to "Pinned Bearing - Fixed", Sub-element No. 375.

375 Pinned Bearing - Fixed
(Sub-element of CoRe 313)

Units: Each (EA)

This element defines only those bridge bearings that provide for deflection only by means of a steel plate, resting on a steel pin which is supported by a second steel plate.

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

Feasible actions: 1) Do Nothing

Condition State 2 The paint system, if present, may show moderate to heavy corrosion with some pitting, but it is still functioning as intended. The assemblies may have moved enough to cause minor cracking in the supporting concrete.

Feasible actions: 1) Do Nothing
2) Clean and paint or reset bearings, and/or rehab supports

Condition State 3 Advanced corrosion with section loss. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Shear keys may have failed.

Feasible actions: 1) Do Nothing
2) Rehab supports or bearings
3) Replace unit

314 Pot Bearing

Units: Each (EA)

This element defines those high load bearings with a confined elastomer. 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. In this type of bearing, rotation about any plane can be accommodated with a large round elastomeric disc that is confined within a thick steel ring or cylinder (the "pot"). This bearing accommodates rotations by deformations of the disc. Because the elastomer is confined, it is able to carry more load than if it was allowed to bulge out in the unconfined state.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab supports or bearing devices

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

Feasible actions: 1) Do Nothing
2) Rehab bearing devices
3) Replace unit

315 Disc Bearing

Units: Each (EA)

This element defines those high load bearings with a central disc which is molded from a urethane compound. This disc is surrounded by an elastomeric material. 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. In this type of bearing, vertical loads are supported by the elastomeric material and lateral loads are resisted by the central disc. Longitudinal movements can be accommodated by providing a polytetrafluorethylene (PTFE, or teflon) sliding surface. An additional device may be provided to partially restrain the elastomeric material against lateral expansion.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab supports or bearing devices.

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

Feasible actions: 1) Do Nothing
2) Rehab bearing devices
3) Replace unit

Notes:

- Also refer to "Spherical Bearing", Sub-element No. 376.

376 Spherical Bearing **(Sub-element of CoRe 315)**

Units: Each (EA)

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.

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

Feasible actions: 1) Do Nothing

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

Feasible actions: 1) Do Nothing
2) Rehab supports or bearing devices.

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

Feasible actions: 1) Do Nothing
2) Rehab bearing devices
3) Replace unit

520 Isolation Bearing (Non-CoRe Element)

Units: Each (EA)

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 dissipator 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.

Condition State 1 The system shows little or no deterioration. Vertical and horizontal alignment is within limits. The bearing support member is sound.

Feasible actions: 1) Do Nothing

Condition State 2 The system may show signs of minor deterioration or distress. The assemblies may have moved enough to cause minor cracking in the supporting concrete.

Feasible actions: 1) Do Nothing
 2) Clean and paint and/or reset bearings and/or rehab supports

Condition State 3 The system shows advanced deterioration or distress. Vertical and horizontal alignments are beyond tolerable limits.

Feasible actions: 1) Do Nothing
 2) Rehab supports or bearings
 3) Replace unit

**521 Bearing - Other
(Non-CoRe Element)**

Units: Each (EA)

This element defines those bridge bearings which are not defined in any of the previous bearing elements. This includes, but is not limited to, moveable bridge bearing types, etc.

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

Feasible actions: 1) Do Nothing

Condition State 2 The paint system, if present, may show moderate to heavy corrosion with some pitting, but it is still functioning as intended. The assemblies may have moved enough to cause minor cracking in the supporting concrete. Minor maintenance problems may exist, but the bearing is functioning as intended.

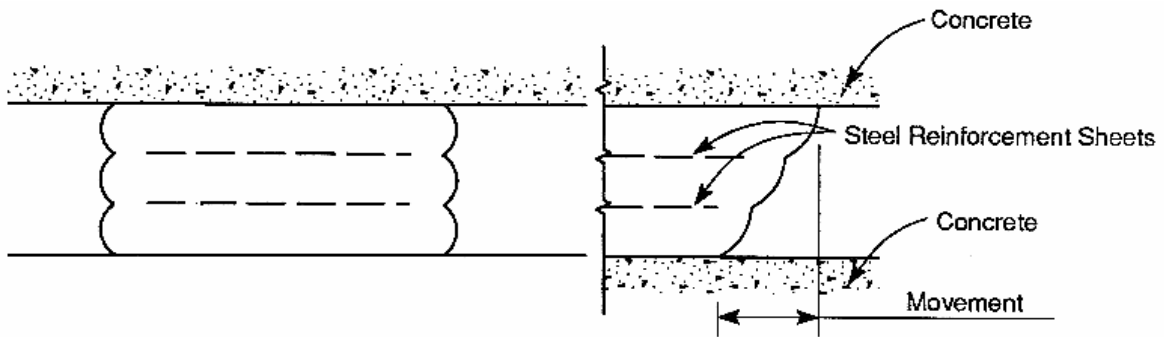
Feasible actions: 1) Do Nothing
2) Clean and paint or reset bearings, and/or rehab supports

Condition State 3 Advanced corrosion with section loss. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. The lubrication system, if any, may have failed. Advanced maintenance problems may exist which do affect the function of the bearing.

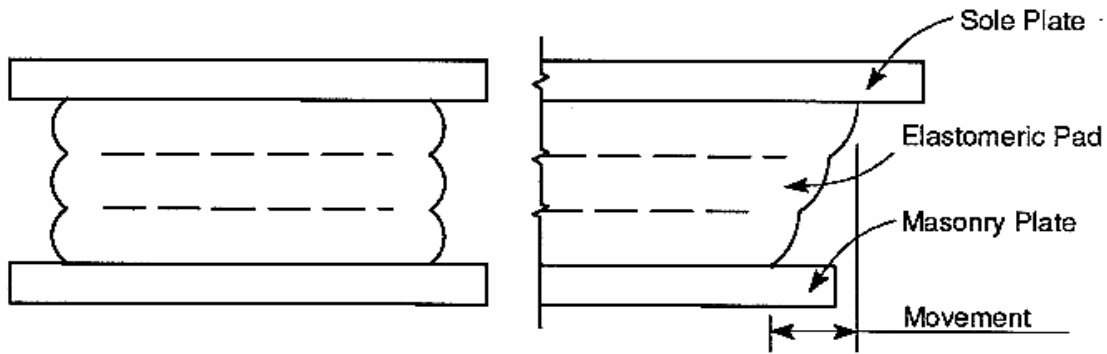
Feasible actions: 1) Do Nothing
2) Rehab supports or bearings
3) Replace unit

EXAMPLES OF BEARING TYPES

Elastomeric Bearing, Element No. 310:



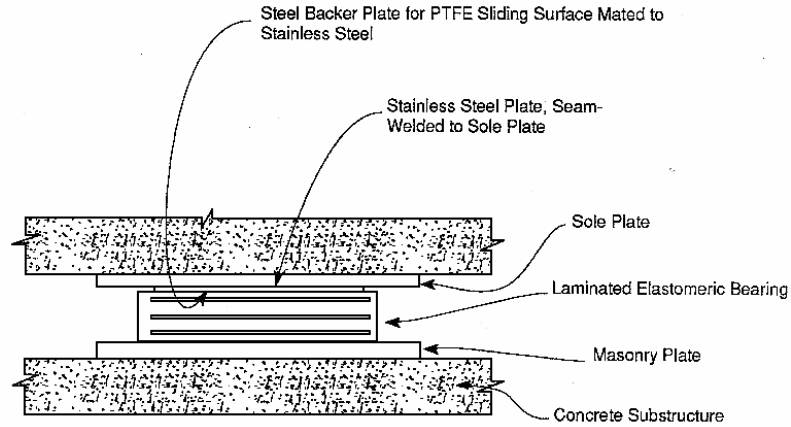
Elastomeric Pads



Elastomeric Pads with Steel Sole and Masonry Plates

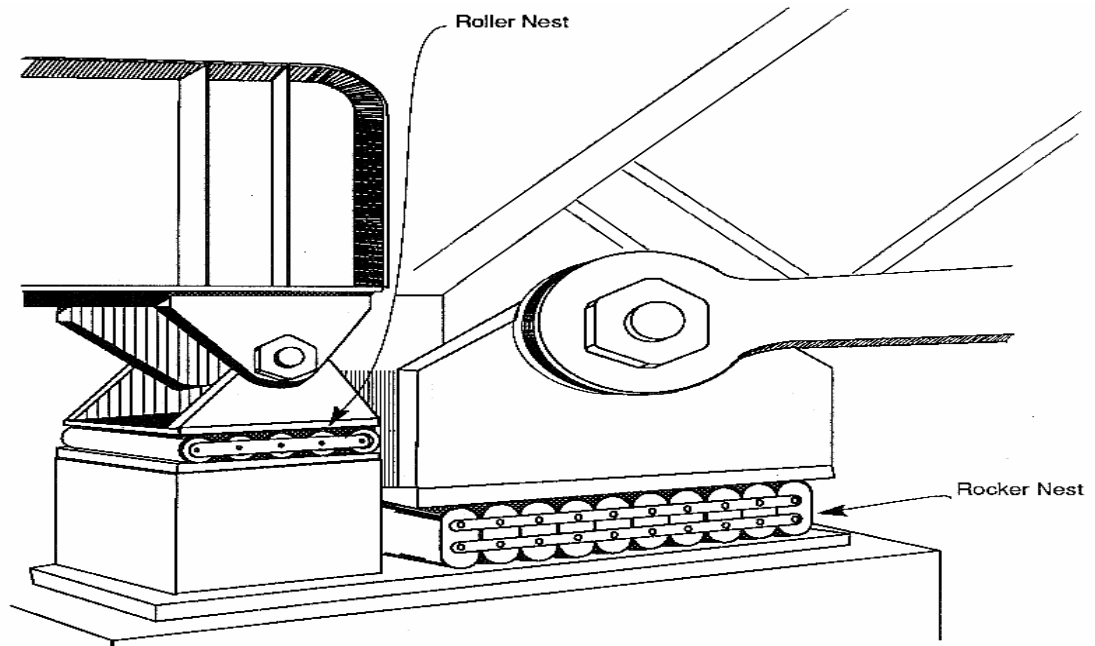
EXAMPLES OF BEARING TYPES (Continued)

**Elastomeric Bearing with Teflon , Element No. 370:
(Sub-Element of CoRe No. 310)**



Elastomeric Bearing with PTFE (Teflon)

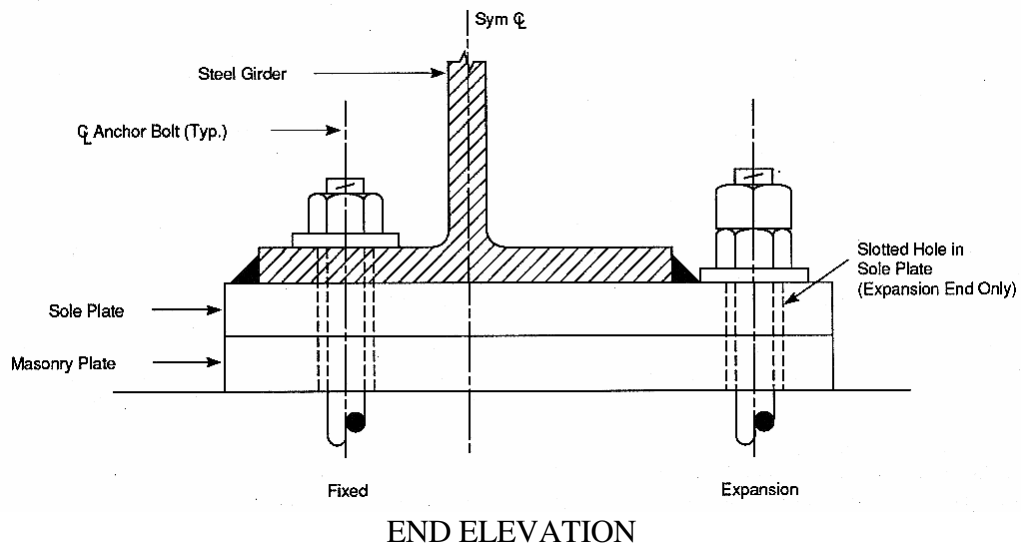
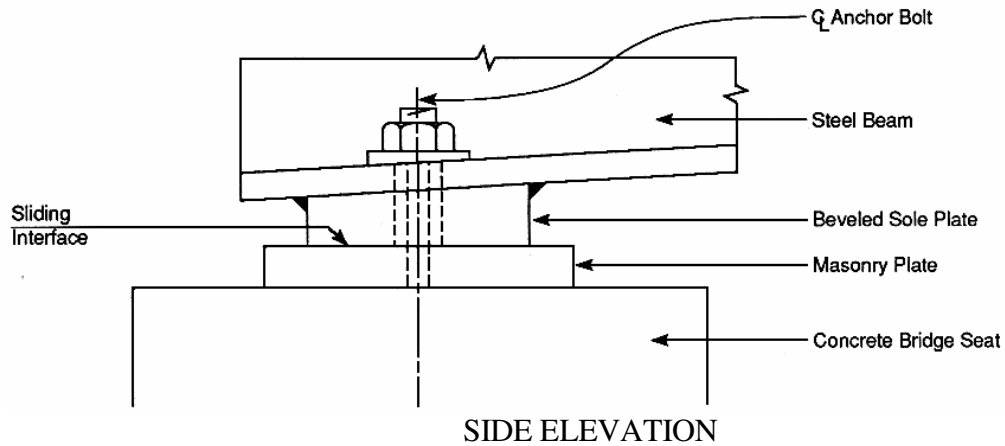
Expansion/Moveable Bearing - Roller, Etc., Element No. 311:



Roller and Rocker Nests

EXAMPLES OF BEARING TYPES (Continued)

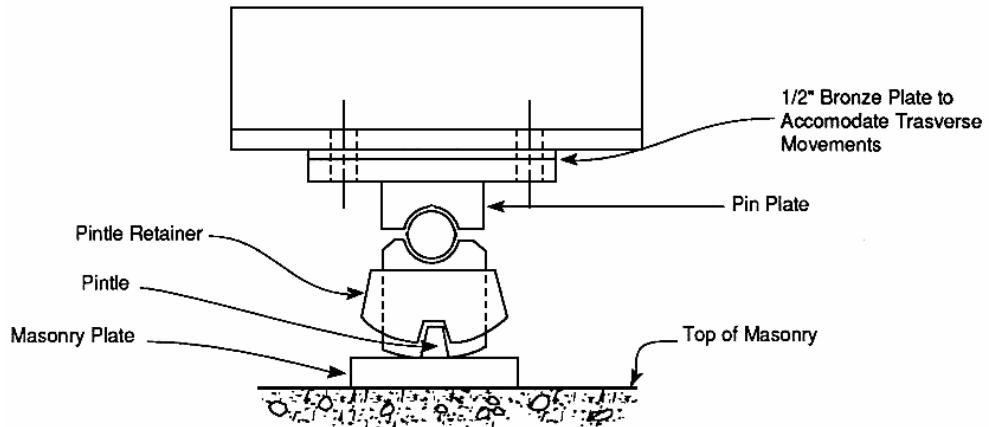
Sliding Plate Bearing - Expansion/Moveable, Element No. 372:
(Sub-Element of CoRe No. 311)



Sliding Plate Bearing

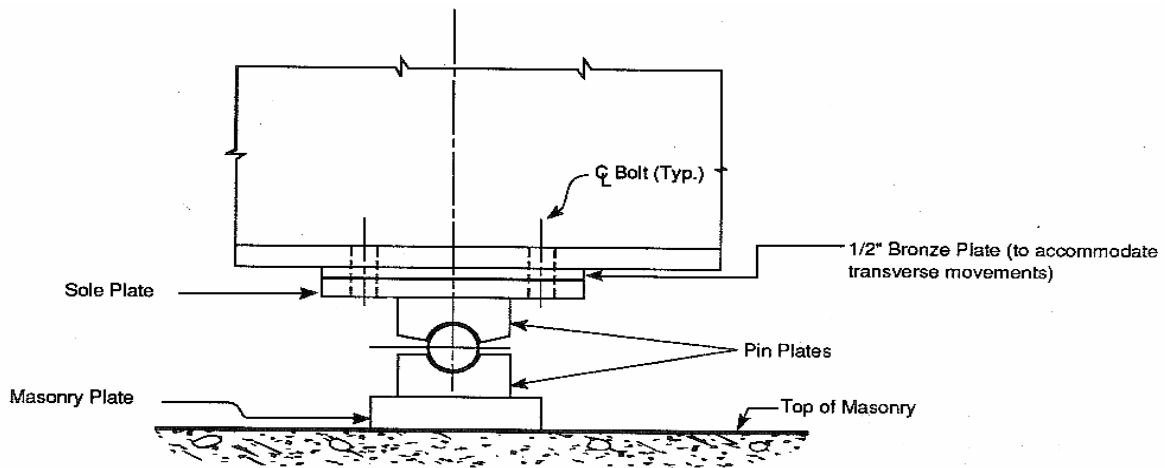
EXAMPLES OF BEARING TYPES (Continued)

Rocker Bearing - Expansion/Moveable, Element No. 374:
(Sub-Element of CoRe No. 311)



Rocker Bearing

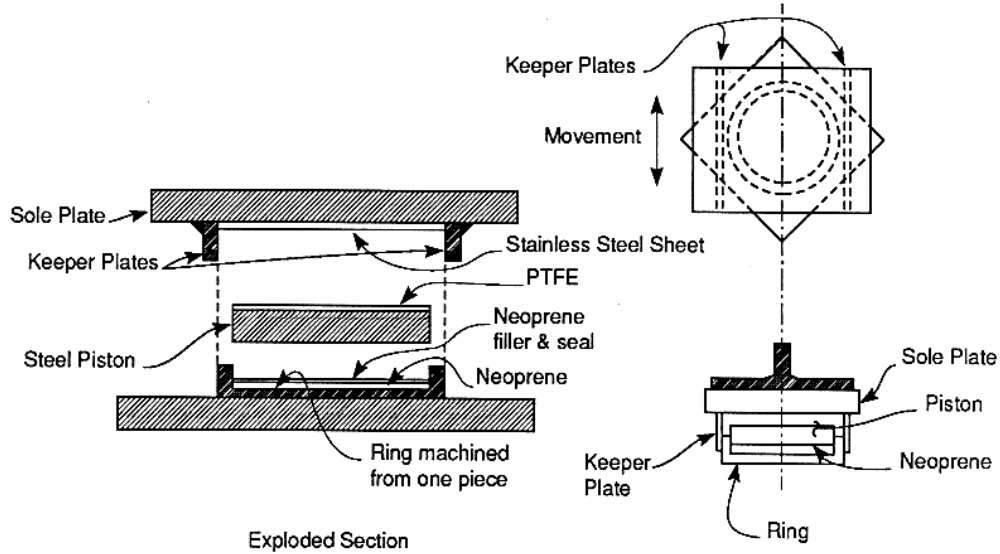
Pinned Bearing - Fixed Pinned Bearing - , Element No. 375:
(Sub-Element of CoRe No. 313)



Fixed Bearing

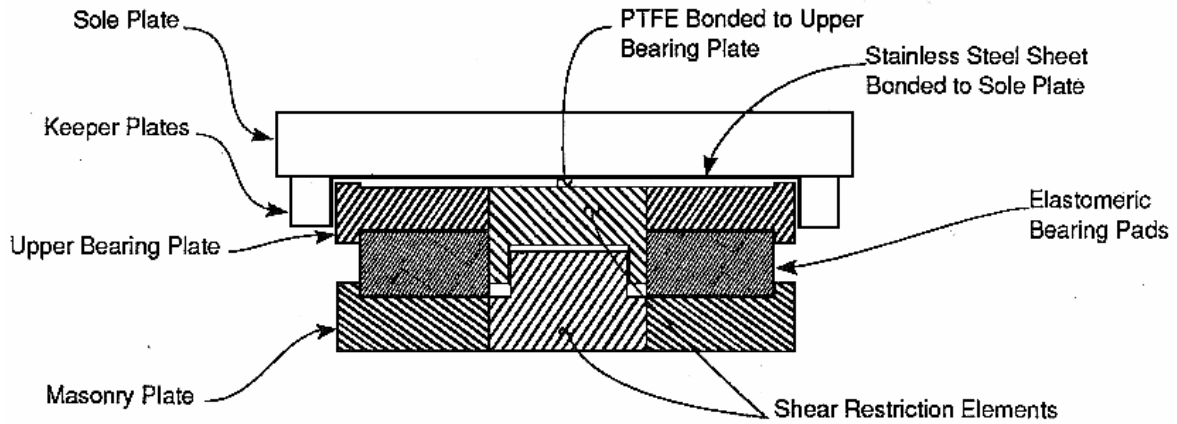
EXAMPLES OF BEARING TYPES (Continued)

Pot Bearing , Element No. 314:



Sliding Pot Bearing

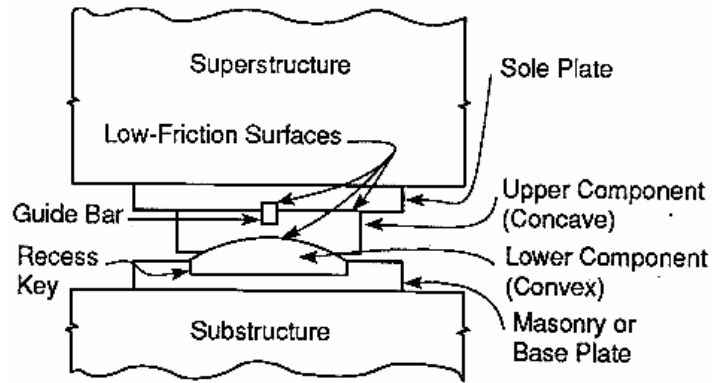
Disc Bearing, Element No. 315:



Disc Bearing

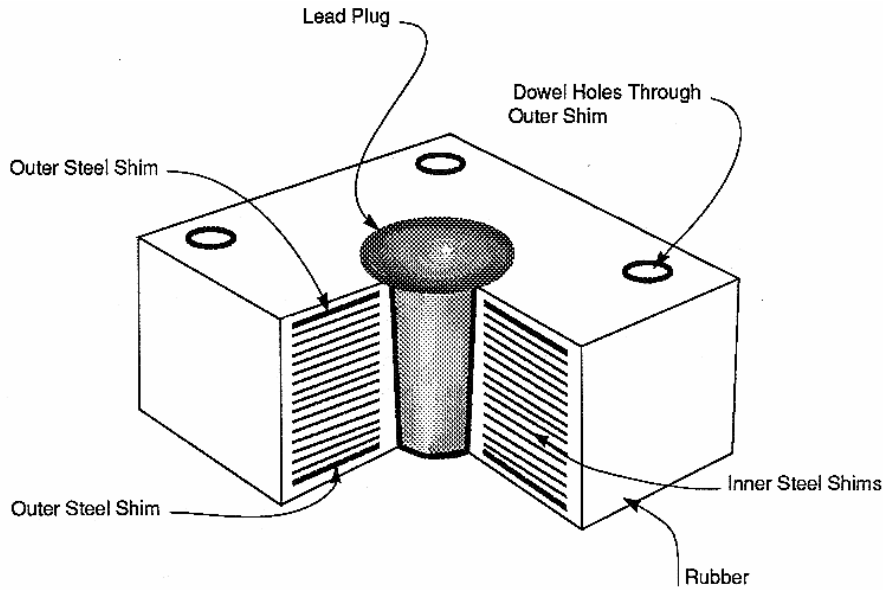
EXAMPLES OF BEARING TYPES (Continued)

Spherical Bearing, Element No. 376:
(Sub-Element of CoRe No. 315)



Spherical Bearing

Isolation Bearing, Element No. 520:
(Non-CoRe Element)



Typical Lead-Rubber Bearing

SMART FLAGS

356 Steel Fatigue (for Steel Elements)

Units: Each (EA)

This condition state language addresses only those bridges which contain steel elements that are currently, or have previously, showed signs of fatigue damage. It should not be applied to steel bridges prior to fatigue damage becoming apparent.

Condition State 1 Fatigue damage to the bridge has been repaired or arrested. The bridge may still be fatigue prone.

Condition State 2 Fatigue damage exists which has not been repaired or arrested.

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

Notes:

- Normally, Condition State 2 would be used the first time the element is identified as having fatigue damage, and at any other time when additional fatigue damage is identified.
- This Smart Flag represents all the steel on a bridge. The quantity will always be one (1). Do not count each fatigue crack individually.

357 Pack Rust (for Steel Elements)

Units: Each (EA)

This condition state language addresses only those connections (including shapes in contact in built-up members) of steel bridges which are currently showing signs of rust packing between steel plates.

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

Condition State 2 Rusting between plates is beginning to distress the connection. Minor swelling exists.

Condition State 3 Rusting between plates has caused serious distress to the connection. The plates may be badly distorted, however all connectors (rivets, bolts, etc.) are still functioning.

Condition State 4 Rusting between plates has caused serious distress to the connection which warrants analysis of the bridge to ascertain the impact on the serviceability of the bridge. Some rivets or other connectors may have popped or are no longer effective.

Notes:

- This Smart Flag represents all occurrences of pack rust on a bridge. The quantity will always be one (1). Do not count each occurrence of pack rust.

358 Deck Cracking (for Deck Elements)

Units: Each (EA)

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

Condition State 1 The surface of the deck is cracked, but the cracks are either filled, sealed or insignificant in size and density to warrant repair activities.

Condition State 2 Unsealed cracks exist which are of moderate size or density.

Condition State 3 Unsealed cracks exist in the deck which are of moderate size and density.

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

Notes:

- Guidelines for crack density:
 - Moderate density - Crack spacing of ten feet or greater.
 - Severe density - Crack spacing of less than ten feet.
- Guidelines for crack size:
 - Minor cracks - These are superficial or hairline cracks that cannot be easily measured.
 - Moderate or severe cracks - These can be easily measured with a ruler.
- This Smart Flag is to be used only with concrete decks including those with latex modified concrete or other cement based overlays. Do not use on asphalt overlaid or timber decks.
- This Smart Flag represents all occurrences of deck cracking. The quantity will always be one (1). Do not count each occurrence of deck cracking.

359 Soffit (or Undersurface) of Decks and Slabs (for Deck Elements)

Units: Each (EA)

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

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

Condition State 2 Cracking and/or efflorescence on the undersurface is light. The distressed area is less than or equal to 10% of the total underside area.

Condition State 3 Cracking and/or efflorescence on the undersurface is moderate. The distressed area is greater than 10% but less than or equal to 25% of the total underside area.

Condition State 4 Light to moderate rust staining and/or spalling on the undersurface of the deck indicates that active corrosion is occurring in the deck. Cracking and/or efflorescence on the undersurface is heavy. The distressed area is greater than 25% but less than or equal to 50% of the total underside area.

Condition State 5 Heavy to severe rust staining and/or spalling on the undersurface of the deck indicates that active corrosion is occurring in the deck. Cracking and/or efflorescence on the undersurface is severe. The distressed area is greater than 50% of the total underside area.

Notes:

- This Smart Flag represents the entire undersurface of a deck slab, not just the undersurface of the overhang.

360 Settlement (for Substructure Elements)

Units: Each (EA)

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

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

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

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

Notes:

- This Smart Flag represents all occurrences of settlement at a bridge. The quantity will always be one (1). Do not count each location of settlement individually.

361 Scour (for Substructure Elements)

Units: Each (EA)

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

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

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

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

Notes:

- The Scour Smart Flag should be used whenever scour is observed during the field inspection. Substructure elements should not be assigned a lower Condition State because of scour.

362 Traffic Impact Damage (for Superstructure Elements)

Units: Each (EA)

This condition state language addresses distress of any elements (mainly superstructure) due to traffic impact.

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

Condition State 2 Impact damage has occurred. Prestressing system is exposed, but is not impaired. Steel strength does not threaten the serviceability of the bridge.

Condition State 3 Impact damage has occurred and strength of the member is impaired. Analysis is warranted to ascertain the serviceability of the bridge.

Notes:

- This Smart Flag should be used primarily for superstructure impact damage. Impact damage sustained by the bridge rail or substructure elements should be handled with the appropriate Condition State language for those elements.
- This Smart Flag represents all occurrences of impact damage at a bridge site. The quantity will always be one (1). Do not count each location of impact damage individually.

363 Section Loss (for Steel Elements)

Units: Each (EA)

This condition state language addresses section loss in the locations of steel members which warrant analysis (beam/girder webs in high shear areas, beam/girder flanges in high moment areas, bottom chords of through trusses, etc.).

Condition State 1 Section loss to the elements has been repaired or cleaned and painted.

Condition State 2 Section loss to the element exists and has not been repaired or painted. Structural analysis is not yet warranted.

Condition State 3 Measurable section loss to the element exists which warrants analysis to determine the serviceability of the element or the bridge. An analysis has been done and it has been determined that serviceability has not been affected.

Condition State 4 Section loss has affected the load carrying capacity or serviceability of the bridge. An analysis has been done and it has been determined that serviceability has been affected.

Notes

- This smart flag should be used when a steel element reaches Condition State 4 or for those steel elements which have areas of section loss that have been repaired or cleaned and painted.
- This Smart Flag represents all occurrences of section loss at a bridge site. The quantity will always be one (1). Do not count each location of section loss individually.

500 Deterioration of Pin & Hanger Assembly (for Superstructure Elements) (Non-CoRe Element)

Units: Each (EA)

This condition state language addresses only steel bridges which contain pin and hanger assemblies that are already showing some type of defect (deformation, cracking, rusting, pack rusting, section loss, bulging, or seizure of the assembly). It should not be applied to steel bridges with pin and hanger assemblies that do not yet exhibit these forms of damage or deterioration.

Condition State 1 The pin and hanger assembly shows areas of light rust. The assembly still functions properly, and there is no section loss.

Condition State 2 The pin and hanger assembly shows areas of pack rusting. The assembly still functions properly and any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

Condition State 3 The pin and hanger assembly shows areas of heavy rusting and/or pack rusting which has caused other problems such as deformation, bulging, seizure, or cracking. The assembly does not function properly and/or corrosion has caused section loss that is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Notes:

- This Smart Flag represents all occurrences of deterioration of all the pin and hanger assemblies on the bridge. The quantity will always be one (1). Do not count each deteriorated pin and hanger assembly individually.
- Condition State 3 refers to "warrants structural analysis...". For this condition code, if the steel member has 10% or more section loss, consider that member to be Condition State 3.

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APPENDIX A - Federal Description of BMS and Pontis

(Taken From the Federal Highway Administration's Element Data Collection Manual, January 1995)

BRIDGE MANAGEMENT SYSTEM (BMS)

Why Do We Need a Bridge Management System?

We have an inventory of over 577,000 bridges in the United States. Over 90,000 were constructed in the 1930's and a large percentage are now in need of rehabilitation or replacement. Of the approximately 223,000 bridges built between 1956 and 1975, most will require deck replacement or major repairs in the near future. However, available funding is insufficient to address all the needs. Therefore, wise management of the Nation's bridge inventory is required to ensure the best use of limited monies.

A key concept of a management system is that the best action for an individual bridge may not be the best action when faced with limited funding. Also, in addition to funding, other concerns such as safety, preservation of investment, and uninterrupted service must be included in any management decision process. The bottom line is that bridge failures cannot be tolerated.

Given such factors as limited funds, safety, investment, and type of service, as well as other factors such as variation in designs and materials, differing deterioration rates, interdependence of components (girder deterioration due to leaking joint), the need for a set of tools to help consider all these factors, assess current and future conditions and needs, and help determine where and when to best spend funds was obvious. A bridge management system provides these tools.

A Brief History of Bridge Management

Back in the late 1960's/early 1970's, the National Bridge Inventory (NBI) was created and the National Bridge Inspection Standards (NBIS) were introduced. The NBIS required all bridges over 20 feet in length to have a safety inspection performed at no more than every 2 years. To assist the States in meeting this goal, a *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges* was written. Since then, the requirements for bridge inspections have basically remained unchanged. The Federal Highway Administration (FHWA) continues to use the data collected during these bridge safety inspections to determine the extent of a State's eligibility for Federal funding for their bridge programs.

In the 1980's, concerns were raised about whether use of the NBI was resulting in the most economically realistic needs in view of the limited funds available. Therefore, in 1985, the FHWA initiated a two phase demonstration project to refine the concept of a Bridge Management System (BMS). Phase 1 called for a review of existing State BMS practices and a synthesis of fundamental elements of a national BMS. Phase 2 was initiated to develop a microcomputer tool that any State could use to manage their bridge inventory. This tool eventually was called Pontis.

In 1991, Federal legislation, the Intermodal Surface Transportation Efficiency Act (ISTEA), required every State to have a BMS. The ISTEA gave a compliance schedule that the States were to meet:

- 10/1/94 - Work plan and objectives outlined in a schedule (*Completed*)
- 10/1/95 - BMS design completed or underway with full scale data collection underway
- 10/1/98 - Have a fully operational BMS

The Needs of a Bridge Management System

Essentially, a good BMS is a comprehensive database of bridge, traffic, cost and safety related data and an ongoing program for data collection. An analytical tool is needed to take the data and, through a systematic procedure, yield a network level analysis and optimization of bridge data. Unlike the way engineers handled the bridge program in the past, we now need to look at "Network vs. Project Level" programs. The major difference is that network level analysis deals with the entire bridge inventory (or a subset) whereas project level looks at single bridges. Network analysis is geared at overcoming the traditional practice of examining projects one at a time, in isolation from one another. It provides an initial indication of the best action to take for each bridge.

Using the bridge inspection data you collect, you want to be able to: (1) predict deterioration with and without intervening actions; (2) identify feasible actions to improve condition, safety, or serviceability; (3) estimate costs and user savings; (4) determine maintenance strategies; (5) optimize a program over a specified period and with limited funds; and (6) generate reports for your State legislature.

NBI Compatibility

The ISTEA legislation does not require a State to perform complete dual inspections of all NBI and BMS (Pontis) bridge elements. Essentially, you are required to collect all current NBI data with the exception of NBI item numbers 58 (Deck), 59 (Superstructure), 60 (Substructure), and 62 (Culverts). Through your BMS, you will have a new, more detailed manner for collecting the condition data for NBI items 58, 59, 60, and 62. This new process is called element level data collection.

The FHWA has no plans to change the NBI or how Federal funding is allocated. Therefore, all NBI data is still required. If a State elects to collect only BMS data in the Pontis element level format, a translator program is needed to convert Pontis element data into the required NBI items.

The Role of Bridge Inspectors

As with the NBI, all inspectors collecting and reporting the condition ratings using Pontis must have the same qualifications as the NBIS inspectors.

A good bridge database and a good bridge management system is entirely dependent on good bridge inspection data. A bridge inspector will need to become familiar with the concept of breaking a bridge down into its component elements and assigning a condition state to each element based generally on visual observations and the condition state language provided in this manual.

PONTIS

To quote the *Pontis User's Manual*, "Pontis is a new generation network-level bridge management system which incorporates dynamic, probabilistic models and a detailed bridge database to predict maintenance and improvement needs, recommend optimal policies and schedule projects within budget and policy restraints." In plain English, it is a database containing bridge condition data, traffic needs, accident data, maintenance, improvement and replacement costs, available money, etc. From all this data, a prioritized list of bridge needs can be produced that optimize the limited funds available. Pontis, which means bridge in Latin, differs from the existing NBI inspection program and the system for prioritizing bridge needs currently being used in that the description of the condition of the individual bridge components is more detailed and the Pontis program will analyze all the related data as compared to your entire network, or family, of bridges in your State.

Inspecting bridges under the Pontis system will probably require a State to revise or supplement their field inspection forms. The information collected will be maintained in a computerized data base. You will now have new names for the items collected and new condition descriptions to use. Information will be collected on elements that will have predictable deterioration rates which is important for the deterioration models that are used in Pontis. However, the bottom line is that what was in good condition is still considered good and what was in a bad condition is still considered bad.

Getting Started

To get started, you must import your NBI data into the Pontis system. This will give you all the inventory data and some condition and appraisal ratings from your previous bridge safety inspections. These will be modified once you start collecting your new Pontis field inspection data. The NBI condition ratings can not be used directly, or as the only data source, since these ratings were an attempt to define conditions at an **individual** bridge level indicating general need for repair. Pontis will divide a bridge into it's major elements and require more precise condition inspections.

Element Level Data Inspection

Under the NBI inspection program, you inspect the bridge component or item with an inspection rating of '0' (the worst) through '9' (the best). The guidelines of NBIS required inspectors to give an **average** rating to provide an overall indication of the general condition of the **entire** component being rated. Pontis will look at things differently with '1' being the best and '5' being the worst. Then, rather than look at an average rating, we will be rating bridge elements in quantitative units so that an inspector can rate the entire element and subdivide it into various condition states.

An element is a major component of a bridge (such as abutments, girders, piles, caps, etc.) which can be further subdivided by material type (such as prestressed concrete, timber, weathering steel, etc.). Elements have defined deterioration rates and units that are descriptive and easily measured. The Pontis program provides a list of 160 bridge elements. Every bridge will not have **all** these elements, but more likely would have under a dozen. The maximum number of elements per bridge is based upon the version of Pontis that you are using.

Each element has a set of defined condition states. There are at least three different states and at most five states for each element. Basically they range from "new" to "badly deteriorated" condition. For each condition state, there can be up to two feasible repair actions that could be performed on that element. This does not include the "do nothing" alternative, which is common to all condition states. Condition state language is **not** an attempt to define an element as good, fair or poor. It is **not** a means to handle multiple distresses unless there are similarities in the deterioration rates, have the same feasible actions or have the same associated costs.

In addition to the condition of a bridge element, the behavior of an element is governed by its environment and the effects of traffic and aging. In Pontis, to relate these environmental effects, each element of a bridge is placed in one of these categories: benign, low, moderate or severe.

- A **benign** environment - Neither environmental factors nor operating practices are likely to change the condition of the element over time.
- A **low** environment - Environmental factors or operating practices do not adversely affect condition of the element.
- A **moderate** environment - Changes in element condition are normal as measured against environmental factors and/or operating practices.
- A **severe** environment - Environmental factors or operating practices contribute to the rapid decline in the condition of the element.

Since we inspect total quantities of an element, it is not unreasonable that an element can either have multiple environmental states or condition states. A good example of this is beam ends. A State can elect to track the deterioration of the end portion of a girder/beam (say under an open joint) using the condition state language or by creating a sub-element and assigning it a different environmental category. Using the beam example, there may be 4 girders, each 100 foot long (a total of 400 LF).

However, possibly only the beam ends have advanced deterioration due to joint leakage. You would not code the entire 400 LF in Condition State 4 but only a portion of the total amount, say 5 LF per beam end under the open joint. Also, the deterioration does not have to be on every beam or at each end. Something important to note, when inspecting an element, do not record a rating quantity of less than 1% of the total quantity. Pontis does not track a quantity less than 1% of the total amount for an element.

Pontis consists primarily of CoRe Elements and smart flags. However, Pontis will also support sub-elements and non-CoRe elements. Sub-elements relate directly to a specific CoRe element and share the same units, condition state language and feasible actions. Non-CoRe elements are items that can be added by a State for conditions or situations that are unique to their bridges or a specific bridge.

Pontis will support an element number from 0 to 999. However, the CoRe Element Task Force and the designers of Pontis have chosen to group the elements into some logical order: 1-99 are reserved for deck elements, 100-199 for superstructure elements, 200-299 for substructure elements, and 300-399 for other miscellaneous items. When a State chooses to add a sub-element, they can choose any number not in use. However, we recommend that you follow this numbering scheme. Also, we have been suggesting that you add State element numbers at the high end of the numbering range (i.e. 185-199 for a superstructure element). This is just for your identification of a new sub-element.

Commonly Recognized (CoRe) Elements

As noted above, CoRe elements are those that are common to all bridges nationwide. The elements have consistent definitions, condition state language, units of measure, and contribute to the NBI condition ratings.

A task force, made up of 6 States (Minnesota, Oregon, Colorado, California, Virginia, and Washington) and FHWA developed the idea of using common bridge elements nationwide so that data can be shared, or reported on, nationally. In June 1993, the task force issued its final report. In it, they defined CoRe elements, sub-elements, and smart flags. We, in FHWA, have chosen to use this report as interim guidance regarding element level inspection. A translator program will be issued by FHWA that will take Pontis CoRe element level data and convert the appropriate data to the corresponding NBIS condition ratings.

As mentioned, a CoRe element will have nationwide consistency regarding condition state language, units of measure and relationship to the NBI. These elements were intended to provide a standard list of bridge elements, units of measure, condition states, and feasible actions. This consistent use would facilitate data sharing of costs and deterioration rates and patterns among the States. Also, it is necessary for the standard conversion of the inspection data to the NBI ratings required by FHWA. The University of Colorado and FHWA are developing a conversion program to simplify the transition from Pontis to NBI ratings. The FHWA translator program will access the Pontis database and only use those Pontis elements and sub-elements that directly affect the NBI ratings.

Sub-Elements

A State can also choose to add sub-elements. Why would a State want to add a sub-element? If the physical size, location, and environment is different; or if there are expected differences in deterioration rates or Maintenance, Repair & Rehabilitation (MR&R) costs. As noted above, beam ends are a good example of why a State might consider using a sub-element. However, it is important to remember that these sub-elements must relate directly to a specific CoRe element. In order to be considered a sub-element, the following criteria must be met: (1) the condition state language and feasible actions must remain the same as the corresponding CoRe element; and (2) the units of measure must remain the same as its parent CoRe element.

Some examples of sub-elements are:

- other paint systems
- exterior girders
- girder ends
- hinges

Smart Flags

Smart flags are another feature of Pontis over the NBI program. These "flags" look and operate like an element. They can be used to model specific problems or areas that do **not** exhibit a logical pattern of deterioration. When reviewing the *Field Inspection Manual*, note that Smart Flags do not have feasible actions associated with them. Therefore, they have no impact on the MR&R optimization models run by Pontis. However, Smart Flags are necessary for accurate NBI translation. Another reason to use a Smart Flag is to track distresses not included in the CoRe condition state language. When reading over the condition state language of any element in the manual, you will note that it is written for a specific type of deterioration. For example, look at Element No. 330 "Metal Bridge Rail" in the manual. Note the condition state language is concerned with the condition of the coating system but does not address other problems with the rail system.

Currently we have seven Smart Flags, all have the units of each (EA):

- Steel fatigue
- Pack Rust
- Deck cracking
- Soffit (underside of deck)
- Settlement
- Scour
- Traffic impact

Non-CoRe Elements

Non-CoRe elements are items that a State can add to their Pontis data base for conditions or situations that are unique to their bridges or to a specific bridge. Also, this type of element is used for other non-major components of any bridge.

Some examples of non-CoRe elements:

- Tunnels
- Rigid Frames
- Diaphragms
- Slope Protection
- Lateral Bracing
- Splice Plates

Intentionally Blank

APPENDIX B - Federal Coding Examples

(Taken From the Federal Highway Administration's Element Data Collection Manual, January 1995)

Element Level Rating Examples

Just as with bridge safety inspections, you need to develop a routine for your inspections. The easiest way appears to be to start at the top of the bridge and inspect the deck or slab, joints, bridge railing, and approach slabs. Then, move below and check out the bearing devices, abutments, and piers. Following a routine such as this will enable you to remember the element numbers and ensure that an element is not left unrecorded. Here are some examples:

Example No. 1

Description of Bridge

This is a two span, simply supported, rolled steel multi-beam bridge, with each span consisting of six beams. The two spans are supported by one pier and two abutments constructed of reinforced concrete. The bridge has a deck width of 24 feet and structure length of 144 feet This structure carries two lanes of traffic on Beaver Creek Road over the tributary to Beaver Creek.

Calculating the Quantities

- | | |
|--|--|
| • Beams
144 ft. x 6 beams = 864 LF | • Deck
144 ft. (span) x 24 c/c = 3,456 SF |
| • Expansion Bearings
12 EA | • Bridge Railings
144 ft. x 2 = 288 LF |
| • Fixed Bearings
12 EA | • Pier
24 LF |
| • Abutments
26 ft. x 2 Abuts. = 52 LF | |

Summary of Condition States

- The top of the deck has delaminated concrete and several spalls with exposed rebar. Approximately 13% of the deck surface is affected.
- The bridge railing is in good condition with no deficiencies.
- The expansion joints are clean and functional.

- The underside of the deck shows general areas of fine cracking with rust stains and efflorescence.
- Minor pitting to a depth of 1/16 inch and paint scaling is typical on all bottom flanges of the beams. Top flanges are in good condition with the exception of areas of the diaphragm connections. An area of approximately 6 inches on each side of the connection from top to bottom has 1/16 inch section loss.
- Cover plate end welds at three locations exhibited 4 inch long hairline cracks.
- The diaphragms are showing general pitting to 1/16 inch depth and scaled surface rust typical of all diaphragms.
- The bearings are in fair condition with a minor build-up of pigeon droppings around the base plates causing a failure of the paint system.
- The far abutment has a full height vertical crack between stringers No. 3 and No. 4. This crack varies in width from 1/16 inch to 1/8 inch.
- The near abutment is in good condition, with no deficiencies.
- The pier is in good condition, with no deficiencies.
- The near abutment has lateral scour along the front face for a length of 28 feet x 7 feet wide to a depth of 4 feet.
- The upstream end of pier has a build-up of sediments and debris measuring 40 feet wide x 4 feet high.

Using the descriptions provided above and the condition state language for each appropriate element, data is recorded on a form such as the one shown below.

BMS Field Inspection Form

ELEMENT DESCRIPTION	ENV	TOTAL QTY	UNITS	QUANTITY in CONDITION STATES				
				1	2	3	4	5

CoRe/Non-CoRe Elements

012 - Concrete Deck (Bare)	3	1 (3456 SF)	EA				1	
107 - Painted Steel Open Girder	3	864	LF				864	
210 - R.C. Pier Wall	3	24	LF	24				
215 - R.C. Abutment	3	52	LF	51	1			
311 - Moveable Bearings	3	12	EA		12			
313 - Fixed Bearings	3	12	EA		12			

330 - Metal Railing	3	288	LF	288				
---------------------	---	-----	----	-----	--	--	--	--

Smart Flags

356 - Steel Fatigue	3	1	EA		1			
359 - Soffit	3	1	EA				1	
361 - Scour	3	1	EA		1			

Note that in the above example, a quantity was recorded in Condition State 1 where appropriate. If Condition State 1 is left blank, Pontis will assume the quantity to be the portion not assigned to other condition states. In other words, Pontis will subtract any quantities coded in Condition States 2 through 5 from the total quantity and put any remaining quantity in Condition State 1.

Also, the example assumes all elements are in environment category 3 - moderate. In practice, environments will be assigned in accordance with your State's policy. As inspectors, you may or may not get involved in assigning environments.

Example No. 2

Description of Bridge

This is a single span adjacent box beam bridge with a span length of 38 feet and a clear deck width of 26 feet. The cross section consists of seven beams and measures 28 feet out-to-out. The top flanges of the boxes are exposed as there is no applied wearing surface.

Calculating the Quantities

- Deck
38 ft. (span) x 26 ft. c/c = 988 SF
- Bridge Rail
38 ft. span x 2 = 76 LF
- Beams
38 ft. span x 7 beams = 266 LF
- Abutments
28 ft. x 2 Abuts. = 56 LF

Summary of Condition States

- Transverse cracks can be found in the exposed top flange of Beam #6 for its full length, Beam #3 for 4 LF from Abutment #2, Beam #2 for 6 LF from Abutment #2, and Beam #4 for 3 LF from Abutment #1. Typical crack spacing is 18 inches. The entire surface exhibited light scaling. Joint spaces between the beams were filled with road dirt.
- The metal bridge rail exhibits one 6 LF section which is partially detached from the support post.

- Transverse flexure cracks can be found in the center 6 feet at the bottom, flange of four box beams. The joints between the box beams typically leak, however there is no sign of rust stains or reinforcement damage.
- There is a large longitudinal crack and spall in the bottom flange of Beam #6. The crack extends from Abutment #1 for 15 LF toward mid span.
- The lead sheet bearing material shows no sign of distress.
- A bearing seat stone under Beam #3 at Abutment #1 (20 inches) is deteriorated with 15% loss of bearing area.
- The masonry stems and wingwalls are generally solid and intact with all joint mortar in place. One three foot stone in the stem of Abutment #1 is cracked and weathered on the exposed surface. Abutment #2 stem exhibits a full-height, 1/16 inch wide crack under Beam #3, which extends through the masonry and concrete apron.
- Approximately 5 LF of the downstream corner of Abutment #2 exhibits a large scour hole 2-3 feet deep which extends beneath the footing apron and approximately 1 foot of the abutment footing. The apron along the far left wing exhibits a 1 inch wide crack due to settlement, however the corner masonry is displaced only about 1/16 inch.

BMS Field Inspection Form

ELEMENT DESCRIPTION	ENV	TOTAL QTY	UNITS	QUANTITY in CONDITION STATES				
				1	2	3	4	5

CoRe/Non-CoRe Elements

012 - Concrete Deck - Bare	3	1 (988 SF)	EA	1				
330 - Metal Bridge Rail	3	76	LF	70			6	
104 - P/S Concrete Closed Web Box Girder	3	266	LF	191	24	15		
217 - Other Abutment	3	56	LF	50	4		2	

Smart Flags

358 - Deck Cracking	3	1	EA	1				
360 - Settlement	3	1	EA		1			
361 - Scour	3	1	EA		1			

State Pontis Coding Examples

Introduction

The intention of this Appendix is to assist the inspector with the identification of the various elements used to create a Pontis model of a specific bridge. The examples are designed to exhibit the Pontis element selection process for several specific bridge types as follows:

<u>Example #</u>	<u>Structure Type</u>
1	Two span welded steel girder bridge
2	Steel Girder/Floorbeam/Stringer bridge—only the superstructure elements are modeled
3	Spill through abutment (buttressed)—only the abutment elements are modeled
4	Prestressed concrete adjacent box beam bridge with reinforced concrete deck slab—only the deck and beam elements are modeled

The examples also include various notes designed to eliminate some errors in the Pontis element identification coding which typically occur. There are also some notes included that are intended to help reduce some of the common Pontis quantity and Condition State errors. However, it is understood that examples of all possible bridges cannot be provided in any manual. Therefore, it remains the responsibility of the inspector to use judgment and experience when utilizing this Manual. If questions arise regarding the Pontis coding in specific cases, the inspector should contact Structural Evaluation for clarification.

Element Identification

The first step in the Pontis Identification is the determination of the various elements that comprise the model of the bridge and the calculation of the quantities of the various elements. Before starting this first step, the inspector would be requested to read the “Supplementary Notes” and “Appendix B—Federal Coding Examples” sections of this Manual. Next, the inspector should obtain the following reference documents for the specific bridge being inspected:

- NJDOT Pontis Guidelines Manual
- As-built construction plans for the bridge-if no plans are available, identify and quantify the Pontis elements during the field inspection
- Latest cycle Bridge Survey Report (with photos)
- Structure Inventory and Appraisal (SI&A) Sheet

One of the most common errors includes the failure to identify all Pontis elements. This error can be reduced by first becoming familiar with the Pontis Manual before attempting to develop a Pontis model. Second, the inspector should identify and list all of the structure elements from the plans and the bridge report and then determine the corresponding Pontis Element codes. This procedure is shown in the following four examples.

As the inspector becomes intimately familiar with the element identification process, the listing process before element identification would no longer be necessary. However, there are structure types with unusual Pontis Elements such as “Pin and Hanger Assembly” or “Steel Cable.” Therefore, great care must be taken when unusual structure types are being modeled.

Determining Element Quantities

The quantity calculations are a relatively straight forward process and should not present any difficulties for the inspector who is familiar with the Pontis Manual. However, the following common problems have surfaced and should be avoided:

1. The “Deck/Slab” quantity is in SF (not EACH) and is measured out-to-out of the slab, not curb-to-curb. Care should be taken on older concrete encased steel stringer bridges because the deck slab does not always extend under the sidewalks as on modern construction.
2. The “Approach Slab” quantity is EACH. This means that each approach slab may have multiple slabs separated by longitudinal joints. Rarely is the quantity for this element “2.”
3. The “Wingwall” quantity is LF (not EACH as was erroneously shown in the Pontis database). Remember—only the portions of the wingwalls that are not integral with the abutment are included in this element. Integral portions of the wingwalls are included in the “Abutment” element.
4. When calculating quantities for “Deck Joints”, remember that the joint does not end at the curblines in most cases.
5. When raised median malls are present, they should be included in the quantity for the “Curbs/Sidewalks” element.
6. When NJ shape (or other non-mountable) median barriers are present, they should be included in the quantity for the “Bridge Railing” element.
7. If a concrete curb has a steel angle nose, the concrete and steel portions of the curb would be combined under Element #503 (Curbs/Sidewalks) rather than considered as separate elements. This same situation can also occur with other elements, such as steel curbs and timber sidewalks, which would be treated similarly.
8. When a reinforced concrete balustrade bridge railing with a galvanized steel w-beam guide rail attached to the face of the balustrade is present, Pontis Element #333 (Bridge Railing—Miscellaneous) should be used for the combination railing system. Alternatively, if the galvanized steel w-beam guide rail was installed on steel posts anchored to the top of the sidewalk, Pontis Element #334 (Bridge Railing—Metal—Coated) should be used as the balustrade no longer functions as a bridge railing.

Determining Condition States

The determination of Condition States for the various elements is done in accordance with the Pontis Manual which provides very detailed evaluation criteria. However, some common problems have become apparent that are listed below. If the inspector keeps these problem areas in mind, the chances of making an error will be greatly reduced.

1. The entire area of the “Deck/Slab” must be placed in the one most representative Condition State. The deck/slab area cannot be split up between two or more Condition States.
2. It is not acceptable to leave the Condition States of elements blank because they are not visible. This is a typical problem with “Decks/Slabs”, “Deck Joints” and “Approach Slabs” that are overlaid with asphalt. The inspector must use his judgment to determine the most appropriate Condition States when this occurs. Overlaid deck joints are typically placed in Condition State 2.
3. The inspector must be certain that the coding of SI&A Items 58, 59, 60, etc. are consistent with the various Pontis Condition State coding. This means that when SI&A Item 59 is coded “6”, the various superstructure Pontis elements should not all be Condition State 1 without any Smart Flags coded. The Pontis Condition States and Smart Flags should indicate a representation that SI&A Item 59 is correctly coded as “6.”

Coding Example #1

This is an example of a Pontis model for a simple bridge type. The following bridge is utilized for the example:

Structure No. 1138-171 Princeton Pike over I-295

See the attached bridge plans—sheets 62, 64, 66, 67, 68, 70, 71 and 73 of 88.

Deck and Joint Elements:

<u>Potential Elements</u>	<u>Actual Elements</u>
1. Deck or Slab	#012—Concrete Deck—No Protection
2. Bridge Railing	#331—Bridge Railing—Reinforced Concrete
3. Curbs/Sidewalks	#503—Curbs/Sidewalks—Concrete
4. Median Mall	#503—Curbs/Sidewalks—Concrete
5. Deck Joints	#302—Compression Joint Seal
6. Approach Slab	#321—Approach Slab—Reinforced Concrete
7. Deck Cracking Smart Flag	#358—Determined in the field
8. Soffit Smart Flag	#359—Determined in the field

Deck and Joint Element Notes:

1. There will always be a code for Deck/Slab unless SI&A Item 58=N.
2. The Deck/Slab element code must be consistent with the SI&A Item 108 code. If Item 108C=1 (Epoxy Coated Reinforcing), the Pontis Element must include epoxy coated reinforcing or it is inconsistent.
3. Raised medians or malls will be modeled as Curb/Sidewalk Elements.
4. NJ shape median barriers will be modeled as Bridge Railing Elements. The quantity for split median barriers will be double non-split median barriers.
5. To help identify deck joint elements, use the examples starting on page 172 in the Pontis Manual. Also, do not forget to consider the longitudinal deck joints. However, do not code the approach slab relief joints at the abutments.
6. The Deck Cracking Smart Flag only considers cracking in the top of the Deck/Slab of unprotected decks. Underdeck cracking is considered in the coding of the Soffit Smart Flag.

Superstructure and Bearing Elements:

Potential Elements

Actual Elements

1. Girders	#107—Open Girder—Steel—Painted
2. Fixed Bearings	#375—Pinned Bearings—Fixed
3. Expansion Bearings	#374—Rocker Bearing—Expansion
4. Steel Fatigue Smart Flag	#356—Determined in the field
5. Pack Rust Smart Flag	#357—Determined in the field
6. Section Loss Smart Flag	#363—Determined in the field
7. Traffic Impact Smart Flag	#362—Determined in the field

Superstructure and Bearing Element Notes:

1. Less typical potential superstructure elements have not been listed.
2. Do not use “Stringer” elements unless the structure type I “Truss” or “Girder/Floorbeam/Stringer.” Use “Girder” elements for typical “Stringer” structure types.
3. To help identify bearing elements, use the examples starting on page 193 of the Pontis Manual. For typical rocker and pinned bearings, use elements #374 and #375 respectively.

Substructure Elements:

Potential Elements

Actual Elements

1. Abutments	#215—Abutment—Reinforced Concrete
2. Wingwalls	N/A—Wingwalls are integral with the Abutments
3. Pier Column	#205—Column—Reinforced Concrete
4. Pier Cap	#234—Pier Cap—Reinforced Concrete
5. Slope Protection	#505—Slope Protection
6. Settlement Smart Flag	#360—Determined in the field
7. Scour Smart Flag	N/A

Substructure Element Notes:

1. Element #506 (Wingwalls) should be left blank when the wingwalls are integral with the abutment. The integral portions of the wingwalls must be included with the abutment element quantity.
2. If SI&A Item AJ (Type of Slope Protection) is coded “None”, there should not be a slope protection element.
3. For column bent type piers with crashwalls, the crashwall should be modeled using Element #210 (Pier Wall—Reinforced Concrete) or #211 (Pier Wall—Other).
4. For “spill through” (buttressed) type abutments, see Coding Example #3.

Coding Example #2

This is an example of a Pontis model for a Girder/Floorbeam type bridge. The following bridge is utilized for the example:

Structure No. 0206-163

NJ Route 4 over NJ&NY RR, Kinderkamack Road and Coles Brook

See the attached bridge plan for the framing plan—sheet #11 of 36. Only the center span is being considered.

Superstructure and Bearing Elements:

<u>Potential Elements</u>	<u>Actual Elements</u>
1. Girders	#170—Open Girder—Concrete Encased Steel
2. Stringers	N/A
3. Floorbeams	#174—Floorbeam—Concrete Encased Steel
4. Fixed Bearings	#375—Pinned Bearing—Fixed
5. Expansion Bearings	#374—Rocker Bearing—Expansion
6. Steel Fatigue Smart Flag	#356—Determined in the field
7. Pack Rust Smart Flag	#357—Determined in the field
8. Section Loss Smart Flag	#363—Determined in the field
9. Traffic Impact Smart Flag	#362—Determined in the field

Superstructure and Bearing Element Notes:

1. Less typical potential superstructure elements have not been listed.
2. Do not use “Stringer” elements unless the structure type is “Truss” or “Girder/Floorbeam/Stringer.”
3. To help identify bearing elements, use the examples starting on page 193 in the Pontis Manual. For typical rocker and pinned bearings, use elements #374 and #375 respectively.

Coding Example #3

This is an example of a Pontis model for a spill through (buttressed) abutment. The following bridge is utilized for the example:

Structure No. 1509-152
NJ Route 70 over Central Railroad (Conrail)

See the attached bridge plan for the west abutment—sheet #4 of 9.

This example is provided to specifically illustrate how to model the abutment of similar type bridges. The other elements are not shown.

Substructure Elements

Potential Elements

Actual Elements

1. Abutment	#215—Abutment—Reinforced Concrete
2. Abutment Cap Beam	#234—Pier Cap—Reinforced Concrete
3. Buttress Columns	#205—Column—Reinforced Concrete
4. Wingwalls	N/A—Wingwalls are integral with the Abutment
5. Slope Protection	None—Not Applicable
6. Settlement Smart Flag	#360—Determined in the field
7. Scour Smart Flag	N/A—Not over waterway

Substructure Element Notes:

1. All spill through abutments are modeled in a similar manner.
2. Item 215 (Abutment) would consist of the “backwall” which may also be visible below the cap beam plus any integral portions of the wingwall.
3. Timber bulkhead type abutments would be modeled in a similar manner to the above example.

Coding Example #4

This is an example of a Pontis model for a prestressed concrete adjacent box beam structure with a reinforced concrete deck. The following bridge is utilized for the example:

Structure No. 0507-152
NJ Route 47 over Bidwell Creek

See the attached bridge plan—sheet 174 of 180.

This example is designed to specifically illustrate how to model the deck and superstructure of similar bridge types. The other elements are not shown:

Deck and Superstructure Elements:

Potential Elements

Actual Elements

- | | |
|--------------|---|
| 1. Deck | #026—Concrete Deck—Coated Bars |
| 2. Box Beams | #104—Closed Web/Box Girder—Prestressed Concrete |

Deck and Superstructure Element Notes:

1. Bridges constructed with prestressed concrete voided slab or solid slab beams and reinforced concrete decks would be modeled the same as the above example.
2. Bridges constructed with prestressed concrete box beams, voided slabs or solid slab beams but without a reinforced concrete deck would still have a deck element unless SI&A Item 58 is coded “N”. The deck on such structures would be modeled using Elements #012, #013, #014, #071, #018, #074, #022, #077 or #027.
3. This type bridge frequently has channel beams along the fascia to carry utilities. If present, these beams would be modeled using Element #109—Open Girder—Prestressed Concrete.

New Jersey Department of Transportation

SEISMIC CODING GUIDE

Seismic Coding Guide

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Preface

Introduction

This guide has been prepared for use by the owners of bridges in the State of New Jersey for the recording and coding of data items that will form a Seismic Bridge Database. The data required is in addition to that which is normally obtained through the inventory of bridges and shall be used in conjunction with the *Federal Recording and Coding Guide for Structure Inventory and Appraisal of the Nations Bridges*, the *NJDOT Recording and Coding Guide for the Structure Inventory and Appraisal of New Jersey Bridges* and the *NJDOT Pontis Coding Guide*.

The data items in this Guide will be used as the primary source of information for the New Jersey Bridge Seismic Retrofit Program. Input forms are to be coded according to the definitions and classifications contained in this Guide.

The coded information collected through this effort will assist the New Jersey Department of Transportation (NJDOT) in determining bridge vulnerability to a seismic event and subsequently lead to the fruition of a Multi-Year Priority Retrofit Plan for bridges in New Jersey.

Background information - NJDOT Seismic Retrofit Program

The NJDOT Seismic Retrofit Program (SRP) was developed as a result of extensive changes concerning seismic design for bridges as well as a heightened awareness of the possibility of a significant seismic event in the northeastern part of the United States. The issuance of the 1983 AASHTO Guide Specifications for the Seismic Design of Highway Bridges indicated that the occurrence of a seismic event would have serious implications on public safety.

In 1988, the Seismic Horizontal Acceleration Map was reissued through the American Association of State Highway and Transportation Officials (AASHTO) national bridge design code with considerable changes. Many areas on the east coast, including New Jersey, were placed into higher seismic risk categories. These changes were the impetus for the planning philosophy for the NJDOT SRP.

In 1991, the Federal Highway Administration (FHWA) requested a detailed plan for executing bridge retrofit measures for critical and eligible structures. This action is to result in the development of a Multi-Year Priority Plan for the retrofit of the aforementioned structures. The Department developed the SRP, which is composed of two phases.

PHASE 1 - Preliminary Bridge Screening

The first phase of the SRP will be to perform a preliminary bridge seismic screening. This screening effort will prioritize bridges based on each bridge's potential vulnerability to a seismic event. This screening will investigate structural details that are prone to damage during an earthquake and soils susceptible to liquefaction or amplification that will contribute to structure damage. In order to identify these criteria, the bridge screening process will employ computer methods using the NJDOT Bridge Management System's (BMS) computerized database, that includes the Seismic Bridge Database. Structures containing vulnerable structural details will be identified by using the BMS through data analysis involving various structural fields.

The Department will identify structural details in relationship to soil parameters that are susceptible to damage in a seismic event. Once these details have been identified, they will be ranked according to structural vulnerability. After this information has been obtained, the BMS will be used to identify the structures located in various regions that may be considered at risk due to problematic soil interaction or with seismically vulnerable structural details.

The final task of Phase 1 will result in a bridge list including those bridges that have been identified as containing structural details that are susceptible to damage from ground induced motions based on an AASHTO stipulated event.

PHASE 2 - Structural Evaluation Procedure and Development of a Multi-Year Priority Plan

The bridge list developed from Phase 1 will have been ranked by structural vulnerability. Phase 2 will apply a bridge importance factor that will ultimately determine the Multi-Year Priority Plan.

Information for each bridge on the list will be compiled and utilized in a ranking process using computer methods. This ranking process will include specific decision analysis and risk based techniques. Specific criteria that will be investigated, but not limited to, are: structural vulnerability, public safety, traffic volumes, economics of repairs, major utilities carried, emergency routes, high population density centers, loss of access, current physical bridge condition, etc. The result of this ranking process will enable the Department to develop the Multi-Year Priority Plan for Seismic Bridge Retrofitting.

Data Collection Procedure

A seismic inspection should be performed concurrently with the routine National Bridge Inspection Standards (NBIS) and Pontis inspection survey. Use standard access procedures for a routine biennial inspection for each structure being evaluated. The scope of work for Seismic Bridge data collection includes but is not necessarily limited to the following:

- Complete the Seismic Inspection Form entitled “Seismic Bridge Inspection Form” as follows:

Refer to bridge plans to record all information for those fields that require plan dimensions. When bridge plans are not available, the necessary information for the items shall be collected in the field.

Check for general accuracy of all recorded information during the field inspection. The verification of the seismic data items in the field will not require additional efforts beyond the regular NBIS and Pontis field inspection efforts, since all are to be conducted concurrently.

- Submit completed seismic input forms with the preliminary submission of the Bridge (Re)Evaluation Survey Reports.

- Include output seismic forms provided by the State in the final Bridge (Re)Evaluation Survey Reports under Appendix 1 (Structural Inventory & Appraisal sheet, PONTIS form and the Seismic form).

During the course of data collection, the engineer may encounter data items that do not apply to the structure being evaluated. In this event, the corresponding items on the seismic input form are to be left blank. If information is unavailable or unattainable, the items are also to be left blank.

Seismic Deck Information

Deck Thickness

Field Name: DECK_TH
Field Type: Character
Field Width: 5

Record the thickness of the deck, in inches rounded to the third decimal place. In the event the deck has a variable thickness, record the average thickness of the deck.

Examples: 7.5" Deck Thickness = "07500"
12" Deck Thickness = "12000"
10.55" Deck Thickness = "10550"

Deck Joint Width over Abutment

Field Name: A_JT_WDTH
Field Type: Character
Field Width: 5

The information for this item is to be coded for the most conservative expansion joint opening (smallest opening) over an abutment. Record the perpendicular *plan* width of the deck joint, in inches rounded to the third decimal place.

Examples: 1.5" Joint Width = "01500"
1.75" Joint Width = "01750"

Deck Joint Width over Pier

Field Name: P_JT_WDTH
Field Type: Character
Field Width: 5

The information for this item is to be coded for the most conservative expansion joint opening (smallest opening) over a pier. Record the perpendicular *plan* width of the deck joint in inches rounded to the third decimal place.

Examples: 1.5" Joint Width = "01500"
1.75" Joint Width = "01750"

Seismic Bearing Information

Bearing Height

Field Name: BR_HT
Field Type: Character
Field Width: 5

If the bearing system is a steel rocker configuration, record the bearing height, for the highest bearing on the structure, in inches rounded to the third decimal place. The bearing height shall be measured from the bearing seat or pedestal to the bottom of the beam. This item should not be coded for other bearing systems.

Examples: 7.5" Bearing Height = "07500"
12" Bearing Height = "12000"
10.55" Bearing Height = "10550"

Number of Anchor Bolts

Field Name: NUM_ABLT
Field Type: Character
Field Width: 2

If the bearing system is a steel rocker configuration, record the number of anchor bolts, for the non-alignment bearing. This item should not be coded for the other bearing systems.

Example: 2 Anchor Bolts = "02"

Anchor Bolt Dimensions

Field Name: ABLT_DIM
Field Type: Character
Field Width: 7

If the bearing system is a steel rocker configuration, record the anchor bolt dimensions for the non-alignment bearing. Record the bolt length, in inches rounded to the nearest inch. Also record the bolt diameter, in inches rounded to the third decimal place. This item should not be coded for other bearing systems.

The code is recorded in the following manner:

- Digits 1,2 - Anchor Bolt Length
- Digits 3,4 - Whole Portion of the Bolt Diameter.
- Digits 5,6,7 - Decimal Portion of the Bolt Diameter.

Example: 8" Anchor Bolt, 1.125" Diameter = "0801125"

Pin Diameter

Field Name: PIN_DIA
Field Type: Character
Field Width: 5

If the bearing system is a steel rocker configuration, record the pin diameter for the non-alignment bearing. Record the pin diameter, in inches rounded to the third decimal place. This item should not be coded for other bearing systems.

The code is recorded in the following manner:

- Digits 1,2 - Whole Portion of the Pin Diameter.
- Digits 3,4,5 - Decimal Portion of the Pin Diameter.

Example: 1.125" Diameter = "01125"

Shoulder Dimensions

Field Name: SH_DIM
Field Type: Character
Field Width: 10

If the bearing system is a steel rocker configuration, record the pin shoulder dimensions, for the non-alignment bearing. Record the shoulder diameter, in inches rounded to the third decimal place. Also record the shoulder thickness, in inches rounded to the third decimal place. This item should not be coded for other bearing systems.

The code is recorded in the following manner:

- Digits 1,2 - Whole Portion of the Shoulder Diameter.
- Digits 3,4,5 - Decimal Portion of the Shoulder Diameter.
- Digits 6,7 - Whole Portion of the Shoulder Thickness.
- Digits 8,9,10 - Decimal Portion of the Shoulder Thickness.

Example: 2.5" Shoulder Diameter, 1.5" Shoulder Thickness = "0250001500"

Alignment Bearing

Field Name: AL_BRG
Field Type: Character
Field Width: 1

An alignment bearing is often used to establish the alignment of the bridge roadway. This bearing is generally stiffer than the other bearings on the structure and consequently can effect the response of a structure to a seismic event. These systems generally contain more anchor bolts and an increase in detail dimensions.

Code this item for all bearing systems. Record whether there is an alignment bearing present in the system.

The code is recorded in the following manner:

<u>Code</u>	<u>Description</u>
1	Alignment Bearing Present
2	No Alignment Bearing

Transverse Restraint

Field Name: TRAN_MOV
Field Type: Character
Field Width: 1

Code this item for all bearing systems. Record whether there is restraint against transverse movement.

The code is recorded in the following manner:

<u>Code</u>	<u>Description</u>
1	Bearing System has a Restraint Mechanism
2	No Restraint System Present

Examples of transverse restraint follow:

- A rocker bearing system is considered to have limited transverse restraint capabilities. The pintel and the pin shoulder are expected to prevent major movement in the transverse direction.
- Prestressed box beam girders use a grouted dowel system embedded in the abutment to prevent lateral movement.
- Systems where shear blocks have been employed to prevent lateral movement.
- Some structures have cheek walls which can prevent the exterior girders from moving laterally.

Seismic Superstructure Information

Number of Beams (Main Span) and Beam Spacing

Field Name: NUM_BMS

Field Type: Character

Field Width: 7

Record the number of beams in the main span only. The main span is generally defined as the largest span. Record the maximum beam spacing, measured center to center perpendicular between beams found in the main span, in feet rounded to the third decimal place.

The code is recorded in the following manner:

- Digits 1,2 - Number of Beams.
- Digits 3,4 - Whole Number Portion of the Beam Spacing.
- Digits 5,6,7 - Decimal Portion of the Beam Spacing.

Examples: 7 beams with a maximum spacing of 8'-6" = "0708500"
 10 beams with maximum spacing of 7'-5" "1007417"

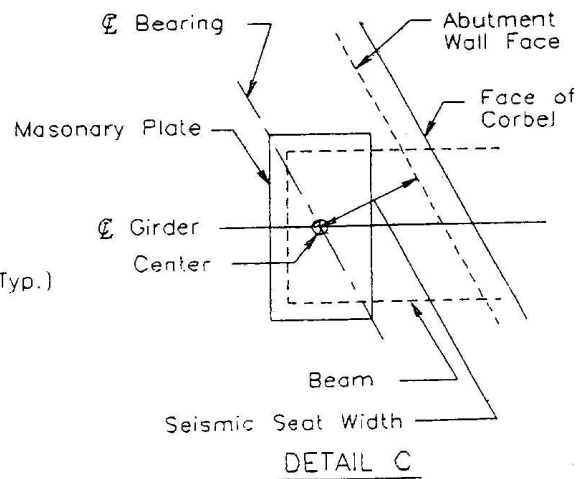
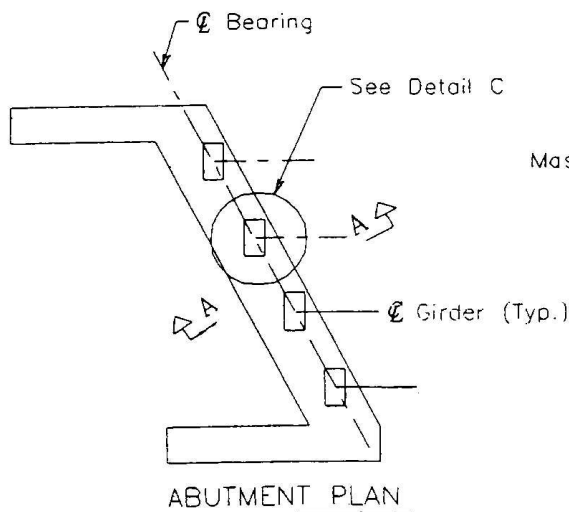
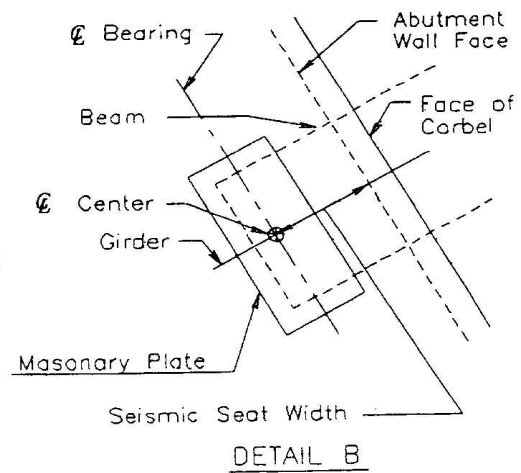
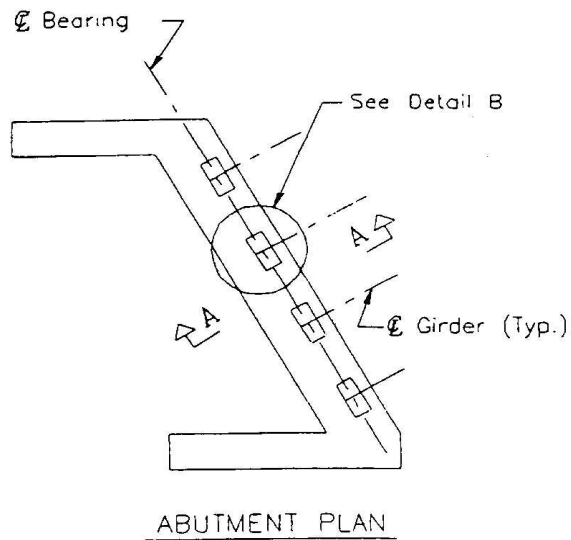
Seismic Substructure Information

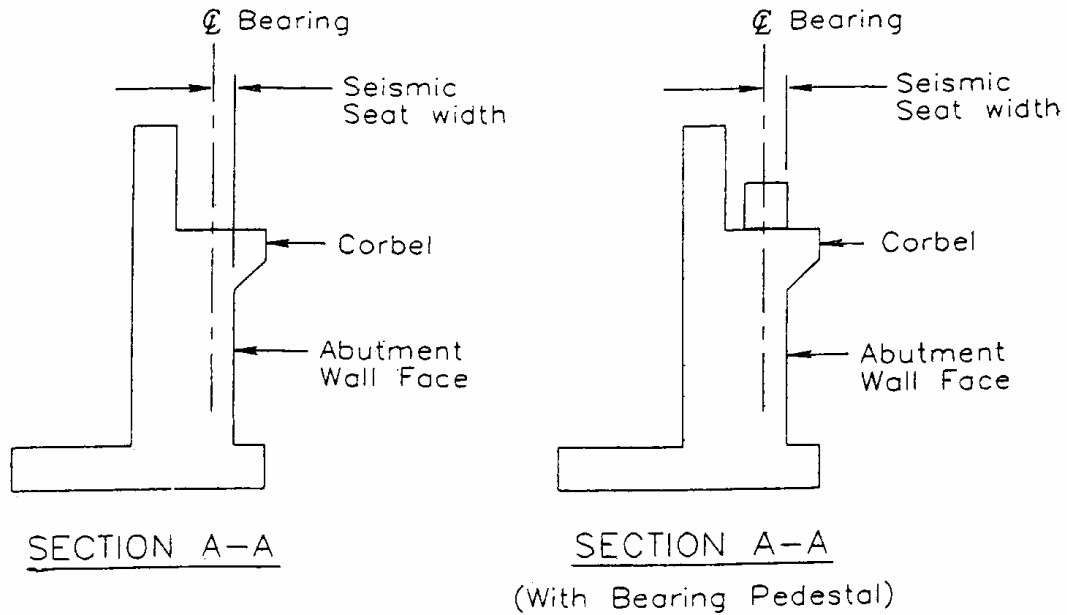
Abutment Seat Width

Field Name: ASEAT_WD
Field Type: Character
Field Width: 5

Record the abutment seat width, in inches rounded to the third decimal place. The seat width is to be measured from the centerline of bearing to the edge of the bearing seat or pedestal.

Examples: 7.5" Seat Width = "07500"
12" Seat Width = "12000"
10.55" Seat Width = "10550"





Note: Ignore Abutment Corbel

Pier Seat Width

Field Name: PSEAT_WD
Field Type: Character
Field Width: 5

The information for this item is to be coded for the most conservative pier (tallest pier). The seat width is to be measured from the centerline of bearing to the edge of the bearing seat or pedestal. Record the pier seat width, in inches rounded to the third decimal place.

Examples: 7.5" Seat Width = "07500"
 12" Seat Width = "12000"
 10.55" Seat Width = "10550"

Column Reinforcement

Field Name: COL_REIN
Field Type: Character
Field Width: 1

The information for this item is to be coded for the most conservative pier (tallest pier). Record the type of column reinforcement.

The code is recorded in the following manner:

<u>Code</u>	<u>Description</u>
1	Tied Reinforcement
2	Spiral Reinforcement

Column Cross Section

Field Name: COL_DIM
Field Type: Character
Field Width: 6

The information for this item is to be coded for the most conservative pier (tallest pier). Record the column cross section dimensions, in inches rounded to the nearest inch. If the pier is a solid wall configuration, code the thickness of the wall.

The code is recorded in the following manner:

- Digits 1,2,3 - Length of cross section if rectangular or square column.
Code "000" - If column is circular or solid wall.
- Digits 4,5,6 - Width of cross section if rectangular or square, diameter if circular, wall thickness if solid wall.

Examples: 36" Circular Column = "000036"
 24" x 24" Square Column = "024024"
 18" x 24" Rectangular Column = "018024"
 30" Solid Wall = "000030"

Column Height

Field Name: COL_HT
Field Type: Character
Field Width: 5

The information for this item is to be coded for the most conservative pier (tallest pier). Record the column height, in feet rounded to the third decimal place. The height shall be measured from the top of the footing to the bottom of the pier cap. If the pier system is a solid wall, the wall height shall be coded in this field.

The code is recorded in the following manner:

- Digits 1,2 - Whole number portion of the height.
- Digits 3,4,5 - Decimal portion of the height.

Examples: 13'-6" Column Height = "13500"
8'-10" Wall Height = "08833"

Column F'c

Field Name: COL_FC
Field Type: Character
Field Width: 4

The information for this item is to be coded for the most conservative pier (tallest pier). Record the column concrete compressive strength in PSI.

Examples: 3000 PSI Concrete Strength = "3000"
3250 PSI Concrete Strength = "3250"

Longitudinal Reinforcement

Field Name: COL_BAR
Field Type: Character
Field Width: 4

The information for this item is to be coded for the most conservative pier (tallest pier). Record the number of longitudinal bars in the column and the bar designation. If the pier system is a solid wall, the amount of steel shall be calculated per foot of wall length.

The code is recorded in the following manner:

- Digits 1,2 - Amount of Bars.
- Digits 3,4 - Bar Designation.

Example: 8 - Number 9 Bars = "0809"

Pile Embedment

Field Name: PILE_EM
Field Type: Character
Field Width: 3

The information for this item is to be coded for the most conservative pier (tallest pier). If the pier is on a pile foundation, record pile embedment in inches rounded to the first decimal place. The program will check the number entered. If the whole portion of the number is a single digit number, the program will place a zero in the first position.

Examples: 7.5" Pile Embedment = "075"
12" Pile Embedment = "120"

General Seismic Information

Structure Remarks

Field Name: SEIS_REM

Field Type: Memo

Field Width: N/A

This field is intended for the use of the engineer. Information considered as relevant information that has not been captured by the seismic fields can be recorded in paragraph form here.

In the case that the field data is consistent with the plan information, the field data shall be recorded in the appropriate field and a remark shall be recorded in this field concerning the discrepancy.

New Jersey Department of Transportation
SEISMIC BRIDGE INSPECTION FORM

Structure Identification

Route: 9104	Structure Number: 004A-006	Milepoint: 000.000
Structure Name: MORGAN BLVD/N BR NEWTON CREEK		

Seismic Deck Information

Deck Thickness:	
Abutment Joint Width:	
Pier Joint Width:	

Seismic Superstructure Information

# Beams Main Span:	
Structure Type: 111	CONCRETE ARCH-DECK

Seismic Substructure Information

Abutment Seat Width:	
Pier Seat Width:	
Column Reinforcement:	
Column Cross Section:	
Column Height:	
Column F'c:	
Longitudinal Reinforcement:	
Pile Embedment:	
Type of Pier:	NONE
Type of Abutment: 29	GRAVITY/T/2

Seismic Bearing Information

Bearing Height:	
Number of Anchor Bolts:	
Anchor Bolt Dimensions:	
Pin Diameter:	
Shoulder Dimensions:	
Alignment Bearing:	
Transverse Restraint:	

Seismic Remarks

Produced By: _____

Inspected By: _____