

**DIVISION 4**

**MASONRY**



**SECTION 04100****MORTAR****PART 1 - GENERAL****1.01 WORK INCLUDED**

Mortar and grout for unit masonry.

**1.02 RELATED WORK**

- A. Section 01450 - Quality Control.
- B. Section 04200 - Reinforced Unit Masonry System.

**1.03 REFERENCES**

- A. ASTM C5 - Quicklime for Structural Purposes.
- B. ASTM C91 - Masonry Cement.
- C. ASTM C94 - Ready-Mixed Concrete.
- D. ASTM C144 - Aggregate for Masonry Mortar.
- E. ASTM C150 - Portland Cement.
- F. ASTM C207 - Hydrated Lime for Masonry Purposes
- G. ASTM C270 - Mortar for Unit Masonry.
- H. ASTM C387 - Packaged, Dry, Combined Materials for Mortar and Concrete.
- I. ASTM C476 - Grout for Reinforced and Non-Reinforced Masonry.
- J. ASTM C780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- K. International Masonry Industry All-Weather Council (IMIAC) Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

**1.04 MIX TESTS**

Sampling and testing of grout and mortar shall be the responsibility of the Contractor. Mortar and grout laboratory-proportioned and tested.

**1.05 SUBMITTALS**

- A. Submit product data under provisions of Section 01300.
- B. Include design mix, environmental conditions, and admixture limitations.

15029/7.19.2016

MORTAR

- C. Submit manufacturer's installation instructions under provisions of Section 01300.

## 1.06 ENVIRONMENTAL REQUIREMENTS

Maintain materials and surrounding air temperature to minimum 50-F prior to, during, and 48 hours after completion of masonry work.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Mortar mix can consist of any one of the following combinations:  
gravel.
1. Portland Cement, lime and fine aggregate.
  2. Masonry Cement and fine aggregate.
  3. Portland Cement, masonry cement and fine aggregate.
  4. Commercially prepared premix mortar and fine aggregate.
- B. Portland Cement: ASTM C150.
- C. Masonry Cement: ASTM C98.
- D. Mortar Aggregate: ASTM C144.
- E. Grout Course Aggregate: ASTM C404, size no. 8 or 3/811 - pea
- F. Grout Fine Aggregate: ASTM C404 or C144.
- G. Hydrated Lime: ASTM C207, Type S.
- H. Quicklime: ASTM C5, non-hydraulic type.
- I. Premix Mortar: ASTM C387, using gray cement.
- J. Water: Clean and potable.

### 2.03 MIXES

- A. Mortar for Load Bearing Walls and Partitions: ASTM C27.  
Type-M.
- B. Mortar for Non-Load Bearing Walls and Partitions: ASTM C270,  
Type S.
- C. Pointing Mortar: ASTM C270, Type N, with maximum two percent ammonium stearate or calcium stearate per cement weight.

- D. Grout shall conform to ASTM C476.

#### **2.04 MORTAR MIXING**

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.
- B. Add mortar colors and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar or grout.
- D. If water is lost by evaporation, retemper within two hours of mixing. Do not retemper mortar after two hours of mixing.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. After inspection of concrete grout spaces by the Engineer, plug cleanout holes with masonry units. Brace against wet grout pressure.
- B. Install mortar and grout in accordance with 04300.
- C. Work grout into cores and cavities to eliminate voids.
- D. Do not displace reinforcing steel when placing grout.
- E. Clean concrete grout spaces of excess mortar and debris.

- END OF SECTION -

**SECTION 04200**  
**CONCRETE UNIT MASONRY**

**PART 1 - GENERAL**

**1.01 SUMMARY**

This section includes all the requirements for providing concrete and brick unit masonry.

**1.02 STANDARDS AND CODES**

Comply with provisions of the following codes, specifications and standards except where more stringent requirements are shown or specified.

- A. Building Code Requirements for Masonry Structures (ACI-530/ASCE 7/TMS 402) and Commentary.
- B. Specifications for Masonry Structures (ACI 530.1/ASCE -6/TMS 602) and Commentary.

**1.03 SUBMITTALS**

- A. The Contractor shall submit for approval the concrete mix design used for the production of concrete masonry units. The concrete mix design shall indicate the replacement rate (%) of fly ash or ground granulated blast furnace slag used in place of cement.
- B. The Contractor shall deliver all submittals required under Specification Section 01610- TRANSPORTATION AND HANDLING.

**PART 2 - PRODUCTS**

**2.01 MASONRY UNITS**

Concrete masonry units are 40CFR247 EPA Designated Construction Products. When purchasing concrete masonry units the Contractor shall make all reasonable efforts to purchase units that contain coal flyash or ground granulated blast furnace slag as a partial replacement for Portland cement. The replacement rates (%) shall be as follows:

Flyash: ASTM C-618, Class F, except that its loss on ignition (LOI) shall not be more than 4 percent. Flyash shall be used as a direct replacement for Portland cement (one for one), ASTM C-595. A minimum of 15 percent by weight of the cementitious material in the concrete mix shall be flyash.

or

Ground Granulated Blast-Furnace (GGBF) Slag: ASTM C 989, Grade 120. GGBF slag may be used as an alternate to flyash as a direct replacement for Portland cement, ASTM C-595. A minimum of 25 percent and no more than 50 percent by weight of the cementitious material in the concrete mix shall be GGBF.

- A. Hollow core concrete masonry blocks shall be Grade N Type I, hollow core, load-bearing type, conforming to ASTM C-90. Moisture content shall not exceed 30 percent.
- B. Solid masonry units shall be ASTM C-145, Grade N, Type I, load bearing. Solid units shall be 100 percent solid or shall have their void space, permitted under this ASTM Standard, filled with mortar.
- C. Solid masonry units for catchbasin and manholes shall conform to ASTM C-139.
- D. Concrete brick shall conform to ASTM C-55, Grade N, Type I.
- E. Brick Masonry units shall be clay manhole bricks conforming to ASTM C-32, Grade SM. Brick shall have plain and smooth surfaces on both ends and on the face side.
- F. Lintels shall be precast, reinforced lintel units of 3000 psi minimum concrete strength, 16 inches longer than the opening they are to span. Lintels shall be reinforced as shown on the drawings or with a minimum of 2 Number 4 bars in each 4 inch wide unit.

## **2.02 MORTAR**

- A. Portland cement shall conform to ASTM C-150, Type I, II or III.
- B. Hydrated lime shall conform to ASTM C-207, Type S.
- C. Mortar aggregates shall conform to ASTM C-144 except that not less than 3 percent of their particles by weight, nor more than 15 percent, shall pass the number 100 sieve.
- D. Mortar shall comply with the property specification for Type S mortar as specified in ASTM C-270.

## **2.03 REINFORCEMENT**

- A. Reinforcement shall be heavy grade, welded, galvanized and of the truss type with diagonal connectors. Crosswire and longitudinal wire shall be 3/16 inch in diameter.

**2.04 JOINT CONTROL**

- A. Premolded control joint strips shall be made of solid rubber with a Shore A durometer hardness of 60 to 80, designed to fit standard sash block and maintain lateral stability in masonry wall, size and configuration as indicated.

**2.05 PRODUCTS AND HANDLING**

- A. Handle, store and protect masonry units in a manner to avoid chipping, breakage, or contact with the soil.
- B. Cementitious materials shall be stored in a dry place and kept free from dirt and debris.
- C. Packaged materials shall be stored in their original unbroken package or container.

**PART 3 - EXECUTION****3.01 UNIT MASONRY CONSTRUCTION**

- A. Unit masonry shall be laid plumb, true to line and in level courses on a full bed of mortar, both vertically and horizontally. All masonry work shall meet the following tolerances for completed work:
  - 1. Variation from plumb in lines and surfaces of wall, 1/4 inch in 10 feet and for external corners, expansion or control joints, 1/4 inch in 20 feet maximum.
  - 2. Variation from level, 1/4 inch in 20 feet maximum.
  - 3. Variation in cross sectional dimensions of walls, plus or minus 1/4 inch.
- B. Packing the joints after the block is placed will not be allowed. Each unit shall be adjusted to its final position while the mortar is still soft and plastic. Any unit which is disturbed after the mortar has stiffened shall be removed, the existing mortar removed and the unit relaid with fresh mortar.
- C. The wall shall be laid up in a straight uniform course with a regular running bond.
- D. Cutting of masonry units shall be done with a masonry saw.
- E. Block bond beams shall consist of bond beam units, reinforced as shown on the drawing and filled with 3000 psi concrete per Section 03300.
- F. Block reinforcing shall be continuous every second tier. Lap reinforcing a minimum of 6 inches, break only at expansion joints. Embed reinforcing completely in mortar.
- G. After the mortar has taken its initial set, all joints shall be tooled concave with the mortar thoroughly compacted and pressed against the edges of the units.

**3.02 MORTAR**

- A. In mixing mortar, the minimum amount of water necessary to produce a workable consistency shall be used. Mortar that has stiffened due to hydration shall not be used and shall be discarded. Mortar shall not be retempered.
- B. No admixtures will be permitted.

### **3.03 COLD WEATHER MASONRY CONSTRUCTION**

- A. Cement, sand and water shall be heated uniformly to a temperature between 70 degrees F and 120 degrees F before mixing.
- B. Masonry units shall be heated before laying when the temperature is below 30 degrees F. Work shall only be permitted to proceed if the newly laid masonry is protected.
- C. Newly laid masonry shall be heated and protected so that the surface temperature of both sides of the wall does not drop below 40 degrees F for at least 24 hours after laying.
- D. Any masonry work which has frozen shall be removed and redone.

### **3.04 EXPANSION JOINTS**

- A. Provide vertical expansion, control and isolation joints in masonry where shown. If location of control joints is not shown, place vertical joints spaced 30 feet on centers.

### **3.05 CLEANING**

- A. Work in as clean a manner as possible. Remove excess materials and mortar droppings daily. Remove mortar droppings on connecting or adjoining work before its final set.
- B. At completion of work, point holes in joints of exposed masonry surfaces. Fill holes with mortar and tool. Clean concrete masonry units which remain exposed in finished work, with wire brushes or other approved method.
- C. Remove, replace defective materials, correct defective workmanship, leaving masonry clean, free of efflorescence and other staining.

-END OF SECTION-