



City of Tacoma

**ADDENDUM NO. 03**

**DATE: 6/2/2025**

**REVISIONS TO:  
Specification No. PW25-0098F  
Tacoma Municipal Building Exterior Preservation**

**NOTICE TO ALL BIDDERS:**

This addendum is issued to clarify, revise, add to or delete from, the original specification documents for the above project. This addendum, as integrated with the original specification documents, shall form the specification documents. The noted revisions shall take precedence over previously issued specification documents and shall become part of this contract.

**REVISIONS TO THE SUBMITTAL DEADLINE:**

The submittal deadline is hereby extended to Tuesday the 10<sup>th</sup>, of June (6/10/2025), to allow for the incorporation of revisions into the bid submittals. All other requirements of the bid submittal remain in force.

**REVISIONS TO THE TECHNICAL SPECIFICATIONS:**

Specification 04 27 00 section 1.5 has been amended to allow certification from Architectural Precast Association.

NOTE: Acknowledge receipt of this addendum by initialing the corresponding space as indicated on the Signature Page. Vendors who have already submitted their bid/proposal may contact the Purchasing Division at 253-502-8468 and request return of their bid/proposal for acknowledgment and re-submittal. Or, a letter acknowledging receipt of this addendum may be submitted in an envelope marked Request for Bids Specification No. PW25-0098F Addendum No. 01. The City reserves the right to reject any and all bids, including, in certain circumstances, for failure to appropriately acknowledge this addendum.

**SECTION 04 72 00**  
**CAST STONE MASONRY**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Furnish all labor, materials, tools, and equipment and perform all Work necessary and incidental to removal and repair or providing new cast stone elements and dutchman units to match existing, as shown on the Drawings and specified herein.
- B. Related Sections:
  - 1. Section 04 01 27 – Repointing with Cement-Lime Mortar
  - 2. Section 04 01 40.52 - Cast Stone Cleaning
  - 3. Section 04 05 01 – Masonry Mortar
  - 4. Section 07 19 17 - Silane Water Repellent
  - 5. Section 07 92 00 - Joint Sealants

**1.2 REFERENCES**

- A. Reference Standards: Edition referenced in the model code for the project, otherwise use latest edition as of date of award.
  - 1. ASTM International
    - a. A36 - Standard Specification for Carbon Structural Steel.
    - b. A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
    - c. A276 - Standard Specification for Stainless Steel Bars and Shapes
    - d. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
    - e. C33 – Standard Specification for Concrete Aggregates.
    - f. C114 - Standard Test Methods for Chemical Analysis of Hydraulic Cement
    - g. C150 – Standard Specification for Portland Cement.
    - h. C185 - Standard Test Method for Air Content of Hydraulic Cement Mortar
    - i. C260 - Standard Specification for Air-Entraining Admixtures for Concrete
    - j. C494 - Standard Specification for Chemical Admixtures for Concrete
    - k. C666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
    - l. C979 – Standard Specification for Coloring Pigments for Integrally Pigmented Concrete.
    - m. C1194 – Standard Test Method for Compressive Strength of Architectural Cast Stone.
    - n. C1195 – Standard Test Method for Absorption of Architectural Cast Stone.
    - o. C1364 – Standard Specification for Architectural Cast Stone.
  - 2. Cast Stone Institute Technical Manual
  - 3. Cast Stone Institute “Quality Control Procedures Required for Plant Inspection”
  - 4. Precast/Prestressed Concrete Institute (PCI): PCI MNL-117, Manual for Quality Control for Plants and Production of Cast Stone Products.
  - 5. National Park Service (NPS) Preservation Brief #42 The Maintenance, Repair, and Replacement of Historic Cast Stone.

### 1.3 DEFINITIONS

- A. Cast Stone: Architectural precast concrete building units intended to simulate natural cut stone.

### 1.4 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finish options for cast stone units.
- B. 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.
- C. Samples for Verification:
  - 1. The Contractor shall submit to the Owner and Owner's Representative three (3) samples for each color and texture of cast stone required. Provide samples 10 inches by 10 inches by 3 inches thick.
- D. Full-Size Samples: For each color, texture, and shape of cast-stone unit required.
  - 1. Make available for Owner's Representative's review at Project site.
  - 2. Make Samples from materials to be used for units used on Project immediately before beginning production of units for Project.
  - 3. Approved Samples may be installed in the Work.
- E. Accessories: Submit 3 samples of each type of anchor, fastener, or other accessory required for installation.
- F. Qualification Data: For manufacturer and testing agency. Provide confirmation of Cast Stone Institute active membership and examples of three (3) past projects of similar scope and scale.
- G. Quality-Control Plan: Manufacturer's written quality-control plan that includes all elements of the Cast Stone Institute's "Quality Control Procedures Required for Plant Inspection."
  - 1. Provide copies of documentation showing compliance with quality-control plan as requested by Owner's Representative.
- H. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C1364, including test for resistance to freezing and thawing.
  - 1. Provide test reports based on testing within previous year.

### 1.5 QUALITY ASSURANCE

- A. Manufacturer: A qualified manufacturer of cast stone units similar to those indicated for this Project, with sufficient production capacity to manufacture required units.
  - 1. A plant certified by the Cast Stone Institute, the Architectural Precast Association, or equivalent.
- B. Contractor: Must have a minimum of ten (10) years of experience in construction and supervision of cast stone fabrication, repair, and installation in buildings of this age and vintage.
- C. Cast Stone Masons: Must have a minimum of five (5) years of experience in cast stone installation work in buildings of this age and vintage and be approved by the Owner and the Owner's Representative to perform work under the Contract Documents.

- D. Except as modified by the Drawings and Specifications, all cast stone materials and installation methods shall be in accordance with the latest edition of the Cast Stone Institute Technical Manual and related guidelines.
- E. Testing Agency Qualifications: An independent testing agency qualified according to ASTM E329 for testing indicated, as documented according to ASTM E548.
- F. Source Limitations for Cast Stone: Obtain cast stone units through one source from a single manufacturer.
- G. Mockups: Perform mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Mockup to include typical cast stone installation as shown on Drawings.
  - 2. Perform mockups for each repair type.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to the Project site undamaged, in manufacturer's original unopened containers, labeled with the manufacture date, type, and name of product and manufacturer. Handle materials in accordance with manufacturer's instructions.
- B. Pack cast stone so as to prevent damage in transit and deliver in accordance with the Contract schedule and setting sequence. Protect from disfiguring elements.
- C. Separate cast stone from wood skids with polyethylene, or other non-staining material. Store clear of the ground under waterproof covering and keep dry. Remove unacceptable stones from job site immediately.
- D. Store cementitious materials off the ground, under cover, and in a dry location.
- E. Comply with manufacturer's written instruction for minimum and maximum temperature requirements for storage.
- F. Coordinate delivery of cast stone to minimize the need for onsite storage and to avoid delaying the Work.
- G. Pack, handle, and ship cast stone units in suitable packs or pallets.
- H. 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.
- I. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.
- J. Store installation materials on elevated platforms, under cover, and in a dry location.

## **1.7 PROJECT CONDITIONS**

- A. Verify existing dimensions and details prior to start of repointing Work. Notify Owner's Representative of conditions found to be different than those indicated in the Contract Documents. Owner's Representative will review situation and inform Contractor and Repointing Subcontractor of how to proceed.

- B. Protection of Work:
  - 1. The Contractor shall cover all partially completed areas of work at the end of each working day or shutdown or when work is not in progress.
  - 2. The cover shall extend a minimum of 24 inches beyond each side of partially completed walls.
  - 3. Cover shall be secured tightly in place.
  - 4. Mortar shall be prevented from staining existing and new materials adjacent to area of work.
- C. Cold-Weather Requirements: When the ambient air temperature is less than, or expected to be less than, 40 degrees Fahrenheit, comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- D. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates.
- E. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 degrees Fahrenheit and above and will remain so until cast stone has dried, but not less than 7 days after completing cleaning.
- F. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

## **1.8 CHANGES IN WORK**

- A. During rehabilitation work, existing conditions may be encountered that are not known or are at variance with the Contract Documents. Such conditions may interfere with or preclude the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
  - 1. Notify Owner's Representative of conditions that may interfere with proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

## **1.9 WARRANTY**

- A. Contractor shall submit the warranty for the cast stone material prior to beginning fabrication.
- B. Warranty period shall be for a minimum of three years, from date of substantial completion.
- C. The contractor shall warrant that the cast stone material shall be free of defects and meet all the conditions used for acceptance at the end of the warranty period.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Source Limitations for Cast Stone: Obtain cast-stone units from single source from single manufacturer.
- B. Provide Cast Stone from fabricators who are active members with the Cast Stone Institute.

## 2.2 CAST STONE MATERIALS

- A. General: Comply with ASTM C1364.
- B. Cement: Portland cement, ASTM C150, Type I, non-staining without air entrainment, containing not more than 0.60 percent total alkali when tested according to ASTM C114. Provide natural color or white cement as required to produce cast-stone color indicated.
- C. Water: Clean, potable, and free of deleterious materials.
- D. Coarse Aggregates: Composed of graded and washed natural gravel, or crushed graded granite, quartz, or limestone complying with ASTM C33; size gradation may vary to produce approved cast stone textures, finishes, and colors, without excessive shrinkage.
- E. Fine Aggregates: Composed of graded and washed natural sands, or crushed and ground granite, quartz, or limestone sands complying with ASTM C33; size gradation may vary to produce approved cast stone textures, finishes, and colors, without excessive shrinkage.
- F. Color Pigment: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black; guaranteed by manufacturer to be fade-proof and unaffected by alkali. Amount of pigment not to exceed 10 percent by weight of cement used.
- G. Admixtures: Do not use admixtures unless specified or approved in writing by Owner's Representative.
- H. 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.
  - 1. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
  - 2. Air-Entraining Admixture: ASTM C260. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.
  - 3. Water-Reducing Admixture: ASTM C494, Type A.
  - 4. Water-Reducing, Retarding Admixture: ASTM C494 Type D.
  - 5. Water-Reducing, Accelerating Admixture: ASTM C494, Type E.
- I. Stainless Reinforcing steel: Use stainless steel, Type 304 or 316
- J. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A240, ASTM A276, or ASTM A666, Type 304 or 316.
  - 1. Standard building stone anchors: Stainless steel Type 304 or 316

## 2.3 CAST STONE UNITS

- A. General: Comply with one of the following.
  - 1. Comply with ASTM C1364, Standard Specification for Architectural Cast Stone, except as otherwise required in these Specifications
  - 2. Comply with the recommended practices of PCI MNL-117, Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; with the ACI Manual of Concrete Inspection; and with the standards of the Cast Stone Institute.

- B. Casting Process: Provide cast stone units complying with ASTM C1364 using the wet-cast method.
  - 1. Wet Cast Method: Consisting of placing a wet, low slump concrete into a rigid form, vibrating to eliminate voids and consolidate material around reinforcement. Damp or steam cure in form while maintaining controlled temperature and humidity. Once adequate strength is reached, strip forms, protect and continue curing until adequate strength and dimensional stability is achieved.
- C. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C666, Procedure A, as modified by ASTM C1364.
- D. 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.
- E. Detailing:
  - 1. Fabricate units in sizes and with joint patterns shown on Contract Drawings and approved shop drawings to match existing.
  - 2. Provide joints to match existing unless otherwise shown.
  - 3. Provide square-edged units for outside corners. Ease edges 1/16-inch.
  - 4. Provide special shapes where required or indicated on the drawings.
  - 5. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
  - 6. Slope exposed horizontal surfaces 1:12, unless otherwise indicated.
  - 7. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
  - 8. Provide drips on projecting elements, unless otherwise indicated.
  - 9. Carefully execute the work, making arrises sharp and the details faithfully reproduced.
  - 10. Make openings for installation of work of other trades, in accordance with approved shop drawings.
  - 11. Provide suitable wash on exterior sills, copings, and pieces with exposed top surfaces.
- F. Reinforcement:
  - 1. Use only specified reinforcement types approved by the Owner's Representative prior to fabrication.
  - 2. Reinforce units only when necessary for safe handling and structural stress.
  - 3. Provide a minimum of 1-1/2 inches of cast stone material as concrete cover.
  - 4. Where used, the area of reinforcement in panels shall not be less than 1/4 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.
- G. Fabrication Tolerances:
  - 1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
  - 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch whichever is greater, but in no case by more than 1/4 inch.
  - 3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, 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 on formed surfaces of units and 3/8 inch on unformed surfaces.

H. Curing:

1. Cure units by one of the following methods:
  - a. Cure units with steam in enclosed curing room at temperature of 105 degrees Fahrenheit or above and 95 to 100 percent relative humidity for 6 hours.
  - b. Cure units with dense fog and water spray in enclosed warm curing room at 95 to 100 percent relative humidity for 24 hours.
2. After initial cure, cover and keep damp for one of the following:
  - a. Not less than 5 days at mean daily temperature of 70 degrees Fahrenheit or above.
  - b. Not less than 6 days at mean daily temperature of 60 degrees Fahrenheit or above.
  - c. Not less than 7 days at mean daily temperature of 50 degrees Fahrenheit or above.
  - d. Not less than 8 days at mean daily temperature of 45 degrees Fahrenheit or above.

- I. Acid etch units after curing to remove cement film from surfaces to be exposed to view. Verify that procedure and dilution are consistent throughout entire fabrication.

- J. Colors and Textures: Match existing units.

## 2.4 SOURCE QUALITY CONTROL

- A. Employ an independent testing agency to sample and test cast stone units according to ASTM C1364 and the following:
1. Include one test for resistance to freezing and thawing, in accordance with ASTM C666, Procedure A, except that evaluation shall be based on cumulative percent loss in material mass, not relative dynamic modulus of elasticity.
    - a. Samples for testing shall be selected at random from fabricated material.
  2. Samples for testing shall be taken from fabricated material selected at random by Owner's Representative responsible for quality assurance.
  3. One set of specimens for ASTM C1195 and ASTM C1194 shall be taken for each 500 CF, up to 1 percent of the total amount of material fabricated.

## 2.5 MORTAR MATERIALS AND MIXES

- A. Refer to Section 04 05 01 Masonry Mortar.

## 2.6 ACCESSORIES

- A. Shims: High-Density Polyethylene (HDPE) plastic manufactured by Korolath or approved equal for setting cast stone units.

## 2.7 REPLACEMENT STEEL ANGLES

- A. Replacement Steel Angles: ASTM A36.
1. Match the size and length of the existing steel angles.
- B. Fabricate and assemble in shop to greatest extent possible. Comply with requirements of AISC 303, including tolerances.
1. Cut, drill, and punch elements cleanly and accurately.
    - a. Remove burrs.

2. Cutting:
    - a. Structural Steel: When thermal cutting is necessary, mechanically thermal cut to greatest extent possible. Grind thermally-cut edges to be welded to comply with requirements in AWS D1.1.
  3. Holes: Fabricate bolt holes, holes required for securing other work to steel elements, and holes for other work to pass through steel elements.
    - a. Cut, drill, mechanically thermal cut, or punch holes cleanly and accurately, perpendicular to steel surfaces. Do not thermally cut holes or enlarge holes by burning.
  4. Grind edges of members to be coated to minimum radius of about 1/32 inch unless otherwise indicated. Members that will be shop coated only do not need to have edges ground.
- C. Clean and install coating on angles. See Section 09 97 13 Steel Coating.
- D. Install steel elements in accordance with requirements of AISC 303.

## 2.8 ANCHORS

- A. Anchors: Type and size indicated on drawings, fabricated from stainless steel complying with ASTM A240, ASTM A276, or ASTM A666, Type 304 or 316.
- B. Strap Anchors: Type 304 stainless steel; type and size indicated on Drawings. Anchors to secure cast stone units to backup construction.
1. Anchorage locations will vary based on the configuration of existing cast stone unit. Final configuration will be determined in the field by Owner's Representative.
    - a. Strap to be at minimum 1/8 inch thick and 2 inches wide or as shown on Drawings.
    - b. Length of strap to vary.
  2. Anchorage for straps as shown on Drawings will be determined in the field and completed using stainless steel anchors.
    - a. Sleeve Anchors: Type 304 stainless steel, diameter and length as shown on Drawings.
      - 1) HLC-HX manufactured by Hilti Corporation or approved equal.
    - b. Expansion Anchors: Type 304 stainless steel, diameter and length as shown on Drawings.
      - 1) Kwik Bolt 3 manufactured by Hilti Corporation or approved equal.
    - c. Epoxy Screen Anchor: Type 304 stainless steel, diameter and length as shown on Drawings.
      - 1) HIT-HY 270 manufactured by Hilti Corporation or approved equal.
      - 2) Screen Tubes: Stainless steel or nylon; sized to fit hole diameter and span voids in cast stone to sound substrate.
    - d. Self-tapping Anchors: Type 304 stainless steel, diameter and length as shown on Drawings.
      - 1) S-MD HWH manufactured by Hilti Corporation or approved equal.
- C. Anchors for new J-Hook to Steel Angle: Type and size indicated on drawings, fabricated from stainless steel complying with ASTM A240, ASTM A276, or ASTM A666, Type 304 or 316.
1. Huck BOM Blind Bolt by Howmet Aerospace.
- D. Auxiliary Anchor Components:
1. Threaded Rods: Type 304 stainless steel; diameter as indicated on the Drawings.
  2. J-Hook: Type 304 stainless steel; diameter as indicated on the Drawings.
  3. Nuts: Type 304 stainless steel; diameter as indicated on the Drawings.

4. Washers: Type 304 stainless steel; diameter as indicated on the Drawings.
5. Dowels: Type 304 stainless steel; round stainless-steel bars. Size as indicated on the drawings.

## **2.9 REPAIR MATERIALS**

- A. Biscuit Repair Materials:
  1. Washers: Type 304 stainless steel, thickness and diameter shown on drawings.
- B. Setting Adhesives for Dutchman and Biscuit Repairs:
  1. AKEPOX 2010 supplied by AKEMI GmbH.
  2. Bonstone Duropoxi supplied by Bonstone Materials Corporation.
  3. FLEXI-WELD 520-T supplied by Edison Coatings, Inc.
- C. Dutchman Dowels:
  1. Stainless Steel 300 Series Spring-Load Dowel by Heckmann Building Products.
  2. Stainless Steel 300 Series solid dowel to meet dimensions shown on drawings.
- D. Crack Repair Compound:
  1. Injection Grout for Crack Filler: Inject a single-component, low viscosity grout into cracks, which is suitable for application to wet or dry cracks, exhibits low shrinkage, and develops high bond strength to cast stone.
    - a. M31 Micro Injection Grout, Jahn Restoration Mortar, as manufactured by Cathedral Stone Products, Inc.,

## **2.10 CLEANERS**

- A. Cleaners: Refer to Section 04 01 40.52 Cast Stone Cleaning.

## **2.11 WATER REPELLENT**

- A. Water Repellent: Refer to Section 07 19 17 Silane Water Repellent

## **2.12 SEALANTS**

- A. Sealants: Refer to Section 07 92 00 Joint Sealants

## **PART 3 EXECUTION**

### **3.1 GENERAL ERECTION REQUIREMENTS**

- A. Comply with manufacturer's written instruction for products.
- B. Build work to the dimensions and profiles to match existing unit to be replaced unless otherwise indicated on the Drawings.

### **3.2 PREPARATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.

- B. Together with the cast stone masonry installer, examine the substrate and conditions under which the work is to be performed and notify Owner's Representative in writing of any condition detrimental to the proper and timely completion of the work.
- C. Prior to installation of the units, verify on site the dimensions affecting proper installation of the work.
  - 1. Bring to Owner Representative's attention any discrepancies between design dimensions and field dimensions that could adversely affect proper installation as required.
  - 2. Do not proceed with the installation until dimensional discrepancies are corrected and accepted by the Owner's Representative.
- D. Prior to setting, clean stone surfaces that have become dirty or stained to remove soil, stains, stone dust, and foreign material. Clean stones by thoroughly scrubbing stones 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.
  - 1. Do not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the stone-masonry installer and the Owner's Representative.
  - 2. Proceed with installation only after unsatisfactory conditions have been corrected.
- E. Lay out:
  - 1. Lay out the work in advance of setting in wall so as to ensure accurate spacing of units with uniform joint widths and for accurate location of openings, movement type joints, returns, and offsets.
  - 2. Lay out walls in advance to coordinate with other masonry work.
- F. Cutting and Shaping: Do not cut or shape cast stone in the field. If a unit is improperly cast, have it factory recast. For unique conditions, the Owner's Representative 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 Owner Representative'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 1/2 inch into the surface of unit.
    - b. Apply bonding agent and pack recess tightly with setting mortar. Damp cure patch, then test patch by tapping with a hammer before setting unit in wall. Replace loose patches.

### **3.3 SETTING CAST STONE IN MORTAR**

- A. Perform installations using methods and materials used for accepted mockups.
- B. Lay-up: 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. Fill dowel holes, slots, kerfs, and other anchor penetrations into the cast stone with sealant. Do not use non-shrink grout.

- C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
  - 1. Set units in full bed of mortar with full head joints, unless otherwise indicated. Protect surfaces from splashing mortar or damage by other trades. Remove foreign matter splashed on the stone immediately.
  - 2. If not indicated, set units with joints to match width of joints for adjacent units.
  - 3. Build anchors and ties into mortar joints as units are set.
  - 4. Fill dowel holes and anchor slots with sealant.
  - 5. Fill collar joints solid as units are set.
  - 6. Build concealed flashing into mortar joints as units are set.
  - 7. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
  
- D. Pointing Joints:
  - 1. Prior to the mortar setting, rake it out of joints for pointing to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
  - 2. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
  - 3. Tool exposed joints to match existing when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
  - 4. Do not point at the bed joint of cast stone units where the shelf angles are not continuous. Install soft joint material.
  - 5. See Section 04 01 27 Repointing with Cement-Lime Mortar for additional information and requirements.
  
- E. Sealant-Filled Joints:
  - 1. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated. Keep joints free of mortar and other rigid materials.
  - 2. Form open joint of width indicated and to match existing.
  - 3. Prepare joints indicated to receive sealant and apply sealant of type and at locations indicated to comply with applicable requirements in Section 07 92 00 Joint Sealants.
  - 4. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.
  - 5. See Section 07 92 00 Joint Sealants for additional information and requirements.

### **3.4 INSTALLATION TOLERANCES**

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- C. Variation in Mortar Joint Thickness: maximum plus or minus 1/4 inch of typical joint width. Zero variation between adjacent aligning joints.
- 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, except due to warpage of units within tolerances specified.

- E. Variation from Plane: Set stones within the tolerance of plus-or-minus 1/8 inch out-of-plane from adjacent units.

### **3.5 DUTCHMAN REPAIR**

- A. At locations designated for dutchman repair, cut out immediate area of spall, adjacent unsound cast stone, and, as necessary, sound cast stone to identify additional damaged material. Remove a combination of sound and unsound material to form rectangular removal area.
- B. Do not use impact tools that will fracture, microfracture, or damage cast stone surfaces during dutchman fabrication. Only use cutting or grinding tools that do not produce such damage.
- C. Remove mortar from joints if adjacent to dutchman.
- D. Prepare dutchman unit to match color and texture of adjacent cast stone.
- E. Fabricate dutchman to maintain following tolerances:
  - 1. Non-exposed joints between dutchman and parent cast stone substrates: +/-1/8 inch maximum.
  - 2. Exposed joints between dutchman and parent cast stone: 1/16 inch.
- F. Fill voids less than 1/8 inch deep using epoxy. Allow epoxy to cure prior to proceeding with installation.
- G. Fill voids greater than 1/8 inch deep using mortar. Allow mortar to cure prior to proceeding with installation.
- H. Install anchors in accordance with the drawings.
  - 1. All anchors for new dutchman are to be stainless steel unless approved by Owner's Representative.
- I. Uniform bearing on the supporting cast stone below shall be provided for the dutchman repairs.
- J. Protect adjacent stone at location of dutchman fit-up joint.
- K. Install and set all dutchman repairs with head and bed joints filled with UV-stable epoxy or grout, as indicated in drawings. Leave epoxy roughly 1/2 to 3/4 from the face surface at the sides of the unit. Fill remaining fit-up joint voids and tool flush after installation. At vertical and horizontal joints protected from direct water runoff, remaining fit-up joints should be filled with unsanded grout to match stone and tooled.
- L. If present, repoint adjacent mortar joints per Section 04 01 27 Repointing with Cement-Lime Mortar.

### **3.6 BISCUIT REPAIRS**

- A. General:
  - 1. Owner's Representative to review proposed biscuit repair locations.
- B. Biscuit Repair:
  - 1. At locations designated for biscuit repair, separate and inspect fragments to confirm mating edges will create a tight fit when paired back together.
  - 2. Remove any loose or foreign material to clean substrate.

3. Create kerfs at the mating sides of the cast stone located in the middle of the cast stone face shell. Locate a minimum of two kerfs per cast stone unit (size depending).
4. Prepare and install epoxy and stainless steel washer at kerfs. Prepare and install epoxy at crack mating surfaces. Join cast stone pieces together.
5. Keep epoxy a minimum of 1/2 inch from the exterior face of the cast stone unit. Install micro injection grout to finish the exposed surface of the crack in accordance with the manufacturer's recommendations.

### **3.7 ADJUSTING 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 Owner's Representative.
- 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. Dismantle and reconstruct work that is unacceptable in appearance, including but not limited to improper alignment; irregularity of joints; outside the approved range of color, texture, and finish; chips; cracks; evidences of having been patched in completed work; and spillage of materials that cannot be satisfactorily removed.
- D. 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.
- E. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone per Section 04 01 40.52 Cast Stone Cleaning.

### **3.8 INSTALLATION OF WATER REPELLENT**

- A. After cast stone has been cleaned and all repairs have been performed, install a water repellent per Section 07 19 17 Silane Water Repellent.

### **3.9 ACCEPTANCE**

- A. Cast stone shall be inspected by the Owner's Representative prior to and after installation, under wet and dry conditions.
- B. The cast stone shall be evaluated in accordance with the following:
  1. This project specification and related sections
  2. Other applicable contract requirements
  3. Section 10 of ASTM C1364
  4. The Cast Stone Institute Bulletin #36, "Inspection and Acceptance."
- C. Excessive crazing shall be cause for rejection. Excessive crazing is defined as that which is visible from a distance of 10 feet under dry and normal daylight conditions, similar to other visual and textural irregularities.
- D. The Owner's Representative shall have the option to reject any repairs and/or entire fabricated cast stone elements, if they do not meet the criteria established above.

- E. At the end of the project, provide the Owner with all usable cast stone unit molds for future fabrication use. The Owner reserves the right to reject a mold(s) if deemed not usable.

**END OF SECTION**