



Midwest Bridge Preservation Partnership

Agenda – Monthly Teleconference Tuesday, June 7, 2022

Business Meeting: 12:30 – 1:00 PM Central

Technical Session: 1:00 – 2:00 PM Central

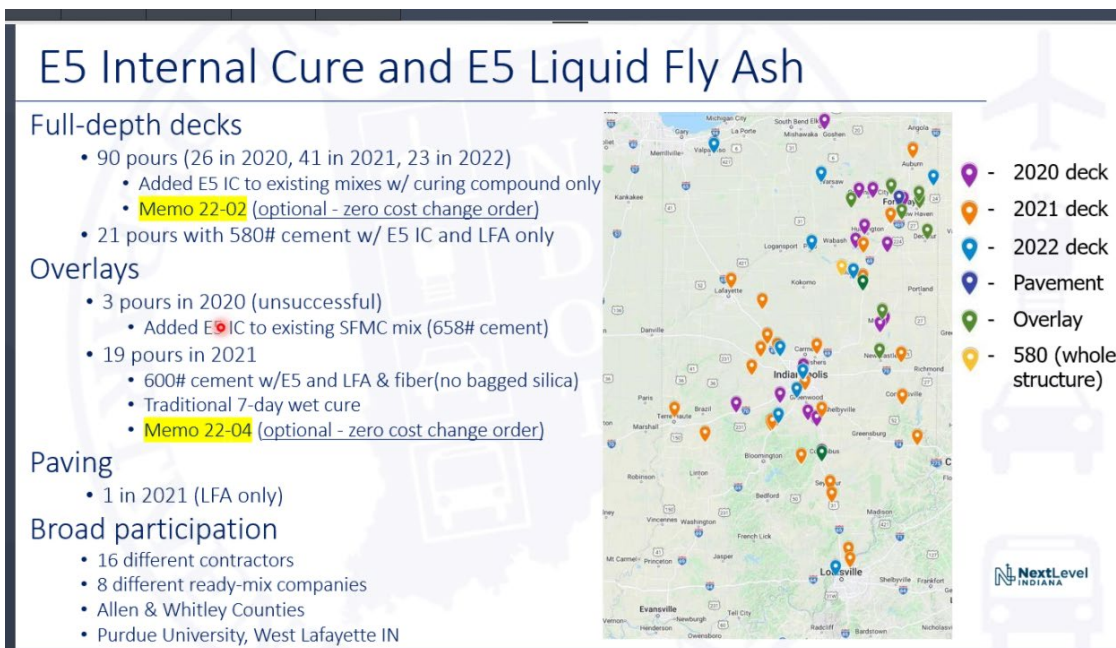
12:30 PM – BUSINESS MEETING

1. **Treasury Update Treasury Report – May 22 – balance in good shape –**
 - a.) Shows Payments for the 2021 Conference Scholarships (made money on the conference)
 - b.) Payment for MWBPP portion of Deck Sealer Study \$1,200
 - c.) Balance currently \$60,305.60
2. **AASHTO Committee on Maintenance Meeting (July 23-28, 2022)**
 - a.) Bill Oliva has retired, so there's an opening for another person to go. Typically, Officers or Director's attend.
 - b.) Jim Leaden is unable to attend, Sarah Wilson will seek approval to attend.
3. **Scholarships for MWBPP Annual Meeting Lexington, KY October 25-27, 2022.**
 - a.) Discussion about the costs of the scholarships and how much money it would require. Flight costs are very variable currently, states close may drive. With the cost's unknown, it was assumed \$2000 per scholarship, some will be less depending on travel costs.
 - b.) Sarah W motioned for 7 Scholarships - Jason D. seconded; all in favor, Approved.
 - c.) Sarah S. to ask members to submit their names for the scholarships (in accordance with the bylaws)
4. **Approval of Minutes**
 - a.) Nancy's updates to be made, no other updates mentioned.
 - b.) Motion to approve – motion DDG, 2nd – CK – no opposing, approved.
5. **Open Discussion**
 - a.) Conference app for National Meetings but won't be used for regional meetings, too costly.
 - b.) July 5th next meeting – will that be a vacation issue? Consider moving the date of the meeting.
 - c.) Updates - none
 - d.) Suggestions- none

1:00 PM - TECHNICAL SESSION

1. Concrete Admixture to Reduce Shrinkage Cracking (Mike Nelson, Indiana DOT, Office of Materials Management) See presentation at end of minutes.

- Colloidal Silica; IC – internal cure. Use of the material provides an alternate curing method to the contractors.
- Products are proprietary and patented. One of the reasons why it's voluntary, and not a specification.
- Material makes concrete more workable, and helps reduce cracking, among other benefits...
- Used in both bridge decks (90 to date) and Overlays (22)
- Contractors were given option to use, and they have taken advantage – voluntarily, with no extra pay.. No specifications used, just two construction memoradums.
- Purdue University is doing research. Published reports – aren't available yet, but there are presentations.
- Good discussion was held, with many states interested in the material.
- Link for construction Memos –
https://www.in.gov/dot/div/contracts/conmemo/con_memo.htm
- Memos Indiana 22-02 and 22-04 attached with the presentation
- Mike Nelson, Indiana – mnelson@indot.in.gov



Decks

Benefits

Placement

- Improved workability
- No water applied on the surface
- Longer window for finishing
- Minimal bleed rate
- Eliminate evaporative retardants (90% water)
- Consistent air entrainment
- Lower pump pressure
- No wet curing (curing compound or plastic)

Hardened concrete

- Pozzolanic (more nucleation sites)
- Cement/paste reduction
- Improved strength (Type 1L cement ??)
- Minimal to zero cracking
- Reduced permeability
- Reduced CH & Ca-Oxy (report coming)
- Hardened air ??

INDOT's original goal:

Resolve issues behind the screed



Decks

Restrained Shrinkage ASTM C-1581 / AASHTO T-334

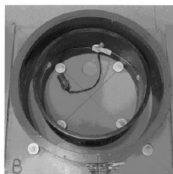


TABLE X1.1 Potential for Cracking Classification

Net Time-to-Cracking, t_{cr} , days	Average Stress Rate, S (MPa/day)	Average Stress Rate, S (psi/day)	Potential for Cracking
$0 < t_{cr} \leq 7$	$S \geq 0.34$	$S \geq 50$	High
$7 < t_{cr} \leq 14$	$0.17 \leq S < 0.34$	$25 \leq S < 50$	Moderate-High
$14 < t_{cr} \leq 28$	$0.10 \leq S < 0.17$	$15 \leq S < 25$	Moderate-Low
$t_{cr} > 28$	$S < 0.10$	$S < 15$	Low

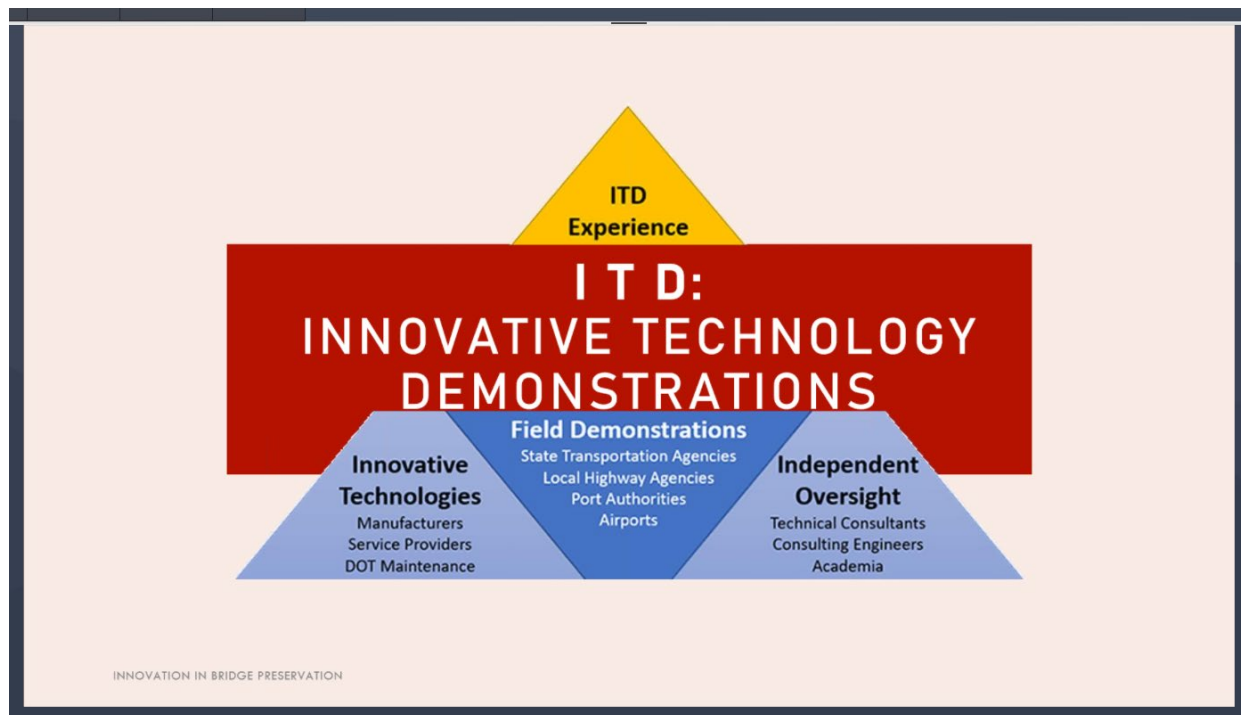
Material/Action Item	REFERENCE (REF)	LFA AND E5+ COMBINATION (LFA E5+ COMBO)
ASTM C 150, Buzzi Type I/II, pcy	608	608
ASTM C 33, Concrete Sand, pcy	1250	1250
Water, pcy	274	274
ASTM C 33, LS 57/67, pcy	1750	1750
ASTM C 494 Type A and F, Optima 258, fl oz per cwt	4.50	4.50
LFA, fl oz per cwt	-	8.00
E5+, fl oz per cwt	-	4.00
Slump, in	7.50	6.50
Density, pcf	147.0	151.2
Temperature, F	69.0	74.5

	REFERENCE, AVERAGE	LFA E5+ COMBO, AVERAGE
Average Age at Cracking, Days	8.50	28.00
Average Age at Cracking, STD DEV	0.75	0.00
Average Initial Strain, m/m	-0.01	0.00
Average Maximum Strain, m/m	-0.06	-0.09
Average Stress Rate, MPa/day	0.63	0.13
Stress Rate, STD DEV	0.12	0.00
Potential for Cracking	HIGH	MODERATE-LOW
AASHTO T334, 15 DAY MINIMUM	FAIL	PASS

Source: Intelligent Concrete
Dr. Belkowitz May 2022

2. ITD Working Group Update (Mario Baggio, Alchemco)

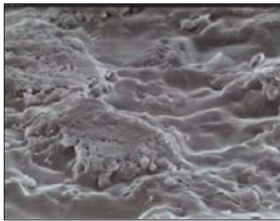
- See the website for the ITD reports, application forms and guidelines.
<https://tsp2bridge.pavementpreservation.org/industry/itd/>
- ITD is a national working group that came out of the TSP2 Bridge Program
- The AASHTO TSP-2 Innovative Technology Demonstrations (ITD) Program is a **field demonstration program** documented by an **Independent Consultant** and managed by the ITD Working Group, with TSP-2 oversight. The purpose is to introduce new and innovative preservation materials and technologies to owners of the nation's highway systems. Demonstrations involve products, services, processes, and equipment for highway and bridge preservation.
- Products with ITD projects include: (see presentation for contact info)
 - MPC Concrete Repair, Phoscrete
 - Box Culvert – Maintainable Weep Hole Filters, Jet Filters
 - Transparent Stay-In-Place Forms, TrueTech Bridge
 - SME-PS Concrete Durability Enhancer, Indiana Soy Alliance
 - MPC + SME-PS, Phoscrete and Indiana Soy Alliance
 - MALP Concrete, Phoscrete
 - Galvanizing Compound for Metal Coating, Galvatech 2000



- Alchemco – Waterproofing Protection for Highway Bridges
 - ITD Report is pending.
 - Questions – Mario Baggio, Alchemco - mario@alchemco.com



Innovative Technology: Integral Gel Waterproofing System



Alchemco **BridgeDECK Waterproofing Agent** produces a modified silicate gel material 'below the concrete surface' (*inside the concrete matrix*)

The gel is created by a chemical reaction between the calcium hydroxide that is present in the concrete (*as a by-product of cement's hydration*) and the chemical components of BridgeDECK Waterproofing Agent

By filling concrete porosity and cracks, the gel works as an integral waterproofing barrier that protects concrete from infiltration of water and water-soluble contaminants ... especially de-icing salts.



THE UNIQUENESS OF OUR SPRAY APPLIED WATERPROOFING

No other product offering combines the:

- Ability to seal future cracks (*sustainability*)
- Proven performance in the field - since the 1970's
- Speed & ease of application (*less down time*)
- Up to 25-Year Warranty
- 'Money saving' solution to water problems
- Can't be damaged or deteriorate (*long-term solution*)

IMPRESSIVE PHYSICAL CHARACTERISTICS

- *Densifies concrete (increases hardness/durability)*
- *Resistant to snow & ice melt ... great hydrostatic pressure ratings*
- *Allows outgassing = no trapped moisture*
- *VOC free ... environmentally friendly (green)*
- *Potable water safe – UL Certified: NSF/ANSI 61*
- *Doesn't change the appearance or the slipperiness coefficient of the structure*
- *Colorless & odorless ... safe & easy to work with*



SUMMARY

- Improves **DURABILITY & SUSTAINABILITY** of concrete structures
- Seals 'stable' cracks up to 2.0 mm wide
- **VAPOR PERMEABLE.** Allows concrete to breathe (*outgassing*) ... *does not trap moisture within the concrete.*
- Highly Resistant to chemicals & chloride ions
- Acts as a **DENSIFIER** ... increases the hardness of concrete from 6 to 8 on the Mohs scale (*similar to Granite*)
- Excellent hydrostatic pressure ratings (*1,300 feet / 400 meters*)

PROS

- **FAST APPLICATION** ... *resulting in far less 'down time'*
- Gel formulation handles 'thermal stress' very well
- Non-toxic and VOC free ... *completely recyclable after demolition of a structure*
- **LOWER APPLIED COST** than most other methods!
- No mixing of products on-site ... *eliminates error factor*
- Can be applied on positive or the negative side ... *although we highly recommend applying it to the positive side*
- Can't be damaged, deteriorate or delaminate ... **provides long-term waterproofing protection!**

CONS

- Concrete surface must be dry to the touch, in order to begin application of waterproofing products (*timing varies*)

3. National Concrete Bridge Council Webinar Series, “Preserving & Extending the Life of Concrete Bridges”

- 6 short webinar style presentations on concrete repairs,
 - June 23, 2022 Fundamentals of Concrete
 - July 7, 2022 Evaluating Concrete Bridges
 - July 21, 2022 Analyze, Design & Select the Solution
 - Aug 4, 2022 Concrete Repair 101
 - Aug 18, 2022 Strengthening Bridge Assets
 - Sept 1, 2022 Delivering Long-Term Bridge Protection
- See attachments for flyer for more information
- Registration at https://us02web.zoom.us/webinar/register/4816533981829/WN_VkWEt89ES-OiOaSMtwIAaw

4. Next Monthly Meeting

- July 5, 2022 Any Challenges – Sarah S to see if the date should be altered, if so, an update email will be sent.

Notes:

News: Bill Oliva Wisconsin DOT, has retired.

Requests for Travel Scholarships for the MWBPP Regional meeting by **June 30th**, to Sarah Sondag. These scholarship attendees would be in addition to the normal 2 attendees from each member state.

Nancy H - All of the Midwest States have made their contributions to the TSP2 program!.

Linked In Page for TSP2 – Bridge Preservation – Join It!

Drew Storey – membership has 254 followers. Please join if you haven’t already, and **forward the invitation to your colleagues.** Let’s try to make sure that the Midwest has the largest number of members on this forum –

<https://www.linkedin.com/company/tsp2-bridgepreservationpartnership>

Attendance Chart – MWBPP Teleconference

June 7, 2022

NCPP Representatives			Industry Representatives		
Darlene Lane	NCPP	☒	Tim Woolery	Adv. Chem. Tech.	☐
Nancy Huether	NCPP	☒	Brad Ehle	Adv. Chem. Tech.	☐
Chris Keegan	NCPP	☒	Lorella Angelini	Angelini Consulting	☐
Bouzid Choubane,	NCPP	☒	Patrick Martens	Br Pres & Insp Svcs	☒
			Allen Scarborough	CMC	☒
			Mike Stroia	CMC	☐
State Agency Representatives			Barritt Lovelace	Collins Eng.	☒
			Drew Garceau	Collins Eng.	☒
Sarah Wilson(Secretary)	Illinois DOT	☒	Thomas Collins	Collins Eng.	☐
Adam Post	Indiana DOT	☒	Marc Parker	Collins Eng.	☐
Jennifer Hart	Indiana DOT	☐	Brent Toller	DS Brown	☒
Jeremy Hunter	Indiana DOT	☐	Mark Ericson	ECHEM	☐
Mark Swiderski	Indiana DOT	☒	Ray Breer	ECHEM	☐
Joe Stanisz	Iowa DOT	☒	Andy Castillo	EMSEAL	☐
Scott Neubauer	Iowa DOT	☒	Diana Hellman	FujiFilm	☒
Dewight Jones	Iowa DOT	☐	Jason Fogg	HDR, Inc.	☐
Dominique Shannon	Kansas DOT	☒	LJ Dickens	HNTB	☐
Don Whisler	Kansas DOT	☒	Ed Liberati	Hughes Group	☐
Jim Leaden (Vice-Chair)	Kansas DOT	☒	Blake Liberati	Hughes Group	☐
John Culbertson	Kansas DOT	☐	Kevin Irving	Int. Zinc Assoc.	☐
Josh Rogers (Director)	Kentucky TC	☐	Greg Heilman	Jet Filter System	☐
Dora Alexander	Kentucky TC	☒	Paul Vinik	GPI	☐
Brandon Boatman	Michigan DOT	☐	Richard Dunne	GPI	☒
Jacob Creisher	Michigan DOT	☐	Paul Jensen	Jensen Eng.	☒
Jason DeRuyver (Director)	Michigan DOT	☒	Dave Juntunen	Mott MacDonald	☐
Paul Pilarski	Minnesota DOT	☐	Drew Storey (Vice Chair)	Mott MacDonald	☒
Sarah Sondag (Chair)	Minnesota DOT	☒	Bobby Scarpitto	Kwikbond	☒
Mark Spafford	Minnesota DOT	☐	Gregg Freeman	Kwikbond	☒
Jerry Goodman	Missouri DOT	☒	Josh Bunderson	Metal Fatigue Soln.	☐
Todd Miller	Missouri DOT	☐	Adam Hales	Phoscrete	☐
Fouad Jaber	Nebraska DOT	☒	Kyle Bartfay	Phoscrete	☐
Kent Miller	Nebraska DOT	☐	Paul Imbrock	PoreShield	☐
Mark Traynowicz	Nebraska DOT	☐			
Babrak Niazi	Nebraska DOT	☐	Richard Huza	Salit Steel	☐
Miles Nelson	North Dakota DOT	☒	Derrick Castle	Sherwin Williams	☒
Ida Narbuvooll	North Dakota DOT	☒	Mark Hudson	Sherwin Williams	☒
Matthew Kurle	North Dakota DOT	☒	Aamer Syed	Sika	☐
Brad Noll	Ohio DOT	☒	Fabio Puzzo	Sika	☐
Jared Backs	Ohio DOT	☒	Siva Venugopalan	Siva Corrosion	☐

Mike Brokaw	Ohio DOT	☐	Chris Davis	Structural Tech	☐
Walt Peters	Oklahoma DOT	☒	Tom Donnelly	Transpo	☐
David Coley	South Dakota DOT	☒	Michael Stenko	Transpo	☐
Todd Thompson	South Dakota DOT	☐	Lawrence Kirchner	TranSystems	☐
Alex Pence	Wisconsin DOT	☐	David Brodowski	TrueTech Bridge	☐
Philip Meinel	Wisconsin DOT	☐	Peter Seibert	UHPC Soln.	☒
Ryan Bowers	Wisconsin DOT	☒	Kevin Stumpf	Urettek USA	☐
Travis McDaniel	Wisconsin DOT	☐	Kevin Stull	Washer Coatings	☐
David Bohnsack	Wisconsin DOT	☒	Nick Graziani (Director)	Watson Bowman	☒
Anthony Stakston	Wisconsin DOT	☒			
Local Agency Representatives					☐
Mel Quick-Miller	Harrison Cty IN	☐			
Javier Romero	Cook County, IL	☐	Guest / Mixed Affiliation		
			Amir Rezvani	Infratek Solutions	☒
Academia Representatives			Caleb Austel	Hughes Group	☒
Basak Bektas	MN State Mankato	☐	Dan Patacca	E-CHEM	☒
Glenn Washer (Director)	U of Missouri	☐	Jonathan Sirianni	AASHTO	☒
Pat Conner (Director)	Indiana LAP	☐			☐
			Steve Conley	ECHEM	☒
FHWA Representatives					☐
Larry O'Donnell	FHWA	☒			☐
Raj Ailaney	FHWA	☒			☐
Scott Stotlemeyer	FHWA	☒			☐
Tim Anderson (Director)	FHWA	☒			☐
					☐
					☐
					☐
					☐
					☐
			Guest Speakers		
			Mike Nelson	Indiana DOT	☒
			Mario Baggio	Alchemco	☒
					☐

Anyone shown with Unknown Affiliation can email the Secretary at Sarah.Wilson@illinois.gov with an update for the roll call.

SUMMER ENRICHMENT SERIES

Preserving & Extending the Service Life of Concrete Bridges

Brought to you by:



register now

The National Concrete Bridge Council (NCBC), with its supporting member organizations, is pleased to bring you this summer's premier virtual workshop series on concrete bridges and how to repair, maintain, and extend their life cycle.

The 6-part series, supported by Structural Technologies, includes interactive sessions with industry experts sharing proven methodology which identifies root causes of issues encountered on concrete bridges and provides guidance for optimal solutions and design strategies. Understanding this holistic approach dispels perceived limitations in our ability to repair and preserve concrete bridges. Tools are provided to help owners and practitioners be the best possible stewards of critical transportation infrastructure. Certificates of attendance are available for each of these free virtual workshops.

01 Fundamentals of Concrete

Understand concrete basics, deterioration mechanisms, and an overview of the repair process.

Date: June 23rd, 2022

Time: 2:00-3:30PM (EST)

02 Evaluating Concrete Bridges

Explore the different aspects of condition assessments, including concrete and post-tensioning investigation.

Date: July 7th, 2022

Time: 2:00-3:30PM (EST)

03 Analyze, Design & Select the Solution

Ensure the best project solutions are implemented through repair analysis, design and material selection.

Date: July 21st, 2022

Time: 2:00-3:30PM (EST)

04 Concrete Repair 101

Review concrete repair procedures, application techniques and best practices for desired outcomes.

Date: August 4th, 2022

Time: 2:00-3:30PM (EST)

05 Strengthening Bridge Assets

Learn key strengthening techniques and various applications through case studies.

Date: August 18th, 2022

Time: 2:00-3:30PM (EST)

06 Delivering Long-Term Bridge Protection

Determine the best protections strategies for your concrete bridge whether it's cathodic protection, sealers, coatings or overlays.

Date: September 1st, 2022

Time: 2:00-3:30PM (EST)

Sponsoring Organizations:



Supported By:



Midwest Bridge Preservation Partnership

Agenda – Monthly Teleconference Tuesday, June 7, 2022

Business Meeting: 12:30 – 1:00 PM Central

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Appendix 1 - Concrete Admixture to Reduce Shrinkage Cracking

Mike Nelson, Indiana DOT, Office of Materials Management

mnelson@indot.in.gov

Presentations

Indiana Construction Memos 22-02 & 22-04

MWBPP INDOT's Use of Colloidal Silica

Michael Nelson, PE
Concrete Engineer
INDOT Division of Materials & Tests

June 7, 2022

NextLevel
INDIANA

E5 Internal Cure and E5 Liquid Fly Ash

Full-depth decks

- 90 pours (26 in 2020, 41 in 2021, 23 in 2022)
 - Added E5 IC to existing mixes w/ curing compound only
 - Memo 22-02** (optional - zero cost change order)
- 21 pours with 580# cement w/ E5 IC and LFA only

Overlays

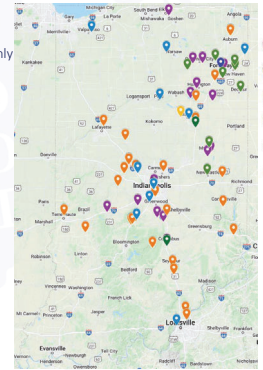
- 3 pours in 2020 (unsuccessful)
 - Added E5 IC to existing SFMC mix (658# cement)
- 19 pours in 2021
 - 600# cement w/E5 and LFA & fiber (no bagged silica)
 - Traditional 7-day wet cure
 - Memo 22-04** (optional - zero cost change order)

Paving

- 1 in 2021 (LFA only)

Broad participation

- 16 different contractors
- 8 different ready-mix companies
- Allen & Whitley Counties
- Purdue University, West Lafayette IN



- 2020 deck
- 2021 deck
- 2022 deck
- Pavement
- Overlay
- 580 (whole structure)

NextLevel
INDIANA

Nano-Silica

Silica Fume

- By-product of silicon chip manufacturing
- Pozzolanic - Reactive with calcium hydroxide (CH)
- Fine powder
 - (57 x more surface area than Portland cement/Fly Ash)



Nano-silica

- Manmade from salts and metals
- Pozzolanic - Reactive with calcium hydroxide (CH)
- Two forms
 - Very fine powder
 - (1714 x more surface area than Portland cement/Fly Ash)
 - Colloidal nano-silica



NextLevel
INDIANA

Decks

Benefits

Placement

- Improved workability
- No water applied on the surface
- Longer window for finishing
- Minimal bleed rate
- Eliminate evaporative retardants (90% water)
- Consistent air entrainment
- Lower pump pressure
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Hardened concrete

- Pozzolanic (more nucleation sites)
- Cement/paste reduction
- Improved strength (Type 1L cement ??)
- Minimal to zero cracking
- Reduced permeability
- Reduced CH & Ca-Oxy (report coming)
- Hardened air ??

INDOT's original goal:
Resolve issues behind the screed



E5 Internal Cure and E5 Liquid Fly Ash

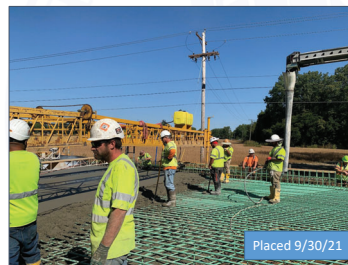
- Developed by Specification Products (Noblesville, IN)
- Colloidal silica (modified)
- Patented
 - Batch sequencing is critical
 - Particle composition and size range are unique
- "Internal Curing" and "Fly Ash" ??
 - Cement grains electrically bond more molecules of water due to tiny particle size
 - More efficient hydration of cement particles



NextLevel
INDIANA

Decks

More forgiving



26" thick reinforced slab deck - 580# cement, 4 oz/cwt E5 & 8 oz/cwt E5 LFA

NextLevel
INDIANA

Decks

Restrained Shrinkage ASTM C-1581 / AASHTO T-334

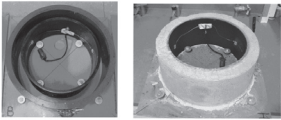


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Source: Intelligent Concrete
Dr. Belkowitz May 2022

Performance

SR-49 – temporary overlays
NB Evans – no fiber

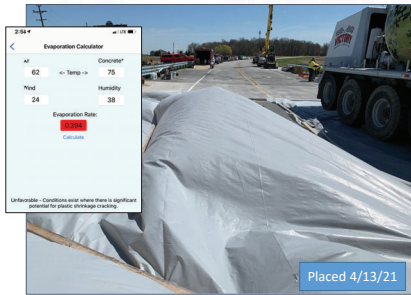


Pic – March 1, 2022

Overlays

Mix design

- Cement content 600 pcy
- 4 oz/cwt E5 Plus Internal Cure admixture
- 8 oz/cwt E5 Liquid Fly Ash (LFA) admixture
- Fibrillated microfiber
- 0.46 W/C ratio (minimum)
- Traditional water cure & machine grooving



Placed 4/13/21



Performance

SR-49 – temporary overlays
SB Evans – no fiber



Pic – March 1, 2022

Performance

SR-49 – temporary overlays



Performance

SR-49 – temporary overlays
NB over RR – fiber



Pic – March 1, 2022

Performance

SR-49 – temporary overlays

SB over RR – fiber

- Minimal cracking
- Worst starting condition



Performance

SR 35 / SR 67 – Muncie Bypass SB



SFMC plastic shrinkage



Performance

NB I-469 over Dawkins Road

- SFMC (passing In) – 5/18/21
- E5 (driving In) – 7/15/21



Thank You !

Michael Nelson

mnelson@indot.in.gov

Questions

Performance

SR 3 over Big Blue River

- Both look good
- Minimal cracking in both
- Shadowing of cracks in SFMC

Cores

- Bond strength 2 – 2.5x higher





INDIANA DEPARTMENT OF TRANSPORTATION

100 North Senate Avenue
Room N758-CM
Indianapolis, Indiana 46204

www.in.gov/indot/

Eric Holcomb, Governor
Michael Smith, Commissioner

April 04, 2022

CONSTRUCTION MEMORANDUM 22-02

TO: District Deputy Commissioners
District Construction Directors, Area Engineers, Project Engineers/Supervisors
Division of Materials and Tests
District Project Management Directors
District Technical Services Directors
District Testing Engineers

FROM: Gregory G. Pankow, Chief Engineer of Construction
Division of Construction Management and District Support

SUBJECT: Alternate Curing Method for Structural Concrete using E5 Internal Cure and E5 Liquid Fly Ash

SUPERSEDES: 21-05

E5 Internal Cure and E5 Liquid Fly Ash are a new type of concrete admixture that has been shown to provide significant benefits during the placement of concrete and in the overall quality of the in-place concrete. Some of the benefits include improved water retention, workability, pumpability and higher pozzolanic activity, which can create higher strength and reduced permeability.

To evaluate the performance of these admixtures, an alternate curing method was developed in lieu of the water curing requirements in 702.22 Standard Specifications. This alternate curing method is to be considered for bridge decks, slab bridges and reinforced concrete bridge approaches on existing and future construction contracts.

In lieu of the water curing requirements in 702.22, concrete may be placed and cured as follows. Concrete shall be in accordance with 702 except as follows:

Mix Design & Batching:

Mix Option 1:

1. The concrete mix design shall include the admixture "E5 Internal Cure" by Specification Products with a dosage rate of 4 oz/cwt of cementitious.

2. The concrete mix design shall include either 3% silica fume addition or 30% slag cement replacement per 709.05(c). Class C concrete mix designs shall be based on 658 lbs/cu yd of cement. The cement content shall not be increased.
3. The water-cementitious ratio shall be 0.420 to 0.490.
4. A water-reducing admixture is not required.
5. Ensure that the concrete mixture is fully wetted before adding the E5 Internal Cure admixture to the load.

Mix Option 2:

1. The concrete mix design shall include the following two admixtures by Specification Products: “E5 Internal Cure” with a dosage rate of 4 oz/cwt of cementitious and “E5 Liquid Fly Ash” with a dosage rate of 8 oz/cwt of cementitious.
2. Mix design shall be based on a cement content from 550 to 600 lbs/cu yd. The cement content shall not be increased above 600 lbs/cu yd. No other supplementary cementitious materials shall be added.
3. Minimum 28-day compressive design strength shall be 4,000 psi
4. The water-cementitious ratio shall be 0.44 to 0.49.
5. A water-reducing admixture, Type A, may be used.
6. Ensure that the concrete mixture is fully wetted before adding the E5 Internal Cure and Liquid Fly ash admixtures to the load.

During placement:

1. A representative from Specification Products shall be on site during placement.
2. Each truck shall mix the concrete on site for a minimum of 30 seconds at mixing speed before discharging concrete.
3. Water shall not be applied to the plastic concrete surface.
4. To avoid damaging the air void system when the slump is greater than or equal to 5 inches (≥ 5 in.) minimal mechanical vibration shall be used. To the extent practical handheld vibrators should only be used as needed to consolidate concrete along copings or in areas that are heavily congested with reinforcing steel.
5. Products marketed as “evaporative retardants” or “evaporation reducers” shall not be used. Some common trade names for these products include Sika Film, MasterKure ER50 and Eucobar.
6. The following products may be used as finishing aids as directed by the manufacturer:
 - a. E5 Miracle Aid by Specification Products
 - b. EZ Finish by Specified Surfaces
 - c. The Juice by M2 Solutions.

After placement:

1. Curing shall be for a minimum period of five days (120 h) and until flexural test beams indicate a modulus of rupture of 600 psi. Curing shall consist of covering

with plastic sheeting (minimum 4 mil thickness). The sheeting shall be white. Sheeting shall be applied as soon as possible.

2. Acceptance beams shall be field cured by wrapping the beams in wet burlap and then wrapping in plastic. The beams will be placed near the structure and shaded from direct sunlight. It is imperative that the burlap around the beams remain moist during the curing period.
3. The requirements of 702.24(a) are modified as follows. Equipment or traffic will not be allowed on structures for a minimum of 120 hours and until flexural test beams representing all concrete required to carry live loads indicate a modulus of rupture of 600 psi.
4. The requirements of 702.14(b)1 and 702.14(b)2 are modified as follows. Falsework and/or falsework jacks shall remain in place at least 120 hours after concrete placement and until flexural test beams indicate a modulus of rupture of 600 psi or greater has been achieved.
5. For the purpose of determining cold weather concrete conditions in accordance with section 702.11 the minimum curing period shall be continuous for 168 hours after placement.
6. The Department's project personnel will provide feedback to the Concrete Engineer at Department's Division of Materials and Tests, including strength data and visual observations both during the pour and curing periods.

The Contractor shall submit a request to use one of the two E5 mix options and alternate curing method to the Department's project personnel for approval. The request shall be submitted a minimum of seven days prior to placement. Project personnel will then forward the request to the Area Engineer and the Concrete Engineer at the Division of Materials and Tests. Upon approval, a zero-cost change order will be processed to add the appropriate contract pay item(s) with a supplemental description as follows:

609-06259	Reinforced Concrete Bridge Approach, E5 Internal Cure
704-51002	Concrete, C, Superstructure, E5 Internal Cure

Any questions should be directed to the Concrete Engineer at Materials and Tests, Mike Nelson mnelson@indot.in.gov.

GGP/mwn



INDIANA DEPARTMENT OF TRANSPORTATION

100 North Senate Avenue
Room N758 - CM
Indianapolis, Indiana 46204

www.in.gov/indot

Eric Holcomb, Governor
Mike Smith, Commissioner

May 12, 2022

CONSTRUCTION MEMORANDUM 22-04

TO: District Deputy Commissioners
District Construction Directors
District Technical Services Directors
District Area Engineers, Project Engineers/Supervisors
District Project Management Director, Project Management Director
District Traffic Engineers, District Testing Engineers
District LPA Coordinators, Field Engineers, Division of Materials and Tests

FROM: Gregory G. Pankow, P.E., Director 
Division of Construction Management and District Support

SUBJECT: Alternate Overlay Mix Design Using E5 Internal Cure and E5 Liquid Fly Ash

E5 Internal Cure and E5 Liquid Fly Ash are a new type of concrete admixture that has been shown to provide significant benefits during the placement of concrete and in the overall quality of the in-place concrete. Some of the benefits include improved water retention, improved workability, reduced cracking and higher pozzolanic activity, which can create higher strength and reduced permeability.

An alternate bridge deck overlay mix design may be used while the Department continues to evaluate the performance of these admixtures. In lieu of Latex Modified Concrete per 722.05(a) or Silica Fume Modified Concrete per 722.05(c) Standard Specifications, concrete may be in accordance with 722 and the following exceptions:

Mix Design & Batching:

1. The concrete mix design shall include the following two admixtures by Specification Products: "E5 Internal Cure" with a dosage rate of 4 oz/cwt of cementitious and "E5 Liquid Fly Ash" with a dosage rate of 8 oz/cwt of cementitious.
2. Mix designs shall be based on a cement content from 600 to 620 lbs/cu yd. The cement content shall not be increased above 620 lbs/cu yd. No other supplementary cementitious materials shall be added.
3. The water-cementitious ratio shall be 0.45 to 0.49.
4. Fibrillated polypropylene fiber with dosage per manufacture (min 1.5 lbs/cu yd).
5. Slump at time of placement (AASHTO T 119): minimum 5 in., maximum 8 in.
6. Compressive strength: 3,200 psi at 7 days, 4,200 psi at 28 days.
7. A water-reducing admixture, Type A, may be used.

8. Ensure that the concrete mixture is fully wetted before adding the E5 Internal Cure and E5 Liquid Fly Ash admixtures to the load.
9. The minimum batch size shall be 2 cu yds. The maximum batch size of 80% shall not apply.
10. An additional 15 seconds of mixing time shall be added during batching of each load.

During placement:

1. A representative from Specification Products shall be on site during placement.
2. Water shall not be applied to the plastic concrete surface.
3. Products marketed as “evaporative retardants” or “evaporation reducers” shall not be used. Some common trade names for these products include Sika Film, MasterKure ER50 and Eucobar.
4. The following products may be used as finishing aids as directed by the manufacturer:
 - a. E5 Miracle Aid by Specification Products
 - b. EZ Finish by Specified Surfaces
 - c. The Juice by M2 Solutions.

After placement:

1. Curing shall be for a minimum period of 7 days and consist of 120 h of wet cure followed by 48 h of dry cure. Wet curing shall be in accordance with 702.22(a) Standard Specifications and pre-wetted burlap and soaker hoses shall be used. The deck shall remain completely covered with burlap and white plastic during the dry cure period except the soaker hoses shall be off. The bridge deck may be opened to traffic after the dry cure period and when the average compressive strength of cylinders is 3,200 psi or greater.
2. Strength testing will consist of the average of three 4 in. by 8 in. cylinders or two 6 in. by 12 in. cylinders. The cylinders will be cured in accordance with AASHTO T 23 Section 10.1, Standard Cure conditions. The frequency for all testing will be per the Frequency Manual and will be the same as for silica fume modified concrete overlay.

The Contractor shall submit a request to use the alternate overlay mix design along with the proposed CMDS to the Department’s project personnel for approval a minimum of 14 days prior to the trial batch. Project personnel will then forward the request to the Area Engineer, the Concrete Engineer at the Division of Materials and Tests and District Testing Engineer. Upon approval, a zero-cost change order will be processed to add the appropriate contract pay item with a supplemental description as follows:

722-12899 Bridge Deck Overlay, E5 Internal Cure

Any questions should be directed to the Concrete Engineer at Materials and Tests, Mike Nelson
mnelson@indot.in.gov.

GGP/mwn



Midwest Bridge Preservation Partnership

Agenda – Monthly Teleconference Tuesday, June 7, 2022

Business Meeting: 12:30 – 1:00 PM Central

Technical Session: 1:00 – 2:00 PM Central

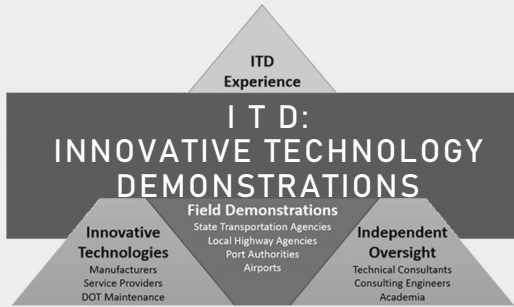
Appendix 2 – ITD Working Group Update

Mario Baggio, Alchemco

mario@alchemco.com

Presentations

ITD: INNOVATIVE TECHNOLOGY DEMONSTRATIONS



INNOVATION IN BRIDGE PRESERVATION

ITD Program Underway MPC Concrete Repair

Rapid-Setting Concrete Repair for Bridge Decks, Expansion Joints, plus Vertical/Overhead Patch and Shotcrete
Phoscrete Corporation: Adam Hales adam@phoscrete.com



ITD Experience
Reports from project demonstrations are compiled, published here, and presented at TSP-2 regional conferences.

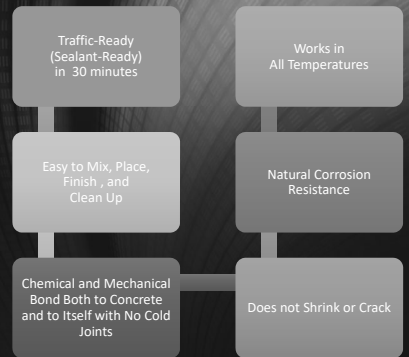
Innovative Technologies
Manufacturers
Service Providers
DOT Maintenance
Contractors

Field Demonstrations
State Transportation Agencies
Local Highway Agencies
Port Authorities
Airports

Independent Oversight
Technical Consultants
Consulting Engineers
Academia
AASHTO TSP-2

INNOVATION IN BRIDGE PRESERVATION

MPC Performance Characteristics



5



ITD Partners



Manufacturer



Consultant



Owner/DOT



TSP-2 Bridge



Academia



MALP Deck Patch Cold Climate First ITD Installation

- MassDOT
- December 4, 2014

6



**MALP Overhead Patch
2 Year Inspection**

- Oklahoma DOT
- Packsaddle Bridge,
- March 1, 2017

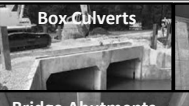
7

EARTH RETAINING STRUCTURES

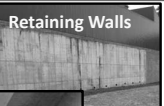
Maintainable Weep Hole System
Preventing Geotextile Drainage & Erosion Control



Seawalls & Bulkheads



Box Culverts



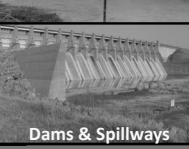
Retaining Walls



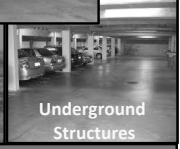
Bridge Abutments



Drainage Canals



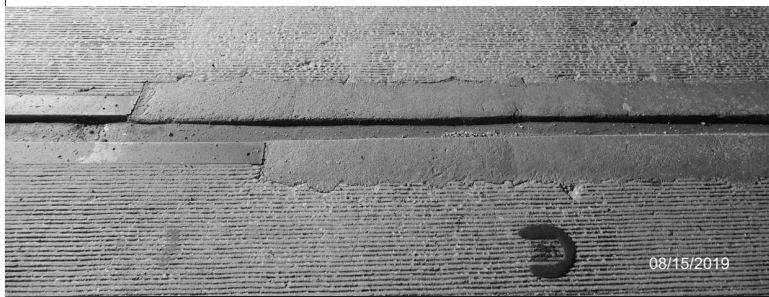
Dams & Spillways



Underground Structures

Earth Retaining structures are used for a variety of applications.

10



**Expansion-Joint Header + Seal
“Done-In-One”**

08/15/2019

- I-595 Fort Lauderdale FL
- July 11, 2019

8

PRODUCT MATERIALS

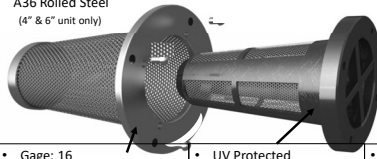
Maintainable Weep Hole System
Preventing Geotextile Drainage & Erosion Control

Protective Housing

- 316L Stainless
- A36 Rolled Steel (4" & 6" unit only)

Cleanable Filter Cartridge

ABS (Acrylonitrile butadiene Styrene)



Geotextile Filter Fabric

Ex. Mirafi FW300



- Gage: 16
- Surface area: 40 sq. in.
- 1/4 dia. Holes, 5/16" spacing
- 58% opening (~23.5 sq. in.)
- ~2.4 times drain opening
- 316L - 1mm pit in 220 years

- UV Protected
- ABS Black
- Tenisle (4350 psi)
- Impact 17 ft lb/in²
- ASTM D4673, ABS0120, B43420
- Est. Life 50-80 years

- Woven Geotextile
- Apparent opening size 30
- Permeability 1.5
- Flow Rate 115 gal/min/ft²
- Tear Strength 125 lbs.
- Est. Fabric Life 25-75 years.

Use a wrench not a backhoe.

11

ITD Program Underway Box Culvert – Maintainable Weep Hole Filters

Drainage & Soil Filtration to extend the life of Retaining Walls,
Seawalls, & Bridge Infrastructure

JET Filter System: David Heilman • dheilman@jetfiltersystem.com



ITD PROJECT / MDOT BOX CULVERT

Maintainable Weep Hole System
Preventing Geotextile Drainage & Erosion Control




- 172' twin box culvert
- Constructed in 1963
- 52 existing 3" weep-holes
- Class II & aggregate backfill
- High groundwater
- High pressure against walls

Significant water flowing along median to culvert walls.

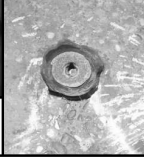
12

BOX CULVERT SITUATION

Maintainable Weep Hole System
Preventing Groundwater Drainage & Erosion Control

Over time,

- Soil leached through weep holes
- Many manually plugged
- Water leaking through cracks & seams



Pressure relieved through wall/ ceiling cracks & seams.

13

ITD Program Underway Silane-Epoxy Coating

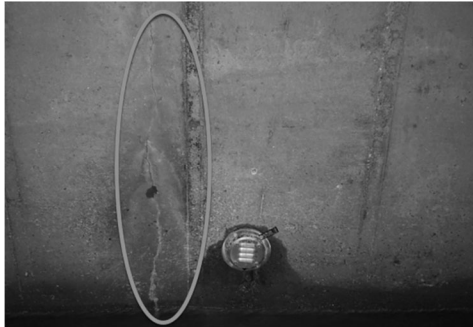
Dual coat system that creates a deep hydrophobic layer and repairs cracks in a single surface preparation and lane closure.

Advanced Chemical Technologies: Tim Woolery • tim@advchemtech.com

TSP2
AASHO

LOWERED WATER TABLE

Maintainable Weep Hole System
Preventing Groundwater Drainage & Erosion Control



Significant water pressure draw down in 48 hours.

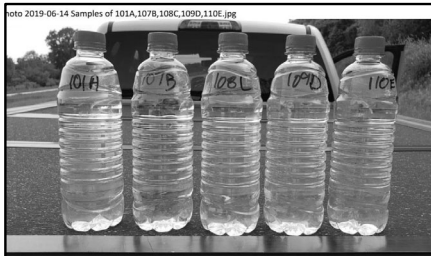
14

Advanced Chemical Technologies Deck-Sil - ITD Project MaineDOT

SAMPLES AFTER 9 DAYS

Maintainable Weep Hole System
Preventing Groundwater Drainage & Erosion Control

foto 2019-06-14 Samples of 101A,107B,108C,109D,110E.jpg



Periodic inspection: flow rate, soil filtration & fabric clogging.

15

Shot Blasting



Applying Silane Concrete Water Repellent



**Advanced Chemical Technologies
Deck-Sil System ITD Project**

- Creates deep hydrophobic layer up to ¾ inch
- Heals Cracks
- Superior chloride protection
- Single surface preparation
- Prevents Rebar corrosion ASTM G109 tested



Applying Epoxy Healer Sealer to fill cracks

**ITD Program Underway
Transparent
Stay-In-Place Forms**

Allows owners to inspect during and after deck concrete placement and comply with routine inspection requirements.

TrueTech Bridge: Dave Brodowski • brodowskid@inventure-group.com

**TSP2
AASHTO**



**Broadcasting Aggregate for
skid resistance**

TRANSPARENT FORMS //

TrueTech Bridge®
ENGINEERED FOR INTEGRITY

ClearCast Forms

Proven benefits of stay-in-place forms

Inspect concrete during deck placement

Comply with MAP-21 / AASHTO / NBIS

Allows for Bridge Deck Preservation Actions

GALVANIZED STEEL

ACRYLIC

TYP. LENGTH: 4'-0"

WIDTH: VARIES WITH BAY

TRUETECH BRIDGE // truetechbridge.com

INNOVATIVE TECHNOLOGY DEMONSTRATIONS //

THE ClearCast Forms DIFFERENCE

ClearCast Forms are the result of years of research and development, yielding an innovative method of bridge deck construction that improves productivity and safety while complying with bridge owner inspection criteria.

- 1 SPEED
- 2 SAFETY
- 3 SUSTAINABILITY



TSP2 TRANSPORTATION SYSTEM PRESERVATION AASHTO BRIDGE PRESERVATION TECHNICAL SERVICES PROGRAM

ITD Program: Transparent Stay-In-Place Forms

LET'S BE CLEAR...



DESCRIPTION OF DEMONSTRATION:
Translucent stay-in-place forms have been used to improve productivity for bridge deck construction for nearly 20 years in the United States. The primary advantage is the ability to inspect the surface of the deck throughout construction, allowing for quality assurance, but also for routine and emergency inspections over time in accordance with national bridge inspection standards. Transparent Stay-In-Place Forms (TSP-IF) improve safety and speed of construction while protecting inspection. This is achieved in helping bridge owners preserve the deck and protect the underlying elements, extending the service life of the bridge.

DOCUMENTS:
Program Application: TSP-IF Use Guide - ITD Application

Report: ITD Research & Construction - Transportation Maintenance & Preservation

TRUETECH BRIDGE // truetechbridge.com

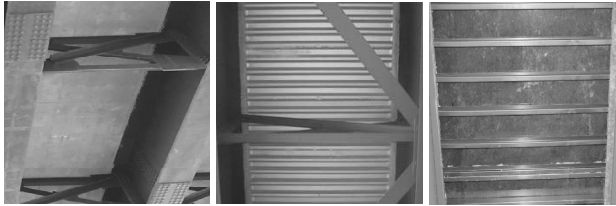
ITD Program Underway SME-PS Concrete Durability Enhancer

Soy Methyl Ester-Polystyrene delivers more than 10 years of protection against water, salt, and freeze/thaw damage.

Indiana Soy Alliance: Paul Imbrock • pimbrock@poreshield.com



DECK FORMING ALTERNATIVES //



Speed & Safety

Construction Inspection

Routine Inspection

Maint. / Preserve

TRUETECH BRIDGE // truetechbridge.com

PoreShield™ Concrete Durability Enhancers



Paul Imbrock | pimbrock@poreshield.com | 260-318-5506

SUMMARY //

ClearCast Forms

Allow for Deck Inspection During & After Construction

Improve on SIPF Durability

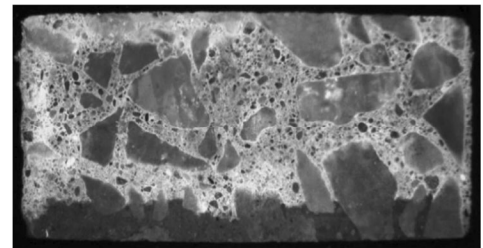
Easy for Contractors to Use

Help Extend Life of Deck with Bridge Preservation Actions



TRUETECH BRIDGE // truetechbridge.com

PoreShield enhances durability from within the pores, blocking water/ion ingress...



Test at 50% humidity

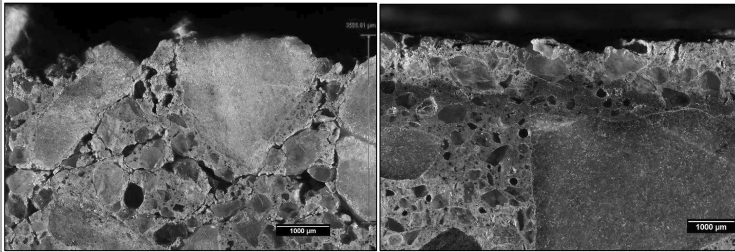
Fluorescent dye shows PoreShield SME-PS filling concrete pores, preventing moisture and ion ingress. Once in the pores, PoreShield remains fluid and adjust to cracking or other changes in concrete over time

Published in 2012, by: John Wiley and Sons
www.wiley.com/go/transportation

PoreShield prevents water & salt damage below the concrete surface

Cross-Section Photomicrographs

ASTM C 672 (modified): 10 weeks of daily freeze/Thaw (70 Cycles), 40 g/L CaCl₂



UNTREATED CONCRETE
Interior cracking (red arrows) >260mg mass loss

SME-PS TREATED CONCRETE
No interior cracks < 10mg mass loss

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PoreShield SME-PS in use



PoreShield SME-PS: 10 yr field results 13-year-old heavily deiced highway at application



SME-PS

UNTREATED

Now 23 years old, PoreShield treated highway protected while untreated joints are deteriorating

Note: black marks are from removed original joint fill

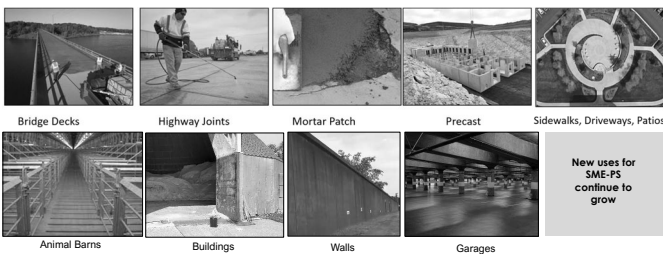
ITD Program Synergy MPC + SME-PS

Admixture improves freeze/thaw and salt/scale durability.

Phoscrete: Brian Mintz • brian@phoscrete.com
Indiana Soy Alliance: Paul Imbrock • pimbrock@poreshield.com



PoreShield SME-PS in use



ENDURE ADMIX



PRECISE | INNOVATIVE | AUTHENTIC

April 18, 2022
Phoscrete Corporation – Phoscrete Formula 3E-HC
Project #: 21-1297
Page 2 of 2

TEST RESULTS

ASTM C672 – Salt Scaling

Average of two 8 x 10 x 4-in specimens subjected to 100 freeze-thaw cycles using a 4 g. per 100 ml solution of sodium chloride with water.

Phoscrete Formula 3E-HC

Mass Loss @ 50 cycles **0.0 lb/ft²**
Specimen 1 0.0 lb/ft² (Rating 0 – no scaling)
Specimen 2 0.0 lb/ft² (Rating 0 – no scaling)

Mass Loss @ 100 cycles **0.0 lb/ft²**
Specimen 1 0.0 lb/ft² (Rating 0 – no scaling)
Specimen 2 0.0 lb/ft² (Rating 0 – no scaling)

6/7/2022

INNOVATION IN BRIDGE PRESERVATION

36

ITD Program Underway Integrated Gel Waterproofing System

Forms a gel below the surface of the concrete that provides long-term protection against corrosion and freeze/thaw damage.

Alchemco: Mario Baggio • mario@alchemco.com

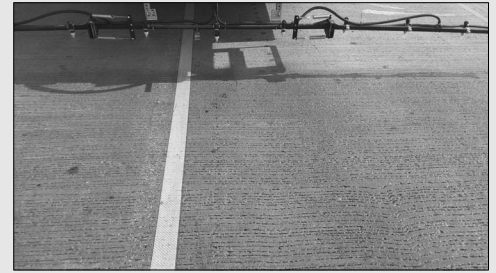
TSP2
AASHTO



FASTER APPLICATION
translates into
LESS DOWN TIME

APPLYING WATERPROOFING

Truck Mounted Spray Rig
applying 40,000+ square feet per hour



SOUTH DAKOTA - D.O.T. Application: Hwy 12 - Millbank, SD



Spray Applied Waterproofing



Watering



WASHINGTON - D.O.T. Highway Bridge Application



FASTER APPLICATION
translates into
LESS DOWN TIME

Truck Mounted Spray Rig
Watering



SOUTH DAKOTA - D.O.T. Application: Hwy 12 - Millbank, SD



Spray Applying the Waterproofing



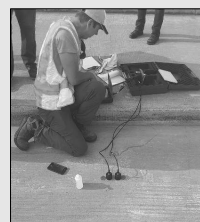
Watering the Bridge Deck and Jersey Barriers



IOWA - Highway Bridge Application



Moisture Content Testing



ITD Task Force Testing



ITD Task Force Testing



MINNESOTA - D.O.T. Application: Part of the TSP2 ... ITD Task Force Project to Evaluate New Technologies



Both the Waterproofing and Accelerating Agent are spray-applied to the concrete surface (horizontal or vertical).

The waterproofing gel forms $\frac{3}{4}$ " below the surface of the concrete ... filling all of the cracks, voids, fractures, etc. This protects the concrete matrix and prevents corrosion of the steel reinforcement

Waterproofing chemicals stay resident in the concrete slab and react with the water that enters the slab from all 'new cracks' that occur in the future ... to form more gel and seal those cracks. This cycle repeats itself for 15 – 25 years, depending on which waterproofing option is chosen

Modified Silicate Gel – Chemical Reaction Video



GALVANIZED TOWERS REFURBISHMENT

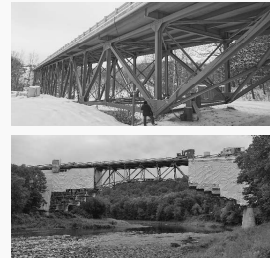


ITD Program Underway Galvanizing Compound for Metal Coating

Active cathodic protection to steel structures with its extra fine pure atomized zinc resulting in a greater zinc density and a performing anode
Galvatech 2000: Maxim Dubé • maximdube@galvatech2000.com



GALVANIZED BRIDGES REFURBISHMENT



BEFORE

AFTER

GALVATECH 2000 GALVANIZING COMPOUNDS



TOWERS
SUBSTATIONS
BRIDGES

METALLIZED BRIDGES REFURBISHMENT



THANK YOU

Brian Mintz
brian@phoscrete.com

*Visit Adam and me
in the exhibit hall
and check out our
outside demonstration
this afternoon.*





DIVERSE APPLICATIONS



PROJECTS AROUND THE GLOBE



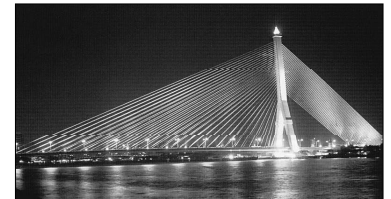
Waterproofing Protection for Highway Bridges

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DIVERSE APPLICATIONS



PROJECTS AROUND THE GLOBE



ALCHEMCO is a global manufacturer of integral waterproofing products for concrete & masonry structures ... based in the United States

In 2018, Alchemco acquired the formulas & assets of TechCrete, LLC - a creator & manufacturer of superior waterproofing products that have protected concrete structures around the world for the past 45 years

Infrastructure projects such as:

- Parking Structures
- Highway Bridges
- Stadiums
- Ports & Marinas
- Water Treatment Plants
- Containment Vessels & Water Parks
- Hydroelectric Plants
- Dams & Tunnels

Bank of America Tower - Parking
Jacksonville, FL

Nhat Tan Bridge - Hanoi

Paul Brown Stadium - Cincinnati, OH

DIVERSE APPLICATIONS



PROJECTS AROUND THE GLOBE



Concrete & Masonry
Waterproofing Products

Concrete Cleaning,
Patching & Repair
Products

Graffiti Blocking &
Removal Products



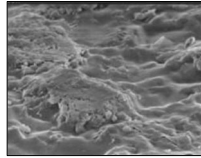
World Class Products
with 40+ years of proven performance



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Innovative Technology: Integral Gel Waterproofing System



Alchemco **BridgeDECK Waterproofing Agent** produces a modified silicate gel material 'below the concrete surface' (*inside the concrete matrix*)

The gel is created by a chemical reaction between the calcium hydroxide that is present in the concrete (*as a by-product of cement's hydration*) and the chemical components of BridgeDECK Waterproofing Agent

By filling concrete porosity and cracks, the gel works as an integral waterproofing barrier that protects concrete from infiltration of water and water-soluble contaminants ... especially de-icing salts.

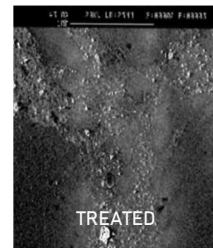
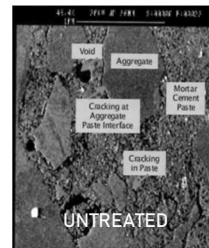
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Award Winning - Spray Applied Waterproofing Systems

Biochemically Modified - Silicate Gel Forming Technology



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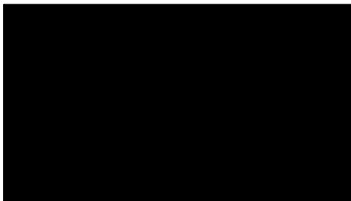
Close up view of concrete sections: untreated and treated

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Biochemically Modified Sodium Silicate Waterproofing

Demonstration of the gel formation that occurs 'inside' the concrete



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Demonstrations



Demonstration

Parking Structure UT – Chattanooga

Top side of Concrete Slab ...
with 1 inch of standing water, showing the
area that has been cleaned (4 parking spaces)
on a very old, and dirty parking structure.

NOTE: the white piece of metal is covering a
huge crack that you'll see on the next slide



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Demonstration



Parking Structure – Demo Area

Underside of Concrete Slab ... showing where the cracks & leaks were (*stains*), and how they have stopped leaking ... even though there is standing water up above

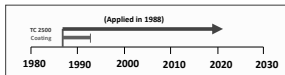
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What were you doing in 1988?



'Documented' Long-Term Protection

33 years and counting ...

In 1988, TC 2500 was spray-applied to this leaking parking structure

The watertightness of the parking deck was confirmed in August 1993 ... and a 100% watertight seal was once again confirmed in April 2017

There has now been **34 years of watertight performance without any interim maintenance** being performed on this concrete structure

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PROtectant

15-year Performance



PROtectant Plus

20-year Performance



Waterproofing Agent

25-year Performance



Products for Highway and Infrastructure Projects

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THE UNIQUENESS OF OUR SPRAY APPLIED WATERPROOFING

No other product offering combines the:

- Ability to **seal future cracks** (*sustainability*)
- Proven performance in the field - since the 1970's
- Speed & ease of application (*less down time*)
- Up to 25-Year Warranty
- 'Money saving' solution to water problems
- Can't be damaged or deteriorate (*long-term solution*)

IMPRESSIVE PHYSICAL CHARACTERISTICS

- *Densifies concrete (increases hardness/durability)*
- *Resistant to snow & ice melt ... great hydrostatic pressure ratings*
- *Allows outgassing = no trapped moisture*
- *VOC free ... environmentally friendly (green)*
- *Potable water safe – UL Certified: NSF/ANSI 61*
- *Doesn't change the appearance or the slipperiness coefficient of the structure*
- *Colorless & odorless ... safe & easy to work with*

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WATERPROOFING SYSTEM COMPARISON (after cleaning & prep work is done)

BridgeDECK PROtectant

15-year 'material only' warranty

STEP ONE

- Spray Waterproofing
- Let dry & then Water

Very Short Downtime
15-year performance

BridgeDECK PROtectant Plus

20-year 'material only' warranty

STEP ONE

- Spray Waterproofing
- Let dry & then Water

STEP TWO

- Spray C&V Treatment
- Spray Accelerator
- Let dry & then Water

Short Downtime
20-year performance

BridgeDECK Waterproofing

25-year 'material only' warranty

STEP ONE

- Spray Waterproofing
- Let dry & then Water

STEP TWO

- Spray C&V Treatment
- Spray Accelerator
- Let dry & then Water

Short Downtime
25-year performance

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DOT CONCERNS WHEN ANALYSING NEW TECHNOLOGIES FOR DECK WATERPROOFING AND PROTECTION

- Lane Closure – Time to Traffic? Very short
- Life Expectancy – How often do I have to reapply? Up to 25 years
- Modulus - Is it rigid or flexible? Flexible Gel
- Will it penetrate microcracks? (*viscosity*) Yes
- What are the preparation requirements Pressure Wash & dry surface
- What is the temperature range for application? 40 F and rising
- Cost Low
- Lifecycle cost Very low

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FASTER APPLICATION *translates into* LESS DOWN TIME

APPLYING WATERPROOFING

4-Wheeler Spray Rig
applying 30,000+ square feet per hour



Iowa D.O.T. Application

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Spray Applied Gel Forming Waterproofing ...

... approximate application rate
is 20,000 square feet per hour
when pumped directly from the drum



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FASTER APPLICATION *translates into* LESS DOWN TIME

APPLYING WATERPROOFING

Truck Mounted Spray Rig
applying 40,000+ square feet per hour



South Dakota D.O.T. Application: Hwy 12 - Millbank, SD

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OKLAHOMA D.O.T. – 15,000 sf per hour direct spray
BridgeDECK PROtectant Plus



WASHINGTON D.O.T.
Post Application Watering

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FASTER APPLICATION *translates into* LESS DOWN TIME

Truck Mounted Spray Rig
Watering



South Dakota D.O.T. Application: Hwy 12 - Millbank, SD

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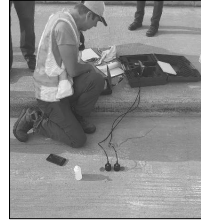
Alchemco Waterproofing Systems

Selected U.S. Bridge Projects

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Moisture Content Testing



ITD Task Force Testing



ITD Task Force Testing



MINNESOTA - D.O.T. Application: Part of the TSP2 ... ITD Task Force Project to Evaluate New Technologies

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Spray Applied Waterproofing



Watering



WASHINGTON - D.O.T. Highway Bridge Application

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ILLINOIS - D.O.T. Application: Hwy 171 & I-55 – Summit, IL (Chicago Metro)

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Drying after Application



Drying after Watering



MINNESOTA - D.O.T. Highway Bridge Application

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Crack Treatment



Spray Applied Waterproofing



Watering



ILLINOIS - D.O.T. Application: Hwy 171 & I-55 – Summit, IL (Chicago Metro)

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Cleaning & Prep



Spray Application out of 55-gallon drum



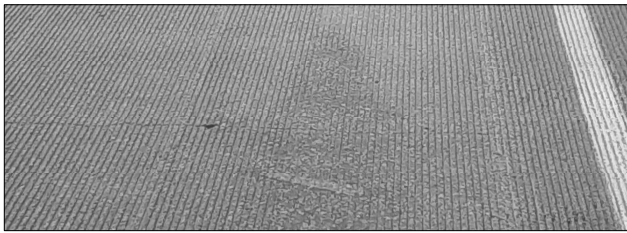
OHIO - Highway Bridge Applications

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IOWA - Highway Bridge Application

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IOWA - Highway Bridge Application

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Spray Applied Waterproofing



Watering



SOUTH DAKOTA - D.O.T. Application: Hwy 12 - Millbank, SD

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IOWA - Highway Bridge Application

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Spray Applied Waterproofing



Water Truck



OKLAHOMA - D.O.T. Highway Bridge Application

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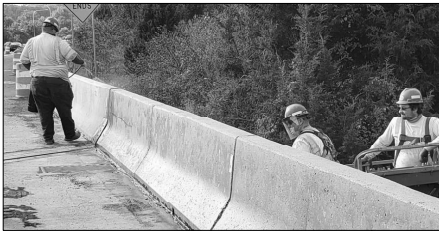
DELAWARE - D.O.T. Application: Jersey Barrier Protection

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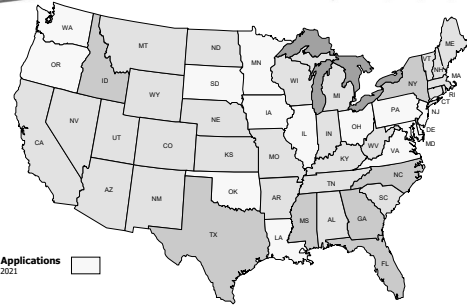
NEW JERSEY - D.O.T. Highway Bridge Applications

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DELAWARE - D.O.T. Application: Jersey Barrier Protection

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U.S. Highway Bridge Applications
as of November 2021

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PENNSYLVANIA - Fort Pitt Bridge

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Alchemco Waterproofing Systems

Selected International Bridge Projects

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Nhat Tan Bridge – Hanoi, Vietnam

**100,000 square meter concrete bridge deck
(8 lanes wide) as it was constructed in 2013-14.**

The bridge provides a high-speed connection between Hanoi City and the Noi Bai International Airport.

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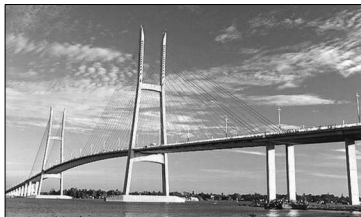
Tyrsuv Sad Overpass – Czech Republic

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PK1



First Thai–Lao Friendship Bridge – Thailand/Laos



My Thuan Bridge – Vinh Long City, Vietnam

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Highway SS 115 Bridge - Italy



Tarif Interchange – Abu Dhabi, United Arab Emirates

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Slide 44

PK1 Peter Kesser, 6/3/2020



Binh Trieu Bridge – Ho Chi Minh City, Vietnam



**New Construction Freeway – Taipei, Taiwan
65,000 square meters**

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Rama VIII Bridge
Bangkok, Thailand

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SUMMARY

PROS

- Improves **DURABILITY & SUSTAINABILITY** of concrete structures
- Seals 'stable' cracks up to 2.0 mm wide
- **VAPOR PERMEABLE.** Allows concrete to breathe (*outgassing*) ... *does not trap moisture within the concrete.*
- Highly Resistant to chemicals & chloride ions
- Acts as a **DENSIFIER** ... increases the hardness of concrete from 6 to 8 on the Mohs scale (*similar to Granite*)
- Excellent hydrostatic pressure ratings (1,300 feet / 400 meters)
- **FAST APPLICATION** ... *resulting in far less 'down time'*
- Gel formulation handles 'thermal stress' very well
- Non-toxic and VOC free ... *completely recyclable after demolition of a structure*
- **LOWER APPLIED COST** than most other methods!
- No mixing of products on-site ... *eliminates error factor*
- Can be applied on positive or the negative side ... although we highly recommend applying it to the positive side
- Can't be damaged, deteriorate or delaminate ... **provides long-term waterproofing protection!**

CONS

- Concrete surface must be dry to the touch, in order to begin application of waterproofing products (*timing varies*)

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QUESTIONS?

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