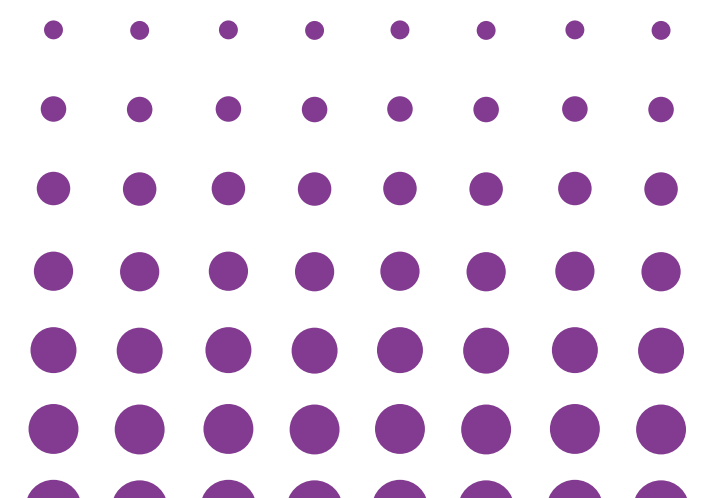


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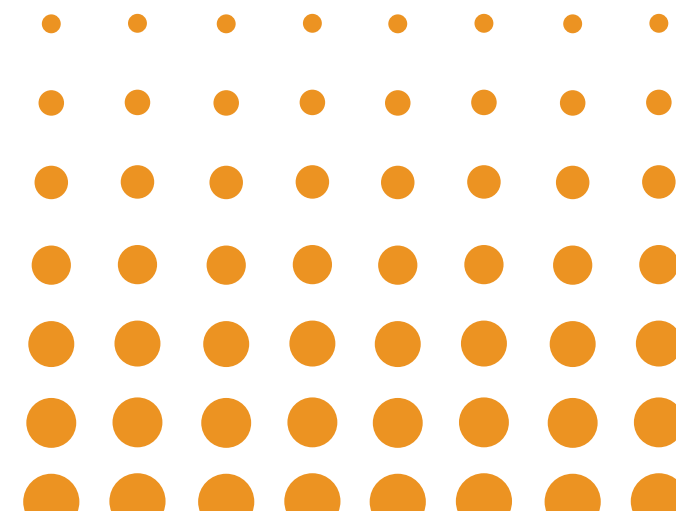


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Concrete Coatings: Insights from Failures and Best Practices

Terry McGovern, PE - Wiss, Janney, Elstner Associates, Inc.
Adrienne Larson, PE - Wiss, Janney, Elstner Associates, Inc.



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Live Content Slide

When playing as a slideshow, this slide will display live content

Poll: What best describes your typical role in concrete coating projects?

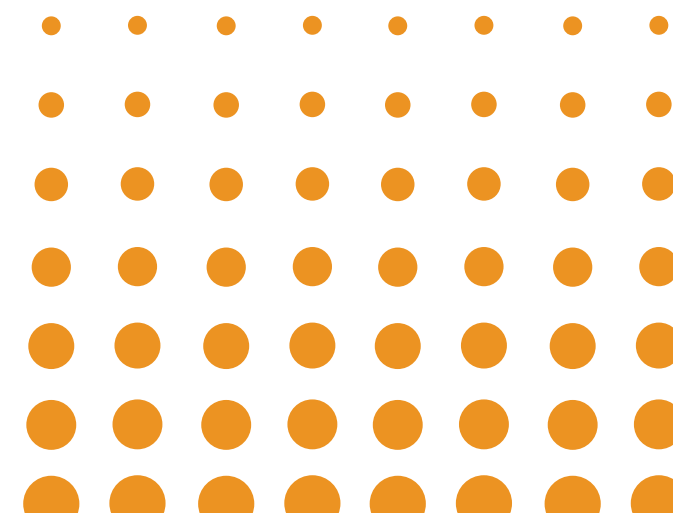


Outline

- Types of protective coatings
- Coating system selection
- Evaluation of existing coatings
- Surface preparation/evaluation



Case Studies!



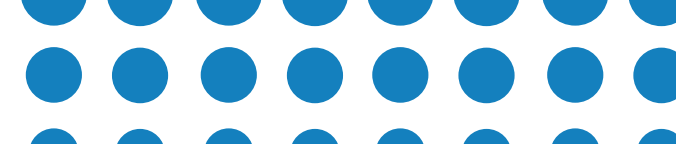


Table 4.1: Material Type and Performance

	Polyurethane, single-component		Polyurethane, two-component		Polyurea		Epoxy, low modulus	Methyl methacrylate	Cementitious	
	Aromatic	Aliphatic	Aromatic	Aliphatic	Aromatic	Aliphatic			Single- component	Two- component
UV resistance (Note 1) Property retention Color stability	***	****	**	****	***	***	*	***	****	****
	**	***	**	***	**	***	*	***	***	***
Scratch resistance	**	***	***	***	***	***	****	***	**	***
Tensile strength	**	***	****	****	***	***	****	****	*	*
Resistance to tear	**	***	**	***	****	***	****	****	*	*
Crack bridging	****	****	**	****	**	***	**	**	*	*
Hardness range	**	***	***	***	***	***	****	***	**	***
Durability	**	***	***	****	***	***	****	****	**	****
Breatheability	**	**	**	**	*	*	**	*	****	****
Low odor	**	**	****	****	**	**	***	*	****	****

Ratings (Note 2) * Poor ** Fair *** Good **** Excellent

NOTES:

(1) UV stability may depend on the inclusion of UV stabilizers, the usage of a fully broadcast aggregate or whether a UV stable topcoat is used

(2) Ratings are based upon the comparison of properties published on product data sheets from several manufacturers for similar products and on collective committee experience





Types of Protective Coatings

Architectural

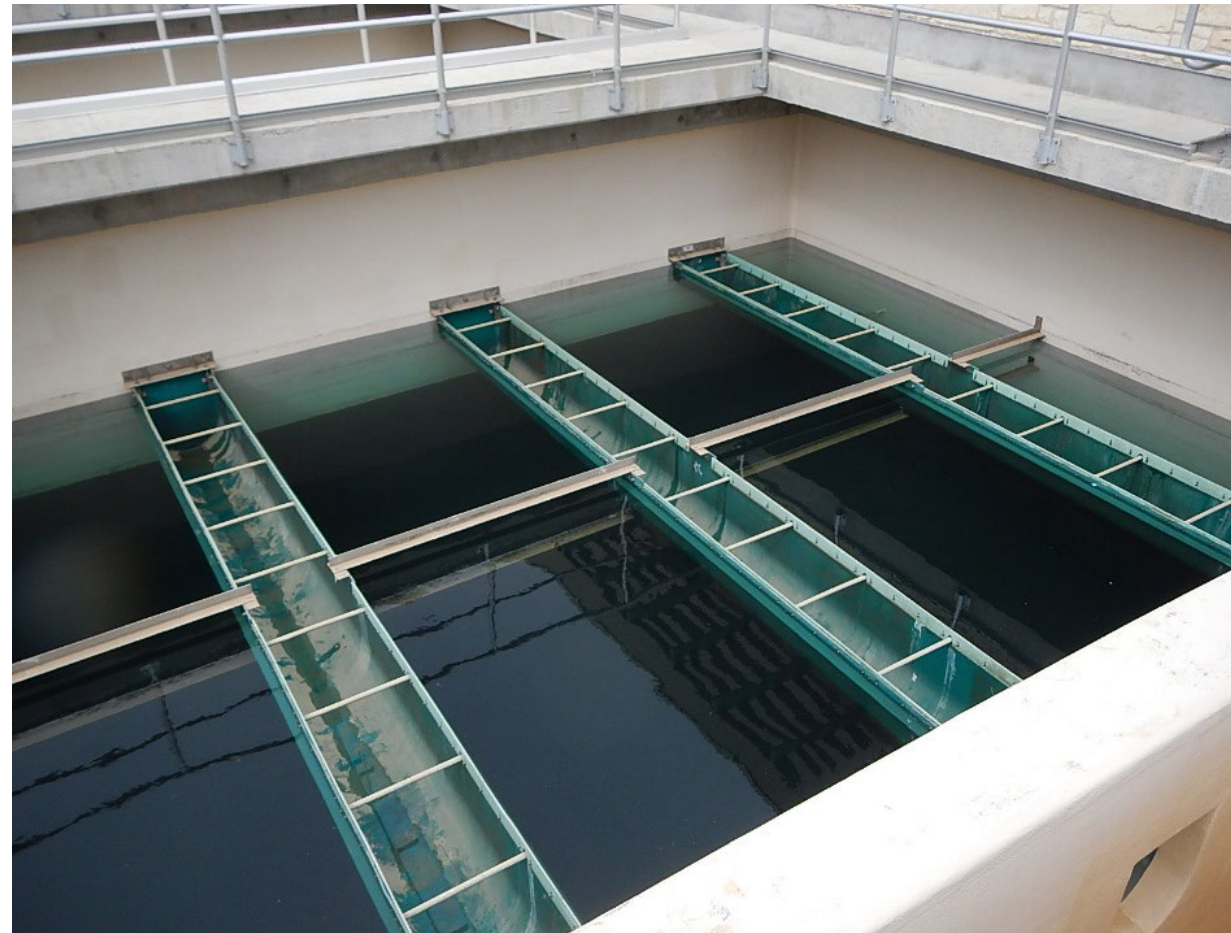


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Types of Protective Coatings

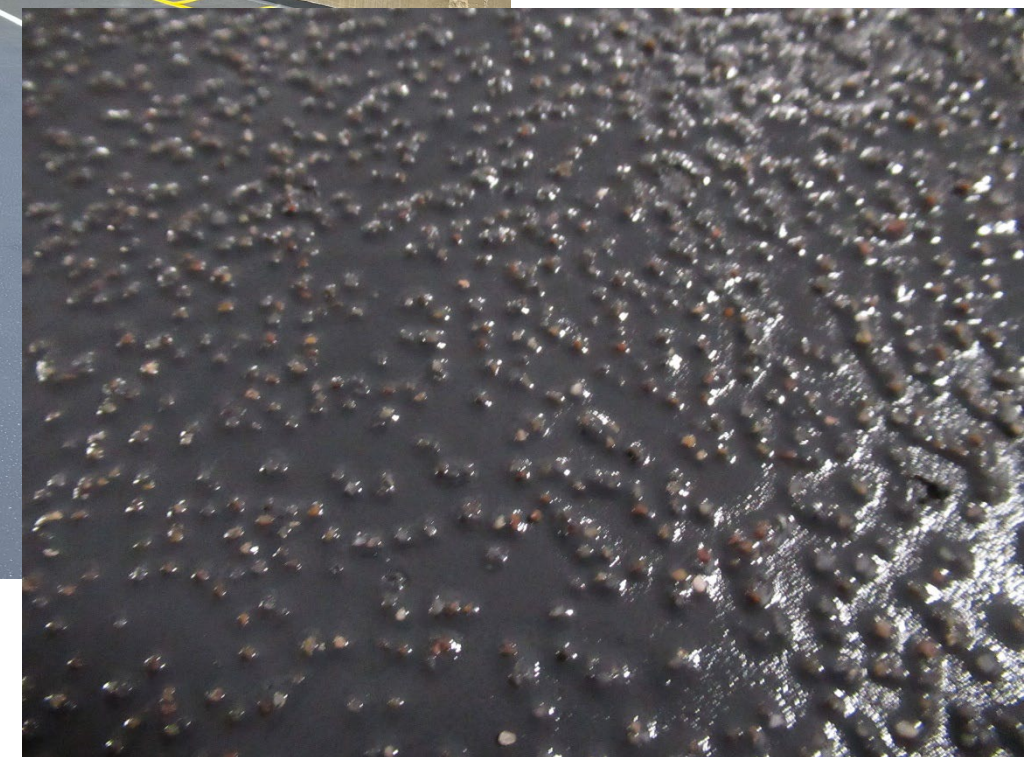
Industrial





Types of Protective Coatings

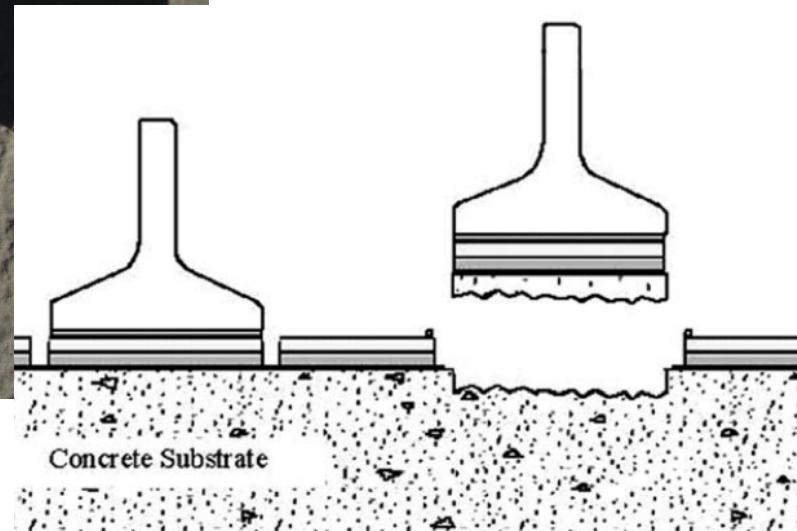
Traffic Protection





Existing Coatings Evaluation Techniques

- ASTM D7234 (Pull-off Adhesion) – Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete using Portable Pull-Off Adhesion Testers
- ASTM D3359 (Tape Test, X-cut) - Standard Test Methods for Rating Adhesion by Tape Test



Classification		Surface of "X" - Cut from which flaking/peeling has occurred
5A	No peeling or removal	None
4A	Trace peeling or removal along incisions or at their intersection	
3A	Jagged removal along incisions up to 1/16" on either side	
2A	Jagged removal along most of incisions up to 1/8" on either side	
1A	Removal from most of the area of the X under the tape	
0A	Removal beyond the area of the X	

FIG. 1 Classification of Adhesion Test Results for Test Method A



Existing Coatings Evaluation Techniques

- ASTM D8555 – Standard Practice for Conducting a Coating/Lining Detachment Acoustical Sounding (Tapping) Inspection
- ASTM D6132 – Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings Using an Ultrasonic Coating Thickness Gage



Coating on rough, large aggregate concrete



Thin coating on smooth, cement surface



Thick, soft coating on concrete



Coating on rough, lightweight concrete



CASE STUDY DISCUSSION





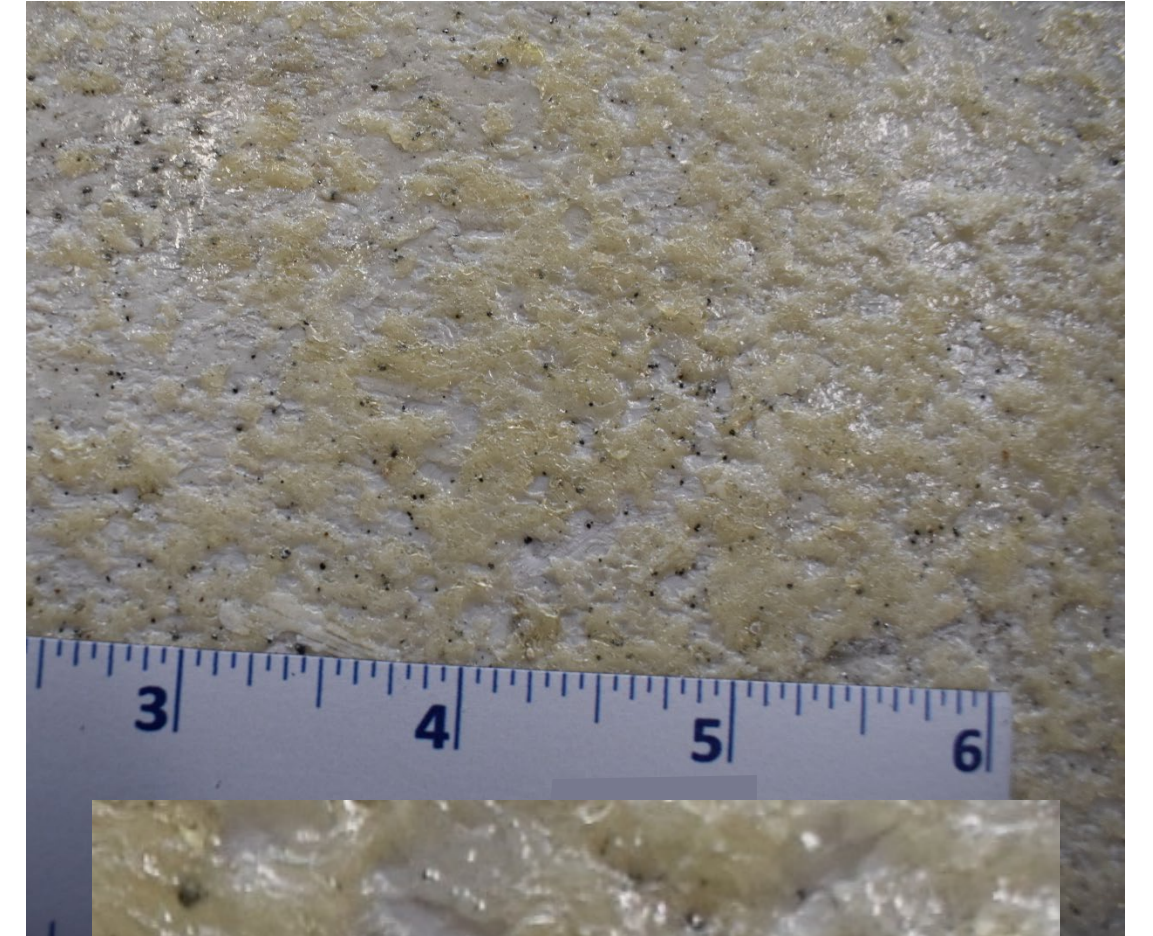
Surface Preparation Cleaning

- ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating





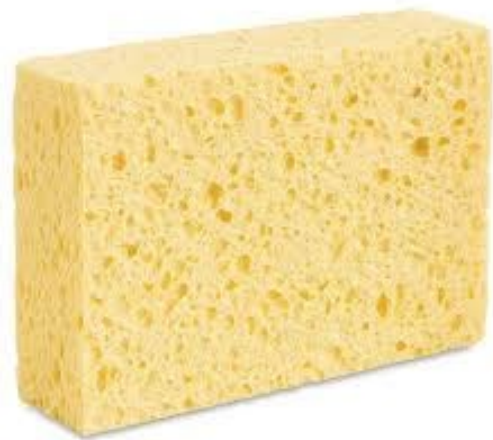
CASE STUDY DISCUSSION



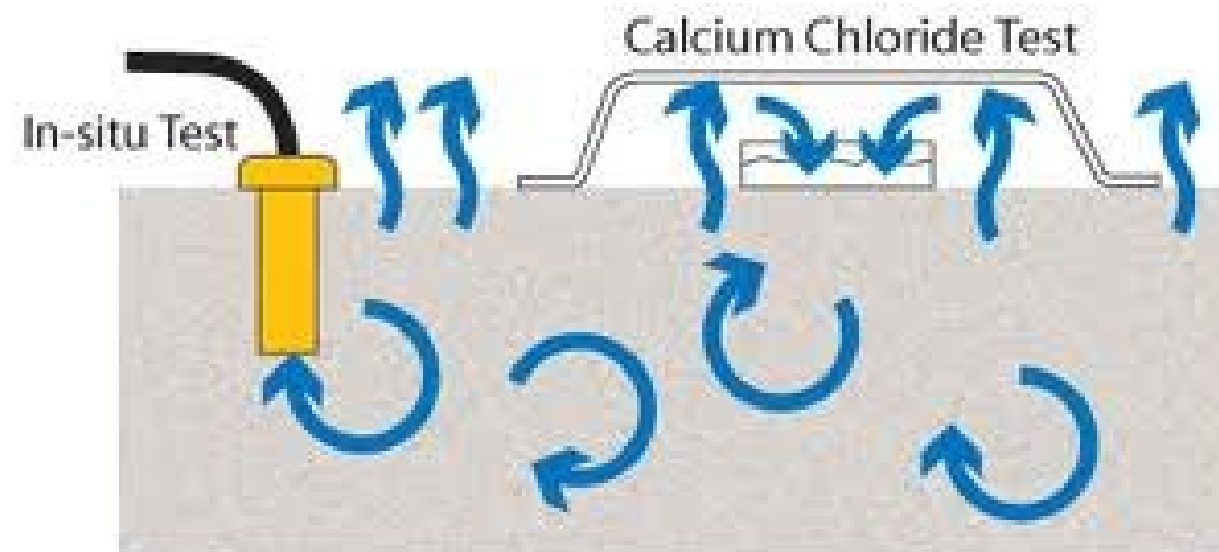


Surface Preparation

Moisture

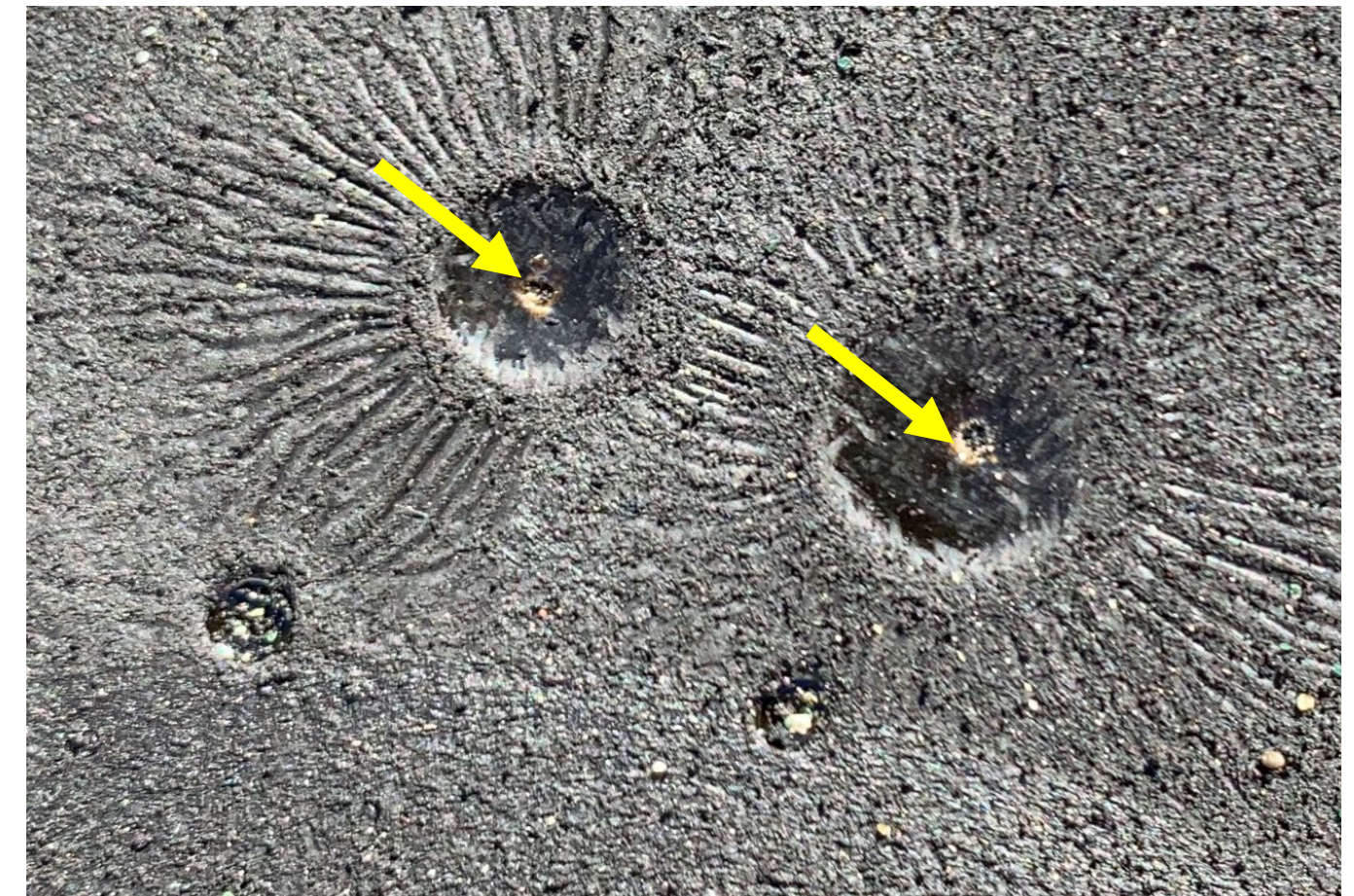
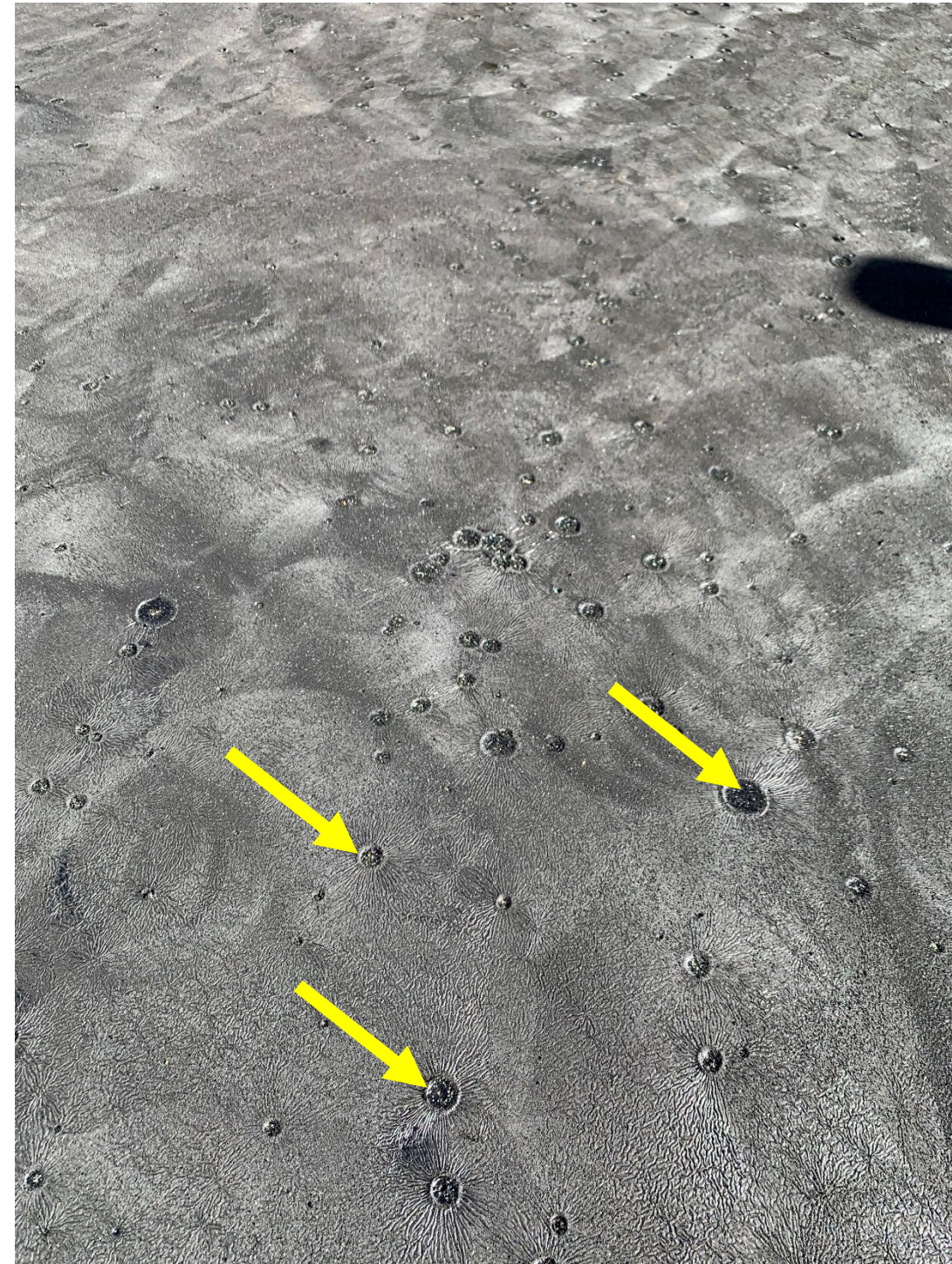


- ASTM D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
- ASTM F2170 - Standard Test Method for Determining RH in Concrete Floor Slabs Using In-Situ Probes
- ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate (MVER) of Concrete Subfloor Using Anhydrous Calcium Chloride



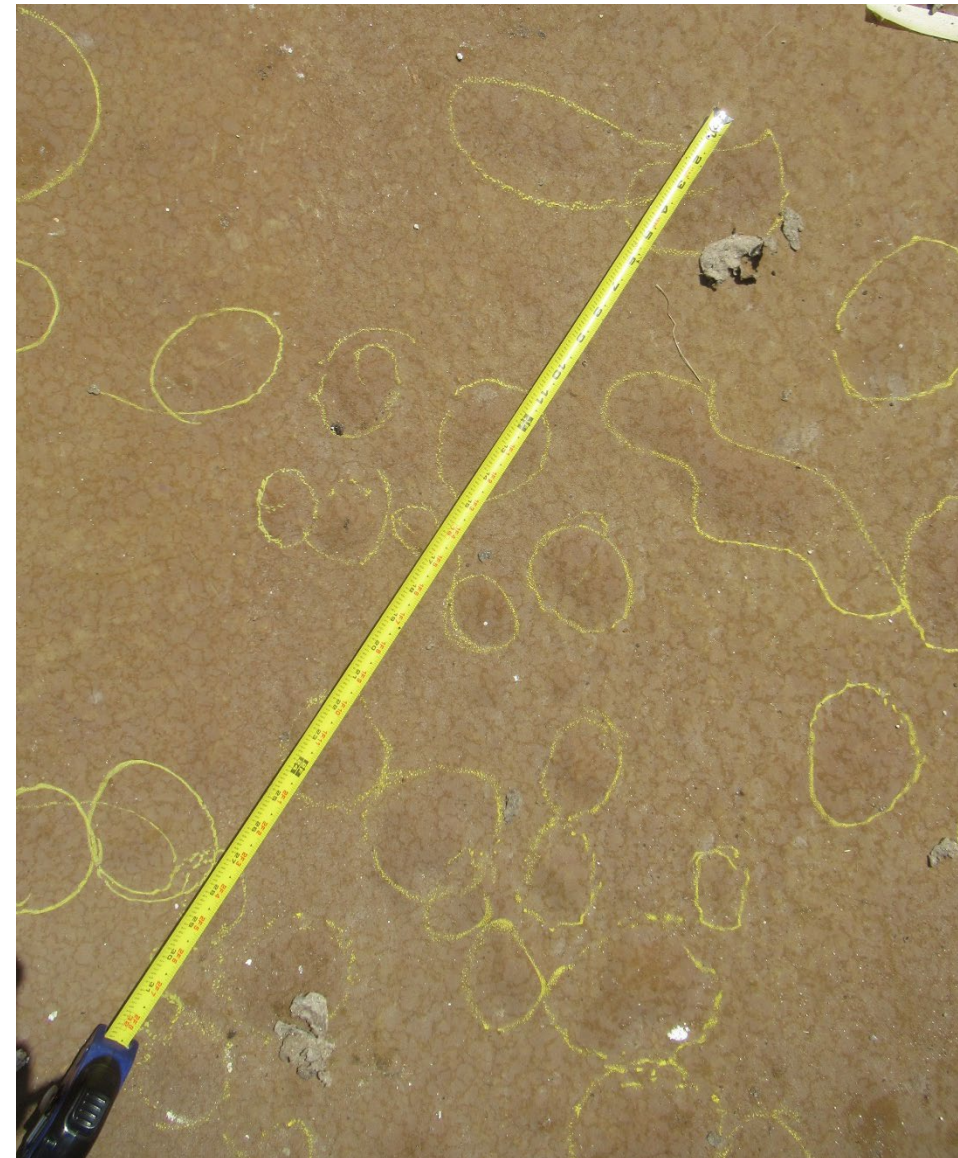


CASE STUDY DISCUSSION



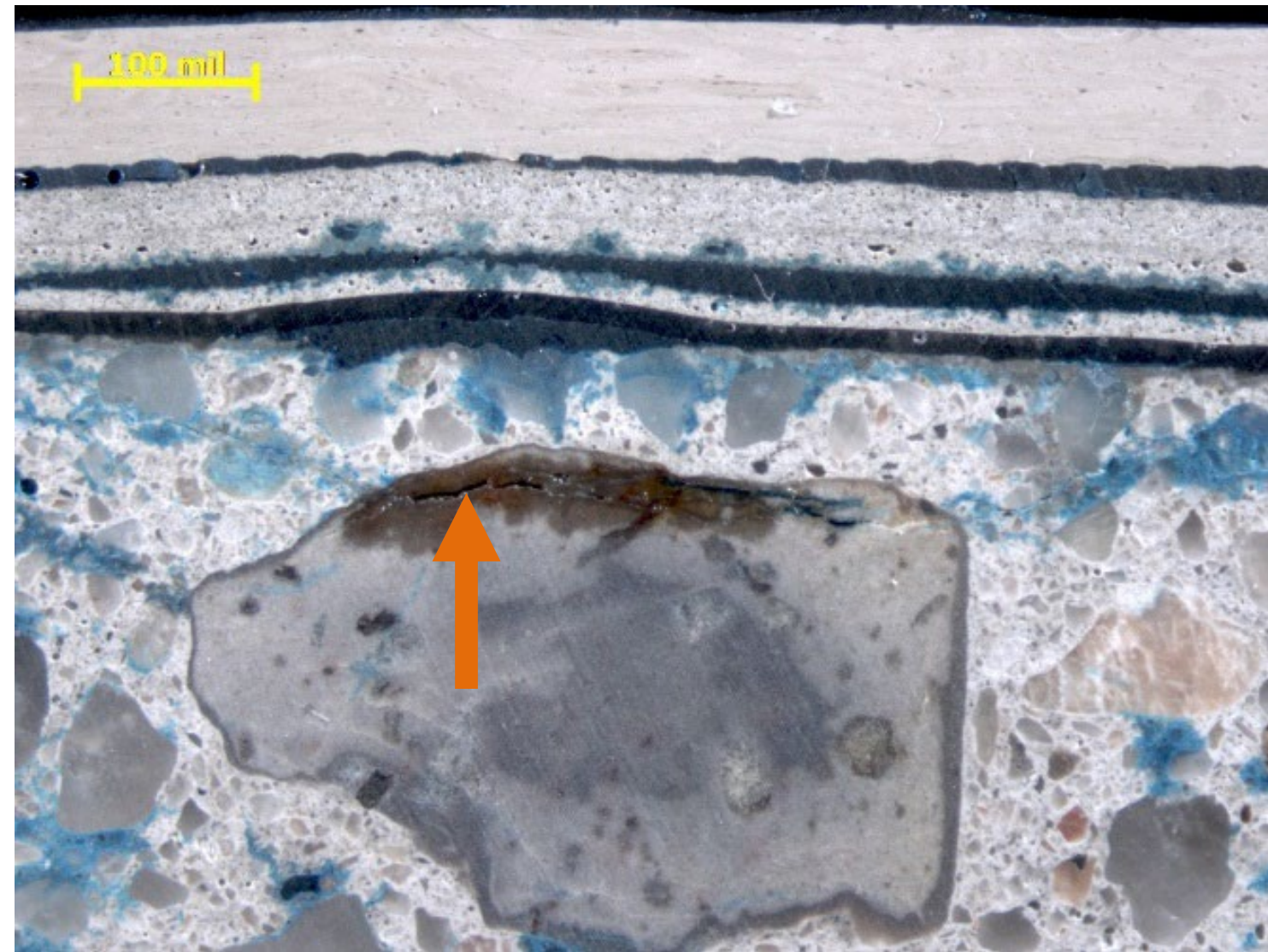


CASE STUDY DISCUSSION





CASE STUDY DISCUSSION

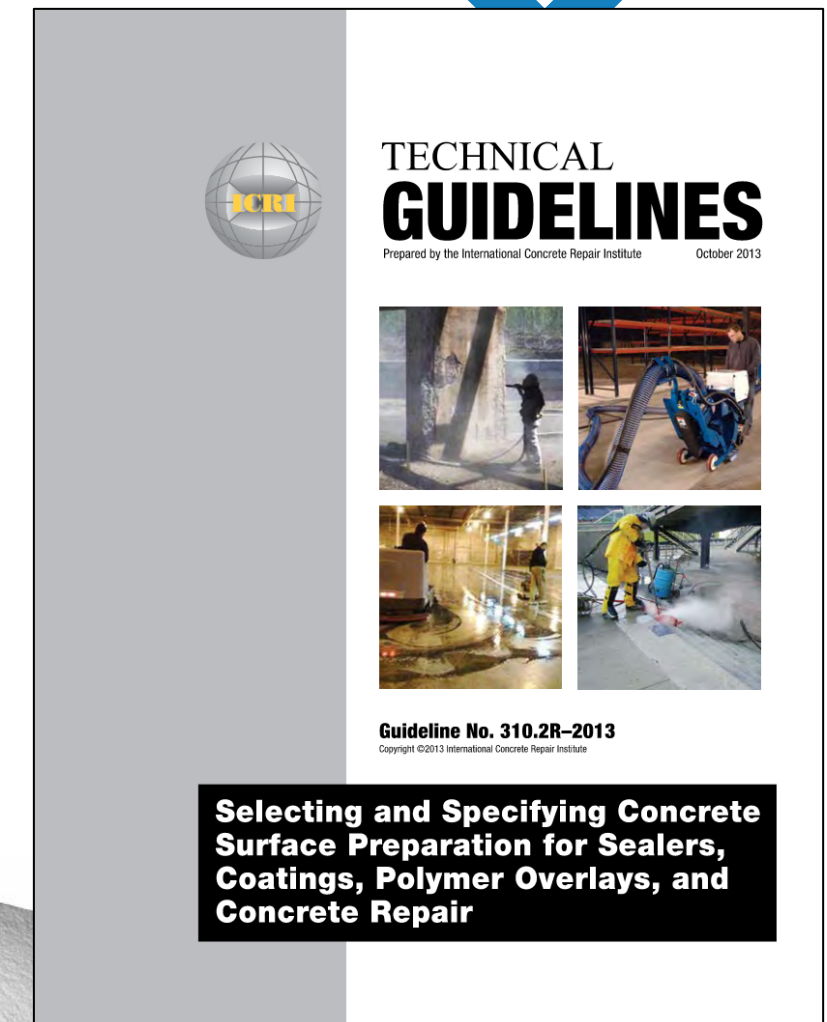




Surface Preparation

Surface Preparation and Profile

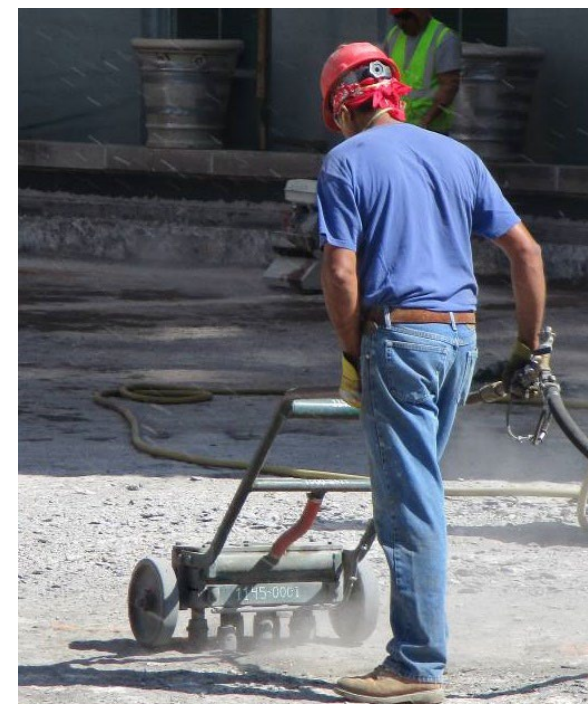
- ASTM D4259 - Standard Practice for Preparation of Concrete by Abrasion Prior to Coating Application
- ICRI No. 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair



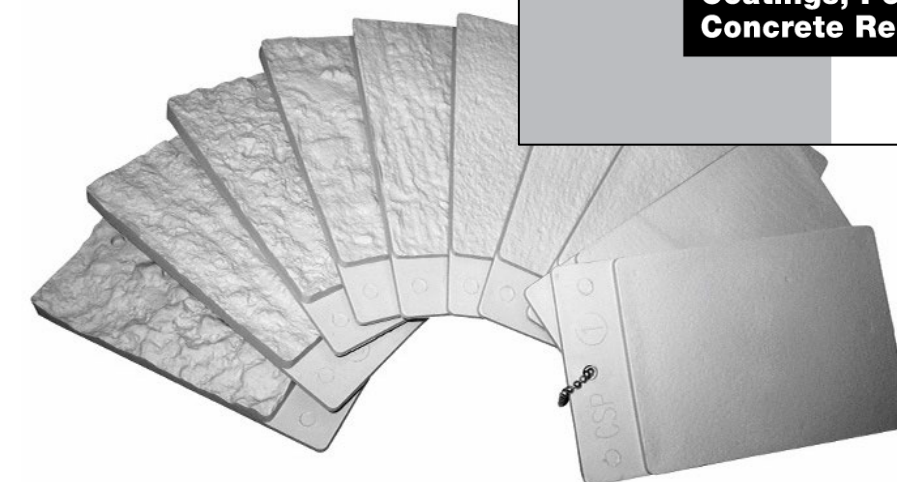
Pressurized Water
Cleaning



Abrasive Blasting



Scabbling





Surface Preparation

Surface Preparation and Profile



Material	Surface preparation method	Concrete Surface Profile									
		CSP 1	CSP 2	CSP 3	CSP 4	CSP 5	CSP 6	CSP 7	CSP 8	CSP 9	CSP 10
Sealers, 0 to 3 mils (0 to 0.076 mm)	Detergent scrubbing	█									
Thin films, 4 to 10 mils (0.1 to 0.254 mm)	Low-pressure water cleaning	█									
	Grinding	█	█								
High-build coatings 10 to 40 mils (0.254 to 1.016 mm)	Acid etching	█	█	█							
Self-leveling toppings 50 mils to 1/8 in. (1.27 to 3.18 mm)	Needle scaling		█	█	█						
	Abrasive blasting		█	█	█	█	█				
Polymer overlayers 1/8 to 1/4 in. (3.18 to 6.35 mm)	Shotblasting		█	█	█	█	█	█			
	High- and ultra-high-pressure water jetting		█	█	█	█	█	█	█	█	█



Surface Preparation

Surface Profile



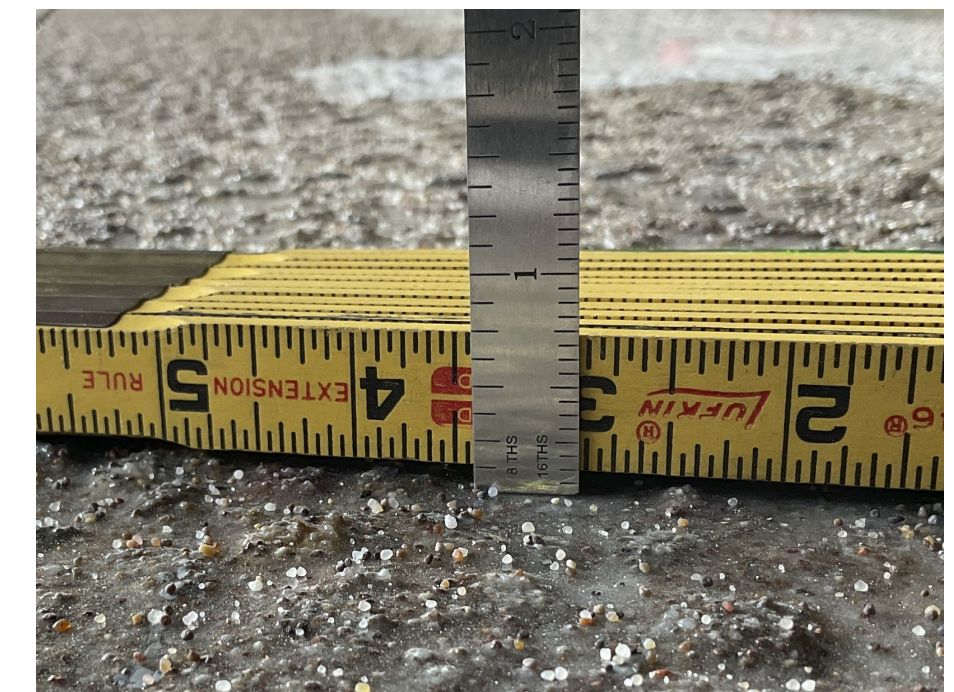


CASE STUDY DISCUSSION





CASE STUDY DISCUSSION





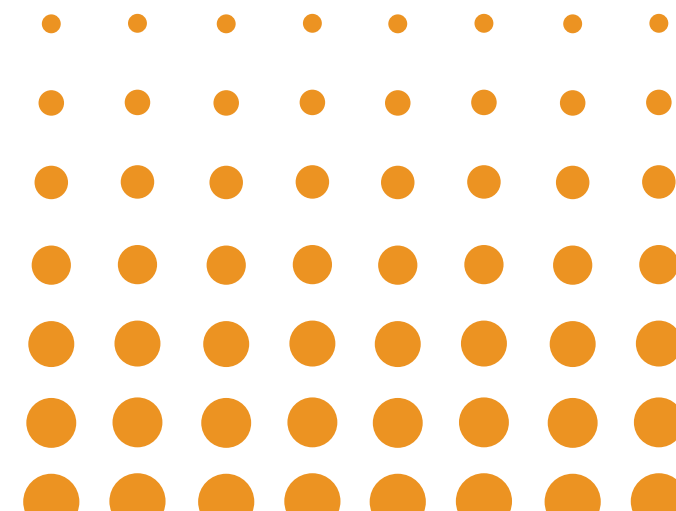
CASE STUDY DISCUSSION





Summary

- Various types of protective coatings exist
- Define the “why” to help select coating type
 - Why is my concrete distressed?
 - Why would my concrete benefit from a coating?
- Surface preparation is critical!





SESSION EVALUATION

Resources

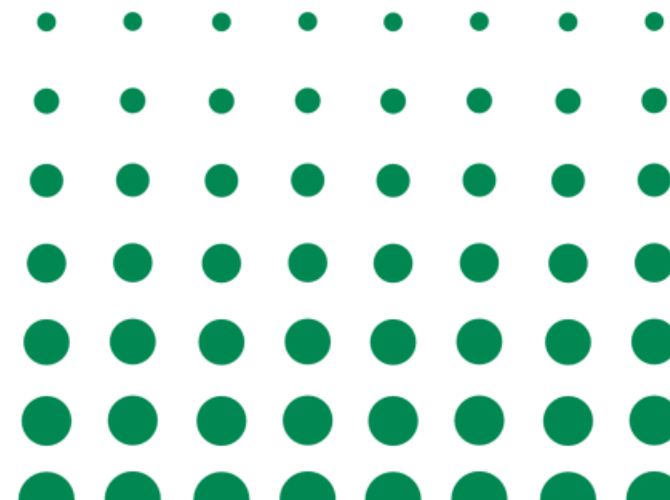
Evaluate this Session



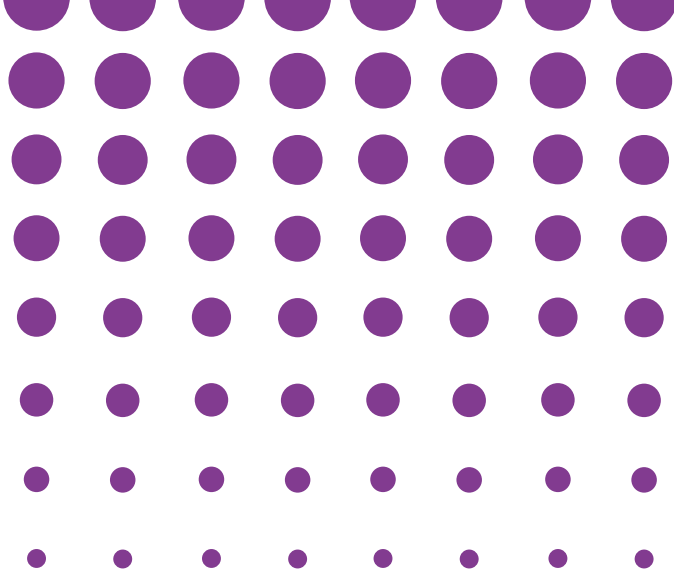
To complete the session evaluation, open the ICRI Convention App.

Under **Plan Your Event**, select Schedule, and then the Technical Session you are attending. Select the sub-session you are attending, scroll down to Resources, and select Evaluate this Session.

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THANK YOU Questions?



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