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## SECTION 097500

### STONE FACING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section includes

1. The following interior dimension stone hand set with anchors with cavity:
  - a. Wall cladding.
  - b. Column cladding.

c. Interior trim including window stools, base.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for installing masonry inserts for anchoring interior stone facing.
2. Division 04 Section "Exterior Stone Cladding" for exterior stone facing.
3. Division 05 Section "Cold Formed Metal Framing" for steel framing backup.
4. Division 07 Section "Joint Sealants" for sealing expansion joints in interior stone facing.
5. Division 09 Section "Stone Tiling" for stone floor and wall tile.
6. Division 09 Section "Stone Flooring" for stone flooring.

1.2 REFERENCES

- A. ASTM A 123-02: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B. ASTM C 97-02: Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
- C. ASTM C 119-04: Terminology Relating to Dimension Stone
- D. ASTM C 170-90 (1999): Test Method for Compressive Strength of Dimension Stone
- E. ASTM C 207-04: Specification for Hydrated Lime for Masonry Purposes
- F. ASTM C 270-03: Specification for Mortar for Unit Masonry
- G. ASTM C 615-03: Specification for Granite Dimension Stone
- H. ASTM C 880-98: Test Method for Flexural Strength of Dimensional Stone
- I. ASTM C 1354-96: Test Method for Strength of Individual Stone Anchorages in Dimension Stone
- J. ASTM E 329-03: Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- K. ASTM F 593-02: Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
- L. ASTM F 594-02: Specification for Stainless Steel Nuts
- M. National Building Granite Quarries Association (NBGQA) Specifications for Architectural Granite.

1.3 DEFINITIONS

- A. Definitions contained in ASTM C 119 apply to this Section.
- B. Metric Conversions: The following metric conversions shall apply where English measurements are indicated in the text:

1. 1/16 inch (1.5 mm)
2. 1/8 inch (3 mm)
3. 3/16 inch (5 mm)
4. 1/4 inch (6 mm)
5. 5/16 inch (8 mm)
6. 3/8 inch (10 mm)
7. 1/2 inch (12 mm)
8. 5/8 inch (15 mm)
9. 13/16 inch (20 mm)
10. 1 inch (25 mm)
11. 1-3/16 inches (30 mm)
12. 1-1/4 inches (32 mm)
13. 1-1/2 inches (40 mm)
14. 1-5/8 inches (40 mm)
15. 2 inches (50 mm)
16. 3 inches (75 mm)
17. 4 inches (100 mm)
18. 6 inches (150 mm)
19. 8 inches (200 mm)
20. 12 inches (300 mm)

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Design Requirements: Stone Anchors and Anchoring: ASTM C 1242.
- B. Safety Factors: Loads indicated without exceeding allowable working stress of stone determined by dividing stone's average ultimate strength by the following factors:
  1. Safety Factor: [**3 for granite**].
  2. Safety Factor for Concentrated Stresses: [**4 for granite**].
  3. Safety Factor for Anchors: [**4 for granite**].

#### 1.5 SUBMITTALS

- A. Product Data: For each stone type and each manufactured product shown on Drawings or specified.
  1. For each stone variety used on Project, include physical property data.
- B. Shop Drawings: Show fabrication and installation details for stone cladding:
  1. Include dimensions and profiles of stone units.
  2. Show locations and details of joints.
  3. Show locations and details of anchors.
  4. Include elevations and details of graphics and carvings.
  5. Include structural analysis data signed and sealed by the qualified professional engineer.
- C. Samples: Submit samples for each stone type required, exhibiting the full range of color characteristics expected.
  1. Submit a minimum of 2 each, 12 inches x 12 inches in size, in each color and finish specified.

2. In the case of more variegated stones, color photos shall be submitted in addition to the number of samples to show the full range of color and markings to be expected.

**[[Mortar Samples]:** Full range of exposed color and texture.

4. **[Sealant Samples]:** For each type and color of joint sealant required.
- D. Graphics and Carvings: Electronic files for drawings of graphics and carving work will be provided by the **[Architect]**.
- E. Quality Assurance/Control Submittals:
1. Sealant Test Report: Submit test report from sealant manufacturer, in accordance with Division 07 Section "Joint Sealants" stating that sealants will not stain stone.
  2. Submit welding certificates.
  3. Material Test Reports: From a qualified independent testing agency, as follows:
    - a. Provide reports for each stone type.
    - b. For metal components.
- F. Maintenance Data: For interior stone facing to include in maintenance manuals. Include Product Data for stone-care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

## 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate interior stone facing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Installer Qualifications: Experienced stone setters skilled in installing interior stone facing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- C. Single Source Responsibility for Stone Cladding: Engage a qualified installer for stone cladding system to assume complete responsibility for fabrication and installation of stone cladding to comply with specified requirements.
1. For stone types that include same list of varieties and sources, provide same variety from same source for each.
- D. Visual Mockup: **[At the Owner's Expense]** Provide full sized mock-up of the approved stone or stones in the approved finishes, erected at a site agreed to by the Architect, Contractor, and the Fabricator. The approved mock-up shall become the standard for the project.
1. Build mockup of typical area as shown on Drawings.
  2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle materials to prevent deterioration or damage.
  - 1. Stone shall be carefully packed and loaded for shipment using reasonable care and customary precautions against damage in transit. Material, which may cause staining or discoloration shall not be used for blocking or packing.
  - 2. The stone shall be stacked on timber or platforms at least 4 inches above the ground. Care shall be taken to prevent staining or discoloration during storage.
  - 3. If storage is to be for a prolonged period, polyethylene or other suitable plastic film shall be placed between wood and finished surfaces of completely dry stone.
- B. Properly store cementitious materials. Do not use damp cementitious materials.

## 1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions of construction to receive interior stone facing by field measurements before fabrication and indicate measurements on Shop Drawings.

## 1.9 SEQUENCING

- A. Coordinate installation of concrete or masonry inserts. Furnish setting drawings, templates, and directions for installing such items.
- B. Coordinate delivery and installation of dimension stone cladding.

## PART 2 - PRODUCTS

### 2.1 STONE SOURCE

- A. Varieties and Source: Subject to compliance with requirements, provide stone of the following variety and from the following source:
  - 1. Granite: **[Insert stone variety]** by Coldspring.
  - 2. Dolomitic Limestone: Kasota Valley Limestone by Coldspring.

### 2.2 GRANITE MATERIAL

- A. Granite: ASTM C 615.
- B. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
- C. Match Architect's samples.
- D. Granite Type **[Insert Drawing Designation Type]**:
  - 1. Stone Variety: **[Insert stone variety]** by Coldspring.
  - 2. Location: Interior cladding
  - 3. Finish:
    - a. [Polish]

- b. [Velvet]
- c. [Diamond 8 (Honed)]
- d. [Rub & Sand]
- e. [Textured]
- f. [Thermal]
- g. [Diamond 10]

4. Thickness: Not less than the following:

- a. [13/16 inch (+1/8" -1/16")] [20 mm]
- b. [1-3/16 inches (+1/8" -1/16")] [30 mm]
- c. [1-9/16 inches (+1/8" -1/16")] [40 mm]
- d. [1-15/16 inches (+1/8" -1/16")] [50 mm]

### 2.3 LIMESTONE MATERIAL

A. Dolomitic Limestone: ASTM C 568, classification as follows:

1. Medium Density Limestone: ASTM C 568 Class II.

- a. Density: **[135 - 160 lb/cu. ft.]**
- b. Absorption by weight: 5 percent maximum
- c. Modulus of rupture: **800 psi** minimum

B. Dolomitic Limestone Type **[insert type designation]**:

1. Location: **[Interior Cladding]**.

2. Finish:

- a. [Polish]
- b. [Honed]
- c. [Diamond Smooth]
- d. [Textured]

3. Color: Cream

4. Thickness: Not less than the following:

- a. [2 inches (+1/8" -1/16")] [50 mm]
- b. [2-1/2 inches (+1/8" -1/16")] [64 mm]
- c. [3 inches (+1/8" -1/16")] [75 mm]
- d. [4 inches (+1/8" -1/16")] [100 mm]

### 2.4 SETTING MATERIALS

A. Molding Plaster: ASTM C 59/C 59M.

B. Portland Cement: ASTM C 150, Type I

- 1. Provide white cement
- 2. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

C. Hydrated Lime: ASTM C 207, Type S.

- D. Aggregate: ASTM C 144.
- E. Water: Potable.
- F. Bonding Stone Adhesive: 2-part, epoxy-resin or polyester-resin stone adhesive with an initial set time of not more than 2 hours at **70 deg F**.
  - 1. Color: [**Match stone**].

## 2.5 GROUT FOR STONE JOINTS

- A. Grout Color:
  - 1. [Match stone]
  - 2. [As selected by Architect].
- B. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce required color.
- C. Standard Sanded Cement Grout: ANSI A118.6.
- D. Standard Unsanded Cement Grout: ANSI A118.6.
- E. Polymer-Modified Tile Grout: ANSI A118.7.
  - 1. Polymer Type: [**Acrylic resin**] in liquid-latex form for addition to prepackaged dry-grout mix.
  - 2. Grout Type: [**Sanded**] [**Unsanded**].

## 2.6 SEALANTS

- A. Joint Sealants: Sealants of comply with requirements in Division 07 Section "Joint Sealants" and will not stain the stone.
  - 1. Colors: Provide colors of exposed sealants to match colors of grout in stone adjoining sealed joints.
  - 2. Single-component, silicone sealant; Class 25, and Use M (masonry).
- B. Sealant for Filling Kerfs: [Elastomeric sealants indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants"].
  - 1. Single-component, nonsag, urethane sealant; Class 25, Use T (traffic), and Use M (masonry).

## 2.7 STONE ANCHORS AND ATTACHMENTS

- A. Stainless steel, ASTM A 240/A 240M, Type 304.
  - 1. Fasteners for Stainless-Steel Anchors: Annealed stainless-steel bolts, nuts, and washers; **ASTM F 593** for bolts and **ASTM F 594** for nuts, Alloy Group **1**.
- B. Dowels: Stainless steel, ASTM A 276, Type 304.

- C. Extruded aluminum: **ASTM B 221**, alloy and temper as required to support loads imposed without exceeding allowable design stresses, but not less than strength and durability properties of Alloy 6063-T6.
  - 1. Fasteners for Extruded-Aluminum Anchors: Annealed stainless-steel bolts, nuts, and washers; **ASTM F 593** for bolts and **ASTM F 594** for nuts, Alloy Group 1.
- D. Wire Tiebacks: [No. 9 AWG copper or copper-alloy] [or] [**0.120-inch-** diameter, stainless-steel] wire.

## 2.8 STONE ACCESSORIES

- A. Temporary Setting Shims: Rigid plastic shims, nonstaining to stone, sized to suit joint thickness.
- B. Setting Shims: Strips of resilient plastic or neoprene, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.
- C. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

## 2.9 STONE FABRICATION, GENERAL

- A. General: Fabricate stone per requirements, including Drawings and Shop Drawings.
  - 1. Granite: NBGQA's "Specifications for Architectural Granite."
  - 2. For dolomitic limestone, comply with recommendations in MIA's "Dimension Stone--Design Manual."
- B. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.
- C. Fabricate interior stone facing in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
- D. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association.
  - 1. Clean sawed backs of stones to remove rust stains and iron particles.
  - 2. Dress joints straight and at right angle to face.
  - 3. Cut and drill holes in stone for anchors, supports, and lifting devices
  - 4. Shape beds to fit supports.
  - 5. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
  - 6. Produce moldings with abrasive shaping wheels made to reverse contour of molding shape.
  - 7. Miter moldings at corners with edges of miters slightly eased at outside corners.
- E. Finish exposed faces and edges of stone to match stone finish.

## 2.10 STONE WALL AND COLUMN CLADDING

### A. Granite Nominal Thickness:

1. [13/16 inch (+1/8" -1/16")] (20 mm)
2. [1-3/16 inches (+1/8" -1/16")] (30 mm)
3. [1-9/16 inches (+1/8" -1/16")] (40 mm)
4. [1-15/16 inches (+1/8" -1/16")] (50 mm)

### B. Limestone Nominal Thickness:

1. [2 inches (+1/8" -1/16")] [50 mm]
2. [2-1/2 inches (+1/8" -1/16")] [64 mm]
3. [3 inches (+1/8" -1/16")] [75 mm]
4. [4 inches (+1/8" -1/16")] [100 mm]

### C. Maintain minimum clearances of **[3/4 inch]** **[1 inch]** between backs of stone and work behind stone. Do not back check stone less than **1 inch** thick.

### D. Joint Width:

1. [**1/16-inch-** wide grouted joints]
2. [**1/8-inch-** wide grouted joints]
3. [**1/8-inch-** wide, sealant-filled] joints.

## 2.11 STONE BASE AND TRIM

### A. Wall Base:

1. Nominal Thickness: [13/16 inch (20 mm)]
2. Top-Edge Detail: [**Straight, slightly eased at corner**]
3. Ends: [**Butt ends into casings**]
4. Joints: [**1/16-inch- wide grouted joints**]

### B. Trim:

1. Nominal Thickness: [13/16 inch (20 mm)]
2. Top-Edge Detail: [**Straight, slightly eased at corner**]
3. Joints: [**1/16-inch- wide grouted joints**]

### C. Profiled Trim:

1. Profile: Match [**profiles indicated on Drawings**].
2. Joints: [**1/16-inch- wide grouted joints**]

## 2.12 STONE GRAPHICS AND CARVING

### A. Carve and cut graphics and carvings according to Shop Drawings. Use skilled stone carvers experienced in the successful performance of work similar to that indicated.

### B. Abrasively etch graphics and carvings according to Shop Drawings.

### C. Laser etch graphics and carvings according to Shop Drawings.

## 2.13 MIXES

- A. Spotting Plaster: Stiff mix of molding plaster and water.
- B. Mortar: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
  - 1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride.
  - 2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer, unless otherwise indicated. Discard mortar when it has reached initial set.
- C. Setting Mortar: Comply with ASTM C 270, Proportion Specification, Type N.
- D. Grout: Comply with mixing requirements of referenced ANSI standards and with manufacturer's written instructions.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces indicated to receive interior stone facing and conditions under which interior stone facing will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

### 3.3 SETTING OF STONE, GENERAL

- A. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight and true, with edges eased slightly to prevent snipping.
- B. Contiguous Work: Provide reveals and openings as required to accommodate contiguous work.
- C. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.

- D. Erect stone units level, plumb, and true with uniform joint widths. Use temporary shims to maintain joint width.
- E. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
  - 1. Sealing of expansion, control, and pressure-relieving joints is specified in Division 07 Section "Joint Sealants."
  - 2. Keep expansion, control, and pressure-relieving joints free of plaster, mortar, grout, and other rigid materials.

### 3.4 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/8 inch in 96 inches, 1/4 inch maximum.
- B. Variation from Level: For lintels, sills, chair rails, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, 3/8 inch maximum.
- C. Variation of Linear Building Line: For position shown in plan and related portion of walls and partitions, do not exceed 1/8 inch in 96 inches, 1/4 inch in 20 feet, 3/8 inch maximum.
- D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus 1/8 inch.
- E. Variation in Joint Width: Do not vary joint thickness more than 1/16 inch or 1/4 of nominal joint width, whichever is less.
- F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/32-inch difference between planes of adjacent units.

### 3.5 INSTALLATION OF STONE CLADDING

- A. Set units firmly against setting spots. Locate setting spots at anchors and spaced not more than 18 inches apart across back of unit, but provide no fewer than 1 setting spot per 2 sq. ft., unless otherwise indicated.
  - 1. Use portland cement mortar for setting spots where stone is applied to inside face of exterior walls.
- B. Anchors: Provide a minimum of 4 anchors per panel up to 12 sq. ft. in face area, plus a minimum of 2 additional anchors for each additional 8 sq. ft.
- C. Grout joints after setting.

### 3.6 INSTALLATION OF STONE TRIM

- A. Stone Trim: Set stone window stools on wood or metal framing or wood blocking in a full bed of adhesive. Hold adhesive back from exposed edges of joints to allow for grouting.

- B. Stone Trim: Adhere units to plywood backing with full spread of water-cleanable epoxy adhesive. Hold adhesive back from exposed edges of joints to allow for grouting.
- C. Grout joints after setting.

### 3.7 GROUTING JOINTS

- A. Grout stone to comply with ANSI A108.10.
- B. Remove temporary shims before grouting.
- C. Tool joints uniformly and smoothly with plastic tool.

### 3.8 JOINT-SEALANT INSTALLATION

- A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."
  - 1. Remove temporary shims before applying sealants.

### 3.9 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean interior stone facing as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
- B. Remove and replace interior stone facing of the following description:
  - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
  - 2. Defective stone facing.
  - 3. Defective joints, including misaligned joints.
  - 4. Interior stone facing and joints not matching approved Samples and mockups.
  - 5. Interior stone facing not complying with other requirements indicated.
- C. Replace in a manner that results in interior stone facing's matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.
- D. Clean interior stone facing no fewer than six days after completion of grouting and pointing, using clean water and soft rags or stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.

### 3.10 PROTECTION

- A. Protect stone surfaces, edges, and corners from construction damage. Use securely fastened untreated wood, plywood, or heavy cardboard to prevent damage.
- B. Before inspection for Substantial Completion, remove protective coverings and clean surfaces.

END OF SECTION