**SECTION 042150**

 **ADHERED THIN BRICK VENEER UNITS**

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| NOTE TO SPECIFIER:Editing Conventions:Coordinate requirements in the Specifications containing **indicated on the Drawings** with the Drawings.Verify that items in red are used on the project or are referred to the right section of the specification and code, and coordinate/confirm all references to other specification sections, in general, are appropriate.The information presented in this document is for general information only, intended to aide in the preparation of the project specifications. Information contained herein should not under any circumstances be relied upon for specific application or use without independent review and evaluation by a licensed design professional familiar for its specific use and application. Anyone making use of this information does so at their own risk and assumes any and all liability resulting from such use. |

1. GENERAL
	1. SUMMARY
		1. Section Includes: Thin Brick masonry veneer units.
		2. Related Sections:
			1. Section 013119 - Project Meetings.
			2. Section 033000 - Concrete Substrate
			3. Section 040513 - Masonry mortaring
			4. Section 054000 - Cold-Formed Metal Framing
			5. Section 061000 - Rough Carpentry (wood framing)
			6. Section 071000 – Weather Resistive Barrier
			7. Section 071900 - Water Repellents
			8. Section 076000 - Flashing and Sheet Metal
			9. Section 079000 - Expansion and Control Joints
			10. Section 079200 - Joint Sealants
			11. Section 092400 - Cement Plastering (Stucco)
			12. Section 092813 – Cement Backing Boards
			13. Section 092900 - Gypsum Board
	2. REFERENCES
		1. American Society for Testing and Materials (ASTM):
			1. A 525 – Steel Sheet Zinc-Coated – hot dip galvanized
			2. C 33 - Specification for Concrete Aggregates.
			3. C 67 - Test Methods of Sampling and Testing Brick and Structural Clay Tile.
			4. C 79 – Gypsum Sheathing board
			5. C 270 - Specification for Mortar for Unit Masonry.
			6. C 578 – Preformed Cellular Polystyrene Thermal Insulation
			7. [C 482-02 Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement](http://www.astm.org/cgi-bin/SoftCart.exe/DATABASE.CART/REDLINE_PAGES/C482.htm?L+mystore+cfxc4456+1153507125)
			8. C 270 - Specification for Mortar for Unit Masonry.
			9. C 1019 - Method of Sampling and Testing Grout.
			10. C 1088 - Standard Specification for Thin Veneer Brick Units Made from Clay or Shale.
			11. C 1325 – Standard specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units
			12. C 1780 – Standard Practice for Installation Methods for Adhered Manufactured Stone Masonry Veneer.
		2. ANSI
			1. A108.11 Installation of cementitious backer units.
			2. A108.13 Installation of waterproof membranes for thin-set brick.
			3. A118.1 Dry-set Portland cement mortar.
			4. A118.4 latex Portland cement mortar.
			5. A118.9 Cementitious backer units.
			6. A118.10 Waterproof membranes for thin-set brick.
			7. A136.1 Organic Adhesives, Type I and Type II
		3. International Building Code (ICC), adopted addition.
		4. Building Code Requirements and Specification for Masonry Structures (TMS 402/602), adopted addition.
		5. PCA Plaster and Stucco Handbook, latest edition
		6. TCNA Handbook for Ceramic, Glass, and Stone Tile Installations, latest edition.
		7. Masonry Veneer Manufacturers Association Installation Guide and Detailing for Compliance with ASTM C1780, latest edition
	3. SUBMITTALS
		1. Submit under provisions of Section 013300.
		2. Product Data, and Evaluation Reports as required for installation.
		3. Shop Drawings: Include elevations of each wall indicating type and layout of units.
		4. Samples: Include samples of stretcher units in sufficient quantity to illustrate color range and texture.
		5. Test Reports from an independent testing laboratory showing compliance with applicable specifications.
		6. Provide manufacturer's specification, data, and installation for review prior to fabrication of work.
		7. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect
	4. QUALITY ASSURANCE
		1. Continuous Inspection:
			1. Employ a qualified masonry inspector for continuous inspection of the masonry work. Acceptance by a State or municipality having a program of examining and certifying masonry inspectors will be considered adequate qualifications. The masonry inspector shall be at the site during all masonry construction and perform the following duties:
				1. Review Drawings and Specifications and meet with the CONTRACTOR to discuss requirements before work commences.
				2. Before masonry work commences, CONTRACTOR and the Contractor's Quality Control Representative shall attend meeting with ENGINEER to review the requirements for surveillance and quality control of the masonry work.
				3. Check brand and type of cement, lime (if used), and source of sand.
				4. Ensure that the backing is continuous, rough, and moisture resistant to receive units.
				5. Observe field proportioning of mortar. Visually check aggregate to determine uniformity of grading, cleanliness, and moisture.
				6. Ensure that joints are full of mortar and kept tight during work.
				7. Continuously observe placing of grout.
				8. Perform or supervise performance of required sampling and testing.
			2. Keep complete record of inspections. Report daily to the Contractor's Quality Control Representative the progress of the masonry inspection.
		2. Mock-up (Sample Panel):
			1. Prior to starting construction of masonry, construct minimum 4 foot square mock-up.
			2. Use accepted materials, containing each different kind and color of brick masonry units and/or mortar to illustrate wall design.
			3. Show color range, texture range, bond, mortar color, joint tooling, critical design details and quality of workmanship.
			4. Show adjustments to coursing patterns illustrating partial size units to accommodate non-modular layout dimensions and adjustments to joint sizes.
			5. Masonry construction may not proceed until the Architect./ Engineer approves mock-up.
			6. When not accepted, construct another mock-up/sample panel.
			7. When accepted, mock-up will remain intact during construction, will be the standard of comparison for the remainder of masonry work.
			8. Upon completion and acceptance of Project, dispose of mock-ups in legal manner at offsite location.
		3. Pre-installation Conference: Conduct as specified in Section 013119.
		4. Certification: Furnish manufacturer’s certification that clay thin brick units provided meet or exceed the requirements of this specification.
	5. DELIVERY, STORAGE, AND HANDLING
		1. Store masonry units above ground to prevent contamination by mud, dust or other materials likely to cause staining or other defects.
		2. Cover and protect masonry units from inclement weather to maintain quality control and physical requirements.
		3. Transport and handle brick masonry units as required to prevent discoloration, chipping, and breakage.
		4. Locate storage piles, stacks, and bins to protect materials from heavy traffic.
		5. Remove chipped, cracked, and otherwise defective units from jobsite upon discovery.
	6. PROJECT CONDITIONS
		1. Cold Weather Requirements:
			1. In accordance IBC Section 2104.3.
			2. Provide adequate equipment for heating masonry materials when air temperature is below 40 degrees Fahrenheit (4 degrees Celsius).
		2. Hot Weather Requirements:
			1. In accordance with IBC Section 2104.4.
			2. When ambient air temperature exceeds 100 degrees Fahrenheit (38 degrees Celsius), or when ambient air temperature exceeds 90 degrees Fahrenheit (32 degrees Celsius)and wind velocity is greater than 8 miles per hour, implement hot weather protection procedures.
			3. Wet mortar board before loading and cover mortar to retard drying when not being used.
			4. Do not spread mortar beds more than 48 inches (1.22 m) ahead of placing masonry units.
			5. Place masonry units within one minute of spreading mortar.
		3. Wetting of Brick: shall be required at the time of laying if the unit’s initial rate of absorption (IRA) exceeds 30 grams per 30 square inches per minute or 1 g/ 645mm2.
		4. Assess all preceding prior to starting brick installation and confirm all such work is complete and ready to receive the thin brick installation. Document all issues found unsuitable or not within project parameters (location, plumbness, etc.), that will impact brick installation. Report such found items to the general contractor or construction manager, as appropriate, and seek resolution prior to initiating work.
2. PRODUCTS
	1. THIN BRICK MASONRY UNITS
		1. Manufacturers:
			1. HC Muddox: www.hcmuddox.com
				1. Sales Representative:

Name

Phone

Email

* + - 1. Interstate Brick: [www.interstatebrick.com](http://www.interstatebrick.come)
				1. Sales Representative:

Name

Phone

Email

* + 1. Type: ASTM C 1088, Grade Exterior, Type TBS [TBX] thin veneer brick. [some large format thin brick may not be available in Type TBX]
		2. Surface Texture: To be selected by Architect/ENGINEER from manufacturer’s full range of available textures.
		3. Colors:
			1. Color as selected by Architect/ENGINEER from standard colors.
		4. Size: 5/8 in. thick x 2¼ in. high x 75/8 in. long, (Modular size) unless otherwise **indicated on the drawings**.
		5. Special Sizes and Shapes: As required for window and door locations and custom sills where indicated, corners, and other special applications to minimize cutting.
		6. Substitutions: None allowed
	1. Cement Plaster/stucco (For THick-set assemblies)
		1. Type N or Type S mortar suitable for intended use. Meet requirements for ASTM C1714/1714M for preblended (pre-bagged) mortar (preferred), or ASTM C270 for site mixed mortar.
	2. Setting Bed Mortar
		1. Site mixed mortar: Meet requirements of ANSI A118.4 or A118.15.
		2. Preblended: Meet requirements of ANSI A118.4 or A118.15.
		3. Mortar for use with cement backer board substrate: comply with ANSI A118.4 or A118.15

[ANSI A118.15 recommend for high seismic and extreme wind velocity zones, and for overhead and downward facing applications]

* 1. Pointing mortars (mortar between brick units, not at movement joints)
		1. Mortar used to grout or tuck-point mortar joints (sometimes called grouting mortars) between thin brick units after they are adhered to the substrate wall. Mix by proportion: 1 part Portland cement (ASTM C150); 1 part hydrated lime (ASTM C207); 6 parts sand (ASTM C144), or Modified Epoxy emulsion mortar/grout conforming to ANSI 118.07.
			1. Site mixed: Meet requirements of ASTM C270 Type N or Type S.
			2. Preblended: Meet requirements of ASTM C1714/C1714M Type N or Type S.
	2. Weather-REsistive Barrier (WRB) – see Section 071000 for additional information
		1. Sheet goods: For exterior wall (not roof) applications. compatible with cementitious plaster and mortar capable of bond capacities of 50 psi (0.34 MPa) shear and tension bond
		2. Elastomeric liquid/fluid applied: compatible with cementitious plaster and mortar capable of bond capacities of 150 psi (1.03 MPa) shear and tension bond.

* 1. Drainage layer (required in moist and marine climate zones per 2021 IBC)

Sheet or roll goods comprised of woven plastic strands, plastic strand mesh, entangled plastic mesh, profiled (ribbed, or dimpled) plastic sheeting, all faced with filter fabric. Alternatively, the drainage layer may be created with a filter membrane with dimples, or “buttons”, other protrusions bonded to the surface which create a 3/16” (5 mm) (minimum) air space, or other suitable material to provide a separation that allows water to drain out of the wall system.

* + 1. HydroGap® by [Benjamin Obdyke](http://www.benjaminobdyke.com/products), or equivalent
		2. Mortairvent® by Advanced Building Products, or equivalent
		3. Sure Cavity™ by MTI, or equivalent
	1. rigid exterior insulation – Section 072113
		1. Type and thickness as defined in the drawings and in specification Section 072113
		2. To be installed as part of the exterior adhered thin brick wall system outboard of the WRB
	2. Lath (Furred)
		1. 3/8” (9.5mm) dimples or ribs, 3.4 lb./yd2 (1.9kg/m2) self-furring expanded galvanized metal lath – ASTM C847
		2. 1/4” (6.3mm) dimples or ribs, 2.5 lb/yd2 (1.4kg/m2) (or heavier) self-furring metal lath – ASTM C874
		3. Welded wire lath – ASTM C933
		4. Proprietary integral woven fiberglass lath and profiled drainage membrane – See 2.09-F.
	3. flashing
		1. Corrosion resistant plastic, copper, stainless steel, painted metal, coated metal as shown on the drawings. See section 076000 for additional information.
	4. Accessories
		1. Weep screeds: Corrosion resistant with 3.5” (89mm) (minimum) vertical attachment flange (that terminates behind WRB)
			1. Metal weep screed: not less than 26 gage; .0179 inches (0.45mm)
			2. Plastic weep screed: not less than 0.05 inches (1.3mm)
		2. Casing beads: Corrosion resistant
			1. Metal weep screed: not less than 26 gage; .0179 inches (0.45mm)
			2. Plastic weep screed: not less than 0.05 inches (1.3mm)
		3. Elastomeric sealants. Sized for calculated movement. Section 079200
		4. Fasteners: ASTM C1063
			1. For steel studs: corrosion resistant screws; coated or bi-metallic (mild [drill] tip with stainless threaded shank), for fastening drainage plane material and lath material to substrate wall; rated for resistance to moist environments. Penetrate stud to expose 3 full threads through steel studs
			2. For wood studs: corrosion resistant staples, corrosion resistant roofing nails, or corrosion resistant screws and washers, all of sufficient length to penetrate a minimum of ¾” into wall framing members
			3. For concrete or CMU: corrosion resistant concrete screws (with 1¼” minimum penetration into sound substrate) or corrosion resistant powder actuated fasteners (with 1” minimum penetration into sound substrate)
				1. Follow fastener manufacturer’s recommendations for installation into CMU
			4. Fasteners intended to secure lath shall have sufficiently large heads or added corrosion resistant washers large enough to not pull through the lath.
		5. Fluid applied bond coat – used on the face of rigid insulation
		6. Proprietary Lath Systems – follow manufacturer’s recommendations for installation
			1. Punched galvanized sheet metal: TABS II® or equivalent
			2. Thermoset reinforced plastic: Speedymason® or equivalent
				1. Mortar set
				2. Peel n’ stick
			3. Profiled expanded rigid foam: Brickwebb® by Old Mill or equivalent.
			4. Fiberglass woven lath by SpiderLath®, or equivalent. [For non-fire-rated Type V construction]
			5. Fiberglass woven lath bonded to profiled plastic drainage membrane
				1. Delta-Dry and Lath, by Dorken, or equivalent. [For non-fire-rated Type V construction]
		7. Proprietary Masonry Veneer Installation System (MVIS) systems: exterior wall assembly system applied to clean and sound exterior substrate surfaces that has compatible components comprised of: liquid/fluid elastomeric WRB membrane, cementitious plaster substrate, setting/bonding mortar, and pointing mortar (grout) systems designed specifically for adhered exterior masonry veneers, including thin brick. Not applicable where it would be applied directly to a drainage layer.
			1. Laticrete MVIS or equivalent.
				1. 3-part system: fluid WRB + masonry veneer mortar + pointing mortar. Used for thin or thick set applications
				2. 4-part system: fluid WRB + premium mortar bed + masonry veneer mortar plus pointing mortar. Used in lieu of stucco substrates
		8. Other
	5. CEment Backer (CB) OR CEMENT BACKER board (CBB) – see Section 092813 cement backer board
		1. Specialty cement backer boards are available that come with rigid polystyrene foam and/or mineral wool of various thicknesses bonded to the cement backer board as an option to provide exterior insulation.
	6. STUCCO – see Section 092400 Cement Plastering
1. EXECUTION
	1. veneer SuBSTRATE SURVEY
		1. Survey condition of substrate wall or backing to receive thin brick and report all non-conformance issues, including but not limited to: out of tolerance flatness, plumbness, alignment, and location. Report all pertinent issues to the General Contractor prior to initiating any work.
	2. VENEER SUBSTRATE PREPARATION
		1. Concrete, CMU, CBB, and Lath + Stucco
			1. Remove all deleterious substances (form release, curing compounds, paint, graffiti, etc.)
			2. Wash surface to remove dust and laitance, and allow to dry
			3. Cleaning may be waived/eliminated where new construction makes in unnecessary, and when proprietary lath systems are used, pending acceptance of Architect and lath system manufacturer.
		2. Wood sheathing.
			1. Prepare to receive veneer assembly by properly setting all protruding fasteners and fixing fasteners that have punched through the exterior surface of the sheathing.
			2. Remove all deleterious materials from the surface of the sheathing.
		3. Prepare substrate surface to receive adhered thin brick assembly as noted above or by any other suitable and approved means and methods that will ensure code compliant thin brick installation. Submit proposed means and methods for review and receive approval prior to initiating any work.
		4. Other
	3. COnfirmation of MAsonry layout
		1. Prior to installation of thin brick, layout (dry) coursing to fill/cover surface and note any adjustments that are necessary to produce the desired look, eliminating units that are less than 1/2 of the full unit width. This may require adjusting the location of head joints and using 3/4 length (approx.) units to maintain the desired appearance. Layout vertical coursing using story poles or other means to maintain standard masonry coursing modules. Tile spacers or ropes are not recommended as aids for layout.
		2. Adjust joint widths (expand or compress) within established tolerances to accommodate brick tolerances and layout tolerances necessary to achieve the desired look. Maintain uniform joint widths as much as possible by making adjustments over multiple joints.
		3. Adjustments to layout, including but not limited to partial brick units and adjustments to joint sizes should be represented on the mock up/sample panel and must be approved by the Architect prior to installation.
	4. BRICK MASONRY UNITS
		1. Review brick material prior to installation and report any units deemed unsatisfactory to the manufacturer. Set aside (do not discard or remove from site) all units deemed unsatisfactory for further assessment by testing agency and/or brick manufacturer’s authorized representative, as deemed mutually acceptable. immediately notify supplier if quantities that are set aside are projected to create a shortfall of useable units. Installation or units placed in service constitutes mason’s acceptance of, and responsibility for, the brick quality.
		2. Select units from multiple (at least 3) packages, boxes, pallets, or cubes to blend hues to create a uniform random pattern when placed in service to avoid patches of light and dark brick. Install patterns of color as directed where a specific blend of colors or pattern is specified. In all cases lay brick in a pattern acceptable to the Architect.
	5. exterior THick-set application for uneven substrates (Concrete, CMU and uneven wood sheathing)

The following guidelines are intended for exterior application over somewhat uneven substrates or when using thin brick with undulating/uneven back surfaces or thin bricks that vary in thickness. Thick-set application includes code required 2-coat lath plus cement plaster (stucco) substrate.

* + 1. Protect adjacent construction with appropriate means from mortar droppings and other effects of laying of brick masonry units.
		2. Install flashing at the perimeter of thin brick veneer wall assembly, around openings, and at base of veneer, integrated with the WRB to prevent the moisture from entering the building and to transmit the moisture to the outside of the wall. Install weeps (weep screeds) at the bottom of the walls, integrated with the WRB to transmit the moisture to the outside face of the wall. Secure flashings with fasteners.
		3. Install two layers of WRB sheet or roll goods over the substrate wall, in shingle fashion, starting at the bottom of the wall. Each layer must provide a complete, independent, uninterrupted drainage path. The laps should be 2 in. (51 mm) minimum for horizontal laps and 6 in. (152 mm) minimum for vertical laps. Stagger laps in each layer, in shingle fashion. Secure in place with mastic, adhesive or fasteners. WRB may be reduced to a single layer of sheet goods where a drainage layer is used, then, increase horizontal laps to 3” (76 mm).
			1. Alternatively, apply liquid or fluid WRB to clean, sound substrate materials.
		4. Install optional (recommended) drainage layer (article 2.06 above) over WRB. Avoid creating dams or terminations that would impede the flow of water and moisture out of the wall, directing it to the exterior surface. Secure drainage layer to backing with fasteners.
		5. Where exterior insulation is intended, rigid insulation is recommended, and it should be installed over the optional but recommended drainage layer, secured in place with appropriate fasteners designed to carry the eccentric loads of the thin brick assembly.
		6. Install metal lath complying with ASTM C847 on the substrate material, furred a minimum of ¼” (6 mm) off the face of the substrate material. Self-furring lath may be used (recommended). Refer to ASTM C1063 for installation of metal lath for portland cement plastering applications. Secure lath with fasteners. The maximum horizontal spacing for the fasteners is 16 in. (406 mm) o.c. and maximum vertical spacing for fasteners is 6 in. (152 mm) o.c.
			1. Alternative: drainage layer and lath can be provided by proprietary system of lath combined with a drainage layer as noted in article 2.07-F.4.
		7. Apply 1/2” to 3/4” (13 mm to 19 mm) thick cementitious plaster (stucco) scratch coat on clean and dust-free substrate, using Type N or Type S mortar (per article 2.02 above), working into lath to completely embed lath into cementitious plaster with at least ¼” coverage on the back of the lath. Scarify surface while moist – before becoming thumb-print hard. Where exterior insulation is the receiving surface of the cement plaster, apply 5/8” to 1” (16 mm to 25 mm) thick cementitious plaster (stucco) over furred lath covering rigid insulation. Vary applied thickness of scratch coat within noted limits to mitigate and correct undulations and anomalies in the receiving surface to the extent possible.
			1. Contiguous areas of cementitious plaster (stucco) bounded by joints or edges of the plaster should not exceed 144 sq ft (13.4 sq. m), with joint spacing not to exceed 18 feet (5.5 m), and with the aspect ratio of areas bounded by joints or edges of the plaster should not exceed 1.5:1.0. Jointing sizes and locations must be shown on contract documents.

Cure scratch coat at least 24 hours prior to the application of subsequent coats. If surface is dry, pre-wet surface prior to applying second/brown coat. the setting (bonding) mortar. See Section 092400 for additional information.

* + 1. Apply 1/4” (6 mm) to 3/8” (10 mm) thick cement plaster brown coat over properly cured scratch coat to create a code compliant 2-coat lath and cement plaster system using Type N or Type S mortar. Vary applied thickness within noted limits to mitigate and correct undulations and anomalies in the receiving surface to the extent possible. Roughen finish with notched trowel or other means to create a scarified surface. Total combined 2-coat plaster system should be less than 1 1/8” (29 mm), or 1 3/8” over rigid insulation (35 mm). Moist cure for at least 24 hours prior to application of setting bed (bonding) mortar. If surface is dry, pre-wet surface prior to the setting bed (bonding) mortar. See Section 092400 for additional information.
		2. Spread ~~brick~~ setting bed (bonding) mortar 3/8” (10 mm) thick onto the prepared, clean and dust-free substrate using the flat side of a trowel then comb using a notched trowel (3/16” to 1/4” [5 mm to 6 mm] deep notches) to obtain an even, although notched, setting bed. Use Type N or Type S polymer-modified mortar (mortar per article 2.03, above). Additional thickness (up to 1/8” [3 mm]) may be required to account for humoring or adjusting non-prismatic brick or brick with minor distortion(s).
		3. Apply brick setting bed mortar to the back of the veneer units, working into the back of the brick unit using the flat side of a trowel and comb using a notched trowel (as above) and place the unit into the setting bed on the substrate wall. Work the thin brick unit into place by tapping, or sliding slightly back-and-forth, or up-and-down, or rotating slightly, to provide full contact coverage and until excess mortar is squeezed out at the edges of the veneer unit, completely filling the space between unit and bonding mortar. The final installed thickness of the setting/bonding mortar bed shall be between 3/16” and 3/8” (5 mm and 10 mm) to accommodate variations in the substrate surface, variations in the brick, and to adjust for plumbness and flatness of the wall. Install all bricks by aligning the top edge of each brick with the string line. For brick with edge distortion, use the upper corners of the brick as control points for alignment with the string line – checking for plumb with a level. Use of a 48-inch-long (min) straight edge is recommended to ensure a planar installation, sweeping over the surface and humoring (adjusting) the brick as needed to correct for anomalies to provide a flat planar finished surface. Lay all bricks with edge distortion in the same orientation – all “smiles” or all “frowns”. Use of a sled runner to tool the joints helps improve the appearance.
		4. Lay-up (install) units at corners (a ‘lead’), using a level (for plumb) and a story pole, or other means to provide the appropriate number of courses to fill the available vertical space between critical vertical control points (IE: door heads and window heads and sills, and movement joints), while maintaining full height brick units and uniform bed joints within the acceptable joint tolerances. On long walls an intermediate control point which is level with the end leads may be used to hold a modified twig (or trig), or other tool, or may be shot in with a surveying level. Once the end leads (and intermediate control points) are set, use line blocks (and trigs [or twigs] at the intermediate control point) and a taught string line to establish the face of the wall, and to establish straight and level coursing. Other means and methods to control brick installation while maintaining a plumb and flat wall finish may be utilized with prior approval of the Architect.
		5. Lay units to desired height with joints of uniform thickness. “Grout” (apply pointing mortar to) the static brick-to-brick joints using Type N mortar mix per 2.04 above. Use grout bag, mortar board, hawk, or trowel to fill the joints between units. Do not smear grout over brick surface as is done with tile. Tool the joint when they are thumb print hard.
		6. Bond shall be plumb throughout.
		7. Lay units to avoid formation of cracks when units are placed.
		8. Lay masonry plumb, true to line, with courses level. Keep bond pattern plumb throughout. Care should be taken to produce a flat finished surface where uneven substrates exist or where thin brick thicknesses vary. Lay masonry within the tolerances of ACI 530.1 Section 3.3 G.
		9. When positions of units shift after mortar has stiffened, bond is broken, or cracks are formed, remove and reinstall units in new mortar.
		10. Avoid laying units where they would bridge active cracks or established movement joints in substrate materials. Cut where necessary to respect jointing in substrate.
		11. Avoid mortar staining on the units during installation. Clean any mortar smearing or staining promptly to reduce final cleaning.
		12. Alternate 1: Use a proprietary 4-part MVIS system (2.10-G-1-b) applied to clean, sound concrete or CMU substrates, where no drainage layer is required.
	1. Interior thick-set application for uneven cementitious substrates (Concrete, CMU) and uneven wood sheathing [no lath]

The following guidelines are intended for interior thin brick applications over somewhat uneven substrates or when using thin brick with undulating/uneven back surfaces or thin bricks that vary in thickness. No drainage layer required. Intended for dry service applications.

* + 1. Follow Section 3.05, items A, and G through R or S for cementitious substrates.
		2. Follow Section 3.05, items A, C (liquid/fluid WRB), and F through R or S for wood or exterior rated gypsum sheathing substrates.
		3. A proprietary 4-part Masonry Veneer Installation System (MVIS) (2.10-G-1-b) may be used for interior applications where no drainage layer is required, applied directly to sound substrate of concrete, CMU, CBB, wood, or exterior gypsum board sheathing. Care should be taken to produce a flat finished surface where uneven substrates exist.
	1. exterior Thin-Set Application to flat cementitious substrate (concrete, cmu, and cement backer board [over framed walls])

The following guidelines are intended for exterior application over reasonably flat substrates when using thin brick with uniform thickness.

* + 1. Protect adjacent construction with appropriate means from mortar droppings and other effects of laying of brick masonry units.
		2. Install flashing at the perimeter of thin brick veneer wall assembly, around openings, and at base of veneer, integrated with the WRB to prevent the moisture from entering the building and to transmit the moisture to the outside of the wall. Install weeps (weep screeds) at the bottom of the walls, integrated with the WRB to transmit the moisture to the outside face of the wall. Secure flashings with fasteners.
		3. Apply liquid/fluid WRB membrane to clean concrete substrate surfaces.
			1. If drainage layer is used, WRB may be single layer of sheet or roll goods. Lap sheet goods per article 3.05 C.
		4. Install optional (recommended) drainage layer over sheet or roll goods WRB or liquid/fluid elastomeric WRB. Avoid creating dams or terminations that would impede the flow of water and moisture out of the wall, directing it to the exterior surface. Secure in place with fasteners.
		5. Where exterior insulation is intended, rigid insulation should be chosen, and it should be installed over the optional but recommended drainage layer, secured in place with appropriate fasteners.
		6. Apply CBB over WRB sheet or roll goods (or liquid/fluid WRB) and over optional (recommended) drainage layer, and over exterior rigid insulation, where used. Secure cement backer board in place with appropriate fasteners. Tape joints.
		7. Spread brick setting bed (bonding) mortar 3/8” (10 mm) thick onto the clean and dust-free substrate using the flat side of a trowel then comb using a notched trowel (3/16” to 1/4” [5 mm to 6 mm] deep notches) to obtain an even, although notched, setting bed. Use Type N or Type S polymer-modified mortar (mortar per article 2.03, above). Additional thickness (up to 1/8” [3 mm]) may be required to account for humoring or adjusting non-prismatic brick or brick with minor distortion(s).
		8. Apply brick setting bed mortar to the back of the veneer units, working into the back of the brick unit using the flat side of a trowel and comb using a notched trowel (as above) and place the unit into the setting bed on the substrate wall. Work the thin brick unit into place by tapping, or sliding slightly back-and-forth, or up-and-down, or rotating slightly, to provide full contact coverage and until excess mortar is squeezed out at the edges of the veneer unit, completely filling the space between unit and bonding mortar. The final installed thickness of the setting/bonding mortar bed shall be between 3/16” and 3/8” (5 mm and 10 mm) to accommodate variations in the substrate surface, variations in the brick, and to adjust for plumbness and flatness of the wall. Install all bricks by aligning the top edge of each brick with the string line. For brick with edge distortion, use the upper corners of the brick as control points for alignment with the string line – checking for plumb with a level. Use of a 48-inch-long (min) straight edge is recommended to ensure a planar installation, sweeping over the surface and humoring (adjusting) the brick as needed to correct for anomalies to provide a flat planar finished surface. Lay all bricks with edge distortion in the same orientation – all “smiles” or all “frowns”. Use of a sled runner to tool the joints helps improve the appearance.
		9. Lay-up (install) units at corners (a ‘lead’), using a level (for plumb) and a story pole, or other means to provide the appropriate number of courses to fill the available vertical space between critical vertical control points (IE: door heads and window heads and sills, and movement joints), while maintaining full height brick units and uniform bed joints within the acceptable joint tolerances. On long walls an intermediate control point which is level with the end leads may be used to hold a modified twig (or trig), or other tool, or may be shot in with a surveying level. Once the end leads (and intermediate control points) are set, use line blocks (and trigs [or twigs] at the intermediate control point) and a taught string line to establish the face of the wall, and to establish straight and level coursing. Other means and methods to control brick installation while maintaining a plumb and flat wall finish may be utilized with prior approval of the Architect.
		10. Lay units to avoid formation of cracks when units are placed.
		11. Lay masonry plumb, true to line, with courses level. Keep bond pattern plumb throughout. Lay masonry within the tolerances of ACI 530.1 Section 3.3 G.
		12. When positions of units shift after mortar has stiffened, when bond is broken, or when cracks are formed, remove and reinstall units in new mortar.
		13. Avoid laying units where they would bridge active cracks or established movement joints in substrate materials. Cut where necessary to respect jointing in substrate.
		14. Avoid mortar staining on the units during installation. Clean any mortar smearing or staining promptly to reduce final cleaning.
		15. Alternate 1: Proprietary lath systems (2.10-F) are suitable for this application in lieu of the setting/bonding mortar application noted above. Apply over WRB and optional (recommended) drainage layer, and over optional insulation. Where proprietary lath system has an integral drainage layer, additional drainage layer is not needed. Where proprietary lath system has integral insulation, additional insulation may not be necessary.
		16. Alternate 2: Proprietary 3-part MVIS systems (2.10-G-1-a) may be used where no drainage layer is required, applied over concrete, CMU, or over CBB that is installed over (optional) drainage and insulation layers.
	1. interior Thin-Set Application to flat substrate (concrete, cmu, and cement backer board)

The following guidelines are intended for interior thin brick applications over reasonably flat substrates when using thin brick with uniform thickness. No drainage layer required. Intended for dry service interior applications.

* + 1. Follow Section 3.07, items A, and G through O or P for cementitious substrates (concrete of CMU)
		2. Follow Section 3.07, items A, and G through O or P for wood or exterior gypsum sheathing substrates.
		3. A proprietary 3-part MVIS systems (2.10-G-1-a) may be used, applied directly to wood or exterior gypsum sheathing, cement, CMU, or CBB substrates, for interior applications where no drainage layer is required.
		4. A proprietary lath system, (2.10-F) may be used in lieu of the above, applied directly to wood or exterior gypsum board sheathing, concrete, CMU, or CBB.
	1. MORTAR JOINTS
		1. Make joints straight, clean, smooth, and uniform in thickness.
		2. Pointing: Tool exposed joints, slightly concave. Strike concealed joints flush.
		3. Tool joints while slightly moist and thumbprint hard.
		4. Joint Thickness: Make vertical and horizontal joints as required to achieve nominal dimensions on drawings and within tolerances listed in ACI 530.1 Section 3.3 G.
		5. Where fresh masonry joins totally or partially set masonry, clean and roughen set masonry before laying new units.
	2. BOND PATTERN
		1. Install brick masonry units in running bond pattern, unless otherwise **indicated on the Drawings**.
	3. CUTTING BRICK MASONRY UNITS
		1. When possible, use full units of the proper size in lieu of cut units.
			1. Cut units as required to form chases, openings, for anchorage, and for other appurtenances, and at all movement joints and terminations, as required, so as to eliminate units bridging across movement joints (or cracks) in substrate.
		2. Cut and fit units with power-driven carborundum or diamond disc blade saw.
		3. Clean back of units after cutting to remove dust and other deleterious material(s).
		4. Discard units that are damaged during the cutting process, which do not meet the appearance standard of ASTM C1088.
	4. CONTROL JOINTS / EXPANSION JOINTS
		1. Size joints to accommodate anticipated movements with respect to moisture and thermal gradients in addition to building movements commensurate with the movement potential of the joint material(s).
		2. Provide in masonry walls where **indicated on the Drawings**.
		3. Make full height and continuous in appearance.
		4. Control and expansion joints must be continuous through the backing, unless detailed otherwise.
		5. Insert control joint filler in joints as wall is constructed.
		6. Insert 50% compressible elastomeric (neoprene or equivalent) expansion joint material in properly sized expansion joints.
		7. Apply sealant as specified in Section 079000.
	5. FLASHING
		1. Flashing must be installed at all through wall penetrations and at lower boundaries of the adhered thin brick veneer installations.
		2. Flashings will be integrated with the WRB materials to provide effective control of moisture exiting the wall assembly, with sealed corners, end dams and other accessories as needed.
	6. OTHER EMBEDDED ITEMS
		1. Build in wall plugs, accessories, flashings, pipe sleeves, and other items required to be built-in as the masonry work progresses.
	7. PATCHING
		1. Patch exposed brick masonry units at completion of the Work and in such manner that patching will be indistinguishable from similar surroundings and adjoining construction.
	8. MISCELLANEOUS
		1. Build in required items, such as anchors, flashings, weep screeds, sleeves, electrical boxes, frames, structural steel, lintels, anchor bolts, and metal fabrications, as required for complete installation.
	9. WATER REPELLENT (Recommended)
		1. Apply water breathable repellent as specified in Section 071900 where directed or specified on drawings.
	10. FIELD QUALITY CONTROL
		1. Have minimum 3 masonry units of each type proposed for Project tested in accordance with ASTM C 67 to verify conformance to Specifications.
		2. Tests shall include absorption, Initial Rate of absorption and unit weight.
		3. Employ and pay acceptable independent testing laboratory to perform testing
		4. Per ASTM C 1088, after brick are placed in usage, the manufacturer or the manufacturer’s agent shall not be held responsible for compliance of brick with the requirements of ASTM C 1088 for chippage and tolerances.
	11. CLEANING
		1. Exercise extreme care to prevent mortar splotches.
		2. Do not attach construction supports to masonry walls.
		3. Use only new cleaning products from previously unopened and untampered containers. Do not mix, or concoct, or blend cleaning materials unless specifically instructed to do so by the cleaning material manufacturer, and then only upon approval by the General contractor, Architect, and owner.
		4. Identify a suitable, non-critical location, mutually acceptable to the General Contractor, Architect and Owner, to test cleaning methods for approval prior to mass cleaning of the installation.
		5. Wash off brick scum and grout spills before scum and grout set.
		6. Remove grout stains from walls using cleaning agent and methods recommended by brick manufacturer.
		7. Test clean masonry in selected area with the least aggressive method possible that will attain the desired effect starting with “Bucket and Brush” method. Apply cleaning solution recommended by brick manufacturer in accordance with cleaning solution manufacturer's printed instructions and brick manufacturer’s recommendations.
		8. Once the cleaning method is established and approved, proceed to clean the building in total following established procedures.
		9. Remove scaffolding and equipment. Dispose of debris, refuse, and surplus material offsite legally.
		10. Correct efflorescence on exposed surfaces with commercially prepared cleaning materials acceptable to masonry unit manufacturer.
		11. Do not use unbuffered muriatic or hydrochloric acid as cleaning solutions.
		12. Do not use abrasive cleaning equipment or methods.
		13. Do no use high-pressure spray equipment to clean brick; 400 psi spray pressure, maximum.
	12. FORMS AND SHORES
		1. Where required, construct forms to the shapes **indicated on the Drawings**.
			1. Construct forms sufficiently rigid to prevent deflection which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout.
			2. Do not remove supporting forms or shores until the supported masonry has acquired sufficient strength to support safely its weight and any construction loads to which it may be subjected.
				1. Wait at least 16 hours after grouting masonry columns or walls before applying uniform loads.
				2. Wait at least 64 hours before applying concentrated loads.
	13. PROTECTION
		1. Provide temporary protection for exposed masonry corners subject to damage.
		2. Bracing:
			1. Adequately brace masonry walls over 8 feet in height to prevent overturning and to prevent collapse unless wall is adequately supported by permanent supporting elements so wall will not overturn or collapse.
			2. Keep bracing in place until permanent supporting elements of structure are in place.
		3. Limited Access Zone:
			1. Establish limited access zone prior to start of masonry wall construction.
			2. Zone shall be immediately adjacent to wall and equal to height of wall to be constructed plus 4 feet by entire length of wall on un-scaffolded side of wall.
			3. Limit access to zone to workers actively engaged in constructing wall. Do not permit other persons to enter zone.
			4. Keep zone in place until wall is adequately supported or braced by permanent supporting elements to prevent overturning and collapse.

 END OF SECTION

Additional items to coordinate:

CEment board – Section 092813

* + - 1. Exterior: ½” (13mm) (minimum) fiber-reinforced cement board compliant with ASTM C1325. Applied over WRB and exterior sheathing.
			2. Interior: 3/8” (10mm) (minimum) fiber reinforced cement board compliant with ASTM C1325. Applied over sheathing.
			3. Optional proprietary cement board bonded to rigid foam insulation with integral drainage channels: PRO-GUARD, or equivalent
			4. Current “best practice” philosophy is to provide a drainage layer behind the cement board (and insulation, where exists)

Lath – part of stucco (section 092400)

1. 18 Gauge (43mils; 1.4mm) galvanized woven wire mesh – ASTM C1032

2. 3/8” (9.5mm) rib, 3.4 lb./yd2 (1.9kg/m2) self-furring expanded galvanized metal lath – ASTM C847

3. 2.5 lb/yd2 (1.4kg/m2) (or heavier) self-furring galvanized expanded metal diamond lath – ASTM C874

4. Welded wire lath – ASTM C933. Must be furred ¼” off of receiving surface.

5. Lath should be furred off the face of the drainage layer/WRB so cementitious plaster fully engulfs the metal lath. Self-furring lath products are available.

6. lath should be fastened through WRB and exterior sheathing into the wall framing members with adequate penetration.

Proprietary lath systems should be included

**Stucco – Section 092400**

1. For uneven substrates (wood framing) a 2-coat application is best to provide an even and flat substrate for the thin brick veneer.
2. For very flat substrates (steel studs) a single coat stucco may be adequate.
3. Roughen surface to receive thin brick bonding mortar (scratch coat).
4. Current “best practice” philosophy is to provide a drainage layer behind the stucco and over the WRB.
5. Follow PCA Plaster and Stucco Handbook guidelines and recommendations. Suggest maximum panel aspect ratio of 1.5:1.0, rather than 2.5:1.0 in handbook.
6. Use weep screeds or other means to eliminate any accumulated water/moisture.

**Weather resistive Barrier – Section 071000**

1. Suitable as substrate to cementitious plaster (stucco) with minimum bond capacity of 150 psi tensile and shear strength for applications where a stucco substrate is added.
2. Typical sheet or roll goods application as substrate to cementitious plaster/stucco/cement board: Applied in 2 layers, shingle fashion, from the bottom of the wall.
	1. When covered by a drainage layer, then single layer of WRB is adequate.
3. May be liquid/fluid applied membrane barrier suitable for bonding to cementitious plaster (stucco) and mortar where no lath and cementitious plaster is used.

WATER REPELLENT (Recommended)

1. Apply water repellent as specified in Section 071900 where directed or specified on drawings.
2. Water repellant should have a high vapor transmission rate and repel liquid water. Silanes, siloxanes, or combinations of those, are typical.