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THIN VENEER STONE ASSEMBLIES – SECTION 04 42 11

PART 1 GENERAL

1.1 Section Includes

- A. Non-load bearing, natural thin veneer applied with cement mortar to a structural back-up wall including mortar, metal lath, [weep system,] special stone shapes, and installation of [plywood sheathing,] [gypsum sheathing,] [weather-resistant underlayment,] [water repellent] [and] [anti-graffiti coating].

1.2 Related Sections

- A. Section 03 11 13 - Structural Cast-In-Place Forms
- B. Section 03 11 19 - Insulating Concrete Forming: Structural cast concrete supporting wall for natural thin veneer
- C. Section 03 05 00 - Basic concrete materials and methods
- D. Section 03 30 00 - Cast-In-Place Concrete: Concrete foundations
- E. Section 04 22 00 - Concrete Unit Masonry: Structural concrete unit masonry back-up wall for natural thin veneer
- F. Section 04 05 00 - Basic masonry materials & methods
- G. Section 05 40 00 - Cold-Formed Metal Framing: Formed steel framed supporting wall
- H. Section 05 50 00 - Metal Fabrications: Rolled steel lintels, shelf angles, and other structural supports; anchors; and other steel components for building into natural thin veneer
- I. Section 06 10 00 - Rough Carpentry: [Structural wood stud wall framing] [and] [plywood sheathing] for supporting natural thin veneer
- J. Section 07 13 26 - Self Adhering Sheet Waterproofing: Self-adhering sheet membrane applied as part of this Section to [plywood sheathing] [gypsum sheathing] [_____] as weather-resistant underlayment for natural thin veneer
- K. Section 07 62 00 - Sheet Metal Flashing and Trim
- L. Section 07 92 00 - Joint Sealers: Sealant for perimeter and control joints
- M. Section 09 22 36 - Metal Lath
- N. Section 09 24 00 - Portland Cement Plaster: Metal lath and scratch coat back-up supporting walls
- O. Section 09 21 16 - Gypsum Board Assemblies
- P. Section 09 96 24 - Water Repellent and Anti-Graffiti Coating

1.3 References

- A. ASTM C79M - Treated Core and Nontreated Core Gypsum Sheathing Board
- B. ASTM C91 - Standard Specification for Masonry Cement
- C. ASTM C97 - Standard Specification for Absorption and Bulk Specific Gravity of Dimension Stone
- D. ASTM C144 - Aggregate for Masonry Mortar
- E. ASTM C150 - Standard Specification for Portland Cement
- F. ASTM C170 - Standard Specification for Compressive Strength of Dimension Stone
- G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes
- H. ASTM C270 - Mortar for Unit Masonry
- I. ASTM C476 - Grout for Masonry
- J. ASTM C568 - Standard Specification for Limestone Dimension Stone
- K. ASTM C615 - Standard Specification for Granite Dimension Stone
- L. ASTM C616 - Standard Specification for Quartz Based Dimension Stone
- M. ASTM C 629 - Standard Specification for Slate Dimension Stone
- N. ASTM C780 - Preconstruction Evaluation of Mortar for Plain & Reinforced Masonry
- O. ASTM C847 - Standard Specification for Metal Lath
- P. ASTM C880 - Standard Specification for Flexural Strength of Dimension Stone
- Q. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster
- R. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
- S. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics
- T. ASTM D4632 - Standard Test Method Grab Breaking Load and Elongation of Geotextiles
- U. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
- V. ASTM E96 - Standard Test Method for Water Vapor Transmission of Materials
- W. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures
- X. ACI 530.1/ASCE 6/TMS 602 - Specifications for Masonry Structures
- Y. ANSI A118.4 - Specifications for Latex-Portland Cement Mortar
- Z. PCA - Portland Cement Plaster (Stucco) Manual

1.4 Submittals

- A. Submit under provisions of Section 01 33 00.
 - 1. Product data for natural dimensional stone, mortar design, weep system, and accessories.
 - 2. Shop drawings for layout of stone veneer work illustrating coursing and pattern and details for instructions of built-in items, flashing, weep system, window and door openings, penetrations, control joints, and joints with adjacent materials.
 - 3. Copies of test reports or certificates showing compliance with specified requirements.

- B. Design Data: Submit design mix when property specification of ASTM C270 is to be used, with required environmental conditions, and admixture limitations.
- C. Selection Samples:
 - 1. Selected dimensional stone illustrating color range, surface, and texture: Two stones minimum [6 inches] [152 mm] long by [3 inches] [76 mm] wide.
 - 2. Mortar sample, [1/2 by 4 inches] [13 by 102 mm] minimum, illustrating selected color.
 - 3. [4 by 4 inches] [102 by 102 mm] minimum size of weep system material.

1.5 Quality Assurance

- A. Manufacture's qualifications: Company owning and operating stone quarry and specializing in quarrying, cutting, and dressing natural stone for masonry assemblies with 5 years minimum documented, successful experience.
- B. Installer qualifications: Company specializing in performing stone masonry work with 5 years documented, successful experience.

1.6 Mock-up

- A. Construct sample panel at location indicated or directed, illustrating color, finish, texture, joints, construction methods, and workmanship quality. Mock-up shall be done as follows:
 - 1. Mock-up shall be building corner [with [window] [door] opening] illustrating Natural Thin Veneer and mortar combination, coursing, and pattern. Mock up shall be constructed with:
 - a. Natural Thin Veneer as specified in this section.
 - b. Mortar, weep system, metal lath, specified in this section.
 - c. Structural supporting wall as specified in Section [____].
 - d. [Sheathing,] [underlayment,] and other specified accessories.
 - e. [Clear sealer] [and/or] [anti-graffiti coating].
 - 2. Size shall be minimum [4 feet] [1.2 m] [____] high by [4 feet] [1.2 m] [____] long.
 - 3. Obtain architect's acceptance of sample panel before beginning construction activities of this section.
 - 4. Do not remove sample panel until construction activities of this section have been accepted by the architect. Completely remove when work is accepted.

1.7 Pre-Installation Conference

- A. Preconstruction Meetings: Conduct preconstruction meetings including the architect, contractor, stone masonry subcontractor, flashing subcontractor, and any other entity directly concerned with exterior wall construction and stone veneer to verify project requirements, substrate conditions, manufacturer's installation instructions and other requirements.
- B. Comply with Division 1 requirements.
- C. Review at meeting:
 - 1. Erection and removal of scaffolding.
 - 2. Protection of non-masonry building surfaces and adjacent elements.

3. Installation procedures and manufacturer's recommendations.
4. Availability of system materials.
5. Preparation and acceptance of substrate.
6. Protection of installed items and finishes.
7. Approved mockup to be used as measure of acceptance.
8. Weather conditions forecast.
9. Other items related to successful execution of work.

1.8 Delivery, Storage, and Handling

- A. Store products on pallets, under cover and in manufacturer's unopened packaging until ready for installation to avoid chipping, breakage, marring faces, and contact with contaminating materials.
- B. Store stone materials on pallets on a dry level surface. Pallets shall not be stacked and shall be covered with tarps.
- C. Store mortar and cementitious materials under cover and in an area where temperature is maintained between [40 degrees F] [4 degrees C] to [110 degrees F] [43 degrees C].

1.9 Environmental Requirements

- A. Maintain materials and surrounding air temperature to following limits prior to, during, and 24 hours after completion of masonry veneer [and application of water repellent coating]:
 1. Minimum [40 degrees F] [4 degrees C].
 2. Maximum [90 degrees F] [32 degrees C].
- B. Hot and Cold Weather Requirements: In accordance with ACI 530.1/ASCE 6/TMS 602 Specifications for Masonry Structures.
- C. When ambient temperature falls below [50 degrees F] [10 degrees C], heat mortar mixing water.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Acceptable Stone Quarrier: Buechel Stone Corporation
800.236.4473
www.buechelstone.com
- B. [Requests for substitutions will be considered in accordance with provisions of Section 01 25 13 - Product Substitution Procedures: Architect reserves the right to reject substitution requests based on natural stone color and texture, even though size, shapes, and properties are equivalent.] [Substitutions are not acceptable.]

2.2 Veneer Stone

1. Blue Ridge River Rock
 - a. Nominal size range:
 - 1) Length: [3 to 16 inches] [76 to 406 mm]
 - 2) Height: [3 to 16 inches] [76 to 406 mm]
 - 3) Width: [3/4 to 1 1/4 inches] [19 to 31 mm]
 - b. Color range: purple, lavender, mauve, gray, buff, blue, and brown

- c. Color consistency: somewhat consistent
- d. Finish: tumbled
- e. Ends: irregular – free form stone
- f. Properties for limestone complying with ASTM C568:
 - 1) Maximum absorption rate tested in accordance with ASTM C97: 3 percent.
 - 2) Minimum density tested in accordance with ASTM C97: 2,560 kg per cubic meter.
 - 3) Minimum compressive strength tested in accordance with ASTM C170: 55 Mpa.
 - 4) Minimum flexural strength tested in accordance with ASTM C 880: 8.27 Mpa.

2.3 Special Shapes

- B. Provide special shapes as indicated on the Drawings and as follows:
 - 1. [Arches]
 - 2. [Cornerstones]
 - 3. [Edgestones]
 - 4. [Headers]
 - 5. [Keystones]
 - 6. [Quoins]
 - 7. [Ledges]
 - 8. [Medallions]
 - 9. [Sills]
 - 10. [Other _____]
- B. Material shall be furnished in sizes indicated plus or minus 1/2 inch.
- C. Color shall be:
 - 1. [Bluestone]
 - 2. [Caramel Frappuccino]
 - 3. [Chestnut]
 - 4. [Chilton]
 - 5. [Desert]
 - 6. [Fond du Lac]
 - 7. [Frontier Gray]
 - 8. [Indiana Buff]
 - 9. [Mill Creek]
 - 10. [Rustic Buff]
 - 11. [Prairie Dust]
 - 12. [Silverdale]
 - 13. [Smoked Fog]
 - 14. [Spiced Linen]
 - 15. [St. Croix]
 - 16. [St. Mary Cream]
 - 17. [Texas Cream]
 - 18. [Match the veneer stone]
 - 19. [_____]

2.4 Weep System

- C. Provide complete weep system to separate Natural Thin Veneer from

Structural back-up wall and provide means to remove water entering wall from exterior and allow wall to vent properly thus reducing chance of mold and mildew growth; [EMC-3639] [EMC-3639XL] Weep System by Buechel Stone Corporation.

- D. System Components: Fabricated from plastic extrusions:
1. Collection and drainage membrane: Corrugated plastic sheet with permeable fabric facing to be placed vertically and continuously behind stone veneer on structural back-up wall; [EMC-3639] [EMC-3639XL] by Buechel Stone Corporation.
 2. Weeps: Cellular plastic material placed at base of stone veneer wall to receive water from collection and drainage membrane and convey it horizontally to weep strips spaced at [16 inches] [406mm] [_____] and penetrating through base mortar bed. [SCW-3639] [WOW-3639] by Buechel Stone Corporation.
 3. Material properties:
 - a. Water vapor transmission tested in accordance with ASTM E96: 13.8 grains per hour per square foot.
 - b. Permeability tested in accordance with ASTM E96: 3.7 perm-inches.
 - c. Compressive strength tested in accordance with ASTM D1621: 30 PSI at 10 percent strain.
 - d. Flexural breaking load tested in accordance with ASTM D4632: 136 Pounds minimum.
 - e. Puncture resistance tested in accordance with ASTM D4833: 48.7 pounds.

2.5 Mortar

- A. Mortar Cement: Complying with ASTM C91:
1. Type S.
 2. Color [gray] [white] [_____]
- B. Portland Cement: Complying with ASTM C150:
1. Type I.
 2. Color [gray] [white] [_____]
- C. Mortar Aggregate: Complying with ASTM C144, standard masonry type.
- D. Hydrated Lime: Complying with ASTM C207:
1. Type S
 2. Type SA
- E. Water: Clean and potable.
- F. Mortar mix: ASTM C270 [1,000] [_____] PSI Type S using the Property Method.
- G. Color: Mineral oxide pigment. Color as selected by Architect.
- H. Acrylic Polymer Liquid Internal Bonding Admixture: Normal ratio of Acryl 60 to clean potable water is 1 part Acryl 60 to 3 parts of water. Select dilution ratio of [1:3], [1:2], [1:1], or [2:1] as required by substrate and environmental conditions.
1. Prepare a mixing solution of 1 part Acryl 60 and 3 parts water. Prepare enough solution to perform several days work. Solution will remain usable if kept in tightly covered containers.
 2. Mix cement and sand first. Sand must be clean, free of clay and dry.
 3. Add mixing liquid to cement-sand mixture. Mix for 1 to 2 minutes

avoiding entrapping air.

- I. Mix mortar ingredients in accordance with ASTM C270. Mix only in quantities needed for immediate use.
 - 1. Do not use anti-freeze compounds.
 - 2. Use mortar within two hours after mixing.

2.6 Accessories

- E. Substrate: [CDX exterior grade plywood] [Plywood as specified in Section 06 10 00] [Moisture resistant gypsum sheathing complying with ASTM C79] [Gypsum sheathing as specified in Section 09 26 16].
 - 1. Thickness [1/2] [5/8] [3/4] inch.
- F. Concrete bonding agent: Latex type as recommended by Buechel Stone.
- G. Underlayment: [Cold applied, self-adhering waterproof membrane composed of polyethylene film coated one side with rubberized asphalt adhesive] [Unperforated asphalt saturated felt complying with ASTM D226, No. 30.] [_____].
- H. Expanded Metal Lath: ASTM C847, galvanized, self-furring.
- I. Lath Anchorage: Tie wire, nails, screws and other metal supports, galvanized, of type and size to suit application and to rigidly secure materials in place.
- J. Setting Buttons and Shims: Plastic.
- K. Flashing: Provide [copper] [sheet metal] [self-adhered rubber] [galvanized] [_____] flashings for base of installation, at door and window lintels, window sills, and other locations as detailed on Drawings and reviewed shop drawings and as required to prevent water penetration and provide weathertight, complete, functional natural thin veneer installation.
- L. Sealants: Provide sealants and backing material for perimeter and control joints as detailed on Drawings and reviewed shop drawings and as required to provide weathertight natural thin veneer installation.
 - 1. Type: [_____] [As specified in Section 07 92 00 - Joint Sealers: Sealant for perimeter and control joints.]

PART 3 EXECUTION

3.1 Preparation for Installation

- M. Coordinate installation of Natural Thin Veneer with installation of other components to ensure timely execution of work and sequencing to ensure sound, attractive, and weather tight exterior wall system.
- N. Prior to starting installation, inspect project conditions:
 - 1. Verify that back-up wall construction is complete, rigid, plumb, and ready to receive stone.
 - 2. Verify that door and window openings and other penetrations are accurately located, sized, and adequately prepared for application of Natural Thin Veneer.
 - 3. Verify built-in items are properly located and ready for roughing into masonry. Ensure built-in items are free of rust, ice, mud, and other foreign matter and that ferrous items are primed or galvanized.
 - 4. Verify that mechanical and electrical services within walls have been installed, tested, and approved.
 - 5. Concrete:

- a. Verify cast-in-place concrete walls have cured 30 days minimum.
 - b. Verify that surfaces are free of form release and curing agents, oil, bituminous waterproofing, water repellent, dirt, and other foreign material that would be detrimental to mortar bonding. Clean surface as required by sandblasting, acid wash, or other means. Thoroughly rinse cleaned surfaces.
 - c. Apply bonding agent to concrete in accordance with manufacture's instructions and application rate.
- 6. Concrete unit masonry:
 - a. Verify that joints are flush and masonry walls have cured 30 days minimum.
 - b. Verify that surfaces are free of oil, bituminous waterproofing, water repellent, paint, dirt, and other foreign material that would be detrimental to mortar bonding. Clean surfaces as required by sandblasting, acid wash, or other means. Thoroughly rinse cleaned surfaces.
- 7. Stud framed wall:
 - a. Verify that [plywood] [gypsum] sheathing substrate is:
 - 1) Securely installed with ends and edges over firm bearing.
 - 2) Clean, dry, smooth, and free of voids, sharp edges, loose splinters, oil, grease, and other materials.
 - b. Fasteners are flush with surface of substrate.
- O. Report deficiencies to Architect and do not proceed with Natural Thin Veneer installation until all deficiencies have been addressed.

3.2 Installation

- P. Install stone and related components as detailed on Drawings and reviewed shop drawings, manufacture's instructions, and standards of workmanship as published in ACI530.1/ASCE 6/TMS.
- Q. Underlayment installation: Install [asphalt felt underlayment] [self-adhered sheet waterproofing underlayment] on wall substrate in accordance with manufacturer's instructions.
 - 1. Start installation at bottom of wall. Install underlayment horizontally with [4 inches] [102 mm] minimum side laps and [6 inches] [152 mm] minimum end laps.
 - 2. Do not leave underlayment exposed for lengthy period. Exercise care not to puncture or tear underlayment.
- R. Flashing: Install flashings at base of air cavity, at door and window lintels, window sills, and other locations as detailed on Drawings and reviewed shop drawings in accordance with Section 07 62 00 - Sheet Metal Flashing and Trim.
- S. Weep system installation: Install over weather resistant underlayment of [[metal] [wood] stud framed back-up wall with [plywood] [gypsum] sheathing.] [concrete back-up wall cast in permanent insulating foam forms.] Install in accordance with manufacturer's instructions and reviewed shop drawings.
 - 1. Apply weep system over complete back-up wall. Where sections join, overlap fabric facing.

2. At base of wall anchor weeps by stapling to substrate. Space at [16 inches] [406 mm] minimum and extend out beyond location of Natural Thin Veneer.
- T. Metal lath installation: Install in accordance with ASTM C1068. Apply taut with long dimensional horizontal.
1. Attach metal lath directly to [cast concrete] [concrete unit masonry] with [galvanized] [stainless steel] concrete [nails] [screws] spaced [6 inches] [152 mm] maximum vertically and [16 inches] [406 mm] maximum horizontally.
 2. Attach metal lath to cast concrete with [galvanized] [stainless steel] concrete [nails] [screws] sufficient to penetrate through weep system, weather-resistant underlayment, insulating foam formwork. Space fasteners at [6 inches] [152 mm] maximum vertically and [16 inches] [406 mm] maximum horizontally.
 3. Anchor metal lath to [wood] [metal] studs with [galvanized] [stainless steel] [_____] fasteners penetrating through sheathing, weep system, and weather resistant underlayment. Space fasteners at [6 inches] [406 mm] minimum vertically and [16 inches] [406 mm] maximum horizontally.
 4. Start installation at bottom of wall.
 5. Lap horizontal in shingle fashion with minimum [3 inches] [76 mm] overlap.
 6. Lap ends [1 inch] [25 mm] minimum. Secure laps with tie wire when they occur between supports.
 7. Lap corner installations minimum [16 inches] [406 mm] and securely fasten into adjacent wall stud.
 8. Stop lath [1 inch] [25 mm] from finished edges.
- U. Scratch coat installation: Apply cement mortar scratch coat in accordance with PCA Plaster (Stucco) Manual.
1. Key into metal lath.
 2. Thickness [$\frac{1}{2}$ to $\frac{3}{4}$ inch] [13 to 19 mm] or [$\frac{1}{4}$ behind lath, $\frac{1}{4}$ inch in front of lath] [6.5 mm behind lath, 6.5 mm in front of lath]
 3. Prior to initial set, scratch horizontally to provide key for bond coat.
 4. Allow to cure 20 hours.
 5. Slightly dampen scratch coat before installation of Natural Thin Veneer.
 6. Apply mortar to metal lath in amount that is capable of being worked while mortar is still workable
 7. Install Natural Thin Veneer to mortar before initial setup.
- V. Stone installation
1. Lay out work in advance and distribute color range and stone uniformity over total work area.
 2. Coursing patterns: [Coursed] [Random Ashlar] [Random rubble] [Squared rubble] [As indicated on [Drawings] [reviewed shop drawings] [To match approved mock-up]]. Arrange stone pattern to provide color and uniformity, visual variations, blend of sizes, and regularity and neat appearance of joints. Exercise care to avoid concentration of any one color on any one wall surface. Do not use stacked vertical joints.

3. Mortar setting: Apply [½ inch] [13 mm] bonding mortar to back of Natural Thin Veneer. Ensure complete coverage of back surface. Apply extra bed of mortar around all outside edges of stone. Press and wiggle stone firmly onto wall.
 - a. Work from bottom up.
 - b. Start at corners. Alternate installation of long and short ends of corner units in adjacent courses.
 - c. [Maintain minimum [4 inch] [101 mm] clearance from grade.]
 - d. Isolate top of veneer stone from horizontal structural framing members and slabs or decks with compressible joint filler and sealant in accordance with Section 07900.
4. Joints: Lay stone with [½ inch] [13 mm] approximate mortar joints.
 - a. Fill joints with mortar. Pack and work into voids.
 - b. When thumb-print hard, neatly tool to concave joint with round jointer slightly larger than joint width.
 - c. [_____]
- W. Remove excess mortar as work progresses to prevent staining.
- X. Remove units disturbed after laying, clean, and re-lay with fresh mortar. If adjustments are required, remove units, clean off mortar, and reset with fresh mortar.
- Y. Exercise care that wet mortar is not splashed onto stone face during installation. Excess or splashed mortar shall be cleaned from face with dry burlap wipe. Remove excess after mortar becomes hard enough not to smear but prior to mortar setting.
- Z. Ensure that sealant materials are not smeared onto stone faces. Remove as recommended by manufacturer.
- AA. After installation of Natural Thin Veneer, cut off excess weep materials flush with stone edge.

3.4 Field Quality Control

- BB. Test mortar and grout in accordance with Section 01 45 00 Quality Control and ASTM C780.
- CC. Testing of Mortar Mix: In accordance with ASTM C780, Annex A4, for mortar aggregate ratio and ASTM C780, Annex A5, for mortar water content.

3.5 Protection

- A. Protect installed products until completion of project.
- B. Cover the top of unfinished stone masonry work to protect it from the weather.
- C. Touch-up, repair or replace damaged products before substantial completion.

3.6 Cleaning and Sealing

- A. Remove excess mortar and mortar smears as work progresses.
- B. Allow walls to air dry. Brush off mortar with stiff fiber brush. Do not use metallic tools for cleaning.
- C. Review www.buechelstone.com for detailed cleaning if chemicals are required.

- D. After cleaning, treat exposed stone surfaces and mortar joints with clear water repellent [and anti-graffiti] coating [_____]. Apply in accordance with manufacturer's instructions. Verify surfaces are clean and thoroughly dry prior to application.
- E. Review www.buechelstone.com for details on sealing stone.

END OF SECTION