

ITEM 11607.9402M - DEMOLITION AND RECONSTRUCTION OF EXISTING BALUSTRADE

DESCRIPTION

Under this item, the Contractor shall furnish all materials and provide for all work required in the selective demolition and reconstruction of the existing balustrade, complete, in accordance with the Contract Documents, these specifications and/or as ordered by the Engineer.

The work shall include, but is not limited to the following:

1. Removal of existing rail to accommodate new construction.
2. Cast stone repair and replacement of existing balustrade.
3. Mortar.
4. Anchors and accessories.
5. Joint filler.
6. Custom light fixtures, fixture mounting and related electrical wiring at balustrade opening.

MATERIALS

A. Cast Stone

1. Appearance: The Cast Stone used in this work shall match color and texture of existing railing assembly and samples approved by the Architect.
 - a. Exposed surfaces, unless otherwise specified, shall exhibit a typically fine grained texture similar to natural stone. No bug holes will be permitted and all facing material shall be mixed in a muller mixer.
 - b. Samples shall be approved by the Architect before the manufacturer shall be required to proceed with the work.
2. Manufacturer: All Cast Stone used in this work shall be manufactured by W.N. Russell and Company, Westmont, New Jersey or equal made by Dura Art Stone Co. or Continental Cast Stone Mfg. Inc. and conform to the following properties:
 - a. Compressive Strength, ASTM C 1194: 45MPa psi min. for products at 28 days or;
 - b. Compressive Strength, ASTM C 39: 3.5 MPa min. for products at 28 days or;
 - c. Absorption, ASTM C 1195 or ASTM C642: 6% max. for products at 28 days.
 - d. Color Variation: Must match color and finish of approved sample when viewed in direct daylight at a 1.5m distance. ASTM color variation allowed - 2% hue; 6% lightness, chrome and hue combined.

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3. Composition: Cement shall be Portland Type I white, meeting ASTM C150.
 - a. Fine aggregate shall be carefully graded and washed natural sands, or manufactured granite, marble, quartz or limestone sands meeting ASTM C33, except that gradation may vary to achieve desired finish and texture.
 - b. Coarse aggregate shall be carefully graded and washed natural gravel, or crushed graded stone such as granite, marble quartz, limestone or other durable stone meeting ASTM C33, except that gradation may vary to achieve desired finish and texture.
4. Coloring: All colors added shall be inorganic (natural or synthetic) iron oxide pigments meeting ASTM C979 excluding the use of a cement grade of carbon black pigment, and shall be guaranteed by the manufacturer to be light fast and lime proof. The amount of pigment shall not exceed ten (10) percent by weight of the cement used. Colorant shall be manufactured by Davis Colors or approved equal.
5. Reinforcing: Cast stone shall be reinforced with new billet steel reinforcing bars meeting ASTM A615, grade 400, when necessary for safe handling, setting and structural stress, and the size of the reinforcing shall be as shown on approved shop drawings. If the surfaces are to be exposed to the weather, the reinforcement shall be galvanized or epoxy coated when covered with less than 50mm of material for bars larger than 16mm and 38mm for bars 16mm or smaller. The material covering in all cases shall be at least twice the diameter of the bars. Stone shall be fully reinforced to take all stresses including handling, temperature changes and structural stress.
6. Attachment: All anchors, dowels and other anchoring devices shall be furnished by the stone setter as shown on approved shop drawings using building stone anchors fabricated of Stainless Steel Type 304.
7. Accessories:
 - a. Mortar for setting of cast stone sections shall conform to ASTM C270, Type N, with not more than ½ part lime per part of white non-staining Portland cement.
 - b. Joint Filler: Fill all joints with exposed tops with "Emseal" Greyflex Expanding Foam Sealant as manufactured by Emseal, Inc. or approved equal. Material shall be designed for compression in joint twenty-five (25) percent of its original width, depth of filler as per manufacturer's standard. Joint filler shall be recessed 19mm from finished surface.
 - c. Sealant: ASTM C920 Type S, one-part silicone equal to Dow 795 by Dow Chemical or approved equal by Tremco or GE.
 - d. Backer Rod: "Sof Rod" by Nomaco or approved equal.

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CONSTRUCTION DETAILS

A. Quality Assurance

1. Manufacturer shall have a minimum of ten (10) years experience in the manufacture of cast stone. Manufacturer's products must have previously been used on the exterior with satisfactory results. Manufacturer must have capability to produce cast stone on schedule and must be a member of the Cast Stone Institute.
2. Qualifications of Workmen - For the actual cutting and placing of cast stone units, use only skilled journeyman masons who are thoroughly experienced with the materials and methods specified and thoroughly familiar with the design requirements.
 - a. In acceptance or rejection of installed cast stone units, no allowance will be made for lack of skill on the part of the workmen.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Cast stone Institute Standard Specification 04435-90, except where more stringent standards are specified herein.
2. ASTM C 150 Specification for Portland Cement.
3. ASTM C 33 Specification for Concrete Aggregates
4. ASTM C 979 Specification for Coloring Pigments for Integrally Pigmented Concrete
5. ASTM C 494 Specification for Concrete Admixtures
6. ASTM A 615 Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement
7. ASTM C 1194 Test Method for Compressive Strength of Architectural Cast Stone
8. ASTM C 1195 Test Method for Absorption of Architectural Cast Stone
9. ASTM C 642 Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete
10. ASTM C 39 Test Method for Compressive Strength of Concrete Cylinders
11. ASTM D 2244 Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates

C. Casting Tolerances: Maintain casting, bowing, warping and dimension tolerance within the following maximums:

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1. Overall dimension for height and width of units: Plus zero of unit dimension to minus 2mm for 3m and over.
 2. Bowing or warping: Do not exceed 1/360 of the span.
 3. Insert locations: Place within plus or minus 6mm in each direction.
- D. Testing: Test three specimens per 15 cubic meters at random from plant production in accordance with referenced standards.
- E. Submittals
1. Samples:
 - a. Submit samples of cast stone with documented independent testing laboratory reports to the Architect for approval.
 - b. Before any cast stone materials are delivered to the job site, submit 300mm long samples of each profile type cast stone unit required.
 - c. Submit 150mm x 150mm cast stone samples showing full range of colors and texture available.
 2. Shop Drawings: Submit complete shop drawings of all cast stonework showing anchorage, type location and spacing, joint fillers, mortar, and cast stone profiles, sizes, connections, location, type and size of reinforcing and adjacent construction.
 - a. The shop drawings shall show the setting mark of each stone and its location on the structure. The stone when delivered shall bear the same corresponding setting mark on an unexposed surface.
 - b. Shop drawings must show exact profiles for each piece.
 3. Certification: Submit certification from an independent testing laboratory certifying to test results required.
- F. Fabrication: Cast stone, after being made, shall be cured in a totally enclosed curing room under a dense fog and water spray at ninety-five (95) percent relative humidity for a period of twenty-four (24) hours.
1. Cast stone shall be “dry tamp” or “wet coat” (depending upon selected finish) to produce sharp arises to match profiles on approved shop drawings. Provide stone with sinkages to receive anchors.
 2. Cast stone for copings shall be fabricated to largest practical length, as shown on approved shop drawings.
 3. Acid etch exposed surfaces as required to remove cement film prior to packaging and shipment. Sandblasting or chemical retardation finishing is not permitted.

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G. Product Handling

1. Protection: Use all means necessary to protect cast stone and related materials before, during and after installation and to protect the installed work and materials of all other trades.
2. Stone shall be stored on skids off the ground and covered with plastic sheeting; all material in contact with stone shall be non-staining.
3. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the State.

H. Inspection: Examine the areas and conditions where cast stone is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

I. Removal of existing railing: Selectively demolish existing construction in conformance with the drawings and these specifications.

1. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surface to receive installation of work by others and patching of finish surfaces.
2. Do all cutting or removal so as to leave neat, true, plumb and square edges, at edges to remain. Use carborundum or diamond saw equipment for cutting concrete, where edges or surfaces are to remain.
3. Do not cut or remove construction which might weaken or impair the structural integrity or strength of the structural framing or support systems which are to remain.
4. Remove materials so as to not impose excessive loads on supporting walls, and so as not to damage remaining undemolished portions of the structure.
5. Provide shoring of existing portion of balustrade to remain, until new balustrade is in place.

J. Installation: Carefully coordinate with all other trades to ensure proper and adequate interface of the work of other trades with the work of this Section.

K. Jointing:

1. Joint Size: 10mm, unless otherwise noted.
2. Joint Material - Leave all joints with exposed tops open for sealant.

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3. Location of Joints: As shown on approved shop drawings.

L. Setting

1. All cast stone shall be set by experienced stone masons, accurately and in accordance with the shop and setting drawings. All anchors and dowels shall be firmly placed and all anchor holes and dowel holes and similar holes filled completely with mortar.
2. Setting Tolerances: Plus/minus 1mm allowable out of plane with adjacent units.
 - a. All stone shall be protected from splashing mortar or damage by other trades. Any foreign matter splashed on the stone shall be removed immediately.
 - b. All joints with exposed tops shall be filled with joint filler specified herein recessed 19mm from stone surface; balance of joint shall be filled with back-up rod and sealant.
 - c. Provide stainless steel anchors for fastening railing into existing structural substrate.

M. Patching: The repair of chipped or damaged cast stone shall be done only by mechanics skilled in this class of work, with materials furnished by the manufacturer and according to his direction.

1. Cast stone shall show no obvious repairs or imperfections other than minimal color variations when viewed with the unaided eye under good typical lighting at a 3 m distance.

N. Cleaning: Before pointing, the face of all cast stone shall be scrubbed with a fiber brush, using soap powder and water and shall then be rinsed thoroughly with clean running water. Any mortar on the face of the cast stone shall be removed. No acids or prepared cleaners shall be used without the approval of the cast stone manufacturer.

O. Protection: All projecting cast stone pieces shall be fully protected when installed against damage of any kind. Any piece damaged shall be replaced at no additional cost to the state.

P. Inspection and Adjustment: Upon completion of the work, make a thorough inspection of all installed cast stone and verify that all units and joints have been installed in accordance with the provisions of this section, make all necessary adjustments.

METHOD OF MEASUREMENT

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The item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as ordered by the Engineer.

BASIS OF PAYMENT

The lump sum price shall include the cost of furnishing all labor, materials, equipment and appliances necessary to complete the work as indicated on the drawings, and as specified under this item.