SECTION 04000 - UNIT MASONRY

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all materials, equipment and labor required to complete the concrete masonry walls and partitions including concrete masonry units, precast concrete formed units, and miscellaneous masonry items in accordance with the Drawing and Specifications. Properly coordinate all work with that of other trades.

1.02 RELATED WORK

A. Section 03200 – Concrete Reinforcement

B. Section 03300 – Cast-In-Place Concrete

C. Section 04230 - Reinforced Unit Masonry

D. Section 07210 - Building Insulation

E. Section 09210 - Lathing, Plaster, and Stucco

F. Section 09900 - Painting

1.03 QUALITY ASSURANCE

A. Provide the services of qualified and licensed masons and brick layers with at least five years experience in installations of a similar nature.

B. Where a fire-resistance classification is required, provide concrete masonry units and mortar as tested and listed for the particular construction in accordance with ASTM E119 by a recognized testing and inspecting organization.

C. Furnish masonry units obtained from one manufacturer, cured by one process, of uniform color and texture, without spalls, chips or other deficiencies that impair strength and/or appearance, and conforming to the physical requirements of the Concrete and Products Association, CM-1 Guide Specifications for hollow regular concrete masonry units, modular dimensions.

D. Perform laying, finishing and grouting of masonry work in accordance with the requirements of the American Concrete Institute, ACI 530, Building Code Requirements for Masonry Structures, and ACI 530.1, Specifications for Masonry Structures.

E. Provide mortar materials and mortar application in compliance with the recommendations of the National Lime Association and Portland Cement Association. Conform to the following Standards:

1. BOCA Building Code, 2003 Edition.
2. American Society for Testing materials (ASTM)

   a. ASTM C144 “Standard Specification for Aggregate for Masonry Mortar”.
   b. ASTM C150 “Standard Specification for Portland Cement”.

F. Masonry Accessories: Conform to following Standards:

1. ASTM A615 “Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement”.

G. Job Mock-Up: Erect at the job site, one sample mock-up masonry wall panel 8 feet long by 6 feet high, constructed to represent finish face brick and masonry work for quality, appearance, materials and workmanship. Upon approval by the Resident, the panel shall become the standard of comparison for all masonry work built of the materials represented in the sample panel. Do not move, alter or destroy the sample panel until all masonry work is complete.

1.04 CONSTRUCTION TOLERANCES

A. Variation from Plumb:

1. For vertical lines and surfaces of columns, walls and arises, do not exceed the following:

   a. 1/4" in 10 feet.
   b. 3/8" in any story height, maximum 20 feet.
   c. 1/2" in 40 feet or more.

2. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed the following:

   a. 1/4" in any story, maximum 20 feet.
   b. 1/2" in 40 feet or more.

3. For vertical alignment of head joints, do not exceed 3/8" in 10 feet.

B. Variations from Level:

1. For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed the following:

a. 1/4" in any bay, maximum 20 feet.
b. 1/2" in 40 feet or more.

2. For top surface of bearing walls, do not exceed 1/8" between adjacent floor elements in 10 feet or 1/16" 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 the following:

1. 1/2" in any bay, maximum 20 feet.
2. 3/4" in 40 feet or more.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, do not exceed minus 1/4" or plus 1/2" from dimensions shown.

E. Variation in Mortar Joint Thickness: Do not exceed indicated bed joint thickness by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed indicated head joint thickness by more than plus or minus 1/8".

1.05 PRODUCT DELIVERY AND STORAGE

A. Deliver masonry units and mortar materials to the site undamaged, on pallets, stacked to allow air circulation and covered and protected from rain, ground water, soilage, stainage, or intermixture with earth or other materials.

B. Store mortar materials off the ground, under cover using tarpaulins, felt paper, or polyethylene sheets, and in a dry location. Remove damaged materials from the site and replace at no additional cost to the Owner.

1.06 SUBMITTALS

A. Manufacturer's Data: Submit product data, manufacturer's technical information and instructions for each manufactured product.

B. Samples: Submit the following samples:

1. Unit masonry samples for each type of exposed masonry unit required in sufficient quantity to show full range of exposed color and texture to be expected in completed work.
2. Single scored masonry unit of full size to illustrate quality, color and texture of surface finish.
3. Precast concrete formed units, approximately 6"x6"x2" thick to illustrate quality, color and texture of surface finish.
4. Anchors, Ties, Joint Reinforcement: Two of each type proposed for use.
5. Mortar: Two cured mortar samples matching Resident's color selection.

C. Certification:

1. Submit manufacturer's written certification that the concrete masonry units meet or exceed all the requirements set forth in this Section.
2. Submit the grout mix design.

D. Shop Drawings, Reinforcement: Submit shop drawings for fabrication, bending, and placement of wall reinforcement. Comply with ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.

E. Test Reports: Contractor may furnish recent (within two months) representative test reports and certificates of compliance for concrete masonry units, otherwise Testing Laboratory shall sample and test. "Q-Block" quarterly test reports are acceptable.

F. Portland Cement: Provide Mill Certificates of compliance.

G. Weighmaster Certificate: Grout batches offsite and delivered by truck mixer shall be accompanied by load tickets signed by a Bonded Weighmaster certifying the content of each load.

1.07 JOB CONDITIONS

A. Protection of Work: During erection, cover top of walls with waterproof sheeting at end of each days work. Cover partially completed structures when work is not in progress.

B. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.

C. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

D. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Immediately remove grout or mortar in contact with such masonry. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surfaces.

E. Protect sills, ledges and projections from dropping of mortar.

1.08 PRODUCT HANDLING

A. Store masonry units above ground on level platforms which allow air circulation under the stacked units.

B. Cover and protect against wetting prior to use.

C. Handle units on pallets or flat bed barrows.

D. Do not permit free discharge from conveyor units or transporting in mortar trays.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Provide concrete masonry units having nominal face dimensions of 16" long by 8" high, smooth textured, sound and free from cracks, chipped edges or other defects that would interfere with proper setting or impair strength or durability of the construction. Use units of special shapes and sizes for lintels, corners, jambs, sash, control joints, headers and other special conditions as required to complete the work shown. Where units are to be exposed on the interior of the building, use units free of surface defects that would be noticeable and objectionable at a distance of 12-feet from the finished wall.

B. Non-load Bearing Concrete Masonry Units: Provide units conforming to ASTM C 129, Type 1, normal weight, with nominal face dimensions of 8" by 16", thicknesses as shown on Drawing and with external corners bullnosed.

C. Load Bearing Concrete Masonry Units: Provide units conforming to ASTM C90, Grade N-1, of normal weight, in color “Natural Gray”.

D. Deliver units to the job site in an air-dry condition and protect them at the job from ground water and rain prior to and during construction of the walls. Provide units that are suitably aged at time of delivery to meet linear shrinkage potential requirements of ASTM C 426.

2.02 PRECAST CONCRETE FORMED UNITS

A. Design Mixes: Prepare design mixes by independent testing facility or by qualified precast manufacturing plant personnel, at precast fabricator's option, using mix proportions determined by either laboratory trial batch or field experience methods, using materials to be employed on the Project, complying with ACI 318.

B. Provide standard-weight concrete consisting of ASTM C 150, Type I or Type III "white" portland cement, ASTM C 33 hard, durable, "white" silica aggregate free of material that causes staining, admixtures, and potable water to produce the following properties:

1. Compressive Strength: 3,000 psi at 28 days.
2. Total Air Content: Not less than 4 percent nor more than 6 percent.
3. Water Absorption: Not to exceed 5 to 6 percent by weight, except between 3 to 4 percent for sloping surfaces (sills).

2.03 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type II, non-staining, without air entrainment and of natural color.

B. Sand: ASTM C144.

C. Masonry Cement: ASTM C91.

D. Premix Mortar: ASTM C87, Type M.

E. Aggregate: Provide clean, sharp, well graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings and organic matter and complying with the following:

1. For Mortar: ASTM C144.
2. For Grout: ASTM C404.

F. Water: Potable water free of deleterious materials which would impair the strength or bond.

G. Hydrated Lime: ASTM C207, Type S.

H. Waterproofing: Sec No. l, Atlas Chemical Co., Miami, FL, Master Builders Stearox or equal.

I. Mortar Mix: ASTM C270 Type S – minimum strength 2000 psi.

1. Mortar: Follow exact proportions by loose dry volumes:

a.	Portland cement	1 part
b.	Hydrated lime, add dry	1/2 part
c.	Mortar sand	3-1/2 - 4-1/2 parts to produce required consistency

J. Colored Mortar Pigments:

1. Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.
2. Products: Subject to compliance with requirements, provide one of the following:

   a. Centurion Pigments by Centurion.
   b. True Tone Mortar Colors by Davis Colors, a subsidiary of Rockwood Industries, Inc.
   c. SGS Mortar Colors by Solomon Grind-Chem Services, Inc.

3. Color: Standard Gray.

2.04 ANCHORS AND TIES

A. Zinc coated steel or copper coated steel. Provide anchors and ties as indicated on the Drawings, or as required for installation of various items. Provide anchors of the type best suited for the situation. Unless specifically noted to be otherwise, shall be hot-dip galvanized as per ASTM A153.

B. Metal Wall Ventilator: Stamped aluminum alloy, Wilko Weephole AA224 by AA Wire Products Company, or equal.

2.05 HORIZONTAL JOINT REINFORCEMENT

A. Dur-O-Wal, 9-gauge, ladder type, Hohmann & Barnard Lox-All No. 8, or equal.

1. Finish: Hot-dipped galvanized per ASTM A153.

2.06 MISCELLANEOUS

A. Reinforcing Bars: Deformed steel, ASTM A615, Grade 60.

B. Concealed Flashings: 3 oz. copper sheet laminated between 2 sheets of bituminous impregnated creped kraft paper or saturated felt, and equal to Cop-A-Bond Duplex by AFCO Products, Inc., Cop-R-Tex Duplex by York Manufacturing, Inc., or Copper Armored Sisalkraft by Fortifiber Corp.

C. Cold-Applied Asphalt Cut-Back Damproofing Material: Asphalt and solvent compound, compounded to penetrate substrate and build to firm, moisture-resistant, vapor-resistant, elastic coating. Provide heavy fibrated-type mastic compound complying with ASTM D 2822, Type I and containing nonasbestos inorganic fibrous reinforcement materials.

D. Buck Anchors: 16 gauge corrugated galvanized steel,
1-1/4 inch wide, 8 inch long leg, with 2 inch up-turned end, punched for fastenings, complete with No. 10 galvanized machine screws and metal expansion anchors for securement to concrete.

2.07 SPECIAL MASONRY UNITS

A. Splash Blocks: 12"x3"x24" with curb on three sides, equal to Type SB-710 of the Florida Concrete Products Association.

B. Thermal Insulated Concrete Block: Concrete block units insulated with expanded polystyrene inserts equal to Korfil block insulation. Insulation inserts individually molded to fit in the cell of the concrete block shall have a minimum density of 1.3 pounds per cubic foot and a maximum water vapor transmission rate of 1.4 perm-inch and shall conform to Federal Specification HH-524 B.

C. Split Faced Block: Monnan Park Block Co., Model MPB 8SF, or equal, with color tone to be selected from manufacturer's standard tones, gray color, 4"x8"x16" nominal dimensions.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. When the work of this Section is to be installed on, over adjacent to, or abutting the work of others, the subcontractor installing the work of this Section shall inspect the existing conditions, prior to commencing the work, to determine if the work meets the requirements of the work to be installed.

B. If the surface or installed work is found to be unacceptable, the condition shall be reported immediately to the General Contractor who shall then promptly coordinate the correction of the unacceptable condition. The cost of the corrective work shall be borne solely by the party who initially installed the work.

C. If the subcontractor performing the work of this Section commences the work, and no report of unsatisfactory conditions is made, the existing work shall be deemed acceptable in every regard, and the subcontractor installing the work of this Section shall be fully responsible for the work he performs.

3.02 ENVIRONMENTAL CONDITIONS

A. Do not place masonry units when air temperature is below 32 degrees F.

B. Protect masonry construction from direct exposure to wind and sun when erected in ambient air temperature of 99 degrees F in the shade, with relative humidity less than 50%.

3.03 INSTALLATION

A. Do not commence installation of the work of this Section until horizontal and vertical alignment of foundation is within 1” of plumb. Clean the top of the foundation free from dirt, debris, and laitance, and expose the aggregate prior to start of installing first course.

B. Construct all work plumb and true and built accurately to dimensions shown. Accurately fit the units to plumbing, ducts, openings, and other interfaces, neatly patching all holes. Provide and place such special units as required to form all corners, returns, offsets and maintain proper bond. Where interior concrete masonry partitions meet other interior partitions or exterior walls, provide a masonry bond or the equivalent in approved metal ties.

C. Lay only dry masonry units and keep the walls continuously clean, preventing grout and mortar stains. If grout does run over, clean immediately.

D. Do not use chipped or broken units. If such units are discovered in the finished wall, the Resident may require their immediate removal and replacement with new units at no additional cost to the DEPARTMENT.

E. Laying up:

1. Place units in mortar with full shoved bed and head joints.
2. Align vertical cells of hollow units to maintain a clear and unobstructed system of flues.
3. Hold racking to an absolute minimum.
4. For grout lifts over 4'-0" provide cleanouts at the bottom of each cell of hollow units for removing mortar droppings. Do not close the cleanouts until they have been inspected and approved by the Resident.

F. Joints: Nominal 3/8" with full mortar coverage of vertical and horizontal face shells. Vertical joints forced tight ranging from 3/8" to 9/16" for adjusting bond and minimizing cutting at openings.

1. Exposed block: All vertical and horizontal joints as well as locations of switches, outlets, and receptacles within masonry blocks shall be saw cut straight, level, and with plumb lines.
2. Tooling: Tool joints to a dense, smooth surface. Unless otherwise shown on the Drawings, provide joints of "concave" pattern throughout.

G. Tolerances:

1. Vertical: Walls, partitions, corners and jambs, plumb and straight within a tolerance of 1/8 inch in 5 feet.
2. Horizontal: Course, level within tolerance of 1/4 inch for length of building.

H. Opening for other Trades: Coordinate work of other trades and make provisions for installation of built-in work, duct-access doors, grilles and other work as specified or called for on drawings. Avoid unnecessary cutting and patching.

3.04 BOND

A. Unless otherwise shown on the Drawings, lay all masonry units, except decorative screen masonry units, in running bond by lapping units in successive courses a distance of one-half a unit. Lay all courses level with joints of uniform width and finished flush. Provide full mortar coverage of the face shells in both the horizontal and vertical joints. Point all joints solid with mortar on both sides of wall. Firmly compact joints in exposed work with a pointing tool when partially set.

3.05 MORTAR MIX

A. Proportion mortar by volume, in accordance with Florida Concrete Products Association "Mortar Requirements - Table 2" for Type M mortar, as follows:

Mortar Type		M	M
1.	Portland Cement	1	1
2.	Masonry Cement	1 (Type II)	-
3.	Hydrated Lime or Lime Putty	-	1/4
4.	Aggregate, Damp, Loose	2-1/2 min.to	3 max.combined volumes above
5.	Aver. Comp. Strength at 28 days	2500	2500

B. Use all mortar and grout within 30 minutes of initial mixing and discard any that has begun to set. Re-tempering of mortar in which setting has started will not be permitted. Mortar may be re-tempered as necessary to keep it plastic, providing it has not begun to set or older than 30 minutes.

C. Mix mortar by methods that will insure accurate proportioning of ingredients, mix materials by power-driven mixer until the entire batch is homogeneous and of proper consistency.

D. Add mixtures to mortar in compliance with manufacturer's published recommendations.

3.06 LOW LIFT GROUTING

A. Preparation:

1. Remove all debris, clean, and saturate with water.
2. Remove free water.

B. Perform grouting in strict accordance with the provisions of governing building code and as indicated herein.

C. Mixing Grout:

1. Proportions: By accurate volume measurement in mechanical mixer of one full sack capacity. Split-sack batches may be used only if approved by the Inspector and if the cement is weighed and other ingredients are proportioned in accurate measures. Grout may be furnished as ready-mix.
2. Consistency: Grout to permit pouring without segregation of ingredients about a 7" to 9" slump.

3. Do not use water having temperature above 80 degrees F.
4. Maintain temperature of grout and grouted materials above 50 degrees F.

D. Placing Grout:

1. After mortar has been firmly set, cores cleaned of mortar and debris, reinforcing is properly in place and checked, grout masonry in lifts no greater than 4-feet, using specified pea gravel grout mix.
2. Grout walls solid, with no voids.
3. Place grout pump, tremie or bucket, using hoppers to avoid spilling on exposed surfaces. Compact, using hardwood spading stick or pencil vibrators. Stop grout pours 1/2" below top of each lift. Remove and discard spilled grout from upper units before grout has hardened.

3.07 CUT UNITS

A. Cut all odd size masonry units in a finally exposed wall with suitable power driven masonry saw, free from broken or spalled corners and edges. Chipping of units will not be permitted.

3.08 JOINT REINFORCEMENT

A. Provide horizontal joint reinforcement throughout exterior masonry walls, 16 inches o.c. vertically.

3.09 REINFORCEMENT

A. Provide reinforcement as shown on Drawings, fully embedded in grout and not in mortar or mortar joints.

B. Provide required metal accessories to ensure adequate alignment of steel during grout filling operations.

3.10 FRAMES, MULLIONS AND SPACES

A. Fill solidly with grout all hollow metal frames, mullions and spaces around built-in items.

3.11 LINTELS

A. Provide masonry lintels where shown and wherever openings of more than 1 foot are shown without structural steel or other supporting lintels, provide precast or formed-in-place masonry lintels. Thoroughly cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

B. For hollow concrete masonry unit walls, use specially formed U-shaped lintel units with reinforcing bars placed as shown and filled with grout of consistency required to complete fill space between reinforcing bars and masonry unit.

C. Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

3.12 CONTROL AND EXPANSION JOINTS

A. Provide vertical expansion, control and isolation joints in masonry where shown on the Drawings or at 20 feet maximum intervals. Build in related masonry accessory items as the masonry work progresses.

B. Build in flanges of factory-fabricated expansion joint units.

C. Provide joint fillers where shown, and as specified in Section 07920. Joint width for sealants shall be 3/8" unless otherwise indicated.

3.13 FASTENINGS

A. Supply and install all items incidental to work in this Section required to be embedded in concrete in accordance with coordinated placement drawings, in sufficient time for incorporation of work.

B. Give full cooperation, make necessary provisions and furnish to the applicable Sections all necessary devices for anchoring masonry work to the work of other applicable trades, which will build in all said devices.

3.14 SPECIAL MASONRY UNITS

A. Split Faced Block: Lay up in running bond with all flutes carefully aligned. The Contractor may, at his option, lay the block in stack bond by adding horizontal joint reinforcement at each joint. Tool horizontal joints flush with the face of the grooves with projecting flutes wiped clean.

3.15 PROTECTION

A. Protect partially completed masonry against the weather, when work is not in progress, by covering the tops of walls with strong, waterproof, non-staining membrane extending at least 2 feet down both sides of walls and held securely in place.

B. Protect exposed masonry surfaces against staining. Remove misplaced mortar immediately.

3.16 REPAIR AND POINTING

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

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weepholes, and completely fill with mortar. Point-up all joints or corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of caulking or sealant compounds.

3.17 INSPECTION AND ADJUSTMENT

A. Upon completion of the work of this Section, make a thorough inspection of installed masonry and verify that units have been installed in accordance with the provisions of this Section. Make necessary adjustments.

3.18 CLEANING

A. Clean mortar drippings from exposed masonry and adjacent surfaces as soon as possible to prevent surfaces from being permanently stained. Remove drippings and smears before mortar sets or hardens. Remove mortar extruded beyond face of walls or partitions.

B. Clean exposed CMU masonry by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings. Comply with recommendations in NCMA Tek Bulletin No. 28. Use the following masonry cleaner:

1. Job-mixed detergent solution.
2. Job-mixed acidic solution.
3. Proprietary acidic cleaner applied in compliance with directions of the manufacturer.

C. Clean surfaces of masonry as required for proper application of the specified finishes.

D. Clean up such trash and debris generated by the work and leave complete work in a clean, undamaged and finished condition, ready to receive without further preparation, unless so specified in other Sections, and adjacent or abutting work to be performed by others.

END OF SECTION