

List of WSDOT Elements by Number

Bridge Decks				
12	Concrete Deck	4-16	28 Steel Deck – Open Grid	4-19
13	Bridge Deck Surface	4-16	29 Steel Deck – Concrete Filled Grid	4-19
14	Fully Supported Concrete Deck	4-17	30 Deck – Corrugated or Other Steel System.	4-19
15	Post Tensioned Concrete Deck	4-17	31 Timber Deck	4-20
16	Thin Concrete Deck < 6” Thick	4-18	32 Fiber Reinforced Polymer (FRP) – Deck.	4-20
20	Concrete Deck – Lightweight Aggregate	4-18	35 Concrete Deck Soffit	4-21
26	Concrete Deck w/Coated Bars	4-18	36 Deck Rebar Cover Flag	4-21
27	Steel Orthotropic Deck	4-19		

Superstructure				
38	Concrete Slab	4-23	115 Prestressed Concrete Girder	4-32
49	Concrete Hollow Slab	4-23	116 Concrete Stringer	4-33
50	Prestressed Concrete Slab	4-23	117 Timber Sawn Girder	4-33
51	Prestressed Concrete Slab w/Coated Bars	4-23	118 Timber Stringer	4-33
52	Concrete Slab w/Coated Bars	4-24	119 Concrete Truss	4-34
54	Timber Slab	4-24	126 Steel Thru Truss	4-34
89	Prestressed Concrete Girder w/Coated Strands	4-25	131 Steel Deck Truss	4-34
90	Steel Rolled Girder	4-25	133 Truss Gusset Plates	4-35
91	Steel Riveted Girder	4-25	135 Timber Truss	4-35
92	Steel Welded Girder	4-26	139 Timber Arch	4-36
96	Concrete Encased Steel Girder	4-26	140 Composite Arch	4-36
97	Prestressed Concrete Tub Girder	4-27	141 Steel Arch	4-36
98	Thin Flange Girder	4-27	142 Steel Tied Arch	4-37
100	Post Tensioned Concrete Segmental Box Girder	4-28	143 Steel Suspender	4-37
102	Steel Box Girder	4-28	144 Concrete Arch	4-38
103	Prestressed Concrete Super Girder	4-29	140 Composite Arch	4-36
104	Post Tension Concrete Box Girder	4-29	145 Earth Filled Concrete Arch	4-38
105	Concrete Box Girder	4-29	146 Suspension – Main Cable	4-39
107	Steel Open Girder	4-30	147 Suspension – Suspender Cable	4-39
108	Prestressed Concrete Bulb-T Girder	4-30	149 Cable Stayed Bridge – Cable	4-39
109	Prestressed Concrete Multiple Web Girder Units	4-30	150 Concrete Column on Spandrel Arch	4-40
110	Concrete Girder	4-31	152 Steel Floor Beam	4-40
111	Timber Glue-Lam Girder	4-31	154 Prestressed Concrete Floor Beam	4-40
113	Steel Stringer	4-32	155 Concrete Floor Beam	4-41
114	Concrete Multiple Web Girder Unit	4-32	156 Timber Floor Beam	4-41
			160 Steel Column on Spandrel Arch	4-41
			161 Steel Hanger	4-42
			162 Steel Pin	4-42
			163 Tension Hold Down Anchor Assembly	4-43

Substructure			
200	Abutment Fill	4-46	225 Steel Pile 4-52
202	Steel Column	4-46	226 Prestressed Concrete Pile 4-53
203	Prestressed Hollow Concrete Column	4-47	227 Concrete Pile 4-53
204	Prestressed Concrete Column	4-47	228 Timber Pile 4-53
205	Concrete Column	4-47	229 Timber Cap Rehab with Steel 4-54
206	Timber Column	4-47	231 Steel Pier Cap/Crossbeam 4-54
210	Concrete Pier Wall	4-48	232 Prestressed Hollow Concrete Pile 4-55
211	Other Pier Wall	4-48	233 Prestressed Concrete Pier Cap/ Crossbeam 4-55
214	Concrete Web Wall between Columns	4-48	234 Concrete Pier Cap/Crossbeam 4-55
215	Concrete Abutment	4-49	235 Timber Pier Cap 4-56
216	Timber Abutment	4-50	236 Concrete Floating Pontoon 4-56
217	Other Abutment	4-50	237 Pontoon Hatch/Bulkhead 4-58
218	Steel Abutment	4-51	238 Floating Bridge – Anchor Cable 4-59
220	Concrete Pile Cap/Footing	4-51	
222	Timber Foundation	4-52	

Culverts			
240	Metal Culvert	4-61	242 Timber Culvert 4-62
241	Concrete Culvert	4-61	243 Other Culvert 4-62

Sidewalk and Supports			
260	Steel Open Grid Sidewalk and Supports	4-63	264 Timber Sidewalk and Supports 4-64
261	Steel Concrete Filled Grid Sidewalk and Supports	4-63	266 Concrete Sidewalk and Supports 4-64
262	Corrugated/Orthotropic Sidewalk and Supports	4-63	267 Fiber Reinforced Polymer (FRP) Sidewalk and Supports 4-64

Bearings			
310	Elastomeric Bearing	4-65	314 Pot Bearing 4-66
311	Moveable Bearing (Roller, Sliding, etc.)	4-65	315 Disc Bearing 4-66
312	Concealed Bearing or Bearing System	4-65	316 Isolation Bearing 4-66
313	Fixed Bearing	4-65	

Approach Slab	
321	Concrete Roadway Approach Slab 4-67

Bridge Rail			
330	Metal Bridge Railing	4-67	332 Timber Bridge Railing 4-67
331	Concrete Bridge Railing	4-67	333 Other Bridge Railing 4-68

Pedestrian Rail			
340	Metal Pedestrian Rail	4-68	342 Timber Pedestrian Rail 4-68
341	Concrete Pedestrian Rail	4-68	343 Other Pedestrian Rail 4-69

Smart Flags

322 Approach Roadway Impact – Smart Flag	4-69	361 Scour – Smart Flag	4-72
351 Chloride Impact – Smart Flag	4-70	376 Concrete Deck Delamination Testing – Smart Flag	4-73
353 Encampment Impact– Smart Flag	4-71	378 WSDOT Undercrossing Safety – Smart Flag	4-74
355 Damaged Bolts or Rivets – Smart Flag	4-71	379 Local Agency Undercrossing Safety Inspection – Smart Flag	4-74
355 Damaged Bolts or Rivets – Smart Flag	4-71	381 Joint Seal/Gland Leaking – Smart Flag	4-74
356 Steel Cracking – Smart Flag	4-71		
357 Pack Rust – Smart Flag	4-72		
360 Bridge Movement – Smart Flag	4-72		

Seismic Retrofit

207 Concrete Column w/Steel Jacket	4-75	371 Seismic – Transverse Restrainer	4-77
208 Concrete Pile/Column w/Composite Wrap	4-76	372 Seismic – Link/Pin Restrainer	4-78
368 Seismic Pier Crossbeam Bolster	4-77	373 Seismic – Catcher Block	4-78
369 Seismic Pier Infill Wall	4-77	374 Seismic - Column Silo	4-79
370 Seismic – Longitudinal Restrainer	4-77		

Expansion Joints

400 Asphalt Butt Joint – Paving Joint Seal	4-81	412 Strip Seal – Anchored	4-85
401 Asphalt Open Joint – Paving Joint Seal	4-81	413 Strip Seal – Welded	4-86
402 Open Concrete Joint – Paving Joint Seal	4-82	414 Bolt Down – Sliding Plate w/springs	4-86
403 Concrete Bulb-T	4-82	415 Bolt-Down Panel – Molded Rubber	4-87
404 Compression Seal/Concrete Header	4-83	416 Assembly Joint Seal (Modular)	4-87
405 Compression Seal/Polymer Header	4-83	417 Silicone Rubber Joint	4-88
406 Compression Seal/Steel Header	4-83	418 Asphalt Plug	4-88
407 Steel Angle Header	4-84	419 Steel Angle w/Raised Bars	4-89
408 Steel Sliding Plate	4-84	420 Joint Paved Over Flag	4-89
409 Steel Sliding Plate w/Raised Bars	4-84	421 Concrete Slab In-Span Joint	4-90
410 Steel Fingers	4-85	422 Flexible Joint Seal	4-91
411 Steel Fingers w/Raised Bars	4-85		

Movable Bridges

501 Movable Bridge Steel Tower	4-92
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Other Bridge Elements

705 Bridge Luminaire Pole and Base	4-92	709 Ceramic Tile	4-94
707 Fender System/Pier Protection	4-93	710 Bridge Mounted Sign Structures	4-94

Overlays

800 Asphalt Concrete (AC) Overlay	4-95	804 Polyester Concrete Overlay	4-96
801 Asphalt Concrete (AC) Overlay with Waterproofing Membrane	4-95	805 AC Over a Polymer Overlay	4-96
802 Thin Polymer Overlay	4-95	806 BST on Concrete (Chip Seal)	4-96
803 Modified Concrete Overlay	4-96	807 Asphalt Concrete (AC) Overlay W/High Performance Membrane	4-97

Protective Coatings

901	Red Lead Alkyd Paint System	4-97	907	Galvanizing	4-98
902	Inorganic Zinc/Vinyl Paint System	4-97	908	Epoxy Paint for Weathering Steel	4-98
903	Inorganic Zinc/Urethane Paint System	4-97	909	Zinc Primer	4-98
904	Organic Zinc/Urethane Paint System	4-97	910	Weathering Steel Patina	4-99
905	Coal Tar Epoxy Paint System	4-98	911	Paint System – Other	4-99
906	Metalizing	4-98			

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13	Bridge Deck Surface	4-16	29	Steel Deck – Concrete Filled Grid	4-19
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16	Thin Concrete Deck < 6" Thick	4-18	32	Fiber Reinforced Polymer (FRP) – Deck	4-20
20	Concrete Deck – Lightweight Aggregate	4-18	35	Concrete Deck Soffit	4-21
26	Concrete Deck w/Coated Bars	4-18	36	Deck Rebar Cover Flag	4-21
27	Steel Orthotropic Deck	4-19			

Bridge Deck Overlays					
801	Asphalt Concrete (AC) Overlay with Waterproofing Membrane	4-95	805	AC Over a Polymer Overlay	4-96
802	Thin Polymer Overlay	4-95	806	BST on Concrete (Chip Seal)	4-96
803	Modified Concrete Overlay	4-96	807	Asphalt Concrete (AC) Overlay W/High Performance Membrane	4-97
804	Polyester Concrete Overlay	4-96			

Expansion Joints					
402	Open Concrete Joint – Paving Joint Seal	4-82	412	Strip Seal – Anchored	4-85
403	Concrete Bulb-T	4-82	413	Strip Seal – Welded	4-86
404	Compression Seal/Concrete Header	4-83	414	Bolt Down – Sliding Plate w/springs	4-86
405	Compression Seal/Polymer Header	4-83	415	Bolt-Down Panel – Molded Rubber	4-87
406	Compression Seal/Steel Header	4-83	416	Assembly Joint Seal (Modular)	4-87
407	Steel Angle Header	4-84	417	Silicone Rubber Joint	4-88
408	Steel Sliding Plate	4-84	418	Asphalt Plug	4-88
409	Steel Sliding Plate w/Raised Bars	4-84	419	Steel Angle w/Raised Bars	4-89
410	Steel Fingers	4-85	420	Joint Paved Over Flag	4-89
411	Steel Fingers w/Raised Bars	4-85	421	Concrete Slab In-Span Joint	4-90

Approach Slab		
321	Concrete Roadway Approach Slab	4-67

Bridge Rail					
330	Metal Bridge Railing	4-67	332	Timber Bridge Railing	4-67
331	Concrete Bridge Railing	4-67	333	Other Bridge Railing	4-68

Pedestrian Rail					
340	Metal Pedestrian Rail	4-68	342	Timber Pedestrian Rail	4-68
341	Concrete Pedestrian Rail	4-68	343	Other Pedestrian Rail	4-69

Sidewalk and Supports

260	Steel Open Grid Sidewalk and Supports	4-63	264	Timber Sidewalk and Supports	4-64
261	Steel Concrete Filled Grid Sidewalk and Supports	4-63	266	Concrete Sidewalk and Supports	4-64
262	Corrugated/Orthotropic Sidewalk and Supports	4-63	267	Fiber Reinforced Polymer (FRP) Sidewalk and Supports	4-64

Seismic Retrofit

207	Concrete Column w/Steel Jacket	4-75	370	Seismic – Longitudinal Restrainer	4-77
208	Concrete Pile/Column w/Composite Wrap	4-76	371	Seismic – Transverse Restrainer	4-77
368	Seismic Pier Crossbeam Bolster	4-77	372	Seismic – Link/Pin Restrainer	4-78
369	Seismic Pier Infill Wall	4-77	373	Seismic – Catcher Block	4-78

Reinforced Concrete

38	Concrete Slab	4-23	116	Concrete Stringer	4-33
49	Concrete Hollow Slab	4-23	119	Concrete Truss	4-34
52	Concrete Slab w/Coated Bars	4-24	144	Concrete Arch	4-38
96	Concrete Encased Steel Girder	4-26	145	Earth Filled Concrete Arch	4-38
105	Concrete Box Girder	4-29	150	Concrete Column on Spandrel Arch	4-40
110	Concrete Girder	4-31	155	Concrete Floor Beam	4-41
114	Concrete Multiple Web Girder Unit	4-32			

Prestressed Concrete

50	Prestressed Concrete Slab	4-23	103	Prestressed Concrete Super Girder	4-29
51	Prestressed Concrete Slab w/Coated Bars	4-23	104	Post Tension Concrete Box Girder	4-29
89	Prestressed Concrete Girder w/Coated Strands	4-25	108	Prestressed Concrete Bulb-T Girder	4-30
97	Prestressed Concrete Tub Girder	4-27	109	Prestressed Concrete Multiple Web Girder Units	4-30
98	Thin Flange Girder	4-27	115	Prestressed Concrete Girder	4-32
100	Post Tensioned Concrete Segmental Box Girder	4-28	154	Prestressed Concrete Floor Beam	4-40

Structural Steel

90	Steel Rolled Girder	4-25	131	Steel Deck Truss	4-34
91	Steel Riveted Girder	4-25	133	Truss Gusset Plates	4-35
92	Steel Welded Girder	4-26	141	Steel Arch	4-36
102	Steel Box Girder	4-28	142	Steel Tied Arch	4-37
107	Steel Open Girder	4-30	143	Steel Suspender	4-37
113	Steel Stringer	4-32	152	Steel Floor Beam	4-40
126	Steel Thru Truss	4-34	160	Steel Column on Spandrel Arch	4-41

Pin & Hangers			
161	Steel Hanger.....	4-42	162 Steel Pin 4-42
Timber			
54	Timber Slab.....	4-24	135 Timber Truss..... 4-35
111	Timber Glue-Lam Girder.....	4-31	139 Timber Arch 4-36
117	Timber Sawn Girder	4-33	156 Timber Floor Beam
118	Timber Stringer	4-33	
Cables			
146	Suspension – Main Cable.....	4-39	149 Cable Stayed Bridge – Cable..... 4-39
147	Suspension – Suspender Cable.....	4-39	
Bearings			
310	Elastomeric Bearing	4-65	314 Pot Bearing..... 4-66
311	Moveable Bearing (Roller, Sliding, etc.) .	4-65	315 Disc Bearing..... 4-66
312	Concealed Bearing or Bearing System..	4-65	316 Isolation Bearing
313	Fixed Bearing	4-65	
Reinforced Concrete			
205	Concrete Column	4-47	227 Concrete Pile
210	Concrete Pier Wall	4-48	234 Concrete Pier Cap/Crossbeam
214	Concrete Web Wall between Columns .	4-48	236 Concrete Floating Pontoon
215	Concrete Abutment	4-49	237 Pontoon Hatch/Bulkhead
220	Concrete Pile Cap/Footing	4-51	238 Floating Bridge – Anchor Cable
Prestressed Concrete			
203	Prestressed Hollow Concrete Column..	4-47	232 Prestressed Hollow Concrete Pile
204	Prestressed Concrete Column.....	4-47	233 Prestressed Concrete Pier Cap/ Crossbeam
226	Prestressed Concrete Pile	4-53	
Structural Steel			
202	Steel Column	4-46	225 Steel Pile..... 4-52
218	Steel Abutment	4-51	231 Steel Pier Cap/Crossbeam..... 4-54
Timber			
206	Timber Column	4-47	228 Timber Pile
216	Timber Abutment	4-50	235 Timber Pier Cap..... 4-56
222	Timber Foundation	4-52	
Substructure - Other			
211	Other Pier Wall	4-48	217 Other Abutment

Culverts

240	Metal Culvert	4-61	242	Timber Culvert.	4-62
241	Concrete Culvert.	4-61	243	Other Culvert.	4-62

Movable Bridges

501	Movable Bridge Steel Tower	4-92
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Other Bridge Elements

705	Bridge Luminaire Pole and Base	4-92	709	Ceramic Tile	4-94
707	Fender System/Pier Protection.	4-93	710	Bridge Mounted Sign Structures.	4-94

Protective Coatings

901	Red Lead Alkyd Paint System	4-97	907	Galvanizing.	4-98
902	Inorganic Zinc/Vinyl Paint System	4-97	908	Epoxy Paint for Weathering Steel.	4-98
903	Inorganic Zinc/Urethane Paint System	4-97	909	Zinc Primer.	4-98
904	Organic Zinc/Urethane Paint System.	4-97	910	Weathering Steel Patina.	4-99
905	Coal Tar Epoxy Paint System	4-98	911	Paint System – Other	4-99
906	Metalizing.	4-98			

Smart Flags

322	Approach Roadway Impact – Smart Flag	4-69	361	Scour – Smart Flag	4-72
351	Chloride Impact – Smart Flag	4-70	378	WSDOT Undercrossing Safety - Smart Flag	4-74
353	Encampment Impact– Smart Flag	4-71	379	Local Agency Undercrossing Safety Inspection – Smart Flag	4-74
355	Damaged Bolts or Rivets – Smart Flag.	4-71	381	Joint Seal/Gland Leaking – Smart Flag	4-74
356	Steel Cracking – Smart Flag.	4-71			
357	Pack Rust – Smart Flag.	4-72			
360	Bridge Movement – Smart Flag	4-72			

4-1 Introduction

This chapter defines the Washington State Department of Transportation (WSDOT) approach for inspection, evaluation and recording of the structural condition state of the bridge structures within the WSDOT obligation to the National Bridge Inventory.

Local Agencies with inventory not on the National Highway System are encouraged, but not required, to use the WSDOT Bridge Element approach as defined in this chapter. Doing so will enable the Local Agency to benefit from WSDOT Management strategies and lessons learned.

The intent of the element-level condition reporting is to supplement the National Bridge Inventory (NBI) structural condition state of the Bridge Deck, Superstructure, and Substructure. NBI information such as bridge location, traffic, and geometry is useful, however, element-level condition reporting provides a greater degree of information from which to draw upon to more effectively apply solutions to emergent bridge preservation and management needs.

Though the NBIS provides a consistent standard for the collection of bridge data, it is not comprehensive enough to provide performance-based decision support that includes economic considerations.

Limitations within the NBI system include:

- Each bridge is divided into only three major components for condition assessment: deck, superstructure, and substructure. This level of detail is not sufficient to identify appropriate repair strategies, or to accurately estimate repair/rehabilitation/replacement costs.
- Each of the three major components are rated on a 0-9 scale by severity of deterioration, without identifying the deterioration process at work or the extent of deterioration.
- NBI condition ratings vary based on the broad language of the condition definitions. Because the bridges include multiple distress symptoms and ratings to describe the overall or “average” condition of the bridge, it is often difficult to decide what the “average” condition is when a bridge has mainly localized problems.
- NBI does not provide a method to inspect or track the performance of items such as paint, overlays, and expansion joints.

WSDOT recognized a different strategy towards future bridge preservation was needed in the early 1980's. A comprehensive deck testing program existed at the time and the Bridge Inspection Program needed to have a connection to the NBI bridge condition rating convention.

WSDOT elements have been in use since 1992 and are designed to be practical for the inspector, useful to a bridge manager, and accurately capture bridge conditions.

WSDOT elements have matured since 1992 and so have the national element philosophies:

- 1985 – NCHRP Project 12-28: Bridgit and Pontis Management software
- 1987 – NCHRP Report 300: Element based Bridge Management System (BMS)
- 1993 – FHWA CoRe Element Report recommendations
- 1996 – AASHTO CoRe Element Guidelines adopted
- 2011 – AASHTO Guidelines for Bridge Element Inspection

- 2014 – FHWA requirement to collect element level bridge inspection data for NHS bridges.
- 2015 – As a supplement to the National Bridge Inventory (NBI) data submission due April 1, 2015, and every year thereafter, each State and Federal agency will also provide element level bridge inspection data for bridges on the NHS to the FHWA for inclusion in the NBI.

Today, a successful Bridge Management System must use supplemental bridge condition data to ensure the effective use of available funds. WSDOT element data has supported WSDOT Bridge needs with minor changes since the year 2008 in the following ways:

- Element data is used to identify current bridge condition, need, and cost.
- Provides a logical and realistic method to prioritize bridge projects.
- Provides realistic and reliable forecasts of future preservation needs and costs.
- Adapts to changes in management philosophies without changing an element definition or category.
- Tracks the performance of desired bridge needs.

4-1.1 Element Description

A bridge is divided into three major components which includes the:

- Bridge deck
- Bridge superstructure
- Bridge sub-structure.

Bridge *elements* are individual members comprised of basic shapes and materials connected together to form bridge components. (Ref BIRM Sec. 4.2.2). The WSDOT Inspection program is based upon documenting the condition state of these elements. This is accomplished through documenting the results of the visual and physical examination of these elements.

4-1.2 Smart Flag

The “Smart Flag” provides supplemental information gathered by the Inspector concerning an observed condition or defect that may or may not be included in the National Bridge Inventory element condition state language – and is judged to be necessary in order to accurately document the element commentary.

4-1.3 Identifying Elements Prior to Inspection

Details about the design of the bridge are important when identifying the elements. As-built plans should be used to determine the correct elements, and then field verified during the inspection. If as-built plans are not available, then the elements will have to be defined or assumed at the bridge site. Many of the element dimensions for the element total quantity are difficult to determine in the field and it is highly recommended the total quantities be calculated based on contract plan dimensions.

For example, looking at the contract Plans is the only practical way to determine if a bridge deck has plain reinforced steel which is element 12, or epoxy coated steel which is element 26 because this information is not visible to the inspector. Likewise, field measuring the deck length and width in traffic would not be necessary and usually less accurate than if plan dimensions are available.

An average bridge made of the same material will have six to ten elements. A large or complex bridge may have up to 20 elements. A typical bridge will have a bridge deck, possibly a deck overlay, bridge rails, a primary load carrying member like a prestressed concrete girder, primary substructure support like concrete columns, other elements like abutments, expansion joints and/or bearings.

In order to maintain quality element data, the Inspector is responsible for updating the elements and quantities as they change with time by maintenance or by contract. Many bridges will have construction work that changes the joints, asphalt depth, rail, concrete overlay, or widens the structure, etc. These activities can change elements that apply to the bridge and must be updated accordingly. WSDOT uses a Contract History database to log contract work and for reference. See Section 2-2 for more information on the Contract History database.

4-1.4 **Application of Element Units**

Each element is assigned a unit of measure which quantifies the extent of an observed defect.

Unit descriptions are:

- **Square Feet (SF):** Where the surface area is used to document the element condition state, such as deck surface and paint surface elements.
- **Lineal Feet (LF):** Represents the total length of an element and is based on the way it was constructed. For example: A bridge may have been built using five “Prestressed Concrete Girders.” Each girder was individually pre-cast and then put into place at the bridge site. If each girder were 100 feet in length, then the total element quantity would be “500 LF.” If the same bridge was a “Concrete Box Girder” then the total quantity would be “100 LF” since the box girder was constructed as one unit.
- **Each (EA):** Applies to the number of members in a condition state. For example: A bridge may include 5 piles at 3 pier locations for a total pile element quantity of 15. Then, each pile is inspected, evaluated, and recorded in the appropriate condition state. Elements with units of “EA” are coded to reflect the entire member in one condition state, such as pile, where the entire pile is in one of the defined condition states. Other element units, such as “LF” or “SF” may have all or portions of the element in one or all the condition states in order to describe the existing element conditions.
- **“Cell”:** Applies to floating bridge concrete pontoon segments.

4-1.5 **Quantifying Element Defects**

To quantify the condition of an element, the first step is to review the element condition state language. A complete list of the condition state descriptions is provided in pages 4-12 through 4-98 of this chapter.

Similar to the NBI system of evaluation, element condition requires the inspector to evaluate defects and also quantify the defect’s impact to the element or possibly the bridge. A defect evaluation may result in element quantities in CS1, CS2, CS3, or CS4 depending on the location, size, structural importance, or element units.

Element condition state (CS) language is typically based on four condition state levels as noted above. However, it is important to note that only three condition states (CS1, CS2 & CS3) apply to Expansion Joint elements. Additionally certain Smart Flag defects may include only one or two condition states or use all four.

4-1.5.A Affected Quantity

The concept of the “Affected quantity” is relied on heavily when quantifying the defects in the primary structural elements and should be applied in two ways. Condition State 3 defines “Affected Quantity” of the defect as local damage to a member and the “Affected Quantity” is the actual length of the defect. Whereas Condition State 4 defines “Affected Quantity” as a reduced capacity of the member and the “Affected Quantity” is the length of the span. In the case of prestressed girders, damage that does not “Affect” capacity of a prestressed girder would only quantify the length of damaged concrete in CS3. Whereas, Condition State 4 does “Affect” the capacity of the girder and the quantity is the span length, not just the length of damaged concrete. Using this same rational to quantify repairs in CS2, a patch that covers damage to the concrete only is quantified as the length of the visible patch and a patch that covers repaired strand is quantified as the span length in CS2. In other words, the patch is quantified in CS2 based on the “Affected length” of the damage.

This philosophy applies directly to all beam type elements including concrete slab structures with side-by-side beam elements using square foot quantities. It is less obvious where there can be significant redistribution of stresses such as a timber deck or cast-in-place concrete slab. In these cases, a defect, such as a hole in the deck, would have to be evaluated as to whether the capacity of the span is “Affected” or not. Trusses are the most difficult because the linear feet quantities represent a 3-dimensional member with chords, verticals, horizontals, sway bracing, etc. Trusses should quantify CS3 defects by panel length of truss and CS4 truss capacity defects by span length of the truss.

4-1.5.B WSDOT Condition States for Structural Members

The following summarizes the WSDOT element condition state philosophy for primary structural members. Different condition philosophies apply to the non-primary structural elements such as deck/overlays, joints, paint, and smart flags which are specified for each element in Chapter 4, but not discussed in this section.

Condition State 1: Good Condition – Most parts of a bridge will be in this condition state for all WSDOT elements. The element may have some defects but is in good condition. Many times, new bridges have insignificant defects and older bridges will acquire insignificant defects with time. To determine if the defect is insignificant, the inspector must decide if the defect will impact the element load carrying capacity with time. Inspectors are cautioned to look at new construction that may not be CS1.

Condition State 2: Repaired Condition – This condition state documents repairs to structural members. A repair is defined as a defective member partially modified to carry design loads and still dependent on the remaining portions of the defective member, such as an in-span splice, helper member, or column splice. Generally, these are easy to identify and report. Common repairs do not have the same integrity or longevity as original construction. Many times, members are difficult to access and prohibit a good quality repair. Inspectors are cautioned to verify repairs to make sure they are functioning as intended. When a damaged or defective member has been entirely replaced, the member quantity is CS1 or considered a new member. If a repair is not completed correctly or is not functioning properly, then the repair should be coded as CS3 or CS4. For example:

- A timber helper stringer/pile that does not properly transfer design loads is not considered sufficient to be considered in CS2. A repair must properly block, brace, or connect to the stringer/pile as required by repair design.
- Timber pier caps are assumed to be designed as simple spans. Even though the member that has been partially replaced is not continuous at a support, if there is a positive connection to the supporting columns, the replaced portion may be considered in CS1.

The amount of repaired quantity to be coded in CS2 depends on the affected length of the repair for all primary structural members. In general terms, the quantity to be coded in CS2 is the quantity that was in CS3 or CS4 and is now repaired. For example:

- A prestressed girder with a high load hit that did not damage strand would code the length of the concrete patch as the repair quantity for CS2. If a strand is damaged, then the span length is the repair quantity for CS2.
- A repaired crack in a steel member that did not threaten capacity would code the minimum length or 1 foot for CS2. If the repaired crack did threaten capacity, then the span length is the repair quantity for CS2.

Condition State 3: Fair Condition – This condition state records any significant defect noticed by the inspector, but the defect does not significantly impact the capacity of the element. Capacity is not currently threatened, but if left unchecked, it could be threatened in the future. Repairs may apply to the elements in CS3 because the defects are more economical to address now than to wait and repair later.

Condition State 4: Poor Condition – This condition state documents members with defects that have impacted the structural capacity of the element. Based on the visual inspection, the owner of the bridge must address this deficiency to preserve or restore the capacity of the member and/or structure. Generally, these defects have reduced the structural capacity of the element but are still within safe operating limits of design.

4-1.6 **Reporting Structural History**

There are times when structural information may be known but not visible, or visible and then at a later time not visible to the inspector. This can happen to piles/footings that are buried or submerged one inspection and exposed the next. This also applies to asphalt overlays where the deck patching is not visible to the inspector. This type of element information should remain in the element notes until the element condition is known to have changed. An example of an element change would be deck delaminations recorded in CS4 which are not visible to the inspector and are removed by hydro milling during construction of a concrete overlay. The CS4 data does not apply after the concrete overlay is completed and WSDOT element 376 should be deleted from the report and the concrete deck CS4 quantity should be zero.

4-1.7 Concrete Element Cracking

The following table is reproduced from the *Bridge Inspector's Reference Manual* (BIRM), Volume 1, Table 2.2.3; and should be used to distinguish between different sizes of concrete cracks.

Exhibit 4-1 WSDOT Element Concrete Crack Width Guidelines

	Reinforced Concrete		Prestressed Concrete	
	English	Metric	English	Metric
Hairline (HL)	< 0.0625"	< 1.6 mm	< 0.004"	< 0.1 mm
	< 1/16"			
Narrow (N)	0.0625" to 0.125"	1.6 to 3.2 mm	0.004" to 0.009"	0.1 to 0.23 mm
	1/16" to 1/8"			
Medium (M)	0.125" to 0.1875"	3.2 to 4.8 mm	0.010" to 0.030"	0.25 to 0.75 mm
	1/8" to 3/16"			
Wide (W)	> 0.1875"	> 4.8 mm	> 0.030"	> 0.76 mm
	> 3/16"			

Concrete Structural Cracking – For the purpose of evaluating element condition, concrete structural cracks are narrow (or wider) in regions of high shear or moment (see BIRM). Crack width is significant to the extent that it indicates exposure of rebar to water and/or a structural problem in a concrete element. Generally, most concrete elements will exhibit some level of hairline cracking which is not considered significant from a structural standpoint.

4-1.8 WSDOT Deck Element to NBI Deck Table

WSDOT began testing concrete decks in the early 1980s and discovered a very poor correlation to the traditional assumptions of deck deterioration. In addition, the deck testing and crack surveys did not prioritize deck preservation projects in a fashion acceptable to the inspectors, maintenance, or management. Today, WSDOT recommends the use of the deck and soffit elements and Table 4.1.6 to evaluate the NBI Item 058, NBI Deck Overall Condition Code. This table originates from the 1973 FHWA Coding Guidelines and has been modified to reflect WSDOT's primary bridge deck management philosophies since the early 1990s.

Secondary and more subjective concrete deck conditions such as cracking, scaling, leaching, rebar cover, chloride content, Half-cell potential, etc. may be documented in the deck element notes, but not applied to the deck element evaluation of structural condition. These secondary conditions are applied during annual prioritization of the concrete bridge decks and should not determine the NBI code. To be clear, these types of secondary conditions visible below the deck in the soffit or other structural elements below the deck element require an evaluation of:

Exhibit 4-2 WSDOT Deck Condition to NBI Deck Overall

Percent of Concrete Deck Patches, Spalls, and Delaminations (CS2 + CS3 + CS4)	Percent of Concrete Deck Soffit in CS3 (CS3 only)	NBI Deck Condition Code
N/A	N/A	9
None	None	8
None	None	7
< 1%	< 1%	6
1% to 2%	1% to 2%	5
2% to 5%	2% to 5%	4
> 5%	> 5%	3

4-2 Bridge Decks

The intent of the bridge deck elements is to record the top surface deterioration. The Concrete Deck Soffit, slab, or deck-girder elements record the structural deterioration. Deck elements 12, 13, 14, 15, 16, 20, and 26 record deck patches in CS2, deck spalls in CS3, and delaminations in CS4. Other deck top surface distress such as cracking, scaling, and rutting are not tracked in the deck BMS condition states. These items should be described in the notes at the inspector's discretion. Do not count filling in of the rut as a patch. These locations have filled in a rut with Liquid Concrete or urethane-based repair materials and are not considered a deck structural repair.

All asphaltic patching material on a concrete bridge deck shall be considered a spalled area, or CS3, and is an unacceptable patching material. These materials can be picked out of the spall and will smell like tar.

All bridges will have at least one deck element, even though some bridges do not have a traditional deck and use elements 13 or 14. (The one exception is an earth filled arch structure with an asphalt pavement surface only.)

Traditional concrete bridge decks use elements 12, 20, or 26 to record the top surface deterioration; and have the WSDOT Soffit Element (35) to record the structural deterioration. It should be noted for element 26 that epoxy coated rebar in bridge decks became an industry standard in Washington State in the early 1980s.

Non-Traditional concrete decks use elements 13 or 14 to record the top surface deterioration and the slab or deck-girder elements record the structural deterioration.

Steel and Timber decks use elements 28, 29, 30, 31 to record structural deterioration of the top and bottom surface.

Inspectors are encouraged to take the time to locate and describe the patches and spalls on larger structures using photos and descriptions. The preferred documentation format for patching is the number and SF per span. This format is easiest for the next inspector to identify quantity changes.

Quantity estimates must be based on the sum of the estimated length and width of the patched or spalled areas. Approximations based on the percent of area are not useful.

Note: The total quantity for deck elements is the actual bridge deck area. Do not use the NBI Item 051, "Bridge Roadway Width Curb-to-Curb" (or WSBIS Item 1356 "Curb-to-Curb Width") when deck curb-to-curb dimensions vary.

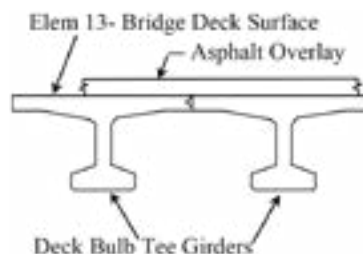
12	Concrete Deck	Units - SF
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This element defines a concrete bridge deck constructed with uncoated steel reinforcement. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

13	Bridge Deck Surface	Units - SF
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This WSDOT element defines a surface of a bridge deck that consists of a slab or girder without a traditional deck. Usually there is a deck protection system (overlay) present, but in some cases, traffic may be driving directly on the girder or slab. The Bridge Deck Surface consists of precast or prestressed girders with no span between the flanges. This WSDOT element is generally used with superstructure elements 38, 49, 50, 51, 52, 54, 108, 109, or 114. The total quantity for this element is the actual bridge deck area from curb line to curb line.

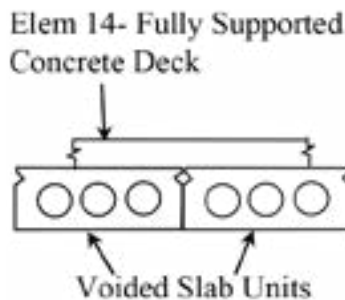


14	Fully Supported Concrete Deck	Units – SF
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This WSDOT element defines a fully supported concrete bridge deck constructed with one layer of coated reinforcement (epoxy, galvanizing, stainless steel, etc.). The bridge support surface consists of precast or prestressed girders with no span between the flanges. This WSDOT element may apply to superstructure WSDOT elements 50, 51, 108, 109, or 114. The total quantity for this element is the actual bridge deck area from curb line to curb line.

Condition States for WSDOT Elements 13 and 14

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces have no exposed reinforcing. The deck surfaces may have hairline cracks, rock pockets and/or be worn exposing aggregate.
2. If the top of the slabs or girders are visible, area of deck with repairs.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.



15	Post Tensioned Concrete Deck	Units – SF
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This element is defined by a concrete bridge deck that has transverse or longitudinal post tensioning; and includes the deck on elements 100 Post Tensioned Segmental and 104 Post Tensioned Concrete Box. These decks require a higher level of care for maintenance, special attention by management, and have a higher replacement cost. This element does not include the deck of elements 105 Concrete Box and 97 Trapezoidal. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

16	Thin Concrete Deck < 6" Thick	Units – SF
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This element defines a concrete bridge deck constructed with a deck that is less than 6" in thickness. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

20	Concrete Deck – Lightweight Aggregate	Units – SF
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This WSDOT element defines a lightweight concrete bridge deck constructed with lightweight aggregate and steel reinforcement. The total design weight of the deck is approximately 120 lbs./C.Y. The total quantity for this element is the actual bridge deck area from curb line to curb line.

26	Concrete Deck w/Coated Bars	Units – SF
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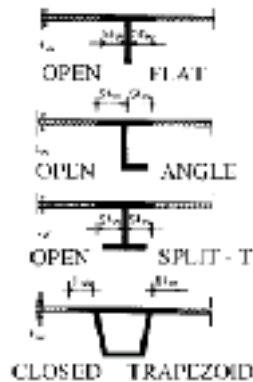
This WSDOT element defines a concrete bridge deck constructed with coated (epoxy, galvanizing, stainless steel, fiber reinforced polymer (FRP), etc.) reinforcement. The total quantity for this element is the actual bridge deck area from curb line to curb line.

Condition States for WSDOT Elements 20 and 26

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

27	Steel Orthotropic Deck	Units - SF
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This WSDOT element defines a bridge deck constructed of a flat, deck plate stiffened either longitudinally or transversely, or in both directions. See BIRM, Volume 1, Figure P.1.2.7. The total quantity for this element is the actual bridge deck area curb to curb.



28	Steel Deck - Open Grid	Units - SF
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This WSDOT element defines a bridge deck constructed of steel grids that are open and unfilled. The total quantity for this deck WSDOT element is the actual bridge deck area from curb line to curb line.

29	Steel Deck - Concrete Filled Grid	Units - SF
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This WSDOT element defines a bridge deck constructed of steel grids with either all of the openings or just those in the wheel lines filled with concrete. The total quantity for this element is the actual bridge deck area from curb line to curb line.

30	Deck - Corrugated or Other Steel System	Units - SF
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This WSDOT element generally defines a bridge deck constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete. This element may also be used to identify other non-standard steel decks. The total quantity for this element is the actual bridge deck area from curb line to curb line.

Condition States for WSDOT elements 27, 28, 29, and 30 (Structural Decks)

1. Defects are superficial. The connectors (such as welds, rivets, etc.) or concrete/asphalt filler are functioning as designed.
2. Deck area with repairs or replaced panels.
3. Deck area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Deck area with damage in locations or quantity and has reduced the structural capacity of the element. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

31	Timber Deck	Units - SF
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This WSDOT element defines a bridge deck constructed of timber. The deck may be longitudinally or transversely laminated or of planks. The deck may have an overlay or may be constructed with runners of metal or timber. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Timber deck area with repairs, plates, or replaced timbers.
3. Timber deck area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. These areas are typically marked with a YELLOW TAG by inspectors.
4. Timber deck area with damage in locations or quantity and has reduced the structural capacity of the WSDOT element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. These areas are typically marked with a RED TAG by inspectors.

32	Fiber Reinforced Polymer (FRP) - Deck	Units - SF
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This WSDOT element defines a bridge deck constructed of fiber reinforced polymer. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial. Cracking or delamination of layers may be present.
2. FRP Deck area with repairs, patches, or plated.
3. FRP Deck area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. FRP Deck area with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

35	Concrete Deck Soffit	Units - SF
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This WSDOT element defines the bottom (or undersurface) and edge of a concrete deck and is to be included with concrete WSDOT deck elements 12, 20, and 26. It is extremely valuable when an asphalt overlay exists on the top surface of the deck. The purpose of the element is to identify decks that may have a reduced structural capacity through visual inspections of the deck soffit. Element 35 does not apply if steel stay-in-place forms are present since the soffit is not visible. To be consistent with the deck quantity, the total quantity for this element is the actual bridge deck area from curb line to curb line. Delaminations on concrete soffits over roadways may pose a danger to traffic below the bridge. In this situation, a repair should be recommended to correct the condition.

1. The undersurface of the deck is not showing signs of distress. There may be rust stains from rebar chairs, spalls without exposed rebar, or cracks with efflorescence.
2. Deck soffit area with repairs or patches.



3. Deck soffit area showing signs of reduced structural capacity. Typical indications include areas with heavy to severe rust staining from deck reinforcement, Spalling with corroded rebar indicating active corrosion, Cracks that are full depth, severe or leaking water.



36	Deck Rebar Cover Flag	Units - SF
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This does not apply to deck spalling with exposed rebar. This element is used to identify the top surface of bridge decks with concrete cover less than 1 inch and having rebar exposed. This condition results from either lack of cover during construction or general rutting that has exposed rebar. Deck patching is often difficult at these locations. This flag will determine method of deck rehabilitation. Report square foot of visible deficiency in CS2. The total quantity for this element is the actual bridge deck area curb to curb.

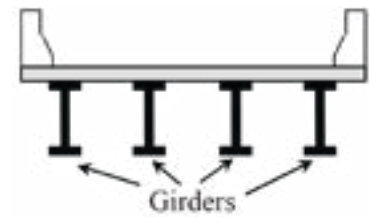
1. Deck top surface area with adequate concrete cover.
2. Concrete deck area with visible lack of cover due to construction or general rutting that has exposed rebar.



4-3 Superstructure

4-3.1 Girders

A girder is defined as any longitudinal structural member (single web or box section) that directly supports the bridge deck. A girder type bridge will typically have two or more girders. Girders may be constructed of the following typical materials: Rolled, welded or bolted (riveted), steel sections; Post tensioned, prestressed or reinforced concrete sections; or Timber sections.



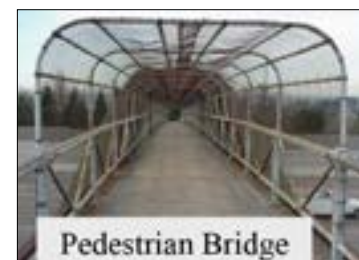
4-3.2 Diaphragms

Diaphragms are structural members used to tie adjoining girders together to improve the strength and rigidity of the girder and to distribute forces in the lateral direction.

Diaphragms do not have an element but if a diaphragm has advanced deterioration, it should be noted in the element comments of the associated girder.

4-3.3 Pedestrian Bridges

The same WSDOT elements used for bridges that carry vehicular traffic can be used for pedestrian bridges. Do not use the WSDOT sidewalk elements (#260 through #266) for pedestrian bridges.



4-3.4 Slab Bridges

Slab bridges can have precast segments or cast in place concrete. The bridge in the picture is a cast in place concrete slab and will have a deck element for the deterioration of the top surface. Structural deficiencies of the slab bottom and edge are documented in WSDOT element 38 "Concrete Slab."

Note: The total quantity for slab elements is the actual bridge deck area. Do not use the NBI Item 051, "Bridge Roadway Width Curb-to-Curb" (or WSBIS Item 1356 "Curb-to-Curb Width") when a deck curb-to-curb dimensions vary.

38	Concrete Slab	Units - SF
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This element defines a concrete slab bridge and edge that has been constructed with uncoated reinforcement. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.



49	Concrete Hollow Slab	Units - SF
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This element defines a concrete slab bridge and edge that has been constructed with sonotubes and uncoated reinforcement. Structural deficiencies of the edge and bottom surface are addressed in the condition states. This type of bridge was typically built in the 50's and 60's on the state highway system. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

50	Prestressed Concrete Slab	Units - SF
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This element defines a concrete slab bridge that has been constructed with prestressed concrete and uncoated steel reinforcement. This element may be solid or have built in voids. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

51	Prestressed Concrete Slab w/Coated Bars	Units - SF
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This element defines a concrete slab bridge that has been constructed with prestressed concrete and coated steel reinforcement (epoxy, etc.). This element may be solid or have built in voids. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

52	Concrete Slab w/Coated Bars	Units – SF
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This element defines a concrete slab bridge and edge that has been constructed with coated (epoxy, etc.) reinforcement. This element may or may not contain a hollow core. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

Condition States for WSDOT Elements 38, 49, 50, 51, and 52

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Concrete slab area with repairs or patches.
3. Concrete slab area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Concrete slab area with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. For slabs made with beam units, the affected area should be based on the span length.



54	Timber Slab	Units – SF
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This element defines a slab that is constructed of timber. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Slab area with repairs, plates or replaced timbers.
3. Slab area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. These areas are typically marked with a YELLOW TAG by inspectors.
4. Slab area with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. These areas are typically marked with a RED TAG by inspectors.

89	Prestressed Concrete Girder w/Coated Strands	Units - LF
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This element defines a girder constructed of precast prestressed concrete and epoxy coated strand that supports the bridge deck. The element quantity should equal the sum of each girder length. The element total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.



90	Steel Rolled Girder	Units - LF
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This element defines a girder unit of structural steel that has an integral web and flanges and was fabricated in a steel mill by the rolling process. This element may have bolted, riveted or welded cover plates. This element directly supports the bridge deck and is part of a two or more longitudinal girder system. The total quantity for this element is the sum of each girder length.

91	Steel Riveted Girder	Units - LF
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This element defines a girder unit of structural steel that directly supports the bridge deck. This element has a web and flanges that are connected with rivets. This element is part of a two or more longitudinal girder system. The total quantity for this element is the sum of each girder length.

92	Steel Welded Girder	Units - LF
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This element defines a girder unit of structural steel that directly supports the bridge deck. This element has a web and flanges that are connected with welds. This element is part of a two or more longitudinal girder system. The total quantity for this element is the sum of each girder length.

Condition States for WSDOT Elements 90, 91, and 92

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Girder length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

96	Concrete Encased Steel Girder	Units - LF
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This element defines a steel girder that is encased in concrete. The total quantity for this element is the sum of each girder length.


1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking.
2. Girder length affected by repairs or patches.
3. Girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth), concrete delaminations or spalls in a tension zone.
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.


97	Prestressed Concrete Tub Girder	Units - LF
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This element defines a prestressed concrete box girder or Tub Girder as defined in the *Bridge Design Manual M 23-50*. Post-tensioning and span field splices may or may not be present.

The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.


4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.



98	Thin Flange Girder	Units - LF
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This element defines a precast prestressed concrete girder unit where the top flange is not designed to carry live load and must have a concrete deck. There may be asphalt or a concrete overlay on the concrete slab. This element represents the WSDOT - WFxxTDG girder sections: WF36TDG, WF42TDG, WF50TDG, WF58TDG, WF66TDG, WF74TDG, WF83TDG, WF95TDG, and WF100TDG. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this element is the sum of each girder length.

100	Post Tensioned Concrete Segmental Box Girder	Units - LF
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This element defines a post-tensioned concrete box girder constructed using the segmental precast process. The total quantity for this element is the length of segmental box girders.

Condition States for WSDOT Elements 97, 98, and 100

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.



102	Steel Box Girder	Units - LF
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This element defines a box girder unit constructed with structural steel. This element directly supports the bridge deck. The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Girder length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

103	Prestressed Concrete Super Girder	Units - LF
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This element defines a prestressed WSDOT girder WF83G, WF95G, WF100G, WF83PTG, WF95PTG, WF100PTG. Girders may or may not be post-tensioned. The total quantity for this element is the sum of each girder length.

104	Post Tension Concrete Box Girder	Units - LF
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This element defines a box girder unit constructed of post-tensioned, cast in place concrete. The total quantity for this element is the sum of each girder length.

105	Concrete Box Girder	Units - LF
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This element defines a box girder superstructure unit constructed with cast in place reinforced concrete. The total quantity for this element is the sum of each girder length.

Condition States for WSDOT Elements 103, 104, and 105

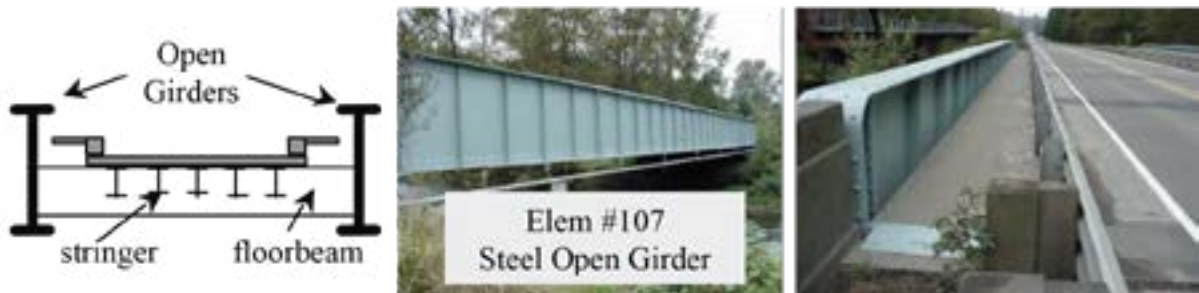
1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Girder span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.



107	Steel Open Girder	Units - LF
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This element defines an open girder unit that is constructed of structural steel. An open or “through” girder is part of a two-girder system with stringer and floor beam elements that support a bridge deck. Open girders are located on the outside of the bridge. The bridge deck and any sidewalks are contained between the open girders. Bridges with open girders were generally built prior to 1950 and usually have built up riveted steel members. The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Steel open girder length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Steel open girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Steel open girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.



108	Prestressed Concrete Bulb-T Girder	Units - LF
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This element defines a precast prestressed concrete Bulb-Tee girder unit which has little or no span between the top flanges. There may be asphalt, a concrete slab, a concrete overlay, or nothing on the top flange. This element represents the following WSDOT girder sections: W35DG, W41DG, W53DG, W65DG, WF39DG, WF45DG, WF53DG, WF61DG, WF69DG, WF77DG, WF86DG, WF98DG, WF103DG. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this element is the sum of each girder length.



109	Prestressed Concrete Multiple Web Girder Units	Units - LF
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This element defines a precast prestressed concrete girder that has more than one web. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this element is the sum of each girder length.

110	Concrete Girder	Units - LF
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This element defines a girder (including T-Beams) constructed of non-prestressed reinforced concrete. The total quantity for this element is the sum of each girder length.

Condition States for WSDOT Elements 108, 109, and 110

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
 
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.
 

111	Timber Glue-Lam Girder	Units - LF
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This element defines a girder unit constructed of glue-lam timber. This element directly supports the bridge deck. The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Glue-Lam girder length affected by repairs, patches, or plated.
3. Glue-Lam girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. These areas are typically marked with a YELLOW TAG by inspectors.
4. Glue-Lam girder span length with damage in locations or quantity and has reduced the structural capacity of the girder or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. These areas are typically marked with a RED TAG by inspectors.

113	Steel Stringer	Units - LF
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This element defines a stringer constructed of structural steel that supports the deck in a stringer-floor beam system. A stringer is connected to a floor beam and directly supports a bridge deck. A steel stringer and floor beam combination is commonly used in steel truss and steel open girder bridges. The total quantity for this element is the sum of each girder length.



1. Defects are superficial and have no effect on the structural capacity of the element.
2. Stringer length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Stringer length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Stringer span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

114	Concrete Multiple Web Girder Unit	Units - LF
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This element defines a girder constructed of non-prestressed reinforced precast concrete. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this element is the sum of each girder length. Check the NBIS main span type.

115	Prestressed Concrete Girder	Units - LF
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This element defines a girder constructed of precast prestressed concrete that may or may not be post-tensioned and supports the bridge deck. The total quantity for this element is the sum of each girder length.

116	Concrete Stringer	Units – LF
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This element defines a stringer constructed of reinforced concrete that supports the bridge deck in a stringer-floor beam system. The total quantity for this element is the sum of each stringer length. See Steel Stringers and Floor Beams for a more general description.

Condition States for WSDOT Elements 114, 115, and 116

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.



117	Timber Sawn Girder	Units – LF
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This element defines a girder constructed of sawn timber that supports the bridge deck. The total quantity for this element is the sum of each girder length.

118	Timber Stringer	Units – LF
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This element defines a stringer constructed of timber that supports the bridge deck. The element total quantity is the sum of each stringer length. See Steel Stringers, WSDOT Element 113, for a more general description.

Condition States for WSDOT Elements 117 and 118

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Girder or stringer length affected by repairs or plates.
3. Girder or stringer length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½" are marked with a YELLOW TAG.
4. Girder or stringer span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½" shell thickness are marked with a RED TAG.

119	Concrete Truss	Units - LF
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This element defines all members in a truss that is constructed of concrete. There is only one concrete truss on the state highway system. The total quantity for this element is the sum of each concrete truss length, which is two times the truss span length.

1. Truss panel length with superficial defects that have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Truss panel length with repairs or patches.
3. Truss panel length affected with structural defects.

The defects do not significantly affect structural capacity.

Defects do not warrant analysis but may require repairs.

Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.



4. Length of truss span affected with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.



126	Steel Thru Truss	Units - LF
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This element includes all structural steel truss members. Code this element for through and pony trusses only. The total quantity for this element is the sum of each truss length, which is two times the truss span length.

131	Steel Deck Truss	Units - LF
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This element includes all truss members of a structural steel deck truss. The top and bottom chords are included in this element. The total quantity for this element is the sum of each truss length, which is two times the truss span length.

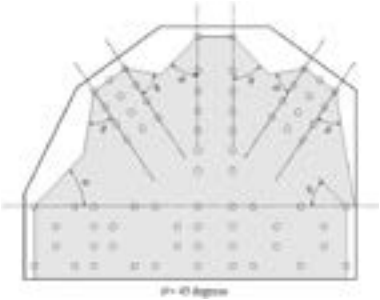
Condition States for WSDOT Elements 126 and 131

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Truss panel length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Truss panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Truss span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

133	Truss Gusset Plates	Units – EA
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This element documents structural defects on gusset plates at the panel points of a truss element. Gusset plates are defined as any plate attached to primary members that transfer primary or secondary load at the panel joint. Significant defects should be considered when they are within the stress zones of the gusset. Stress zones are approximately illustrated as the shaded portion in Figure at right. The total quantity for a truss is the total number of all node points of all trusses.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of panel points with repairs or have been reinforced.
3. Number of panel points with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of panel points with structural deficiencies in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.



135	Timber Truss	Units – LF
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This element defines a truss constructed of timber members. The total quantity for this element is the sum of each truss length, which is two times the truss span length.

1. Truss panel length with defects that are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Truss panel length with repairs or plates.
3. Truss panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½" are marked with a YELLOW TAG.
4. Truss span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½" shell thickness are marked with a RED TAG.

139	Timber Arch	Units - LF
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This element includes all members of an arch constructed of Timber. The total quantity for this element is the length measured from one arch support to the other.

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Arch panel length with repairs or plates.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½" are marked with a YELLOW TAG.
4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½" shell thickness are marked with a RED TAG.

140	Composite Arch	Units - LF
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This element includes all members of an arch constructed of Composite material. The total quantity for this element is the length measured from one arch support to the other.

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element.
2. Arch panel length with repairs or patches.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

141	Steel Arch	Units - LF
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This element includes only the arch constructed of structural steel. When coding NBI, pier caps, cross beams, and any other coded substructure elements within the arch span are considered superstructure elements. The total quantity for this element is the length measured from one arch support to the other.

142	Steel Tied Arch	Units - LF
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This element includes all members of a tied arch constructed of structural steel. The bottom and top chords are included in this element. The total quantity for this element is the length measured from one arch support to the other.

Condition States for WSDOT Elements 141 and 142

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element.
2. Arch panel length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

143	Steel Suspender	Units - EA
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This element defines a steel member used to suspend a bridge deck from an arch or truss. The total quantity for this element is the total number of suspenders.

1. Number of suspenders with defects that are superficial and have no effect on the structural capacity of the element.
2. Number of suspenders with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Number of suspenders with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of suspenders with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

144	Concrete Arch	Units - LF
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This element only defines the arch (open/closed spandrel, bowstring, etc.) and is constructed of non-prestressed reinforced concrete. When coding NBI, pier caps, cross beams, and any other coded substructure elements within the arch span are considered superstructure elements. The total quantity for this element is the length measured from one arch foundation to the other.

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Arch panel length with repairs or patches.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

145	Earth Filled Concrete Arch	Units - LF
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This element defines an earth filled arch constructed of reinforced concrete. The total quantity for this element is the length measured from one arch foundation to the other. If there is a concrete deck constructed on the fill, WSDOT element 14 applies. If there is an ACP wearing surface, WSDOT element 800 or 801 applies.

1. Arch span length with defects that are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Arch span length with repairs or patches.
3. Arch span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.



146	Suspension – Main Cable	Units – EA
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This element defines a main steel cable used to support the superstructure in a suspension bridge. The total quantity for this element is the number of cables.

147	Suspension – Suspender Cable	Units – EA
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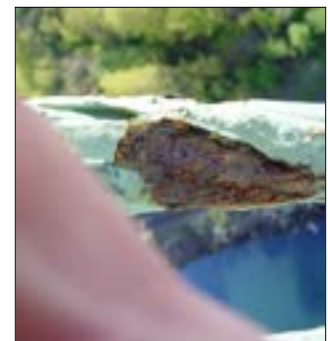
This element defines a suspender steel cable that connects the bridge superstructure to the main suspension cable. Suspender cables include the anchor device at the ends and the zinc protection on the wires. The outer protection system is usually a form of a paint element. The total quantity for this element is the number of steel cables.

149	Cable Stayed Bridge – Cable	Units – EA
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This element defines a steel cable used to support the superstructure in a cable stayed bridge. The cable stays include the anchor device at the ends. The total quantity for this element is the number of steel cables.

Condition States for WSDOT Elements 146, 147, and 149


1. Number of cables with no defects. Zinc coating may be dull gray showing early signs/stages of zinc oxidation. New replacement cables are coded in this condition state.
2. Number of cables with defects that are insignificant and do not affect the capacity of the cable. Zinc coating has white spots or areas of the surface which indicate corrosion of the zinc protection.
3. Number of cables or anchors with defects that are beginning to affect the capacity of the cable but are within acceptable design limits. Localized areas of zinc depletion and showing rust spots, but there is no visible section loss.
4. Number of cables or anchors with defects that have clearly affected the capacity. This includes broken wires or localized section loss due to other defects. The zinc protective coating is largely depleted with ferrous rust prevalent in many locations along the cable length.




150	Concrete Column on Spandrel Arch	Units - EA
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This element defines the column supports on a spandrel arch bridge. The total quantity for this element is the number of columns supported by the arch.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Number of columns with repairs or patches.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.


4. Number of columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.



152	Steel Floor Beam	Units - LF
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This element defines a floor beam constructed of structural steel that supports stringers in a stringer-floor beam system. Floor beams are load carrying elements located transversely to the general bridge alignment. Floor beams transmit the loads from the deck and/or stringers to the outside open girders or to the bottom chord of a truss bridge. The total quantity for this element is the sum of each floor beam length.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Floor beam length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Floor beam length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Floor beam span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.



154	Prestressed Concrete Floor Beam	Units - LF
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This element defines a floor beam constructed of prestressed concrete that supports the bridge deck in a stringer-floor beam system. The total quantity for this element is the sum of each floor beam length.

155	Concrete Floor Beam	Units - LF
<p>This element defines a floor beam constructed of reinforced concrete that supports the bridge deck in a stringer-floor beam system. Floor beams are load carry elements located transversely to the general bridge alignment. Floor beams transmit the loads from the deck and/or stringers to the outside open girders. The total quantity for this element is the sum of each floor beam length.</p>		
<p>Condition States for WSDOT Elements 154 and 155</p>		
<ol style="list-style-type: none"> 1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations. 2. Floor beam length affected by repairs or patches. 3. Floor beam length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands. 		
<ol style="list-style-type: none"> 4. Floor beam span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. 		
156	Timber Floor Beam	Units - LF
<p>This element defines a stringer constructed of timber that supports the bridge deck. The total quantity for this element is the sum of each floor beam length. See Steel Floor beam, WSDOT Element 152, for a more general description.</p>		
<ol style="list-style-type: none"> 1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist. 2. Floor beam length affected by repairs or plates. 3. Floor beam length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½" are marked with a YELLOW TAG. 4. Floor beam span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½ shell thickness are marked with a RED TAG. 		
160	Steel Column on Spandrel Arch	Units - EA
<p>This element defines the column supports on a spandrel arch bridge. The total quantity for this element is the number of columns supported by the arch.</p>		

161	Steel Hanger	Units - EA
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This element defines the hanger portion of a pin and hanger usually on a steel girder. Truss “hanger” members are not included in this element. The total quantity for this element is the number of steel hangers on the bridge. Generally, there will be two hangers at each location.

Condition States for WSDOT Elements 160 and 161

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of steel columns or hangers with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Number of steel columns or hangers with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of steel columns or hangers with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

162	Steel Pin	Units - EA
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This element defines a structural pin used in any connection joint in a girder or truss.

The total quantity for this element is the number of pins on the bridge. Zero force and construction pins are not included in the quantity. Pins in bearing elements are not included unless they have uplift loadings.

1. Number of pins and associated connection plates are in good condition. Visual Inspection: There may be minor rust or shallow surface deformations on the exposed pin surfaces. Minor amounts of rust powder or paint damage may be present suggesting minor pin rotation in place. No pack rust is present between associated connection plates. There is no noise associated with the pin connection. Ultrasonic Testing (UT): Transducer can be applied to both ends of pin allowing a complete scan of pin grip surfaces, there are strong shoulder and end reflections, and there are no UT indications. UT indications are defined as pips in the grip area that are three times larger (3:1) than the background noise when the GAIN is adjusted to produce a 90 to 100 percent reflection height for the far shoulder.
2. Number of pins and associated connection plates have defects that do not affect the strength or serviceability of the bridge. Visual Inspection: Corrosion with pitting or laminar rust may be present. Minor abnormalities may be observed in alignment, pin wear, or deck joint movement. Pack rust may be present between connection plates but is not judged to put a jacking force between the pin nuts. The connection may have some rust powder and/or make noise under loading. Ultrasonic Testing (UT): For pins UT inspected from both ends, there may be non-coincident indications between 10 and 20 percent of the far shoulder reflection height. There may be loss in shoulder or back reflections which can be explained by pin end conditions (dents, holes, corrosion). Pins that can be UT inspected from one end only are considered CS2, even if they have no indications or have indications less than 10 percent of the far shoulder reflection height.

3. Number of pins and associated connection plates have defects that may affect the strength or serviceability of the bridge. Visual Inspection: Significant corrosion may be present, suggesting that pin is “frozen” in place. Measurable abnormalities may be observed in alignment, pin wear, or deck joint movement. Pack rust may be present between connection plates that place a jacking force between the pin nuts. The connection may have significant amounts of rust powder and/or make noise under loading. Ultrasonic Testing (UT): For pins UT inspected from both ends, there may be coincident indications (of any size) or non-coincident indications greater than 20 percent of the far shoulder reflection height. There may be loss in shoulder or back reflections that cannot be explained by pin end conditions (dents, holes, corrosion). Pins that can be UT inspected from one end only are considered CS3 if there are indications greater than 10 percent of the far shoulder reflection height.
4. Number of pins and associated connection plates have defects that are judged to affect the strength or serviceability of the bridge. Visual Inspection: There may be “frozen” pins designed for free rotation as part of normal bridge movement. Pack rust may be present between connection plates that are causing distortion/displacement of plates or pins.

163 Tension Hold Down Anchor Assembly
Units – EA

This is a NSTM of the bridge that carries uplift loads from the superstructure to the substructure. The anchorage may consist of several parts with built-up steel members. Each location has anchor bolts in tension that must be evaluated and included in the NSTM Report. The element is defined as all parts in tension between the lower tip of the anchor bolts to the first pin or truss member. A pin is usually present and included in element 162 because it carries uplift loads. The total quantity for this element is the number of Tension Hold-Down Anchor Assemblies on the bridge.



WSDOT bridges known to have Tension Hold Down Anchor Assemblies are: 2/35, 20/204, 25/130, 169/8, 261/125, 305/10 and 395/545.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of Tension Hold-Down Anchor Assemblies with repairs.
3. Number of Tension Hold-Down Anchor Assemblies with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of Tension Hold-Down Anchor Assemblies with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

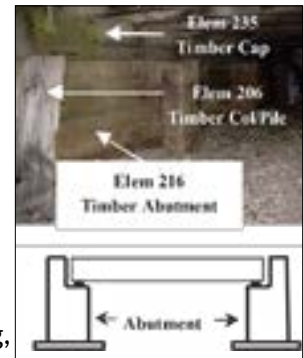
4-4 Substructure

The evaluation of the substructure elements is based on those portions of the member that are exposed for visual inspection and included in the element quantity. If an element is added to a bridge or quantities are changed due to exposure or discovery by other means, do not delete the historical information in subsequent inspections. Simply note the prior exposure or those members not visible and document the current condition.

4-4.1 Abutments

An abutment is a substructure unit located at the end of a bridge that is designed to retain the fill supporting the roadway and support the bridge superstructure. Bridges that terminate in mid-span or at a pier that is not at grade do not have an abutment substructure unit and do not have abutment elements. These cases will use other appropriate structural elements to evaluate condition.

All abutments shall be evaluated for the capacity to transfer design loads to a foundation thru structural elements. The roadway embankment with non-monolithic concrete wingwalls, timber planking, or other abutment retaining systems are included in the evaluation of the WSDOT Abutment Fill element 200 (EA) where the evaluation is limited to no more than 25 feet from the abutment. Timber Abutment element 216 (LF) is equivalent to element 200.



4-4.2 Pier Cap/Cross Beam

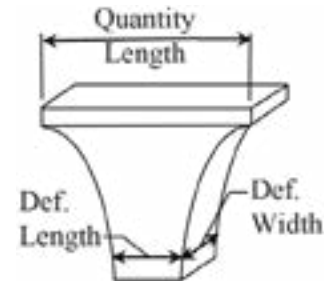
A pier cap is an element that is attached to the top of a pier and is used to support the superstructure of a bridge. A pier cross beam is generally attached to the girders and is used to distribute the loads from the girders to the pier.

One WSDOT element is used to define either a cap or cross beam constructed of the same material.



4-4.3 Pier Wall Definition

A pier wall is a substructure pier element. For WSDOT elements, a pier wall is defined using two criteria: if the length (transverse direction) is 3 times greater than the width (longitudinal direction) at the bottom; and the wall extends full height from the foundation to the superstructure. If the pier does not meet these two criteria, then the element would be coded as a column or other pier.



4-4.4 Pile/Column Elements

These long slender members transfer load normally as a part of the bridge substructure. The bottom of a column element may be visible or supported on unknown foundations. For element and inspection purposes, a pile is inspected as a designed column for the visible portion above ground or if visible in the past. Single columns supported on a single shaft are to be considered the same as one column or column length even though a part of the shaft is visible.

4-4.5 Foundation Elements

WSDOT Timber Foundation and Concrete Foundation elements document that a foundation is visible, and the structural condition may or may not be related to scour. The foundation may be a spread footing, or a footing supported by piles or drilled shafts. The foundation element is based on the footing material and the piles may be of any material. The condition of the foundation is the focus of these elements, not the pile design or material.

If the supporting piles are visible, then the pile element should be added to the bridge. Do not delete the pile element in subsequent inspections. The total quantity is the quantity of piles supporting the exposed foundation, not just the number of exposed piles. When scour threatens or reduces the condition, the scour documentation and condition is recorded separately in WSDOT element 361 and not recorded in the foundation element.

200	Abutment Fill	Units - EA
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This element is defined as the soil retained behind a concrete or steel abutment and includes the materials retaining the embankment such as non-monolithic concrete wing walls or other retaining wall system. The evaluation of the fill or retaining systems should not extend beyond 25 feet or the approach slab, whichever is greater. This element also includes abutment ends of cantilevered spans (formerly element 219).

Normally structures have two abutments at grade. When bridges terminate at intermediate piers or in mid-span (not on the ground), then this element does not apply. In addition, WSDOT Element 200 is equivalent to and does not apply to structures with WSDOT Timber Abutment 216 (LF).

Erosion outside of the abutment/wingwalls can be documented in the notes but is not included in the evaluation or condition of the element.

1. Defects are superficial and have no effect on the structural capacity or performance of the fill.
2. Number of abutments that have been repaired.
3. Number of abutments with a fill problem which does not significantly affect the support of the traveled lanes. Deficiencies do not warrant analysis but may require repairs.
4. Number of abutments with a fill problem in locations or quantity and has reduced the structural capacity of the soil to support the approach or roadway. It is a threat to traffic. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

202	Steel Column	Units - EA
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This element defines a column or portion of a column constructed of structural steel visible for inspection.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of columns with repairs such as: welded, bolted or riveted connections have been replaced; steel cracks or corrosion that has been mitigated or plated.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, connections with steel cracking, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of columns with damage. Locations or quantity of damage has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, welded bolted or welded bracing connections. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

203	Prestressed Hollow Concrete Column	Units - EA
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This element defines a column or portion of a column constructed of prestressed concrete and hollow. Inspection includes the visible portion above ground line.

204	Prestressed Concrete Column	Units - EA
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This element defines a column or portion of a column constructed of prestressed concrete visible for inspection.

205	Concrete Column	Units - EA
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This element defines a column or portion of a column constructed of reinforced concrete visible for inspection. Usually, WSDOT concrete piles are designed and constructed inside a sacrificial steel pipe casing.

Condition States for WSDOT Elements 203, 204 and 205

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Number of columns that has been repaired or patched.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Number of columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

206	Timber Column	Units - EA
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This element defines a column or portion of a column constructed of timber visible for inspection.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Number of columns with repairs, plates, or splices.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½" are marked with a YELLOW TAG.
4. Number of columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½" shell thickness are marked with a RED TAG.

210	Concrete Pier Wall	Units - LF
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This element defines a pier wall, including submerged pier walls (formerly under Element 212), constructed of reinforced concrete. The total quantity for this element is the length at the top of the wall.

211	Other Pier Wall	Units - LF
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This element defines a pier wall including submerged non-standard material (rock and mortar) or non-standard construction type walls (formerly element 213), that is constructed of a non-standard material (rock and mortar) or non-standard construction. The total quantity for this element is the length at the top of the wall.

Condition States for WSDOT Elements 210, 211

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Length of pier wall with repairs.
3. Length of pier wall with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Entire length of pier wall with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

214	Concrete Web Wall between Columns	Units - LF
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This element defines a secondary concrete wall constructed between pier columns. This element includes railroad crash barriers. The total quantity for this element is the length at the top of the wall.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Affected length of Web wall with repairs.
3. Length of Web wall with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Entire length of Web wall with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

215 Concrete Abutment

Units - LF

This element is defined as a concrete abutment or a concrete cap at the abutment which are designed to carry design loads to a foundation. A concrete abutment is a short or tall wall supporting the superstructure. An abutment cap is generally a rectangular beam supporting the superstructure. An abutment cap is included in this element and excluded from the quantity of element 234, Concrete Caps, elsewhere in the bridge. An abutment cap may be supported with concrete, steel, or timber columns or piles and the columns are coded separately and not included in this element but are included with the quantity and evaluation of the other the similar columns in the bridge. The columns are only coded if they are visible or have been visible in the past.

The element quantity is measured along the skew and includes concrete monolithic wingwalls up to the first open joint or expansion joint when oriented parallel to the abutment or skewed towards the approaching roadway. Wingwalls extending inboard towards the bridge are not included in the quantity (Fig. 1). Skewed wingwalls are measured from either the back of the pavement (when parallel to roadway, Fig. 2) or from the abutment wall angle point. Wingwalls monolithic with the abutment shall be included in the evaluation of the abutment. The length of monolithic wingwall shall not exceed 20 feet per corner.

The embankment and retaining system, or retaining system beyond a monolithic wingwall, are documented in WSDOT element 200.

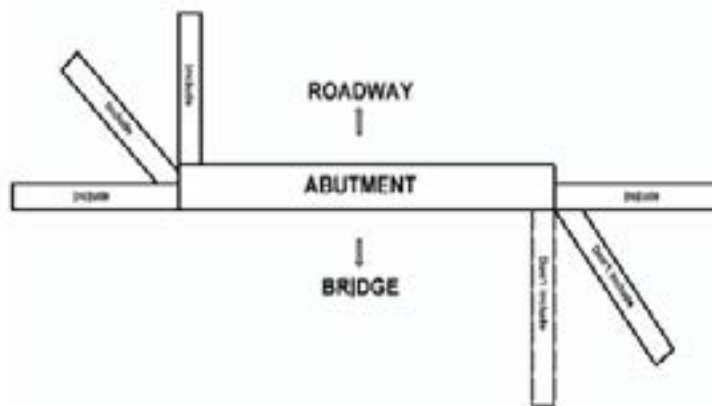


Fig. 1

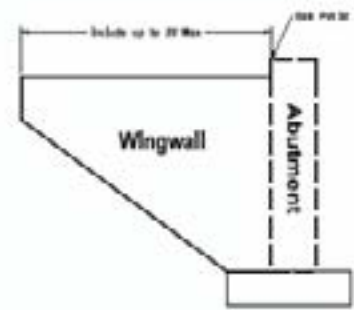


Fig. 2

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Affected length of abutment with repairs.
3. Length of abutment with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Entire length of abutment when damage exists in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

216	Timber Abutment	Units - LF
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This element defines the roadway embankment fill behind a timber cap and includes the sheet materials retaining the embankment. The total quantity is the length of the timber cap. Timber caps at the abutment and the piles supporting the caps are not included in this element. The caps are included in the element 235 with other timber caps and the piles are included with the other pile elements in the bridge.

Erosion outside of the abutment/wingwalls can be documented in the notes but is not included in the evaluation of the element condition states.

1. Defects are superficial and have no effect on the structural capacity or performance of the fill.
2. Length of abutment that has been repaired.
3. Length of abutment with a fill problem which does not significantly affect the support of the traveled lanes. Deficiencies do not warrant analysis but may require repairs.
4. Length of abutment with a fill problem in locations or quantity and has reduced the structural capacity of the soil to support the approach or roadway. It is a threat to traffic. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

217	Other Abutment	Units - LF
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This element defines an abutment not constructed of steel, timber, or concrete such as rock/mortar. The element quantity is the length of abutment measured along the skew. The element quantity includes monolithic wing walls but not to exceed 20 feet per corner.

Document the condition of the embankment and the embankment retaining system conditions in WSDOT element 200.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Affected length of abutment with repairs
3. Affected length of abutment with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Entire length of abutment when damage exists in locations or quantity and has reduced the structural capacity of the abutment. Structural analysis is warranted or has determined repairs are essential to restore the full abutment capacity.

218	Steel Abutment	Units - LF
<p>This element defines an abutment constructed of structural steel which is usually a steel cap at the abutment. Similar to concrete abutment caps, steel abutment caps are included in this element and are not included in the quantity of element 233, steel cap/crossbeam. The columns supporting the steel cap are coded separately or included with other similar columns in the bridge. The element quantity is the length of steel abutment cap measured along the skew.</p>		
<p>Document the embankment conditions and the embankment retaining system conditions in WSDOT element 200.</p>		
<ol style="list-style-type: none"> 1. Defects are superficial and have no effect on the structural capacity of the element. 2. Length of abutment with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated. 3. Length of abutment with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth). 4. Entire length of abutment affected when damage exists in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. 		
220	Concrete Pile Cap/Footing	Units - LF
<p>This element defines a reinforced concrete pile cap/footing supported by shafts, piles, or soil (spread footing) that is visible for inspection and may be always, or seasonably covered by water. (Formerly covered by Elements 220 and 221). Scour deficiencies at a concrete pile cap/footing are included in WSDOT element 361 and are not included in this element. Plinths are a form of spread footing and included in this element which are a small concrete base that supports a column. Quantity is sum of the length of footings or pile caps along the skew angle.</p>		
<p>The supporting piles may be timber, concrete, or steel. If the supporting piles become visible, then the pile element should be added to the bridge.</p>		
<ol style="list-style-type: none"> 1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations. 2. Number of Pile Caps/Footings with repairs. 3. Number of Pile Caps/Footings with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. 4. Number of Pile Caps/Footings with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. 		

222	Timber Foundation	Units - LF
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This element defines a timber foundation element that includes a mud sill which is a spread footing and the rare case of a pile supported footing. A timber pile supported footing is where a timber horizontal footing member provides support for the columns and the timber member is supported by piles. The total quantity for this element is the length of timber foundation.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Total length of foundation if repairs exist.
3. Total length of foundation if structural defects exist, but the defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½" are marked with a YELLOW TAG.
4. Total length of foundation where damage exists in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½ shell thickness are marked with a RED TAG.

225	Steel Pile	Units - EA
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This element defines a pile or pile portion of a pile constructed of structural steel visible for inspection. Do not delete the element from the bridge because the element is no longer visible. The exposure may be intentional or caused by scour.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of piles with repairs such as: welded, bolted or riveted connections have been replaced; steel cracks or corrosion that has been mitigated or plated.
3. Number of piles with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, connections with steel cracking, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of piles with damage. Locations or quantity of damage has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, welded bolted or welded bracing connections. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

226	Prestressed Concrete Pile	Units - EA
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This element defines a pile or portion of a pile constructed of prestressed concrete and is visible for inspection. This includes all prestressed concrete piles, submerged or not. Do not delete the element from the bridge because the element is no longer visible. The exposure may be intentional or caused by scour.

227	Concrete Pile	Units - EA
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This element defines a pile or portion of a pile constructed of reinforced concrete and is visible for. This includes all concrete piles, submerged or not. Do not delete the element from the bridge because the element is no longer visible. The exposure may be intentional or caused by scour.

Condition States for WSDOT Elements 225, 226, and 227

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Number of pile with repairs.
3. Number of pile with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Number of pile with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

228	Timber Pile	Units - EA
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This element defines a pile or portion of a pile constructed of timber and is visible for inspection. This includes all timber piles, submerged or not. Do not delete the element from the bridge because the element is no longer visible. The exposure may be intentional or caused by scour.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Number of pile with repairs, plates, or splices.
3. Number of pile with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½" are marked with a YELLOW TAG.
4. Number of pile with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½" shell thickness are marked with a RED TAG.

229	Timber Cap Rehab with Steel	Units - LF
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This element consists of a timber cap rehabilitation where alternate load paths to piling are provided by steel members on the exterior of the cap and the timber cap remains in place. The timber conditions are excluded from the condition evaluation. The total quantity for this element is the length of the existing timber pier cap, where this quantity is deducted from the total quantity of Element 234.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Steel span length of pier cap rehabilitation with repairs.
3. Steel length of pier cap rehabilitation with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Steel span length of pier cap rehabilitation with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

231	Steel Pier Cap/Crossbeam	Units - LF
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This element defines a steel pier cap or crossbeam. The total quantity for this element is the length at the top of the crossbeam.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Steel span length of pier cap/crossbeam with repairs.
3. Steel span length of pier cap/crossbeam with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Steel span length of pier cap/crossbeam with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

232	Prestressed Hollow Concrete Pile	Units - EA
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This element defines a pile or portion of a pile constructed of prestressed concrete pile that has an interior void or is hollow. This includes all hollow prestressed concrete piles, submerged or not.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Number of piles that have been repaired or patched.
3. Number of piles with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Number of piles with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

233	Prestressed Concrete Pier Cap/Crossbeam	Units - LF
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This element defines a prestressed concrete pier cap or crossbeam. The total quantity for this element is the length at the top of the crossbeam.

234	Concrete Pier Cap/Crossbeam	Units - LF
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This element defines a reinforced concrete pier cap or crossbeam. Integral pier caps with girders framed directly into the crossbeam are also included in this element. The total quantity for this element is the length at the top of the crossbeam.

Condition States for WSDOT Elements 233 and 234

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Length of pier cap/crossbeam affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Length of pier cap/crossbeam affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Concrete span length of pier cap/crossbeam affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

235	Timber Pier Cap	Units – LF
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This element defines a timber pier cap that directly supports the superstructure. The total quantity for this element is the length at the top of the crossbeam.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Length of pier cap with repairs, plates, or splices.
3. Length of pier cap with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½" are marked with a YELLOW TAG.
4. Timber span length of pier cap with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1 ½ shell thickness are marked with a RED TAG.

236	Concrete Floating Pontoon	Units – Cell
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A concrete floating bridge is a series of post-tensioned floating pontoons which are subdivided into internal compartments called cells. Traffic may ride directly on the top of the pontoon, or the roadway may be elevated above the pontoon and supported by columns. This element includes all pontoons regardless of size or configuration and all cells shall be evaluated at the same risk to the bridge condition. Deck elements will apply for the entire length of the pontoon structure. Pontoon condition will include the top slab where the deck/soffit elements exist on the pontoon. The deck/soffit elements are not included where the deck is elevated above the pontoon. The total quantity for the Concrete Floating Pontoon element is the total number of pontoon cells for the bridge.

Concrete pontoons are specially designed to be watertight and dry while in service. The concrete is specifically designed to be visually crack free and have low permeability with watertight construction joints. Watertight design is the basis for condition evaluation of the pontoon below water line and is to include but is not limited to the assessment of post-tensioned concrete, connections between pontoons, WSDOT element 237-Pontoon Hatch/Bulkheads, and the risk to buoyancy. Watertight criteria shall not apply to the evaluations of conventionally designed concrete conditions above the waterline.

Concrete cracking shall be assessed on the location:

- Above or below the waterline.
- Whether it is in an exterior or interior wall.
- Whether it is active or in-active.
- And based on the design criteria that visible cracking should not exist on submerged surfaces.

An active crack is defined for this element as a crack that allows water to pass into or through a concrete section which is a risk for transporting fine materials out of the section or a source of contaminants into the section. Active cracks may be visible under normal bridge loading or only visible under storm conditions.

The presence of water in a cell is evaluated based on the time required to obtain a measured depth of water. Stated another way, the evaluation is based on the rate of accumulation, not the total depth of water. For example, seepage in a cell is defined as, less than 1" of water accumulated over a period of one year. Ballasted cells shall establish a void ratio of the ballast to calculate a volume of water in a cell, and also the actual infiltration rate of water assuming no ballast was present.

This Concrete Floating Pontoon element also defines the relationship between the bridge element condition and the corresponding NBI Substructure Condition rating or NBI Item 060. For cases where defects are observed in pontoons underwater and defects are independent of those seen on the interior of pontoons, Underwater Inspection Condition (SNBI Item B.C.15) coding will follow the same coding correlations as defined below for NBI Substructure Condition rating.

1. Number of pontoon cells with defects that are superficial and are insignificant to structural capacity or buoyancy of the cell, pontoon or bridge. The cell concrete surfaces may have structurally insignificant hairline cracks, possibly sealed with Crystalline during construction, with no history of seepage. The cell is dry. A cell may have water present due to condensation or from water accumulating at a rate slower than would be considered a CS3 "trace" amount of water.
 - If the total quantity is in CS1, then NBI Item 060 shall be an 8.
2. Number of pontoon cells with a repair such as, but not limited to a concrete patch or an epoxy injected sealed crack.
 - If repairs are above water level, or on interior walls between cells, then NBI Item 060 shall be a 7.
 - If repairs are below water level, then NBI Item 060 shall be a 6.
3. Number of pontoon cells with significant defects. Conventional concrete defects which do not affect structural capacity of the bridge. Watertight defects below the waterline which may affect buoyancy of the cell, pontoon or the bridge. Typical CS3 submerged defects include but are not limited to seepage of less than 1" of water accumulation in a year (trace). Trace is further defined as the amount of water required to manifest as puddled water over more than 50% of the pontoon floor. Below this amount of water, the pontoon cell is considered dry. Pontoon cells which have water present but does not increase in amount for 3 consecutive years are considered CS1 cells.

Pontoon cells will be monitored annually for water when there is more than 1" accumulation in a year, but do not meet the leaking requirements of CS4.

- If cells are in CS3 due to seepage, then NBI Item 060 shall be a 6.
- If eight or more adjacent or contiguous cells in a single pontoon are in CS3, then NBI Item 060 shall be a 5.
- If 20 percent of the cells in one pontoon, or a total of 10 percent of the cells in adjoining pontoons or 5 percent of the total element quantity are in CS3, then NBI Item 060 shall be a 4.

4. Number of pontoon cells with damage in locations or quantity, which has reduced the structural capacity of the pontoon or threatens the buoyancy of a cell, the pontoon, or the bridge. Wet conditions that indicate a threat to a cell's buoyancy include, but not limited to: Water leaks 1 inch or more per year in three consecutive years; Water leaks 2 inches or more in a year; Any cell visually leaking water at a rate greater than what would be classified as seepage for a CS3 cell. Any cell with a pontoon hatch or bulkhead in CS4, see WSDOT element 237.
- If cells are in CS4, then NBI Item 060 shall be a 4.
 - If eight or more non-adjacent cells in a single pontoon are in CS4 or one cell leaks ½ inch per month, then NBI Item 060 shall be a 3.
 - If eight or more adjacent cells in a single pontoon are in CS4, or one cell leaks 1 inch of water per month, then NBI Item 060 shall be a 2.
 - If 20 percent of the cells in one pontoon, or a total of 10 percent of the cells in adjoining pontoons or 5 percent of the total element quantity are in CS4, then NBI Item 060 shall be a 2.
 - If one cell leaks 1 inch of water per month, for three consecutive months, then the NBI Item 060 shall be a 1 and the bridge shall be closed to traffic.
 - If there is a measurable or visual change in the alignment or the free board distance at any location on the pontoon, then the NBI Item 060 shall be a 1 and the bridge shall be closed to traffic.

237	Pontoon Hatch/Bulkhead	Units - EA
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This element defines a deck or bulkhead access hatch made of steel or aluminum. Deck hatches are accessed from the exterior of a pontoon and bulkhead hatches provide access between cells. The condition evaluation of a pontoon hatch is based on the condition of the hatch and the ability of a hatch to provide a watertight structural seal. The performance of the hatches is critical to the design buoyancy of the pontoon structure during extreme events. The total element quantity is the total number of hatches on a bridge.

1. Defects are superficial and are insignificant to the performance of the hatch to moderate surface corrosion with no appreciable pitting or section loss. Insignificant amounts of water enter a cell when a deck hatch is closed.
2. Number of hatches with temporary repairs such as: partially replaced seals, repaired hold-down dogs or locks. Light to moderate surface corrosion with some pitting resulting in section loss of up to 5% of the surface area of the hatch.
3. Number of hatches with structural defects. The defects do not threaten performance of the hatch. Moderate to heavy surface corrosion with more frequent section loss due to pitting. Section loss estimated between 5% and 25% of the surface area of the hatch. Heavy pitting and section loss along seal edges which compromises the watertight integrity of the hatch. Superficial chipping noted in hatch components. Number of hatches which allow water accumulation into a cell of less than 1" per year.
4. Number of hatches with damage that threatens performance during an extreme event. Heavy surface corrosion with more uniform pitting. Visually corresponds to approximately 25% or more section loss of the surface area of the hatch. Cracking present in hatch components. Chips or broken hatch components that compromise the strength of the hatch or the watertight seal. Number of hatches which allow water accumulation into a cell of 1" or more per year. All pontoon cells in WSDOT element 236 shall be coded CS4 that have a deck hatch or bulkhead hatch coded CS4.

238	Floating Bridge – Anchor Cable	Units – EA
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This element defines a steel anchor cable or structural strand used to stabilize the position of a floating bridge. The condition of a floating pontoon anchor cable is evaluated during underwater inspections performed by divers and remotely operated vehicles. Condition evaluation is based on the cable protection system, breakage of wires within the cable and the condition of the cable anchor. The total element quantity should equal the number of floating pontoon anchor cables attached to the bridge.

Floating bridge anchor cables Condition Definitions: The amount of corrosion noted corresponds to the following criteria.

LIGHT (CS2) – Light surface corrosion (freckle rust, not white oxidation) and rusting of the outer layers of wires, no appreciable rust nodules or section loss detected.

LIGHT TO MODERATE – More significant corrosion with scattered rust nodules 1/16 inch thick, very early stages of section loss due to occasional pitting less than 1/32 inch deep.

MODERATE (CS3) – Rust nodules more uniform and typically 1/16 to ¼ inch thick with more frequent section loss due to pitting, typically still less than 1/32 inch deep, but with occasional pitting up to 1/32 inch deep. Visually corresponds to approximately 5% section loss in outer wires.

MODERATE TO HEAVY – Uniform rust nodules typically ¼ inch thick with uniform section loss due to pitting typically 1/32 inch deep. Outer wire section loss estimated between 5% and 25%.

HEAVY (CS4) – Uniform rust nodules typically ¼ inch to 3/8 inch thick with uniform section loss due to pitting typically 1/32 to 1/16 inch deep. Visually corresponds to approximately 25% section loss to the outer wires (obvious flattening of the wires, with grooves between the wires still visible).

1. Number of cables or anchors with no defects in the cable or anchor and the galvanized protection system is functioning properly, which includes white zinc oxidation. New replacement cables are coded in this condition state. (Corresponds to NBI Substructure (NBI Item 060) and SNBI Underwater Inspection Condition (SNBI Item B.C.15) rating of 7 or 8.)
2. Number of cables or anchors with defects that are insignificant and do not affect the capacity of the cable. The galvanized protection system is showing signs of failure, and surface or freckled rust may exist with no measurable loss of section. Any individual wire up to 75% out of lay and no closer than 30 LF apart is CS2. If any portion of the cable or anchor is CS2, then the NBI Substructure Condition rating (NBI Item 060) and SNBI Underwater Inspection Condition (SNBI Item B.C.15) shall be a maximum of 6.
3. Number of cables or anchors with defects that are beginning to affect the capacity of the cable but are within acceptable design limits. Corrosion section loss is not more than 25% of the outer wire layer. Single wire failures of the cable may exist due to corrosion or hydrogen embrittlement, but no closer than 30 feet apart. Gaps in the outer wires exposing the inner layer with no ferrous corrosion to inner layer. Multiple adjacent wires up to 100% out of lay. Wires more than 100% out of lay with second layer exposed are considered broken wires. If any portion of the cable or anchor is CS3, then the NBI Substructure Condition rating (NBI Item 060) and SNBI Underwater Inspection Condition (SNBI Item B.C.15) shall be a maximum of 5.

4. Number of cables or anchors with defects that have significantly affected the capacity. Two or more broken wires, or equivalent section loss due to other defects, are within 30 feet. Outer wire section loss greater than 25%. Exposed inner wires with measurable section loss. Any cable which exhibits permanent deformation. If any portion of the cable or anchor is CS4, then the NBI Substructure Condition rating (NBI Item 060) shall be a maximum of 4. If two or more adjacent cables (on the same side or opposite sides of the pontoon) or more than four cables on the structure are CS4, then the NBI Substructure Condition rating (NBI Item 060) and SNBI Underwater Inspection Condition (SNBI Item B.C.15) shall be 3.

4-5 Culverts

240	Metal Culvert	Units - LF
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This element defines a metal (steel, aluminum, etc.) culvert including arches, round or elliptical pipes, etc. The total quantity is the length of culvert from inlet to outlet along the bottom of the culvert and does not include the apron.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be corrosion, erosion, scour, distortion, or roadway settlement.
2. Length of culvert with repairs.
3. Length of culvert with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Length of culvert affected by damage in locations or quantity and has reduced the structural capacity of the culvert. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to: distortion, deflection, roadway settlement, or misalignment of the barrel.

241	Concrete Culvert	Units - LF
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This element defines all precast and cast-in-place (conventional or prestressed) concrete arch, pipe and box culverts. The total quantity is the length of culvert from inlet to outlet along the bottom of the culvert and does not include the apron.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Length of culvert with repair or patch.
3. Length of culvert affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Length of culvert affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the culvert. Structural deficiencies are not limited to distortion, deflection, roadway settlement, or misalignment.

242	Timber Culvert	Units - LF
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This element defines all timber box culverts. The total quantity is the length of culvert from inlet to outlet along the bottom of the culvert and does not include the apron.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Length of culvert that has been replaced, repaired, patched, or plated.
3. Length of culvert with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½" are marked with a YELLOW TAG.
4. Length of culvert affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the structural capacity of the culvert. Structural deficiencies are not limited to distortion, deflection, roadway settlement, or misalignment of the barrel. Typically, locations in a load path with less than a 1½" shell thickness are marked with a RED TAG.

243	Other Culvert	Units - LF
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This element defines all culverts not included under steel, concrete, or timber culvert elements. It may include masonry or combinations of other materials. The total quantity is the length of culvert from inlet to outlet along the bottom of the culvert and does not include the apron.

1. Defects are superficial and have no effect on the structural capacity of the culvert.
2. Length of culvert with repairs.
3. Length of culvert with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Length of culvert affected by damage in locations or quantity and has reduced the structural capacity of the culvert. Structural analysis is warranted or has determined repairs are essential to restore the structural capacity of the culvert. Structural deficiencies are not limited to distortion, deflection, roadway settlement, or misalignment of the barrel.

4-6 Sidewalk and Supports

A sidewalk is an element that provides pedestrian access across a bridge. A sidewalk is supported by a bridge deck and/or by sidewalk brackets that consist of several types of materials. The purpose of the sidewalk BMS is to record the structural integrity of the support system and sidewalk. Identify these elements in BMS if the sidewalk width is greater than or equal to 3 feet.

However, there are exceptions that must be accommodated. When there is a true sidewalk on a bridge as determined by the design, approach sidewalks, and location, it is appropriate to enter a sidewalk element in the BMS. Timber sidewalks, for example, may be narrow and have a support system. These exceptions should include a sidewalk WSDOT element. A specific note explaining the reasoning for including the sidewalk element should be provided.

If a rail retrofit or a wide curb has been determined to NOT be a sidewalk, then Bridge Rail elements will be used to document defects.



260	Steel Open Grid Sidewalk and Supports	Units - SF
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This element defines a sidewalk constructed of steel grids that are open and unfilled. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

261	Steel Concrete Filled Grid Sidewalk and Supports	Units - SF
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This element defines a sidewalk constructed of steel grids that have been filled with concrete. This element also includes the members used to provide support like stringers and braces.

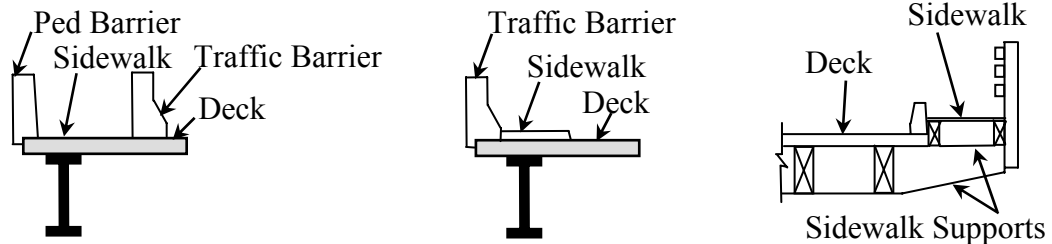
The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

262	Corrugated/Orthotropic Sidewalk and Supports	Units - SF
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This element defines a sidewalk constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete or an orthotropic steel deck. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

264 Timber Sidewalk and Supports**Units - SF**

This element defines a sidewalk constructed of timber. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

**266 Concrete Sidewalk and Supports****Units - SF**

This element defines a sidewalk constructed of reinforced concrete. The concrete sidewalk may be supported by the roadway deck, bracing, diaphragms, or sidewalk stringers. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

267 Fiber Reinforced Polymer (FRP) Sidewalk and Supports**Units - SF**

This element defines a sidewalk constructed of fiber-reinforced polymer. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

Condition States for WSDOT Elements 260, 261, 262, 264, 266, and 267

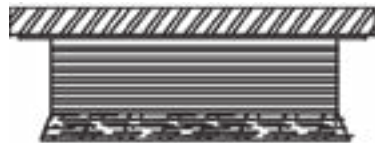
1. Defects are superficial and have no effect on the structural capacity of the sidewalk or supports.
2. Sidewalk area (or support projected area) with repairs or patches.
3. Sidewalk area (or support projected area) with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Sidewalk area (or support projected area) affected by damage in locations or quantity and has reduced the structural capacity of the sidewalk support. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

4-7 Bearings

When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only.

310 Elastomeric Bearing **Units - EA**

This element defines a bridge bearing that is constructed primarily of elastomers, with or without fabric or metal reinforcement.



311 Moveable Bearing (Roller, Sliding, etc.) **Units - EA**

This element defines those bridge bearings that provide for both deflection and longitudinal movement by means of roller, rocker or sliding mechanisms.



312 Concealed Bearing or Bearing System **Units - EA**

This element defines those bridge bearings and/or bearing seats that are not accessible with tools or equipment and therefore are not open for detailed inspection.

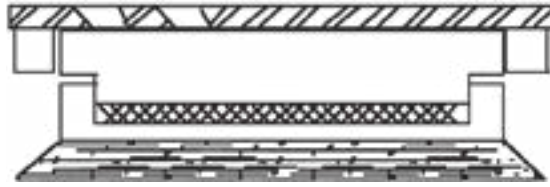
313 Fixed Bearing **Units - EA**

This element defines those bridge bearings that provide for rotation only.



314	Pot Bearing	Units - EA
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This element defines those high load bearings with a confined elastomer. The bearing may be fixed against horizontal movement, guided to allow sliding in one direction, or floating to allow sliding in any direction.



315	Disc Bearing	Units - EA
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This element defines a high load bearing with a hard plastic disc. The bearing may be fixed against horizontal movement, guided to allow sliding in one direction, or floating to allow sliding in any direction.

316	Isolation Bearing	Units - EA
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This element defines a bearing that is laminated and is a sandwich of neoprene and steel plates. The bearing contains a lead core that is primarily used for seismic loads. The isolation bearing is used to protect structures against earthquake damage.

Condition States for WSDOT Elements 310, 311, 312, 313, 314, 315, and 316

1. Defects are superficial and have no effect on the superstructure movements or safe transfer of load to the substructure. Shear deformation, displacement, or cracking of grout pad may be present. Top and bottom surfaces may not be parallel.
2. Number of bearings with a repair.
3. Number of bearings with structural defects. The defects are not detrimental to the superstructure or the safe transfer of load to the substructure. Deficiencies do not warrant analysis but may require repairs.
4. Number of bearings with defects that are detrimental to the superstructure or the safe transfer of load to the substructure. Loss of minimum bearing area may be imminent. Structural analysis is warranted or has determined bearing repairs are essential to restore the safe movement or transfer of load to the substructure.

4-8 Bridge Approach

321	Concrete Roadway Approach Slab	Units – SF
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This element defines a structural concrete slab supported at the bridge abutment and the roadway pavement. This element is essentially a concrete deck element that documents the surface conditions of the approach slab. The element quantity is the total area of both concrete approach slabs attached to the bridge. Do not include asphalt shoulder if present. Whether surface of approach slab is visible or covered by an asphalt overlay, a WSDOT element shall exist.

1. Defects are superficial. The slab surface does not have spalls/delaminations or previous repairs. The deck surfaces may have cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Slab area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Slab area with spalling. Do not add delaminations found in the field.
4. This condition state documents when an approach slab has failed and needs to be replaced. Failure is normally due to the slab falling off the bridge seat with a visible grade separation and/or excessive gap at the pavement seat. Code the total SF of approach slab in condition state 4.

4-9 Bridge Rail

WSDOT element for bridge railing are to be entered for each type of rail. For example, if there is W-beam or Thrie beam guardrail mounted on the concrete bridge rail, then the length of each metal and concrete element should be entered. If the original concrete bridge rail has aluminum rail installed on top (with or without a rail retrofit), enter that quantity into the appropriate WSDOT element as well. In the element notes, describe what type of metal bridge or pedestrian rail has been entered.

330	Metal Bridge Railing	Units – LF
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This element defines all types and shapes of metal bridge railing aluminum, metal beam, rolled shapes, etc. The quantity should equal the total length measured along each bridge rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

331	Concrete Bridge Railing	Units – LF
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This element defines all types and shapes of reinforced concrete bridge railing. The quantity should equal the total length measured along each bridge rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

332	Timber Bridge Railing	Units – LF
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This element defines all types and shapes of timber railing. All elements of this rail (except connectors) must be timber. The quantity should equal the total length measured along each bridge rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

333	Other Bridge Railing	Units - LF
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This element defines all types and shapes of bridge railing except those defined as METAL, CONCRETE or TIMBER. This element will include cable rails, and combinations of materials. The quantity should equal the total length measured along each bridge rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

Condition States for WSDOT Elements 330, 331, 332, and 333

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Bridge rail length with a repair.
3. Bridge rail length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth), decay, or spalling.
4. Bridge rail length with damage in locations or quantity and has reduced the structural capacity of the rail. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

4-10 Pedestrian Rail

A pedestrian rail will typically be on the outside of a sidewalk and protected from traffic by a Bridge Rail.

340	Metal Pedestrian Rail	Units - LF
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This element defines all types and shapes of metal pedestrian bridge railing including steel (excluding weathering steel), aluminum, metal beam, rolled shapes, etc. The quantity should equal the total length measured along each pedestrian rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

341	Concrete Pedestrian Rail	Units - LF
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This element defines all types and shapes of reinforced concrete pedestrian bridge railing. The quantity should equal the total length measured along each pedestrian rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

342	Timber Pedestrian Rail	Units - LF
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This element defines all types and shapes of timber pedestrian bridge railing. All elements of this rail (except connectors) must be timber. The quantity should equal the total length measured along each pedestrian rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

343	Other Pedestrian Rail	Units - LF
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This element defines all types and shapes of pedestrian bridge railing except those defined as METAL, CONCRETE or TIMBER. This element will include cable rails, and combinations of materials. The quantity should equal the total length measured along each pedestrian rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

Condition States for WSDOT Elements 340, 341, 342, and 343

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Pedestrian rail length with a repair.
3. Pedestrian rail length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth), decay, or spalling.
4. Pedestrian rail length with damage in locations or quantity and has reduced the structural capacity of the rail. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

4-11 Smart Flags

322	Approach Roadway Impact - Smart Flag	Units - EA
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Assigned to document the increase to the bridge live load, or impact, due to hammering or dynamic response of the bridge from traffic (specifically trucks) coming onto the bridge. Traffic speed may be considered when slower speeds reduce the impact. Total quantity is based on the direction of traffic coming onto the bridge. Bridges with two-way traffic will have two approaches and bridges with one way traffic such as ramps or divided main line structures will have only one approach. Code the approach roadway lanes in the condition state that best indicates the severity of the problem. For the roadway lanes where traffic is leaving the structure, deficiencies will be described and repairs may be called out; however, the trailing roadway will not be quantified in the condition states.

1. The number of approach roadways that are smooth. Hammer or dynamic response to the structure is not significant. There may be small bumps or minor raveling of the pavement in the approach roadway.
2. The number of approach roadways (not approach slab) that have been repaired or feather patched to correct an approach problem. If a paving project has removed the repairs, maintain the CS2 condition and note the year of the new asphalt.
3. The number of approach roadways that are rough, but the increase in live load to the structure is minor. Hammering impact is minor due to the wheels passing over surface discontinuities such as joints, cracks, or potholes. Dynamic response is minor due to a dip or rise in the approach roadway alignment.
4. The number of approach roadways that are causing significant increase in live load to the structure. Hammering impact is significant due to the wheels passing over surface discontinuities such as joints, cracks, or potholes. Dynamic response is significant due to a dip or rise in the approach roadway alignment.

351	Chloride Impact – Smart Flag	Units – EA
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Assigned when chloride contamination of a structure is identified through testing or field evaluation. Contamination may be in any of the Deck, Superstructure or Substructure elements. Condition state coding represents levels of impact, deterioration and degree of mitigation or rehabilitation expected to be necessary to extend structure life or restore it.

1. Structure has been identified to have chloride contamination through testing and or field evaluation by the Bridge Preservation Repair section. Best practices are required to extend the life of the structure to include:
 - Maintain the seal of all deck expansion joints to protect superstructure and substructure elements below.
 - Seal all cracking in deck surface or overlay and restore membranes prior to new overlay.
 - Seal barrier expansion joints within 6” above the deck surface and all leaking deck to barrier construction joints.
 - Direct all bridge and roadway drainage away from the structure to include extending any bridge drains away from pier caps and columns.
 - Initiate practices to minimize or eliminate use of chlorides on or in vicinity of the bridge.
2. Chloride contamination is actively contributing to deterioration of bridge elements with areas of concrete cracking, discoloration and delamination primarily concentrated in locations exposed to chloride use. Corrosion of reinforcement may not be openly evident but is occurring. These include the deck surface or soffit and areas of the superstructure and substructure exposed to water spray or uncontrolled drainage. Mitigation is required to reduce further impact, protect damaged elements, and slow the progression of ongoing damage. By the nature of chloride impacts, deterioration will continue, but without mitigation and extensive repair, damage will spread in extent and severity at increasing rates.
 - Once contamination reaches reinforcing steel. patching with cementitious products can result in a “Halo Effect” pattern of deterioration, accelerating corrosion of the steel. All chloride contaminated concrete and steel must be removed and replaced as part of a proper repair. (See ACI 364.6T-02, July 2002)
3. Chloride contamination has caused damage and decay of bridge Deck, Superstructure, or Substructure elements. Damage is widespread with areas of delamination, possible spalling, and open cracking progressing into and throughout structural elements. Corrosion of reinforcement has resulted in section loss that is directly impacting the overall serviceability and integrity of elements. Loss of capacity may or may not be indicated. Current condition risks necessity for restrictions or closure. Additional invasive evaluation may be necessary to fully determine the extent of damage. Extensive rehabilitation is indicated to extend useable life of the structure.
4. Chloride contamination has caused extensive damage and decay of bridge Deck, Superstructure, or Substructure elements and continues at increased rates. Damage is widespread with areas of delamination, spalling and open cracking progressing throughout structural elements. Corrosion of reinforcement has resulted in heavy section loss that is directly impacting the serviceability, integrity, and capacity of elements. Overall damage is extensive and expected to expand at increased rates reducing or eliminating options for rehabilitation. Remaining structure life is limited with high risk of near-term restrictions or closure that precipitate replacement.

353	Encampment Impact- Smart Flag	Units - EA
<p>Assigned when encampment activity is impacting inspection, maintenance, and condition of a bridge. Activity indicates the presence of encampments and/or encampment related activity or debris that prevents full access for adequate inspection or maintenance of a structure. Activity may be causing or has previously caused damage to the structure. Condition state coding represents levels of impact, or damage. Write any repairs for removal or clean up under the "0" Note".</p>		
<ol style="list-style-type: none"> 1. Encampment activity is evident with accumulations of debris under and/or in the immediate vicinity of the structure. Activity may be hindering inspection and maintenance activities in one or more areas making access and thorough examination of bridge elements difficult. 2. Heavy encampment activity and accumulations of related debris under and around the immediate vicinity of the bridge is creating a hazardous situation and prevents full and adequate inspection of the structure. 3. Encampment is causing or has caused physical damage to the structure through vandalism, break-in, theft or excavation of footings or slope protection. Damage may or may not require repairs. Graffiti is not considered. 4. Encampment is causing or has caused physical damage as a result of fire. Damage may or may not require repairs but may affect longevity of bride element conditions. Resulting access conditions may be hazardous. 		
355	Damaged Bolts or Rivets - Smart Flag	Units - EA
<p>Assigned to identify superstructure steel elements that have broken or missing bolts and/or rivets.</p>		
<p>Report a quantity of one unit in the appropriate condition states identified, but no more than one unit per condition state total.</p>		
<ol style="list-style-type: none"> 1. Bolts or rivets missing, damaged or replaced in the superstructure due to fatigue. 2. Bolts or rivets missing, having more than 10% section loss in the superstructure due to corrosion. 		
356	Steel Cracking - Smart Flag	Units - EA
<p>Assigned to identify superstructure steel elements with cracks. Report a quantity of one unit in the appropriate condition states identified, but no more than one unit per condition state total. If fatigue damage exists, which may warrant analysis of the element or the serviceability of the element is uncertain, contact a supervisor immediately. Any cracks (typically cope cracks) on WSDOT bridges must be repaired accordance with WSDOT Bridge Preservation Office procedures.</p>		
<ol style="list-style-type: none"> 1. Steel cracks, of any length, are present in a secondary member(s). 2. Steel cracks within a load path that have been repaired or arrested are present. 3. Steel cracks within a load path that are not arrested and less than 1 inch. 4. Steel cracks within a load path that are not arrested and 1 inch or greater in length are present. 		

357	Pack Rust – Smart Flag	Units – EA
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Assigned to identify the presence of pack rust within steel connections. Steel connections where pack rust is significant or rust expansion is visually deflecting steel plates and should be addressed when the bridge is painted. Structural impacts to pack rust overstressing are recorded within the steel elements. Report a quantity of one unit in the appropriate condition states identified, but no more than one unit per condition state total.

1. Pack rust exists and is less than ¼ inch thick.
2. Pack rust exists where rust is more than ¼ inch thick and/or the deformation of connection steel members is evident.

360	Bridge Movement – Smart Flag	Units – EA
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Assigned to identify structural movement that is causing significant distress to the bridge. Movements may be horizontal, vertical, or rotational. Evidence of movement should be documented (photo) in such a way that future measurements can determine if the structure is still moving or has stabilized.

1. The entire bridge appears to have stabilized due to repairs or recent history of measurements. Tilt meters, piezometer tubes, or monitoring system show no movement in the past two years.
2. Bridge elements are moving but do not cause a significant problem for the bridge. Bearings may be approaching design limits. Substructure elements may be moving.
3. Bridge movement is at or beyond design limits. Investigation and repair analysis of the bridge is warranted.

361	Scour – Smart Flag	Units – EA
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Assigned to identify foundation scour for bridge crossing waterways as observed during inspections. Its primary purpose is to identify bridge piers or abutments that are subject to scour and to provide some measure of the magnitude of that scour. Piers in normal high water are typically considered for this element but there are instances where piers above high water may be subject to scour. Maintain historical information related to scour documented in previous inspections such as measurements and/or comments of exposed footings.

1. Number of pier/abutment foundations where no Scour exists, or where scour is superficial and has no effect on the foundation's structural capacity.
2. Number of pier/abutment foundations where scour has been mitigated and the repair is functioning and in place as designed. Evaluate and comment on any riprap or other scour countermeasures that are in place.
3. Number of pier/abutment foundations where scour exists. The scour does not significantly affect the foundations structural capacity. Scour does not warrant analysis but may require repairs. If left unchecked, could adversely impact the foundations structural capacity.

Scour at this level should not impact the NBI Substructure Overall rating code, item 060 (WSBIS Item 1676).

Examples:

- Top of spread footings are exposed due to scour.
 - Bottom of pile caps are exposed due to scour.
 - Minimum known pile embedment is between 5' and 10' or the column unbraced length has increased, but does not threaten pile capacity.
4. Number of pier/abutment foundations with scour damage in significant locations or quantity and has reduced the foundations structural capacity. Structural analysis is warranted. Repair and or action are required to protect exposed foundation and to restore capacity to the pier.

Scour at this level may impact the NBI Substructure Overall rating code, item 060 (WSBIS Item 1676). A comment is necessary if the NBI Substructure Overall rating code is lowered.

Examples:

- Undermining of spread footings or foundation material is occurring.
- Minimum known pile embedment is less than 5' or the column unbraced length has increased and threatens pile/column capacity. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

376	Concrete Deck Delamination Testing – Smart Flag	Units – SF
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Assigned to document the deck delamination testing and must be included in the evaluation of a concrete deck and overlay. ASTM4580, Chain Drag Testing will locate and quantify the patches, spalls, delaminations not visible to the inspector and other defects on the entire top surface of the bridge deck. This information is supplemental to the deck/overlay elements and the quantities do not change. For Washington State bridges, the BMS engineer will provide the condition state quantities and notes for this element based on a Chain Drag Report produced by Design or Construction.

For decks covered with an Asphalt Overlay, the 376 data will be updated each time the asphalt is removed from the concrete surface and must be used to evaluate the deck element even though defects are not visible to the inspector. This information does not expire, and the element must not be deleted from the report unless the deck is replaced, or new information is provided.

1. Deck area with no delaminations.
2. For decks covered with asphalt, this quantity of patching must be recorded in the Deck CS2 and used to evaluate the deck. Do not include this quantity in the evaluation of a bare deck.
3. For decks covered with asphalt, this quantity of spalling must be recorded in the Deck CS3 and used to evaluate the deck. Do not include this quantity in the evaluation of a bare deck.
4. For concrete decks and concrete overlays, the CS4 delamination quantities must be applied to the deck/overlay element CS4. If the Chain Drag Report is more than 10 years old, then the 376 element is deleted from the report because the test results are no longer accurate and also must be removed from the evaluation of the deck/overlay element. If a Chain Drag was completed before the concrete overlay was constructed, then the 376 element must be deleted from the report since patching and delaminations are addressed during the construction.

378	WSDOT Undercrossing Safety - Smart Flag	Units - EA
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Assigned to cover the WSDOT Safety Inspection report type, to be used when the structure is not owned by WSDOT but interacts with a route that is. WSDOT Safety Inspections only address significant safety issues on those parts of the structure that affect the route that is owned by WSDOT.

This smart flag is intended to hold all notes associated with the primary safety inspection, and the inspector should not create or edit any other inspection notes except for repair recommendations, if warranted.

Examples include:

- railroad owned structures over state or local agency routes.
 - locally owned structures over state routes.
 - state owned structures over locally owned routes.
1. Report the entire bridge in condition state 1 (EA).

379	Local Agency Undercrossing Safety Inspection – Smart Flag	Units - EA
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Assigned to cover the Local Agency Safety Inspection report type, to be used when the structure is not owned by the local agency performing the inspection but interacts with a route that is. Local Agency Safety Inspections only address significant safety issues on those parts of the structure that affect the route that is owned by the local agency performing the inspection.

This smart flag is intended to hold all notes associated with the secondary safety inspection, and the inspector should not create or edit any other inspection notes except for repair recommendations, if warranted.

Examples include:

- railroad owned structures over local agency routes.
 - a state route crosses over a city street and a county road.
1. Report the entire bridge in condition state 1 (EA).

381	Joint Seal/Gland Leaking – Smart Flag	Units - EA
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Assigned when inspection identifies that the joint seal or gland is no longer effective in providing a watertight seal within the joint gap, or the joint design does not include a seal, allowing water to pass through on to bridge elements below. Active corrosion or damage may or may not already be present in the elements below. Identify the joints in the notes for the flag and describe any joint defects and impacts under the joint BMS Element. Code a quantity for each joint identified as leaking.

In cases where a leaking joint only affects roadway or embankment fill (joints at integral abutments and approach slabs, for example) do not use this smart flag.

1. Seal/Gland is separated or missing, whole or in part, allowing water to pass through the joint gap onto structural bridge elements below.

4-12 Seismic Retrofit

Earthquake restrainers have been installed on WSDOT bridges since the 1980s. The typical longitudinal restrainer uses epoxy coated Dywidag bars with a designed gap maintained by double nuts. An earlier system using springs to maintain the required restrainer gap was used until the early 1990s when it was discontinued. Gap measurements are required during an inspection if visual inspection or loose double nuts indicate the gaps are not uniform.



207	Concrete Column w/Steel Jacket	Units - EA
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This element defines a column, including a submerged column (formerly Element 209) or portion of a concrete column where the exposed surface has been retrofitted top to bottom with a steel jacket visible for inspection. This changes the deterioration and management of the pile. Element 207 replaces existing column elements 204 and 205 where the existing column quantities decrease, and Element 207 quantities increase by the number of steel jacketed columns. Construction of the steel jacket also rehabilitates any pre-existing defects, and the quantities are initially coded in condition state one.

Columns that are not jacketed top to bottom are considered a repair and Element 207 does not apply, such as a timber element with a steel splice. Code these repairs as CS2 in the original element 204 or 205.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of columns with repairs.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member.



208	Concrete Pile/Column w/Composite Wrap	Units - EA
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This element defines a concrete pile/column or portion of a pile/column where the exposed surface has been retrofitted top to bottom with a composite wrap. Examples of composite material are carbon fiber and fiberglass. This changes the deterioration and management of the pile/column. Element 208 replaces existing pile/column elements 204, 205, 226, or 227 where the existing pile/column quantities decrease, and Element 208 quantities increase by the number of composite piles/columns. Composite wrapping also rehabilitates any pre-existing defects and the quantities are initially condition state one.

Pile/columns that are not wrapped top to bottom are considered a repair and Element 208 does not apply, such as a fiberglass repair to a timber pile at the ground line. Code these repairs as CS2 in the existing pile element.

The structural condition should be based on the quantity and location of visible defects. Defects should be documented well enough to determine a change in condition. Defects include cracked or damaged composite reinforcement, abrasions, or seepage of moisture. Sounding with a rock hammer should use caution and not damage the resin materials.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, superficial cracked resin, debonding, or blisters on the surface.
2. Number of composite wrapped pile/columns with repairs.
3. Number of composite wrapped pile/columns with structural defects. The defects do not significantly affect structural capacity of the wrap or pile/column. Deficiencies do not warrant analysis but may require repairs.
4. Number of composite wrapped pile/columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

368	Seismic Pier Crossbeam Bolster	Units - LF
<p>This element identifies those piers that have been seismically retrofit with crossbeam bolsters. The quantity for this element is the length along the top of each crossbeam face (typically two lengths) that has been retrofitted with a bolster.</p>		
<p>Condition States for WSDOT Element 368</p>		
<ol style="list-style-type: none"> 1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations. 2. Length of bolster/crossbeam bolster affected by repair. 3. Length of bolster/crossbeam bolster affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, or structural cracking, exposed or corroded reinforcing. 4. Length of bolster/crossbeam bolster affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. 		
369	Seismic Pier Infill Wall	Units - EA
<p>This element identifies concrete piers with seismic structural improvements.</p> <p>Number of piers with a seismic pier infill wall.</p>		
370	Seismic - Longitudinal Restrainer	Units - EA
<p>This element is used to identify longitudinal seismic restrainers. When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only. The quantity should equal the total number of longitudinal restrainers on the bridge.</p>		
371	Seismic - Transverse Restrainer	Units - EA
<p>This element identifies existing bridges that have been retrofitted or newer structures that have been equipped with transverse restrainers designed to restrain transverse movement during a seismic event. The quantity should equal the total number of transverse restrainers on the bridge. When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only. Concrete girder stops located at the ends of girders attached to the abutment or intermediate pier caps/crossbeams provide lateral restraint however it is not the intention to include these in with this element.</p>		

372	Seismic – Link/Pin Restrainer	Units – EA
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This element is used to identify link/pin seismic restrainers. When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only. The quantity should equal the total number of link/pin restrainers on the bridge.

Condition States for WSDOT Elements 370, 371, and 372

1. Restrainer is in good condition and will function as designed. Anchor plate nuts have been checked and are in good condition.
2. Number of restrainers with misaligned seismic-longitudinal restrainer rods. Anchor plate nuts that are tight, but that have epoxy running down their bolts or are of varying lengths. The gap between adjacent longitudinal restrainers varies between $\frac{1}{4}$ inch and $\frac{3}{4}$ inch. Short transverse pipe restrainer length. Measure the depth of the diaphragm hole to the restrainer. Take a picture of the hole and tape measure.
3. Number of restrainers with improper anchor plate installation. Loose or inadequately bonded anchor nuts. A repair is warranted if over 25 percent of the anchor nuts have more than 2 inches of bolt thread exposed below the nut. Restrainer gap variation in a series of longitudinal seismic restrainers is greater than $\frac{3}{4}$ inches (measure and add the two gap distances on both sides of each restrainer in making your comparisons). Loose double nuts. Specify the replacement of the double nuts with (new) nuts having (with) setscrews and the resetting of the restrainer gaps according to the design tables. The inspector shall specify the required gaps, according to the bridge plans, in the repair.



373	Seismic – Catcher Block	Units – EA
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This element is used to identify a catcher block attached to a pier or abutment installed as part of a seismic retrofit. The quantity should equal the total number of catcher blocks on the bridge.

1. Number of catcher blocks in good condition.
2. Number of catcher blocks with deficiencies that need correction.

374 Seismic - Column Silo

Units - EA



This element is used to identify when a column has been designed to be isolated from the surrounding soil during a seismic event. This will usually consist of a corrugated metal pipe buried in the ground with a cap at the base of a column. The inspection note needs to identify the individual columns that are siloed along with the planned depth (relative to an identifiable elevation) at each one. In cases with small numbers of siloed columns, that could be done in the note. In other situations, a spreadsheet attached as a file or something similar may be useful. In-depth inspections are required upon the occurrence of a seismic event that is judged to have potentially affected the structure. Due to the dimensional variation of the column isolation feature at each structure, the In-depth inspection may require means (equipment and manpower) to open and then reclose/reseal the capping system along with tools to measure the silo depth and to roughly assess column and silo condition below the capping system. Each bridge with siloed columns may require an individual in-depth inspection procedure.

1. Silo capping system is intact as designed and is accessible with no visible deterioration.
2. Minor deterioration of silo capping system elements such as hardware corrosion, visible seal deterioration, access hardware broken/missing.
3. Capping system has been buried and is not visible for inspection. (Write repair - priority 2 or higher)
4. Capping system has failed allowing solid foreign material to enter the intended gap and potentially restrict column movement. (Write repair - priority 1)

4-13 Expansion Joint Elements

The expansion joint evaluation considers the overall function of the joint assembly including any observed structural defects such as spalling, cracking, patches, raveling, or defects connected with the joint seal, filler or gland component.

If any portion of a joint falls into a lower condition state, code the entire length of the joint in the lower condition state. Joints with structural defects are coded in CS2. Joints that require replacement are tracked in CS3. In general, joints in Condition State 3 will be programmed for rehabilitation or replacement. Note that condition state CS4 is not used within this section.

When a joint is entirely reconstructed or replaced with a new joint type, then revise the WSDOT element to reflect the new joint type. These new joint types may include the use of a header assembly to form the new joint configuration. These headers may consist of cementitious or polymer types of concrete material and are to be included within the joint element, not the deck surface element.

Deck surface spalling, cracking, or raveling within 1'-0" of a joint or joint header assembly is considered a joint defect, not a deck surface defect.

Assign Smart Flag 381 when inspection identifies that the joint seal or gland is no longer effective in providing a watertight seal within the joint gap, or the joint design does not include a seal, allowing water to pass through on to bridge elements below. Certain joint types are designed to allow the passage of water through the joint gap, and in such cases, Smart Flag 381 still applies. Active corrosion or damage may or may not already be present in the elements below. Identify the joints in the notes for the flag and describe any joint defects and impacts under the joint BMS Element.

Do not use more than one WSDOT element for a joint location, unless the structure has been widened and there are two joint systems present. Joint notes should reference specific joints by pier or span number. If multiple joint types exist within a joint location where the deck has not been widened, then record the joint type that represents the larger quantity of the skewed length. Make a note of the other (lesser quantity) joint type.

When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only.

400	Asphalt Butt Joint – Paving Joint Seal	Units – LF
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This element defines a butt joint between concrete and asphalt pavement that is an asphalt sawcut filled with hot poured rubber. This joint is shown in WSDOT Standard Plan A-40.20, Bridge Paving Joint Seals, Detail 3 or 4.

This element applies to the asphalt butt joint located at the back of the abutment pavement seat. It does not apply to the asphalt butt joint located at the roadway end of an approach slab. The quantity should equal the length measured along the joint.

1. The joint is functioning as designed. Defects are superficial and have no effect on the performance of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location. “D” spalls, patches, cracking or raveling is present in the concrete or asphalt within one foot of either side of the joint but no more than 10 percent of the length.
3. Skewed joint length at each location with the following typical criteria: When the concrete or asphalt must be rebuilt to maintain a reliable roadway surface; More than 10 percent of the joint length has spalls or patches adjacent to the seal; Asphalt was placed without a sawcut or the sawcut was not in the proper location.

401	Asphalt Open Joint – Paving Joint Seal	Units – LF
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This element represents a sealed and sawcut contraction joint or an asphalt joint in bridge paving over an open concrete joint in a bridge deck or truss panel joint, as shown in WSDOT Standard Plan A-40.20, Bridge Paving Joint Seals, Detail 1, 2, 5, or 6. The joint consists of hot poured rubber placed in an open concrete joint and a membrane may or may not exist. After the asphalt is placed, a sawcut is placed over the concrete joint and the gap filled with hot poured rubber. WSDOT Elements 402 - Open Concrete Joint and 420 - Joint Paved Over flag do not apply at these locations. The quantity should equal the length measured along the joint. It does not apply to the asphalt open joint located at the roadway end of an approach slab.

WSDOT Element 420 - the Joint Paved Over flag does apply for all locations of a buried steel joint due to the risk of planing equipment damaging the bridge deck.

1. The joint is functioning as designed. Defects are superficial and have no effect on the performance of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location. “D” spalls, patches, cracking or raveling is present in the concrete or asphalt within one foot of either side of the joint but no more than 10 percent of the length.
3. Skewed joint length at each location with the following typical criteria: When the concrete or asphalt must be rebuilt to maintain a reliable roadway surface; More than 10 percent of the joint length has potholes or patches adjacent to the seal; Asphalt was placed without a sawcut or the sawcut was not in the proper location.

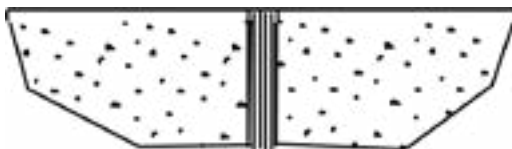
402 Open Concrete Joint – Paving Joint Seal**Units – LF**

This element defines a joint designed to have concrete edges at the joint opening in a concrete wearing surface. The original design is usually filled with hot poured rubber or pre molded joint filler and the design materials may or may not be present. This joint is typical for panel joints at a truss floorbeam, interior joints on older bridges, and at the concrete roadway/approach slab joint. At the back-of-pavement seat, if a compression seal has been removed and replaced with Hot Poured Rubber (crack sealant), then quantities for the 402 element apply and the quantities for the compression seal must be reduced. The quantity should equal the length measured along the expansion joint. It does not apply to the open concrete joint located at the roadway end of an approach slab.

This joint type does not apply to: WSDOT Element 403 - Concrete Bulb-T joint, WSDOT Elements 405 or 406 Compression Seals with the seal missing, or WSDOT Element 417 - Rapid Cure Silicone (RCS) joint.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the performance of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with “D” spalls or patches present in the header or in the deck within one foot of either side of the joint and is less than 25 percent of the joint length.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

A repair to reseal the joints is required for bridges at each steel floor beam where water is corroding the top flange and/or connections.

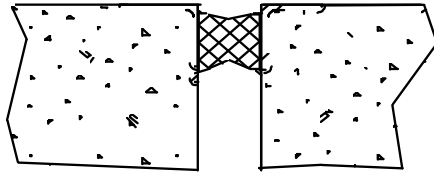
**403 Concrete Bulb-T****Units – LF**

This element defines a joint formed to accept a Bulb-T preformed seal. The seal may be missing, or other materials present to provide a seal. The quantity should equal the length measured along the expansion joint.



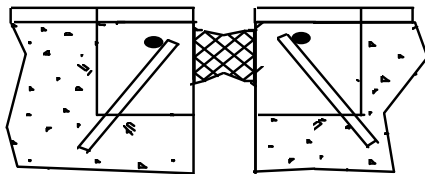
404 Compression Seal/Concrete Header Units - LF

This element defines a joint with concrete headers formed during the original construction of the bridge. The joint is filled with a pre-formed compression type seal. The quantity should equal the length measured along the expansion joint.



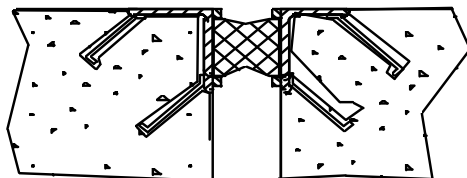
405 Compression Seal/Polymer Header Units - LF

This element defines those joints that have been rehabilitated with a polymer header and filled with a pre-formed compression type seal. The quantity should equal the length measured along the expansion joint.



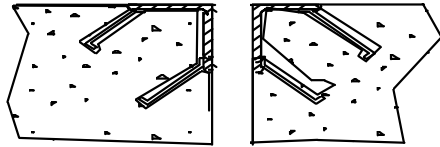
406 Compression Seal/Steel Header Units - LF

This element defines a joint with steel angle plate headers that have a pre-formed compression type seal. The quantity should equal the length measured along the expansion joint.

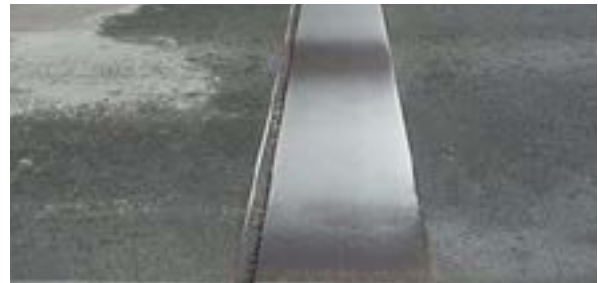
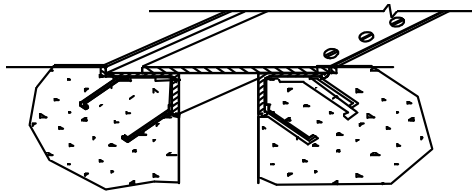


407 Steel Angle Header**Units - LF**

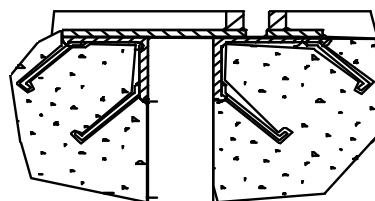
This element defines an open joint with steel angle plate headers. The quantity should equal the length measured along the expansion joint.

**408 Steel Sliding Plate****Units - LF**

This element defines a joint with steel sliding plates. The quantity should equal the length measured along the expansion joint.

**409 Steel Sliding Plate w/Raised Bars****Units - LF**

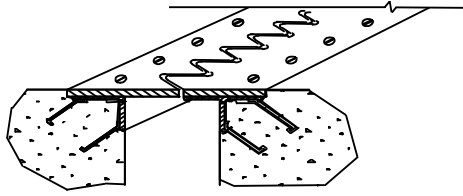
This element defines a joint with steel sliding plates and steel raised bars welded to the plates to accommodate an overlay. The quantity should equal the length measured along the expansion joint.



410 Steel Fingers

Units - LF

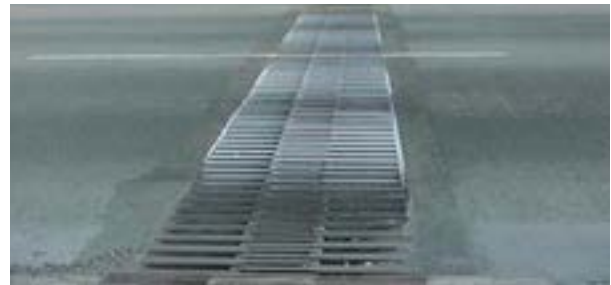
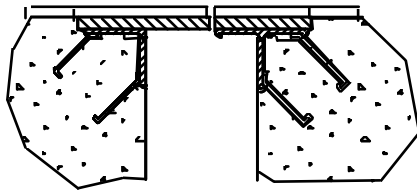
This element defines a joint with open steel fingers. The quantity should equal the length measured along the expansion joint.



411 Steel Fingers w/Raised Bars

Units - LF

This element defines a joint with bars or plates welded to the steel finger plates to accommodate an overlay. The quantity should equal the length measured along the expansion joint.



412 Strip Seal - Anchored

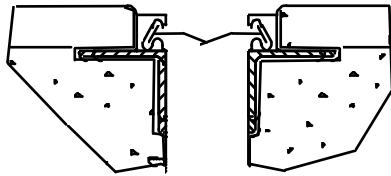
Units - LF

This element defines an expansion joint that uses a neoprene type waterproof gland with steel extrusion or other system to anchor the gland. The steel extrusion is anchored into the concrete deck or header. The quantity should equal the length measured along the expansion joint.



413 Strip Seal - Welded**Units - LF**

This element defines an expansion joint that uses a neoprene type waterproof gland with steel extrusion or other system to anchor the gland. The steel extrusion is welded to a preexisting steel expansion joint. The quantity should equal the length measured along the expansion joint.

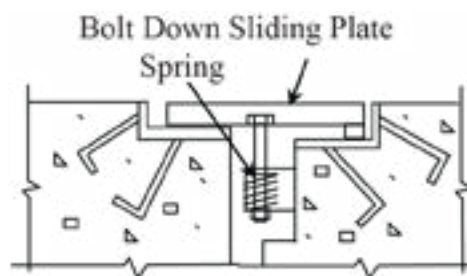
**414 Bolt Down - Sliding Plate w/springs****Units - LF**

This element defines a bolted sliding plate expansion joint that uses steel springs. The quantity should equal the length measured along the expansion joint.

Condition States for WSDOT Elements 403,404, 405, 406, 407, 408, 409, 410, 411, 412, 413, and 414

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

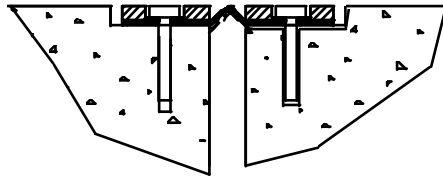
Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.



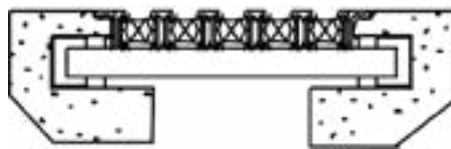
415 Bolt-Down Panel – Molded Rubber**Units – LF**

This element defines an expansion joint that uses a waterproof gland that is held in place by molded rubber panels that are attached with bolts. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Molded Rubber panels are secure and have no defects. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with “D” spalls or patches present in the header or in the deck within one foot either side of the joint. Some of the bolts may be broken but they represent less than 10 percent of the total for that panel.
3. Skewed joint length at each location where more than 10 percent of the bolts in a panel are missing, loose, or broken. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

**416 Assembly Joint Seal (Modular)****Units – LF**

This element defines a large movement joint that has an assembly mechanism with multiple neoprene type waterproof glands. The quantity should equal the length measured along the expansion joint.



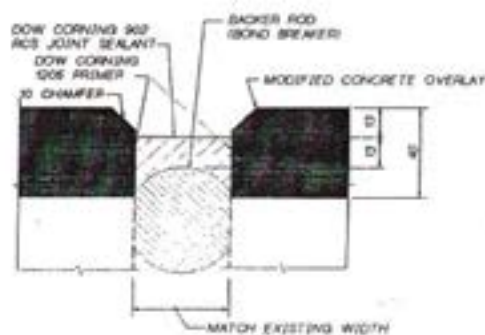
417	Silicone Rubber Joint	Units - LF
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This element defines an expansion joint that has been repaired with a single or two component rubber joint filler. The quantity should equal the length measured along the expansion joint.

Condition States for WSDOT Elements 416 and 417

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

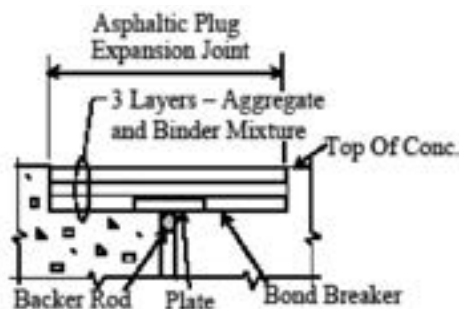
Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.



418	Asphalt Plug	Units - LF
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This element defines an expansion joint that has been replaced with an asphalt plug system. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with rutting in the joint is minor. "D" spalls or patches are present in the joint, or in deck adjacent to joint.
3. Skewed joint length at each location where the asphalt material in the joint has significant rutting, bulging or is missing. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

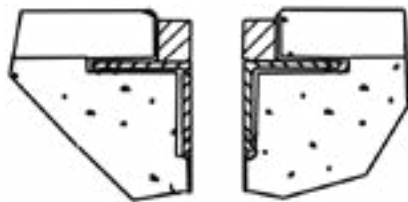


419 Steel Angle w/Raised Bars Units - LF

This element defines a joint with steel angles and steel raised bars welded to the angles to accommodate an overlay. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.



420 Joint Paved Over Flag Units - LF

This element identifies when a steel joint system that has been paved over with asphalt. This is a high risk to damaging the steel joint or bridge deck by the paving operations. When this flag is used, a cost for joint work will be included in the next paving contract to correct the problem. Since the joint cannot be inspected, the joint element condition states should remain unchanged (and so noted). Some steel joints may have more than 2.5" of asphalt may not require rehabilitation. The Total quantity will be the sum total length of all joint systems on the bridge.

1. Skewed joint length at each location that is paved over, but rehabilitation is not required.
2. Skewed joint length at each location that requires rehabilitation. A photo is helpful to determine the type of rehabilitation.

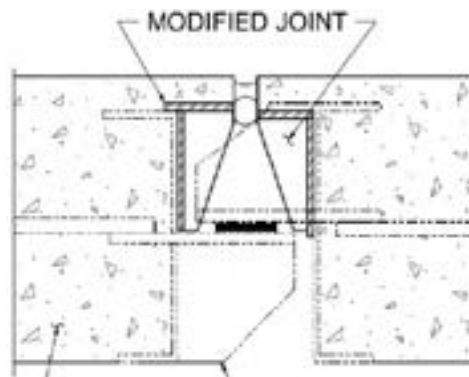
421	Concrete Slab In-Span Joint	Units - LF
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This element is defined as a modified joint at an In-Span bearing in a slab superstructure. These joints are distinct because the joint anchorages are in concrete structurally significant to supporting slab. This joint element applies at these locations regardless of the current joint type. As of 2016, all current modified joints are RCS joints. The quantity should equal the length measured along the expansion joint.

WSDOT bridges known to have this modified s are: 5/539E&W, 5/536E&W, 5/535E, 5/537E-S, 5/537N &S, 5/537N-W, 5/538E, 5/543E&W, 5/543NCD, 5/543SCD, 5/545NCD, 5/545SCD. As with all WSDOT contracts, work that affects bridge elements will have a record in the Contract History for reference by the inspector.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.

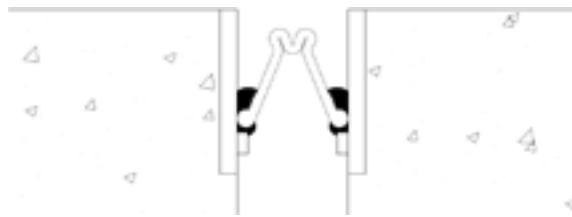


422 Flexible Joint Seal Units - LF

This element defines a joint with a flat extruded gland that is flexible. The gland is folded, held in place with adhesive, and may be supported by steel or concrete materials. This element supersedes other joint elements where maintenance has replaced the existing gland with a flexible joint seal. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.



4-14 Movable Bridges

501	Movable Bridge Steel Tower	Units - LF
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This element defines the structural steel columns and members used to support a counterweight of a vertical lift span. The total quantity is the total of the supporting column lengths.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Tower column length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Tower column length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Tower column length affected by damage in locations or quantity and has reduced the structural capacity of the column or the tower. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

4-15 Other Bridge Elements

705	Bridge Luminaire Pole and Base	Units - EA
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This element is defined by a light pole and anchor system attached to a bridge. It does not include the mast arm or other types of lights that may be attached to the bridge. The condition states describe the structural condition of the pole, anchor bolts, and support. WSDOT Region maintenance may need to be contacted prior to inspection in to remove bolt covers or otherwise provide access for inspection. The total element quantity should equal the number of luminaire poles attached to the bridge.

1. There are no significant structural defects in the pole or support, and the grout pad is solid. Poles or supports that have been replaced are coded in this condition state.
2. Number of poles where structural inspection requires special equipment to access.
3. Number of poles with structural defects. The defects do not significantly affect the structural capacity.
4. Number of poles affected by damage in locations or quantity and has reduced structural capacity. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Visual inspection indicates a base plate that is not supported by leveling nuts.

707 Fender System/Pier Protection Units - EA

Piers in the water can be vulnerable to rot, corrosion, and collision damage from ships or ice flows. This element is limited to external pier collision systems such as dolphins and fenders designed to resist vessels in the water. Dolphins are placed in front of a pier to re-direct an impact such as a large mass structure or pile clusters tied together. Fenders are protective fences or bumpers that surround a pier to absorb impacts from marine traffic. This element is coded separately from the pier elements and does not include extended concrete footings or coffer dams that are designed and constructed to primarily support vertical pier loads.

This element defines a protection system made of wood, steel, or concrete that is designed to protect the pier from vessel damage. The total element quantity should equal the number of piers with protection. In the case of a log boom, count the one pier connected to the boom.

1. There are no significant structural defects in the pier protection system. A protection system that has been replaced is coded in this condition state.
2. Number of pier protection systems that have been repaired.
3. Number of pier protection systems with structural defects. The defects do not significantly affect the structural capacity or function of the system.
4. Number of pier protection systems affected by damage in locations or quantity and has reduced structural capacity. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.



709	Ceramic Tile	Units - SF
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This is an element to identify ceramic tile. The total quantity is the area of tile visible for inspection.

1. Tile is bonded with no cracks, chips, or blemishes. Tile may be dirty but reflectivity is enhanced during regular washing operations.
2. Tile area that has been repaired.
3. Tile area that is bonded, but cracked and may have efflorescence or small amounts of section loss. Tile may be blemished from impact or other causes resulting in major loss of reflectivity.

Tile area with delaminations based on soundings, is completely missing, or has major section loss warranting replacement.

710	Bridge Mounted Sign Structures	Units - EA
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This element defines bridge mounted sign structures anchored to the bridge. This includes signs mounted to the outside face of the bridge or over the deck using a beam, truss, or cantilevered support. The condition states address any physical damage defects with the sign or its anchorage and the inventory status of the sign. The inventory status may be determined by the presence of a "Bridge Preservation Sign Structure Identification Tag". The quantity should equal the number of signs mounted to the bridge.

1. The sign has been inventoried and has the appropriate identification tag. The sign, support, and anchorage are in good condition with no significant structural defects.
2. The sign has not been inventoried. The sign, support, and anchorage are in good condition with no apparent defects.
3. The sign may or may not have been inventoried and has defects to the structure or anchorage but is safe and the structural capacity has not been significantly reduced.
This may include loose, missing or damaged bolts, or hardware within the sign structure where redundant framework or hardware prevents the identified defects from creating an immediate hazard. Anchorage defects may include corrosion or cracks; grout may be loose or missing. A repair should be written, and the sign bridge engineer notified.
4. The sign may or may not have been inventoried. Defects to the structure or anchorage threaten or have reduced the structural capacity. This may include loose, missing or damaged bolts, or hardware in multiple locations, and cracks within structural sections. Anchorage defects may include loose, missing, or broken hardware, broken or delaminating anchor locations, or loss of embedment due to creep or pull out. An emergent repair should be specified with written notification to region maintenance and the sign bridge engineer.

4-16 WSDOT Bridge Deck Overlay Elements

WSDOT categorizes overlays into two different types. The first type consists of Asphalt Concrete Pavements (ACP) and Thin Overlays. These are deck protection systems intended to prolong the life of the deck by removing the traffic wear from the surface of the concrete deck. The second type is a Concrete Overlay which is intended to rehabilitate the deck and provide a new concrete wearing surface.

ACP Overlays represented by the WSDOT element 800 can generally be identified in the field where as WSDOT element 801 represents asphalt with a membrane below it that is not visible. Thin overlays may be identified in the field if the system has failed, and areas of the thin layers are missing.

Deterioration of the ACP and thin overlays is not generally associated with the deterioration of the deck. The ACP may be replaced several times without exposing the concrete deck and the condition states for the deck and overlay elements are independent and DIFFERENT. Paving contracts attempt to repair all concrete spalls and delaminations on WSDOT bridges before placing the overlay. If the area of patching/spalls/delams is known, then the quantity should be noted and recorded in the WSDOT concrete deck element as CS2, CS3 or CS4 respectively, while the Overlay quantities of CS2 and CS3 are based on the visible inspection of the surface. In a similar fashion, if a new Bituminous Surface Treatment (BST) has been applied to an asphalt surface, then the overlay element CS2 and CS3 are equal to zero.

800	Asphalt Concrete (AC) Overlay	Units - SF
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This element defines an Asphalt Concrete (AC) bridge deck overlay, with or without a Bituminous Surface Treatment (BST). The quantity should equal the overlay's width times the length.

801	Asphalt Concrete (AC) Overlay with Waterproofing Membrane	Units - SF
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This element defines an asphaltic concrete with waterproofing membrane bridge deck overlay. The quantity should equal the overlay's width times the length.

802	Thin Polymer Overlay	Units - SF
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This defines a thin polymer bridge deck overlay that is less than or equal to 0.5 inches in thickness (i.e., epoxy, methyl-methacrylate). The quantity should equal the overlay's width times the length.

Condition States for WSDOT Elements 800, 801, and 802

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have cracking.
2. Total area of overlay patches.
3. Total area of overlay spalls or potholes. Thin Polymer Overlays (802) may have visible delaminations and should be considered as spalls and coded in CS3.

Concrete Overlay elements are difficult to discern in the field and are identified in special provisions or Plans. When constructing modified concrete overlays, the material removed by the deck preparation (spalls and delams) is replaced with the overlay material. WSDOT considers this construction deck rehabilitation; or in other words, the concrete overlay and deck are monolithic. Therefore, CS2 and CS3 for the deck and concrete overlay will be the SAME. All defects noted in the concrete overlay (SF) apply to the deck. It is not uncommon to have the overlay break up when there is a problem in the deck below it.

803	Modified Concrete Overlay	Units - SF
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This defines a rigid modified concrete bridge deck overlay that is normally 1.5 inches or greater in thickness (i.e., Latex (LMC), Microsilica (MMC), Fly Ash (FMC), Fiber Reinforced (FRC)). The quantity should equal the overlay's width times the length.

804	Polyester Concrete Overlay	Units - SF
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This defines a rigid polyester concrete bridge deck overlay that is normally 0.75 inches in thickness. The quantity should equal the overlay's width times the length.

Condition States for WSDOT Elements 803 and 804

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets.
2. Concrete overlay area with repairs or patches. Do not include the rare cases of rutting that has been filled with patching material.
3. Concrete overlay area with spalling.
4. Record the delaminated area (CS4) from WSDOT element 376 in the overlay CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

805	AC Over a Polymer Overlay	Units - SF
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This defines an asphaltic concrete applied over a thin polymer bridge deck overlay (i.e., epoxy, methyl-methacrylate). The quantity should equal the overlay's width times the length.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have cracking.
2. ACP overlay area with patches.
3. ACP overlay area with spalls or potholes.

806	BST on Concrete (Chip Seal)	Units - SF
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This defines a Bituminous Surface Treatment (BST), or commonly known as a chip seal, mistakenly applied directly on a concrete deck and is to be removed. This severely limits the inspection of the deck. Code the area of BST covering the concrete deck in CS1.

Note: Element 800 or 801 is used when a chip seal is intentionally applied to a structure. WSDOT discontinued use of this element in the year 2012.

807 Asphalt Concrete (AC) Overlay W/High Performance Membrane Units - SF

This element is defined as asphaltic concrete overlay with a higher quality waterproof membrane on a bridge deck. These membranes are spray-on polymers that cover rough surfaces or bridge decks that are considered significant. The condition states are based on the overlay, not the membrane. The quantity should equal the overlay width times the length.



As of 2016, there are three WSDOT bridges with this element: 16/110W, 5/504W, and 5/814.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have cracking.
2. Total area of overlay patches.
3. Total area of overlay spalls or potholes.

4-17 Protective Coatings

The steel paint area is equal to the surface area of the steel members in the bridge. An estimate of the steel paint area may be made if bridge plans are not available but the steel tonnage is known. The following table provides an approximate conversion factor:

Bridge Type	Square Feet Per Ton
Rolled or Plate Girder	110
Truss	160

901 Red Lead Alkyd Paint System Units - SF

This paint protection system is a 3-coat alkyd system incorporating lead-based paint. Use this paint element as a default if the paint was installed prior to 1991.

902 Inorganic Zinc/Vinyl Paint System Units - SF

This paint protection system consists of an inorganic zinc silicate shop applied primer system and a vinyl is paint applied after erection, cleaning, and spot priming.

903 Inorganic Zinc/Urethane Paint System Units - SF

This paint protection system consists of a inorganic zinc silicate shop applied primer system and an epoxy, aliphatic urethane paint system applied after erection, cleaning, and spot priming. **This paint system is used on new WSDOT steel bridges.**

904 Organic Zinc/Urethane Paint System Units - SF

This paint protection system is a 3-coat system incorporating an organic zinc primer, an epoxy second coat and a moisture cured urethane topcoat and is typically used on existing WSDOT steel bridges.

905	Coal Tar Epoxy Paint System	Units - SF
This paint protection system incorporates a coal tar epoxy-based product.		
906	Metalizing	Units - SF
This protection system consists of a sprayed coating of zinc or zinc/aluminum.		
907	Galvanizing	Units - SF
This protection system consists of zinc applied to steel in a variety of spray-on methods.		
908	Epoxy Paint for Weathering Steel	Units - SF
This protection system consists of a clear epoxy coating applied to weathering steel to prevent excessive corrosion.		
909	Zinc Primer	Units - SF
This paint protection system consists of a zinc silicate shop applied primer system.		

Condition States for WSDOT Elements 901 thru 909

1. The protection system is sound and functioning as intended to protect the metal surface.
2. Protection system area that has been painted by maintenance.
3. Protection system area with chalking, peeling, curling or showing other early evidence of paint system distress, but there is no exposure of metal.
4. Protection system area that is no longer effective. The metal substrate is exposed.



910	Weathering Steel Patina	Units - SF
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This protection system consists of a chemical compound formed on the surface of weathering steel elements and is called the patina. When exposed to the atmosphere, weathering steel develops a patina, which seals and protects the steel from further corrosion. This oxide film is an intended layer of surface rust, which protects the member from further corrosion and loss of material thickness. The patina acts like a paint system to protect the steel. The color is an indicator of the condition of the patina may vary from orange to dark brown or purple-brown.

1. Weathering steel area that is chocolate brown or purple, brown in color (boldly exposed) and in good condition. The patina is tightly adhered, capable of withstanding hammering or vigorous wire brushing. The patina system is sound and functioning to protect the metal surface.
2. Weather steel area that has been painted by maintenance.
3. Weathering steel color is yellow orange to light brown. Some areas may not have rust. Patina has a dusty to granular texture.



4. Weathering steel area that is black in color indicating non-protective patina. Area that remains damp for long periods of time due to rain, condensation, leaky joints, traffic spray or other source of moisture. Area where debris has accumulated on a horizontal surface and the steel is continuously wet. Area with a texture of large granules (greater than 1/8" diameter); flaking (greater than 1/4" diameter) or laminar rusting in thin sheets.



911	Paint System - Other	Units - SF
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This element applies to any protective structural steel coating system not included in the previously listed protective coating elements.

Examples may include:

- High Ratio Calcium Sulfonate Alkyd (HRCSA) which is typically a single-coat system and behaves as a flexible elastomeric film once applied to steel surfaces.
- Two-coat Polyurethane based (Polyaspartic) coatings applied to steel surfaces.
- Polysiloxane based coatings applied to steel surfaces.

Condition State for WSDOT Element 911

1. Defects are superficial. The protection system is sound and functioning as intended to protect the metal surfaces.
2. Protection system area that has been painted by maintenance.
3. Protection system area with chalking, peeling, curling, or showing other early evidence of paint system distress, but there is no exposure of metal.
4. Protection system area that is no longer effective. The metal substrate is exposed.

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