Algonquin Hotel, New Brunswick, Canada

CONCRETE PROTECTION

- Certificates will be provided via email
- All attendees will receive a copy and recording of the webinar, this may take up to a week to distribute
- We appreciate your patience

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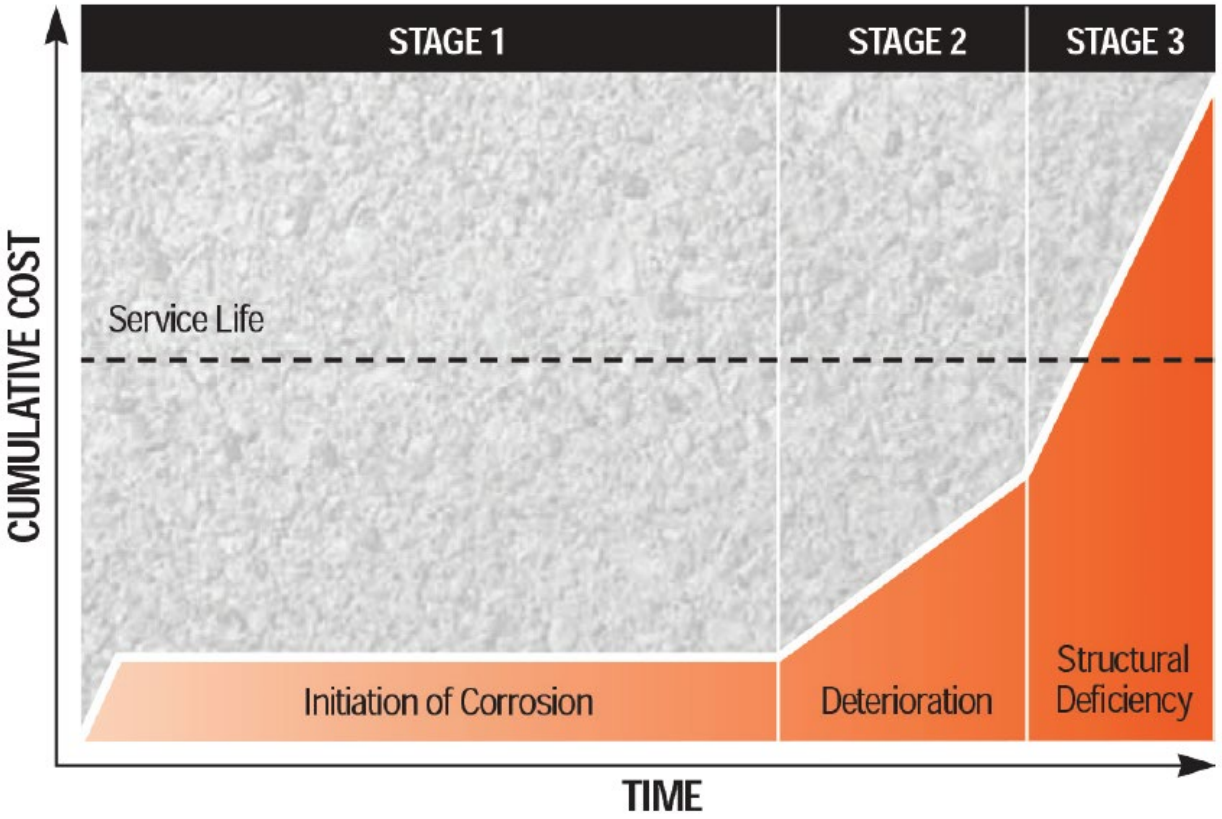
BUILDING TRUST

IMPORTANCE OF PROTECTION FROM CORROSION



- 3% of yearly GDP attributed to corrosion
- 27.5% of US bridges are structurally deficient*
- D+ infrastructure rating*

* ASCE 2003 Progress Report

DOES NOT INCLUDE

- Disruption
- Lost revenue
- Liability
- Poor appearance

OBJECTIVES – CONCRETE PROTECTION

DETERIORATION OF REINFORCED CONCRETE

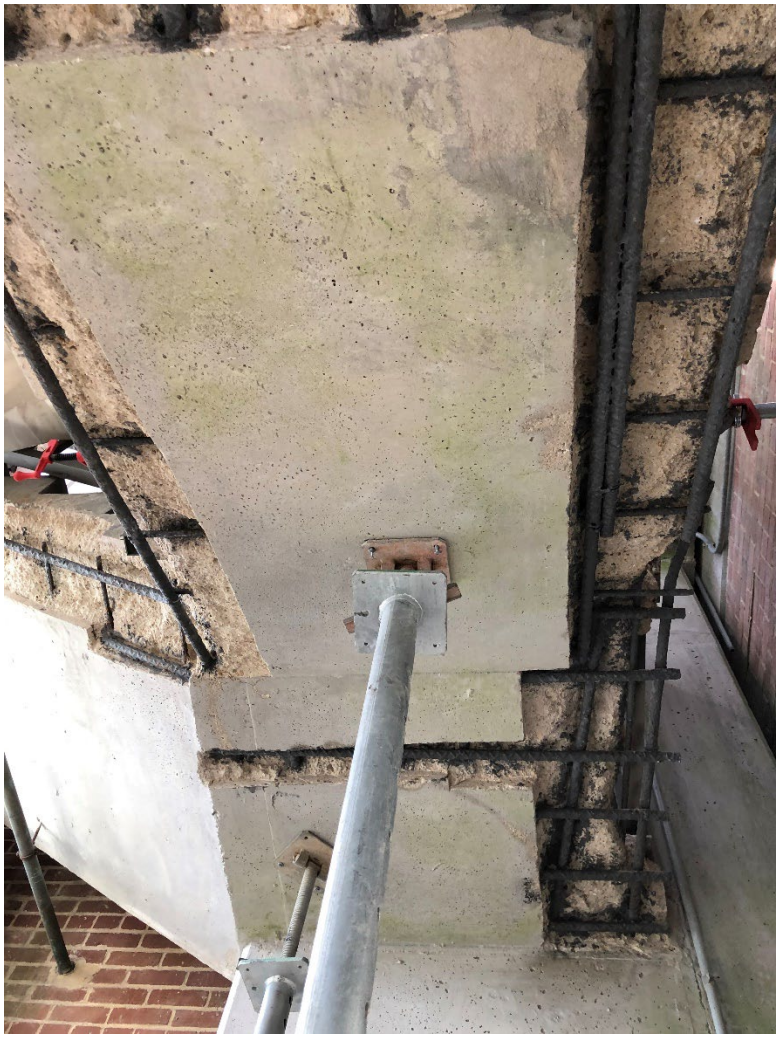
- Root causes of deterioration
- Conducting condition survey
- Determining a repair and protection strategy

PROTECTION AT REINFORCEMENT

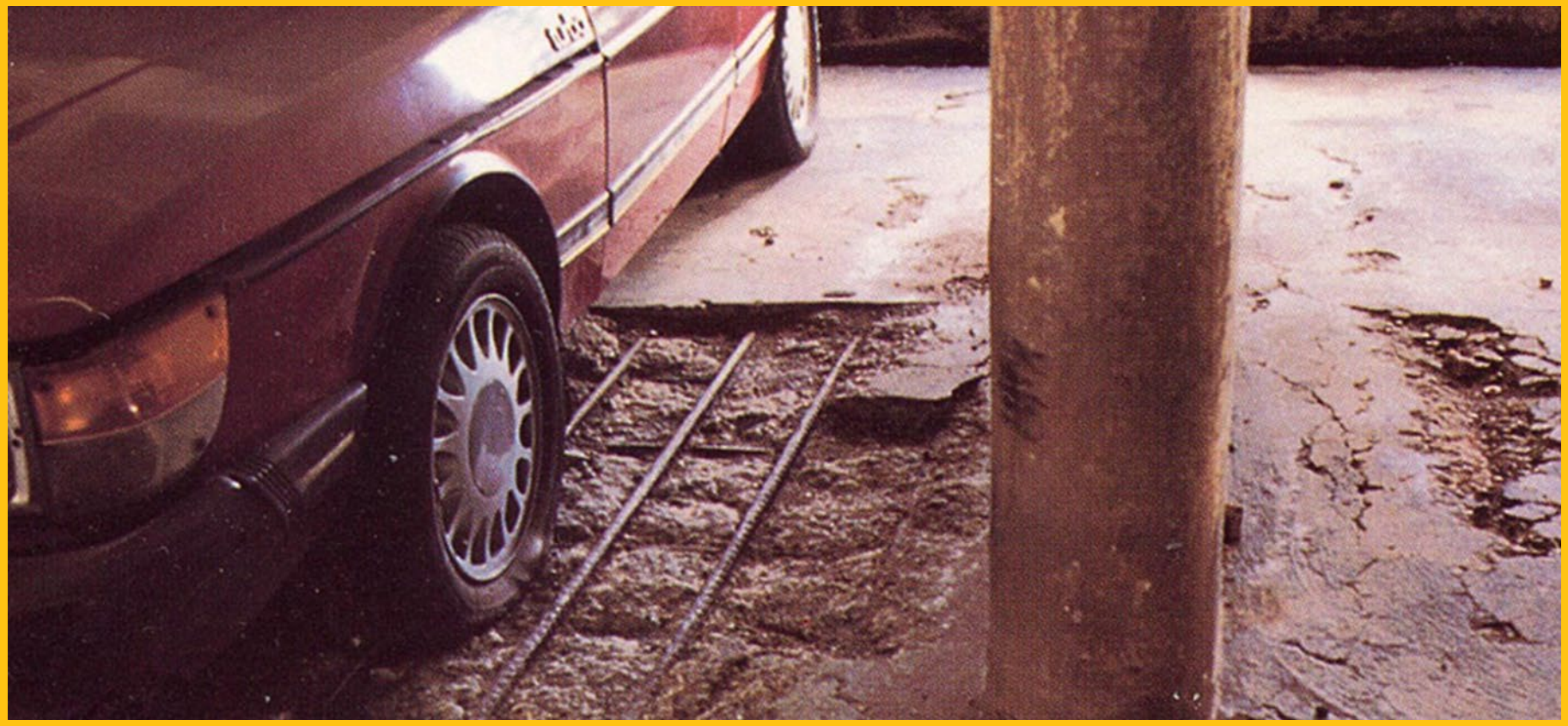
- Cathodic anodes
- Corrosion inhibitors

PROTECTION AT CONCRETE SURFACE

- Penetrating sealers
- Cement-based coatings
- Urethane/Epoxy/Hybrid traffic coatings
- Architectural acrylic wall/soffit coatings
- Immersible/chemical resistant coatings



Corrosion is highly complex, time is limited, and any pricing information is only for perspective.

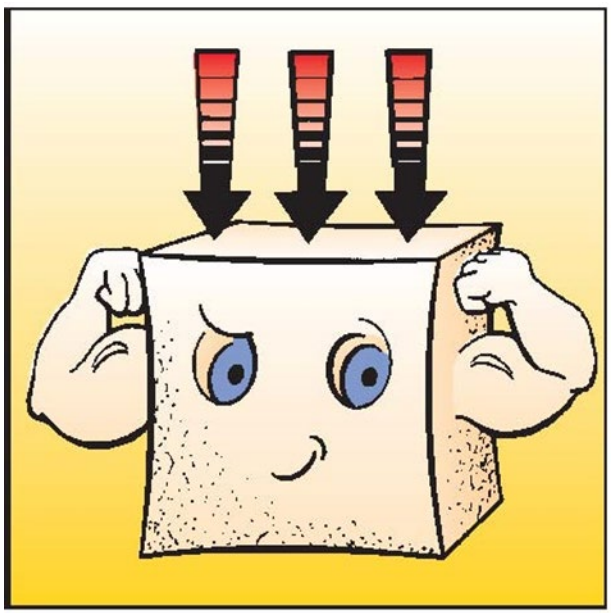


CAUSES OF DETERIORATION
CONDITION SURVEY
REPAIR AND PROTECTION STRATEGY

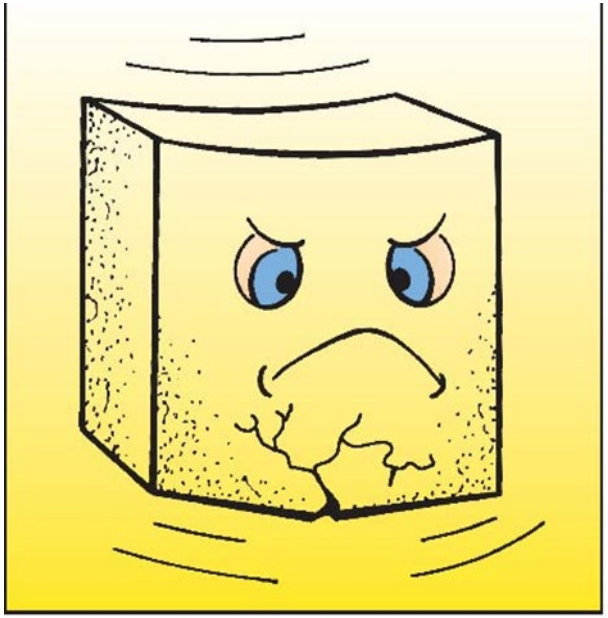
CAUSES OF DETERIORATION

- Impact
- Abrasion
- Freeze/thaw cycles
- Chemicals/sulfates
- Biological (micro-organisms)
- Reactive aggregates (ASR)
- Dissimilar metals
- **Steel reinforcement corrosion**

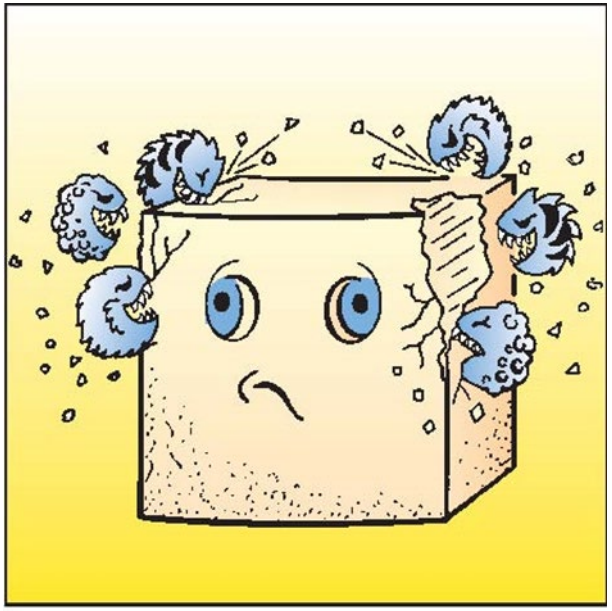
CONCRETE PROPERTIES



Concrete is Good in Compression



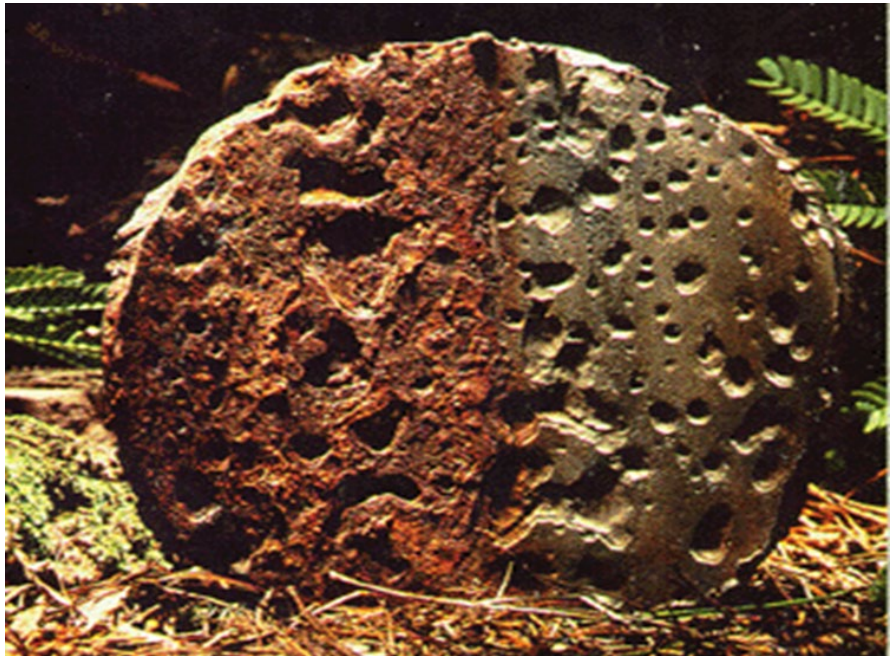
Concrete is Poor in Tension



Concrete is Always Under Attack

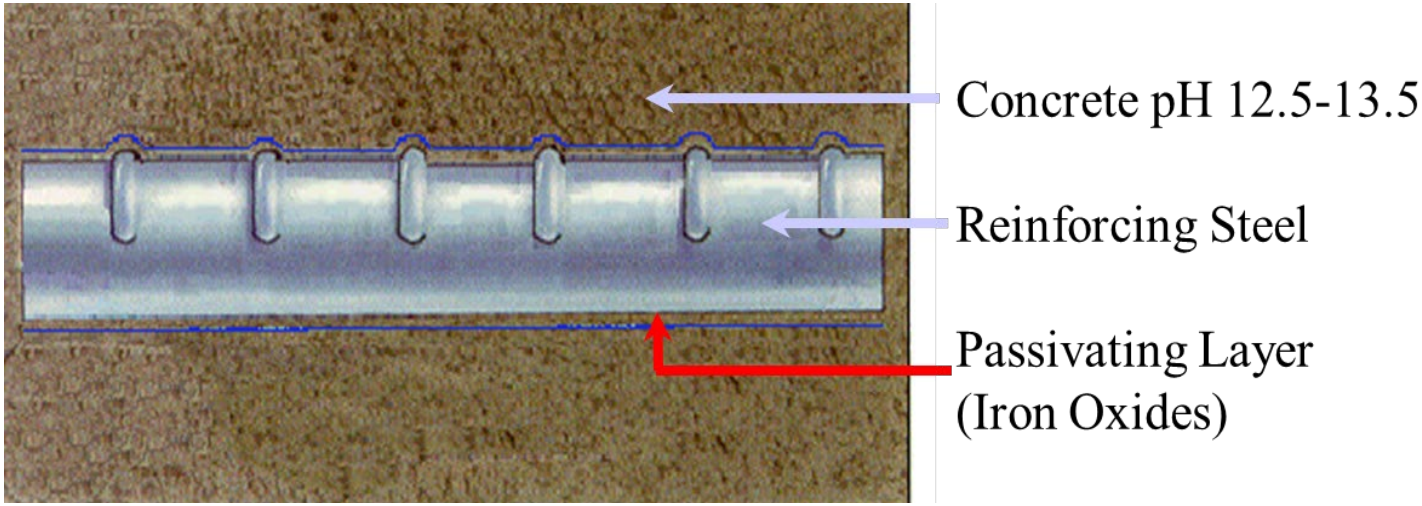
REINFORCING STEEL

- Economical method to add necessary tensile strength to concrete
- Corrodes in presence of oxygen and moisture
- Right side cleaned of corrosion
- Clearly see both anodic and cathodic areas



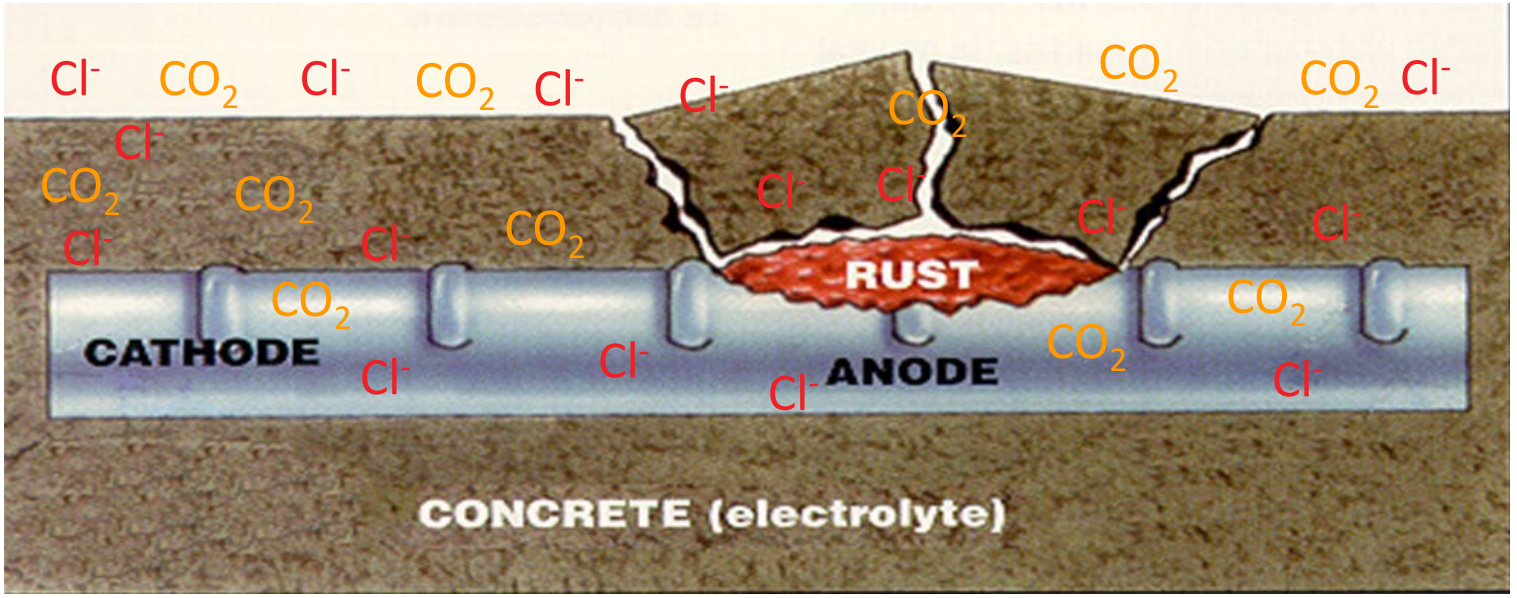
STEEL REINFORCED CONCRETE

- Concrete and steel are compatible
- Steel is passivated in concrete
- Alkaline environment protects steel from corrosion despite moisture and oxygen



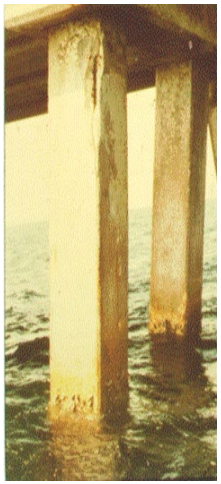
ROOT CAUSES OF REINFORCEMENT CORROSION

- Chlorides and carbonation destroy the passivating layer
- Available moisture and oxygen corrode steel
- As steel corrodes it expands causing cracking and spalling of the concrete

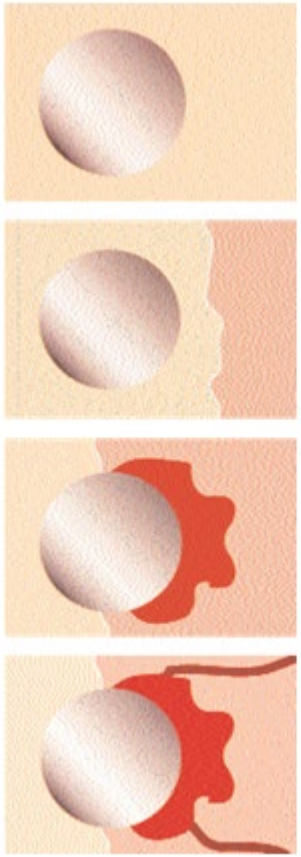


CHLORIDE-INDUCED CORROSION

- Corrosion initiated when chlorides exceed 1.2 lb/cy = .2% by weight cement = .03% by weight concrete = 300 ppm at reinforcement



CARBONATION-INDUCED CORROSION



Good quality concrete (pH = 12.7-13.2) steel is passivated

CO_2

Carbon dioxide enters, pH begins to drop, steel is not yet affected

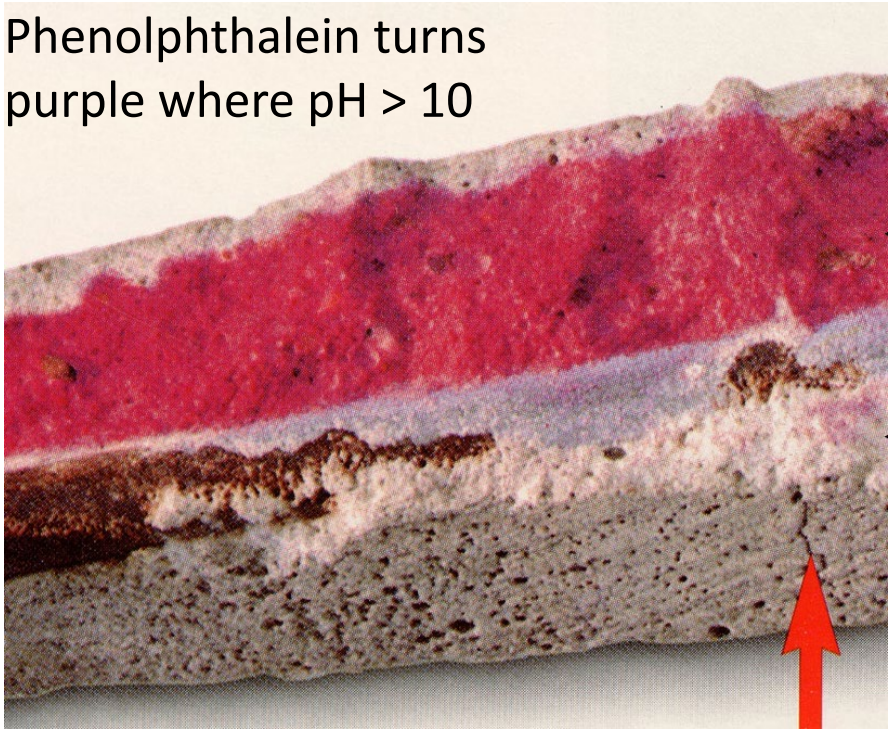
Exterior

pH at steel drops below 10, corrosion begins

CO_2

Volume expansion of rust causes cracking and spalling

Phenolphthalein turns purple where pH > 10



- $Ca(OH)_2 + CO_2$ ➔ $CaCO_3 + H_2O$
- Concrete 'carbonated' when pH < 10

UNDERSTANDING THE CONDITIONS

Learn the condition of the concrete

- Strengths
- Air entrainment
- Chloride content
- Carbonation depth
- Reactive aggregates

Evaluate the status of the steel

- Depth of cover
- Contaminated or uncontaminated
- Cross-sectional loss

Quantify the existing damage

- Identify spalls and delaminations

Predict the future damage

- Evaluate the latent corrosion
- Determine benefit of protection

SELECTING A REPAIR AND PROTECTION STRATEGY

Now that we know the conditions, we can design a solution to best meet the project requirements

Basic approach

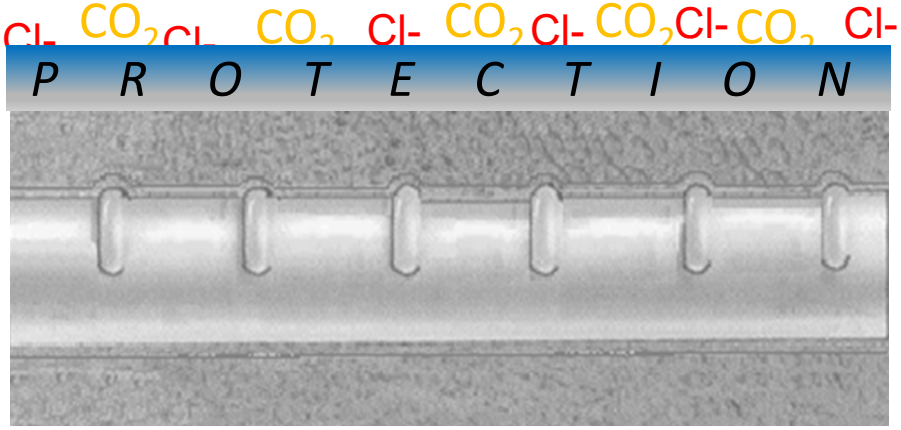
- Remove the unsound concrete
- Clean or replace the steel
- Coat the steel
- Repair the spalls
- Repair the cracks
- Protect steel from contamination
- Protect concrete from contamination

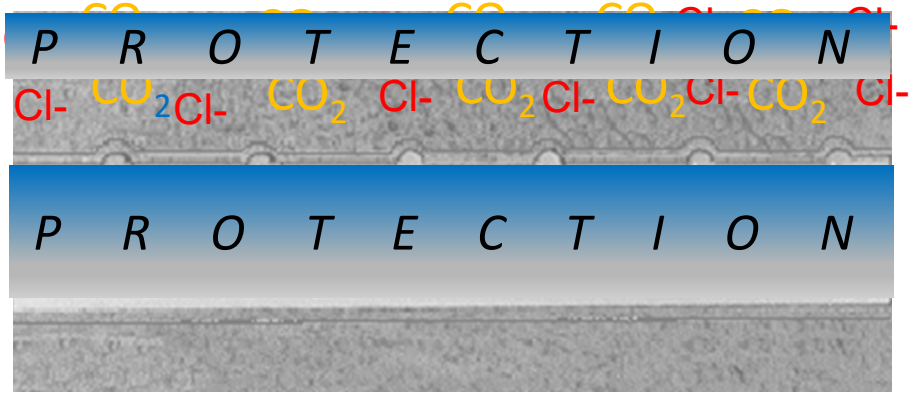
Considerations

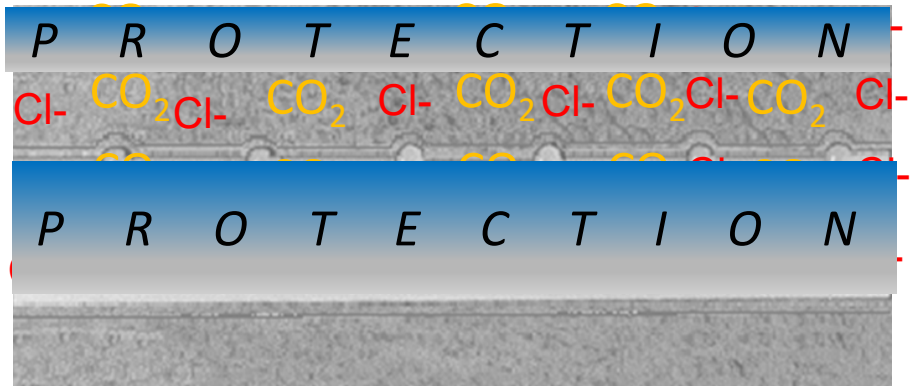
- Short or long-term goals
- Safety and liability
- Downtime
- Extent of latent corrosion
- Service conditions
- Aesthetics
- Budget

CONCRETE PROTECTION

EXISTING CONDITION







PROTECTION STRATEGY

CONCRETE UNCONTAMINATED

1. Protect at concrete surface to prevent contamination

CONCRETE UNCONTAMINATED @ STEEL

1. Protect at concrete surface to prevent further contamination
2. Consider protecting at steel surface as chlorides will migrate further

CONCRETE CONTAMINATED @ STEEL

1. Protect at steel surface to mitigate active corrosion
2. Protect at concrete surface to prevent further contamination

EXISTING CONDITION - CHLORIDE CONTENT

Threshold: (.2% by weight of cement) .03 300 1.2

Sample ID	Location	Depth	% By Weight of Concrete	parts per million (ppm)	pounds per cubic yard (pcy)	Remarks
1a	10th Floor Ramp	¾"	0.013	130.3	0.4980	
1b	10th Floor Ramp	1 ½"	0.0033	33.4	0.1277	
2a	9th Floor	¾"	0.0063	63.1	0.2412	
2b	9th Floor	1 ½"	0.0022	22.3	0.0852	
3a	7th Floor	¾"	0.061	610.3	2.3326	
3b	7th Floor	1 ½"	0.037	370.1	1.4145	
4a	5th Floor	¾"	0.071	710.4	2.7151	
4b	5th Floor	1 ½"	0.054	540.1	2.0642	
5a	3rd Floor	¾"	0.069	690.4	2.6387	
5b	3rd Floor	1 ½"	0.015	150.3	0.5744	
6a	Entrance	¾"	0.068	680.2	2.5997	
6b	Entrance	1 ½"	0.039	390.2	1.4913	

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Total Chloride Ion Analysis Performed In Accordance With AASHTO T260

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Total Chloride Ion Analysis Performed In Accordance With AASHTO T260

PROTECTION AT STEEL SURFACE (CORROSION MANAGEMENT)

CORROSION MANAGEMENT

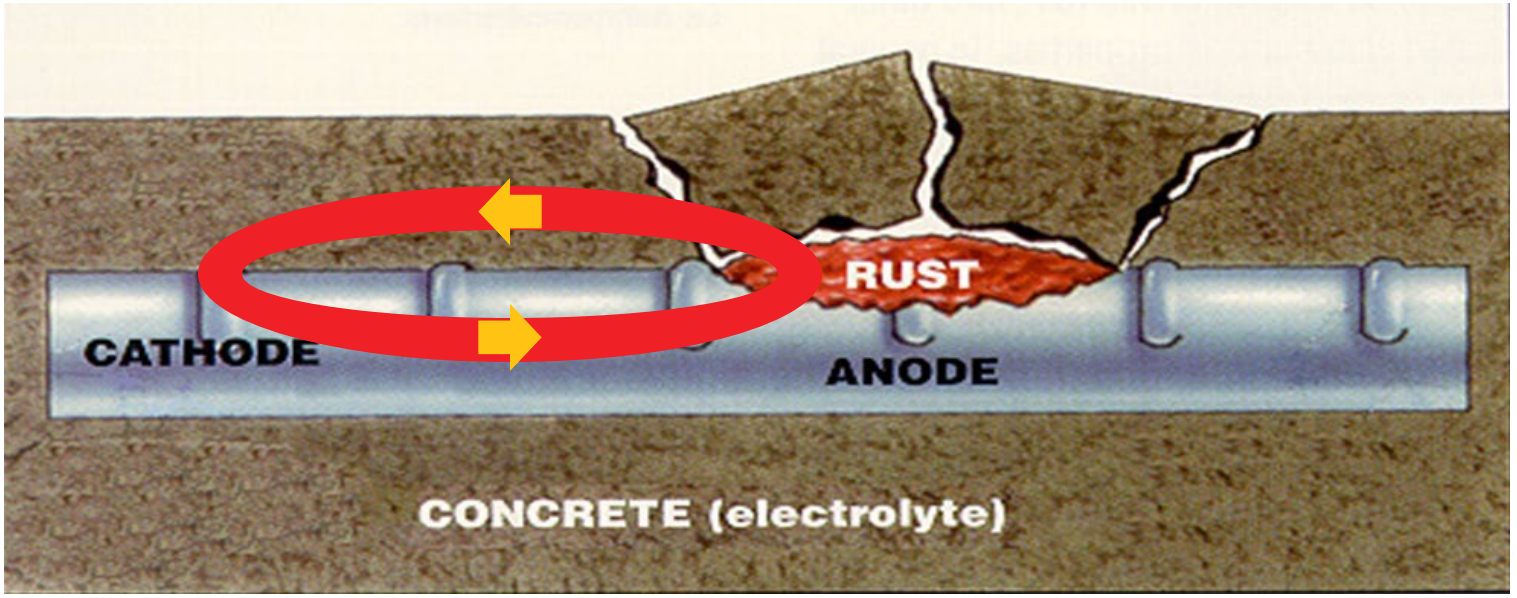
- Reinforcement is existing in contaminated concrete
- Repairs create anodic ring or halo effect driving more corrosion activity around the repairs
- Matter of time until corrosion generates forces to crack and spall the concrete
- Often 3–5-year cycles of significant spalling
- Treat the latent (unseen) corrosion now to prevent/reduce future damage

CORROSION MANAGEMENT OPTIONS

- Impressed current cathodic protection
- Chloride extraction
- Re-alkalization
- Sacrificial anodes
- Migrating corrosion inhibitors

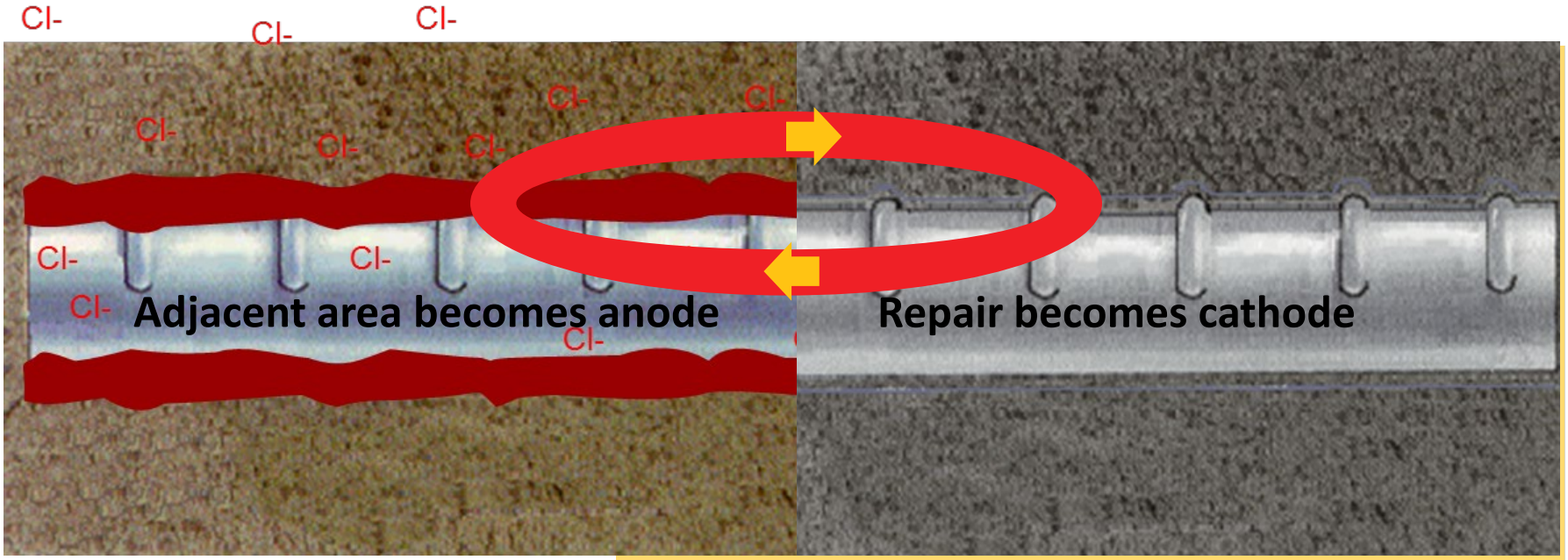
CORROSION PROCESS

- Current flows between cathode and anode through steel and concrete
- Electrical current flow is governed by Ohm's Law
- V = IR Potential Difference (V) = Current (I) x Resistance (R)
- V = IR Current (I) is the concern
- I = V/R Current (I) = Potential Difference (V) / Resistance (R)
- To lower Current (I), increase Resistance (R)



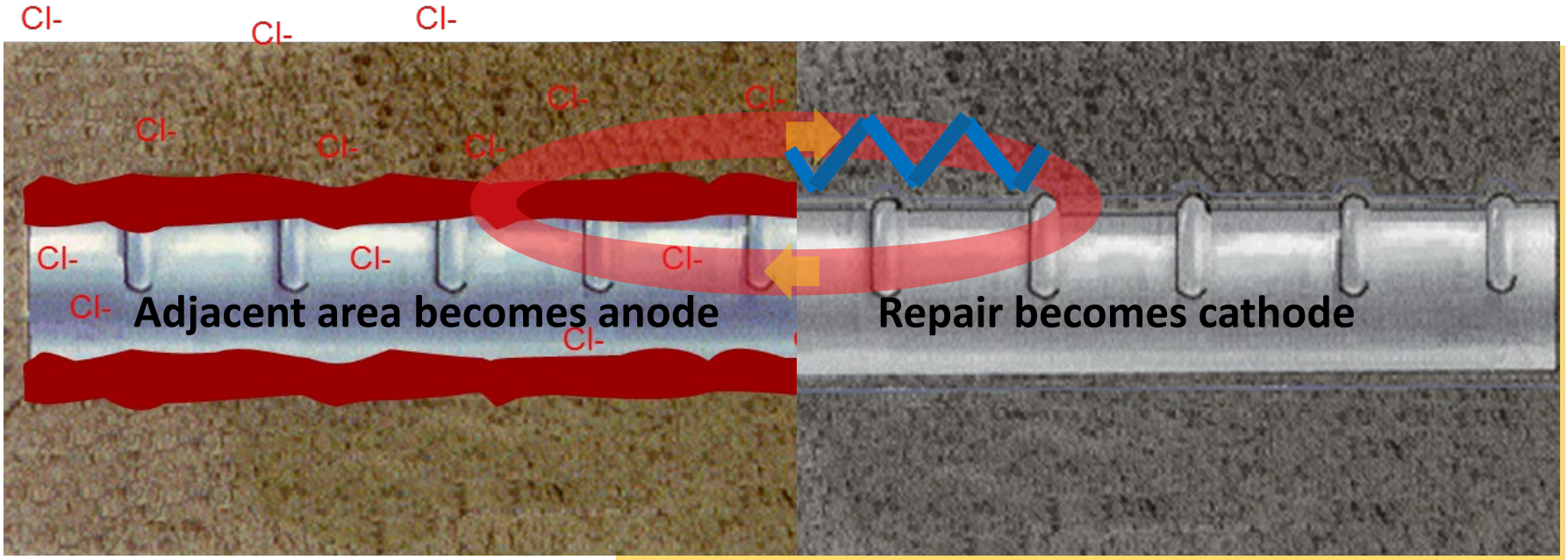
RESISTANCE OF REPAIR MATERIALS

- Material permeability measured in coulombs, ≈ inverse of resistance (ohm/cm)
- Typical concrete about 3,000 – 4,000 coulombs (moderate)
- A repair turns the anode to a cathode
- Increased corrosion activity around perimeter of repair referred to as ‘incipient anode’, ‘anodic ring effect’, or ‘halo effect’



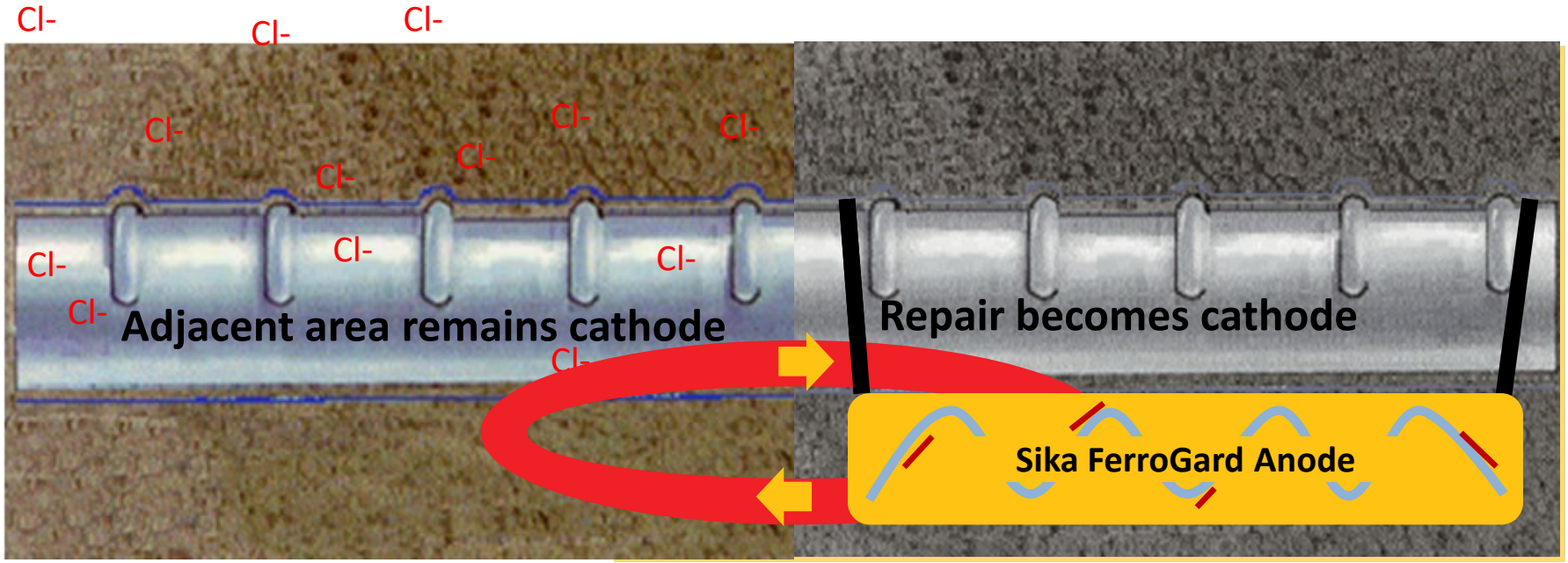
RESISTANCE OF REPAIR MATERIALS

- Increase resistance with a higher resistant (lower permeability) repair material
- Repair materials available with < 500 coulombs (very low)
- 6 times better resistance than moderate permeability repair materials (to corrosion current and penetration of chlorides/contaminants)

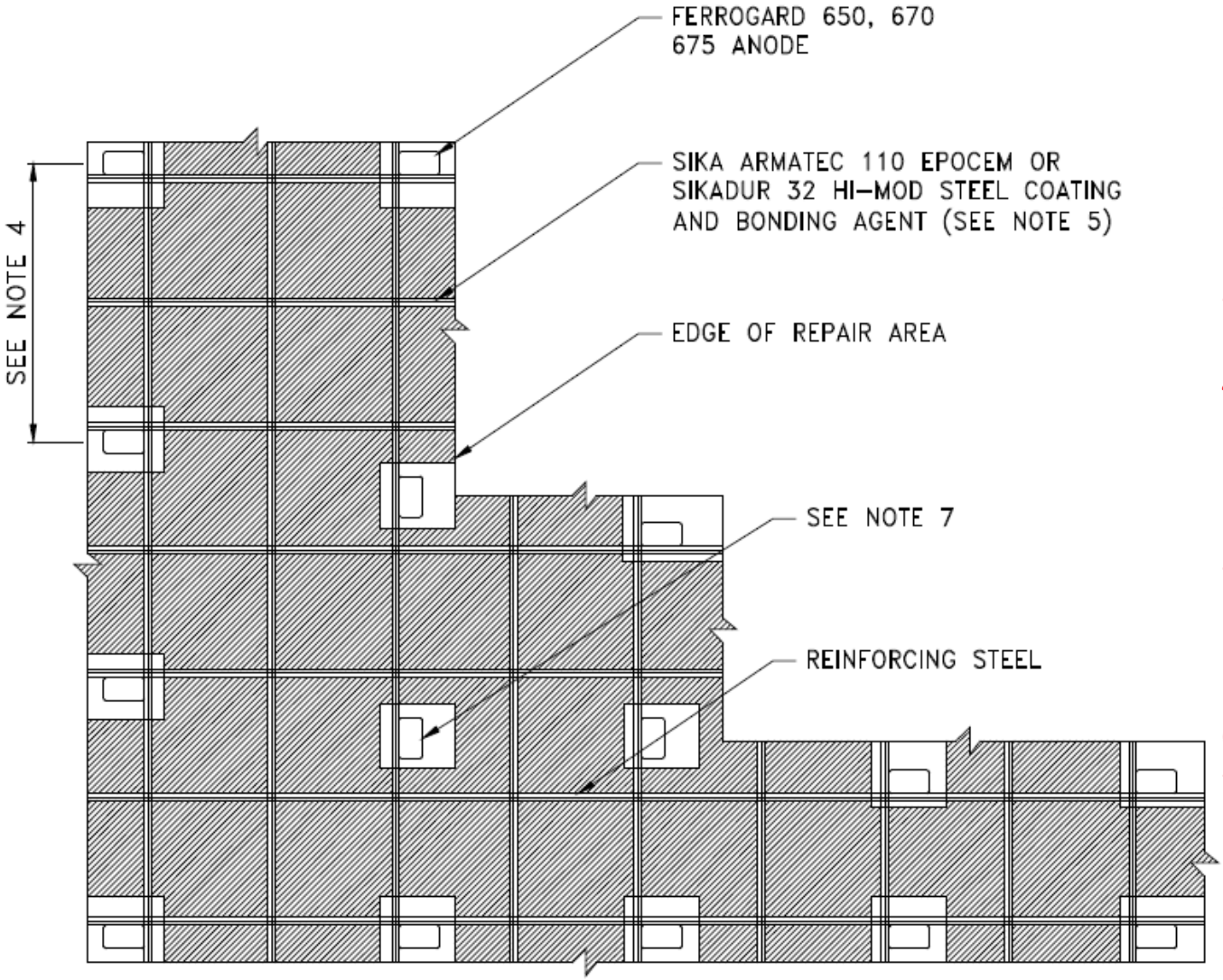


SACRIFICIAL ANODE PROTECTION

- Dissimilar metals current
- Zinc will corrode rather than steel



SIKA FERROGARD 650/670/675



TYPICAL LAYOUT FOR SLAB REAPAIR

1. Remove unsound concrete
2. Clean/replace corroded steel
3. Ensure continuity of steel with tie wires
4. Attach anodes to clean steel and verify connection with ohmmeter
5. Do not apply steel coating or bonding agent within 1” of anodes
6. Install repair material
7. Anodes typically installed around perimeter (interior if steel in contamination)

BUILDING TRUST

SIKA FERROGARD 650/670/675

- Zinc core corrodes rather than rebar
- Protects reinforcement just outside the repair area
- Treats the halo/anodic ring/incipient anode effect
- Could also be spaced throughout a large area

Union Station Ramp, DC 2010

BUILDING TRUST

SIKA FERROGARD 650/670/675

- Spacing based on steel density ratio and service environment (see PDS)
- Spacing usually 18-30” around perimeter
- Use on interior area of repair if reinforcement in contaminated concrete
- Verify continuity of repair area steel with DC resistance ≤ 1Ω

SIKA FERROGARD 650/670/675

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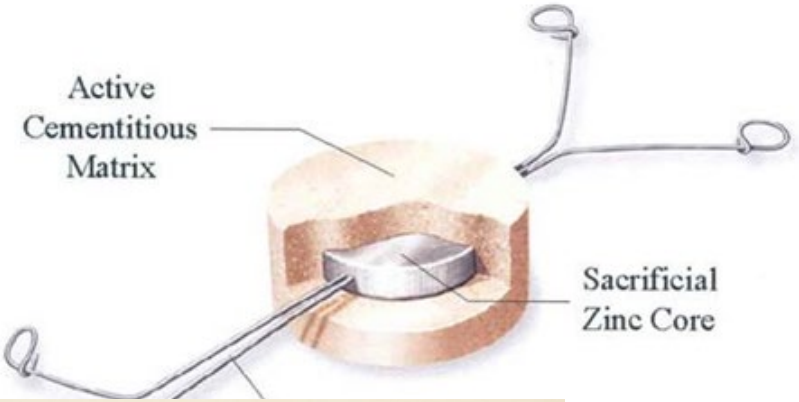
- Spacing usually 18-30” around perimeter
- Use on interior area of repair if reinforcement in contaminated concrete
- Verify continuity of repair area steel with DC resistance ≤ 1Ω

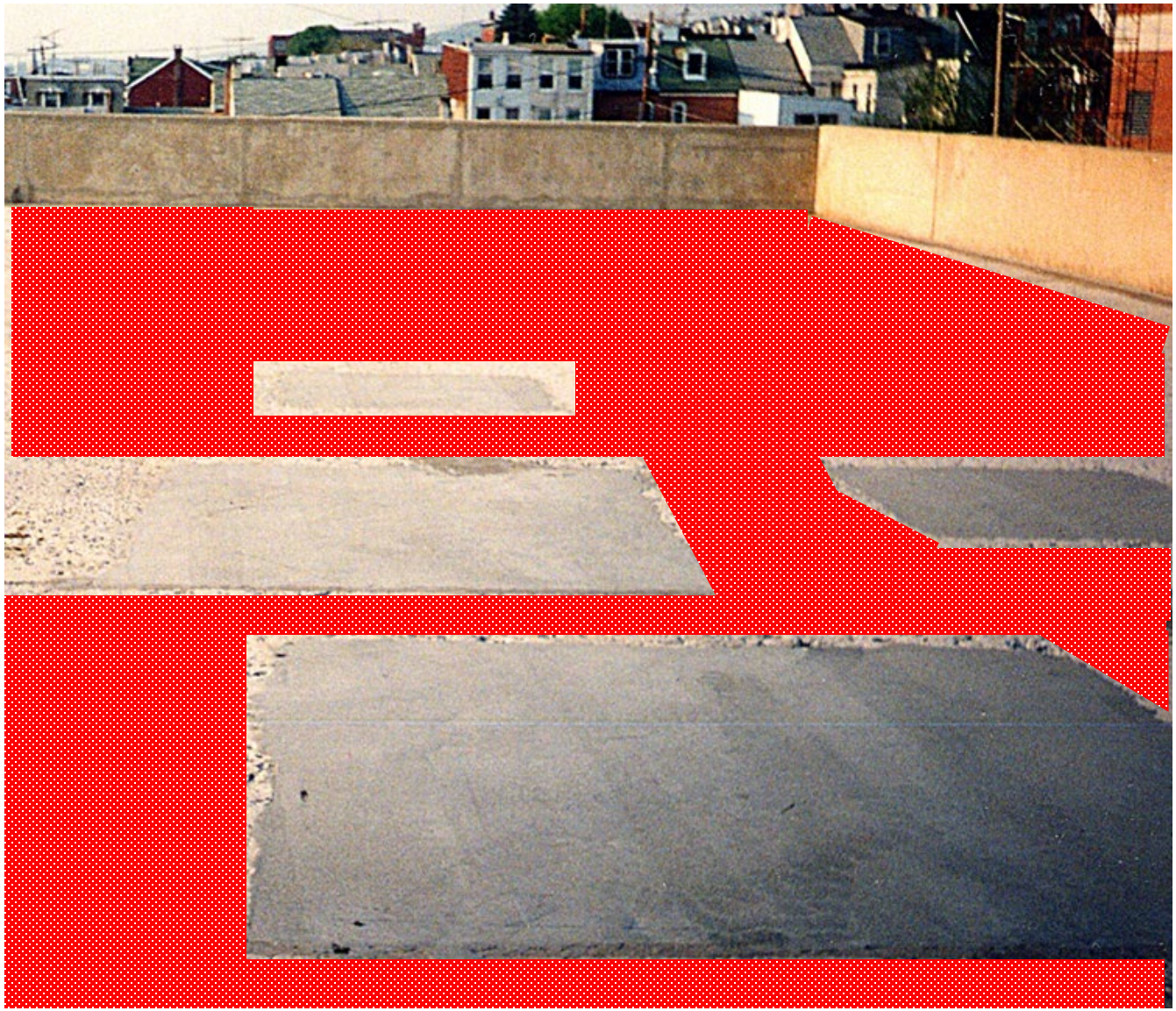
SIKA FERROGARD 650/670/675

- Zinc anodes
- Replaces Sika Galvashield anodes
- Better performance: increased surface area and chelation process
- Thinner design for easier installation
- Expected 10+ year service life

- 650 = 65 grams zinc
- 670 = 105 grams zinc
- 675 = 160 grams zinc



SIKA FERROGARD 903
MIGRATING CORROSION INHIBITOR



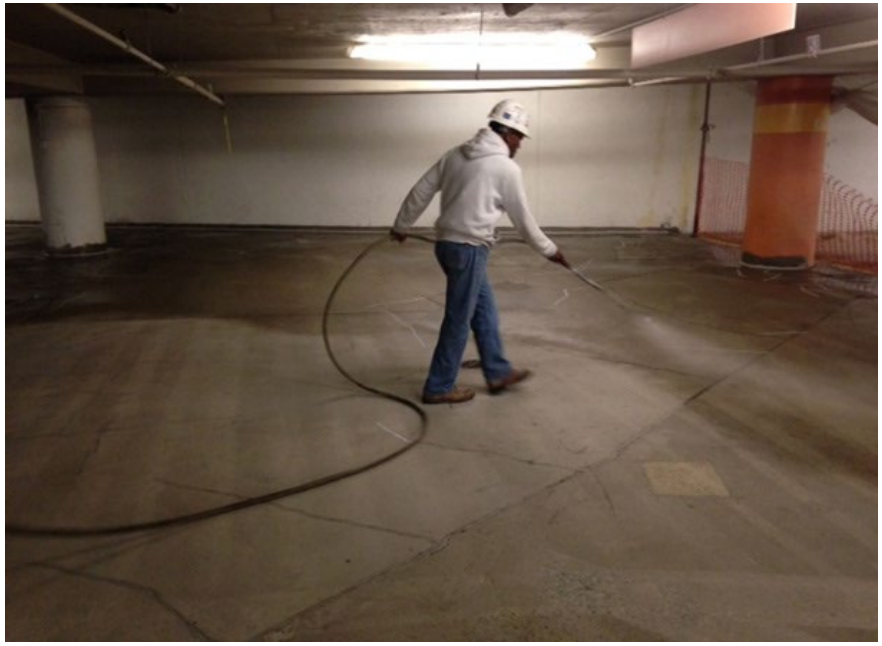
- Durable repairs completed
- Incipient anode corrosion activity
- Rest of deck is in a red zone (reinforcement in corrosive environment)

SIKA FERROGARD 903
MIGRATING CORROSION INHIBITOR (SACI)

Indianapolis Motor Speedway

- Spray corrosion inhibitor on surface
- Migrates to coat embedded reinforcement within 3” of surface
- Treats latent corrosion activity mitigating cracking and spalling
- Economical treatment to avoid expensive repairs

SIKA FERROGARD 903
MIGRATING CORROSION INHIBITOR



- Clean, dry, open-pore substrate
- 100 sf/gal coverage rate
- Decks best at (2) 200 sf/gal coats
- Walls/OH best at (3) 300 sf/gal coats
- Next coat as soon as previous is dry

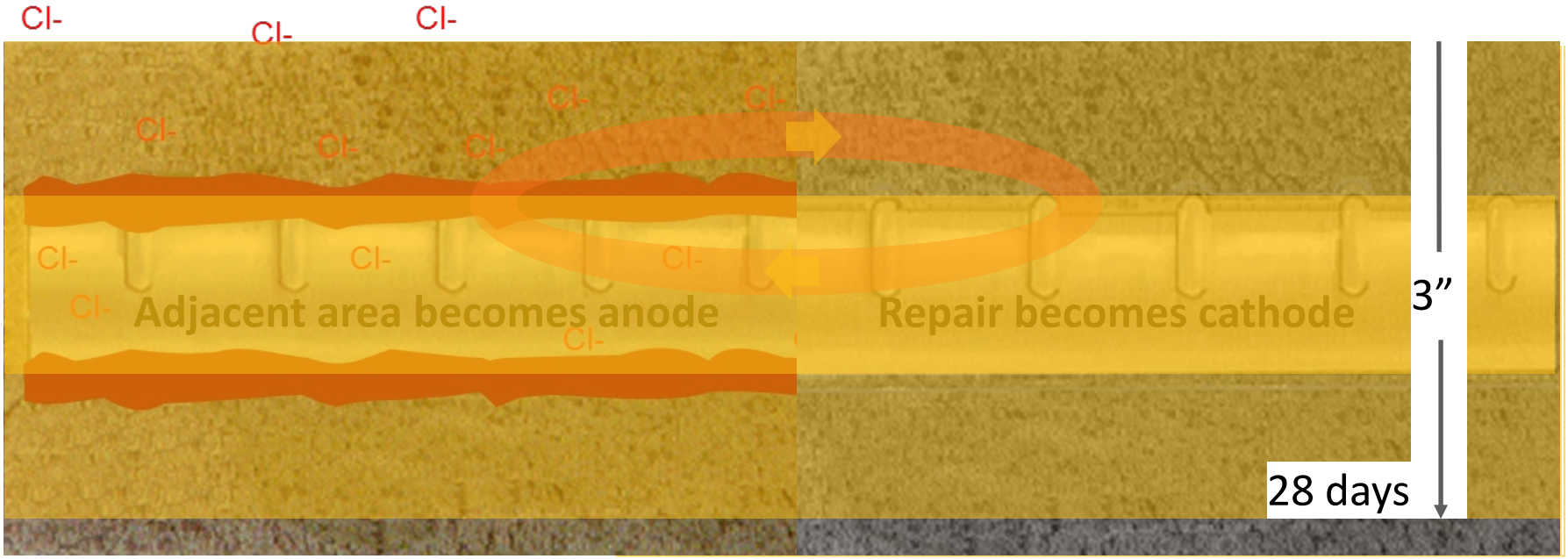
WITH USE OF PROTECTIVE COATING

- Prepare concrete for the coating
- Let inhibitor migrate for 24 hours
- Remove surface residue with water
- Allow concrete to dry for coating

Mazza Gallerie, DC 2014

SIKA FERROGARD 903
MIGRATING CORROSION INHIBITOR

- Migrates 3” within 28 days (SNMS and can verify depth with field cores)
- Forms protective layer on steel surface about 100 Å thick (XPS and SIMS)
- Displaces chloride ions from the steel surface (XPS and SIMS)
- Corrosion rate reduced over 65% (ASTM G109 and field monitoring/C-Probe)



- Highly effective with chloride content up to 6 lb/cy

SIKA FERROGARD 903
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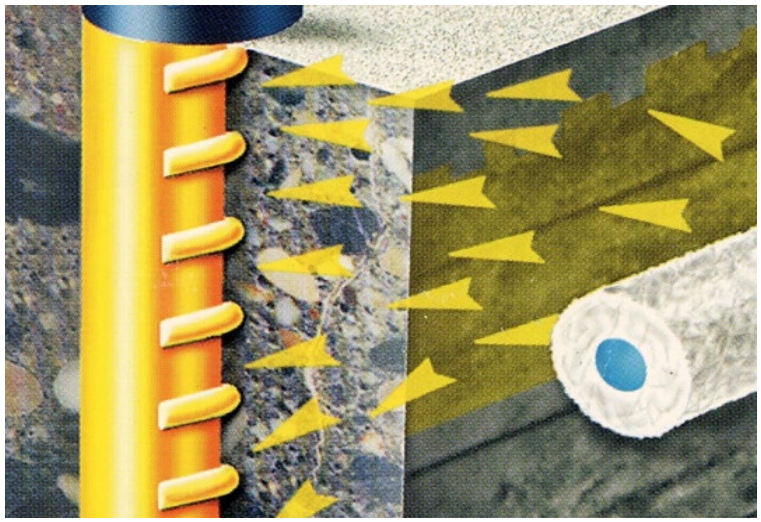
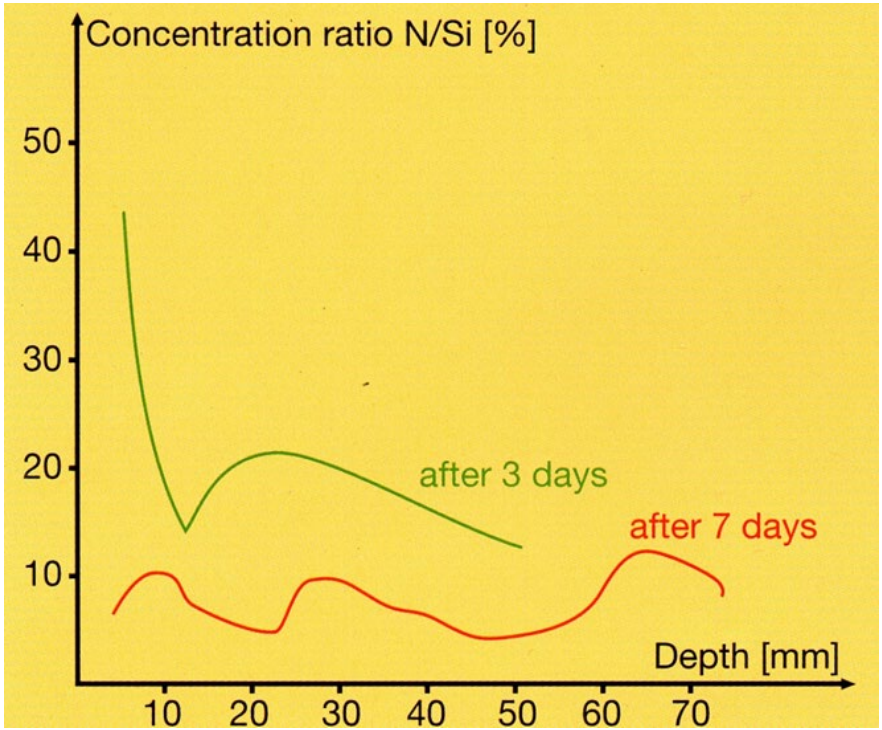


- Same penetration independent of orientation (soffit same as topside)



- Inhibitor has strong affinity to steel

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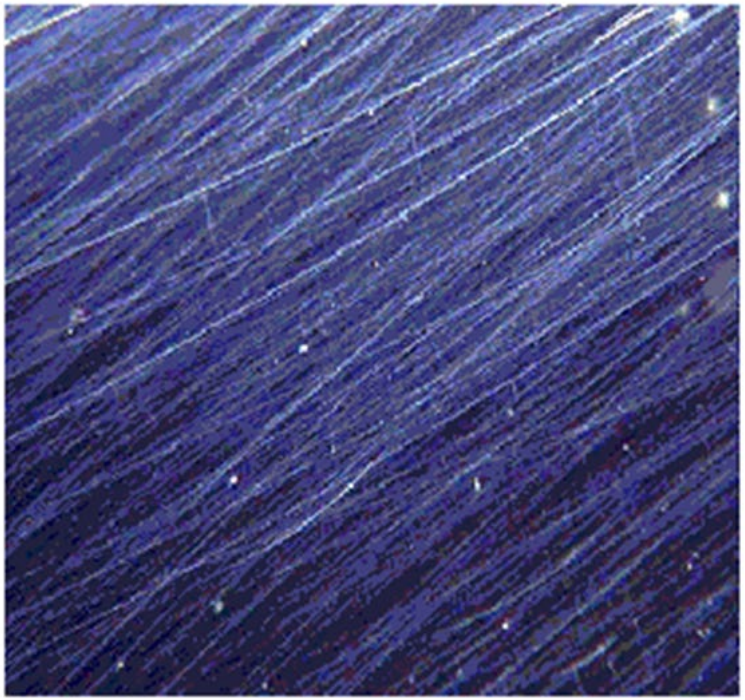
SIKA FERROGARD 903
MIGRATING CORROSION INHIBITOR



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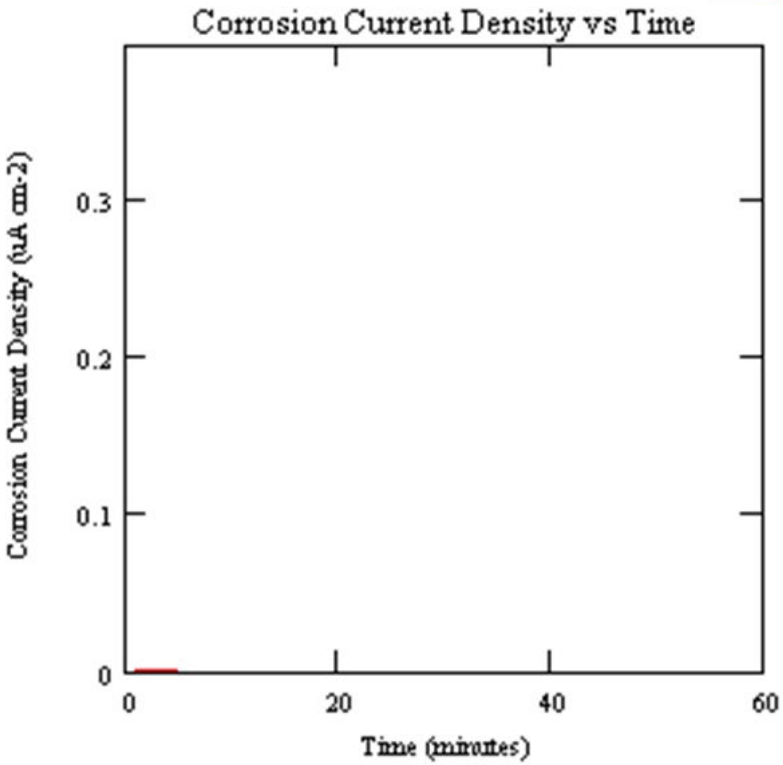
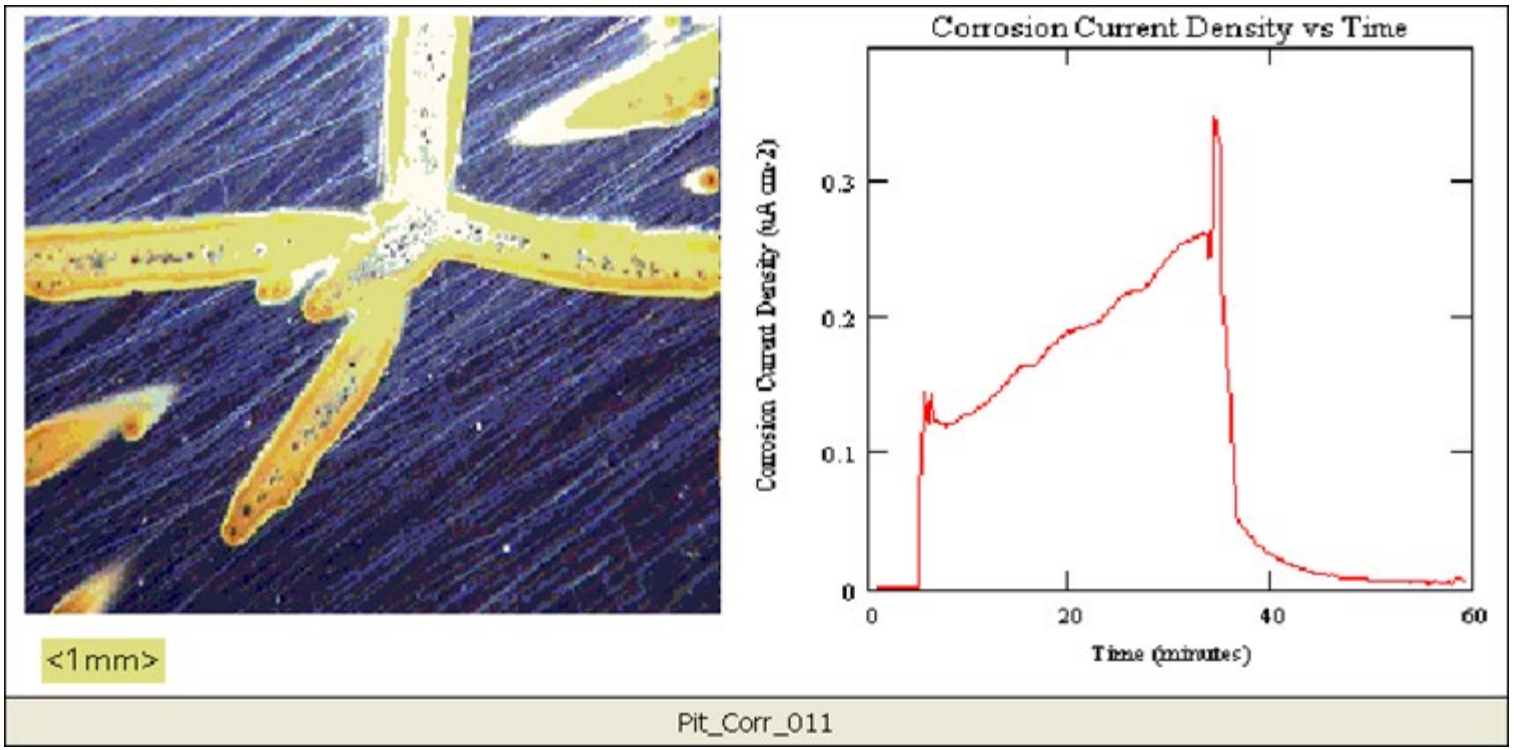


- Steel plate to have chloride solution applied to it
- Corrosion current to be measured

BUILDING TRUST

SIKA FERROGARD 903
MIGRATING CORROSION INHIBITOR

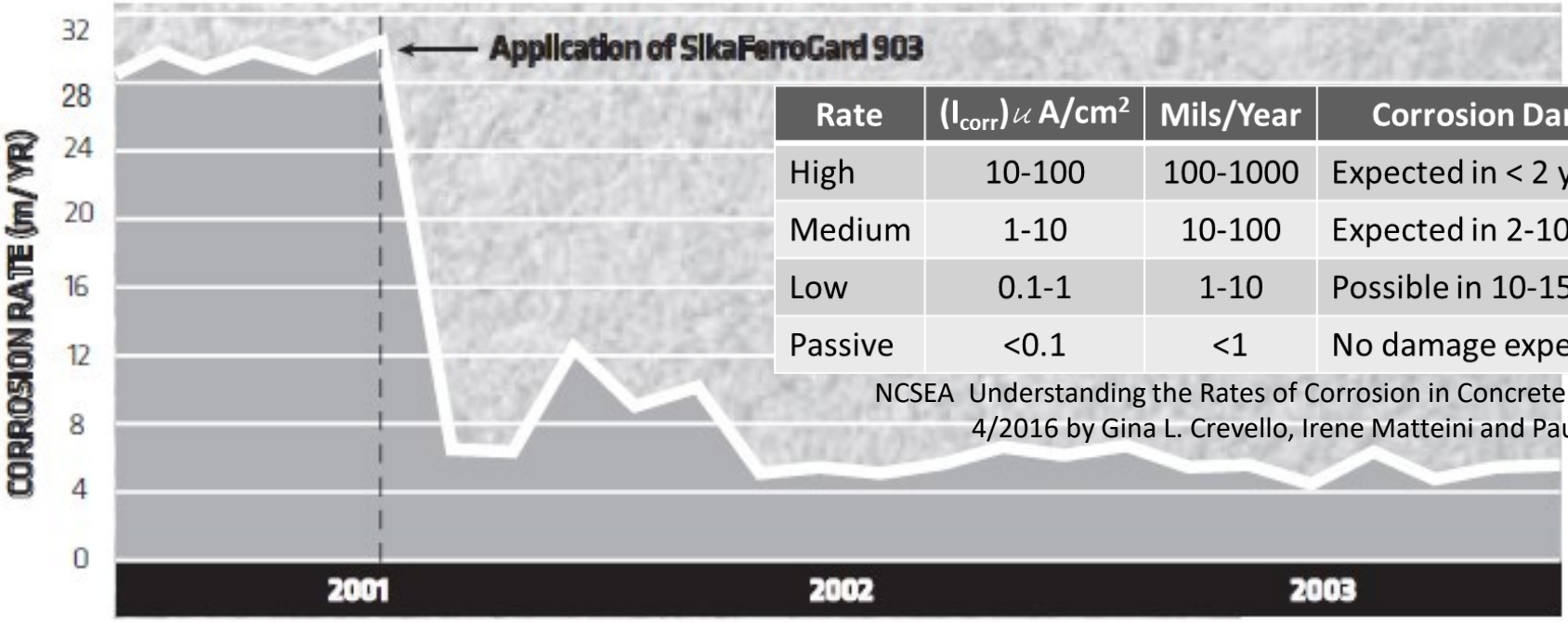


- Corrosion begins on plate and current increases
- Inhibitor is introduced, sudden spike
- Inhibitor displaces chlorides and attaches to steel
- The barrier coating protects steel and current is mitigated

SIKA FERROGARD 903
MIGRATING CORROSION INHIBITOR

- 65% corrosion reduction delays 3-year spall to 8.5 years
- 80% corrosion reduction delays 3-year spall to 15 years
- 90% corrosion reduction delays 3-year spall to 30 years

CORROSION RATE VALUES



Rate	(I_{corr}) μ A/cm^2	Mils/Year	Corrosion Damage
High	10-100	100-1000	Expected in < 2 years
Medium	1-10	10-100	Expected in 2-10 years
Low	0.1-1	1-10	Possible in 10-15 years
Passive	<0.1	<1	No damage expected

NCSEA Understanding the Rates of Corrosion in Concrete Structures
4/2016 by Gina L. Crevello, Irene Matteini and Paul A. Noyce

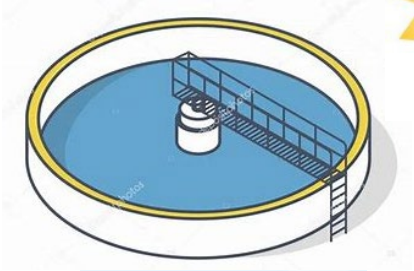
TEST DATE

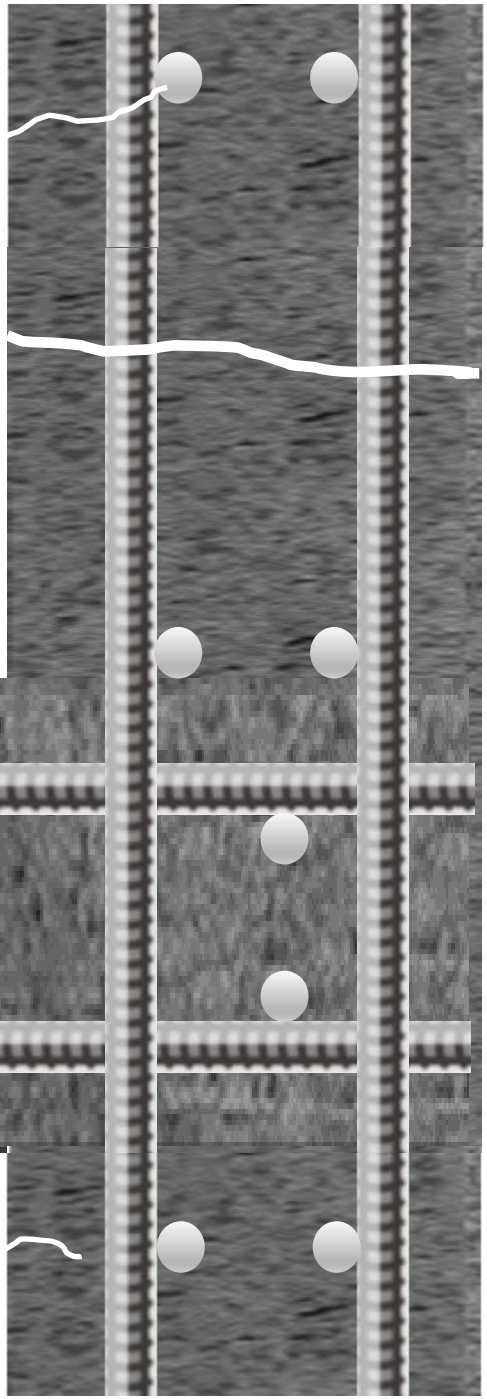
Monitoring and data provided by C-Probe Technologies Ltd.

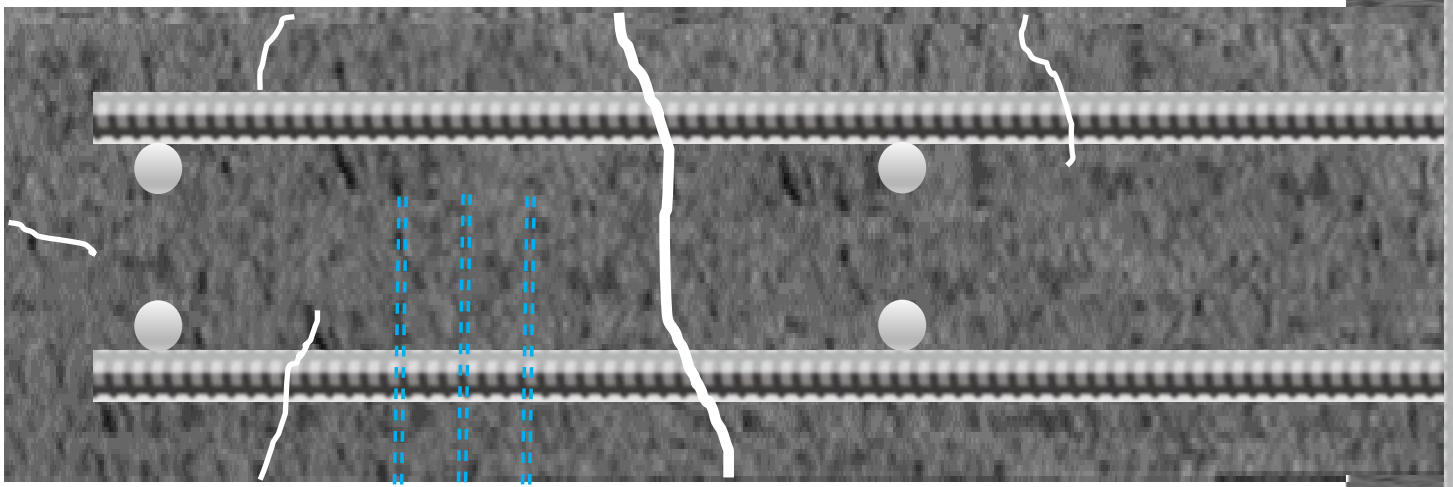
(MAVERICK BEACH RESORT)

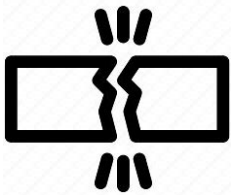
PROTECTION AT CONCRETE SURFACE (PROTECTIVE SEALERS AND COATINGS)

SERVICE REQUIREMENTS









RESISTANCE CAPABILITIES OF AVAILABLE MATERIALS

Generalization. Always consult PDS for the material's/system's specific properties.

	Silane	Cement	Acrylic	Urethane	Epoxy	Hybrid
Water	~ 85%	✓	✓	✓	✓	✓
Cracks	≤ 12 mils	≤ 15 mils	✓	✓	✗	✓
Chlorides	~ 85%	✓	✓	✓	✓	✓
CO2	🤔	✓	✓	✓	✓	✓
Freeze/thaw	✓	✓	✓	✓	✓	✓
Breathable	✓	✓	✓	✗	✗	✗
Pedestrian	✓	✓	🤔	✓	✓	✓
Vehicular	✓	🤔	✗	✓	✓	✓
UV light	✓	✓	✓	✓	🤔	✓
Immersion	✗	✓	✗	✗	✓	✓
Chemicals	✗	✗	✗	✗	✓	✓

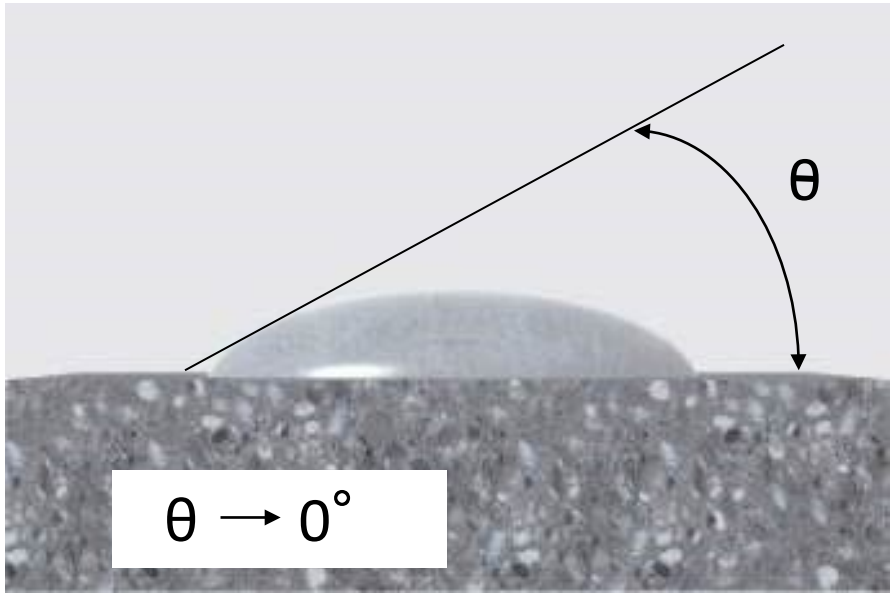
SIKAGARD SILANE SEALERS

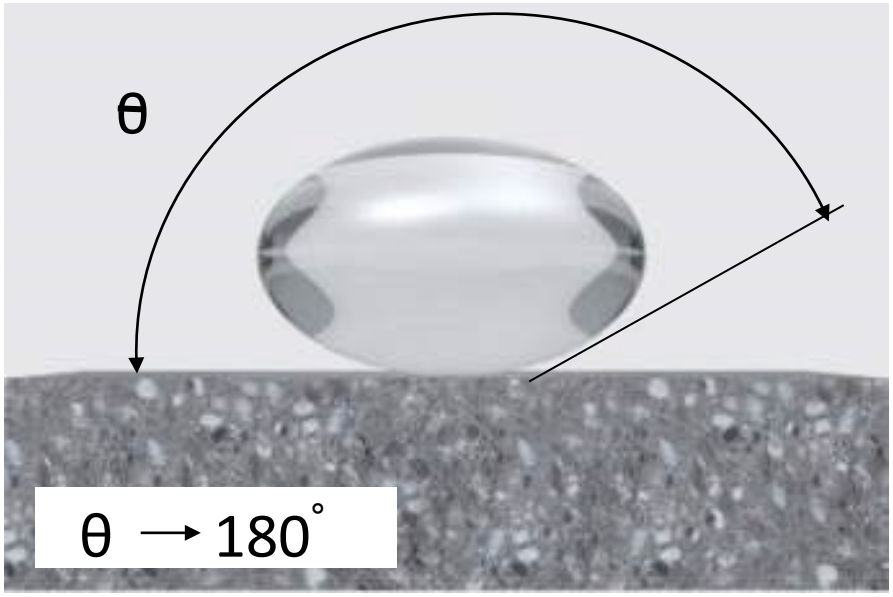
- Repel water and chlorides (screens out about 85%)
- Improve freeze/thaw resistance
- Do not alter appearance (keep cleaner)

Corporate Blvd, Linthicum Heights MD 2014

BUILDING TRUST

MECHANISM OF PROTECTION





Absorption of the water by the substrate!

The surface repels the water!

Non-Treated Substrate:

- The surface tension is higher than that of liquid water.
- The attraction from the substrate to the water is higher than the inter-attraction of the water molecules.

Treated Substrate:

- Reduction of the surface tension by the hydrophobic impregnation
- The inter-molecular attraction of the water molecules is then much higher than the attraction of the water into the substrate.

BUILDING TRUST

SIKAGARD SEALERS – DRYING EFFECT

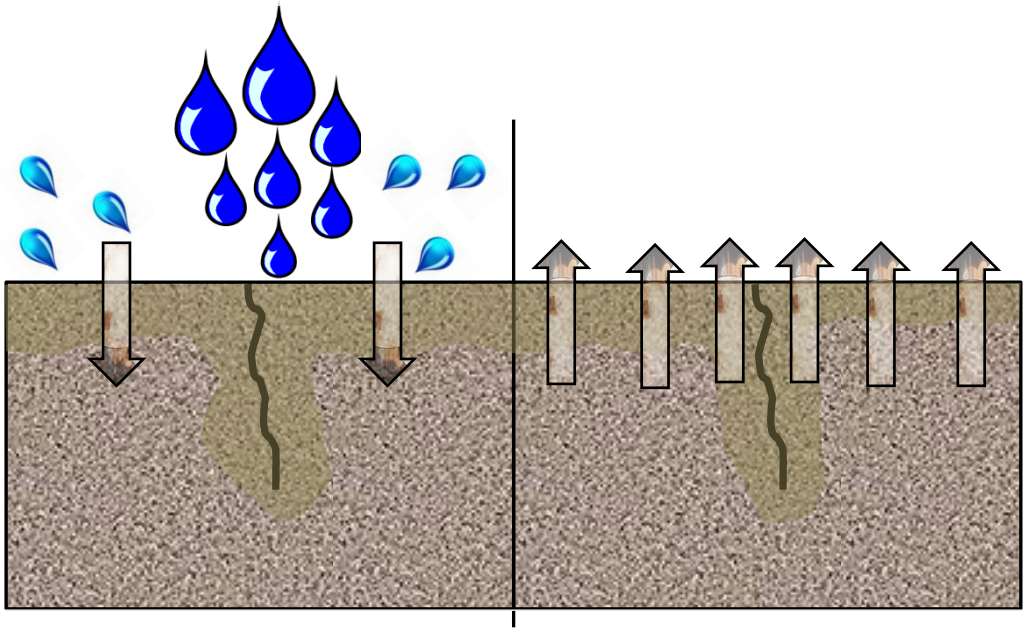
WET PERIOD

- Liquid water does not penetrate the concrete
- Water vapor can enter the concrete

DRY PERIOD

- Water vapor can evaporate

Silane penetrates for several millimetres in the concrete and along cracks



Net effect: Relative humidity of the concrete decreases

Less moisture is available for corrosion to develop

SIKAGARD SILANE SEALERS

- Sikagard 740W 40% ~ ¼” penetration
- Sikagard 705L 100% ~ ½” penetration
- 100% silane best for traffic decks to resist hydrostatic pressure
- Simple pump sprayer application

SIKAGARD SILANE SEALERS

- Drum pump sprayer for higher production
- Coat evenly and avoid puddling
- NCHP 244 testing done at 125 sf/gal total consumption
- Decks done best with 2 coats
- Walls/OH best with 3 coats

SIKAGARD SILANE SEALERS

- Can apply next coat as soon as surface is dry (not glistening)
- Blow or broom out any puddles
- Completely dry in ~ 6 hours and ready for service

SIKAGARD SILANE SEALERS

- Excellent repellency of both water and oil with Sikagard 705 OWR

WMATA North Largo Metro Garage, 2018

BUILDING TRUST

SIKAGARD SILANE SEALERS

BUILDING TRUST

SIKAGARD SILANE SEALERS

- 5 years after application
- Treated area still not absorbing
- Can even see where bucket rundown protected
- Sikagard 701W siloxane last 5+ years
- Sikagard 740W 40% silane last 10+ years
- Sikagard 705L 100% silane last 15+ years

SIKAGARD SILANE SEALERS

- Verify repellency with RILEM tube testing (before and after application)
- Verify penetration with cores

SIKAGARD FLEXCOAT

- Polymer-modified, cement-based coating
- Waterproofing
- Breathable
- Conceals fine cracks ~ 15 mils (1/64” wide)

BUILDING TRUST

SIKAGARD FLEXCOAT

- Best installed in 2 coats by squeegee or roller

- 120 mils (~1/8”) total thickness

BUILDING TRUST

SIKAGARD FLEXCOAT

- Resurface scaled/pitted concrete
- Apply 1st coat by squeegee to level

BUILDING TRUST

SIKAGARD FLEXCOAT

- 2nd coat receives preferred finish
- Typical concrete appearance

BUILDING TRUST

SIKAGARD FLEXCOAT

- Roller, broom, or knockdown finish
- Protection completed

BUILDING TRUST

SIKAGARD FLEXCOAT SYSTEM

- Add color with Sikagard FlexCoat ATC

8900 Battery Place, Bethesda MD 2018

BUILDING TRUST

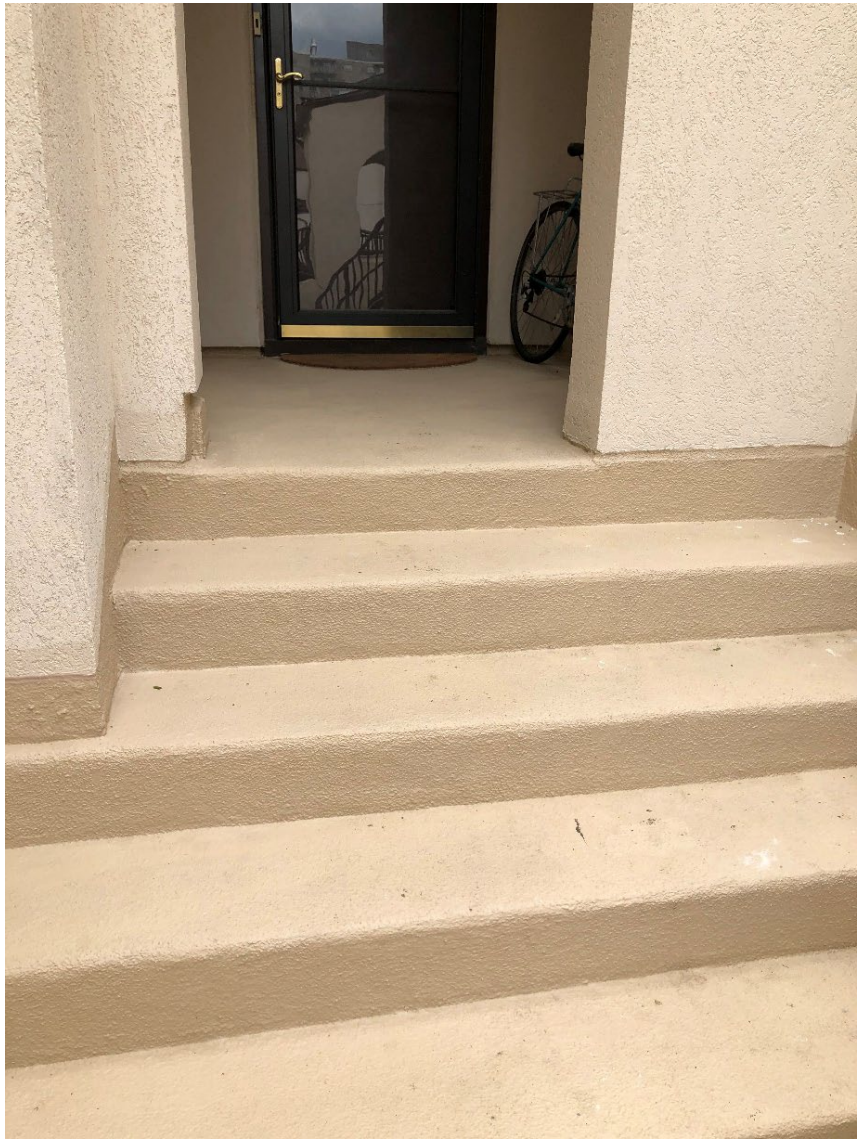
SIKAGARD FLEXCOAT SYSTEM

PROJECT REQUIREMENTS

- Waterproofing over occupied space
  (FlexCoat not recommended over occupied space)
  (stairs going up to landings)
- Hide concrete repairs
- Level rough surfaces
- Suitable for on-grade service
- Conceal wider treated cracks
- Conceal fine cracks
- Perform in seldom dry walk-down areas
- Install in sections to allow use of sole entries and common areas
- Final total uniform appearance
- Easy maintenance

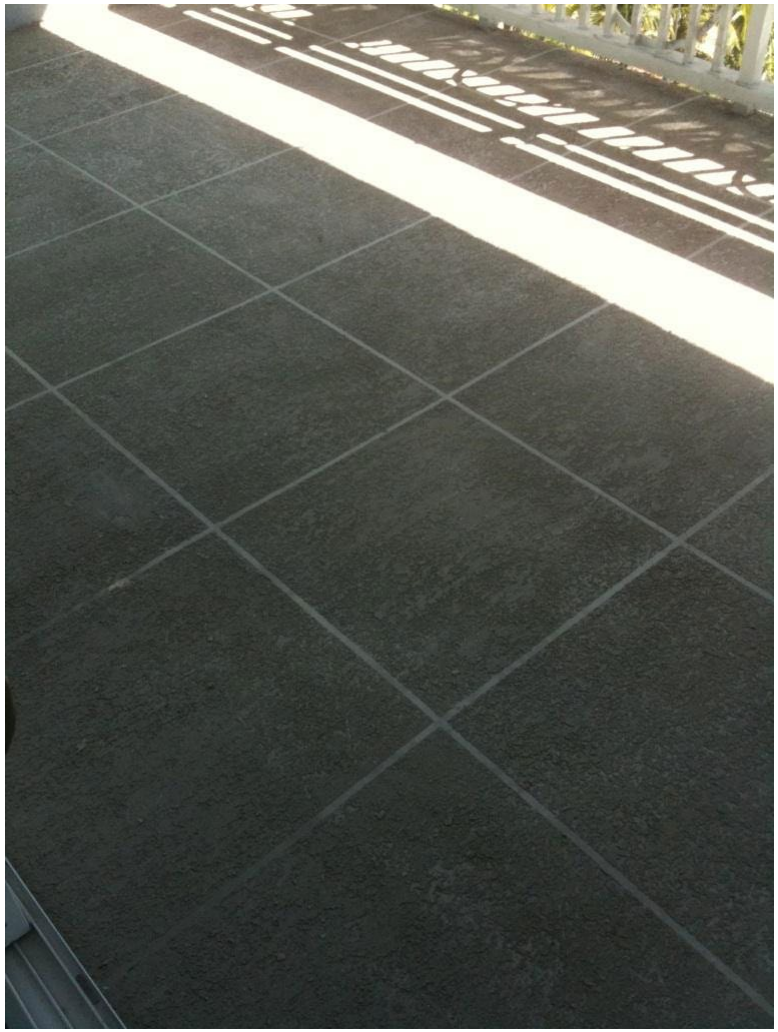
BUILDING TRUST

SIKAGARD FLEXCOAT SYSTEM



- Sikagard FlexCoat ATC applied in 2 coats for a total of 5 mils
- Color will last, but it will wear
- Very easy to touchup
- Sikagard 620 FlexCoat CC can be applied for additional clear coat protection

SIKAGARD FLEXCOAT SYSTEM



- Grout lines can both vary in color and texture

BUILDING TRUST

SIKAGARD FLEXCOAT SYSTEM

- Best to repair cracks with low-viscosity epoxy than urethane sealant
- Best to honor all joints
- Reinforcing embedding mesh available

SIKAGARD FLEXCOAT SYSTEM

- Avoid trapping moisture
- Natural coir is breathable

BUILDING TRUST

SIKAGARD FLEXCOAT SYSTEM

- Photo taken 6 years after installation
- Cracks pretreated
- Joints honored

The Refuge, Selbyville DE 2015

BUILDING TRUST

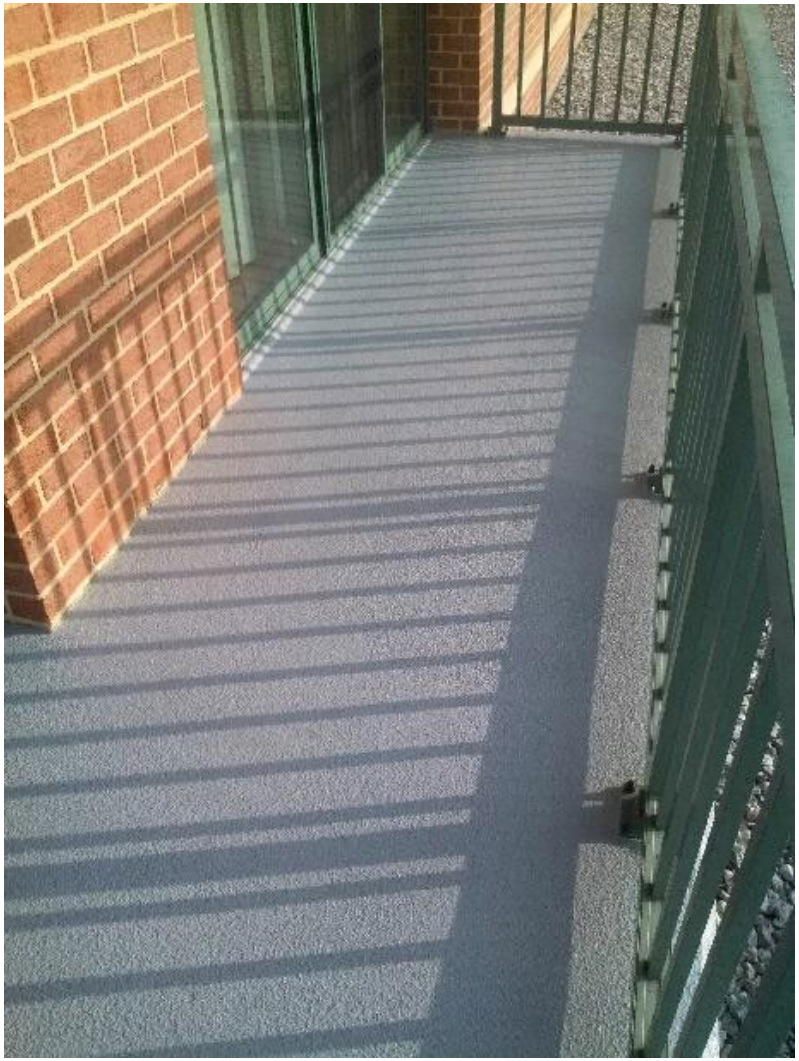
SIKAGARD FLEXCOAT SYSTEM

- Protective
- Decorative
- Breathable

BUILDING TRUST

SIKALASTIC 726 BALCONY ONE SHOT

- Polyurethane coating
- Waterproofing
- Elastomeric
- Aliphatic
- Lo-VOC
- Integral aggregate



BUILDING TRUST

SIKALASTIC 726 BALCONY ONE SHOT

SINGLE COAT

- Spread by 1/4” notched squeegee at 50 sf/unit (1.33-gal unit)

BUILDING TRUST

SIKALASTIC 726 BALCONY ONE SHOT

SINGLE COAT

- Back-roll twice (0° and 90°)

BUILDING TRUST

SIKALASTIC 726 BALCONY ONE SHOT

SINGLE COAT

- 35 mils
- All aliphatic resin
- Integral aggregate for improved durability and increased uniformity
- Return to service in 8 hours

WARRANTIES

- 1-year standard
- 5-year limited material
- 5 + 5-year limited material

BUILDING TRUST

SIKALASTIC TRAFFIC SYSTEMS

Stevenson University Stadium, Owing Mills MD
Installed 2011, Pictures 2016

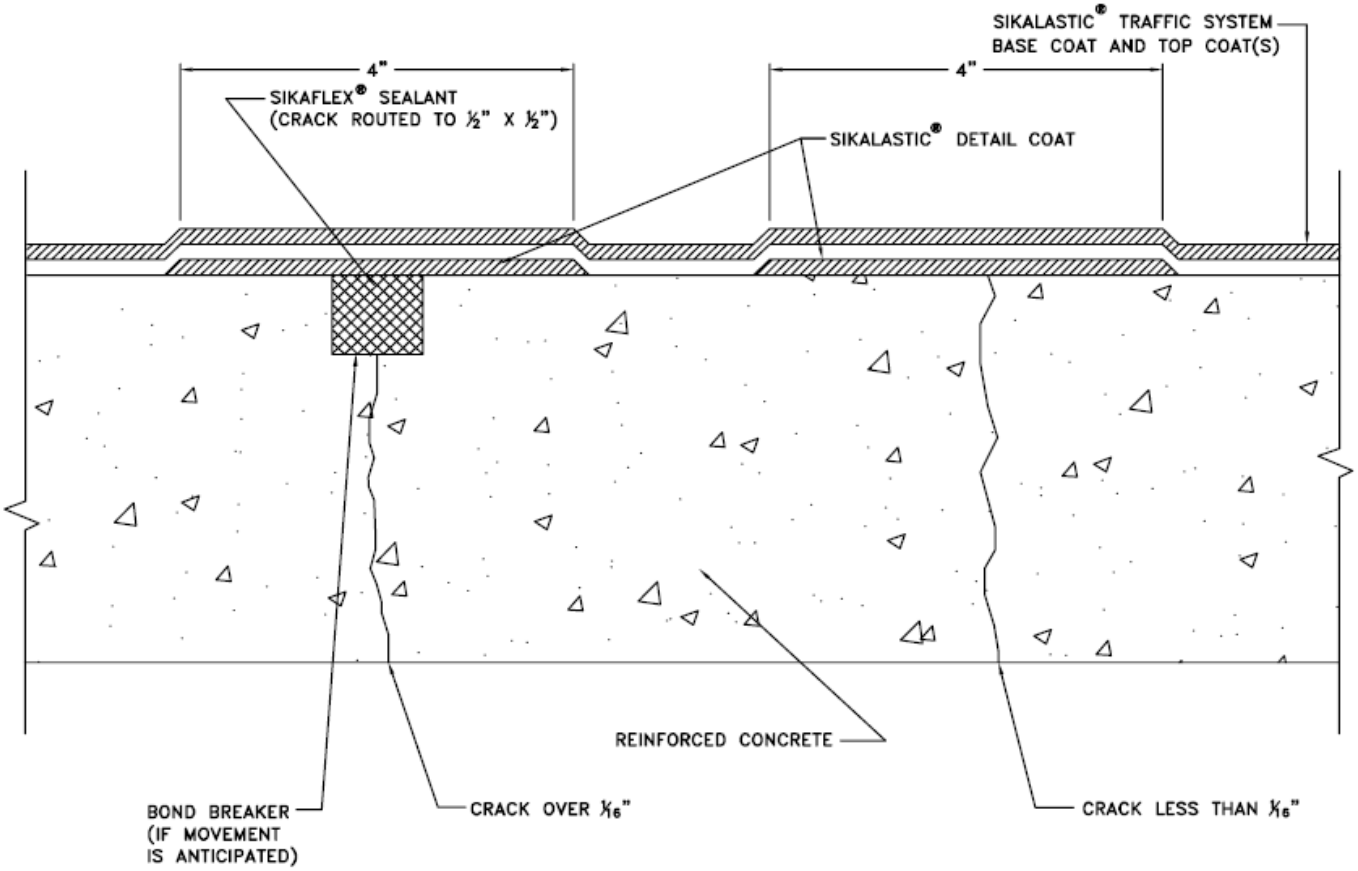
BUILDING TRUST

SIKALASTIC TRAFFIC SYSTEMS

Stevenson University Stadium, Owing Mills MD
Installed 2011, Pictures 2016

BUILDING TRUST

SIKALASTIC TRAFFIC SYSTEMS

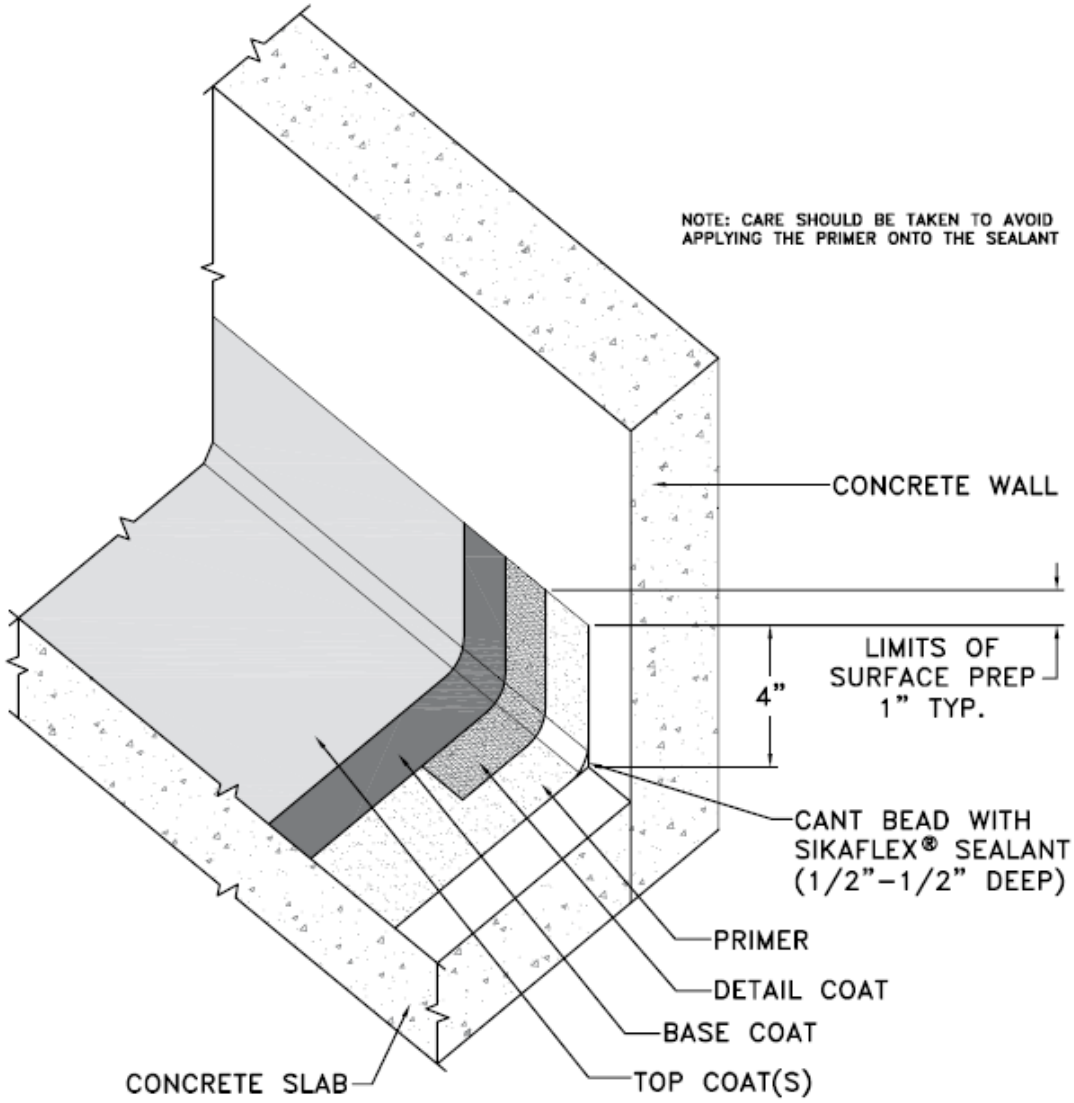


CRACKS

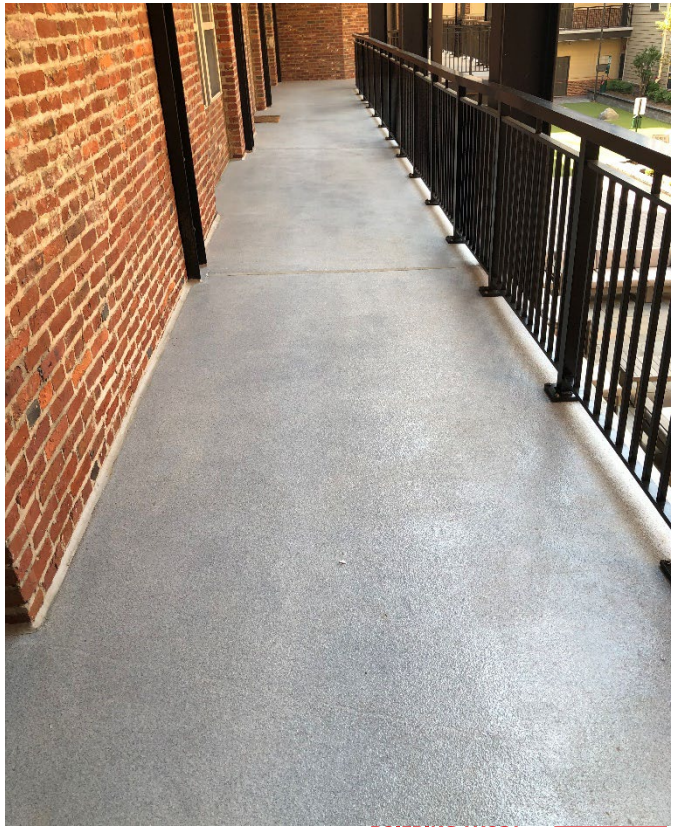
- ≥ 1/16": rout ½" by ½" and seal with Sikaflex sealant, apply 4" wide detail coat 30 mils thick
- < 1/16": apply 4" wide detail coat 30 mils thick

BUILDING TRUST

SIKALASTIC TRAFFIC SYSTEMS



- Install cove bead of sealant and coat over for cove base
- Or coat to wall and install cove bead of sealant
- Same for rail posts



SIKALASTIC TRAFFIC SYSTEMS

STANDARD COLORS

- Gray and Tan
- Can go under tile

SIKALASTIC TRAFFIC SYSTEMS

The Fountains Condominiums Sports Deck, Alexandria VA 2015

SPECIAL COLORS

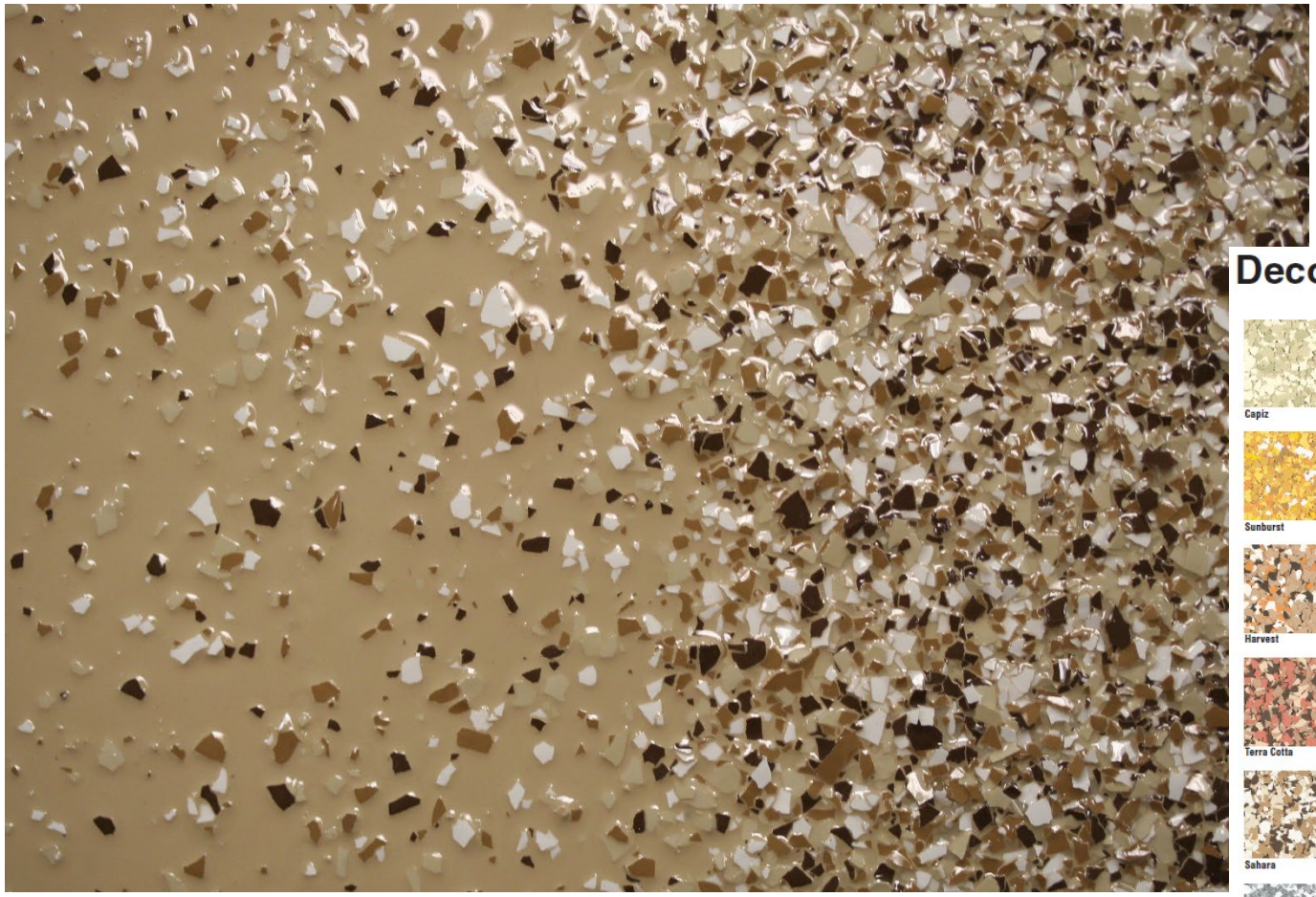
- Made to order

SIKALASTIC TRAFFIC SYSTEMS

SPECIAL COLORS

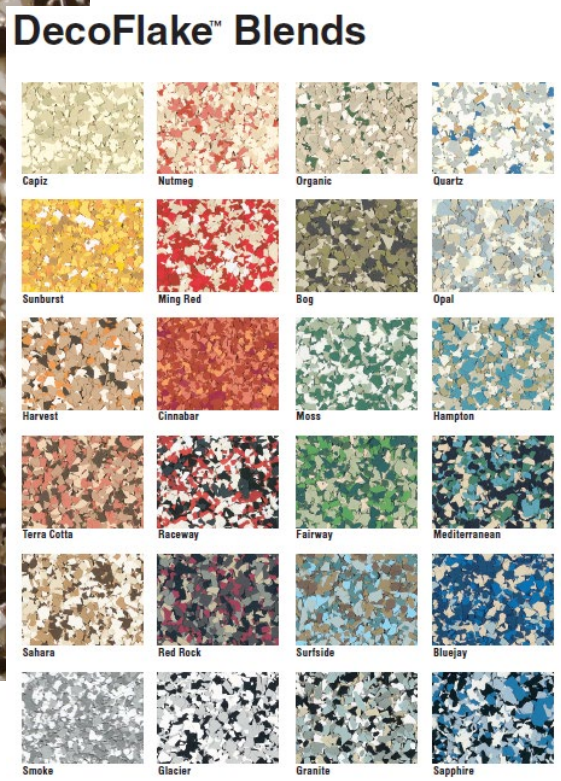
- Color packs

SIKALASTIC TRAFFIC SYSTEMS



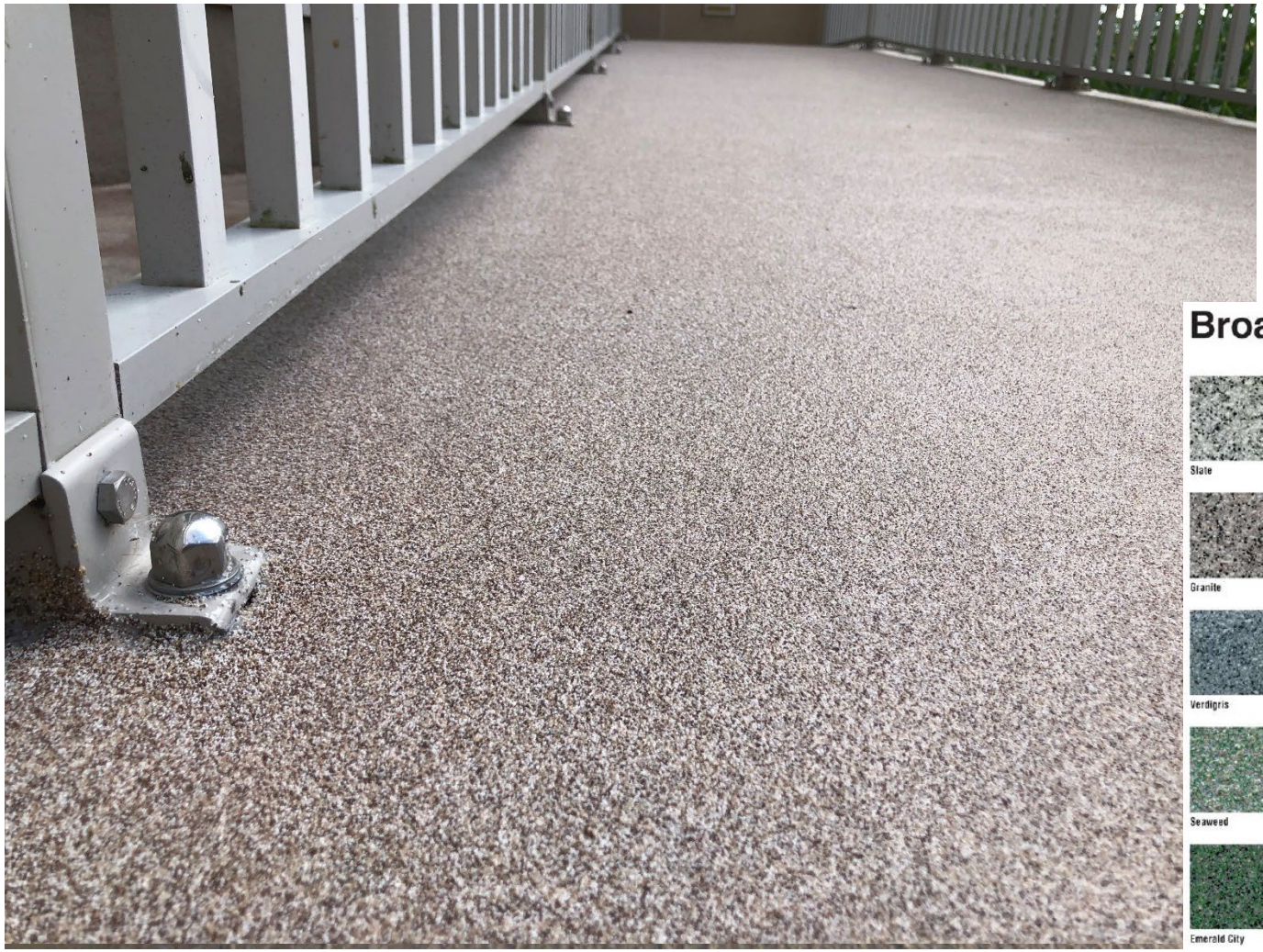
SPECIAL COLORS

- Colored flakes
- Clear top coat



BUILDING TRUST

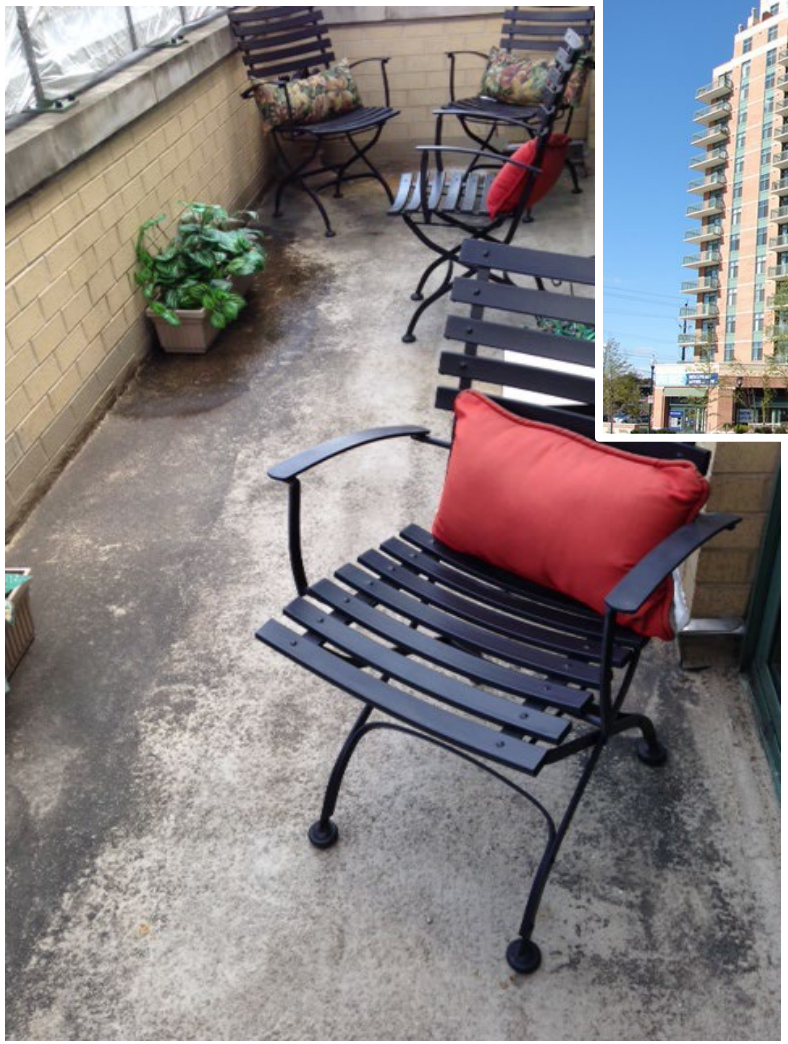
SIKALASTIC TRAFFIC SYSTEMS



SPECIAL COLORS

- Color quartz aggregate
- Clear top coat

SIKALASTIC TRAFFIC SYSTEMS



The Sterling, North Bethesda MD 2014

Attractive waterproofing protection

BUILDING TRUST

SIKALASTIC 325 LO-VOC

- Polyurethane coating
- Waterproofing
- Elastomeric
- Aliphatic
- Lo-VOC
- **Fully reinforced**

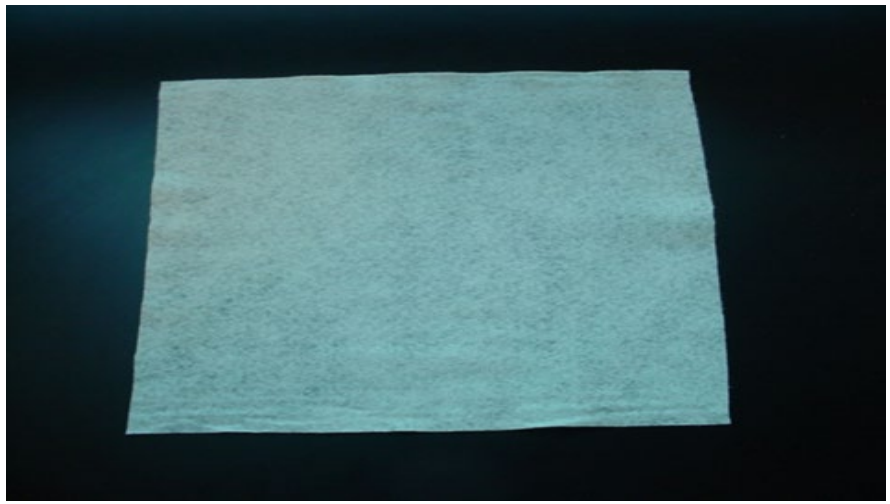
- Premium waterproofing ideal for balconies over occupied space
- Up to 20-year Limited Material Warranty

BUILDING TRUST

SIKALASTIC 325 LO-VOC

Polyester Fleece:

- Woven
- Non-conformable
- Must be cut, lapped, and tends to result in ‘tenting’ around details and bridging across substrate high points
- Allows same day installation



Fiberglass Reemat:

- Non-woven
- Conformable – fully bonded

BUILDING TRUST

SIKALASTIC 325 LO-VOC

Polyester Fleece

Fiberglass Reemat

BUILDING TRUST

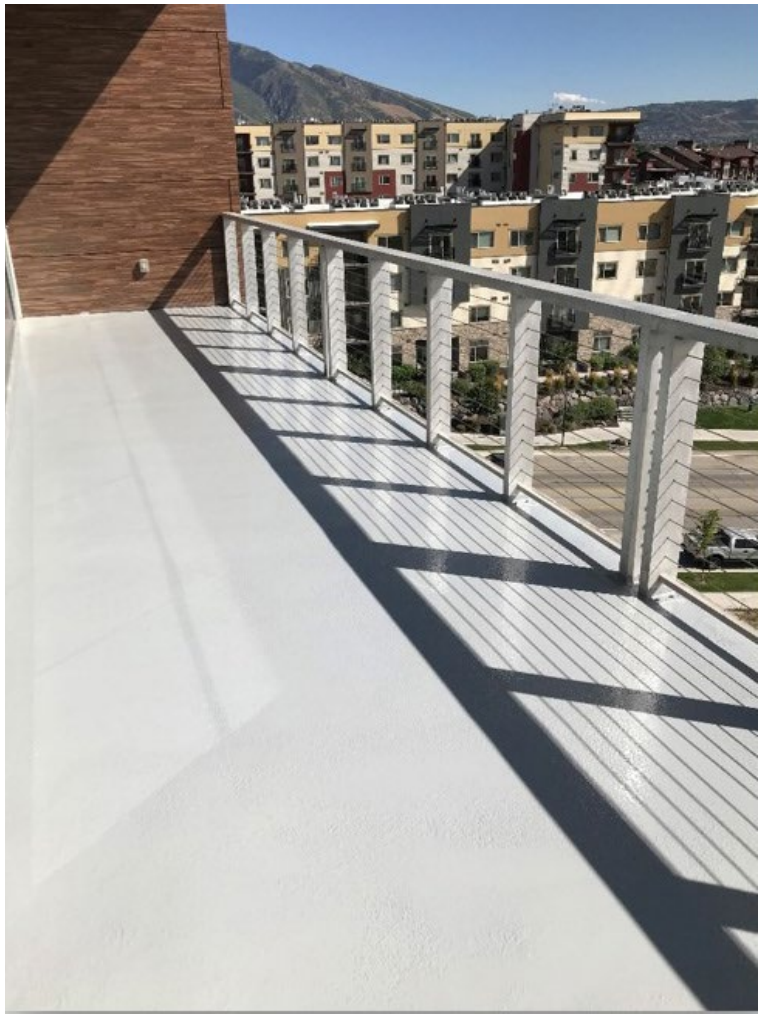
SIKALASTIC 325 LO-VOC

- Apply base coat by roller at 45 mils (35 sf/gal)
- 1-component so no pot life issues
- Moisture triggered chemistry is rain resistant in 10 minutes

SIKALASTIC 325 LO-VOC

- Top coat is applied at 50 mils (32 sf/gal) for a 20-year limited material warranty waterproofing system
- Apply another 16 mils (100 sf/gal) seeded with aggregate and back-rolled for slip-resistant wear coat

SIKALASTIC 325 LO-VOC



Attractive, fully-reinforced, waterproofing protection

BUILDING TRUST

SIKAGARD ACRYLIC WALL/SOFFIT COATINGS

HARD COATINGS

Sikagard 615 DPR

- Economical lasting color

Sikagard 670W

- Anti-carbonation

Sikagard 575 Aquasol

- Hydrophobic, photocatalytic

ELASTOMERIC COATINGS

Sikagard 515 Elastomeric

- Economical lasting color

Sikagard 550W Elastocolor

- Anti-carbonation

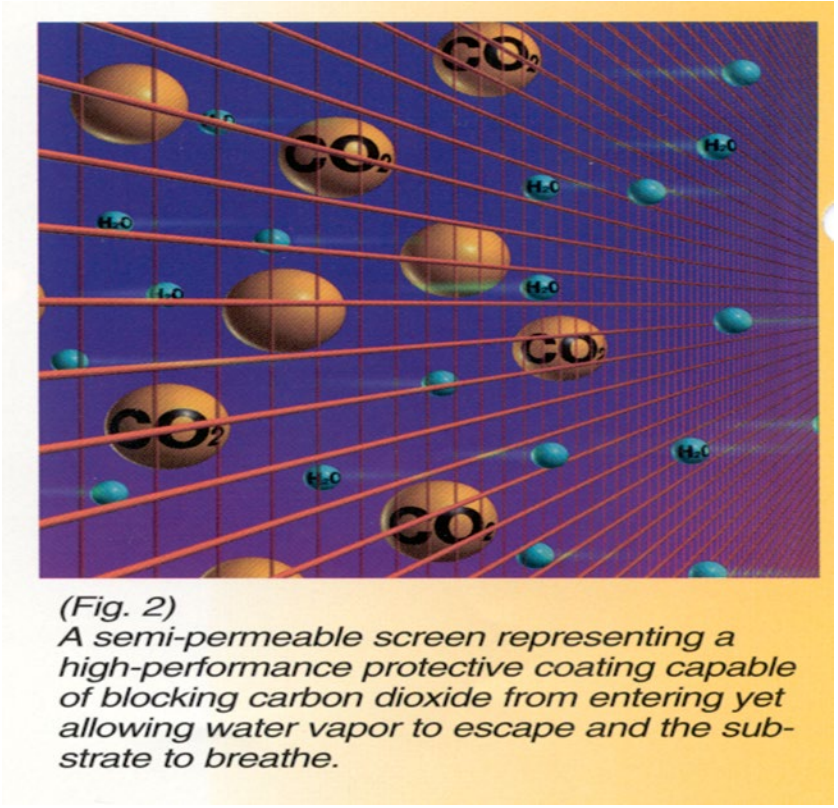
Sikagard 570

- Anti-carbonation, UV hardened skin


Fayette St Post Office, Baltimore 2011

SIKAGARD ACRYLIC WALL/SOFFIT COATINGS

- Allow vapor transmission but stop water, chlorides, and carbon dioxide



(Fig. 2)
A semi-permeable screen representing a high-performance protective coating capable of blocking carbon dioxide from entering yet allowing water vapor to escape and the substrate to breathe.

BUILDING TRUST

SIKAGARD 550W ELASTOCOLOR

Before

After

BUILDING TRUST

SIKAGARD 670W

Jessup MD 2020

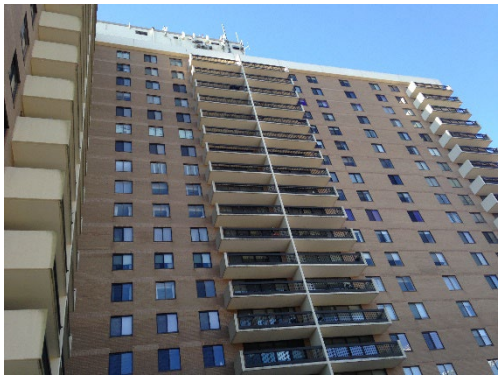
BUILDING TRUST

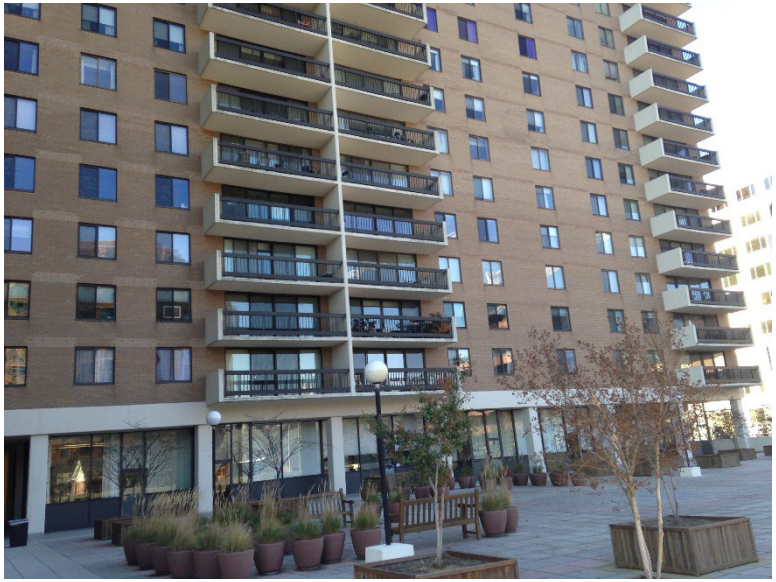
SIKAGARD 550W ELASTICOLOR

- Coating at 15 years old
- Actively protecting
- Looks good except where planter runoff occurs on face of balconies
- Could just power wash clean

SIKAGARD 550W ELASTICOLOR

- Pressure wash
- Refresh top coat





REPAIR & PROTECT

REPAIR

- Sika Armatec 110 EpoCem
- Sikacrete 100 CI

PROTECT

- Sikagard 670W
- Sikagard FlexCoat with ATC
- Sikalastic Traffic System

PROTECTIVE COATINGS

Sikagard 670W on vertical elements and soffit of decks

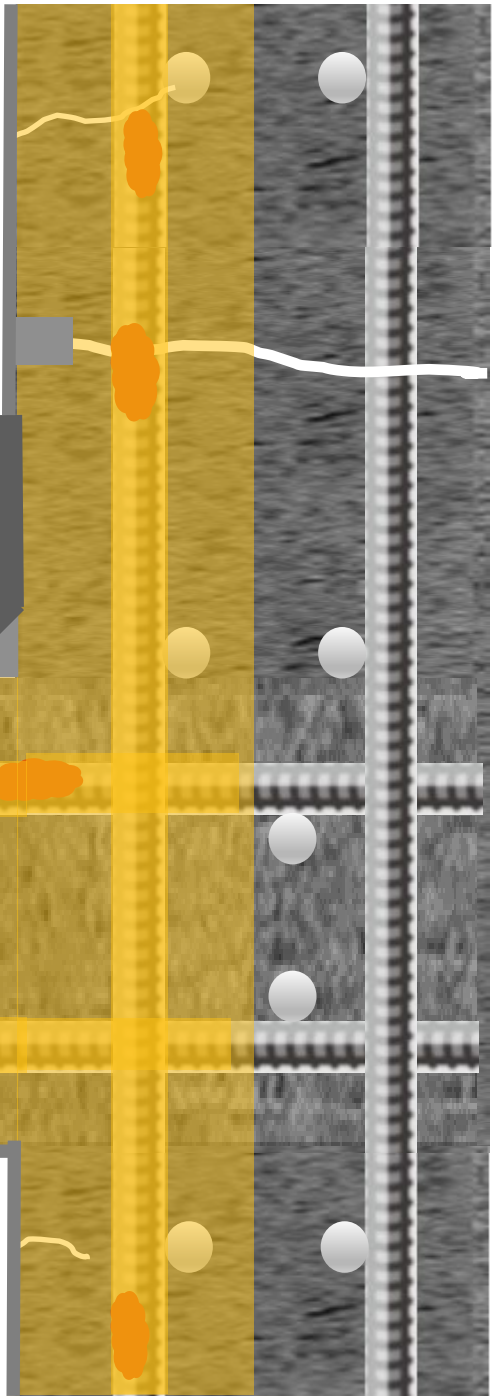
Sikagard FlexCoat System for on-grade traffic

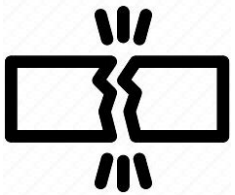
Sikalastic Traffic System on structural decks

The Mondrian, DC 2011

BUILDING TRUST

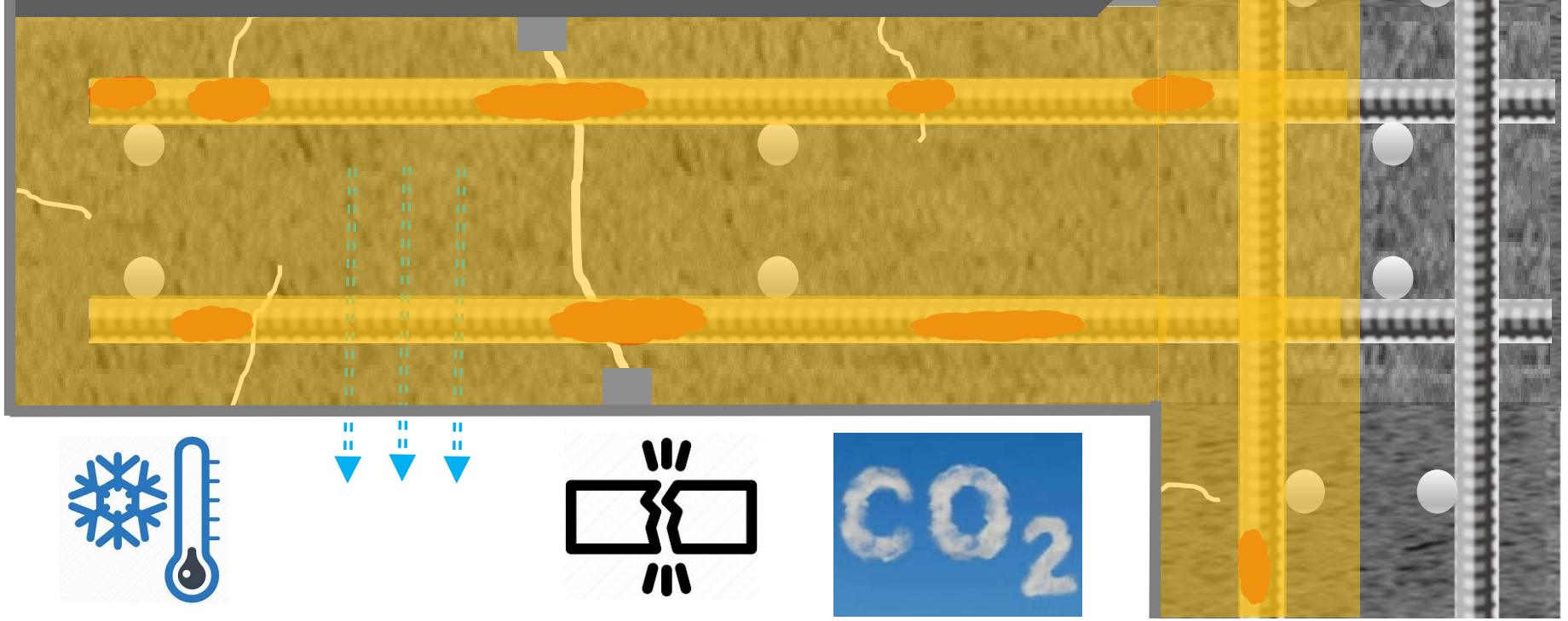
SERVICE REQUIREMENTS





TOTAL PROTECTION

Buildings

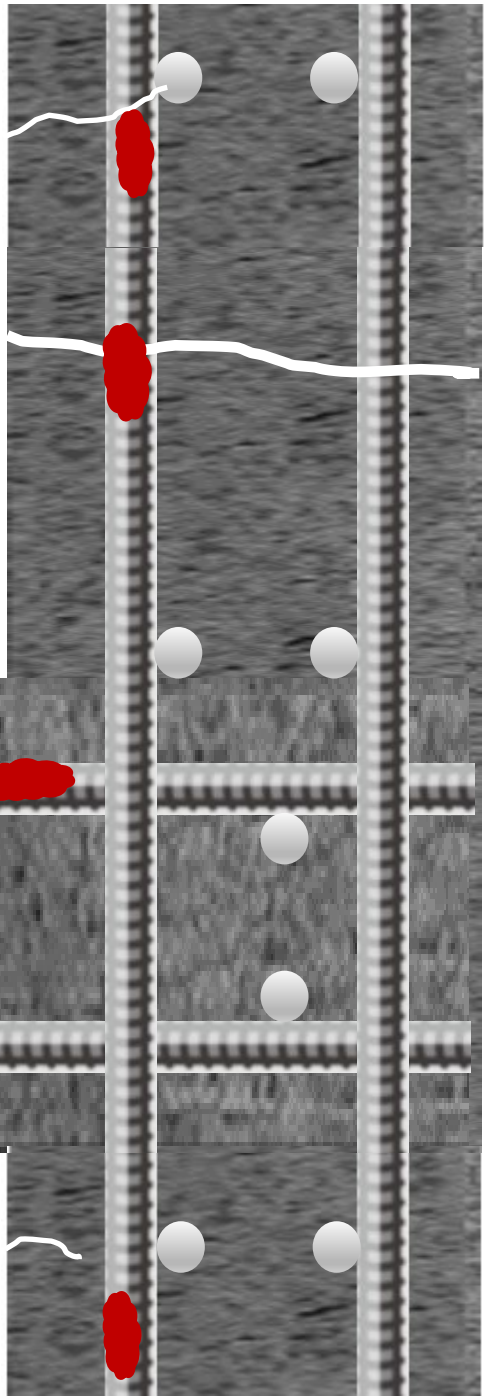


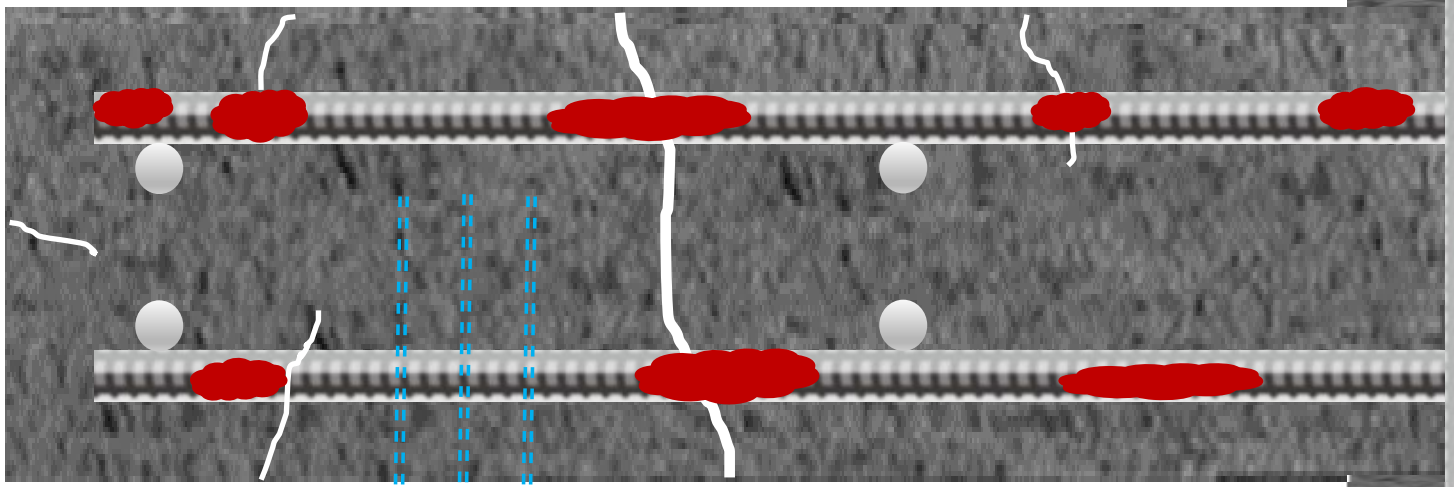
SIKALASTIC AND SIKAGARD TOTAL BUILDING PROTECTION

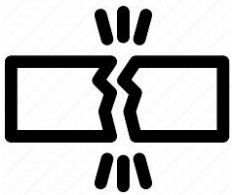
The Philadelphian, 2014

BUILDING TRUST

SERVICE REQUIREMENTS







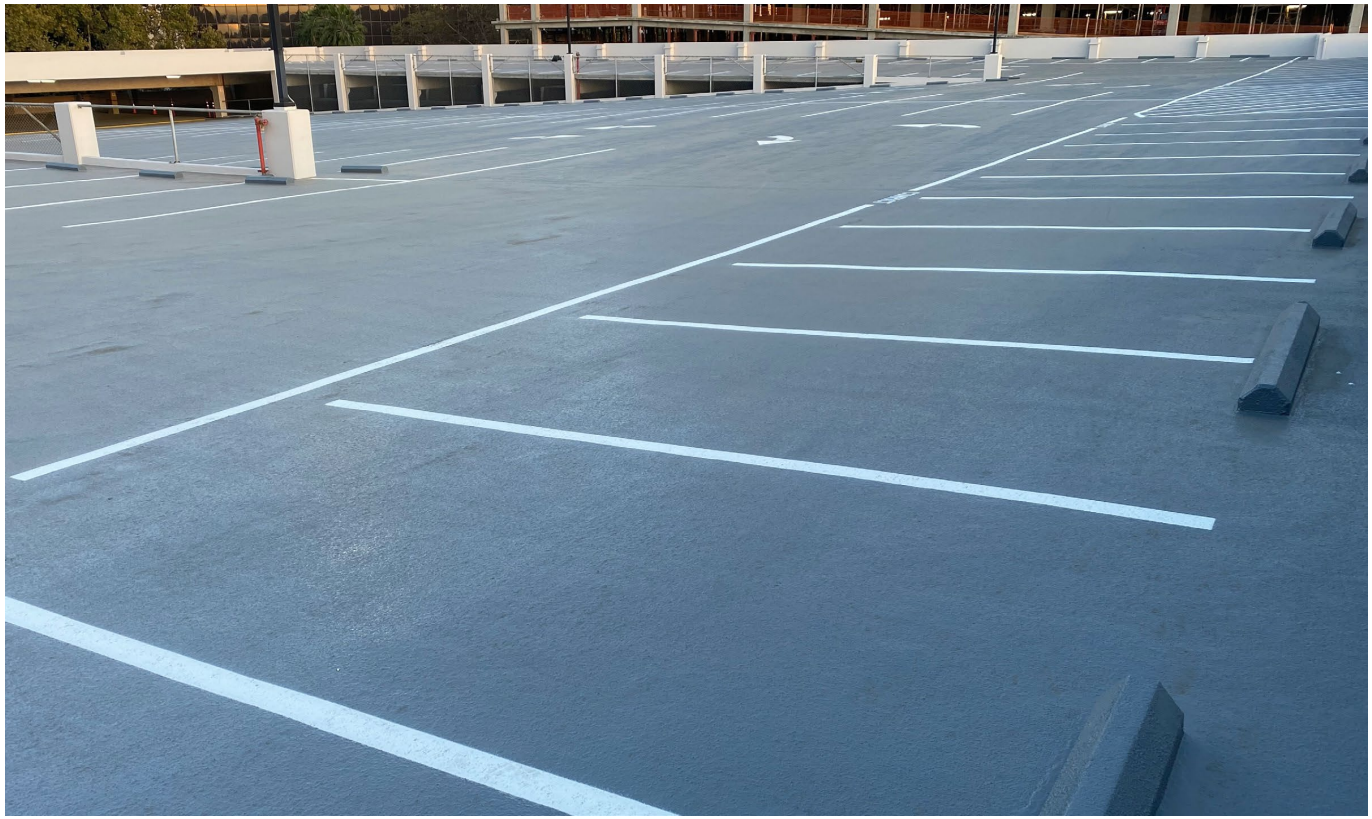
SIKALASTIC VEHICULAR TRAFFIC BEARING MEMBRANES

Franconia-Springfield Metro Station, VA 2015

BUILDING TRUST

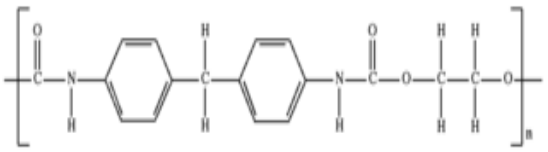
SIKALASTIC TRAFFIC BEARING MEMBRANE (TRADITIONAL)

- Primer, urethane base coat, urethane seeded wear coat, urethane seeded top coat
  ~ 23 mils ~ 14 mils ~ 18 mils



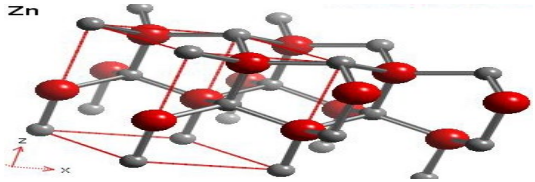
- Seamless, durable waterproofing protection
- Sikalastic Primer
  Sikalastic 720
  Sikalastic 745 AL
  Sikalastic 745 AL

Aromatic



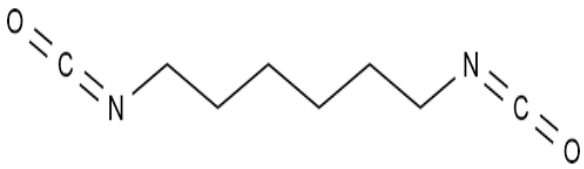
- Aromatic rings absorb UV light, thus making them very sensitive to UV degradation
- Chalk and darken over time
- Plasticizers break down, lose elasticity
- Lower cost
- Used for base coats, can use for interior top coats

Aromatic with UV Stabilizers



- Nano Zinc Oxide molecules are used as UV stabilizers
- The lighter density causes the particles to reside near the top
- nZnO blocks most of the UV rays from penetrating into the aromatic rings of the material

Aliphatic



- Aliphatic urethanes have a molecular structure containing a straight-line chain preventing UV absorption
- Higher cost
- Last longer with much better color retention
- Harder surfaces with more gloss
- Extra effort needed to bond to them

SIKALASTIC TRAFFIC BEARING MEMBRANE (TRADITIONAL)

- Primer, urethane base coat, urethane seeded wear coat, urethane seeded top coat

Northampton Place, Alexandria VA 2016

- Seamless, durable waterproofing protection

- Sikalastic Primer
  Sikalastic 720
  Sikalastic 745 AL
  Sikalastic 745 AL

SIKALASTIC TRAFFIC BEARING MEMBRANE (TRADITIONAL)

- Primer, urethane base coat, urethane seeded wear coat, urethane seeded top coat

- Seamless, durable waterproofing protection

- Sikalastic Primer
  Sikalastic 390
  Sikalastic 391
  Sikalastic 391

Rayburn House Office Building, DC 2018

BUILDING TRUST

SIKALASTIC DECK PROTECTION

601 Calvert Street, Baltimore 2018

- Seamless, durable waterproofing protection

- Sikalastic Primer
  Sikalastic 390
  Sikalastic 391
  Sikalastic 395

BUILDING TRUST

SIKAGARD WALL PROTECTION

- Seamless, breathable waterproofing protection
- Sikagard 550W Elastocolor

601 Calvert Street, Baltimore 2018

BUILDING TRUST

SIKALASTIC AND SIKAGARD PROTECTION

601 Calvert Street, Baltimore 2018

Attractive Protection

- Water
- Chlorides
- CO2
- UV light

BUILDING TRUST

SIKALASTIC TRAFFIC BEARING MEMBRANE (TRADITIONAL)

- Primer, urethane base coat, urethane seeded wear coat, urethane seeded top coat
  ~ 23 mils ~ 14 mils ~ 18 mils

WMATA Shady Grove Station, Derwin MD
Installed 2018, Pictures 2022
Double-tee precast panel construction

- Seamless, durable waterproofing protection

- Sikalastic Primer
  Sikalastic 720
  Sikalastic 745 AL
  Sikalastic 745 AL

BUILDING TRUST

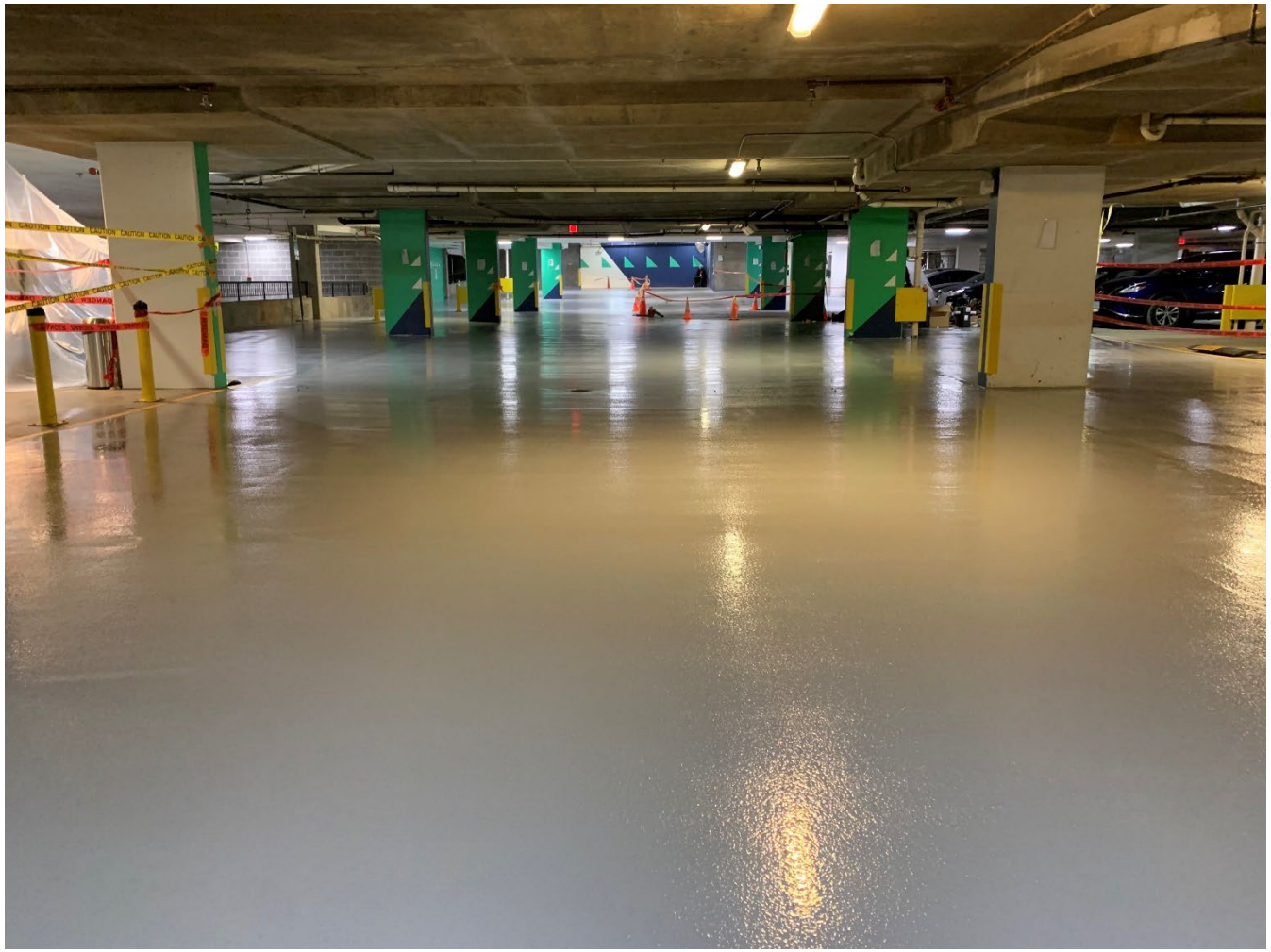
SIKALASTIC TRAFFIC BEARING MEMBRANE (TRADITIONAL)

- Primer, urethane base coat, urethane seeded wear coat, urethane seeded top coat
  ~ 23 mils ~ 14 mils ~ 18 mils

WMATA Shady Grove Station, Derwin MD
Installed 2018, Pictures 2022
Double-tee precast panel construction

SIKALASTIC 720 ONE SHOT

- Primer, Sikalastic 720 One Shot



Bell Arlington Ridge Apts, 2400 24th Rd South, Arlington 2021

Benefits

- More durable
- 2 less coats
- Faster to service
- Improved texture consistency
- No silica
- Exterior/interior

Considerations

- Minor material cost increase

BUILDING TRUST

SIKALASTIC 720 ONE SHOT

- 2-component with unique integral aggregate

BUILDING TRUST

SIKALASTIC 720 ONE SHOT

- Primed, detailed, applied with 3/8” notch squeegee at 160 sf/4.8-gal mix

BUILDING TRUST

SIKALASTIC 720 ONE SHOT

- Back-roll twice (0° and 90°) for best consistency

BUILDING TRUST

SIKALASTIC 720 ONE SHOT

- 55 mil system with 45 mils of aliphatic urethane
- Ready for traffic in 36 hours

BUILDING TRUST

SIKALASTIC 720 ONE SHOT

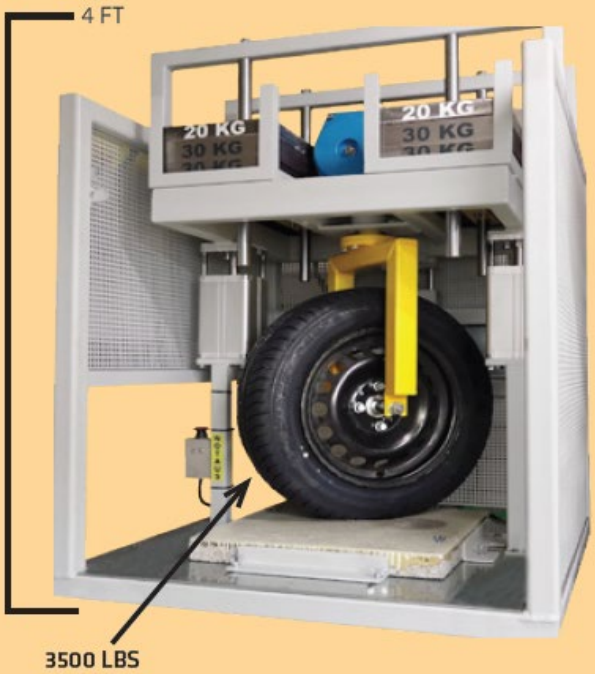
40 E West Street, Baltimore 2022

BUILDING TRUST

SIKALASTIC 720 ONE SHOT

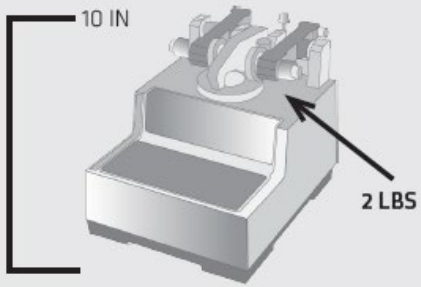
THE SIKA DURABILITY DIFFERENCE

THE SIKA PARKING ABRASION TEST



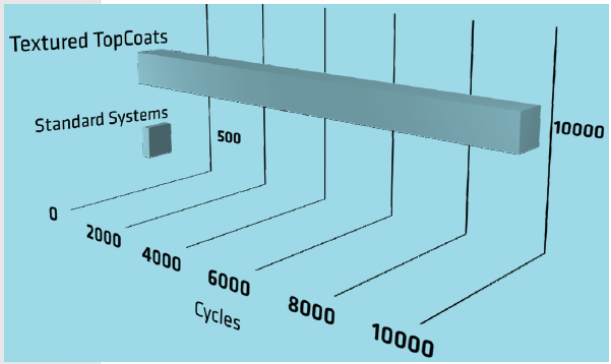
- ✓ Wear Resistance Test
- ✓ Real Tire
- ✓ Tests Full System
- ✓ Includes Aggregate
- ✓ Mimics Vehicular Weight

INDUSTRY STANDARD ABRASION TEST



- ✓ Wear Resistance Test
- ✗ Real Tire
- ✗ Tests Full System
- ✗ Includes Aggregate
- ✗ Mimics Vehicular Weight

- Sika coatings already at top of the list using industry standard
- One Shot integral aggregate takes resistance to roll-out to the next level



- Most durable aliphatic urethane system

BUILDING TRUST

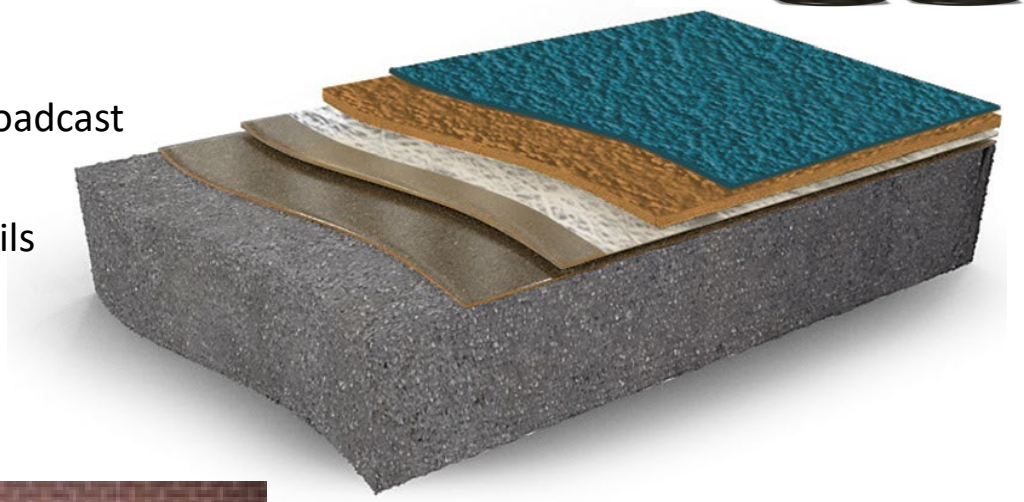
SIKALASTIC PRONTO RB-5700 PUMA

Top: Sikalastic®-518 Pronto, 30 mils

Wear: Sikalastic®-532 Pronto + Sikalastic®-Pronto Filler, 83 mils + aggregate broadcast

Base: Sikalastic®-532 Pronto, 64 mils

Primer: Sikalastic®-511 Pronto Primer, 16 mils



Benefits

- Each coat cured in ~ 1 hour
- Cold application (32F)
- Very durable elastomeric waterproofing

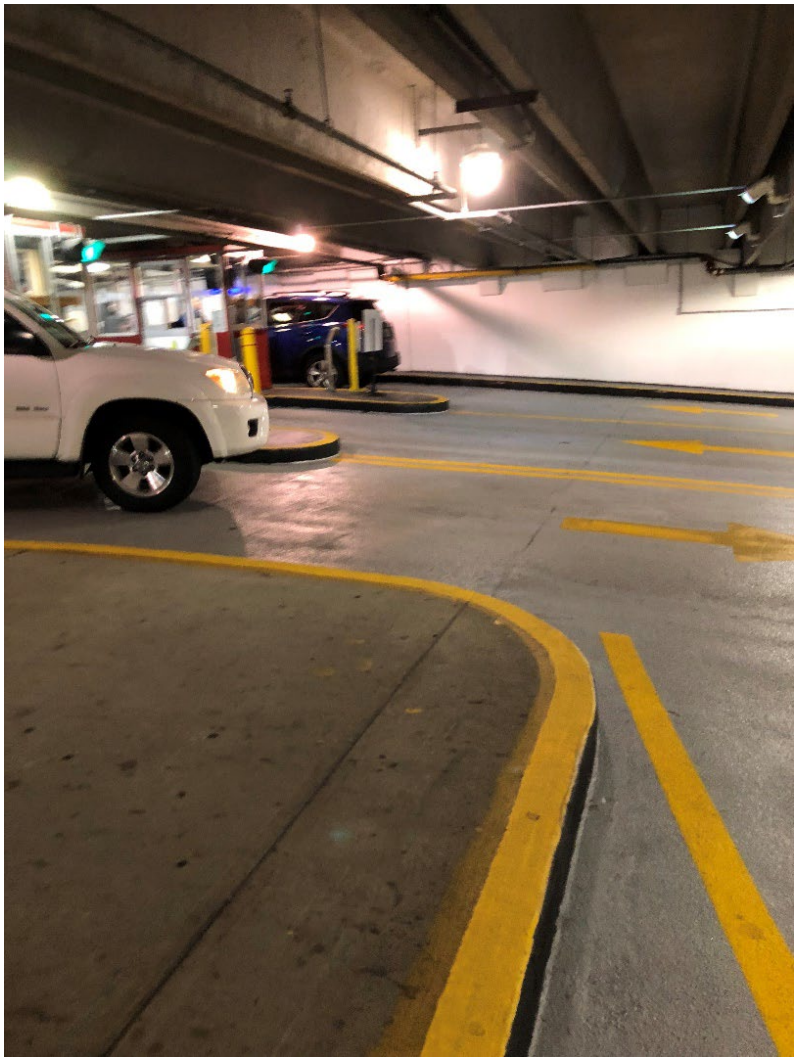
Considerations

- High material cost

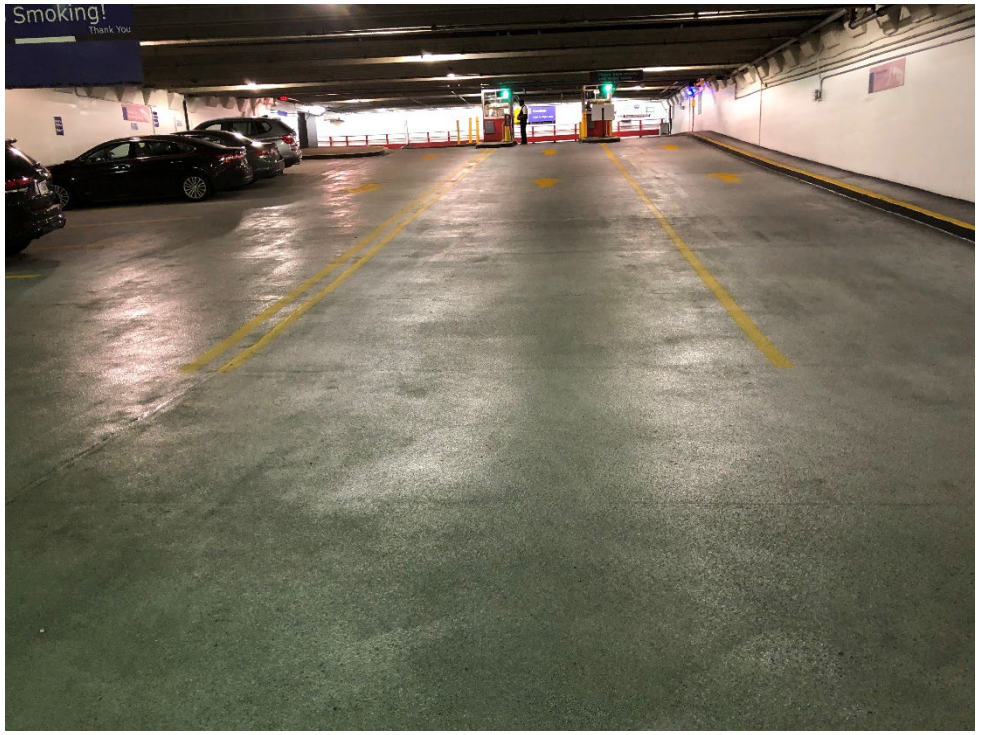
BUILDING TRUST

SIKALASTIC HYBRID USING SIKADUR 22 LO-MOD

- Primer, urethane base coat, epoxy fully-seeded wear coat, urethane top coat



Plaza Garage, Baltimore 2018



Benefits

- Much increased durability with superior hold of the aggregate by the epoxy

Considerations

- Minor cost increase

BUILDING TRUST

SIKALASTIC HYBRID USING SIKADUR 22 LO-MOD

- Primer, urethane base coat, epoxy fully-seeded wear coat, urethane top coat

Benefits

- Much increased durability with superior hold of the aggregate by the epoxy
- Ideally consistent profile

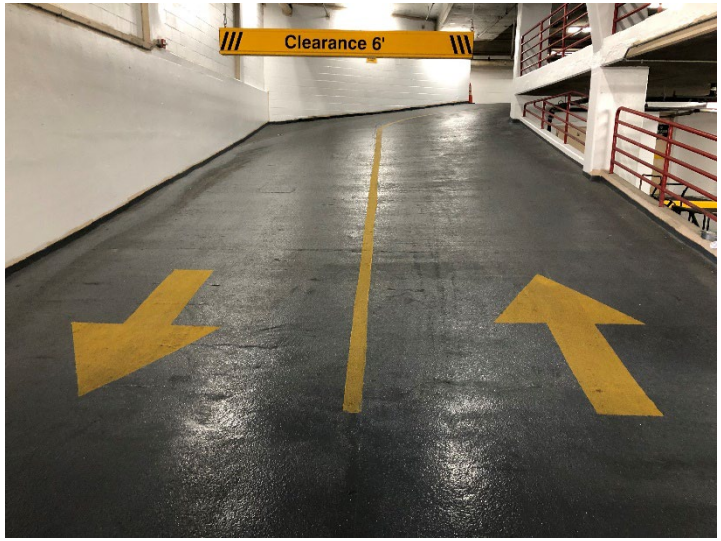
Considerations

- Minor cost increase

SIKALASTIC HYBRID USING SIKADUR 22 LO-MOD

- Primer, urethane base coat, epoxy fully-seeded wear coat, epoxy top coat

Shops at Wisconsin Place, MD 2020



Benefits

- Extremely durable with superior hold of the aggregate by the epoxy and abrasion resistance of the epoxy top coat

Considerations

- Minor cost increase
- Epoxy top coat for interior use only

BUILDING TRUST

SIKALASTIC HYBRID USING SIKADUR 22 LO-MOD

- Primer, urethane base coat, epoxy fully-seeded wear coat

700 2nd St NE, DC 2017

Benefits

- Much increased durability with superior hold of the aggregate by the epoxy
- Improved traction
- Interior and exterior

Considerations

- Stains more easily, harder to clean
- Initial loss of loosely adhered aggregate

BUILDING TRUST

SIKALASTIC HYBRID USING SIKADUR 22 LO-MOD

- Primer, urethane base coat, epoxy seeded top coat

1323 Greenwood Road, Pikesville MD 2021

Benefits

- More durable
- 1 less coat
- Faster cure
- Lower cost

Considerations

- Epoxy top coat for interior use only

BUILDING TRUST

SIKALASTIC HYBRID USING SIKADUR 22 LO-MOD

- Primer, urethane base coat, epoxy seeded top coat

Benefits

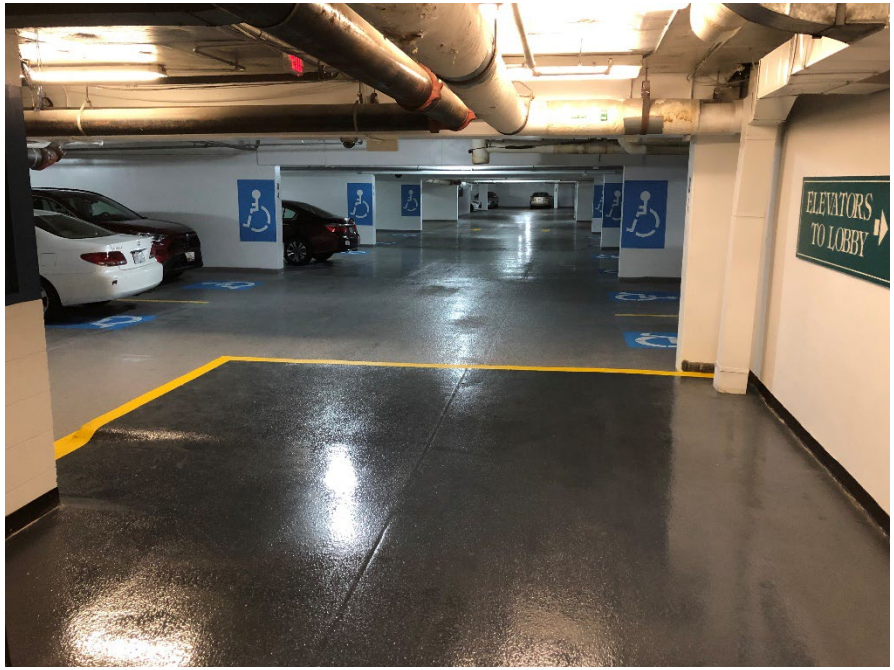
- More durable
- 1 less coat
- Faster cure
- Lower cost

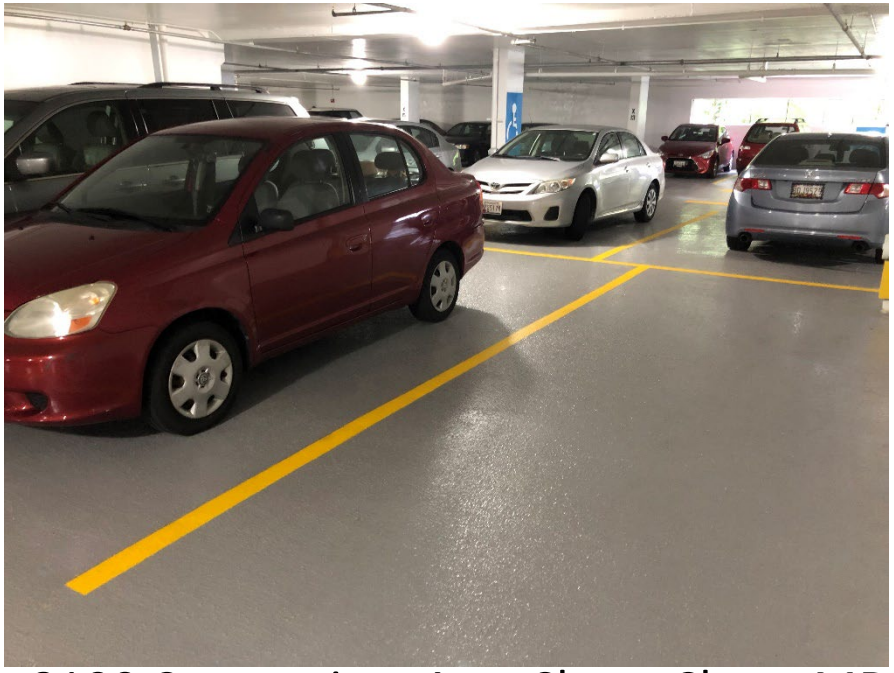
Considerations

- Epoxy top coat for interior use only

SIKALASTIC HYBRID USING SIKADUR 22 LO-MOD

- Primer, urethane base coat, epoxy seeded top coat





8100 Connecticut Ave, Chevy Chase MD

Benefits

- More durable
- 1 less coat
- Faster cure
- Lower cost

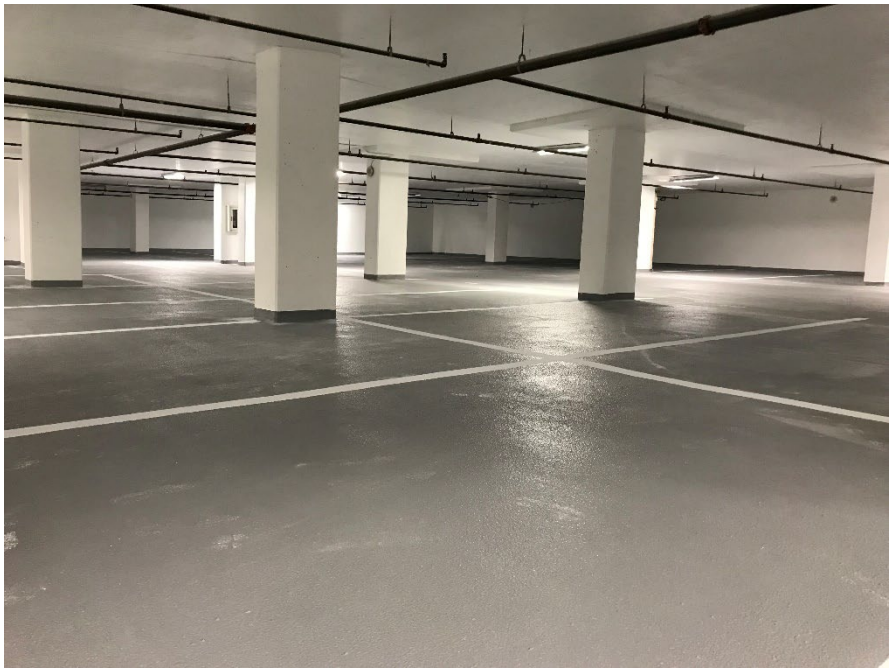
Considerations

- Epoxy top coat for interior use only

BUILDING TRUST

SIKALASTIC AND SIKAGARD PROTECTION

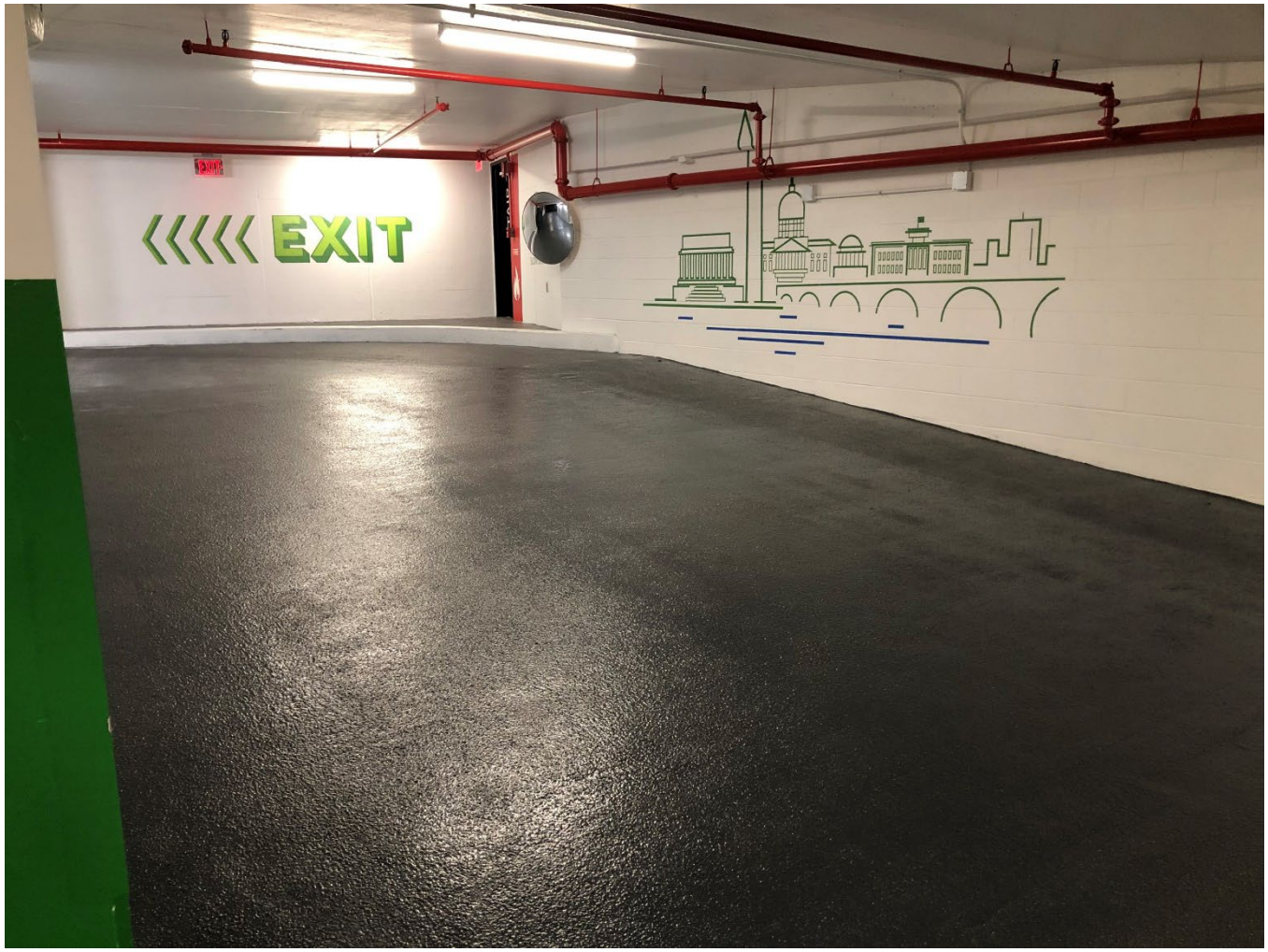
- Repaired
- Protected
- Enhanced



The Charleston, Arlington VA 2019

BUILDING TRUST

SIKALASTIC AND SIKAGARD PROTECTION



500 NJ Ave SE, DC 2020

Attractive Protection

- Water
- Chlorides
- CO2
- Durable

- Sikagard 670

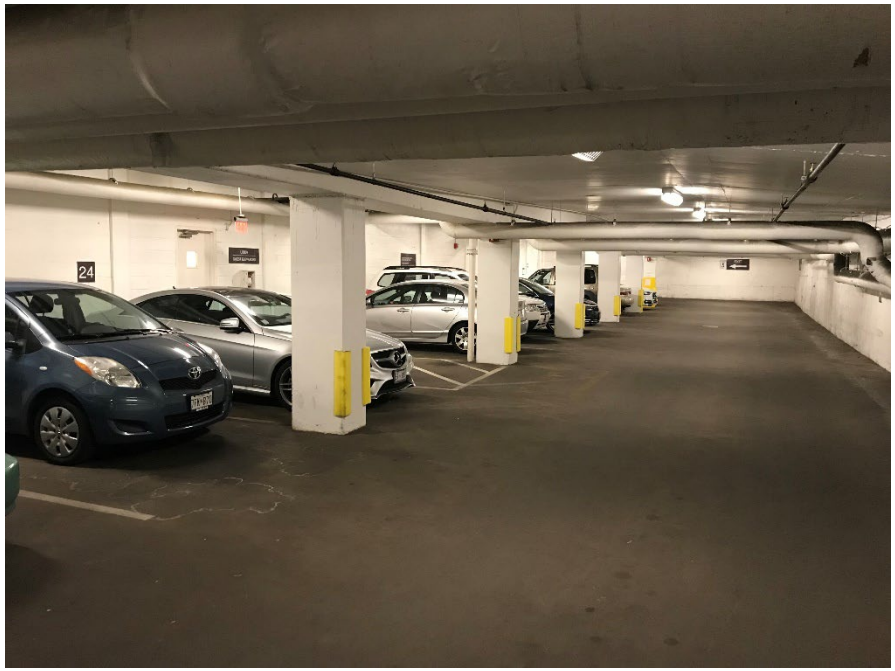
- Sikalastic Primer
  Sikalastic 390
  Sikadur 22 Lo-Mod

BUILDING TRUST

SIKADUR 22 LO-MOD (FS/LT)

- Epoxy fully-seeded system

Marriott NE, DC 2007



Marriott NE, DC 2019

Benefits

- Superior durabilty
- Single application
- Quick return to service (~6-8 hours)

Considerations

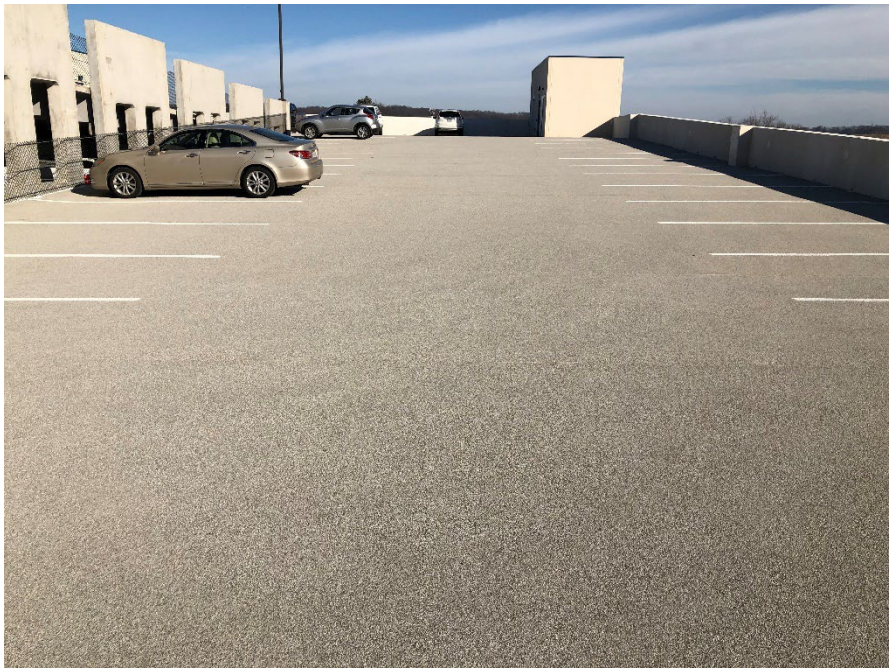
- Stains more easily, harder to clean
- Initial loss of loosely adhered aggregate
- Not crack-bridging

BUILDING TRUST

SIKADUR 22 LO-MOD (FS/LT)

- Epoxy fully-seeded system

Cracks flooded with super low-viscosity resin then immediately coated



Century Garage, Hunt Valley MD 2018

Benefits

- Superior durability
- Single application
- Quick return to service (~6-8 hours)

Considerations

- Stains more easily, harder to clean
- Initial loss of loosely adhered aggregate
- Not crack-bridging

BUILDING TRUST

SIKADUR 22 LO-MOD (FS/LT)

- Epoxy fully-seeded system, epoxy fully-seeded system, epoxy top coat

Reagan Airport Rental Garage installed 2009 pictures taken 2019

Benefits

- Superior durability

Considerations

- Not crack-bridging
- Epoxy top coat chalks/yellows

SIKADUR 22 LO-MOD (FS/LT)

- Epoxy fully-seeded system, epoxy fully-seeded system

8100 Connecticut Ave, Chevy Chase MD installed 1999 pictures taken 2019

Benefits

- Superior durability
- Quick return to service (~6-8 hours)

Considerations

- Stains more easily, harder to clean
- Initial loss of loosely adhered aggregate
- Not crack-bridging

BUILDING TRUST

SIKADUR 22 LO-MOD (FS/LT)

- Epoxy fully-seeded system, epoxy fully-seeded system

- 20 years of superior durability
- Epoxy may crack over sealant

SIKADUR 22 LO-MOD (FS/LT)

- Epoxy fully-seeded system, epoxy fully-seeded system

I-95 MD, 2015

Benefits

- Superior durability
- Quick return to service (~6-8 hours)
- Strategic Highway Report Program estimates 15-year life expectancy

SIKADUR 22 LO-MOD (FS/LT)

- Epoxy fully-seeded system

- Flint
- Basalt
- Bauxite

Benefits

- Superior durability and traction
- Quick return to service (~6-8 hours)

BUILDING TRUST

SIKADUR 22 LO-MOD (FS/LT)

- Epoxy fully-seeded system

US-77, Lincoln Nebraska 2015

- 1 coat on roads (50 mils)
- 2 coats on bridges (100 mils)

BUILDING TRUST

SIKALASTIC & SIKAGARD PROTECTION

- Substructure protection

SIKALASTIC & SIKAGARD PROTECTION

- Substructure protection
- Waterproofing
- Sikalastic polyurethane on top of pier cap
- Sikagard breathable acrylic on rest

SIKALASTIC & SIKAGARD PROTECTION

- Substructure protection
- Waterproofing
- Sikalastic polyurethane on top of pier cap
- Sikagard breathable acrylic on rest

15 Mile Creek, Garrett County MD
Installed 1998, Picture 2016

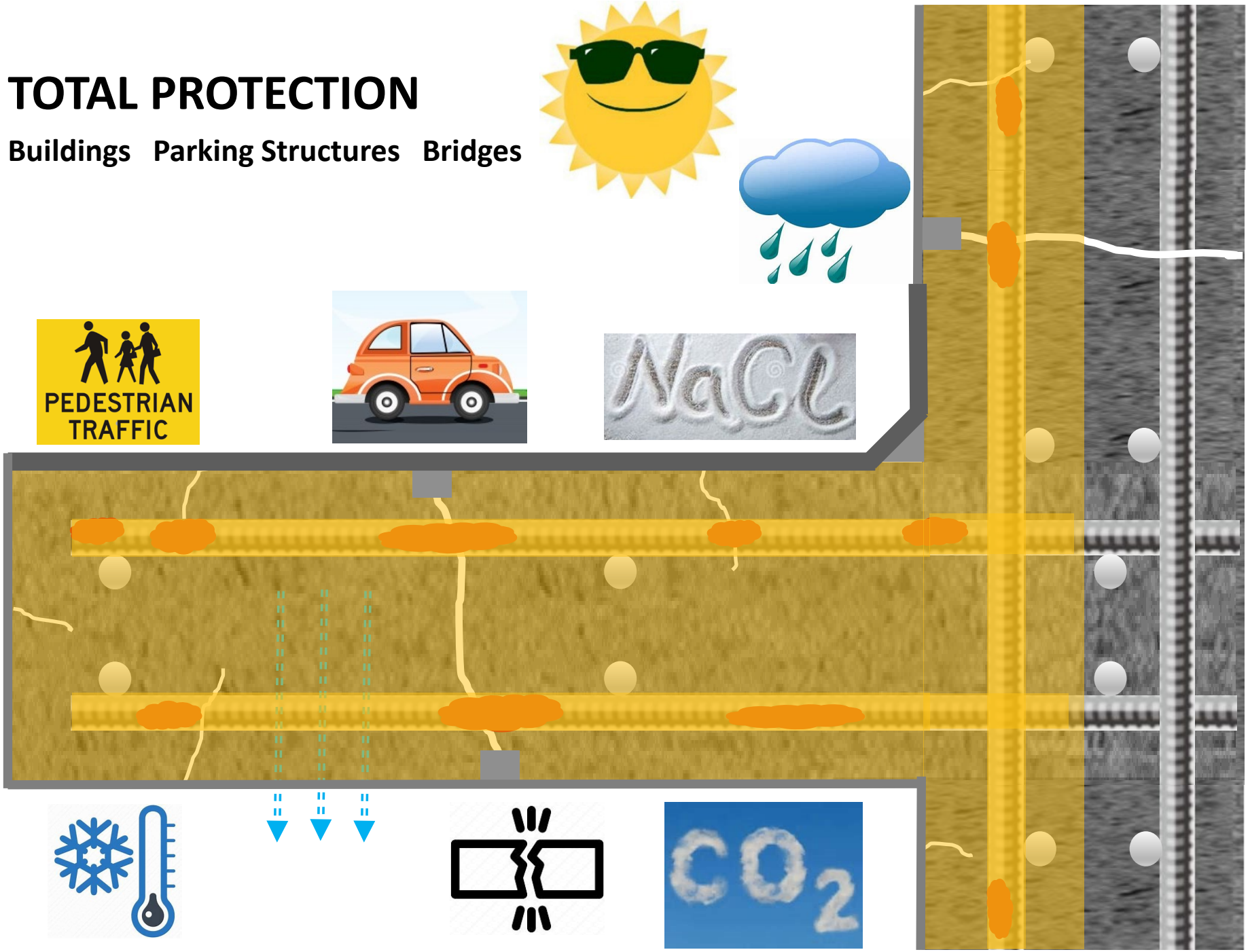
BUILDING TRUST

SIKALASTIC & SIKAGARD PROTECTION

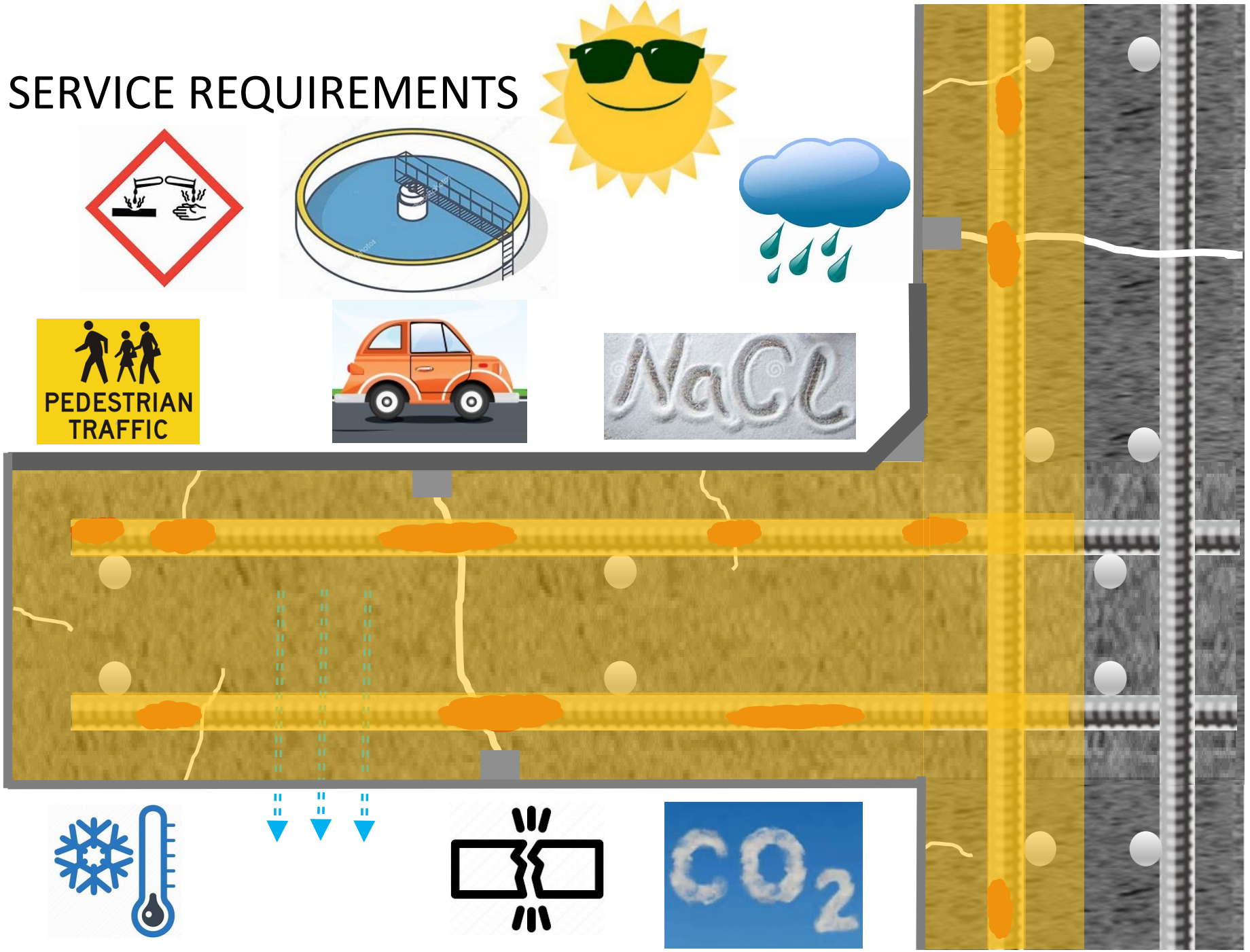
- Substructure protection
- Waterproofing
- Sikalastic polyurethane on top of pier cap
- Sikagard breathable acrylic on rest

TOTAL PROTECTION

Buildings Parking Structures Bridges



SERVICE REQUIREMENTS



SIKATOP SEAL 107

- Polymer-modified, cement-based coating
- Waterproofing
- Constant immersion service
- Breathable
- Tolerates fine cracks ~ 15 mils (1/64” wide)
- Fills in bug-holes and surface irregularities

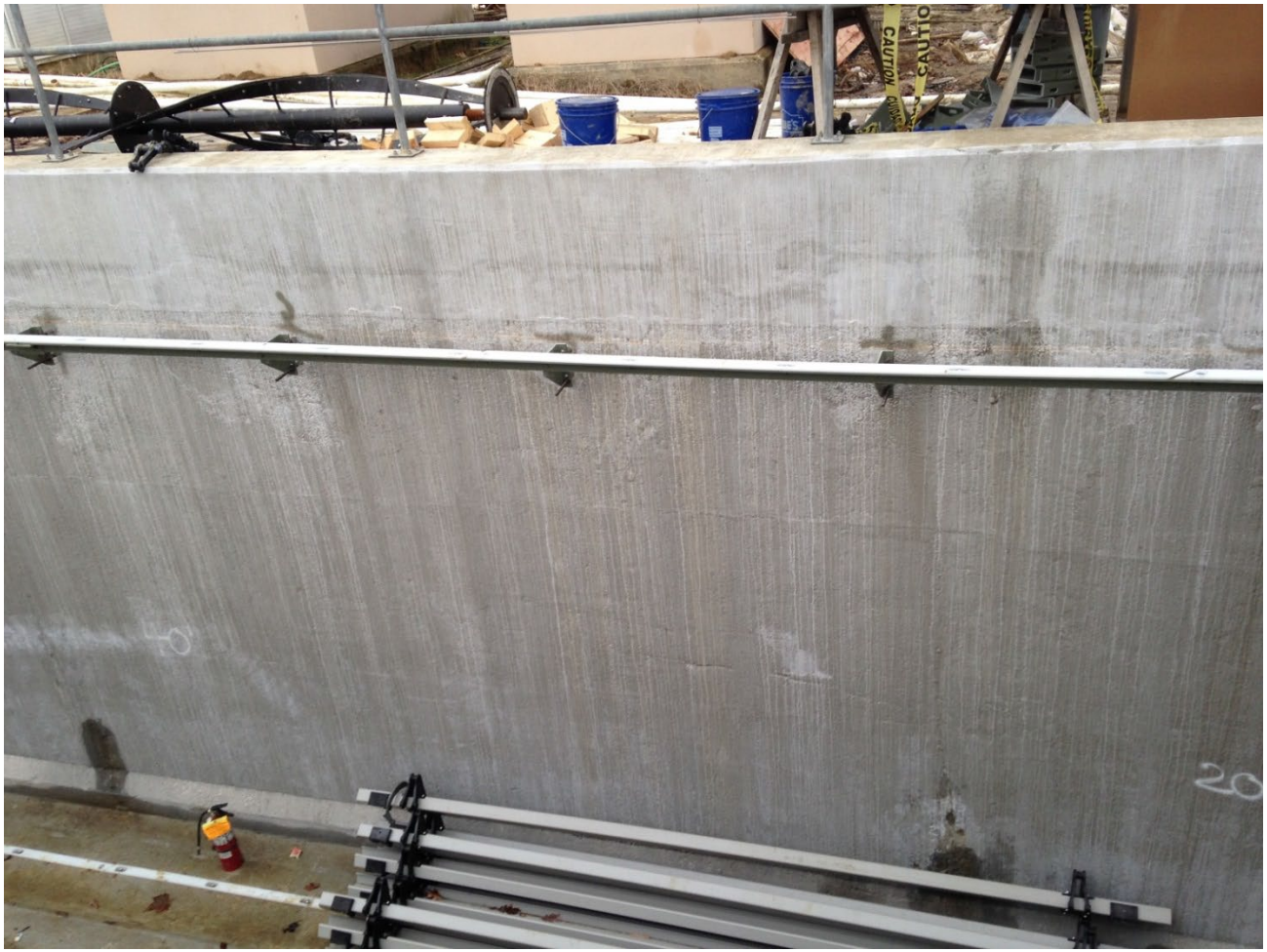
Aberdeen Proving Grounds 2009

SIKATOP SEAL 107

- Bonds to damp concrete
- Effective both on positive and negative side

SIKATOP SEAL 107

- ANSI Standard 61 Potable Water Approved
- Gray or white color



SIKATOP SEAL 107

Apply by

- Roller
- Squeegee
- Trowel
- Brush
- Spray

Theodore Roosevelt Monument Reflecting Pool 2011

SIKATOP SEAL 107

Apply by

- Roller
- Squeegee
- Trowel
- Brush
- Spray

Theodore Roosevelt Monument Reflecting Pool 2011

SIKATOP SEAL 107

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Theodore Roosevelt Monument Reflecting Pool 2011

SIKATOP SEAL 107

Apply by

- Roller
- Squeegee
- Trowel
- Brush
- Spray

Theodore Roosevelt Monument Reflecting Pool 2022

BUILDING TRUST

SIKATOP SEAL 107

Apply by

- Roller
- Squeegee
- Trowel
- Brush
- Spray

- Breathable protection

Theodore Roosevelt Monument Reflecting Pool 2022

BUILDING TRUST

SIKAGARD 62 AND SIKA DUOCHEM 7500

Patapsco WTP, Baltimore 2019

- Epoxy and epoxy novolac coatings
- Waterproofing
- Constant immersion service
- **Chemical resistant**
- Durable
- ANSI Standard 61 Potable Water Approved

BUILDING TRUST

SIKAGARD 62 AND SIKA DUOCHEM 7500

- Epoxy and epoxy novolac coatings
- Waterproofing
- Constant immersion service
- **Chemical resistant**
- Durable
- ANSI Standard 61 Potable Water Approved

- Prevent deterioration

Patapsco WTP, Baltimore 2019

BUILDING TRUST

SIKAGARD 62 AND SIKA DUOCHEM 7500

Patapsco WTP, Baltimore 2019

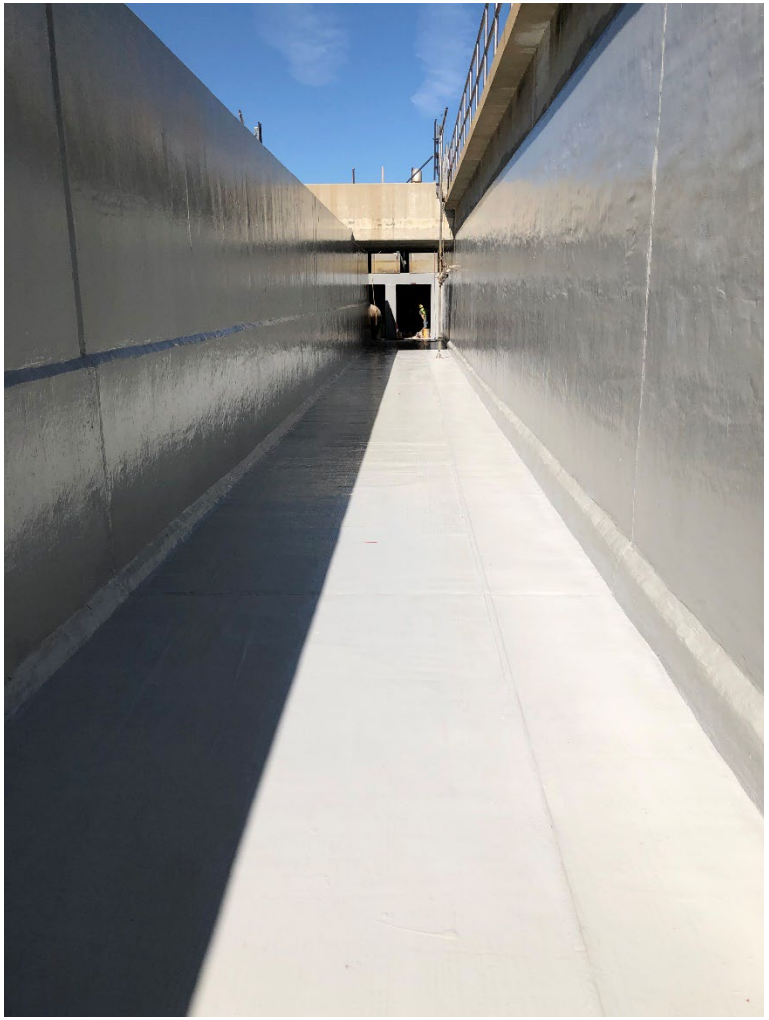
- Epoxy and epoxy novolac coatings
- Waterproofing
- Constant immersion service
- **Chemical resistant**
- Durable
- ANSI Standard 61 Potable Water Approved

- Prevent deterioration
- Avoid high-cost repairs

BUILDING TRUST

SIKAGARD 62 AND SIKA DUOCHEM 7500

Patapsco WWTP, Baltimore 2019



Apply by

- Roller
- Squeegee
- Brush
- Spray

BUILDING TRUST

SIKAGARD 62 AND SIKA DUOCHEM 7500

Back River WWTP, Baltimore 2014

- 20 mil typical build
- Red coat/gray coat assists in verifying thickness of each coat
- Red coat/gray coat for half-life indicator

SIKAGARD 62 AND SIKA DUOCHEM 7500

Leesburg WWTP, VA 2015

- Long service life
- This plant had Sikagard 62 already in service for over 30 years

SIKAGARD 62 AND SIKA DUOCHEM 7500

Secondary Containment

- Chemical(s)
- Concentration(s)
- Temperature
- Contact time

- Need for chemical resistance outweighs breathability

SIKAGARD 62 AND SIKA DUOCHEM 7500

Secondary Containment

- Epoxy-novolac for strong acids pH 1-3
- Higher acid concentrations
- Higher acid temperatures
- Prolonged acid contact

SIKAGARD 62 AND SIKA DUOCHEM 7500

- Excellent for interior flooring

SIKAGARD 7600

- Bitumen-modified polyurethane coating
- Waterproofing
- Constant immersion service
- Chemical resistant
- **Elastomeric tolerating cracks up to 1/8” wide**
- Durable
- ANSI Standard 61 Potable Water Approved
- UV light resistant

SIKAGARD 7600

- Roll, squeegee, brush, or spray apply
- HG and VG grades

SIKAGARD 7600

- Typical 60, 90, and 120 mil builds
- Seamless over cracks and joints
- 20+ years of service

Montebello WTP, Baltimore 2021

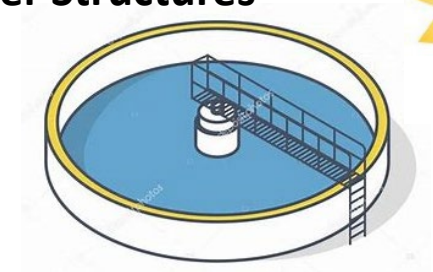
BUILDING TRUST

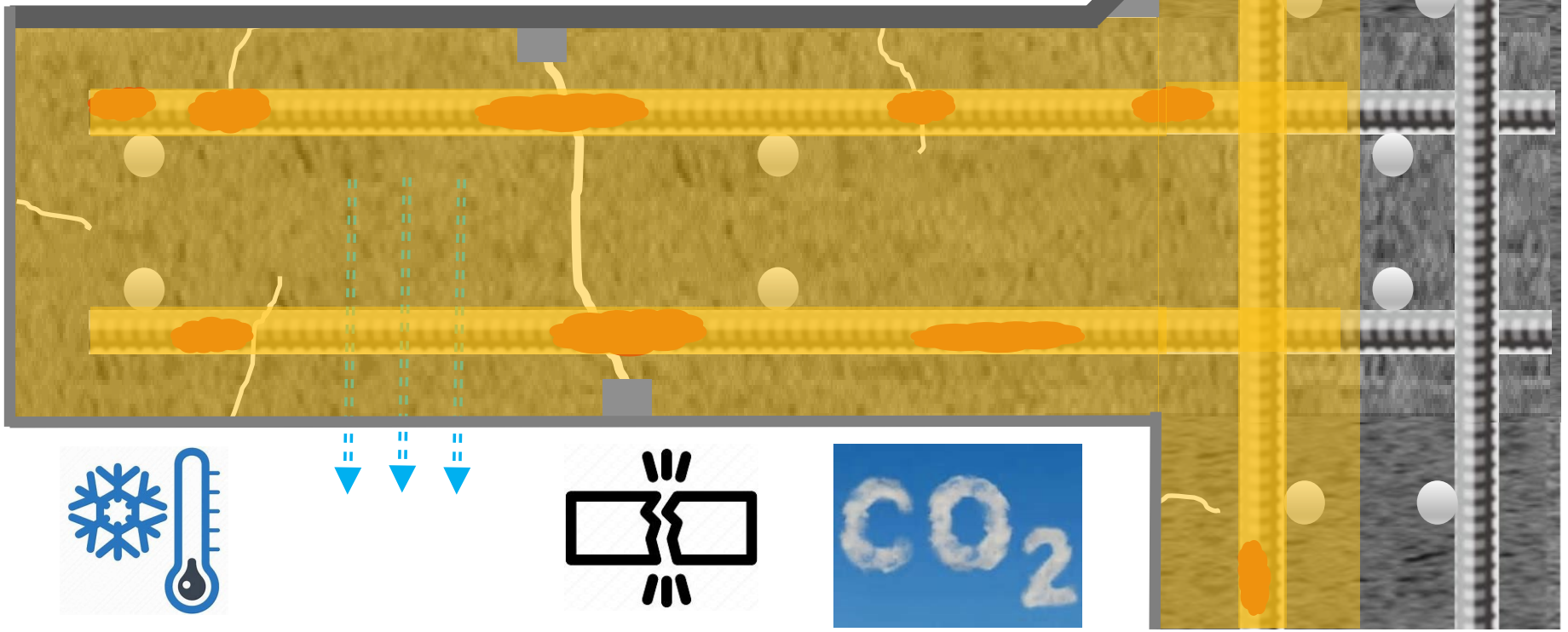
SIKAGARD 7600

- Can be top coated
- Elastomeric, chemical resistant, immersion service

TOTAL PROTECTION

Buildings Parking Structures Bridges
Water & Wastewater Structures





THANK YOU FOR YOUR ATTENTION!

RANDALL KRATZ
410-336-3757
KRATZ.RANDALL@US.SIKA.COM

BUILDING TRUST

AVAILABLE RELATED PRESENTATIONS

- ✓ Concrete Repair (Part 1 – Material Selection)
- ✓ Concrete Repair (Part 2 – Preparation & Installation)
- ✓ Crack Repair
- ✓ Concrete Protection
- ❑ Structural Strengthening with Fiber Reinforced Polymers
- ❑ High Performance Sealants
- ❑ Joint Fillers, Specialty Sealants, and Waterstops
- ❑ Below-Grade Waterproofing Membranes