

**ADHERED THIN MASONRY VENEER INSTALLATIONS TO A
MAXIMUM 3.05m ABOVE LOCAL GRADE ON PART 9
RESIDENTIAL UNITS IN ALBERTA**

Prepared by

Mark D. Hagel

January 20, 2021

ABSTRACT

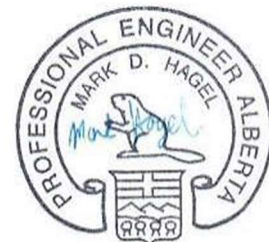
The following engineered solution applies to adhered manufactured thin masonry veneers installed on **Part 9 residential buildings constructed as per 9.10.15 only** to heights of **10 feet (3050 mm) or less above local grade** including and limited to:

- 1) Thin light-weight concrete, manufactured stone masonry tested and/or approved by Dr. Mark D. Hagel through the Alberta Masonry Council.
- 2) Thin clay brick veneer units tested and/or approved by Dr. Mark D. Hagel through the Alberta Masonry Council.

The details report includes a list of approved products, a list of permitted details, a set of installation instructions to be followed, relevant engineering calculations and a summary of testing to date, that support requirements for the pre-engineered design contained within this document.

This pre-engineered solution for adhered thin masonry veneers will remain in effect from **January 20, 2021 until November 30, 2021**, at which time renewal or amendment will be considered.

PERMIT TO PRACTICE ALBERTA MASONRY COUNCIL	
RM SIGNATURE:	<u>Mark Hagel</u>
RM APEGA ID#:	<u>77768</u>
DATE:	<u>January 20, 2021</u>
PERMIT NUMBER: P12918 The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	



January 20, 2021

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This Pre-Engineered solution applies to **Any Part 9 residential building constructed per 9.10.15 only** with a construction similar to the example in Figure 1, with a maximum height of the adhered masonry veneer of 10 feet (3.05 m) above local grade.



Figure 1: Example of an adhered manufactured stone veneer installation up to 10 feet (3048 mm) on a Part 9 residential unit constructed per 9.10.15 only.

LIST OF ACCEPTABLE THIN MANUFACTURED STONE UNIT MANUFACTURERS:

Eldorado™,	Dutch Quality™,
Cultured Stone™,	ProStone™
Boulder Creek™,	Environmental Stoneworks™,
Creative Mines™,	Rinox

LIST OF ACCEPTABLE THIN BRICK MANUFACTURERS:

Glen-Gery™,	Interstate Brick™,
Hebron™,	Summit™,
Endicott™,	Acme™,
Meridian™,	Sioux City™,
Brampton Brick™,	McNear™,
Mutual Materials™	General Shale™
Meridian Brick™	Pacific Clay

LIST OF ACCEPTABLE SETTING BED MORTAR PRODUCTS

Laticrete Hi-Bond Masonry Veneer Mortar™
SPECMIX® - Thin Veneer Adhesion Mortar XP500
Custom Building Products – Flexbond Mortar™

CASE I: ADHERED MASONRY VENEER WITHOUT DRAINAGE

Where the wall cladding(s) above and/or adjacent to the adhered masonry veneer is not required to provide for drainage as described in ABC Sentence 9.27.2.2.(1), then the adhered stone veneer need not employ drainage unless surrounding cladding is also installed to provide drainage. APPENDIX A contains details that must be included in the drawings submitted to the Authorities Having Jurisdiction (AHJ). Figure 2 provides a 2D detail of components of adhered manufactured stone veneer without a drainage mat to provide drainage.

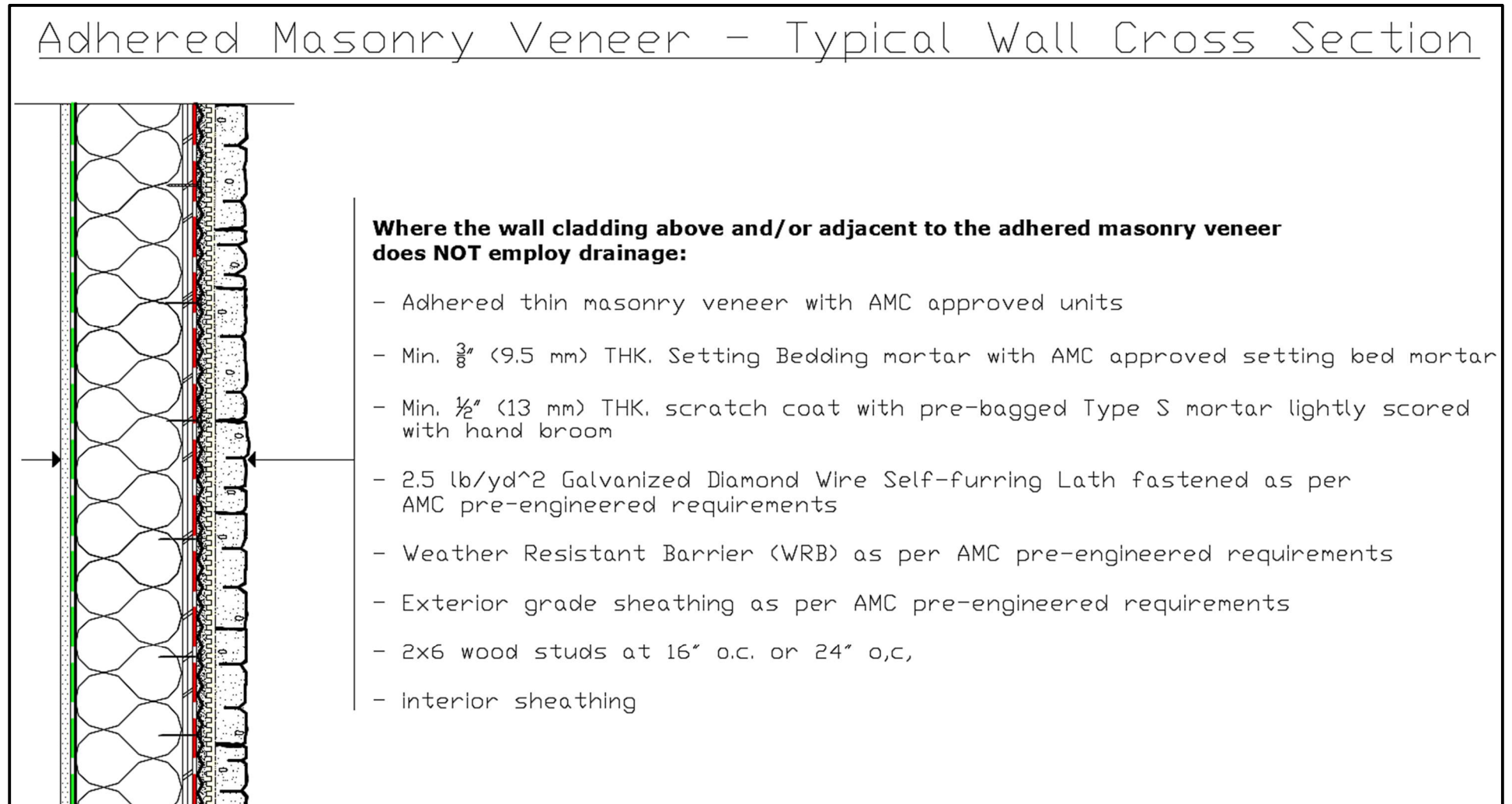


Figure 2: 2D Detail of Components of Adhered Manufactured Stone Veneer without a Drainage Mat.

A 3D isometric detail in Figure 3 illustrates the approved configuration for an adhered masonry veneer without a drainage mat from the 2D detail in Figure 2.

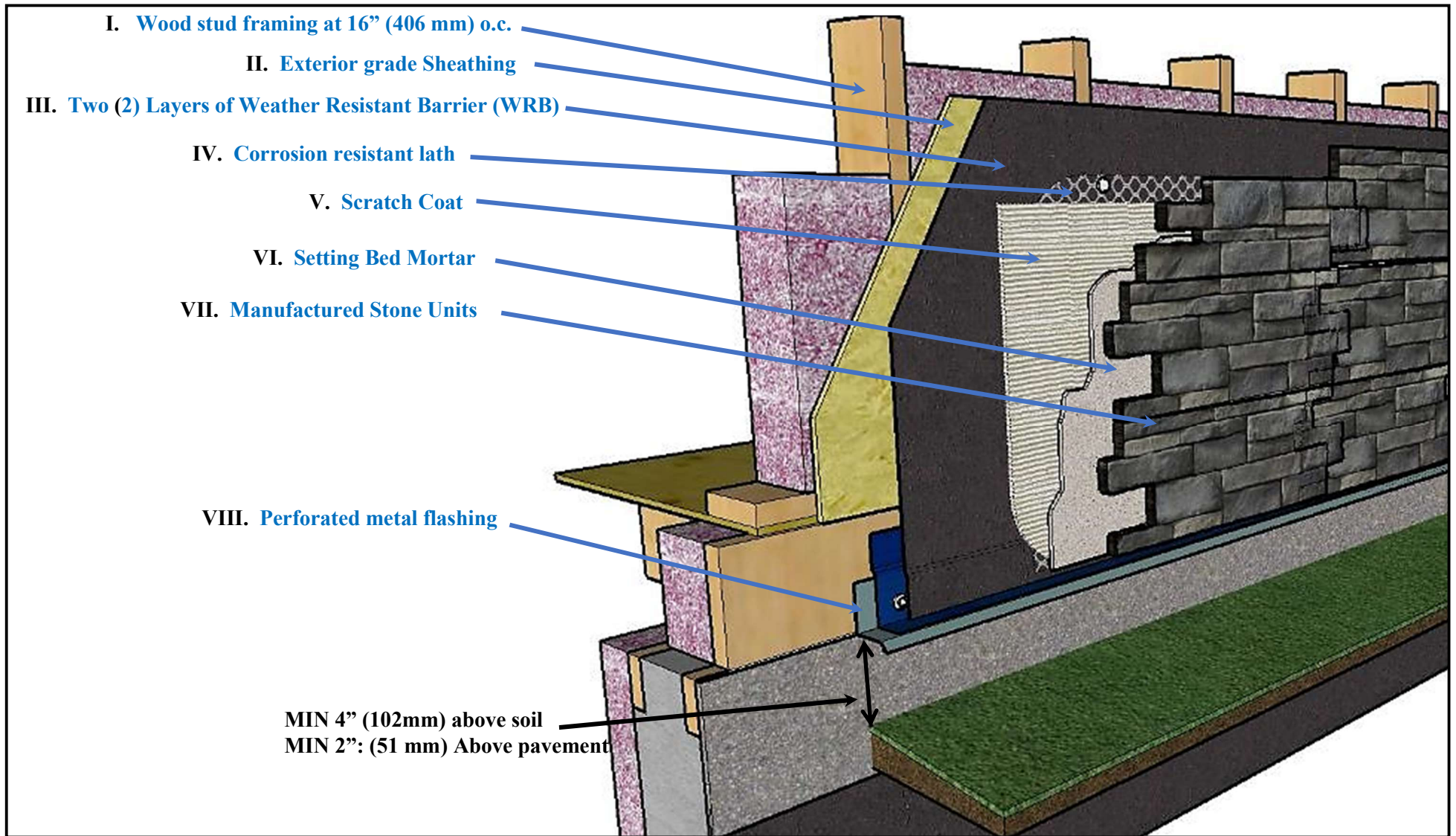


Figure 3: Isometric of Components of Adhered Manufactured Stone Veneer without a Drainage Mat.

Approved Installation Instructions – Adhered Masonry Veneer Without Drainage

Install the Adhered Masonry Veneer without drainage as per the details provided above and the following instructions:

- 1) Review the **backup wall** for plumb and true and ensure a $\frac{1}{8}$ " (3.8 mm) gap between exterior grade OSB or plywood sheets.

Acceptable backup wall for adhered masonry veneer installations:

Wood Framing (behind adhered masonry veneers):

- 2x6 Wood Studs (*SPF #3 or better*) @ maximum 16" (406 mm) o.c. spacing
- 2x6 Wood Studs (*SPF #3 or better*) @ maximum 24" (610 mm) o.c. spacing
- 2x4 Wood Studs (*SPF #3 or better*) @ maximum 16" (406 mm) o.c. spacing

Exterior Grade Sheathing:

2x6 or 2x4 Studs at 16" (406 mm) o.c.

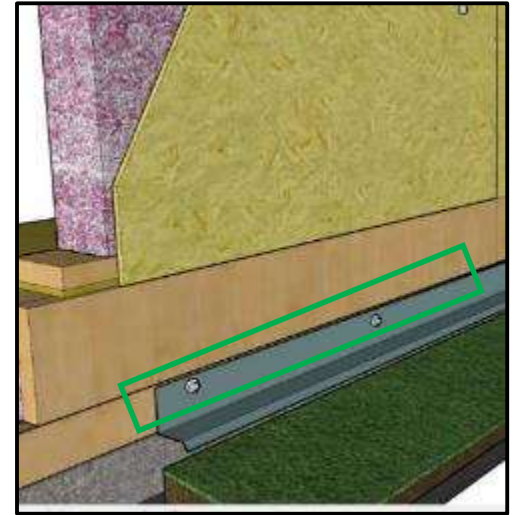
- minimum $\frac{3}{8}$ " (10 mm) thick exterior grade Oriented Stand Board (OSB-1).
- minimum $\frac{1}{2}$ " (13 mm) thick exterior grade plywood
- minimum $\frac{1}{2}$ " (13 mm) thick exterior grade gypsum.

2x6 Studs at 24" (610 mm) o.c.

- minimum of $\frac{5}{8}$ " (16 mm) thick exterior grade Oriented Stand Board (OSB-1) OR minimum 2 sheets of $\frac{3}{8}$ " (9.5 mm) thick exterior grade Oriented Stand Board (OSB-1)
- minimum of $\frac{3}{4}$ " (19 mm) thick exterior grade plywood.
- minimum of $\frac{3}{4}$ " (19 mm) thick exterior grade gypsum.

Installation of weep screed and/or flashing at the base of the wall

- 2) Install Weep Screed and/or through wall flashing at the base of the wall.
- 3) Weep Screed and/or through wall flashing to be a minimum 4" (102 mm) above soil or 2" above paved surfaces.



Acceptable Weep Screeds for wall for adhered masonry veneer installations:

Perforated metal flashing:

Drainaway™

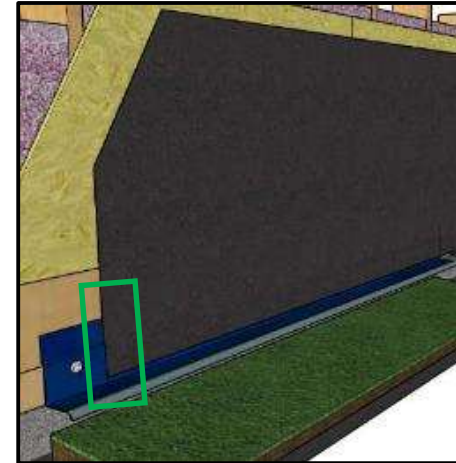


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Installation of Weather Resistant Barrier (WRB)

- 4) Install Two (2) Layers of Weather Resistant Barrier (WRB):
 - i. 2 Layers of 30 min Asphalt impregnated building paper
 - ii. 1 Layer of 30 min building paper installed over 1 Layer of spun bonded polyolefin (house wrap).
- 5) Lap WRB on to weep screed/through wall flashing from the base of the weep screed/through wall flashing and a minimum 6" (152 mm) up the wall onto the exterior grade sheathing (highlighted in the green box strip in the isometric).



- 6) Working from the base of the wall, shingle lap the first course of WRB over the WRB lapped over the flashing in Step 5.
- 7) Continuing up the wall, Shingle Lap WRB a minimum 6" (152 mm) at all vertical seams and a minimum 4" (102 mm) at all horizontal seams.

Installation of Lath

- 8) Install minimum **2.5 lb/yd² corrosion resistant, self-furring diamond mesh metal lath meet or exceed ASTM-C847-18.**
- 9) Lath shall be installed horizontally (perpendicular to studs) with a minimum 1" (25 mm) lap at all vertical and horizontal seams.
- 10) Lap the lath a minimum 12" (305 mm) at all inside and outside corners. in accordance with ASTM-C1780-18a.



11) Fasten lath to the wood studs at:

- i. 16" (406 mm) o.c. horizontally and 6" (152 mm) o.c. vertically as per ASTM-C1780-18a. using **acceptable fasteners for lath** as detailed below.

OR

- ii. 24" (610) horizontally by 4" vertically (102 mm) as per pre-engineered calculations using **acceptable fasteners for lath** as detailed below.

Acceptable Fasteners for Lath:

- i. 0.120" diam. (6d), corrosion resistant roofing nails, 2" long
min. embedment 1-3/4" (45 mm) into stud.

OR

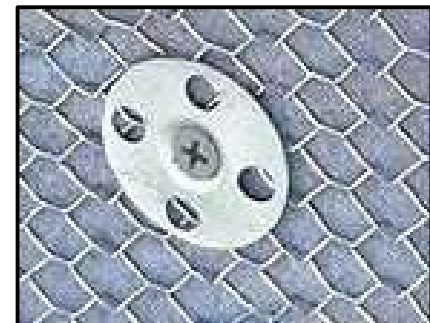


- ii. 14-gauge, corrosion resistant 3/4" crown staples, 2" (51 mm) leg,
min. embedment 1-3/4" (45 mm) into stud.

OR

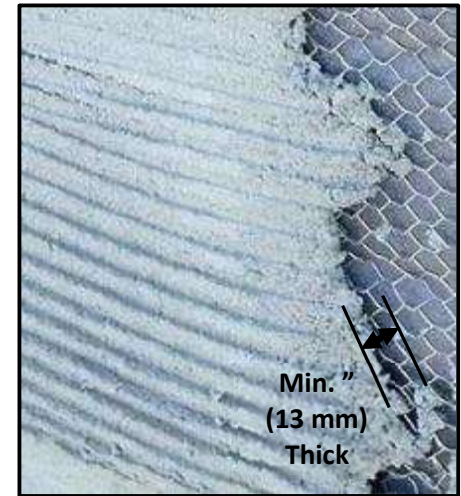


- iii. #8 corrosion resistant wood screws, 1-1/4" (32 mm) long,
min. embedment 1" (25 mm).



Installation of Scratch Coat

- 12) Install scratch coat to a **minimum thickness of ½” (13 mm)** using a **pre-blended (pre-bagged) Type S mortar** conforming to CSA-A179-14.
- 13) The scratch coat shall be installed with a sufficient amount of mortar to fully encapsulate the lath.
- 14) When the scratch coat mortar is thumbprint hard, the mortar is to be scored with a hand broom in the **horizontal direction only**.
- 15) Allow scratch coat to **cure for a minimum 48 hours** prior to unit installation in accordance with ASTM-C1780-18a. and installed in cold weather in compliance with CSA-A371-14 cold weather construction requirements.



Thin Masonry Veneer Unit Installation - Drystack (tight fit) Installation

- 16) Pre-wash the back of the masonry units with water to remove debris and allow units to dry before installation.
- 17) Install thin masonry units fully buttering the back of the masonry units with setting bed mortar with sufficient pressure to fill in voids and according to manufacturer’s instructions

Acceptable setting bed mortars:

- i. Laticrete *Hi-Bond Masonry Veneer mortar*
- ii. Specmix *Thin Veneer Adhesion Mortar XP500*
- iii. Custom Building Products *Flexbond*.



- 18) Setting bed mortar to be installed to a minimum thickness of $\frac{3}{8}$ ” (10 mm).
- 19) Press the masonry unit against the scratch coat with sufficient pressure to squeeze mortar around the perimeter of the unit.
- 20) Maintain a **maximum 1/16” (1.5 mm) joint** between units for tight fit applications.

Thin Masonry Veneer Unit Installation - Jointed Installation

- 21) Pre-wash the back of the masonry units with water to remove debris and allow units to dry before installation.
- 22) Install thin masonry units fully buttering the back of the masonry units with setting bed mortar with sufficient pressure to fill in voids and according to manufacturer's instructions

Acceptable setting bed mortars:

- i. Laticrete *Hi-Bond Masonry Veneer mortar*
- ii. Specmix *Thin Veneer Adhesion Mortar XP500*
- iii. Custom Building Products *Flexbond*.

- 23) Setting bed mortar to be installed to a minimum thickness of $\frac{3}{8}$ " (10 mm).
- 24) Press the masonry unit against the scratch coat with sufficient pressure to squeeze mortar around the perimeter of the unit.
- 25) Maintain a minimum $\frac{3}{8}$ " (10 mm) joint for adhered thin brick veneers and a minimum $\frac{1}{2}$ " (13 mm) joint between units as per ASTM-C1780-18a for thin adhered manufactured stone veneers.



26) Wait a minimum 24 hour before filling (Grout Bag) and pointing the joints, grout with a pre-blended Type N or Type S mortar:



27) Installation of adhered masonry veneers (scratch coat, setting bed mortar and mortar joints in jointed applications) below temperatures of 4°C must be installed in compliance with CSA-A371-14 heating and hoarding requirements.

CASE 2: ADHERED MASONRY VENEER WITH DRAINAGE

Where the adhered masonry veneer installation height is to the underside of the first storey roof (i.e. full height wall) OR where the wall cladding(s) above and/or adjacent to the adhered masonry veneer provide for drainage as described in ABC Sentence 9.27.2.2.(1), then the adhered stone veneer *shall* employ drainage. APPENDIX A contains details that must be included in the drawings submitted to the Authorities Having Jurisdiction (AHJ). Figure 4 provides a 2D detail of components of adhered manufactured stone veneer with a drainage mat to provide drainage.

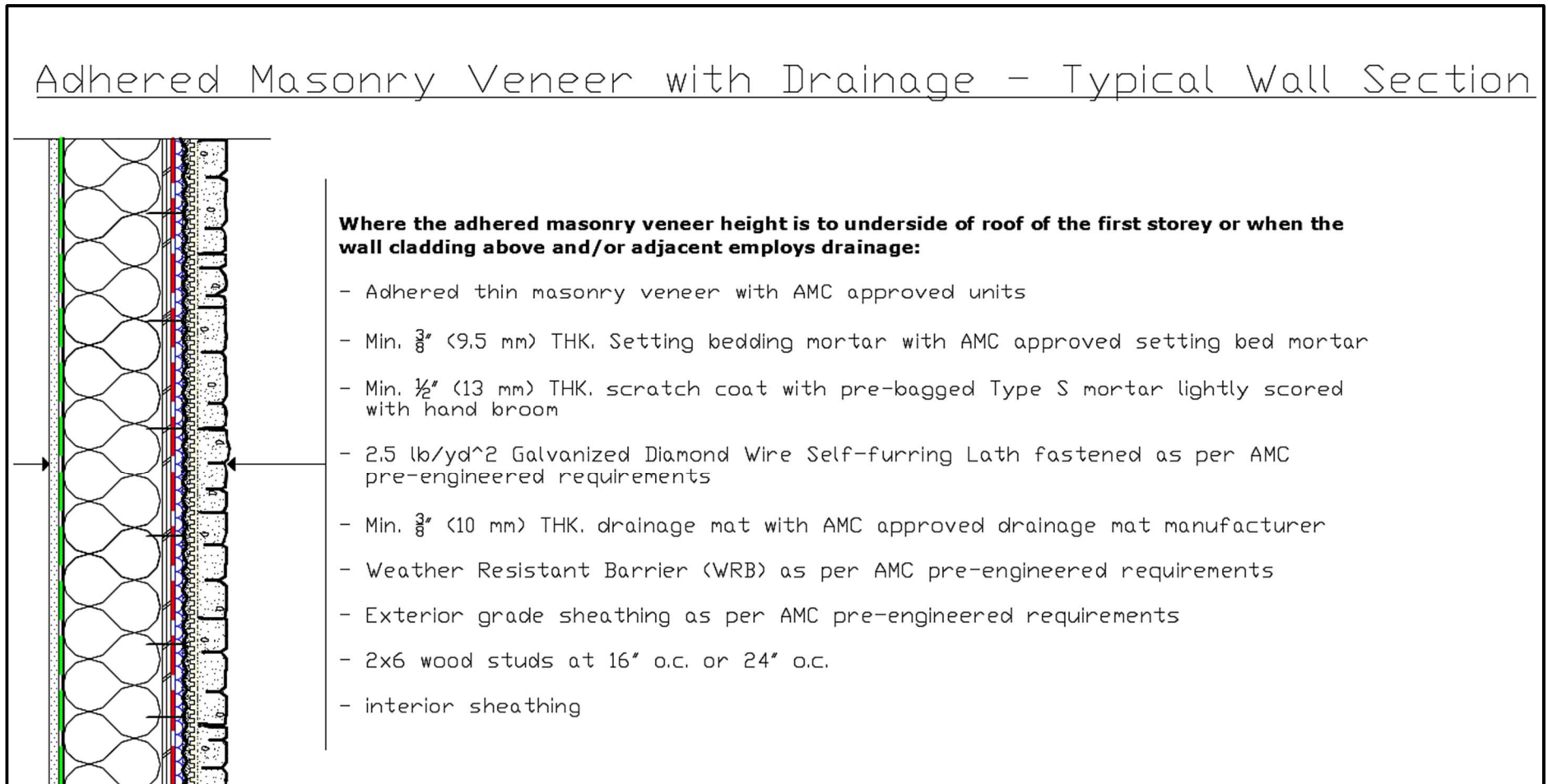


Figure 4: 2D Detail of Components of Adhered Manufactured Stone Veneer with a Drainage Mat.

A 3D isometric detail in Figure 5 illustrates the approved configuration for an adhered masonry veneer with a drainage mat from the 2D detail in Figure 4.

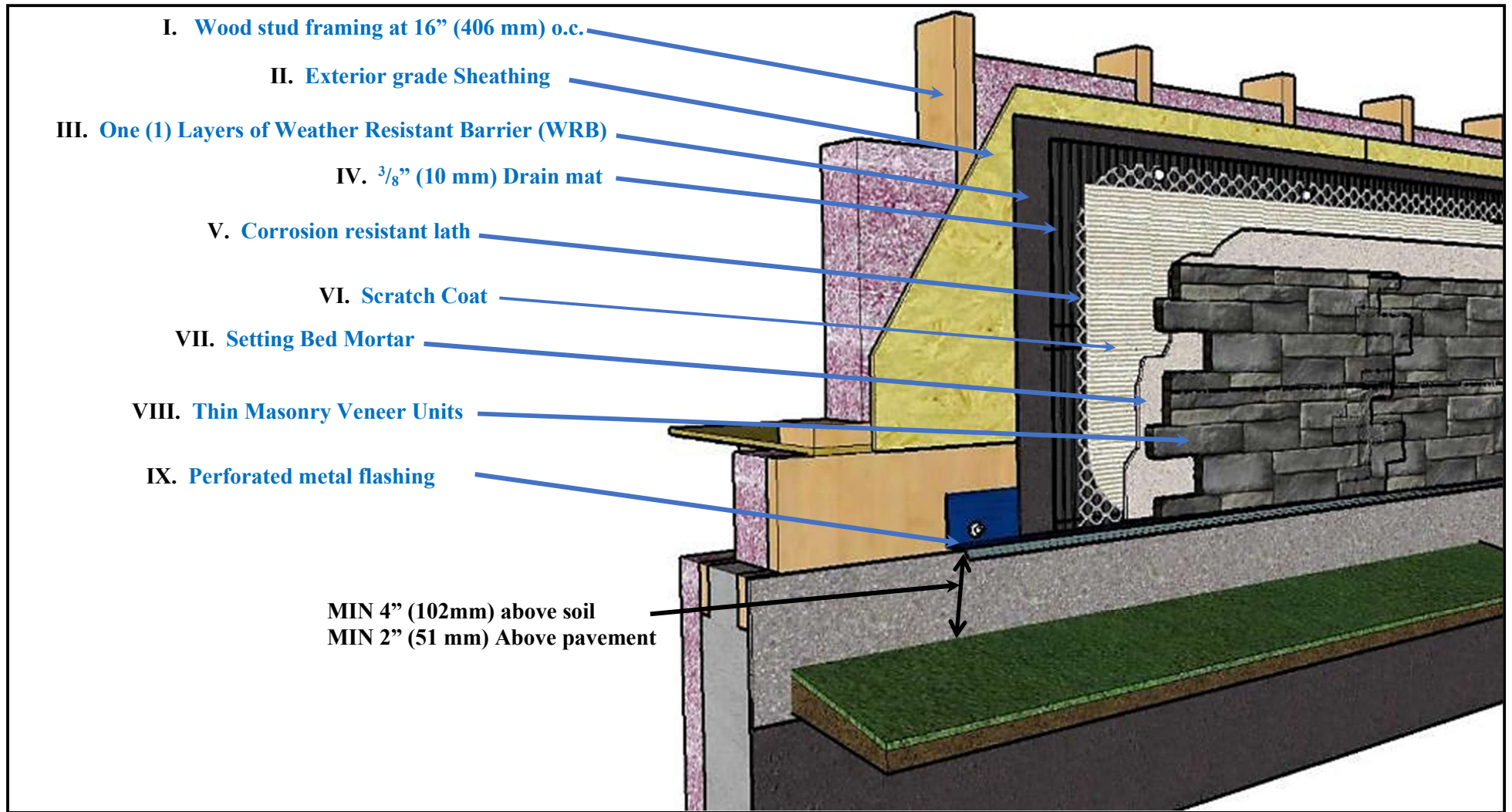


Figure 5: Isometric of Components of adhered manufactured Stone Veneer with a Drainage Mat.

Approved Installation Instructions – Adhered Masonry Veneer with Drainage

Install the Adhered Masonry Veneer with drainage as per the details provided above and the following instructions:

- 1) Review the **backup wall** for plumb and true and ensure a $\frac{1}{8}$ " (3.8 mm) gap between exterior grade OSB or plywood sheets.

Acceptable backup wall for adhered masonry veneer installations:

Wood Framing (behind adhered masonry veneers):

- 2x6 Wood Studs (*SPF #3 or better*) @ maximum 16" (406 mm) o.c. spacing
- 2x6 Wood Studs (*SPF #3 or better*) @ maximum 24" (610 mm) o.c. spacing
- 2x4 Wood Studs (*SPF #3 or better*) @ maximum 16" (406 mm) o.c. spacing

Exterior Grade Sheathing:

2x6 or 2x4 Studs at 16" (406 mm) o.c.

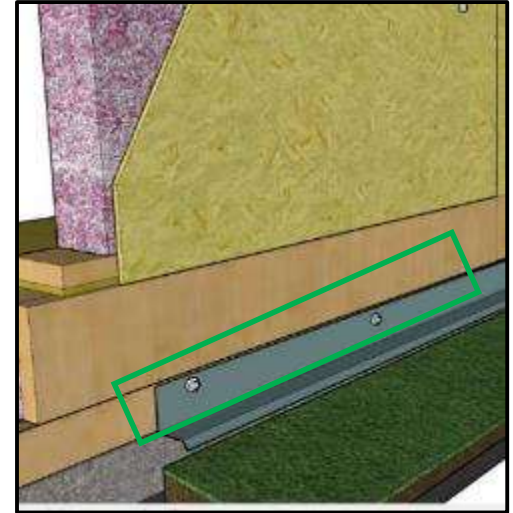
- minimum $\frac{3}{8}$ " (10 mm) thick exterior grade Oriented Stand Board (OSB-1).
- minimum $\frac{1}{2}$ " (13 mm) thick exterior grade plywood
- minimum $\frac{1}{2}$ " (13 mm) thick exterior grade gypsum.

2x6 Studs at 24" (610 mm) o.c.

- minimum of $\frac{5}{8}$ " (16 mm) thick exterior grade Oriented Stand Board (OSB-1) OR minimum 2 sheets of $\frac{3}{8}$ " (9.5 mm) thick exterior grade Oriented Stand Board (OSB-1)
- minimum of $\frac{3}{4}$ " (19 mm) thick exterior grade plywood.
- minimum of $\frac{3}{4}$ " (19 mm) thick exterior grade gypsum.

Installation of weep screed and/or flashing at the base of the wall

- 2) Install Weep Screed and/or through wall flashing at the base of the wall
- 3) Weep Screed and/or through wall flashing to be a minimum 4" (102 mm) above soil or 2" Above paved surfaces



Acceptable Weep Screeds for wall for adhered masonry veneer installations:

Perforated metal flashing:

Drainaway™

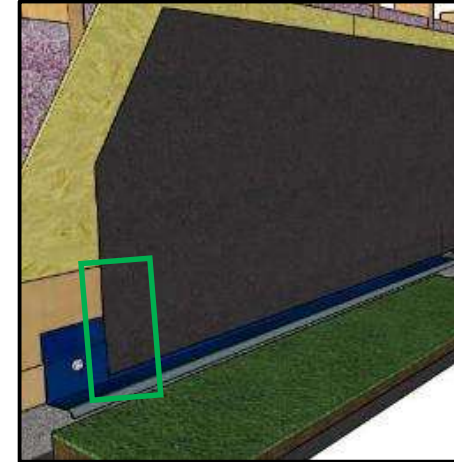


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Installation of Weather Resistant Barrier (WRB)

- 4) Install One (1) Layer of Weather Resistant Barrier (WRB):
 - i. 1 Layers of 60 min Asphalt impregnated building paper
 - ii. 1 Layer of spun bonded polyolefin (house wrap).
- 5) Lap WRB on to weep screed/through wall flashing from the base of the weep screed/through wall flashing and a minimum 6" (152 mm) up the wall onto the exterior grade sheathing (highlighted in the green box strip in the isometric).



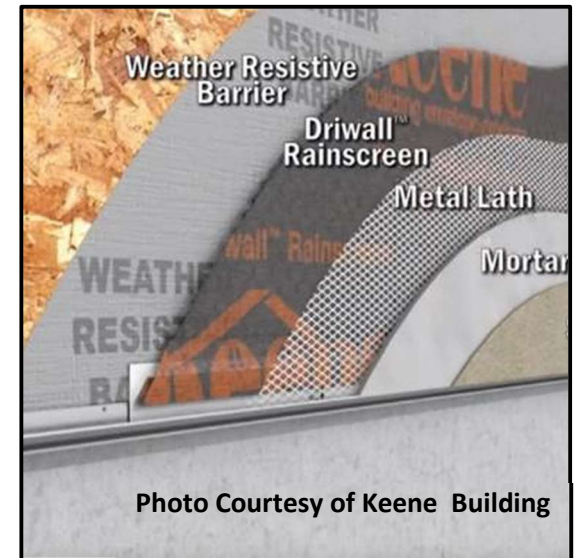
- 6) Working from the base of the wall, shingle lap the first course of WRB over the WRB lapped over the flashing in Step 5.
- 7) Continuing up the wall, Shingle Lap WRB a minimum 6" (152 mm) at all vertical seams and a minimum 4" (102 mm) at all horizontal seams.

Installation of Drainage Mat

- 1) Fasten $\frac{3}{8}$ " **(10 mm) Drainage mat** with minimum compression resistance of 15 psi (0.10 MPa at 10% strain) as per manufacturers instructions:

Acceptable minimum $\frac{3}{8}$ " (10 mm) drainage mats:

- i) Delta-Dry (10 mm)
- ii) Keene Dri-wall (10 mm)
- iii) MTI SureCavity (10 mm)
- iv) Henry HEDB500 (11mm)



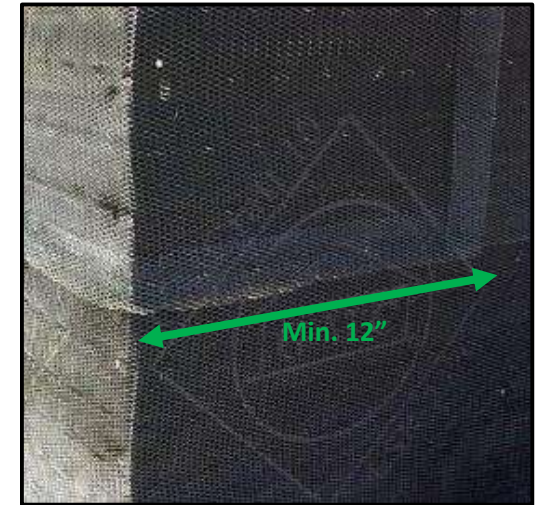
- 2) Filter Cloth toward the lath.
- 3) Drainage plane toward the WRB.
- 4) Lap drainage mat as per manufacturer's instructions.

Installation of Lath

28) Install minimum **2.5 lb/yd² corrosion resistant, self-furring diamond mesh metal lath** meet or exceed **ASTM-C847-18**.

29) Lath shall be installed horizontally (perpendicular to studs) with a minimum 1" (25 mm) lap at all vertical and horizontal seams.

30) Lap the lath a minimum 12" (305 mm) at all inside and outside corners. in accordance with ASTM-C1780-18a



31) Fasten lath to the wood studs at:

- i. 16" (406 mm) o.c. horizontally and 6" (152 mm) o.c. vertically as per ASTM-C1780-18a. using **acceptable fasteners for lath** as detailed below

OR

- ii. 24" (610) horizontally by 4" vertically (102 mm) as per pre-engineered calculations using **acceptable fasteners for lath** as detailed below.

Acceptable Fasteners for Lath:

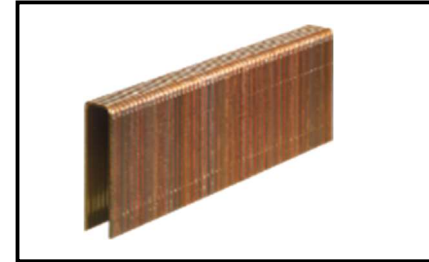
- iv. 0.120" diam. (6d), corrosion resistant roofing nails, 2" long
min. embedment 1-3/4" (45 mm) into stud.

OR



- v. 14-gauge, corrosion resistant 3/4" crown staples, 2" (51 mm) leg,
min. embedment 1-3/4" (45 mm) into stud.

OR

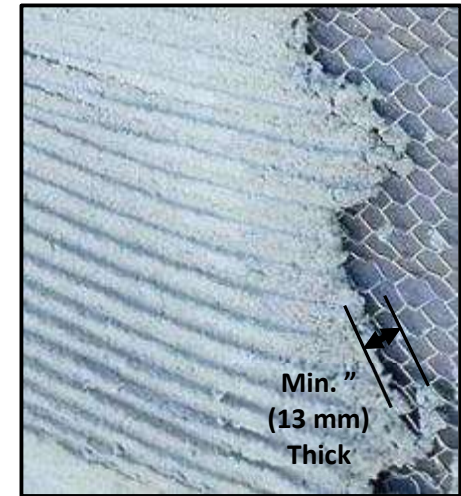


- vi. #8 corrosion resistant wood screws, 1-1/4" (32 mm) long,
min. embedment 1" (25 mm).



Installation of Scratch Coat

- 32) Install scratch coat to a **minimum thickness of ½” (13 mm)** using a **pre-blended (pre-bagged) Type S mortar** conforming to CSA-A179-14.
- 33) The scratch coat shall be installed with a sufficient amount of mortar to fully encapsulate the lath.
- 34) When the scratch coat mortar is thumbprint hard, the mortar is to be scored with a hand broom in the **horizontal direction only**.
- 35) Allow scratch coat to **cure for a minimum 48 hours** prior to unit installation in accordance with ASTM-C1780-18a. and installed in cold weather in compliance with CSA-A371-14 cold weather construction requirements.



Thin Masonry Veneer Unit Installation - Drystack (tight fit) Installation

- 36) Pre-wash the back of the masonry units with water to remove debris and allow units to dry before installation.
- 37) Install thin masonry units fully buttering the back of the masonry units with setting bed mortar with sufficient pressure to fill in voids and according to manufacturer's instructions

Acceptable setting bed mortars:

- i. Laticrete *Hi-Bond Masonry Veneer mortar*
- ii. Specmix *Thin Veneer Adhesion Mortar XP500*
- iii. Custom Building Products *Flexbond*.

- 38) Setting bed mortar to be installed to a minimum thickness of $\frac{3}{8}$ ” (10 mm).
- 39) Press the masonry unit against the scratch coat with sufficient pressure to squeeze mortar around the perimeter of the unit.
- 40) Maintain a **maximum $\frac{1}{16}$ ” (1.5 mm) joint** between units for tight fit applications.



Thin Masonry Veneer Unit Installation - Jointed Installation

- 41) Pre-wash the back of the masonry units with water to remove debris and allow units to dry before installation.
- 42) Install thin masonry units fully buttering the back of the masonry units with setting bed mortar with sufficient pressure to fill in voids and according to manufacturer's instructions

Acceptable setting bed mortars:

- iv. Laticrete *Hi-Bond Masonry Veneer mortar*
- v. Specmix *Thin Veneer Adhesion Mortar XP500*
- vi. Custom Building Products *Flexbond*.

- 43) Setting bed mortar to be installed to a minimum thickness of $\frac{3}{8}$ " (10 mm).
- 44) Press the masonry unit against the scratch coat with sufficient pressure to squeeze mortar around the perimeter of the unit.
- 45) Maintain a minimum $\frac{3}{8}$ " (10 mm) joint for adhered thin brick veneers and a minimum $\frac{1}{2}$ " (13 mm) joint between units as per ASTM-C1780-18a for thin adhered manufactured stone veneers.



46) Wait a minimum 24 hour before filling (Grout Bag) and pointing the joints, grout with a pre-blended Type N or Type S mortar:



47) Installation of adhered masonry veneers (scratch coat, setting bed mortar and mortar joints in jointed applications) below temperatures of 4°C must be installed in compliance with CSA-A371-14 heating and hoarding requirements.

STANDARD REFERENCES

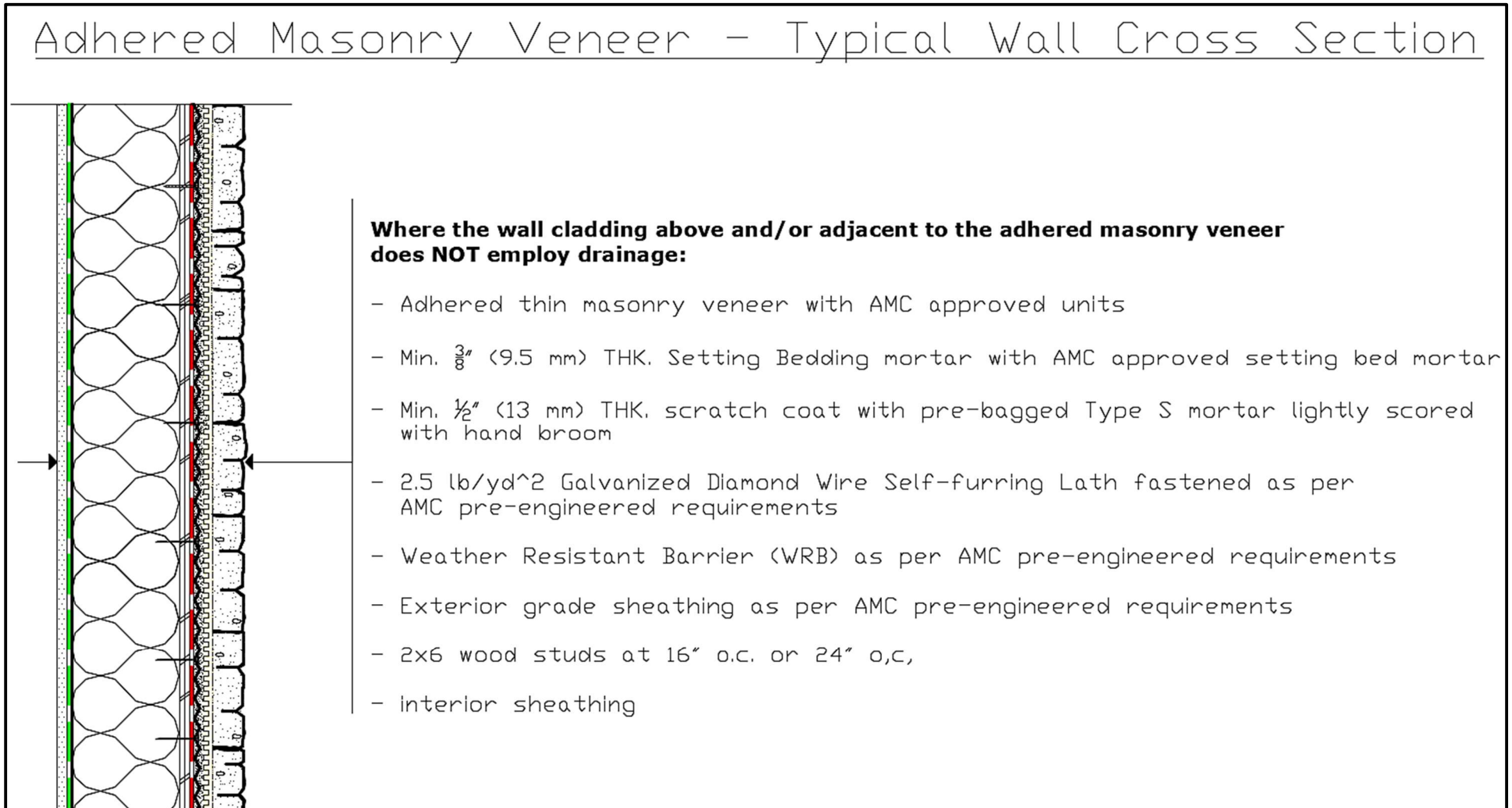
1. ASTM-C847-18 - Standard Specification for Metal Lath
2. ASTM-C1780-18a - Standard Practice for Installation Methods for Adhered Manufactured Stone Masonry Veneer
3. ASTM-C1670-19 - Standard Specification for Adhered Manufactured Stone Masonry Veneer Units
4. ASTM-C1714 - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry
5. CSA-A179-14 - Mortar and grout for unit masonry
6. CSA-A371-14 - Masonry construction for buildings
7. ANSI 118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar
8. ASTM-C482 -02 (2014) - Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement Paste

APPENDIX A:

DETAILS TO BE INCLUDED IN THE DRAWINGS SUBMITTED TO THE AUTHORITIES HAVING JURISDICTION (AHJ)

CASE I: ADHERED MASONRY VENEER *WITHOUT* DRAINAGE

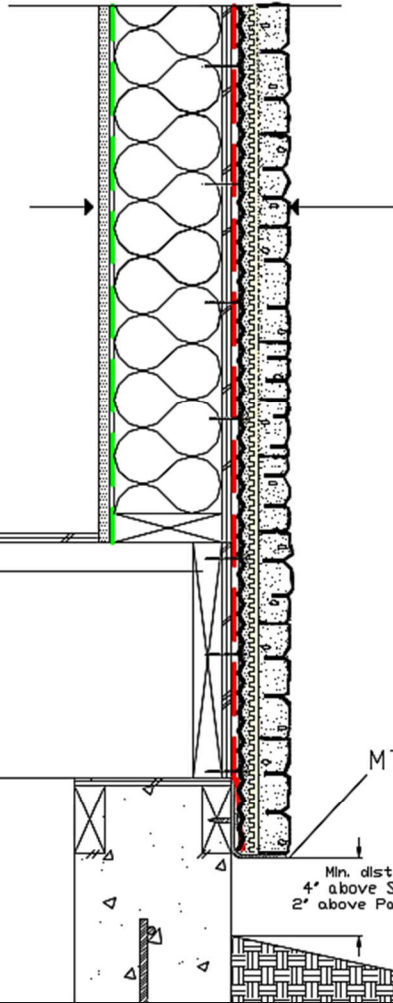
Where the wall claddings above and/or adjacent to the adhered masonry veneer do not employ drainage, then the adhered stone veneer *need not* utilize a drainage mat.



APPENDIX A:

DETAILS TO BE INCLUDED IN THE DRAWINGS SUBMITTED TO THE AUTHORITIES HAVING JURISDICTION (AHJ)

Adhered Masonry Veneer - Foundation Detail



Where the wall cladding above and/or adjacent to the adhered masonry veneer does NOT employ drainage:

- Adhered thin masonry veneer with AMC approved units
- Min. $\frac{3}{8}$ " (9.5 mm) THK. Setting Bedding mortar with AMC approved setting bed mortar
- Min. $\frac{1}{2}$ " (13 mm) THK. scratch coat with pre-bagged Type S mortar lightly scored with hand broom
- 2.5 lb/yd² Galvanized Diamond Wire Self-furring Lath fastened as per AMC pre-engineered requirements
- Weather Resistant Barrier (WRB) as per AMC pre-engineered requirements
- Exterior grade sheathing as per AMC pre-engineered requirements
- 2x6 wood studs at 16" o.c. or 24" o.c.
- interior sheathing

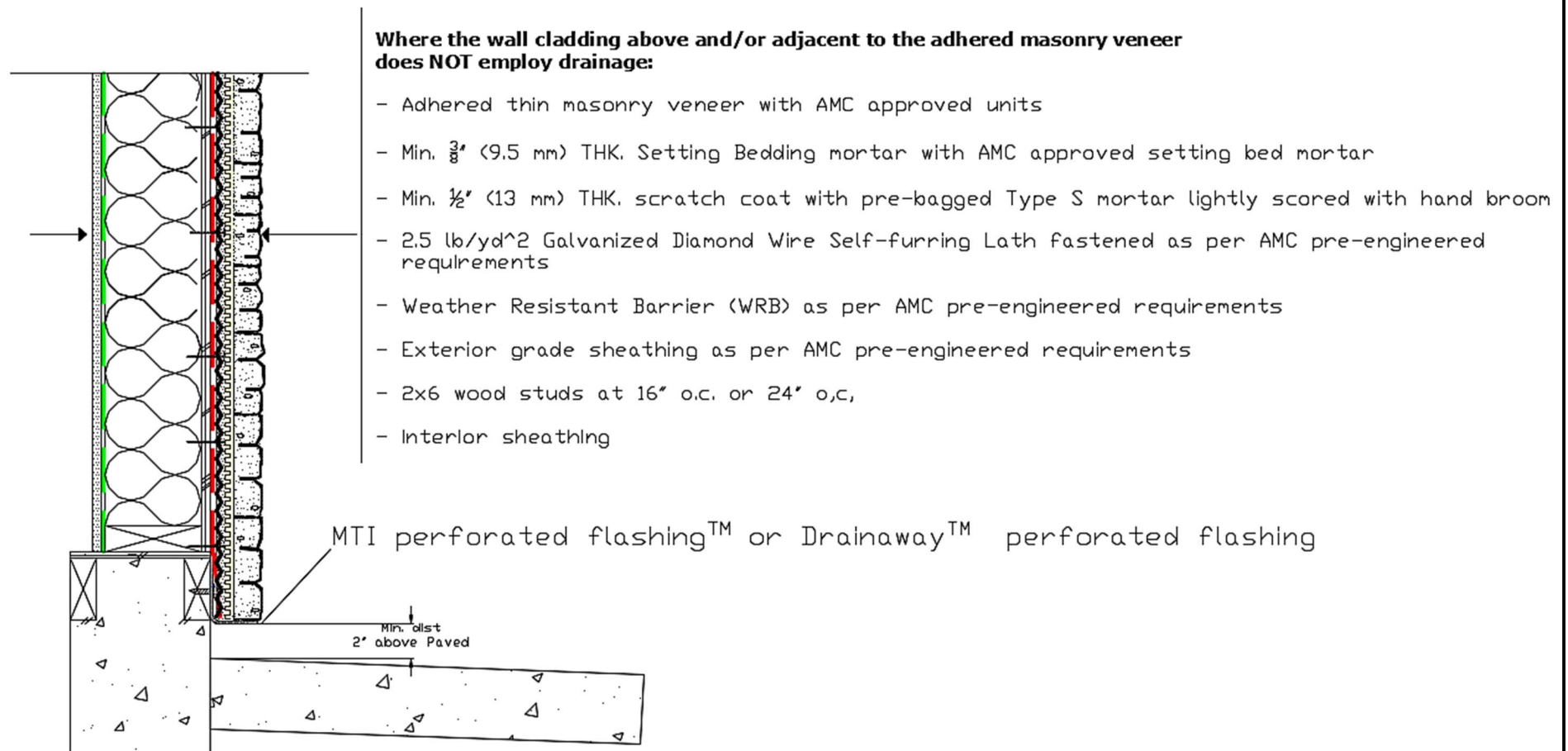
MTI perforated flashing™ or Drainaway™ perforated flashing

Min. dist
4" above Soil
2" above Paved

APPENDIX A:

DETAILS TO BE INCLUDED IN THE DRAWINGS SUBMITTED TO THE AUTHORITIES HAVING JURISDICTION (AHJ)

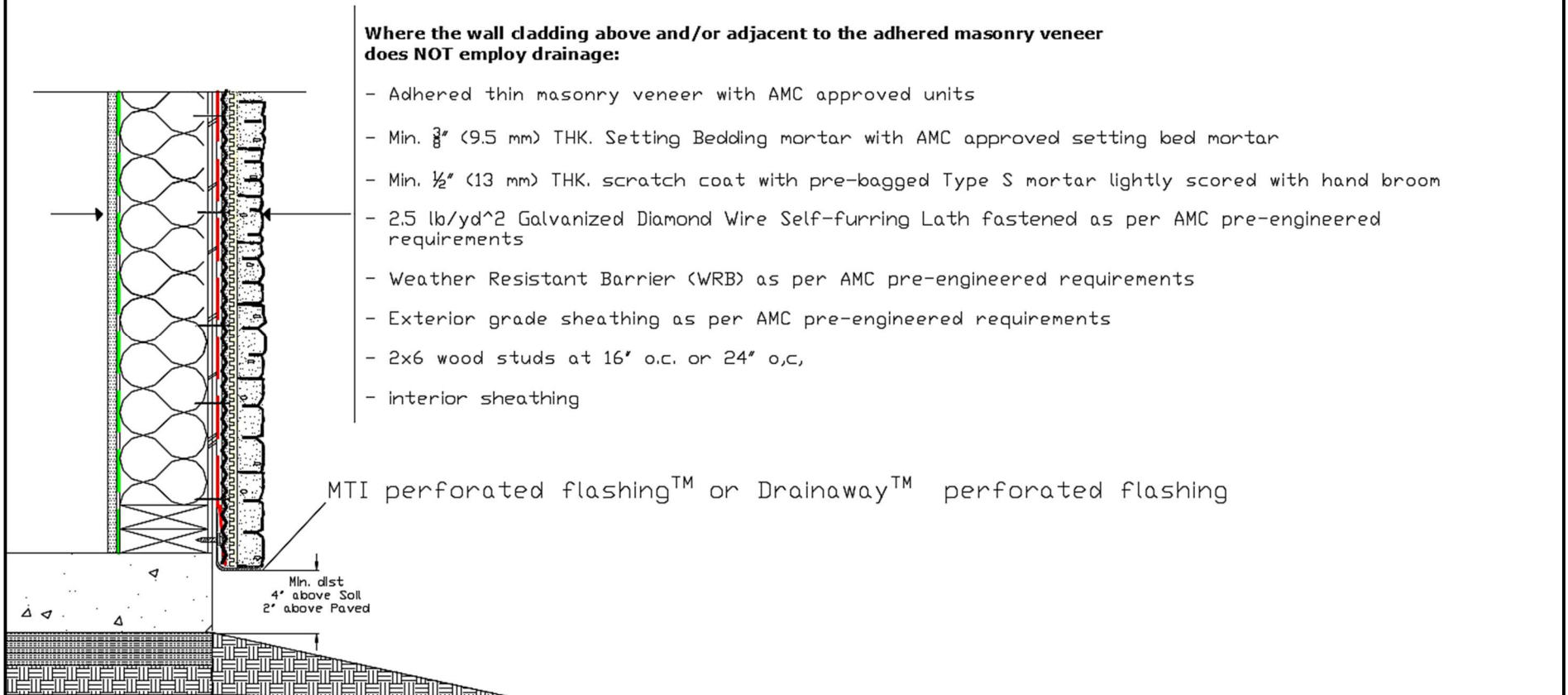
Adhered Masonry Veneer - Base of Wall Detail I (Wall on curb)



APPENDIX A:

DETAILS TO BE INCLUDED IN THE DRAWINGS SUBMITTED TO THE AUTHORITIES HAVING JURISDICTION (AHJ)

Adhered Masonry Veneer - Base of Wall Detail II (Walk-out basement)



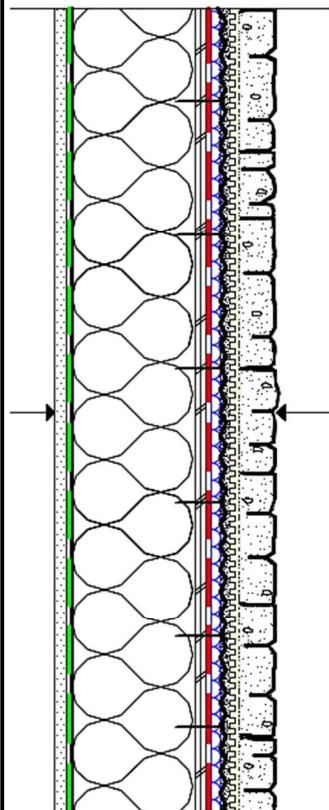
APPENDIX A:

DETAILS TO BE INCLUDED IN THE DRAWINGS SUBMITTED TO THE AUTHORITIES HAVING JURISDICTION (AHJ)

CASE 2: ADHERED MASONRY VENEER WITH DRAINAGE

Where the adhered masonry veneer installation height is to the underside of the first storey roof (i.e. full height wall) OR when the wall cladding above and/or adjacent to the adhered masonry veneer employs a drainage mat the adhered masonry veneer *shall* utilize a drainage mat.

Adhered Masonry Veneer with Drainage – Typical Wall Section



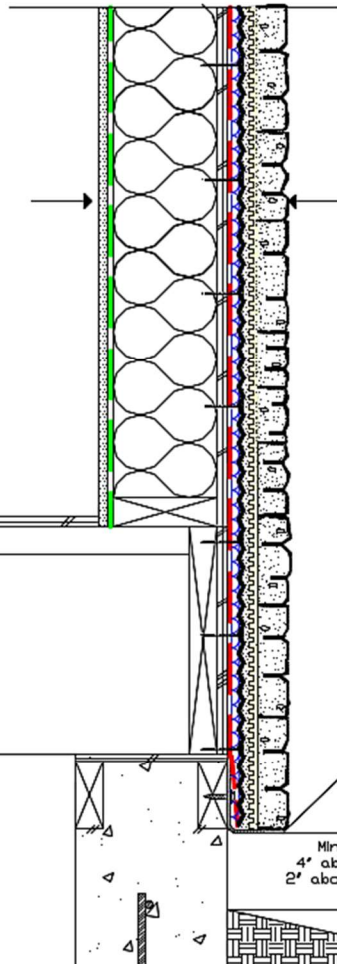
Where the adhered masonry veneer height is to underside of roof of the first storey or when the wall cladding above and/or adjacent employs drainage:

- Adhered thin masonry veneer with AMC approved units
- Min. $\frac{3}{8}$ " (9.5 mm) THK. Setting bedding mortar with AMC approved setting bed mortar
- Min. $\frac{1}{2}$ " (13 mm) THK. scratch coat with pre-bagged Type S mortar lightly scored with hand broom
- 2.5 lb/yd² Galvanized Diamond Wire Self-furring Lath fastened as per AMC pre-engineered requirements
- Min. $\frac{3}{8}$ " (10 mm) THK. drainage mat with AMC approved drainage mat manufacturer
- Weather Resistant Barrier (WRB) as per AMC pre-engineered requirements
- Exterior grade sheathing as per AMC pre-engineered requirements
- 2x6 wood studs at 16" o.c. or 24" o.c.
- interior sheathing

APPENDIX A:

DETAILS TO BE INCLUDED IN THE DRAWINGS SUBMITTED TO THE AUTHORITIES HAVING JURISDICTION (AHJ)

Adhered Masonry Veneer with Drainage- Foundation Detail



Where the adhered masonry veneer height is to underside of roof of the first storey or when the wall cladding above and/or adjacent employs drainage:

- Adhered thin masonry veneer with AMC approved units
- Min. $\frac{3}{8}$ " (9.5 mm) THK. Setting bedding mortar with AMC approved setting bed mortar
- Min. $\frac{1}{2}$ " (13 mm) THK. scratch coat with pre-bagged Type S mortar lightly scored with hand broom
- 2.5 lb/yd² Galvanized Diamond Wire Self-furring Lath fastened as per AMC pre-engineered requirements
- Min. $\frac{3}{8}$ " (10 mm) THK. drainage mat with AMC approved drainage mat manufacturer
- Weather Resistant Barrier (WRB) as per AMC pre-engineered requirements
- Exterior grade sheathing as per AMC pre-engineered requirements
- 2x6 wood studs at 16" o.c. or 24" o.c.
- interior sheathing

MTI perforated flashing™ or Drainaway™ perforated flashing

Min. dist
4' above Soil
2' above Paved

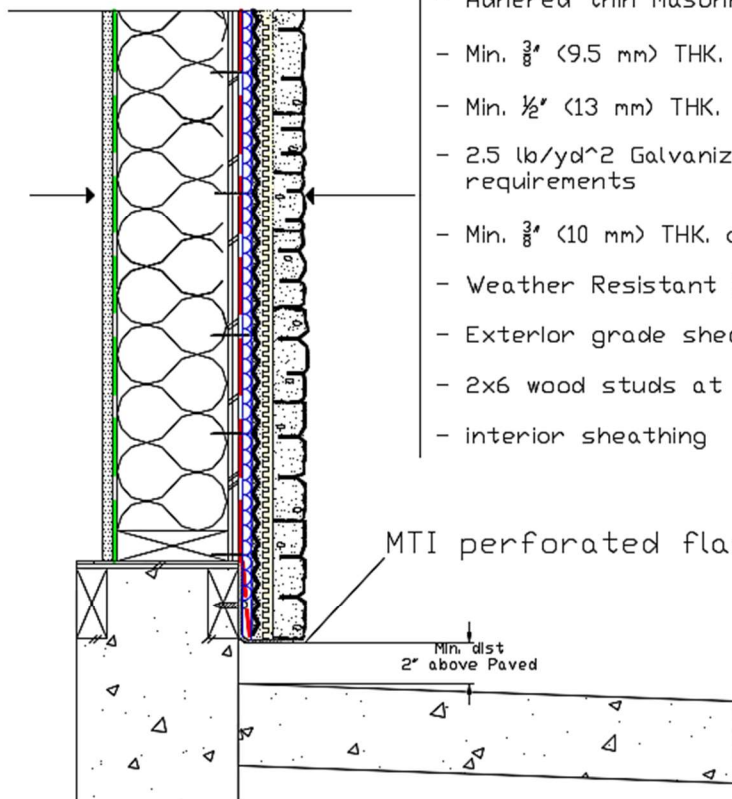
APPENDIX A:

DETAILS TO BE INCLUDED IN THE DRAWINGS SUBMITTED TO THE AUTHORITIES HAVING JURISDICTION (AHJ)

Adhered Masonry Veneer with Drainage - Base of Wall Detail I (Wall on Curb)

Where the adhered masonry veneer height is to underside of roof of the first storey or when the wall cladding above and/or adjacent employs drainage:

- Adhered thin masonry veneer with AMC approved units
- Min. $\frac{3}{8}$ " (9.5 mm) THK. Setting bedding mortar with AMC approved setting bed mortar
- Min. $\frac{1}{2}$ " (13 mm) THK. scratch coat with pre-bagged Type S mortar lightly scored with hand broom
- 2.5 lb/yd² Galvanized Diamond Wire Self-furring Lath fastened as per AMC pre-engineered requirements
- Min. $\frac{3}{8}$ " (10 mm) THK. drainage mat with AMC approved drainage mat manufacturer
- Weather Resistant Barrier (WRB) as per AMC pre-engineered requirements
- Exterior grade sheathing as per AMC pre-engineered requirements
- 2x6 wood studs at 16" o.c. or 24" o.c.
- interior sheathing



MTI perforated flashing™ or Drainaway™ perforated flashing

Min. dist
2" above Paved

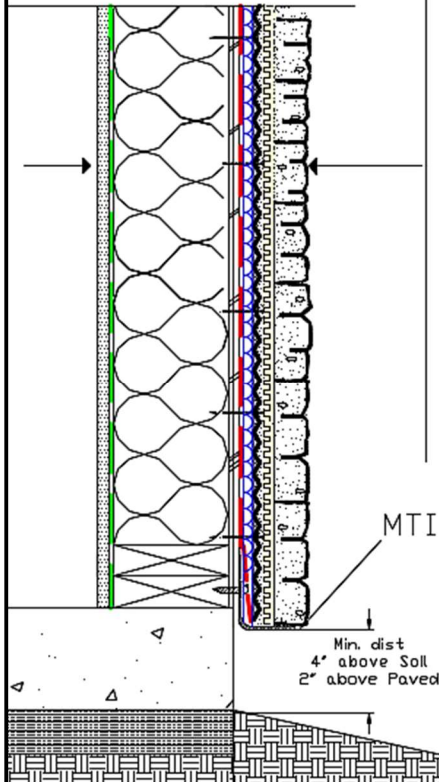
APPENDIX A:

DETAILS TO BE INCLUDED IN THE DRAWINGS SUBMITTED TO THE AUTHORITIES HAVING JURISDICTION (AHJ)

Adhered Masonry Veneer with Drainage - Base of Wall Detail II (Walk-out basement)

Where the adhered masonry veneer height is to underside of roof of the first storey or when the wall cladding above and/or adjacent employs drainage:

- Adhered thin masonry veneer with AMC approved units
- Min. $\frac{3}{8}$ " (9.5 mm) THK. Setting bedding mortar with AMC approved setting bed mortar
- Min. $\frac{1}{2}$ " (13 mm) THK. scratch coat with pre-bagged Type S mortar lightly scored with hand broom
- 2.5 lb/yd² Galvanized Diamond Wire Self-furring Lath fastened as per AMC pre-engineered requirements
- Min. $\frac{3}{8}$ " (10 mm) THK. drainage mat with AMC approved drainage mat manufacturer
- Weather Resistant Barrier (WRB) as per AMC pre-engineered requirements
- Exterior grade sheathing as per AMC pre-engineered requirements
- 2x6 wood studs at 16" o.c. or 24" o.c.
- interior sheathing



MTI perforated flashing™ or Drainaway™ perforated flashing

Min. dist
4" above Soil
2" above Paved

APPENDIX B: ENGINEERING CALCULATIONS AND TEST DATA

DEAD LOAD

Maximum veneer self-weight (including lath/scratch and units) = **0.96 kPa (20psf)**

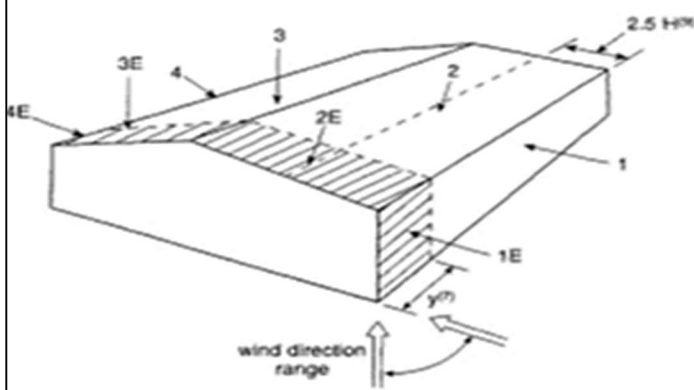
EARTHQUATE LOAD

S _a (0.2)=	0.50	BANFF	$A_x = 1 + 2(h_x / h_n) = 1 + 2(1) 3.0$		
C _p =	1.0		$S_p = C_p A_r A_x / R_p =$	2.0	
A _r =	1.0			(0.7 < S _p < 4)	S _p = 2.0
R _p =	1.5				
I _e =	1.0				
Site Class=	E				
F _a =	1.64				
W _p =	0.96	kN/m ²			
	(20 psf)				
			Clause 4.1.8.18		
					V_p = 0.3 F_a S_a(0.2) I_e S_p W_p = 0.47 kN/m²
					= 9.8 psf

APPENDIX B: ENGINEERING CALCULATIONS AND TEST DATA

WIND LOAD (Pincher Creek, Alberta)

Load Case A: Winds Generally Perpendicular to Ridge

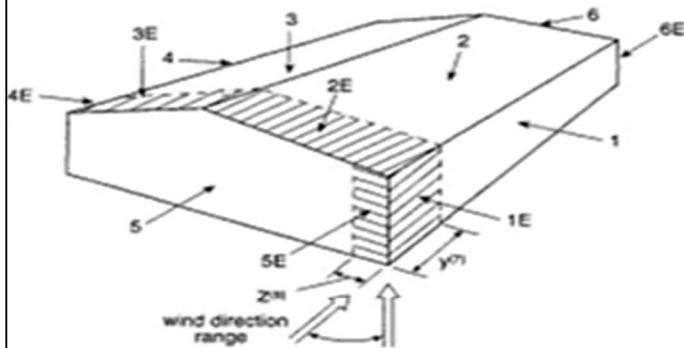


Building Surface	$C_p C_g$	External $C_{pi} =$	Pressures (kPa)		P_{net}	
			Internal			
			-0.15	0.00	-0.15	0.00
1	0.75	0.66	-0.26	0.00	0.92	0.66
1E	1.15	1.01	-0.26	0.00	1.27	1.01
2	-1.30	-1.14	-0.26	0.00	-0.88	-1.14
2E	-2.00	-1.75	-0.26	0.00	-1.49	-1.75
3	-0.70	-0.61	-0.26	0.00	-0.35	-0.61
3E	-1.00	-0.88	-0.26	0.00	-0.61	-0.88
4	-0.55	-0.48	-0.26	0.00	-0.22	-0.48
4E	-0.80	-0.70	-0.26	0.00	-0.44	-0.70

Application of Note [1]?: No ;

Extension of zone 2/2E from windward eaves: 4.57 m

Load Case B: Winds Generally Parallel to Ridge



End zone distance, z = 1.00 m
End zone distance, y = 6.00 m

Building Surface	$C_p C_g$	External $C_{pi} =$	Pressures (kPa)		P_{net}	
			Internal			
			-0.15	0.00	-0.15	0.00
1	-0.85	-0.74	-0.26	0.00	-0.48	-0.74
1E	-0.90	-0.79	-0.26	0.00	-0.53	-0.79
2	-1.30	-1.14	-0.26	0.00	-0.88	-1.14
2E	-2.00	-1.75	-0.26	0.00	-1.49	-1.75
3	-0.70	-0.61	-0.26	0.00	-0.35	-0.61
3E	-1.00	-0.88	-0.26	0.00	-0.61	-0.88
4	-0.85	-0.74	-0.26	0.00	-0.48	-0.74
4E	-0.90	-0.79	-0.26	0.00	-0.53	-0.79
5	0.75	0.66	-0.26	0.00	0.92	0.66
5E	1.15	1.01	-0.26	0.00	1.27	1.01
6	-0.55	-0.48	-0.26	0.00	-0.22	-0.48
6E	-0.80	-0.70	-0.26	0.00	-0.44	-0.70

WIND GOVERNS at -1.75 kPa (1.75 kN/m²) for lateral loading

APPENDIX B: ENGINEERING CALCULATIONS AND TEST DATA

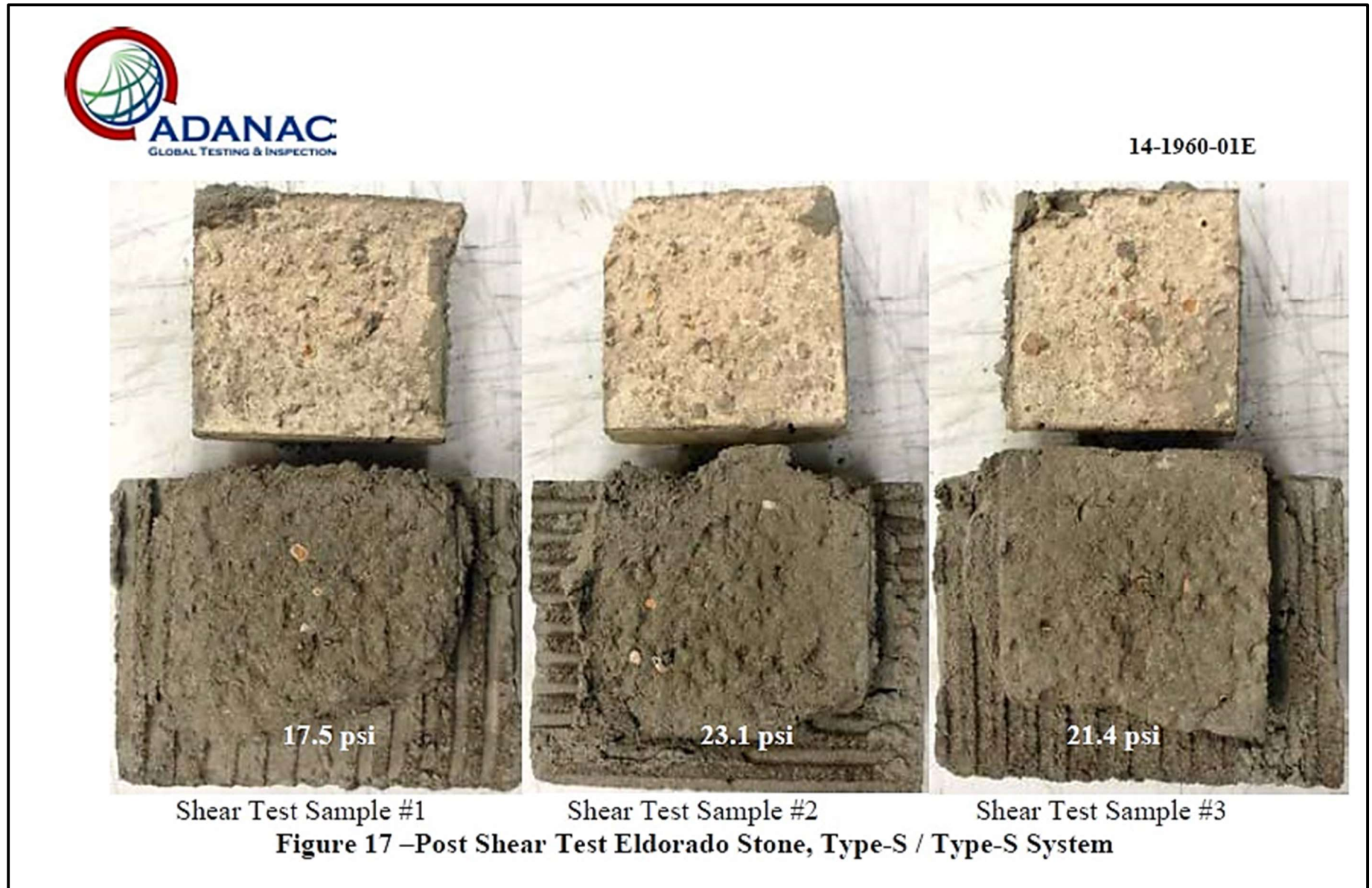
The Adhered Stone Testing Program commissioned by Alberta Masonry Council was conducted at the ISO/IEC 17025:2005 accredited, ADANAC Global Laboratories. The tests were conducted by casting mortar block (simulated scratch coat) sample, allowing it to cure for 24 hours at laboratory conditions (21C and 40% R.H.), adhering the masonry unit to the mortar block after the 24-hour cure and testing the sample 7 days later. This construction of the specimens better represents field construction where a minimum 24 hours is required for the scratch coat to cure before installation of stone units.

TEST CONFIGURATION (MODIFIED ASTM-C482-01):



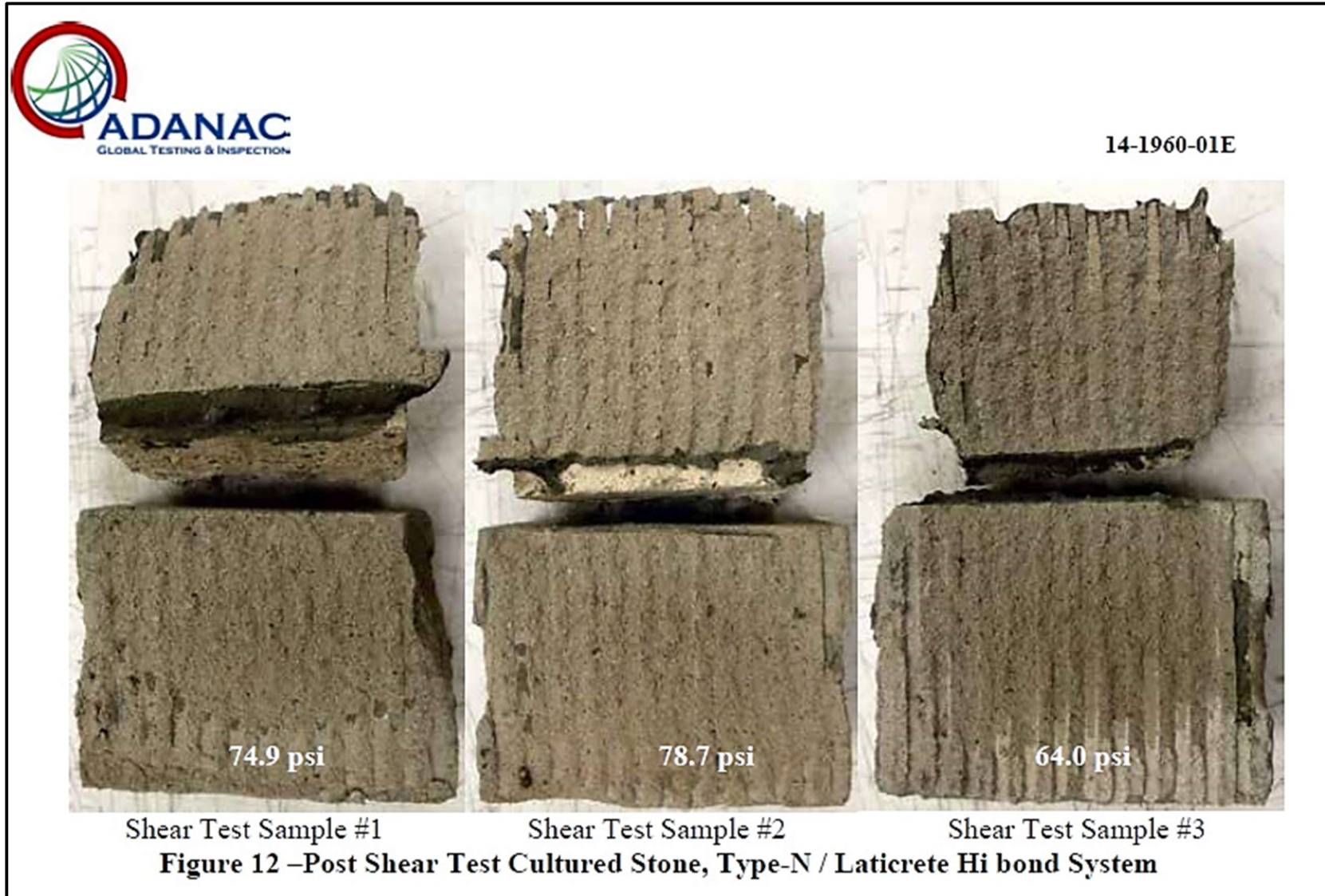
APPENDIX B: ENGINEERING CALCULATIONS AND TEST DATA

SAMPLE RESULT WITH TYPE S SIMULATED SCRATCH COAT AND TYPE S SETTING BED MORTAR:



APPENDIX B: ENGINEERING CALCULATIONS AND TEST DATA

SAMPLE RESULT WITH TYPE N SIMULATED SCRATCH COAT AND LATICRETE HI BOND SETTING BED MORTAR:



APPENDIX B: ENGINEERING CALCULATIONS AND TEST DATA

SUMMARY OF TEST RESULTS:

The following summary reports the *maximum* shear bond and tensile bond resulting from three test samples. The red boxes identify the tests where the *maximum* shear bond strength achieved from the three test samples was less than the minimum 50 psi required by ASTM-C1780-18a and ASTM-C1670-19.

Adhered Stone Testing at Adanac Global Testing 2014-2016						
Stone Manufacturer	Scratch Coat	Bedding Mortar	Max Shear Bond Strength		Max Tensile Bond Strength	
			(psi)	(MPa)	(psi)	(MPa)
Culture Stone	Type N	Type N	21	0.1	10	0.07
	Type S	Type S	32	0.2	12	0.08
	Type N	Specmix Polymer Modified	43	0.3	19	0.13
	Specmix Polymer Modified	Specmix Polymer Modified	42	0.3	17	0.11
	Type S	Specmix XP 500	157	1.1	73	0.50
	Type N	Laticrete Hi Bond	79	0.5	38	0.26
	Type N	Laticrete Hi Bond + Air water	80	0.5	39	0.27
	Exterior Grade Cement Board	Laticrete Hi Bond + Air water	113	0.8	33	0.23
	Exterior Grade Cement Board	Specmix XP 500	74	0.5	38	0.26
Eldorado	Type N	Type N	18	0.1	10	0.07
	Type S	Type S	23	0.2	11	0.08
	Type N	Specmix Polymer Modified	57	0.4	23	0.16
	Specmix Polymer Modified	Specmix Polymer Modified	65	0.4	23	0.16
	Type S	Specmix XP 500	221	1.5	112	0.77
	Type N	Laticrete Hi Bond	91	0.6	44	0.31
	Type N	Laticrete Hi Bond + Air water	66	0.5	30	0.21
	Exterior Grade Cement Board	Laticrete Hi Bond + Air water	125	0.9	34	0.23
	Exterior Grade Cement Board	Specmix XP500	75	0.5	39	0.27
Boulder Creek	Type N	Type N	12	0.1	6	0.04
	Type S	Type S	14	0.1	7	0.05
	Type N	Specmix Polymer Modified	34	0.2	25	0.17
	Specmix Polymer Modified	Specmix Polymer Modified	40	0.3	17	0.11
	Type N	Laticrete Hi Bond	98	0.7	50	0.34
	Type N	Laticrete Hi Bond + Air water	86	0.6	50	0.35
Exterior Grade Cement Board	Laticrete Hi Bond + Air water	123	0.8	47	0.32	
Harris Stone	Type N	Type N	12	0.1	14	0.09
	Type S	Type S	17	0.1	12	0.08
	Type N	Specmix Polymer Modified	30	0.2	33	0.23
	Specmix Polymer Modified	Specmix Polymer Modified	60	0.4	18	0.12
	Type N	Laticrete Hi Bond	117	0.8	64	0.44
	Type N	Laticrete Hi Bond + Air water	104	0.7	86	0.59
	Exterior Grade Cement Board	Laticrete Hi Bond + Air water	183	1.3	69	0.47

APPENDIX B: ENGINEERING CALCULATIONS AND TEST DATA

Natural Stone Shear and Tensile Bond Testing Summary

Adhered Stone Testing at Adanac Global Testing 2015						
Stone Manufacturer	Scratch Coat	Bedding Mortar	Max Shear Bond Pressure		Max Tensile Bond Pressure	
			(psi)	(MPa)	(psi)	(MPa)
Indiana Limestone	Type N	Type N	7	0.05	1	0.01
	Type S	Type S	8	0.05	8	0.05
	Type N	Specmix Polymer Modified	54	0.37	30	0.20
	Specmix Polymer Modified	Specmix Polymer Modified	52	0.36	22	0.15
	Type N	Laticrete Hi Bond	114	0.79	63	0.43
	Type N	Laticrete Hi Bond + Air water	108	0.74	69	0.48
Eldorado Natural	Cement Board	Laticrete Hi Bond + Air water	130	0.89	52	0.36
	Type N	Type N	30	0.21	25	0.17
	Type S	Type S	10	0.07	11	0.07
	Type N	Specmix Polymer Modified	80	0.55	47	0.33
	Specmix Polymer Modified	Specmix Polymer Modified	50	0.35	51	0.35
	Type N	Laticrete Hi Bond	47	0.32	31	0.22
Eldorado Natural	Type N	Laticrete Hi Bond + Air water	83	0.57	48	0.33
	Type N	Laticrete Hi Bond + Air water	147	1.01	35	0.24
	Cement Board	Laticrete Hi Bond + Air water				

Baselite and Flexbond mortars Shear & Tensile Bond Testing Summary

Adhered Stone Testing at Adanac Global Testing 2016						
Stone Manufacturer	Scratch Coat	Bedding Mortar	Max Shear Bond Strength		Max Tensile Bond Strength	
			(psi)	(MPa)	(psi)	(MPa)
Eldorado Manufactured	Baselite polymer modified stone veneer	Baselite polymer modified stone veneer	37.7	0.20	18	0.12
Cultured stone Miftern	Baselite polymer modified stone veneer	Baselite polymer modified stone veneer	43.9	0.30	16	0.11
Boulder Creek	Baselite polymer modified stone veneer	Baselite polymer modified stone veneer	40.8	0.28	12	0.08
Indiana Lime stone	Baselite polymer modified stone veneer	Baselite polymer modified stone veneer	37.9	0.26	37	0.26
Cultured stone Miftern	Baselite MortarTec	Baselite MortarTec	60.5	0.42	16	0.11
Boulder Creek	Baselite MortarTec	Baselite MortarTec	40.5	0.28	15	0.11
Indiana Lime stone	Baselite MortarTec	Baselite MortarTec	47.4	0.33	12	0.09
Cultured stone Miftern	Baselite MortarTec	Baselite MortarTec	40.7	0.28	20	0.11
Cultured stone Miftern	Cement Board	Flexbond	77.3	0.53	31	0.21
Eldorado Manufactured	Cement Board	Flexbond	94.4	0.65	40	0.28