

SECTION 04200

UNIT MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope

1. Furnish and install unit masonry as indicated on the Drawings
2. Work to be installed
 - a. Bolts
 - b. Anchors
 - c. Nailing blocks and truss bearing plates
 - d. Inserts
 - e. Flashing and other sheet metal
 - f. Steel lintels
 - g. Mechanical and electrical sleeves and blockouts
 - h. Reinforcing bars
 - i. All other built-in members

B. Additional Requirements Specified Elsewhere

1. Section 01010: Summary of Work
2. Section 01340: Shop Drawings, Product Data and Samples
3. Section 01600: Materials and Equipment

C. Related Requirements Specified Elsewhere

1. Section 03200: Concrete Reinforcement
2. Section 03300: Cast-In-Place Concrete
3. Section 04100: Mortar and Grout
4. Section 04150: Masonry Accessories
5. Section 05500: Metal Fabrications
6. Division 6: Wood and Plastics
7. Section 07600: Flashing and Sheet Metal
8. Section 07900: Joint Sealants
9. Division 8: Doors and Windows
10. Section 09900: Painting
11. Division 15: Mechanical
12. Division 16: Electrical

1.2 QUALITY ASSURANCE

A. Testing Agency

1. All masonry shall be specially inspected in accordance with Level 1 inspection per International Building Code. Prism, grout and mortar tests will be conducted by a testing laboratory selected and paid by the Owner

B. Reference Standards

1. Comply with listed recommendations of the following
 - a. ASTM
 - b. National Concrete Masonry Association
 - c. ACI 530-02

1.3 SUBMITTALS

A. In accordance with Section 01340

B. Shop Drawings and Product Data

1. Materials specification data
2. Color samples of both split face and smooth face masonry units for Owner and Engineer selection
3. Reinforcing steel. Details and placement of unit masonry reinforcing. Comply with ACI 315.
4. Mix design for grout.

C. Test Reports: Reports of prism tests

D. Standard color samples for color selection by Engineer and Owner

1. Provide sample block materials, one split face and one smooth face block for each color selected by Owner and Engineer from paper color chart, maximum of four colors for review
2. Added color is not required for the Headworks Building

E. Certificate of Compliance

1. Manufacturer's affidavit of compliance certifying
 - a. All tests have been conducted
 - b. All materials comply with applicable standards
 - c. All materials comply with these Specifications
 - d. Compressive tests
 - e. Absorptive tests
2. Retain test information and make available to Engineer as required

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inspect masonry units upon delivery and handle carefully to avoid chipping and breakage
- B. Store on pallets or concrete slab until ready to use
- C. Cover and protect against wetting and staining prior to use, allowing air circulation
- D. Minor defects will be permitted

- E. Cement and lime shall be delivered and stored in their original containers, plainly marked with identification of material and maker. Materials in broken containers, or in packages showing water marks or other evidence of damage, shall not be used and shall be removed from the site
- F. Store anchors, ties, reinforcement, insulation and other accessories off the ground and under cover

PART 2 - PRODUCTS

2.1 MATERIALS

A. Masonry Units

1. All exterior concrete masonry units shall contain integral color to match standard color samples by Pfizer's Iron Oxide Pigments. Final colors for split face and smooth face block to be selected by Engineer and Owner
 - a. Added integral color is not required at Headworks Building
2. All exterior concrete masonry units shall contain the recommended amount of integral water repellent known as the "Dry-Block[®] System Block Admixture" as manufactured by W.R. Grace & Co., Grace Construction Products Division
3. Lightweight block
 - a. Aggregate: ASTM C331
 - b. Hollow load-bearing units: ASTM C90
 - c. Solid load-bearing units: ASTM 145
 - d. Classification: Grace N, Type 1, normal weight, medium weight or light weight
 - e. Nominal size: 6"x8"x16" and 8"x8"x16", where shown on the Drawings
 - f. Minimum net area compressive strength: 1,900 psi
 - g. Provide lintel blocks, corner blocks, jamb blocks, header blocks, and all required special shapes as detailed or required to complete the job
4. Split face block
 - a. Same as lightweight block with face shell thickness not less than that required for standard block
 - b. Exterior masonry walls
 - 1) Provide smooth face and split face masonry units
 - a) Refer to Drawings for coursing
 - 2) Integrate smooth-faced, lightweight block in exterior walls where required to locate surface-mounted fixtures and equipment
 - a) Surface-mounted lighting fixtures
 - b) Use full or one-half block segments, depending on coursing and adjacent structures such as door frames, headers or lintels
5. Integral color
 - a. Submit color samples of smooth face and split face masonry units for Owner selection
6. Concrete masonry units shall be free from substances that will cause staining or popouts, and shall be of fine, even texture with straight and true edges
7. All units shall have been wet steam cured for at least 18 hours and then air cured in covered storage for not less than 28 days before delivery
8. Bond beams shall consist of load-bearing units filled with grout and reinforced as indicated on the Drawings

- a. Reinforcement shall be continuous and shall be provided under concrete reinforcing steel as specified in Section 03200
- B. Reinforcing, Ties, Anchors and Miscellaneous
 - 1. Horizontal reinforcement
 - a. Welded wire units prefabricated in straight lengths of not less than 10 ft.
 - b. Matching corner and tee units fabricated from cold-drawn steel wire complying with ASTM A82 & A951
 - c. Unit width of 1½ inches to 2 inches less than thickness of wall or partition
 - d. Galvanized after fabrication conforming to ASTM A153, Class B-2, 1.5 oz. per square foot
 - e. Ladder type
 - 1) Fabricated with single pair of galvanized 3/16ths inch cold-drawn steel wire conforming to ASTM A82 side rods
 - 2) Continuous 9 gauge cross-rods spaced not more than 16 inches O.C.
 - 2. Design equipment
 - a. Dur-O-Wal, Hohmann and Barnard, AA Wire products, or equal
 - 3. Vertical reinforcing steel for reinforced masonry walls, piers and columns
 - a. Specified in Section 03200
 - b. All cells containing reinforcing shall be filled with grout in lifts not to exceed 4 feet high
 - c. Miscellaneous anchors and attachment members which are not specifically provided under separate sections

PART 3 - EXECUTION

3.1 PREPARATION

A. Inspection

- 1. Before beginning Work, the masonry subcontractor shall inspect foundations or other bearing surfaces for proper grades and elevations
 - a. Free from dirt and other foreign material
- 2. Report unsatisfactory conditions immediately to the Contractor

B. Cleaning

- 1. Remove all dirt, ice, loose rust and scale from walls, ties, and reinforcing prior to installation

- C. All equipment for mixing, transporting and placing mortar shall be cleaned before starting work

3.2 MORTAR

- A. Mortar shall be machine mixed in an approved type of mixer in which the quantity of water can be accurately and uniformly controlled

1. Mixing time shall not be less than 5 minutes, approximately 2 minutes of which shall be for mixing the dry materials and not less than 3 minutes for continuing the mixing after the water has been added
- B. Where hydrated lime is used for mortar requiring a lime content, the Contractor will have the option of using the dry-mix method, or first converting the hydrated lime into a putty
- C. Where the dry-mix method is employed, the materials for each batch shall be well turned over together until the even color of the mixed dry materials indicates that the cementitious material has been thoroughly distributed throughout the mass, after which the water shall be gradually added until a thoroughly mixed mortar of the required plasticity is obtained
1. Color shall be as acceptable to the Engineer
- D. Mortar boxes shall be cleaned out at the end of each day's work and all tools shall be kept clean
- E. Mortar that has begun to set shall not be used
1. Mortar shall be used within 2½ hours after initial mixing

3.3 INSTALLATION

A. General

1. Unless indicated otherwise on the Drawings, lay all block in running bond
2. Lay all masonry plumb and true to lines to the tolerances indicated
 - a. Provide full mortar joints
 - b. Mortar beds shall be spread smooth or only slightly furrowed
3. Where cutting of units is unnecessary, make cuts with a motor-driven masonry saw
4. All joints shall be plumb or level
 - a. All exposed joints shall be tooled
 - b. Vertical and horizontal joints shall be uniform spacing
 - c. All joints in concrete masonry unit construction shall be ⅜ inch
5. Masonry dimensions are nominal; Contractor shall lay out masonry openings to provide ¼" maximum sealant joint at all jambs of doors, windows and other openings
6. Joints
 - a. Where fresh masonry joins masonry that is partially or totally set, clean the exposed surface of the set masonry and wet lightly to obtain best possible bond with new work
 - b. Remove all loose masonry and mortar
 - c. If it is necessary to stop off a horizontal run of masonry, rack back one-half masonry unit length in each course; do not tooth
7. Reinforce horizontally by use of ladder design steel reinforcement placed continuously in every second horizontal block course
8. Lap horizontal reinforcement 6" at ends. Provide tee or ell prefabricated sections at all wall intersections

9. Provide one additional horizontal reinforcement piece above and below opening
 - a. Extending 2' minimum beyond each side of the opening
10. Refer to Drawings for additional reinforcing
11. Reinforce vertically as shown on the Drawings
12. Vertical reinforcement shall be secured in place prior to grouting with minimum clearance of 1/2" to face of masonry
13. All splices in vertical reinforcement shall be lapped as indicated on the Drawings
14. Where masonry walls intersect concrete foundation walls vertically or horizontally, provide dowels as indicated on the Drawings or matching horizontal reinforcing and grout in solid
15. Hollow unit masonry shall have full mortar coverage on the face shells and on the webs surrounding cells to be filled with grout
16. Vertical head joints shall be well buttered for a thickness equal to the face shell of the unit
17. Cells containing reinforcing shall be filled solid with grout
18. Grout shall be poured in lifts of not more than 4 feet, then the grout shall be puddle or vibrated into place and shall be stopped 1 1/2" below the top course to form a key with the next course above
19. All corners and bond beams shall be grouted solid
20. Vertical cells to be grouted shall maintain a continuous, unobstructed cell area of not less than 2" x 3"

B. Loose Lintels

1. Set loose lintels in a full bed of mortar and supported by solid or mortar-filled hollow concrete blocks as indicated on the Drawings
2. Provide loose lintels at all openings in masonry walls greater than 12" unless otherwise indicated on the Drawings
3. Lintel angles shall bear 6-inch minimum on masonry grouted solid to the foundation

C. Door and Window Frames

1. Install all door and window frames plumb, level and square in rough openings located as indicated on the Drawings
2. Door jambs and window frames set in masonry shall have jambs grouted full of mortar as wall is built up against same
3. Integrate, coordinate and incorporate conduit, duct runs or other embeds as necessary for door operators, electric latch operators, closers and lighting fixtures

D. Allowable Tolerances

1. Maximum variable from plumb
 - a. In lines and surfaces of columns, walls, and arrises
 - 1) 1/4" in 10'
 - 2) 3/8" in any story or 20' maximum
 - 3) 1/2" in 40'
 - b. For external corners, expansion joints, and other conspicuous lines
 - 1) 1/4" in any story or 20' maximum
 - 2) 1/2" in 40'

2. Maximum variation from level or grades for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines
 - a. $\frac{1}{4}$ " in any bay or 20'
 - b. $\frac{1}{2}$ " in any 40'
3. Maximum variation of linear building line from an established position in plan and related portions of columns, walls, and partitions
 - a. $\frac{1}{2}$ " in any bay or 20' maximum
 - b. $\frac{3}{4}$ " in 40'

E. Control Joints

1. Provide control joints in masonry walls at 30 feet on center maximum spacing
 - a. Obtain approval of the Engineer for joint locations varying from locations shown on the Drawings
 - b. Joints shall be installed completely through and full height of masonry
 - c. Use standard sash block both sides of control joints
2. Reinforcement in control joints
 - a. Horizontal ladder-type mortar joint reinforcement shall not continue across control joints
 - b. Bond beam reinforcing shall be continuous through control joints
3. Keep the control joint free of mortar by using a continuous wood strip ($\frac{3}{8}$ " x $\frac{3}{4}$ " deep) temporarily set in the wall
4. Control joints shall receive caulking as specified in Section 07900

F. Cold Weather Protection

1. Masonry work performed during freezing weather shall comply with the recommendations of the National Concrete Masonry Association "Guide Specification for Concrete Masonry", latest edition
 - a. Paragraph 9.4.1 of the construction requirements section shall be strictly followed
2. No material which is frozen or covered with frost or snow shall be used in the construction
3. No antifreeze salts or ingredients shall be mixed with the mortar
4. Masonry shall not be laid at temperatures below 40 degrees F, without the approval of the Engineer, and all work shall be done in a manner as to ensure the proper and normal hardening of all mortar
5. All masonry work shall be so protected and heated that the temperature at the surface will not fall below 40 degrees F for a period of 72 hours after placing
6. Any completed work found to be affected by freezing shall be taken down and rebuilt by the Contractor at his expense

G. Cutting and Patching

1. All cutting and patching of masonry shall be done by the Contractor at his own expense wherever necessary for other trades
2. Such work shall be done only by experienced mechanics to the satisfaction of the Engineer
3. No work may be done which will tend to injure the strength or purpose of the structure

3.4 POINTING AND CLEANING

A. Pointing and Cleaning

1. Cut out any defective joints and holes in exposed masonry and repoint with mortar
2. Dry brush masonry surface after mortar has set at end of each day's work and after final pointing
3. Commercial cleaners or diluted acid may be used only under the following conditions
 - a. Follow manufacturer's recommendations
 - b. Thoroughly wet surface of masonry on which no efflorescence appears before using cleaning agent
 - c. Scrub with acceptable cleaning agent
 - d. Immediately rinse with clean, potable water
 - e. Work small sections at a time
 - f. Work from top to bottom
 - g. Protect sash, metal lintels, glass, and other materials which may corrode when masonry is cleaned with acid solution
 - h. Remove efflorescence or other stain in accordance with CMU manufacturer's recommendations
4. Upon completion of pointing and cleaning, leave the work area and surrounding surfaces clean and free of mortar spots, droppings, and broken masonry
5. The masonry subcontractor shall be responsible for the removal of efflorescence and any other block stains for a period of two years following substantial completion and acceptance of the Project by the Owner

3.5 QUALITY ASSURANCE

- A. All structural/exterior masonry shall be specially inspected by the approved testing agency. Inspection shall consist of all reinforcing steel and grout placements to conform to specified standards. Prism, grout and mortar tests shall be performed on masonry at a rate of two tests per building

END OF SECTION