

SECTION 04200

UNIT MASONRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes: Work of this Section consists of installing all materials furnished under this Section, including all equipment, labor, services, and incidental items required to complete work as shown on Drawings and specified in this Section.

- 1. Interior non-loadbearing single-wythe construction for concrete masonry unit with field-applied paint (provided by Section 09900).
- 2. Unit masonry to include:
 - a. Normal-weight, square-edge concrete masonry units.
- 3. Mortar and grout for masonry construction.
- 4. Joint reinforcement for masonry construction.
- 5. Reinforcing steel for reinforced masonry construction.
- 6. Masonry cleaners.

- B. Related Sections:

- 1. 07841, "Through-Penetrations Firestop Systems"; for sealing top joint between fire-rated interior partition and underside of structure above.
- 2. 07901 "Joint Sealants" for sealing joints between masonry and adjacent materials.
- 3. 09900 "Painting"; for field-painting unit masonry scheduled to be painted.

- C. Products Installed But Not Furnished Under This Section Include Following:

- 1. 05500, "Metal Fabrications"; for steel lintels and steel shelf angles.
- 2. 06100, "Rough Carpentry"; for wood nailers and blocking built into unit masonry.
- 3. 08111, "Standard Steel Doors and Frames"; for hollow metal frames in unit masonry openings.

1.03 SUBMITTALS

- A. Product Data: For each type of masonry unit, accessory, and other manufactured product.

- B. Samples for Verification Purposes:

- 1. Unit Masonry: Full size units for each different exposed masonry unit required showing full range of exposed colors, textures, and dimensions to be expected in completed construction.
- 2. Colored Masonry Mortar:
 - a. Submit samples of each color required showing full range of color expected in finished construction.
 - b. Make samples using same sand and mortar ingredients to be used on Project.

- c. Label samples to indicated type and amount of colorant used.
 3. Dimension Precast Trim: Submit samples min. 12 in. in length showing full range of exposed color and texture to be expected in finish construction.
- 1.04 QUALITY ASSURANCE
- A. Employ and pay for qualified professional engineer to provide survey and inspection of foundations for compliance with dimensional tolerances.
 - B. Reference Standards:
 1. Comply with ACI 530/ASCE 5/TMS 402, Building Code Requirements for Unit Masonry, for either empirical or engineered design and construction procedures.
 2. Comply with Brick Institute of America, Technical Notes on Brick Construction, except where more stringent requirements are mandated by ACI 530/ASCE 5/TMS 402.
 3. Comply with National Concrete Masonry Association, TEK Manual for Concrete Masonry Design and Construction, except where more stringent requirements are mandated by ACI 530/ASCE 5/TMS 402.
 - C. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined by testing in compliance with ASTM E119 by recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.
 - D. Single Source Responsibility:
 1. Masonry Units: Obtain exposed masonry units of uniform texture and color, or uniform blend within ranges accepted for these characteristics, from one source and by single manufacturer for each different product required.
 2. 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.
- 1.05 DELIVERY, STORAGE, AND HANDLING
- A. Storage and Handling:
 1. Masonry Units:
 - a. Store on elevated platforms, under cover, and in dry location to prevent their deterioration and damage due to moisture, temperature changes, contaminants, corrosion or other causes.
 - b. If units become wet, do not install until they are in air-dried condition.
 2. Cementitious Materials: Store on elevated platforms, under cover, and in dry location.
 3. Aggregates: Store on elevated platforms, under cover, and in dry location.
 4. Accessories: Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- 1.06 PROJECT CONDITIONS
- A. Protection of Work:
 1. During erection, cover top of walls with waterproof sheeting at end of each day's work.
 2. Cover partially completed structures when work is not in progress.
 3. Extend cover min. 24 in. down both sides and hold cover securely in place.

4. Do not apply uniform floor or roof loading for min. 12 hrs. after building masonry walls or min. 3 days after building masonry walls or columns.
- B. Stain Prevention:
1. Prevent grout or mortar or soil from staining face of masonry to be left exposed or painted.
 2. Immediately remove grout or mortar in contact with such masonry.
 3. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
 4. Protect sills, ledges, and projections from mortar droppings.
 5. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 6. Turn scaffold boards near wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed masonry.
- C. Cold Weather Construction and Protection:
1. General:
 - a. Do not use frozen materials or materials mixed or coated with ice or frost.
 - b. Do not build on frozen subgrade or setting beds.
 - c. Remove and replace unit masonry damaged by frost or freezing conditions.
 2. Comply with ACI 530/ASCE 5/TMS 402 cold weather-construction requirements.
- D. Cold Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg. F and above and will remain so until masonry has dried out, min. 7 days after completion of cleaning.
- E. Hot Weather Construction:
1. Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout.
 2. Provide artificial shade and wind breaks and use cooled materials as required.
 3. Do not apply mortar to substrates with temperatures of 100 deg. F and above.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete Masonry Units: ASTM C90 and as follows.
1. Provide shapes indicated and as follows for each form of concrete masonry unit required.
 2. Special Shapes: Provide for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 3. Square-Edged Units: Provide for outside corners, except where indicated as bullnose.
 4. Unit Compressive Strength: Min. 1900 psi average net-area compressive strength.
 5. Weight Classification: Normal-weight.
 6. Aggregates: Do not use aggregates made from pumice, scoria, or tuff.
 7. Type I: Moisture-controlled units; max. 3.5 percent of total absorption as tested to ASTM C140; maintain min. 35 percent moisture content during storage and erection.
 8. Residual Lineal Shrinkage: Max. 0.01 percent when dried to 50 percent relative humidity equilibrium at 73 deg. F ambient temperature.
 9. Size: 8 in. x 16 in. normal face size; nominal thickness as indicated shown on Drawings and manufactured within tolerances specified in applicable referenced ASTM specification.
 10. Exposed Face Color and Texture: Uniform light gray color, and medium fine texture.
 11. Do not use units with chipped or otherwise objectionable damage to exposed faces.
- B. Mortar and Grout Materials:

1. Portland Cement:
 - a. ASTM C150, Type I, except Type III may be used for cold-weather construction.
 - b. Provide natural color or white cement as required to produce required mortar color.
 2. Hydrated Lime: ASTM C207, Type S.
 3. Aggregate – Mortar: ASTM C144, except for joints min. 1/4 in. use aggregate graded with 100 percent passing No. 16 sieve.
 4. Aggregate – Grout: ASTM C404.
 5. Mortar Pigments:
 - a. Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes.
 - b. Use only pigments with record of satisfactory performance in masonry mortars.
 - c. Color: As selected by Architect.
 - d. Product: Davis Colors Model True tone Mortar Colors, Laforge Corp. Model Centurion Pigments, Solomon Grind-Chem Model SGS Mortar Colors.
 6. Cold-Weather Admixture:
 - a. Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - b. Product: Euclid Chemical Co. Model Accelguard 80, W.R. Grace & Co. Model Morseled, Sonneborn Div. (ChemRex Inc.) Model Trimix-HGA.
 7. Water: Potable.
- C. Reinforcing Steel:
1. Steel Reinforcing Bars: ASTM A615 for billet steel, Grade 60.
 2. Welded Wire Fabric: ASTM A185.
- D. Joint Reinforcing Bars:
1. Galvanized Carbon Steel Wire: ASTM A641, Class 1 for interior walls and ASTM A153, Class B-2 for exterior walls or ASTM A153, Class B-2 for both interior and exterior walls.
 2. Description:
 - a. Welded Wire units prefabricated with deformed continuous side rods and plain cross rods into min. 10 ft. straight lengths with prefabricated corner and tee units.
 - b. Wire Size – Side Rods: 0.1483 in. dia. (9 ga.)
 - c. Wire Size – Cross Rods: 0.1483 in. dia. (9 ga.).
 3. Single-Wythe Masonry:
 - a. Provide type with single pair of side rods.
 - b. Ladder Design: Perpendicular cross rods spaced max. 16 in. o.c.
- E. Miscellaneous Masonry Accessories:
1. Compressible Filler: Premolded filler strips complying with ASTM D1056, Type 2 Class A, Grade 1; compressible to 35 percent, of width and thickness indicated; formulated with neoprene.

2. Reinforcing Bar Positioners:

- a. Wire designed to fit into mortar bed joints spanning masonry unit cells with loops to center reinforcing bars in cells.
- b. Form from 0.142 in. steel wire hot-dipped galvanized after fabrication.
- c. Product: Dur-O-Wal Inc. Model D/A811, Heckman Building Products Inc. Model No. 376 Rebar Positioner, Hohmann & Barnard Model #RB Rebar Positioner.

F. Masonry Cleaners:

- 1. Job-Mixed Detergent Solution: Solution of 1/2 cup dry measure trisodium phosphate and 1/2 cup dry measure laundry detergent dissolved in 1 gal. of water.

2.02 MIXES

A. Mortar and Grout – General:

- 1. Do not add admixtures including coloring pigments, air entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
- 2. Do not use calcium chloride in mortar or grout.
- 3. Add cold-weather admixture at same rate for all mortar, regardless of weather conditions, in order to ensure that mortar color is consistent.

B. Mortar for Unit Masonry:

- 1. Comply with ASTM C270, Property Specification for job-mixed mortar.

TYPE	APPLICATION
S	Unreinforced masonry above-grade
M	Reinforced and unreinforced masonry below-grade and in contact with earth
N	Exterior walls above –grade where subject to severe exposure, and parapets, chimneys and veneer walls
O	Interior nonloadbearing partitions

- 2. Limit cementitious materials in mortar to portland cement lime.

C. Grout for Unit Masonry: Comply with ASTM C476.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Laying Masonry Walls:

- 1. Layout:
 - a. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns, and offsets.
 - b. Avoid use of less than half size units at corners, jambs, and wherever possible at other locations.

- c. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.
 2. Stopping and Resuming Work:
 - a. In each course, rake back 1/2-unit length in each course; do not tooth.
 - b. Clean exposed surfaces of set masonry, wet units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
 3. Built- In Work:
 - a. As work progresses, build in items specified under this and other Sections of these Specifications.
 - b. Fill in solidly with masonry around built-in items.
 - c. Fill space between hollow metal frames and masonry solidly with mortar.
 - d. At exterior frames, insert extruded polystyrene board insulation around perimeter of frame in thickness indicated min. 3/4 in. to act as thermal break between frame and masonry.
 - e. Where built-in items are to be embedded in cores of hollow masonry units, place layer of metal lath in joint below and rod mortar or grout into core.
 4. Fill cores in hollow concrete masonry units with grout 3 courses (24 in.) under bearing plates, beams, lintels, posts and similar items.
 5. Nonload-bearing Interior Partitions:
 - a. Build full height of story to underside of solid floor or roof structure above.
 - b. Install compressible filler in joint between top partition and underside of structure above for non-rated assemblies.
 - c. For rated assemblies, fill joint between top of partition and underside of structure to comply with requirements of Section 07841.
 - d. Wedge nonload bearing partitions against structure above with small pieces of tile, slate, or metal.
 - e. Fill joint with mortar after dead-load deflection of structure above approaches final position.
- B. Mortar Bedding and Jointing:
 1. Hollow Units:
 - a. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells.
 - b. 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 reinforced or filled with concrete or grout.
 - c. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.
 2. Joints:
 - a. Maintain joint widths shown, except for minor variations required to maintain bond alignment.
 - b. If not shown, lay walls with 3/8 in. joints.
 - c. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.

- d. Tool exposed joints slightly concave using jointer larger than joint thickness, unless otherwise indicated.
- C. Horizontal Joint Reinforcement – Concrete Unit Masonry:
1. Provide continuous horizontal joint reinforcement s indicated.
 2. Install longitudinal side rods in mortar for entire length min. 5/8 in. cover on exterior side of walls, 1/2 in. elsewhere.
 3. Lap reinforcing min. 6 in.
 4. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
 5. Reinforce walls with continuous horizontal joint reinforcing unless specifically to be omitted.
- D. Control and Expansion Joints:
1. General:
 - a. Provide control and expansion joints in masonry where shown.
 - b. Build-in related items as masonry work progresses.
 - c. Do not form continuous span through movement joints, unless provisions are made to prevent in-plane restraint of wall or partition movement.
 2. Concrete Masonry:
 - a. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint.
 - b. Fill resultant core with grout and rake joints in exposed faces.
 - c. Install preformed control joint gaskets designed to fit standard sash block.
 - d. Install interlocking units designed for control joints.
 - e. Install bond breaker strips at joint.
 - f. Keep head joints free and clear of mortar or rake joints.
 - g. Install temporary foam plastic filler in head joints and remove when unit masonry is complete.
 3. Form open joint of width indicated, min. 3/8 in., for installation of sealant and backer rod specified in Section 07901; maintain joint free and clear of mortar.
 4. Horizontal Pressure-Relieving Joints;
 - a. Build-in by constructing joints by either leaving air space or inserting compressible filler or width required for installing sealant and backer rod specified in Section 07901.
 - b. Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.
- E. Steel Lintels: Install where required; furnished by Section 05500 for installation as work of this Section.
- F. Reinforced Unit Masonry:
1. Temporary Formwork:
 - a. Construct formwork and shores to support reinforced masonry elements during construction.
 - b. Construct formwork to conform to shape, line, and dimensions shown.
 - c. Make sufficiently tight to prevent mortar and grout leakage.

- d. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - e. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
2. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS402.
 3. Grouting:
 - a. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - b. Comply with requirements of ACI 530.1/ASCE 6/TMS602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.02 FIELD QUALITY CONTROL

A. Construction Tolerances:

1. Variation from Plumb:
 - a. Vertical Lines and surfaces of Columns, Walls and Arrises: Max. 1/4 in.
 - b. External Corners, Expansion Joints, Control Joints, and Other Conspicuous Lines: Max. 1/4 in.
 - c. Vertical Alignment – Head Joints: Max. +/- 1/4 in. in 10 ft., max. 1/2 in.
2. Variation from Level:
 - a. Bed Joints and Lines – Exposed Lintels, Sills, Parapets, Horizontal Grooves, and Other Conspicuous Lines: Max. 1/4 in.
 - b. Top Surface – Bearing Walls: Max. 1/8 in. between adjacent floor elements in 10 ft. or 1/16 in. within width of single unit.
3. Variation – Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, Max. 1/2 in.
4. Variation – Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, max. -1/4 in. and +1/2 in.
5. Variation – Mortar Joint Thickness:
 - a. Bed joint thickness indicated max. +/- 1/8 in., with max. thickness limited to 1/2 in.
 - b. Do not exceed head joint thickness indicated by more than +/- 1/8 in.

3.03 REPAIRING, POINTING, AND CLEANING

A. Damaged or Defective Masonry:

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

B. Pointing:

1. During tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar.
2. Point up all joints including corners, opening, and adjacent work to provide neat, uniform appearance, prepared for application of sealants.

C. Final Cleaning:

1. General:

- a. After mortar is thoroughly set and cured, clean masonry.
- b. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
- c. Test cleaning methods on sample wall panel; leave 1/2 panel unclean for comparison purposes.
- d. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
- e. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

2. Detergent Cleaning:

- a. Saturate wall surface with water before application of cleaners.
- b. Remove cleaners promptly by rinsing thoroughly with clear water.
- c. Use bucket and brush hand cleaning method described in BIA Technical Note No. 20, revised to clean brick masonry made from clay or shale, except use masonry cleaner indicated.

- D. During warranty period (one year after Substantial Completion), return to remove any discolorations or staining appearing on masonry work using materials and methods suited to type of discoloration or staining and in compliance with industry standards and instructions provided with materials to be used.

END OF SECTION 04200