

## University of Houston Master Specification

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<Insert Issue Date>

### SECTION 04 7200 - CAST STONE MASONRY

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified in bold.

This Section uses the term "Architect" or "Engineer." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

### 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.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
  - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
  - 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Cast stone trim including the following:
    - a. Window sills.
    - b. Lintels.
    - c. Surrounds.
    - d. Coping.
    - e. Wall caps.
    - f. Belt courses.
    - g. Water tables.
    - h. Quoins.

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- i. Pilasters.
  - j. Column covers.
  - k. Medallions.
2. Cast stone steps.
  3. Cast stone bollards.
  4. Cast stone benches.
  5. Cast stone curbing.

### 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.

[Retain paragraph and associated subparagraphs below if Project is to be LEED v4 certified.](#)

#### B. LEED Submittals (Projects authorized for LEED certification only):

##### 1. Building Product Disclosure and Optimization - Sourcing of Raw Materials:

###### a. Leadership Extraction Practices

- 1) Extended Producer Responsibility (EPR): Submit documentation indicating that manufacturers have a take back or recycling program for the product purchased.
- 2) Recycled Content: For products having recycled content, indicate percentages by weight of post-consumer and pre-consumer recycled content.

a) Include statement indicating costs for each product having recycled content.

###### b. Sourcing of Raw Materials: For products that are required to comply with requirements for regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.

- 1) Include statement indicating distance to Project, cost for each regional material and the fraction by weight that is considered regional
- 2) Product Certificates: For materials manufactured within 100 miles of Project, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each raw material.

##### 2. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

#### 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 showing layout of units and locations of joints and anchors.

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- D. Samples for Initial Selection: For colored mortar.
  - 1. Approved Samples may be installed in the Work.
- E. Samples for Verification: For each color and texture of cast stone required.
  - 1. Provide samples 10 inches square by three inches thick.
- F. Accessories: Submit 3 samples of each type of anchor, fastener, or other accessory required for installation.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and testing agency.
- B. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364.
  - 1. Provide test reports based on testing within previous two years.

Retain paragraph and associated subparagraphs below if Project is to be LEED v4 certified.

- C. LEED Informational Submittals:
  - 1. Building Product Disclosure and Optimization - Sourcing of Raw Materials:
    - a. Raw Material Sources and Extraction Reporting: Submit Raw materials supplier corporate Sustainability Reports (CSRs); documenting responsible extraction; including extraction locations, long term ecologically responsible land use, commitment to reducing environmental harms from extraction and manufacturing processes, and a commitment to meeting applicable standards or programs that address responsible sourcing criteria.
      - 1) Submit manufacturers' self-declared reports.
      - 2) Submit third party verified corporate sustainability reports (CSR) using one of the following frameworks:
        - a) Global Reporting Initiative (GRI) Sustainability Report
        - b) Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises
        - c) UN Global Compact
        - d) ISO 26000
        - e) USGBC approved program.
  - 2. Building Product Disclosure and Optimization - Material Ingredients
    - a. Material Ingredient Optimization: Submit manufacturer's Environmental Product Declaration (EPD) or at least one of the following:
      - 1) GreenScreen V1.2 Benchmark: Third party report prepared by a licensed GreenScreen List Translator, or a full GreenScreen Assessment.

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- 2) Cradle to Cradle: Manufacturer's published literature for the product bearing the Cradle to Cradle logo.
  - 3) International Alternative Compliance Path - REACH Optimization
  - 4) Declare: Manufacturer's completed Product Declaration Form
  - 5) Other programs approved by USGBC
- b. Product Manufacturer Supply Chain Optimization: Submit documentation from manufacturers for products that go beyond material ingredient optimization as follows:
- 1) Are sourced from product manufacturers who engage in validated and robust safety, health, hazard, and risk programs which at a minimum document at least 99 percent (by weight) of the ingredients used to make the building product or building material, and
  - 2) Are sourced from product manufacturers with independent third party verification of their supply chain that at a minimum verifies:
    - a) Processes are in place to communicate and transparently prioritize chemical ingredients along the supply chain according to available hazard, exposure and use information to identify those that require more detailed evaluation
    - b) Processes are in place to identify, document, and communicate information on health, safety and environmental characteristics of chemical ingredients
    - c) Processes are in place to implement measures to manage the health, safety and environmental hazard and risk of chemical ingredients
    - d) Processes are in place to optimize health, safety and environmental impacts when designing and improving chemical ingredients
    - e) Processes are in place to communicate, receive and evaluate chemical ingredient safety and stewardship information along the supply chain
    - f) Safety and stewardship information about the chemical ingredients is publicly available from all points along the supply chain.

### 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 a plant certified by the Cast Stone Institute the Architectural Precast Association or the Precast/Prestressed Concrete Institute for Group A, Category AT.
- 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 single manufacturer.

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### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for 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. Move cast stone units, if required, using dollies with wood supports.
  - 2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

## PART 2 - PRODUCTS

### 2.1 CAST STONE MATERIALS

- A. Portland Cement: ASTM C 150, for Units Type I for Mortar Type I or II, 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.
- B. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast stone textures and colors.
- C. 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.
- D. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and gauranteed by manufacturer for resistance to lime and other alkalis. Amount of pigment not to exceed 10 percent by weight of cement used.
- E. 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. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 4. Water-Reducing, Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 5. Water-Reducing, Accelerating Admixture: ASTM C 494/C 494M, Type E.
- F. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M, Grade 60 (Grade 420). Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches (38 mm) of cast stone material.

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1. Epoxy Coating: ASTM A 775/A 775M.
2. Galvanized Coating: ASTM A 767/A 767M.
3. Touch-up cut ends with repair paint, MS DOD-P-21035 in 2 coats.

- G. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with Type 304
- H. Steel Welded Wire Reinforcement: ASTM A 185/A 185M and ASTM A 82, galvanized or epoxy coated.
- I. Shelf Angles and Similar Structural Items: Type 304 stainless steel, of all shapes and sizes as required for conditions.
- J. **Mortar**: Portland cement-lime, ASTM C 270, Type N. Do not use masonry cement.
- K. Sealant: As specified in Section 07 9200 "Joint Sealants."
- L. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.
- M. Water: Potable.

### 2.2 CAST STONE UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
1. Any current producer member of the Cast Stone Institute.
- B. Regional Materials: Cast stone units shall be manufactured within 500 miles (800 km) of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- C. **Provide** cast stone units complying with ASTM C 1364 using either the vibrant or wet-cast method.
- D. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
1. Wash or 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.
  4. Make openings for installation of work of other trades, in accordance with approved shop drawings

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- E. Fabrication Tolerances:
1. Variation from any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch (3 mm) or length divided by 360, whichever is greater, but not more than ¼ inch (6 mm).
- F. Remove cement film from exposed surfaces before packaging for shipment.
- G. Color and Texture: Cast stone shall be mixed thoroughly dry as follows: One (1) sack Atlas White Portland Cement with one (1) oz. of Lambert Bright Yellow Color. After blending the above, use the following mixture: Four (4) parts “Big Sandy” sand to one (1) part of blended cement color mixture. Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet (6 meters).
- H. Compressive Strength: As specified in ASTM C 1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
- I. Properties:
1. Compressive strength: wet and dry, ASTM C1194: Minimum 6,500 psi at 28 days.
  2. Water Absorption: 48-hour cold water absorption in accordance with ASTM C1195 (Method A): Maximum 5 percent.
  3. Water Absorption: 48-hour cold water/5 hour boil absorption in accordance with ASTM C1195 (Method B): Maximum 8 percent.
  4. Air entrainment, ASTM C185: 5 to 7-percent.
- J. Reinforcement: Provide reinforcement only as required for structural applications or when necessary for safe handling to comply with ACI 318.
1. Pieces more than 12 inches (305 mm) wide: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.
  2. Provide a minimum of 1-1/2 inches of cast stone material as concrete cover.
  3. Do not place reinforcing steel directly at lift lines, and fully consolidate material around reinforcement.
  4. Where used, the area of reinforcement in panels shall not be less than ¼ percent of the cross sectional area.
  5. Avoid placing reinforcement in the transverse direction of slender pieces (less than 24 inches in width). Highlight placement of transverse reinforcement on shop drawings.
  6. Do not use three dimensional reinforcing cage assemblies with stirrups when fabricating cast stone using the VDT method.

### 2.3 ACCESSORIES

- A. Anchors: Type and size indicated, fabricated from stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666, Type 304.
- B. Dowels: Round steel bars complying with ASTM A36/A36M or ASTM A615/A615M, 1/2-inch diameter, and hot-dip galvanized to comply with ASTM A123/A123M.

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- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.
  - 1. Use in strict accordance with manufacturer's directions.
  - 2. Do not use prior to performing accepted sample area.
  - 3. Do not vary from approved application, dilution, or dwell time without specific direction from Architect.
  - 4. Comply with all safety and protection requirements.
  - 5. Manufacturers:
    - a. Diedrich Technologies, Inc.
    - b. EaCo Chem, Inc.
    - c. ProSoCo, Inc.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Prior to setting, clean cast stone surfaces that have become dirty or stained to remove soil, stains, stone dust, and foreign material. Clean cast stone by thoroughly scrubbing with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh filler or abrasives.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Cutting and Shaping: Do not cut or shape cast stone in the field. If a unit is improperly cast, have it factory recast. For very special conditions the Architect/Engineer may permit cutting if the cut end is fully concealed or embedded.
  - 1. Use high-speed cutting equipment, grinders, and appropriate masonry files to cut and smooth edges of units as necessary, subject to the Architect/Engineer's acceptance of methods and results.
  - 2. Where field cut units have exposed the ends of reinforcing, prepare these ends as follows:
    - a. Grind back end of reinforcing to a point recessed at least ½-inch into the surface of unit.
    - b. Touch-up end of reinforcing in recess with galvanizing repair paint in 2 coats, being careful not to get paint on sides of recess. This is not required for stainless steel reinforcing.
  - 3. Patching units is not acceptable. Remake units if they are damaged.

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### 3.2 SETTING CAST STONE IN MORTAR

- A. Install cast stone units to comply with requirements in Section 04 2000 "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.
  - 3. Fill dowel holes, slots, kerfs, and other anchor penetrations into the cast stone with sealant or mortar. Do not use non-shrink grout.
- 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.
  - 1. Set units with joints 1/4 to 3/8 inch (6 to 10 mm) wide unless otherwise indicated.
  - 2. Build anchors and ties into mortar joints as units are set.
  - 3. Fill dowel holes and anchor slots 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. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated, or rake back mortar joints and prepare for sealant installation at locations indicated in Drawings.
- F. Curing: Keep mortar damp until cured, not less than 7 days.
  - 1. Hairline cracking within the joint or bond line separation at the edge of the joint is not acceptable. Completely remove such joints and reinstall.
  - 2. Remove all traces of surplus mortar as the work progresses.
- G. Provide sealant joints at copings and other horizontal surfaces, at expansion, control, and pressure-relieving joints, and at locations indicated.
  - 1. Keep joints free of mortar and other rigid materials.
  - 2. Build in compressible foam-plastic joint fillers where indicated.
  - 3. Form joint of width indicated, but not less than 3/8 inch (10 mm).
  - 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 07 9200 "Joint Sealants."

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### 3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

- A. 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. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.
- B. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout unless otherwise indicated.
- C. Fill anchor holes with sealant.
  - 1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.
- D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.
- E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.
  - 1. Form open joint of width indicated, but not less than 3/8 inch (10 mm).
- F. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
- G. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 07 9200 "Joint Sealants."

### 3.4 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired only if methods and results are approved by Architect.
- 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. Follow cleaning procedures outlined in Section 04 2000 "Unit Masonry."

END OF SECTION 04 7200

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