Healer Sealer / Epoxy Overlay Best Practices

Michigan Bridge Week

Bridge Maintenance Workshop

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Agenda

- Background
- Specifications
- Definitions
- Best Practices
- When to use each
- Healer-Sealer vs Epoxy Overlay Comparison
- Lessons Learned
- Summary

Background

- Bridge preservation importance
- Common deck deterioration issues
- Where healer-sealers and epoxy overlays fit in preservation strategy

Deck Preservation Matrix

BRIDGE DECK PRESERVATION MATRIX – DECKS WITH EPOXY COATED REBAR (ECR)

DECK CONDITION STATE				REPAIR OPTIONS	POTENTIAL RESULT TO DECK BSIR		ANTICIPATED FIX LIFE
Top Surface		Bottom Surface			Top Surface BSIR #58a	Bottom Surface BSIR #58b	
BSIR #58a	Deficiencies % (a)	BSIR #58b	Deficiencies % (b)				
≥ 5	N/A	N/A	N/A	Hold (c) / Seal Cracks	No Change	No Change	N/A
				Silane			5 years
				Healer Sealer (d)			8 to 10 years
	≤ 10%	≥ 6	≤ 2%	Epoxy Overlay (f)	8, 9	No Change	15 to 20 years
	≤ 10%	≥ 4(k)	≤ 25%(k)	Deck Patch (e, j)	6, 7, 8	No Change	5 to 10 years
4(k) or 5	10% to 25%(k)	4(k)	10% to 25%(k)	Shallow Concrete Overlay (h, i, j)	8, 9	No Change	20 to 25 years
				HMA Overlay with water-proofing membrane (f, i)	8, 9	No Change	8 to 10 years
		2 or 3(k)	> 25%(k)	HMA Cap (g, i)	8, 9	No Change	2 to 4 years
≤ 3(k)	>25%(k)	4(k) or 5	2% to 25%(k)	Shallow Concrete Overlay (h, i, j)	8, 9	No Change	10 years
				HMA Overlay with water-proofing membrane (f, i)	8, 9	No Change	5 to 7 years
		2 or 3(k)	>25%(k)	HMA Cap (g, i)	8, 9	No Change	1 to 3 years
				Replacement with Epoxy Coated or Stainless Rebar Deck	9	9	60+ years

(a) Percent of deck surface area that is spalled, delaminated, or patched with temporary patch material. Top surface decision making based on concrete surface, not the condition of thin epoxy overlays or other wearing surfaces.
(b) Percent of deck underside area that is spalled, delaminated or map cracked.
(c) The "Hold" option implies that there is on-going maintenance to sustain current ratings.
(d) Seal cracks when cracks are easily visible and minimal map cracking. Apply healer sealer when crack density is too great to seal individually by hand. Sustains the current condition longer.
(e) Crack sealing must also be used to seal the perimeter of deck patches and joint replacements.
(f) Deck patching required prior to placement of epoxy overlay or waterproofing membrane.
(g) Hot Mix Asphalt cap without waterproofing membrane for ride quality improvement. Deck should be scheduled for replacement in the 5 year plan.
(h) If bridge crosses over traveled lanes and the deck contains slag aggregate, do deck replacement.

Epoxy Based Special Provisions

- Sealing Localized Cracks 20SP-706A-02
- Penetrating Healer Sealer on Bridge Decks 20SP-710B-03
- Thin Epoxy Polymer Bridge Deck Overlay 20SP-712B-02
- Performance Warranty, Thin Epoxy Polymer Bridge Deck Overlay 20SP-712C-02
- Performance Warranty High Friction Thin Epoxy Polymer Bridge Deck Overlay 20RC712(A615)
- High Friction Surface Treatment 20SP-800A-02
- Substructure Horizontal Surface Sealers 20SP-710C-02
- Removal of Thin Epoxy Polymer Bridge Deck Overlay 20SP-712D-02

Definitions

Floodcoat = Healer Sealer = Epoxy Overlay

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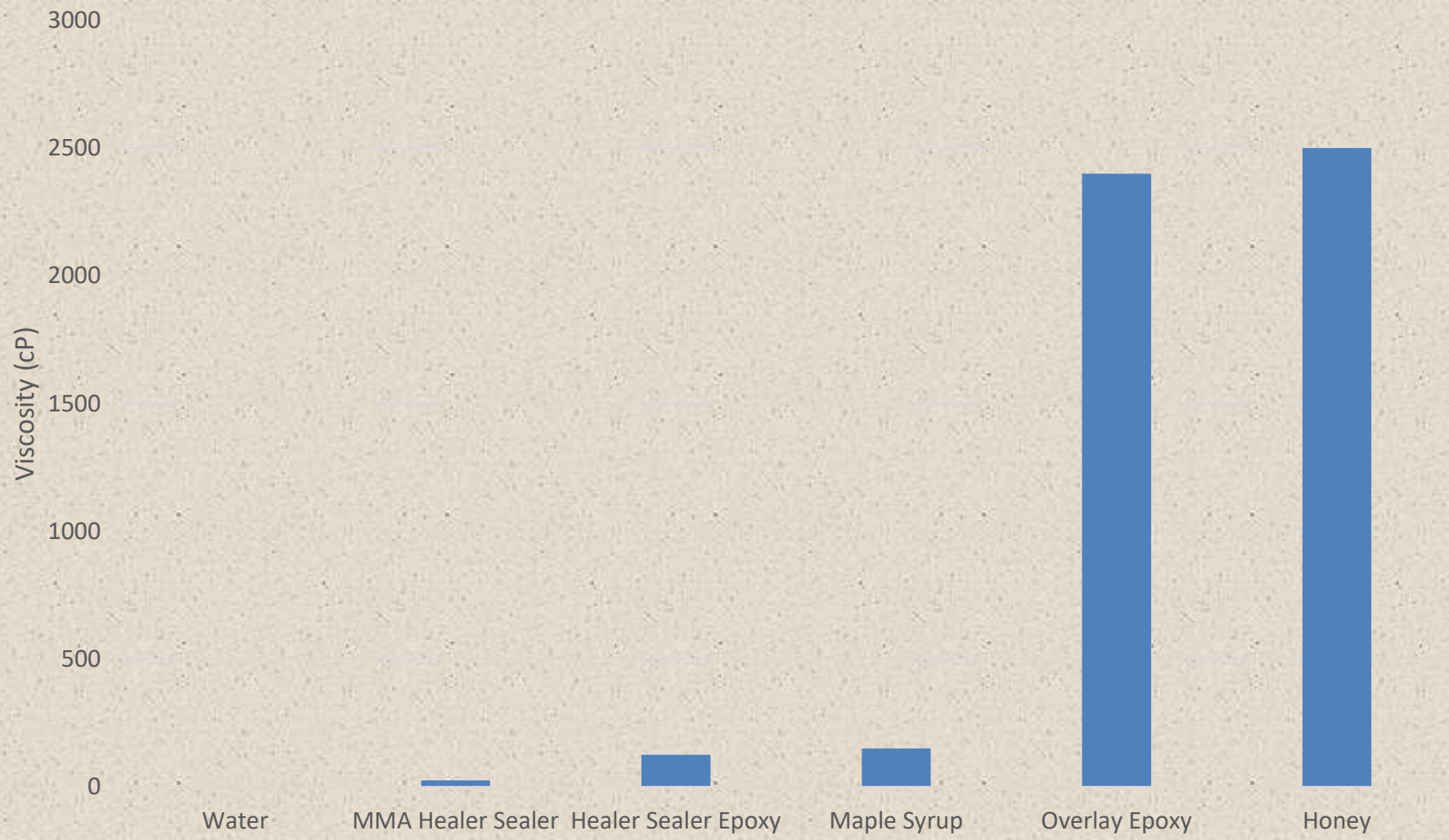
H	Floodcoat deck surface.

Definitions

- Healer-Sealer: Low-viscosity resin that penetrates tight cracks
- Epoxy Overlay: 2 course resin + aggregate system for waterproofing and friction improvement

Viscosity Comparisons

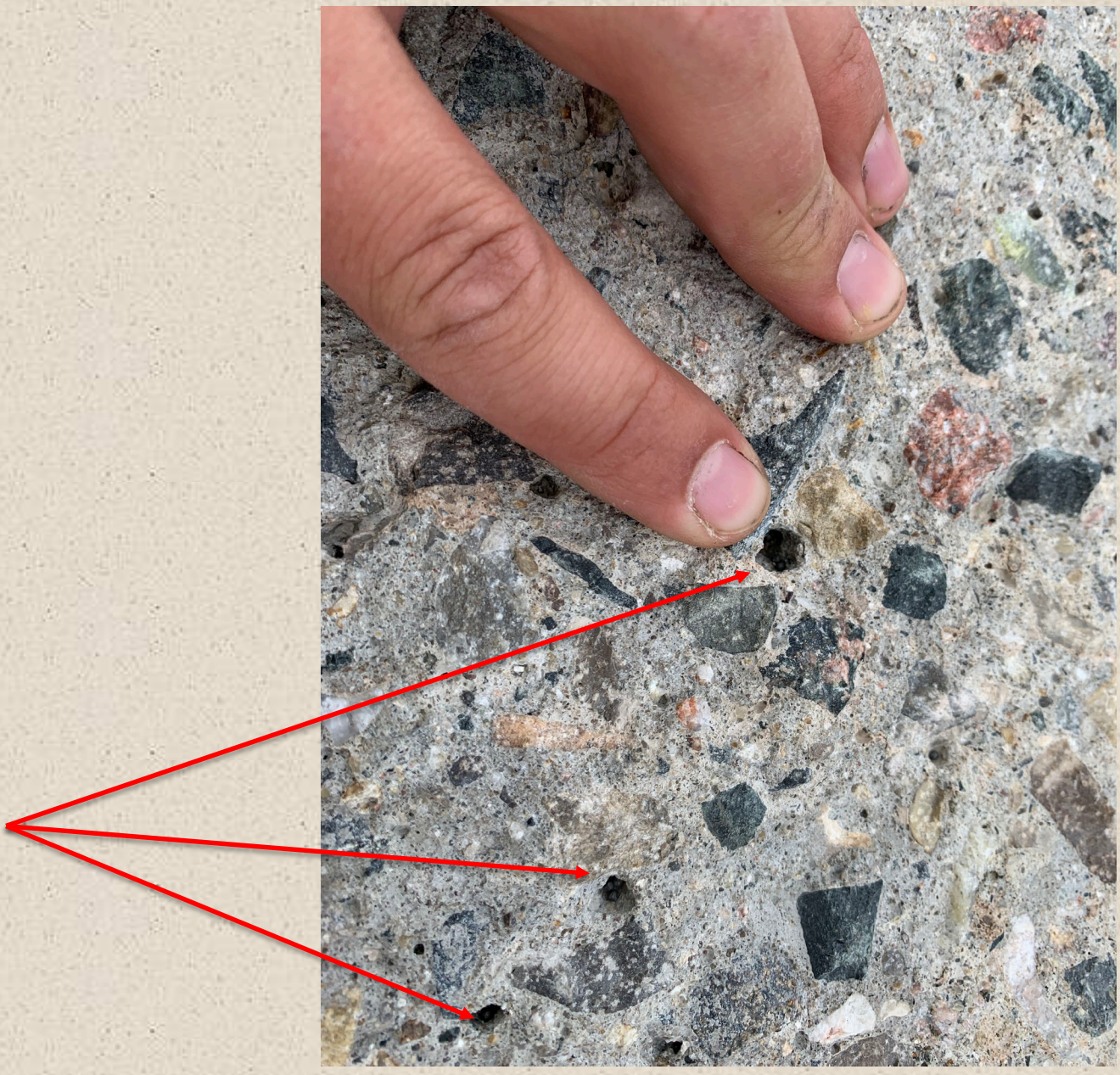


Best Practices: Healer-Sealers

- Use on tight, non-working cracks
- Best for low-severity cracking and early preservation
- Apply only to clean, dry surfaces at proper temperature
- Does not require a defect free deck

Best Practices: Healer-Sealers

- Verify viscosity and gel time for field conditions
- Use flood application with proper dwell time
- Remove excess stone to avoid slickness
- Avoid where structural improvement is needed
- Best before chloride infiltration increases



Mathacrylate Healer Sealers

- Significantly lower viscosity can penetrate cracks deeper
- Less labor intensive than epoxy sealers
- Not easily used with application rigs such as epoxy pumps

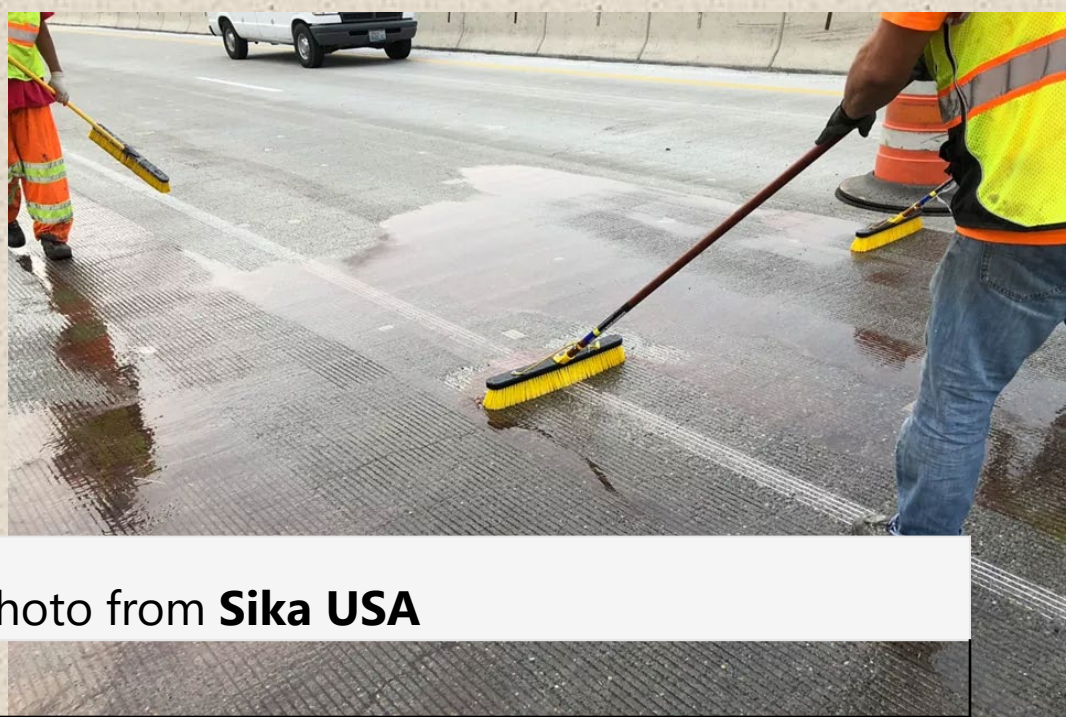


Photo: KBP-204 P polymer
Source: Sika Corporation (n.d.) — Photo from **Sika USA**

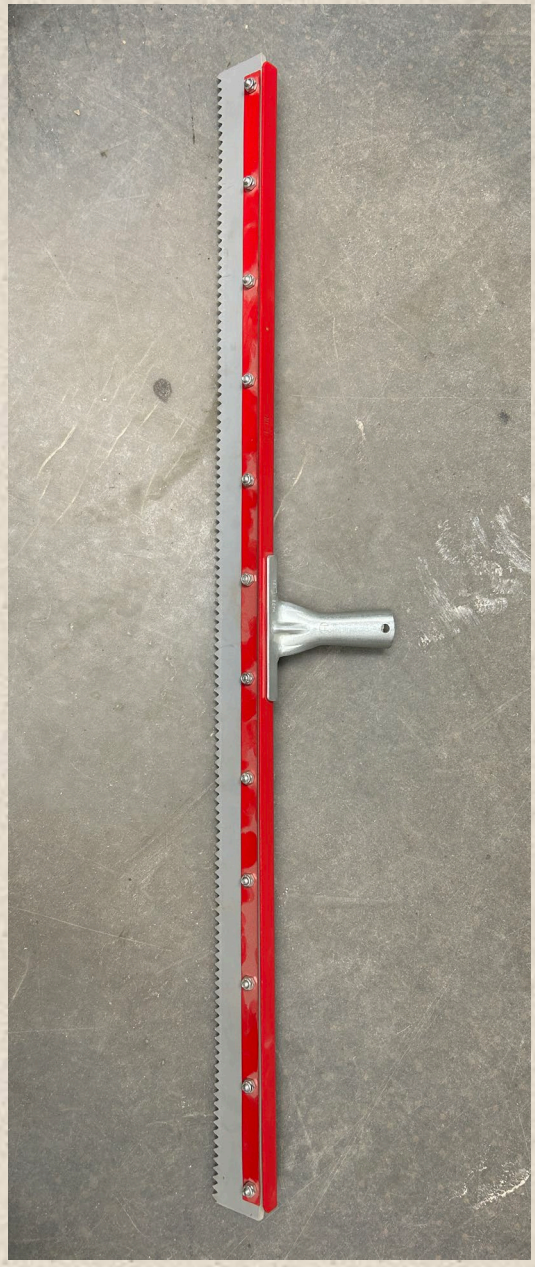
Best Practices: Epoxy Overlays

- Use to improve waterproofing, friction, and deck life
- Appropriate for moderate cracking or surface wear
- Requires sound substrate; remove delaminations
- Shotblast to proper surface profile

Best Practices: Epoxy Overlays

- Strict temperature/humidity/dew point requirements
- Verify mix times and component ratios
- Uniform resin rate and dry aggregate broadcast
- Allow full cure before traffic

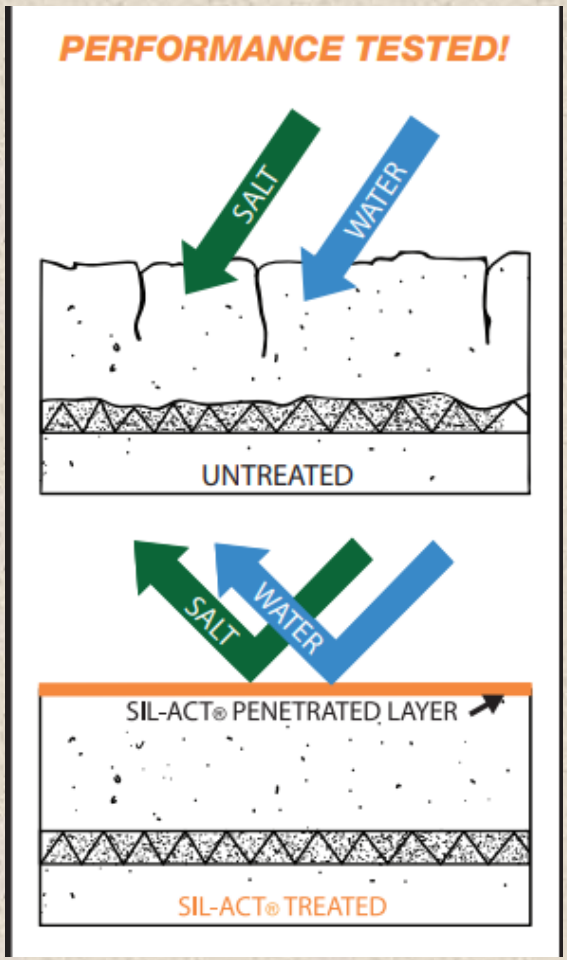
Approaches



When to Use Which?

- Healer-Sealer: crack penetration, low cost, quick return
  - Significant amount of cracking
  - Relatively lower construction time
- Epoxy Overlay: Waterproofing + friction, longer service life
  - When it is tough to get MOT
  - Polished wearing surface
  - Curve or complex geometry

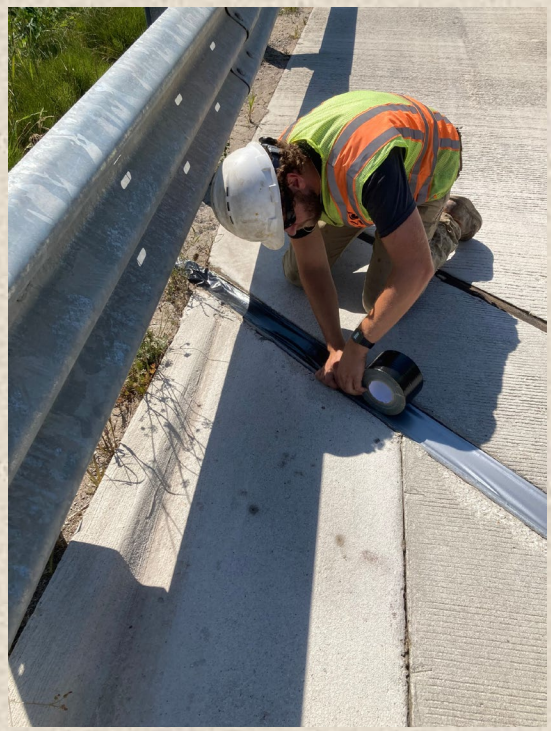
Silane Incorporation



Source: Advanced Chemical Technologies (2021). *ATS-100 Product Data Sheet.* https://advchemtech.com/wp-content/uploads/2021/03/ATS-100-version-5-PDS.pdf

Lessons Learned

- Moisture / impurities are a common cause of failure
- Surface cleanliness affects penetration and bond – surface prep is key.
- High humidity / moist areas may effect bonding



Adiacent Box Beams

Summary

- Understand purpose of each treatment
- Match treatment to deck condition
- Quality prep = performance
- Document field work thoroughly

Questions?

- Placeholder for discussion and audience Q&A

- https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Programs/Bridges-and-Structures/Mgmt-and-Scoping/Thin-Epoxy-Overlays-Healer-Sealer-Treatments-Bridge-Decks.pdf?rev=e674cca727cf4ba39aacfbd73ff4627e&hash=0DC4B6731AA8696F8B4D68D342D46E35