

*“The Six Sides of Building Enclosure  
Restoration - A Jacket of Protection”*  
Presentation #1

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Construction Products Group



# Stop Water Intrusion on Existing Structures

*with a Focus on Performance, Energy Efficiency, & Resiliency*



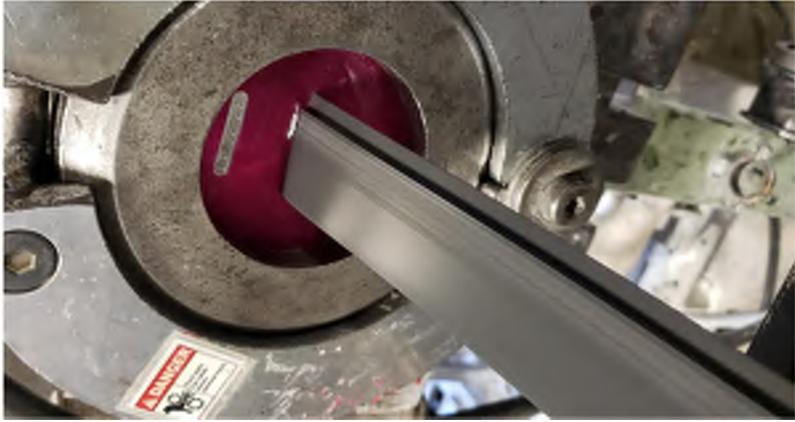
## Learning Objectives

- Identify water intrusion issues on commercial construction projects.
- Describe a variety of possible solutions for water intrusion depending on the affected areas.
- Discuss the potential challenges and benefits of each solution.
- Evaluate the performance of a chosen solution based on industry test methods.



# Membranes & Coatings

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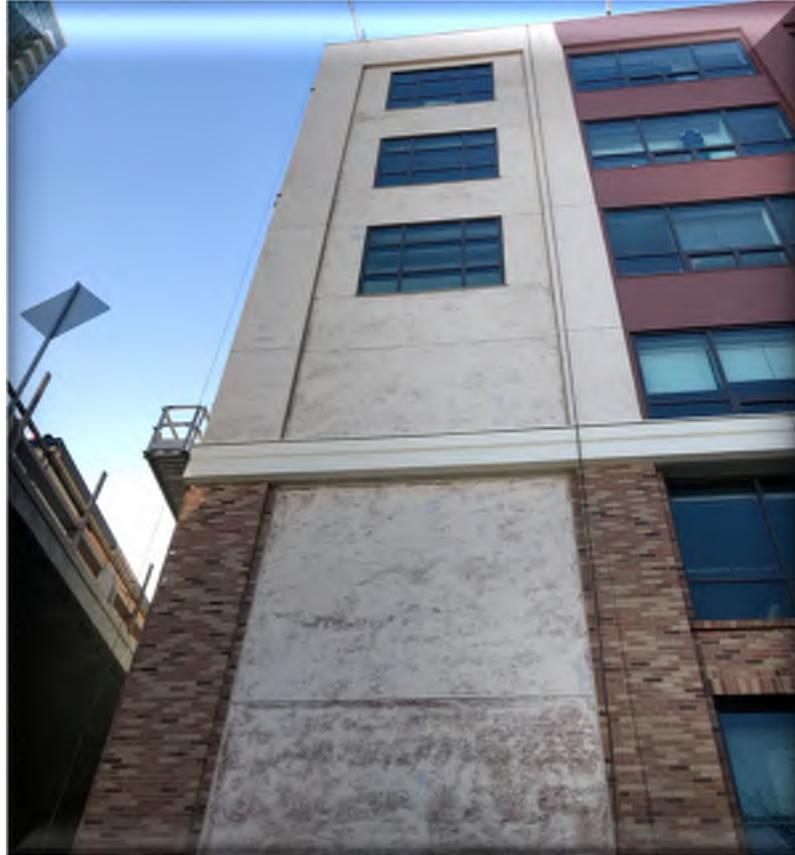
# Gaskets & Glazing

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A close-up photograph of two black gasket components, showing their complex, multi-faceted shape and the way they fit together.



**Performance**  
**Energy Efficiency**  
**Resiliency**



Restoration Opportunities

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## Sealants

- Sealants come in a variety of different technology types with specific movement capabilities, hardness, tensile strength, and elongation. With the new technologies available for sealant restoration, sealants or pre-cured membranes are options to meet the needs of every application.



## Identify

- What is a Restoration Candidate?
- Mode failure
- Substrates
- Performance
- Water Infiltration

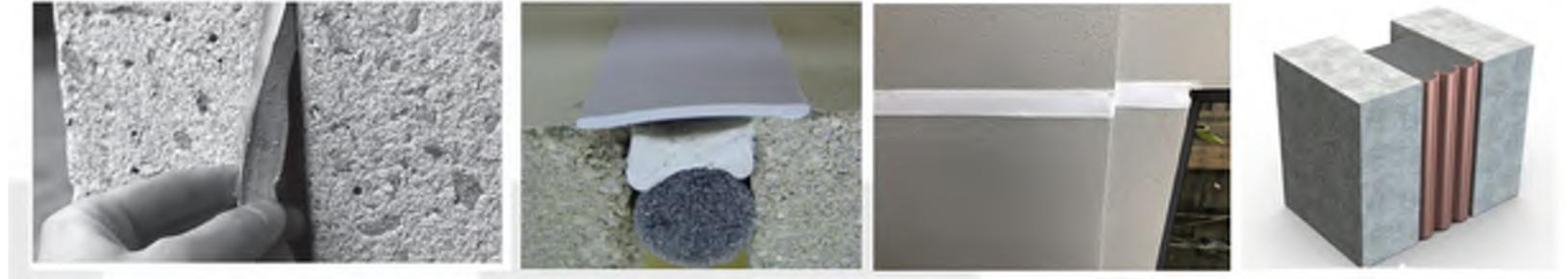


# Restoration Candidates

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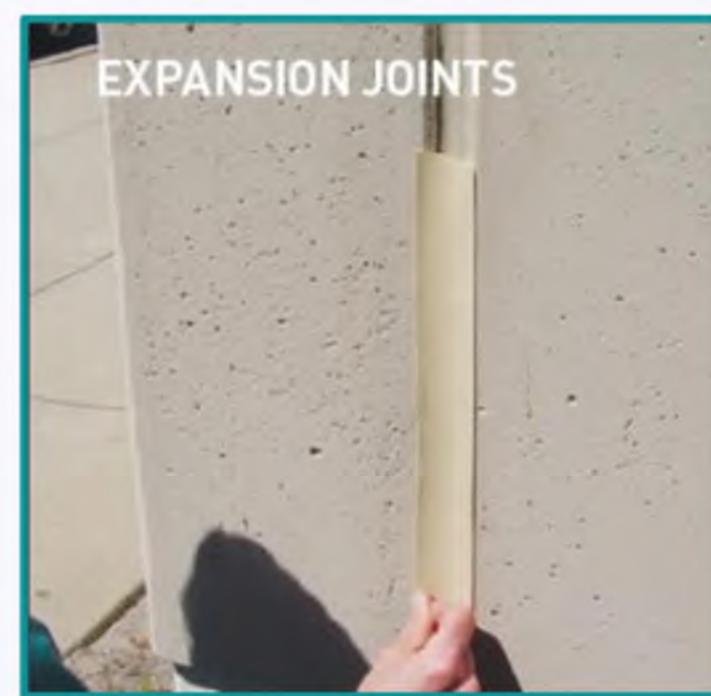
# Solutions

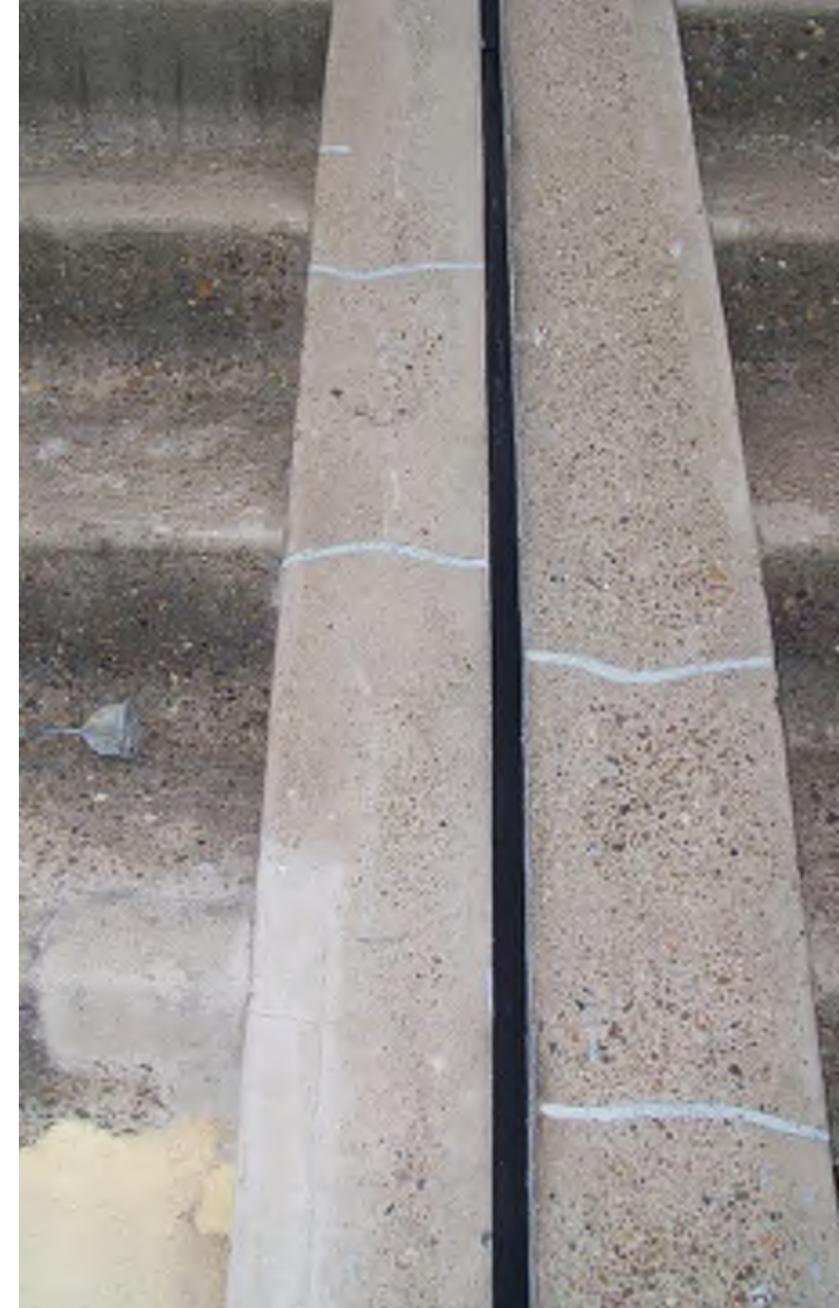
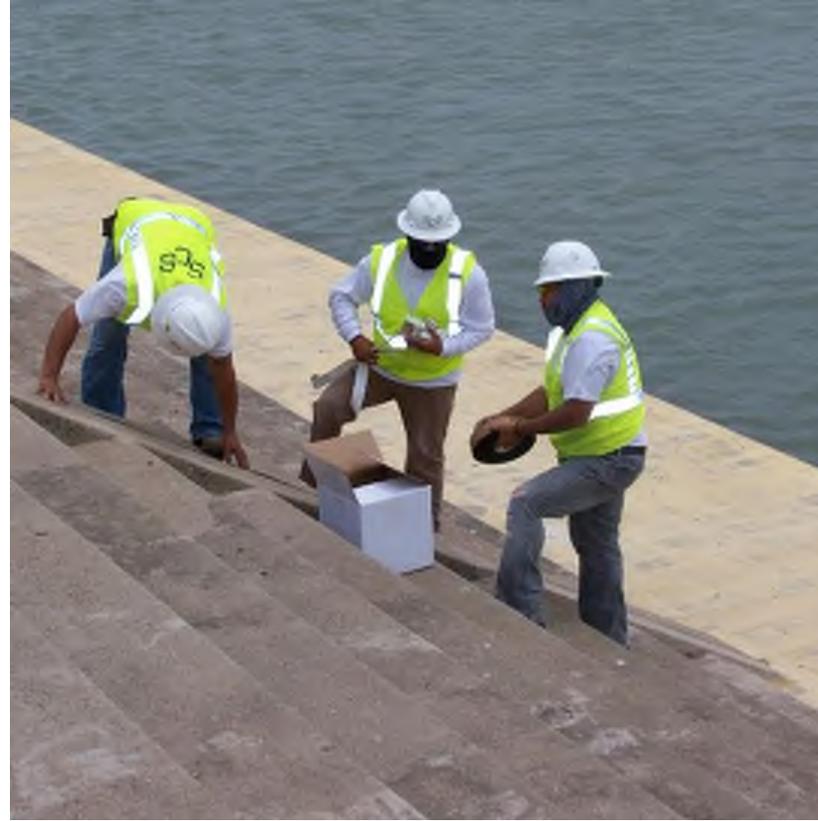


Factors To Consider	Sealant	Pre-Cured Silicone	Pre-Cured Polyurethane	Pre-Compressed Foam Tapes
Sealant Removal	Yes	No	No	Yes
Surface Preparation	Yes	No	No	No
Color Flexibility	Yes	Yes	No	Yes
Approved for Exposure	Yes	Yes	No	Yes
Traffic Rated	Yes	No	No	Yes

# Pre-Cured Solutions

- Window & door perimeters
- EIFS joints
- Parapet walls
- Aluminum window seals
- Transition seals
- Skylights
- Curtain wall metal-to-metal joinery
- Sheet metal roof joints
- Penetrations
- Floor to wall connections
- Many other gap and joint conditions



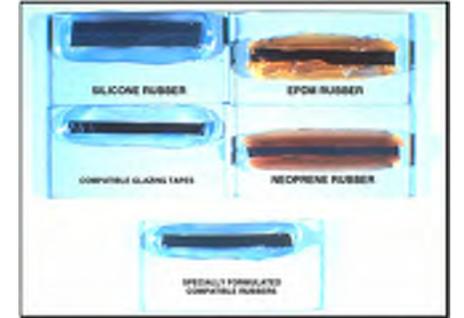
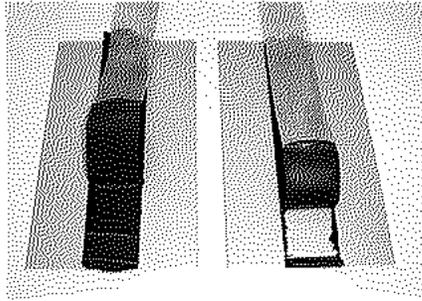


## Pre-Compressed Foam Tapes

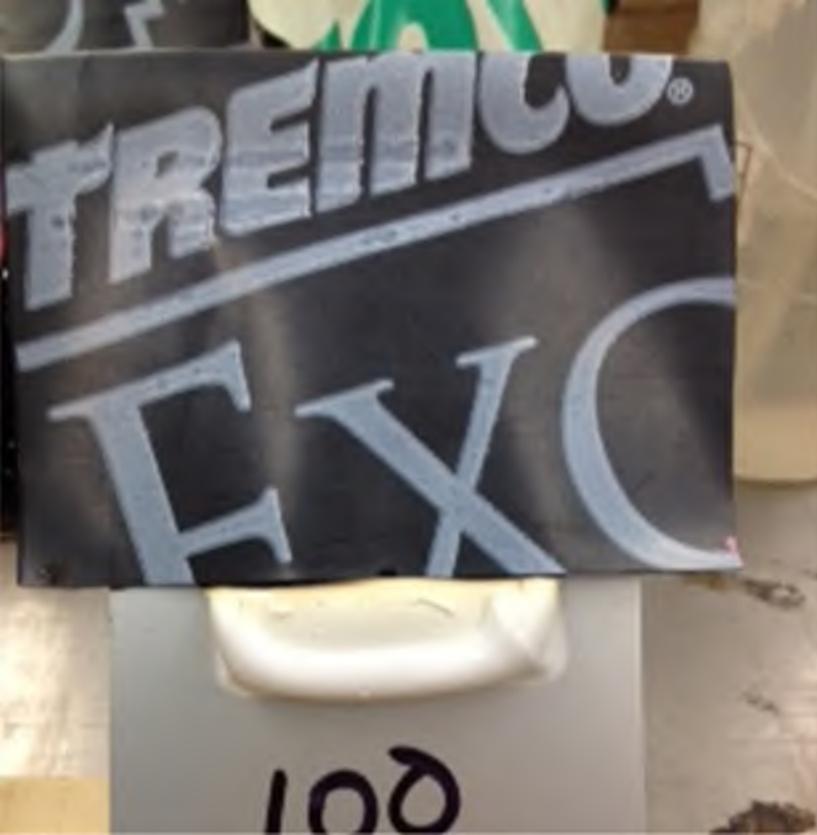
- Ease of Installation
- No Surface Prep
- Irregular Joint
- Thermal Efficiencies

# Evaluation

- Visual observations
- Adhesion testing
- Compatibility
- Tensile Strength
- Elongation





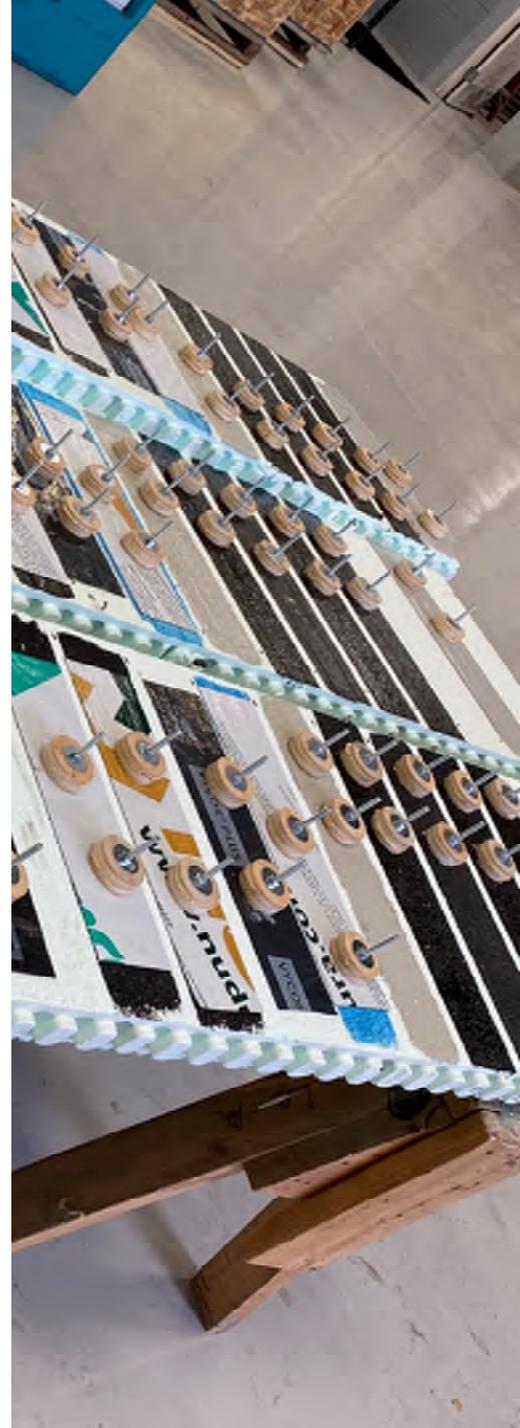


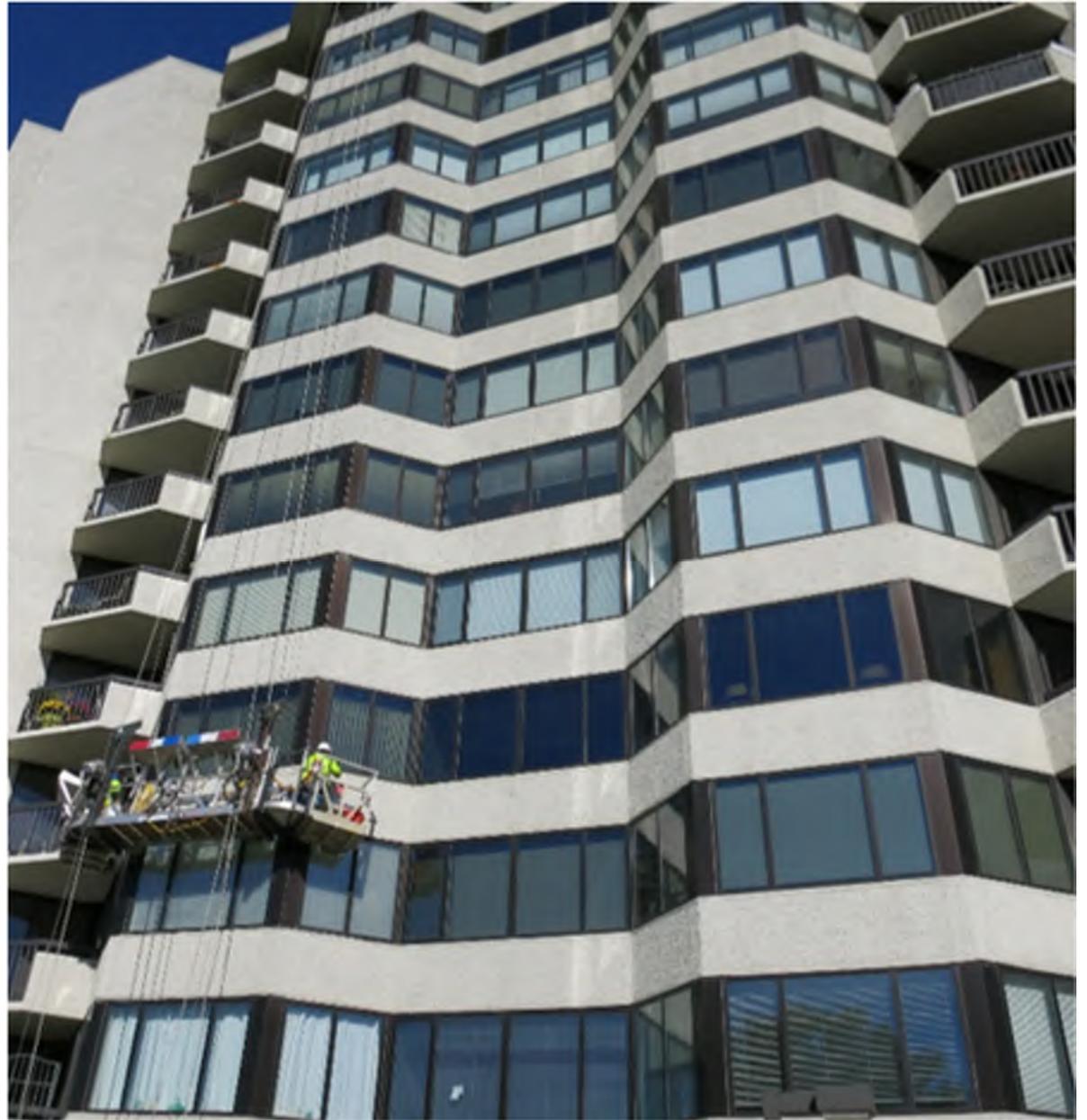
## Compatibility

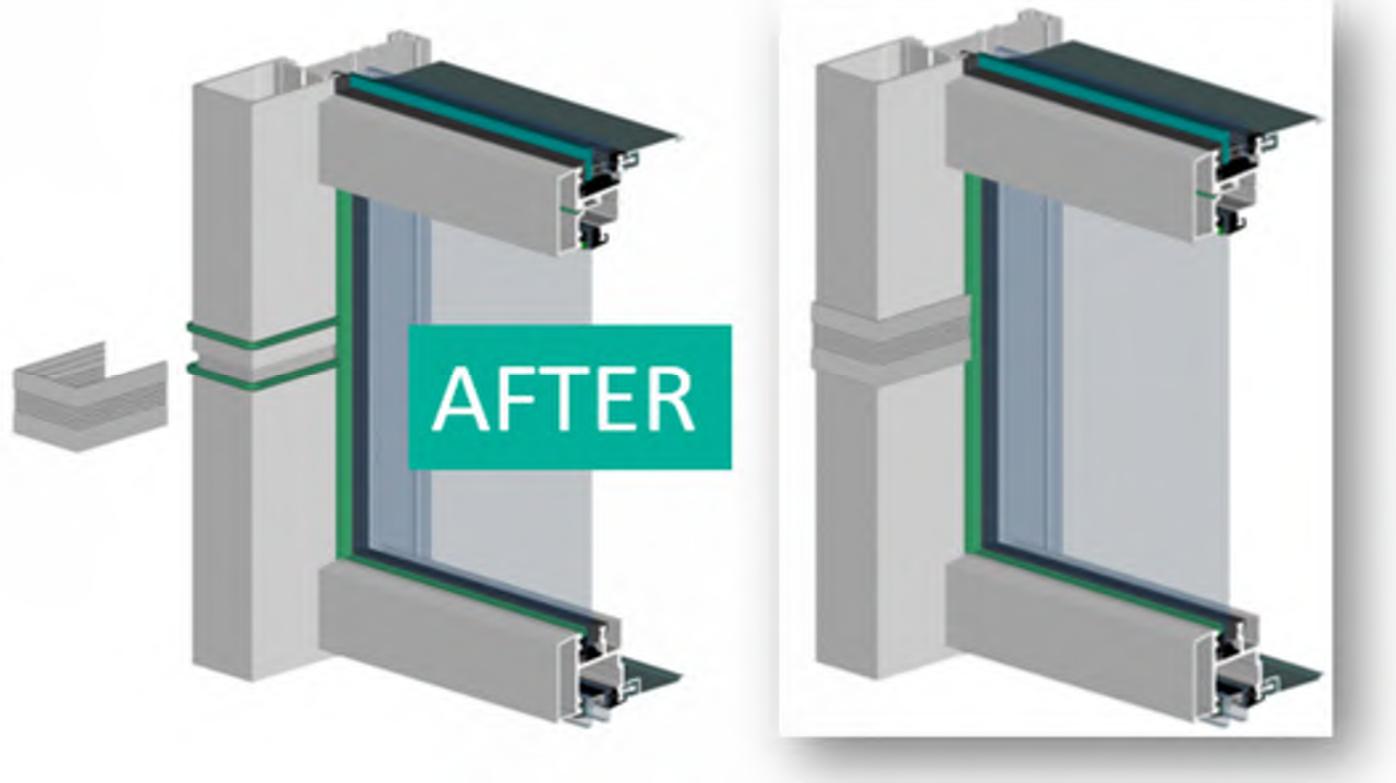
- The compatibility of two or more compounds or substances to be placed in contact or close proximity to one another without detrimental effects on either
- Compatibility does not guarantee good adhesion

Weathered  
Flashing  
Adhesion  
Sample Prep

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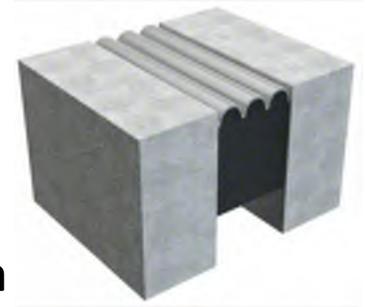




Restoration Candidate



# Notre Dame Fighting Irish Football Stadium – Restoration Project

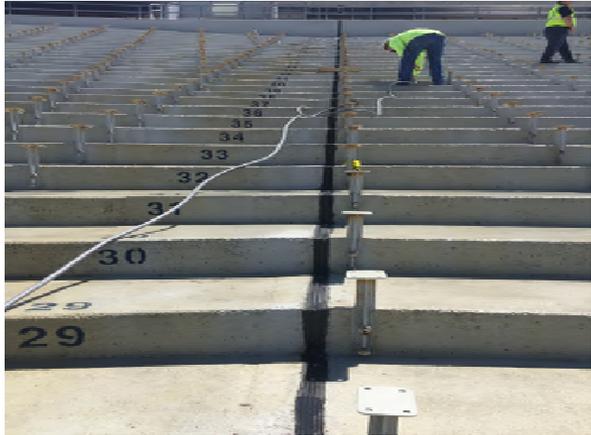


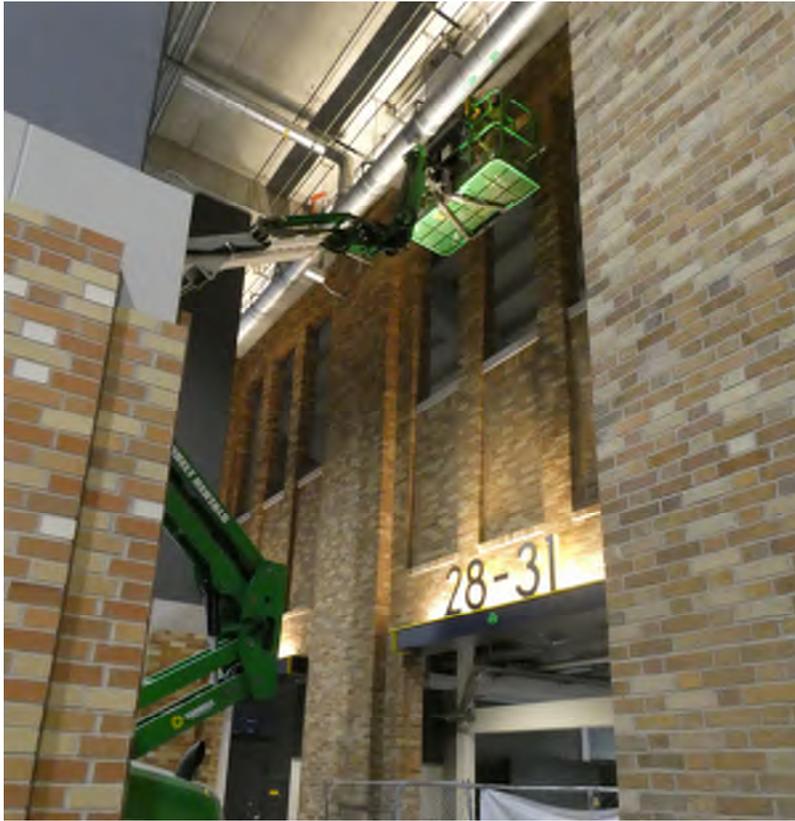
## Project Team

- Tony Polotto, Director of Construction at University of Notre Dame
- Matthew Sherman, Principal at Simpson Gumpertz & Heger Inc.
- Shawn Quinn, Vice President at Quinn Construction, Inc.

SWRI Trinity Project Award Winner







100% Water Tested

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**Performance**  
**Energy Efficiency**  
**Resiliency**

# Glazing

- The detailing around the windows may still be structurally sound, but leaking water and air. Efficiencies for the building can be restored through glazing restoration.
- Custom solutions for restoring window and curtain wall systems has a variety of options depending on the condition.



# Identify

- What is a Restoration Candidate?
- Improvement of energy efficiency
- Remedy of water intrusion
- Correction of improper installation
- Restoring performance lost due to aging of components
- Renewal of aesthetic
- Historic renovation

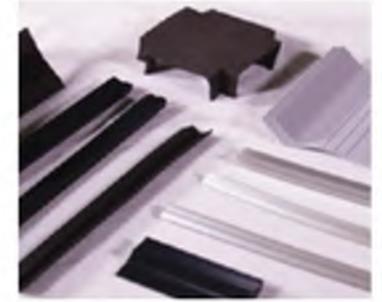
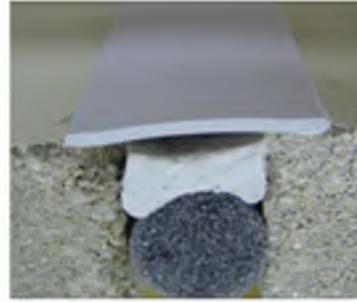




# Restoration Candidates

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# Solutions



Factors To Consider	Sealant	Pre-Cured Silicone	Restoration Overlay	Gasket Replacement
Sealant Removal	Yes	No	No	Yes
Window Removal	No	No	No	No / Yes
Color Flexibility	Yes	Yes	Yes	Yes
Approved for Exposure	Yes	Yes	Yes	Yes
Solution Type	Standard Solution	Encapsulation Solution	Encapsulation Solution	System Reset Solution



CAN/ULC S 742

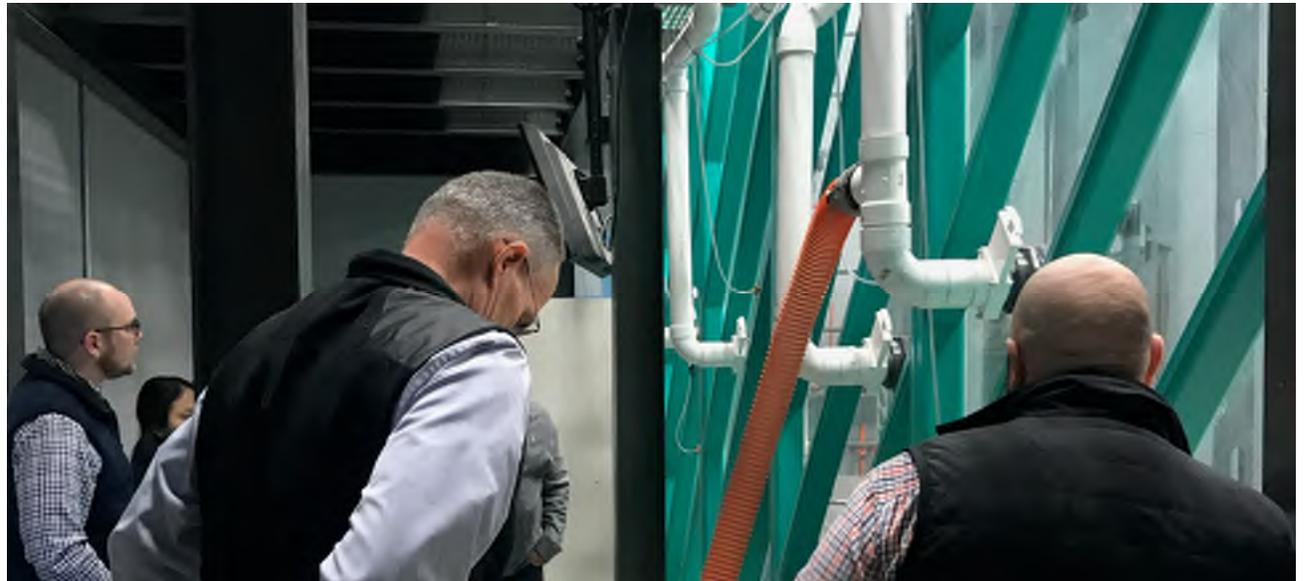
ASTM E 283 / E 2357

Air Leakage of *ASSEMBLIES*

ASTM E 331 Water Leakage

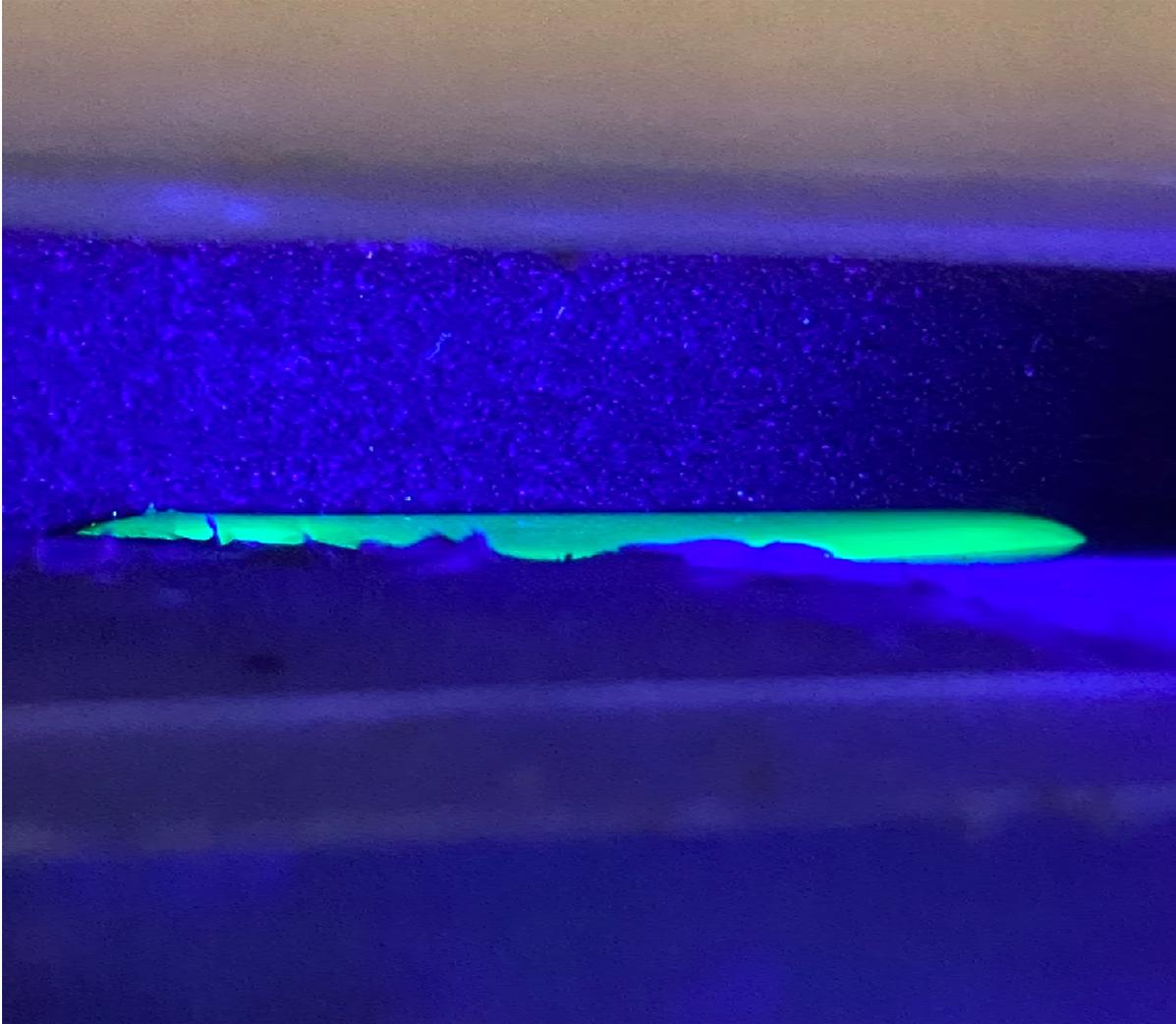
Window - Façade Installed & Evaluated

Water Leakage of *ASSEMBLIES*



**CAUTION**  
EYE  
PROTECTION  
REQUIRED





Observable Leak

# Evaluation

- Survey existing conditions
- Determine what results can be achieved
- Recommend steps to be taken
- Establish benchmarks for measuring success
- Provide methods for verification

AAMA 503-03:  
Voluntary Specification for Field  
Testing of Metal Storefronts,  
Curtain Walls, and Sloped  
Glazing Systems

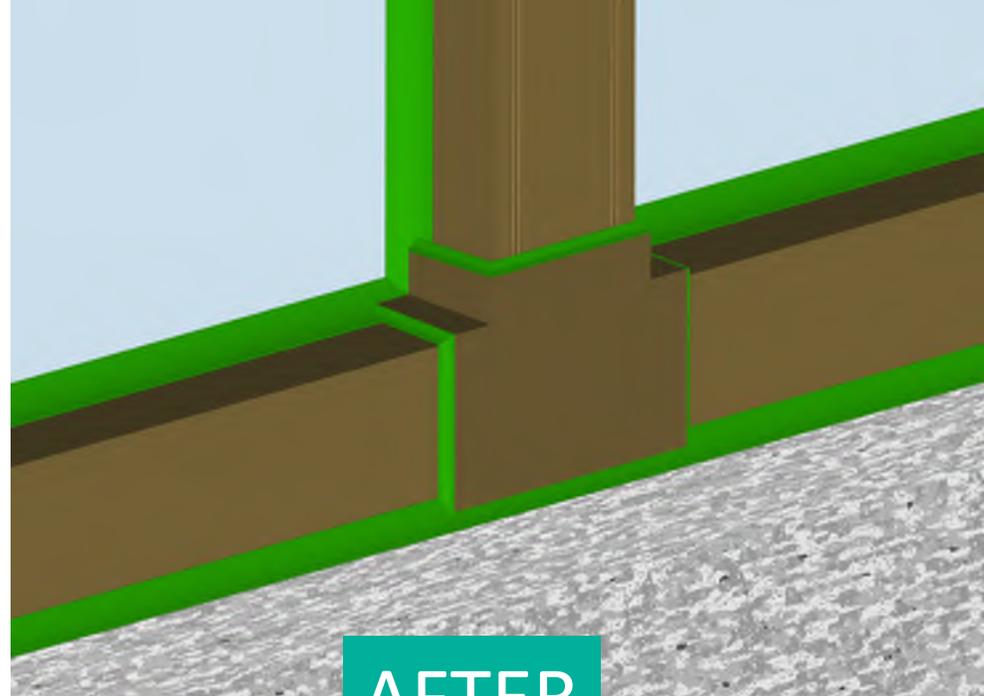
ASTM E 783-02:  
Field Measurement of Air Leakage  
Through Installed Exterior  
Windows and Doors

ASTM E 1105-00:  
Field Determination of Water  
Penetration of Installed Exterior  
Windows, Curtain Walls, and  
Doors by Uniform or Cyclic Static  
Air Pressure Difference





BEFORE



AFTER

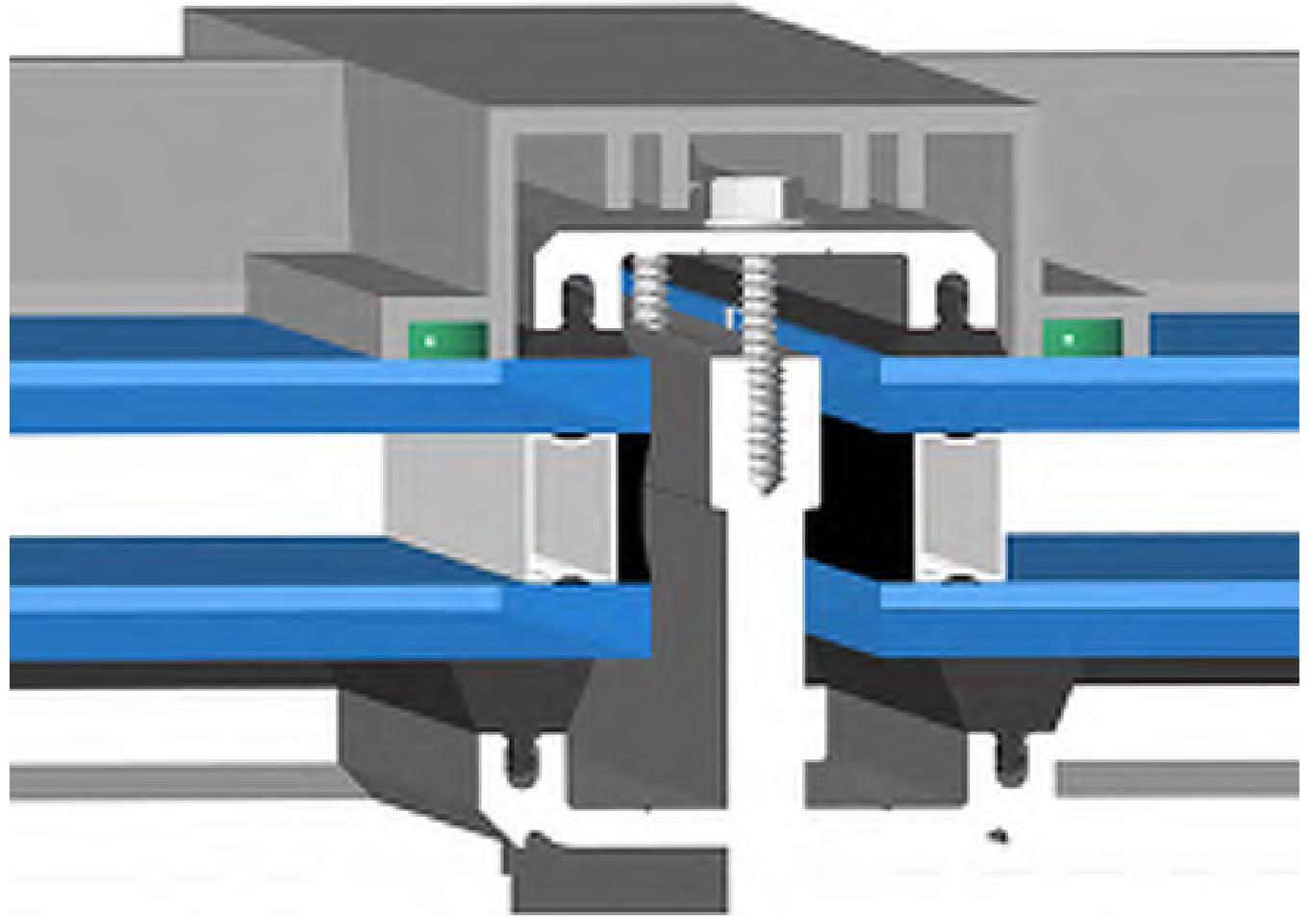




BEFORE



AFTER



BEFORE



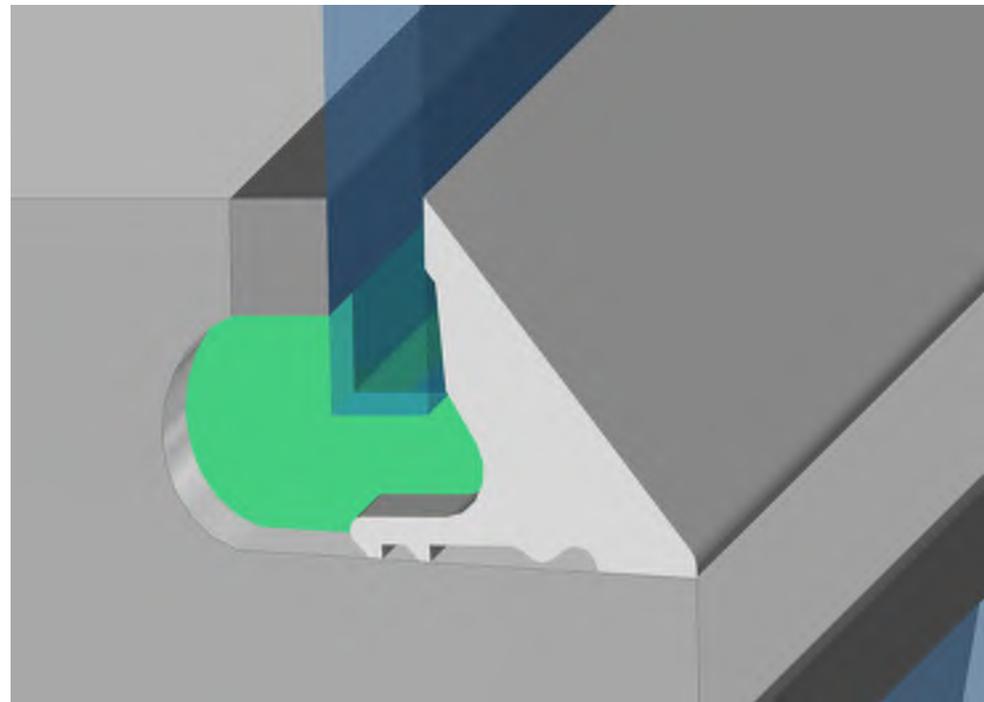
AFTER



BEFORE



AFTER





## University Tower: Custom Overlay Silicone Solutions



HighRise Repair & BECS

**Performance**  
**Energy Efficiency**  
**Resiliency**

# The Façade

- The addition of insulation outbound is driven by integrity of existing façade, cost, and disruption to interior usage.
- Future building envelope retrofit efforts may lean towards over-cladding in buildings where the structural integrity of the existing façade is not in question.



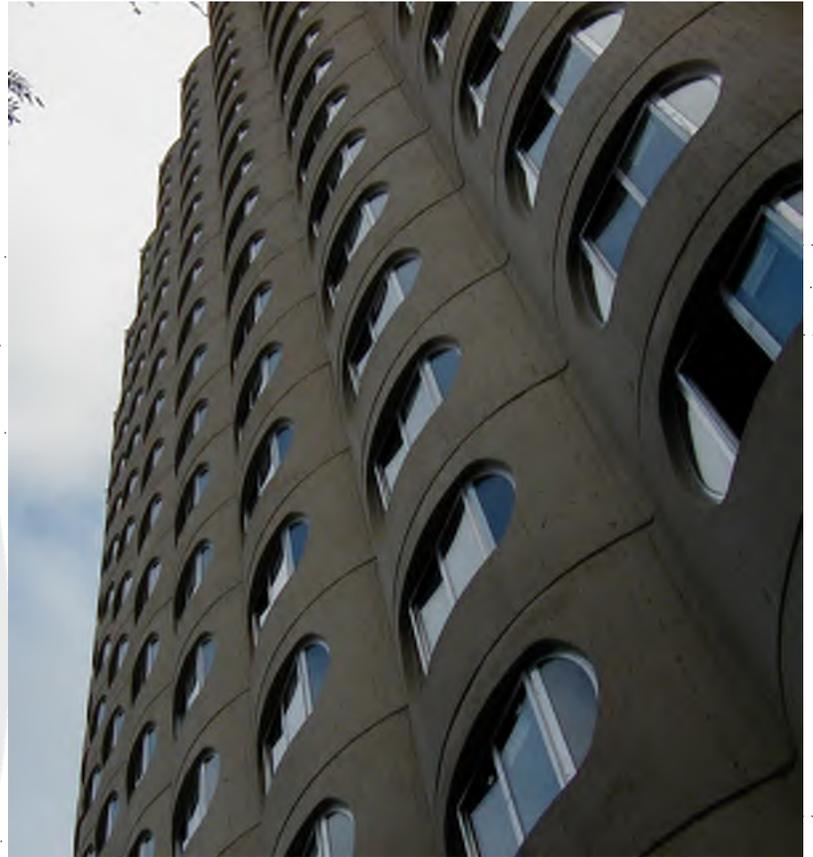
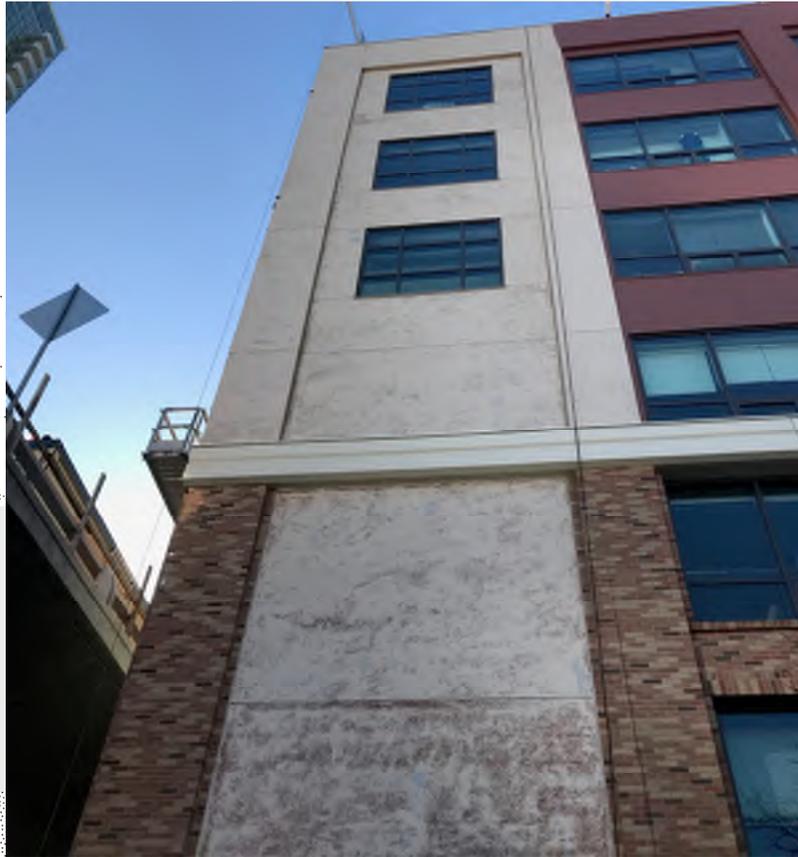
Jackson Towers  
Harrisburg, PA  
Complete renovation  
for HUD housing

# Identify

What is a Restoration Candidate?

- Minimal Deficiencies
- Structural Integrity
- Insulation / Energy
- Water Infiltration





# Restoration Candidates

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## Efflorescence & Staining

- Common Problems Related to Water Infiltration



## Interior Water Leakage

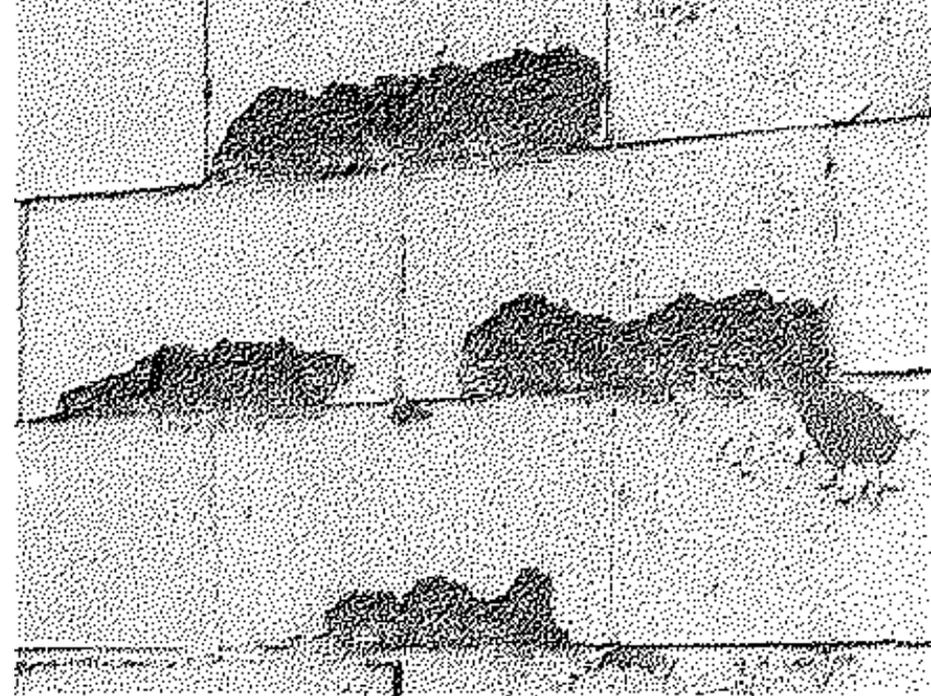
- **Common Problems Related to Water Infiltration**





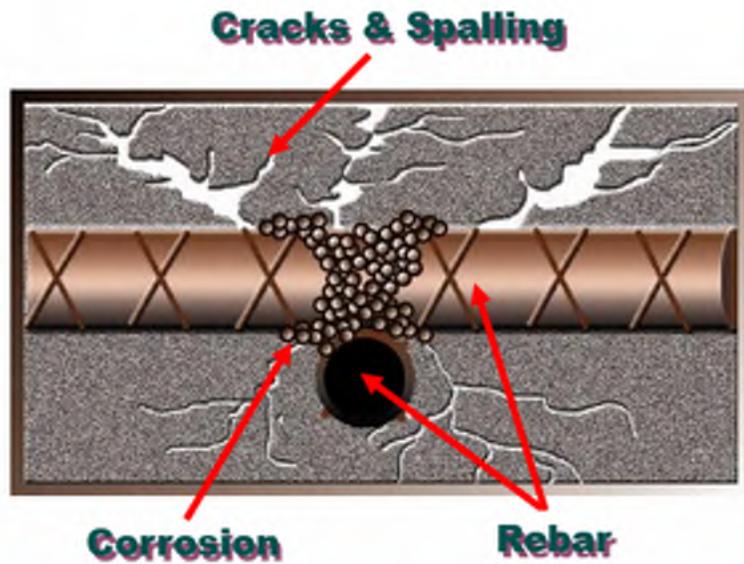
## Freeze/Thaw Deterioration

- **Common Problems Related to  
Water Infiltration**



# Internal Steel Member Corrosion

- Common Problems Related to Water Infiltration



# Carbonation of Concrete

- **Common Problems Related to Water Infiltration**



# Solutions



Target Outlets | Phoenix, Arizona



## Factors To Consider

## Coatings & Finishes

## Continuous Insulation

Substrate repairs

Minimal

Concrete repairs

Added Insulation / Energy Efficiency

No

Yes

Color Options

Yes

Yes

Façade Options

No

Yes

Durability

Minimal

Yes

Drainage Plane

No

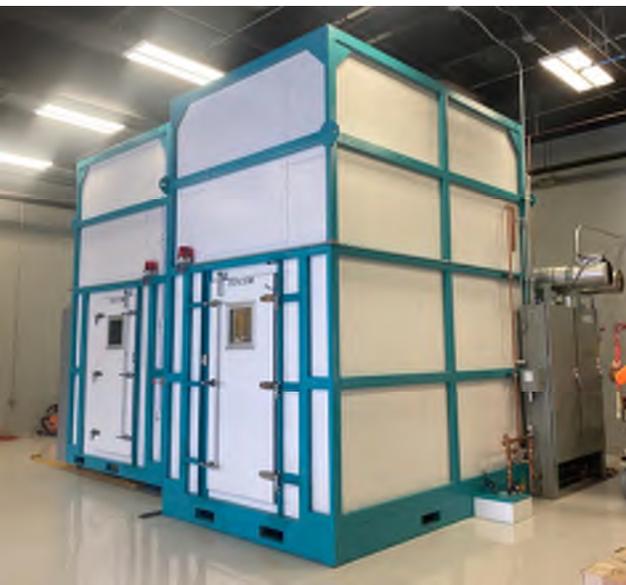
Yes



# Evaluation

- Visual observations
- Destructive as well as nondestructive examination methods
- Moisture content
- Water penetration testing





# Thermal Environmental Chamber

- 240 Data Acquisition channels - 120 in each "room"
- PID Feedback Loop Light Rack - Custom designed to provide more BTUs than the harshest thermal radiation on earth. (200 BTU/ ft<sup>2</sup>)
- Pressure Differential - +/- 1200 Pascals (25 PSF)
- Temperature Differential - -4 to 150 F
- Humidity Control - 10-95% RH
- Rain Water Simulation- 5 g/hr/ft<sup>2</sup> ( ~200 g/hr)

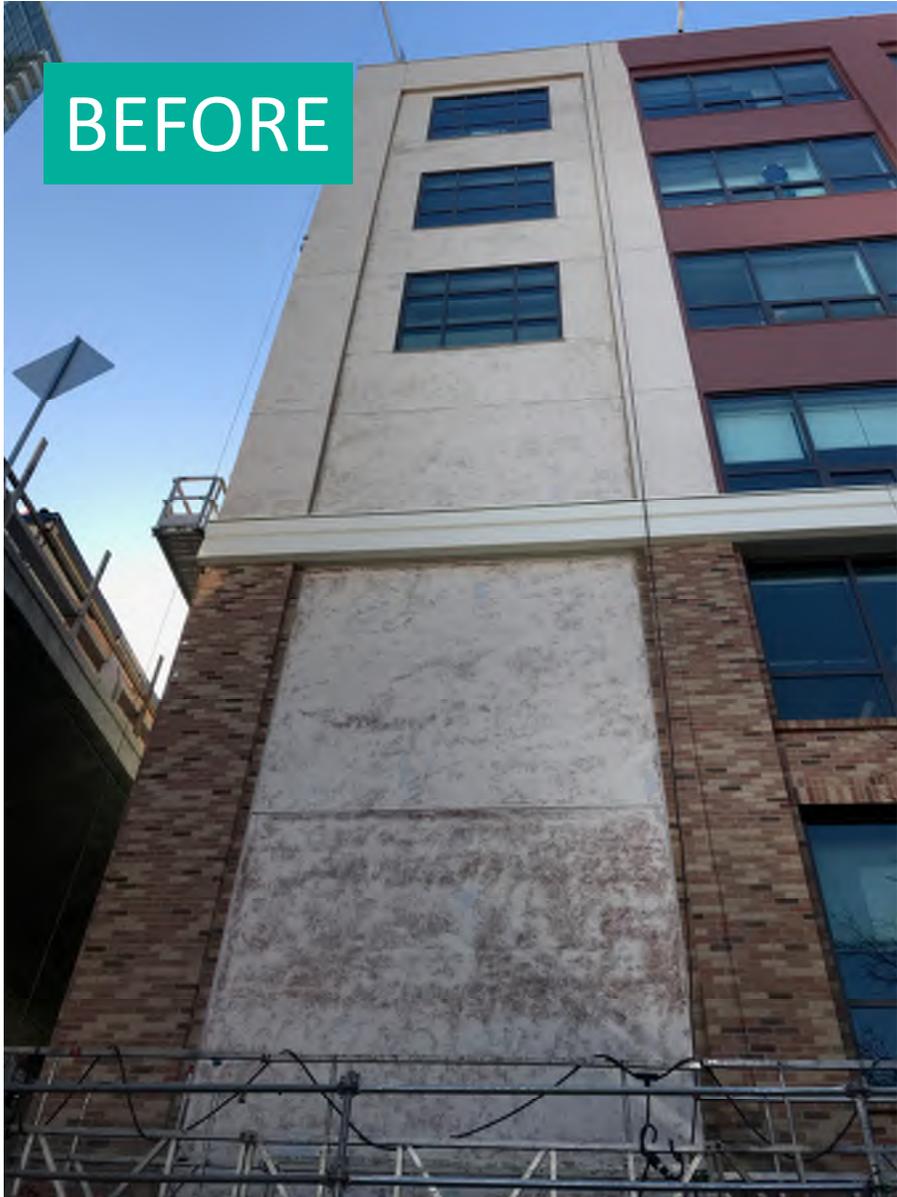


## Energy Efficiency & Resiliency

- ICF
- EIFS
- Lightweight Insulated Veneers
- Panelization



BEFORE



AFTER





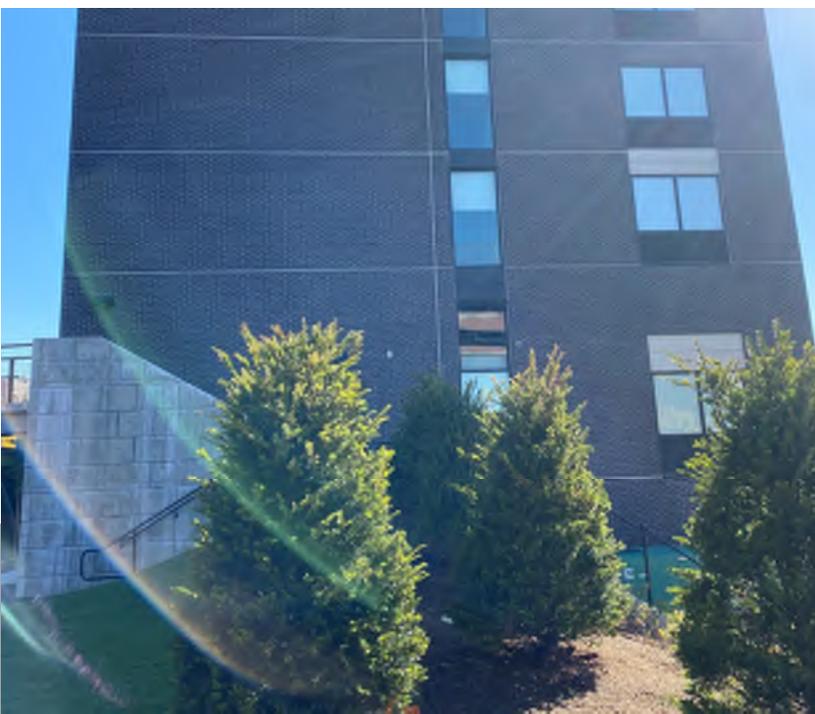
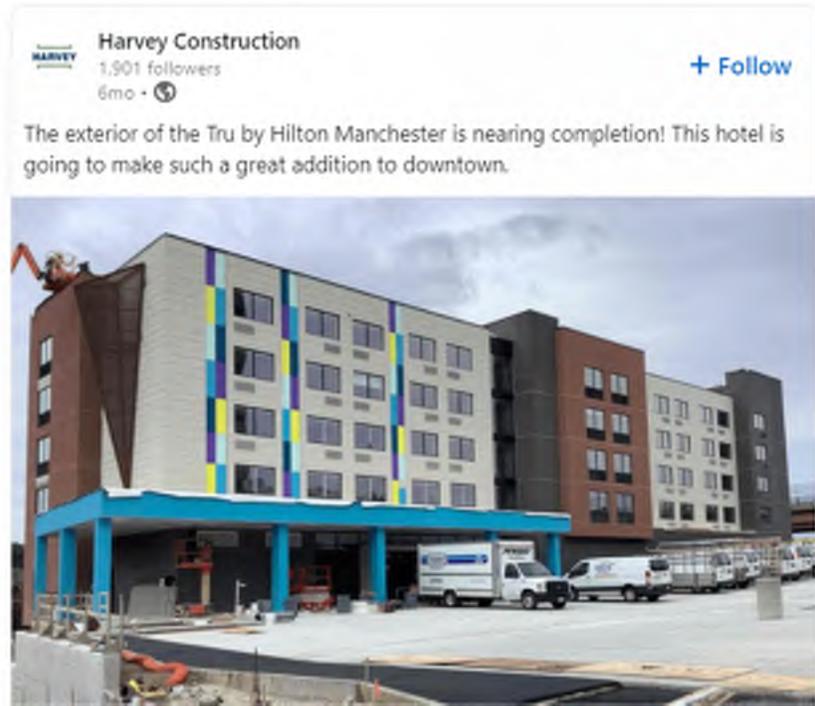
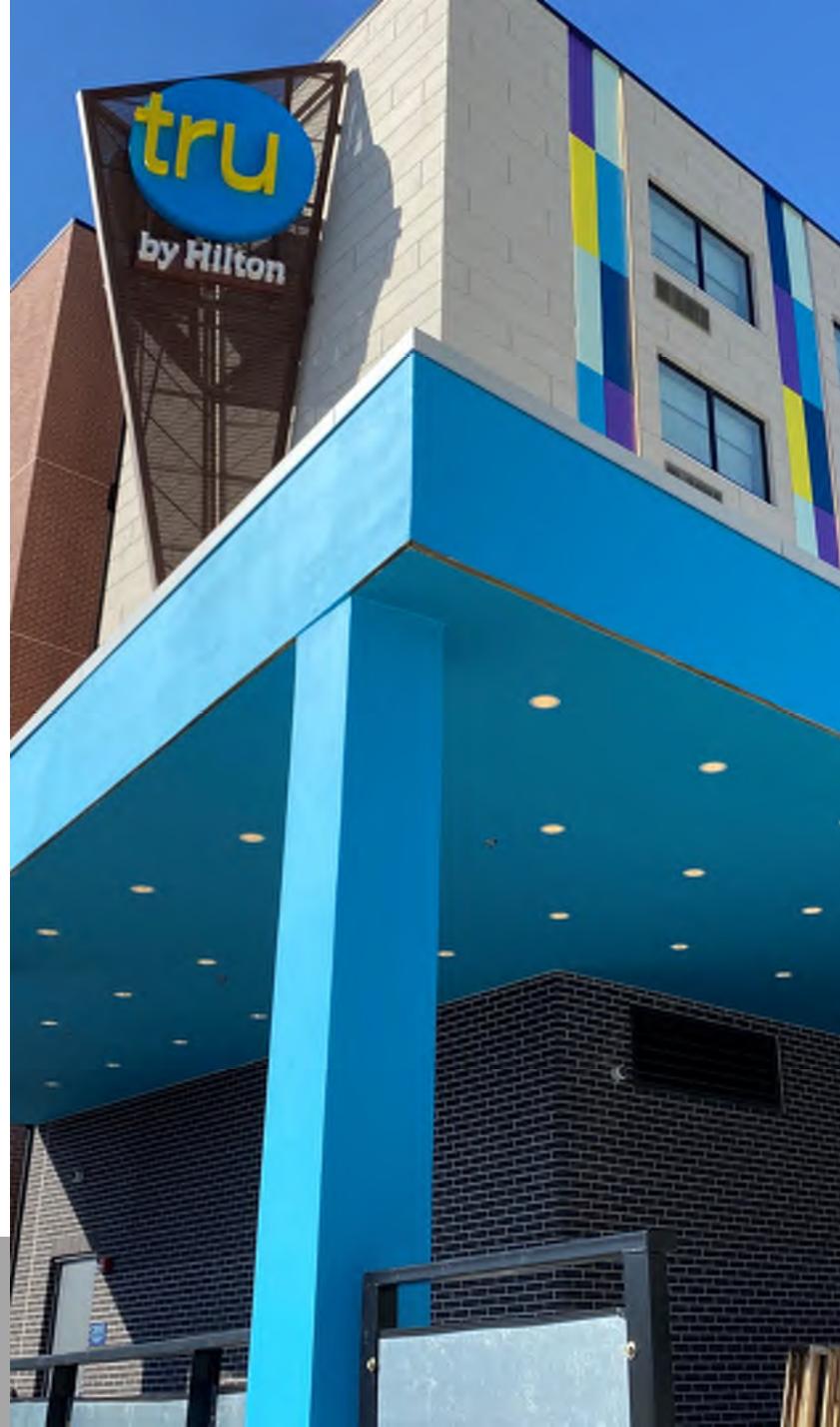
Owens Community  
College  
Perrysburg, OH

- Overclad of their administration building
- Condensation issue of the brick shelf penetrating thermal barrier
- Solution: Lightweight insulated veneer and EIFS



# Union College

- Old world stucco stipple look



**Harvey Construction**  
1,901 followers  
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The exterior of the Tru by Hilton Manchester is nearing completion! This hotel is going to make such a great addition to downtown.

- Wood grain appearance panelized EIFS



**Performance**  
**Energy Efficiency**  
**Resiliency**

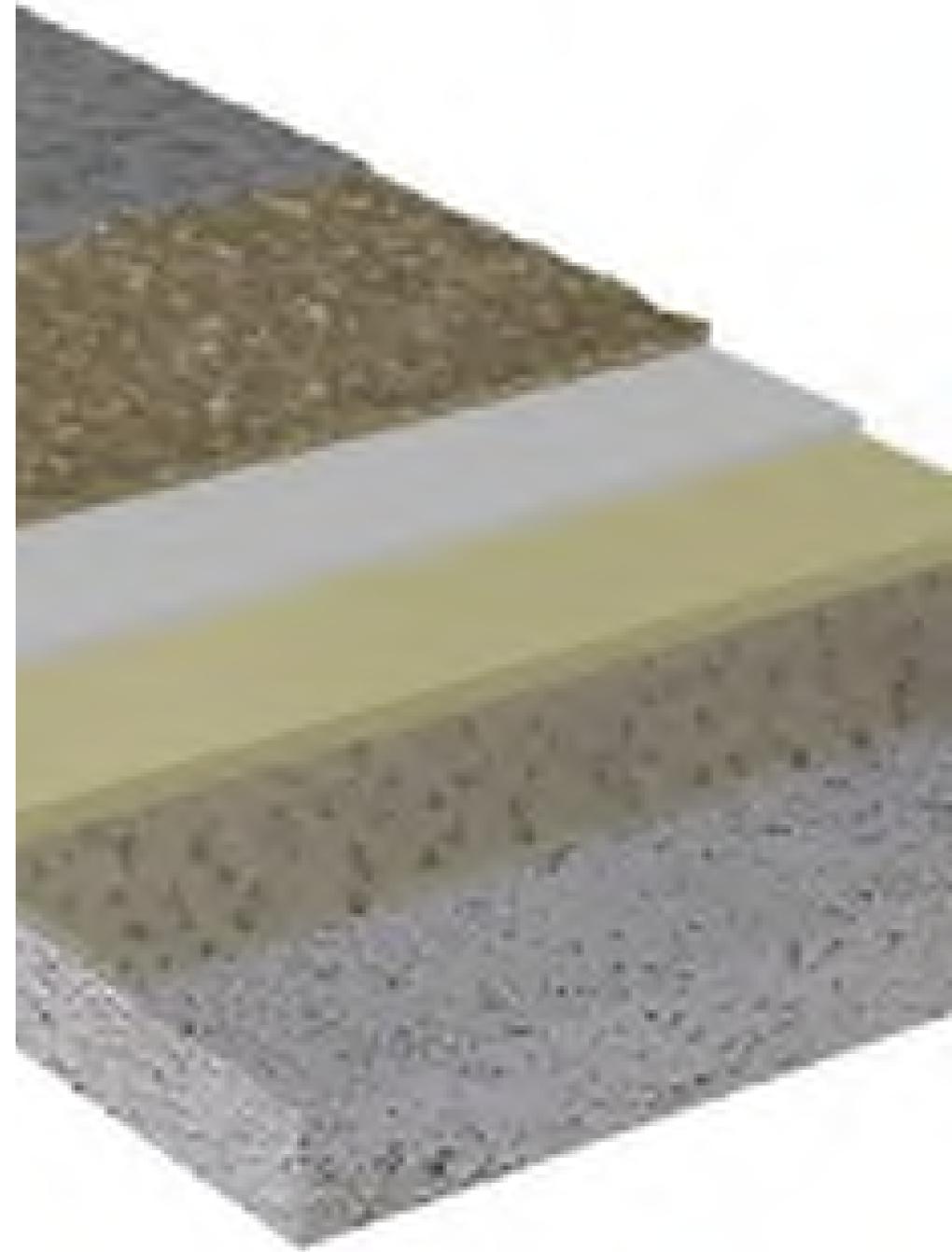
# Parking Structure

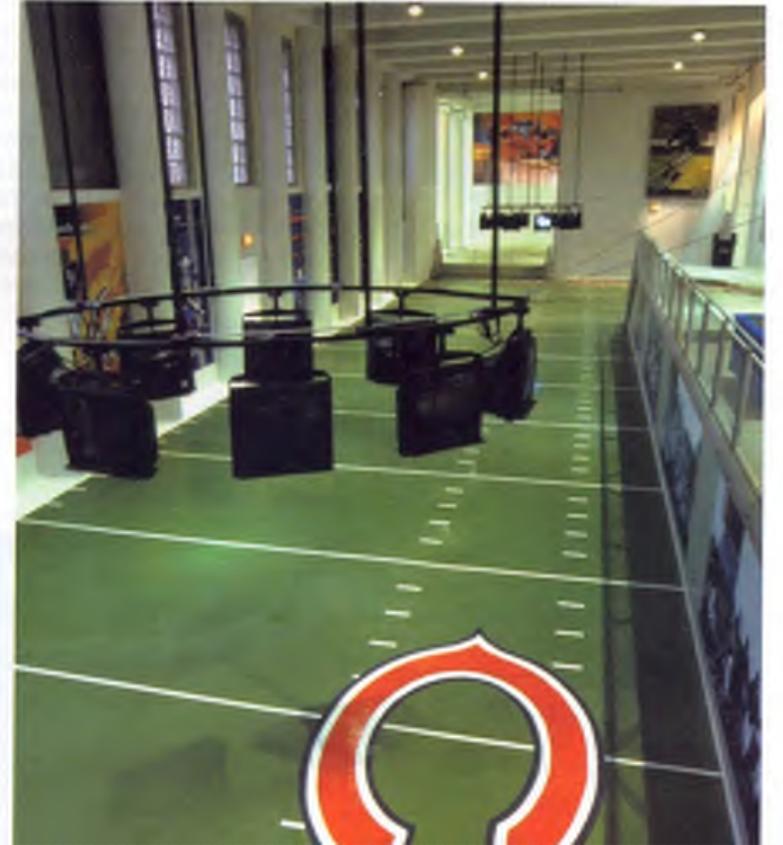
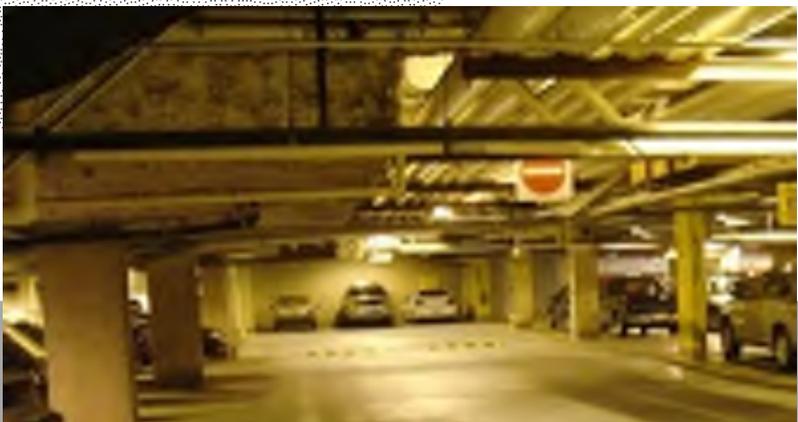
- Concrete repair and coatings can extend the life of a parking structure and provide waterproofing to the concrete and wear and slip resistance.
- New technologies exist that can allow for installation in high wear areas and also have quick turn around times.



# Identify

- What is a Restoration Candidate?
- Remedy of water intrusion
- Correction of improper installation
- Restoring performance lost due to aging of components
- Slip resistance
- Wear





## Restoration Candidates

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# Solutions

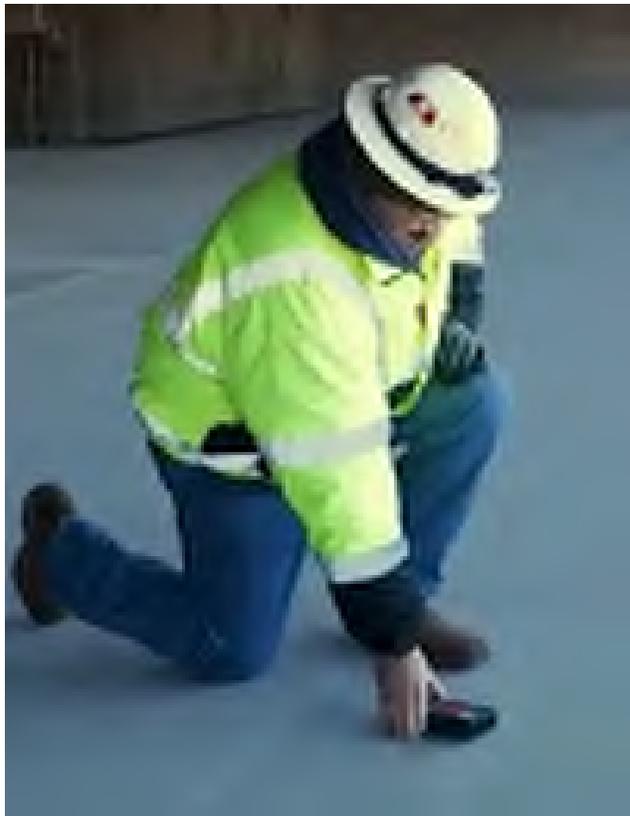


Factors To Consider	Balcony One Coat	Polyurethane	PUMA
Solution	Medium Term	Medium – High Term	High Term
Color Flexibility	Yes	Yes	Yes
Approved for Exposure	Yes	No / Yes	Yes
Traffic	Light Pedestrian	Vehicular	Extreme Wear & Turn Around Time



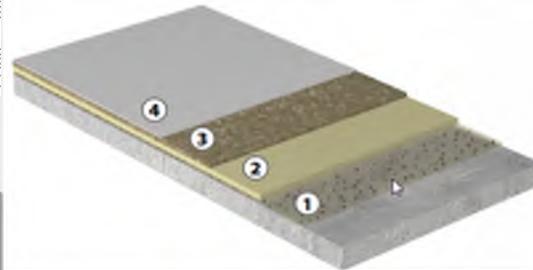
# Evaluation

- Visual Inspection
- Patch & Repairs
- Removal of Existing
- Cleaning
- Concrete Surface Profile
- Adhesion Testing
- Temperature
- Moisture Content





# Restoration Project Pedestrian Coating



Coverage Rate	Wet Mil	Comments
90 ft <sup>2</sup> /gal	17	Broadcast 25 to 50 mesh silica sand at a rate of 7 lb per 100 ft <sup>2</sup> into wet primer.
26 ft <sup>2</sup> /gal	60	Allow 45 minutes to cure before proceeding.
90 ft <sup>2</sup> /gal	17	Broadcast silica sand or color quartz to refusal into wet TC. Allow 45 minutes to cure before proceeding.
64 ft <sup>2</sup> /gal	25	Absent of aggregate. Allow 45 minutes to cure before opening to traffic.

BEFORE



AFTER



# Restoration Project Vehicular Coating





## COLD WEATHER INSTALLS

**Project: O'Hare Airport**

**General Contractor:** Power

**Waterproofing**

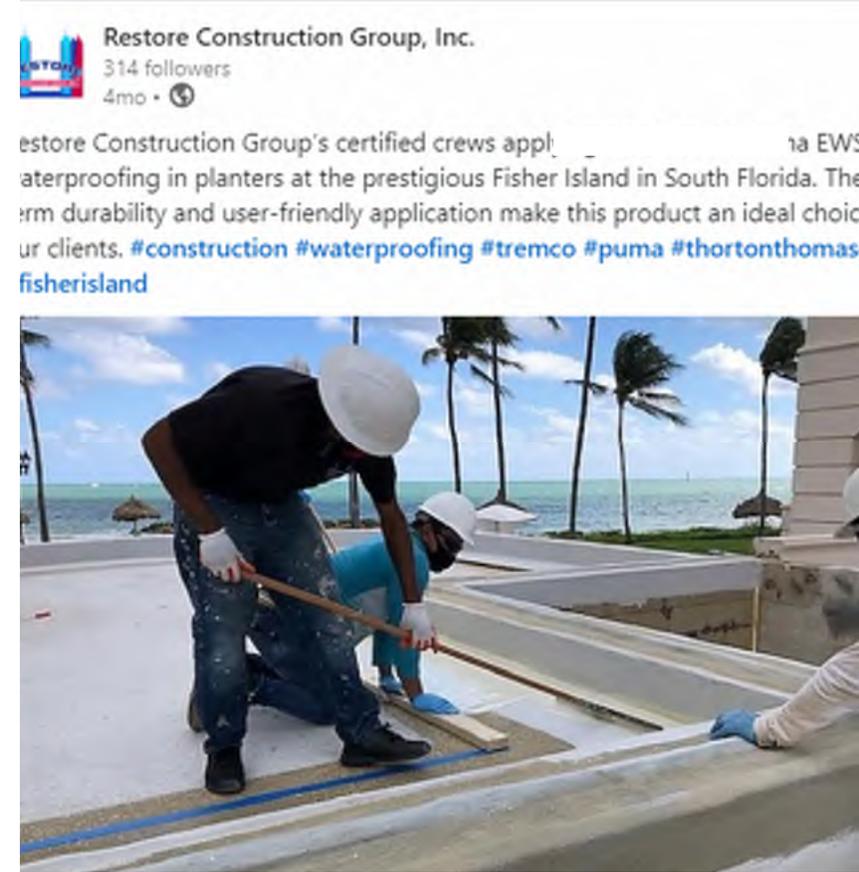
**Subcontractor:** Kedmont

Work continued even when temperatures were below freezing and majority of the install, they were single digits.





Installation Temperature: Low 30s



# Fisher Island Planters

# Restoration Project – Façade, Concrete, Sealants, Balcony Coating





Existing Balcony  
Damage





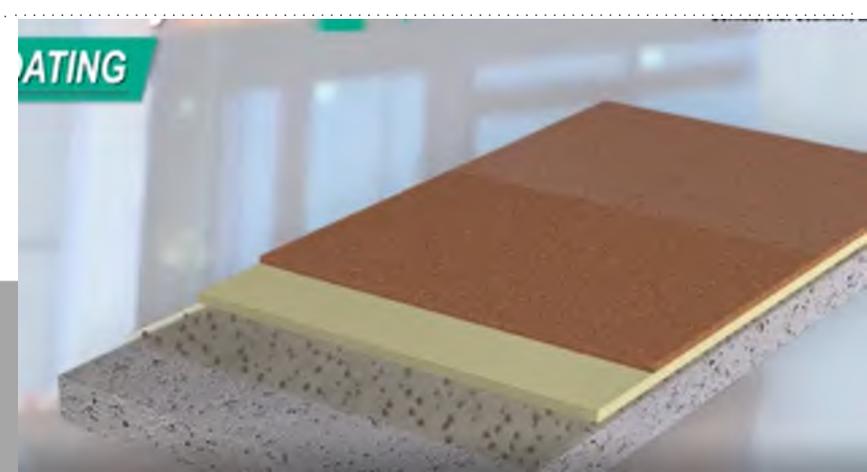
# Concrete Repair

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Coating over  
existing façade  
with  
air & weather  
resistive barrier

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Restoration Project:  
Façade, Concrete, Sealants,  
Balcony Coating

## PROJECT PROFILE

*500 Pacific Avenue, Bremerton, Washington*

BEFORE



AFTER



**Performance**  
**Energy Efficiency**  
**Resiliency**

## Sealants, Glazing, Façade, & Parking Structures

### Performance

Adhesion & compatibility of each material, system evaluation with project specific building enclosure elements, addressing connections throughout the entire enclosure

### Energy Efficiency

Air & Water-tight evaluation of assemblies, evaluation of thermal resistance based on system selection, protection for substrates & enclosure transitions

### Resilience

Tensile strength & elongation of each material, system evaluation for durability, chemical resistance, exposure and confirmation on long term performance



## SUSTAINABLE BUILDING SOLUTIONS TEST FACILITY



## System Performance Evaluation Opportunity

We provide monthly tours that are both virtual and in person. We invite you to visit and bring your systems and design challenges with you.



Stop water intrusion and make  
your building enclosure perform  
like new

