SECTION 04200

MASONRY

PART 1 – GENERAL

1.1 Summary

A. This Section includes the following:

1. Concrete unit masonry.

2. Reinforced unit masonry.

1.2 Quality Assurance

A. Reference Standards and Specifications

1. American Concrete Institute (ACI)

ACI 315 – Details and Detailing of Concrete Reinforcement.

ACI 530.1-05 – Specification for Masonry Structures.

2. American Society for Testing and Materials (ASTM)

ASTM A153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM A185 – Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.

ASTM A496 – Steel Wire, Deformed, for Concrete Reinforcement.

ASTM A615/A615M – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

ASTM C90 – Load-Bearing Concrete Masonry Units.

ASTM C91 – Masonry Cement.

ASTM C140 – Method of Sampling and Testing Concrete Masonry Units.

ASTM C144 – Aggregate for Masonry Mortar.

ASTM C150 – Portland Cement.

ASTM C207 – Hydrated Lime for Masonry Purposes.

ASTM C270 – Mortar for Unit Masonry.

ASTM C404 – Aggregates for Masonry Grout.

ASTM C476 – Grout for Masonry.

ASTM C494 – Chemical Admixtures for Concrete.

ASTM C780 – Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

ASTM C1019 – Method of Sampling and Testing Grout.

ASTM C1093 – Practice for the Accreditation of Testing Agencies for Unit Masonry.

3. Brick Institute of America (BIA)

M1 – Specifications for Portland Cement-Lime Mortar for Brick Masonry.

Technical Note No. 1 – Cold Weather Masonry Construction – Introduction.

4. International Conference of Building Officials

U.B.C. Standard No. 21-15 – Mortar for Unit Masonry and Reinforced masonry other than Gypsum.

5. National Concrete Masonry Association (NCMA)

TEK 8-2 – Removal of Stains from Concrete Masonry Walls.

B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Engineer/Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM C1093, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Preconstruction Testing: Employ and pay a qualified independent testing agency to perform the following preconstruction testing to establish compliance of proposed materials and construction with specified requirements:

1. **Concrete Masonry Unit Test:** For each different concrete masonry unit indicated, test units for strength, absorption, and moisture content per ASTM C140.

2. **Prism Test:** For each type of wall construction indicated, test masonry prisms per ASTM E447, Method B.

3. Test mortar properties per test methods of ASTM C270.

4. Evaluate mortar composition and properties per ASTM C780.

5. Test grout compressive strength per ASTM C1019.

D. Single-Source Responsibility for Masonry Units: Obtained exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.

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

F. Mockup: Prior to installing unit masonry, construct a sample wall panel to verify selections made under sample submittals and to demonstrate aesthetic effects of materials and execution. Build mockup to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mockup on site as directed by Engineer/Architect.

2. Build mockup for the following type of masonry in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes as well as accessories. Include a sealant-filled joint at least 16 inches long in each mockup.

    a. Typical exterior CMU wall through-wall flashing installed for a 24 inch length in corner of mockup approximately 16 inches with an 8 inch length of flashing left exposed to view (omit masonry above half of flashing).

3. Clean exposed faces of mockup with masonry cleaner indicated.

4. Notify Engineer/Architect on week in advance of the date and time when mockup will be constructed.

5. Protect accepted mockup from the elements with weather-resistant membrane.

6. Retain and maintain mockup during construction in an undisturbed condition as a standard for judging the completed Work.

a. Acceptance of mockup is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints, aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Engineer/Architect in writing.

b. Acceptance of mockup does not constitute approval of deviations from the contract Documents contained in mockup unless such deviations are specifically approved by Engineer/Architect in writing.

c. When directed, demolish and remove mockup from Project site.

G. Preinstall Conference: Conduct conference at Project site to comply with requirements of Section 01320.

1.3 Submittals

A. Submit as specified in Section 01330.

B. Product data for each different masonry unit, accessory, and other manufactured product specified.

C. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit Masonry reinforcing bars. Comply with ACI 315 showing bar schedules, stirrup spacing, Diagrams of bent bars, and arrangement of masonry reinforcement.

D. Samples for initial selection of the following:

1. Unit masonry samples of split-faced CMU in full or small-scale form showing the full range of colors and textures available.

E. Material certificates for the following, signed by manufacturer and Contractor, certifying that each material complies with requirements.

1. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.

2. Each material and grade indicated for reinforcing bars.

3. Each type and size of joint reinforcement.

4. Each type and size of anchors, ties, and metal accessories.

F. 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 C270.

2. Grout mixes. Include description of type and proportions of grout ingredients.

3. Masonry units.

G. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed project names and addresses, names and addresses of architects/engineers and owners, and other information specified.

1.4 Performance Requirements

A. Provide unit masonry that develops the following installed compressive strengths (*fm)* at 28 days.

1. For Concrete Unit Masonry: As follows, based on net area:

a. fm = 1800 psi.

1.5 Delivery, Storage, and Handling

A. Deliver all materials to site in a dry condition.

B. Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminates, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 Project Conditions

A. **Protection of Masonry:** During erection, cover tops of walls, projections, and sills with waterproof, non-staining sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

2. Protect completed works from mortar drippings using non-staining coverings.

B. Do not apply loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or pilasters.

C. **Stain Prevention:** Prevent grout, mortar, and soil from staining the face of masonry to be left exposed. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and mortar droppings.

2. Protect flat areas under voids in wall from mortar droppings.

3. 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.

D. **Cold-Weather Requirements:** Do not use frozen materials or materials mixed or coated with ice or frost. Do not builds on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with the following requirements:

1. **Cold-Weather Construction:** When the ambient temperature is within the limits indicated, use the following procedures:

a. **40°F to 32°F:** Heat mixing water or sand to produce mortar temperatures 40 and 120°F.

b. **32°F to 25°F:** Heat mixing water and sand to produce mortar temperatures between 40 and 120°F. Heat grout

materials to produce grout temperatures between 40 and 120°F. Maintain mortar and grout above freezing until used in masonry.

c. **25°F to 20°F:** Heat mixing water and sand to produce mortar temperatures between 40 and 120°F. Heat grout materials to produce grout temperatures between 40 and 120°F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40°F if grouting. Use heat on both sides of walls.

d. **20°F and Below:** Heat mixing water and sand to produce mortar temperatures between 40 and 120°F. Heat grout materials to produce grout temperatures between 40 and 120°F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40°F. Provide enclosures and use heat on both sides of walls to maintain temperatures above 32°F within the enclosures.

2. **Cold-Weather Protection:** When the mean daily temperature is within the limits indicated, provide the following protection:

a. **40°F to 25°F:** Cover masonry with a weather-resistant membrane for 48 hours after construction.

b. **25°F to 20°F:** Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breakers when wind velocity exceeds 15 mi./h.

c. **20°F and Below:** Provide enclosure and heat to maintain temperatures above 32°F within the enclosure for 48 hours after construction.

3. **Cold-Weather Cleaning:** Use liquid cleaning methods only when air temperature is 40°F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

E. **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. Use waterproof, non-staining coverings. Do not apply mortar to substrates with temperatures of 100°F and above.

PART 2 – MATERIALS

2.1 Manufacturers

A. Manufacturers: Subject to compliance with requirements, provide Products by one of the following:

1. Concrete Masonry Units

a. A Block Co., Inc.

b. Manufacturers within project area.

2. Portland Cement, Mortar Cement, Masonry Cement, and Lime

a. Glen-Gery Corporation.

b. Lafarge Corporation.
c. Lehigh Portland Cement Co.

d. Riverton Corporation (The).

3. Mortar Pigments:

a. Davis Colors – True Tone Mortar Colors.

b. Lafarge Corporation – Centurion Pigments.

c. Solomon Grind-Chem Services, Inc. – SGS Mortar Colors.

4. Joint Reinforcement, Ties, and Anchors

a. Dur-O-Wal, Inc.

b. Heckman Building Products, Inc.

c. Hohmann & Barnard, Inc.

d. Masonry Reinforcing Corp. of America.

e. National Wire Products Industries.

f. Southern Construction Products.

2.2 Concrete Masonry Units

A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required.

1. Provide special shapes for lintels, corners, headers, bonding, and other special conditions.

2. Provide square-edged units for outside corners.

B. Concrete Masonry Units: ASTM C90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength indicated below:

a. 1800 psi.

b. Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

2. Weight Classification: Normal weight.

3. Cement: Low alkali content and of one brand. Units shall be rated “not effloresced.”

4. Aggregates: Do not use aggregates made from pumice, scoria, or tuff.

5. Type: Type I, moisture-controlled units.

6. Size: Manufactured to the actual dimensions listed below (within tolerances specified in the applicable referenced ASTM specification) for the corresponding nominal sized indicated on Drawings:

a. 4-inch nominal: 3-5/8-inch actual.

b. 8-inch nominal: 7-5/8-inch actual.

c. 12-inch nominal: 11-5/8-inch actual.

C. Decorative Concrete Masonry Units: ASTM C90 and as follows:

1. Unit Compressive Strength: Provide units with minimum

average net-area compressive strength indicated below:

a. 1800 psi.

b. Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

2. Weight Classification: Normal weight.

3. Type: Type I, moisture-controlled units.

4. Size: Manufactured to dimensions indicated for nondecorative units. Nominal dimensions; 8" x 16" thickness indicated on the drawings.

5. Finish: Exposed faces of the following general description matching color, pattern, and texture of Engineer/Architect's sample.

a. Normal-weight aggregate, tinted split-face finish. Two colors have been selected; reference drawings. Colors indicated on drawings are names used by A Block Co., Inc.

6. Use in the following location: Solids Process Building.

2.3 Mortar and Grout Materials

A. Portland Cement: ASTM C150, Type I or II with low alkali content, except Type III may be used for cold-weather construction.

B. Masonry Cement: ASTM C91.

1. For pigmented mortars, use premixed, colored masonry cements of formulation required to produce color to match CMU or Building Brick wall colors. Pigments shall not exceed 5% of masonry Cement by weight for mineral oxides nor 1% for carbon black.

C. Hydrated Lime: ASTM C207, Type S.

D. Aggregate for Mortar: ASTM C144; except for joints less than ¼-inch, use aggregate graded with 100% passing the No. 16 sieve.

E. Aggregate for Grout: ASTM C404.

F. Mortar Pigments: Natural and synthetic oxides and chromium oxides,

compound for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.

H. Water: Potable.

2.4 Reinforcing Steel

A. Steel Reinforcing Bars: Material and grade as follows:

1. Billet steel complying with ASTM A615 (ASTM A615M).

B. Deformed Reinforcing Wire: ASTM A496, with ASTMA153 Class B-2 zinc coating.

C. Welded-Wire Fabric: ASTM A185.

2.5 Joint Reinforcement

A. General: Provide joint reinforcement formed from the following:

1. Galvanized carbon-steel wire, coating class as follows:

a. ASTM A153, Class B-2, for exterior walls.

B. 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 units, and complying with requirements indicated below:

1. Wire Diameter for Side Rods: 0.1875 inch.

2. Wire Diameter for Cross Rods: 0.1875 inch.

C. For multi-wythe masonry, provide type as follows:

1. Ladder-eye design with perpendicular cross rods spaced not more than 16 inches o.c.

2.6 Miscellaneous Masonry Accessories

A. Weep Holes:

1. **Round Plastic Tubing:** Medium density polyethylene, 3/8-inch outside diameter by 4-inches long, to be used in the cavity wall.

B. Cavity Drainage Material: 1-inch (25-mm) thick, reticulated, nonabsorbent mesh, made from polyethylene strands and shaped to maintain drainage at weep holes without being clogged by mortar droppings.

1. **Product:** Subject to compliance with requirements, provide "Mortar Net" by AA Wire Products Co.

2.7 Embedded Flashing Materials

A. Reinforced Plasting Flashing: Composite plastic flashing as described below:

1. Polyester film bonded to fiberglass scrim reinforcement and 1.25-mil (0.03-mm) black-vinyl ethylene film, with a total thickness of 8 mils (0.2-mm).

2. **Joint Tape:** Reinforced plastic flashing manufacturer's standard polyester tape, 2 inches (50 mm) wide by 2.0 mils (0.05-mm) thick.

3. **Application:** Use where flashing is fully concealed in masonry.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Reinforced plastic flashing equal to Fiberweb International Corp.-Fiberweb 300.

2.8 Masonry Cleaners

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

B. Proprietary Acidic Cleaner: General-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry unit being cleaned.

1. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.

2. For dark-colored masonry not subject to metallic oxidation stains, use formulation consisting of a liquid blend of surface-acting acids and special inhibitors.

3. For masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic and inorganic acids and special inhibitors.

4. **Products:** Subject to compliance with requirements, provide one of the following:

   a. Diedrich Technologies, Inc. – 202 New Masonry Detergent.

   b. Diedrich Technologies, Inc. – 200 Lime Solvent.

   c. Diedrich Technologies, Inc. – 202V Vana-Stop.

   d. ProSoCo, Inc. – Sure Klean No. 600 Detergent.

   e. ProSoCo, Inc. – Sure Klean No. 101 Lime Solvent.

   f. ProSoCo, Inc. – Sure Klean Vana Trol.

2.9 Mortar and Grout Mixes

A. **General:** Do not use admixtures, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. Add cold-weather admixture (if used) at the 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, Proportion Specification, for types of mortar indicated below.

   a. Limit cementitious materials in mortar to Portland Cement and Lime.

   b. For exterior, above-grade, nonload-bearing walls and pilasters use type indicated below:

(1) **Type:** S.

2. **Pigmented Mortar:** Select and proportion pigments with other ingredients to produce color required.

C. **Grout for Unit Masonry:** Comply with ASTM C476. Use grout of consistency at time of placement that will completely fill spaces intended to receive grout.

1. Use fine grout in grout spaces less than 2 inches in horizontal dimension, unless otherwise indicated.

2. Use coarse grout in grout spaces 2 inches or more in least horizontal dimensions, unless otherwise indicated.

PART 3 – EXECUTION

3.1 Experience

A. Mason contractor must have proven experience on a similar job.

3.2 Examination

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 Installation, General

A. **Thickness:** Build cavity walls to full thickness shown.

B. 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.

C. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

3.4 Construction Tolerances

A. **Variation from Plumb:** For vertical lines and surfaces of pilasters and

walls, do not exceed ¼-inch in 10 feet. For external corners and other conspicuous lines, do not exceed ¼-inch in 10 feet. For vertical alignment of head joints, do not exceed plus or minus ¼-inch in 10 feet, nor ½-inch maximum.

B. Variation from Level: For bed joints and lines of exposed lintels, and other conspicuous lines, do not exceed ¼-inch in 20 feet, nor ½-inch in 40 feet or more.

C. Variation of Linear Building Line: For position shown in plan and related portion of walls and pilasters, do not exceed ½-inch in 20 feet, nor ¾-inch in 40 feet or more.

D. Variation in Cross-Sectional Dimensions: For pilasters and thickness of walls, from dimensions shown, do not exceed minus ¼-inh nor plus ½-inch.

E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8-inch, with a maximum thickness limited to ½-inch. Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8-inch. Do not vary from head-joint thickness from adjacent head-joint thickness by more than 1/8-inch. Do not vary from collar-joint thickness indicated by more than minus ¼-inch or plus 3/8-inch.

3.5 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. Avoid the use of less-than-half-size units at corners 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. Lay exposed masonry in the following bond pattern; do not use units with less than nominal one-half horizontal face dimensions at corners.

1. All CMU to be running bond with vertical joint in each course centered on units in courses above and below.

D. Stopping and Resuming Work: In each course, rack back ½-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.

E. Fill cores in hollow concrete masonry units with grout 24 inches under Lintels, unless otherwise indicated.

3.6 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, 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.

4. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch joints.

B. Tool exposed joints slightly concave when thumbprint hard, using a Jointer larger than joint thickness, unless otherwise indicated.

3.7 Horizontal-Joint Reinforcement

A. **General:** Provide continuous horizontal-joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8-inch on exterior side walls, ½-inch elsewhere. Lap reinforcing a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.

2. Provide continuity with horizontal-joint reinforcement at corners by using prefabricated “L” units in addition to masonry bonding.

a. Reinforcement above is in addition to continuous reinforcement.

3.8 Cavities

A. Keep cavities clean of mortar drippings and other materials during construction. Strike joints facing cavities flush.

1. Place temporary wood strips in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.

3.9 Installation of Reinforced Unit Masonry

A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.

1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. 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.

B. Grouting: Do not place grout until entire length of masonry to be grouted has attained sufficient strength to resist grout pressure.

1. Do not exceed the following pour heights for fine grout:

a. For minimum widths of grout spaces of ¾-inch or for Minimum grout space of hollow unit cells of 1-1/2 by 2 Inches, pour height of 12 inches.

b. For minimum widths of grout spaces of 2 inches or for Minimum grout space of hollow unit cells of 2 by 3 inches, Pour height of 60 inches.

c. For minimum widths of grout spaces of 2-1/2 inches or for Minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 12 feet.

d. For minimum widths of grout spaces of 3 inches or for Minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 24 feet.

2. Do not exceed the following pour heights for coarse grout:

a. 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.

b. 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.

c. 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.

d. 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.

3. Provide cleanout holes at least 3 inches in least dimensions for grout pours over 60 inches in height.

a. Provide cleanout holes at each vertical reinforcing bar.

b. At solid grouted masonry, provide cleanout holes at not more than 32 inches o.c.

3.10 Flashing and Weep Holes

A. **General:** Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer before covering with mortar.

C. Install flashing as follows:

1. As composite masonry walls, including cavity walls, extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches, and through the inner wythe to within ½-inch of the interior face of the wall in exposed masonry.

2. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn up not less than 2 inches to form a pan.

3. Cut off flashing flush with face of wall after masonry wall is completed.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and follows:

1. Form weep holes with product specified in Part 2 of this Section.

2. Form weep holes by keeping head joints free and clear of mortar.

3. Space weep holes 24 inches o.c.

3.11 Field Quality Control

A. The Owner will employ and pay a qualified independent testing agency to perform the following testing for field quality control. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

1. **Testing Frequency:** Tests and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.

2. Mortar composition and properties will be evaluated per ASTM C780.

3. Grout will be sampled and tested for compressive strength per ASTM C1019.

B. **Evaluation of Quality-Control Tests:** In the absence of other indications of noncompliance with requirements, masonry will be considered satisfactory if results from construction quality-control tests comply with minimum requirements indicated.

3.12 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; install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. **Pointing:** During the tooling of joints, enlarge voids and holes, and Completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance.

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 as follows:

1. Remove large mortar particles with wooden paddles and nonmetallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave on half of panel uncleaned for comparison purposes. Obtain Engineer/ Architect's approval of sample cleaning before proceeding with cleaning of masonry.

3. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.

E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.13 Masonry Waste Disposal

A. Undamaged, excess masonry materials are Contractor's property and shall be removed from the Project site.

B. Remove all other masonry waste and legally dispose of off Owner's property.

PART 4 – MEASUREMENT AND PAYMENT

4.1 Measurement

No measurement will be made for this item.

4.2 Payment

Payment will be made at the Contract Lump Sum Price Bid and shall be Considered full payment for providing labor and materials to perform this work.

**** END OF SECTION 4200 ****