



SECTION 04200

UNIT MASONRY

1. GENERAL

1.1 DESCRIPTION OF WORK

- A. Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.
- B. Extent of Unit Masonry is shown on the drawings.
- C. In addition to work shown on the drawings and specified elsewhere in this Section, build in steel lintels, anchors, inserts and sleeves.

1.2 QUALITY ASSURANCE

- A. Standards: Comply with recommendations of Brick Institute of America (BIA), and National Concrete Masonry Assoc. (NCMA).

1.3 SUBMITTALS

- A. Issue submittals in accordance with Section 01300, Submittals.
- B. Submit product data and installation recommendations for masonry units, cementitious products for mortar and grout, coloring pigments, throughwall flashing, and masonry accessories.
- C. Submit samples of exposed masonry units and mortar, illustrating full range of colors and textures.

PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Except as shown on Drawings or specified otherwise, all concrete masonry units shall be as follows:
  - 1. Hollow-type complying with ASTM C 90, Type 1 (moisture-controlled), Grade N.
  - 2. Compressive strength: 2500 psi net, 1250 psi gross (average of three units). Prism strength  $f_m=2500$  psi in Pier A,  $f_m=2000$  elsewhere.
  - 3. Normal-weight, with sand and gravel aggregate complying with ASTM C 33, approximate oven-dry unit weight of 135 lbs. per cu. ft.



4. Nominal 8" x 16" face dimensions (modular for 3/8 in. mortar joints), thickness per drawings, smooth face, standard gray color, laid up in running bond.

## 2.2 MORTAR AND GROUT

- A. Mortar shall comply with ASTM C 270, BIA Technical Notes 8 and 8A, and local Building Code.
- B. Materials shall conform to applicable ASTM specifications including the following:
  1. Portland Cement: ASTM 150, Types I, II, or III (do not use Types IA, IIA, or IIIA).
  2. Masonry Cement: ASTM C 91.
  3. Hydrated Lime: ASTM C 207, Type S only (do not use Type N).
  4. Natural or manufactured sand aggregate: ASTM C 144, gradation conforming to Table 1 in BIA Technical Note 8.
  5. Masonry cement shall not contain ground limestone.
  6. Water: clean, potable, and free of deleterious amounts of acids, alkalies or organic materials.
- C. Mortar Type
  1. General:
    - a. Mortar for exterior brick shall be colored, submit samples to Architect for approval. Color to be SGS 22A Tan.
    - b. Use 1800 psi minimum Type S mortar for reinforced masonry and where indicated.
    - c. Use 750 psi minimum Type N mortar for exterior, above-grade loadbearing and non-loadbearing walls, and for other applications where another type is not indicated.
- D. Grout
  1. Grout shall conform to ASTM C 476 and to match existing.
  2. Fine and coarse aggregate for grout mixes shall be defined in ASTM C 404.
    - a. Fine grout shall consist of one part portland cement, 0 to 1/10 part lime, 2-1/4 to 3 parts fine sand.

- b. Coarse grout shall consist of the fine grout mix described in "a" above plus 1 to 2 parts coarse aggregate.
  - c. Use coarse grout (pea gravel aggregate) except where minimum horizontal core dimension is under 4 in., in which case use fine grout (sand aggregate). Ordinary concrete (maximum 1 in. aggregate) may be used where minimum core dimension exceeds 6 inches.
- E. During cold-weather construction at exterior walls, use Type III (high-early strength) cement and Type S hydrated lime. A non-calcium-chloride-based accelerator such as Dur-o-Wal, Dur-o-Guard, or Euco Accelguard 80 may be used, in quantities recommended by manufacturer for expected ambient temperature. Calcium chloride may not be used. Refer to EXECUTION portion of this Section for general provisions governing cold weather construction.

### 2.3 METAL REINFORCING, TIES, ANCHORS

- A. Acceptable manufacturers: Heckmann Building Products, or approved equal.
- B. Brick ties at masonry veneer construction:
  - 1. 14 Ga # 315-D anchor with 3/16 x 4" #316 triangle ties. Min. 2" into bed joints. Ties to be stainless steel.
  - 2. At gypsum sheathing secure anchors through sheathing directly to wood studs with s/s wood screws as recommended by anchorage manufacturer.
  - 3. Maximum spacing: 24 in. o.c. vertically, 16 in. o.c. horizontally or closer spacing as required at expansion joints, corners, floors, etc., or to secure directly to studs.
  - 4. Material: stainless steel.

### 2.4 THROUGHWALL FLASHING

- A. Thru wall flashing with H & B #DP stainless steel drip plant as manufactured by Hohmann & Barnard Inc. See section 07650 - Flexible Flashing Active Drainage Plane System.

### 2.5 ROOFING FELT

- A. No. 15, asphalt-saturated, unperforated organic roofing felt, complying with ASTM D 226, Type I, 36 inches wide.

### 2.6 MASONRY ACCESSORIES

- A. Weepholes: medium-density polyethylene, 3/8 in. diameter, full depth of outer wythe.



- B. Chemical cleaning agents for newly-installed masonry: ProSoco Sure-Klean liquid masonry cleaners or equal by Diedrich, as recommended by manufacturer for particular condition. Recommended cleaners include Sure-Klean No. 600 Detergent, No. 101 Lime Solvent, and Vana Trol.

### 3. EXECUTION

#### 3.1 MASONRY WORK IN GENERAL

- A. Erect all masonry work in compliance with the line and level tolerances specified herein. Correct, or replace, as directed by the Architect, non-conforming masonry work at no additional cost to the Contract.
- B. Lay no face brick or concrete masonry unit having chipped edges or face defects where such unit or piece would be exposed to view. Remove any such unit or piece, if installed, replace with new matching material, and bear all costs therefore.
- C. Examine all Drawings as to requirements for the accommodation of work of other trades. Provide all required recesses, chases, slots, cutouts, and set loose lintels. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take every precaution to minimize future cutting and patching. Closely coordinate the location and placement of such items.
- D. Protect all masonry from rain prior to, and during the installation thereof. If the temperature is in excess of 80 degrees F. at time of installation, lightly moisten contact surfaces or masonry units by brushing with water.
- E. Lay all masonry in full mortar beds, and completely butter all concealed from view vertical edges with mortar. Completely fill cells of masonry units with mortar where vertical reinforcement is to be installed therein and in other locations specified or indicated on the Drawings.
- F. Provide complete protection against breakage and weather damage to all masonry work, including substantial wood boxing around door jambs, over the tops of walls and wherever necessary to protect work at all stages of completion. Protect masonry when not roofed over, at all times when masons are not working on the walls. Apply non-staining tarpaulins or waterproof paper, properly weighted, or nailed, to assure their remaining in place to protect masonry from all possible hazards.
- G. Fit masonry into bucks and frames so as not to distort alignment of such items, and fill backs of such items with mortar, except where joints are indicated to receive caulking and sealant and have no compressible filler therein, in which case rake joints to a uniform depth of  $\frac{3}{4}$  inch for proper installation of caulking and sealant material.
- H. Use only power saw, equipped with carborundum blade, for cutting exposed masonry, as needed to assure straight, evenly-cut edges.
- I. Lay out coursing before setting to minimize cutting closures or jumping bond. Do not spread any more mortar than can be covered before surface of mortar has begun to dry. Do not

endanger bond or mortar by moving masonry when once laid. If necessary to re-adjust any items, remove entirely, clean-off mortar, and reset with fresh mortar.

- J. Except for cleaning down and pointing, finish all new masonry as the walls and partitions are carried up.
- K. Point and fill all holes and cracks in mortar joints with additional fresh mortar; do not merely spread adjacent mortar over defect or use dead mortar droppings. Do all pointing while mortar is still soft and plastic. If hardened, chisel defect out and refill solidly with fresh additional mortar, and tool as specified.

### 3.2 JOB CONDITIONS

- A. Store cement, lime and other cementitious materials under cover in a dry place.
- B. Keep steel reinforcing, ties and anchors free from oil, dirt, rust, and other materials which would destroy bond.
- C. Store masonry above ground on level platforms which allow air circulation under stacked units. Masonry units shall be dry and free from soil and ice before being laid in wall.
- D. Keep installed walls dry and clean at all times. Immediately remove grout or mortar from face of masonry to be left exposed or painted. Protect previously installed elements such as louvers, doors, frames, and windows from mortar droppings and construction damage, using masking elements, dropcloths, etc.
- E. Cover exposed walls at end of working day with well-secured canvas tarpaulins. Protect base of exterior walls from splashing mud and mortar by spreading sand, straw, and sawdust or plastic sheeting 3 to 4 ft. horizontally and up face of wall. Turn scaffold boards near wall on edge at end of day to prevent splashing mortar or dirt.
- F. Securely brace partially completed walls against wind damage. Walls shall have been completed 24 hours minimum before application of distributed loads, 72 hours before concentrated loads.
- G. Comply with cold-weather construction specifications in NCMA-TEK 16 and BIA Technical Note 1A:
  - 1. Maintain masonry above 32 degrees F. for 24 hours minimum using insulated blankets or heated enclosures. Construct windbreaks at wind velocities over 15 mph. Maintain mortar on board at 40 degrees F. minimum, heating mixing water and sand as required.
  - 2. Sprinkle units with high rates of absorption with heated water. Refer to mortar paragraph under PRODUCTS in this Section for provisions governing cold-weather additives to mortar. If standard instead of Type III high-early strength cement must be used, maintain installed masonry above freezing for 48 instead of 24 hours.



3. Do no masonry work at temperatures below 38 degrees F and falling or 35 degrees F and rising, until General Contractor has contacted Architect.

### 3.3 INSTALLATION

- A. Verify that substrate is dry and free from frost, dirt, laitance, loose sand and other material which would prevent satisfactory bond. Lay first course in full mortar bed including face shells and webs of concrete masonry units. Keep cells to be grouted free from mortar.
- B. Dampen masonry units as required to prevent excess suction of mortar. Lay concrete masonry units to form continuous unobstructed vertical spaces within wall. Provide full mortar coverage on horizontal and vertical face shells. Also bed webs adjacent to reinforced cores to prevent grout leakage, except omit web bedding at fully grouted walls to permit grout to flow laterally. Lay face brick with full vertical and bed joints, except as specified below to provide weepholes. Cut exposed masonry units, where necessary, with a power saw. Avoid the use (by proper layout) of less-than-half-size units.
- C. Install masonry units in the bond pattern indicated, or if none is indicated, in running bond.
- D. Step back unfinished work -- toothing is not permitted. Do not adjust installed units -- where necessary, completely remove and reinstall using fresh mortar.
- E. Maximum variation of installed walls from plumb, level, or plan grid shall not exceed 1/4 in. in 10 ft. Wall thickness shall not vary more than 1/4 in. plus or minus from dimension shown on drawings.
- F. Mortar:
  1. Measure materials in calibrated containers, or by similar easily-controlled and maintained method. Do not use shovel measurement.
  2. Mix materials in a mechanical mixer at least three minutes with minimum amount of water necessary to produce a workable consistency. Retemper stiffened mortar as required to restore evaporated water, but do not place mortar any later than 2-1/2 hours after mixing.
  3. Exposed-to-view joints shall be approximately 3/8 in. wide, to meet coursing shown, tooled when thumbprint hard with a round bar to produce a dense, slightly concave surface well-bonded to masonry edges.
  4. After tooling, cut off mortar tailings with a trowel and brush off excess. Concealed joints, including those on cavity side of masonry veneer, and joints in masonry to be plastered or stuccoed shall be struck off flush, with no protrusions.

5. Mortar not tight at time of tooling shall be raked out, pointed with fresh mortar, and retooled. Where sealant is shown, rake out joint 3/4 in., ready for backer rod and sealant specified in Division 7 sealants Section.

G. Through-wall flashing:

1. Install flashing to the profiles shown on the drawings.
2. Masonry and concrete surfaces receiving through wall flashings shall be thoroughly dry, free from loose material, and reasonably smooth. There shall be no slopes that will form pockets or prevent free drainage of water to exterior surfaces of wall.
3. Set flashing in sealant. Hold sealant back 1/4 inch from face of lintel. Hold flashing 1/2 inch back from face of lintel.
4. At wall openings, extend flashing 6 in. beyond each side of opening and turn up to form pan. Fold all corners, do not cut.
5. Lap joints between lengths of flashing 6 in. minimum and seal with mastic. Seal penetrations through flashing with mastic or overlapping piece of flashing.

H. Provide weepholes at 24 inches on center maximum spacing through outer face of masonry at all through-wall flashing.

I. At masonry veneer construction over gypsum sheathing, provide rubber washers or bituminous dampproofing compound at all penetrations made in sheathing board or paper as part of work under this Section, including screw heads and veneer-tie anchorage.

J. Provide openings and chases as required for structural members, ductwork, large pipes, etc. Cut exposed masonry with carborundum saw to ensure straight even edges. Neatly block around and patch penetrations. Provide compressible filler around edges of openings to accommodate vibration and structural deflection. Ensure that joint reinforcement remains uncut or is well-lapped.

K. Provide control and expansion joints at locations shown, and keep clean of mortar droppings. Install Joint Sealers in accordance with Section 07900.

L. Build other work into the masonry work as shown, fitting masonry units around other work, and grouting to secure anchorage.

### 3.4 ALLOWABLE TOLERANCES FOR MASONRY WORK

A. Maximum variation from true surface level for exposed to view walls and partitions:

1. Unit-to-unit tolerance: 1/8 inch.



2. Surface, overall tolerance:  $\frac{1}{4}$  inch in 10 feet in any direction when tested with ten foot long straightedge. Where both faces or wall or partition will be exposed to view, request and obtain decision from the Architect as to which face will be required to conform to the specified surface level tolerance.
- B. Maximum variation from true vertical plumb lines:
1. In lines of walls and arises:
    - a.  $\frac{1}{4}$  inch in 10 feet.
    - b.  $\frac{3}{8}$  inch in any story, or up to 20 feet maximum.
    - c.  $\frac{1}{2}$  inch in 40 feet maximum.
  2. For external corner lines, control joints, and other conspicuous lines:
    - a.  $\frac{1}{4}$  inch in any story, or up to 20 feet maximum.
- C. Maximum variation from horizontal level or grades for exposed sills, lintel blocks, and other conspicuous lines:
1.  $\frac{1}{4}$  inch in any bay, or up to 20 feet maximum.
  2.  $\frac{1}{2}$  inch in 40 feet maximum.
- D. Maximum variation of linear building line from an established position in plan and related portions of walls and partitions:
1.  $\frac{1}{2}$  inch in any bay or up to 20 feet.
  2.  $\frac{3}{4}$  inch in 40 feet maximum.

### 3.5 WALL AND PARTITION CONSTRUCTION

- A. General:
1. Build the masonry walls and partitions in the various combinations and thickness as indicated on the Drawings and as herein specified.
  2. Build in anchorage items and loose lintels as the work progresses.
  3. Lay first course of masonry on a smooth bed or mortar, after supporting concrete has been cleaned. Fill cells of first course concrete masonry units with mortar in all cases. Completely fill cells of concrete masonry units wherever vertical reinforcing rods are installed therein.
  4. For exterior masonry cavity walls, install cavity insulation, through wall membrane flashings, weep wicks, and peastone, as specified herein.
  5. Fill pressed metal frames occurring in masonry with mortar, as the masonry is erected.





### 3.6 GROUT

- A. Lay masonry units with core cells vertically aligned and cavities clear of mortar and unobstructed.
- B. Permit mortar to cure three (3) days before placing grout.
- C. ACI Building Code requirements for Masonry Structures and ACI Specifications for Masonry Structures are made part of this specification as are all pertinent sections of the ACI Building Code.

### 3.6 CLEANING MASONRY

- A. Masonry cleaning procedures shall follow recommendations of NCMA-TEK 45 and BIA Technical Note 20 (revised).
- B. Dry brush masonry work at end of each day's work.
- C. After new mortar has cured 14 days minimum, remove large mortar particles with non-metallic scrapers, chisels, or wooden paddles. Wash off dirt and other foreign materials with clean water and light concentration of soap or detergent.
- D. For mortar smears, construction dirt, stains, efflorescence, etc., not removable by above methods, use proprietary cleaners specified under PRODUCTS. Muriatic acid may not be used. Adhere strictly to manufacturer's recommendations.
- E. Apply and scrub cleaning solutions with non-metallic fibrous brushes. Thoroughly rinse cleaned area before cleaning solution can dry, using water hosed under moderate pressure.

END OF SECTION