SPEC SECTION 04720

CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast stone trim units potentially including:

a. Window Sills
b. Headers / Lintels
c. Veneer / Small Panels
d. Coping / Wall Caps
e. Base / Band / Belt Courses
f. Cornice / Watertable
g. Quoins / Medallions / Keystones
h. Pilasters / Column Covers
i. Any Other Appropriate Trim Elements Required

B. Related Sections:

1. Section 03450 "Precast Architectural Concrete"
2. Section 04200 "Unit Masonry" for cast stone installation

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. LEED Submittals:

1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

1. Include building elevations and/or plan views to show orientation of cast stone assembly and locations of joints.

D. Samples for Review:

1. Provide typical range of cast stone colors: Samples to be 5 inches square in size.

E. Full-Size Samples / Mock-Ups: Provide pieces with approved color(s) for record & QC.

1. Make available for Architect's review at project site or manufacturing plant.
2. All samples / mock-ups to be made with materials that will be used on this Project.
3. Approved Samples may be installed in the work, if applicable (mock-ups).

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Manufacturer and Testing Agency

1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.

B. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364, including test for resistance to freezing and thawing.

1. Provide test reports based on testing within previous two years.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is certified to produce Cast Stone by the Architectural Precast Association (APA).

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations for Cast Stone: Obtain cast stone units through single source, from a single manufacturer.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Mockups: Furnish cast stone for installation in mockups specified in Section 04200 "Unit Masonry."

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mock-up of typical wall area, as shown on Drawings or directed by Design Team.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the work and to increase organization & productivity, minimizing the need for excessive on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining or chipping. Move cast stone units, if required, using dollies with proper dunage.
2. Store cast stone units on wood skids or pallets with non-staining, waterproof covers, secured. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements: Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CAST STONE MATERIALS

A. General: Comply with ASTM C 1364 and the following:

B. Portland Cement: ASTM C 150, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast stone color indicated.

C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast stone textures and colors.

D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation and colors as needed to produce required cast stone textures and colors.

E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable**, free of carbon black, nonfading**, and resistant to lime and other alkalis.

F. Admixtures: Use only admixtures specified or approved in writing by Architect.

1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
3. Air-Entraining Admixture: Per ASTM C 260, add to cast stone mixes for units exposed to the elements, manufacturer's prescribed rate to be in the 5 to 7 percent range.
4. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

G. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M, Grade 60 (Grade 420). Use galvanized or epoxy-coated reinforcement when coverage is less than 1-1/2 inches (38 mm) of cast stone material.

1. Epoxy Coating: ASTM A 775/A 775M.
2. Galvanized Coating: ASTM A 767/A 767M.

H. Embedded Anchors and Other Inserts:

1. Fabricated from steel complying with ASTM A 36/A 36M and hot-dip galvanized to comply with ASTM A 123/A 123M, or
2. Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.
3. Plastic inserts in Cast Stone Units preferred, to avoid risk of future corrosion.

2.2 CAST STONE UNITS

A. Manufacturers:

1. Miller-Mize Precast
2702 Martin Luther King Blvd.
P.O. Box 5693
Columbus, GA 31906
Phone: (706) 322-1311
Website: millermizeprecast.com

2. Approved Equal: APA Certified Plant who is available and capable to provide cast stone elements required for this project.
   a. Producer to submit product data & qualifications for preliminary approval.
   b. Producer to provide a list of past cast stone projects for Design Team's review.

B. Regional Materials: Cast stone units shall be produced within 500 miles (800 km) of the project site. All aggregates and cement that are used must have been extracted, harvested, or recovered within 500 miles (800 km) of project site as well.

C. Provide cast stone units complying with ASTM C 1364 using either the wet-cast method. Dry-tamp method of fabrication not acceptable on this project.

1. Provide units that are air-entrained and resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364 (test to be current within two years).

D. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

E. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch (3 mm).
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater, but in no case by more than 1/4 inch (6 mm).
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch (3 mm) on formed surfaces of units and 3/8 inch (10 mm) on unformed surfaces.

F. Curing:

1. Cure wet-poured units in accordance with concrete standards.
2. Cold Weather: Keep units indoor or covered with foundation blankets, if necessary.
3. Warm Weather: Keep units damp or shaded, if necessary.

G. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

H. Color(s) and Texture(s): Provide samples to match Architect's sample, directive or the existing material / façade.

1. Color: Provide units to simulate natural limestone color, resembling Indiana limestone, unless otherwise indicated on the Contract Documents.
2. Texture: Provide units with fine texture, light acid etch finish to resemble natural stone, unless otherwise indicated on the Contract Documents.
3. Exact matches are difficult to achieve: New sample(s) should be a close match when compared from a visual distance of 20 feet.

2.3 ACCESSORIES / ANCHORS

A. Strap Anchors: Type and size indicated, fabricated from ASTM A 666 steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123/A 123M or Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

B. Dowels / Pins: ½” diameter, round bars, smooth or threaded, fabricated from ASTM A 666 steel complying with ASTM A 36/A 36M and hot-dip galvanized to comply with ASTM A 123/A 123M or Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276.

2.4 MORTAR MIXES

A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.

2.5 SOURCE QUALITY CONTROL

A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364

B. If Manufacturer performs testing in-house, provide documentation of ACI Certification for making and breaking cylinders / beams.

1. Include one test for resistance to freezing and thawing (current within last two years).

2. 28 Day break results (beam or cylinder) 6,500 PSI min. Compressive Strength

PART 3 - EXECUTION

3.1 EXAMINATION

A. Installer to examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Review every cast stone unit for overall quality priot to installation, including color consistency, chips, defects and dimensional accuracy.

3.2 INSTALLATION

A. Install cast stone units to comply with requirements in Section 042000 "Unit Masonry."

B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Coordinate installation of cast stone with installation of flashing specified in other Sections.

C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

D. Set units in full bed of mortar with full head joints unless otherwise indicated, shim as required.

1. Set units with joints 3/8” joints typical, unless otherwise indicated.
2. Build anchors and ties into mortar joints, as units are set.
3. Fill dowel holes and anchor slots solid with mortar.
4. Fill collar joints solid, as units are set.

5. Build concealed flashing into mortar joints, as units are set.
6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
7. Keep joints at shelf angles open to receive sealant.

E. Rake & Point: If applicable, rake out joints for pointing with mortar to depths of not less than 3/4 inch (19 mm). Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

F. Pointing: Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch (10 mm). Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

G. Tooling: Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

H. Sealant joints: Provide sealant joints at copings, all upwards facing joints, vertical joints that are greater than 16" tall, expansion joints, control joints, pressure-relieving joints and anywhere else indicated on the Contract Documents.

1. Keep joints free of mortar and other rigid materials.
2. Build in compressible foam-plastic joint fillers where indicated (backer rod).
3. Form joint of width indicated, but not less than 3/8 inch, with a max. tolerance of 1/8".
4. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.3 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch (1.5 mm), except where variation is due to warpage of units within tolerances specified.

3.4 INSPECTION, REPAIR AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect, refer to manufacturer's recommendations on all repairs and use patch material supplier by selected cast stone producer.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.

1. Remove mortar fins and smears before tooling joints.
2. Remove excess sealant immediately, including spills, smears, and spatter.
3. Protect cast stone from work and debris created by adjacent masonry and other trades.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Masonry Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved by cast stone manufacturer, intended for cleaning masonry veneer and cast stone units / assemblies and safe to any adjacent materials to the masonry.
   a. Detergent / Cleaner Manufacturers: Submit products that are pursuant to manufacturer & masonry contractor recommendation, appropriate for the intended application method (brush vs. fan spray) and final approval by the Design Team.

END OF SECTION 04720