Achieving a Sustainable Surface, Polished Concrete!

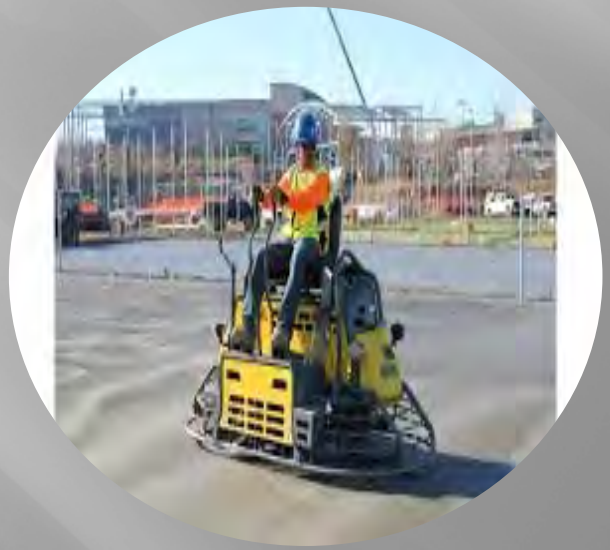
Course Number: ICC03BE
Provider - RetroPlate System
An AIA Continuing Education Program
Credit for this course is 1 AIA CE LU/HSW

Course Description

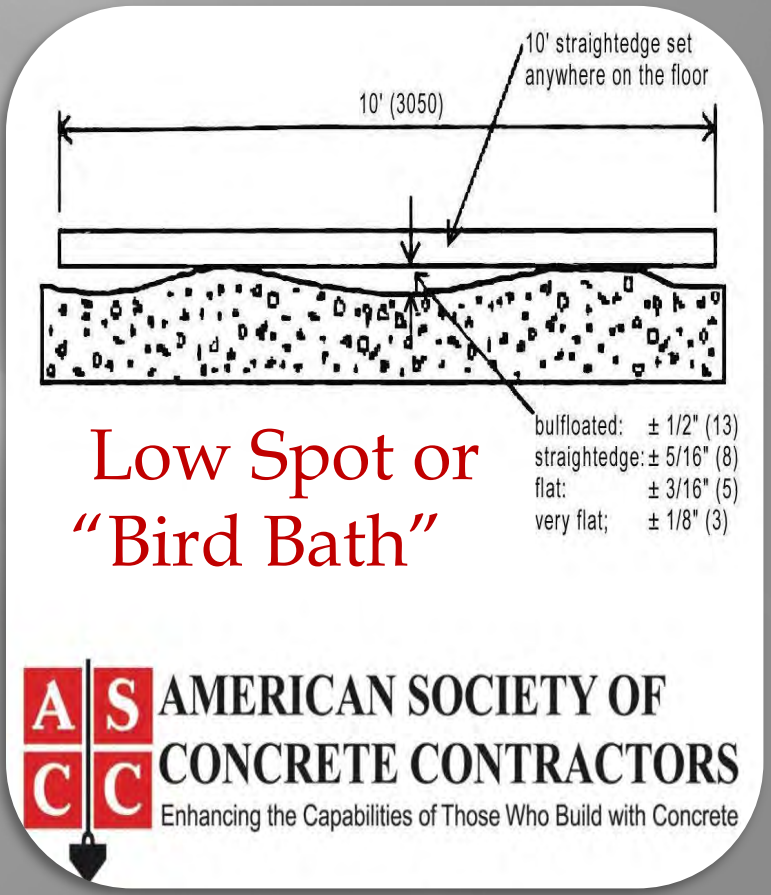
This course will provide an understanding of the benefits and limitations of chemically densified and densified/mechanically refined polished concrete. You will learn how to recognize how specifications influence the final outcome. In addition, you will be introduced to the ancillary products which help to ensure that your floor will perform as planned: joint fillers, dyes and protectants. Throughout the presentation we will discuss the most common environments and industries that are conducive to densified and polished concrete.

What is Concrete?

You directly influence the final outcome by focusing on flatness and finishing during specification writing.



What Is The Importance of Floor Flatness When Specifying Densified and Polished Concrete ?

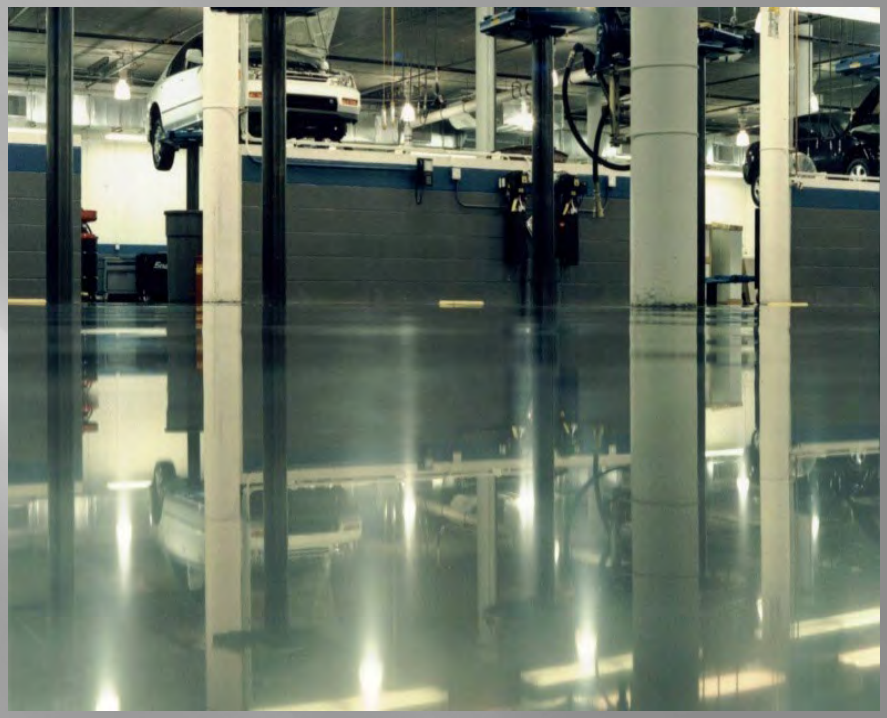


Concrete flatness determines overall look and aggregate exposure for polished floors

Low Spots create “bird baths” and high spots create uneven aggregate. A floor flatness, (known as F(f)) rating of 40+ can help avoid these from occurring.

Concrete flatness and finishing help determine the final outcome especially with polished floors.

Wavy Floor



Flat Floor

These two floors were polished by the same crew, with the same equipment, densifier, and process. The only difference was the flatness of the concrete before the grinding and polishing began.

How Was The Floor Cured?

✧ Plastic Sheeting (Visqueen)

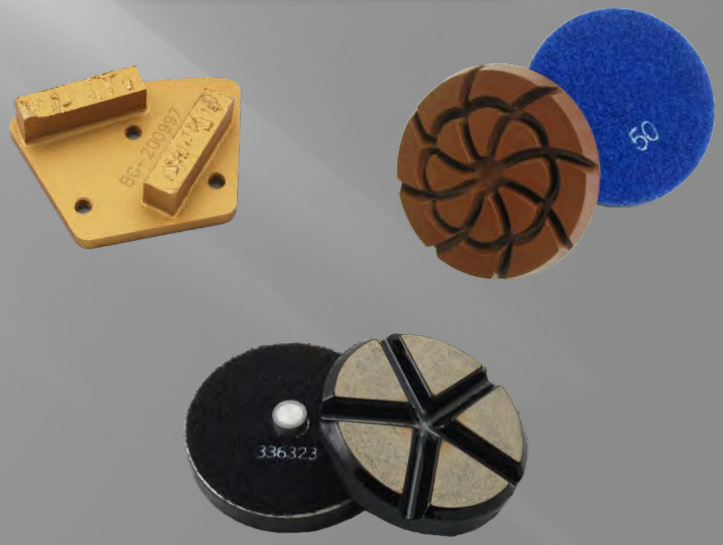
✧ Water Pooling

✧ Curing Blanket

✧ Topically Applied
Membrane Forming Film

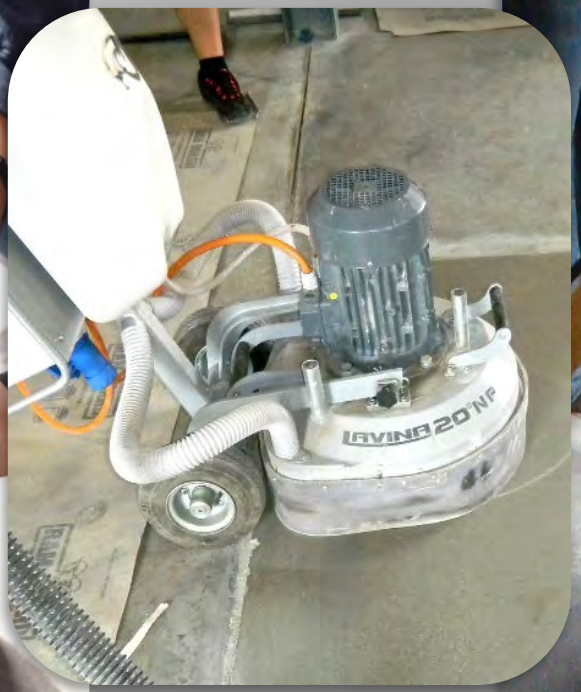
How to Produce Densified & Polished Concrete

Step 1: Grind the floor



GEAR –TO-GEAR GRINDERS

PLANETARY GRINDERS



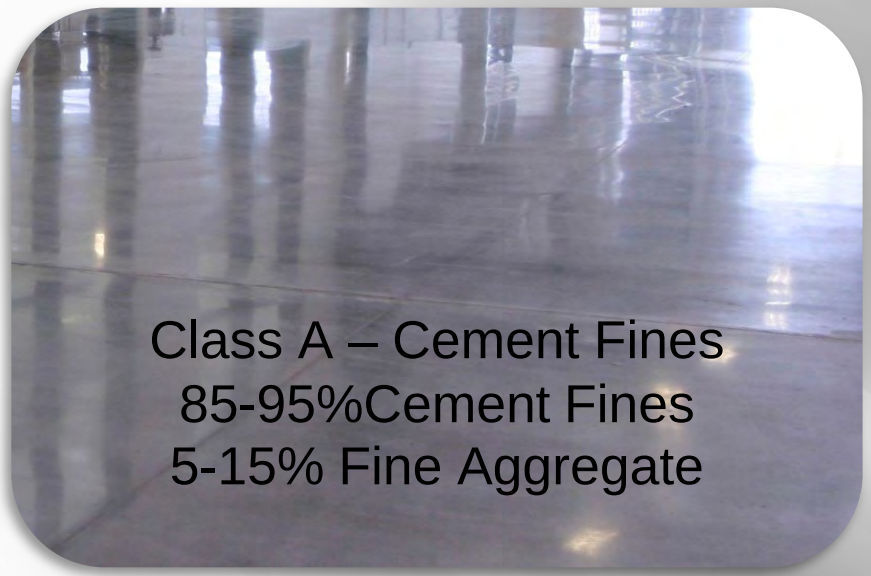
PROPANE

STAND UP EDGE GRINDERS

ASST'D 50 GRIT SEGMENTS

Concrete Polishing Council Effective 11/2017

Polished Concrete Aggregate Exposure Chart:



Class A – Cement Fines
85-95%Cement Fines
5-15% Fine Aggregate

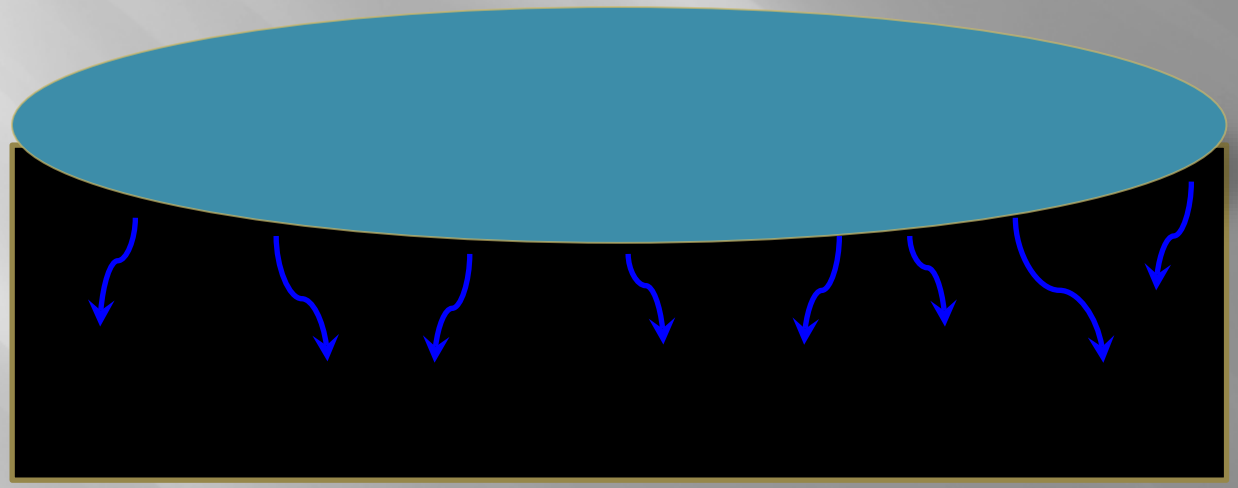
Class B – Fine Aggregate
85-95% Fine Aggregate
5-15% Blend of Fines and
Coarse Aggregate

Class C – Course Aggregate
80-90% Coarse Aggregate
10-20% Blend of Fines and
Fine Aggregate

How to Produce Densified & Polished Concrete

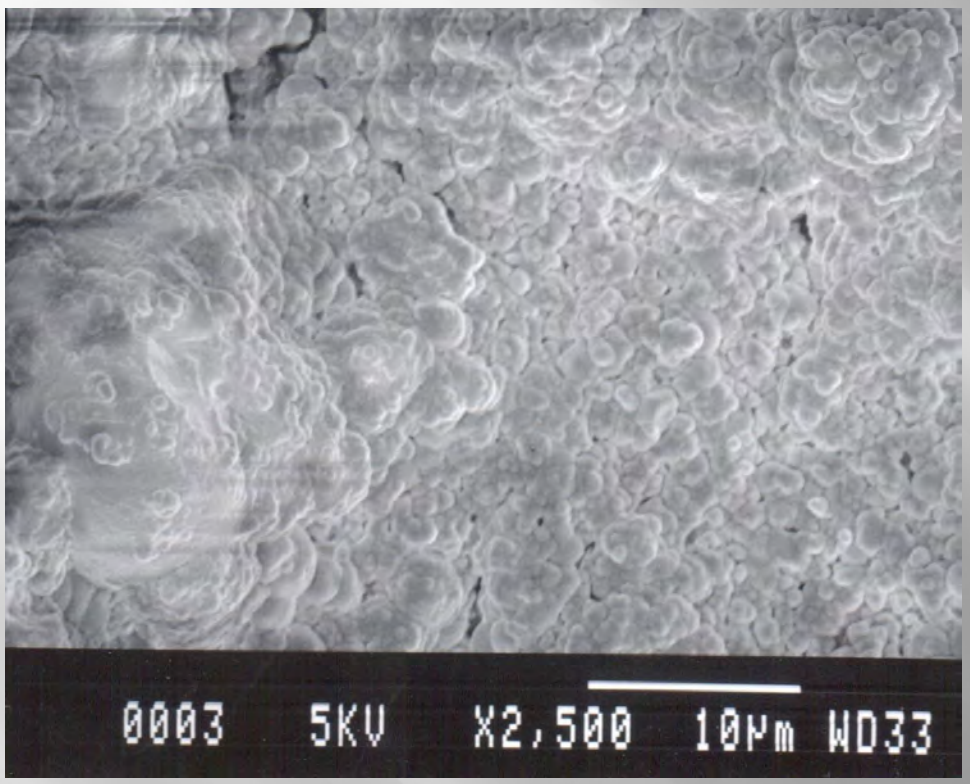
Step 2: Apply a Densifier

The densifier is drawn into the surface of the concrete to interact with the Calcium Hydroxide. This chemical reaction creates a dense, hardened surface by reducing the porosity of the concrete.

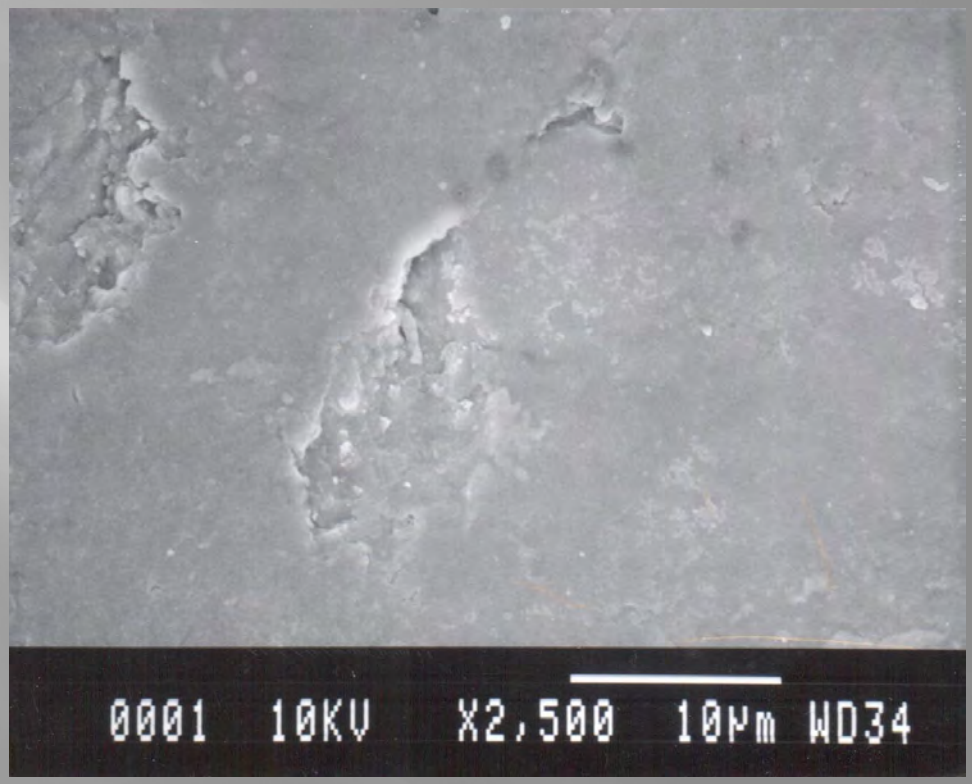


Petrographic analysis of concrete

Without a densifier



With a densifier



Although the least expensive part of the polished concrete process, the densifier is vital in creating the long-term, sustainable benefits of polished concrete.

Not all Densifiers are applied equal.

Minimally applied

Properly applied

Densifiers should be flooded onto the surface and allowed to penetrate for 30-60 minutes in order to achieve true densification. Applying less than 250 square feet per gallon will result in a diminished chemical reaction. This limited densification reduces the hardness and sustainability.

How to Produce Densified & Polished Concrete

Step 3: Polish the Floor

Concrete Polishing Council Effective 11/2017

Polished Concrete Appearance Chart:

Level 1 – Flat(Ground) DOI Range 0-9

Level 3 – Polished DOI Range 40-69

Level 2 –Satin(Honed) DOI Range 10-39

Level 4 – Highly Polished DOI Range 70-100

Benefits of Polished Concrete

Increased reflectivity up to 30%

Increased impact resistance up to 21%*

Meets ANSI A 137.1 for DCOF and meets OSHA and ADA SCOF recommendations up to 800 grit*

Lowest Life Cycle Cost of any flooring surface

Has been shown to increase abrasion resistance of up to 400%*

* These figures are the results of 3rd party independent testing of a specific modified sodium silicate. Request independent testing from a manufacturer prior to writing your performance based specifications for concrete polishing.

Limitations of Densified & Polished Concrete

Acid resistance – additional protection needed

Not elastomeric – does not cover cracks or holes

Will not hide variations in the concrete color

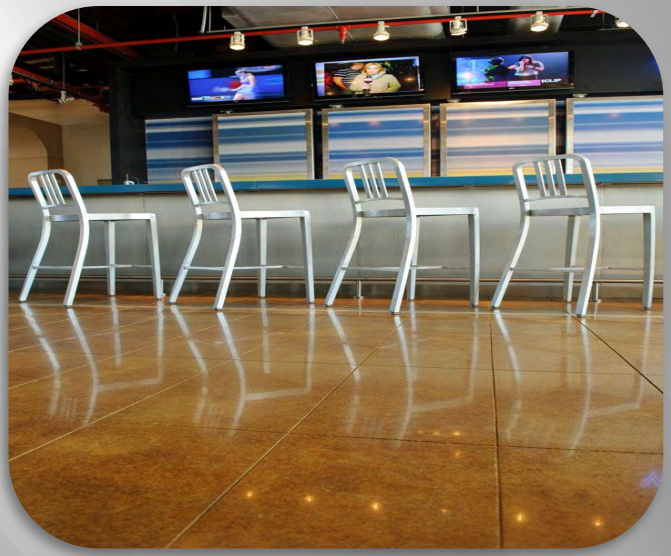
When Polishing newly poured concrete, a minimum 28 day cure time is recommended

Salt resistance – walk-off mat system recommended

What Are Your Color Options with Polished Concrete?

INTEGRAL

DRY SHAKE



DYES

ACID STAIN

Dye/stain with topical sealer (worn off)

After 2 years of use

Dye/stain with polished concrete

After 2 years of use

The abrasion resistance of polished concrete, keeps the concrete and penetrated dye from wearing away. Whereas, topical sealers and dye wear quickly, leaving traffic patterns.

St. Peter's Hospital 2002/03 & 2016

Todd Beamer High School 2003 & 2015


2002/03

2015


2002/03

2015

POLISHED CEMENTITIOUS TERRAZZO

POLISHED CONCRETE WITH EXPOSED AGGREGATE TERRAZZO LOOK AT

Whole Foods

BROADCAST AGGREGATE or RECYCLED GLASS

Analyzing an Existing Floor for Polished Concrete

Pour backs? Patching?

Is the floor a candidate for polished concrete?

What type of floor prep is needed – coatings removal? Existing coverings?

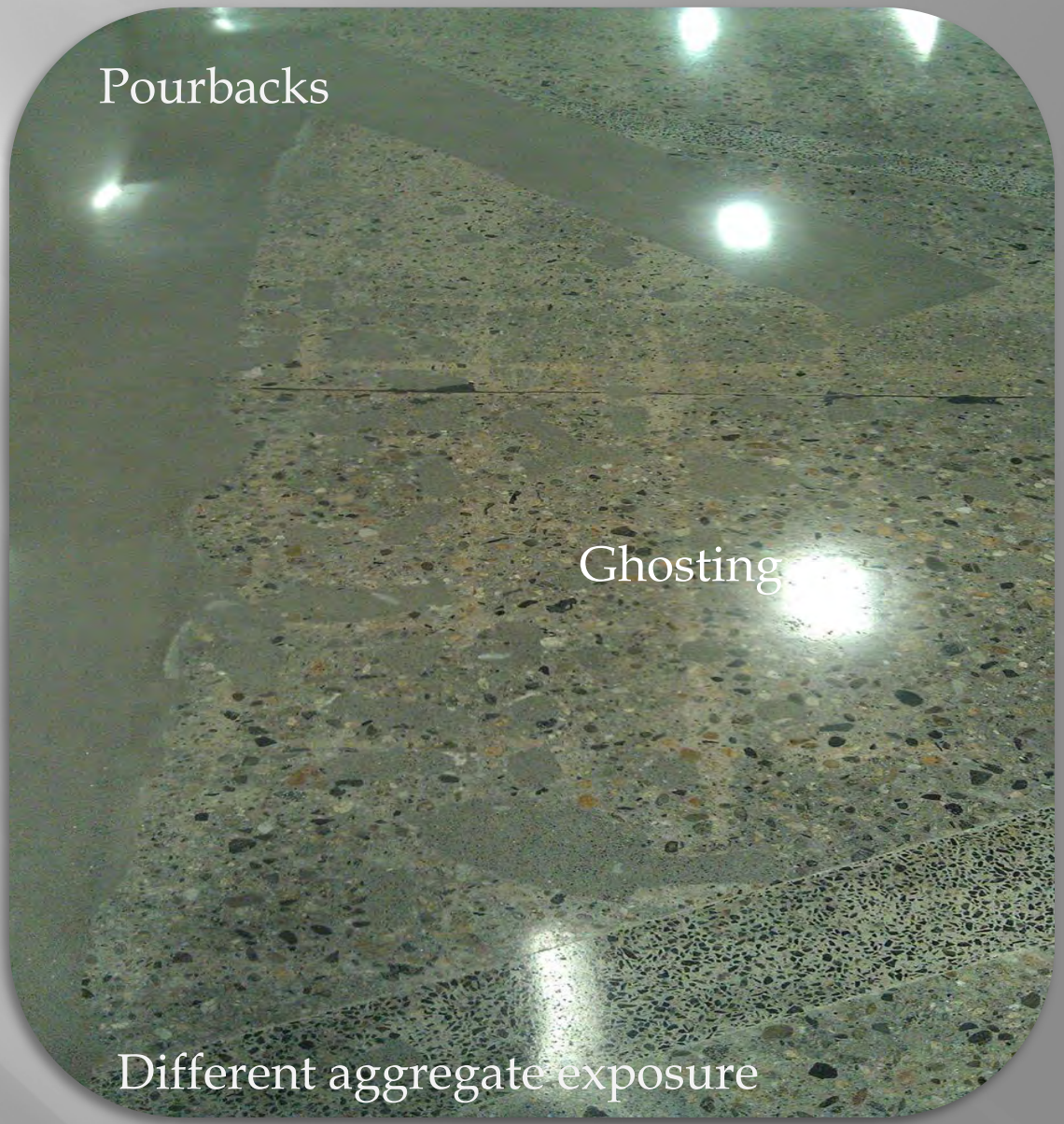
Coating Removal

Mastic Removal

Always do a mock up!

Analyzing an Existing Floor for Polished Concrete

Considerations when specifying polished concrete on an existing floor…



Existing Floors – Spall Repair

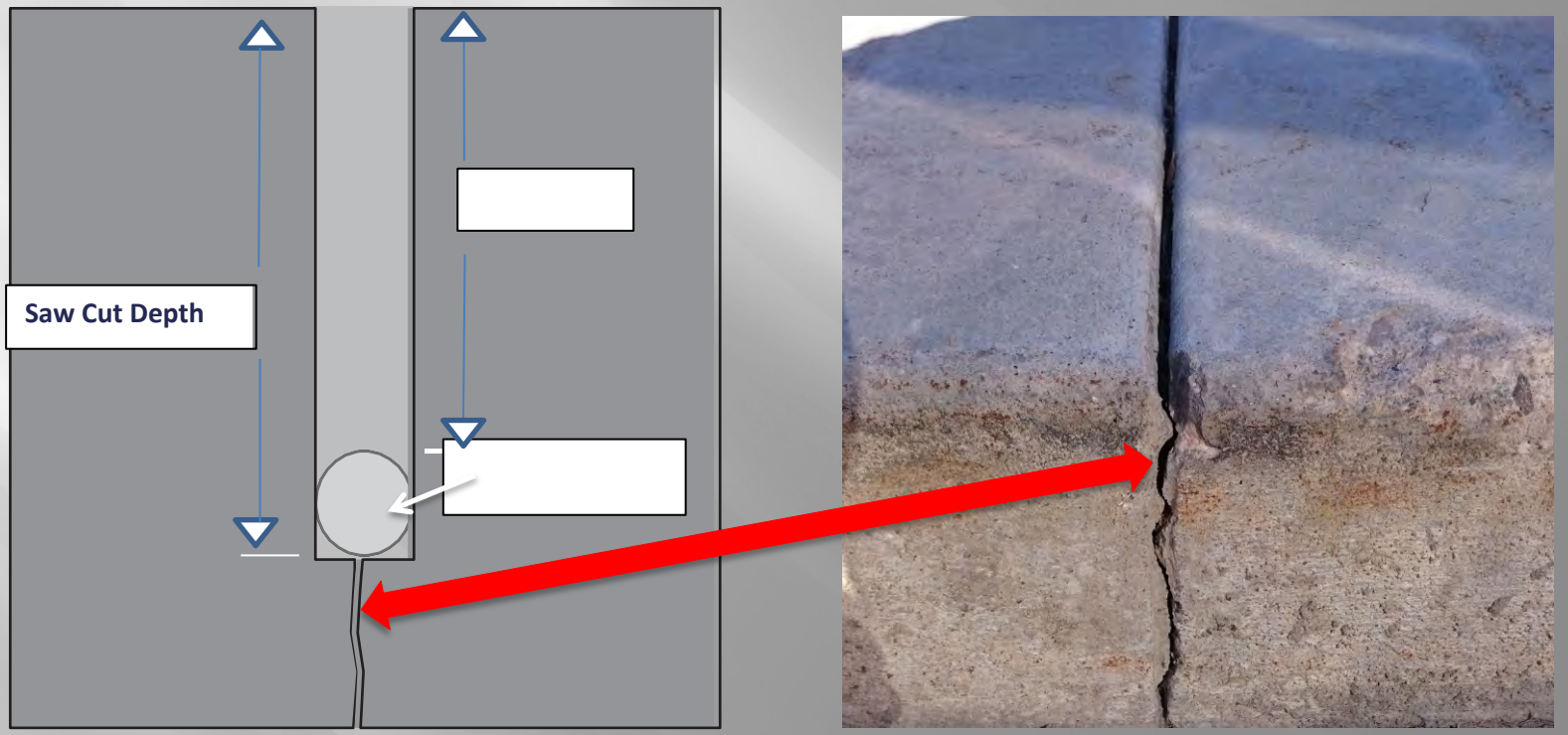
Color-match Spall and Crack repair products to surrounding concrete .

Existing Floors – Crack Repair

Existing Floors – Crack Repair

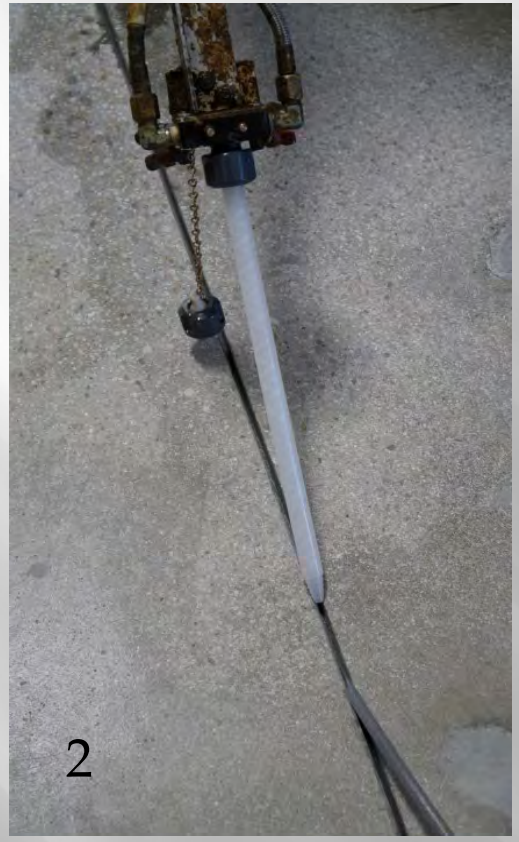
Joint Fillers – structural and part of the architectural design

Avoid future cracks with proper join



Joints: The Effect On Your Finished Floor Performance and Appearance

1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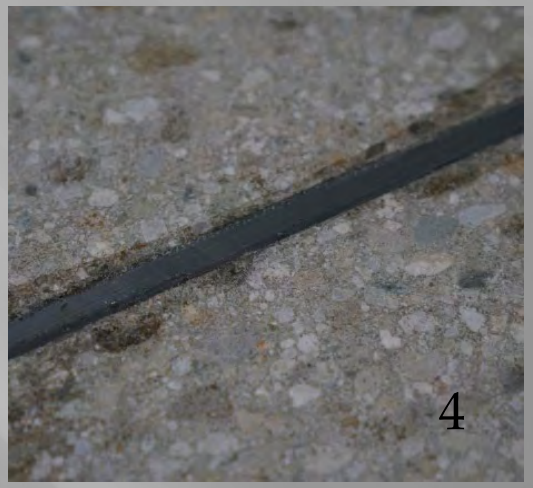

4


3

Grinding, Polishing, Crack Repair, Spall Repair, Coloring, Edge / Hand Polishing, Overlayments, etc. should be done by certified applicators and artisans.
Lowest bidders need not apply!

Sustainability and LEED®

Da Vinci Arts Middle School
Portland, Oregon

First public school building to achieve LEED Platinum and Net Zero Classifications. Polished Concrete used throughout the building.

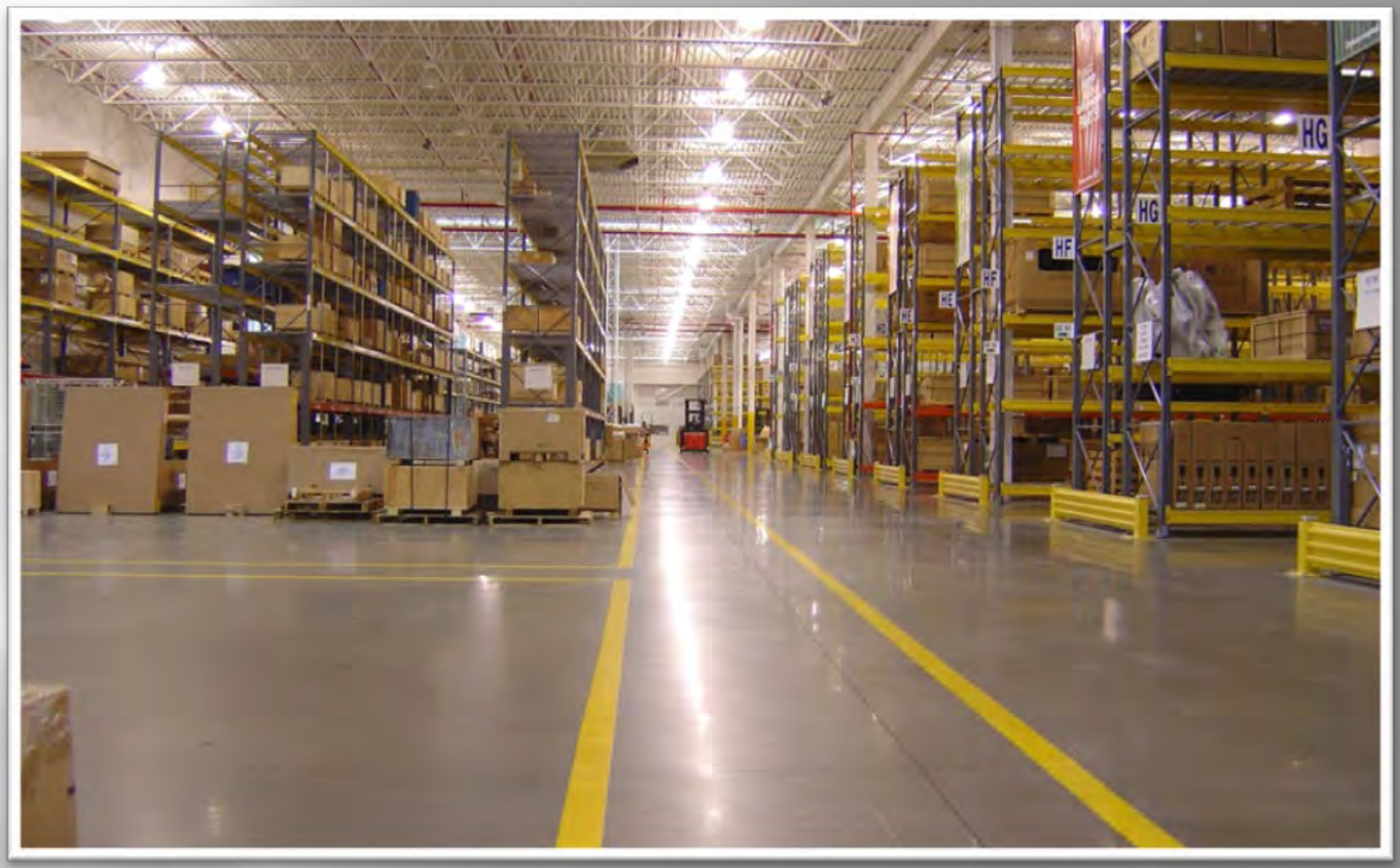
Sustainability Benefits

- Energy cost savings
- Reduce life-cycle impacts
- No off-gassing / Low-emitting materials
- Improved thermal comfort
- Increased daylighting

California Academy of Sciences

- The World's First and Double LEED Platinum Museum

Increased light reflectivity = reduced lighting



Manufacturing / Distribution Center with 1/3 of the lighting turned off

Enhanced Natural Lighting

"Daylighting has been touted for its many aesthetic and health benefits by Designers and researchers alike... daylight environments increase occupant productivity and comfort, and provide the mental and visual stimulation necessary to regulate human circadian rhythms."
"high correlation between schools that reported improvements in student test scores – upwards of 10 percent – and those that reported increased daylight in the classroom"

- Architectural Lighting, March 19, 2014

Life-Cycle Impact Reduction

- No need for re-application
- Ease of maintenance
- Long term performance
- Truly sustainable system

10 Year Life Cycle Cost Per Square Foot for Floor Coverings and Finishes

Product	Installed Cost	Annual Maintenance Cost /Sq. Ft.	Expected Life	Ten-Year Life-Cycle Cost
Acrylic Coating	$0.25	$0.50	6-12 mos	$7.50 (min)
Epoxy Coating	$1.50 - $5.00	$1.50	1-5 yrs	$16.50 - $20.00
Urethane Coating	$0.75 - $2.00	$1.50	2-9 yrs	$15.75 - $17.00
Sheet Vinyl	$3.00 - $5.00	$1.50	9 yrs	$18.00 - $25.00
VCT	$1.50 - $4.00	$1.50	10+ yrs	$16.50 - $19.00
Carpet	$2.50	$1.50	5-10 yrs	$17.50 - $20.00
Ceramic Tile	$7.00 - $8.00	$1.50	10+ yrs	$22.00 - $23.00
Cementitious Terrazzo	$17.00 - $22.00 (If sand cushion add $3.00 -$5.00)	$.70	10+ yrs	$24.00- $29.00 ($27.00 - $34.00)
Epoxy Terrazzo	$14.00 - $28.00	$.50	10+ yrs	$19.00 - $33.00
Polished Concrete	$2.00 - $4.00	$.25	10+ yrs	$4.50 - $6.50
Polished Concrete with Color	$2.50 - $6.00	$.25	10+ yrs	$5.00 - $8.50

Sources: Environmental Building News, National Terrazzo and Mosaic Association, and other independent sources. Figures based on averages and do not take into account downtime costs / loss of profits during product replacement. Oct. 2015

Well written specifications, mock-ups, and samples help get everyone on the same page.

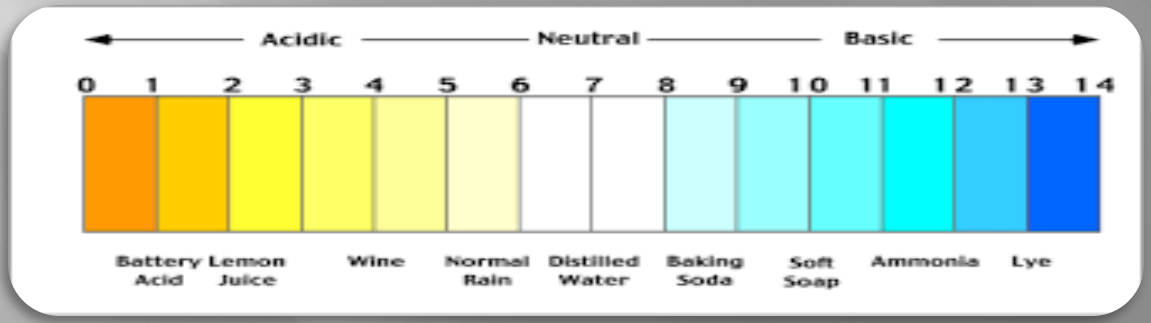
If all parties – owner, architect, General Contractor, concrete contractor, and concrete polisher have the same understanding of polished concrete and the specification, all expectations can be met.

Writing Proper Specifications

- Use CSI Master Format - 2014 for well written specifications
  - 03 35 00 Concrete Finishing (Densification Only)
  - 03 35 43 Polished Concrete Finishing
  - 03 35 43.13 Polished and Dyed Concrete Finishing
  - 03 35 43.16 Polished and Stained Concrete Finishing
  - 07 91 23 Backer Rods
  - 07 91 26 Joint Fillers
  - 09 01 60 Maintenance of Flooring
  - 09 61 19 Concrete Floor Staining (For Densified Only)

Create an Understanding of Maintenance

- A cleaner specifically formulated for Densified and Polished Concrete should be used.
- The cleaner should be neutral to the concrete floor surface, not neutral on the pH scale. In solution pH of 9.5 – 10 is ideal.



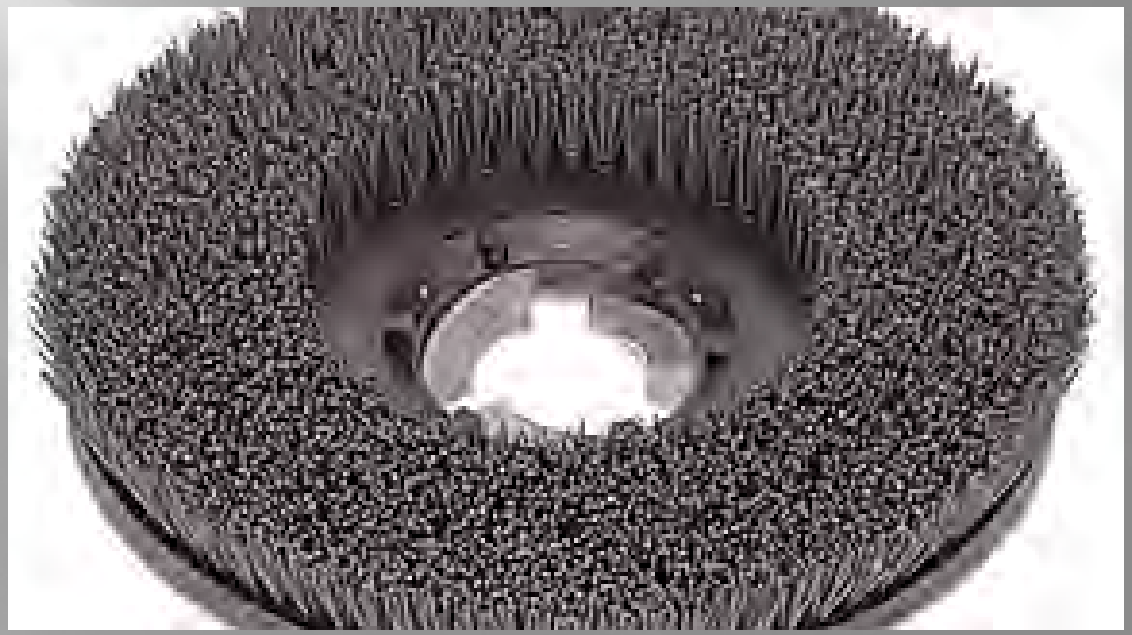
Your Cleaner *MUST* Hold Soil in Suspension!

The fine soil particulates damage the floor when not removed!

Create an Understanding of Maintenance

Aggressive scrubbing brushes can alter the polish pattern and dull the floor.

Tynex Bristles Without Grit – YES



NO!

Create an Understanding of Maintenance

When clean, polished concrete floors have been shown to be one of the safest hard surface floors available. Rated acceptable per ANSI B-101.3

Where Polished Concrete Can Be Specified

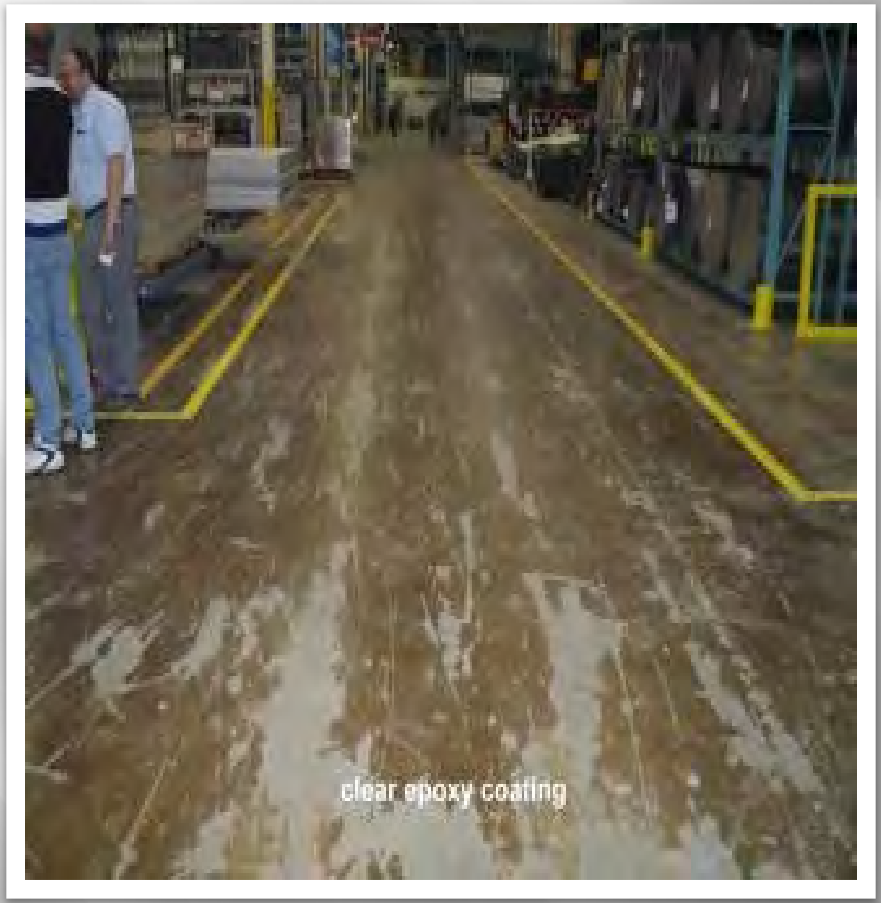
- Restaurants
- Hospitals
- Condos
- Schools
- Convention Centers
- Industrial

Where Polished Concrete Can Be Specified

- Automotive
- Green Building
- Warehouses
- Big Box / Retail
- Commercial
- Logos

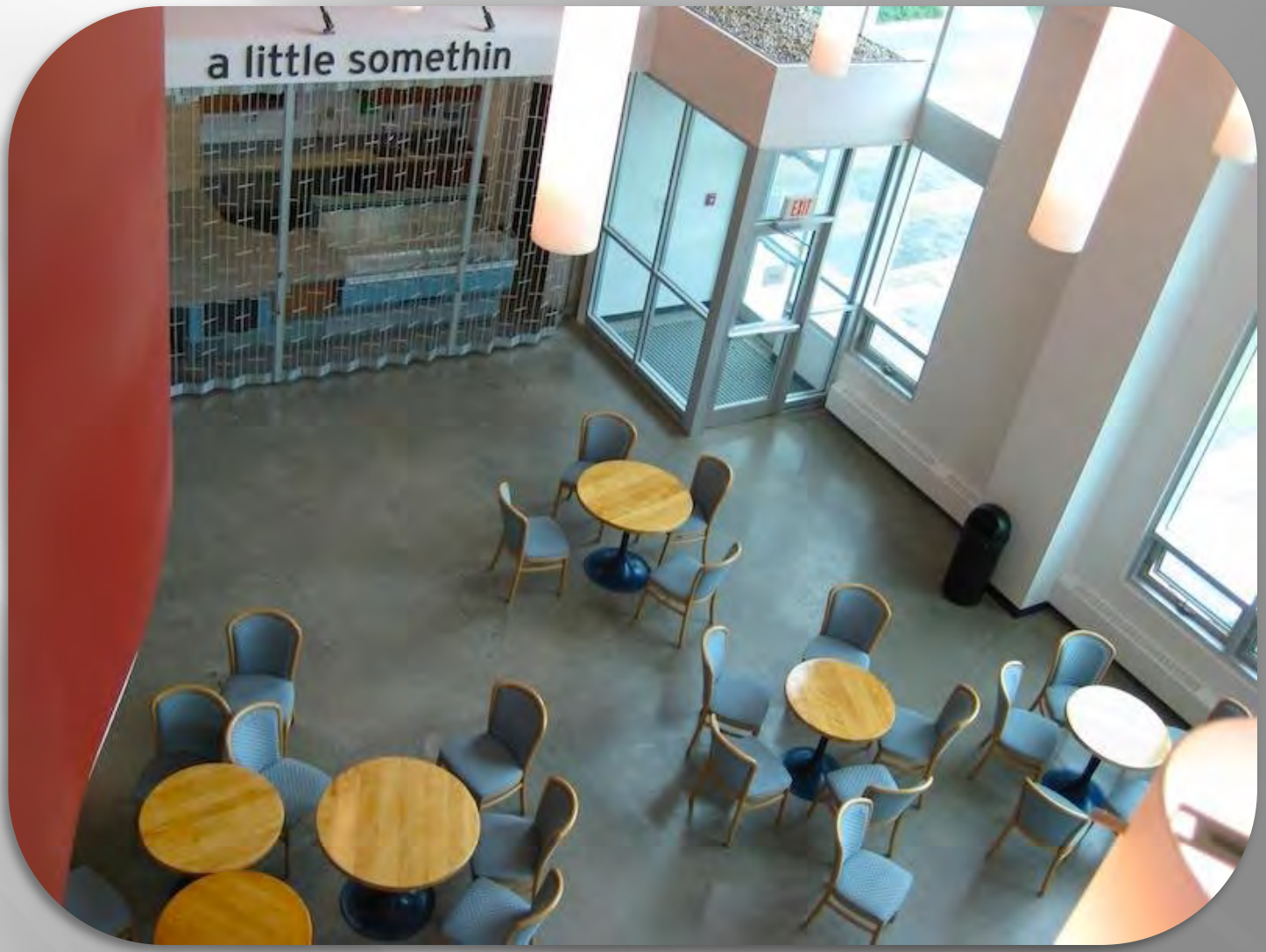
Pacific Audi, Torrance, CA

Automotive Parts Manufacturing / Distribution, Canada

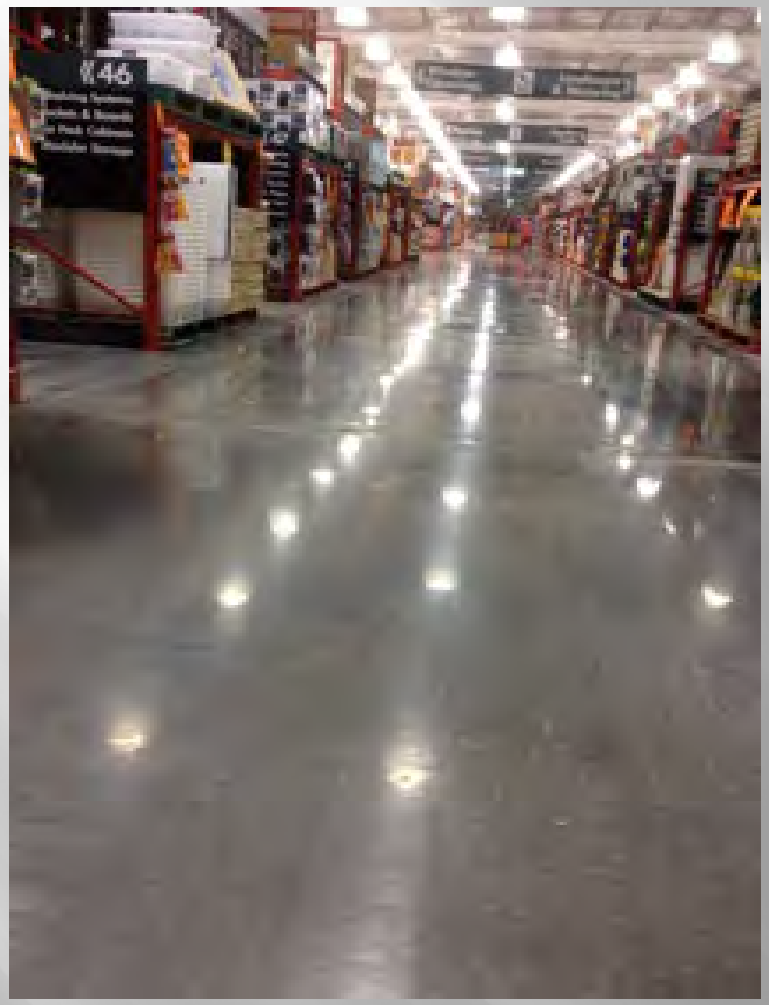


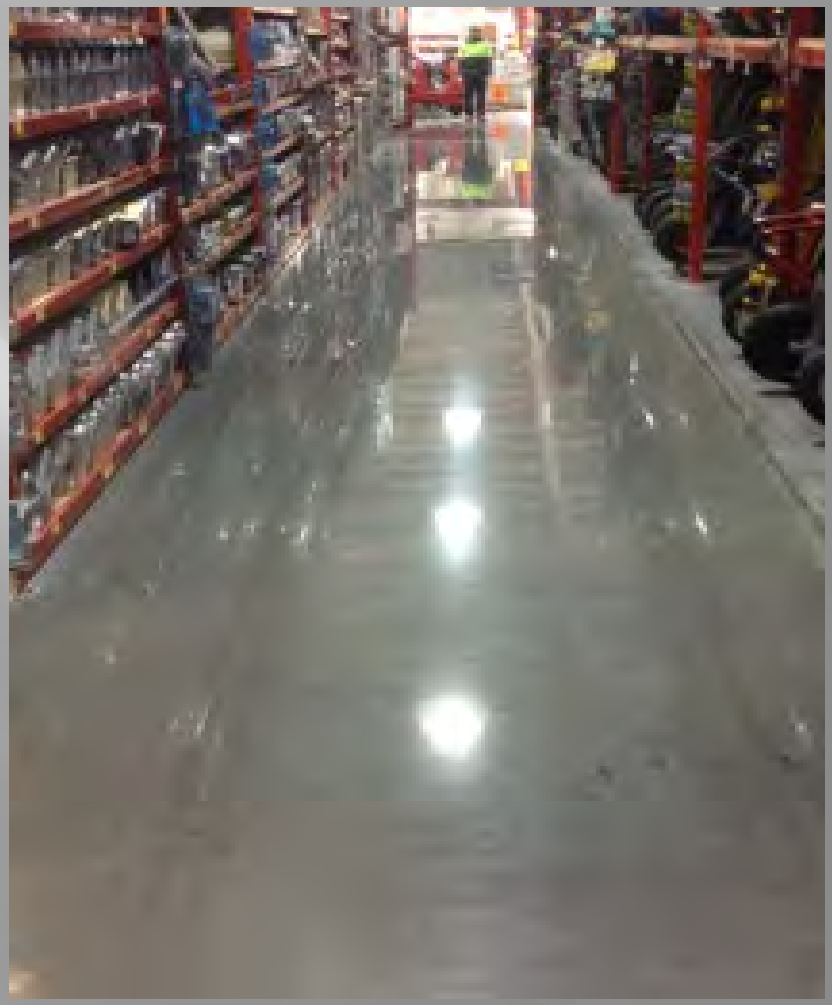
Bass Pro Shop

Child Development Centre (Children's Hospital), Calgary, Canada



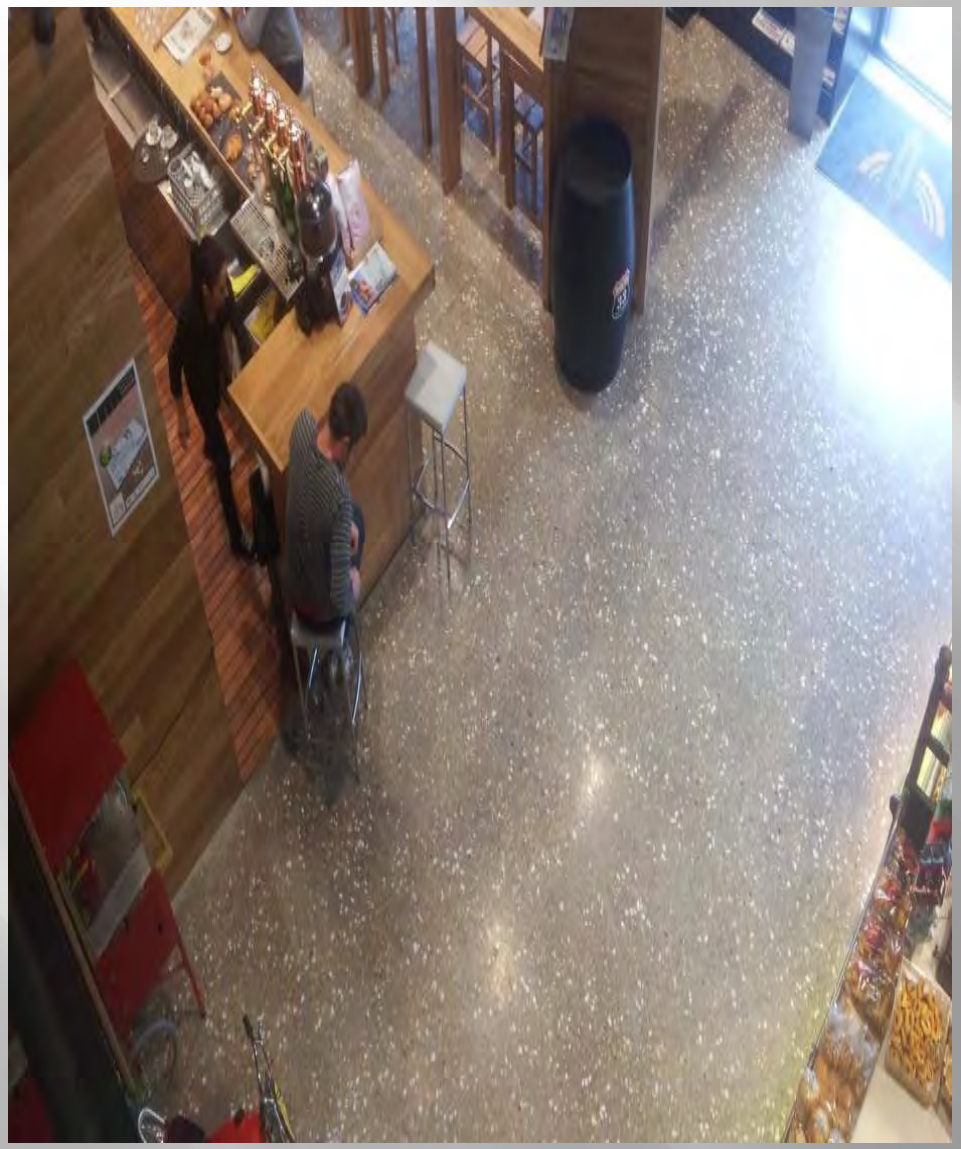
Bunnings Hardware Store, Australia



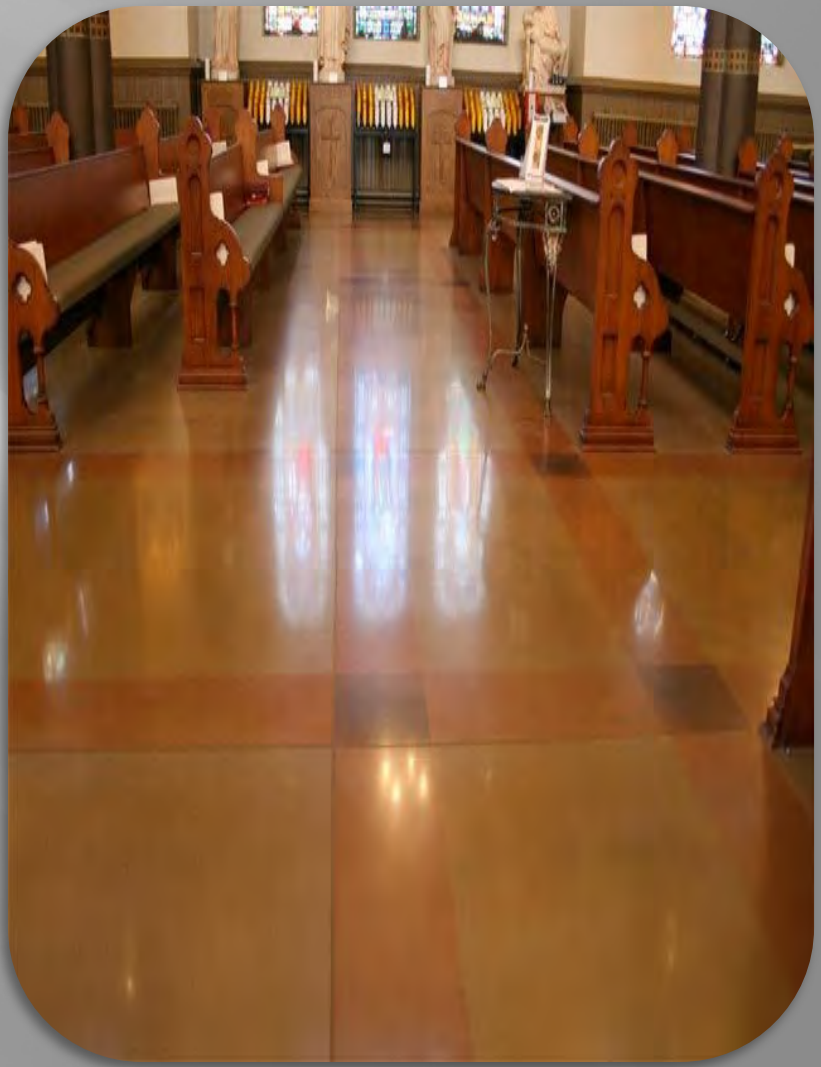


Conrad Harley Davidson, Shorewood, IL

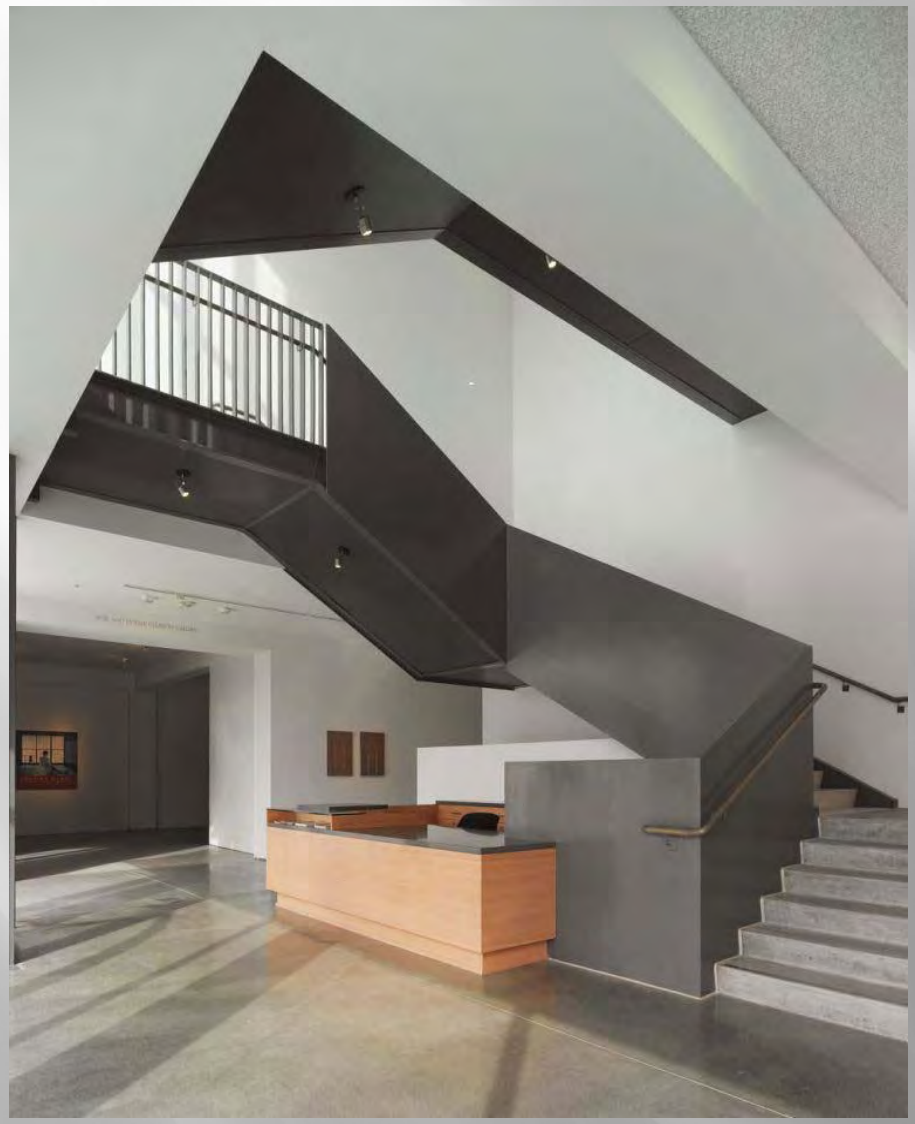
Cafeteria Ruta 33, Bilbao, Spain



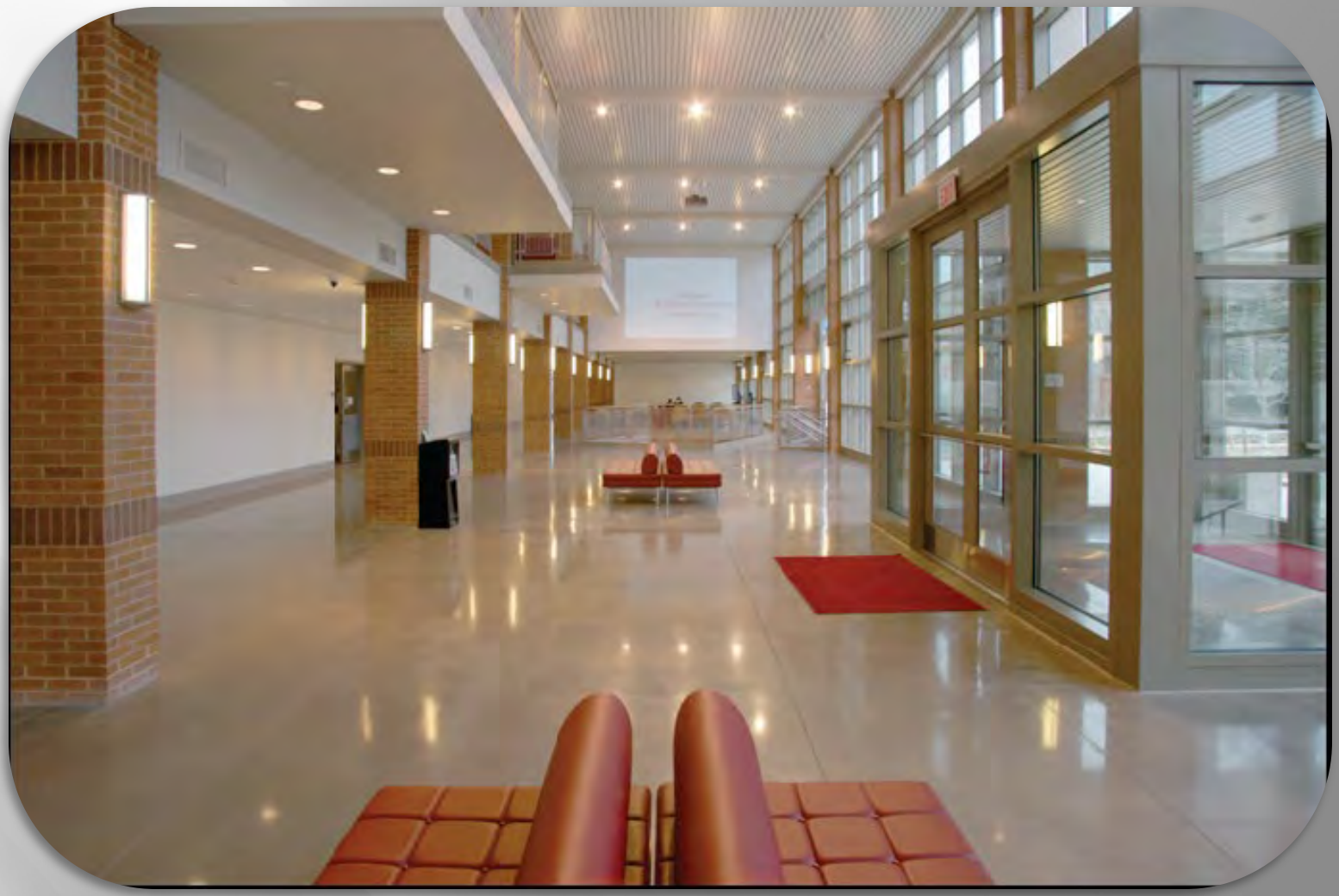
St. Stanisclaus Kostka Church, Pittsburgh, PA



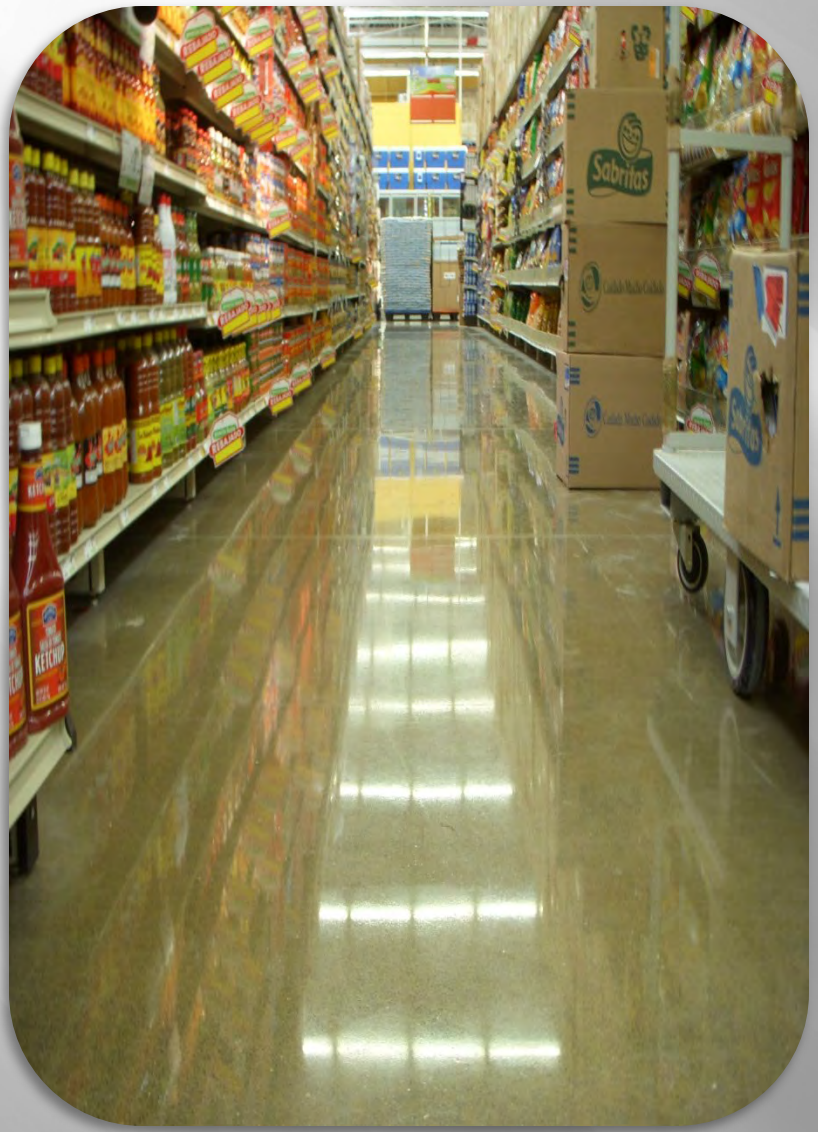
Oceanside Museum of Art, Oceanside, California



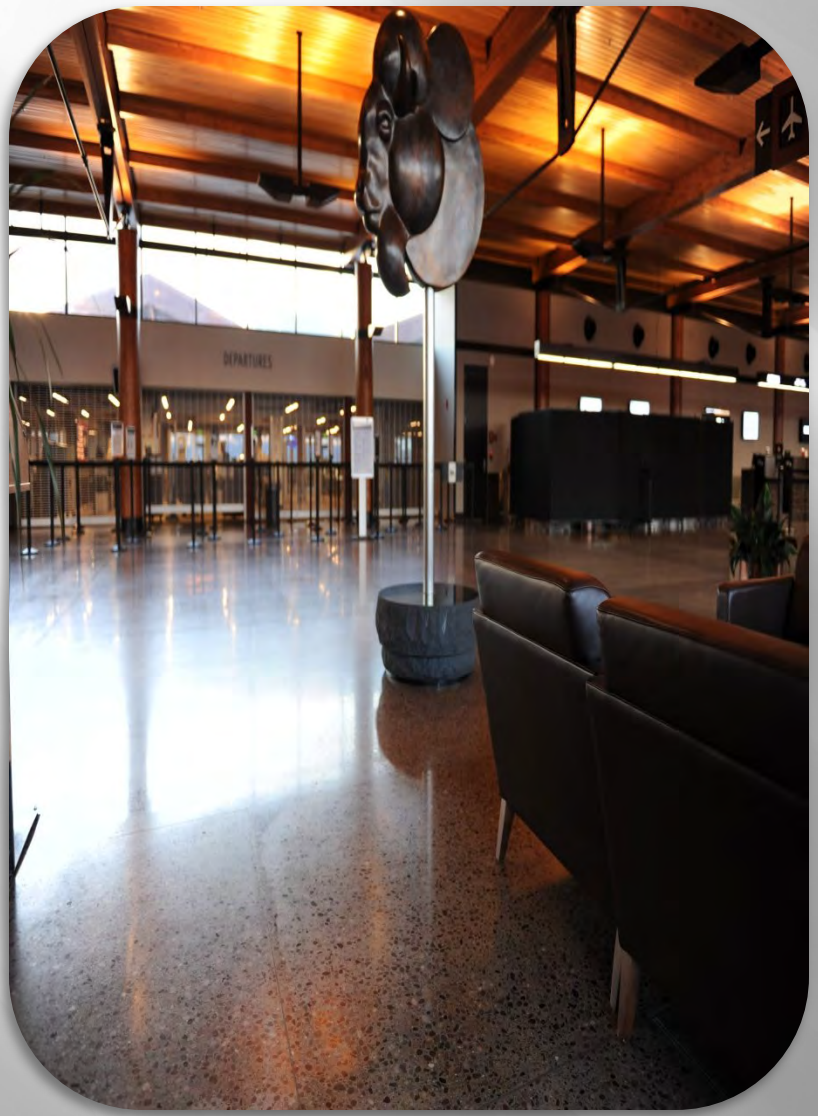
Manhattanville College, Purchase, New York



H-E-B Grocery Store, Concordia, Mexico



Airport, Jackson Hole, Wyoming



The Ohio State University Chiller Plant


Q
&
A

Review Question 1

The 3 basic steps to polishing concrete are?

Review Question 1

Answer: Grinding the floor, densifying the concrete and polishing the surface.

**Slide reference: "How to Produce Densified and Polished Concrete – Step 1, 2, 3"*

Review Question 2

In regards to longevity and sustainability, which step in the polishing process is the most important?

Review Question 2

Answer: Step 2 – Densifying the concrete.

**Slide reference: "How to Produce Densified and Polished Concrete – Step 2"*

Review Question 3

Polished concrete delivers several important benefits, including increasing abrasion resistance up to?

Review Question 3

Answer: 400%.

**Slide reference: "Benefits of Polished Concrete"*

Review Question 4

In order to determine if an existing floor is a good candidate for concrete polishing, what must be determined?

Review Question 4

Answer: The type of floor prep needed, such as the removal of existing coatings or floor coverings.

**Slide reference: "Analyzing an Existing Floor for Polished Concrete"*

Review Question 5

What two factors make polished concrete sustainable?

Review Question 5

Answer: Longevity and ease of maintenance.

**Slide reference: "Sustainability and LEED®"*

Review Question 6

Buildings with highly reflective floors, such as densified-polished concrete, enhance the use of?

Review Question 6

Answer: Natural daylight.

**Slide reference: “Enhanced Natural Lighting”*

Review Question 7

True or False:

The 10-year Life Cycle Comparison chart determined that polished concrete is the most economical and durable flooring system.

Review Question 7

Answer: True.

**Slide reference: "10 Year Life-Cycle Cost Per Square Foot for Floor Coverings and Finishes"*

Review Question 8

Specifications are written to ensure?

Review Question 8

Answer: Consistency and accountability.

**Slide reference: "Writing Proper Specifications"*

Review Question 9

It is important that any cleaner used on polished floors have the same pH as concrete, which is between?

Review Question 9

Answer: 9-10.

**Slide reference: "Create an Understanding of Maintenance"*

Review Question 10

True or False:

No other flooring option can be used in so many different environments, including retail, residential, commercial, educational, medical, automotive, restaurant and more.

Review Question 10

Answer: True.

**Slide reference: "Where Polished Concrete can be Specified"*

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Certificate processing normally takes 3-5 days

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