

## SECTION 042200

### CONCRETE UNIT MASONRY

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
1. Pre-Insulated concrete masonry units.
    - a. Hi-R partailly grouted insulated CMU wall system by Concrete Products Group
    - b. Hi-R-H fully grouted insulated CMU wall system by Concrete Products Group
  2. Mortar, grout, reinforcing, and masonry accessories.

##### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. USGBC LEED v4 Submittals:
1. Building Product Disclosure and Optimization, Environmental Product Declarations (EPD):
    - a. Option 1: For each individual mix design, submit product specific Type III EPD.
  2. Building Product Disclosure and Optimization, Sourcing of Raw Materials:
    - a. General: For credit achievement calculation, submit location of products sourced (extracted, manufactured, and purchased), indicating number of miles from the project site.
    - b. Option 2, Leadership Extraction Practices:
      - 1) Recycled Content: Submit percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
  3. Building Product Disclosure and Optimization, Material Ingredients:
    - a. Option 1, Material Ingredient Reporting: For standard structural concrete masonry units and architectural units, submit Health Product Declarations (HPD).
- C. USGBC LEED v2009 Submittals:
1. Recycled Content, Product Certificates for Credit MR 4: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
  2. Regional Materials, Product Certificates for Credit MR 5: For materials which may contribute to this credit, Indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- D. Samples for Verification: Submit the following:
1. Four representative samples of the masonry units showing the range of color, texture, dimension and any scoring, similar treatment.

2. Pigmented Mortar: Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
3. Accessories embedded in masonry.

### 1.3 QUALITY ASSURANCE

- A. Source Limitations for Masonry Units: Obtain concrete masonry units through one source from a single manufacturer for each product required.
- B. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- C. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 for mockups.
  1. Build sample panels for typical exterior and interior walls in sizes approximately 72 inches long by 48 inches high by full thickness.
  2. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
  3. Clean one-half of exposed faces of panels with masonry cleaner indicated.
  4. Protect approved sample panels from the elements with weather-resistant membrane.
  5. Sample panels shall remain in place until removal is authorized by Owner or Architect.
  6. Approval of sample panels is for quality, color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; clean down; and other material and construction qualities specifically approved by Architect in writing.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver concrete masonry units to the job site on manufacturer's standard pallets. Deliver ground face, polished and weathered polished units with heat shrink plastic covering and with non-staining protection cushion between faces.
- B. Store masonry units on elevated platforms in a dry location. Do not double stack. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied daily. If units become wet, do not install until they are dry.

### 1.5 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof 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. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.

2. Protect sills, ledges, and projections from mortar droppings.
  3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

## PART 2 - PRODUCTS

### 2.1 PRE-INSULATED CONCRETE MASONRY UNITS

- A. Concrete Products Group Hi-R Partially Grouted CMU wall system.
1. Acceptable Manufacturers:
    - A. Jandris & Sons, Inc.
    - Barnes & Cone
    - Fizzano Brothers Concrete Products, Inc.
  2. Integral Water Repellent For Exterior Units Exposed to the Weather
  3. Density as selected by architect. Type: Normal Weight, Medium Weight and Light Weight as required by mix design/color choice, or thermal performance.
  4. CBIS Hi-R<sup>®</sup> Masonry Wall System or equal. Insulated units to be reinforced and grouted, with insulation inserts to remain in place. Factory installed inserts complying with ASTM C 578; Standard Type X. Moisture Absorption: ASTM C 272 – < 1.0% by volume. Thermal Resistance (R) per inch of thickness at 75° = 5.00. Rot & Vermin Resistance: Produced from expanded polystyrene – fully resistant to rot; does not attract vermin, termites or rodents. Insulation shall contain no fluorocarbons and no formaldehyde. Shape: Two-piece interlocking insert shall overlap at both head & bed joints with edges of adjacent inserts of the same type.
  5. [Sustainable Design, Environmental Product Declaration \(EPD\)](#).
  6. [Sustainable Design, Material Ingredient Reporting: Health Product Declaration \(HPD\)](#).
- B. Concrete Products Group Hi-R-H Fully Grouted CMU wall system.
1. Acceptable Manufacturers:
    - A. Jandris & Sons, Inc.
    - Barnes & Cone
    - Fizzano Brothers Concrete Products, Inc.
  2. Integral Water Repellent For Exterior Units Exposed to the Weather
  3. Density as selected by architect. Type: Normal Weight, Medium Weight and Light Weight as required by mix design/color choice, or thermal performance.

4. CBIS Hi-R-H® Masonry Wall System or equal. Insulated units to be reinforced and fully grouted, with insulation inserts to remain in place. Factory installed inserts complying with ASTM C 578; Standard Type X. Moisture Absorption: ASTM C 272 – < 1.0% by volume. Thermal Resistance (R) per inch of thickness at 75° = 5.00. Rot & Vermin Resistance: Produced from expanded polystyrene – fully resistant to rot; does not attract vermin, termites or rodents. Insulation shall contain no fluorocarbons and no formaldehyde. Shape: Two-piece interlocking insert shall overlap at both head & bed joints with edges of adjacent inserts of the same type.
5. [Sustainable Design, Environmental Product Declaration \(EPD\)](#).
6. [Sustainable Design, Material Ingredient Reporting: Health Product Declaration \(HPD\)](#).

C. Manufacturing Requirements:

1. Hollow and Solid Load-Bearing Units: ASTM C 90.
2. Normal Weight Aggregates: ASTM C 33.
3. Light Weight Aggregates: ASTM C 331.
4. Portland Cements: ASTM C 150.

2.2 MORTAR, REINFORCING, GROUT, AND MASONRY ACCESSORIES.

A. Mortar and Grout for Concrete Masonry Unit Assemblies:

1. Mortar Mix: ASTM C 270, Type S, for reinforced masonry, masonry below grade and masonry in contact with earth.
2. Mortar Mix: ASTM C 270, Type N, for above-grade loadbearing and nonloadbearing walls and parapet walls and for interior loadbearing and nonloadbearing partitions.
3. Mortar Materials: Portland cement, ASTM C 150, Type I or II.
4. Mortar Materials: Masonry cement, ASTM C 91.
5. Mortar Materials: Ready mixed, ASTM C 207, Type S.
6. Mortar Aggregate: Natural color, ASTM C 144.
7. Mortar Aggregate: White color, ASTM C 144.
8. Mortar Aggregate: Special color, ASTM C 144.
9. Grout Aggregate: ASTM C 404.
10. Hydrated Lime: ASTM C 207, Type S.
11. Integral Water Repellent For Exterior Units Exposed to the Weather: ACM Chemistries, Rainbloc.

B. Reinforcing:

1. Horizontal Joint Reinforcing
  - a. Steel Wire: 9 gauge (.1875 inch) galvanized steel.
  - b. Type: Ladder or truss type.
2. Ties and Anchors: Galvanized steel.

C. Grout:

1. Hi-R-H units must be fully grouted.

D. Masonry Accessories:

1. Preformed control joint gaskets.

- E. Proprietary Masonry Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new concrete masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of concrete masonry units being cleaned.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
  - 2. Verify that foundations are within tolerances specified.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. For corners and ends, standard units cut as shown on drawings.
- B. Do not remove inserts.
- C. Comply with NCMA Recommended Practices for Laying Concrete Block and TEK Bulletins and with the following requirements.
- D. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- E. Build chases and recesses to accommodate items specified in this and other Sections.
- F. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- G. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges.
  - 1. Allow units to dry before laying unless wetting of units is specified. Units cut with a wet saw on site do not require additional drying.
  - 2. Install cut units with cut surfaces and, where possible, cut edges concealed. Do not use units cut to less than one-half size.
- H. Do not install concrete masonry units with more than 5 percent damage to the face.
- I. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- J. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- K. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
  - 1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

### 3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs. Prior to installation review bond pattern with Architect.
- C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar and remove loose masonry units and mortar.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
- F. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
  1. Install compressible filler in joint between top of partition and underside of structure above.
  2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.
  3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
  4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078440 – FIRE-RESISTIVE JOINT SYSTEMS.

### 3.4 MASONRY JOINT REINFORCEMENT

- A. Install Joint reinforcement in accordance with NCMA TEK 12-2, *Joint Reinforcement for Concrete Masonry*.

- B. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches. Space reinforcement not more than 16 inches o.c.
- C. At corner locations, joint reinforcement to be included every course.
- D. Interrupt joint reinforcement at control joints, unless otherwise indicated.
- E. Provide continuity at wall intersections by using prefabricated T-shaped units.
- F. Provide continuity at corners by using prefabricated L-shaped units.

### 3.5 CONTROL AND EXPANSION JOINTS

- A. Install control joints in accordance with NCMA TEK 10-2, *Control Joints for Concrete Masonry Walls*, NCMA TEK 10-3, *Control Joints For Concrete Masonry Walls - Alternative Engineered Method*, and NCMA TEK 10-4, *Crack Control For Concrete Brick and other Concrete Masonry Veneers*.
- B. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- C. Form control joints in concrete masonry using one of the following methods:
  - 1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
  - 2. Install preformed control-joint gaskets designed to fit standard sash block.
  - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
  - 4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

### 3.6 CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar and sealants are thoroughly set and cured, clean exposed masonry as follows:
  - 1. Comply with recommendations of masonry and cleaning product manufacturers.
  - 2. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 3. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 4. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  - 5. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.

6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A, *Removal of Stains form Concrete Masonry*, applicable to type of stain on exposed surfaces, and NCMA TEK 8-04: *Cleaning Concrete Masonry*.

3.7 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Masonry Waste: Remove masonry waste and legally dispose of off the Site.

END OF SECTION

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