
SECTION 04300 - UNIT MASONRY SYSTEM

PART 1. GENERAL REQUIREMENTS

1.1 SECTION INCLUDES

- A. Regular concrete masonry units and reinforced concrete masonry
- B. Reinforced masonry lintels and bond beams;
- C. Material testing and certification;
- D. Grout, joint reinforcement, reinforcing bars, embedments, anchorage and accessories;
- E. Cooperate with other Sections and separate contracts and coordinate the work required to fulfill the intent of the Contract.
- F. Clean and remove surplus material and waste.
- G. Grout door frames in Masonry walls.

1.2 RELATED SECTIONS

- A. Cement and Lime MortarSection 04100
- B. Metal Fabrications.....Section 05500
- C. Water Repellent.....Section 07190
- D. Joint Sealants.....Section 07901

1.3 REFERENCE DOCUMENTS

- A. ACI 530 – Building Code Requirements for Masonry Structures
- B. ACI 530.1 – Specifications for Masonry Structures
- C. AWS D1.4 – Structural Welding Code – Reinforcing Steel
- D. ANSI/ASTM A82 - Steel Wire, Plain for Concrete Reinforcement
- E. ASTM A496 - Steel Wire, Deformed, for Concrete Reinforcement
- F. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- G. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement
- H. ASTM A706 - Low Alloy Steel Deformed Bars for Concrete Reinforcement

- I. ASTM C90 - Load Bearing Concrete Masonry Units
- J. ASTM C129 - Non-Load Bearing Concrete Masonry Units
- K. ASTM C331 - Lightweight Aggregates for Concrete Masonry Units
- L. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction
- M. UL 618 - Underwriter's Laboratories Standards for Concrete Masonry Units
- N. ASTM C404 - Aggregate for Masonry Grout
- O. ASTM C476 - Grout for Masonry
- P. ANSI/ASTM C55 - Concrete Building Brick
- Q. ANSI/ASTM C216 - Facing Brick
- R. ANSI/ASTM C652 - Hollow Brick
- S. ASTM C744 - Prefaced Concrete and Calcium Silicate Masonry Units

1.4 QUALITY ASSURANCE

- A. Perform all Masonry work according to all requirements of ACI 530.1, except as modified herein or on the Drawings.
- B. The Contractor shall maintain a copy of ACI 530.1 in the project field office at all times.
- C. Weld reinforcing bars according to AWS D1.4.
- D. Tolerances: ACI 530.1, Paragraph 2.3.3.2.

1.5 INSPECTION AND TESTING

- A. Special Inspections will not be required for this project.
- B. All structural inspections will be implemented and performed by the owner.

1.6 SUBMITTALS

- A. Product data for Concrete Masonry Units and for Insulation.
- B. Results of tests of masonry units and materials, attesting compliance with requirements.
- C. Cold weather construction procedures.
- D. Hot weather construction procedures.

- E. Accessories: Submit manufacturer's certificate of conformance.
- F. Reinforcing Steel: Materials, locations, splices, supporting and spacing devices.
- G. Determine the net area compressive strength of masonry according to Paragraph 1.6 of ACI 530.1. Provide compressive strength as specified on the structural drawings.
- H. Grout Mix Design: ASTM A476. A testing laboratory shall submit a design mix. Provide compressive strength over-design of 1000 psi.
- I. Sample Colors of manufactured standard line of concrete ground face and split face masonry units for selection by Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Take special precautions during transit and storage of masonry units to protect them from staining or discoloration from any cause. Replace permanently discolored units, whether set in place or not. Stains that cannot be removed with clear water and fiber brushes will be considered defects and shall not be used.
- B. Manufactured and packaged materials shall be delivered to the site in original factory packaging bearing manufacturer's name, brand name and/or identification code and description.
- C. Store masonry units above ground on platforms that allow air circulation under the stacked units. Cover and protect against wetting before use.
- D. Store aggregates and cement in a dry location, protected from deleterious substances. Any cement sacks containing hard lumps will be rejected.
- E. Reinforcing Steel: Protect from kinking or bending.
- F. Protect cores of uncapped walls from infiltration by rain or snow when work is not in progress.

PART 2. PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Concrete Block: Lightweight ASTM C90 Grade N-1, Type I, moisture-controlled units.
- B. Aggregates: ASTM C-331.
- C. Density: Dry density of the concrete block shall be less than 90 lbs/ft³.
- D. Face Shell and Web Thickness: ASTM C90, Table 3.
- E. Units to be nominal modular size of 8x16 inches, thickness as indicated. Provide special units for 90 degree corners, bond beams and lintels.

- F. Curing: Cure units with low pressure steam at a temperature greater than 140°F with curing time not less than 8 hours.
- G. Moisture content: ASTM C-90, Table 1.
- H. Masonry Lintels: Provide U-shaped masonry lintel units of modular size to match coursing and surface texture and color of adjacent masonry.

2.2 JOINT REINFORCEMENT

- A. Straight, uncoiled, continuous ladders manufactured 2 inches less than nominal wall thickness.
- B. Steel Wire: ASTM A82 galvanized as follows:
 - 1. Interior Walls: ASTM A641 Class 1 (0.10 oz/ft²).
 - 2. Cavity Walls: ASTM A153 Class B2 (1.50 oz/ft²).
 - 3. Exterior Walls: ASTM A641 Cl. 3 (0.80 oz/ft²).
- C. Longitudinal wire: ASTM A496, deformed 3/16 inch diameter.
- D. Perpendicular cross rods: 9 gage wire, spaced 16 inches on center.
- E. Use Fabricated Corners to form continuous reinforcement around corners and for anchoring abutting walls, of corresponding type and design as that used in the walls.
- F. Vary the length of two-pronged hook tie to match cavity wall dimensions as shown on the drawings.

2.3 GROUT MATERIALS

- A. Portland Cement: ASTM C150 or ASTM C595, normal type I/II.
- B. Coarse Aggregate: ASTM C404, maximum 3/8 inch size.
- C. Fine Aggregate: ASTM C404, washed sand.
- D. Admixtures: Use only those specifically approved in advance by the Engineer.

2.4 ACCESSORIES

- A. Control Joint Filler Piece: Mold of synthetic rubber conforming to ASTM D2000, 2AA-805, 70 durometer; Titewall AA1000 by AA Wire Products Co., or approved equal.
- B. Control Joint: Blok-Tite Control Joints (PVC) Model No. AA2005 by A-A Wire Products Co., Dur-O-Wal Rapid Poly-Joint, or approved equal.
- C. Building Paper: Asphalt saturated felt.

- D. Nailing Strips: Western Softwood, preservative treated sized to masonry joints.
- E. Cleaning Solutions: Non acidic, not harmful to masonry work or adjacent materials.
- F. Reinforcing Bars: ASTM A615 or A706 Grade 40, deformed billet steel bars. Fabrication Tolerance: ACI 315.
- G. Fabric Flashing: 5 oz. copper sheet with asphalt-saturated cotton fabric bonded to both sides; the product of Afco Products, Inc., Sandell Mfg. Co., Revere, Wasco Products, Inc. or equal.

PART 3. EXECUTION

3.1 EXAMINATION

- A. Verify that foundations are constructed with the following tolerances:
 - 1. Dimension $\pm 1/2$ inch
 - 2. Variation in alignment..... $\pm 1/4$ inch in 10 feet
 - 3. Variation from grades and elevations specified $\pm 1/2$ inch
 - 4. Variation from level or specified slope $\pm 1/4$ inch in 10 feet
- B. Verify that reinforcing dowels are properly located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- D. Report in writing to the Engineer prevailing conditions that will adversely effect satisfactory execution of the work of this section. Do not proceed with work until unsatisfactory conditions have been corrected.
- E. By beginning Work, contractor accepts conditions and assumes responsibility for correcting unsuitable conditions.

3.2 PREPARATION

- A. Remove laitance, loose aggregate and anything else that would prevent mortar from bonding to the foundation before placing masonry.
- B. Establish layout, lines, levels, and location of all wall openings. Protect from disturbance.
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing. Masonry Contractor is responsible for damages due to inadequate temporary bracing.
- D. Clean reinforcing of all mud, oil or other contaminants.
- E. Clean spaces to be grouted of mortar droppings, debris, loose aggregates and any other deleterious material.

3.3 COURSING

- A. Place masonry to lines and levels shown.
- B. Maintain masonry courses to a uniform dimension. Form vertical and horizontal joints of uniform 3/8 inch thickness.
- C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches.

3.4 PLACING AND BONDING

- A. Lay only dry hollow masonry units that are sound and free of cracks or other defects that would interfere with the proper placing of the units or impair the strength or permanence of the construction.
- B. Provide face shell bedding on head and bed joints for hollow masonry units.
- C. Hollow Unit Webs shall be bedded:
 - 1. In all courses of Piers, Columns and Pilasters
 - 2. In the starting courses on footings and foundation walls
 - 3. Adjacent to cells or cavities to be reinforced and filled with grout
 - 4. Within 10 feet of all building corners
- D. Provide cleanouts in the bottom course at each reinforced cell.
- E. Buttering corners of joints or excessive furrowing of mortar joints is not permitted. Raked joints are not permitted.
- F. All joints shall be well tooled. Tool joints concave with a round jointer, when mortar is thumbprint hard.
- G. Remove excess mortar as work progresses.
- H. Fully bond intersections and external and internal corners.
- I. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- J. Cut masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.5 CONTROL JOINTS

- A. Continue bond beam reinforcement through control joints.

- B. Do not continue horizontal joint reinforcement through control joints.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints according to manufacturer's instructions.
- D. Size control joint according to Section 07901 for sealant performance.

3.6 COLD WEATHER CONSTRUCTION

- A. When the ambient temperature or the temperature of the masonry units is below 40°F, follow the cold weather procedures approved under Paragraph 1 of this Section.
- B. In addition:
 - 1. Temperature of masonry units shall not be less than 20°F when laid in the masonry. Remove visible ice on masonry units before the unit is laid in the masonry.
 - 2. Heat mortar sand or mixing water to produce mortar temperatures between 40°F and 120°F at the time of mixing. Maintain mortar above freezing until used in masonry.
 - 3. Use heat sources where ambient temperatures are between 25°F and 20°F, on both sides of the masonry under construction and install wind breaks when wind velocity is greater than 15 mph.
 - 4. Where ambient temperatures are below 20°F, provide an enclosure for the masonry under construction and use heat sources to maintain temperatures above 32°F within the enclosure.
 - 5. Where mean daily temperatures are between 40°F and 32°F, protect completed masonry from rain or snow by covering with a weather resistive membrane for 24 hours after construction.
 - 6. Where mean daily temperatures are between 32°F and 25°F, completely cover completed masonry with a weather resistive membrane for 24 hours after construction.
 - 7. Where mean daily temperatures are between 25°F and 20°F, completely cover completed masonry with insulating blankets or equal protection for 24 hours after construction.
 - 8. Where mean daily temperatures are below 20°F, maintain masonry temperature above 32°F for 24 hours after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps, or by other acceptable methods.

3.7 REINFORCING BARS

- A. Provide reinforcing as shown on the Structural Drawings.
- B. Weld reinforcing to structural steel per AWS D1.4. Connection to be capable of developing 125% of bar yield strength.

- C. Placing Tolerance: 1/2" to true position.
- D. Secure reinforcement to prevent displacement by construction loads or grouting.
- E. If a foundation dowel does not line up with a vertical core, it may be bent to a minimum radius of 8 bar diameters and a maximum slope of 1 to 6.

3.8 JOINT REINFORCEMENT

- A. See the General Notes.

3.9 MASONRY LINTELS

- A. Install masonry lintels over openings where steel or precast concrete lintels are not scheduled or shown on the drawings.
- B. Use single piece reinforcing bars only.
- C. Allow grout to attain specified strength before removing temporary supports.
- D. Maintain minimum 8 inch bearing on each side of opening.

3.10 GROUT

- A. Preparation:
 - 1. Clean cells to be grouted of excess mortar and debris.
 - 2. Ensure that all reinforcement and embedded items have been inspected and approved by the Engineer.
 - 3. Allow the mortar to set 18 hours minimum before grouting vertical walls.
- B. Mixing:
 - 1. Thoroughly mix ingredients in quantities needed for immediate use according to ASTM A476, to provide compressive strength as shown on the Structural Drawings.
 - 2. Slump: 8 to 11 inches.
 - 3. Add admixtures according to Manufacturer's printed instructions. Provide uniformity of mix.
 - 4. Do not use antifreeze compounds to lower the freezing point of grout.
- C. Placement:
 - 1. Place grout within 1½ hours from the time water is introduced to the mix.

2. Grout solid all reinforced cells. Confine grout to areas shown on the Structural Drawings.
3. Do not displace reinforcement.
4. Consolidate grout at the time of placement.
 - a. Consolidate grout pours 12 inches or less in height by mechanical vibration or by puddling.
 - b. Consolidate pours exceeding 12 inches in height by mechanical vibration and reconsolidate within 1/2 hour by mechanical vibration after initial water loss and settlement has occurred.

3.11 BUILT-IN WORK

- A. Build in fabricated metal door and window frames, ties, anchors, lintels, anchor bolts, grounds, blocking, fittings and devices as shown or required.
- B. Build in items plumb and level and true to lines.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build in organic materials subject to deterioration.

3.12 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves, grounds and ducts. Coordinate with other sections of work to provide correct size, shape and location.
- B. Obtain Engineer's approval before cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.13 CLEANING

- A. Clean all work as specified in Section 01300 of the General Conditions.
- B. Remove excess mortar and mortar smears.
- C. Point or replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with non-acidic cleaning solution.
- E. Use nonmetallic tools in cleaning operations.

3.14 PROTECTION OF FINISHED WORK

- A. Protect incomplete and exposed, finished work from weather by covering the top surfaces with waterproof coverings. The coverings shall overhang both sides of the walls by not less than 2 feet and shall be held in place with weights suspended from both sides or with wire clamps made for this purpose.
- B. Without damaging completed work, provide protective boards at exposed external corners that may be damaged by construction activities.
- C. Replace any damaged, marred or defective work.

END OF SECTION