

SECTION 04200

UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Concrete unit masonry, split-face and regular smooth units.
 - 2. Reinforced unit masonry
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Hollow metal frames in unit masonry are specified in Division 8 Section "Hollow Metal Doors and Frames".

1.3 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following installed compressive strengths (f'm) at 28 days.
- B. For Concrete Unit Masonry: As follows, based on net area:
 - 1 f'm = 1900 psi

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of Contract and Division 1 Specifications.
- B. Material test reports from a qualified independent testing agency, employed and paid by Contractor or manufacturer, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
 - 1. Mortar complying with property requirements of ASTM C 270. Provide tinted mortar for split-face units.
 - 2. Grout mixes
 - 3. Masonry units

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the work.
- B. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
 - 1. Source for Split-Face Concrete Block: A-1 Block Corporation, Orlando, Tel: 407-832-0395. Other Florida suppliers may exist.

- C. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other characteristics can be maintained and contamination avoided.
- D. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.
- C. Hot Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100° F.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows for each type of concrete masonry unit required.
- B. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
- C. Provide square-edged and multi-sided split face units for exterior corners as required.
- D. Concrete Masonry Units: ASTM C 90 and as follows:
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength indicated below;
 - 2. Provide manufacturer's standard split-face block colors for selection by Architect.
- E. Do not use chipped or broken units.

- F. Not less than the unit compressive strengths required to produce concrete unit masonry construction of the strength indicated.
 - 1. Weight Classification: Normal weight.
 - 2. Aggregates: Do not use aggregates made from pumice, scoria or tuff.
 - 3. Provide Type II, nonmoisture-controlled units.
 - 4. Size: Manufactured to the actual dimensions listed below (within tolerances specified in the applicable referenced ASTM specification) for the corresponding nominal sizes indicated on the Drawings:
 - a. 4" nominal: 3-5/8" actual
 - b. 6" nominal: 5-5/8" actual
 - c. 8" nominal: 7-5/8" actual
 - d. 12" nominal: 11-5/8" actual
- G. Exposed Faces: Smooth uniform texture and free from chips and broken edges for interior exposed surfaces and textured split-face units for exterior exposed units.
- H. Provide 3/4" clearance at all structural steel components by laying or cutting of units.

2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II
- B. Masonry Cement: ASTM C 91.
- C. Mortar Cement: UBC Standard No. 21-14
- D. Hydrated Lime: ASTM C 207, Type S.
- E. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or III, and hydrated lime complying with ASTM C 207.
- F. Aggregate for Mortar: ASTM C 144
- G. Aggregate for Grout: ASTM C 404
- H. Water: Clean and potable.

2.3 REINFORCING STEEL

- A. Steel Reinforcing Bars: Material and grade as follows:
 - 1. Billet steel complying with ASTM A 615
 - 2. Grade 60
- B. Deformed Reinforcing Wire: ASTM A 496, with ASTM A 153, Class B-2 zinc coating.

2.4 JOINT REINFORCEMENT

- A. General: Provide joint reinforcement formed from the following:
- B. Galvanized carbon steel wire, coating class as follows:
- C. ASTM A 153, Class B-2 for both interior and exterior walls.
- D. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:
 - 1. Wire Diameter for Side Rods: 0.1875 inch
 - 2. Wire Diameter for Cross Rods: 0.1483 inch

- E. For single wythe masonry, provide type as follows with single pair of side rods:
 - 1. Ladder design with perpendicular cross rods spaced not more than 16" o.c.

2.5 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of this Article, unless otherwise indicated.
- B. Wire: As follows:
 - 1. Galvanized Carbon Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
 - 2. Wire Diameter: 0.1875 inch
- C. Steel Sheet: As follows:
 - 1. Thickness of Steel Sheet Galvanized After Fabrication: Uncoated thickness of steel sheet for hot-dip galvanizing after fabrication.
 - 2. Steel Plates and Bars: ASTM A 36, hot-dip galvanized to comply with ASTM A 153, Class B-1, B-2 or B-3, as applicable to size and form indicated.

2.6 ADJUSTABLE ANCHORS FOR CONNECTING TO STRUCTURAL FRAME

- A. General: Two-piece assemblies as described below allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall, but resisting tension and compression forces perpendicular to it.
 - 1. Wire Diameter: 0.1875".

2.7 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron inserts of type and size indicated.
- B. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers; of diameter and length indicated and in the following configurations:
 - 1. Headed bolts

2.8 EMBEDDED FLASHING MATERIALS

- A. Vinyl Sheet Flashing: Flexible sheet flashing especially formulated from virgin polyvinyl chloride with plasticizers and other modifiers to remain flexible and waterproof in concealed masonry applications, black in color, and of thickness indicated below:
 - 1. Thickness: 30 mils
 - 2. Application: Use where flashing is fully concealed in masonry.
- B. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.
- C. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following:
 - 1. Vinyl Sheet Flashing:
 - a. Lexusco Water Barrier, International Permalite, Inc.
 - b. Nervastral, Nervastral, Inc.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- B. Plastic Weep Hole/Vent:
 - 1. Available Products: Subject to compliance with requirements, weep hole/ventilators that may be incorporated into the work include, but are not limited to, the following:
 - a. Cell Vent, Dur-O-Wall, Inc.

2.10 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: As recommended by masonry manufacturer.

2.11 MORTAR AND GROUT MIXERS

- A. General: Do not add admixtures including air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
- B. Do not use calcium chloride in mortar or grout.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, proportion specification for types of mortar indicated below:
 - 1. Type S, tinted (color to be selected by Architect)
- D. Grout for Unit Masonry: Comply with ASTM C 476. Use grout of consistency indicated, or if not otherwise indicated, of consistency (fine or coarse) at time of placement that will completely fill spaces intended to receive grout.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry. Do not proceed until satisfactory conditions have been corrected.
- B. For the record, prepare written report, endorsed by the Installer, listing conditions detrimental to the performance of unit masonry.
- C. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of thickness indicated.
- B. Build chases and recesses as shown or required to accommodate items specified in this and other sections of the Specifications.
- C. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arises, do not exceed $\frac{1}{4}$ inch in 10 feet, nor $\frac{3}{8}$ inch in 20 feet, nor $\frac{1}{2}$ inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed $\frac{1}{4}$ inch in 20 feet, nor $\frac{1}{2}$ inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or minus $\frac{1}{4}$ inch in 10 feet, nor $\frac{1}{2}$ inch maximum.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed $\frac{1}{4}$ inch in 20 feet, nor $\frac{1}{2}$ inch in 40 feet or more. For top surface of bearing walls, do not exceed $\frac{1}{8}$ inch in 10 feet, nor $\frac{1}{16}$ inch within width of a single unit.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed $\frac{1}{2}$ inch in 20 feet, nor $\frac{3}{4}$ inch in 40 feet or more.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus $\frac{1}{4}$ inch nor plus $\frac{1}{2}$ inch.
- E. Variation in Mortar Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus $\frac{1}{8}$ inch, with a maximum thickness limited to $\frac{1}{2}$ inch. Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than $\frac{1}{8}$ inch. Do not vary from head-joint thickness by more than plus or minus $\frac{1}{8}$ inch. Do not vary from head-joint thickness from adjacent head-joint thickness by more than $\frac{1}{8}$ inch. Do not vary from collar-joint thickness indicated by more than minus $\frac{1}{4}$ inch or plus $\frac{3}{8}$ inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half size units at corners, jambs, and where possible, at other locations.
- B. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4 inch horizontal face dimensions at corners or jambs.
 - 1. One-half running bond with vertical joint in each course centered on units in courses above and below.
- D. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4 inch horizontal face dimensions at corners or jambs.
- E. Stopping and Resuming Work: In each course, rack back half-unit length for one-half running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.
- F. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- G. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated. Conduit and pipes shall not run horizontally through masonry.
- H. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- I. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
 - 1. With full mortar coverage on horizontal and vertical face shells.
 - 2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
 - 3. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.
- B. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8 inch joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- D. Cut joints flush for masonry walls that are to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.6 STRUCTURAL BONDING OF MASONRY

- A. Corners: Provide interlocking masonry unit bond in each course, at corners, unless otherwise shown.
- B. Provide continuity with horizontal joint reinforcement at corners by using prefabricated "L" units in addition to masonry bonding.
- C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:
 - 1. Provide individual metal ties not more than 16" o.c.
 - 2. Provide continuity with horizontal-joint reinforcement by using pre-fabricated "T"- units.

3.7 CAVITIES

- A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities/air spaces flush.
- B. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
- C. Tie exterior wythe to back-up with individual metal ties. Stagger alternate courses.

3.8 HORIZONTAL JOINT REINFORCEMENT

- A. General: Provide continuous horizontal joint reinforcement. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8" in exterior side of walls, 1/2" elsewhere. Lap reinforcing a minimum of 6".
- B. Space reinforcement not more than 16 inches o.c.
- C. Provide reinforcement in mortar joint 1 block course above and below wall openings and extending 24 inches beyond opening.
- D. Reinforcement above is in addition to continuous reinforcement.
- E. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

- F. 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, column fireproofing, pipe enclosures, and other special conditions.

3.9 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - 1. Provide an open space not less than 1" in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24" o.c. vertically and 36" o.c. horizontally.

3.10 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.
- C. Build-in horizontal pressure relieving joints where indicated; construct joints by either leaving an air space or inserting a compressible air filler of width required for installing a sealant and backer rod specified in Division 7 Section "Joint Sealants".

3.11 LINTELS

- A. Provide masonry lintels where shown and where openings of more than 24 inches for block size units are shown without structural steel or other supporting lintels.
- B. Provide precast lintels made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcement bars indicated or required to support loads indicated. Cure precast lintels by same method as CMU.
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.12 INSTALLATION OF REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as required to support reinforced masonry elements during construction.
- B. Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete. Brace, tie and support as required to maintain position and shape during construction and curing of reinforced masonry.
- C. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and all other reasonable temporary loads that may be placed on them during construction.
- D. Grouting: Do not place grout until entire height of masonry to be grouted has attained a sufficient strength to resist grout pressure.
- E. Do not exceed the following pour heights for grout:

1. For minimum widths of grout spaces of 1-1/2 inches or for minimum grout space of hollow unit cells of 1-1/2 by 3 inches, pour height of 12 inches.
 2. For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 60 inches.
 3. For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 12 feet.
 4. For minimum widths of grout spaces of 3 inches or for minimum grout space of hollow unit cells of 3 by 4 inches, pour height of 24 feet.
- F. Provide cleanout holes at least 3 inches in least dimension for grout pours over 60 inches in height.
- G. Provide cleanout holes at each vertical reinforcing bar.

3.13 REPAIRING, POINTING AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corner, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry.
- E. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
- F. Test cleaning methods on sample wall panel; leave half panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
- G. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
- H. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
- I. Clean brick by means of bucket and brush hand-cleaning method described in BIA "Technical Note No. 20 Revised" using the following masonry cleaner:
 1. Job mixed detergent solution.
- J. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.
- K. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION