

<b>Element #225</b> <b>Steel Submerged Pile</b> Each National Bridge Element	<b>Description</b> This element defines only those steel piles that are continuously submerged in water and are visible for inspection. Piles exposed from erosion or are part of the diver inspection are included in this element. This element is for all pile extensions regardless of protective system.
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### Quantity Calculation

The quantity for this element is the sum of the number of submerged piles.

### 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 Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Scour	None	Arrestment or Countermeasures exist, or both	Minor	
Settlement	None	Arrestment or Countermeasures exists, or both	Minor	
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

None

### 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

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

<p><b>Description</b>                  This element defines only those prestressed piles that are continuously submerged in water and are visible for inspection. Piles exposed from erosion or are part of the diver inspection are included in this element. This element is for all columns/pile extensions regardless of protective system.</p>	<p><b>Element #226</b>  <b>Prestressed Concrete Submerged Pile</b>                  Each                  National Bridge Element</p>
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**Quantity Calculation**

The quantity for this element is the sum of the number of submerged piles.

**Condition State Definitions**

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	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.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present with no section loss	
Cracks	Hairline cracks only	Narrow size or density	Medium size or density	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Scour	None	Arrestment or Countermeasures exist, or both	Minor	
Settlement	None	Arrestment or Countermeasures exist, or both	Minor	
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**

None

**Element Definitions**

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1–0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

<p><b>Description</b>                  This element defines only those reinforced concrete piles that are typically submerged in water and are visible for inspection. Piles exposed from erosion or are part of the diver inspection are included in this element. This element is for all columns/pile extensions regardless of protective system.</p>	<p><b>Element #227</b>  <b>Reinforced Concrete Submerged Pile</b>                  Each                  National Bridge Element</p>
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**Quantity Calculation**

The quantity for this element is the sum of the number of submerged piles.

**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	
Scour	None	Arrestment or Countermeasures exist, or both	Minor	
Settlement	None	Arrestment or Countermeasures exist, or both	Minor	
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	Do Nothing Protect Repair Rehab	Do Nothing Rehab Replace

**Element Commentary**

None

**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	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

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

<b>Element #228</b> <b>Timber Submerged Pile</b> Each National Bridge Element	<b>Description</b> This element defines only those timber piles that are typically submerged in water and are visible for inspection. Piles exposed from erosion or are part of the diver inspection are included in this element. This element is for all columns/pile extensions regardless of protective system.
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### Quantity Calculation

The quantity for this element is the sum of the number of submerged piles.

### Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	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.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
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 Rehab Replace

### Element Commentary

None

### Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more than 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth.	Propagates from a tension zone to a depth greater than 50% of the member depth.

<b>Defect</b>	<b>Minor</b>
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

<b>Element #231</b> <b>Steel Pier Cap</b> ft (m) National Bridge Element	<b>Description</b> This element defines those steel pier caps that support girders and transfer load into piles, and is for all steel pier caps regardless of protective system.
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### Quantity Calculation

The quantity for this element is the sum of the cap lengths measured along the skew angle.

### 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 Cracks Exist	
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

None

### 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

<b>Description</b> This element defines those prestressed concrete pier caps that support girders and transfer load into piles and is for all caps regardless of protective system.	<b>Element #233</b> <b>Prestressed Concrete Cap</b> ft (m) National Bridge Element
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**Quantity Calculation**

The quantity for this element is the sum of the cap lengths measured along the skew angle.

**Condition State Definitions**

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	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.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present without section loss	
Cracks	Hairline cracks only	Narrow size or density	Medium size or density	
Efflorescence	None	Moderate but 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	Do Nothing Protect Repair Rehab	Do Nothing Rehab Replace

**Element Commentary**

None

**Element Definitions**

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1–0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar

<b>Element #234</b> <b>Reinforced Concrete Pier Cap</b> ft (m) National Bridge Element	<b>Description</b> This element defines those reinforced concrete caps that support girders and transfer load into piles, and is for all pier caps regardless of protective system.
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### Quantity Calculation

The quantity for this element is the sum of the cap length measured along the skew angle.

### 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	Do Nothing Protect Repair Rehab	Do Nothing Rehab Replace

### Element Commentary

None

### 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	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

<b>Description</b> This element defines those timber caps that support girders that transfer load into piles, and is for all timber pier caps regardless of protective system.	<b>Element #235</b> <b>Timber Pier Cap</b> ft (m) National Bridge Element
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**Quantity Calculation**

The quantity for this element is the sum of the pier cap lengths measured along the skew angle.

**Condition State Definitions**

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	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.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
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 Rehab Replace

**Element Commentary**

None

**Element Definitions**

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more than 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

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