

**SECTION 04100  
MORTAR AND MASONRY GROUT**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Furnish labor, materials, equipment and appliances required for complete execution of Work shown on Drawings and specified herein.
- B. Principal items of work include:
  - 1. Mortar for unit masonry work.
  - 2. Grout for grouting masonry.
  - 3. Mortar for pointing and touchup.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 04150 - Masonry Accessories
- B. Section 04200 - Unit Masonry

**1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS**

- A. Without limiting the generality of the Specifications, the Work shall conform to the applicable requirements of the following documents:
  - 1. ASTM C91 Standard Specification for Masonry Cement
  - 2. ASTM C144 Standard Specification for Aggregate for Masonry Mortar
  - 3. ASTM C150 Standard Specification for Portland Cement
  - 4. ASTM C207 Standard Specification for Hydrated Lime for Masonry Purposes
  - 5. ASTM C270 Standard Specification for Mortar for Unit Masonry
  - 6. ASTM C476 Standard Specification for Grout for Masonry
  - 7. ASTM C979 Pigments for Integrally Colored Concrete
  - 8. ASTM C1019 Standard Methods of Sampling and Testing Grout
  - 9. ACI 530.1/ASCE 6 Specification for Masonry Structures

#### **1.04 SUBMITTALS**

- A. In accordance with the procedures and requirements set forth in Section 01300 - Submittals, submit the following:
  - 1. Manufacturer's data and mixing instructions for each product.
  - 2. Certificate of compliance with these specifications for each material specified below.
  - 3. Test reports.
  - 4. Samples of colored masonry mortar.

#### **1.05 DELIVERY AND STORAGE**

- A. Deliver materials in manufacturer's original containers, bearing labels indicating product and manufacturer's name.
- B. Store cementitious materials in waterproof locations to prevent damage by elements. Reject containers showing evidence of damage.
- C. Store aggregates in separate bins to prevent intrusion of foreign particles. Do not use bottom 6 inches of sand or other aggregate stored in contact with the ground.

### **PART 2 - PRODUCTS**

#### **2.01 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Specifications provide products manufactured by Blue Circle Cement, Inc., Marietta, GA; Lehigh Portland Cement Company, Allentown, PA; Holnam, Inc., Dundee, MI, or equal.

#### **2.02 MATERIALS**

- A. Mortar and Grout Materials
  - 1. Portland Cement: ASTM C-150, Type I above grade and Type II below grade.
  - 2. Hydrated lime: ASTM C-207, Type "S".
  - 3. Sand: Clean, coarse, free of loam, salt, organic and foreign matter and conforming to ASTM C-144.
  - 4. Coarse and fine aggregates for grout: ASTM C-404.
  - 5. Masonry Cement: ASTM C 91, Type S and meet the following criteria:

- a. Prepackaged masonry cement shall contain Portland Cement, hydrated lime and plasticizing admixtures or hydraulic hydrated lime. Masonry cements which contain other materials, including ground limestone, ground slag, or other cementitious and non-cementitious materials, are not acceptable.
  6. Water - clean, fresh, potable and free from injurious amounts of oil, acids, alkalies, salts, organic matter or other deleterious substances.
- B. Admixtures
1. Do not use calcium chloride.
  2. Do not use admixtures, without written approval of Engineer.
  3. Mortar shall contain water repellent that is compatible with the split-face block.
- C. Mortar pigment
1. Natural or synthetic iron oxide and chromium oxides meeting the requirements of ASTM C979.
  2. Pigment shall not exceed 10% of the weight of portland cement. Carbon black shall not exceed 2% of portland cement.
  3. Color shall be selected by the Owner from the manufacturer's full range of colors.

### **2.03 GROUT AND MORTAR MIXES**

- A. Masonry mortar shall be Type "S" according to ASTM C-270. Proportions for masonry mortar shall be one of the following:
1. Proportions by volume: 1 part Portland cement to 1/4 - 1/2 parts hydrated lime, and aggregate volume of not less than 2-1/4 or more than 3 times the sum of the volumes of cement and lime.
  2. Proportions by volume: 1/2 part Portland cement to 1 part masonry cement, and aggregate volume of not less than 1-1/4 or more than 3 times the sum of the volumes of cement and lime.
- B. Proportions for pointing mortar.
1. Proportions by volume: 1 part Portland cement to 1/4 part hydrated lime and 2 parts extra fine sand.
- C. Masonry Grout shall conform to the requirements of ASTM C 476 and ACI 530.1/ASCE 6, Section 4. Strength of grout, tested in accordance with ASTM C 1019 shall be equal to  $f'_m$  as specified in Section 04200, but not less than 2000 psi.

1. Test grout for every 5000 square feet of masonry, with a minimum of one test per structure.

### **PART 3 - EXECUTION**

#### **3.01 FIELD MORTAR MIXING**

- A. Mixing shall be by mechanically operated batch mixer. Entirely discharge before recharging. Mix sand, lime, cement and admixtures dry for two (2) minutes minimum, add water and mix for three (3) minutes minimum. Control batching procedures by measuring materials by volume. Measurement by shovel count shall not be permitted. Mix mortar with less water than the maximum amount, consistent with workability, to provide near maximum tensile bond strength. Mix only quantity that can be used before initial set, or within the first one-half hour.
- B. Mixers, wheel barrows, mortar boards, etc., shall be kept clean.
- C. Retempering of mortar will not be permitted and mortar allowed to stand more than one (1) hour shall not be used.

#### **3.02 INSTALLATION**

- A. Install mortar and grout in accordance with ACI 530.1/ASCE 6.

#### **3.03 REPOINTING MORTAR**

- A. Prehydrate the mortar by mixing ingredients together dry, and then add only enough water to make a damp, stiff mix that will retain its form when pressed into a ball. After one to two hours, add water to bring it to the proper consistency.

**END OF SECTION 04100**

**SECTION 04150  
MASONRY ACCESSORIES**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Furnish labor, materials, equipment and appliances required for complete execution of Work shown on Drawings and specified herein.
- B. Principal items of work include:
  - 1. Metal joint reinforcement for masonry.
  - 2. Accessories for masonry construction.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 04100 - Mortar and Masonry Grout
- B. Section 04200 - Unit Masonry

**1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS**

- A. Without limiting the generality of these specifications, Work shall conform to the applicable requirements of the following documents:
  - 1. ASTM A82 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
  - 2. ASTM A153 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware
  - 3. ASTM D1056 Standard Specification for Flexible Cellular Materials - Sponge or Extruded Rubber
  - 4. ACI 530.1/ASCE 6 Specifications for Masonry Structures

**1.04 SUBMITTALS**

- A. In accordance with the procedures and requirements set forth in Section 01300, Submittals, submit the following:
  - 1. Provide manufacturers complete product data.
  - 2. Provide manufacturer's certification attesting compliance of material and source of each material specified below.

## **PART 2 - PRODUCTS**

### **2.01 ACCEPTABLE MANUFACTURERS FOR MASONRY REINFORCEMENT**

#### A. Manufacturers

Subject to compliance with the Specifications, provide products manufactured by AA Wire Products, Company, Chicago, IL; Dur-O-Wal, Inc., Arlington Heights, IL; Heckmann Building Products, Inc., Chicago, IL; Holman and Barnard, Inc., Hauppauge, NY, or equal..

### **2.02 MATERIALS**

#### A. Multi Wythe Joint Reinforcement

Steel truss type reinforcement with adjustable pintel and eye assembly; 3/16 inch side rods and 9 gauge continuous cross rods; manufactured with wire conforming to ASTM A 82, with widths 2-inches less than nominal wall thickness.

#### B. Anchors: Cast into concrete or weld to steel.

1. Dovetail Slot shall be 1 inch back by 1 inch deep by 5/8 inch throat, 22 gauge, foam filled.
2. Dovetail Anchor - accessory for anchoring triangular flexible tie to dovetail slot, shall be 1/8 inch by 1 inch wide 1/2 inch long dovetail section.
3. Wire/Strap Anchor - 1/4 inch wire or 12 gauge x 3/4 inch x length required, welded or mechanically attached to back up structure.
4. Top of Partition Masonry Anchor – 3/8 inch diameter rod attached to dovetail anchor for anchoring to dovetail slot; hot-dip galvanized finish; clear butyrate tube with compressible filter to be placed over rod anchor.

#### C. Ties

1. Triangular Flexible Tie: 3/16 inch wire, sized to suit application.
2. Adjustable Tie: Pintel and eye full tie; properly sized for application, 3/16 inch cold drawn steel.

#### D. Finish

1. Reinforcements, anchorages and ties shall be hot dipped galvanized, Class B-2, after fabrication in accordance with ASTM A153.

## 2.03 ACCESSORIES

### A. Expansion and Joint Filler Material

1. Closed cell neoprene material conforming to ASTM D 1056, with a minimum compressibility of 50%. Horizontal joint filler shall be 1/4 inch thick. Expansion joints shall be a minimum 3/8" thick.

### B. Weep and Vent Holes

1. Open head joints for brick and half-head joints for concrete masonry veneer.

### C. Control Joint

1. Wide flange rapid preformed neoprene gasket.

### D. Hardware Cloth

1. Waterproof paper backed with 1/2 inch hardware cloth.

### E. Cavity Drainage Protection

1. Cavity drainage protection shall be fluid conducting, non-absorbent, mold and mildew resistant polymer mesh consisting of 100% recycled polymer with PVC binder as manufactured by CavClear Masonry Mat by CavClear, Mortairventor by Advanced Building products, or equal. Thickness shall be as shown on the Drawings.

## PART 3 - EXECUTION

### 3.01 REINFORCEMENT AND ANCHORAGE

- A. In masonry wall panels, place horizontal joint reinforcement at a vertical spacing of 16 inches on center, unless otherwise noted.
- B. Lap side rods at each end joint a minimum of 6 inches.
- C. Install prefabricated corner and tee assemblies at each wall corner and intersection.
- D. Mitre and butt end joints are prohibited.
- E. Place horizontal joint reinforcement in approximate center of out-to-out wall assembly and assuring a 5/8 inch, minimum, mortar coverage on exterior face and 1/2 inch on interior face.
- F. Adjustable anchor assemblies may be offset no more than that which is stated in manufacturer's published instructions. Pintles may be installed either up or down.

- G. Install horizontal joint reinforcement continuous, terminating only at vertical control joints.
- H. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend 24 inches minimum each side of opening.
- I. Place joint reinforcement continuous and at 8 inches on center vertically above roof.
- J. Place reinforcing bars supported and secured against displacement. Maintain position with ½ inch to true dimension.
- K. Coordinate and verify that dowels and anchorages embedded in concrete and attached to structural steel members are properly placed.
- L. Provide wall ties for masonry veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place at maximum 8 inches on center each way around perimeter of openings, within 12 inches of openings.
- M. Masonry adjacent to steel and concrete columns to be attached to the column with masonry anchors at 16 inches on center. Anchors to be attached to each face of the column which is adjacent to a masonry wall, unless otherwise noted.

### **3.02 DOVETAIL SLOTS AND ANCHORS**

- A. Provide dovetail slots to concrete contractor for placement into the concrete construction. Dovetail slots shall be placed vertically and spaced 16 inches on center horizontally.
- B. Remove slot filler after forms are removed.
- C. Hook dovetail anchor into slots and set in masonry joints at 16 inches on center.
- D. Install top of partition masonry anchors per manufacturer's instructions.

### **3.03 BENDING, CUTTING AND SPLICING REINFORCEMENT**

- A. Make bends and splices in reinforcement only where indicated, or prior-approval by Engineer. Bend reinforcement only when cold, and prior to any placement in construction, forming around a steel pin of diameter at least 6 times the reinforcement size. Cut bars only by approved sawing, shearing or welding methods.
- B. Make ends of reinforcement straight, square, clean and free of defects before splicing. Do not heat or weld bends and splices at points of maximum stress. Clip and bend any tie wires as required to direct the ends away from external surfaces of masonry walls.
- C. Where welding is necessary, provide materials and perform welding in accordance with AWS requirements.



- D. All lap splices to be 48 bar diameters, unless otherwise noted.
- 3.04 CAVITY DRAINAGE MAT**

- A. Install cavity drainage mat in air-space between insulation and masonry veneer in all masonry veneer construction.
- B. Cavity drainage mat shall be adhered to back-up in accordance with manufacturer's instructions.

**END OF SECTION 04150**

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**SECTION 04200  
UNIT MASONRY**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Furnish labor, materials, equipment and appliances required for complete execution of Work shown on Drawings and specified work.
  - 1. Principal items of work include:
    - a. Exterior masonry wall construction.
    - b. Installation of masonry reinforcement and accessories.
    - c. Masonry unit lintels.
    - d. Installing insulation, flashing and work required to be built into masonry work.
    - e. Building into masonry work all anchors, inserts, hangers and the like provided under other Sections.
    - f. Pointing and cleaning of exposed masonry surfaces.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 04100 - Mortar and Masonry Grout
- B. Section 04150 - Masonry Accessories
- C. Section 07210 - Building Insulation
- D. Section 07600 - Flashing and Sheet Metal

**1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS**

- A. Without limiting the generality of the Specifications the Work shall conform to the applicable requirements of the following documents:
  - 1. ACI 530.1/ASCE 6 Specifications for Masonry Structures
    - a. ACI 530.1/ASCE 6, jointly published by the American Concrete Institute and the American Society of Civil Engineers, hereafter referred to as ACI 530.1 shall be considered minimum specifications for all materials, workmanship, methods and techniques for all masonry work.

- b. Obtain a copy of the above Specifications prior to beginning any work in this Section.
- 2. ASTM C62 Standard Specification for Building Brick
- 3. ASTM C90 Standard Specification for Load-Bearing Concrete Masonry Units
- 4. ASTM C140 Standard Methods for Sampling and Testing Concrete Masonry Units
- 5. ASTM C216 Standard Specification for Facing Brick
- 6. ASTM C744 Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units
- 7. ANSI A41.1 R70 Code Requirements for Masonry

#### **1.04 TESTING**

##### **A. Tests**

The Owner reserves the right to have the Contractor test materials for compliance with these specifications. Sampling and testing will be done in accordance with the ASTM standard, by an independent testing agency employed by the Contractor and approved by the Engineer. Materials that fail to meet requirements are considered defective. Subsequent tests to establish compliance (of the same or new materials) shall be paid for by the Contractor. All testing shall be at no cost to the Owner.

#### **1.05 SUBMITTALS**

##### **A. Submit the following:**

- 1. Samples of each material to be used showing full range of colors.
- 2. Manufacturer's specifications and certifications of compliance to the Specifications, including results of tests on masonry units showing such compliance, for each type of masonry. Provide handling, storage, and installation instructions along with protection instructions. Indicate by transmittal that installer has received copies of each instruction.
- 3. Cold and/or hot weather construction procedures in accordance with ACI 530.1/ASCE 6 sections 2.3.2.2. and 2.3.2.3.
- 4. Cleaning procedures and cleaner for each masonry type.

### **1.06 MOCK-UPS**

- A. Build mock-ups at the site, where directed, full thickness and approximately 4 feet x 4 feet, indicating the proposed color range, texture and workmanship for each type of masonry. Obtain Engineer's acceptance of visual qualities of the mock-up before start of masonry work. Do not alter, move or destroy mock-ups until Work is completed and removal is directed by the Engineer.

### **1.07 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in the manufacturer's original unbroken, undamaged and unopened packaging with labels bearing the name of the manufacturer and the product. Masonry units and brick shall be factory packaged and strapped, delivered to the site and stored on skids.
- B. Store and handle materials to prevent inclusion of water or foreign matter and to prevent damage of any nature.
- C. Distribute materials on floor slabs to prevent overloading. Designated live loads shown for floor shall not be exceeded.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- A. Provide special shape, type or size indicated or for application requiring a form, size or finish which cannot be produced from standard masonry units by sawing. Provide solid units where masonry unit is exposed.

### **2.02 MATERIALS**

- A. Mortar and Masonry Grout
  - 1. In accordance with Section 04100 - Mortar and Masonry Grout
- B. Masonry Accessories
  - 1. In accordance with Section 04150 – Masonry Accessories
- C. Concrete Masonry Units
  - 1. Provide units conforming to ACI 530.1 unless otherwise specified.
  - 2. Provide normal weight units meeting the requirements of ASTM C90, Type II, for hollow and solid load bearing CMU.
  - 3. Manufacture units of Portland Cement, conforming to ASTM C-150 and light weight aggregate conforming to ASTM C331 and ASTM C33. Weight of unit shall not exceed 105 lb. per cu. ft. when measured in accordance

with provisions of ASTM C140. Units shall be nominally 8 inches x 16 inches x thicknesses shown or as required. Masonry units shall be manufactured not less than 30 days prior to being used and stored under cover until shipment. All units shall have true, sharp edges and corners, free from cracks or other defects unless otherwise noted. Provide bullnose shapes for external corners, sills and jambs. Provide half special sizes and shapes as required by the Drawings or to meet job conditions.

4. Net area compressive strength of concrete masonry units shall be a minimum of 2,800 psi when tested in accordance with ASTM C140. Compressive strength of masonry ( $f'_m$ ) shall be a minimum of 2,000 psi in accordance with ACI 530.1 when these units are used with the mortar specified in Section 04100.

D. Concrete Masonry Lintels

Specially formed units with reinforcing bars and mortar fill provided where shown and wherever openings in masonry are indicated without structural steel or other supporting lintels.

E. Brick, General:

1. Provide modular size brick (7-1/2 inches long x 2-1/4 inches high x 3-3/4 inches wide) ASTM C-216, Grade SW, Type FBS, color as selected by the Owner.
2. Manufacturer: Obtain masonry units from one manufacturer, of uniform texture and color for each kind required, for each continuous area and visually related areas.
3. Coring: At Contractor's option, provide solid cored brick for brickwork. Do not use cored brick with net cross-sectional area less than 75 percent of gross area, or with core holes closer than 3/4-inch from any edge.

F. Building or Common Brick: ASTM C62-84, Grade SW. Concealed units, Grade MW.

G. Miscellaneous Materials:

1. Weepholes: Shall be 3/8-inch outer diameter clear, nonstaining plastic tubing.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Examine areas and conditions under which masonry is to be installed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Do not wet concrete masonry units.
- C. Brick having absorption rates in excess of 0.025 oz. per square inch per minute (as determined per ASTM C 67) shall be wetted sufficiently so that the rate of absorption, when brick is laid, does not exceed this amount.
- D. Clean reinforcing, removing loose rust, ice or other coatings from bars, before placement.
- E. Thickness of cavity and composite walls, and other masonry construction shall be the full thickness shown. Build single wythe walls to the actual size of masonry units.
- F. Build chases and recesses as shown and as required for the work of other trades.
- G. Build other work into masonry work as shown, fitting masonry units around other work and grouting to assure anchorage.
- H. Cut masonry units with motor driven saw designed to cut masonry with clean, sharp, unchipped edges. Cut units as required to provide pattern shown or specified, and to fit adjoining work neatly.
- I. Cold and hot weather construction.
  - 1. No masonry shall be erected when ambient temperature has dropped below 45°F unless it is rising and at no time when it has dropped below 40°F. Provisions shall be made for heating and drying of materials, and the complete work shall be protected in accordance with the ACI 530.1/ASCE 6 Section 2.3.2.2. Masonry shall not be laid with ice or frost on its surfaces, and no masonry shall be laid on frozen work. Any work which freezes before the mortar has set shall be removed and replaced at the Contractor's own expense. Do not use any admixtures or antifreeze in the mortar.
  - 2. When the temperature is above 100°F or 90°F with a wind velocity greater than 8 mph, mortar beds shall be spread no more than 4 feet ahead of masonry and masonry units shall be set within one minute of spreading mortar.

### 3.02 CONSTRUCTION TOLERANCES

- A. Variation from plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10', 1/2" maximum.
- B. Variation from level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.
- C. Variation of Linear Building Line: For position shown on plan and related portion of columns, walls, and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.
- D. Variation in Cross Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".
- E. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

### 3.03 LAYING MASONRY WALLS

- A. Layout walls in advance for accurate spacing of surface bond patterns, with uniform joint widths and to properly locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half size units at corners, jambs, and wherever possible at other locations.
- B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.
- C. Pattern Bond: Lay exposed masonry in the bond pattern shown or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below.
- D. Stopping and Resuming Work: Rack back 1/2 unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly, and remove loose masonry units and mortar prior to laying fresh mortar.
- E. Cover top of walls at the end of each day. Protect wall from water infiltration from the top until wall is capped.
- F. Built-In Work: As work progresses, build-in items specified under this and other sections of these Specifications. Fill in solidly with masonry around built-in items.



1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of hardware cloth in the joint below and rod grout into core.
3. Fill cores in hollow masonry units with grout 3 courses (24") under bearing plates, beams, lintels, posts and similar items, unless otherwise noted.
4. Seal masonry tight around wall penetrations such as beams, joists, pipes, ducts, and conduit by cutting masonry units to fit as tightly as possible, then closing final gap all around with mortar, or joint filler and caulking as necessary.

### **3.04 MORTAR BEDDING AND JOINTING**

- A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.
- B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs with mortar in starting courses on footing or floors, and where adjacent cells are to be reinforced or filled with grout. For starting courses where cells are not grouted, spread full mortar bed including areas under cells.
- C. Maintain joint widths of 3/8", except for minor variations required to maintain bond alignment.
- D. Tooling: Joints shall be tooled to a uniform concave joint. Head joints first and then the bed joints.
- E. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners and jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean and reset in fresh mortar.

### **3.05 JOINT REINFORCING**

- A. Use continuous horizontal joint reinforcement installed in horizontal mortar joints not more than 16" o.c. vertically.
- B. Parapets: Use continuous horizontal joint reinforcement installed in horizontal joints at 8" o.c. vertically.
- C. Reinforced masonry openings greater than 12" wide, with horizontal joint reinforcing placed in 2 horizontal joints immediately above the lintel and immediately below the sill. Extend reinforcements 2'-0" beyond jambs of the opening except at control joints.

- D. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- E. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, pipe enclosures and other special conditions.
- F. Intersecting Load-bearing Walls: Provide rigid steel anchors at not more than 2'-0" o.c vertically. Embed ends in mortar-filled cores.
- G. Non-loadbearing Interior Partitions: Build full height of story to underside of solid floor or structure above, unless shown otherwise. Fill joint with mortar after dead load deflection of structure above approaches final position.

### **3.06 CONTROL AND EXPANSION JOINTS**

- A. General: Provide vertical and horizontal expansion, control and isolation joints in masonry where shown, or where not shown as recommended by brick and concrete masonry unit manufacturer. Notify Engineer prior to providing joints in addition to those specified in the Contract Documents. Build-in related items as the masonry work progresses.

### **3.07 LINTELS**

- A. Install galvanized steel lintels where indicated.
- B. Provide masonry lintels where shown and wherever openings of more than 8" for brick size units and 1'-4" for block size units are shown without structural steel or other supporting lintels. Provide precast or poured-in-place masonry lintels. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.
- C. For hollow concrete masonry unit walls, use specially formed "U"-shaped lintel units with reinforcement bars placed as shown and filled with grout.
- D. Provide minimum bearing of 8" at each jamb.

### **3.08 FLASHING**

- A. Provide flashing as shown and as specified in Section 07600, Flashing and Sheet Metal.

### **3.09 REINFORCED UNIT MASONRY**

- A. Vertical reinforcement shall be held in place by means of frames or other suitable means. Place horizontal joint reinforcement as masonry work progresses. Provide minimum clear distance between longitudinal bars equal to nominal diameter of bar. Minimum thickness of mortar or grout between masonry and reinforcement shall be 1/4", except 6 gage or smaller wires may be laid in 3/8" mortar joints. Collar joints which contain both horizontal and vertical

reinforcement shall have a minimum width of 1/2" larger than the diameter of the horizontal and vertical reinforcement.

- B. Bar splices shall be contact lap splices. Length of splice shall be a minimum of 24" for #4 bars and 30" for #5 bars, unless noted otherwise in the contract documents.
- C. Low lift grouting shall be used when grout space is less than 2" in width. Place grout at maximum intervals of 24" in lifts of 6 to 8 inches as the work progresses. Cores to be grouted shall be clean of mortar, mortar dropping and debris. Agitate grout to assure complete filling and coverage of reinforcement. Hold grout 1 1/2 inches below to top of masonry if work is discontinued for more than a hour.
- D. High lift grouting may be used when the grout space is greater than 2". Grout shall not be placed in lifts greater than 4 feet. Grout core shall be kept clean of mortar, mortar dripping and debris. Provide cleanout holes as required for inspection and cleaning. Replace cleanout plugs after inspection and acceptance. Do not place grout until entire wall has been in place a minimum of 3 days. Hold grout 1 1/2 inches below top of masonry if work is discontinued for more than an hour.
- E. Forms and shoring shall be substantial and tight to prevent leakage of mortar or grout. Brace and shore forms to maintain position and shape. Do not remove forms or shoring until masonry gains enough strength to sufficiently carry its own weight and any other loads, temporary or permanent, placed on it during construction.

### **3.10 BRICK UNITS**

- A. All joints between bricks shall be completely filled with mortar: Bed joints shall be formed of a thick layer of smooth or slightly furrowed mortar, applied to the units previously laid, with the brick then shoved in place; or bed joints may be formed as specified for cross joints. Cross joints shall be formed by applying to the brick to be laid, a full coat of mortar on the entire end or the entire side, as the case requires, and then shoving the mortar-covered end and/or side of the brick tightly against the bricks previously laid. The practice of buttering the corners of brick and then throwing mortar scrapings into the empty joints will not be permitted. All brick shall be laid without disturbing the brick previously laid. Dry or butt joints will not be permitted. Grouting shall be done only as necessary.
- B. Wetting: Brick having absorption rate of more than 0.025 ounce per square inch per minute shall be wetted sufficiently so that the rate of absorption when laid does not exceed this amount. All units shall be free from water adhering to their surfaces when they are laid in the wall. Do not wet concrete masonry units.

### **3.11 CAVITY WALLS**

All exterior walls, unless otherwise indicated, shall be cavity walls of thickness indicated, with continuous 2-inch cavity, except for returns at windows, columns, control joints and as detailed, indicated.

- A. Two wythes of cavity walls shall be securely tied together by joint reinforcement as herein specified.
- B. Cavity between facing and backing wythe shall be kept clean and clear of all mortar droppings, and no mortar ledges shall project into the cavity. Temporary wood strips, cut to width of cavity and fitted with lift-up wires, shall be laid on the joint reinforcement and carefully lifted out before placement of the next layer or reinforcement. Any projecting mortar shall be spread over the back of the outer wythe immediately following the setting of the masonry unit.
- C. Weepholes shall be provided in mortar joints of the exterior wythe of all cavity walls in the first course above top of flashing along the bottom of cavity walls, over foundations, bond beams, shelf angles and water stops by placing 3/8-inch nominal diameter plastic weephole tubing 32 inches on center in each row.

### **3.12 COORDINATION WITH OTHER TRADES**

- A. Consult other trades in advance and make provisions for installation of their work in order to avoid cutting and patching. Build in work specified under other sections of the Specifications as the work progresses. Provide recesses at walls where required for piping, louvers, ducts, etc., install and set all bolts, plates, anchors, flashing reglets and items to support other work to follow masonry.
- B. Set steel lintels which bear on masonry. Lintels shall have beds of mortar and flashed as required by Drawings.

### **3.13 WALL FLASHING**

- A. Shall be set with full bed of mortar above and below flashing and installed in strict accordance with manufacturer's specifications. Flashing shall extend a minimum of 8 inches beyond all masonry openings of each jamb at head and sill. Flashing shall be laid in all cases, extending down one course minimum from the back-up course and out to within 1/2-inch of face of wall.

### **3.14 PROTECTION OF WORK**

- A. Exposed masonry surfaces shall be protected from staining. Tops of wall shall be covered with nonstaining waterproof coverings when work is not in progress. Installed material shall be secure in high winds.
- B. Protection shall be provided for all openings in the walls to prevent damage to sills, jambs, etc., from all causes. Aluminum or steel frames and other finish materials shall be protected from damage during masonry work.

### **3.15 REPAIR, POINTING AND CLEANING**

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install fresh mortar or grout, pointed to eliminate evidence of replacement.

- B. Pointing of Masonry: At the completion of the masonry work, all holes in exposed masonry shall be pointed. Defective joints shall be cut out and tuckpointed solidly with mortar. Pointing and tuckpointing shall be done with a pre-hydrated mortar. The mortar cement shall be controlled so that, after curing of the mortar, no difference in texture or color exists with that of adjacent masonry.
- C. Masonry Cleaning: While laying masonry units, good workmanship and job housekeeping practices shall be used so as to minimize the need for cleaning the masonry work. Protect the base of the wall from mud splashes and mortar droppings. The technique for laying masonry shall be such that mortar does not run down the face of the wall or smear onto the face.
1. After the joints are tooled, cut off mortar failings with the trowel and brush excess mortar burrs and dust from the face of the masonry, use a bricklayer's brush made with medium soft hair.
  2. Remove all large mortar particles with a hardwood scraper.
  3. If, after using the above outlined techniques, additional cleaning of the walls is found necessary, allow the walls to cure one month prior to initiating further cleaning processes.
- D. Clean masonry to comply with the masonry manufacturer's directions and applicable NCMA "Tek" bulletins or BIA technical notes and the following requirements.
1. Saturate the wall with clean water. The wall shall be thoroughly saturated prior to and at the time the cleaning solution is applied.
  2. Clean masonry with an approved cleaning solution for each type of masonry applied with a brush, starting at the top of the wall. Approved cleaners shall be composed primarily of detergents, wetting agents, buffering agents, and a maximum of 10% muriatic acid. Do not use acids on masonry surfaces that will be damaged by use of an acid cleaner. The use of any of the above cleaning agents shall first be approved in writing by the manufacturer of the masonry being cleaned and the Program Manager. The concentration, method of application of the cleaning solution, and method of scraping shall be as outlined on the container by the manufacturer.
  3. High pressure water and sandblasting shall not be used for cleaning except with the recommendation of the masonry manufacturer and the written approval of the Engineer.
  4. Immediately after cleaning a small area, the wall shall be rinsed thoroughly with quantities of water.
  5. Protect adjacent surfaces and materials during masonry cleaning operations.

6. After the walls are cleaned, take the necessary precautions to ensure that other contractors and subcontractors do not damage or soil the walls. Mud protection around the base of walls shall be left in place until the grading work is done.

**END OF SECTION 04200**