

SECTION 04200**UNIT MASONRY****04200.01 GENERAL****A. Description**

Unit masonry shall include, but not necessarily be limited to, furnishing and installing brick and concrete unit masonry above and below grade to the sizes and shapes and at the locations indicated in accordance with the Contract Documents or as directed by the Engineer.

B. Related Work Included Elsewhere

1. General excavation; Section 02220.
2. Excavation support; Section 02400.
3. Dewatering; Section 02512.

C. Quality Assurance

1. The Engineer will inspect all materials before and/or after installation to ensure compliance with the Contract Documents.
2. When indicated, the Contractor shall construct sample masonry panels of exposed brick masonry and exposed concrete masonry. Panels shall be not less than 4 feet by 4 feet by 8 inches thick and incorporate reinforcing, face units, and backup units as indicated. Panels shall show the proposed color range, texture, bond, mortar joint, and workmanship of masonry materials. Provide separate panels for facing brick and glazed masonry units as composite wall, and glazed concrete block masonry unit partitions. Do not proceed with masonry wall work until the Engineer has approved the sample panel for the work involved. The approved panels shall become the standard of comparison for all masonry work built of the materials that the approved panels include. Do not alter, move, or destroy the panels until all masonry work is complete.
3. Brick shall have a fine-grained, uniform, and dense structure, free from lumps of lime, laminations, cracks, checks, soluble salts, or other defects which may in any way impair its strength, durability, appearance, or usefulness for the purpose intended. Bricks shall emit a clear, metallic ring when struck with a hammer. No salmon brick will be accepted.
4. Concrete block units shall be free from dust or other injurious matter, and shall be thoroughly seasoned, whole, sound, and free from cracks or other defects that

interfere with the proper placing or impair the strength or permanence of the construction.

5. Glazed concrete masonry unit surfaces shall be free from chips, cracks, pinholes, and other imperfections detracting from the appearance of the finished wall when viewed at 5 feet, at right angles to the wall.
6. Tolerances

Faces of walls, and inside and outside corners, shall be plumb, and courses shall be within the following tolerances:

- a. Variation from plumb of lines and surfaces of columns, walls, and arrisers shall not exceed 1/4 inch in 10 feet; 3/8 inch in 20 feet; 1/2 inch in 40 feet, and 1/2 inch total.
- b. Variation from plumb of external corners, expansion joints, and other conspicuous vertical lines shall not exceed 1/4 inch in 20 feet; 1/2 inch in 40 feet, and 1/2 inch total.
- c. Variation from level of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous vertical lines shall not exceed 1/2 inch in 20 feet; 3/4 inch in 40 feet, and 3/4 inch total.
- d. Variation of linear building lines from established position in plan and related portion in columns, walls, and partitions shall not exceed 1/2 inch in 20 feet; 3/4 inch in 40 feet, and 3/4 inch total.
- e. Variations of cross sectional dimensions of columns and in the thicknesses of walls shall not exceed minus 1/4 inch, plus 1/2 inch.

D. Submittals

1. Samples
 - a. Submit four samples of each type of brick furnished
 - b. Submit four samples of each type of concrete block furnished.
2. Certificates of Compliance

Certificates of compliance shall be submitted as specified in the "General Provisions" for all brick and concrete block furnished stating that the material meets the requirements specified in Section 04200.02.

04200.02 MATERIALS**A. Materials Furnished by the County**

The County will not furnish any materials for unit masonry.

B. Contractor's Options

The Contractor may furnish load-bearing concrete masonry units in lieu of non-load-bearing units.

C. Detailed Material Requirements

1. Building brick shall meet the requirements of AASHTO M 114, Grade SW.
2. Facing brick shall meet the requirements of ASTM C 216, Grade SW, Type FBS. Exposed face shall contain no visible cracks.
3. Sewer brick shall meet the requirements of AASHTO M 91, Grade SS.
4. Manhole brick shall meet the requirements of AASHTO M 91, Grade SS.
 - a. The Department of Public Works will accept Grade SS or Grade SM brick for manhole channels and benches.
5. Hollow load-bearing concrete masonry units shall meet the requirements of ASTM C 90, Grade N, Type I for exterior and foundation walls, and Grade N, Type I or II, or Grade S, Type I or II for other load-bearing walls and partitions.
6. Hollow non-load-bearing concrete masonry units shall meet the requirements of ASTM C 129, Type I or II.
7. Solid load-bearing concrete masonry units shall meet the requirements of ASTM C 145, Grade S, Types I or II, except units exposed to weather shall be Grade N, Types I or II.
8. Special shapes, such as closures, header units and jamb units, shall be provided as necessary to complete the work and shall conform to the applicable portions of the Specifications for the units with which they are used.
9.
 - a. Glazed concrete masonry units shall be lightweight concrete block, with finished and exposed surfaces covered at point of manufacture with a compound containing at least 75% graded silica sand, cast onto base block by an external heat-polymerizing process. Block shall conform to requirements of ASTM C 90 and C 129 for load-bearing and non-load-bearing units.
 - b. Facing material shall conform to requirements of ASTM C 129 Grade C with respect to imperviousness, resistance to fading (chemical resistance), opacity,

and tolerances on dimensions, and when tested in accordance with ASTM E 84, shall have a flame spread index and other fire characteristics per local requirements. Units tested for shrinkage in accordance with ASTM C 426 shall be free from crazing.

- c. The facing shall return over ends and edges of the block, forming a lip at least 1/16 inches thick, resulting in a 1/4 inch exposed mortar joint. When tested for abrasion, the facing shall have a wear factor not in excess of 130 in accordance with FSS 141A/0192, using a standard Taber Abraser Model with CS 17 calibration wheel and a 1,000 gram weight of 500 wear cycles.
10. Sound absorbing structural masonry units shall conform to requirements of ASTM C 90 and C 129 for load-bearing and non-load-bearing units. Slots and edges shall be straight and clean. Specially fabricated filler elements of incombustible fibrous material shall be factory installed. Where indicated, fillers shall have metal septa laminated to one side of the fibrous material and installed with the septa facing away from the slots. Where indicated, install metal septa without fibrous material. Sound absorption qualities shall meet the criteria specified in the "Special Provisions" with Noise Reduction coefficient determined in accordance with ASTM C 423.
 11. Solid concrete masonry units shall meet the requirements of ASTM C 139.
 12. Mortar shall be as specified in Section 04100.02.
 13. Masonry accessories shall be as specified in Section 04150.02.
 14. Liquid curing compound shall meet the requirements specified in Section 03300.02.
 15. Reinforced precast concrete lintels, unless otherwise indicated, shall be 8 inches high and the thickness of the wall, reinforced with two no. 5 reinforcing bars, top and bottom unless indicated otherwise. Provide a minimum of 8 inches of bearing at each end.

04200.03 EXECUTION

A. Environmental Requirements

1. General
 - a. Cover completed work each day to prevent rain or melting snow from penetrating the mortar of upper courses. Do not uncover until immediately before new work is to be laid. Protect new masonry for a period of not less than 72 hours immediately following laying. This time period may be extended by the Engineer.

- b. Spray masonry laid during the period from April to November, inclusive, with sufficient water so as to be moist, but not saturated with water just prior to use.
 2. Cold Weather Protection
 - a. No brick masonry work or pointing shall be done when there is frost in the brick or when the air temperature is below 50°F unless the Contractor has on the project ready to use, if and when directed, suitable housing, covering, tarpaulins, etc. and the artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 50°F for the curing period.
 - b. Protect work by heating and maintaining the temperature of the masonry materials at not less than 50°F but not more than 160°F and maintaining an air temperature above 50°F on both sides of the masonry for not less than 72 hours. Work will not be permitted with or on frozen materials. Masonry work may be started at 34°F on a rising thermometer, with the approval of the Engineer. When the temperature reaches or is above 50°F proceed as under warm weather conditions.
 3. Hot Weather
 - a. During hot weather, protect masonry from direct rays of sun. Cover, and/or wet all finished work for a period of 7 days after laying.
 - b. Do not erect masonry when the ambient air is warmer than 99°F in the shade and has a relative humidity of less than 40% unless the work is prevented from drying out for not less than 48 hours after having been installed.

B. General

1. Make comparable cavity and composite walls' horizontal joints, which are to contain wall ties and joint reinforcement, level with each other.
2. Install products indicated to be built into the wall as the masonry work progresses. Fill spaces around built-in products with mortar, and allow space for caulking.
3. Keep joint equal to the difference between the actual and nominal dimensions of the unit being installed.
4. Tothing of new work into existing work will not be permitted.
5. Keep chases free from debris and mortar.
6. Construct masonry work to conform to the approved sample panels.

C. Preparation

1. Clean dirt, debris, oil, grease, and other foreign substances which would affect bond of mortar, from all surfaces to receive mortar.
2. Lay out walls to establish accurate spacing of bond pattern, to ensure uniform joint widths, and to locate openings, movement-type joints, returns, and offsets. Arrange units in a manner which will result in few or no units to be cut.
3. In constructing manholes, accurate templates, set at a height to which the manhole is to reach, may be required. From such templates not less than four lines shall be drawn, to serve as guides for the brickwork.
4. Wetting Bricks
 - a. Wet brick having absorption rates in excess of 0.025 ounce per square inch per minute, when tested in accordance with ASTM C 67, so that the rate of absorption does not exceed that the rate when the brick is installed.
 - b. Wetting methods shall ensure that each brick, immediately before being installed, is nearly saturated but brick surfaces are dry.

D. Erection

1. Workmanship
 - a. Lay masonry plumb, true to line, with level and accurately spaced courses with reveals and corners plumb and true, and each course breaking joint with the course below. The height of all courses shall be determined by the use of a story rod. Joints shall be 3/8 inch unless otherwise indicated.
 - b. Build chases and openings for pipes and castings and build in pipes and castings as indicated in the Contract Documents or as directed. Provide waterproof joint.
 - c. Cut masonry around frames in the best possible manner, and fill spaces between masonry and frames solid with mortar. Do not break concrete block wall units with hammers or other tools. Cut, where required, with an electrically operated carborundum saw.
 - d. Build in wood blocking, adjustable wall furring anchors, strips, grounds, wedges, pipe sleeves, frames, and similar items of material necessary to properly secure the work for other trades.
 - e. Remove mortar which has splashed or been smeared on finished surfaces with stiff bristle brushes as the work progresses. Provide jamb units of shapes and sizes required to blend with wall units.

2. Lintels

- a. Provide lintels of reinforced precast concrete or of concrete masonry units filled with concrete for all opening heads in masonry walls. Provide steel angles to support exterior brick where required.
- b. Exposed work shall be of the same material and texture as the adjoining masonry units. Build lintels on the ground and allow to set at least 6 days before being removed.
- c. Bond beams and lintels formed of concrete masonry units shall have the cells filled solidly with grout and concrete. Provide not less than two No. 5 reinforcing bars, unless indicated otherwise. Lap reinforcing a minimum of 24 bar diameters at splices. Break bond beams and reinforcing at control joints.

3. Reinforcing

Provide welded wire tie reinforcement where indicated in every other course and in the two courses above and below openings in walls of concrete masonry units. Reinforcement shall be continuous, except that it shall terminate on each side of control joints. Extend reinforcement above and below openings not less than 24 inches beyond each side of openings. Provide reinforcement in the longest available lengths, utilizing the minimum number of splices. Overlap splices not less than 12 inches. Provide special form pieces with the same size members at the corners and intersections of walls. Tie intersections of non-load bearing partitions with corrugated metal anchors at maximum intervals of 2 feet, or bond alternate courses. Embed reinforcement in the mortar joints so that all parts will be protected by mortar.

4. Parging

Parge exterior masonry in contact with the earth with two coats of Portland cement mortar, each 3/8 inch thick. The first coat shall be cross-scratched; the second coat shall be troweled smooth, beveled at the top, and coved out at the edge of the footing. Extend parging not more than 4 inches above grade, unless indicated otherwise, and keep damp for at least 3 days.

5. Flashing

Provide through-wall flashing as indicated. Unless indicated otherwise, extend flashing from a point 1/2 inch from exterior face of walls, upward across wall cavity into mortar of bed joint for backing wythe. Terminate 3/4 inch back from interior face of walls and turn back on itself not less than 1/2 inch. Firmly secure flashing to provide a watertight joint as indicated. Provide flashing in lengths as long as practicable. Lap-ends not less than 1-1/2 inches for interlocking type ends and 4 inches for other types which require cementing to provide watertight construction.

6. Voids Filled With Grout

Perform grouting from the interior side of walls, except as approved otherwise. Protect sills, ledges, offsets, and other surfaces from grout droppings; grout falling on such surfaces shall be removed immediately. Stir grout well before placing to avoid segregation of the aggregate. Assure that grout is sufficiently fluid to flow into joints and around reinforcing without leaving voids. Place grout by pumping or pouring from buckets equipped with spouts, in lifts not exceeding 4 feet. Keep pours 1 1/2 inches below the top of masonry units in top courses, except at the finish course. "Float" bricks into grout to a position within not less than 1/2 inch nor more than 2 inches of grout surrounding bricks. Puddle or agitate grout thoroughly to eliminate voids without displacing masonry from its original position. Remove masonry displaced by grouting operation and relay in proper location with fresh mortar.

7. Brick

a. Lay brickwork in common bond. Fill all joints between bricks completely with mortar. Form bed joints with a thick layer of mortar, which shall be smoothed. Form head joints by applying to the brick to be laid, a full coat of mortar on the entire end, or on the entire side, as the case requires, and then shoving the mortar-covered end or side of the brick tightly against the brick laid previously. The practice of buttering at the corners of brick and then throwing mortar or scrappings into the empty joints will not be permitted. Lay closure brick with a bed joint and with head joints. Place the brick carefully without disturbing the brick previously laid. Properly bond each course of load-bearing masonry wall and exterior wall at corners and intersections. Dry or butt joints will not be permitted. Provide grouting where indicated.

b. Brick-faced walls shall consist of backing of concrete masonry units, faced with brick. Bond the facing and the backing in every seventh course with brick headers overlapping or extending not less than 4 inches into a recessed portion of backing unit.

Use bats only for closures. At the Contractor's option, anchor the facing and backing with metal ties at the rate of one tie to each 4 1/2 square feet of wall surface, staggered in alternate courses, and spaced vertically not over 18 inches and horizontally not over 36 inches. Provide additional bonding ties spaced not more than 3 feet apart around the perimeter and within 12 inches of the opening at all openings.

c. Fill collar joints in solid brick or brick-faced walls by parging the back of the facing or the outside face of the backing with a uniform trowel coat of mortar, not less than 3/8 inch thick. Apply parging so that the alignment and the bond of the masonry units will not be disturbed. Filling collar joints by slushing will not be permitted.

- d. Construct brick sills as follows: Lay brick on edge, sloped and projected not less than 1/2 inch beyond the face of the wall to form a wash and drip. Fill all joints solidly with mortar and tool.
8. Concrete Masonry Unit Work
 - a. Lay the first course of concrete masonry units in a full bed of mortar for the full width of the unit. Lay succeeding courses with broken joints. Form bed-joints by applying the mortar to the entire top surfaces of the inner and outer face shells. Form head joints by applying the mortar for a width of about 1 inch to the ends of the adjoining units laid previously. The mortar for joints shall be smooth, not furrowed, and shall be of such thickness that it will be forced out of the joints as the units are being placed in position. Where anchors, bolts, and ties occur within the cells of the units, fill such cells with mortar or grout as the work progresses. Use concrete brick for bonding walls, working out the coursing, topping out walls under sloping slabs, distributing concentrated loads, backing brick headers, and elsewhere as required.
 - b. Provide control joints where indicated of the sawed type, or built-in type, as the case requires. Fill joints with a properly formed synthetic rubber or vinyl plastic sealing strip as indicated.
 - c. Lay sound absorbing structural masonry units with the open ends of the cavities facing downward in a full bed of mortar. Expose the slots to the area where sound absorption is required. Keep slots free of mortar and debris above the mortar joints.
 9. Masonry Work for Utility Structures
 - a. Use sewer brick whenever brick construction is exposed to flow; otherwise, use manhole brick or solid concrete block. Lay sewer brick on edge so that the 2 1/4 by 8 inch side is exposed to the flow.

Lay manhole brick so that every sixth course is a header course.

Lay concrete block as specified in Paragraph 8 above.
 - b. Where practicable, lay each course with a line. For courses curved or in non-parallel planes, use bonded and keyed brick construction. Do not exceed a joint thickness of 3/8 inch in straight courses in parallel planes; for courses curved or in non-parallel planes, make the thickest part of the joint as thin as practicable.

Rack or tooth uncompleted brick and block construction and parge non-exposed surfaces with 1/2 inch of mortar.

- c. Wider and deeper foundations than shown on the Standard Details for manholes shall be built of concrete masonry, wherever directed. Manholes shall be built as pipe laying progresses, and the Engineer may stop work entirely on laying pipe until the manhole just passed has been completed. Joints on the inside of manholes shall be neatly struck and pointed. The use of a reasonable number of bats originating on the work will be allowed.
- d. Manhole frames, covers, and steps shall be furnished by the Contractor and set by him as work progresses. Frames shall be well bedded in mortar. Steps shall be spaced vertically and aligned as shown on the Standard Details and set to provide a minimum of a 6 inch tread.
- e. Drop connections of the various types shown in the Standard Details shall be built by the Contractor where shown on the Plans or where directed by the Engineer.

E. Finishing

Clean exposed masonry. At the completion of the masonry work, point holes in exposed masonry and cut out defective joints and tuck point solidly with mortar. Thoroughly wet exposed surfaces of exterior and interior brickwork with clear water and scrub with a solution of not more than one part of muriatic acid to nine parts of water, applied to an area not over 15 to 20 square feet at a time, using a stiff fiber brush. Immediately after cleaning, rinse each area thoroughly with clear water. Protect work which may be damaged, stained, or discolored during the cleaning process. Restore work that is damaged, stained, or discolored to its original condition, or replaced, at no cost to the County.

F. Curing

After the work has been laid up and pointed, the exposed surfaces of brick masonry shall be cured by one of the following methods:

1. The masonry shall be covered with two layers of burlap and kept wet for not less than 3 days.
2. A nonbituminous liquid curing compound (colorless) shall be applied by means of an approved hand or motor-driven spray operated at a pressure of not less than 40 psi nor more than 60 psi. The liquid compound shall be uniformly applied at a rate of 0.034 to 0.040 gallons per square yard. The material shall be applied so that the exposed surface is completely coated and sealed with one application. At points where the work shows evidence of insufficient coating, additional material shall be added as directed by the Engineer.

04200.04 METHOD OF MEASUREMENT

Unit masonry will not be measured.

04200.05 BASIS OF PAYMENT

Unit masonry will not be paid for as a separate item but is considered supplemental work required in the construction of specific structures that are paid for under various items in the Proposal Form. Payment will constitute full compensation for all labor, equipment, tools, and incidentals necessary to complete the required work.