TRANSFORMING SPACES THROUGH COLOR + TEXTURE

WITH ARCHITECTURAL STONE VENEER

Westlake Royal Stone Solutions™

CULTURED STONE® ELDORADO STONE® DUTCH QUALITY STONE® CRAFTSMANSHIP BORN OF TRADITION VERSETTA STONE® STONECRAFT® INDUSTRIES KINDRED® OUTDOORS + SURROUNDS

AIA BEST PRACTICES

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COURSE DESCRIPTION

This learning unit will address the benefits of specifying architectural stone veneer in your design projects, and also provide information on proper installation techniques.

Topics include a breakdown of the innovative mold technology used by the industry's leading manufacturers of architectural stone veneer and what to look for in a high quality product.

The presentation will also include an in-depth overview of installation techniques and evaluate alternative wall systems and regulations.

LEARNING OBJECTIVES

Quality Characteristics & Versatility of Stone Veneer

Wall Systems & Installation Guidelines

Unique Installation Methods, Codes & Resources

Transitional Details & Moisture Prevention

LEARNING OBJECTIVE 1

QUALITY & CHARACTERISTICS OF ARCHITECTURAL STONE VENEER

AUTHENTIC TEXTURES & SHAPES

- Natural stones are selected for their unique shape, texture and size.
- Each profile utilizes an extensive range of unique stones; guarantee less repetitive patterns and characteristics.
- Stones are replicated through proprietary molding technology.
- State of the art mold manufacturing captures every textural nuance.
- Molds are replaced often guaranteeing textural details remain authentic.

STYLE & VERSATILITY

- Architectural stone veneer provides limitless design opportunities from traditional to contemporary designs.
- Juxtaposition of Materials; stone is a leading medium for visually exciting connections between raw materials such as wood, glass and steel.
- Expose unique textures and colors with the combination of stone profiles creating custom architectural statements.


WILLIAM
HERITAGE


1873
TOYOTA
COLLISION CENTER


KIDS
ONLY
DISCOVER

RICH INFUSED COLORS

Natural mineral oxides infuse the surface with rich color tones

Hand applied process guarantees more authentic appearance

Layers of oxides applied to stones create natural depth and visual interest

HIGH QUALITY MATTERS

- High quality aggregates provide durability and strength.
- Authentic color created from mineral oxide pigments.
- Lightweight concrete provides efficient install qualities.

SUSTAINABLE BENEFITS

DURABLITY

- Produced from light weight concrete which will not rot, rust, or burn; making it one of the most durable siding options available.

RECYCLED CONTENT

- Concrete is recyclable. Construction and demolition concrete waste can be ground up and reused in new projects.

REGIONAL MATERIALS

- Locally sourced raw materials.
- Light weight attributes of the product reduce shipping weight and number of trucks needed.

HIGH PERFORMANCE PRODUCT

Verify the appropriate testing has been conducted and evaluation reports have been obtained when specifying Architectural Stone Veneer.

ICC-ES EVALUATION

- ICC-ES is an independent Evaluation Service that confirms products conform to the Building Codes
- ICC-ES conducts annual audits to ensure the quality system is healthy and functional

ASTM TESTING

- Density Measurement
- Compressive Strength
- Tensile Measurement
- Flexural Measurement
- Shear Bond
- Moisture Absorption
- Freeze Thaw Resistance
- Wind-Load Resistance
- Tested/Listed with UL

PRODUCT STANDARD

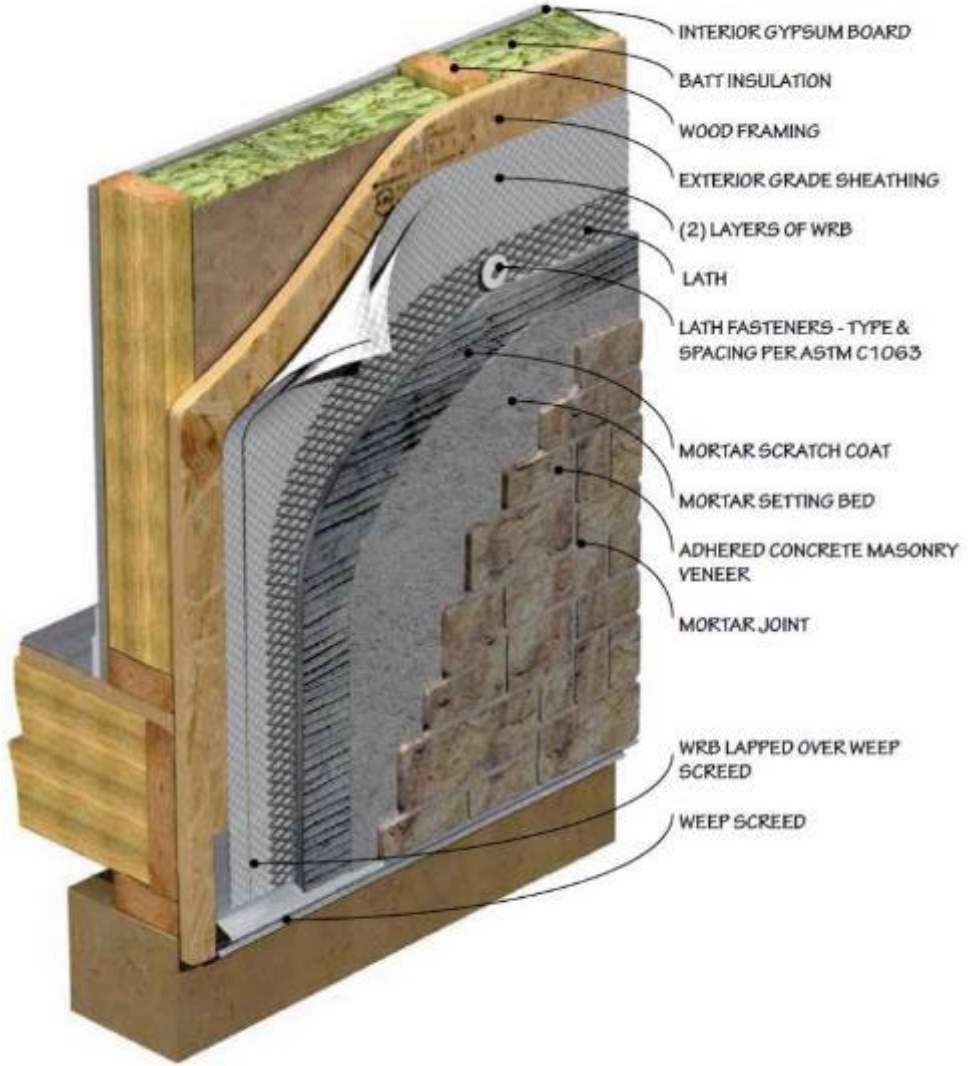
- ASTM C1670 is the new standard describing the physical, chemical and performance characteristics of masonry stone veneer units.
- Look for manufacturers with a 50 year warranty

LEARNING OBJECTIVE 2

WALL SYSTEMS & INSTALLATION GUIDELINES

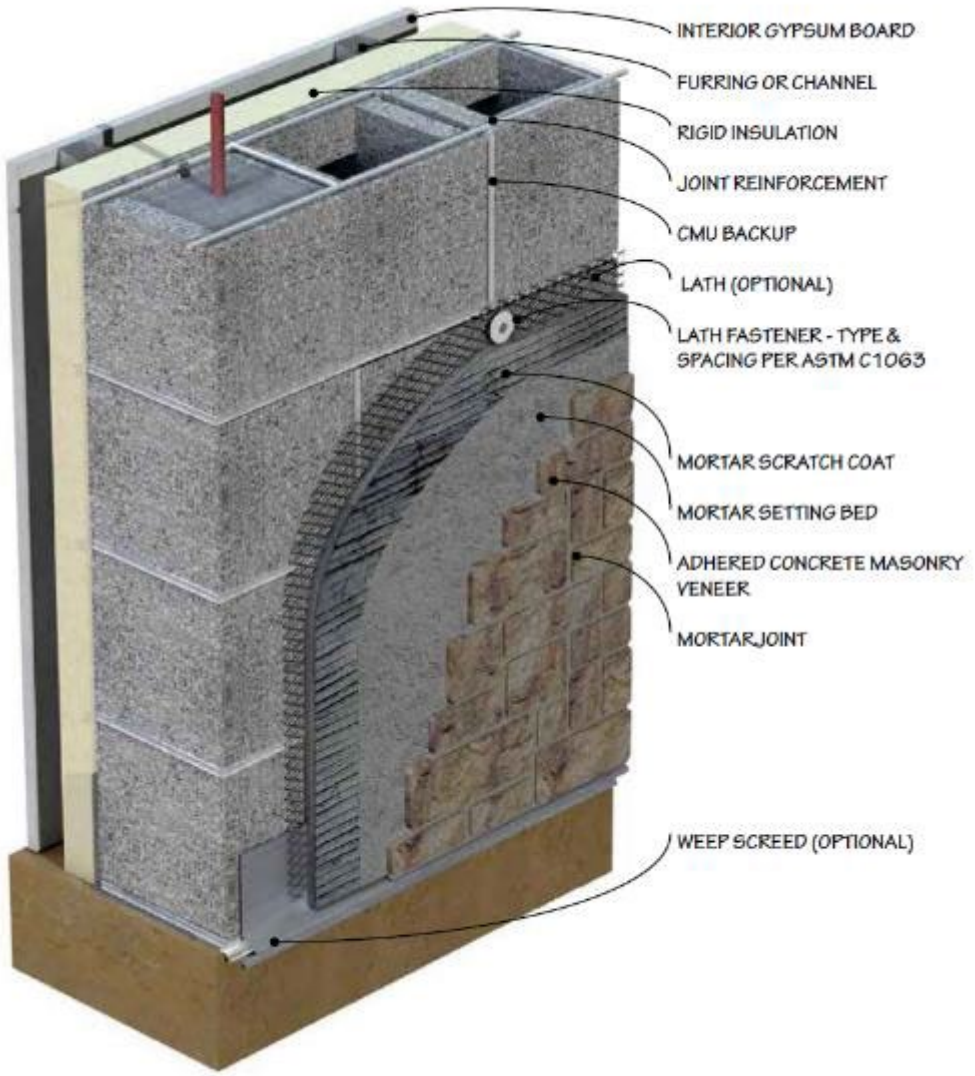
WALL SYSTEMS

- Standard Wood Substrate
- CMU Substrate
- Cement Board Substrate



STANDARD WOOD SUBSTRATE

- Standard stud spacing 2 layers WRB required.
- Wire lath & scratch coat.
- Type S mortar recommended for application.



CMU SUBSTRATE

- WRB may be needed to prevent moisture penetration.
- Can install directly to clean and untreated masonry surfaces.
- Wire lath & scratch coat may be required if clean surface cannot be obtained.
- Lath can help prevent possible cracking due to differential movement in CMU.

CEMENT BOARD SUBSTRATE

- Preferred method for interior applications.
- Cement board must comply with ASTM C1325.
- Acceptable for exterior applications when incorporating water-proofing barriers.
- Install with Modified mortars.
- Faster, cleaner more labor efficient installation.

INSTALLATION GUIDELINES

- Installation & Resources
- Water Resistive Barriers
- Lath & Fasteners
- Mortar

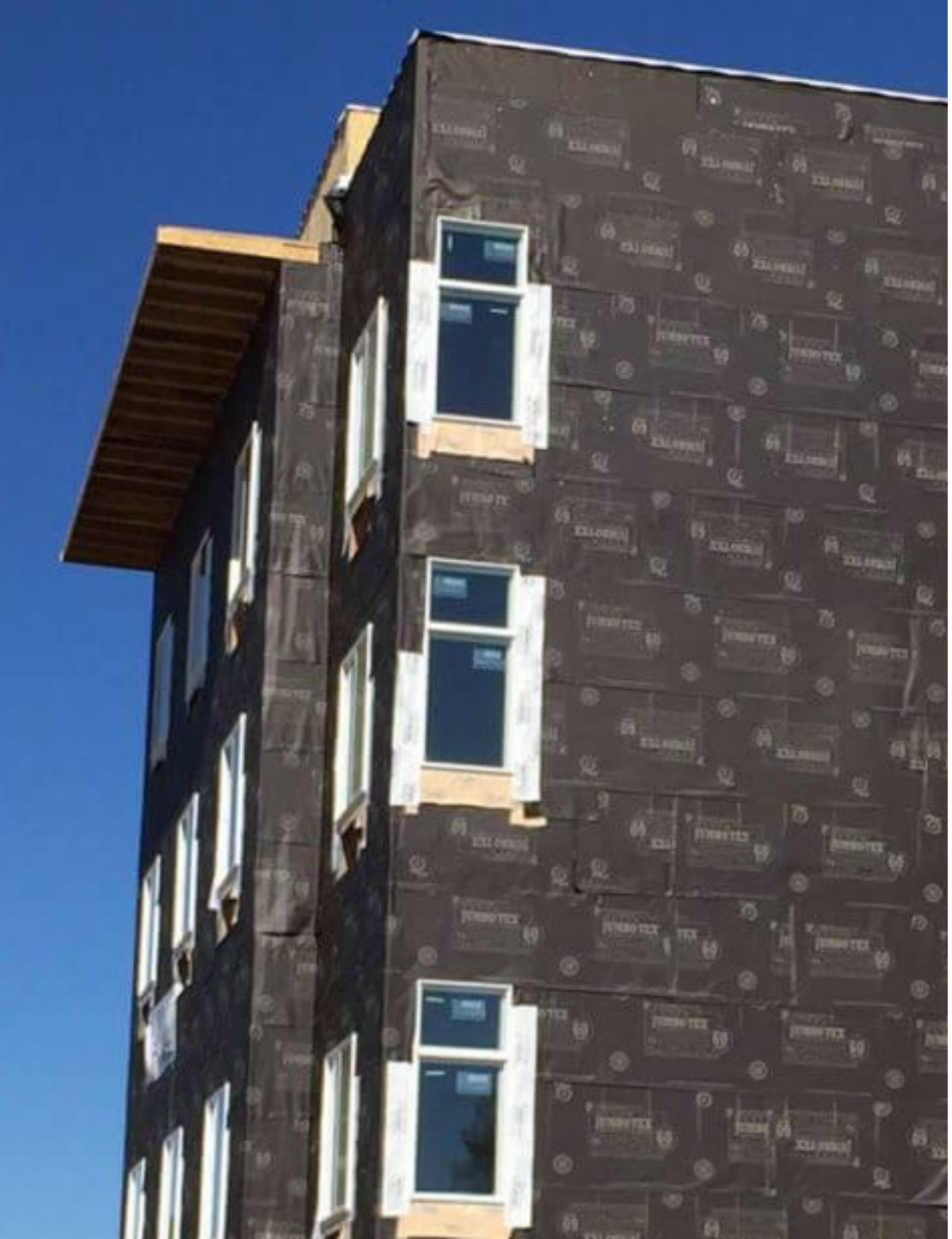
NCMA GUIDELINES

National Concrete Masonry Association (NCMA) Installation Guidelines. A highly detailed and carefully researched installation guide.

AN AVAILABLE RESOURCE PROVIDING:

- Proactive technical details
- Reference to applicable standards and specifications
- Guidance to Building Code Compliance

Intended to share over 45 years of knowledge, experience and understanding regarding proper installation of architectural stone veneer products.



WATER RESISTIVE BARRIERS

Where a (WRB) is required, it should be installed in two separate layers in shingle fashion, starting from the bottom of the wall.

ACCEPTABLE WRBs

Minimum two separate layers of any of the following:

- Asphalt-saturated 10 minute Grade D paper or better
- Asphalt-saturated Felt per ASTM D226
- Wrap meeting ASTM E2556 or equivalent
- Or any combination of two separate layers of these materials

*If combining the use of a house wrap and Grade D or felt, place the house wrap on the inner layer

WATER RESISTIVE BARRIERS

INSTALLATION METHODS

- Install each layer of WRB independently. Double rolls are not acceptable.
- The inner layer of WRB should be installed, along with flashings, to create a continuous drainage plane.
- The outer layer of WRB is intended to keep the scratch coat from contacting the inner layer of WRB.
- Overlap or shiplap such that water flowing downward cannot get behind the WRB layers.
- Terminate WRB into weep screed if applicable; WRB must be on top of (overlap) the weep screed flange.

LIQUID WRBs

COMMONLY USED IN COMMERCIAL APPLICATIONS

- Liquid-applied WRBs come in a bucket and are applied to wall sheathing or concrete blocks with a roller or a spray rig.
- These products cure to form a tenacious, flexible coating that seals small cracks and penetrations.
- Although liquid-applied WRBs cost more than house wrap, they also perform better.
- Provide a high level of airtightness.
- A liquid WRB may qualify as one of the two layers required of the system.

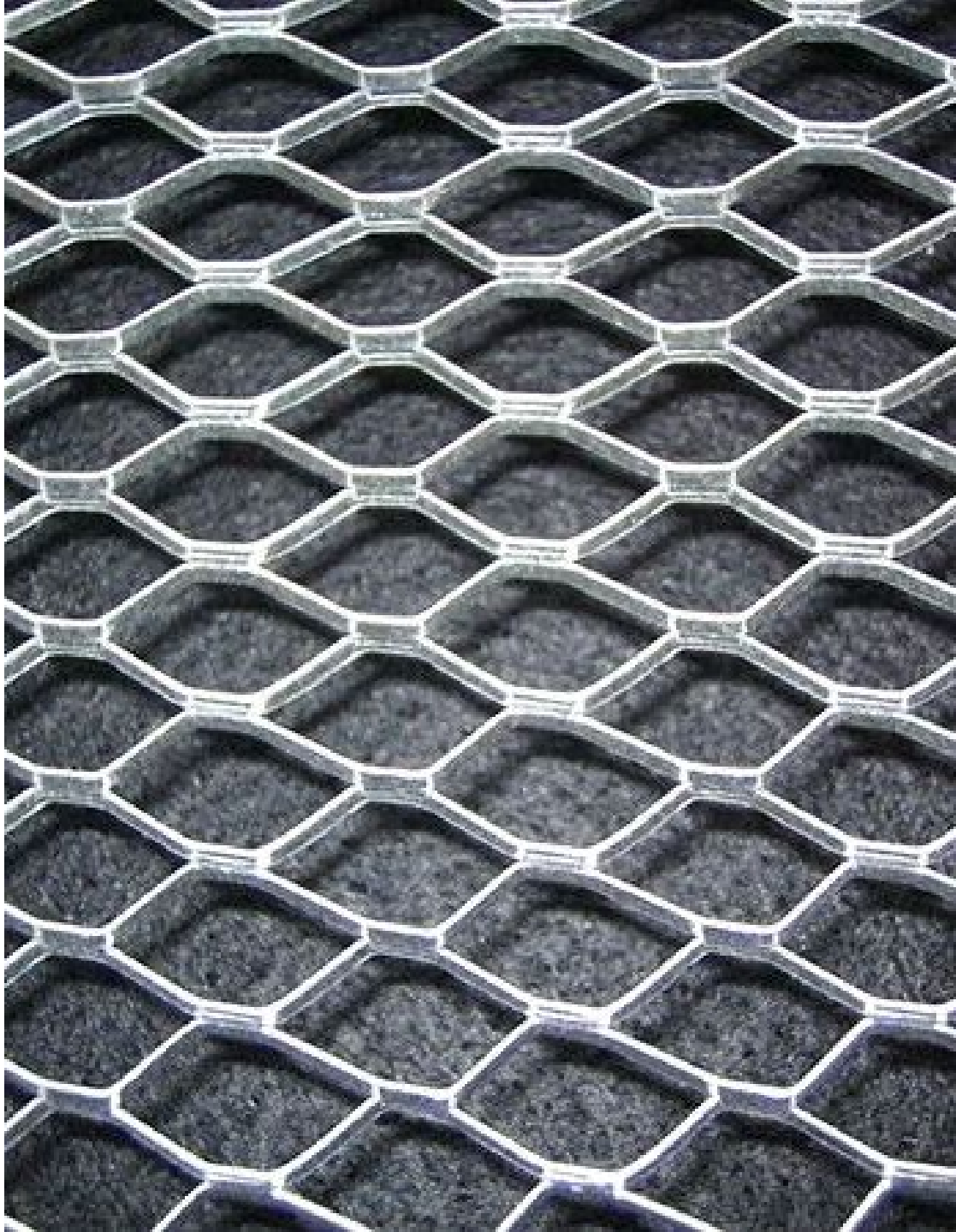
METAL LATH & FASTENERS

- Use 2.5 or 3.4 lb. per square yard self-furring metal lath. Lath material must be self-furred or use self-furring fasteners.
- Woven-wire and welded wire laths are also approved. Must meet ASTM C1032 or ASTM C933.
- All lath and accessories must be corrosion resistant, consisting of either galvanized or stainless steel materials.
- Fasteners must comply with ASTM C1063 – nails, staples or screws are acceptable.

METAL LATH & FASTENERS

INSTALLATION METHODS

- Metal lath should be applied horizontally.
- Overlap a minimum of 1 inch at the vertical seams and a minimum of ½ inch at the horizontal seams.
- Lath should be fastened every 7 inches vertically on each stud.
- Lath should be wrapped around inside and outside corners a minimum of 12 inches and only into framing.



MORTAR

Table 2: Application Based Setting Bed Mortar Recommendations[1]

Application	Type N Mortar (ASTM C270 or ASTM C1714)	Type S Mortar (ASTM C270 or ASTM C1714) or ANSI A118.1 Mortar	ANSI A118.4 or ANSI A118.15[5] Mortar
Interior Applications			
Less than 10 ft (3 m) in height above finished floor	Recommended	Recommended	Recommended
All other interior applications	Not Recommended	Recommended	Recommended
Exterior Single Family Residential Applications			
Grouted[2]	Not Recommended	Recommended	Recommended
All other exterior single family residential applications	Not Recommended	Recommended	Recommended
Exterior Commercial Applications			
Less than 10 ft (3 m) in height above finished grade	Not Recommended	Recommended	Recommended
All other exterior commercial applications	Not Recommended	Not Recommended	Recommended
Special Applications			
Installed directly on cement board	Not Recommended	Not Recommended	Recommended
Non-vertical applications[3,4]	Not Recommended	Not Recommended	Recommended

[1] If the surface area of an AMSV unit exceeds 1 ft² (0.1 m²) or 24 in. (610 mm) in any dimension, then install using setting bed mortar complying with ANSI A118.4 or ANSI A118.15.
[2] Requires a minimum nominal mortar joint thickness of 1/4 in. (6.4 mm) around AMSV units.
[3] Requires a fastening system designed by a professional engineer.
[4] AMSV units should not be subjected to pedestrian or vehicular traffic.
[5] The scope of ANSI A118.15 references these mortars can be used in submerged locations. It is not recommended to use AMSV in submerged applications or other applications with continuous exposure to water.

COMMON MORTAR TYPES

- Type S mortars are commonly used and recommended.
- Type S mortars tend to be less workable but will provide a greater bond strength compared to Type N mortars.
- If working in dry weather conditions, mist the scratch coat and stone to cool the surface. When mortar is robbed of water, the cement hydration process is compromised, negatively impacting bond.

MORTAR

SCRATCH MORTARS

Applied directly to lath and intentionally scratched before hardening to provide enhanced mechanical bond between the scratch coat and setting bed mortars

SETTING BED MORTARS

Applied directly to the back of the stone veneer for installation

GROUTING MORTARS

Used to fill the joints between individual stone veneer units once the setting bed mortar has sufficiently cured

MODIFED MORTARS

Modified mortars achieve higher bond strengths than traditional unmodified Type S or Type N mortars.

- Stones can be set in place and moved up to 10 minutes later without any concern for loss of bond.
- Select a modified mortar complying with ANSI A118.4 or ANSI A118.15.
- Look for manufactures that carry system options and available warranties

MODIFIED MORTARS ARE BETTER SUITED FOR APPLICATIONS SUCH AS:

- Dry Stack Applications
- Tilt-Up Construction
- Direct Bond to Concrete Masonry
- Direct Bond to Cement Board
- Hot Weather Conditions
- Large Format Stones

BASIC INSTALLATION STEPS

USING TYPE N OR TYPE S MORTARS

- Begin application over standard scratch coat.
- Mixing stone sizes, shapes, textures and color will allow for variety and contrast in the design.
- The back of each stone should be entirely buttered with a ½ inch layer of mortar.
- Cover the entire back of the stone, not just the perimeter.
- Press stone veneer onto scratch coat, slide slightly back and forth until the mortar grabs and bonds to the scratch coat.

INCORPORATING CORNERS CAN DRAMATICALLY ADD AUTHENTICITY TO YOUR DESIGN CREATING THE APPEARANCE OF A FULL DIMENSION NATURAL STONE WALL

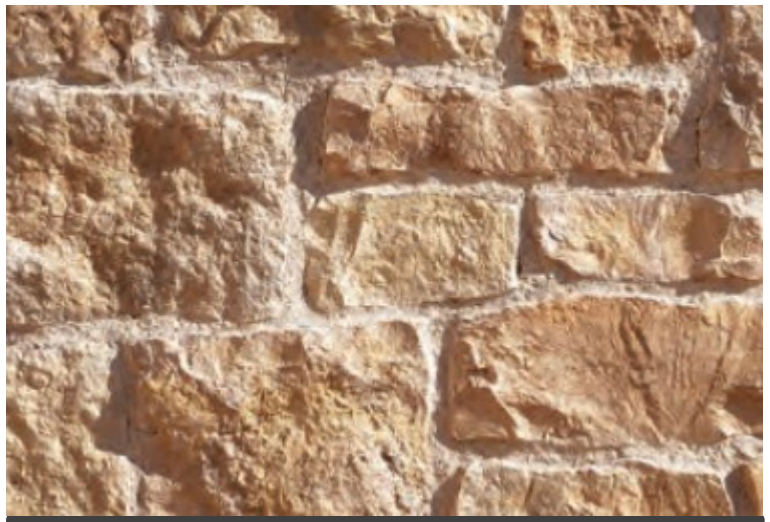
LARGE FORMAT STONE INSTALLATION

Using Modified Mortar on a Cement Board Application

- Cover manageable sections of the wall (10-15 sq. ft.) with ½ inch layer of mortar.
- Use ½ inch by ½ inch square trowel and comb the mortar vertically.
- Skim coat entire back of each stone with a thin layer of mortar and press into the fresh scratch coat.
- The prepared stone veneer should be pressed onto the scratch coat, slide slightly back and forth until the mortar grabs and bonds to the scratch coat.

GROUT TECHNIQUES

STANDARD JOINT



OVERGROUT JOINT

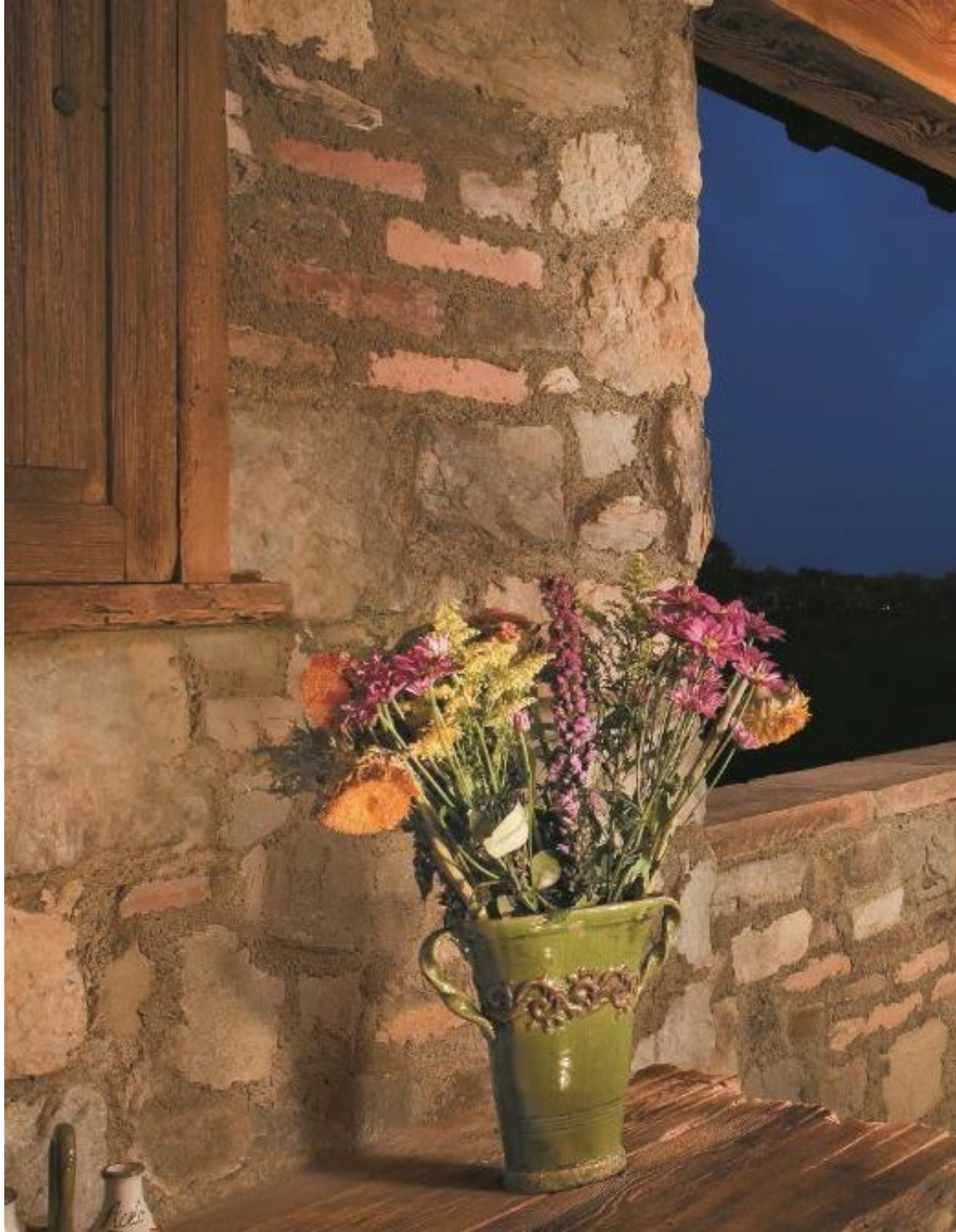
DRYSTACK JOINT

STANDARD JOINT

- Lay each stone roughly one-finger width apart from each other.
- Install from top-down Fill joints with mortar, forcing grout into any voids.
- Use a striker tool to rake the joint for a consistent depth which creates the familiar concave look.

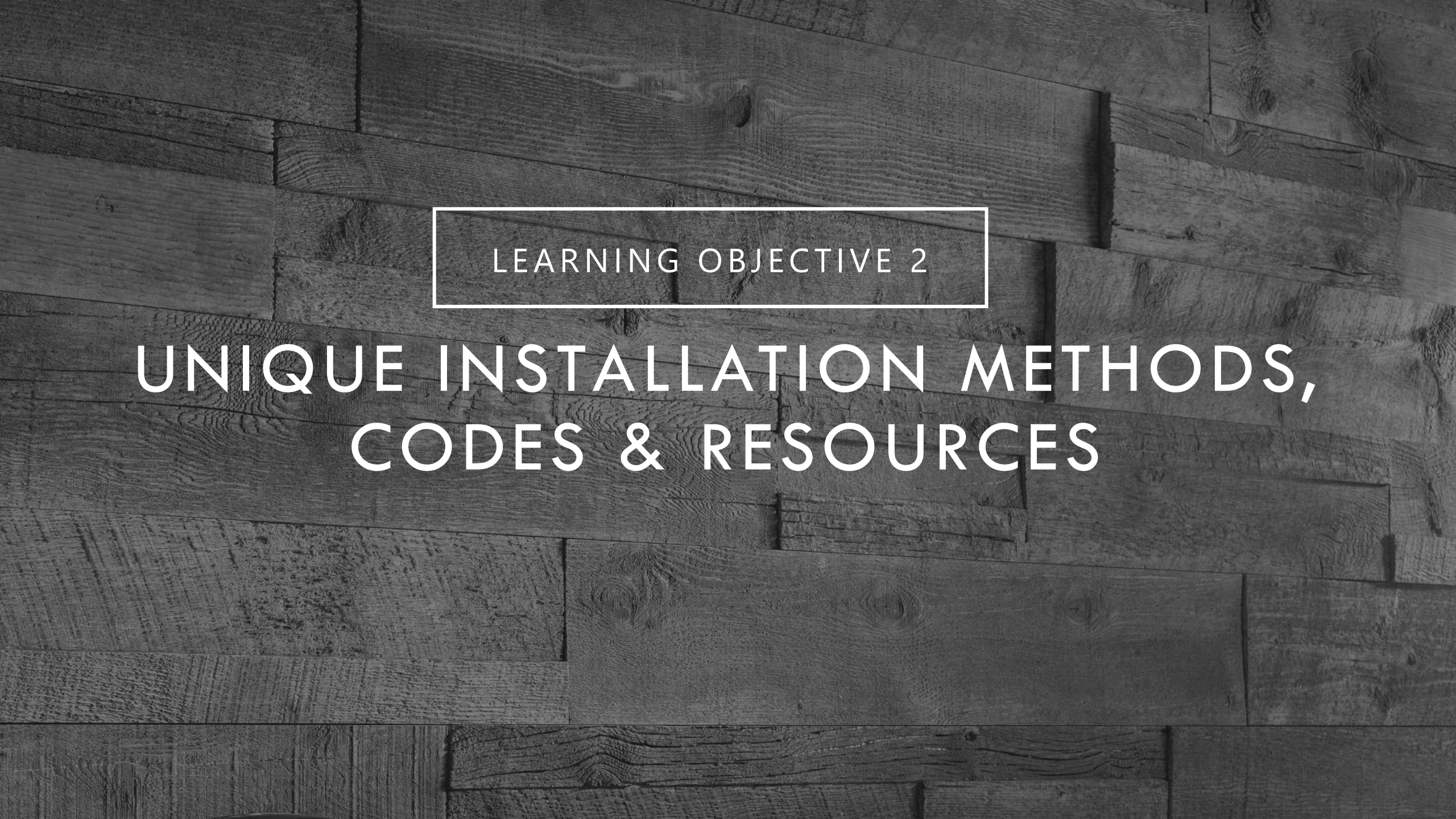
OVERGROUT JOINT

- An increasingly popular way to achieve rustic appearance.
- Overlaps the face of the veneer, widening the joints creating an irregular aesthetic Install from top-down.
- Use a trowel or tuck pointer to strike the joint creating an aged finish.



DRYSTACK JOINT

- Commonly used in designs with clean lines and modern stone styles.
- Dry fit each veneer piece with virtually no joint.
- Install from bottom-up Modified Mortars are highly recommended for a clean and efficient install.
- A colored setting bed mortar may be used to ensure no grout is visible in any exposed areas.


LEARNING OBJECTIVE 2
UNIQUE INSTALLATION METHODS, CODES & RESOURCES

UNIQUE INSTALL METHODS

- Additional Wall Barriers
- Rainscreen Systems
- CMU, Tilt Up, & Poured Walls
- Continuous Insulation

ADDITIONAL WALL BARRIERS

LIQUID APPLIED BARRIERS

- Easy to use and can be applied by roller, sprayer or brushed on.
- Conformance to every bend and corner forming a seamless waterproofing membrane.

AIR BARRIERS

- Intended to stop penetration of moist air into the structure.
- Air leaks can decay the inside environment by changing the humidity and temperature levels.

VAPOR BARRIERS

- Designed to keep water vapor from entering the wall cavity.
- Typically installed towards interior surface for colder climates and installed closer to the exterior surface for warmer climates.

RAINSCREEN DRAINAGE SYSTEMS

A rainscreen provides a drainage plane or drainage cavity that ensures any water which gets past the veneer system will drop down and out of the wall cavity and provides additional ventilation to the structure.

DRAINAGE MATS & FORMED POLYMER SHEATHING

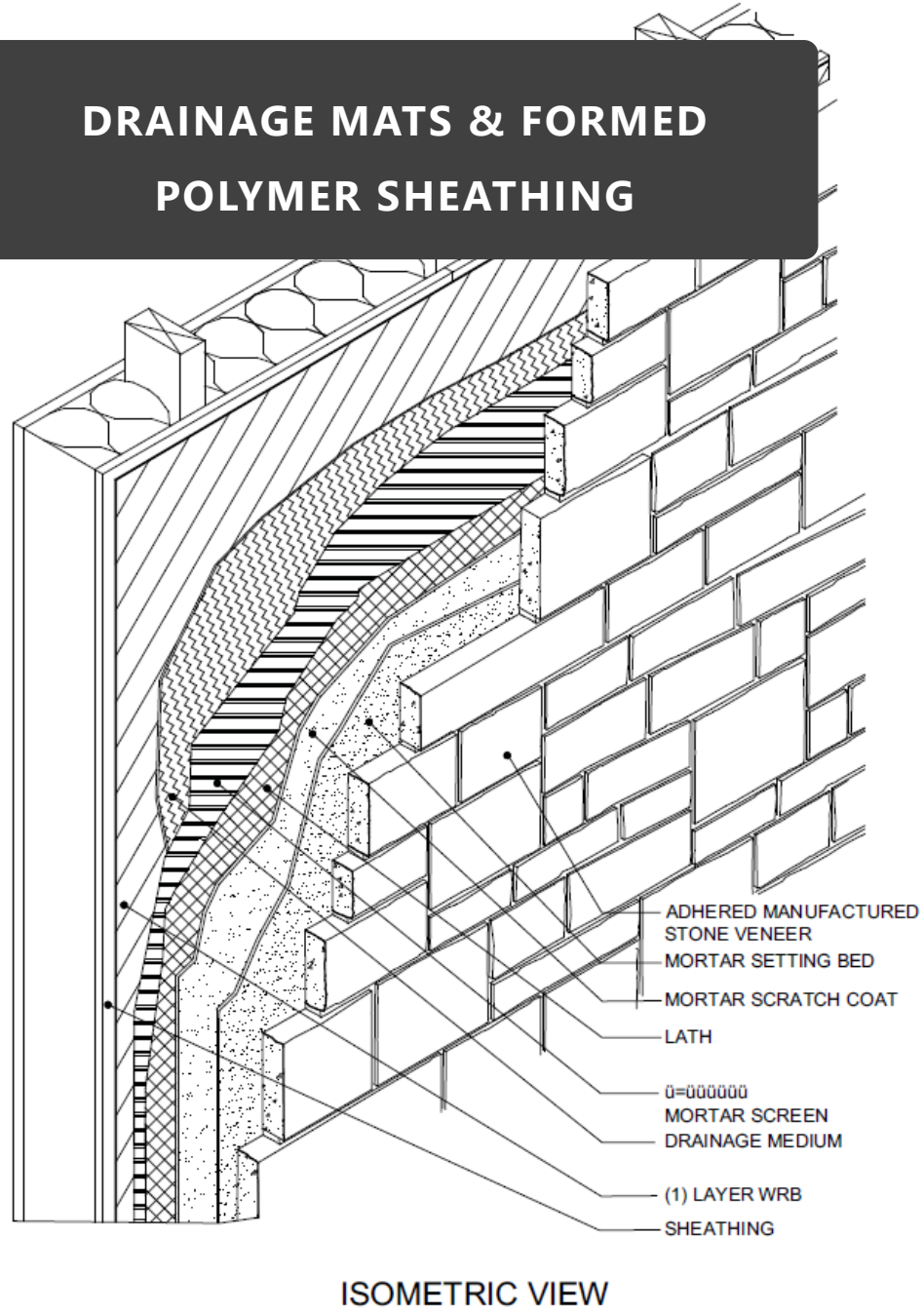
STRAPPING OR FURRING

1 layer WRB (60 minute or equiv.) in conjunction with a rainscreen

Select a rainscreen system which incorporate a mortar screen or net

Rainscreen must terminate onto the flange of a weep screed flashing

DRAINAGE MATS & FORMED POLYMER SHEATHING

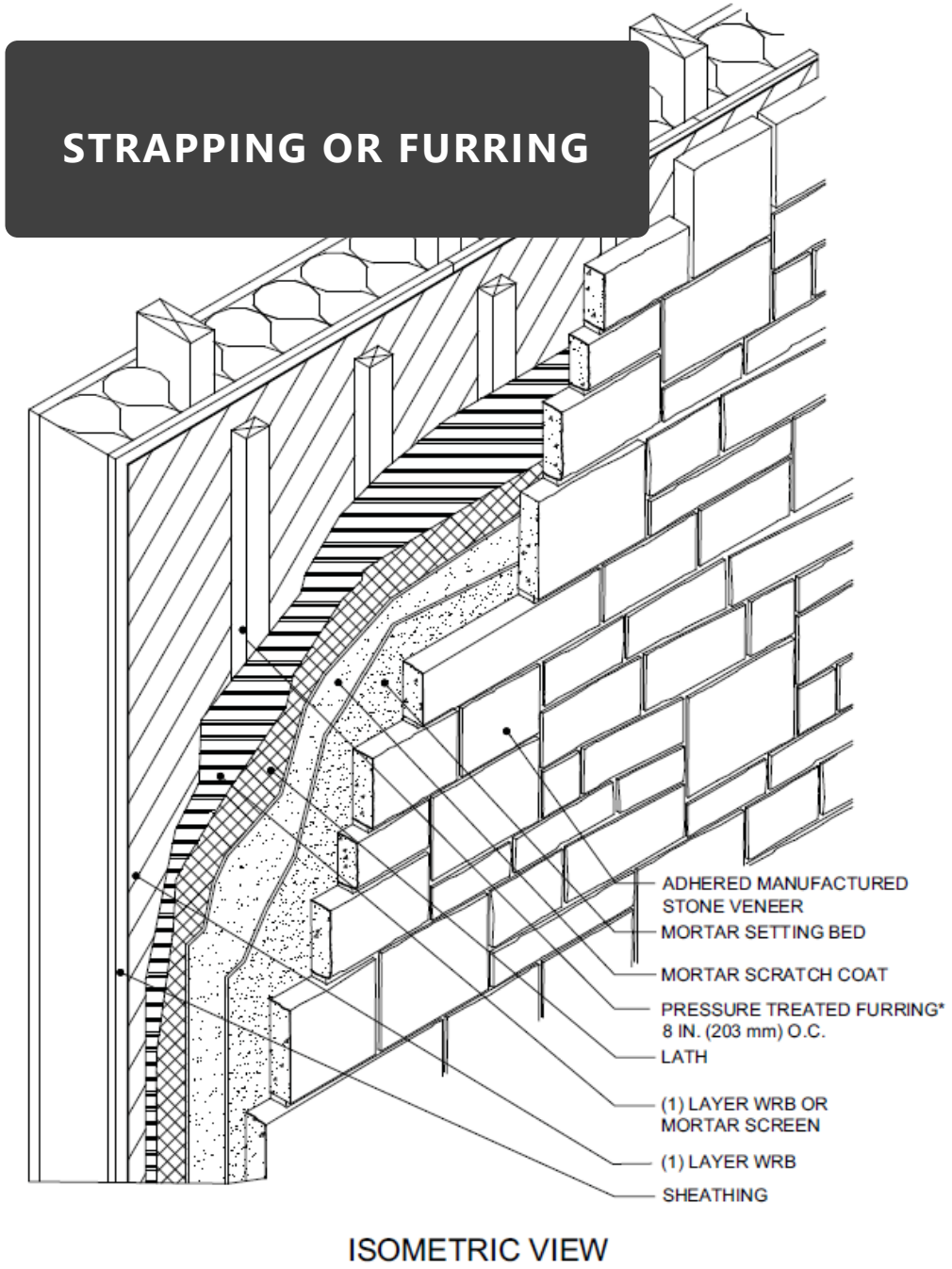


ISOMETRIC VIEW

RAINSCREEN SYSTEMS

- Material should be non-absorbent and should resist compression.
- Material should be rot and corrosion resistant.
- Mortar Screen should consist of a two-ply design with a mortar screen filter fabric to prevent the scratch coat from clogging the drainage path.

STRAPPING OR FURRING

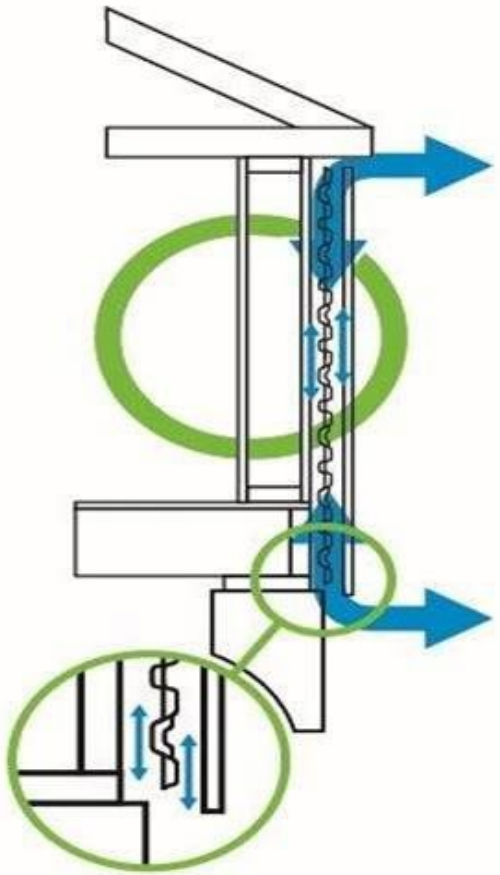


ISOMETRIC VIEW

RAINSCREEN SYSTEMS

- Furring strips typically placed at 8" o.c.
- Use pressure treated wood.
- 1in. x 3in recommended.
- Galvanized hat channel can also be used as an alternative option for strapping.

FORMED POLYMER SHEATHING & FIBERGLASS LATH

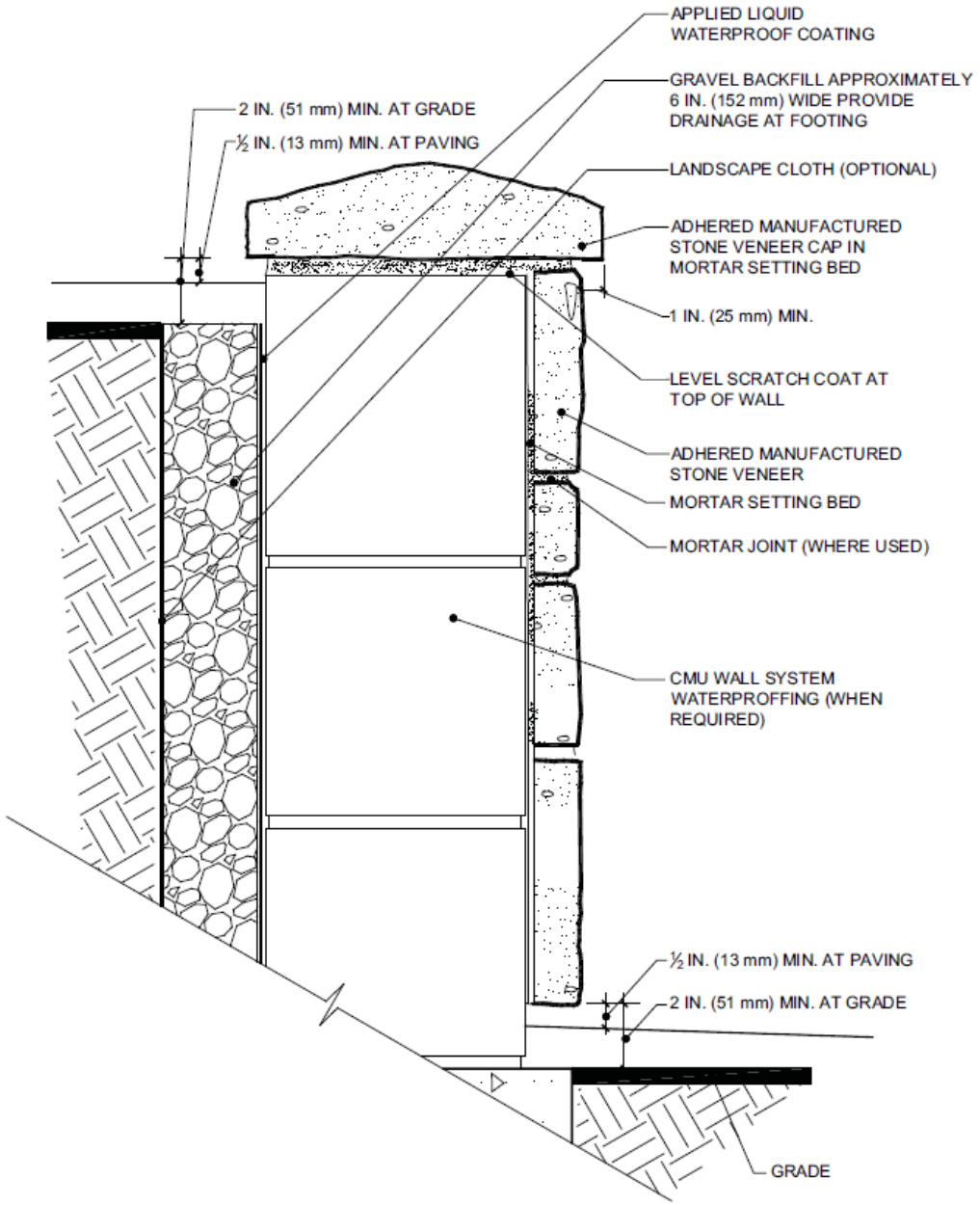


RAINSCREEN SYSTEMS

- Material should be non-absorbent and should resist compression.
- Material should be rot and corrosion resistant.
- Plastic dimple mat to keep moisture out.
- Fiberglass lath resistant to rust.
- Ventilated system allowing vapor to escape at the top, incidental moisture at the bottom, and air circulation to dry out walls faster.

CMU, TILT UP & POURED WALLS

- Must be free of dirt or any other substance that could inhibit the mortar bond.
- Readily accept/absorb water and must have a rough texture to ensure good mortar bond.
- If a bondable surface cannot be achieved, attach lath and scratch coat before installing stone veneer.



SECTION VIEW

CMU RETAINING WALL DETAIL

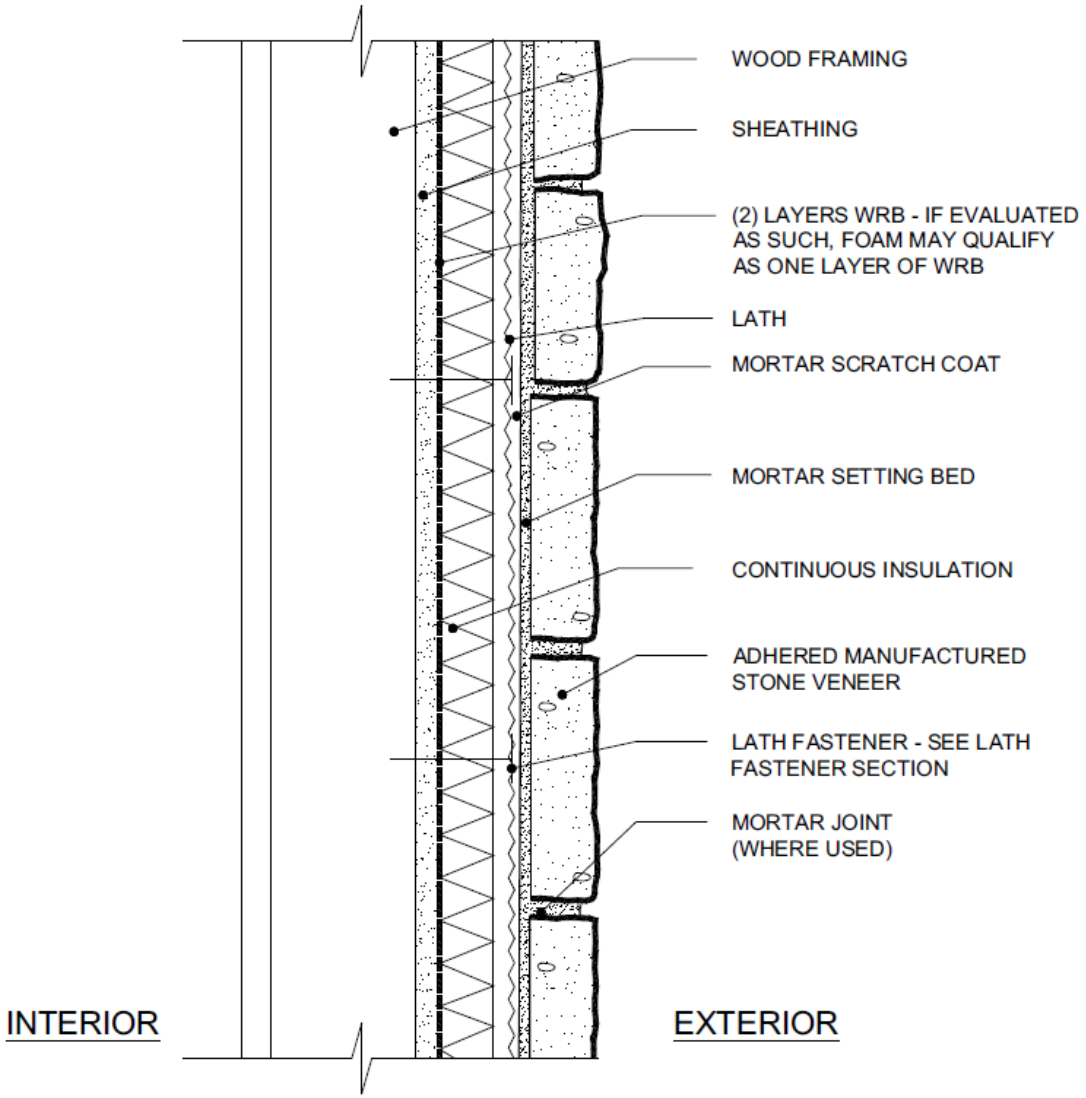
- Direct bonding using conventional mortars or modified mortars are acceptable.
- Avoid efflorescence issues and extend stone durability by waterproofing wall systems backfilled with soil.
- Liquid applied barrier or one layer of WRB and lath are appropriate to mitigate water penetration.
- Gravel backfill approx. 6 inches wide & provide drainage at footing.
- Cap to extend a minimum 1” past the face of the stone, 2” is preferred.
    - Cap should have drip edge or cut kerf to keep water from running back onto the stone.

CONTINUOUS INSULATION (CI)

Sheathing entire outer wall of a structure with continuous insulation (CI). There are no joints or interruptions in the foam insulation offering significantly less thermal loss.

- Reduces thermal bridging.
- Maximized thermal performance while minimizing wall thickness.
- Provides a higher insulation value and maximizes energy savings.

STANDARD WALL SECTION WITH CI



INSTALLATION DETAIL

- Installation of stone veneer over CI greater than 1/2 inch thick will require an engineered fastening system.
- If approved, CI may be substituted for 1 layer (outer layer) of WRB.
- Alternative Attachment Option: Proprietary systems which provide cleats or stand-offs that are attached to the studs.

CODES & RESOURCES

- Maximum Height
- Technical Evaluation Report
- CAD Resources
- Project Support

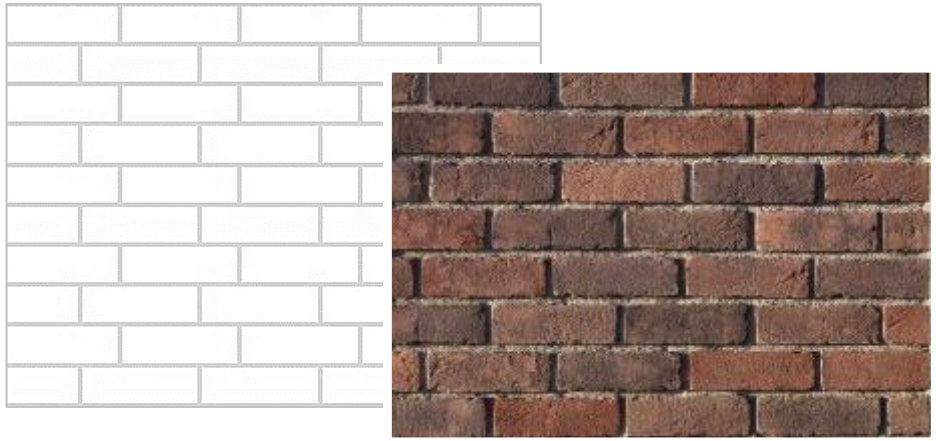
MAXIMUM HEIGHT

- The IRC (residential) provides prescriptive max heights.
- The IBC (commercial) provides prescriptive deflection limits.
- Structural Engineers can calculate deflections for various construction configurations.
- Obtain weights of products used from manufacturers direct.
- Contact manufacturer's representative for additional information.

CAD RESOURCES

Create realistic renderings showing stone size, color and patterns with available CAD resources. Multiple formats are available for many design programs.

- Seamless Textures (JPG)
- Hatch Patterns (PAT)
- Drawing File (DWG)
- Revit (RVT)



LOOK FOR QUALIFIED STAFF ABLE TO:

- Assist with Design
- Wall System Evaluation
- Offer Installation Guidance
- Compliance and Code Support
- LEED Support
- Provide Technical Evaluation Reporting

PROJECT SUPPORT

Select a manufacturer that will attend project planning meetings to discuss product and review the NCMA-MSV installation guidelines with the awarded installer.

- Manufacturers with council memberships provide benefit with up-to-date information on current codes and industry standards.
- Can help influence the development of specifications and procedures to ensure product remains a best interest for the industry.

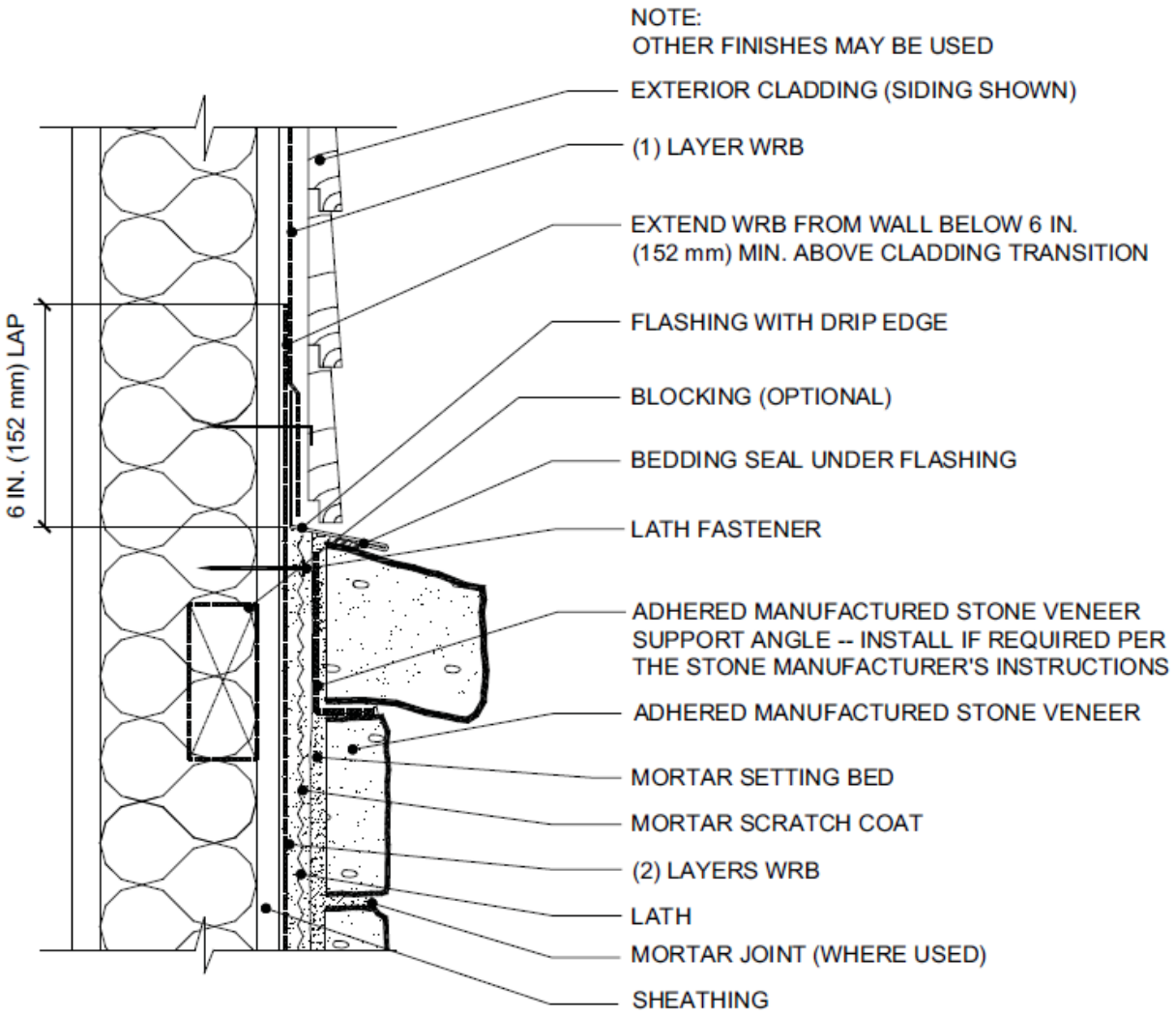
LEARNING OBJECTIVE 2

TRANSITIONAL DETAILS & MOISTURE PREVENTION

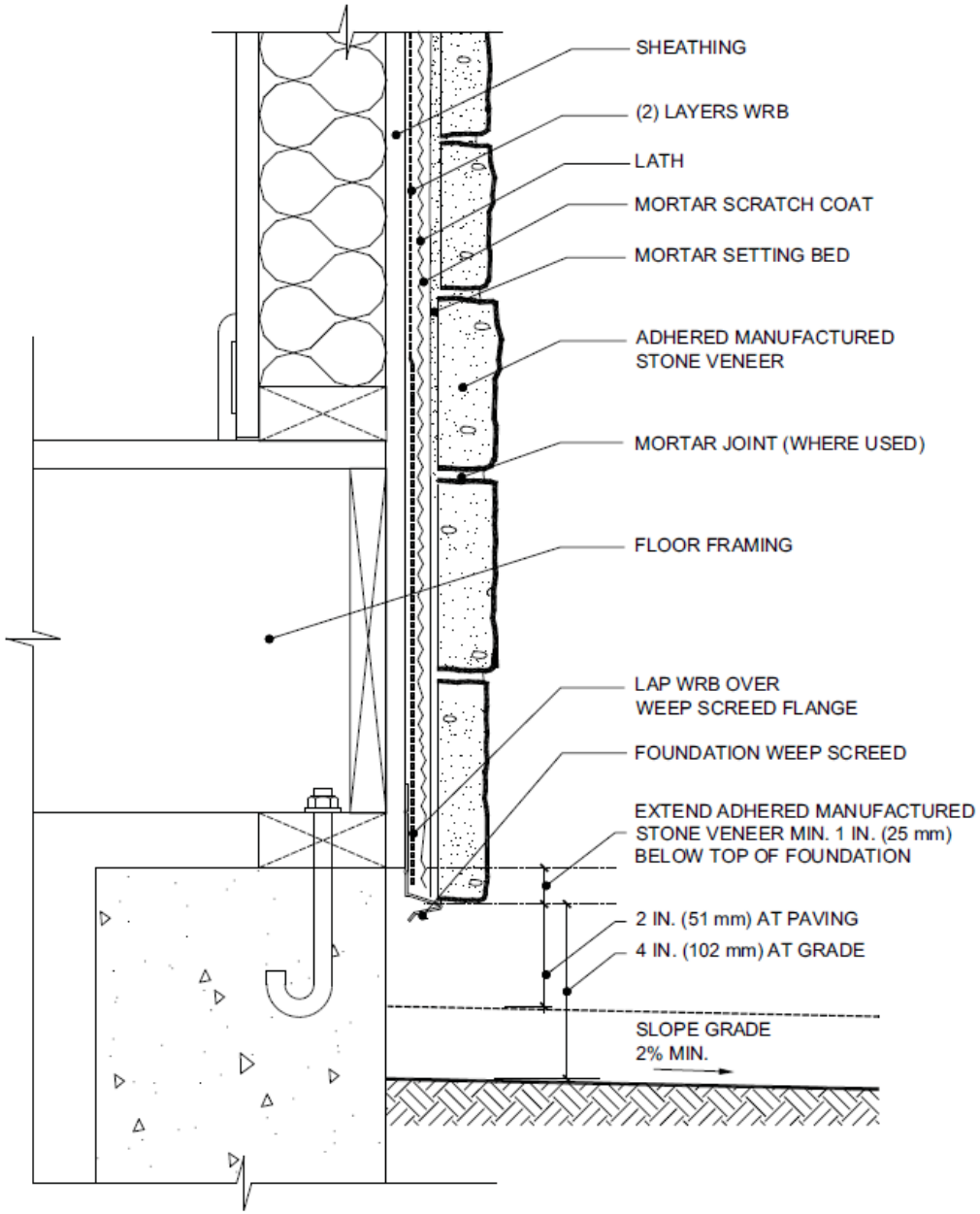
TRANSITION DETAILS

- Wainscot Detail
- Weep Screed Detail
- Clearances
- Movement Joints

WAINSCOT DETAIL



- Flashing installed prior to stone veneer.
- For best drainage, wrap WRB over vertical leg of flashing.
- Support angle may be required.
- Verify with stone veneer manufacturer for installation requirements.



WEEP SCREED DETAIL

- Weep screeds and casing beads must be corrosion resistant.
- Weep screeds must have a minimum vertical attachment flange of 3.5 inches.
- For best drainage, wrap WRB over vertical leg of flashing.
- Verify clearance requirements per project.

CLEARANCES

ON EXTERIOR STUD WALLS

- 4 inches above grade 2 inches above paved surfaces
- If the paved surface is supported by the same foundation that supports the exterior wall, clearance can be reduced to ½ inch

ON EXTERIOR STUD WALLS WITH CMU FOUNDATION OR CMU LANDSCAPE WALL

- 2 inches above grade
- ½ inch above paved surfaces

MOVEMENT JOINTS

Expansion and control joints are installed to limit the effect of differential movement of supports.

- Control Joints may not be needed for Architectural Stone Veneer Space between each stone will serve as a mini control joint.
- Applicable for both dry stack or grouted applications.
- Spanning Expansion Joints with stone veneer can lead to cracking.
- Consult with local engineer and building codes on expansion joint requirements.

MOISTURE PREVENTION

- Diverting Water Runoff
- Efflorescence & Spalling
- Protective Treatment

DIVERTING WATER RUNOFF

Proper waterproofing and efficient drainage are crucial to achieve a successful stone veneer installation.

- Incorporate flashing & waterproofing membranes.
- Wall caps should extend 1-2 inches beyond wall surface.
- Divert direct irrigation water away from stone surfaces

EFFLORESCENCE & SPALLING

EFFLORESCENCE

- The formation of salt deposits caused by moisture migration through the masonry surface.
- Ensure proper drainage and moisture control systems are incorporated into the design to eliminate trapped moisture

SPALLING

- Excessive exposure to water penetration combined with freeze-thaw cycling causing spalling and deterioration.
- Incorporate the use of proper flashing, gutters and wall caps to divert water run-off away from stone veneer surfaces

PROTECTIVE TREATMENT

- Safeguard stone installations from the elements.
- Help masonry surfaces resist staining, spalling, cracking and other damage related to water intrusion.
- Use a penetrating & breathable, silane or siloxane based masonry treatment.
- Treating the stone is not required but recommended Low maintenance and long life span.
- Refer to manufacturer for recommended application, coverage, and maintenance.

BEST PRACTICES

WHAT TO LOOK FOR IN A QUALITY ARCHITECTURAL STONE VENEER MANUFACTURER:

- Authentic colors and natural textures
- Extensive product lines providing versatility in stone selections for all design styles
- High quality production materials
- Comprehensive installation techniques & support
- Detailed testing reports & resources
- Knowledgeable staff & local representation from manufacturer

LEARNING OBJECTIVES

Quality Characteristics & Versatility of Stone Veneer

Wall Systems & Installation Guidelines

Unique Installation Methods, Codes & Resources

Transitional Details & Moisture Prevention

THANKS FOR ATTENDING

For more information visit **www.elevatewithstone.com**

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