



DO'S & DON'TS OF DECK MEMBRANES

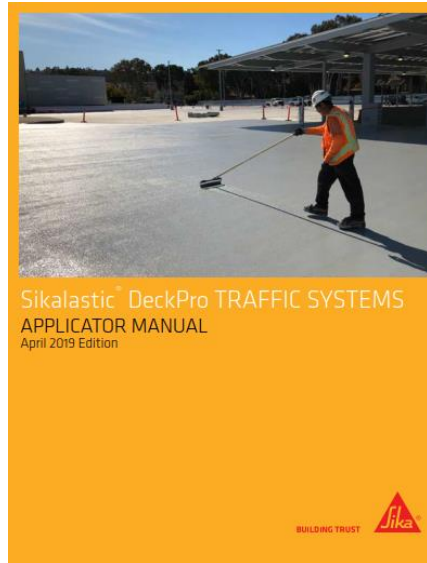
RANDALL KRATZ – DISTRICT MANAGER MD/DC/VA
SIKA CORPORATION – REFURBISHMENT, SEALING & BONDING
WITH SIKA SINCE 1991
GRADUATE DREXEL UNIVERSITY - COMMERCE & ENGINEERING
410-336-3757 KRATZ.RANDALL@US.SIKA.COM

BUILDING TRUST



LEARNING OBJECTIVES

- 1) Understand the materials and builds for proper System Selection
- 2) Discover requirements and means for Surface Preparation
- 3) Master the critical importance of the Ambient & Substrate Conditions
- 4) Learn the common Installation Techniques



DO'S & DON'T OF DECK MEMBRANES

Interchangeable terms (for our purposes all infer crack-bridging ability)

- Deck coating
- Deck membrane
- Traffic coating
- Traffic-bearing membrane (TBM)

Purpose

- Provide elastomeric waterproofing protection
- Deliver appropriate slip resistance
- Tolerate given traffic conditions
- Meet aesthetic criteria

COMMON APPLICATIONS

- Balconies
 - Walkways
 - Plaza decks
 - Mechanical rooms
 - Stadiums
 - Concourses
 - Loading docks
 - Garages
-
- ✓ Fully waterproofed
 - ✓ Slip resistant
 - ✓ Traffic durable
 - ✓ Desired appearance



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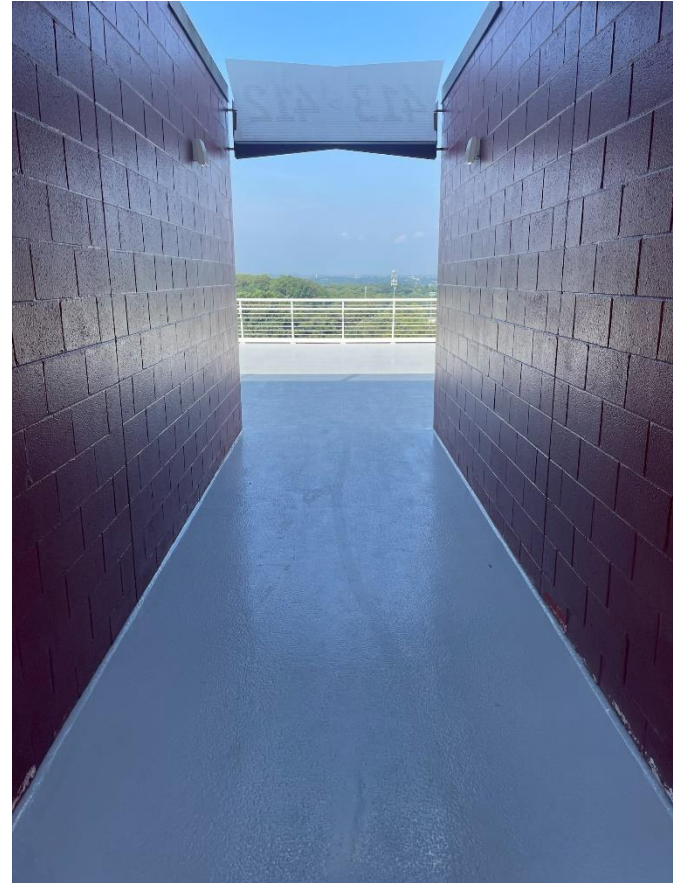
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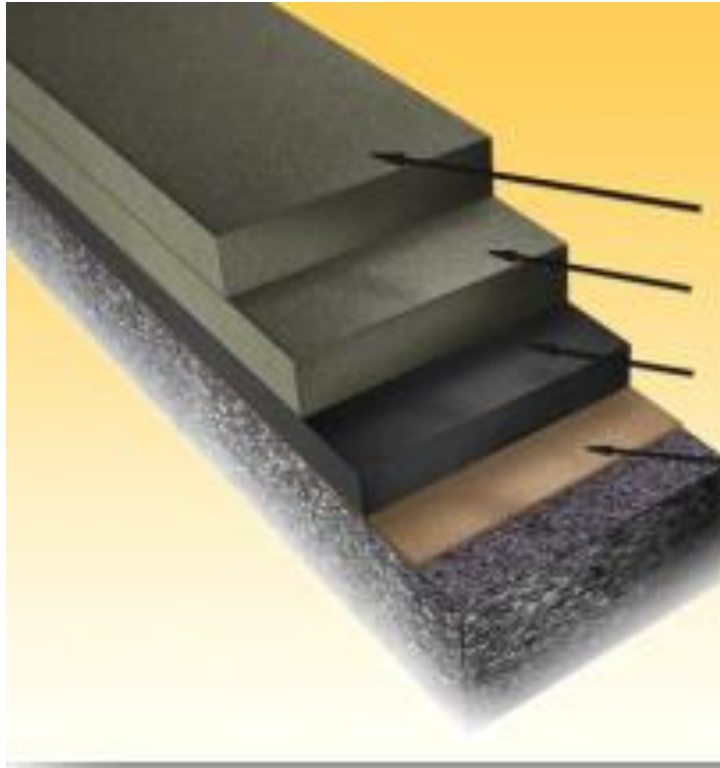


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SYSTEM SELECTION – INFINITE BUILDS



Top (~20 mils)

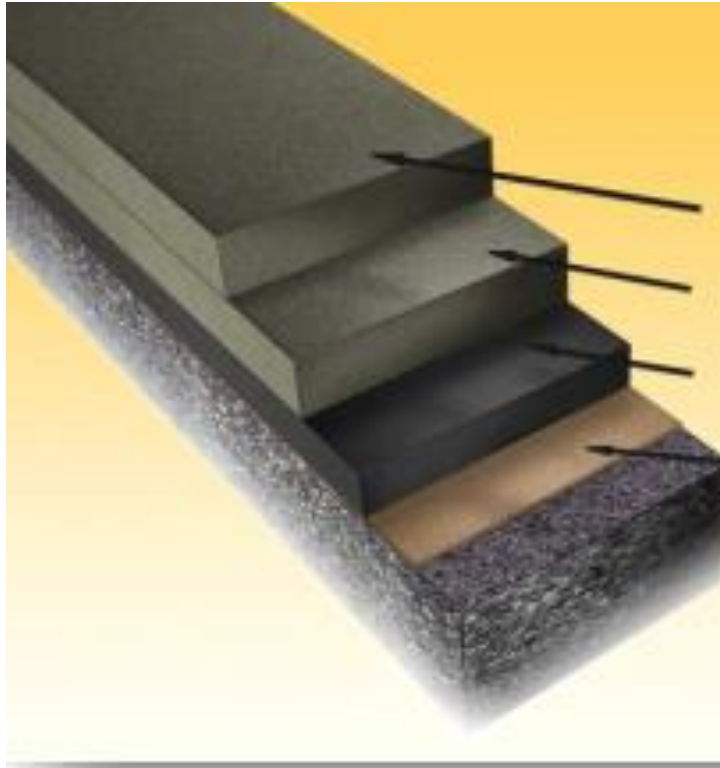
Wear (~15 mils)

Base (~20 mils)

Primer



SYSTEM SELECTION – INFINITE BUILDS



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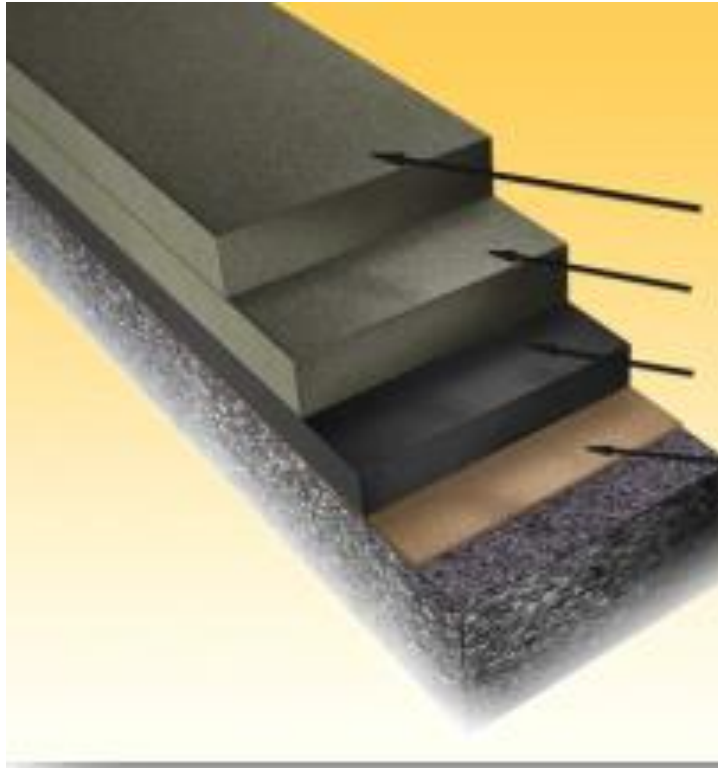
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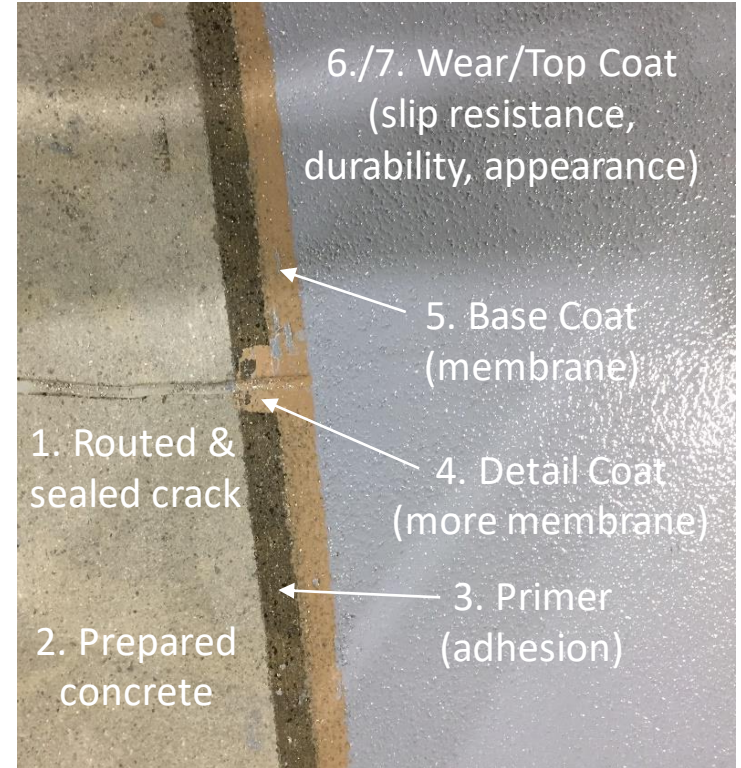


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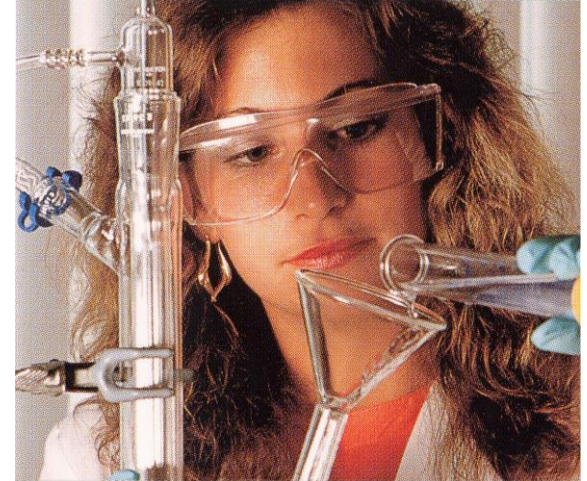
Primer



RESEARCH & DEVELOPMENT



18.....Global Technology Centers
29.....Technology Centers
60.....Local Labs
5,680...Single National Patents
1,778...Researchers and Developers



Scientific & chemical advancements being made for the benefit of your project.

SYSTEM SELECTION

Establish and Maintain Adhesion

- Substrate: concrete, old coating, plywood, other



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- Substrate: concrete, old coating, plywood, other
- Urethane primer
 - Can be elastic – good for sealants, old coatings



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Establish and Maintain Adhesion

- Substrate: concrete, old coating, plywood, other
- Urethane primer
 - Can be elastic - good for sealants, old coatings
- Epoxy primer
 - Strong, conditioning, variable thickness, mortar



SYSTEM SELECTION

Establish and Maintain Adhesion

- Substrate: concrete, old coating, plywood, other
- Urethane primer
 - Can be elastic - good for sealants, old coatings
- Epoxy primer
 - Strong, conditioning, variable thickness, mortar
- Self-priming base coat
 - Adhesion promoters, save time/labor/money



SYSTEM SELECTION

Establish and Maintain Adhesion

- Substrate: concrete, old coating, plywood, other
- Urethane primer
 - Can be elastic – good for sealants, old coatings
- Epoxy primer
 - Strong, conditioning, variable thickness, mortar
- Self-priming base coat
 - Adhesion promoters, save time/labor/money
- Moisture-mitigating primer
 - Damp concrete, trapped moisture



SYSTEM SELECTION

Establish and Maintain Adhesion

- Urethane primer
 - **Sikalastic Primer** – 1-part, coat ~1 hour
 - **Sikalastic P 255** – 2-part, lower odor, coat ~2-3 hours
- Epoxy primer
 - **Sikadur 22 Lo-Mod FS** – 2-part, low odor, level, coat ~3 hours
- Self-priming base coat
 - **Sikalastic 726 One Shot, Sikalastic M 270 NP** – 2-part
 - **Sikalastic 710 NP, Sikalastic M 200, Sikalastic M 205** – 1-part
- Moisture-mitigating primer
 - **Sikalastic 100 VB** – 2-part epoxy



SYSTEM SELECTION

Create Continuous Waterproofing Membrane

- Includes over properly treated cracks, joints, and coves
- 20-25 mils of elastomeric urethane (usually aromatic*)



SYSTEM SELECTION

Create Continuous Waterproofing Membrane

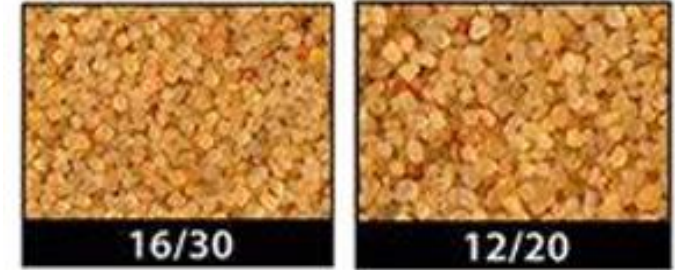
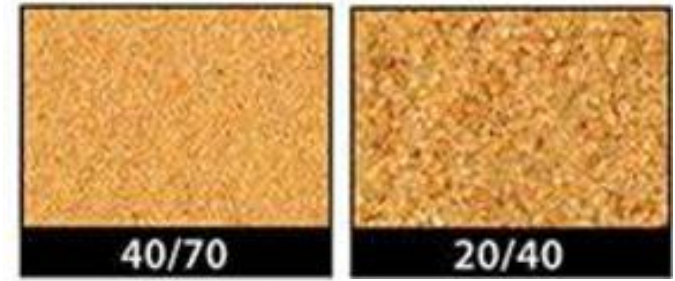
- 1-part Base Coats - coat ~16 hours: **Sikalastic 710, 710 NP, M 200, M205**
- 2-part Base Coats - coat ~4 hours, low odor: **Sikalastic 720, 720 SG, M 270 NP**
- 2-part One Shots*: **Sikalastic 720 One Shot, 726 One Shot**



SYSTEM SELECTION

Slip Resistance

- Integral*
- 40-70 mesh ~ 15 mils
- 20-40 mesh ~ 25 mils, popular pedestrian
- 16-30 mesh ~ 35 mils, popular vehicular
- 12-20 mesh ~ 50 mils
- #2 flint angular
- #3 flint angular



#2

#3

Oven-dried, Mohs min 6.5, Iron oxide/iron content max 0.05%

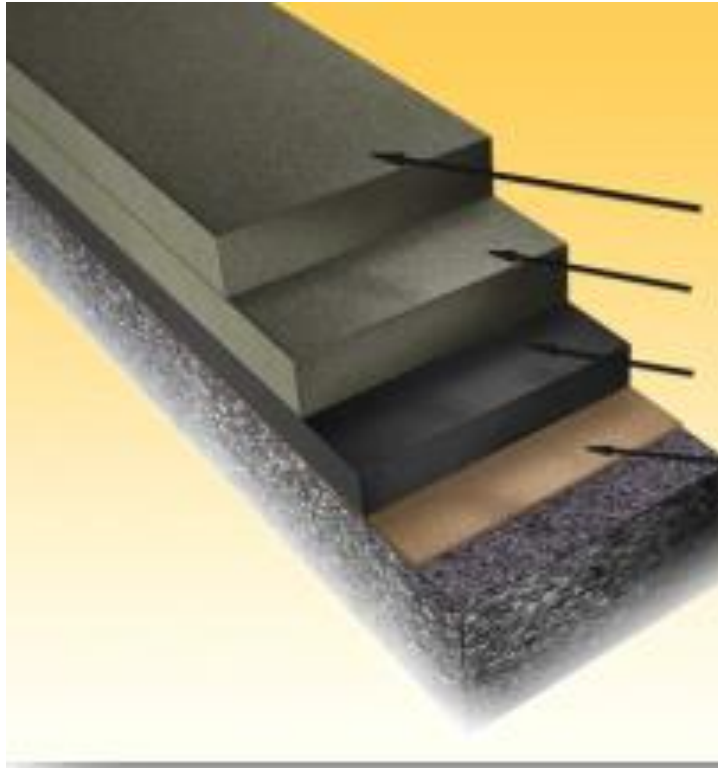
SYSTEM SELECTION

Slip Resistance & Traffic Durable

- Apply wear coat / top coat
- Seed with select aggregate
- Back-roll



SLIP RESISTANCE AND TRAFFIC DURABLE



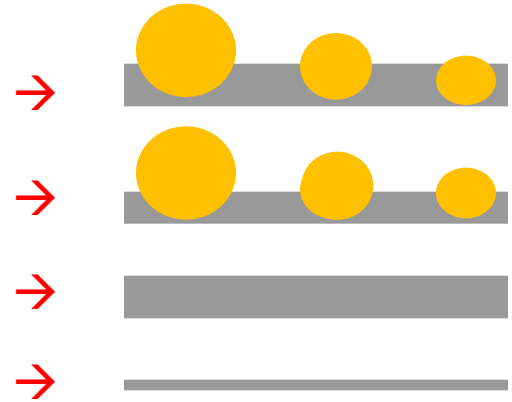
Top (~20 mils)

Wear (~15 mils)

Base (~20 mils)

Primer

12-20 16-30 20-40



Vehicular

SYSTEM SELECTION

Slip Resistance & Traffic Durable

1-part Top Coats – coat ~16 hours

- **Sikalastic 715, 715 Lo-VOC, 735 AL**
- **Sikalastic TC 225, 235**

2-part Top Coats – coat ~4 hours, low odor

- **Sikalastic 745 AL, TC 275, TC 295**

1-part Textured* – coat ~16 hours

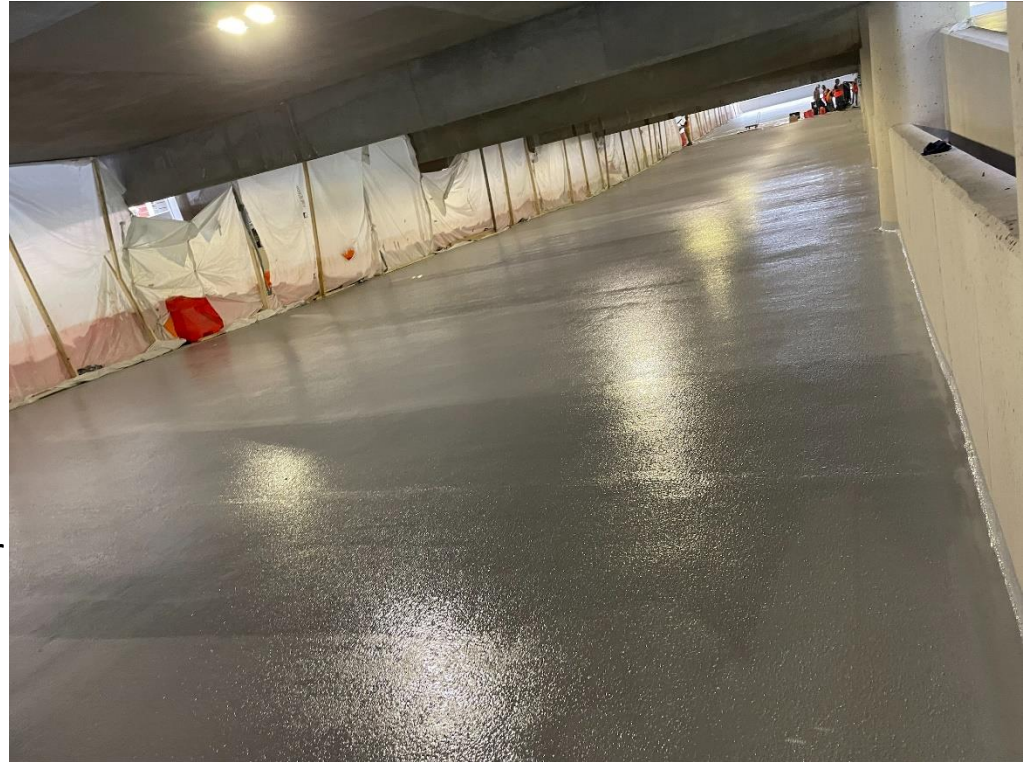
- **Sikalastic 715 Text, 736 Lo-VOC Text**

2-part Textured* - coat ~ 4 hours, low odor

- **Sikalastic 745 AL Textured**

2-part Epoxy – coat ~ 3 hours, low odor

- **Sikadur 22 Lo-Mod, 22 Lo-Mod FS**



SYSTEM SELECTION

Appearance

- Standard: Gray, Charcoal, Tan
- Can use under tile



SYSTEM SELECTION

Appearance

- Standard: Gray, Charcoal, Tan
- Can use under tile
- Custom colors



The Fountains Condominiums, Alexandria VA 2015

SYSTEM SELECTION

Appearance

- Standard: Gray, Charcoal, Tan
- Can use under tile
- Custom colors
- Color packs

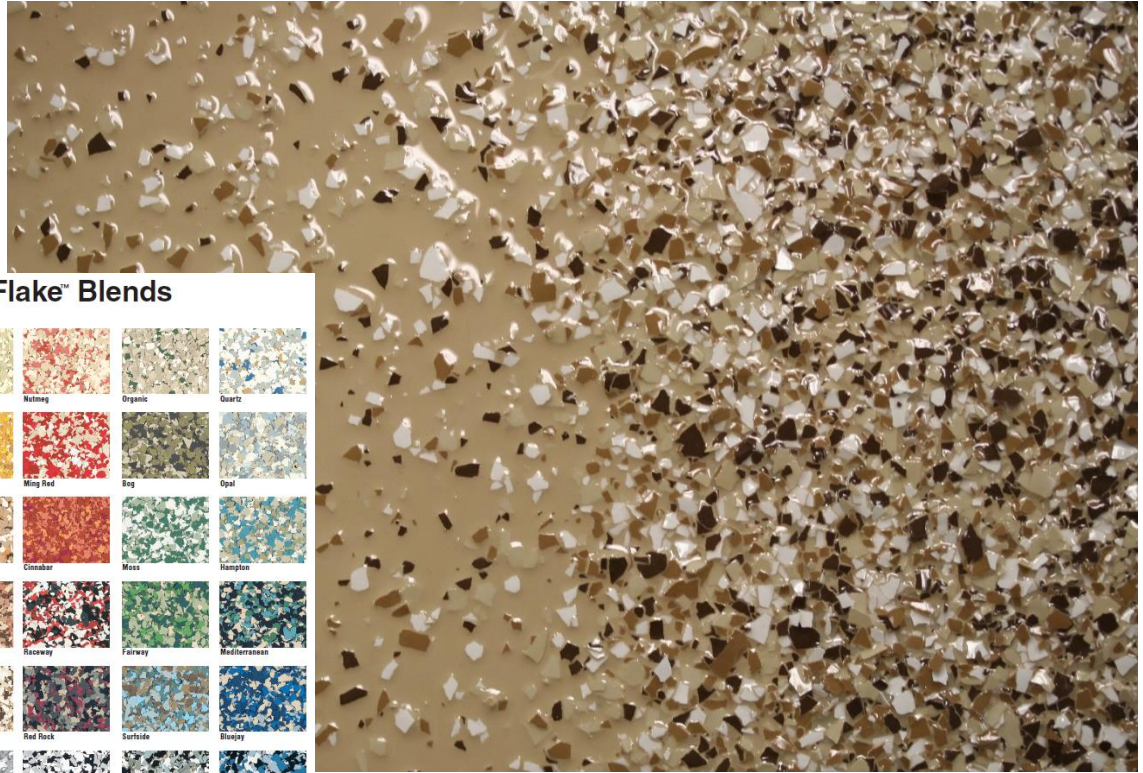


SYSTEM SELECTION

Appearance

- Standard: Gray, Charcoal, Tan
- Can use under tile
- Custom colors
- Color packs
- Colored flakes/Clear top

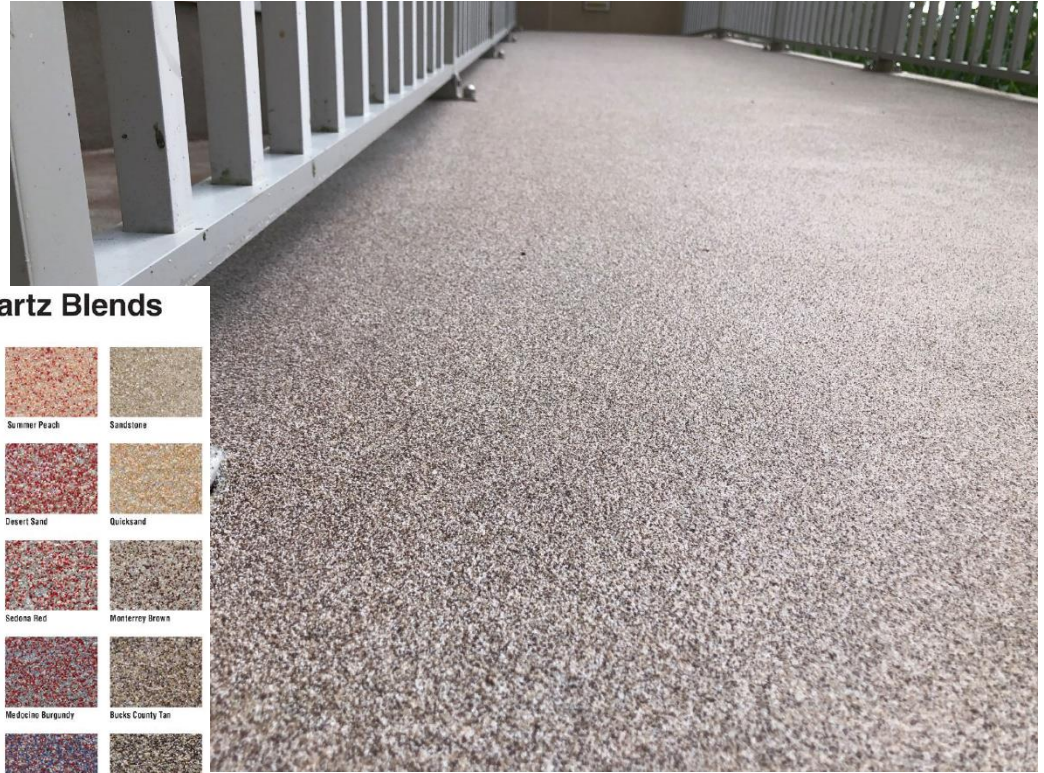
DecoFlake™ Blends



SYSTEM SELECTION

Appearance

- Standard: Gray, Charcoal, Tan
- Can use under tile
- Custom colors
- Color packs
- Colored flakes/Clear top
- Colored quarts/Clear top

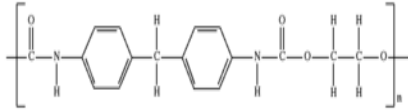


Broadcast Quartz Blends



SYSTEM SELECTION - APPEARANCE

Urethane: Aromatic



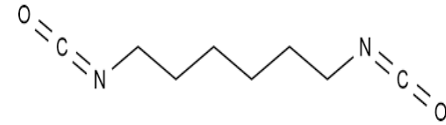
- Aromatic rings absorb UV light, thus making them very sensitive to UV degradation, aging, loss of elasticity
- Chalk and fade over time
- Lower cost
- Used for base coats, some used for indoor top coats

Aromatic with UV Stabilizers



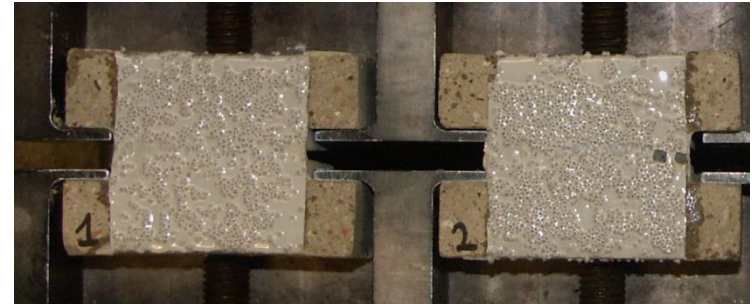
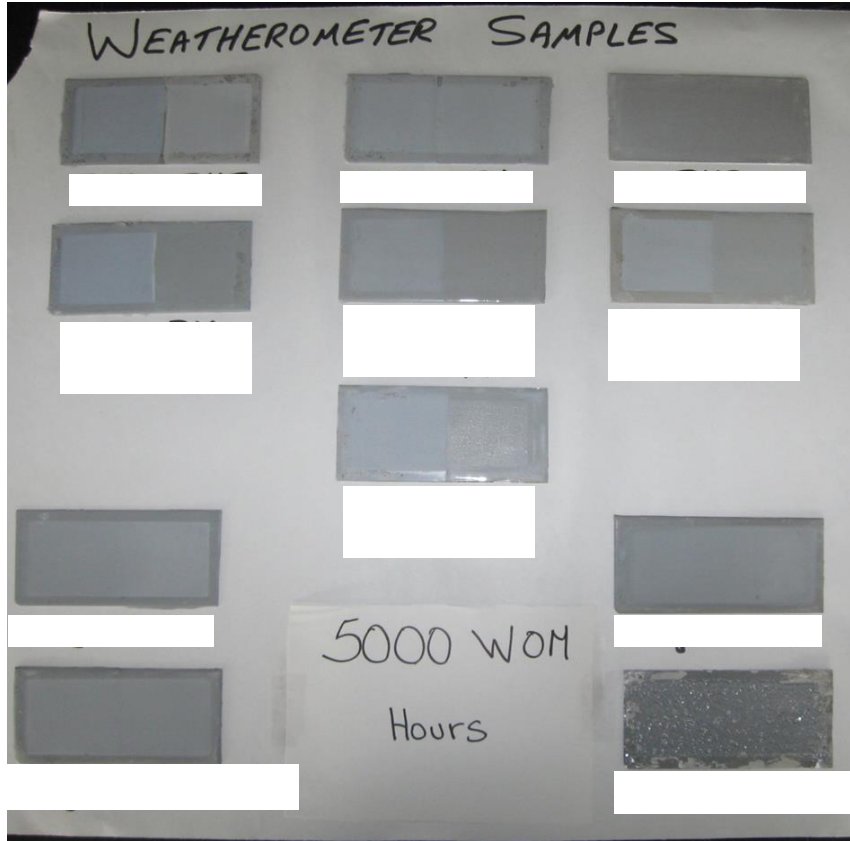
- Nano Zinc Oxide molecules are used as UV stabilizers
- The lighter density causes the particles to reside near the top
- nZnO blocks most of the UV rays from penetrating into the coating, stopping the aromatic ring from absorbing the rays

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

SYSTEM SELECTION - APPEARANCE



SYSTEM SELECTION - APPEARANCE



Epoxies generally yellow and can chalk but experience little degradation.

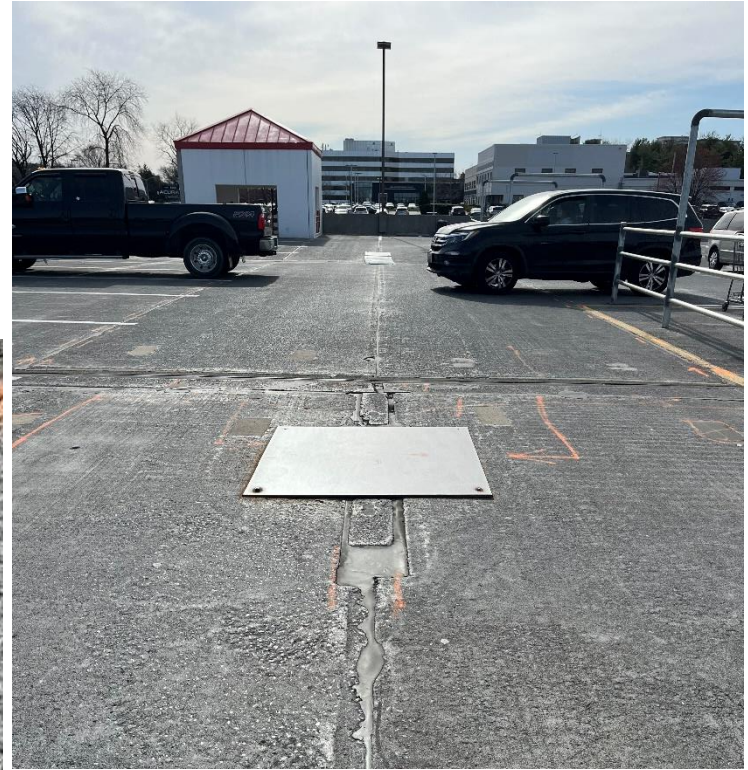
CASE STUDY: SUITLAND STATION GARAGE, 2014

Existing State

- Precast construction
- Leaking joints
- Failed connections
- Early-stage corrosion



COMMON PRECAST GARAGE DAMAGE



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CASE STUDY: SUITLAND STATION GARAGE, 2014

Existing State

- Precast construction
- Leaking joints
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Goals Achieved

- ✓ Fully waterproofed
- ✓ Slip resistant
- ✓ Traffic durable
- ✓ Desired appearance



CASE STUDY: SUITLAND STATION GARAGE, 2014

Conduct Mockup to Verify

- All means and methods
 - Surface preparation
 - Successful adhesion
 - Approved slip resistance
 - Approved appearance
-
- Primer
 - 23 mils 1-part aromatic base coat
 - 16 mils 1-part UV-aromatic wear coat seeded with 16-30 mesh
 - 16 mils 1-part UV-aromatic top coat seeded with 16-30 mesh



VERIFY ADHESION



Peel Strength Test

- 8 pli or more to pass

ASTM D7234-12: Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Adhesion Testers

- 200 psi or more to pass

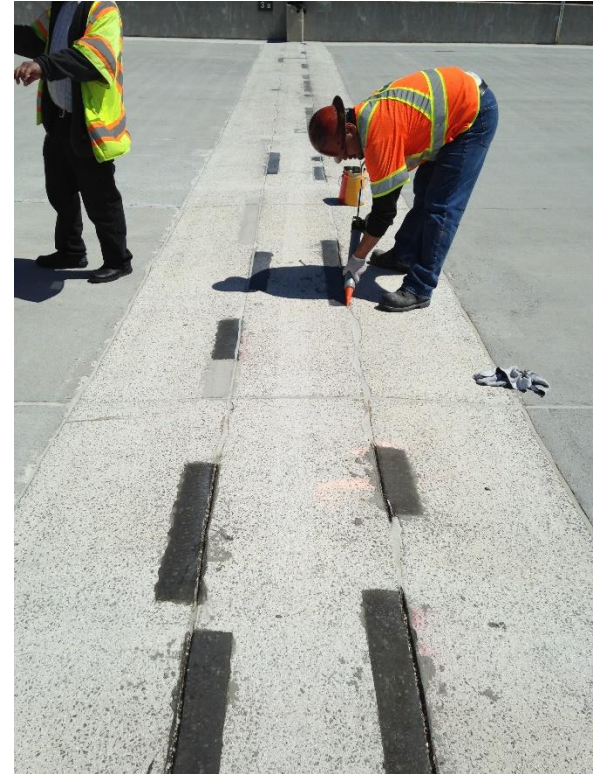


CASE STUDY: SUITLAND STATION GARAGE, 2014

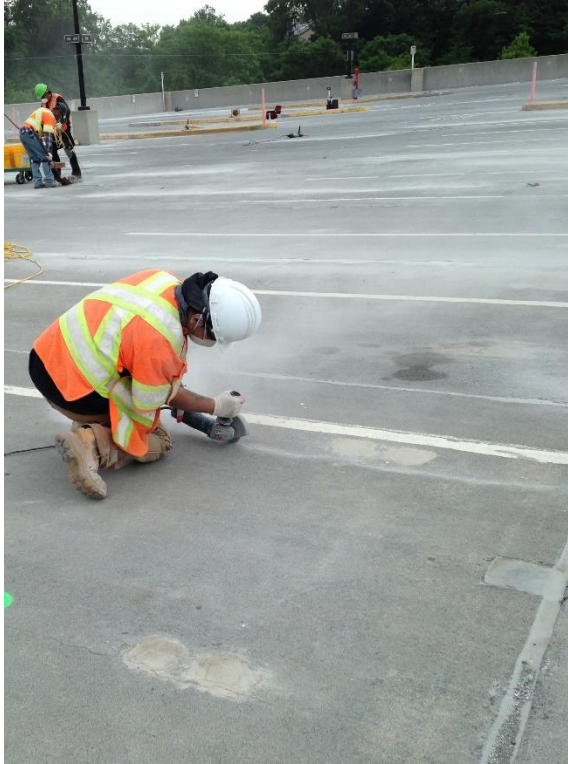


Prior to coating

- Make concrete repairs
- Seal joints
- Rout & seal cracks $\geq 1/16''$



CASE STUDY: SUITLAND STATION GARAGE, 2014

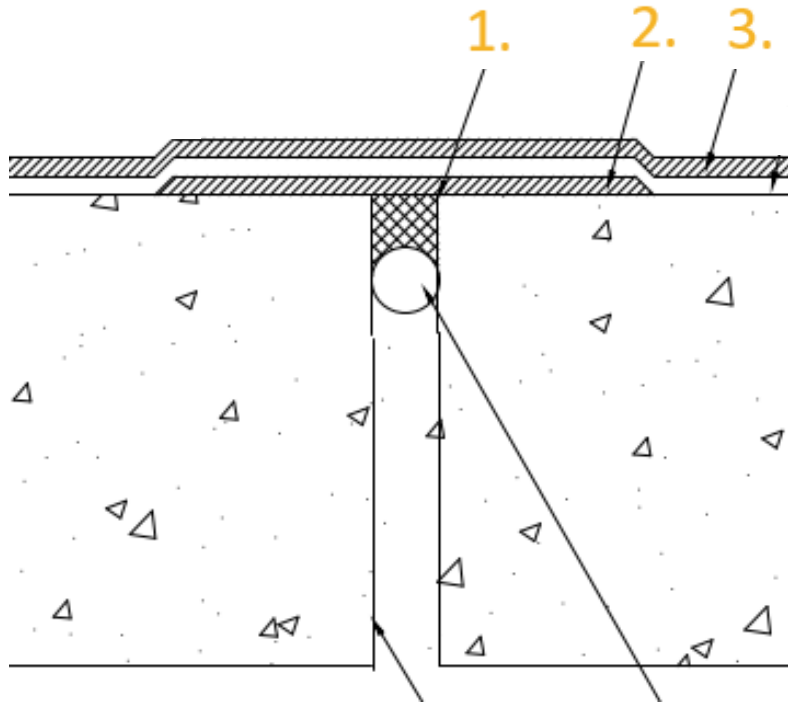


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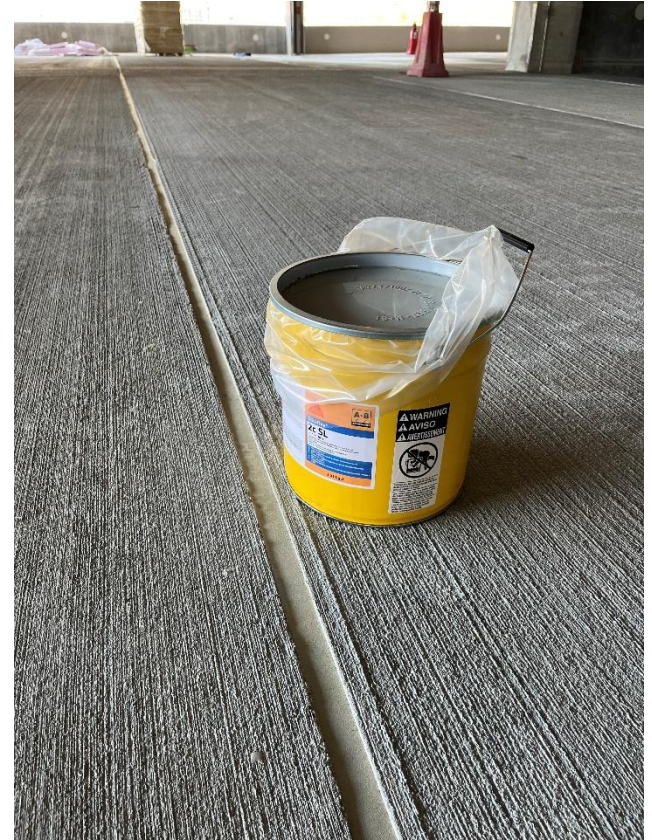
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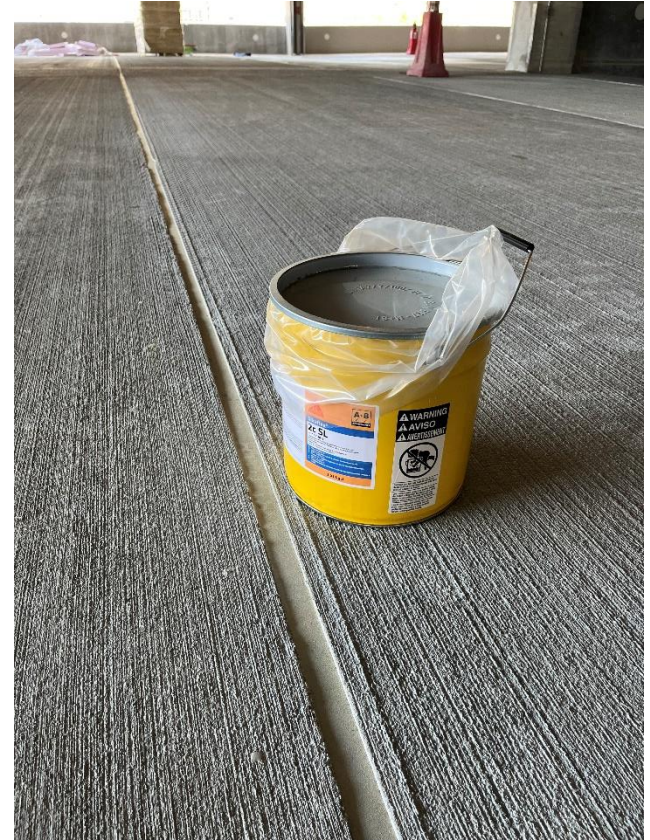
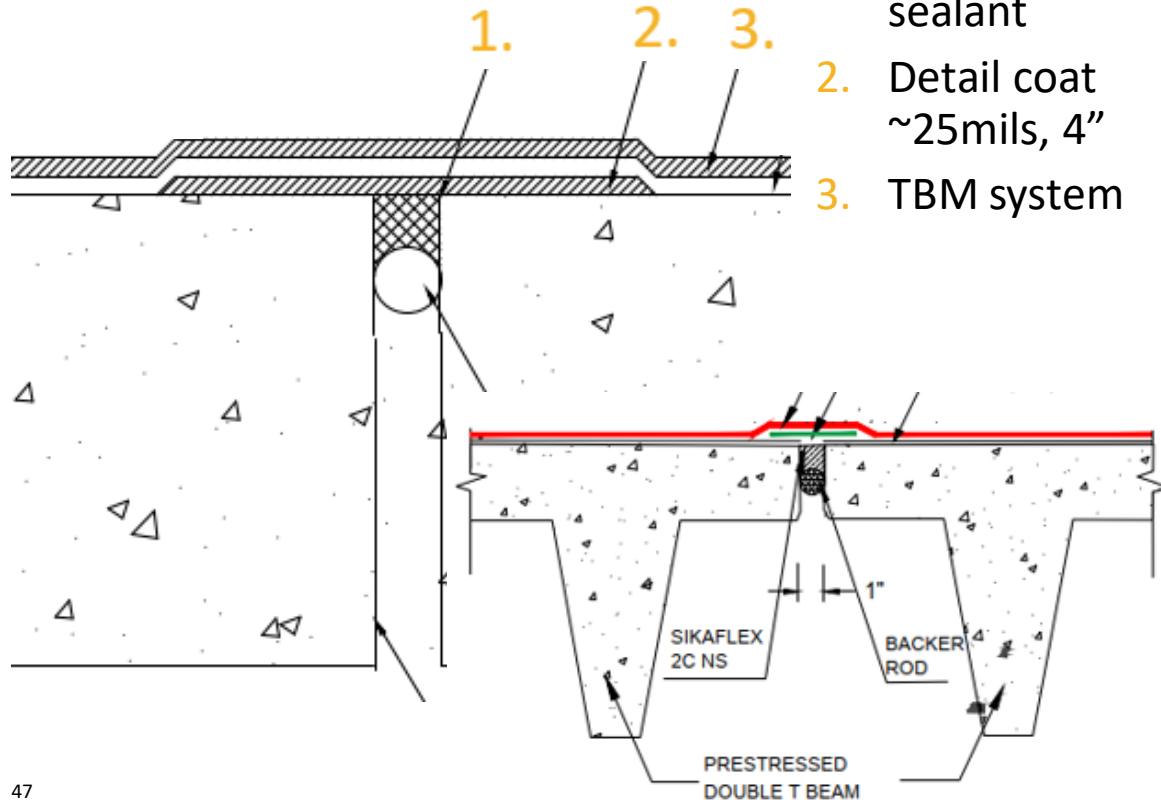
JOINT DETAILING



1. Traffic-grade sealant
2. Detail coat
~25mils, 4"
3. TBM system

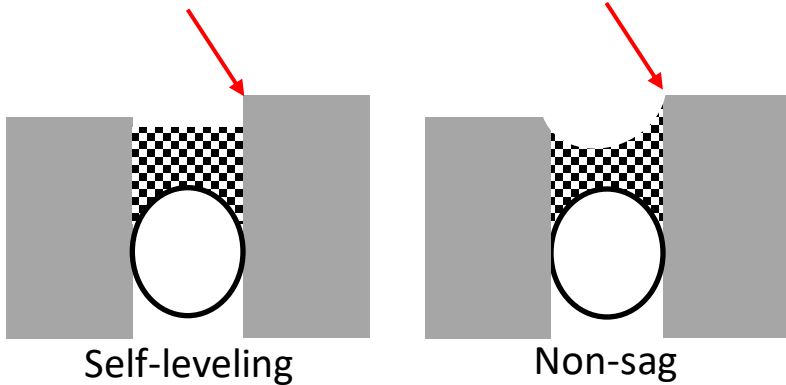


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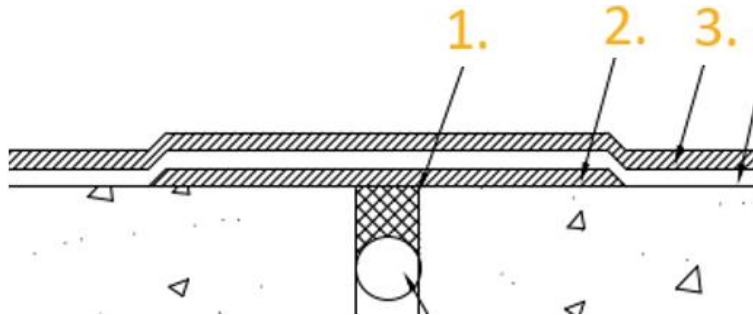
JOINT DETAILING

Results in thin coating at edges



- Grind down high
- Build up low
- Tool flatter
- Lower-gassing coating*

✓ Detail coat to obtain ~25 mils at edges

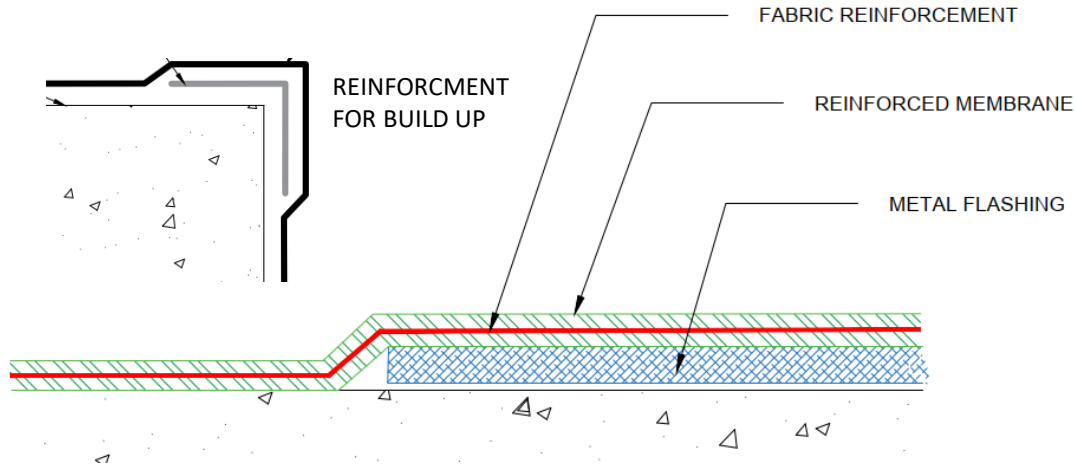


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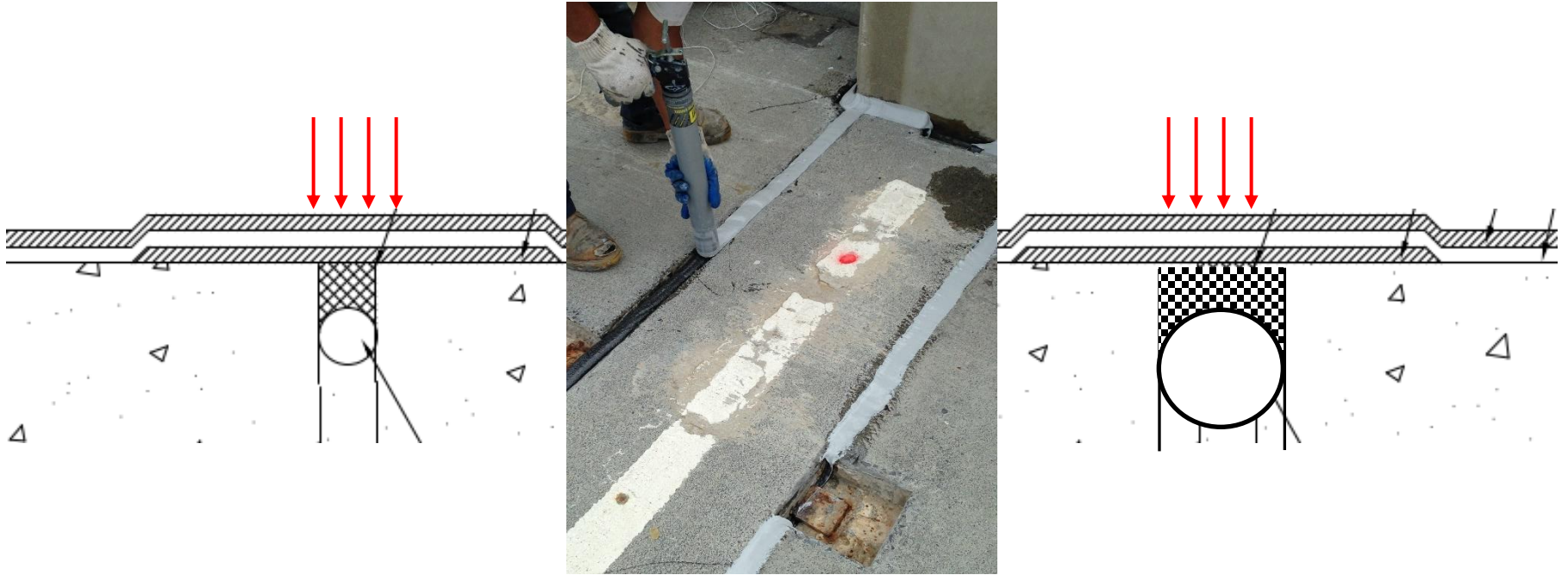
JOINT DETAILING – REINFORCEMENT?

- Increases tensile/tear/puncture
- Decreases elongation
- Visual of membrane thickness
- Critical at transitions where adhesion may be lost (anchored metal flashing)

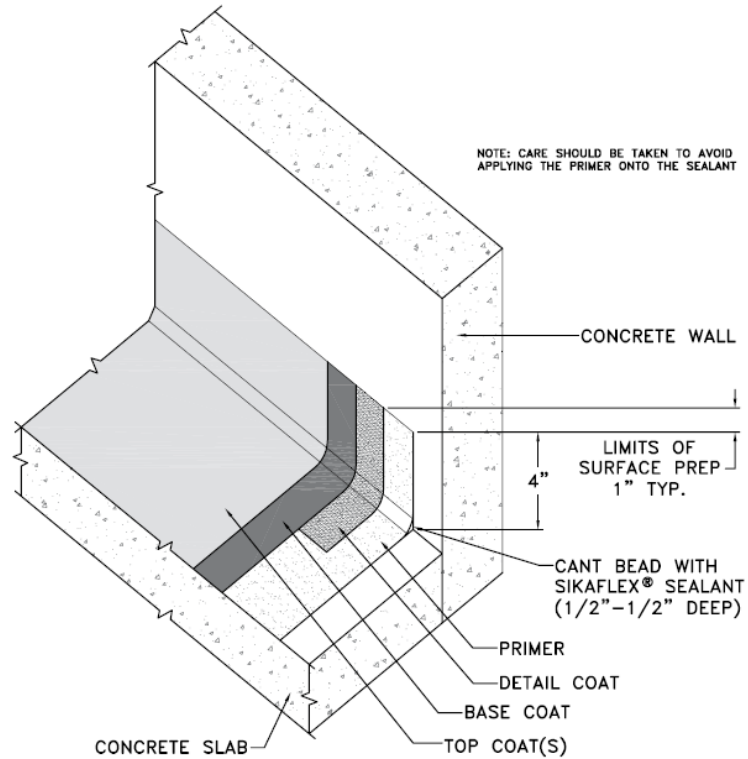


CASE STUDY

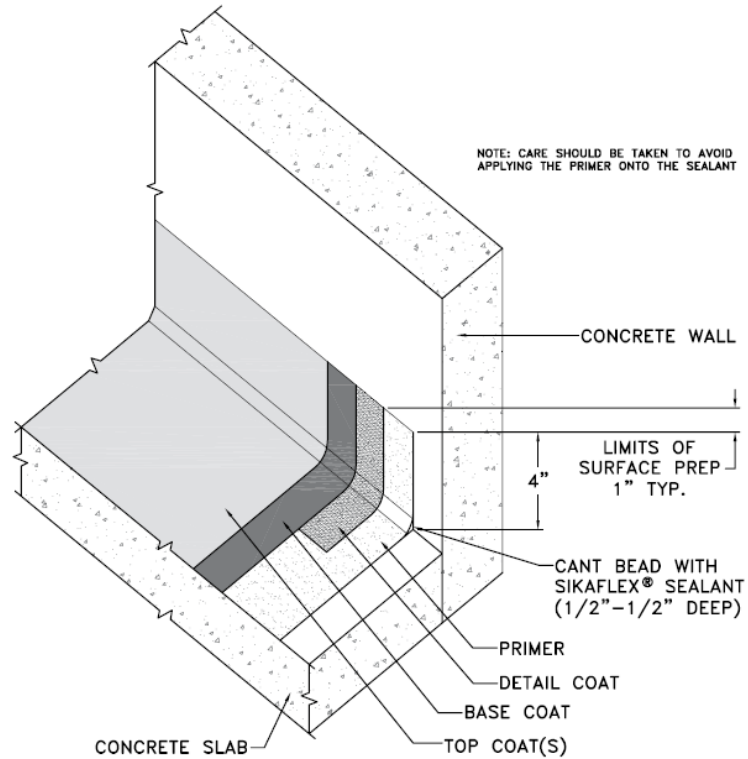
- Warranty covers joint up 1" wide. Repeated downward compression can split coating.



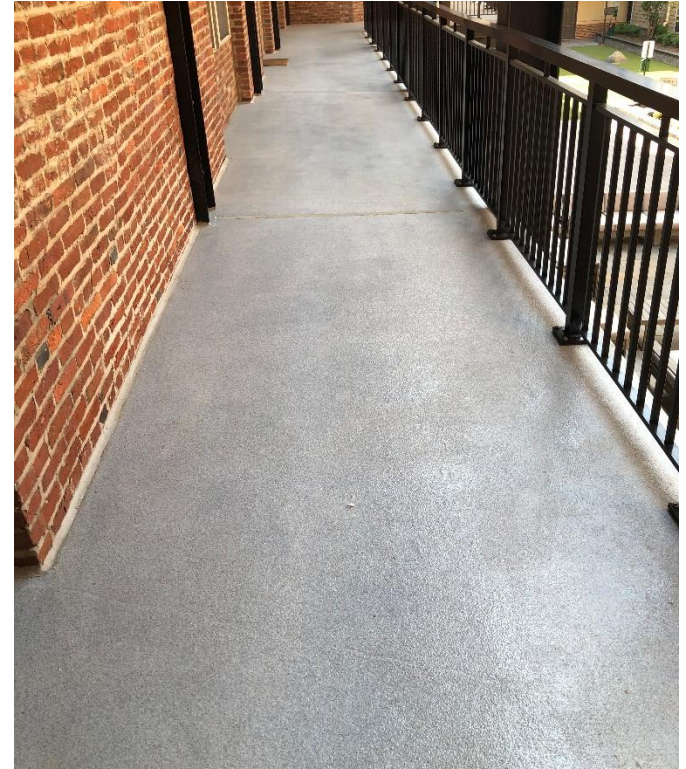
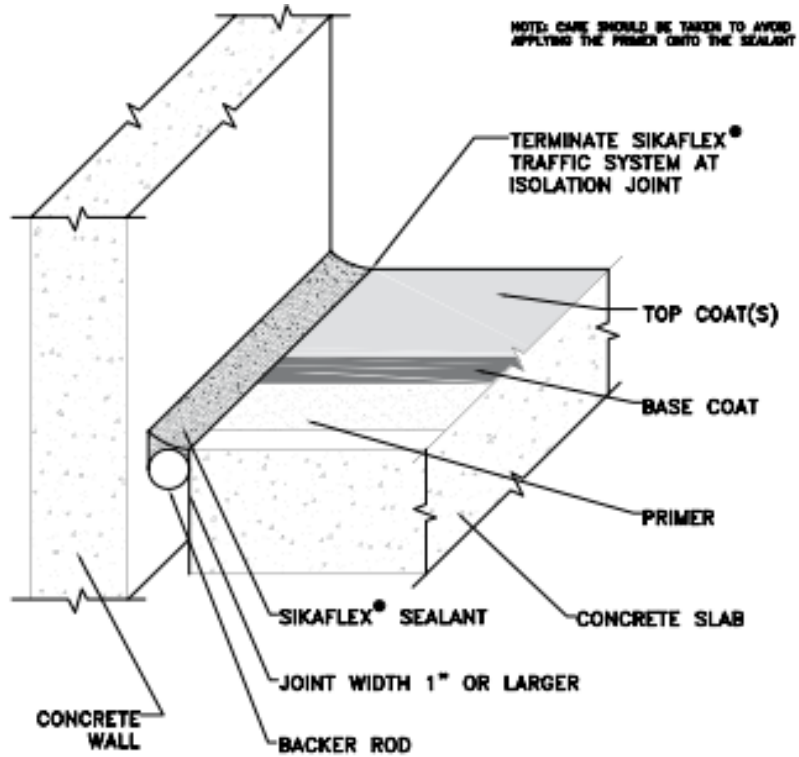
DECK TO WALL TERMINATION



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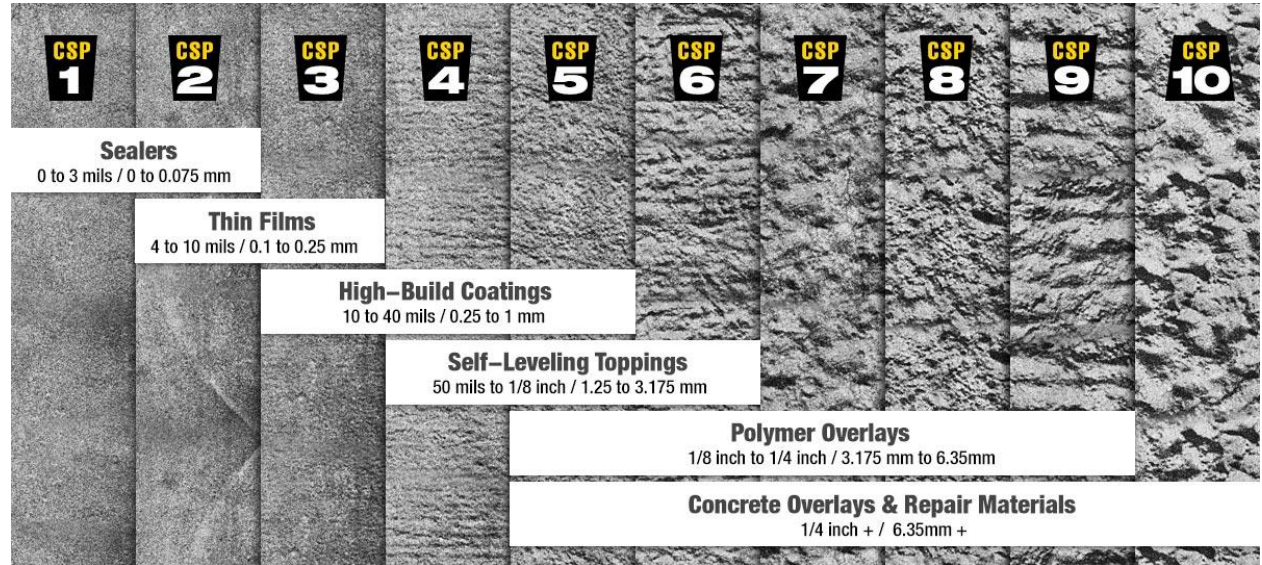
DECK TO WALL TERMINATION



SURFACE PREPARATION

Requirements

- Clean
- Sound
- Profiled – CSP 3
- Dry (<4% moisture content by Tramex meter*)



CASE STUDY: SUITLAND STATION GARAGE, 2014

- Shotblasting



CASE STUDY: SUITLAND STATION GARAGE, 2014

Surface Preparation

- ✓ Clean
- ✓ Sound
- ✓ Profiled – CSP 3
- Dry
($<4\%$ moisture content by Tramex meter*)

Common means

- Shotblast
- Pressure wash
- Grind



SURFACE PREPARATION

Shotblast

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SURFACE PREPARATION

Shotblast

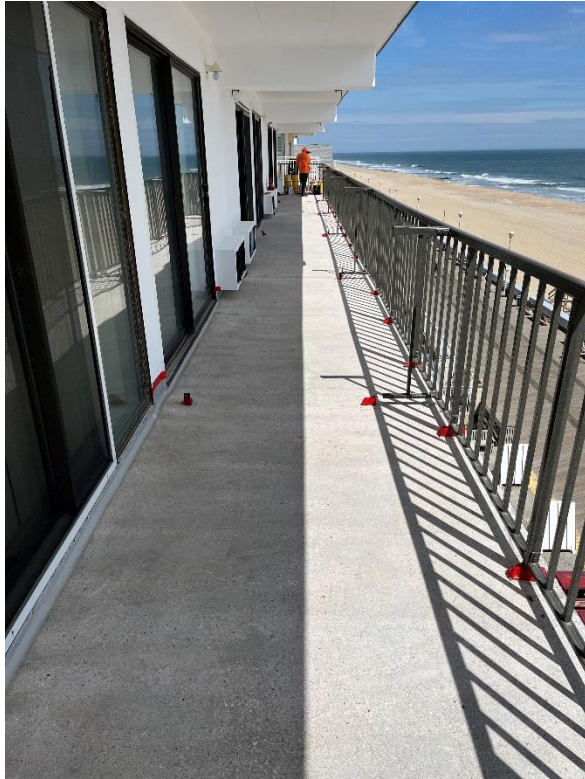
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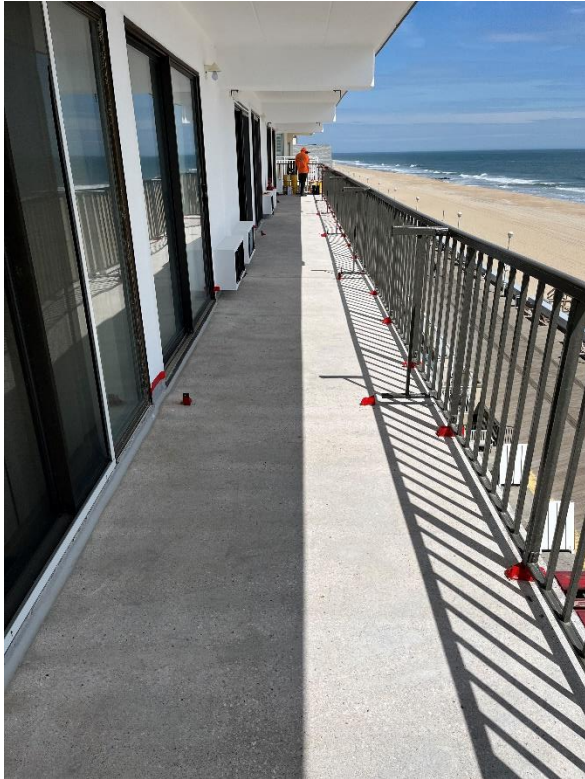


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READY TO COAT?

NOT YET!

AMBIENT & SUBSTRATE CONDITIONS

Understand these Conditions

- Moisture Content of Substrate
- Temperature of Air
- Temperature of Substrate
- Relative Humidity (no rain)
- Dew Point
- Substrate Outgassing
- Material Outgassing

- **At time of installation through tack-free**

Avoid these Problems

- Peeling
- Pinholing
- Cratering/fisheyes
- Foaming
- Wrinkling
- Blistering
- Sponging

AMBIENT & SUBSTRATE CONDITIONS

Understand these Conditions

- Moisture Content of Substrate
 - Most primers/materials need a dry substrate for adhesion
 - Measuring the moisture content is the only means to verify if dry
 - 4% or less moisture content by Tramex meter is considered dry



Avoid these Problems

- Peeling, loss of adhesion



AMBIENT & SUBSTRATE CONDITIONS

Understand these Conditions

- Moisture Content of Substrate
 - If needing to apply to substrate with more than 4% moisture content, prime with Sikalastic 100 VB
 - If doing in freeze/thaw environment, best to have air-entrained concrete



AMBIENT & SUBSTRATE CONDITIONS

Understand these Conditions

- Temperature of Air
 - 40-95F
- Temperature of Substrate
 - 40-140F
- Relative Humidity (no rain)
 - Maximum 95%
- Dew Point
 - Temperature air & substrate minimum 5F above dew point
- Substrate Outgassing
- Material Outgassing

[limits can be material specific]

Avoid these Problems

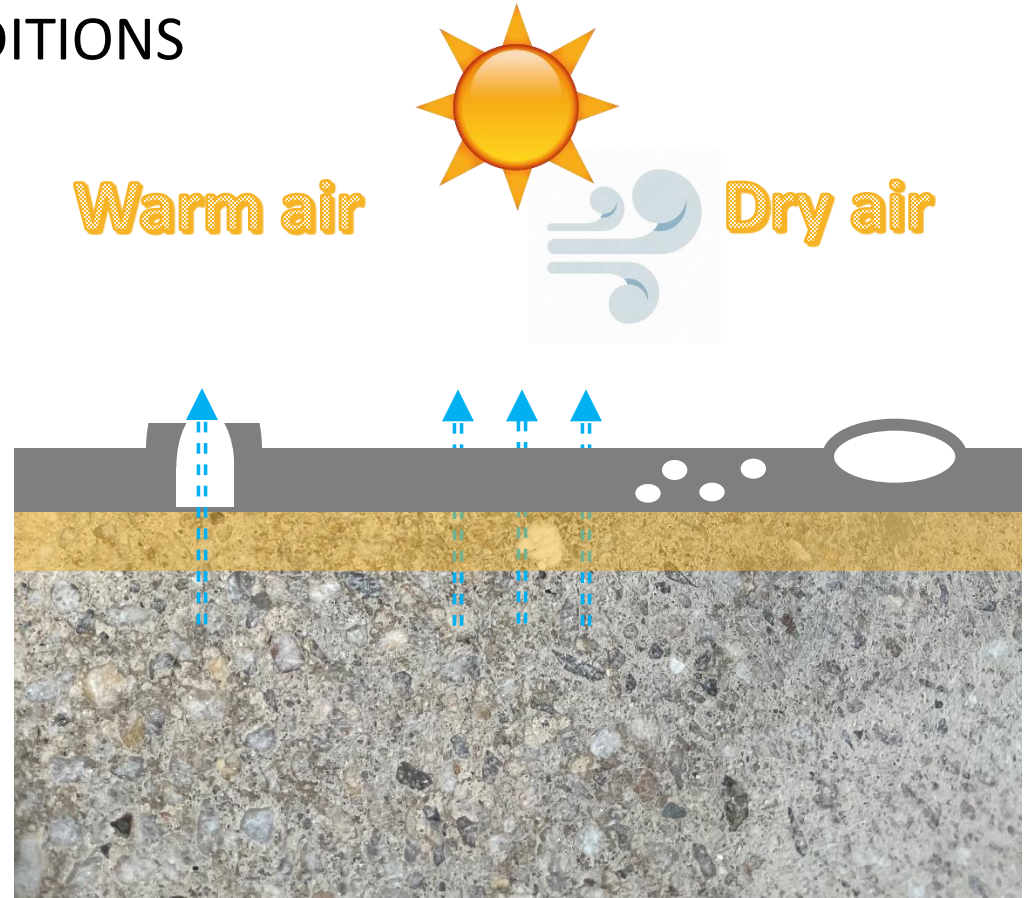
- Pinholing
- Cratering/fisheyes
- Foaming
- Wrinkling
- Blistering
- Sponging

These are all related...

AMBIENT & SUBSTRATE CONDITIONS

Substrate Outgassing (vapor drive)

- Even dry concrete always has air and water vapor in it
- Water vapor is drawn out of the concrete by warmer air, drier air, wind, warmer concrete surface
- As a liquid, the vapor passes through
- As material thickens, it creates a bubble
- Bubble may pop and form pinhole or fisheye
- Curing material may trap vapor and form small voids or series of voids to form blisters



AMBIENT & SUBSTRATE CONDITIONS

Substrate Outgassing (vapor drive)

- Even dry concrete always has air and water vapor in it
- Water vapor is drawn out of the concrete by warmer air, drier air, wind, warmer concrete surface
- It is the imbalance between substrate and air conditions



AMBIENT & SUBSTRATE CONDITIONS

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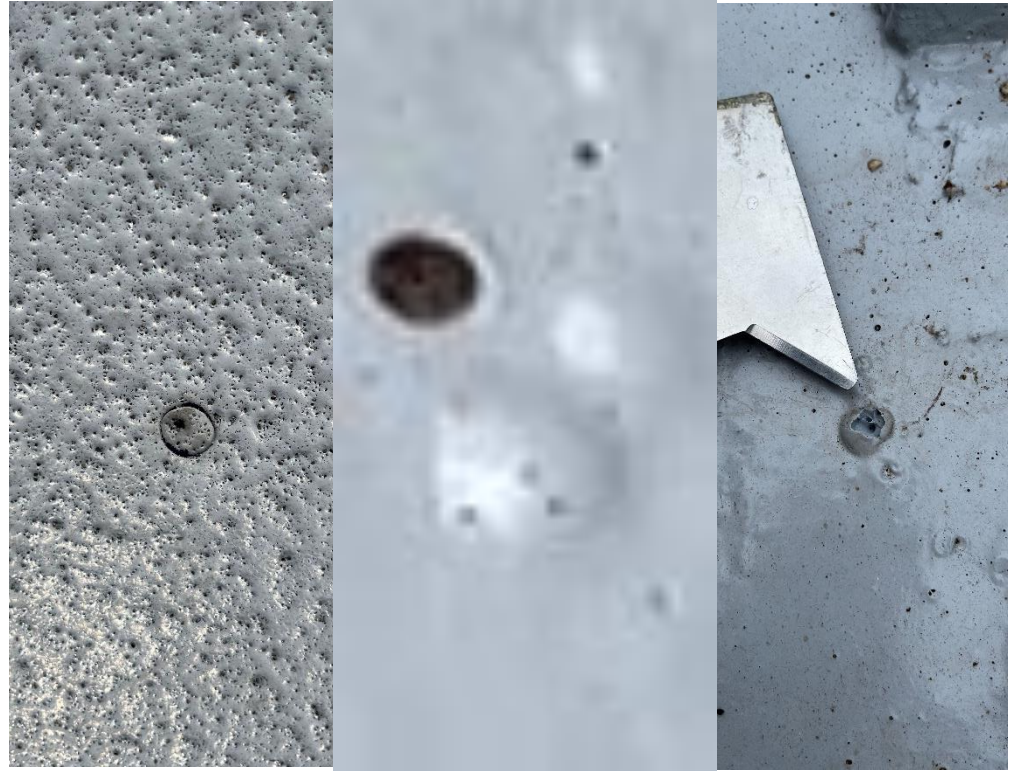
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- As a liquid, the vapor passes through
- As material thickens, it creates a bubble
- Bubble may pop and form pinhole or fisheye
- Curing material may trap vapor and form small voids or series of voids to form blisters



AMBIENT & SUBSTRATE CONDITIONS

Substrate Outgassing (vapor drive)

- Even dry concrete always has air and water vapor in it
- Water vapor is drawn out of the concrete by warmer air, drier air, wind, warmer concrete surface
- As a liquid, the vapor passes through
- As material thickens, it creates a bubble
- Bubble may pop and form pinhole or fisheye
- Curing material may trap vapor and form small voids or series of voids to form blisters

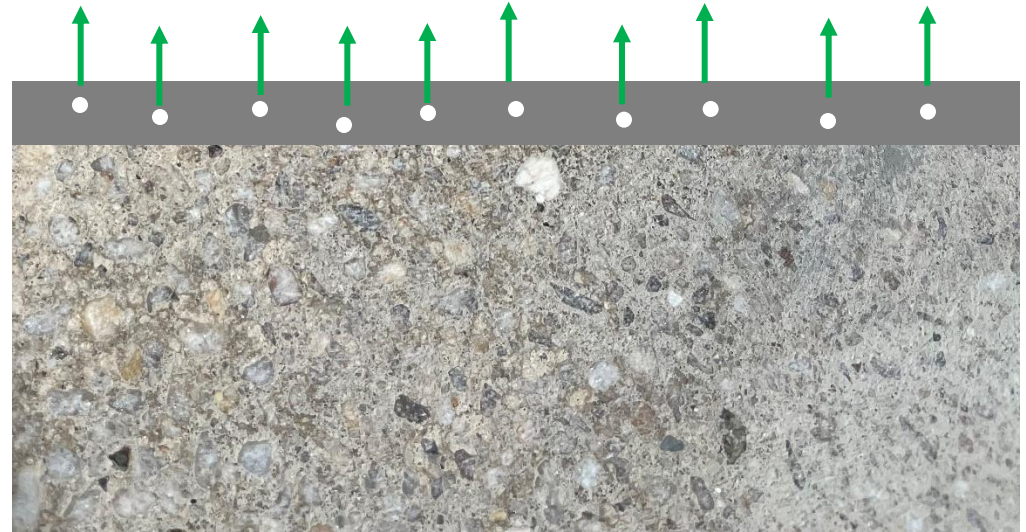


Apply when ambient & substrate temperatures are falling

AMBIENT & SUBSTRATE CONDITIONS

Material Outgassing

- Many materials have solvents that need to be released
- Many materials produce CO2 that needs to be released
- Same effects as substrate outgassing



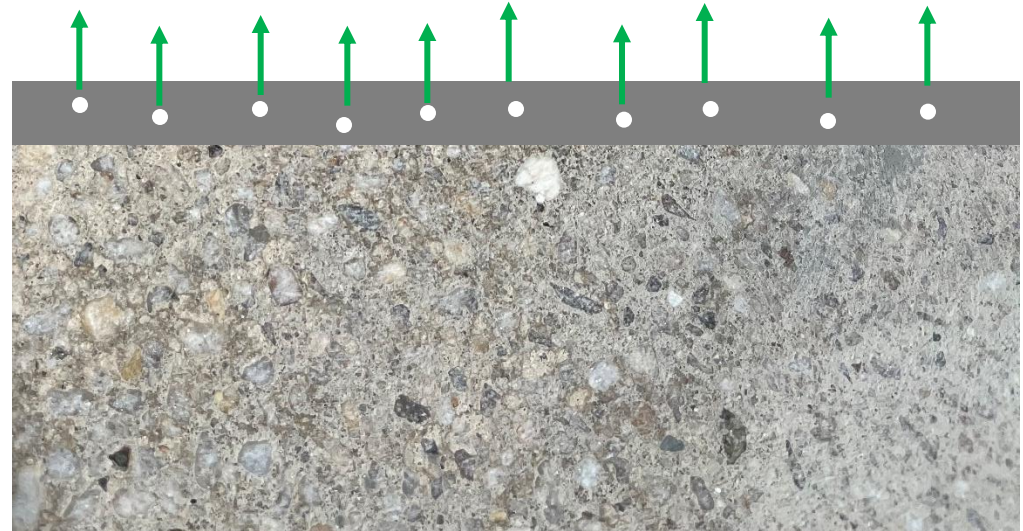
AMBIENT & SUBSTRATE CONDITIONS

Material Outgassing

- Temperature of Air
 - 40-95F
- Temperature of Substrate
 - 40-140F
- Relative Humidity (no rain)
 - ~~Maximum 95%~~
- Dew Point
 - Temperature air & substrate minimum 5F above dew point

[limits can be material specific]

- Too cold/humid, interferes with curing & traps
- Too hot, material sets too quickly & traps
- More moisture, material produces more CO₂, sets too quickly & traps



AMBIENT & SUBSTRATE CONDITIONS

Material Outgassing

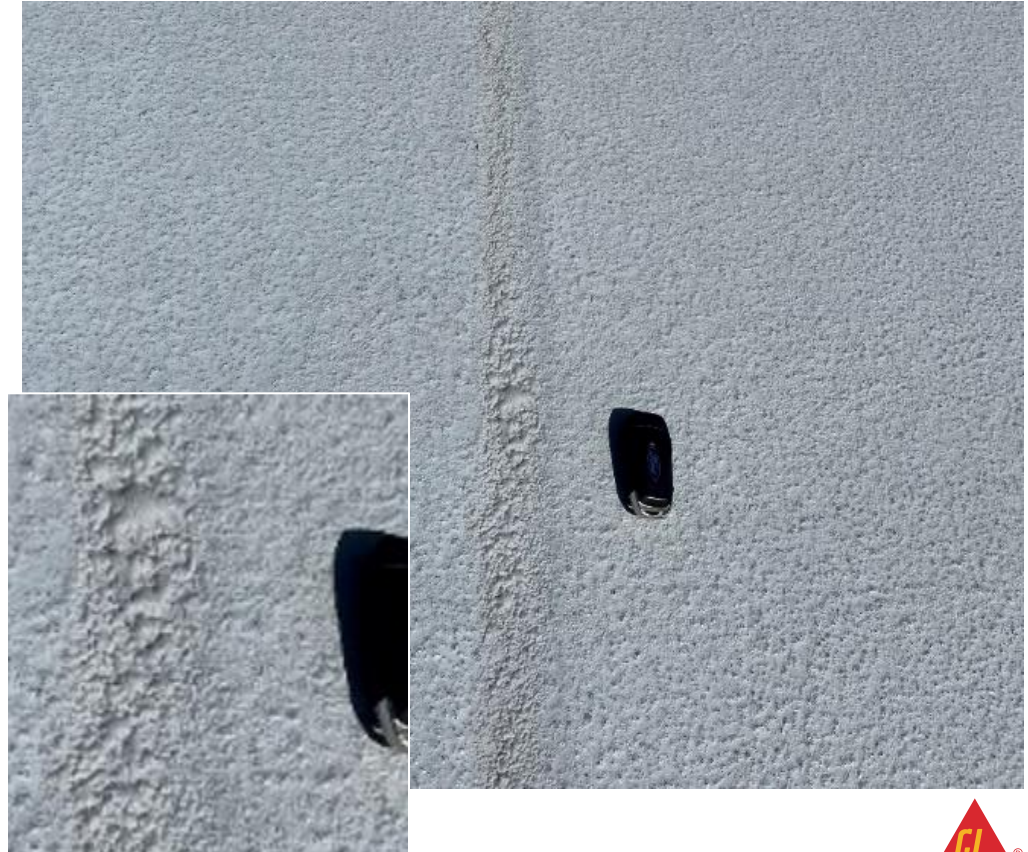
- Many materials have solvents that need to be released
- Many materials produce CO₂ that needs to be released
- Excessive moisture such as from rain, results in spongy surface and can even hear the squishing



AMBIENT & SUBSTRATE CONDITIONS

Material Outgassing

- Many materials have solvents that need to be released
- Many materials produce CO₂ that needs to be released
- Same effects as substrate outgassing
- **Material applied too thick & gasses trapped**



Checklist:

Install to Tack-free

- ✓ Dry substrate
- ✓ Ambient temperatures
- ✓ Substrate temperatures
- ✓ Rain forecast
- ✓ Humidity
- ✓ Dew point
- ✓ Dropping temperatures

NOW READY TO COAT

CASE STUDY: SUITLAND STATION GARAGE, 2014

Priming

- Roll primer for best coverage (~250-300sf/gal) 3/8"-1/2" nap is good
- Coverage function of surface profile
- Urethane primer is good choice for going over joint sealant
- Better not to cover sealant with epoxy primer



PRIMING

- Pour ribbon, flat squeegee, and back-roll for fastest application
- Some leveling of surface
- Coverage rate reduced



PRIMING

- Low odor primers preferred with less ventilation (exhaust to intake)
- More common to prime entire work area and then begin detailing



PRIMING

- Consistent film seals surface
- Allow primer to become tack-free before coating



CASE STUDY: SUITLAND STATION GARAGE, 2014

Priming

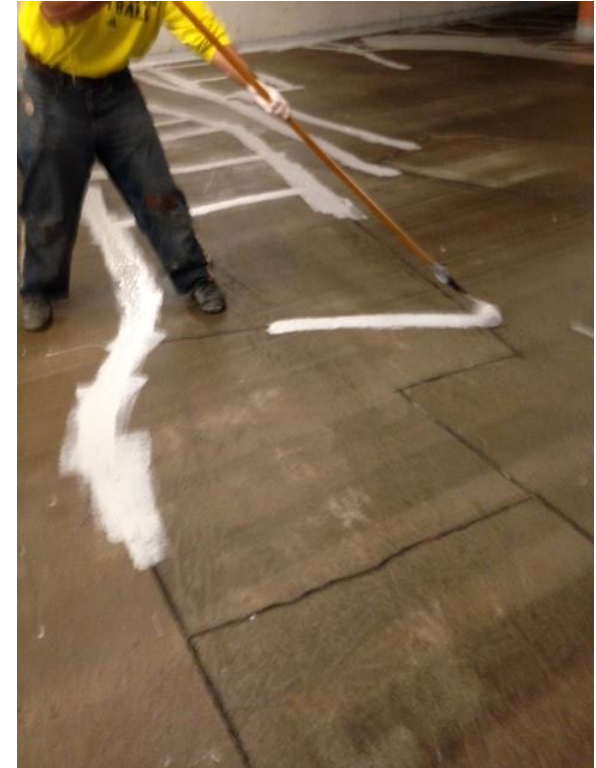
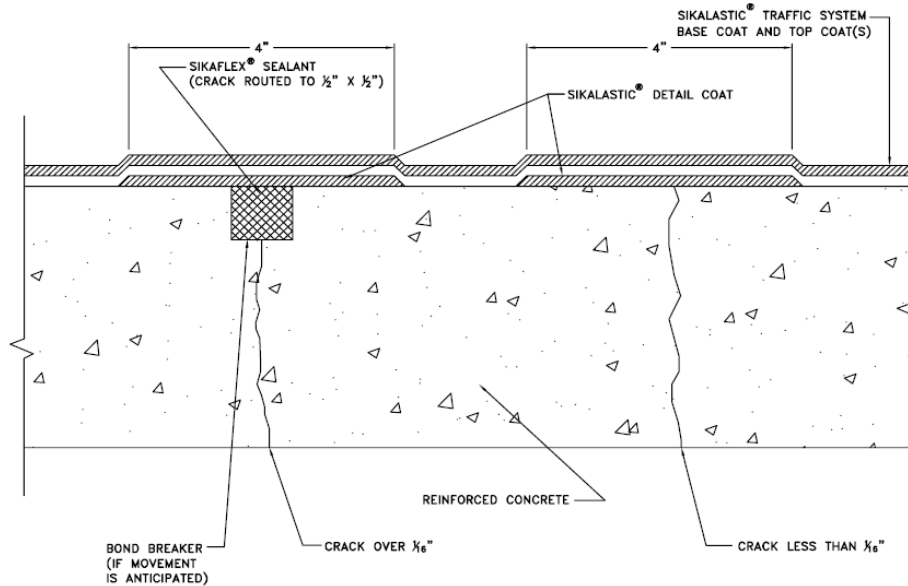
- Allow primer to become tack-free before coating



DETAIL COAT

≥ 1/16": rout ½ x ½" & seal with Sikaflex sealant, apply 4" wide detail coat ~25 mils thick

< 1/16": apply 4" wide detail coat ~25 mils thick



CASE STUDY: SUITLAND STATION GARAGE, 2014

Detailing

- Roll detail coat (base coat material)
- 3/8"-3/4" nap roller
- 4" wide, ~25 mils



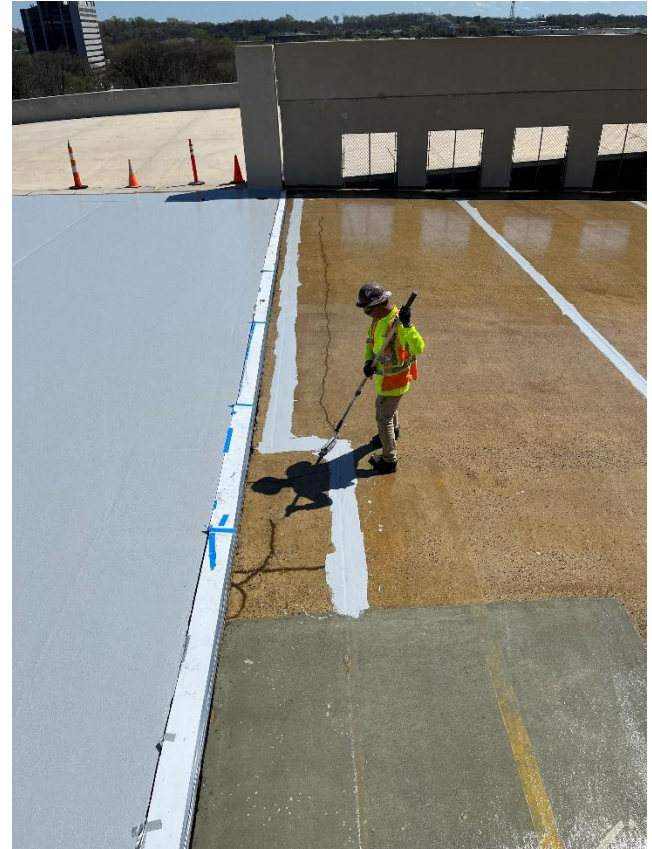
DETAIL COAT

- Provides more membrane at locations of known movement



DETAIL COAT

- Allow to become tack-free prior to coating



CASE STUDY: SUITLAND STATION GARAGE, 2014

Base Coat

- Mil gauges less accurate on non-flat surfaces
- Use grid system for coverage

Example:

To achieve 23 dry mils across 63' with 5 gallons of a 100% solids base coat, spread at 70 sf/gal (350/5 gal) = 5.5' rows

63'

5.5'

5 gallons



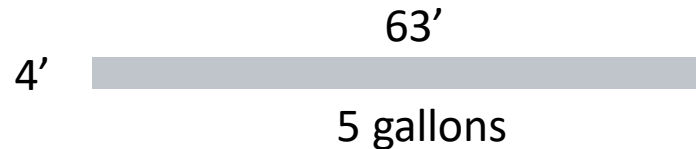
CASE STUDY: SUITLAND STATION GARAGE, 2014

Base Coat

- Mil gauges less accurate on non-flat surfaces
- Use grid system for coverage
- Most 1-parts still need some mixing

Suitland:

To achieve 23 dry mils across 63' with 5 gallons of a 71% solids base coat, spread at 50 sf/gal (250/5 gal) = 4' rows



CASE STUDY: SUITLAND STATION GARAGE, 2014

Base Coat

- Pour ribbon



CASE STUDY: SUITLAND STATION GARAGE, 2014

Base Coat

- Spread to grid with proper notched squeegee (3/16" – 1/4" for most)



BASE COAT

- Use snowplow technique



CASE STUDY: SUITLAND STATION GARAGE, 2014

Base Coat

- Back-roll for consistency of mils
- 3/8"-3/4" nap roller



BASE COAT

- Spread to grid, repeat for next grid



CASE STUDY: SUITLAND STATION GARAGE, 2014

Base Coat

- Allow to become tack-free prior to coating
- No sand in base coat
- Waterproofing layer complete



CASE STUDY: SUITLAND STATION GARAGE, 2014

Wear/Top Coats

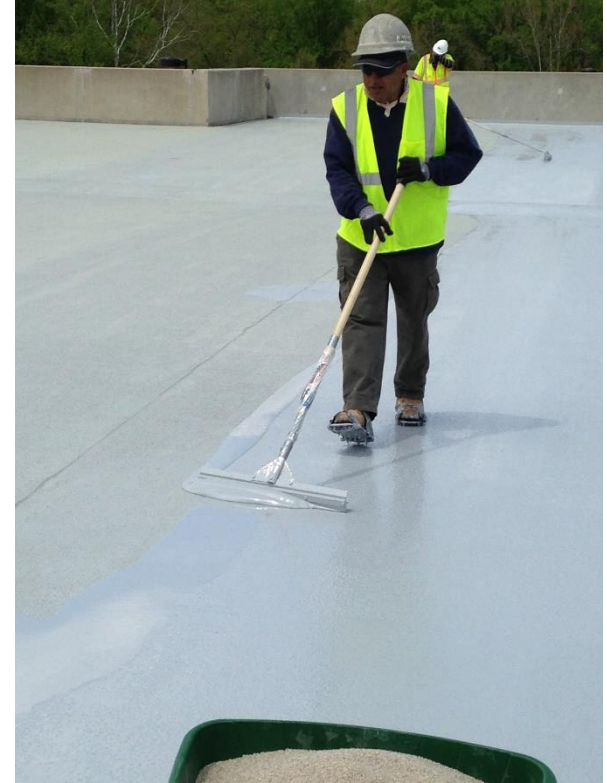
- Pour ribbon



CASE STUDY: SUITLAND STATION GARAGE, 2014

Wear/Top Coats

- Pour ribbon
- Spread to grid with proper notched squeegee (3/16" – 1/4" for most)
- Use snowplow technique



CASE STUDY: SUITLAND STATION GARAGE, 2014

Wear/Top Coats

- Back-roll for consistency of mils
- 3/8"-3/4" nap roller



CASE STUDY: SUITLAND STATION GARAGE, 2014

Wear/Top Coats

- Seed with select aggregate at select rate (common 16-30 mesh at 15 pounds/100 square feet)
- Back-roll to encapsulate and improve consistency



WEAR/TOP COATS

- Seed with select aggregate at select rate (common 16-30 mesh at 15 pounds/100 square feet)
- Back-roll to encapsulate and improve consistency



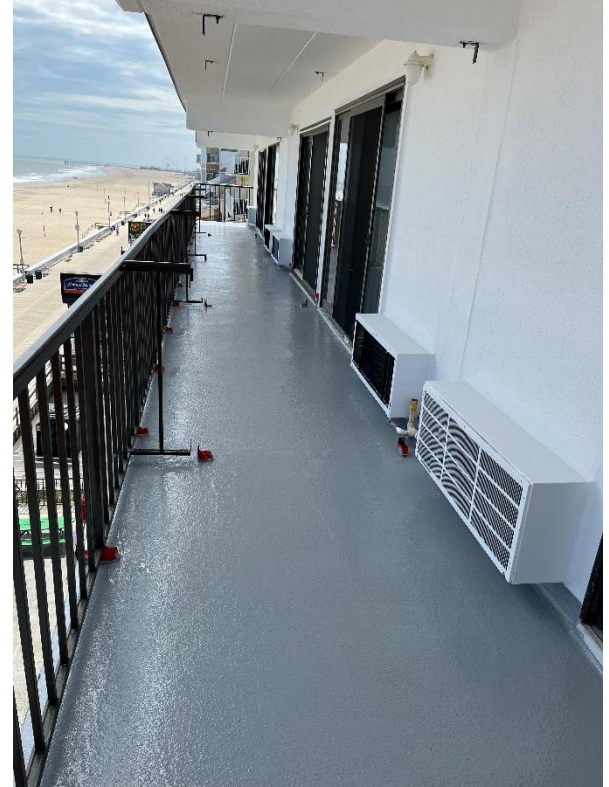
WEAR/TOP COATS

- Allow to become tack-free before coating
- Generally, line stripe in 1-2 days
- Allow 72 hours of cure for most 1-parts before vehicular traffic
- Allow 36 hours of cure for most 2-parts before vehicular traffic



WEAR/TOP COATS

- Although ready for pedestrian traffic, allow more time before placing furniture as still curing
- 7-days generally full cure 1-parts
- 3-days generally full cure 2-parts
- Move furniture around
- Use plastic under feet



CASE STUDY: SUITLAND STATION GARAGE, 2014

Final Inspection

- ✓ Fully waterproofed
- ✓ Slip resistant
- ✓ Traffic durable
- ✓ Desired appearance



CASE STUDY: SUITLAND STATION GARAGE, 2014

Final Inspection

- ✓ Fully waterproofed
- ✓ Slip resistant
- ✓ Traffic durable
- ✓ Desired appearance



CASE STUDY: SUITLAND STATION GARAGE, 2014

2024 After 10 Years of Service

- ✓ Fully waterproofed
- ✓ Slip resistant
- ✓ Traffic durable
- ✓ Desired appearance



CASE STUDY: SUITLAND STATION GARAGE, 2014

2024 After 10 Years of Service

- ✓ Fully waterproofed
- ✓ Slip resistant
- ✓ Traffic durable
- ✓ Desired appearance



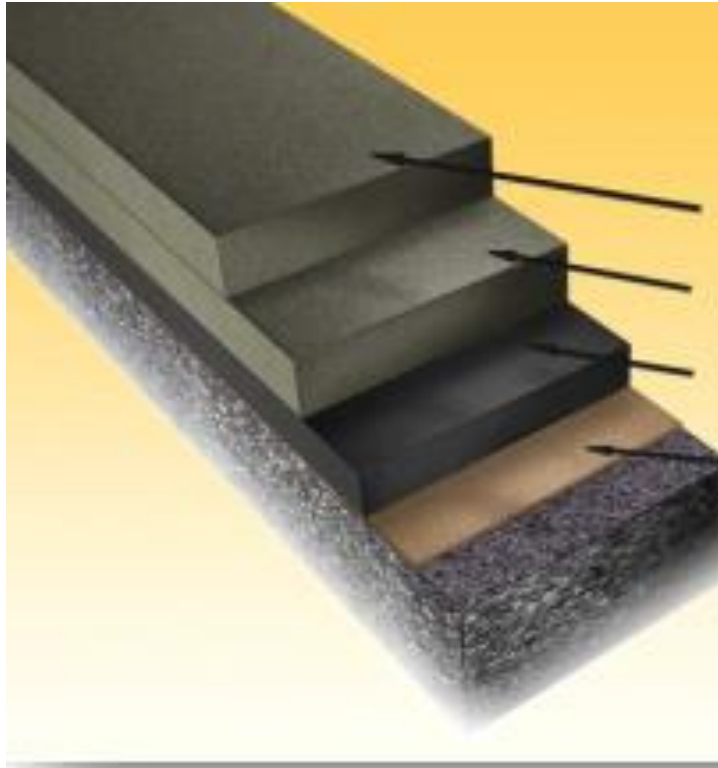
CASE STUDY: SUITLAND STATION GARAGE, 2014

2024 After 10 Years of Service

- ✓ Fully waterproofed
- ✓ Slip resistant
- ✓ Traffic durable
- ✓ Desired appearance



SLIP RESISTANCE AND TRAFFIC DURABLE

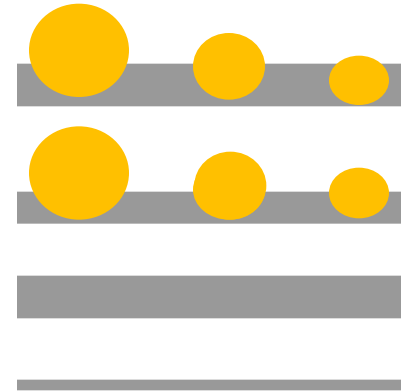


Top (~20 mils)

Wear (~15 mils)

Base (~20 mils)

Primer



SYSTEM SELECTION

 Aromatic Top

 Aromatic Wear

- Lower cost material, interior only



Rayburn House Office Building, DC 2018

SYSTEM SELECTION

 Aliphatic Top

 Aromatic Wear



601 Calvert Street, Baltimore 2018

SYSTEM SELECTION

 Aliphatic Top



 Aliphatic Wear



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



SYSTEM SELECTION

-  Aliphatic Top
-  Aliphatic Wear

- Exterior or interior



Northampton Place, Alexandria VA 2016

SYSTEM SELECTION

 Aliphatic Top
Epoxy Wear 12-20

- Very durable



Plaza Garage, Baltimore 2018

SYSTEM SELECTION



No Top
Epoxy Wear 12-20

- Very durable



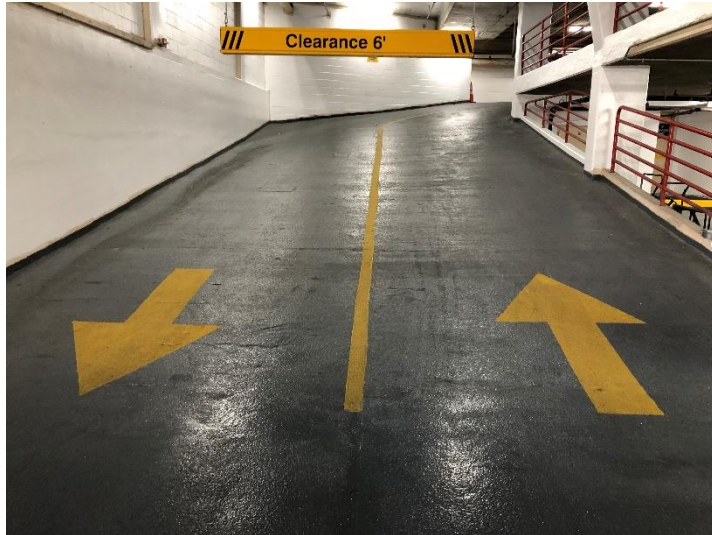
700 2nd St NE, DC 2017

SYSTEM SELECTION



Epoxy Top
Epoxy Wear #3 flint

- Interior system, extremely durable



Shops at Wisconsin Place, MD 2020



1323 Greenwood Road, Pikesville MD 2021

SYSTEM SELECTION



Epoxy Top
Epoxy Wear #3 flint

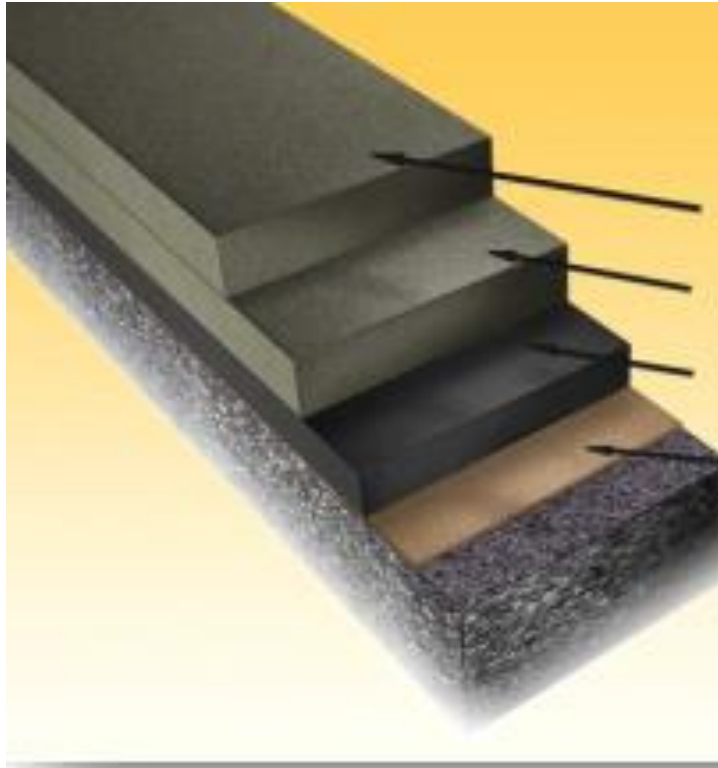
- Interior system, extremely durable



500 NJ Ave SE, DC 2020



SLIP RESISTANCE AND TRAFFIC DURABLE

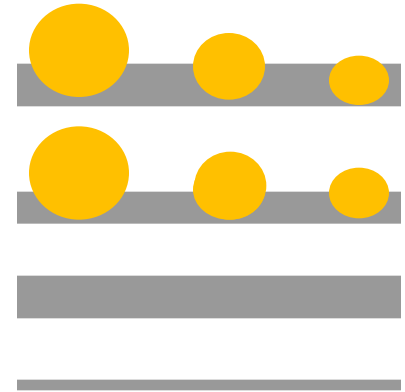


Top (~20 mils)

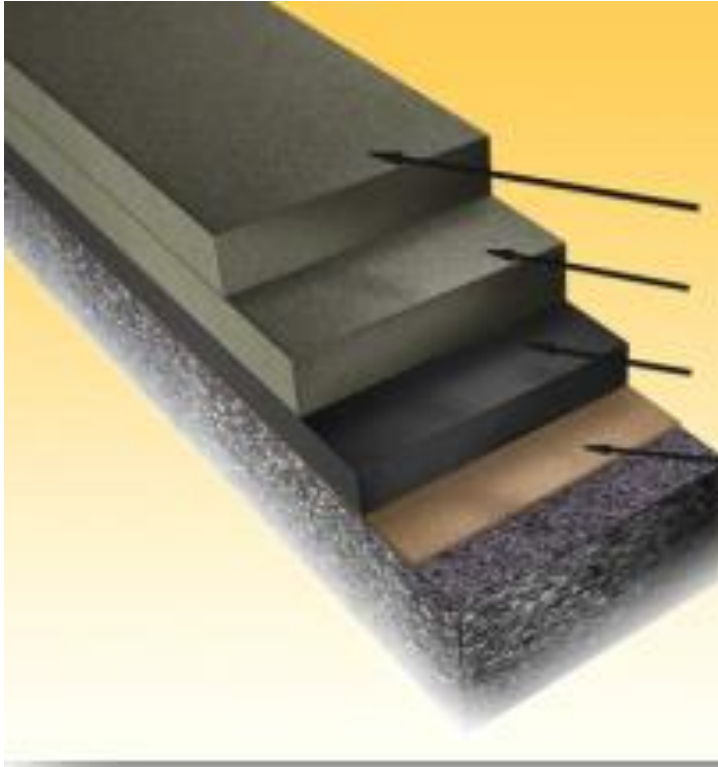
Wear (~15 mils)

Base (~20 mils)

Primer



SLIP RESISTANCE AND TRAFFIC DURABLE



- 45 mils of aliphatic, non-CO2 producing urethane
- Integral angular aggregate, non-absorbent, manufactured to bind

Sikalastic 720 One Shot

One Shot (~45 mils)

Primer (~10 mils)



Sikalastic 726 One Shot

Pedestrian

(35 mils)

self-priming



SYSTEM SELECTION

- Sikalastic 720 One Shot
- Elastic waterproofing protection
- Superior urethane durability



40 E West Street, Baltimore 2022

SYSTEM SELECTION

- Methyl methacrylate/polyurethane (PUMMA)
- Must have quick return to service



Sika Webinar Series:

- Do's & Don'ts of Deck Coatings
- Sikalastic One Shots
- Fast-curing Traffic Systems





THANK YOU FOR YOUR ATTENTION!

RANDALL KRATZ

410-336-3757

KRATZ.RANDALL@US.SIKA.COM

BUILDING TRUST

