PROVEN PROTECTION

DUAL CRYSTALLINE TECHNOLOGY

HYDROPHILIC & HYGROSCOPIC

DIFFUSION

OHIO 2021

MARK CHEW
VP SALES & MARKETING US AND CANADA

WWW.ICCDISTRBUTIONGROUP.COM

Mark@ICCDistributiongroup.com

SO WHAT IS THIS ADVANCED TECHNOLOGY?

PROVEN DUAL CRYSTALLINE PROTECTION IS…

PATENTED

PENETRATING, CLEAR

VISCOSITY OF WATER

100% GREEN NO VOC'S

MOISTURE INSENSITIVE

SINGLE APPLICATION

LONG TERM PROTECTION

NON REACTIVE

BREATHABLE

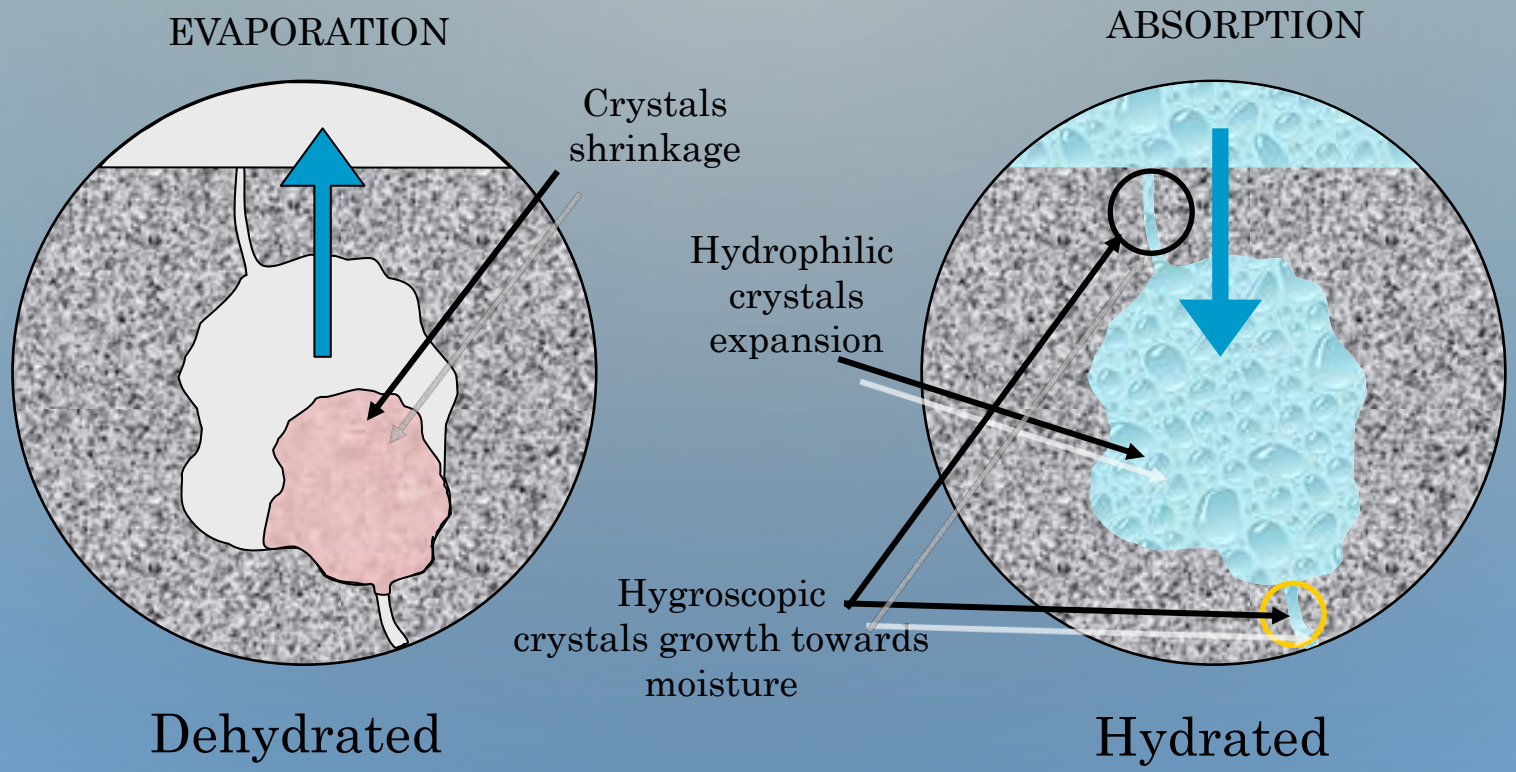
MEET OUR CRYSTALS

HYDROPHILIC AND HYGROSCOPIC

1/4-1/2 INCH PENETRATION

THIS IS NOT A DENSIFIER CREATING CSH GEL / NO LOSS OF FLUXURAL STRENGTH

HOW THE DUAL CRYSTALLINE DIFFUSION TECHNOLOGY WORKS




UNTREATED
TREATED WITH PAVIX CCC100

COMPLIANCE TESTING

ASTM STANDARDS - USA

AMERICAN SOCIETY FOR TESTING & MATERIALS TESTS	
ASTM C944*	Abrasion Resistance of Concrete or Mortar Surfaces by the Rotating-Cutter Method
ASTM C672	Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals
ASTM C1218	Water-Soluble Chloride in Mortar and Concrete
ASTM C666*	Resistance of Concrete to Rapid Freezing and Thawing
ASTM C1262	Freeze-Thaw Durability of Dry-Cast Segmental Retaining Wall Units & Related Concrete Units
ASTM C1202	Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
ASTM 6489	Determining the Water Absorption of Hardened Concrete Treated With a Water Repellent Coating
ASTM D4541	Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM F609*	Standard Test Method for Using a Horizontal Pull Slipmeter (HPS)
ASTM E303*	Measuring Surface Frictional Properties Using the British Pendulum Tester
ASTM C642	Density, Absorption, and Voids in Hardened Concrete
ASTM C457	Microscopic Determination of Parameters of the Air-Void System in Hardened Concrete
ASTM C1583*	Bond Strength or Tensile Strength of Overlay Materials by Direct Tension
ASTM D7234*	Pull-Off Adhesion Strength of Coatings on Concrete

*Fresh Concrete

Fully Cured Concrete

Environmental Impact

48 Hr Acute Toxicity Testing

Main Findings: Ceriodaphnia dubia 48 hr LC50 = 7.3 ml/L
& Pimephales promelas 48 hr LC50 = 20.29 ml/L

Brunel University London

Medway Bridge (UK) a **S**ite of **S**pecial **S**cientific **I**nterest (SSSI).
Crystallization treatment was selected on environmental grounds with application to 28,000 m^2

ASTM C 1567 Alkali Silica Reactivity

Construction Materials Testing

August 21, 2017

Project No: 1706003ICC

International ChemCrete
800 Security Row
Richardson, TX 75081

Re: ASTM C-1567
Alkali Silica Reactivity
Pavix Study

Dear Mr. Al-Rashed,

As per your request, CMT has completed an Alkali Silica Reactivity study utilizing your Pavix product. Two mix designs were created. The first is a typical Iowa Department of Transportation C4 PCC mix, utilizing Martin Marietta Ames Mine Coarse Aggregate and Hallett Materials North Des Moines fine aggregate. This mix is minimally reactive under normal circumstances. The second mix utilized a sand/gravel mixture with aggregates from the Platte River area, west of Omaha, Nebraska. The Platte River area is prone to significant ASR reactions.

For each mix, a control mix was created, then Pavix was introduced utilizing three different w/cm ratios. In the first study, the Pavix product was applied topically. Based on the surface area of the beams and the amount of liquid utilized, the application rate equaled approximately 1 gallon per 160 square feet. This application rate falls into the normal surface application rate of 1 gallon per 150-200 square feet. The topical samples were mixed at 0.39, 0.43 and 0.47 w/cm ratios. These ratios span the normal w/cm ratios being used in Iowa. The bars were compared to a control mix with no Pavix applied. In the topical instances, the amount of reaction was reduced approximately 26-42%.

The second study utilized the Pavix mixed internally at a rate of 2% by cementitious. This would equate to just over 11 pounds per cubic yard of Pavix in typical concrete mix designs having a total cementitious content of 560 - 595 pounds per cubic yard (6 sack mix). The water to cementitious ratios chosen were also 0.39, 0.43 and 0.47. The reaction was reduced approximately 32-74% when used internally.

The mixes created with the Pavix introduced internally performed slightly better than the topical application. In each case, the Pavix treated samples showed a significant reduction in alkali silica reaction. In further studies, we hope to test varying dosage rates to set a standard pattern of "amount of reduction" based on dosage rate. With this information, concrete producers throughout the country can easily integrate into their current mix designs the product to mitigate the ASR problem.

Enclosed you will find the test results, both data and graphic. Please feel free to call should you have questions or if I may be of further assistance.

Sincerely,

Sybil K. Ferrier, P.E.
Principal Engineer
rc/sf

Doug Clement
President/CEO

1610 East Madison Ave. • Des Moines, Iowa 50313
(515) 263-0794 • Fax (515) 263-0851
www.cmt-iowa.com

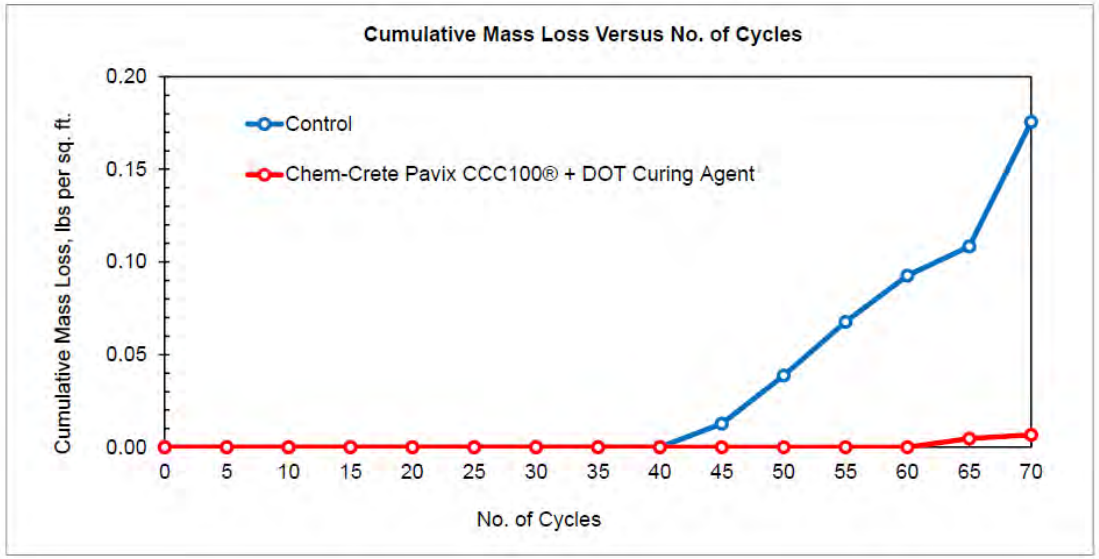
PAVIX CCC100

Up to 42% Reduction
(Topical Application)

TESTING INFORMATION –

Comparison of Concrete Samples with and without DUAL CRYSTALLINE TECHNOLOGY

ASTM C672 - Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals
Comparison of Samples with and without Waterproofing Product and Curing Compound



CTL GROUP

Untreated

Figure 2. Control sample without waterproofing product and curing compound after 70 cycles of freezing and thawing

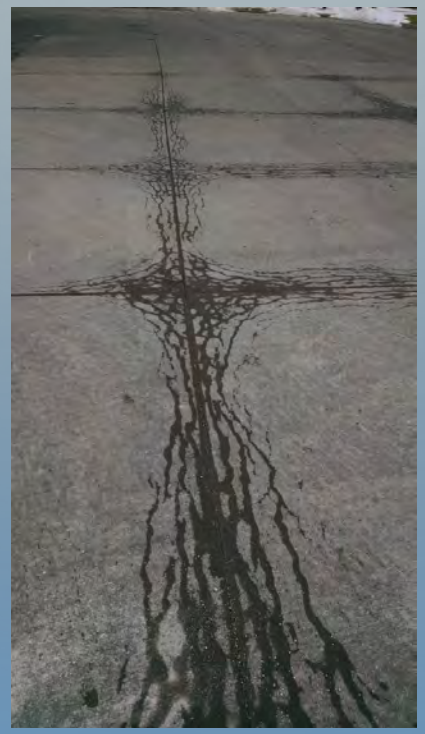
Treated

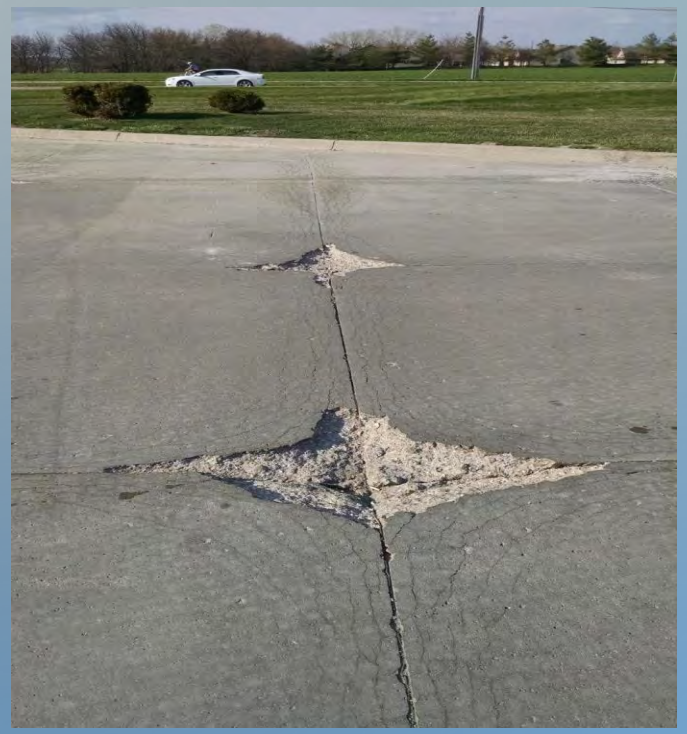
Figure 1. Sample with waterproofing product and curing compound after 70 cycles of freezing and thawing

Premature Joint Delamination
(Calcium Oxychloride)

WATER & MOISTURE RELATED ISSUES IN CONCRETE SUBSTRATES

SHADOWING






SAW-CUT

SPRAY BAR MOUNTED ON T/C MACHINE

APPLICATION

PARAFFIN BASED CURING COMPOUND (TX TYPE 2)

SECONDARY BENEFIT DUE TO CRYSTAL ACTIVITY

TIME LAPSE OF ONE SINGLE APPLICATION

12/30/2011
APPLICATION DAY

3/20/2012
81 Days after application

TIME LAPSE OF ONE SINGLE APPLICATION

5/22/2012

144 DAYS AFTER APPLICATION

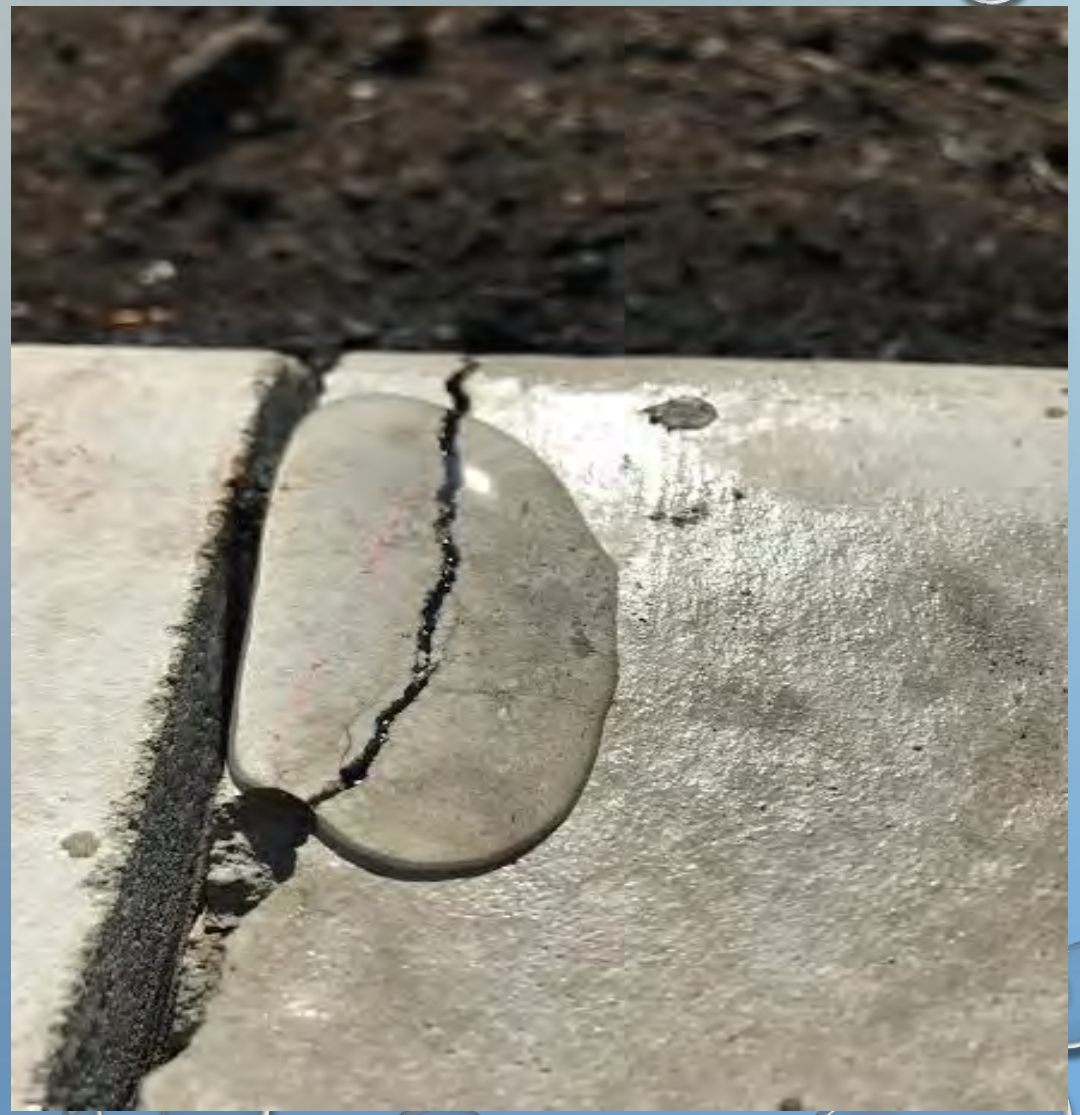
2/11/2013

409 DAYS AFTER APPLICATION

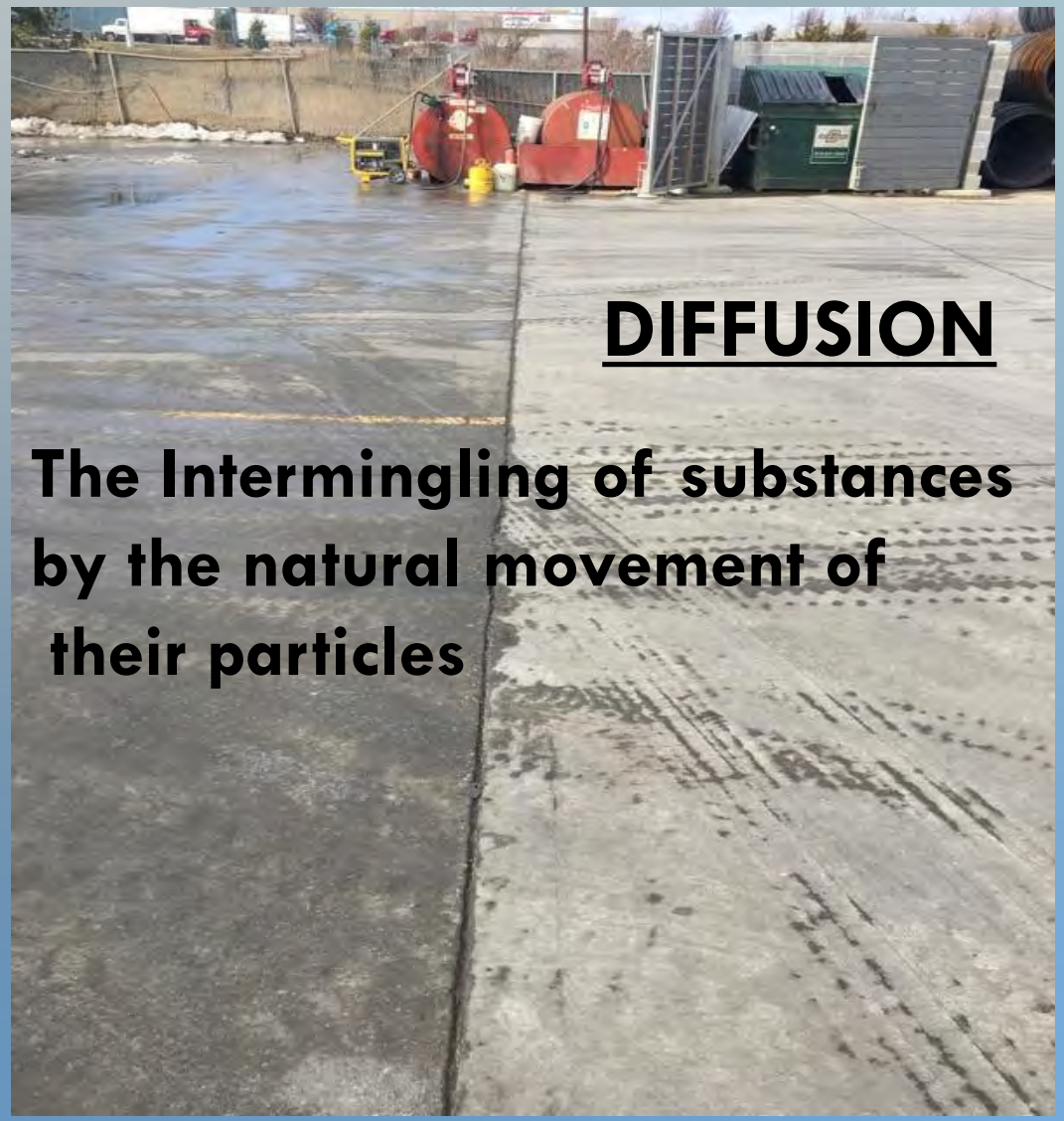
CRACK FILLING CHARACTERISTICS

X 40
Magnification

1/16’ HAIRLINE CRACK



HELP MITIGATE ICE BOND TO CONCRETE



SELF CLEANING ON EIFS ROOF

YUFIX

HIGHER HYDROPHILLIC CONCENTRATION
RESTORATION OR NEW BRICK & MORTER

SOFIX

TUNNELS & ELEVATOR SHAFTS
HIGHER HYGROSCOPIC

AIRPORTS AROUND THE WORLD

GREAT BRITAIN

- HEATHROW
- GATWICK
- STANSTEAD
- MANCHESTER

USA

- **CHICAGO O'HARE 2020 1,000,028 SF**
- DALLAS FORT WORTH
- VIRGINIA CHARLOTTESVILLE
- ALASKA JUNEAU
- ALASKA FAIRBANKS
- BOSTON LOGAN
- ILLINOIS QUAD CITY

TORONTO PEARSON INTERNATIONAL AIRPORT

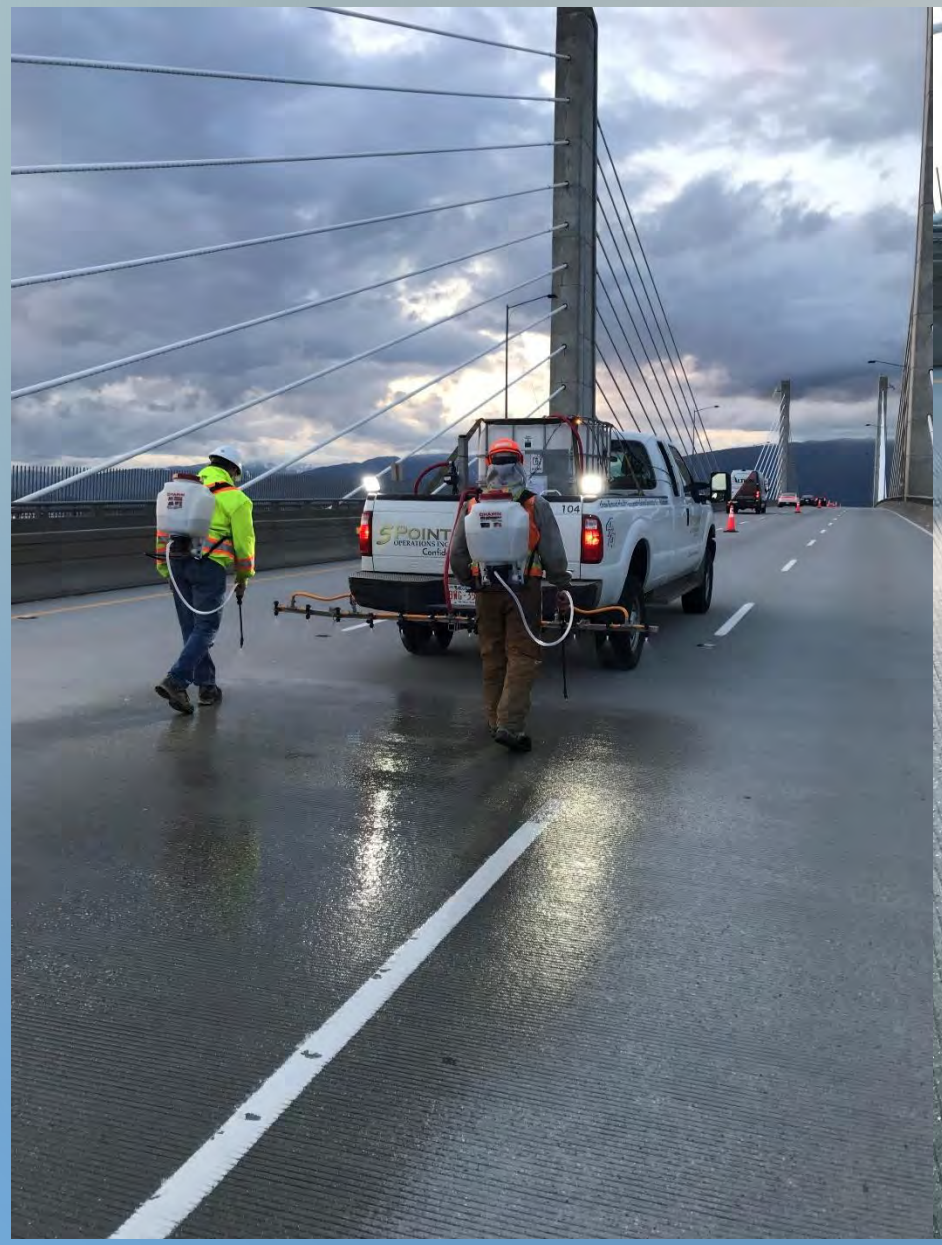
ANDREWS AIRFORCE BASE

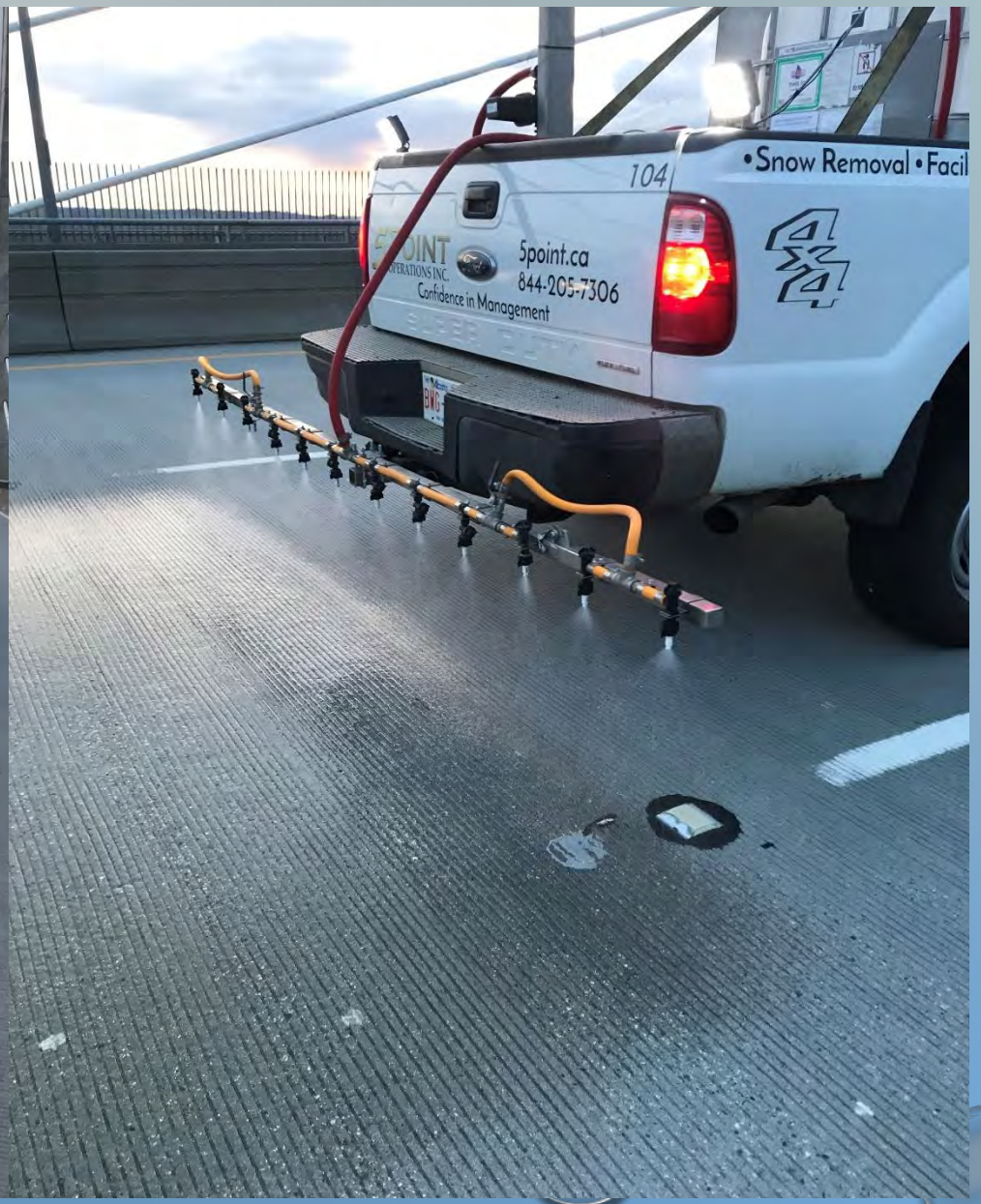
GOLDEN EARS

(MAPLE RIDGE. BRITISH COLUMBIA, CANADA)

260,000 SF OF PAVIX

PAVIX




104
•Snow Removal • Facil
5point.ca
844-205-7306
Confidence in Management
4x4

Minimal Impact On Traffic

Dubuque, IA Bridge Application

FEATURED IN DECEMBER 2020
MUNICIPLE APWA MAGAZINE

ILLINOIS PC DECK BEAM SPEC

PPC DECK BEAMS PROTECTIVE COAT (SPECIAL)

DESCRIPTION. THIS WORK SHALL CONSIST OF THE USE OF CHEM-CRETE PAVIX CCC100 PROTECTIVE COAT ON ALL EXPOSED SURFACES OF THE PPC DECK BEAMS BEFORE DELIVERY TO THE JOBSITE.

GENERAL DESCRIPTION. THE CRYSTALLINE CONCRETE PENETRATING MOISTURE BLOCKER SYSTEM IS A COMPLETE SYSTEM OF COMPATIBLE MATERIALS MANUFACTURED BY CHEM-CRETE TO CREATE A MOISTURE BLOCKER AND VAPOR RETARDER AND SHALL BE USED ON THIS PROJECT.

APPLICATION. THE PROTECTIVE COAT SHALL BE THE ONLY SEALANT APPLIED TO THE PPC DECK BEAMS AND SHOULD ONLY BE APPLIED AFTER THE CONCRETE HAS MET ITS SPECIFIED STRENGTH.

STORAGE AND HANDLING. RECOMMENDED MATERIAL STORAGE AIR TEMPERATURE IS 70°F. HANDLE PRODUCTS TO AVOID DAMAGE TO CONTAINER. DO NOT STORE FOR LONG PERIODS IN DIRECT SUNLIGHT. DO NOT ALLOW PRODUCT TO FREEZE.

JOB CONDITIONS.

A) ENVIRONMENTAL CONDITIONS: 1. DO NOT PROCEED WITH APPLICATION OF MATERIALS WHEN CONCRETE TEMPERATURE IS LESS THAN 40°F. 2. DO NOT APPLY UNLESS SURFACE TO RECEIVE MATERIAL IS CLEAN, DRY, AND SOUND.

B) SAFETY AND HEALTH CONDITIONS: 1. DURING COATING APPLICATION, THE MAXIMUM EFFORT MUST BE MADE TO PROTECT THE APPLICATOR AND OTHERS NEAR THE WORKPLACE FROM COMING IN CONTACT WITH MATERIAL ON SKIN OR EYES. 2. USE PROPER SAFETY CLOTHING, EYE PROTECTION, AND GLOVES.

C) PROTECTION: 1. KEEP PRODUCTS AWAY FROM HEAT. 2. MINIMIZE OR EXCLUDE ALL PERSONNEL NOT DIRECTLY INVOLVED WITH THE APPLICATION PROCESS FROM THE AREA. 3. PROTECTIVE COAT MUST BE ALLOWED TO DRY/CURE FOR A PERIOD OF AT LEAST 1 HOUR BEFORE CONCRETE SURFACE IS ALLOWED TO BE HANDLED.

BASIS OF PAYMENT. THIS WORK WILL BE INCIDENTAL TO THE COST OF THE PPC DECK BEAMS AND NO ADDITIONAL COMPENSATION WILL BE PAID.

AT A MINIMUM NEW ROAD CONTR

IN CONCLUSION

PAVIX - YUFIX - SOFIX

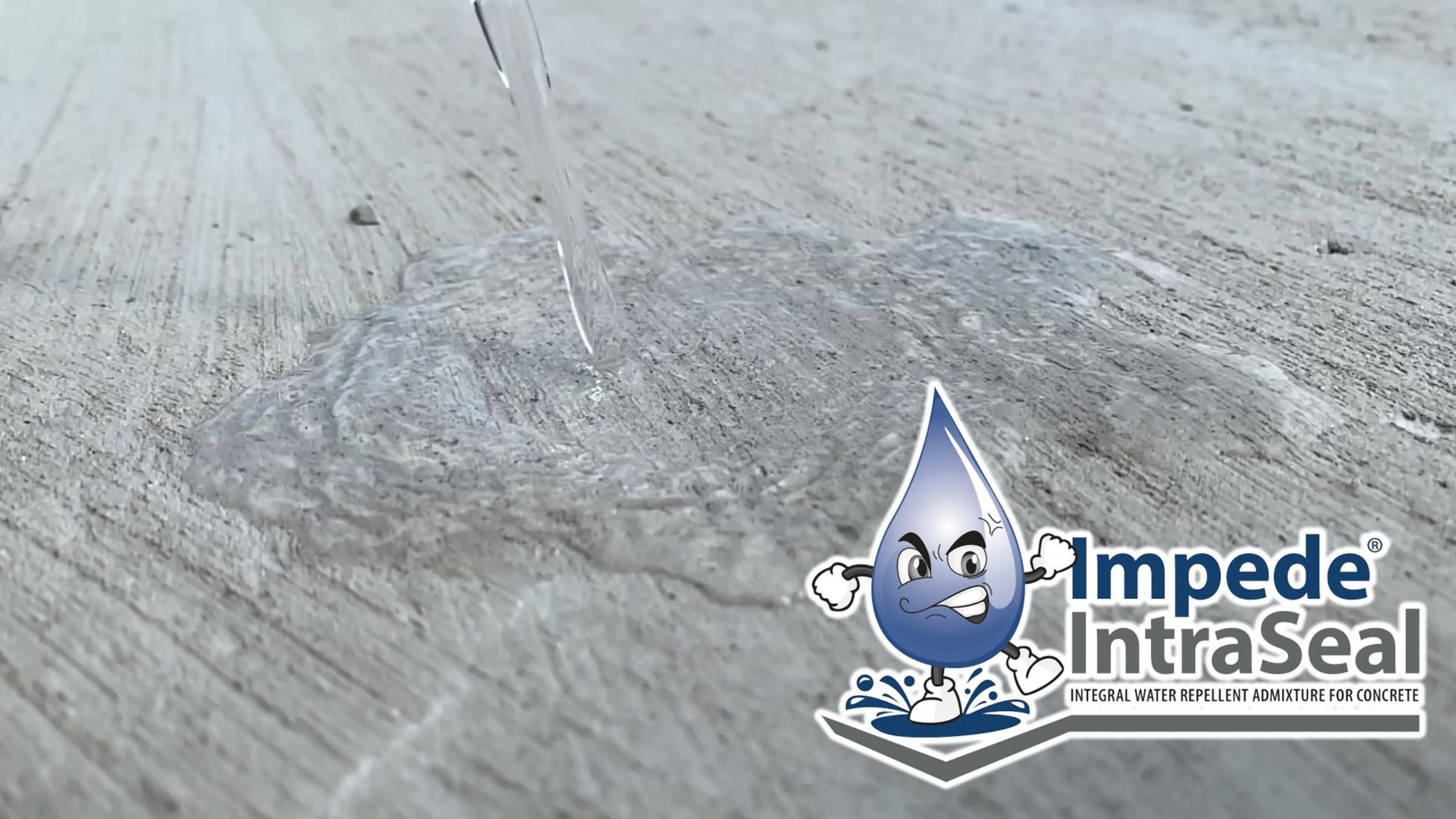
THIS PATENTED DUAL CRYSTAL SYSTEM
IS AN ENVIRONMENTALLY SAFE - **PROVEN SOLUTION**
FOR LONG LASTING CONCRETE AND MASONRY PROTECTION

THANK YOU
QUESTIONS?

MARK CHEW
VP SALES & MARKETING US AND CANADA

WWW.ICCDISTRBUTIONGROUP.COM

Mark@ICCDistributiongroup.com


Impede®
IntraSeal
INTEGRAL WATER REPELLENT ADMIXTURE FOR CONCRETE

Impede® IntraSeal

Why use Impede® IntraSeal?

- Reduce maintenance
- Can be used year-round
- Improved durability by reducing the potential for freeze-thaw stresses
- Water repellency throughout the matrix of the concrete (not just the surface)
- Curing with an acrylic based product is recommended

Impede® IntraSeal

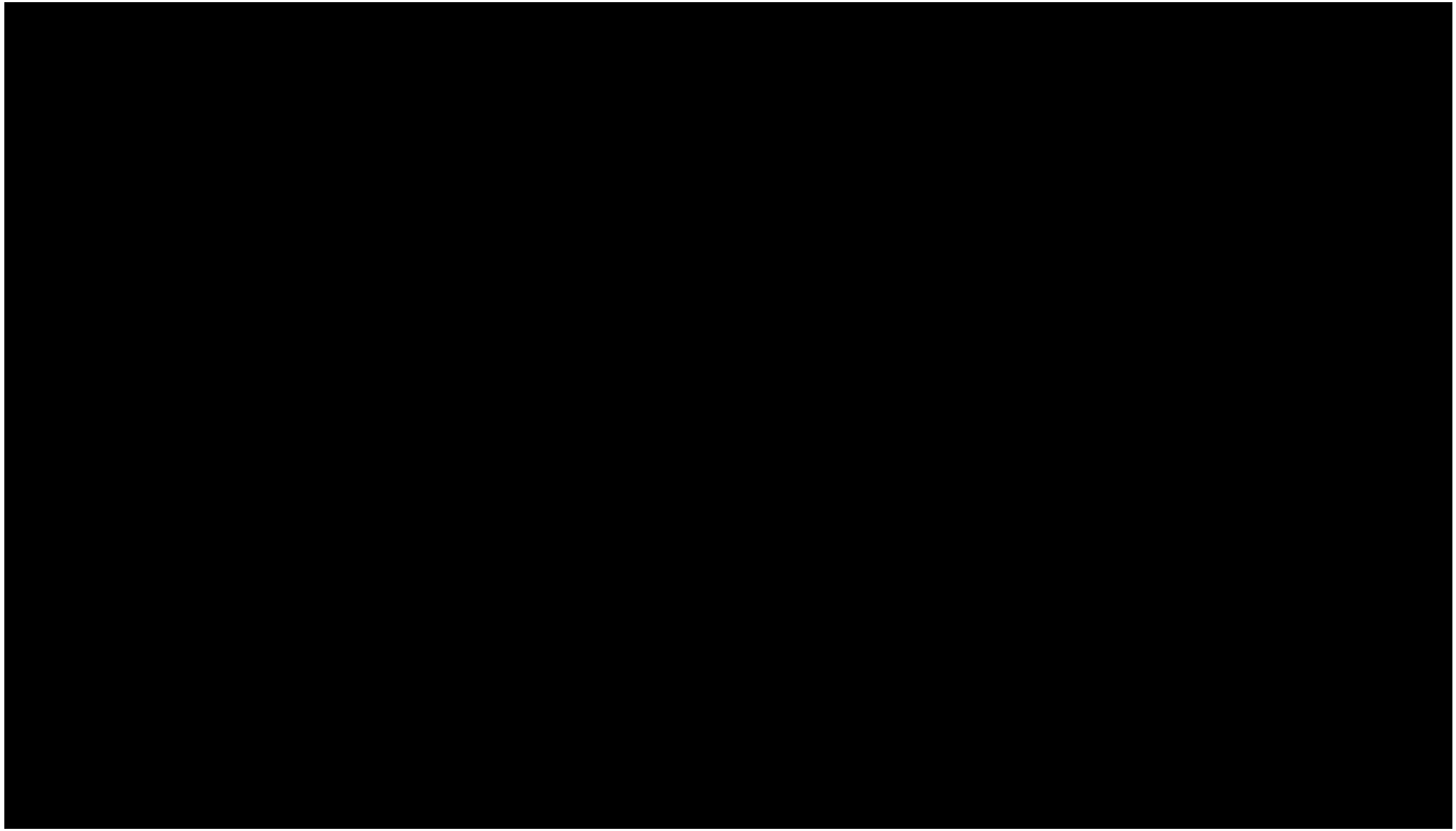
How it works:

Impede® IntraSeal creates a hydrophobic barrier within concrete.
This reduces the ingress of water and de-icing brines/salts.
Increased impermeability means the potential for freeze-thaw stress is greatly reduced.

Impede® IntraSeal

Testing

RILEM



Impede® IntraSeal

Testing

Dec 2020 testing data indicates cold water absorption reduction of 75%+

Performed by

SGS TEC SERVICES
Testing • Engineering • Consulting

AASHTO R18,
ANS/IEC/ISO 17025:2005,
Army Corps of Engineers accredited laboratory

Table 2 – ASTM C1585 – Rate of Absorption

Mix ID	Sample ID	Diameter (mm)	Initial Rate of Absorption (mm/sec1/2)	Secondary Rate of Absorption (mm/sec1/2)
Control	1	101.6	0.0057	0.0011
	2	101.6	0.0078	0.0010
	Average	**101.6**	**0.0067**	**0.0011**
Impede IntraSeal	1	101.6	0.0018	0.0004
	2	101.6	0.0019	0.0004
	Average	**101.6**	**0.0018**	**0.0004**

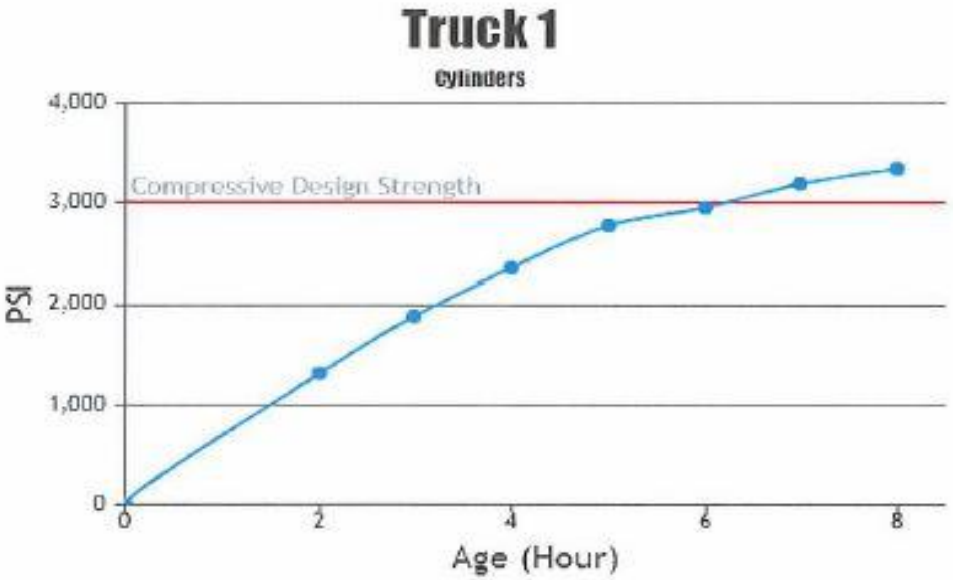
Table 3 – ASTM C67 – Cold Absorption

Mix ID	Sample ID	Oven Dry Weight (g)	Weight After 24 hr. Cold Water (g)	% Absorption	Average
Control	1	1796.2	2089.9	16.4	**16.5**
	2	1731.2	2019.3	16.6	
Impede IntraSeal	1	1791.0	1863.1	4.0	**4.1**
	2	1681.3	1750.0	4.1	

Impede® IntraSeal

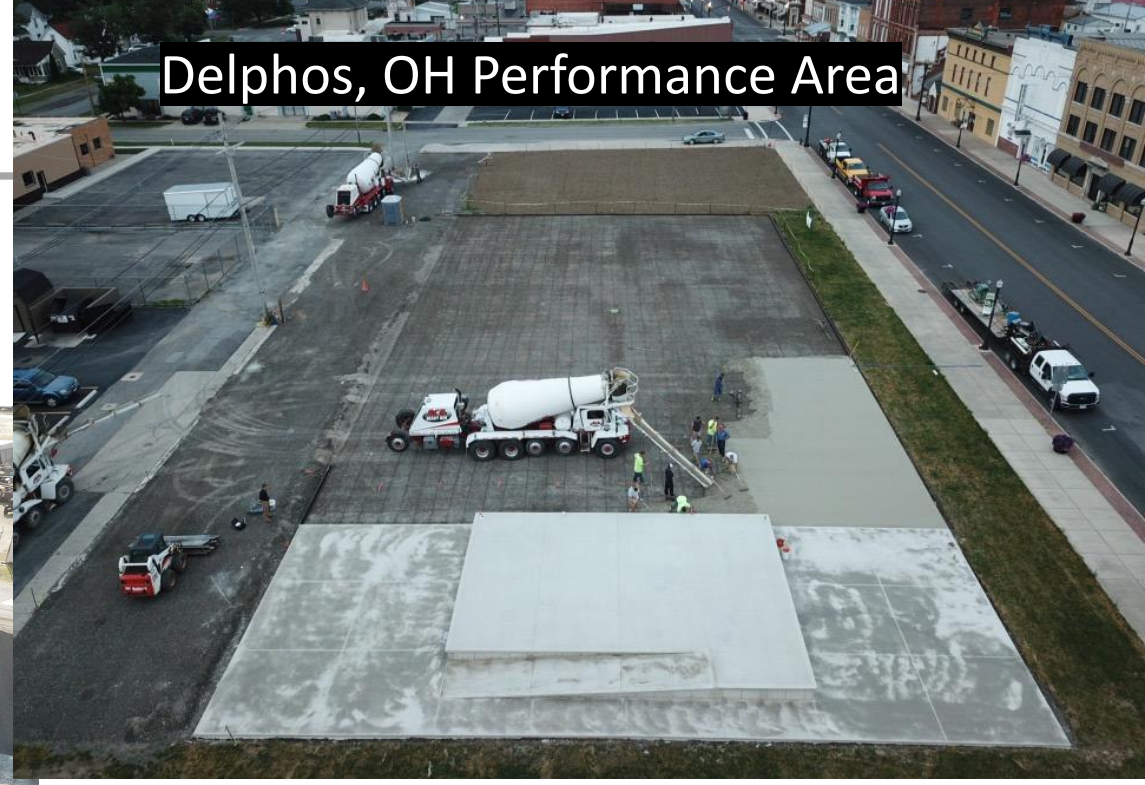
Testing

ODOT Fast Patch Field Testing



Impede® IntraSeal

Public Works Projects


Delphos, OH Performance Area


Auglaize County, OH Salt Storage


Hillsdale County, MI Courthouse Lot

Impede® IntraSeal is increasingly becoming included in County Engineer Specifications.

Impede® IntraSeal

Public Works Projects


Archbold, OH Roadway

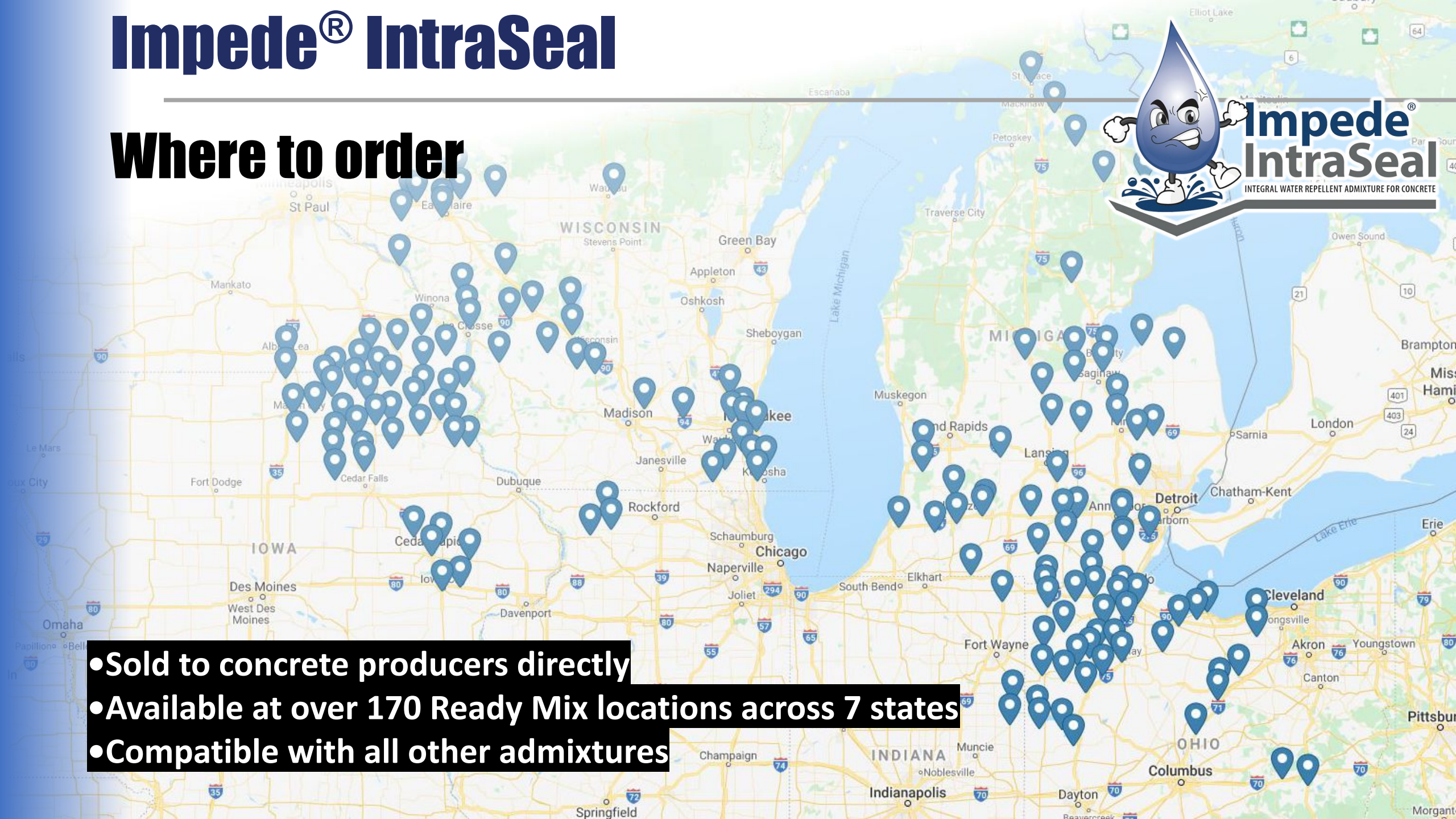

Paulding, OH Senior Care Facility

Some municipalities have taken steps to require **Impede® IntraSeal** in all concrete purchased.

Impede® IntraSeal
INTEGRAL WATER REPELLENT ADMIXTURE FOR CONCRETE

Impede® IntraSeal

Where to order



- Sold to concrete producers directly
- Available at over 170 Ready Mix locations across 7 states
- Compatible with all other admixtures

NeverSealAgain.com

If your local Ready Mix producer doesn't offer Impede® IntraSeal, have them visit NeverSealAgain.com to become a supplier.

Specification Products

Jim Render
Ready Mix Consultant

OHIO CONCRETE

The purpose of this presentation is to educate you on the Element 5 system and the benefits of internally curing concrete

My Background

Auburn University - Civil Engineer

Work History

Ready Mix Concrete – 4 Years

Florida Rock Industries

Atlas Concrete

Admixture – 13 Years

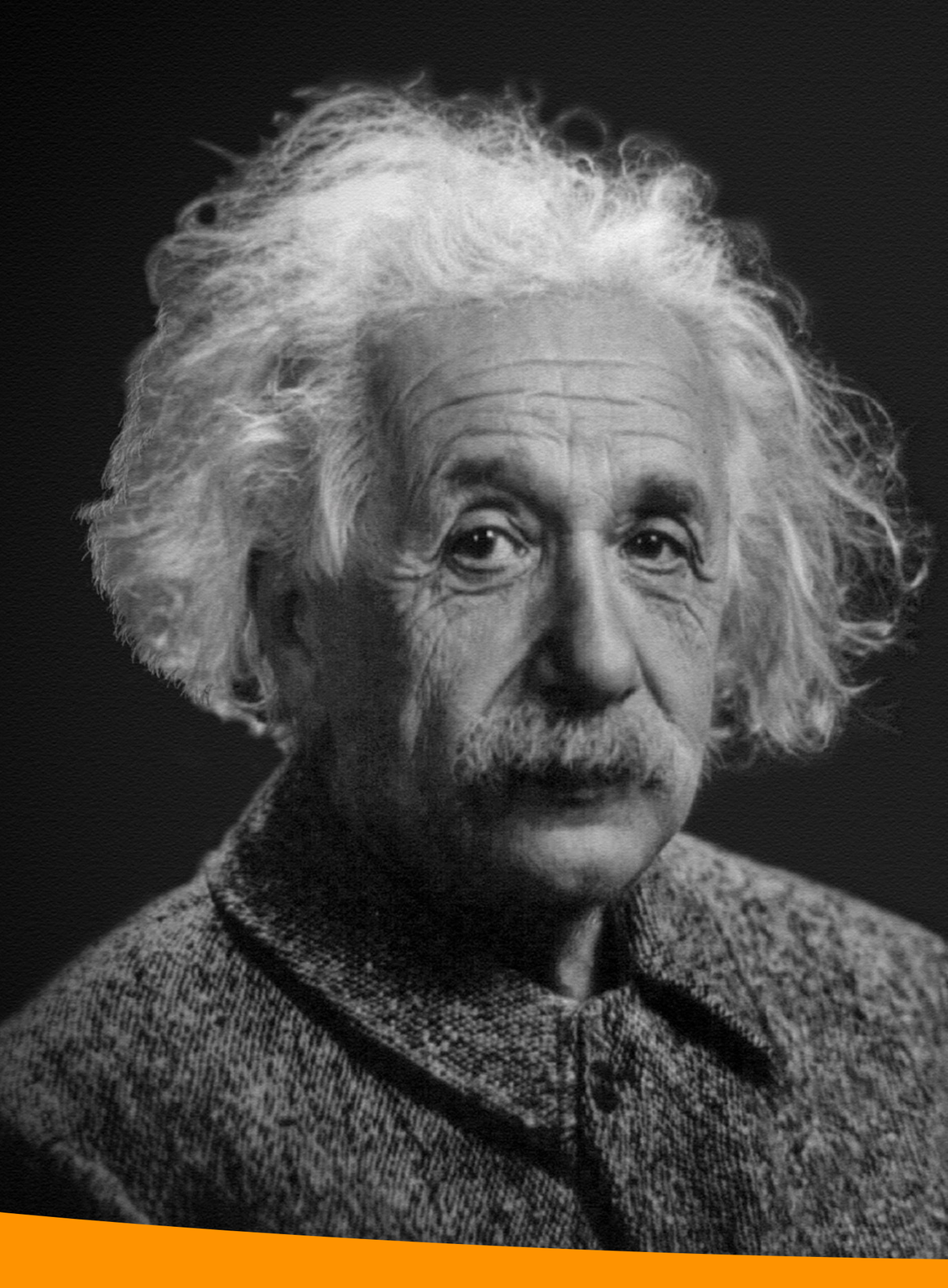
W. R. Grace

Euclid Chemical

Cement

Essroc Cement – 20 Years

JWR Consulting – 4 Years



The definition of insanity is doing the same thing and expecting different results.

-Albert Einstein-

RCS™ Technology

E5 INTERNAL CURE

Eliminate wet curing and curing compounds while improving the sustainability and finish of the concrete surface.

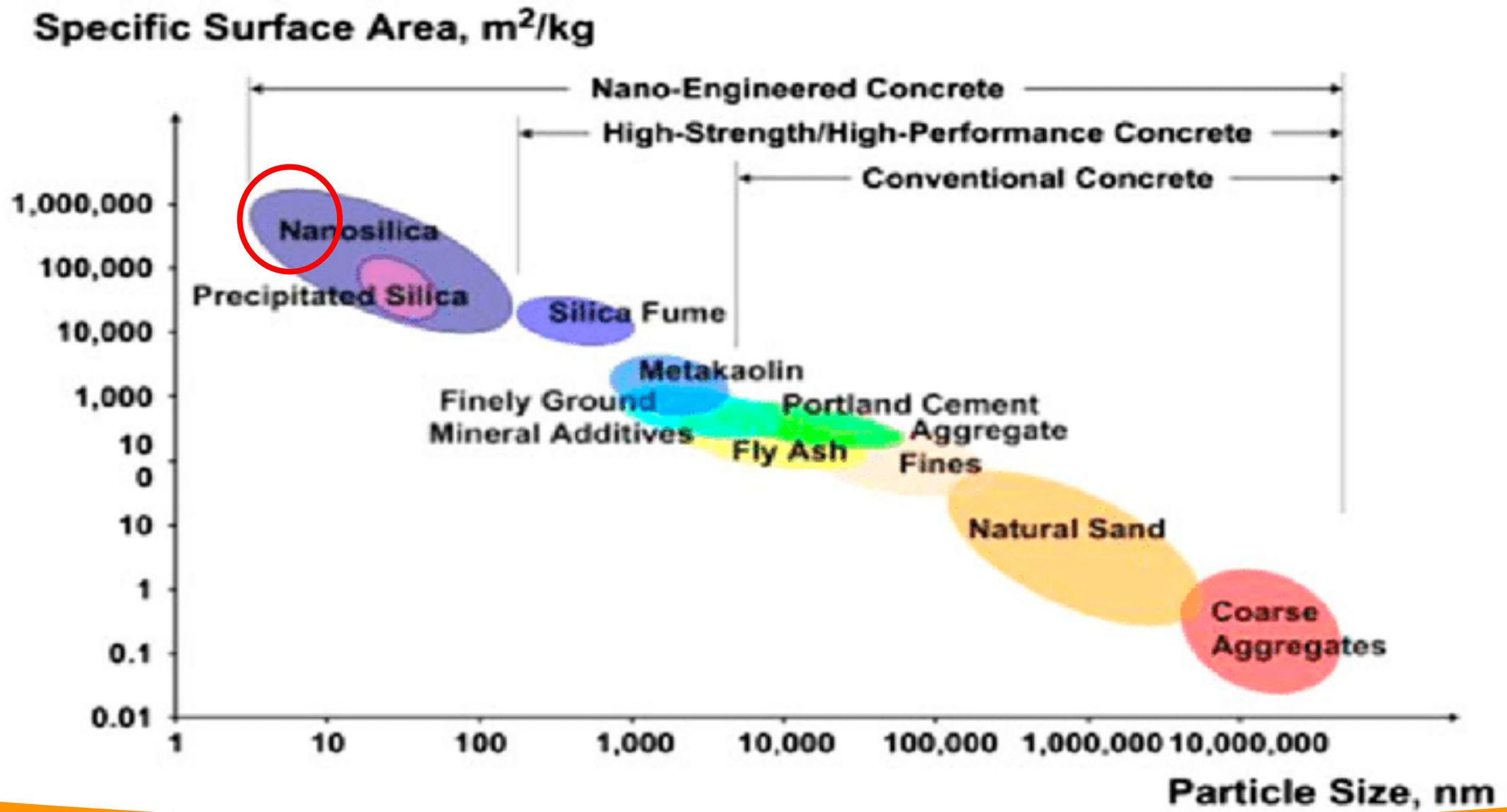
ELEMENTFIVE
THE COMPLETE CONCRETE SLAB SYSTEM

Cure

- Nano particles of Silica
- Precisely sized
- Liquid Admixture
  - 4 oz/cwt of cementious
- Physically attaches to Water
- NO BLEED WATER
- Densifies and Hardens the surface

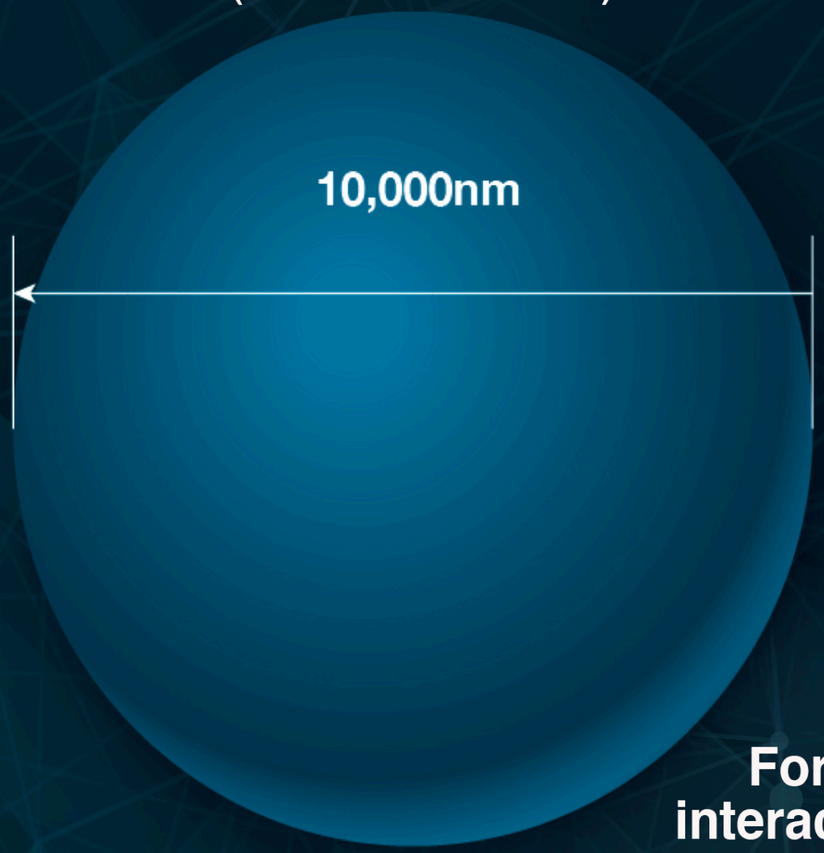
Nano Silica in Suspension

Specific Surface Area



Specific Surface Area

MICROSPHERE
(Cement Grain)



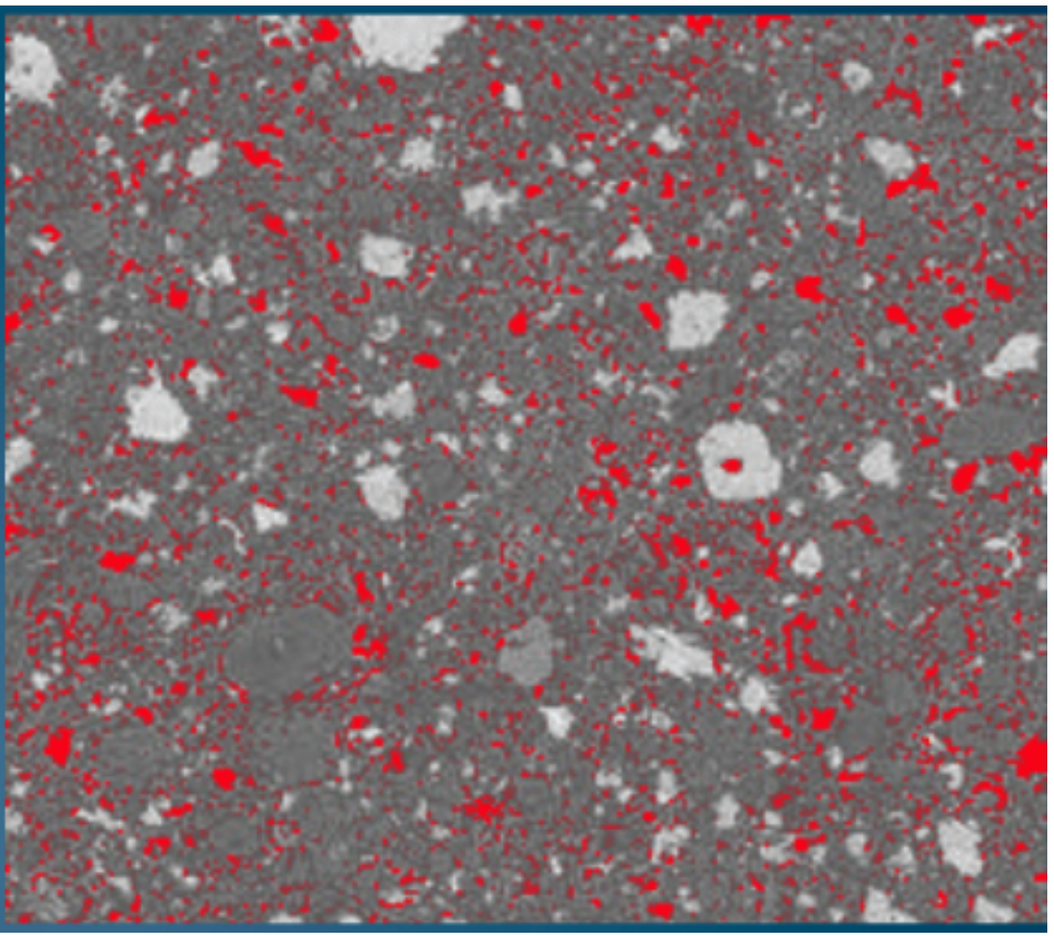
Nano Particles

NANOPARTICLE
(E5 Nano Silica)

For same volume, surface interaction is 1,000 times higher

E5 INTERNAL CURE

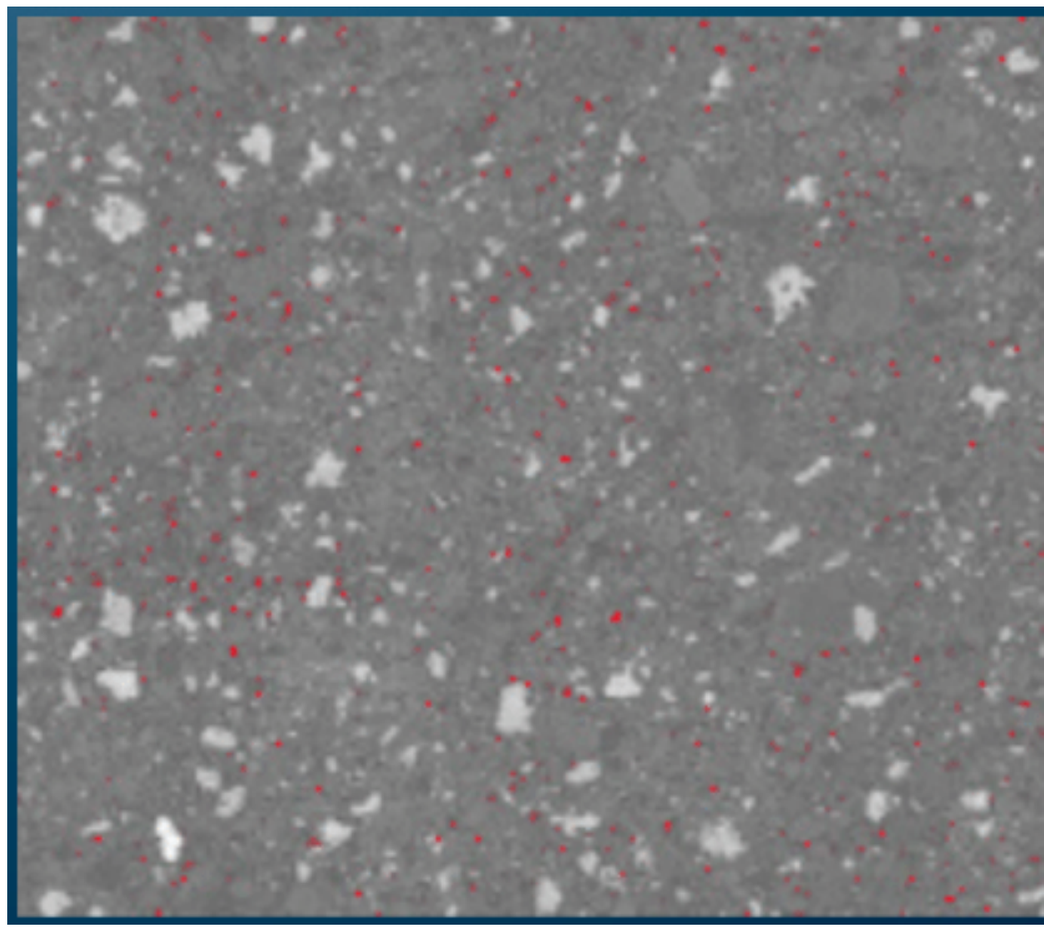
Densification & Hydration



Control

Red stain indicates voids

White indicates un-hydrated cement



E5 Internal Cure

Absorption

ASTM C-642

- **Standard Test Method for Density, Absorption, and Voids in Hardened Concrete**

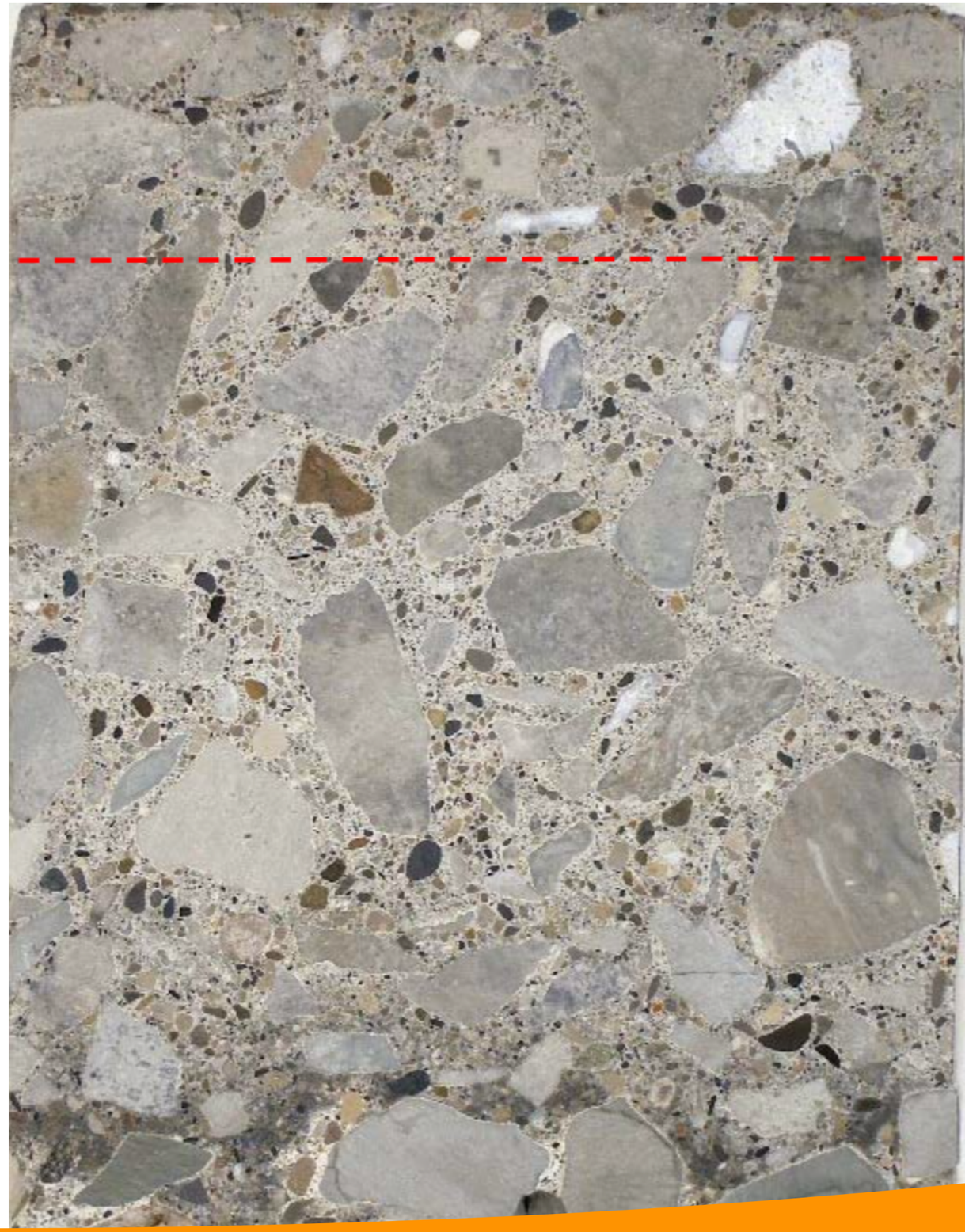
- **Dramatic reduction in capillary absorption**

Absorption	24 Hour	48 Hour
Control	14.2%	15.0%
E5 Internal Cure	3.0%	3.2%

E5 INTERNAL CURE

How It Works

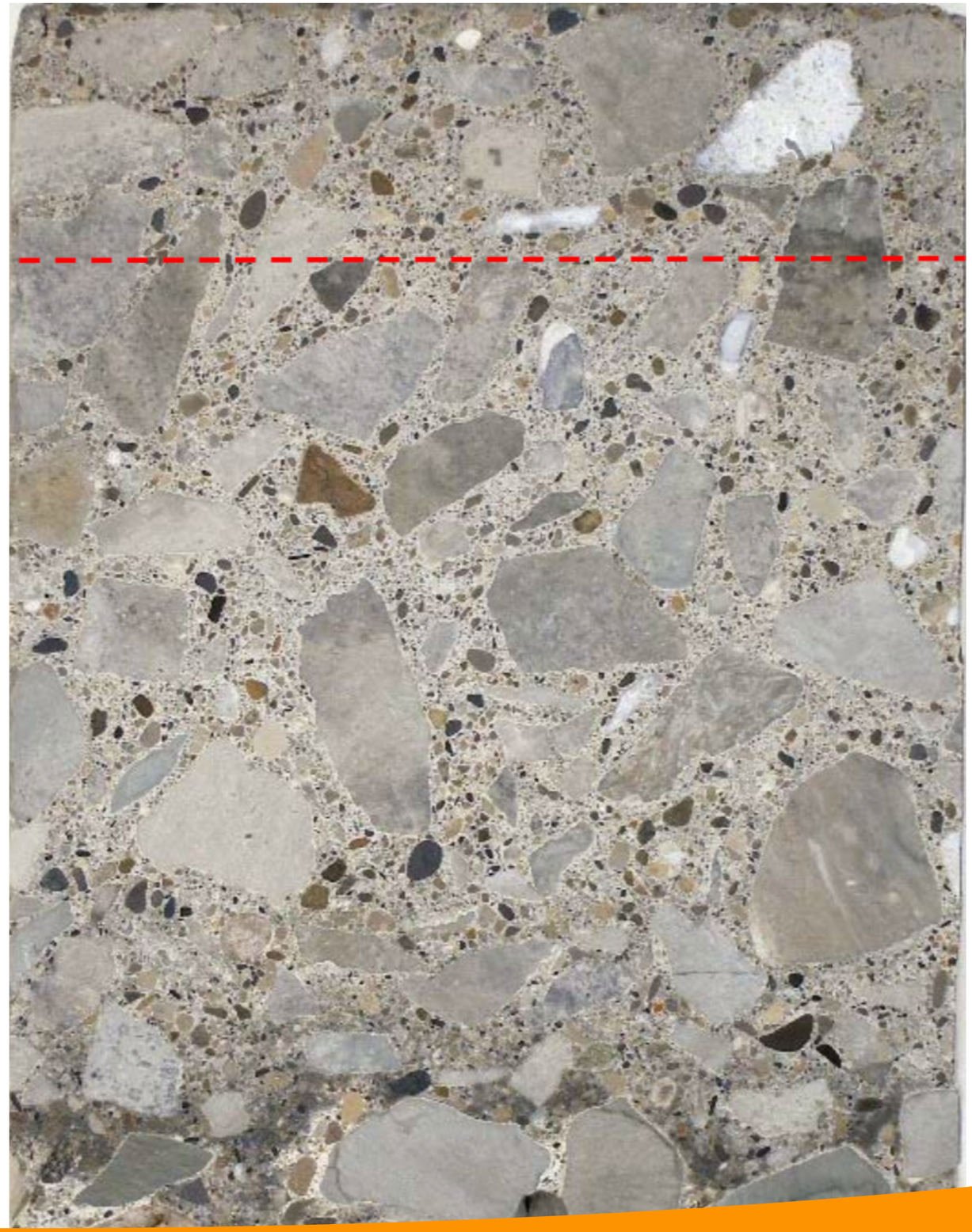
- Silica Attaches to Water
- Water Carries Silica Up
- Hydration of Cementious
- Densifies the concrete surface
  - 0.55 to 0.40!



Concrete Bleeding

No Aggregate Settlement!

- Dramatically reduced Bleed Channels
- Reduced porosity for deleterious materials to enter the concrete

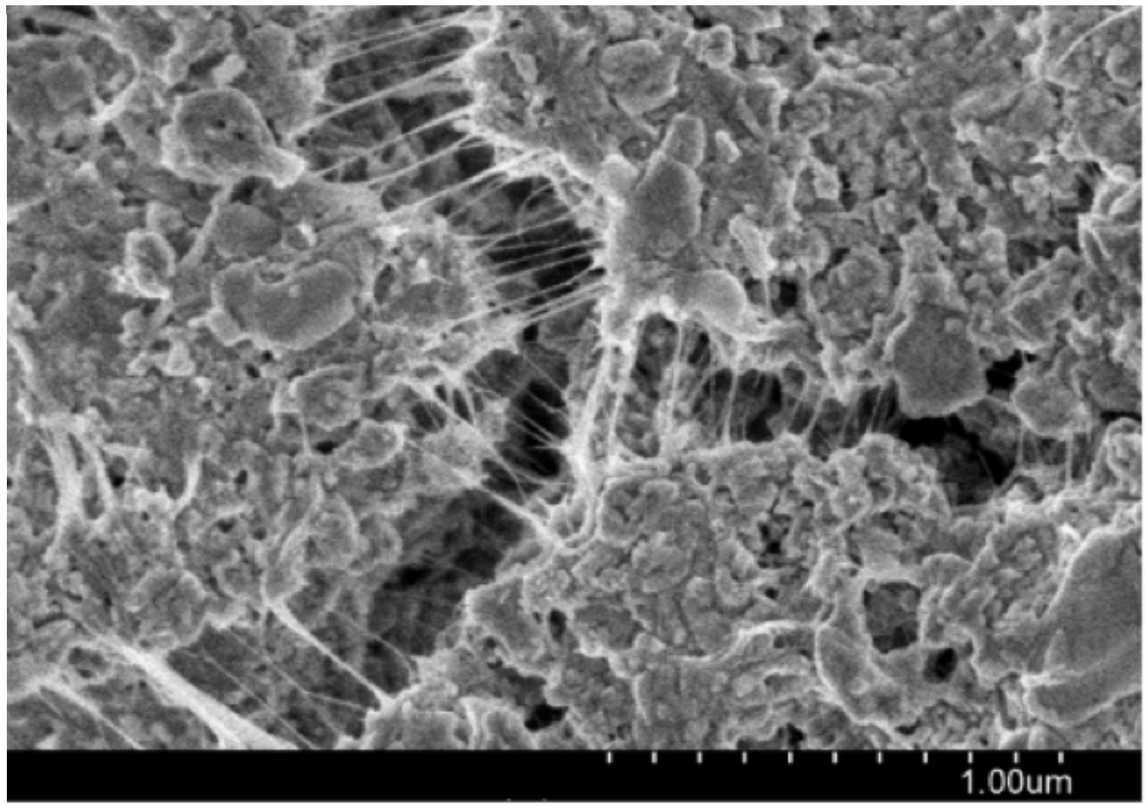


Pozzolanic Reaction

Cement + Water ⟶ C-S-H + CH

- C-S-H = Calcium Silicate Hydrate
- CH = Calcium Hydroxide

Reactive Silica + CH + Water ⟶ C-S-H



Strength Results

Days	Control	E5
3	4740	5210
7	6820	7270
14	7865	8000
28	7960	8760

- Testing done on the same batch of 7000psi concrete
- Testing done in the Customer's Lab

Volume Loss Shrinkage

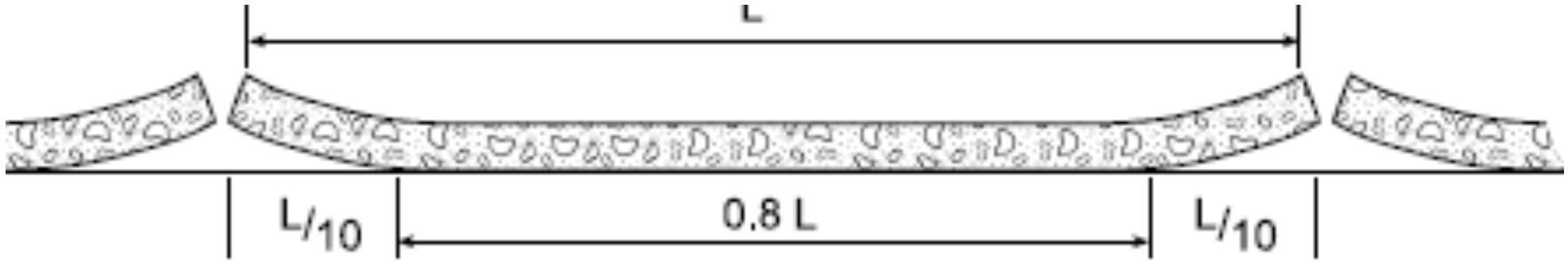
E5 Internal Cure

15% Less Shrinkage

Replaces SRA's

At much lower cost

Curling



- Differential drying
- Moisture loss in the surface causes the edges to “curl”

FF FL Results

Days	FF	FL
1	51	24
9	51	24
56	51	23
356	49	23

- Testing done corner to corner starting 2” from each
- Testing done by 2 separate entities

E5 INTERNAL CURE

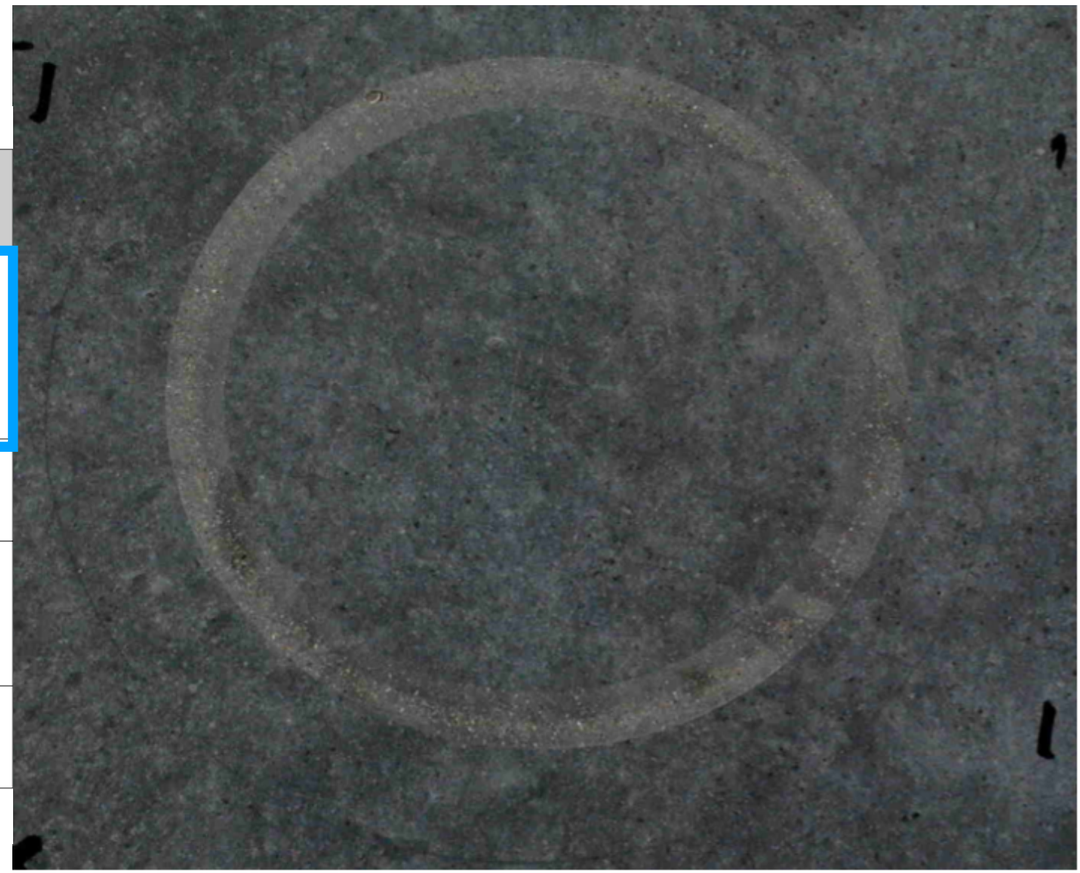
Chaplin Abrasion Resistance Testing Apparatus

Chaplin Abrasion Resistance Results

Table 3. Floor wear classes from BS 8204:Part 2

Wear class	Degree of wear resistance	Maximum wear depth*	Typical use	Traffic
Special	Extremely high	0.050 mm	Very heavy-duty factories	Heavily loaded steel tires, impact, dragged loads
AR1	Very high	0.100 mm	Heavy-duty factories and warehouses	Steel tires, impact
AR2	High	0.200 mm	Medium-duty factories and warehouses	Lightly loaded steel tires, hard plastic tires
AR3	Good	0.400 mm	Light-duty factories and warehouses	Rubber tires

*From standard Chaplin test



Wear ring from test 1
Mean depth 0.035 mm

Benefits

- Cures Concrete
- Reduces or Eliminates Bleed Water
- Reduces or Eliminates Crusting
- Reduces Shrinkage & Cracking
- Densifies & Hardens the concrete surface
- Reduces or Eliminates Curling

We Cure Concrete!

Jim Render

- Ready Mix Consultant
- Specification Products
- (502)396-5072
- Jim.render25@gmail.com
- Specificationproducts.com

RCS™ Technology

MIRACLE AID

Finishing Aid

- Evaporation Retarders are often used as finishing aids
- Evaporation Retarders are over 90% Water!
  - Using them as finishing aids works water into the surface
  - This changes the W/C ratio right where it is needed
- Miracle Aid is designed as a finishing aid
- Nano Silica Technology allows the finisher more ease