

SECTION 04 4200 – EXTERIOR STONE CLADDING

PART 1- GENERAL

1.01 SECTION INCLUDES

- A. Stone cladding for exterior walls.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 – Cast-in-Place Concrete: **[Inserts]** **[Weld plates]** in concrete.
- B. Section 04 2000 – Unit Masonry: **[Inserts]** **[Stone trim]** in unit masonry.
- C. Section 04 4213 – Masonry-Supported Stone Cladding.
- D. Section 04 4216 – Steel-Stud-Supported Stone Cladding.
- E. Section 04 4219 – Strongback-Frame-Supported Stone Cladding.
- F. Section 04 4223 – Truss-Supported Stone Cladding.
- G. Section 04 4226 – Grid-System-Supported Stone Cladding.
- H. Section 04 4243 – Stone Panels for Curtain Walls.
- I. Section 04 4313 – Stone Masonry Veneer.
- J. Section 05 1200 – Structural Steel Framing: Steel structural framing members.
- K. Section 05 5000 – Metal Fabrications: Steel framing and support fabrications.
- L. Section 07 2500 – Weather Barriers: Water-resistive barrier.
- M. Section 07 6200 – Sheet Metal Flashing and Trim: Flashing materials.
- N. Section 07 9200 – Joint Sealants.
- O. Section 08 4313 – Aluminum-Framed Storefronts.
- P. Section 08 4413 – Glazed Aluminum Curtain Walls.
- Q. Section 32 1440 – Stone Paving.
- R. Section 32 1613.43 – Stone Curbs.
- S. Section 32 3253 – Stone Retaining Walls.

1.03 DEFINITIONS

- A. ACI – American Concrete Institute (www.concrete.org).
- B. AISC – American Institute of Steel Construction (www.aisc.org).
- C. ANSI – American National Standards Institute (www.ansi.org).
- D. ASTM – American Society for Testing and Materials (www.astm.org).

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- E. AWS – American Welding Society (www.aws.org).
- F. ILIA – Indiana Limestone Institute of America (www.iliai.com).
- G. IMI – International Masonry Institute (imiweb.org).
- H. NBGQA – National Building Granite Quarries Association (www.nbgqa.com).
- I. NSC – Natural Stone Council (www.naturalstonecouncil.org).
- J. NSI – Natural Stone Institute (www.naturalstoneinstitute.org).

1.04 REFERENCE STANDARDS

- A. ANSI/NSC 373 – Sustainability Assessment for Natural Dimension Stone; 2019.
- B. ASCE/SEI 7-16 – Minimum Design Loads and Associated Criteria for Buildings and Other Structures; 2016.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015e1.
- H. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).
- I. ASTM C97/C97 - Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone; 2015.
- J. ASTM C99/C99M - Standard Test Method for Modulus of Rupture of Dimension Stone; 2015.
- K. ASTM C144 – Standard Specification for Aggregate for Masonry Mortar; 2011.
- L. ASTM C150/C150M – Standard Specification for Portland Cement; 2016.
- M. ASTM C170/C170M - Standard Test Method for Compressive Strength of Dimension Stone; 2016.
- N. ASTM C207 – Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- O. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- P. ASTM C305 - Standard Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency; 2014.

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- Q. ASTM C321 - Standard Test Method for Bond Strength of Chemical-Resistant Mortars; 2000 (Reapproved 2012).
- R. ASTM C503/C503M – Standard Specification for Marble Dimension Stone; 2015.
- S. ASTM C568/C568M – Standard Specification for Limestone Dimension Stone; 2015.
- T. ASTM C615/C615M – Standard Specification for Granite Dimension Stone; 2018, with Editorial Revision.
- U. ASTM C880/C8880M – Standard Test Method for Flexural Strength of Dimension Stone; 2018.
- V. ASTM C1242 – Standard Guide for Selection, Design, and Installation of Dimension Stone Attachment Systems; 2015a.
- W. ASTM C1354/C1354M – Standard Test Method for Strength of Individual Stone Anchorages in Dimension Stone; 2015.
- X. ASTM D570 – Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- Y. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.
- Z. ASTM D695 – Standard Test Method for Compressive Properties of Rigid Plastics; 2015.
- AA. ASTM D2240 – Standard Test Method for Rubber Property-Durometer Hardness; 2015.
- BB. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- CC. AWS D1.1/D1.1M – Structural Welding Code – Steel; 2015.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate exterior stone cladding assemblies with rain drainage, flashing, sills and trim, and other adjoining work.
- B. Preinstallation Meeting:
 - 1. Attendees:
 - 2. Owner.
 - 3. Architect.
 - 4. Stone cladding manufacturer’s representative.
 - 5. Installer’s whose work interfaces with or affects exterior stone cladding including installers of [**doors**], [**windows**], [**storefront**], [**curtain wall**], and [_____].
 - 6. Review and finalize construction schedule.
 - 7. Verify availability of materials, installer's personnel, equipment, and facilities needed to maintain schedule.
 - 8. Review means and methods related to installation, including manufacturer's written instructions.
 - 9. Examine support conditions for compliance with requirements, including alignment and attachment to structural members.

1.06 SUBMITTALS

- A. See Section 01 3000 – Administrative Requirements for submittal procedures.

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- B. Product Data: Submit manufacturer's product data sheets including certified laboratory test reports for stone cladding, accessories, and other products required.
- C. Shop Drawings: Submit fabrication and installation layouts of stone cladding; including exterior elevations, details of edge conditions, joints, profiles, corners, sills, anchorage and attachment system, trim, flashings, closures, accessories, and special details.
 - 1. Include in shop drawings details as developed by cladding engineer in accordance with specified requirements.
 - 2. Include large scale details of decorative surfaces and inscriptions.
 - 3. Include mechanical anchoring and framing of preassembled units showing epoxy joint construction.
- D. Samples: Submit **[two]** or **[three]** samples for each type of stone cladding required, **[at least 12 inch (305 mm) high by 12 inch (305 mm) wide by 3/8 inch (9.5 mm) thick]** or **[in sizes representative of materials specified]**.
 - 1. Sets of samples to represent range of variations in color and finish as expected in completed work.
 - 2. Submit samples of joint sealants for each type and color required.
- E. Delegated Design Submittals: Submit the following data on exterior stone cladding system that has been signed and stamped by Professional Engineer registered in state project is located who certifies preparing or supervising preparation of design data in compliance with specified performance requirements and recognized engineering principles and practices.
 - 1. Engineering calculations.
 - 2. Connection details.
- F. Test and Evaluation Reports: Submit on each type of exterior stone cladding provided for project based on evaluation of comprehensive tests performed by qualified testing agency.
 - 1. Health Product Declaration (HPD): Submit HPD information on stone cladding products to be used on project.
- G. Installer's qualification statement.
- H. Testing Agency's qualification statement.

1.07 QUALITY ASSURANCE

- A. Installer's Qualifications: Company specializing in performing work of this section with at least **[ten]** [____] years of documented experience **[and recommended by manufacturer]**.
- B. Testing Agency's Qualifications: Contractor to engage independent testing laboratories to perform preconstruction testing.
 - 1. Test exterior stone cladding materials for compliance with specified performance requirements.

1.08 MOCK-UPS

- A. Provide mock-up to verify selections made under sample submittals and to demonstrate aesthetic effects of each type, color, and texture of exterior stone cladding, and to establish quality standards for fabrication and installation.
- B. Build mock-up of exterior stone cladding assembly on site, **[as shown on drawings]**, including but not limited to adhesives, mortars, and grouts.
 - 1. Size and location of mock-up as designated by Architect.

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2. Do not proceed with this Work until Architect approves materials and workmanship.
3. Rework mock-up as required to produce acceptable stone cladding assembly.
4. Remove mock-up when directed by Architect.
5. Acceptable mock-up may be incorporated into the work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials and products in strict compliance with manufacturer's instructions, recommendations, and industry standards.
- B. Store and handle stone and related materials to prevent deterioration and damage.
 1. Do not use pinch or wrecking bars on stonework.
 2. Lift stone using wide-belt type slings where possible; do not use wire ropes, or ropes containing tar or other substances that may cause staining.
 3. Store stone on non-staining wood skids or pallets, and cover with non-staining, waterproof membrane.
 4. Place and stack skids and stone to distribute weight evenly and to prevent breakage or cracking of stone.
 5. Store cementitious materials above ground or floor, under cover, and in dry location.

1.10 FIELD CONDITIONS

- A. Cold Weather Protection: Comply with IMI - Cold Weather Masonry Construction and Protection Recommendations (www.imiweb.org/cold-weather-masonry-construction).
- B. Protect stone cladding work during construction as follows:
 1. Cover top of walls with non-staining waterproof sheeting at end of work each day.
 2. Cover partially completed stonework while work is not in progress.
 3. Extend cover at least 24 inches (610 mm) down both sides and hold securely in place.
 4. Prevent staining of stone from mortar, grout, sealants, and other materials; immediately remove such materials from stone without damaging stonework.
 5. Protect base of walls from rain-splashed mud and mortar splatter using approved coverings spread on ground and applied over wall surface.
 6. Protect sills, ledges, and projections from droppings of mortar and sealants.

PART 2- PRODUCTS

2.01 MANUFACTURER

- A. POLYCOR INC. Headquarters:
 1. Address: 76 Saint Paul Street, Suite 100, Quebec City, Quebec, Canada G1K 3V9.
 2. Headquarters Phone: (418) 692-4695.
 3. Website: www.polycor.com.
 4. Contact Email: **[Representative]**@polycor.com.
- B. Indiana Limestone Company, a POLYCOR INC. Company:
 1. Address: 123 South College Ave., Bloomington, Indiana 47404.
 2. Phone: (800) 457-4026 & (812) 275-3341.
 3. Website: www.indianalimestonecompany.com.
- C. North Carolina Granite Corporation (NCGC), a POLYCOR INC. Company:
 1. Address: 151 Granite Quarry Trail, Mount Airy, North Carolina 27030.
 2. Phone: (800) 227-6242 & (336) 786-5141.

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3. Website: www.ncgranite.com.

D. Provide stone cladding for entire project from quarry as indicated for type of **[granite]** **[limestone]** or **[marble]** stone designated for use on this project.

2.02 PERFORMANCE REQUIREMENTS

- A. Granite Physical Properties: Provide granite dimension stone that complies with ASTM C615/C615M and NBGQA.
- B. Limestone Physical Properties: Provide limestone with physical properties that meet or exceed values listed in ILIA Indiana Limestone Handbook, latest edition, and dimension stone that complies with ASTM C568/C568M.
1. Limestone Safety Factors: Provide safety factors for design loads and stresses of limestone cladding assembly that meet or exceed values indicated in ILIA Technote on Safety Factors.
- C. Marble Physical Properties: Provide marble dimension stone that complies with ASTM C503/C503M.
- D. Stone Connections and Attachments: Design steel supports, shapes, plates, bolts, and attachments to support design loads with safety factors and allowable stresses in accordance with ASTM C1242 and AISC Steel Construction Manual, latest edition, and the following.
1. Do not stress steel supports carrying gravity loads more than 50 percent of yield stress in bending.
2. Welds: Comply with AWS D1.1/D1.1M.
3. Concrete Embedded Items: Comply with ACI or manufacturers recommendations, with safety factor not less than 4 to 1 based on concrete failure.
4. Stone Anchorages: Comply with dimension stone anchorage testing in accordance with ASTM C1354/C1354M for strength of stone anchors.
- E. Design Loads: Design cladding and cladding attachments in compliance with following design loads with safety factors as specified.
1. Wind Loads, Dead Loads, **[Seismic Loads]**, and Live Loads: Comply with ASCE/SEI 7-16, local building code and authorities having jurisdiction (AHJ) requirements.
- F. Corrosion and Stain Control: Prevent galvanic and other types of corrosion or staining by isolating metals and other materials from direct contact with incompatible materials, or by applying suitable coatings; staining of stone and joint surfaces is not permitted.
- G. Sustainability: Comply with ANSI/NSC 373 for natural stone quarrying and fabrication operations at **[Bronze]** **[Silver]** **[Gold]** or **[Platinum]** certification level.

2.03 GRANITE MATERIALS

- A. Granite:
1. Granite Thickness: **[3/8 inch (1 cm)] [3/4 inch (2 cm)] [1-1/4 inches (3 cm)] [2 inches (5 cm)] [__ inches (__ cm)] or [As indicated on drawings].**
2. Backside Reinforcement: For 3/8 inch (1 cm) thick granite stone cladding apply composite backing on backside.
3. Granite Type: American Black.
- a. Quarry Location: Elverson, PA, U.S.A. and operating since 1973.
- b. Absorption by Weight: 0.023 maximum percentage; ASTM C97/C97M.
- c. Density: 192.3 lbs/cu ft (3,080.35 kg/cu m), minimum; ASTM C97/C97M.
- d. Compressive Strength: 43,524 psi (300.09 MPa), minimum; ASTM C170/C170M.

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- e. Flexural Strength: 3,560 psi (24.5 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 3,799 psi (26.19 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed] [Plasma flamed]**.
4. Granite Type: American Mist.
- a. Quarry Location: Elverson, PA, U.S.A. and operating since 1973.
 - b. Absorption by Weight: 0.023 maximum percentage; ASTM C97/C97M.
 - c. Density: 192.3 lbs/cu ft (3,080.35 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 43,524 psi (300.09 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 3,560 psi (24.5 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 3,799 psi (26.19 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed] [Plasma flamed]**.
5. Granite Type: Barre Gray.
- a. Quarry Location: Barre, VT, U.S.A. and operating since 1880.
 - b. Absorption by Weight: 0.210 maximum percentage; ASTM C97/C97M.
 - c. Density: 165.7 lbs/cu ft (2,654.26 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 23,654 psi (163.03 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 2,114 psi (14.6 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 2,393 psi (16.50 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Sandblasted] [Propane flamed] [Plasma flamed]**.
6. Granite Type: Bethel White.
- a. Quarry Location: Bethel, VT, U.S.A. and operating since 1900.
 - b. Absorption by Weight: 0.256 maximum percentage; ASTM C97/C97M.
 - c. Density: 164.4 lbs/cu ft (2,633.44 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 34,027 psi (234.61 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 2,495 psi (14.9 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,937 psi (13.36 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Waterjet] [Sandblasted] [Propane flamed]**.
7. Granite Type: Caledonia.
- a. Quarry Location: Riviere-a-Pierre, Quebec, Canada and operating since 1880.
 - b. Absorption by Weight: 0.18 maximum percentage; ASTM C97/C97M.
 - c. Density: 167.6 lbs/cu ft (2,684.69 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 24,426 psi (168.41 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,392 psi (9.6 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,703 psi (11.74 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Propane flamed] [Waterjet]**.
8. Granite Type: Cambrian Black.
- a. Quarry Location: Saint-Nazaire, Quebec, Canada and operating since 1980.
 - b. Absorption by Weight: 0.101 maximum percentage; ASTM C97/C97M.
 - c. Density: 179 lbs/cu ft (2,867.30 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 22,122 psi (152.53 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 2,927.9 psi (20.2 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,868 psi (12.88 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Antique] [Honed] [Propane flamed] [Flamed and washed] [Polished] [Sandblasted] [Waterjet]**.
9. Granite Type: Canadian Red.
- a. Quarry Location: Winnipeg, Manitoba, Canada and operating since 1970.
 - b. Absorption by Weight: 0.16 maximum percentage; ASTM C97/C97M.
 - c. Density: 165 lbs/cu ft (2,643.05 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 26,390 psi (181.95 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,610 psi (11.1 MPa), minimum; ASTM C880/C880M.

- f. Modulus of Rupture: 1,681 psi (11.59 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Antique] [Honed] [Propane flamed] [Flamed and washed] [Polished] [Sandblasted] [Waterjet]**.
10. Granite Type: Canadian Violetta.
- a. Quarry Location: Metabetchouan, Quebec, Canada and operating since 1999.
 - b. Absorption by Weight: 0.15 maximum percentage; ASTM C97/C97M.
 - c. Density: 164.7 lbs/cu ft (2,638.24 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 26,265 psi (181.09 MPa), minimum; ASTM C170/C170M.
 - e. Modulus of Rupture: 2,146 psi (14.80 MPa), minimum; ASTM C99/C99M.
 - f. Finish: **[Polished] [Antique] [Waterjet] [Propane flamed]**.
11. Granite Type: Jay White.
- a. Quarry Location: Jay, ME, U.S.A. and operating since 1912.
 - b. Absorption by Weight: 0.27 maximum percentage; ASTM C97/C97M.
 - c. Density: 168 lbs/cu ft (2,691.10 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 27,700 psi (190.98 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 2,020 psi (13.9 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 2,244 psi (15.47 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed] [Plasma flamed] [Sandblasted]**.
12. Granite Type: Kodiak Brown.
- a. Quarry Location: Chute-des-Passes, Quebec, Canada and operating since 2002.
 - b. Absorption by Weight: 0.10 maximum percentage; ASTM C97/C97M.
 - c. Density: 171 lbs/cu ft (2,739.16 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 25,525 psi (175.99 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,813 psi (12.5 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 2,248 psi (15.50 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed]**.
13. Granite Type: Laurentian Green.
- a. Quarry Location: Lac Morin, Quebec, Canada and operating since 1991.
 - b. Absorption by Weight: 0.12 maximum percentage; ASTM C97/C97M.
 - c. Density: 177.9 lbs/cu ft (2,849.68 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 22,038 psi (151.95 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,754 psi (12.1 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,707 psi (11.77 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed]**.
14. Granite Type: Laurentian Rose.
- a. Quarry Location: Lac-Saguay, Quebec, Canada and operating since 1913.
 - b. Absorption by Weight: 0.25 maximum percentage; ASTM C97/C97M.
 - c. Density: 165 lbs/cu ft (2,643.05 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 32,053 psi (221.00 MPa), minimum; ASTM C170/C170M.
 - e. Finish: **[Polished] [Antique] [Honed] [Plasma flamed]**.
15. Granite Type: Newton Brown.
- a. Quarry Location: Saint-Alexis-des-Monts, Quebec, Canada and operating since 1980.
 - b. Absorption by Weight: 0.17 maximum percentage; ASTM C97/C97M.
 - c. Density: 172 lbs/cu ft (2,755.18 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 26,990 psi (186.09 MPa), minimum; ASTM C170/C170M.
 - e. Modulus of Rupture: 2,040 psi (14.07 MPa), minimum; ASTM C99/C99M.
 - f. Finish: **[Polished] [Antique] [Waterjet] [Propane flamed]**.
16. Granite Type: Nordic Black.
- a. Quarry Location: Riviere-Pentecote, Quebec, Canada and operating since 1990.
 - b. Absorption by Weight: 0.09 maximum percentage; ASTM C97/C97M.

- c. Density: 169.7 lbs/cu ft (2,718.33 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 20,870 psi (143.89 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,340 psi (9.2 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 2,001 psi (13.80 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed]**.
17. Granite Type: Picasso.
- a. Quarry Location: Magpie, Quebec, Canada and operating since 2000.
 - b. Absorption by Weight: 0.16 maximum percentage; ASTM C97/C97M.
 - c. Density: 165.2 lbs/cu ft (2,646.25 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 23,277 psi (160.49 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,740 psi (12.0 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 2,364 psi (16.30 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed]**.
18. Granite Type: Polychrome.
- a. Quarry Location: La Baie, Quebec, Canada and operating since 1968.
 - b. Absorption by Weight: 0.09 maximum percentage; ASTM C97/C97M.
 - c. Density: 168.9 lbs/cu ft (2,705.52 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 25,964 psi (179.02 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,957 psi (13.48 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,825 psi (12.58 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Waterjet] [Propane flamed]**.
19. Granite Type: Saint Henry Black.
- a. Quarry Location: Saint-Henri-de-Taillon, Quebec, Canada and operating since 1970.
 - b. Absorption by Weight: 0.056 maximum percentage; ASTM C97/C97M.
 - c. Density: 177.2 lbs/cu ft (2,838.47 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 22,242 psi (153.36 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,769 psi (12.2 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,929 psi (13.30 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Propane flamed]**.
20. Granite Type: Saint Sebastien.
- a. Quarry Location: Saint-Sebastien, Quebec, Canada and operating since 1997.
 - b. Absorption by Weight: 0.27 maximum percentage; ASTM C97/C97M.
 - c. Density: 163.8 lbs/cu ft (2,623.82 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 29,175 psi (201.15 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,784 psi (12.3 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 2,037 psi (14.04 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed]**.
21. Granite Type: Salisbury Pink.
- a. Quarry Location: Salisbury, NC, U.S.A. and operating since 1918.
 - b. Absorption by Weight: 0.159 maximum percentage; ASTM C97/C97M.
 - c. Density: 163.4 lbs/cu ft (2,617.42 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 36,089 psi (248.82 MPa), minimum; ASTM C170/C170M.
 - e. Modulus of Rupture: 2,028 psi (13.98 MPa), minimum; ASTM C99/C99M.
 - f. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed] [Plasma flamed]**.
22. Granite Type: Stanstead Grey.
- a. Quarry Location: Stanstead, Quebec, Canada and operating since 1920.
 - b. Absorption by Weight: 0.18 maximum percentage; ASTM C97/C97M.
 - c. Density: 166.9 lbs/cu ft (2,659.06 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 24,955 psi (172.05 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 2,257 psi (15.55 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 2,205 psi (15.20 MPa), minimum; ASTM C99/C99M.

- g. Finish: **[Polished] [Antique] [Honed] [Waterjet] [Propane flamed] [Plasma flamed] [Sandblasted]**.
23. Granite Type: Titanium Pearl.
- a. Quarry Location: Riviere-a-Pierre, Quebec, Canada and operating since 2010.
 - b. Absorption by Weight: 0.12 maximum percentage; ASTM C97/C97M.
 - c. Density: 169.4 lbs/cu ft (2,713.53 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 26,004 psi (179.29 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,624.3 psi (11.2 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,769 psi (12.20 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Waterjet] [Propane flamed]**.

2.04 LIMESTONE MATERIALS

A. Limestone:

- 1. Thickness: **[1-1/4 inches (3 cm)] [2 inches (5 cm)] [__ inches (__ cm)] [As indicated on drawings]**.
- 2. Limestone Type: Indiana Limestone.
 - a. Style: **[Full Color Blend] [Rustic Buff] [Rustic Gray] [Standard Buff] [Standard Gray] [Standard Silver Buff]**.
 - b. Quarry Locations: Operating since 1897.
 - 1) Adams Quarry: 700 East Empire Mill Road, Bloomington, Indiana 47403.
 - 2) Empire Quarry: 301 Main Street, Oolitic, Indiana 47421.
 - 3) Eureka Quarry: 7056 State Road 158, Bedford, Indiana 47451.
 - 4) Victor Quarry: 7850 South Victor Pike, Bloomington, Indiana 47403
 - c. Absorption by Weight: 7.5 maximum percentage; ASTM C97/C97M.
 - d. Density: 144 lbs/cu ft (2,307 kg/cu m), minimum; ASTM C97/C97M.
 - e. Compressive Strength: 4,000 psi (28 MPa), minimum; ASTM C170/C170M.
 - f. Modulus of Rupture: 700 psi (4.83 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Honed] [Sandblasted] [Bush-Hammered] [Wire Brushed] [Split Face] [Tumbled]**.
- 3. Limestone Type: Lens.
 - a. Quarry Location: Moulezan, Languedoc-Roussillon, France and operating since ancient period.
 - b. Absorption by Weight: 15 maximum percentage; ASTM C97/C97M.
 - c. Density: 143.6 lbs/cu ft (2,300 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 7,252 psi (50 MPa), minimum; ASTM C170/C170M.
 - e. Modulus of Rupture: 1,130 psi (7.8 MPa), minimum; ASTM C99/C99M
 - f. Finish: **[Brushed] [Honed] [Iron Blasted] [Bush-Hammered] [Tumbled]**.
- 4. Limestone Type: Comblanchien Clair.
 - a. Quarry Location: Comblanchien, Bourgogne, France and operating since 1893.
 - b. Absorption by Weight: 0.40 maximum percentage; ASTM C97/C97M.
 - c. Density: 166.87 lbs/cu ft (2,673 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 24,275 psi (167 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,661 psi (11.46 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 2,310 psi (15.92 MPa), minimum; ASTM C99/C99M
 - g. Finish: **[Polished] [Honed] [Iron Blasted] [Bush-Hammered] [Flamed] [Tumbled]**.
- 5. Limestone Type: Charmot.
 - a. Quarry Location: Massangis, Bourgogne, France and operating since 1893.
 - b. Absorption by Weight: 4.58 maximum percentage; ASTM C97/C97M.
 - c. Density: 147 lbs/cu ft (2,359 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 10,594 psi (73 MPa), minimum; ASTM C170/C170M.

- e. Modulus of Rupture: 1,095 psi (7.55 MPa), minimum; ASTM C99/C99M
- f. Finish: **[Brushed] [Honed] [Iron Blasted] [Bush-Hammered] [Tumbled]**.
6. Limestone Type: Massangis.
 - a. Style: **[Clair]** or **[FCB]**.
 - b. Quarry Location: Massangis, Bourgogne, France and operating since 1893.
 - c. Absorption by Weight: 5.03 maximum percentage; ASTM C97/C97M.
 - d. Density: 143 lbs/cu ft (2,283 kg/cu m), minimum; ASTM C97/C97M.
 - e. Compressive Strength: 11,244 psi (77.5 MPa), minimum; ASTM C170/C170M.
 - f. Modulus of Rupture: 1,037 psi (7.15 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Brushed] [Honed] [Iron Blasted] [Bush-Hammered] [Tumbled]**.
7. Limestone Type: Massangis.
 - a. Style: **[Jaune]** or **[Jaune Clair]**.
 - b. Quarry Location: Massangis, Bourgogne, France and operating since 1893.
 - c. Absorption by Weight: 3.40 maximum percentage; ASTM C97/C97M.
 - d. Density: 146 lbs/cu ft (2,344 kg/cu m), minimum; ASTM C97/C97M.
 - e. Compressive Strength: 9,268 psi (63.9 MPa), minimum; ASTM C170/C170M.
 - f. Modulus of Rupture: 899 psi (6.20 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Brushed] [Honed] [Iron Blasted] [Bush-Hammered] [Tumbled]**.
8. Limestone Type: Valanges.
 - a. Quarry Location: Massangis, Bourgogne, France and operating since 1893.
 - b. Absorption by Weight: 4.58 maximum percentage; ASTM C97/C97M.
 - c. Density: 147 lbs/cu ft (2,359 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 10,594 psi (73.0 MPa), minimum; ASTM C170/C170M.
 - e. Modulus of Rupture: 1,095 psi (7.55 MPa), minimum; ASTM C99/C99M.
 - f. Finish: **[Brushed] [Honed] [Iron Blasted] [Bush-Hammered] [Tumbled]**.
9. Limestone Type: Rocherons Dore.
 - a. Quarry Location: Comblanchien, Bourgogne, France and operating since 1893.
 - b. Absorption by Weight: 0.40 maximum percentage; ASTM C97/C97M.
 - c. Density: 165 lbs/cu ft (2,643 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 25,972 psi (179 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,661 psi (11.46 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 2,329 psi (16.1 MPa), minimum; ASTM C99/C99M
 - g. Finish: **[Polished] [Honed] [Iron Blasted] [Bush-Hammered] [Flamed] [Tumbled]**.
10. Limestone Type: Rocherons.
 - a. Style: **[Dore Clair] [Mouchete]** or **[Ramage]**.
 - b. Quarry Location: Comblanchien, Bourgogne, France and operating since 1893.
 - c. Absorption by Weight: 0.40 maximum percentage; ASTM C97/C97M.
 - d. Density: 166.87 lbs/cu ft (2,673.1 kg/cu m), minimum; ASTM C97/C97M.
 - e. Compressive Strength: 24,275 psi (167.37 MPa), minimum; ASTM C170/C170M.
 - f. Modulus of Rupture: 2,310 psi (15.92 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Honed] [Iron Blasted] [Bush-Hammered] [Flamed] [Tumbled]**.

2.05 MARBLE MATERIALS

A. Marble:

1. Thickness: **[3/8 inch (1 cm)] [3/4 inch (2 cm)] [1-1/4 inches (3 cm)] [2 inches (5 cm)] or [___ inches (___ cm)] or [As indicated on drawings]**.
2. Backside Reinforcement: For 3/8 inch (1 cm) thick marble stone cladding apply composite backing on backside.
3. Marble Type: Pearl Grey.
 - a. Quarry Location: Tate, GA, U.S.A. and operating since 1884.

- b. Absorption by Weight: 0.09 maximum percentage; ASTM C97/C97M.
 - c. Density: 169.4 lbs/cu ft (2,713.53 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 9,505 psi (65.53 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,192 psi (8.22 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,374 psi (9.47 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Antique] [Honed] [Polished] [Sandblasted]**.
4. Marble Type: Solar Grey.
- a. Quarry Location: Tate, GA, U.S.A. and operating since 1884.
 - b. Absorption by Weight: 0.09 maximum percentage; ASTM C97/C97M.
 - c. Density: 169.4 lbs/cu ft (2,713.53 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 9,505 psi (65.53 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,192 psi (8.22 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,374 psi (9.47 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Sandblasted]**.
5. Marble Type: White Cherokee.
- a. Quarry Location: Tate, GA, U.S.A. and operating since 1884.
 - b. Absorption by Weight: 0.09 maximum percentage; ASTM C97/C97M.
 - c. Density: 169.4 lbs/cu ft (2,713.53 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 9,336 psi (64.37 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,296 psi (8.94 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,365 psi (9.41 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Sandblasted]**.
6. Marble Type: White Georgia.
- a. Quarry Location: Marble Hill, GA, U.S.A. and operating since 1884.
 - b. Absorption by Weight: 0.08 maximum percentage; ASTM C97/C97M.
 - c. Density: 170.4 lbs/cu ft (2,729.55 kg/cu m), minimum; ASTM C97/C97M.
 - d. Compressive Strength: 9,883 psi (68.14 MPa), minimum; ASTM C170/C170M.
 - e. Flexural Strength: 1,505 psi (10.38 MPa), minimum; ASTM C880/C880M.
 - f. Modulus of Rupture: 1,467 psi (10.11 MPa), minimum; ASTM C99/C99M.
 - g. Finish: **[Polished] [Antique] [Honed] [Sandblasted]**.

2.06 MORTAR

- A. Setting Mortar, Full Bed Veneer: ASTM C270, Proportion Specifications, Type N, non-staining, and in proportions as recommended by manufacturer.
- B. Joint Width: Provide 3/8 inch (9.5 mm) minimum width, 1/2 inch (12.7 mm) maximum width concave mortar joints, unless otherwise noted.
- C. Portland Cement: ASTM C150/C150M, Type I.
 - 1. Provide gray or white cement as necessary for selected mortar color.
 - 2. For cold weather applications, use ASTM C150/C150M, Type III (high early strength).
- D. Hydrated Lime: ASTM C207, Type S (special hydrated lime for masonry purposes).
- E. Aggregate: ASTM C144; for mortar joints narrower than 1/4 inch (6.4 mm) provide with 100 percent passing No. 8 Sieve and 95 percent passing No. 16 Sieve.
- F. Water: Clean, non-alkaline, and potable.
- G. Mixing: Combine and thoroughly mix cementitious materials, aggregates, and water in a mechanical batch mixer; comply with ASTM C305 for mixing time and water content, unless otherwise indicated.

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- H. Do not add mixtures such as coloring pigments, air-entraining agents, accelerators, retarders, water repellents, anti-freeze compounds, or calcium chloride, unless otherwise indicated.

2.07 STONE ANCHORS AND ATTACHMENTS

- A. Provide anchors and attachments of required type and size to support stonework and fabricated from following materials for conditions indicated:
 - 1. Anchors and Expansion Bolts Embedded in Stone: Stainless steel, Types 304 or 316.
 - 2. Adjustable Inserts Embedded in Concrete: Galvanized malleable iron.
 - 3. Anchor Bolts, Nuts and Washers Not in Direct Contact with Stone: Comply with ASTM A307, Grade A materials; galvanized in accordance with ASTM A153/A153M, Class C.
 - 4. Steel Plates, Shapes and Bars Not in Direct Contact with Stone: Comply with ASTM A36/A36M for materials; galvanized in accordance with ASTM A123/A123M.
 - 5. Expansion Bolts Not in Direct Contact with Stone: Zinc plated or cadmium plated bolts with stainless steel expansion clips.
 - 6. High Strength Threaded Bolts: Comply with ASTM F3125/F3125M
 - 7. Steel Angles Supporting Stone: Comply with ASTM A36/A36M for materials; galvanized in accordance with ASTM A123/A123M.
 - a. Upon approval from Architect, protect supports with one shop coating of zinc-rich or other rust-inhibiting paint, and one field coat of similar compatible paint.
 - 8. Aluminum Angles Supporting Stone: Eclad
- B. Dovetail Slots: Provide dovetail slots with filler strips, and slot sized to receive anchors; with at least 22 gauge, 0.0336 inch (0.85 mm) thick galvanized steel sheet, ASTM A653/A653M, G90 Coating Designation.

2.08 FABRICATION

- A. Fabricate stone cladding in sizes and shapes as necessary and in compliance with requirements indicated on approved shop drawings.
- B. Comply with written recommendations of the NSI – Dimension Stone Design Manual, latest edition.
- C. Cut and drill depressed areas and holes in stones for anchors, fasteners, supports, and lifting devices as indicated or as necessary to set stonework securely in place; shape beds to fit supports.
- D. Cut stones to fabricate pieces of thickness, size, and shape as indicated or required for this Work within fabrication tolerances recommended by NSI – Dimension Stone Design Manual, latest edition.
- E. Tolerances: Provide connections that allow for fabrication, erection, and structural deflection tolerances; see Sections 03 3000 and 05 1200 for additional requirements.
- F. Fabricate stone to thicknesses required in compliance with performance requirements, but not less than as shown on drawings; use tables in NSI – Dimension Stone Design Manual, latest edition, as a guide for size requirements.
- G. Control depth of stone and check to maintain suitable clearance between backside of stone and surfaces and projections of structural members, **[fireproofing,]** backup walls, and other substrate related work.
- H. Fabricate bed and vertical joints straight and at 90-degree angle to stone face, unless noted otherwise, of uniform width and at locations indicated.

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1. Joint Width: [**1/4 inch (6.4 mm)**] [**As indicated on drawings**] or [_____].
 - I. Fabricate quirk-miter corners, unless otherwise indicated, and provide for U-bar cramp anchors in top and bottom bed joints of corner pieces.
 - J. Fabricate chases, reveals, reglets, openings, and other similar features as required to accommodate unbroken sequence of contiguous stonework.
 - K. Fabricate profiled stonework, including washes and drips, to produce stone shapes with uniform profile throughout their entire length and with precisely formed arises slightly eased to prevent snipping, and matched at joints between units.
 - L. Fabricate carved and cut decorative surfaces and inscriptions to conform with drawings or models approved by Architect and employ skilled stone carvers experienced in successful performance of work like that being specified.
 - M. Finish exposed faces and edges of stones in compliance with indicated requirements for finish under each type and application of stone required and to match approved samples [**and mock-ups**].

2.09 ACCESSORIES

- A. Sealants: See Section 07 9200.
- B. Setting Shims: Sized to suit stone joint thicknesses and bed depths without intruding into depths required for joint sealants.
 1. Materials: Lead, stainless steel, or plastic shims; non-staining to stone work.
- C. Concealed Flashing: Fabricate from [**stainless steel**] or [**materials as indicated in Section 07 6200**], with minimum thickness of 0.015 inch (0.38 mm).
- D. Weeps: Provide medium density polyethylene plastic tubing weeps, 1/4 inch (6.4 mm) outside diameter and length as required to extend from interior cavity out to exterior face of limestone.
- E. Water-Resistive Barrier (WRB): Provide WRB in compliance with local building code and authorities having jurisdiction within wall assembly to control condensation and other moisture in wall.
 1. See Section 07 2500 for additional requirements.
- F. Drainage Mats: Provide drainage mats in compliance with local building code and authorities having jurisdiction within wall assembly to allow moisture to flow downward and out weeps system providing a rapid drying capacity.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive stone cladding and current conditions that stone cladding will be installed, with Installer present, for compliance with specified requirements.
- B. Submit written report, validated by Installer, listing any conditions that are not in compliance with specified requirements.
- C. Do not proceed with installation until surfaces and conditions comply with specified requirements for stone cladding or other related work that affects this Work.

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3.02 PREPARATION

- A. Advise installers of related work about specific requirements for proper placement and installation of inserts, flashing reglets, and other necessary items to be used for anchoring, supporting, and flashing of this Work.
 - 1. Provide installers of related work with drawings or templates showing proper locations of these items.
 - 2. Installer of weld-plates and other embedded materials used for connection of stone cladding to provide drawings to installer of this work indicating accurate locations of these materials.
- B. Prior to setting, clean stone surfaces that have become dirty or stained by removing soil, stains, and other foreign materials.
 - 1. Thoroughly clean stone cladding by scrubbing it with fiber brushes followed by thorough drenching with clean clear water and using only mild cleaning compounds that do not contain any acids, caustic, or abrasive materials.

3.03 INSTALLATION

- A. Setting Stone Cladding:
 - 1. Execute stone cladding work with skilled mechanics and use skilled stone fitters on site to complete necessary field cutting as stones are set in place.
 - a. Use power saws to cut stones.
 - b. For stones with exposed edges, provide edges that are cut straight and true.
 - c. Use of mallet and chisel is permitted provided craftsmen are skilled in their use.
 - 2. Aligned and Adjacent Stonework: Provide chases, reveals, reglets, openings and other spaces as indicated on drawings to accommodate adjacent work, and close openings in stonework after other work is in place with stonework that matches stonework already set.
 - 3. Setting of Stonework:
 - a. Comply with requirements indicated on drawings and approved shop drawings.
 - b. Install anchors, supports, fasteners and other attachments indicated or as necessary to properly secure stonework in place.
 - c. Properly shim and adjust anchors, supports and accessories to set stonework accurately in locations indicated with uniform joints with widths as indicated, and with edges and faces in alignment in accordance with established relationships and tolerances.
 - 4. Dampproofing for Stain Prevention: Where indicated on drawings, apply coatings of **[cementitious waterproof stone backing]** or **[bituminous dampproofing]** to back, beds, and joints of stonework used at grade, and dampproof adjacent **[concrete]** or **[concrete masonry unit (CMU)]** haunches, ledges, and support angles.
 - a. Dampproof unexposed surfaces of stone to at least 12 inches (305 mm) above grade.
 - b. Dampproof joints only to within 1 inch (25.4 mm) of finished surfaces when using bituminous or asphaltic solutions.
 - c. Dampproof stonework extending below grade as indicated above, and in addition provide dampproofing to grade level on face surfaces that are covered with grade material.
 - d. Allow cementitious coatings to fully cure prior to setting stonework in place.
 - e. Exercise due care when handling dampproofed stonework to avoid chipping or off-setting of stonework.
 - 5. Joints: Provide expansion joints, control joints, and pressure relieving joints of widths and at locations as indicated on drawings or as required.
 - a. Use of mortar or shims in expansion joints is not permitted.
 - b. Joint Sealants: See Section 07 9200 for additional requirements.
- B. Setting Stonework with Sealant Joints:

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1. Support limestone masonry work on gravity supports and insert anchors for support of lateral loads of type and quantity as indicated on approved shop drawings in compliance with requirements.
2. Securely attach anchors to limestone and backup substrate surfaces.
3. Attach framing for limestone masonry support system to structural frame of building at connection locations indicated by welded or bolted field connections in compliance with the following requirements:
 - a. Install high strength threaded fasteners or anchor bolts in compliance with AISC recommendations.
 - b. Provide joints that allows water to drain to exterior face of building and provide weeps at locations where water may accumulate due to condensation or for other reasons.
 - c. Galvanized Surfaces: Comply with ASTM A780/A780M for cleaning field welds, bolted connections, and abraded areas, and for applying galvanizing repair paint to surfaces of assembled framing.
 - d. Shop Painted Surfaces: Clean field welds, bolted connections, and abraded areas immediately after erection, and apply paint to exposed areas using same materials as used for shop painting.
4. Fill anchor holes with non-staining mortar or sealant, and where dowels occur at pressure-relieving joints, provide compressive material above and below dowels.
5. Limestone Supported on Clips or Continuous Angles: Set limestone on non-corrosive and non-staining shim material with sufficient area to support load; mortar may be used in lieu of shims provided that setting pads are provided to maintain joint sizes needed if weight of stone squeezes out mortar.
 - a. Locate setting buttons of adequate size, in sufficient quantity, and of uniform thickness as indicated joint width, to prevent mortar from squeezing out and to maintain uniform joint widths.
 - b. Place setting buttons back from face of stone to provide space for backer rod and sealant.
 - c. Provide joint free of mortar or shims between bottom of relieving angles and top surface of stones below angles to avoid transfer of loads.
6. Install concealed flashing at continuous shelf angles, lintels, ledges, and similar obstructions to maintain downward water flow and to divert such water to exterior side.
7. Maintain open cavities between back of stone veneer and backup substrate wall; do not fill cavities with mortar or grout.
8. Install weepholes/vents in joints where moisture may accumulate including base of cavity walls, above shelf angles and flashing.
 - a. Locate weepholes/vents at intervals of not more than 2 feet (0.61 m).
 - b. Locate vents at intervals of not more than 5 feet (1.5 m) horizontally and 20 feet (6.1 m) vertically.
9. At locations that mortar is used in setting stones on anchors, or other locations, rake out mortar from joints to depth necessary for placement of backer rod and sealant.
10. Embed ends of lugged sills on shims or mortar and leave balance of joint open until final sealing.
11. For installation of joint sealants, set the stonework with open vertical joints, do not use shims or spacers in these vertical joints.
12. Install sealants and joint systems in compliance with ILIA - Indiana Limestone Handbook, latest edition, and refer to Section 07 9200 for additional requirements.
13. Movement Joints: Provide 3/8 inch (9.5 mm) minimum width, 1/2 inch (12.7 mm) maximum width concave movement joints, unless otherwise noted, and located as indicated on drawings.

3.04 TOLERANCES

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- A. Variations from Plumb:
 - 1. For lines and surfaces of columns, walls, or other vertical surfaces, do not exceed:
 - a. 1/4 inch in 10 feet (6.4 mm in 3 m).
 - b. 3/8 inch (9.5 mm) in story height, 20 feet (6 m) maximum.
 - c. 1/2 inch in 40 feet (12.7 mm in 12.2 m) or more.
 - 2. For external corners, expansion joints and other conspicuous lines, do not exceed:
 - a. 1/4 inch (6.4 mm) in any story, 20 feet (6 m) maximum.
 - b. 1/2 inch in 40 feet (12.7 mm in 12.2 m) or more.
- B. Variations from Level:
 - 1. For exposed lintels, sills, parapets, horizontal grooves, or other horizontal surfaces, do not exceed:
 - a. 1/2 inch (12.7 mm) in any bay, 20 feet (6 m) maximum.
 - b. 3/4 inch in 40 feet (19 mm in 12.2 m) or more.
- C. Variations of Linear Building Lines:
 - 1. For positions shown in plan on drawings and related portion of columns, walls, and partitions, do not exceed:
 - a. 1/2 inch (12.7 mm) in any bay of 20 feet (6.1 m), maximum.
 - b. 3/4 inch in 40 feet (19 mm in 12.2 m), maximum.
- D. Variations in Cross-Sectional Dimensions:
 - 1. For columns and thickness of walls from dimensions indicated, do not exceed:
 - a. Plus 1/2 inch (12.7 mm), or minus 1/4 inch (6.4 mm).

3.05 ADJUSTING

- A. Repair of damaged stone is permitted as some chipping of the stone is expected; repair of small chips is not required if it does not detract from the overall appearance of the work or impair effectiveness of mortar and sealant installation.
- B. Criteria for acceptance of chips and repairs will be based on industry standards and practices, unless other criteria are mutually agreed upon, in writing, by limestone masonry supplier and the Architect.
- C. Remove and replace stonework with the following description:
 - 1. Stones are so damaged that repair is not possible, either structurally or aesthetically.
 - 2. Joints are defective.
 - 3. Stones and joints are not in compliance with established standards based on samples and field-constructed mock-ups as approved by the Architect.
 - 4. Stonework is not in compliance with other specified requirements.
- D. Replace defective stonework with materials in compliance with established standards and specified requirements and showing no evidence of replacement.

3.06 CLEANING

- A. Clean limestone masonry using clean water and stiff fiber bristle brushes. Do not use wire brushes, acidic type cleaning agents, or other materials or methods that could damage stone.
- B. Mechanical or pressure cleaning methods may be used if approved in writing by the Architect.

3.07 PROTECTION

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- A. Protect limestone masonry when adjacent brick is being acid-washed.
- B. Provide protection and maintain conditions, in a manner acceptable to fabricator and installer that ensures limestone masonry will be without damage or deterioration the Date of Substantial Completion.

END OF SECTION

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