SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for furnishing and installing reinforced and grouted concrete masonry units at Parking Structure mechanical and electrical rooms, elevator shafts, stairs and as required to complete program.

B. Related Sections:

1. Painting is specified in Section 09 91 00.

1.02 SUBMITTALS

A. Product Data: Manufacturer's product data for each type of masonry unit and other manufactured products, including certifications that each type complies with specified requirements.

B. Shop Drawings: For fabrication, bending, and placement of reinforcing bars.

1. Comply with ACI 315.

2. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies required for fabrication and placement.

C. Mortar and grout mix designs for County's Testing Laboratory approval at least 7-days before block placement begins.

D. Certificates: Show mortar and grout cement conforms to specified requirements.

1.03 QUALITY ASSURANCE

A. Masonry work shall conform to CBC Chapter 21.

B. Fire Performance Characteristics: Where fire-resistance ratings are required, provide materials and construction identical to those of assemblies tested in compliance with ASTM E119 by a recognized testing and inspecting organization.

C. Tolerances:

1. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises, do not exceed 1/4-inch in 10- feet, or 3/8-inch in a story height not to exceed 20-feet, nor 1/2-inch in 40-feet or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4-inch in any story or 20-feet maximum, nor 1/2-inch in 40-feet or more. For vertical alignment of head joints do not exceed plus or minus 1/4-inch in 10-feet, 1/2-inch maximum.

2. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4-inch in any bay or 20-feet maximum, nor 1/2-inch in 40-feet or more. For top surface of bearing walls, do not exceed 1/8-inch between adjacent floor elements in 10-feet or 1/16-inch within width of a single unit.

3. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2-inch in any bay or 20-feet maximum, nor 3/4-inch in 40-feet or more.

4. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4-inch nor plus 1/2-inch.

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

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Mortar and Grout:

1. Deliver and store packaged materials in manufacturer's original packaging off the ground, in a dry, enclosed space until ready for use. Do not use materials that have been exposed to moisture.

2. Stockpile and handle aggregates to prevent segregation and contamination.

3. Maintain sand for volume proportioning of mortar and grout in a damp loose condition.

1.05 JOB CONDITIONS

A. Cold Weather Requirements: Comply with CBC Section 2104.3

B. Protect surrounding work as required from damage from masonry work. Clean or otherwise correct damage to surrounding work resulting from masonry work.

C. For mortar and grout, follow requirements of ACI 530 for cold and hot weather conditions.

PART 2 - PRODUCTS

2.01 MORTAR MATERIALS

A. Portland Cement: ASTM C150, Type I or II.

B. Hydrated Lime: ASTM C207, Type S.

C. Sand: ASTM C144. For joints less than 1/4-inch, use aggregate graded with 100-percent passing a No. 16 sieve.

D. Water: Suitable for drinking, clean, and free of harmful amounts of acid, alkalis, salts, or organic materials.

E. Admixtures: When required, use only non-chloride based accelerators. Do not use antifreeze substances.

2.02 GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I or II.

B. Hydrated Lime: ASTM C207, Type S.

C. Aggregate: ASTM C404.

D. Water: Suitable for drinking, clean, and free of harmful amounts of acid, alkalis, salts, or organic materials.

E. Admixtures: When required, use only non-chloride based accelerators. Do not use antifreeze substances.

2.03 MORTAR MIXES

A. Mortar:

1. Comply with CBC Section 2103.8 and Table 2103.8(1) or 2103.8(2), Type S.

2. Mortar shall be mixed as follows, with a total mixing time not less than 10-minutes.

a. Place approximately half of required water and sand into mixer while running.

b. Add cement and remainder of sand and water into mixer in that order and mix for a period of at least 2-minutes.

c. Add lime and continue mixing as long as needed to secure a uniform mass.

3. Use and place mortar in final position within 2-1/2-hours after mixing. Mortars that have stiffened due to evaporation of water may be re-tempered with water as required to restore required consistency during this period.

2.04 GROUT MIXES

A. Grout: Comply with CBC Section 2103.12.

1. Minimum Compressive Strength: 2,000-psi.

2. Proportions: As specified in CBC Table 2103.12.

3. Materials for grout shall be measured in suitable calibrated devices. After the addition of water, all materials shall be mixed for at least 3-minutes in a drum type batch mixer. Mixing equipment and procedures shall produce grout with the uniformity required for concrete by ASTM C94.

2.05 MASONRY UNITS

A. General: Comply with referenced standards and other requirements specified for each form of concrete masonry unit required.

1. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

2. Provide square-edged units for outside corners.

3. Minimum compressive strength of all concrete block at 28-days shall be 1,500-psi.

B. Hollow Loadbearing Block: Comply with ASTM C90 and CBC Section 2103.1.

1. Weight Classification: Medium weight made with lightweight expanded clay or shale aggregate in accordance with ASTM C331. Medium weight block shall range from a minimum of 105-pounds to less than 125-pcf.

2. Grade N.

3. Size: Nominal face dimensions of 16-inches long x 8-inches high x thicknesses required.

4. Exposed Faces: Manufacturer's standard color and texture.

2.06 REINFORCEMENT

A. Reinforcing Bars: Comply with CBC Section 2103.13 and ASTM A615, Grade 60 deformed bars.

B. Reinforcing Bars to be Welded: ASTM A706.

C. Shop fabricate reinforcing bars which are shown to be bent or hooked.

2.07 MISCELLANEOUS MATERIALS

A. Control Joints: Preformed rubber in profiles required; Dur-O-Wal, Inc. "Rapid Control Joint" or approved equal.

B. Masonry Cleaner: Job-mixed detergent solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.

2.08 SOURCE QUALITY CONTROL

A. Comply with CBC Section 2105.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Thickness: Build masonry construction to the full thickness. Build single wythe walls to the thickness of the masonry units, using units of nominal thickness specified.

B. Cut masonry units with motor-driven saw producing clean sharp, unchipped edges.

1. Cut units as required to fit adjoining work neatly.

2. Use full units without cutting wherever possible.

3. Use dry cutting saws to cut concrete masonry units.

C. Do not wet concrete masonry units.

D. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths. Locate openings, movement-type joints, returns and offsets. Avoid use of less than half-size units at corners, jambs and other locations.

E. Lay walls plumb, with courses level, accurately spaced and coordinated with other work.

F. Pattern Bond: Lay exposed masonry in running bond.

G. Stopping and Resuming Work: Rake back 1/2-masonry unit length in each course; do not tooth. Clean exposed surfaces of set masonry, and remove loose masonry units and mortar prior to laying fresh masonry.

H. Built-In Work: Build-in items specified under this and other Sections as the work progresses.

1. Fill space between structural steel frames and masonry with silicone joint filler. Use mortar for other frames.

I. Placing Reinforcement:

1. Clean reinforcing of loose rust, mill scale, earth, and other materials which will reduce bond to mortar or grout.

2. Do not use reinforcement with kinks or bends not required, or bars with reduced cross-section due to excessive rusting or other causes.

3. Position reinforcing accurately.

a. Support and secure vertical bars against displacement.

b. Horizontal reinforcing may be placed as the masonry work progresses.

c. Where vertical bars are in close proximity, provide a clear distance between bars of not less than the greater of the nominal bar diameter or 1-inch.

d. For columns, piers and pilasters, provide a clear distance between vertical bars of not less than 1-1/2-times the nominal bar diameter or 1-1/2-inches, whichever is greater. Provide lateral ties as required.

4. Splice reinforcing only where required.

a. Provide lapped splices.

b. In splicing vertical bars or attaching to dowels, lap ends and wire tie.

5. Weld splices shall comply with the requirements of AWS D1.4 for welding materials and procedures.

J. Temporary Formwork: Provide formwork and shores as required for temporary support. Design, erect, support, brace and maintain as required.

1. Construct formwork to conform to shape, line and dimensions required.

2. Make sufficiently tight to prevent leakage of mortar, grout, or concrete.

3. Brace, tie and support as required to maintain shape during construction and curing.

4. Do not remove forms and shores until member has hardened sufficiently to carry its own weight and other temporary construction loads.

3.02 MORTAR BEDDING AND JOINTING

A. Joints: Lay walls with 3/8-inch joints, except for minor variations required to maintain bond alignment.

1. Cut joints flush for masonry walls concealed or to be covered by other materials.

2. Tool exposed joints slightly concave using a jointer larger than joint thickness.

3. Rake out mortar in joints to receive caulking or sealants.

B. Remove masonry units disturbed after laying; clean and relay in fresh mortar.

1. Do not pound corners at jambs to fit stretcher units which have been set in position.

2. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

3.03 CONTROL AND EXPANSION JOINTS

A. Provide vertical expansion, control and isolation joints in masonry.

B. Place neoprene rubber control joint material in the joints. Do not fill joints with mortar.

3.04 LINTELS

A. Provide masonry lintels at openings of more than 12-inches without structural steel or other supporting lintels.

1. Use specially formed "U"-shaped lintel units with reinforcing bars placed and filled with grout of consistency required to fill space between reinforcing bars and masonry unit.

2. Provide 8-inch minimum bearing at each jamb.

3.05 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

A. General: Comply with CBC Section 2104.

1. All head and bed joints shall be filled solid with mortar for a distance in from the face of the unit not less than the thickness of the shell.

2. Head joints of open-end units with beveled ends that are to be fully grouted need not be mortared. The beveled ends shall form a grout key which permits grout within 5/8-inch of the face of the unit. The units shall be tightly butted to prevent leakage of grout.

B. Walls:

1. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted.

a. Keep cavities free of mortar.

b. Solidly bed webs in mortar where adjacent to reinforced cores or cells.

2. Bond Beams: Use special units or modify regular units to allow for placement of continuous horizontal reinforcing.

C. Columns, Piers and Pilasters:

1. Use concrete masonry units of the size, shape and number of vertical core spaces to provide minimum clearances and grout coverage for number and size of vertical bars used.

2. Pattern Bond: Alternate head joints in vertical alignment.

3. Where bonded pilaster construction is used, lay wall and pilaster units together to maximum pour height specified.

3.06 GROUTING

A. General Requirements: Comply with CBC Section 2104.1.2.7.

1. Place grout in final position within 1/2-hours after introduction of mixing water.

2. Consolidate grout by mechanical vibration during placement before loss of plasticity in a manner to fill the grout space. Grout pours greater than 12-inches in height shall be reconsolidated by mechanical vibration to minimize voids due to water loss. Grout not mechanically vibrated shall be puddled.

3. Do not insert vibrators in lower pours that are in a semi-solidified state.

B. The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.

C. Between grout pours, a horizontal construction joint shall be formed by stopping all wythes at the same elevation and with the grout stopping a minimum of 1-1/2-inches below a mortar joint. Where a bond beam occurs, stop grout pour a minimum of 1/2-inch below the top of the masonry.

D. Provide cleanouts for all grout pours over 5-feet in height.

E. Where required, provide cleanouts in the bottom course at every vertical bar, but not spaced more than 32-inches on center. Seal cleanouts after inspection and before grouting.

F. Where cleanouts are not provided, keep the bottom and sides of grout spaces.

G. Units may be laid to the full height of the grout pour and grout shall be placed in a continuous pour in lifts not exceeding 6-feet.

H. All cells and spaces containing reinforcing shall be grouted.

3.07 FIELD QUALITY CONTROL

A. Special Inspections: Comply with CBC Section 1704.5.

B. Compliance with requirements for specified compressive strength for masonry f'm shall be in accordance with one of the following methods:

1. Masonry Prism Testing: As specified in CBC Section 2105.3.1. Compressive strength determined in accordance with ASTM C1314 for each set of prisms shall equal or exceed f'm at 28-days. Verification by masonry prism testing shall comply with the following:

END OF SECTION