

## Engineering Manual Preamble

This manual provides guidance to administrative, engineering, and technical staff. Engineering practice requires that professionals use a combination of technical skills and judgment in decision making. Engineering judgment is necessary to allow decisions to account for unique site-specific conditions and considerations to provide high quality products, within budget, and to protect the public health, safety, and welfare. This manual provides the general operational guidelines; however, it is understood that adaptation, adjustments, and deviations are sometimes necessary. Innovation is a key foundational element to advance the state of engineering practice and develop more effective and efficient engineering solutions and materials. As such, it is essential that our engineering manuals provide a vehicle to promote, pilot, or implement technologies or practices that provide efficiencies and quality products, while maintaining the safety, health, and welfare of the public. It is expected when making significant or impactful deviations from the technical information from these guidance materials, that reasonable consultations with experts, technical committees, and/or policy setting bodies occur prior to actions within the timeframes allowed. It is also expected that these consultations will eliminate any potential conflicts of interest, perceived or otherwise. MDOT Leadership is committed to a culture of innovation to optimize engineering solutions.

The National Society of Professional Engineers Code of Ethics for Engineering is founded on six fundamental canons. Those canons are provided below.

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform Services only in areas of their competence.
3. Issue public statement only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, reasonably, ethically and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

# STEEL BRIDGE GIRDER COATINGS REPAIR MATRIX

ELEMENT No. 515, STEEL PROTECTIVE COATING					RECOMMENDED REPAIR	POTENTIAL RESULT TO CS (NBI)	ANTICIPATED FIX LIFE
Defect	Condition State-CS (National Bridge Inspection-NBI)						
	1 (9-7)	2 (6-5)	3 (4-3)	4 (2-0)			
Chalking (3410)	Chalking is primarily an aesthetic deficiency which may have little to no indication of overall coating system performance, or correlation with remaining service life. See other defects for determining recommended repairs.						
Peeling/ Bubbling/Cracking (3420)	< 5%				Spot Painting <sup>A</sup>	CS 1 (9-7) <sup>C</sup>	Note D
	5% to 15% <sup>B</sup>				Partial Painting	CS 1 (9-7) <sup>C</sup>	30 years <sup>C</sup>
	> 15%				Full Painting	CS 1 (9-7)	35-40 years <sup>E</sup>
Oxide Film Degradation, Color/Texture Adherence <sup>F</sup> (3430)	100%				None	-	-
			0% to 15%		Partial Painting <sup>G</sup>	CS 1 (9-7) <sup>C</sup>	30 years <sup>C</sup>
			> 15%		Full Painting	CS 1 (9-7)	35-40 years <sup>E</sup>
Effectiveness (3440)	< 5%				Spot Painting <sup>A</sup>	CS 1 (9-7) <sup>C</sup>	Note D
	5% to 15% <sup>B</sup>				Partial Painting	CS 1 (9-7) <sup>C</sup>	30 years <sup>C</sup>
	> 15%				Full Painting	CS 1 (9-7)	35-40 years <sup>E</sup>
Damage (7000)	Damage due to vehicle or vessel impact should be evaluated for spot painting or partial painting on a case by case basis. The frequency of damage on some structures should be considered when deciding on the proper repair.						
<b>STRUCTURAL STEEL ELEMENTS (No. 113, 120, 141, 152, 161, 162, 201, 231, 824, 825)</b>							
Corrosion <sup>H</sup> (1000)	< 5%				Spot Painting <sup>A</sup>	CS 1 (9-7) <sup>C</sup>	Note D
	5% to 15% <sup>B</sup>				Partial Painting	CS 1 (9-7) <sup>C</sup>	30 years <sup>C</sup>
	> 15%				Full Painting	CS 1 (9-7)	35-40 years <sup>E</sup>

NOTES: A) Spot painting is not to be used on bridges with red lead paint.

B) When defects are concentrated at beam ends and pin and hanger locations, partial painting may be more appropriate even if CS2-4 is <5% or >15%.

C) Applies only to the areas where repair was done.

D) For the area repaired, assume new service life the same as the current service life of unrepaired coating.

E) Additional spot and partial painting may be necessary during this time.

F) For use with unpainted weathering steel only.

G) Partial painting is typically done at beam ends. If CS3 and CS4 is not at beam ends consider Full Painting.

H) For CS3-CS4, or in the case of steel cracks, buckling, or section loss in excess of 25%, girders should be evaluated for structural steel repairs through detailed inspection or scoping prior to any coating.