Flooring Design and Lessons Learned: Durability and ROI on Flooring Types & Moisture Prevention

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November 2, 2021 Wisconsin Dells, WI

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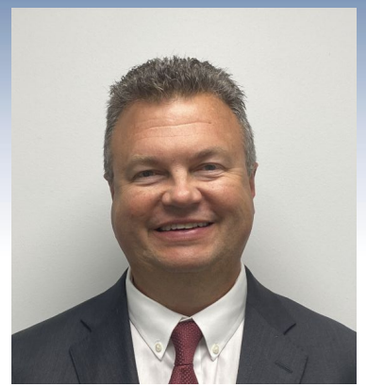

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Flooring Design and Lessons Learned

Objectives Today:

- We are here to help - Reach out to our teams and resources.
- Trends - K12 design, durability.
- Choices - Maintenance, and ROI on a variety of flooring types.
- Pros and Cons on material selection.
- Why more moisture problems are occurring.
- Learn ways to prevent, mitigate or solve moisture problems.

Before you start:
Budget and Approvals

- Allocate each year in fiscal budget.
- Do you have a life-cycle replacement plan? 5-Year PLan
- Allow enough time to get approval from your CSBO/Business Manager for budget and schedule, and design.
- Approvals on flooring selection
- Bid early

Why Now?

Learning - Student Spaces

- High-use Of Flexible Furniture
- Modernization Of Spaces - Outdated Buildings
- More Choices To Impact Aesthetics
- Branding And Standardization District-wide
- Covid - Hygiene, Cleanable Sanitizing, Air Quality

Learning Activities on the Floor

Learning - Student Spaces

- Need Durability For High-use Stem Lab Areas, Entryways, P.E. Spaces
- Softer Materials For Offices And Quiet Areas

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COMMON FLOORING TYPES

Type of Floor	Estimate Average Cost Installation	Key Areas to utilize	Key Benefits
LVT Luxury Vinyl Tile	$$	Halls Classrooms (where you have VCT now)	NO stripping waxing Looks. Aesthetic Choice
VCT Vinyl Composite Tile (Squares)	$	labs	low-cost
CPT - Carpet Tile	$ to $$	offices, libraries, classrooms	sound, comfort (commitment to clean) (discussion)

LVT (Luxury Vinyl Tile)

- Cleaning - Dust/Damp Mop -Water
- Longevity - 15 years
- Aesthetics - Natural looks, bright colors
- Spaces - Corridors, Classrooms
- Acoustics

VCT

- Low upfront cost
- Long term stripping/waxing upkeep
- Long history of use in schools
- Durable

COMMON FLOORING COST comparison

COMPARISON OF VCT, LVT and Carpet Tile

PER 10,000 SQ FT

	VCT	LVT	CPT TILE
Product & Installation Cost	$ 15,000	$ 40,000	$ 35,000
Initial Maintenance (Chemical, Polish & Labor)	$ 2,800	$ 600	$ -
TOTAL Initial Cost	**$ 17,800**	**$ 40,600**	**$ 35,000**
ANNUAL MAINTENANCE COST			
Daily / Routine Maintenance	$ 28,900	$ 27,600	$ 19,100
Periodic / Interim Maintenance	$ 4,400	$ 2,000	$ -
Restorative Maintenance	$ 4,900	$ 900	$ 5,800
TOTAL Annual Maintenance Cost	**$ 38,200**	**$ 30,500**	**$ 24,900**
10 Year Total Maintenance Cost	$ 382,000	$ 305,000	$ 249,000
Total Installation Cost	$ 17,800	$ 40,600	$ 35,000
TOTAL Cost Over 10 Years per 10,000 SQ FT	**$399,800**	**$345,600**	**$284,000**

LVT vs VCT Comparison

LVT Saves Money Within Three Years Over VCT

- Cost analysis are based on hypothetical “test area” and a floor maintenance program including

    - Initial Cleaning Processes
    - Daily Routines Cleaning (dusting, mopping, spray-buffing, burnishing)
    - Periodic Cleaning (semi-annual or quarterly spraying recoating)
    - Restorative Process (semi-annual and annual maintenance that includes stripping and refinishing)

- The average facility (100,000 sf) can expect to **save about $550,000 over a ten year period** by choosing LVT rather than VCT.

Carpet Tile Benefits

- Install methods - aesthetics
- Color coordination - learning space enrichments

Recent Installations

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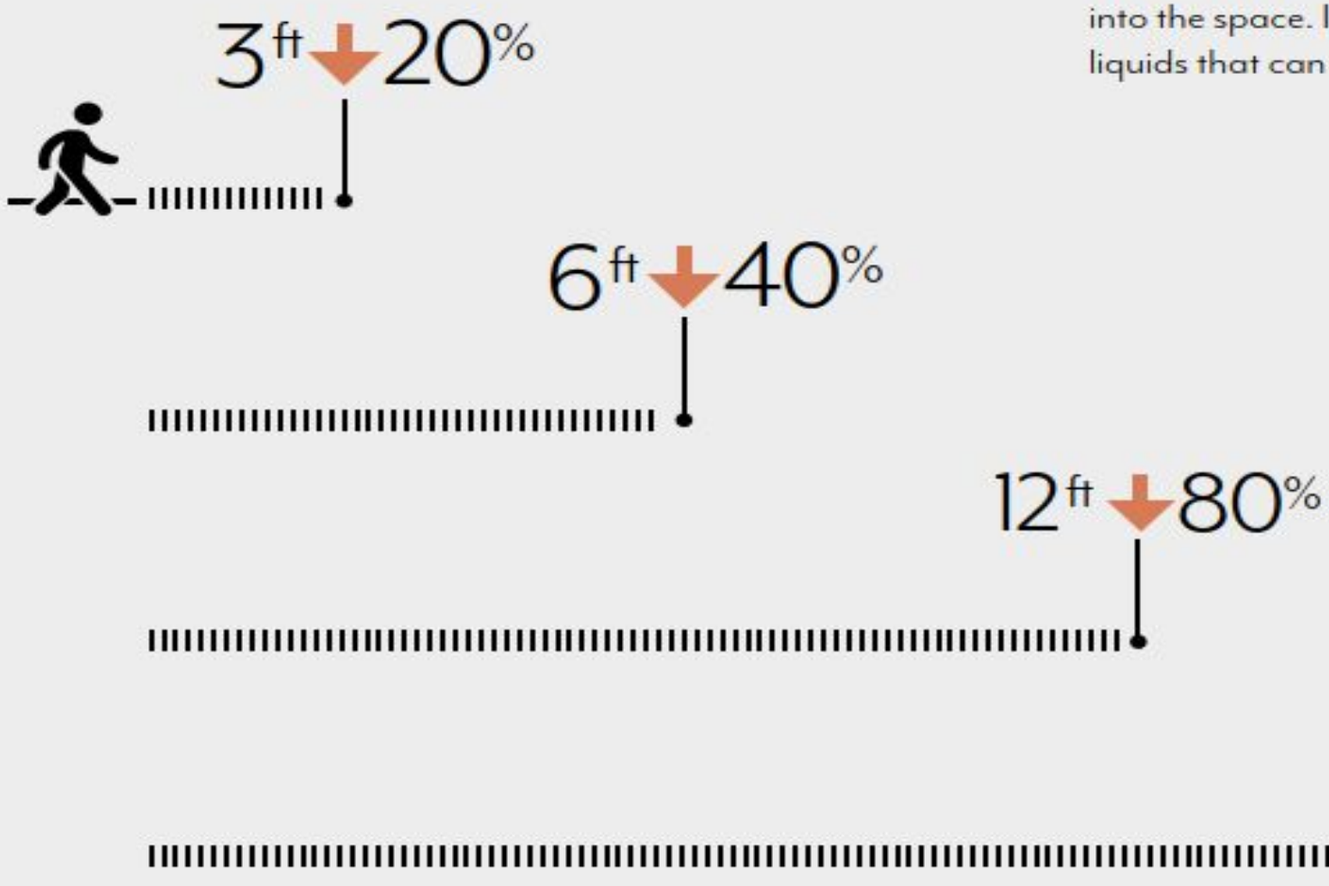
Walk-Off Carpet, Tiles or Roll Product

- **Must-have** in Vestibules and into school lobby and corridors
- Length of foot traffic - 20-30 feet important
- Avoids carpet ‘runners’
- Reduce trip hazards.

Walk-off Carpet



A STEP AHEAD. Entrance flooring is capable of scraping debris off shoes and holds that material, preventing soil from being tracked into the space. It removes small particles of dirt, as well as oils and other liquids that can be picked up and tracked in from outside.

Entrance flooring should extend for **6 to 15 feet** inside the entrance so it will trap up to **80% of soil** and moisture from the first five or six steps.

BY THE NUMBERS

A study by the International Sanitary Supply Association (ISSA) showed 1,000 people in 20 days can track in 24 pounds of soil into a space. The cost to remove one pound of soil from your facility is approximately $700.

ENTRY FLOORING /	None	3ft	6ft	12ft
SOIL TRACKED INDOORS /	24 lbs	19.2 lbs	14.4 lbs	4.8 lbs
SOIL REMOVAL COST /	$16,800	$13,440	$10,080	$3 ,360

Solid Vinyl Tile - Color throughout

Science Lab- Art

- Sheet Vinyl- 3 reasons why
- Chemical, seams, rough use

Sheet Flooring, Vinyl, Linoleum Environmental

P.E. Spaces, Specialty Flooring

- Impact resistant to weights
- Cushions Falls
- Foot/Leg Comfort
- High cost but appropriate to need

P.E. Spaces, Gym Flooring

- Moisture Considerations
- Roof leaks, condensation, groundwater
- Proactive Solutions

Other Hard surface - Specialty Areas

Type of Floor	Estimate Average Cost per Sq. Foot Product/ Installation	Key Areas to utilize the type of Floor	Other Key Variable(s)
Scissor type wood gym competition floor	$$$	Gym	Competition Grade for bounce
Planked wooden flooring	$$$	Gym	Standard Gym
Rubber	$$	Field house/track Fitness	Safety and Cushion
Epoxy options	$$	Garage	Acid resistant
Cement stain/sealer option	$	Shop Maintenance	Least concerns for scratches

Polished Concrete

- Poured concrete
- Poured Epoxy (homogenous option)
- Maintenance areas or labs

Moisture Prevention

The most commonly recurring and expensive flooring-related problem is moisture. North American commercial property owners spend $1B on remediation from moisture-related flooring failures annually.

Highlights:

- Why these problems are increasing
- Effect of excessive moisture on flooring
- Where the moisture comes from
- How moisture behaves in concrete
- How to test for moisture
- How to prevent, survive and solve these problems

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WHY MOISTURE PROBLEMS ARE INCREASING

- Water-based Adhesives (low VOCs)
- Impervious Flooring
- Accelerated Construction Schedules
- Missing or Damaged Vapor Barrier

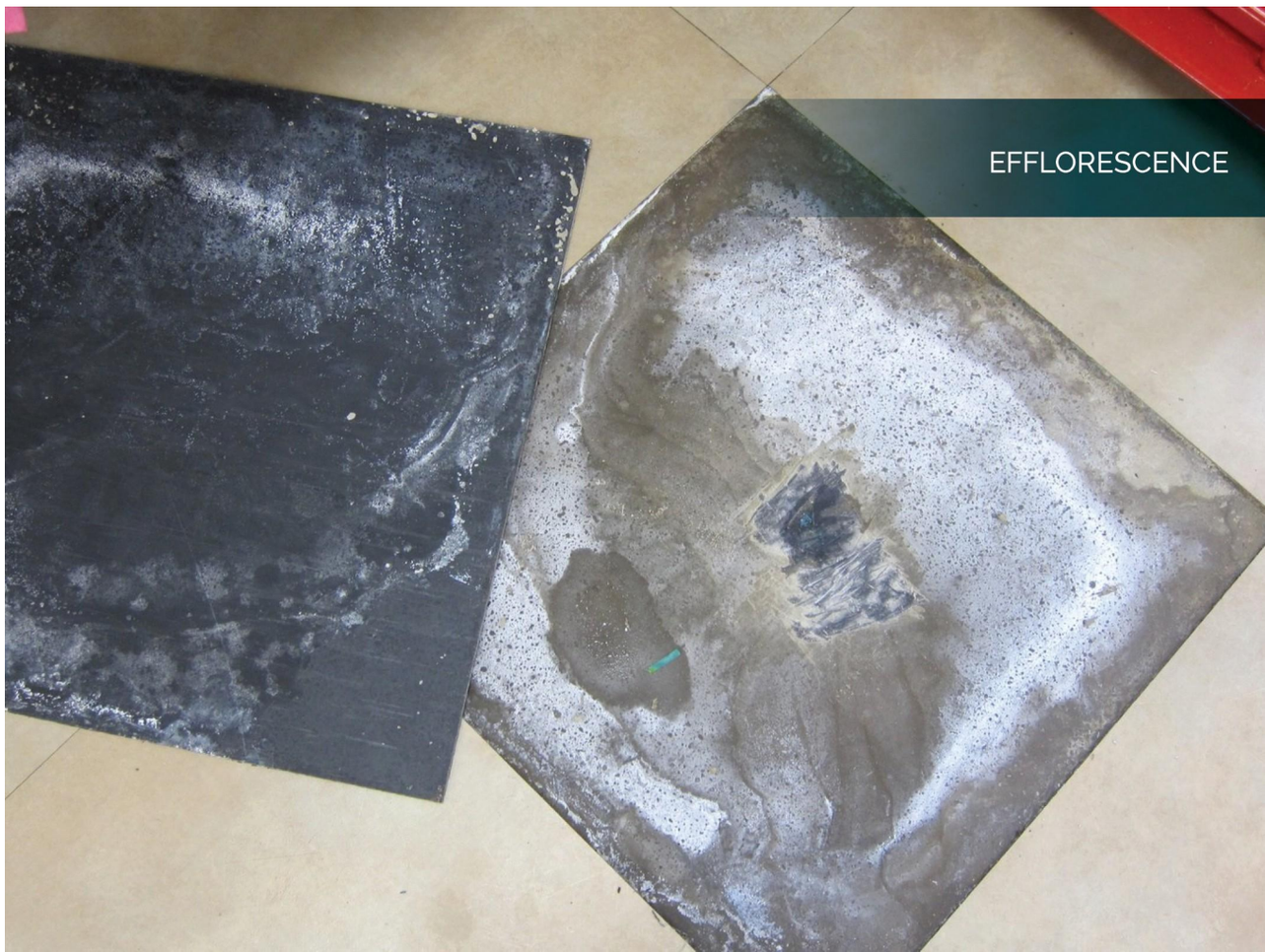
Photo: Created by evening_tao / www.freepik.com

GOOD FLOORS GONE BAD


EMULSIFIED ADHESIVES
UNDER CARPET TILE


WATER UNDER
CARPET TILE


LVP CUPPING

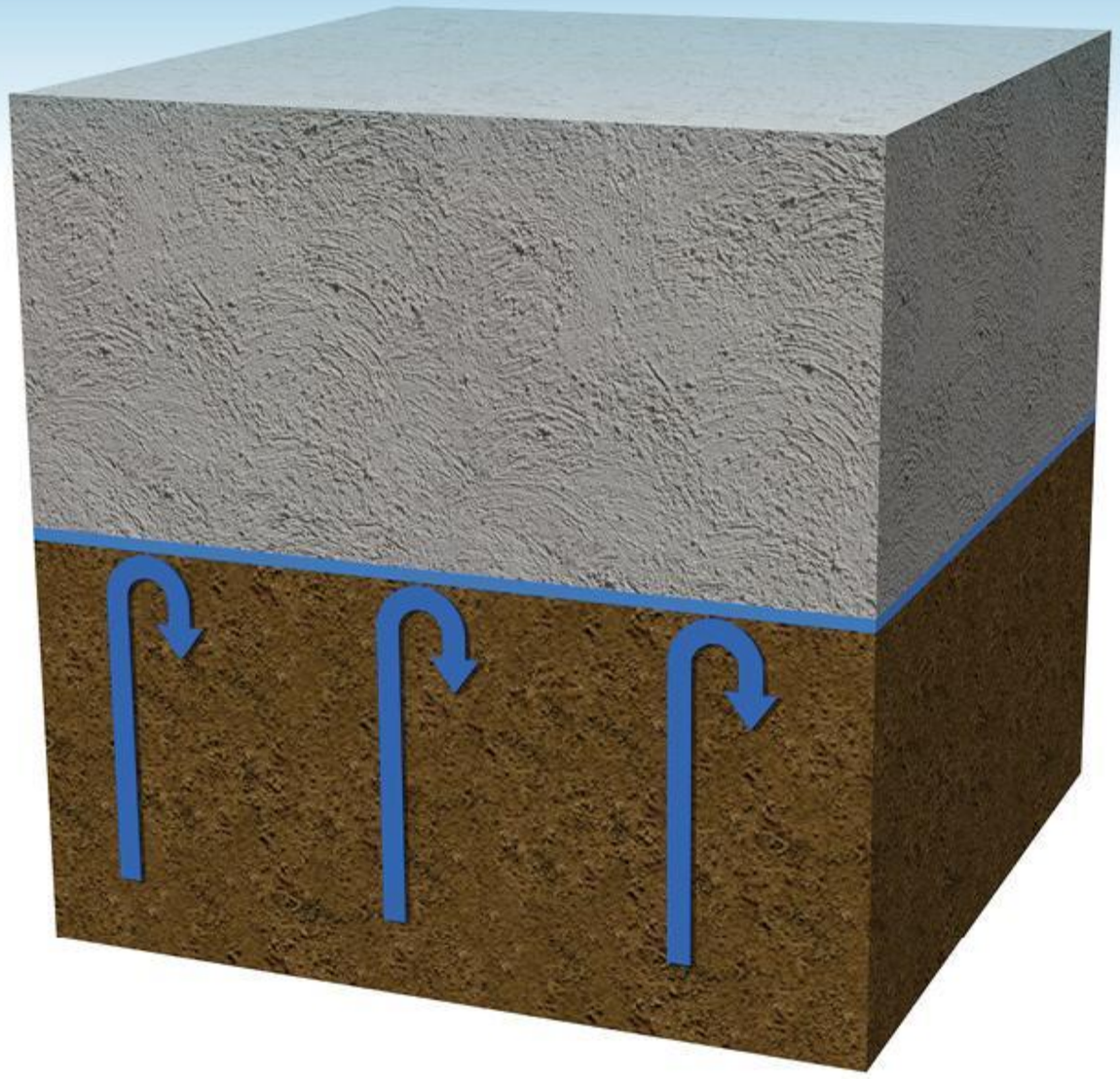

EFFLORESCENCE

MOLD UNDER LVP

SOURCES OF WATER

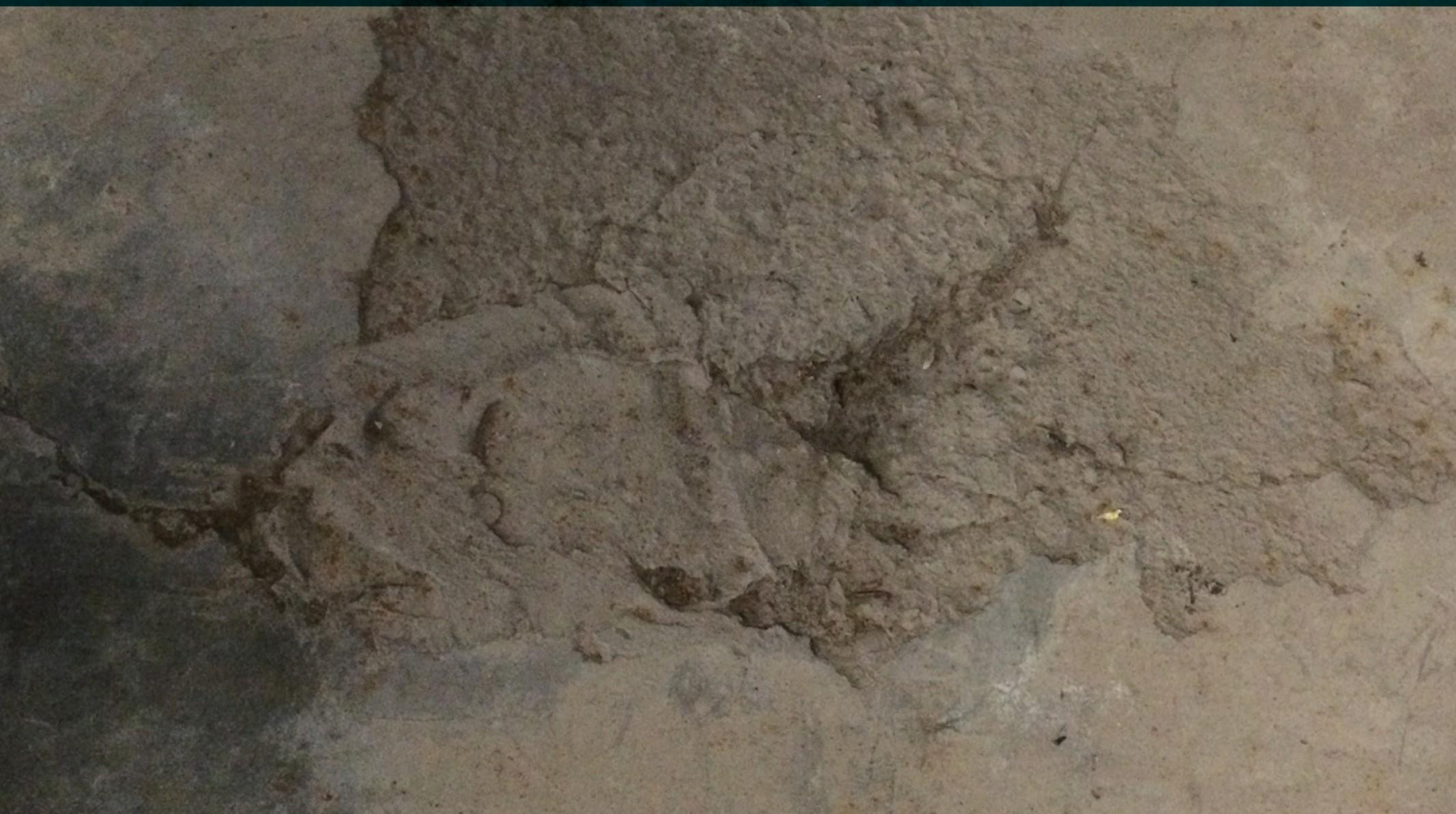
- The Earth Beneath the Slab
- The Air (Sweating Slab Syndrome)
- Water Pressure from Below
- Improperly Dried Concrete

THE EARTH BENEATH THE SLAB



WATER PRESSURE OR HYDROSTATIC PRESSURE

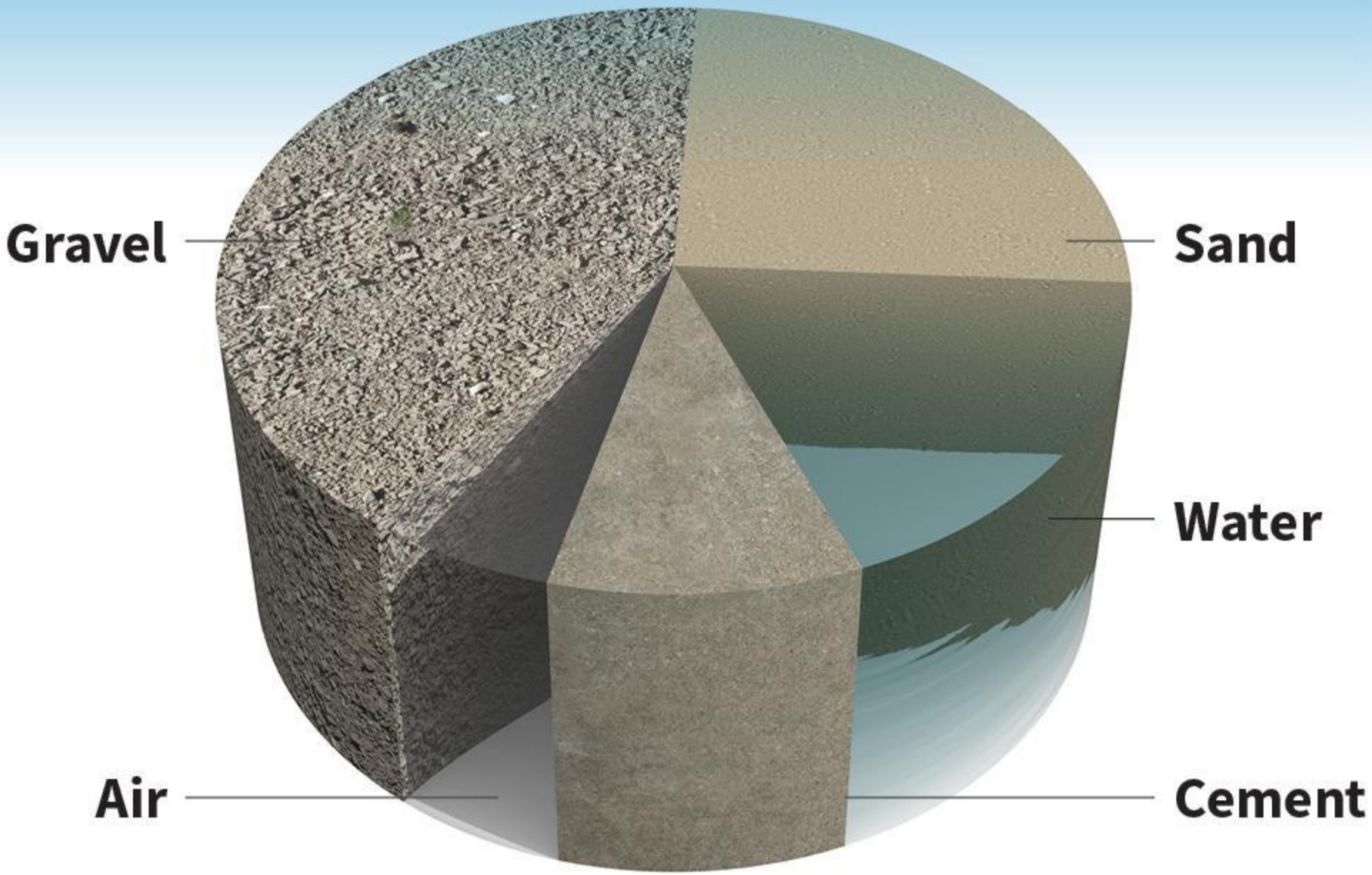
MOISTURE FORCED THROUGH SLAB



FAST TRACK CONSTRUCTION

- Cost Overruns
- Construction Delays
- Liability Issues
- Damaged Reputation

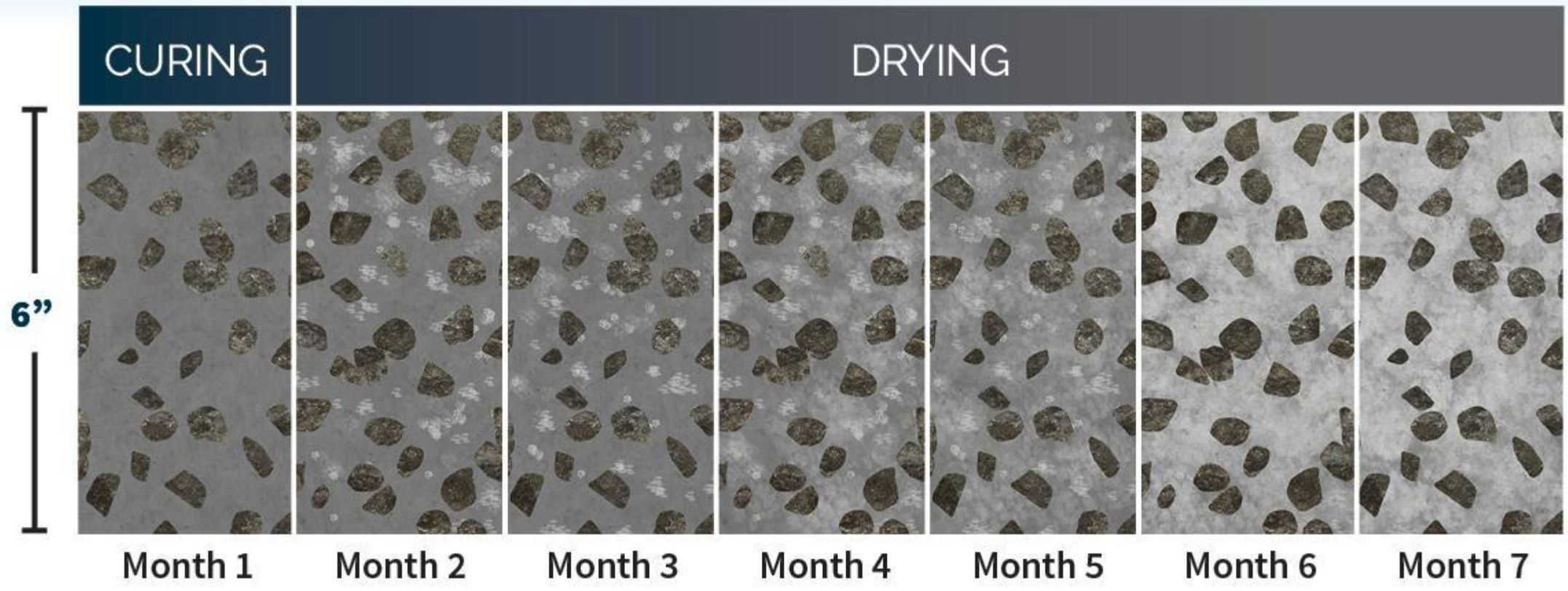
COMPONENTS OF CONCRETE



CURING THEN DRYING

CURING BUILDS STRENGTH–1 MONTH

DRYING PREPARES FOR FLOORING–1 MONTH/1 INCH



▶ 1 Month Curing + (1 Month Drying x 6” Deep of Concrete) = **7 Months To Completion**

MOISTURE TESTS

RH

Quantitative Relative Humidity ASTM F 2170-11

moisture in concrete

MVER (CaCl)

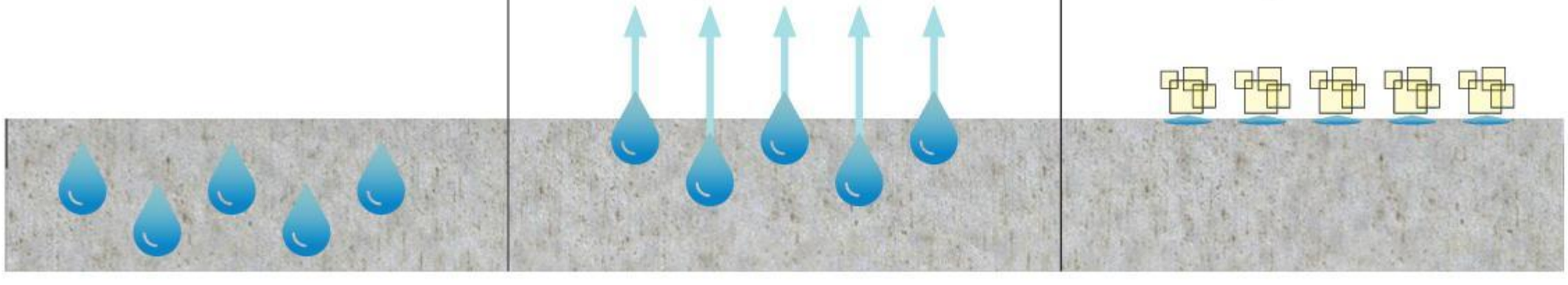
Moisture Vaper Emission Rate ASTM F 1869-11

moisture moving out of concrete

pH

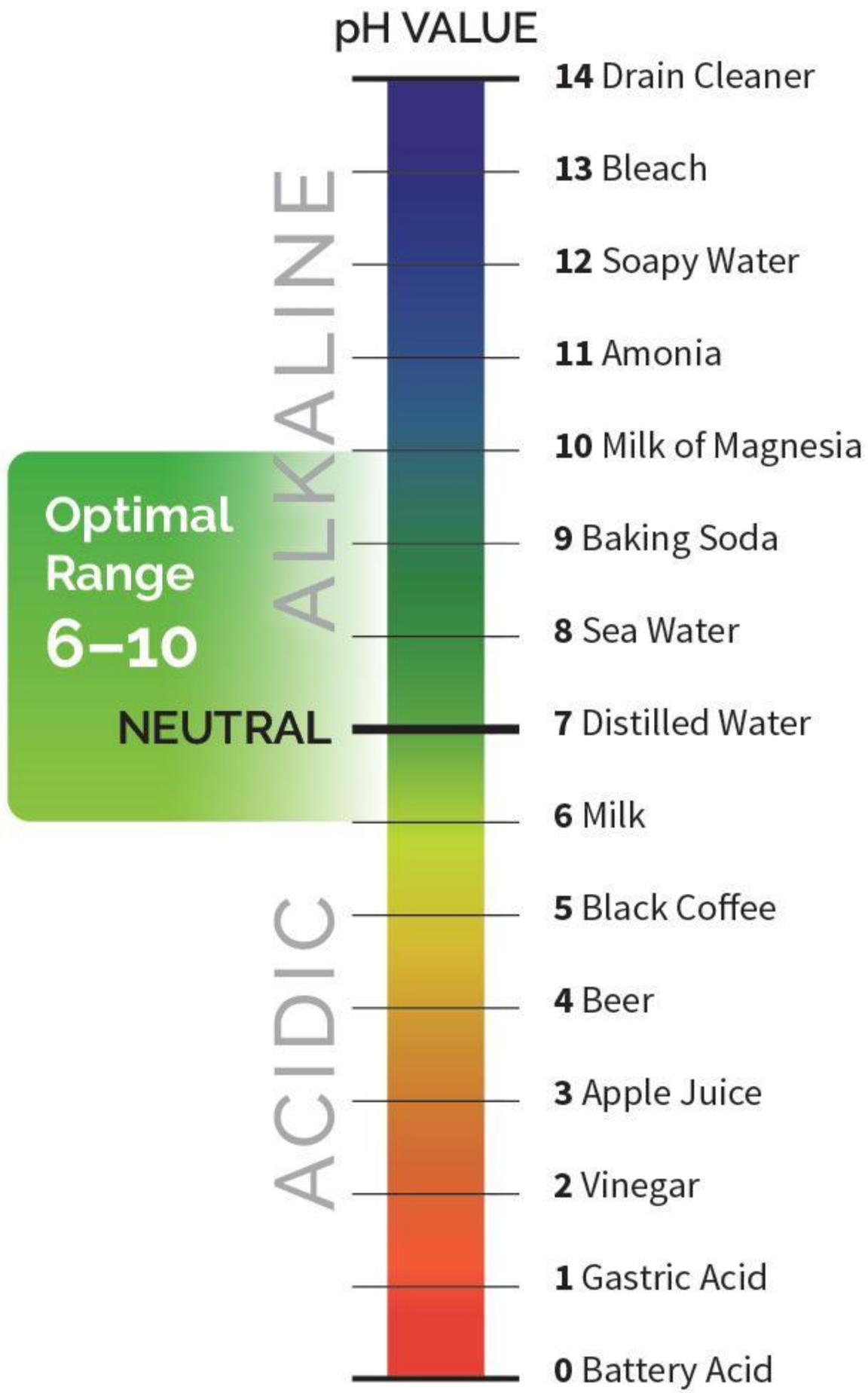
Acidity or Alkalinity ASTM F 710-11

resulting minerals left behind



WHAT IS pH?
POWER OF HYDROGEN

COMMON PRODUCTS & THEIR pH VALUE



CONCRETE AND pH

12.5 pH

Initially
Too High

CO_2 Reacts with
Surface 8.5 pH

CARBONIZATION LAYER

Perfect

Extra Moisture Rises
Bringing Alkalies
10 – 14 pH

Need Special
Adhesives

3 OPTIONS

- Prevent Moisture
- Survive Moisture
- Solve Moisture

PREVENT MOISTURE

1. Vapor Barrier Over Ground

2. Dry Concrete 1 month/inch

3. Moisture Vapor Barrier on Concrete

SURVIVE MOISTURE

1. Moisture-tolerant Patch or Skim Coat

2. Moisture-tolerant Adhesives

3. Breatheable Floor Coverings
- Broadloom
- Cushioned Carpet Tile

4. Rolled Moisture Barriers

MOISTURE-TOLERANT ADHESIVES

- Tolerate
  90% to 100% RH
- Adhesive will hold
- Moisture is still present

BREATHEABLE FLOOR COVERINGS

- Some Broadloom
- Some Carpet Tile

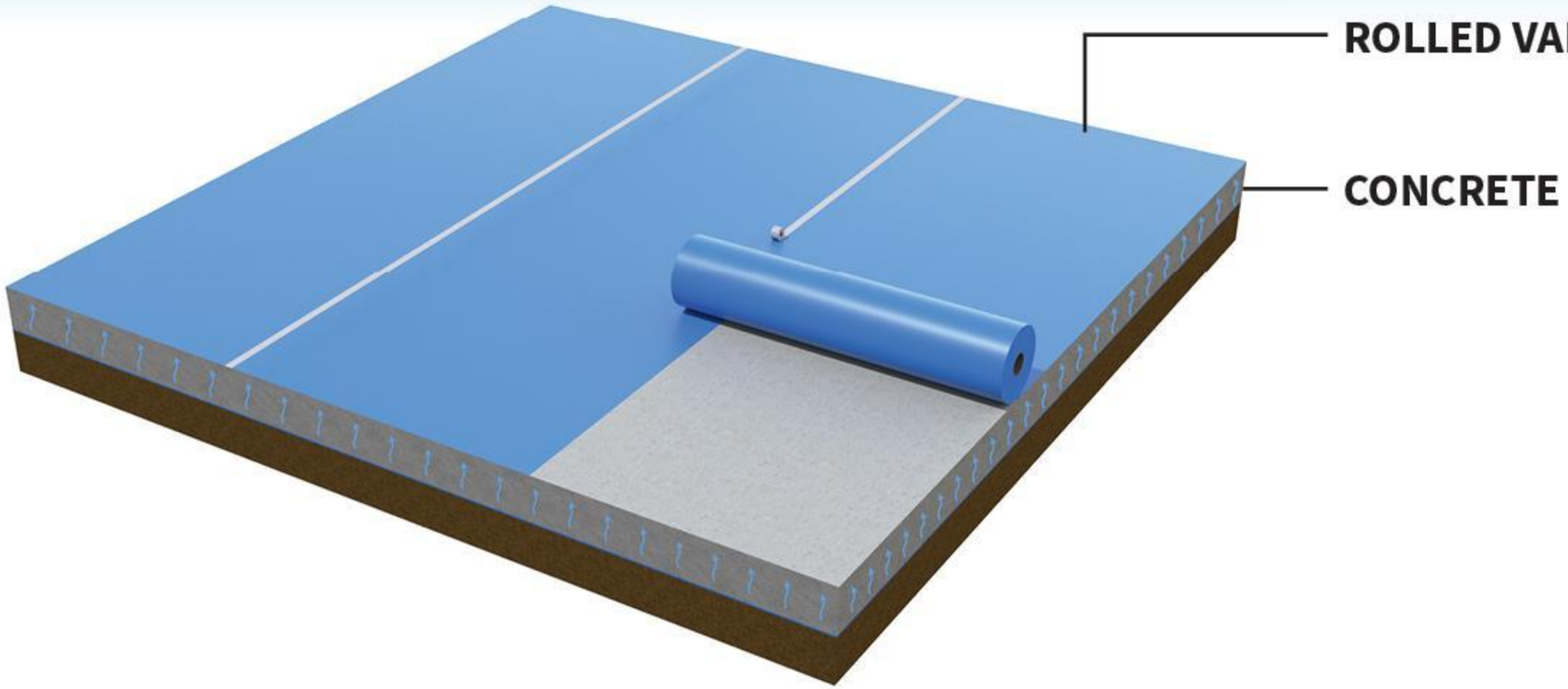
HOW CUSHION TYPES COMPARE

BACKING	WICKING ABILITY
Hardback	None
PVC* Closed Cell Cushion	Good
Urethane Open Cell Cushion	Better
Fiber Matrix Cushion	Best

* Polyvinyl chloride

Fiber Matrix Cushion

ROLLED VAPOR BARRIER

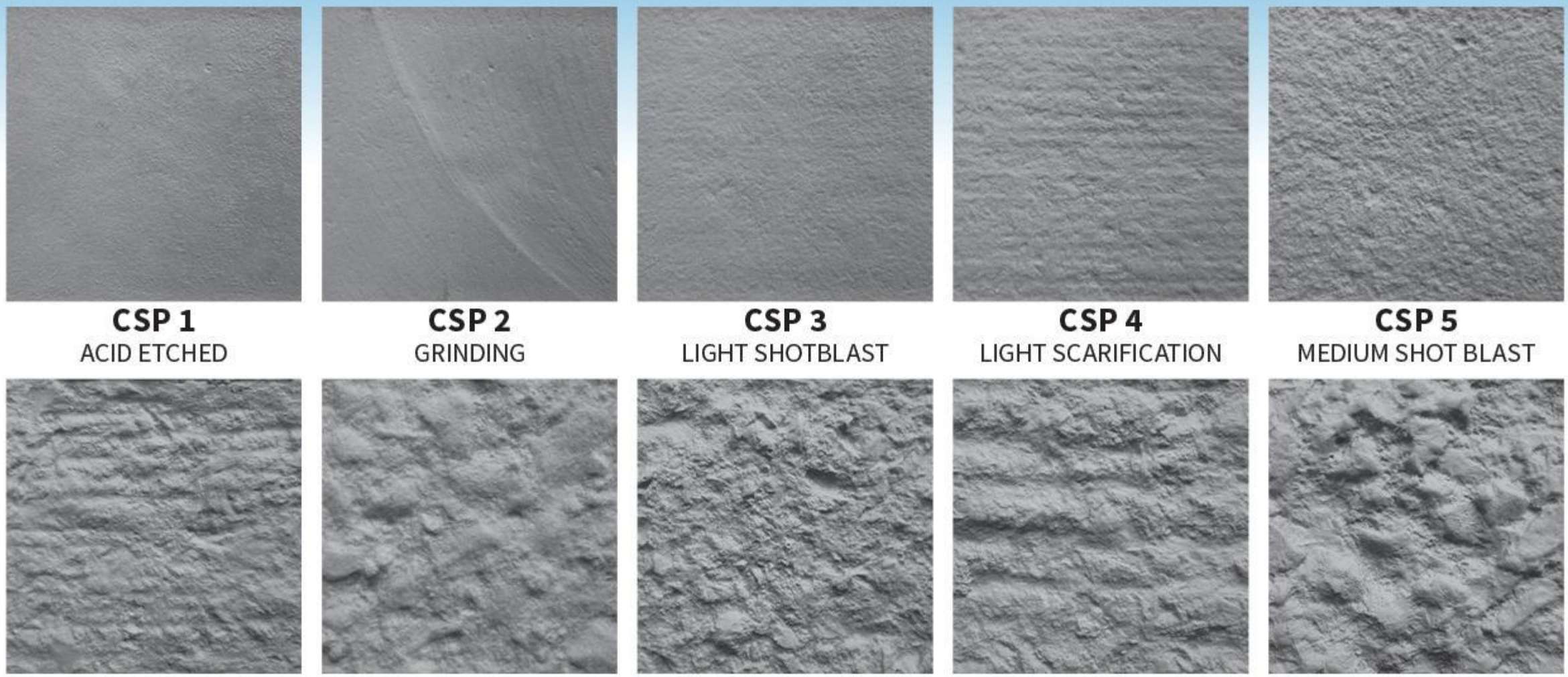


ROLLED MOISTURE BARRIER

Roll Out Barrier

Photos courtesy of Kovara

CONCRETE SURFACE PROFILES (CSP)



CSP 1
ACID ETCHED

CSP 2
GRINDING

CSP 3
LIGHT SHOTBLAST

CSP 4
LIGHT SCARIFICATION

CSP 5
MEDIUM SHOT BLAST

CSP 6
MEDIUM SCARIFICATION

CSP 7
HEAVY ABRASIVE BLAST

CSP 8
SCABBED

CSP 9
HEAVY SCARIFICATION

CSP 10
COURSE PLANING

Source: International Concrete Repair Institute

PREPARE (OPEN) CONCRETE

For Spray-On or Poured Moisture Barriers

OPT. 1 - Beadblast and Vacuum

PREPARE (OPEN) CONCRETE

For Spray-on or Poured Moisture Barriers

OPT. 2 - Chemical Etcher/Cleaner

Spray on chemical etcher/cleaner then it starts reacting

PREPARE (OPEN) CONCRETE

For Spray-On or Poured Moisture Barriers

OPT. 2 - Chemical Etcher/Cleaner

Brush in/agitate then wait 2 hours

Rinse and vacuum twice, touch to determine when dry

SPRAY-ON MOISTURE BARRIER

Spray on application

Spray on to prepared concrete

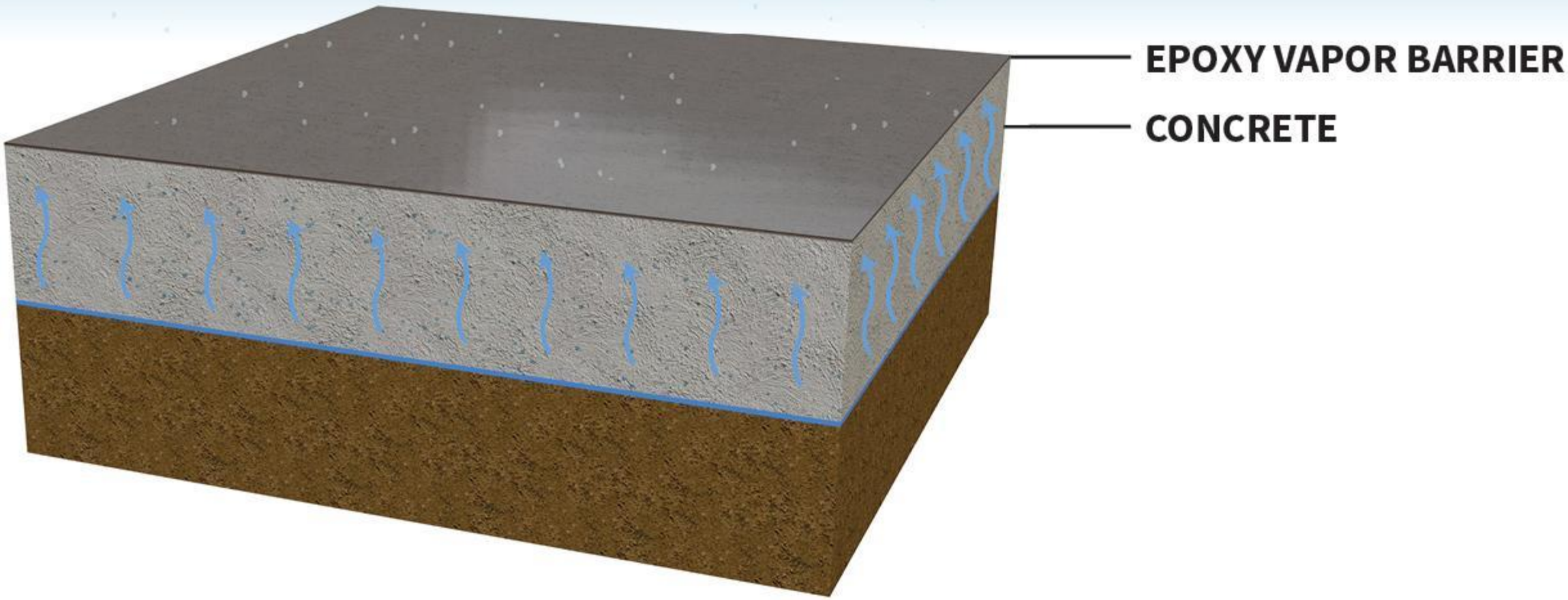
SPRAY-ON MOISTURE BARRIER

Spray on application

Brush in then dries clear

POURED MOISTURE BARRIER

PERMEABILITY = .08



POURED MOISTURE BARRIER

Back Rolling the Epoxy

Experiences We Share?

- What have you experienced
- Share Ideas
- Questions?

Thank you!

Please use us as a resource

before you design or specify

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Michael Eichhorn has dedicated his 25 year career to PK–12 Public Education Facilities. He has extensive experience leading our team to successful results for small scale renovation projects to large high schools, and everything in between. He ensures Wold's designs and customer services are responsive, well-communicated and in alignment with our client's vision and goals. Michael advises and leads clients in long range facility planning, community engagement, and budgeting. He has presented at multiple IASBO annuals and is an active member of the IASBO PDC for Planning and Construction.

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