

DIVISION 4 - MASONRY
SECTION 04 20 00 - UNIT MASONRY SYSTEMS
PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Extent: The work required under this Section consists of all masonry work and related items necessary to complete the work shown on, or reasonably implied by the Drawings and the Specifications.
1. Installation of anchor bolts, bearing plates, and all embedded items described in other Sections of these Specifications.
 2. Setting lintels as detailed on the Drawings.
 3. Grout fill in walls, bond beams and pilasters.
 4. Steel reinforcing in bond beams, walls and pilasters.
 5. Construction of block walls as detailed. Provide all necessary scaffolding. Comply with OSHA scaffolding regulations.
 6. Setting of bearing plates in mortar as detailed for bearing walls.
 7. All masonry will be cut with masonry saws.
 8. Clean all masonry surfaces.
 9. Provide finish masonry surfaces suitable for the intended final architectural finishes to be applied.
 10. Saw cut and cooperate with other trades in the installation of the following concealed work:
 - a. Installing door frames as detailed on the Drawings.
 - b. Vents through roof and concealed piping.
 - c. Electrical conduit and boxes.
 11. Providing exterior wall door and window lintel head flashing as detailed on the Drawings.

1.2 SUBMITTALS

- A. Submit shop drawings for the following items:
1. Shapes of all special masonry units.
 2. Color samples of masonry units and mortar.
 3. Masonry reinforcement and accessories.
 4. Mortar and grout mix design.
 5. Flashings.
 6. UL Certificates.

PART 2 PRODUCTS

2.1 MASONRY UNITS

- A. Regular Type I concrete masonry units shall be 2 core type 8" x 8" x 16" and 12" x 8" x

16". These are the basic units for the work unless otherwise specified on the Drawings. Moisture content at delivery not to exceed 5% of the total absorption.

- B. Mortar colors shall match block color.
- C. Provide all special shapes as detailed and required for a complete installation including angled blocks, sash, stretcher, control joints, heads, single end, jambs, lintel, bond beam, soaps, and knock out.
- D. All exposed outside corners at walls, door jambs, and window jambs shall be bull-nose units. This shall not apply to split faced units or units exposed to the exterior.
- E. Provide fire rated units where noted on the Drawings and submit UL Certificate with Shop Drawings.
- F. All exterior exposed surface block not scheduled or noted to be painted shall contain a water repellant moisture resistant integral admixture additive such as "Dry Block Mortar Admixture" by GCP Applied Technologies or approved equal.
- G. Physical Requirements:
 - 1. $F'm = 2,000$ PSI min.
 - 2. Units shall be normal weight aggregate and comply with ASTM C90 N-I. Units shall have a maximum oven dry density 125 pounds per cubic foot.
 - 3. Minimum compressive strength on the net area (average of three units) when tested in accordance with ASTM C140 shall be 2,500 PSI on the net area at bearing walls and 2,000 PSI on the net area at non-bearing walls. Minimum compressive strength of any individual unit shall be not less than 80% of the required three-unit average.
 - 4. Water absorption shall not exceed 13 lbs. per cubic foot (average of three units) when tested in accordance with ASTM C140.
 - 5. Moisture content of the block when laid shall not exceed 35% of total absorption when tested in accordance with ASTM C140. Maximum lineal shrinkage shall not exceed 0.045%.
 - 6. No overall dimension (width, height, or length) shall differ by more than 1/16" from the specified standard dimension, except that dimensions measured to a split face or end shall not be held to this tolerance. Nominal face of unit 8" x 16".
 - 7. Texture of all concrete masonry units shall be uniform, free of hollows, pop outs, dings and scrapes.

2.2 MASONRY ACCESSORIES

- A. Lintels: Steel angle and steel beam lintels furnished under Section 05 40 00 will be used at the heads of all openings over 4'-0" unless otherwise noted on Drawings. Bond beam lintel shall be used for openings up to 4'-0" unless otherwise noted on Drawings. Install lintels and cut block or use special shapes to construct heads. See Drawings for exceptions.
- B. Anchors and Ties:
 - 1. Rigid steel anchors for intersecting walls shall not be less than 1" x 8" long zinc-coated steel, 1/4" thick, z-type with 3" bends at each end, install at 32" on center vertically.
 - 2. All steel columns adjacent to or embedded in masonry shall be provided with wire

column anchors under Section 05 10 00. Furnish and install Triangle Ties, VBT – Vee Byna-Tie by Hohmann and Barnard, Inc. at all columns. Install at 32" on center vertically. The tie length shall engage the masonry by 4".

3. Veneer Anchoring Ties: For face veneer anchoring supply adjustable, galvanized ties, HB-213 Adjustable Veneer Anchor or 345-SV – Seismic-Notch Veneer Anchor by Hohmann and Barnard, Inc. Provide at 16" on center vertically and 16" on center horizontally.
- C. Reinforcing Bars: Steel bars for bond beams and vertical reinforcement not specified otherwise shall conform to ASTM Specifications A615, Grade 60.
- D. Grout: For bond beams and filled vertical cells grout shall be concrete with pea stone aggregate. Aggregate shall constitute 40% of the mix design by weight. Strength shall be 3,000 PSI at 28 days. Maximum slump shall be 9". Mix shall conform to ASTM C476. Method of sampling and testing grout shall conform to ASTM C1019.
- E. Expansion or Control Joint: Material shall be of natural or synthetic rubber. It shall be cross-shaped in section or of shapes indicated on Drawings. Material shall conform to ASTM D2000 2AA-805. Joint shall be regular type, RS Series – Rubber Control Joint as manufactured by Hohmann and Barnard, Inc.
- F. Through wall flashing bond beams, door and window heads and where shown elsewhere shall be bituminous coated copper, Cop-R-Shield by Advanced Building Products, Inc. with copper weight of 5 oz./S.F. or approved equal.
- G. Sealer: Shall be MasterProtect H107, Sikagard 705 L, or Okon Penetrating Silane/Siloxane S40 applied at 100 S.F. per gallon per coat, provide one coat. Apply to all exterior exposed walls not scheduled to be painted.

2.3 MORTAR MATERIALS

- A. Mortar shall conform to ASTM Specification C270, Type S or M, as follows: one-part Portland cement, one half part hydrated lime and not less than 2¼ and not more than 3 parts sand measured damp, loose. The average strength at 28 days of (3) 2" square cubes shall not be less than 2,000 PSI, the average strength of (3) 2" x 4" cylinders shall not be less than 2,000 PSI and a correction factor shall be applied to the cylinder test results.
- B. Portland Cement: Cement shall conform to ASTM Specification C150 Type I or III.
- C. Lime: Hydrated lime shall be Type S conforming to ASTM Specifications C207.
- D. Lime Putty: Putty shall be stiff mixture of lime and water. Keep putty moist until used.
- E. Sand: Sand shall conform to ASTM Specifications C144 and shall be sharp, clean and well graded, free of dust, lumps, shale, alkali, surface coatings, and organic matter.
- F. Mixing Water: Water shall be clean and potable.
- G. Aggregate for Masonry Grout: Aggregate shall conform to ASTM Specification C404.
- H. Cold weather additives for set acceleration may be used by written permission from the Contractor. In no case shall calcium chloride be used.
- I. All exterior exposed surface block not scheduled or noted to be painted shall have a water repellant moisture resistance admixture such as "Dry Block Mortar Admixture" by GCP Applied Technologies.

PART 3 EXECUTION

3.1 STORAGE OF MATERIALS

- A. Store materials under cover in a dry place on plastic and in a manner to prevent damage or intrusion of foreign matter. During freezing weather, protect all masonry units with tarpaulins or other suitable material. Store concrete masonry units under cover that will permit circulation of air and prevent excessive moisture absorption.
- B. Store cement, lime and air setting mortars under tarps and on pallets.
- C. Protect reinforcement from the elements; immediately before placing, reinforcement shall be free from loose rust, ice or other foreign coatings that will destroy or reduce the bond.
- D. Concrete masonry units shall be protected against wetting prior to use.

3.2 MIXING MORTAR

- A. Mix all cementitious materials and sand in a mechanical batch mixer for a minimum of five minutes. Adjust the consistency of the mortar to the satisfaction of the mason but add only as much water as is necessary.
- B. If the mortar begins to stiffen from evaporation or from absorption of a part of the mixing water, re-temper the mortar immediately by adding water, and remix the mortar. All mortar shall be used within 2-1/2 hours of the initial mixing. It shall not be used after it has begun to set.

3.3 LAYING OF MASONRY

- A. Do not install wet units or units that are less than seven days old.
- B. Units shall be laid with level horizontal joints in a running bond with 50% overlap. Vertical joints shall be on a vertical line on alternate units. No chipped block will be incorporated into the work.
- C. Install horizontal wire truss reinforcing in horizontal joints on 16" centers vertically. Provide continuous grouted bond beams at 8'-0" on center vertically and as shown on the Drawings.
- D. Partitions of all units that abut exterior walls, steel columns, and other partitions shall be bonded in or be anchored thereto once every 32" in height, using rigid steel anchors.
- E. Joints of regular masonry units (interior) shall be cut flush and tooled when thumb print hard to form a concave joint.
- F. Protect facing materials against staining and keep tops of wall covered with non-staining waterproof coverings when work is not in progress. When work is resumed, top surface of work shall be cleaned of all loose mortar and, in dry weather, thoroughly wet.
- G. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells (except that webs also shall be bedded in all courses in piers, columns, pilasters, in starting courses on footings and solid foundation walls and around cells that are to be reinforced or filled with grout). Lay solid units with full 3/8" head and bed joints in concrete masonry so that coursing is in even 8" increments.
- H. Exposed masonry joints, if other than a full-size unit, shall be cut carefully and squarely with an approved masonry saw where straight-line cuts are required and drilled for circular cuts. Interior cuts that cannot be sawed or drilled shall be very carefully hand cut to present a neat and workmanlike finished appearance.
- I. Mortar shall be kept tempered on the board at all times and shall be soft and plastic whenever the mason picks up a trowel full of mortar.
- J. If it becomes necessary to move a block after the mortar has stiffened, the block shall be removed from the wall and relayed with fresh mortar. All the dead mortar shall be scraped off the wall before the block is relayed.

- K. Provide weep holes in starter course at 4' centers on exterior walls, and at window and door lintels.
- L. Vertical cells to be reinforced and filled with grout shall have vertical alignment sufficient to maintain a min. 3" x 3" cell. Vertical reinforcing shall be continuous or properly lapped. Submit layout for review and approval of the locations in the reinforcing drawings.
- M. The room side of each wall shall be the "true" side. Provide continuous control to insure horizontal and vertical alignment. Any block visibly out of plane shall be cut out and replaced.
- N. Provide controls joints where detailed or required by good practice. Joint spacing shall not exceed three times the height of the wall or 50' on center, whichever is less. Submit layout for review and approval of the locations on the reinforcing drawings.
- O. Install flashings and weep holes at split starter courses at the bottom of all walls, above each bond beam and at all door and window lintels or bond beams over windows or doors and all mechanical equipment openings.

3.4 GROUTING REINFORCED MASONRY

- A. Work shall progress until bond beam height has been reached and bond beam units are set.
- B. Vertical cells to be grouted shall be a minimum of 3" x 3" in plan area and carefully aligned. Cells shall be kept free of excess mortar and debris.
- C. Place vertical reinforcing steel in designated cells. Place and block horizontal reinforcing steel in bond beams. Reinforcement and ties shall be placed in grout spaces prior to grouting.
- D. Place pea stone grout by bucket or pump. Work grout into vertical cells, completely fill bond beams. Grout lift height shall not exceed 5 feet. When grout pour height exceeds 5 feet provide cleanouts in the bottom course of masonry for each grout pour. Follow additional high lift grouting procedures as required by the building code.
- E. Consolidate Grout at Time of Placement:
 - 1. Consolidate grout pours 12 inches or less in height by mechanical vibration or by puddling.
 - 2. Consolidate pours excluding 12" height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and supplement has occurred.
- F. Coordinate special inspection of the masonry as required by the Building Code.

3.5 COORDINATION OF WORK

- A. Incorporate sleeves for piping and ductwork, provided by those trades, into the walls as the work progresses.
- B. Mechanical and Electrical trades. Concealed plumbing, electrical risers and outlet boxes are to be installed as partitions are built.
- C. Cutting and Patching: Consult other trades in advance to make provisions for installations of their work to avoid cutting and patching. Any cutting or patching required to accommodate work of others shall be done by mechanics performing the work under this heading.

3.6 PRECAUTIONS AND COLD WEATHER REQUIREMENTS

- A. Do not lay masonry when the temperature of the ambient air is below 40°F unless suitable means as approved by the Contractor are provided to heat materials, protect work from

cold and frost and insure the mortar will harden without freezing. (No anti-freeze ingredient shall be used in the mortar).

- B. Mix water shall be heated to a minimum temperature of 55°F. Cover and heat piles of mortar sand.
- C. The mortar shall be mixed with Type III Portland cement.
- D. Sand shall be heated to a minimum temperature of 40°F.
- E. Enclosures shall be heated when the ambient temperature falls below 25°F. The masonry temperature must be maintained above 32°F for 24 hrs after laying masonry.

3.7 POINTING AND CLEANING MASONRY

- A. Point all holes in exposed masonry. Cut out defective joints and re-point them with mortar of same color as adjacent.
- B. Concrete masonry units shall have all loose and unsightly mortar cleaned off and all stains removed.
- C. Upon completion, all masonry work shall be thoroughly scraped and cleaned of all excess mortar and foreign matter with a solution of "Sure Klean 600" and water, as manufactured by PROSOCO, Inc. Use shall be in accordance with the manufacturer's printed instructions. The solution shall be inhibited and emulsified in such a manner as to make it completely soluble in water, so that rinsing with fresh water will flush all active acids from metal and masonry and other surfaces. Cleaning shall be done after masonry walls are permanently covered at the top.
- D. Clean and re-clean walls until they are free of efflorescence.
- E. All work shall be rubbed with a Carborundum brick (stone) on a daily basis to remove excess mortar.

3.8 SEALER

- A. After exterior block walls have been weathered in from above and cleaned until free of efflorescence, apply the sealer in accordance with this Specification and the Manufacturers recommendations. Do not seal masonry scheduled to be painted.
- B. Soak surface until excess solution runs 6" below the spray pattern.

3.9 TESTING LABORATORY

- A. The materials testing laboratory shall perform testing and inspection as follows.
- B. Documents:
 - 1. Review Plans and Specifications.
- C. Sampling and Testing Duties:
 - 1. Testing Inspection agency shall inspect, sample, and test the materials as follows.
 - 2. Concrete Block Mortar: Sets of four (4) 2" x 2" x 2" mortar cubes should be cast daily during the course of construction. Cubes should be sent to the laboratory and tested; one at 7 days, and three at 28 days. Testing of field-prepared material shall conform to ASTM C780 standards.
 - 3. Grout Prisms: For CMU walls, cast five (5) 3" x 3" x 6", or 3.5" x 3.5" x 7" test prisms conforming to ASTM C1019, for each day's placement or for every 30 cubic yards placed in one day. Prisms should be sent to the laboratory and tested; one at 7 days, and three at 28 days and one to be broken at Contractor's discretion.

- 4. Monitor mortar temperature during cold weather masonry work. Document daily exterior and enclosure temperature.
 - D. Reports
 - E. Submit daily written reports describing the tests and inspections made and showing the action taken to correct nonconforming work. Itemize any changes authorized by the Contractor/Contractor. Report all uncorrected deviations from Plans or Specifications.
- 3.10 SPECIAL INSPECTION
- A. Special inspection of masonry construction for all bearing walls, shear walls and exterior walls should be provided and shall conform to the requirements of this Section.

END OF SECTION