SP- 157032
(New)

SPECIAL PROVISIONS
FOR
CAST STONE

Johnson County
RT-C052(105)--9H-52
NRT-C052(111)--9G-52

Effective Date
October 17, 2017

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

PART I DESCRIPTION

1.01 General

Scope - All labor, materials and equipment to provide the Cast Stone shown on plans and as described in this specification.

A. Manufacturer shall furnish Cast Stone covered by this specification.

B. Installing contractor shall unload, store, furnish all anchors, set, patch, and clean the Cast Stone as required.

1.02 References

A. ACI 318 – Building Code Requirements for Reinforced Concrete.

B. ASTM A 185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

C. ASTM A 615/A 615M – Standard Specification for Deformed and Plain Billet-Steel Bars for Reinforced Concrete.

D. ASTM C 33 – Standard Specification for Concrete Aggregates.

E. ASTM C 150 – Standard Specification for Portland Cement.

F. ASTM C 173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volume Method.

G. ASTM C 231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

H. ASTM C 260 – Standard Specification for Air Entrained Admixtures for Concrete.

I. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.

J. ASTM C 426 – Standard Test Method for Linear Shrinkage of Concrete Masonry Units

K. ASTM C 494/C 494M – Standard Specification for Chemical Admixtures for Concrete.

L. ASTM C 618 – Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Concrete.

M. ASTM C 666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

N. ASTM C 979 – Standard Specification for Coloring Pigments for Integrally Pigmented Concrete.

O. ASTM C 989 – Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete.

P. ASTM C 1194 – Standard Test Method for Compressive Strength of Architectural Cast Stone.

Q. ASTM C 1195 – Standard Test Method for Absorption of Architectural Cast Stone.

R. ASTM C 1364 – Standard Specification for Architectural Cast Stone.

S. ASTM D 2244 – Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

T. Cast Stone Institute® Technical Manual (Current Edition)

1.03 Definitions

A. Cast Stone – a refined architectural concrete building unit manufactured to simulate natural cut stone, used in unit masonry applications.

1. Dry Cast Concrete Products – manufactured from zero slump concrete.
   a. Vibrant Dry Tamp (VDT) casting method: Vibratory ramming of earth moist, zero-slump concrete against a rigid mold until it is densely compacted.
   b. Machine casting method: manufactured from earth moist, zero- slump concrete compacted by machinery using vibration and pressure against a mold until it becomes densely consolidated.

1.04 Submittal Procedures

A. Comply with Section 1105 of the Standard Specifications.

B. Samples: Submit pieces of the Cast Stone that are representative of the general range of finish and color proposed to be furnished for the project.

C. Test results: Submit manufacturers test results of Cast Stone previously made by the manufacturer.

D. Shop Drawings: Submit manufacturers shop drawings including profiles, cross- sections, reinforcement, exposed faces, arrangement of joints (optional for standard or semi-custom installations), anchoring methods, anchors (if required), annotation of stone types and their location.

1.05 Quality Assurance

A. Manufacturer Qualifications:

1. Manufacturer shall have sufficient plant facilities to produce the shapes, quantities and size of Cast Stone required in accordance with the project schedule.

2. Manufacturer shall submit a written list of projects similar in scope and at least three 3 years of age, along with owner, engineer and contractor references.

B. Standards: Comply with the requirements of the Cast Stone Institute® Technical Manual and the project specifications. Where a conflict may occur, the contract documents shall prevail.

C. Mock-up: Provide full size unit(s) for use in construction of sample column. The approved mock-up shall become the standard for appearance and workmanship for the project. Materials used for Mock-up may be incorporated into the construction.

D. Acceptable Manufacturers:

1. Edwards Cast Stone
   777 Edwards Road
   Dubuque, Iowa 52003-8500
   1-800-992-9323
2. Centurian Cast Stone
   5525 NE 22ND ST
   Des Moines, Iowa 50313
   1-515-727-5998
3. Big River Cast Stone
   7517 Sundown Road
   Peosta, Iowa
   1-563-876-3515

PART II - MATERIAL

2.01 Architectural Cast Stone

A. Comply with ASTM C 1364

B. Physical Properties: Provide the following:

1. Compressive Strength – ASTM C 1194: 6,500 psi (45 Mpa) minimum for products at 28 days.
2. Absorption – ASTM C 1195: 6% maximum by the cold-water method, or 10% maximum by the boiling method for products at 28 days.
3. Air Content – ASTM C173 or C 231, for wet cast product shall be 4 to 8% for units exposed to freeze-thaw environments. Air entrainment is not required for VDT products.

4. Freeze-Thaw – ASTM C 1364: The CPWL shall be less than 5% after 300 cycles of freezing and thawing
5. Linear Shrinkage – ASTM C 426: Shrinkage shall not exceed 0.065%.

C. Job Site Testing – One sample from production units may be selected at random delivered to the job site.

1. Three field cut cube specimens from each of these samples shall have an average minimum compressive strength of not less than 85% with no single specimen testing less than 75% of design strength as allowed by ACI 318.
2. Three field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6%.
3. Field specimens shall be tested in accordance with ASTM C 1194 and C 1195.

2.02 Raw Materials

A. Portland cement – Type I or Type III, white and/or grey, ASTM C 150.

B. Coarse aggregates – Granite, quartz or limestone, ASTM C 33, except for gradation, and are optional for the VDT casting method.

C. Fine aggregates – Manufactured or natural sands, ASTM C 33, except for gradation.

D. Colors – Inorganic iron oxide pigments, ASTM C 979 except that carbon black pigments shall not be used.

E. Admixtures – Comply with the following:

1. ASTM C 260 for air-entraining admixtures.

2. ASTM C 494/C 495M Types A - G for water reducing, retarding, accelerating and high range admixtures.

3. Other admixtures: integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.

4. ASTM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.

5. ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.

F. Water – Potable

G. Reinforcing bars:

1. ASTM A 615/A 615M. Grade 40 or 60 steel galvanized or epoxy coated when cover is less than 1.5 inches.

2. Welded Wire Fabric: ASTM A 185 where applicable for wet cast units.

H. All anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel, brass, or stainless-steel Type 302 or 304.

2.03 Color and Finish

A. Color: White – Sample 30 as provided by Edwards Cast Stone, or same color from other acceptable manufacturer.

B. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 inches and the density of such voids shall be less than three occurrences per any 1 square inch and not obvious under direct daylight illumination at a 5 feet distance.

C. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 feet distance.

   1. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.
      a. Total color difference – not greater than 6 units.
      b. Total hue difference – not greater than 2 units.

D. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20 feet distance.

E. The occurrence of crazing or efflorescence shall not constitute a cause for rejection.

F. Remove cement film, if required, from exposed surfaces prior to packaging for shipment.

2.04 Reinforcing

A. Reinforce the units as required by the plans and shop drawings and for safe handling and structural stress. Reinforcing steel shall be of the type and size as shown on the plans or shop drawings and shall conform to the requirements of Section 2404 of the Standard Specifications.

B. Minimum reinforcing shall be 0.25 % of the cross-section area.

C. Reinforcement shall be non-corrosive where faces exposed to weather are covered with less than 1.5 inches of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.

D. Panels, soffits and similar stones greater than 24 inches in one direction shall be reinforced in that direction. Units less than 24 inches in both their length and width dimension shall be non-reinforced unless otherwise specified.

E. Welded wire fabric reinforcing shall not be used in dry cast products.

2.05 Curing

Cure units in a warm curing chamber approximately 100ºF at 95% relative humidity for approximately 12 hours, or cure in a 95% moist environment at a minimum 70ºF for 16 hours after casting. Additional yard curing at 95% relative humidity shall be 350 degree-days (i.e. 7 days @ 50°F or 5 days @ 70°F prior to shipping. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

2.06 Manufactoring Tolerances

A. Cross section dimensions shall not deviate by more than ±1/8 inch from approved dimensions.

B. Length of units shall not deviate by more than length/ 360 or ±1/8 inch, whichever is greater, not to exceed ±1/4 inch. Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.

C. Warp, bow or twist of units shall not exceed length/ 360 or ±1/8 inch, whichever is greater.

D. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features – On formed sides of unit, 1/8 inch, on unformed sides of unit, 3/8 inch maximum deviation.

2.07 Production Quality Control

A. Test compressive strength and absorption from specimens selected at random from plant production.

B. Samples shall be taken and tested from every 500 cubic feet of product produced.

C. Perform tests in accordance ASTM C 1194 and C 1195.

D. New and existing mix designs shall be tested for strength and absorption compliance prior to producing units.

2.08 Delivery, Storage and Handling

A. Mark production units with the identification marks as shown on the shop drawings.

B. Package units and protect them from staining or damage during shipping and storage.

C. Provide an itemized list of products to support the bill of lading.

PART 3 – CONSTRUCTION

3.01 Examination

Installing contractor shall check Cast Stone materials for fit and finish prior to installation. Do not set unacceptable units.

3.02 Setting Tolerances

A. Comply with Cast Stone Institute® Technical Manual.

B. Set stones 1/8 inch or less, within the plane of adjacent units.

C. Joints, plus - 1/16 inches, minus - 1/8 inches.

3.03 Jointing

A. Joint size: At stone/concrete joints in vertical position 1/4 inches.

B. Joint materials:
   1. Mortar, Type N, ASTM C 270.
   2. Use a full bed of mortar at all bed joints.
   3. Flush vertical joints full of mortar.
   4. Leave all joints with exposed tops or under relieving angles open for sealant.

C. Location of joints: As shown on shop drawings.

3.04 Setting

A. Drench units with clean water prior to setting.

B. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

C. Set units in full bed of mortar, unless otherwise detailed.

D. Rake mortar joints 3/4 inch for pointing.

E. Remove excess mortar from unit faces immediately after setting.

F. Tuck point unit joints to a slight concave profile.

3.05 Joint Protection

A. Joints shall be protected during shipment and installation. Joints shall be uniform and free of debris prior to sealing.

B. Prime ends of units, insert properly sized backing rod and install required sealant.

3.06 Repair and Cleaning

A. Repair chips with touchup materials furnished by manufacturer.

B. Saturate units to be cleaned prior to applying an approved masonry cleaner.

C. Consult with manufacturer for appropriate cleaners.

3.07 Inspection and Acceptance

A. Inspect finished installation according to Section 1105 of the Standard Specifications.

B. Do not field apply water repellent until repair, cleaning, inspection and acceptance is completed.

PART 4 – METHOD OF MEASURMENT AND BASIS OF PAYMENT

4.01 Measurement: Measurement will be in lump sum for each cast stone bridge column cap furnished and installed.

4.02 Payment: Payment will be at the lump sum contract unit price for each cast stone bridge column cap furnished and installed.

Lump sum for each cast stone bridge column cap includes: furnishing, transporting, placing, mortar joints, pins, beds, dowels, shims and all equipment and accessories as necessary to provide fully functioning cast stone bridge column caps.