

# Addressing Modern Building Envelope Goals with Advanced EIFS



EX202

Thursday, June 21, 2018, 12:30-1:30 pm

Learning Units - 1.0 CEU's

**A'18** AIA Conference on Architecture 2018  
June 21-23, New York City



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# Presented By:

**Robert W. Dazel**, AIA, CSI, LEED GA

Strategic Accounts Manager

Dryvit Systems, Inc.

[Bob.dazel@dryvit.com](mailto:Bob.dazel@dryvit.com)

734.276.0404

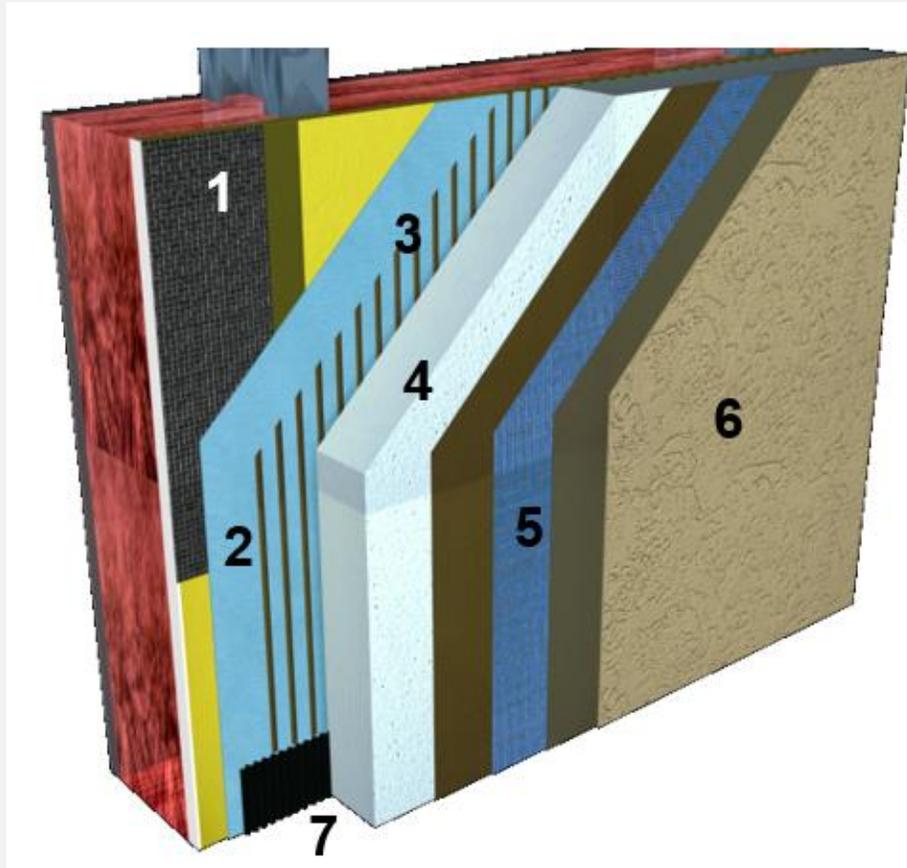
# Learning Objectives

1. Outline building and energy **I-code changes** specifically affecting building envelope walls such as weather-resistive barrier (WRB), continuous insulation (CI), continuous air barrier (AB) and fire testing compliance and how a single sourced Exterior Insulation and Finish System (EIFS) cladding can easily integrate and comply.
2. Present **new advancements in EIFS with Drainage** solutions addressing AWRB and flashing integrations, impact durability, CI options, performance enhancements, coatings and installation accessory components supporting proper installation.
3. Introduce **pre-fabricated EIFS panelization** options and discuss in general EIFS' place in new, restoration, renovation and modularization construction for both commercial and residential structures.
4. Explore the **full range of EIFS aesthetic textured finish options** for stucco, brick, stone, granite, metal and steel aesthetic appearances with supportive project examples.

# Advancements

- Fluid Applied Air/Water-Resistive Barrier Coatings & Flashings
- Insulation Options
- Pre-Coated Starter Boards, Trims, Corners and Shapes
- High-Impact Assemblies
- New Textured Finish Options
- Water-Repellant Hydrophobic Chemistry
- High Performance UV Resistant Colorants
- Lightweight Insulated Brick Veneer
- Pre-Fabricated EIFS Panels
- Code Compliance
- Detailing Changes

# EIFS Composition



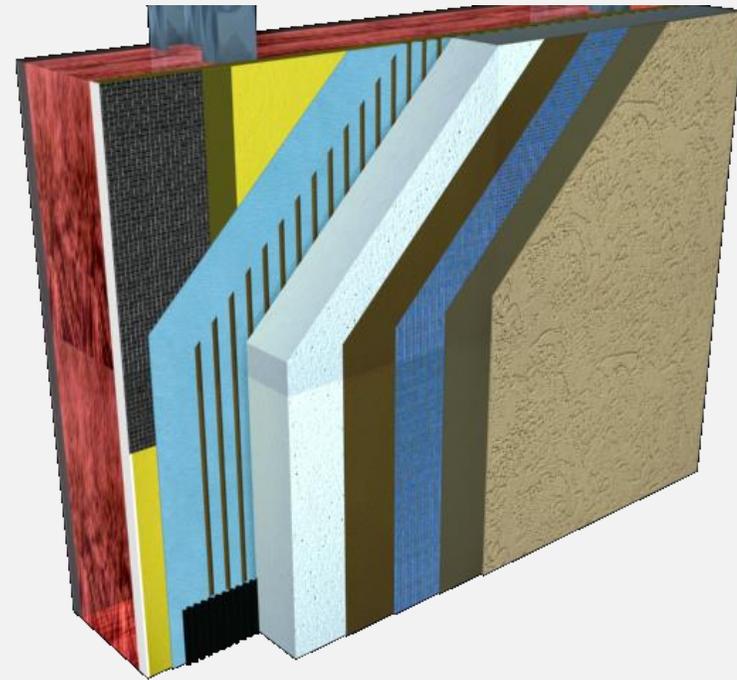
## EIFS With Drainage

1. Fluid applied flashing
2. Fluid applied air/water-resistive barrier (AWRB)
3. Vertical notched Adhesive / Drainage Plane
4. Expanded polystyrene insulation (EPS)
5. Reinforcing Mesh embedded in Base Coat
6. Textured Finish
7. Weep / Drainage Accessories

# EIFS Composition

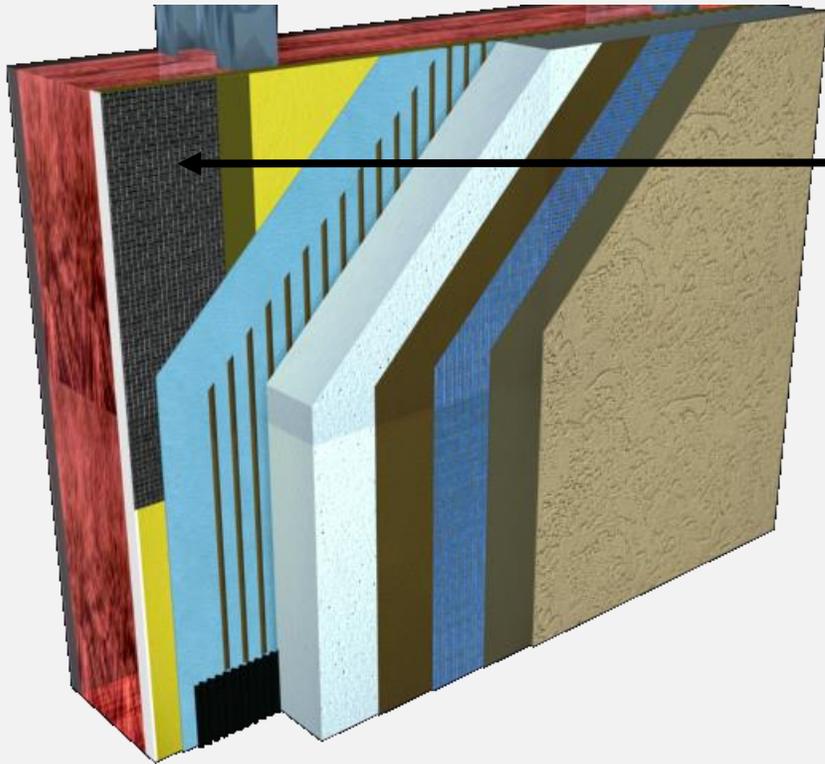
## Exterior Insulation and Finish Systems (EIFS)

- ***Continuous Insulation (CI)*** and ***AWRB*** are integral components of the 'system'
- Single-Sourced Solution for:
  - Building and Energy Code Compliance
    - Flashing
    - Air & Water-Resistive Barrier
    - Continuous Insulation (CI)
    - Fire – **NFPA 285**
  - Integral Color / Texture Finish
  - Any Architectural Style & Aesthetic
  - Comprehensive Warranty



Exterior *Continuous Insulation* Cladding

# EIFS with Drainage



## Critical Components:

### Flexible Flashing Material

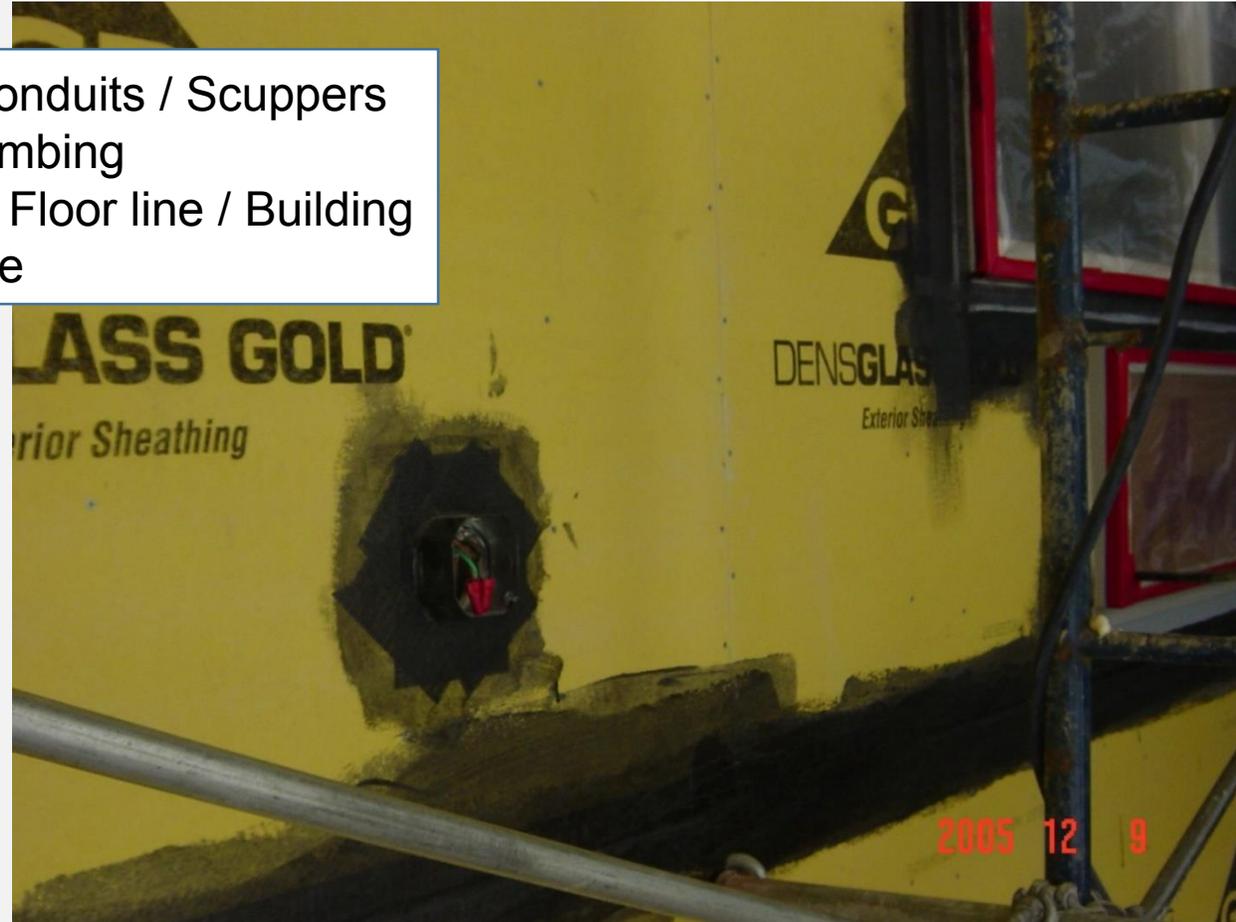
- “Fluid” applied with reinforcing mesh scrim
- Seamless assembly
- Protects against moisture penetration into wall structure
- Flexible - accommodates all shapes and sizes

# Flashing Rough Openings

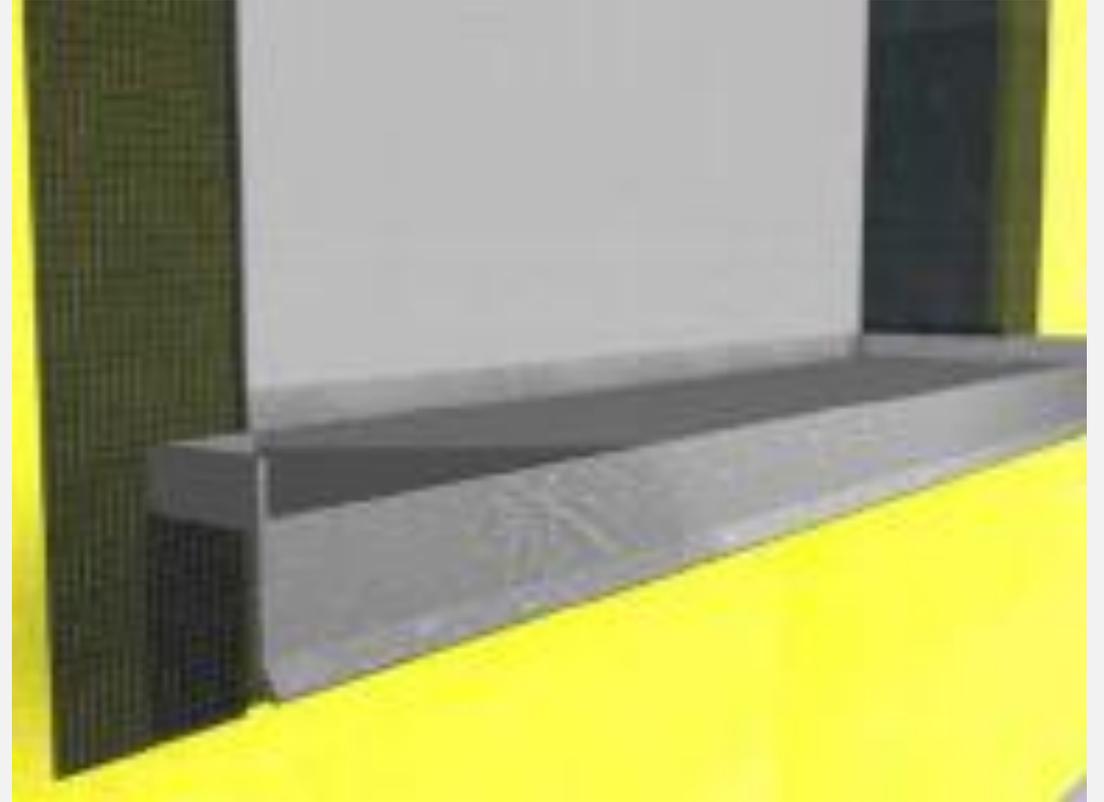


# Flashing Wall Penetrations

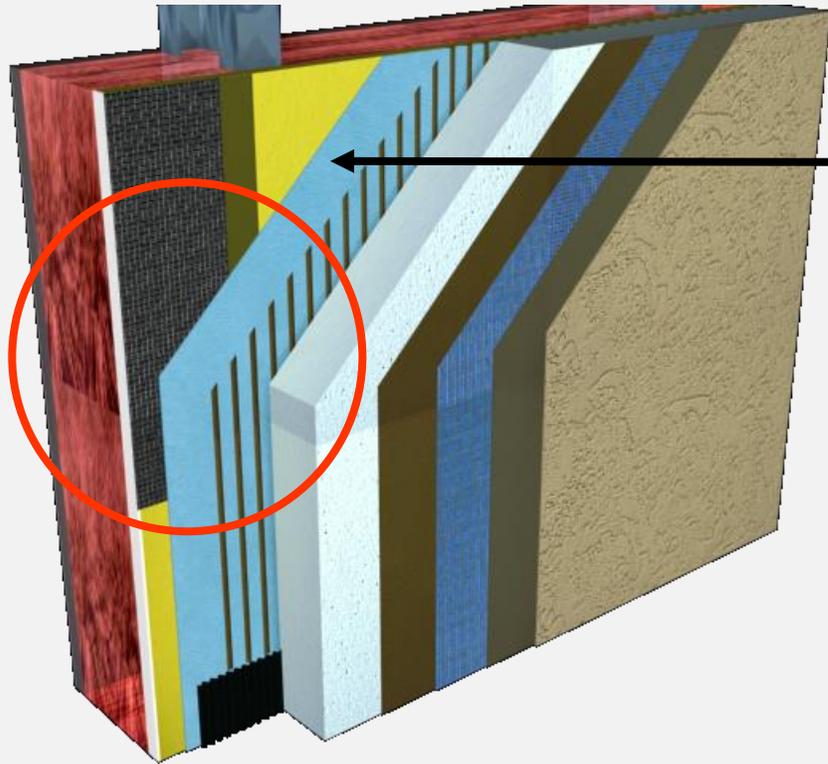
- Electrical boxes / conduits / Scuppers
- PTAC / HVAC / Plumbing
- Expansion Joints – Floor line / Building
- Change of substrate



# Integrating Metal Flashings



# EIFS with Drainage



## Critical Components:

### Air/Water-Resistive Barrier

- Fluid applied
- Seamless air / water-resistive barrier
- Protects against moisture penetration into wall structure
- Permeable and non-permeable versions

Meet the intent of the code

# Treating Board Joints & Fasteners



# Apply Air / Water-Resistive Barrier



# Integrate Flashing & Barrier



# Continuous Seamless Protection

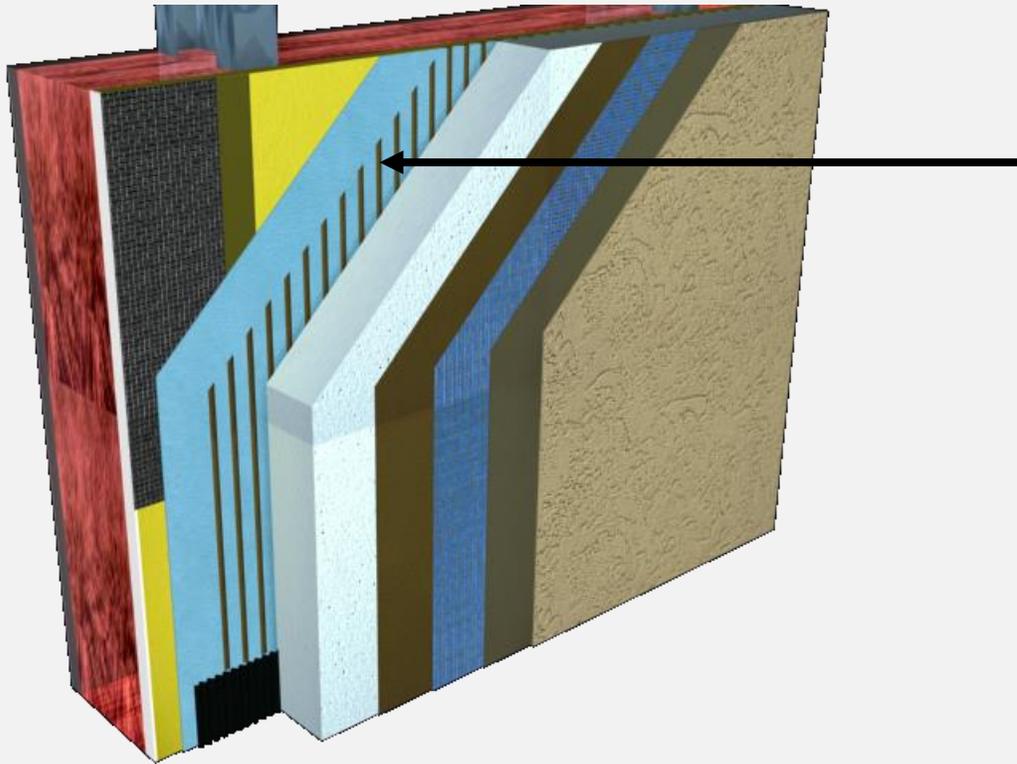


# AWRB – Bigger Picture

- EIFS with Drainage 'requires' the use of proprietary AWRB.
- Building envelope requires AB & WRB
- Building envelope design 'blends' various claddings
- EIFS A&WRB are code compliant behind 'other' claddings
  - Specified for the entire building



# EIFS with Drainage



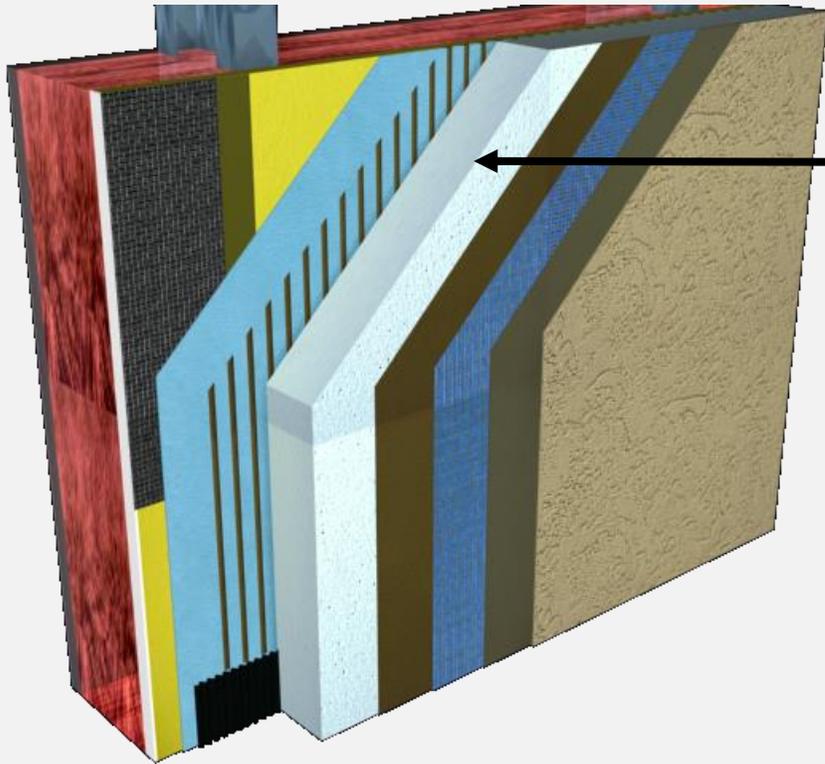
Meet the intent of the code

## Critical Components:

### Adhesive

- Adheres insulation to air / weather-resistive barrier
- Vertical notched pattern allows for incidental moisture drainage
- Vertical notch EPS can further enhance Drainage

# EIFS with Drainage



Meet the intent of the code

## Critical Components:

### EPS Insulation

- R-value (3.85 / inch)
- Eliminates thermal bridging
- Controls dew point / condensation
- Shaped to create any detail / style
- Fire tested up to 13"

Warm the Underlying Wall

# Insulation Options

## EPS



**Expanded Polystyrene (EPS) is molded into a block and cut into boards composed of closed cell beads with air spaces between**

## XPS



**Extruded Polystyrene (XPS) is a continuous board of closed cells with no spaces.**

# Insulation Options

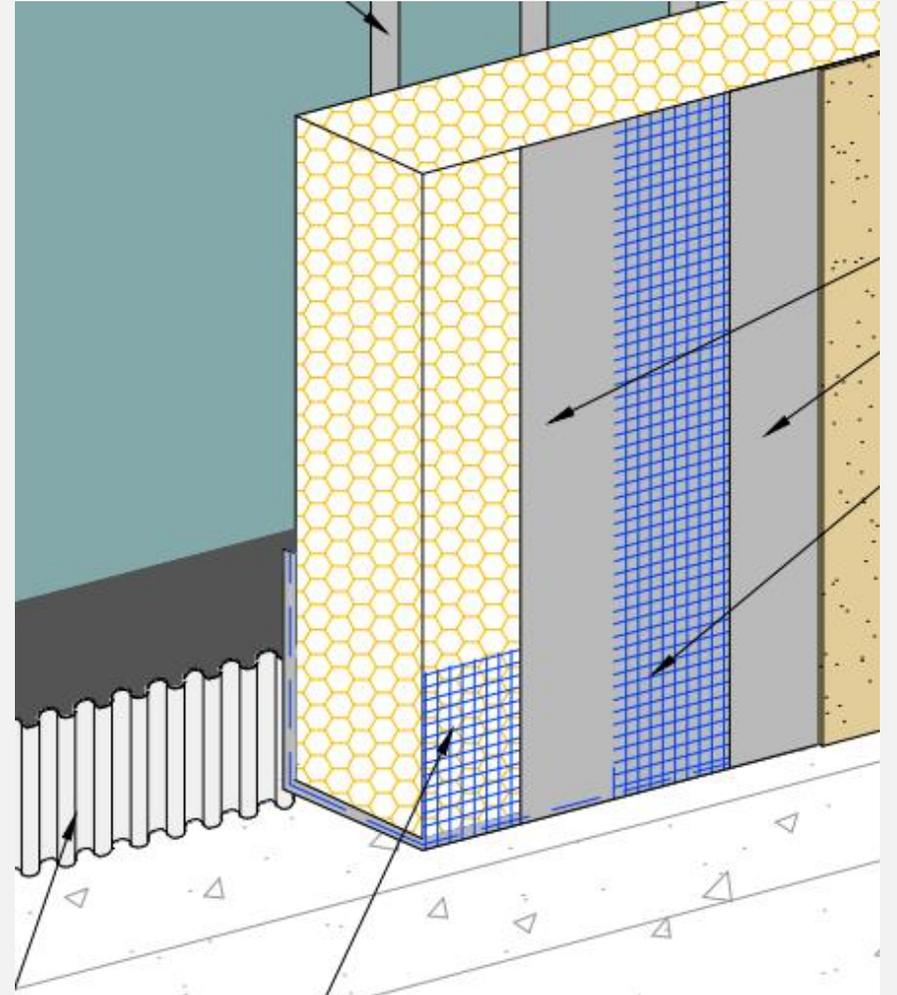
Performance Characteristics	EPS	XPS
<b>R-Value - Thermal Resistance, per inch,</b> ASTM C518 @ 75° F mean temp., ft <sup>2</sup> ·h·° F/Btu, R-value <sup>(1)</sup> , min.	<b>R = 3.85 / inch</b>	<b>R = 5.0 / inch</b>
<b>Impact Resistance</b> ASTM 2486, in-lbs, using 6.0 oz / sq yd mesh	<b>56 in-lbs</b>	<b>76 in-lbs.</b>
<b>Compressive Strength</b> ASTM D1621, psi, min.	<b>10 psi</b>	<b>20 psi</b>
<b>Water Absorption</b> ASTM C272, % by volume, max.	<b>4.0 %</b>	<b>0.3 %</b>
<b>Perm Rating</b> ASTM E-96, perm for 1" thickness	<b>5.0 perms</b>	<b>1.5 perms*</b>

\* Caution - Nearly a Vapor Barrier

# Pre-Based Starter Boards

**“Backwrapping”** is the most fundamental and critical installation aspect of an EIF system

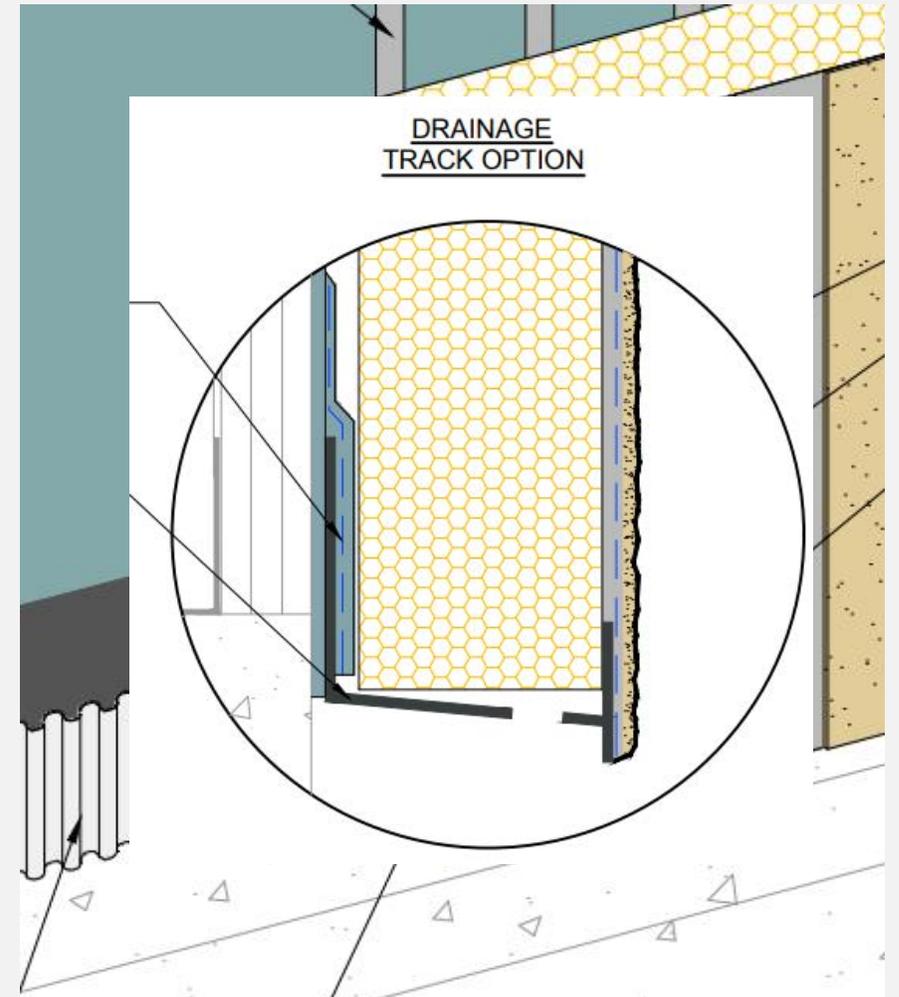
- Full encapsulation of return edge of EPS insulation
  - Detail mesh installed 2.5” behind / onto face of EPS insulation
  - Fully embedded in Base Coat depth of EPS (thickness)
  - Smooth return surface for primer and sealant application



# Pre-Based Starter Boards

## *“Backwrapping”*

- Provides for Fire Resistance rating / testing compliance
- Done by hand in what can be challenging access
- *PVC starter tracks can be substituted for horizontal termination edges*
  - ***BUT ONLY IN COMBUSTIBLE CONSTRUCTION***



# Pre-Based Starter Boards

## Specifying for Pre-Based Starter Boards

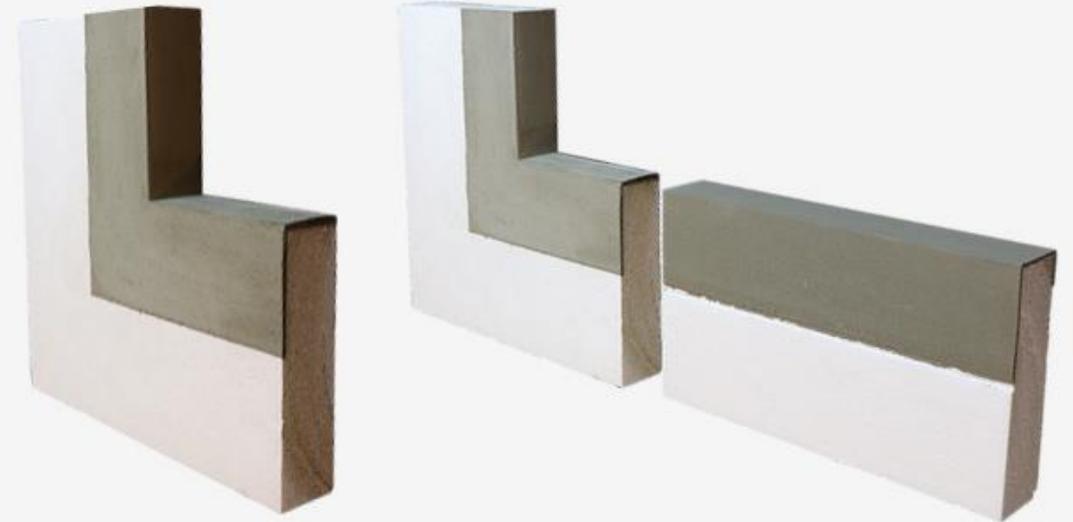
- Eliminates any question to this critical installation step
- Exceptional quality and precision
- **Skilled labor shortage**
- **Must be made with materials by selected EIFS Manufacturer for compatibility / warranty coverage**



# Pre-Based Trims and Corners

## Specifying for Pre-Based Trims and Corners

- Eliminates any question to this critical installation step
- Exceptional quality and precision
- **Must be made with materials by selected EIFS Manufacturer for compatibility / warranty coverage**

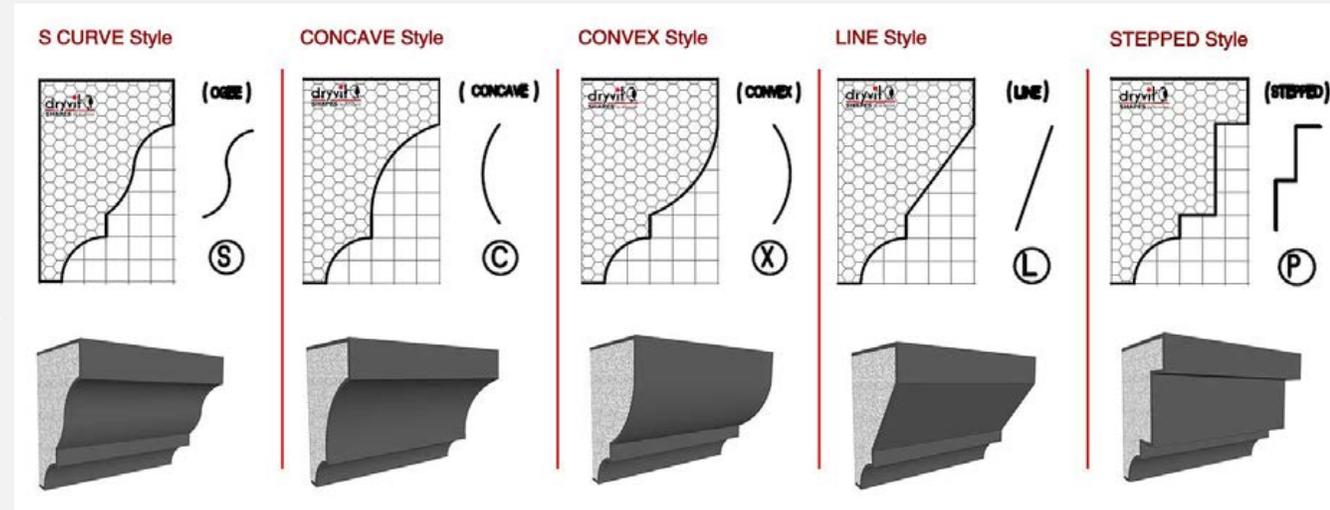


Various Thickness

# Pre-Based Shapes

## Specifying for Pre-Based EPS Shapes

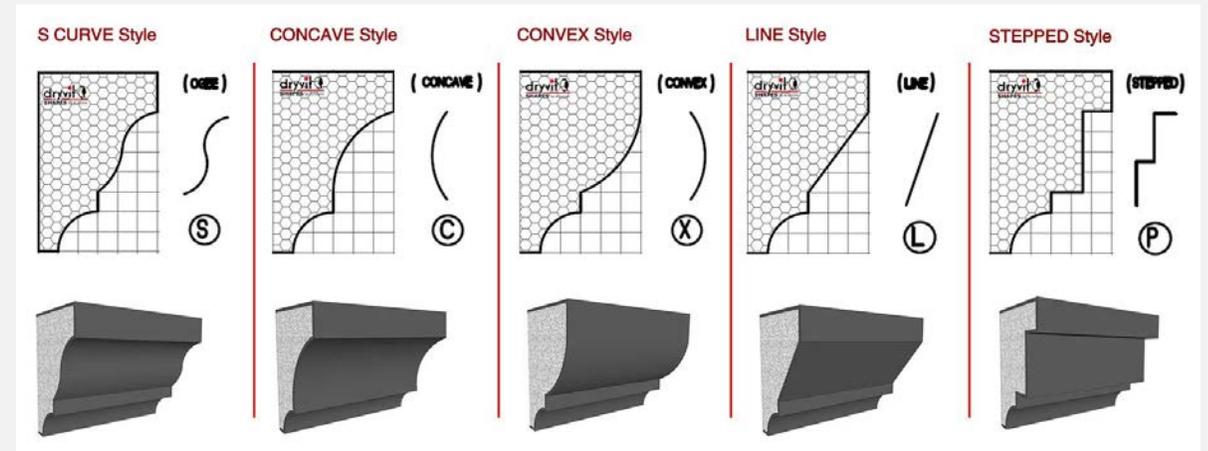
- Eliminates any question to this critical installation step
- Exceptional quality and precision
- **Must be made with materials by selected EIFS Manufacturer for compatibility / warranty coverage**



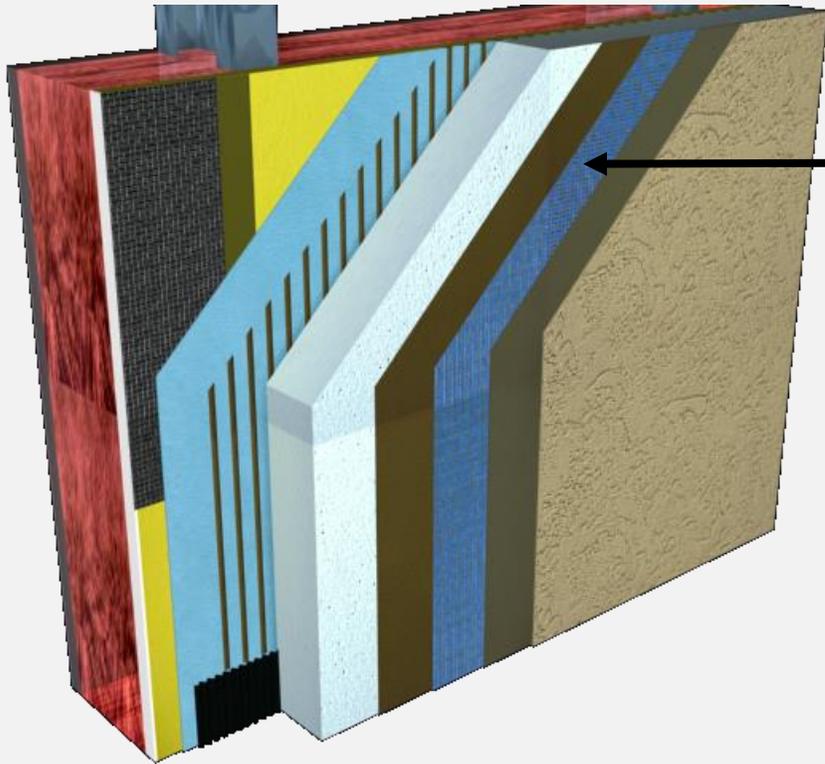
# Pre-Based Starter Boards, Trims, Corners & EPS Shapes

## Warranty

- Integration of Pre-Base Coated Starter Boards, Trims, Corners or Shapes **ADDS 2 additional years to the standard system warranty**
  - 10-year up to 12-year
- **3X Faster. 3X Thicker. 3X Better**



# EIFS with Drainage



## Critical Components:

### Base Coat / Reinforcing Mesh

- Primary weather barrier
- Provides for impact-resistance & tensile strength
- Panzer “High-Impact” mesh options

# Embed Mesh into “Wet” Base Coat





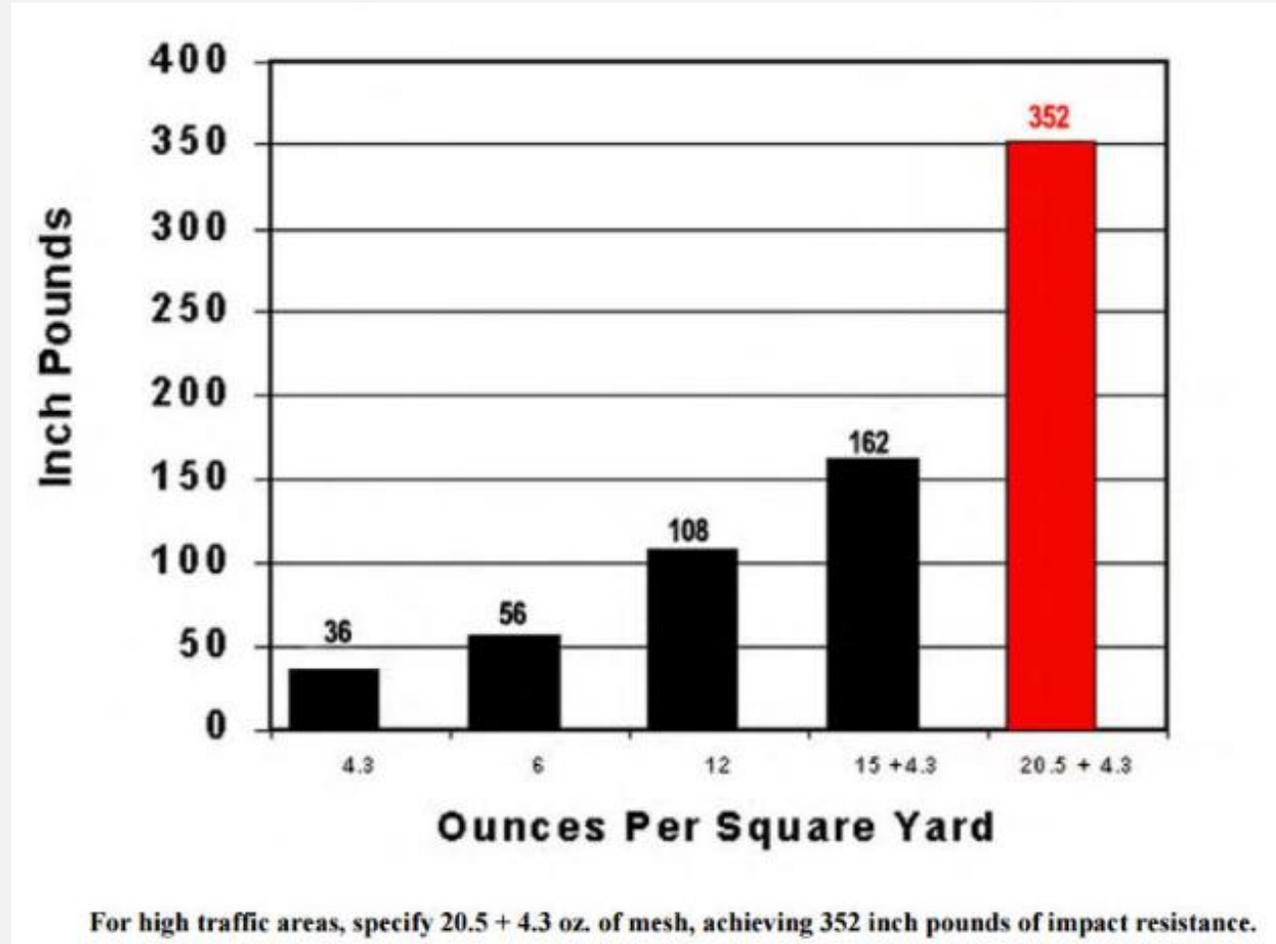
# High Durability CI EIFS

Common impact challenges:

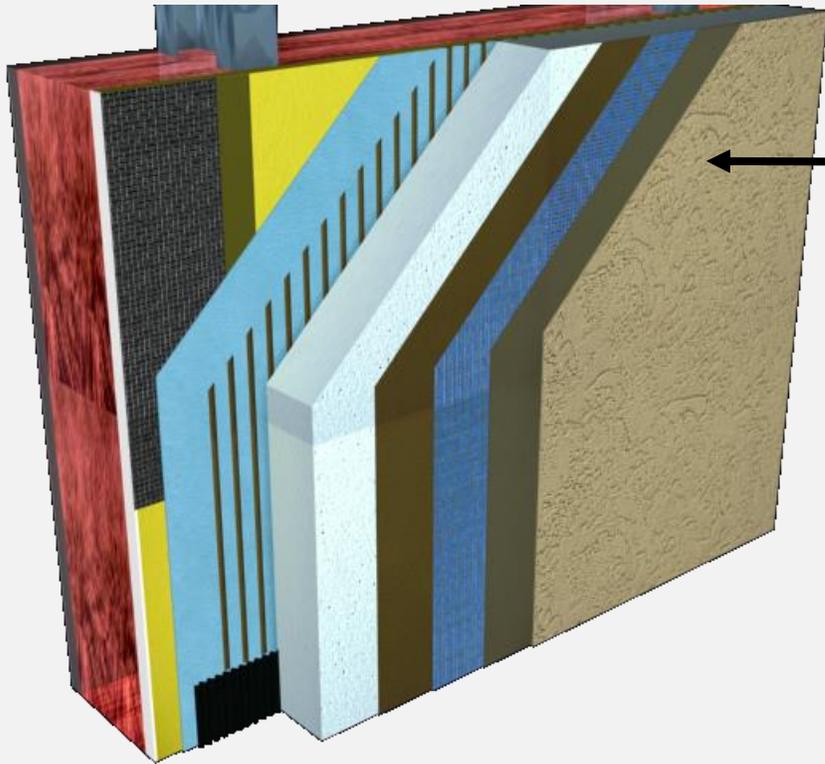


- New High Durability Continuous Insulation (HDCI) EIFS
  - **20 year impact warranty protection**
    - Normal wear-and-tear / unintentional surface impact damages
    - **Repaired at no cost to building owner**
  - Ultra-High Impact Resistance Mesh Assembly required throughout

# High Impact Mesh Assembly



# EIFS with Drainage



## Critical Components

### Textured Finish

- Decorative coating
- Unlimited color selection
- Wide range of textures & aesthetic appearance options

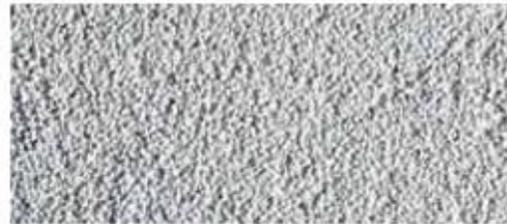
# Standard Textures / Colors



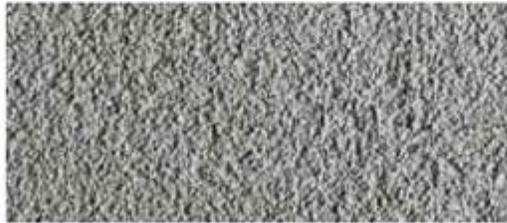
FREESTYLE®



QUARZPUTZ®



SANDBLAST®



Multiple Textures / 100's of colors

# Hydrophobic Chemistry Water Repelling Surface

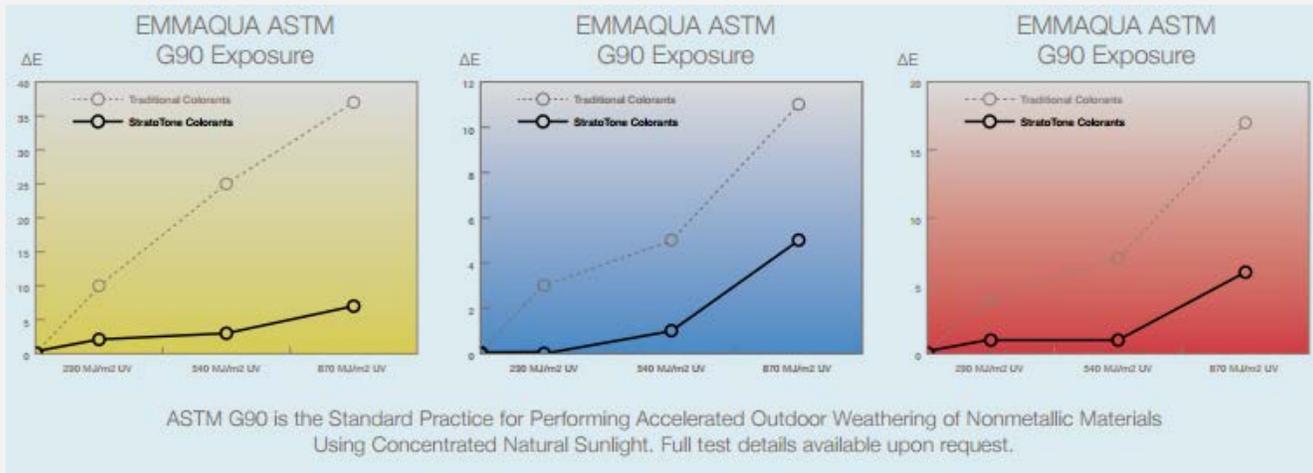
Available in both textured  
finish and paint coatings

- Beads and repels water
- Reduces dirt pick-up
- Lends to cleaner surface



# High Performance Colorant

- Enabling high profile, brand imaging colors
- Enhanced fade resistance / dramatically reduced maintenance cost



Whitener Law Offices | Albuquerque, New Mexico



Tanger Outlets | Phoenix, Arizona

# Aesthetic Options

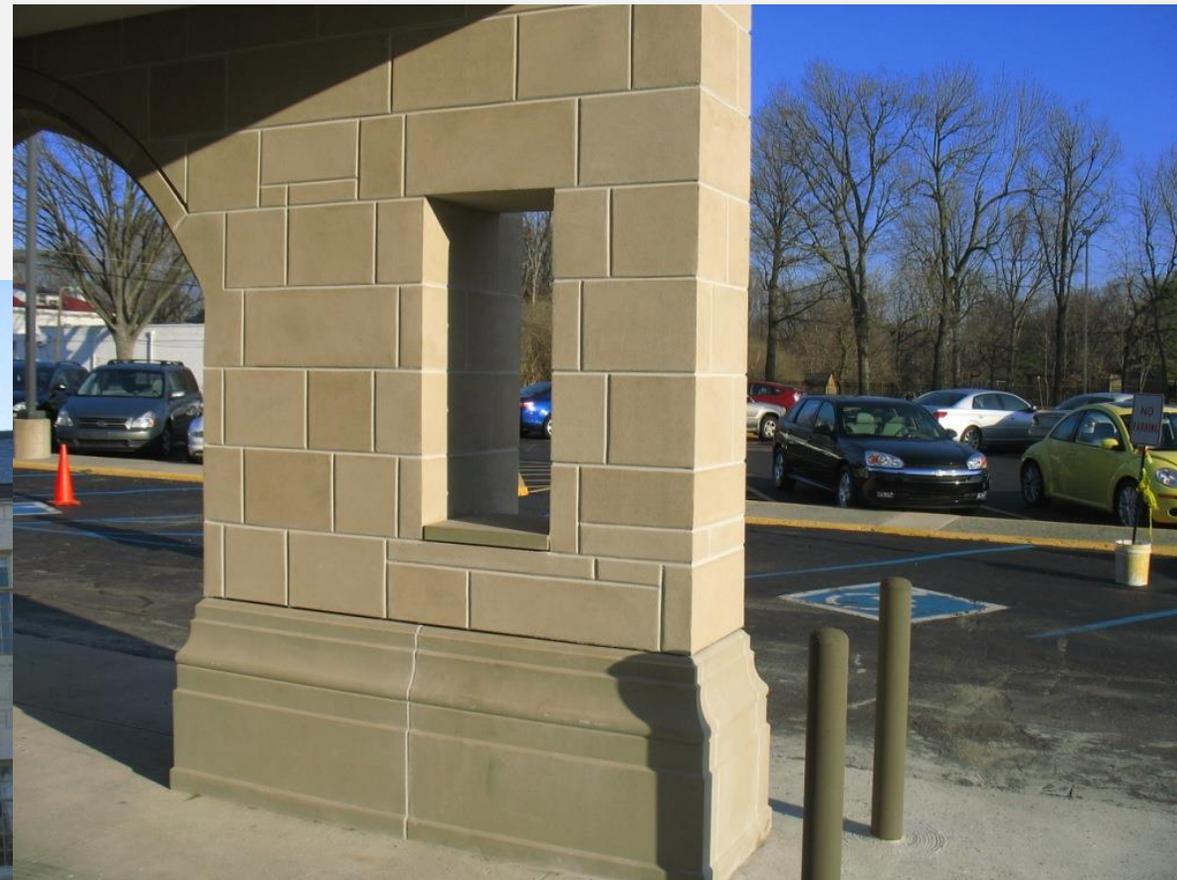


# Aesthetic Options



Brick / Masonry Aesthetic

# Aesthetic Options



Smooth Limestone Texture Aesthetic

# Aesthetic Options



Polished Granite Aesthetic

# Aesthetic Options



Metal Panel Aesthetic

# Aesthetic Options

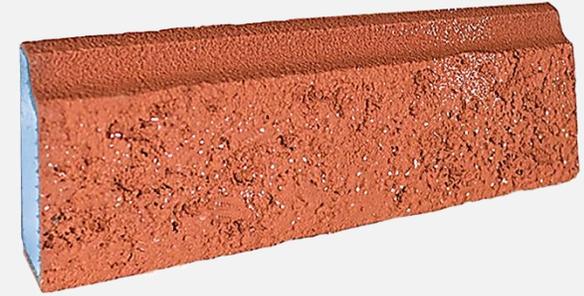


Weathered Steel

# A New Brick – A New Way Lightweight Insulated Brick Veneer



# Lightweight Insulated Brick Veneer



## A different way to design with brick

- Highly durable, lightweight, insulated Brick veneer
- Integrate with CI EIFS cladding or specify direct over solid commercial substrates
- 12-15 times lighter
- ‘Zero’ structure
- NFPA 285 compliant
- Design flexibility
  - Standard Colors & Blends
  - Textures
  - Shapes, Sizes & Effects



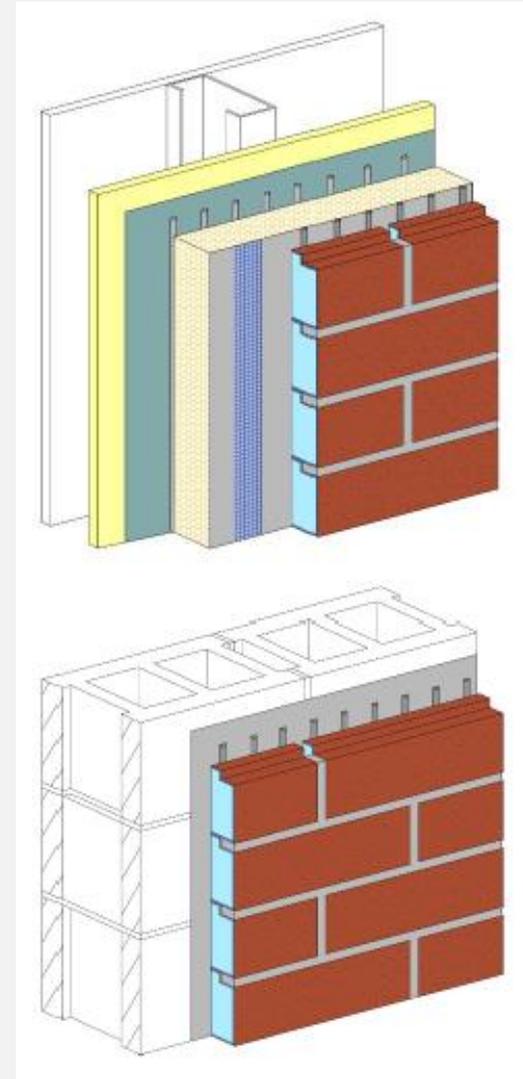
Office Building  
Schenectady, NY

# Lightweight Insulated Brick Veneer

## Numerous Wall Options

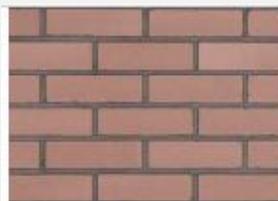
- Framed Construction
  - Over full EIFS CI system
- CMU / Mass Wall
  - Over full EIFS CI system or,
  - Direct applied
- Conventional Stucco
  - Direct applied
- Insulated Concrete Forms (ICF)
  - Direct applied

New and existing Constructions



# Lightweight Insulated Brick Veneer

16 Standard / Solid Colors



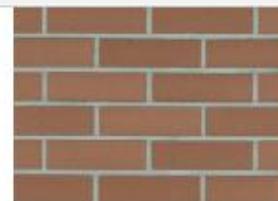
Cannon Dawn



Castle Wall



Citadel



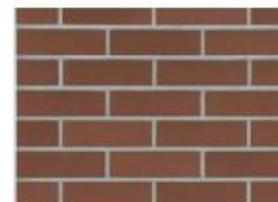
Country Cottage



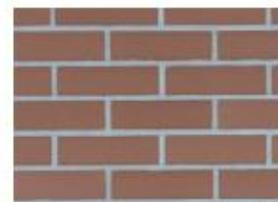
Earthen Vessel



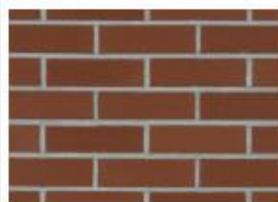
Gatehouse



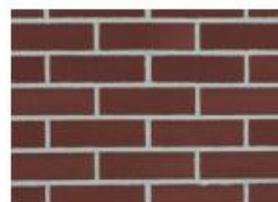
Harbor Side



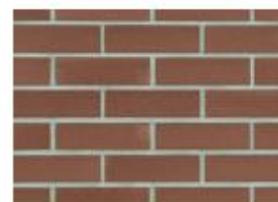
Heritage House



Homeland



Patriot Red



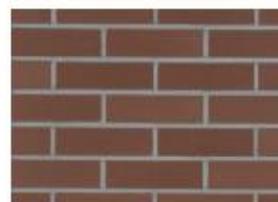
Provincial Park



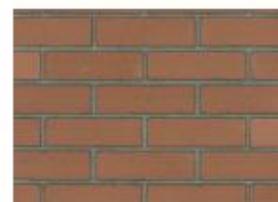
Riverbank



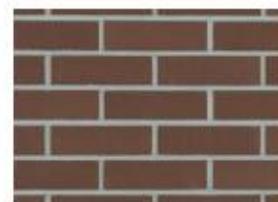
Rustic Villa



School Yard



Town Square

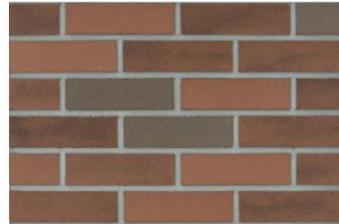


Valley Field

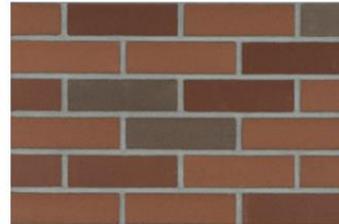
# Lightweight Insulated Brick Veneer

## Blends, Textures & Effects

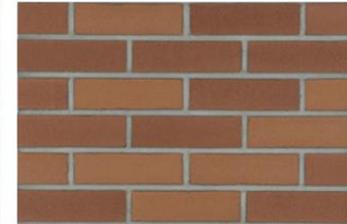
### BLEND



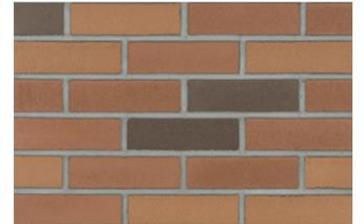
**Corinth** (60% Heritage House Flashed, 30% Heritage House, 10% Riverbank)



**Georgetown** (60% Heritage House, 30% Valley Field, 10% Riverbank)



**Littleton** (50% Provincial Park, 50% Country Cottage)



**Rockland** (60% Provincial Park, 30% Country Cottage, 10% Riverbank)

### TEXTURES



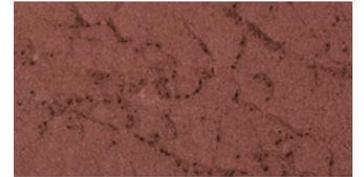
**Smooth**



**Velour**

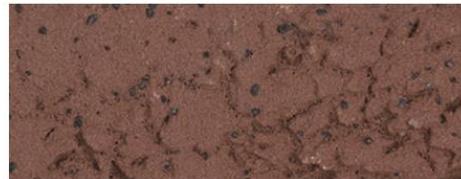


**Wire Cut**

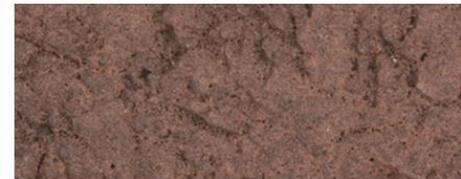


**Coarse Cut**

### EFFECTS



**Iron Spot**



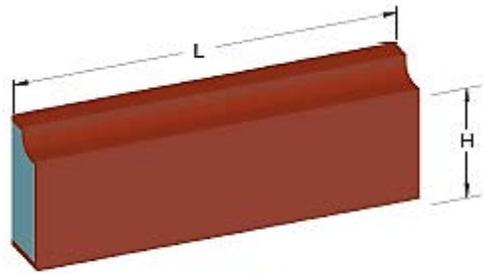
**Flashed**



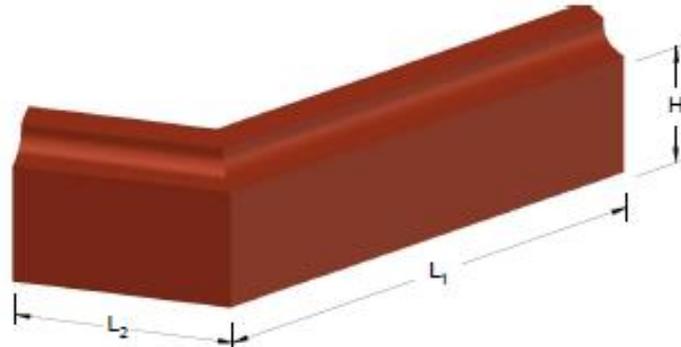
**Flashed with Iron Spot**

# Lightweight Insulated Brick Veneer

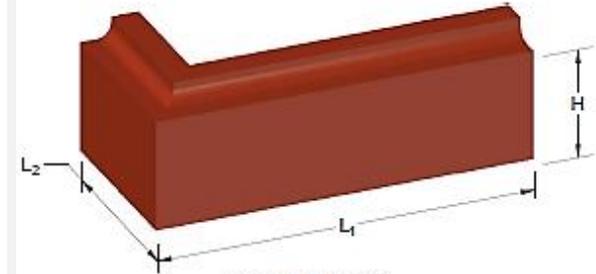
Shapes and Sizes - Modular, Utility, Economy, Norman



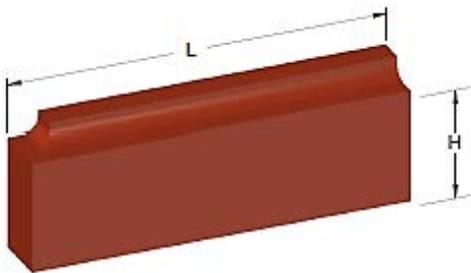
FLAT BRICK



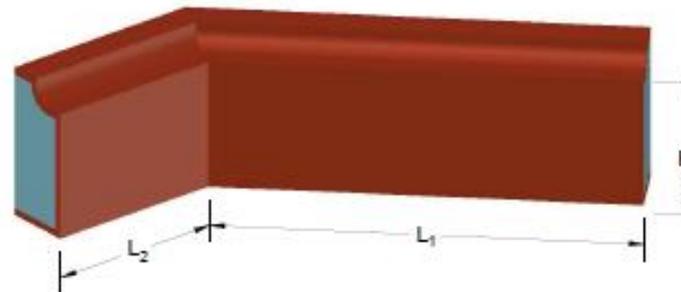
135° OUTSIDE CORNER BRICK



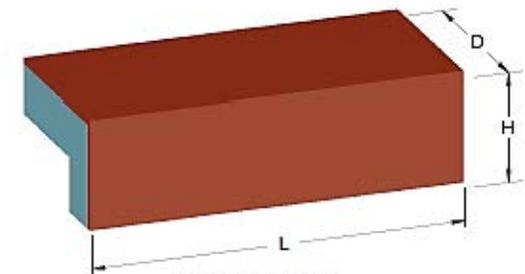
CORNER BRICK  
(LEFT SHOWN)



END BRICK



135° INSIDE CORNER BRICK



EDGE CAP BRICK

# Lightweight Insulated Brick Veneer

- Installation



Adhere New Brick



Install Mortar



Tool Joints

# Lightweight Insulated Brick Veneer



# Lightweight Insulated Brick Veneer



# EIFS Panelization

## Panelization – Why?

- Limited access or space on site
- Fast track project schedules
- **Skilled labor shortage**
- Address weather challenges
- Quality control through warehouse production
- Ready, Transport, Lift, Install

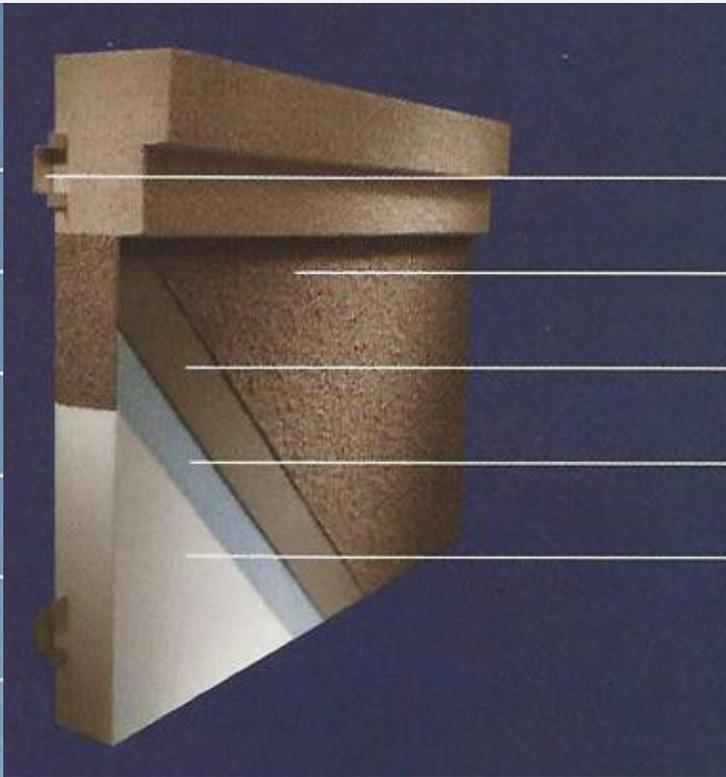


# EIFS Panelization

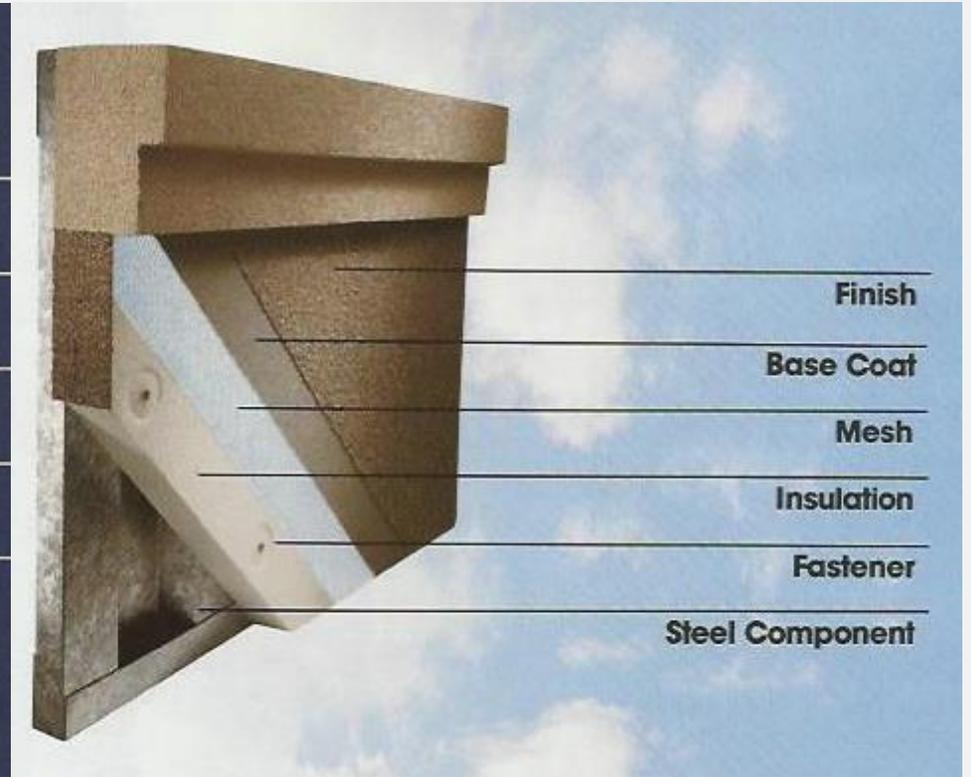
## Full Composite



## Lightweight

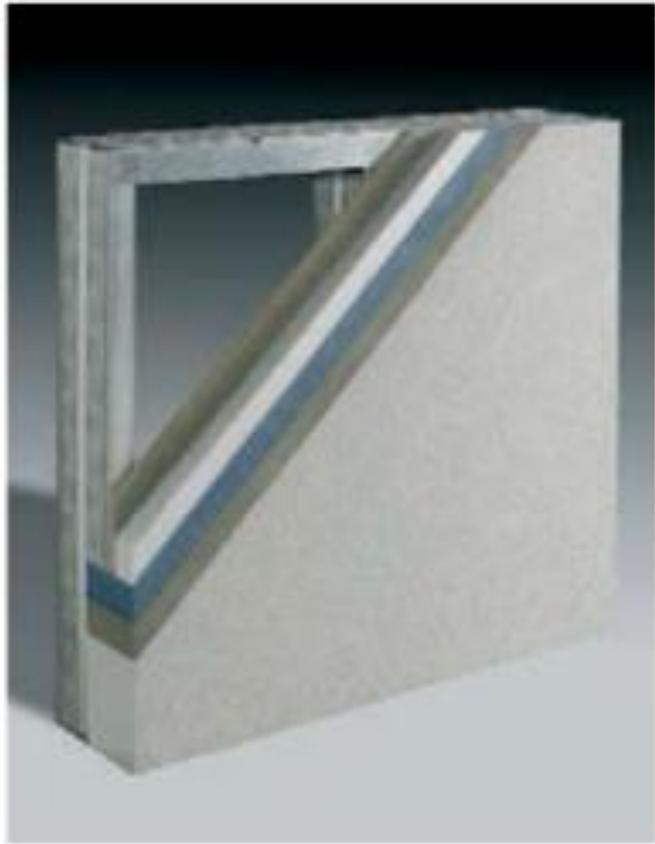


## Metal Deck Backed



# Composite Panels

- Full wall assembly



# Lightweight

- New and Renovation



# Steel Deck Backed

- New and Renovation



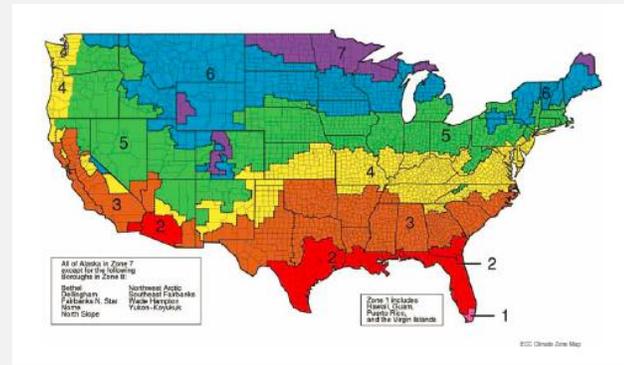
# Code Compliance

## Specific to the Building Envelope Walls

- IBC Chapter 14
  - Weather Resistive Barrier (WRB)
- IECC / ASHRAE Standard 90.1
  - Continuous Air Barrier
  - Continuous Insulation
- IBC Chapter 26
  - NFPA 285 “Assembly” Fire Testing
    - Type I-IV Commercial Construction
  - Mixed Use Podium Design
    - Type 3-B wood framed
    - 2-Hour Load Bearing Wall required
      - ASTM E-19

# Code Compliance

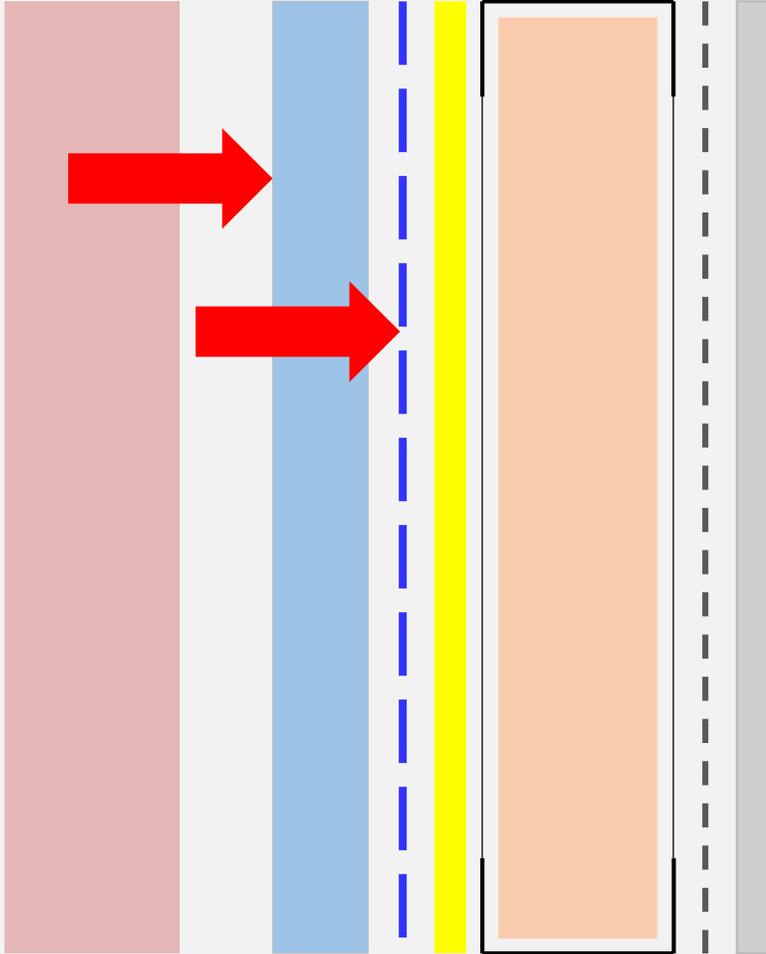
## IECC 2012 / 2015 Insulation Requirements



- **Prescriptive R-value - Cavity + Exterior Continuous Insulation (CI)**

CLIMATE ZONE	1	2	3	4 except Marine	5 and Marine 4	6	7	8
<b>Commercial</b>								
Metal framed	R-13 + R-5.0 CI	R-13 + R-5.0 CI	R-13 + R-7.5 CI	R-13 + R-7.5 CI	R-13 + R-7.5 CI	R-13 + R-7.5 CI	R-13 + R-7.5 CI	R-13 + R-7.5 CI
Wood framed and other	R-13 + R-3.8 CI or R-20	R-13 + R-7.5 CI or R-20 + R-3.8 CI	R-13 + R-7.5 CI or R-20 + R-3.8 CI	R-13 + R-15.6 CI or R-20 + R-10.0 CI				
<b>Commercial - Use Group R Overnight Occupancies</b>								
Metal framed	R-13 + R-5.0 CI	R-13 + R-7.5 CI	R-13 + R-7.5 CI	R-13 + R-15.6 CI	R-13 + R-17.5 CI			
Wood framed and other	R-13 + R-3.8 CI or R-20	R-13 + R-7.5 CI or R-20 + R-3.8 CI	R-13 + R-7.5 CI or R-20 + R-3.8 CI	R-13 + R-7.5 CI or R-20 + R-3.8 CI	R-13 + R-15.6 CI or R-20 + R-10.0 CI			

# Code Compliance



## NFPA 285 Fire Testing Compliance

### Exterior walls in Type I - IV constructions

- Combustible Cladding
- **Continuous Insulation (CI)**
  - Walls of any height
- **Air/Water-Resistive Barrier (AWRB)**
  - Walls greater than 40'-0"
- ***Specific Assembly Test***
  - Exact materials that will be installed in the wall assembly
  - Very few tested assemblies

# Fire Testing Compliance



## Podium Design

- Load bearing wood framed wall assembly
- 2-hour requirement
  - ASTM – E119
- NFPA 285
  - Continuous Insulation (CI)
  - Weather-Resistive Barrier (WRB)

### ASTM E 119 LOAD-BEARING TEST WALL ASSEMBLY

#### Base Wall construction

- 2x4 wood studs spaced 16 inches on center
- 2 layers of 5/8" thick Type X gypsum wall board (ASTM C 1396) installed on interior side
- R-13 Kraft Paper faced fiberglass insulation installed in stud cavities
- 2 layers 5/8" thick Type X exterior gypsum sheathing (ASTM C 1177) installed on exterior side

Outsulation Plus MD system with Backstop® NT and AquaFlash® (air/water-resistive barrier) and 4" EPS

### NFPA 285 TEST WALL ASSEMBLY

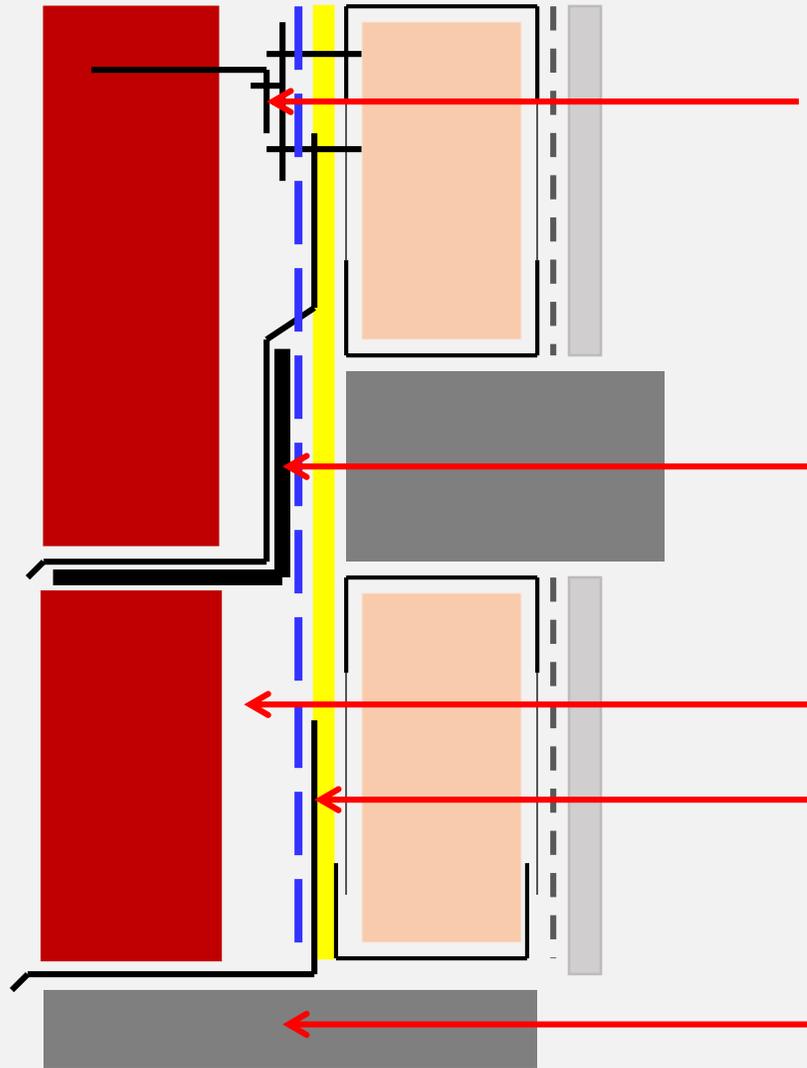
#### Base Wall construction

- 2x4 wood studs spaced 24 inches on center
- Single layer of 5/8" thick Type X gypsum wall board (ASTM C 1396) installed on interior side
- Single layer 1/2" thick Type X exterior gypsum sheathing (ASTM C 1177) installed on exterior side

Outsulation Plus MD system with Backstop® NT and AquaFlash® (air/water-resistive barrier) and 4" EPS

**Note: Not all EIFS Manufacturers have passed these test**

# Traditional Wall Assembly



## Attachment and Support

Anchors & Ties

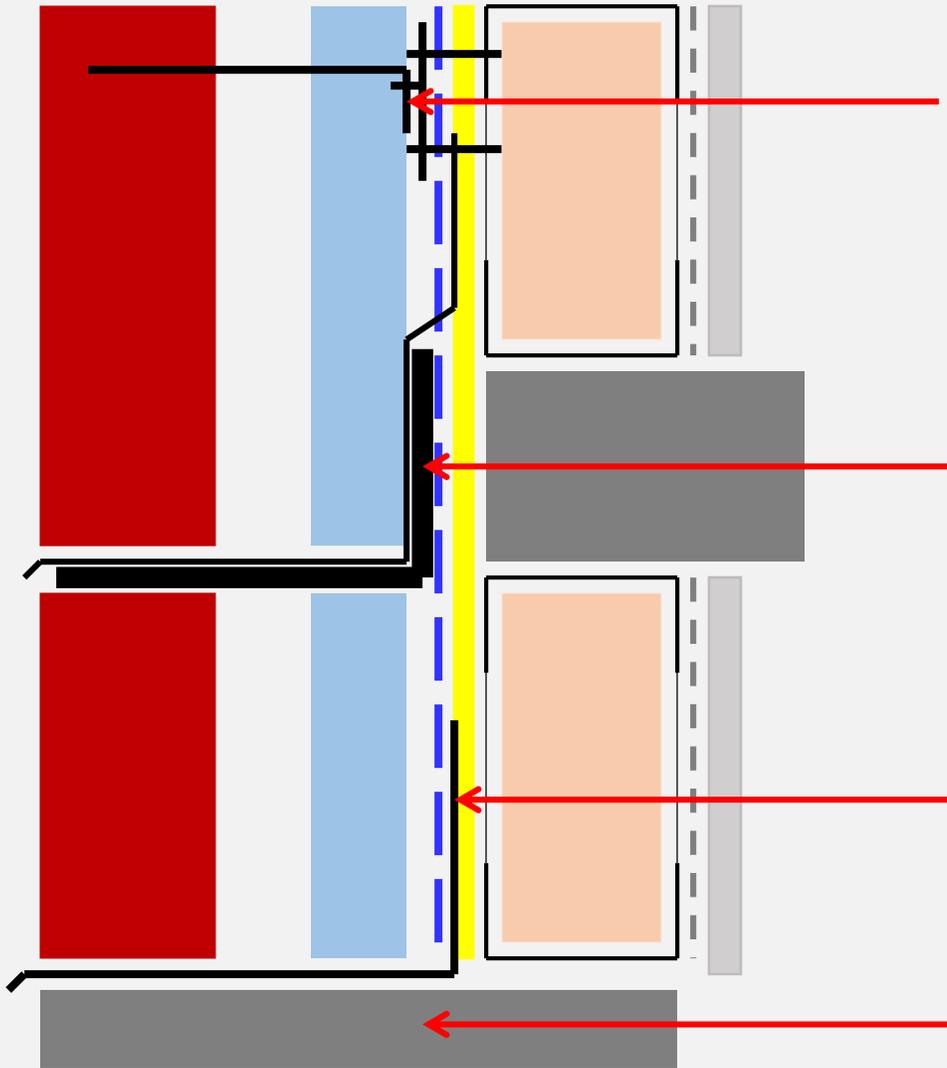
Bearing Angles, Lintels and Flashing

Min. 1" air space

Base Wall Flashing

Concrete foundation

# Integration of CI



## Attachment and Support

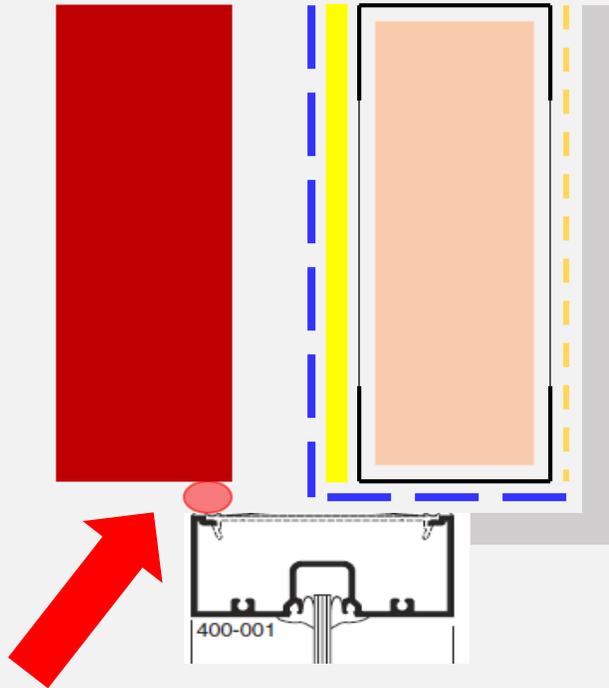
Everything must get bigger,  
longer, stronger

- Increasing engineering /  
structural requirements and cost

- Anchors & Ties
- Bearing Angles, Lintels and Flashing
- Base Wall Flashing
- Concrete Foundation

**Cost is substantially increased**

# Traditional Detailing

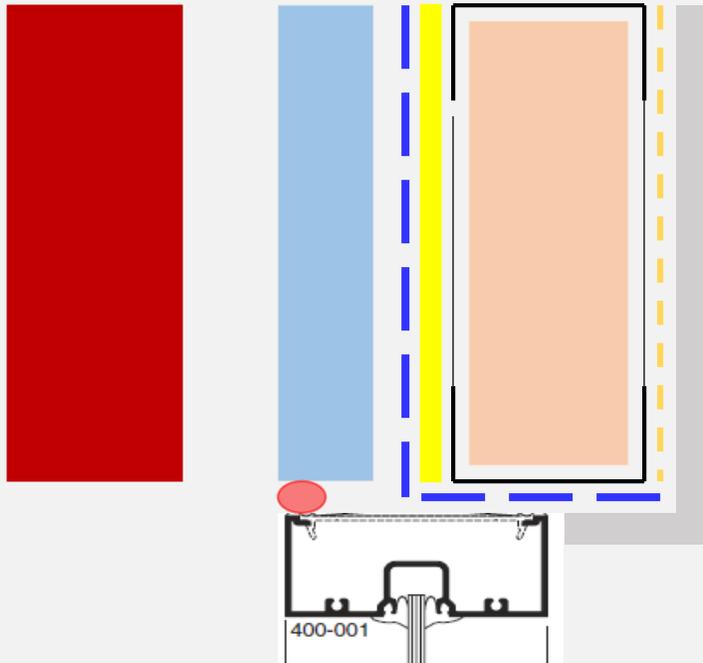


## Typical Detailing – Jamb

**Wall components are sized, designed and detailed to fit traditional wall conditions**

- Windows, doors, louver frames, electrical boxes, etc.
- Solid structural attachments can be made
- Proper “seal” can be accommodated between cladding and wall component
  - Sealant and baker rod

# Integration of CI

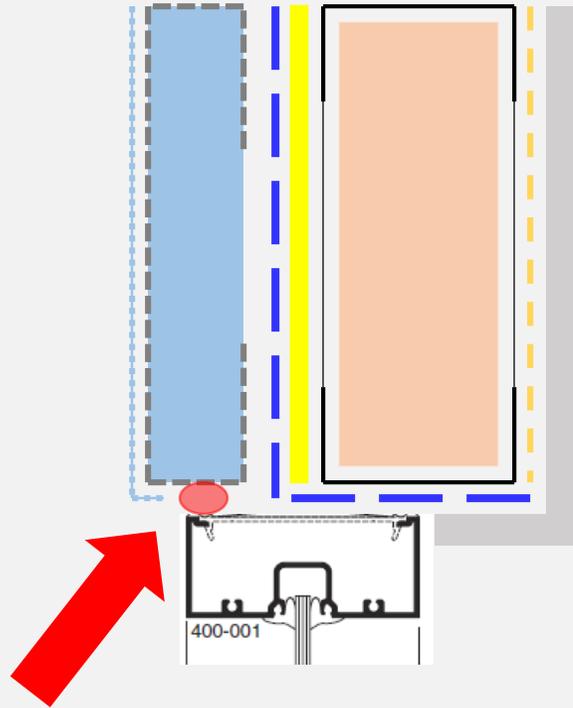


## Typical Detailing – Jamb

### Conditions Change Drastically

- Traditional wall components no longer “fit” the conditions
- Proper “seal” cannot be accommodated
  - Veneer cavity is left open
  - Sealant cannot bond to CI

# Traditional Detailing

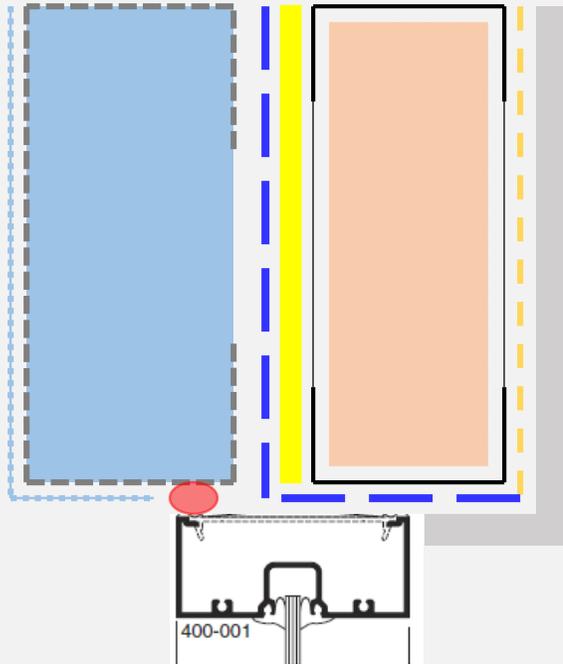


## Typical Detailing – Jamb

### No need for “Enhanced Detailing”

- Accommodates standardized wall components
- Provides for proper seal
- Accommodates requirements for CI at ‘all’ penetrations

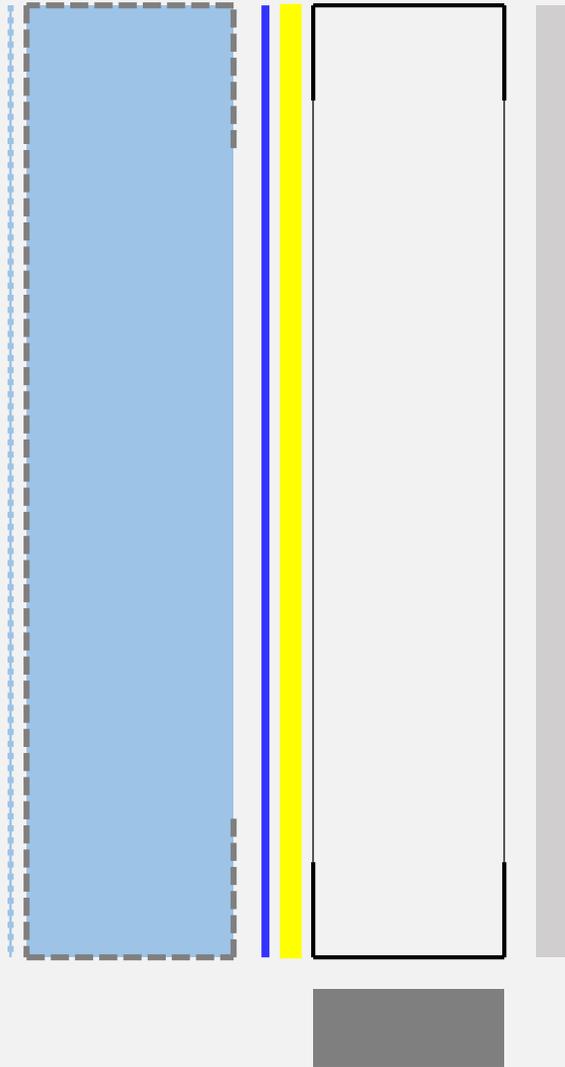
# Traditional Detailing



## Typical Detailing – Jamb

**And it all works regardless of how much insulation is specified**

# High Performance Wall Assembly



## All Continuous Insulation

### Can easily accommodate “NO CAVITY INSULATION” design options

- Delete interior vapor retarder
- Delete cavity insulation
- Change exterior AWRB to ‘non-permeable’
  - Rule of Thumb
  - Run Water Vapor Transmission Analysis

**Huge Additional COST SAVINGS opportunities**

# Warranty

***“Provide manufacturers standard”*** . . . does not cut it any longer

- Provide your client with the best warranty available
  - Material and labor for defective material
  - Fade resistance
  - NO depreciation
  - Renewable system warranty through mfgr. maintenance program
- Min. 3-years on Installer Workmanship
- *If these are the warranty parameters you specify, You MUST require a sample copy of the warranty in the submittal package and You MUST review it.*

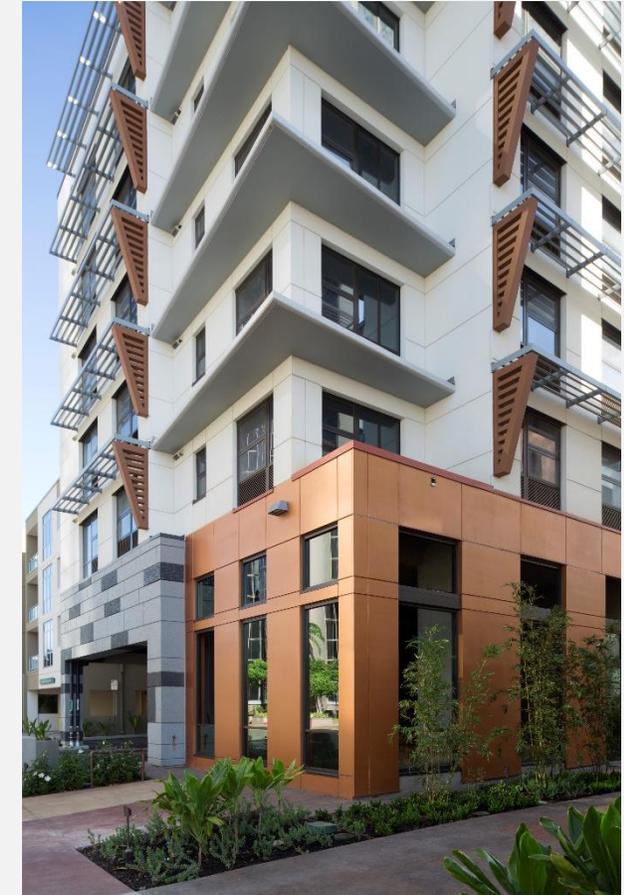
# Specification Update

Is your EIFS specification up to date?

- ***Probably Not***
- Your Master Spec is a starting point
  - Warranty, Basis of Design, Acceptable Alternates, EIFS AWRB on entire building, Pre-Based Components
- Specific Finish, Texture Selections
  - Coordinated to Exterior Finish Schedule
- Selected Performance Options

***We would be happy to review your specification and offer suggested updates***

# Single Source Solution



Keahou Lane - Hawaii

Specification, Manufacturer, Installer, Warranty, Performance

# Review - Advancements

- Fluid Applied Air/Water-Resistive Barrier Coatings & Flashings
- Insulation Options
- Pre-Coated Starter Boards, Trims, Corners and Shapes
- High-Impact Assemblies
- New Textured Finish Options
- Water-Repellant Hydrophobic Chemistry
- High Performance UV Resistant Colorants
- Lightweight Insulated Brick Veneer
- Pre-Fabricated EIFS Panels
- Code Compliance
- Detailing Changes

# Closing

## **EIFS with Drainage Cladding Solutions Today;**

- Meets all current and future energy code requirements
- Eliminates thermal bridging
- Enhanced energy efficiency / Reduced energy consumption
- Controls air / moisture infiltration - dew point / condensation
- Supports sustainable design and achieving LEED Points
- Lightweight - Reduces construction cost
- Freedom for architectural style and aesthetic appearance
- Offers a single sourced solution
- Provides for a comprehensive whole wall warranty

# This concludes the AIA Continuing Education System Program

*Thank you for your time!*

*Questions?*

**Robert W. Dazel, AIA, CSI, LEED GA**

Strategic Accounts Manager

Dryvit Systems, Inc.

[Bob.dazel@dryvit.com](mailto:Bob.dazel@dryvit.com)

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