SECTION 04230 - REINFORCED UNIT MASONRY

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all materials, equipment and labor required to complete the reinforced unit masonry construction in accordance with the Drawings and Specifications. Coordinate all work with that of other trades.

1.02 RELATED WORK

A. Section 04000, Unit Masonry

1.03 SUBMITTALS

A. Submit shop drawings, product data and mixes.

B. Submit complete shop drawings, including bar lists and placement drawings.

C. Submit mill test certificate for reinforcing steel.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Refer to Section 04000 for masonry materials and accessories not included in this Section.

B. Reinforcing Steel: ASTM Designation A 615, Grade 60, unless otherwise specified.

C. Construct all exterior walls of reinforced concrete masonry as follows:

1. Concrete Masonry Units: ASTM C 90, Type I, normal weight units with minimum compressive strength of 2000 psi.
2. Premix Mortar: ASTM C 387, Type M.
3. Vertical Reinforcing: Provide as shown on the Drawings.
4. Concrete Grout for Filling Cells: 3/8-inch pearock mix with minimum compressive strength of 3,000 psi.
5. Horizontal Reinforcing: 9-gauge ladder type at 16" o.c.

PART 3 EXECUTION

3.01 PLACING REINFORCEMENT

A. Clean reinforcement of loose rust, mill scale, earth or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on Drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.

B. Place reinforcement accurately at the spacing shown. Support and secure vertical bars against displacement. Horizontal reinforcement may be placed as the masonry work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1-inch, whichever is greater.

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

D. Splice reinforcement bars only as shown. Do not splice at other points unless approved by the Resident. Provide lapped splices, unless otherwise shown. In splicing vertical bars or attaching to dowels, tie splices with wire.

E. Provide not less than minimum lap shown, or if not shown, as required by governing code.

F. Embed metal ties in mortar joints as work progresses, with a minimum mortar cover of 5/8-inch on exterior face of walls and 1/2-inch at other locations.

G. Anchor reinforced masonry work to supporting structure as indicated.

3.02 INSTALLATION, GENERAL

A. Perform general installation of unit masonry in accordance with the requirements specified in Section 04000.

B. Provide formwork and shores as required for temporary support of reinforced masonry elements. Design, erection, support, bracing and maintenance of formwork is the Contractor's responsibility.

C. Construct formwork to conform to shape, line and dimensions shown and sufficiently tight to prevent leakage of mortar grout, or concrete (if any).

D. Do not remove forms and shores until reinforced masonry member has hardened sufficiently to carry its own weight and all other reasonable temporary loads that may be placed on it during construction. Do not remove forms and shoring supporting the weight

of concrete in beams, slabs and other members until concrete has attained its specified 28 day compressive strength.

3.03 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

A. General:

1. Do not wet concrete masonry units (CMU).
2. Place CMU with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs of starting courses in mortar. Maintain head and bed joint widths as shown, or if not shown, provide 3/8-inch joints.
3. Where solid CMU units are shown, lay units with full mortar head and bed joints.

B. Walls:

1. Pattern Bond: Lay CMU wall units in running bond with vertical joints in each course centered on units in courses above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections and use special-shaped units where shown, and as required for corners, jambs, sash, control joints, lintels, bond beams and other special conditions.
2. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimensions indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.
3. Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms.
4. Option: Where all vertical cores are not shown to be grouted, Contractor may elect to fill all vertical cores with grout, in which case, requirements for mortar bedding of cross-webs and closing of core spaces below bond beams will not apply.

C. Columns, Piers and Pilasters:

1. Use CMU of the size, shape and number of vertical core spaces shown. If not shown, provide units which provide minimum clearances and grout coverage for number and size of vertical reinforcement bars shown.
2. Provide pattern bond as shown, or if not shown, provide alternate head joints in vertical alignment.
3. Where bonded pilaster construction is shown, construct wall and pilaster units together to the maximum pour height specified.

D. Grouting:

1. Use fine grout for filling spaces less than 4-inches in both horizontal directions.
2. Use course grout for filling 4-inch spaces or larger in both horizontal directions.
3. Grouting Technique: At the Contractor's option, use either low-lift or high-lift grouting techniques subject to the requirements which follow.

E. Low-Lift Grouting:

1. Provide a minimum clear dimension of 2-inches and clear area of 8 sq. in. in vertical cores to be grouted.
2. Provide cleanout holes in first course at all vertical cells which are to be filled with grout. Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell.
3. Place vertical reinforcement prior to laying of CMU. Extend vertical reinforcement above elevation of maximum pour height as required to allow for splicing and support it in position at vertical intervals not exceeding 192 bar diameters nor 10 feet.
4. Lay CMU to maximum pour height. Limit pour height to 5 feet. If bond beam occurs below the 5 feet height stop pour at course below bond beam.
5. Pour grout using container with spout or by chute and rod or vibrate during placing. Place grout continuously. Do not interrupt pouring of grout for more than one hour. Terminate grout pours 1-1/2 inches below top course of pour.
6. Bond Beams: Terminate grout in vertical cells 1-1/2 inches below bond beam course. Place horizontal reinforcement in bond beams with corners and intersections lapped as shown. Place grout in bond beam course before filling vertical cores above bond beam.

F. High-Lift Grouting:

1. Do not use high-lift grouting technique for grouting of CMU unless minimum cavity dimension and area is 3 inches and 10 sq. in., respectively.
2. Provide cleanout holes in first course at all vertical cells which are to be filled with grout. Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell.
3. Construct masonry to full height of maximum grout pour specified, prior to placing grout.
4. Limit grout lifts to a maximum height of 5 feet and grout pour to a maximum height of 24 feet, for single wythe hollow concrete masonry walls, unless otherwise indicated.
5. Place vertical reinforcement before grouting. Tie vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 192 bar diameters nor 10 feet.

6. Where reinforcement is prefabricated into cage units before placing, fabricate the units with vertical reinforcement bars and lateral ties of the size and spacing shown.
7. Place horizontal beam reinforcement as the masonry units are laid.
8. Embed lateral tie reinforcement in mortar joints where shown as masonry units are laid.
9. Where lateral ties are shown in contact with vertical reinforcement bars, embed additional lateral tie reinforcement in mortar joints. Place as shown, or if not shown, provide as required to prevent grout blowout or rupture of CMU face shells, but provide not less than No. 2 bars or 8-gage wire ties spaced 16 inches o.c. for members with 20 inches or less side dimensions, and 8 inches o.c. for members with side dimensions exceeding 20 inches.
10. Preparation of Grout Spaces: Prior to grouting, inspect and clean out the grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.
11. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.
12. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Resident.
13. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 5 feet. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Rod or vibrate each grout lift during pouring operation.
14. Place grout in lintels or beams over openings in one continuous pour.
15. Where bond beam occurs more than one course below top of pour, fill bond beam course to within 1-inch of vertically reinforced cavities, during construction of masonry.
16. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 1-1/2 inches of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence if more pours are required.

END OF SECTION