

- An inherent defect is not indicative of damage or deterioration, but is characteristic of the material or results from normal construction practices and generally accepted construction quality.
 - Upon Initial inspection, Large spalls or Wide Cracks from standard pile driving practice would be considered Inherent defects even though they meet the criteria for moderate defects. They will remain Inherent defects (CS1) until some change indicative of damage or deterioration is apparent.
- The defect description definitions describe generalized distress, but the width, spacing, location, orientation, and structural or non-structural nature of the defect should also be considered when applying an Isolated defect to the overall condition rating. A moderate defect is one where damage or deterioration are significant based on the defect type, severity, and location, but the strength and performance of the component are not affected. See Attachment A, moderate defects for reinforced concrete are highlighted based on the definition above.

- The following descriptions will be applied to Table 47 based on guidance from the MBEI (Attachment A)
 - Efflorescence, Rust Staining (Defect 1120) will only be applied when associated with cracking. For example, an unsealed medium width crack may move from a minor defect (CS2) to a moderate defect (CS3) if also associated with rust staining or heavy efflorescence.
 - Abrasion, Wear, Scaling will only apply to Deck elements.

Should you have any questions, please contact Stephanie Doolittle at (225) 379-1329.

HGB: SSD

Cc: Mr. Kevin Reed
Mr. Todd Donmyer
Mr. Chad Roubique

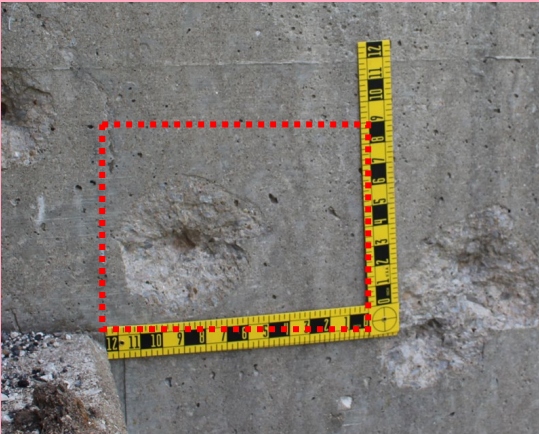
Attachment A

Defects for Reinforced Concrete

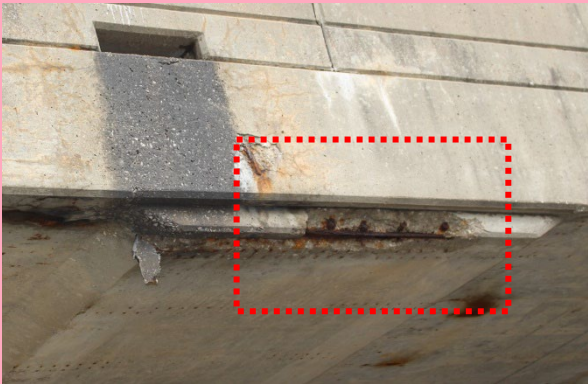
MODERATE DEFECTS

Defects	CS 1 GOOD	CS 2 FAIR	CS 3 POOR	CS 4 SEVERE
Delamination/Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge. spall size)
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Efflorescence/Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining. Only when associated with cracking	
Cracking (RC) (1130)	Insignificant cracks or moderate-width cracks that have been sealed.	Unsealed moderate-width cracks, or unsealed moderate pattern (map) cracking.	Wide cracks or heavy pattern (map) cracking.	
Deck Only Abrasion/Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete. deck	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear. deck only (meets CS3	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in CS 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in CS 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in CS 4 under the appropriate material defect entry.

Defect 1080—Delamination/Spall/Patched Area

Condition State 1	Condition State 2	Condition State 3
None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
		
Boundary Image CS 1–2		Boundary Image CS 2–3
		

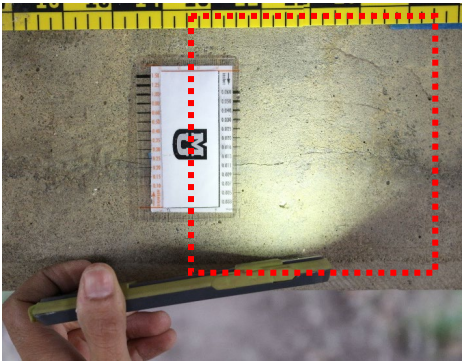
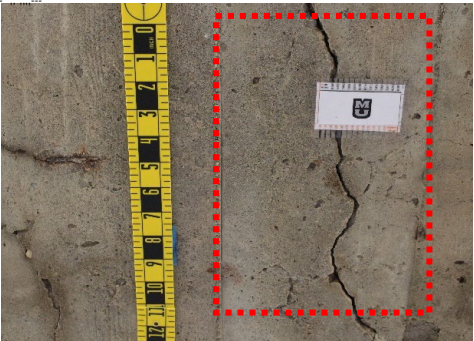
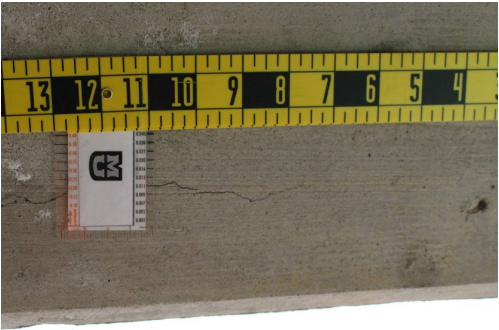
Defect 1090—Exposed Rebar

Condition State 1	Condition State 2	Condition State 3
None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.
		
	Boundary Image CS 2–3	
		

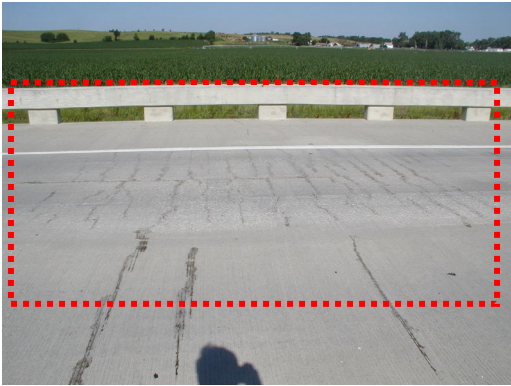
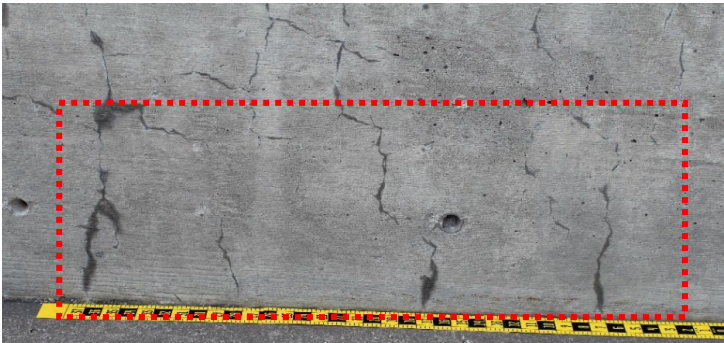
Defect 1120—Efflorescence/Rust Staining

Condition State 1	Condition State 2	Condition State 3
None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.
		
Boundary Image CS 1–2		Boundary Image CS 2–3
		

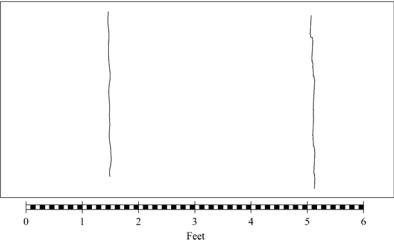
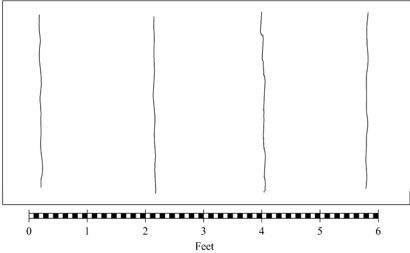
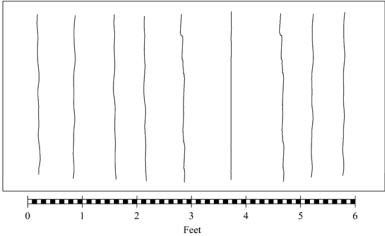
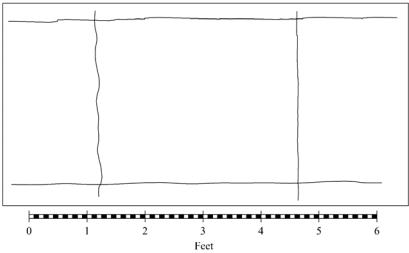
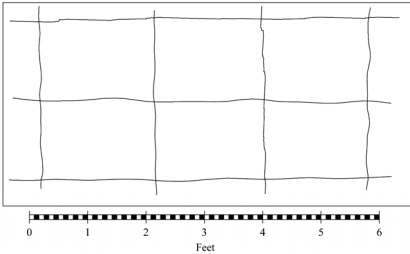
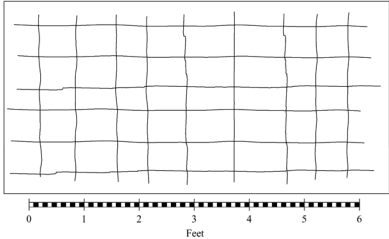
Defect 1130—Cracking (RC and Other)

Condition State 1	Condition State 2	Condition State 3
Insignificant cracks or moderate-width cracks that have been sealed.	Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	Wide cracks or heavy pattern (map) cracking.
Width less than 0.012 in.	Width 0.012–0.05 in.	Width greater than 0.05 in.
		
Boundary Image CS 1–2		Boundary Image CS 2–3
		

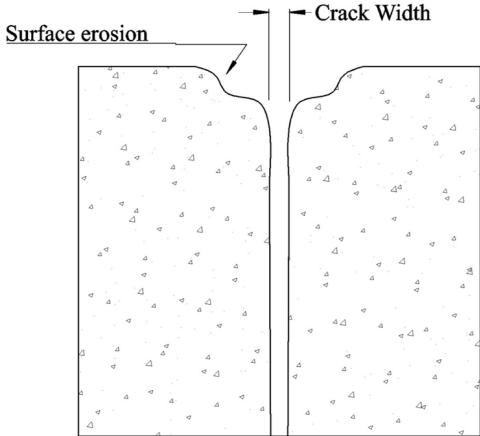
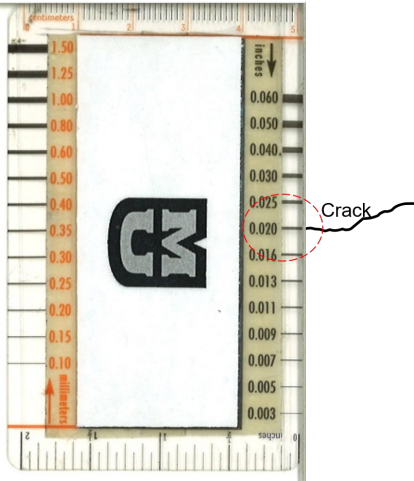
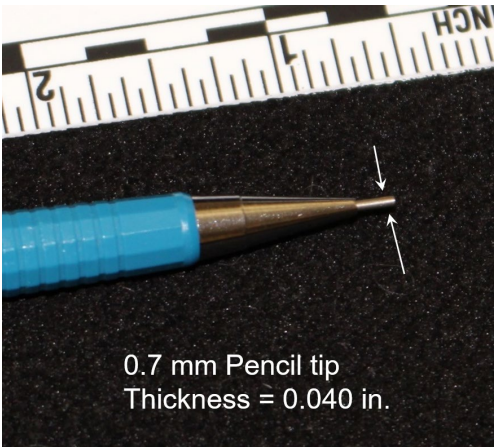
Defect 1130—Cracking (RC and Other)

Condition State 1	Condition State 2	Condition State 3
Insignificant cracks or moderate-width cracks that have been sealed.	Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	Wide cracks or heavy pattern (map) cracking.
Spacing greater than 3.0 ft.	Spacing of 1.0—3.0 ft.	Spacing of less than 1 ft.
		
Boundary Image CS 1–2		Boundary Image CS 2–3
		

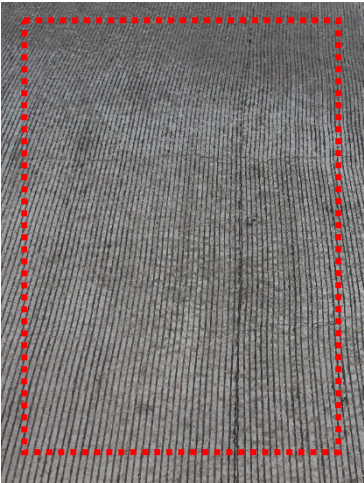
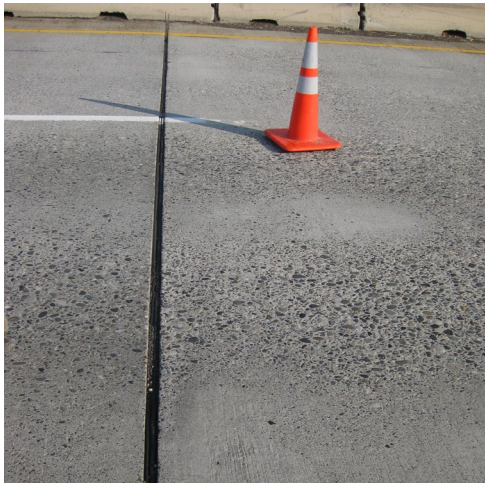
Crack Pattern Guide

Condition State 1	Condition State 2	Condition State 3
Spacing >3 ft.	Moderate pattern (map) cracking, spacing 1–3 ft.	Heavy pattern (map) cracking, spacing less than 1 ft.
		
		

Crack Width Guide

Crack Width Measurement	Crack Measurement	Width Measures
The surface of concrete erodes at a crack, making the crack appear wider at the surface. Crack width measurements should describe the actual crack width, not the eroded surface.	Crack widths can be measured using a crack comparator.	• 1/32 in. = 0.0313 in. • 1/16 in. = 0.0625 in. • 3/32 in. = 0.0938 in. • 1/8 in. = 0.1250 in. • 3/16 in. = 0.1875 in.
 The diagram illustrates a cross-section of a crack in concrete. On the left, 'Surface erosion' is indicated by an arrow pointing to the irregular, eroded edges of the crack opening. On the right, 'Crack Width' is indicated by a double-headed arrow measuring the true width of the crack at its base, where the concrete is intact.	 A photograph of a crack comparator, which is a white card with a black 'CW' logo, placed over a crack in a concrete surface. The card is held in place by a ruler with both inch and centimeter scales. A red dashed circle highlights the crack, with a line pointing to it from the word 'Crack'.	 A photograph showing a US quarter coin placed next to a ruler for scale. The text 'Thickness = 0.069 in.' is overlaid on the image, indicating the thickness of the coin used as a reference for crack width measurement.
	 A photograph of a credit card (MasterCard) used as a reference for crack width measurement. The text 'Credit card thickness ~0.035 in.' is overlaid on the image.	 A photograph showing the tip of a blue pencil held against a ruler. The text '0.7 mm Pencil tip Thickness = 0.040 in.' is overlaid on the image, indicating the thickness of the pencil tip used as a reference for crack width measurement.

Defect 1190—Abrasion/Wear

Condition State 1	Condition State 2	Condition State 3
No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate, but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.
		
Boundary CS 1–2		Boundary CS 2–3
		