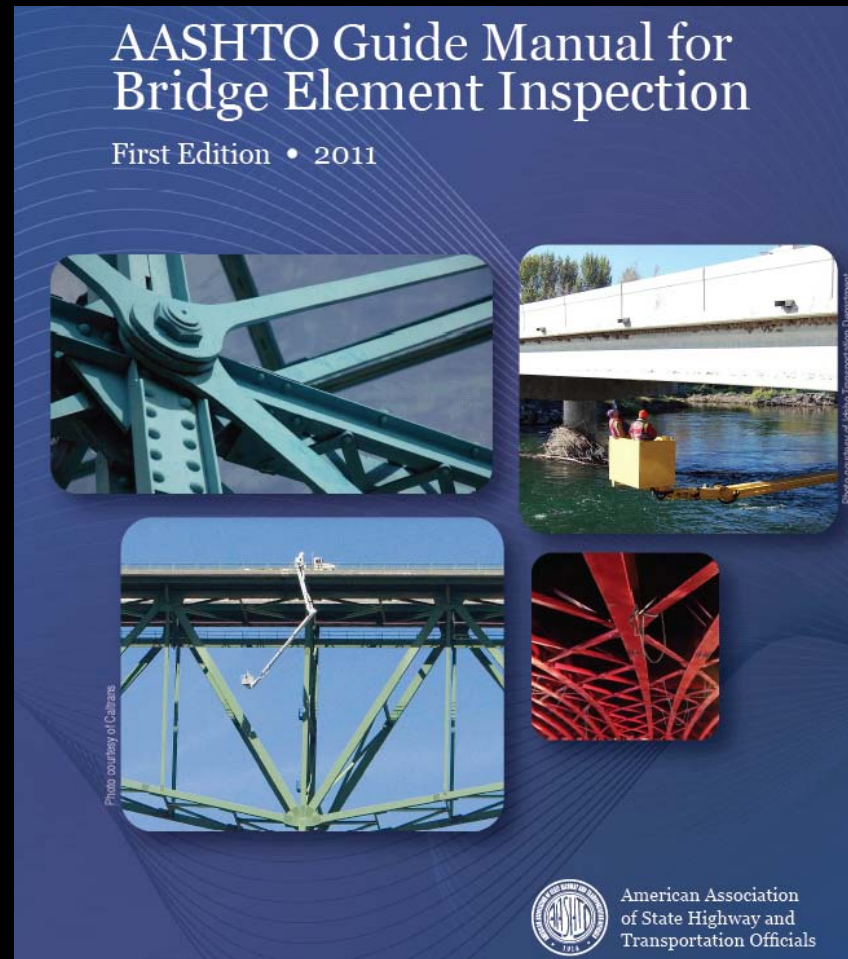


Impact of the New AASHTO Guide Manual for Bridge Element Inspection



54th Annual Transportation Conference

Significant Changes

- Four condition states for all elements.
 - Follow – Good, Fair, Poor, Severe convention.
- Wearing surfaces separated from deck element.
 - Deck element units changed to square feet.
- Steel protective coatings separated from steel.
- All smart flags have been incorporated into condition state language.

Element Types

- National Bridge Elements (NBE's)
 - Provide the minimum element set to define safety and load capacity of bridges.
 - Includes all primary structural elements.
 - Decks, Slabs, Girders, Columns, Abutments etc.
 - Condition state language is not editable.
 - Elements intended for NBI condition assessment.

Element Types

- Bridge Management Elements (BME's)
 - Elements define secondary bridge components.
 - Joints, approach slabs, protective systems, etc.
 - Provide an added level of condition assessment for utilizing bridge management systems.
 - Can be extended to capture other components as desired by the agency.
 - Can influence deterioration modeling.

Element Types

- Agency Developed Elements
 - Supports agency developed elements.
 - Require four states following general definition.
 - May be sub-sets of NBE's, BME's, may be unrelated to any defined element.
 - May be subject to deterioration modeling or not.
 - Allows the incorporation of non-bridge assets.

Questions and Answers

Why change the elements?

- Fully capture all condition defects on the bridges.
- Provide the means for national decision making based on consistent detailed bridge condition information.
- Eliminate the need to translate and synthesize element data for the C&P report.
- Improve the deck and slab language to capture structural capacity and defects of these high maintenance items.
- Separate wearing surfaces and protective coatings out for management of these protection systems.

Questions and Answers

Will the new elements work in Pontis?

- Pontis 5.1 will be updated to accommodate the new element definitions and will have the capability to handle sub-sets and agency developed elements.
- Pontis will facilitate the conversion of older element data for the majority of state DOT's.
- The new element definitions will provide vastly improved modeling and cost estimating too.

Questions and Answers

Will the new element manual impact the sufficiency rating?

- The new elements are not currently associated with the sufficiency rating and will have no impact on project eligibility or apportionment.

How Does Element Inspection Work?

Description This element defines all reinforced concrete bridge deck/slab regardless of the wearing surface or protection systems used.	Element #12/38 Reinforced Concrete Deck/Slab ft ² (m ²) National Bridge Elements
---	--

Quantity Calculation

The quantity for this element should include the area of the deck/slab from edge to edge including any median areas and accounting for any fares or ramps present.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Feasible Actions

Condition State 1	Condition State 2	Condition State 3	Condition State 4
Do Nothing Protect	Do Nothing Protect Repair	Do Nothing Protect Repair Rehab	Do Nothing Protect Replace

Element Commentary

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

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter and no exposed rebar	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Element #12 – Reinforced Concrete Deck

AASHTO Guide Manual for Bridge Element Inspection

3-3

<p>Description This element defines all reinforced concrete bridge deck/slab regardless of the wearing surface or protection systems used.</p>	<p>Element #12/38 Reinforced Concrete Deck/Slab ft² (m²) National Bridge Elements</p>
---	---

Quantity Calculation

The quantity for this element should include the area of the deck/slab from edge to edge including any median areas and accounting for any fares or ramps present.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Feasible Actions

Condition State 1	Condition State 2	Condition State 3	Condition State 4
Do Nothing Protect	Do Nothing Protect Repair	Do Nothing Protect Repair Rehab	Do Nothing Protect Replace

Element #12 – Reinforced Concrete Deck

Element Commentary

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

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter and no exposed rebar	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Element #107 Steel Open Girder/Beam ft (m) National Bridge Elements	Description This element defines all steel open girders, and is for all girders regardless of protective system.
--	--

Quantity Calculation

The quantity for this element is the sum of all the lengths of each girder.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Exists	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Feasible Actions

Condition State 1	Condition State 2	Condition State 3	Condition State 4
Do Nothing Protect	Do Nothing Protect	Do Nothing Protect Repair Rehab	Do Nothing Rehab Replace

Element Commentary

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

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Element #107 – Steel Open Girder/Beam

3-14

AASHTO Guide Manual for Bridge Element Inspection

Element #107 Steel Open Girder/Beam ft (m) National Bridge Elements	Description This element defines all steel open girders, and is for all girders regardless of protective system.
--	--

Quantity Calculation

The quantity for this element is the sum of all the lengths of each girder.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Exists	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Feasible Actions

Condition State 1	Condition State 2	Condition State 3	Condition State 4
Do Nothing Protect	Do Nothing Protect	Do Nothing Protect Repair Rehab	Do Nothing Rehab Replace

Element #107 – Steel Open Girder/Beam

Element Commentary

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

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Element #515 – Steel Protective Coating

3-128

AASHTO Guide Manual for Bridge Element Inspection

Element #515 Steel Protective Coating ft ² (m ²) Bridge Management Element	Description The element is for steel elements that have a protective coating such as paint, galvanization, or other top coat steel corrosion inhibitor.
--	---

Quantity Calculation

This quantity for this element should include the entire exposed surface of the steel element.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Chalking	None	Surface Dulling	Loss of Pigment	Loss of Pigment
Peeling/Curling	None	None	Minor	Exposure of Bare Metal
Oxide Color	Light Brown	Yellow Orange	Dark Brown	Black
Effectiveness	Good Condition, Fully Effective	Fair Condition, Substantially Effective	Poor Condition, Limited Effectiveness	Failed, No Protection of the Underling Metal

Feasible Actions

Condition State 1	Condition State 2	Condition State 3	Condition State 4
Do Nothing	Do Nothing Repair	Do Nothing Repair Replace	Do Nothing Replace

Element Commentary

This element shall describe all coating systems. This includes paint systems, oxide on weathering steel, and galvanization.

Element Definitions

Effectiveness is in evaluation made by the inspector to classify the degree to which the protection system is functioning to protect the steel beneath.

Multi-Path Example

Length = 50 ft

Area = 200 sq ft

Paint – Freckled Rust
Outside, Inside Good



Element	Quantity	State 1	State 2	State 3	State 4
Steel Girder	50 Ft	48 ft		1 ft	1 ft

Multi-Path Example

Length = 50 ft

Area = 200 sq ft

Paint – Freckled Rust
Outside, Inside Good



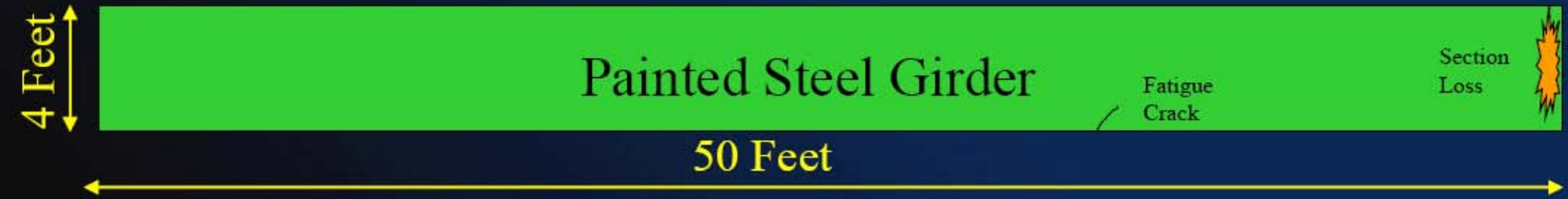
Element	Quantity	State 1	State 2	State 3	State 4
Steel Girder	50 ft	48 ft		1 ft	1 ft
<i>Fatigue Flag (girder)</i>	<i>1 ft</i>				<i>1 ft</i>

Multi-Path Example

Length = 50 ft

Area = 200 sq ft

Paint – Freckled Rust
Outside, Inside Good



Element	Quantity	State 1	State 2	State 3	State 4
Steel Girder	50 ft	48 ft		1 ft	1 ft
<i>Fatigue Flag (girder)</i>	<i>1 ft</i>				<i>1 ft</i>
<i>Section Loss Flag (girder)</i>	<i>1 ft</i>			<i>1 ft</i>	

Multi-Path Example

Length = 50 ft

Area = 200 sq ft

Paint – Freckled Rust
Outside, Inside Good



Element	Quantity	State 1	State 2	State 3	State 4	
Painted Steel Girder	50 Ft	48 ft		1 ft	1 ft	NBE
<i>Fatigue Flag</i>	<i>1 ft</i>				<i>1 ft</i>	
<i>Section Loss Flag</i>	<i>1 ft</i>			<i>1 ft</i>		
<i>Coating System</i>	<i>400 sq ft</i>	<i>200 sq ft</i>		<i>196 sq ft</i>	<i>4 sq ft</i>	BME

AASHTO/Pontis Timelines



- New AASHTO Bridge Element Inspection Guide Manual adopted in May 2010
- AASHTO publication released in February 2011
- Working to incorporate new elements into Pontis 5.1 (expected to be released summer of 2011)

Proposed ALDOT Timelines

- September 2011

- AASHTO Bridge Element Inspection training for state inspectors

- April 2012

- State Inspectors begin Element Inspections

- October-December 2012

- AASHTO Bridge Element Inspection training for county inspectors

- April 2013

- County Inspectors begin Element Inspections



QUESTIONS?

54th Annual Transportation Conference