ICRI SPRING CONVENTION 2016

GROWTH CRYSTALS
and
MOISTURE MITIGATION

PRESENTED BY MARK CHEW

LOGAN CONTRACTORS SUPPLY & ICC DISTRIBUTION GROUP, LLC

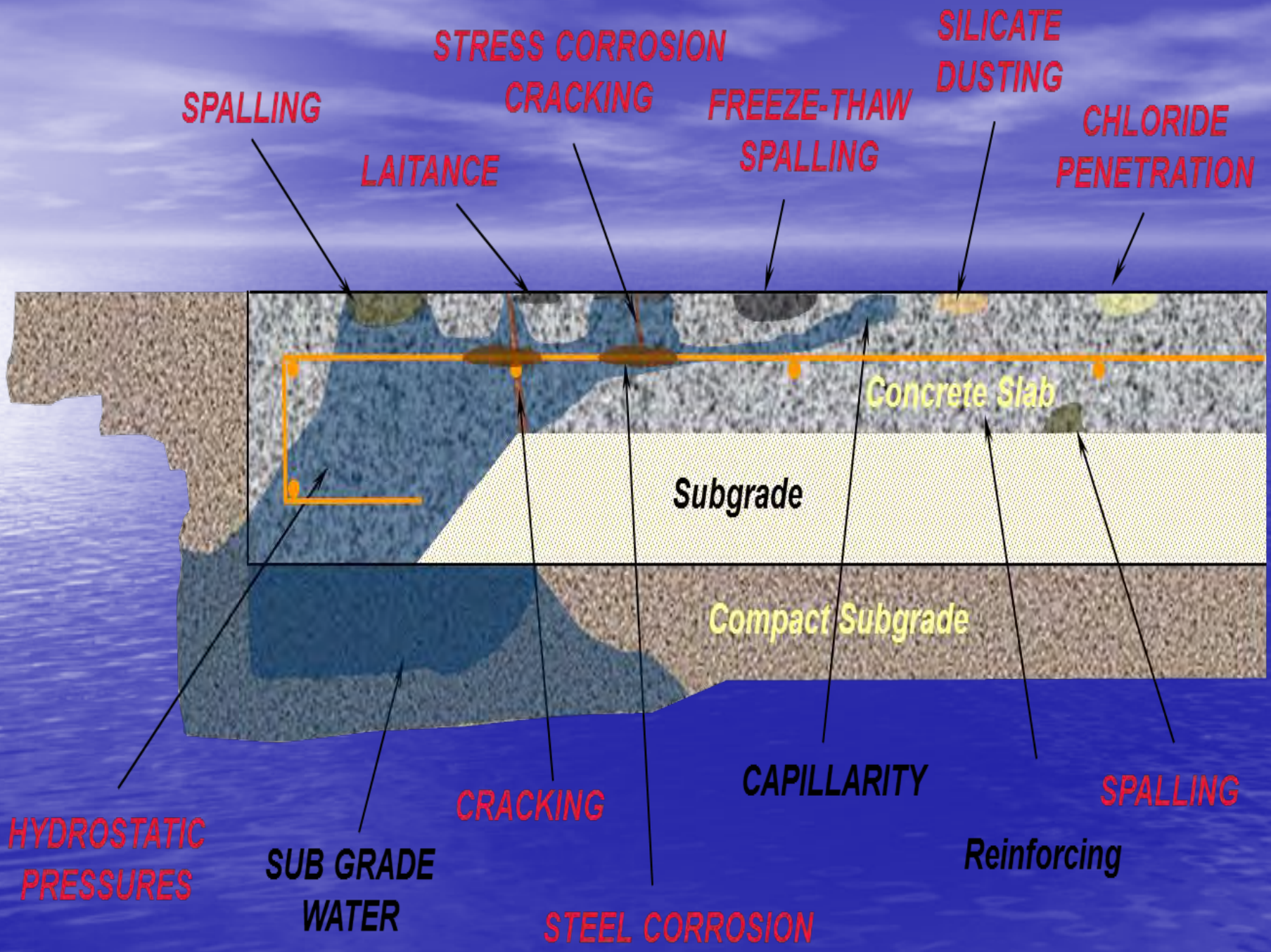
Water Related Issues in Concrete Substrates

POROSITY OF CONCRETE

- *ALLOWS MOISTURE TO TRAVEL FREELY INSIDE CONCRETE*
- *INCREASES ABSORPTION OF CONTAMINATING MATERIALS*

MOISTURE CAUSES CONCRETE DETERIORATION & FAILURE

- *INCREASES THE ABSORPTION OF CHLORIDES FROM DE-ICING MATERIALS*
- *DISSOLVES & ACTIVATES FREE ALKALI MATERIALS THAT ATTACK THE CONCRETE MATRIX*
- **THE FORMATION OF CALCIUM OXY-CHLORIDE**
- *ACCELERATES THE CORROSION OF STEEL*
- *BREAKS THE CONCRETE MATRIX DUE TO FREEZING & THAWING*
- *REDUCES ADHESION OF COATING MATERIALS*


SPALLING
LAITANCE
STRESS CORROSION CRACKING
FREEZE-THAW SPALLING
SILICATE DUSTING
CHLORIDE PENETRATION
Concrete Slab
Subgrade
Compact Subgrade
HYDROSTATIC PRESSURES
SUB GRADE WATER
CRACKING
STEEL CORROSION
CAPILLARITY
Reinforcing
SPALLING

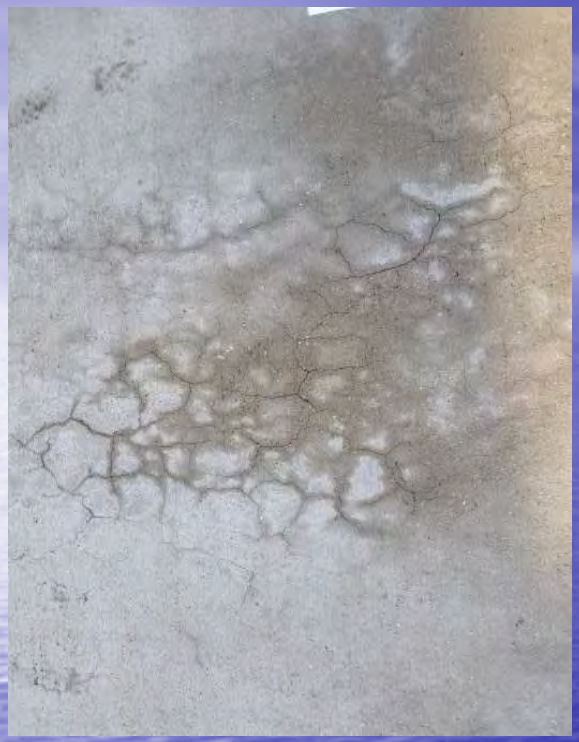
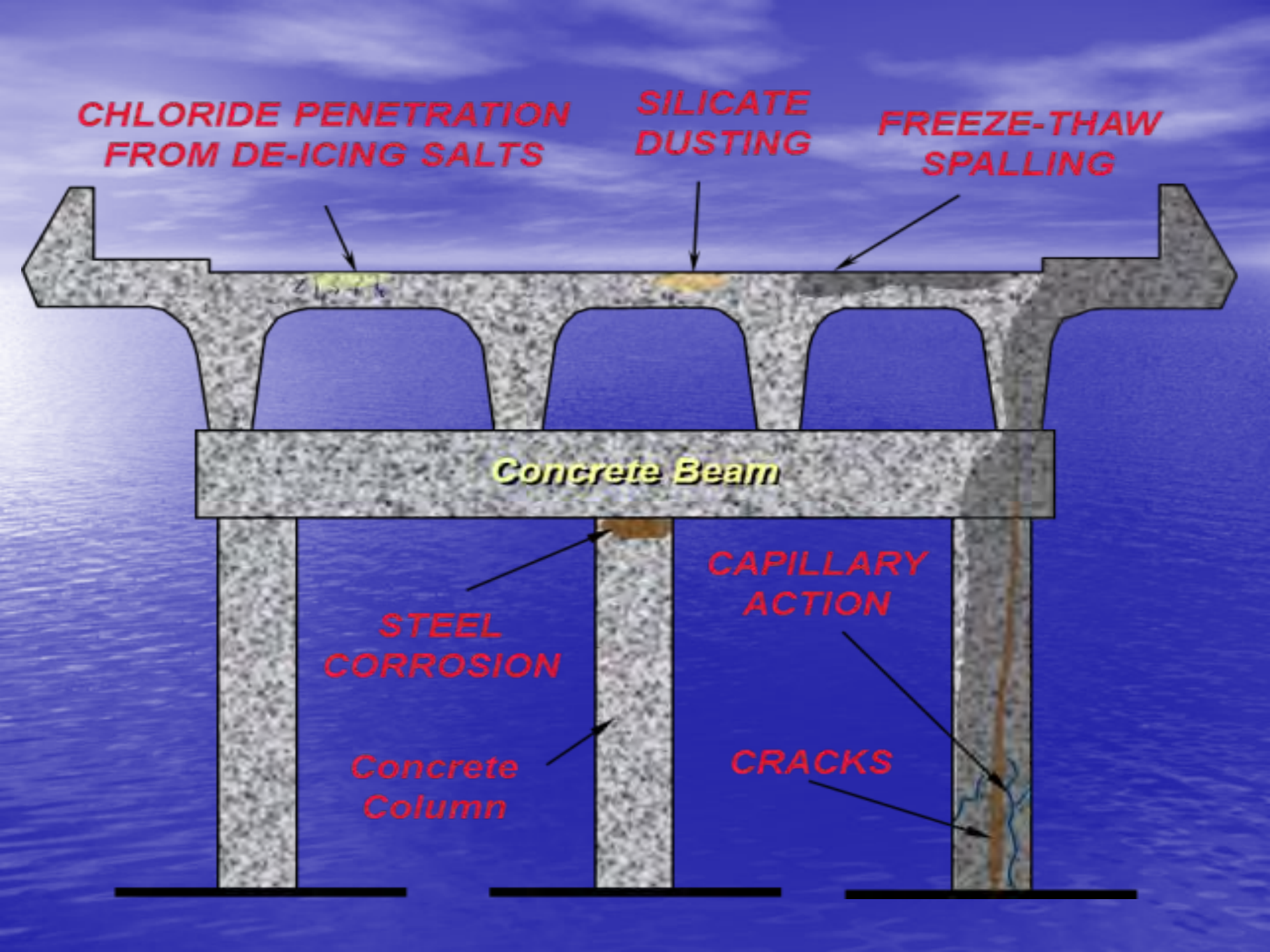


Fig. A & B: Surface cracks allow water into the concrete to cause further damage.

Fig. C: Complete deterioration exposing rusting of the reinforcing steel rebar.


Highway Bridge....
Less Than Forty
Years Old


CHLORIDE PENETRATION FROM DE-ICING SALTS
SILICATE DUSTING
FREEZE-THAW SPALLING
Concrete Beam
STEEL CORROSION
CAPILLARY ACTION
Concrete Column
CRACKS

Shadowing

Concrete Scaling

Shrinkage Cracks or Crazing

SO WHAT IS BEING DONE TO CONTROL THESE IDENTIFIED PROBLEMS?

Standard Accepted Technology

- Curing Compounds
- Epoxy Resins
- Modified Acrylic Latexes (PVA)
- Silanes**
- Siloxanes**
- Silicones
- Linseed Oil
- Sodium Silicates
- Stand Alone Concrete Mix Designs

Now let's take a look at

ACCEPTED PROVEN ADVANCED TECHNOLOGY

Growth Crystals

Hygroscopic

Hydrophillic

Fig. A-B:Shows the 2 types of crystals. The crystals form inside the pores, capillaries and voids to stop and block moisture when present. When moisture is no longer present the hydrophilic crystal shrinks to allow the concrete to breath naturally.

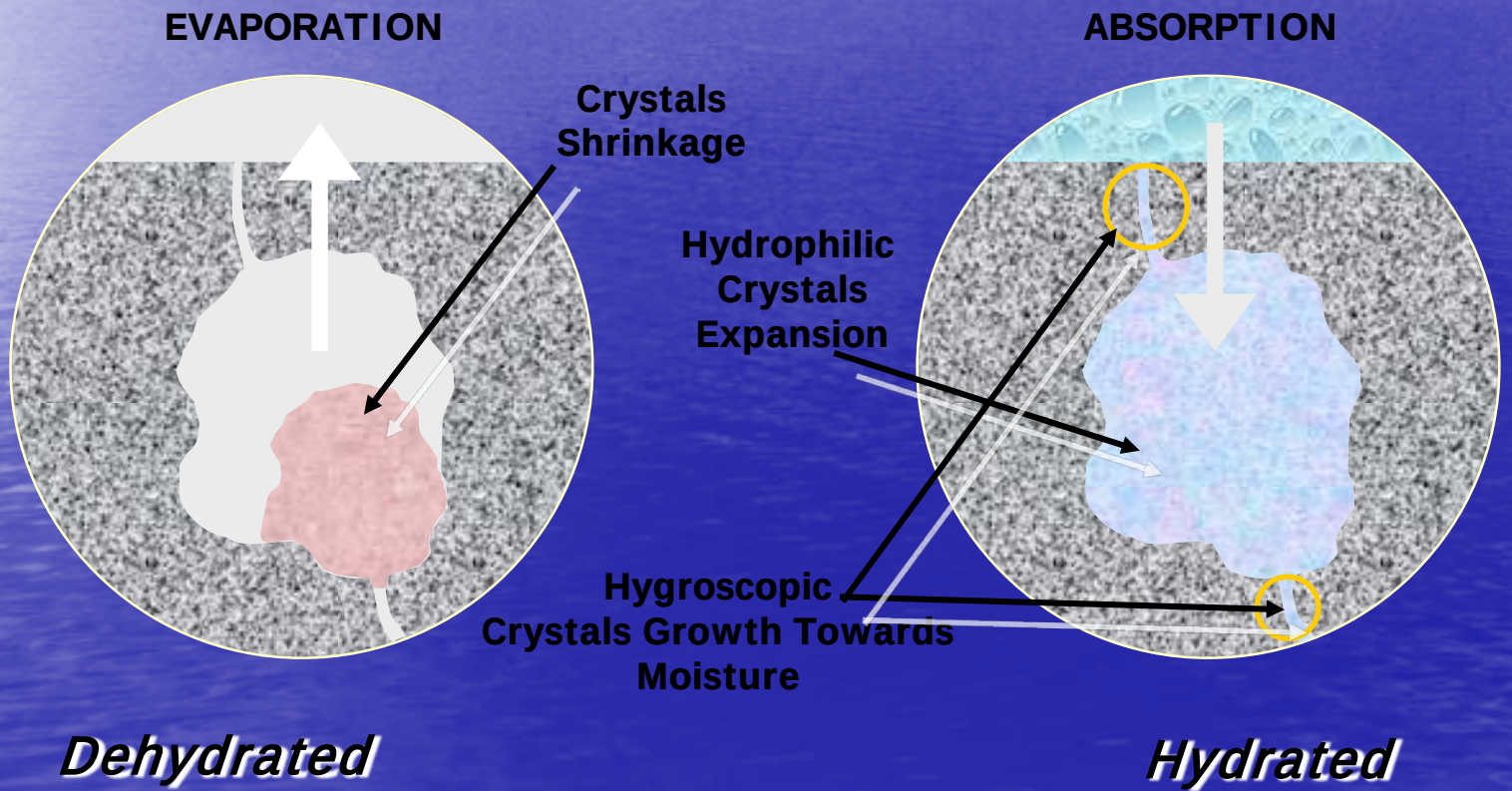
Crystalline Products (Growth Crystals)

- *Crystal Growth liquid applied products are unique water based, non-toxic and can be both hydrophilic and hygroscopic.*
- *All Crystal Growth liquid applied products contain the hydrophilic crystal which permanently fills capillaries and voids within the concrete substrate.*
- *Some Crystal Growth liquid applied products also incorporate a hygroscopic crystal which continues to grow within the concrete substrate seeking out moisture and further blocking pores and capillaries deeper within the concrete.*

Crystalline Products (Growth Crystals)

- *Crystal Growth liquid applied products continue to block moisture and moisture vapor even under constant high hydrostatic pressure and continue to seek out new sources of moisture.*
- *Crystal Growth liquid applied products crystallization activity is continuous while moisture is present.*
- *Growth crystals become inactive during dry conditions and are fully reactivated when moisture and moisture vapor are present.*

Hygroscopic & Hydrophilic Characteristics of Crystals



Growth Crystals Features & Benefits

- Environmentally Friendly
- Crystallization Waterproofing
- Water-Based (Solvent Free)
- Surface Water-Repellency
- Deep Penetration
- Resists De-Icing Chemicals
- Non-Film Forming
- Resists Jet Fuel & Oils
- Single Permanent Application
- Prevents Contamination
- Easy to Apply (Single Component)
- Eliminates Fungous Growth

DEVELOPMENTAL SPECIFICATION
FOR
CONCRETE SEALER – PENETRATING
CRYSTALLINE BLOCKING

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

15XXX.01 DESCRIPTION.

Prepare and treat structural concrete with a penetrating, crystalline blocking sealer meeting this specification when called for in the contract documents. Penetrating crystalline blocking sealers are defined with the following:
Water based and non-toxic.
Promotes crystalline structure in capillary pores.
Does not stain, discolor, or darken surface
Does not affect surface texture.

B. Apply Sections 2403, 2412, and Division 41 of the Standard Specifications with the following modifications.

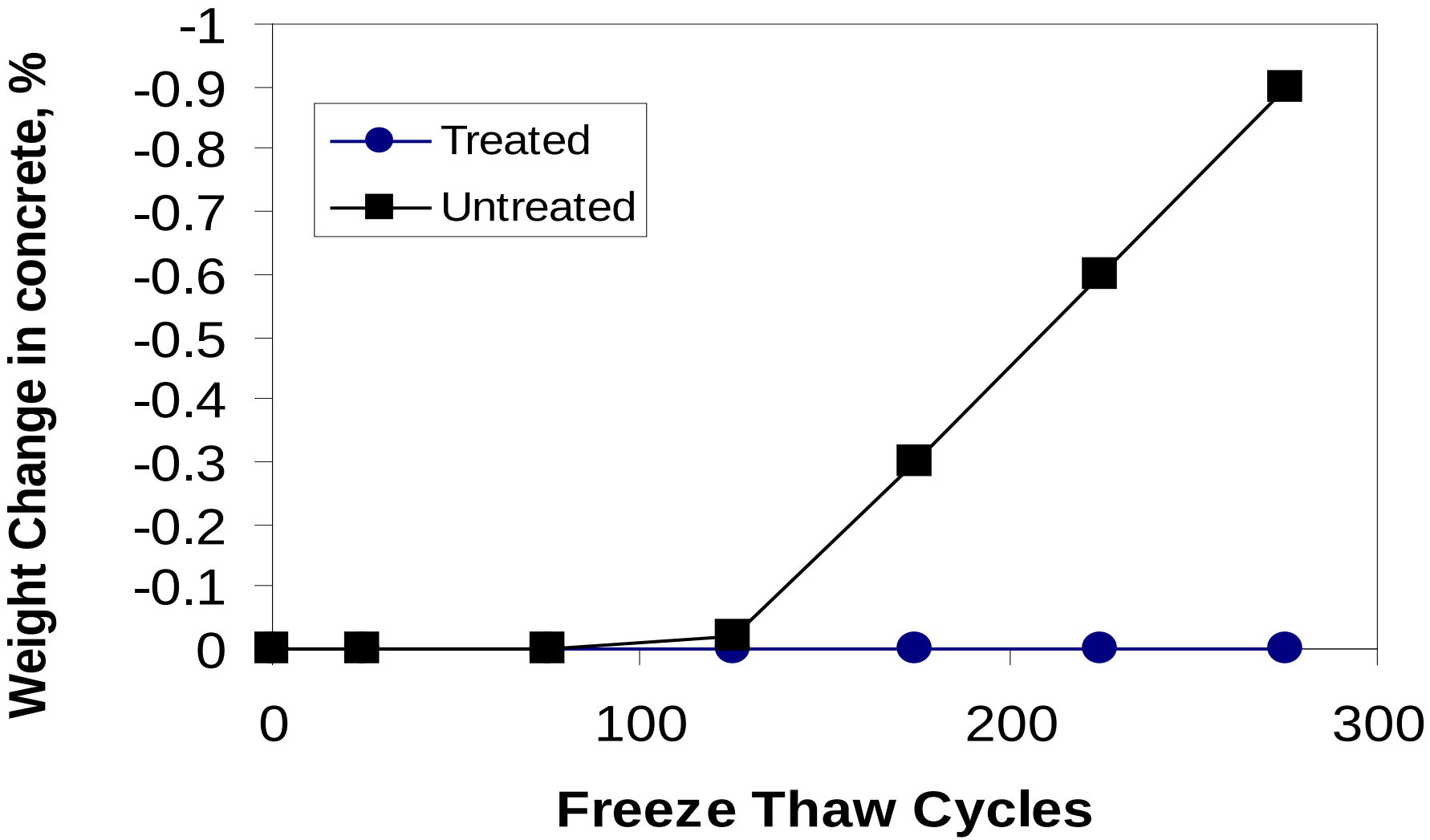
Performance Specification Driven

Test Method	Description
ASTM C666-97	Std. Test Method for Resistance of Concrete to Rapid Freezing & Thawing.
ASTM C1262-98	Std. Test Method for Evaluating the Freeze Thaw Durability of Manufactured Concrete Masonry Units and Related Concrete Units.
ASTM C672-98	Std. Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
ASTM C1218	Std. Test Method for Water-Soluble Chloride in Mortar and Concrete.
ASTM C1202-97	Std. Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
ASTM D6489-99	Std. Test Method for Determining the Water Absorption of Hardened Concrete Treated With a Water Repelling Coating.
ASTM C944-99	Std. Test Method for Abrasion Resistance of Concrete or Mortar Surfaces by the Rotating-Cutter Method.
ASTM D4541-95	Std. Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
ASTM F609-96	Std. Test Method for Measuring Static Slip Resistance of Footwear Sole, Heel or Related Materials Using a Horizontal Pull Slip-meter (HPS).
ASTM E303-93	Std. Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.
ASTM C642-97	Std. Test Method for Density, absorption, and Voids in Hardened Concrete.
ASTM C457-98	Std. Test Method for Microscopic Determination of Parameters of the Air Void System in Hardened Concrete.
AASHTO T259-00	Resistance to Chloride Ion Penetration.

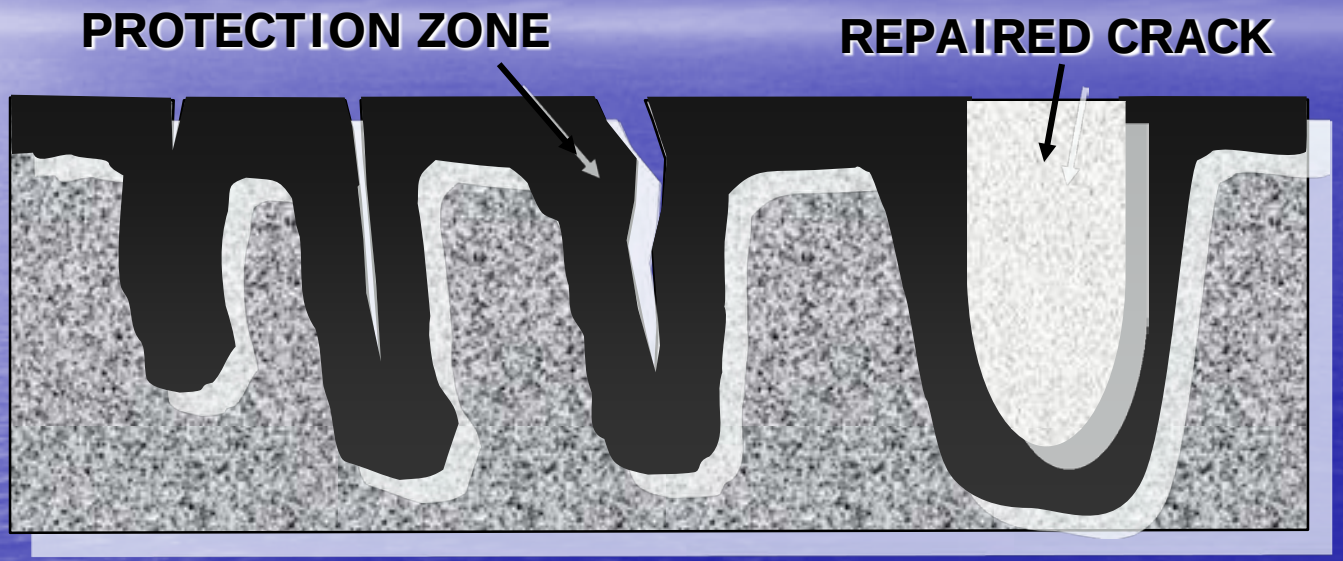
Description	Test Method	Results
Toxicity	48 hour Acute Toxicity Test	Non-toxic to flora and fauna, V.O.C. content 0
Chloride Ion Penetration	ASTM C1202 / AASHTO T277	<2000 coulombs
Abrasion Resistance	ASTM C 994	4.2 grams / m^2
Adhesion	ASTM C 1583	400 PSI
Scaling Resistance	ASTM 672	Not to exceed 0.64
Static Slip Resistance	ASTM F 609	No Effect
Skid Resistance	ASTM E 303	No Effect
Freeze/Thaw 300 Cycles	ASTM C 666	Mass change not to exceed 0.09%
Freeze Thaw 300 Cycles	ASTM C 666	Length change not to exceed -0.017%
Freeze Thaw 300 Cycles	ASTM C666	RDM 97%
Water Absorption	ASTM D 6489	1.5% by wt./ 7 days

All test results listed in Table 5B were performed by an independent third party, CTL Group. A d/b/a of Construction Technology Laboratories, Inc., Skokie, IL. All test results above were performed in 2015, and either meet or exceed D.O.T. requirements.

Copies of test reports are available upon request.


Weight Change in concrete, %
-1
-0.9
-0.8
-0.7
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0
Treated
Untreated
0
100
200
300
Freeze Thaw Cycles

Permanent Protection



- Seals hairline cracks up to one 16th inches in width
- Seals inner surface of large cracks preventing water from causing further damage
- Increases the adhesion property of repairing materials to concrete in the repaired cracks

Bridging Cracks up to 1/6th inch

Dubuque, IA Bridge Application

Blondo Street, Omaha NE

Concrete Parking Lots

Precast Industries
"Facility Installed…Quality Assurance"

SECONDARY BENEFITS

Growth Crystals Dry Concrete

12/30/11

3/20/12

5/22/12

2/11/13

Fig. B-C: Demonstrates ability to push out contaminates and keep surfaces clean.

DANIEL BOONE MEMORIAL

SO WHAT IS THE COST ?

Standard *"VS"* ***Advanced*** *technologies from a cost standpoint.*

- 40% solids Silane(5gal) price per sf, at 150sf per, $.31/sf one application / re-apply 2-3 yrs
- 100% solids Silane(5gal) price per sf, at 200sf per, $.38/sf one application / re-apply 4-5 yrs
- ..Growth Crystals (5gal) price per sf, at 150sf per, $.45/sf. **only** application / no re-application needed

To put in perspective

At $.45/sf cost for a GC Product, to attain 20 years of protection,

GC's are NOW 64% less than 40% solids silane, and 60% less than 100% solids silane

Growth Crystal Treated Concrete

Growth Crystals Performance Conclusions

One Application on Concrete & Masonary:

- *Will be waterproofed and sealed against de-icing chemicals for the life of the Concrete*
- *Will be resistant to most aggressive & harmful chemicals such as jet fuels, oil, & acids*
- *Will be protected against spalling, efflorescence, stress corrosion cracking, and damage from freeze-thaw cycles*

So ask yourself this question....

Would the cost of implementing a pro-active preventive maintenance plan be better for your customers?

Keeping in mind the rules were changed for your concrete, when the technology for better ice control advanced into liquid form creating Calcium Oxy-Chloride.

LOGAN
CONTRACTORS SUPPLY, INC.

Thank you

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