

## SECTION 04200

## UNIT MASONRY

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

A. This Section includes the following:

1. Concrete unit masonry.
2. Clay unit masonry in the form of brick.

B. Related Sections: The following sections contain requirements that relate to this Section: Division 7 Section "Flashing and Sheet Metal" for exposed sheet metal flashing installed in masonry.

C. Products installed but not furnished under this Section include the following:

1. Steel lintels, angles and channels in unit masonry are specified in Division 5 Section "Metal Fabrications."
2. Wood nailers and blocking built into unit masonry are specified in Division 6 Section "Rough Carpentry."
3. Reglets in masonry joints for metal flashing are specified in Division 7 Section "Flashing and Sheet Metal."
4. Hollow metal frames in unit masonry openings are specified in Division 8 Section "Steel Doors and Frames."

## 1.3 SYSTEM PERFORMANCE REQUIREMENTS

Provide unit masonry that develops the following installed compressive strengths (f<sub>m</sub>):

A. For clay unit masonry: As follows: f<sub>m</sub> = 1500 psi.

B. For concrete unit masonry: As follows:

1.  $f_m = 1500$  psi.
2. As indicated.

#### 1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each different masonry unit, accessory, and other manufactured product indicated.
- C. Shop drawings for stone trim in form of cutting and setting drawings showing sizes, profiles, and locations of each stone trim unit required.
- D. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcing" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.
- E. Samples for initial selection purposes of the following: Unit masonry samples in small-scale form showing full extent of colors and textures available for each different exposed masonry unit required.
- F. Samples for verification purposes of the following:
  1. Full-size units for each different exposed masonry unit required showing full range of exposed color, texture, and dimensions to be expected in completed construction. Include size variation data verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances for brick where modular dimensioning is indicated.
  2. Aluminum weep holes/vents painted in color to match mortar color.
  3. Accessories embedded in the masonry.
- G. 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.
- H. Material test reports from a qualified independent testing laboratory employed and paid by Contractor 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 C 270.
  2. Grout mixes. Include description of type and proportions of grout ingredients.
  3. Masonry units.
- I. Cold-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.
- J. Hot-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.
- K. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, telephone numbers, names of Architects and Owners, and other information specified.
- L. Results from tests and inspections performed by the qualified independent testing laboratory will be reported promptly in writing to Contracting Officer.

## 1.5 QUALITY ASSURANCE

- A. Unit Masonry Standard: Comply with ACI 530.1/ASCE 6 "Specifications for Masonry Structures," except as otherwise indicated. Revise ACI 530.1/ASCE 6 to exclude Sections 1.4 and 1.7; Parts 2.1.2, 3.1.2, and 4.1.2; and Articles 1.5.1.2, 1.5.1.3, 2.1.1.1, 2.1.1.2, and 2.3.3.9 and to modify Article 2.1.1.4 by deleting requirement for installing vent pipes and conduits built into masonry.
- B. Inspecting Laboratory Qualifications: To qualify for employment in performing tests and inspection specified in this Section, an independent testing laboratory must demonstrate to Contracting Officer's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.

- C. Preconstruction Testing: The Contractor will employ and pay a qualified independent testing laboratory to perform the following preconstruction testing indicated as well as other inspecting and testing services required by referenced unit masonry standard or indicated herein for source and field quality control:
1. Clay unit masonry tests: For each different clay masonry unit indicated, units will be tested per ASTM C 67.
  2. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C 140.
  3. Prism Tests: For each type of wall construction indicated, masonry prisms will be tested per ASTM E 447, Method B.
  4. Mortar properties will be tested per property specification of ASTM C 270.
  5. Mortar composition and properties will be evaluated per ASTM C 780.
  6. Grout compressive strength will be tested per ASTM C 1019.
- D. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E 119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- E. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
- F. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
- G. Field-Constructed Mock-Ups: Prior to installation of unit masonry, erect sample wall panels to further verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of Work:
1. Locate mock-ups on site in locations indicated or, if not indicated, as directed by Contracting Officer.
  2. Build mock-ups for the following types of masonry in sizes of

approximately 4 feet long by 4 feet high by full thickness, including face and backup wythes as well as accessories.

- a. Each type of exposed unit masonry construction.
  - b. Typical exterior face brick wall.
  - c. Typical interior unit masonry wall.
3. Where masonry is to match existing, erect panels parallel to existing surface.
  4. Notify Contracting Officer one week in advance of the dates and times when mock-ups will be erected.
  5. Protect mock-ups from the elements with weather-resistant membrane.
  6. Retain and maintain mock-ups during construction in undisturbed condition as standard for judging completed unit masonry construction.
    - a. When directed, demolish and remove mock-ups from Project site.
    - b. Accepted mock-ups in undisturbed condition at time of Substantial Completion may become part of completed unit of Work.
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.
- C. Store cementitious materials off the ground, under cover, and in 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.

## 1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During erection, 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 one 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. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that comes in contact with such masonry.
1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread 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.
- D. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:
1. Do not lay masonry units that are wet or frozen.
  2. Remove masonry damaged by freezing conditions.
- E. Hot-Weather Construction: Comply with referenced unit masonry standard.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

### 2.2 CLAY MASONRY UNITS

- A. General: Comply with the following requirements applicable to each form of brick

required: Provide units without cores or frogs and with all exposed surfaces finished for ends of sills, caps, and similar applications that expose brick surfaces that otherwise would be concealed from view.

B. Face Brick Standard: ASTM C 216 and as follows:

1. Grade and Unit Compressive Strength: Provide units of grade and minimum average net area compressive strength indicated below:
  - a. Grade SW.
  - b. Not less than the unit compressive strengths required to produce clay masonry construction of compressive strength indicated.
2. Type FBS (for general use in exposed masonry requiring wider variations in size and color ranges than Type FBX).
3. Size: Provide bricks manufactured to the following actual dimensions within the tolerances specified in ASTM C 216: Standard Modular: 3-5/8 inches thick by 2-1/4 inches high by 7-5/8 inches long.
4. Shape units during manufacture as indicated below:
  - a. Molding.
  - b. Pressing.
  - c. Extruding.
  - d. Any method indicated above.
5. Application: Use where brick is exposed, unless otherwise indicated.
6. Wherever shown to "match existing," provide face brick of matching color, texture, and size as existing adjacent brickwork.
7. Color and Texture: Acme Blend 2 - Rough.
8. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
9. Products: Subject to compliance with requirements, provide the following: Acme Blend 2-Rough Brick selection must match existing building.

C. Building (Common) Brick: ASTM C 62, and as follows:

1. Grade and Unit Compressive Strength: Provide units of grade and minimum average net area compressive strength indicated below:

- a. Grade NW, MW, or SW.
  - b. Not less than the unit compressive strengths required to produce clay masonry construction of compressive strength indicated.
2. Size: Provide bricks manufactured to the following actual dimensions within the tolerances specified in ASTM C 216:
    - a. Match size specified for face brick.
    - b. Standard Modular: 3-5/8 inches thick by 2-1/4 inches high by 7-5/8 inches long.
  3. Application: Use where brick is indicated for concealed locations.

### 2.3 CONCRETE MASONRY UNITS

- A. General: Comply with requirements indicated below applicable to each form of concrete masonry unit required.
  1. Provide special shapes where indicated and as follows:
    - a. For lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
    - b. Square-edged units for outside corners, except where indicated as bullnose.
  2. Size: Provide concrete masonry units complying with requirements indicated below for size that are manufactured to specified face dimensions within tolerances specified in the applicable referenced ASTM specification for concrete masonry units. Concrete Masonry Units: Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on drawings.
  3. Provide Type II, non-moisture-controlled units.
  4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
- B. Hollow Load-Bearing Concrete Masonry Units: ASTM C 90, Grade N and as follows:
  1. Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated below: Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

2. Weight Classification: Lightweight.
- C. Solid Load-Bearing Concrete Masonry Units: ASTM C 145, Grade N and as follows:
1. Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated below: Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.
  2. Weight Classification: Lightweight.

## 2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce required mortar color.
- B. Masonry Cement: ASTM C 91. For colored aggregate mortars use masonry cement of natural color or white as required to produce mortar color indicated.
- C. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this article, combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.
- D. Hydrated Lime: ASTM C 207, Type S.
- E. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.
- F. Aggregate for Grout: ASTM C 404.
- G. Water: Clean and potable.
- H. Available Products: Subject to compliance with requirements.

## 2.5 REINFORCING STEEL

- A. General: Provide reinforcing steel complying with requirements of referenced unit masonry standard and this article.
- B. Steel Reinforcing Bars: Material and grade as follows:
  1. Billet steel complying with ASTM A 615.

2. Epoxy-coated billet steel complying with ASTM A 615 and ASTM A 775.
  3. Grade 60.
- C. Deformed Reinforcing Wire: ASTM A 496.
- D. Plain Welded Wire Fabric: ASTM A 185.
- E. Deformed Welded Wire Fabric: ASTM A 497.

## 2.6 JOINT REINFORCEMENT

- A. General: Provide joint reinforcement complying with requirements of referenced unit masonry standard and this article, formed from the following: Stainless steel wire, Type 304 complying with ASTM A 580, for exterior walls; and galvanized carbon steel wire, coating class as required by referenced unit masonry standard, for interior 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 and tee 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.
  3. For single-wythe masonry provide type as follows with single pair of side rods:
    - a. Ladder design with perpendicular cross rods spaced not more than 16 inches o.c.
    - b. Truss design with continuous diagonal cross rods spaced not more than 16 inches o.c.
  4. For multiwythe masonry provide type as follows:
    - a. Ladder design with perpendicular cross spaced not more than 16 inches o.c. and number of side rods as follows:
    - b. Truss design with diagonal cross rods spaced not more than 16 inches o.c. and number of side rods as follows:
    - c. Use units with adjustable 2-piece rectangular ties where horizontal joints of facing wythe do not align with those of backup where indicated.

- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering joint reinforcement that may be incorporated in the Work include, but are not limited to, the following:
- D. Manufacturers: Subject to compliance with requirements, provide joint reinforcement by one of the following:
  - 1. AA Wire Products Co.
  - 2. Dur-O-Wal, Inc.
  - 3. Heckman Building Products, Inc.
  - 4. Hohmann & Barnard, Inc.
  - 5. Masonry Reinforcing Corp. of America.
  - 6. National Wire Products Industries.
  - 7. Southern Construction Products, Inc.

## 2.7 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of referenced unit masonry standard and of this article.
- B. Galvanized Carbon Steel Wire: ASTM A 82, coating class as required by referenced unit masonry standard for application indicated.
- C. Galvanized Carbon Steel Wire: ASTM A 82, coating class as required by referenced unit masonry standard, for wire ties and anchors in interior walls, unless otherwise indicated.
- D. Stainless Steel Wire: ASTM A 580, Type 304, for wire ties and anchors in exterior walls.
- E. Stainless Steel Wire: ASTM A 580, Type 304. Wire Diameter: 0.1875 inch.
- F. Steel Plates and Bars: ASTM A 36, hot-dip galvanized to comply with ASTM A 123 or ASTM A 153, Class B3, as applicable to size and form indicated.
- G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

H. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AA Wire Products Co.
2. Dur-O-Wal, Inc.
3. Heckman Building Products, Inc.
4. Hohmann & Barnard, Inc.
5. Masonry Reinforcing Corp. of America.
6. National Wire Products Industries.
7. Southern Construction Products, Inc.

## 2.8 BENT WIRE TIES

- A. Individual units prefabricated from bent wire to comply with requirements indicated below:
- B. Tie Shape for Hollow Masonry Units Laid with Cells Vertical: Rectangular with closed ends and not less than 4 inches wide.
- C. Tie Shape for Solid Masonry Unit Construction: Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long.
- D. Type for Masonry Where Coursing Between Wythes Align: Unit ties bent from one piece of wire.
- E. Type for Masonry Where Coursing Between Wythes Does Not Align: Adjustable ties composed of two parts, one with pintles, the other with eyes, maximum misalignment 1-1/4 inches.

## 2.9 ADJUSTABLE ANCHORS FOR CONNECTING MASONRY TO STRUCTURAL FRAMEWORK

- A. General: Two-piece assemblies as described below allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall, but resisting tension and compression forces perpendicular to it.
- B. For anchorage to concrete framework, provide manufacturer's standard with

dovetail anchor section formed from sheet metal and triangular-shaped wire tie section sized to extend within 1 inch of masonry face and as follows:

- C. For anchorage to steel framework provide manufacturer's standard anchors with crimped 1/4-inch-diameter wire anchor section for welding to steel and triangular-shaped wire tie section sized to extend within 1 inch of masonry face and as follows: Wire Diameter: 0.1875 inch.

## 2.10 RIGID ANCHORS

Provide straps of form and length indicated, fabricated from metal strips of following width and thickness. 1-1/2 inches wide by 1/4 inch thick.

## 2.11 ADJUSTABLE MASONRY VENEER ANCHORS

- A. General: Provide two-piece assemblies allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall, but resisting tension and compression forces perpendicular to it; for attachment over sheathing to metal studs; and with the following structural performance characteristics:  
Structural Performance Characteristics: Capable of withstanding a 100 lbf load in either tension or compression without deforming over, or developing play in excess of, 0.05 inch.
- B. Screw-Attached Masonry Veneer Anchors: Units consisting of wire tie section and metal anchor section complying with the following requirements:
  - 1. Wire Tie Shape: Triangular.
  - 2. Wire Tie Length: As required to extend 1-1/2 inches into masonry wythe of veneer face.
  - 3. Wire Tie Length: As indicated.
  - 4. Anchor Section: Rib-stiffened sheet metal plate with screw holes top and bottom, 0.0747 inch thick (14 gage) by 2-3/4 inches wide by 3 inches high fabricated into tee shape with 2 projecting tabs, 3/4 inch wide by 1 inch long, with slotted holes for connection of vertical legs of triangular wire tie specially formed to fit anchor section.
  - 5. Anchor Section: Sheet metal plate, with screw holes top and bottom and with raised, rib-stiffened strap stamped into center to provide slot between strap and plate for connection of wire tie; of overall size indicated: Plate and strap size: 1-1/4 inches wide for plate, 5/8 inch for strap by lengths indicated below; slot clearance formed between face of plate and back of

strap at maximum rib projection: 1/32 inch plus diameter of wire tie.

- a. Plate and Strap Lengths: 6 inches and 3-5/8 inches; with both sides of plate stiffened by ribs.
  - b. Plate and Strap Lengths: 9 inches and 5-1/2 inches.
6. Anchor Section: Sheet metal plate, with screw holes top and bottom, top and bottom ends bent to form pronged legs to bridge insulation and abut studs, and raised, rib-stiffened strap stamped into center to provide slot between strap and plate for connection of wire tie; of overall size indicated: Plate and Strap Size: 1-1/4 inch wide for plate by 6 inches long, 5/8 inch wide by 6 inches long for strap; slot clearance formed between face of plate and back of strap at maximum rib projection: 1/32 inch plus diameter of wire tie.
- C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
- D. Products: Subject to compliance with requirements, provide one of the following:  
Screw-Attached Masonry Veneer Anchors:
1. "D/A 213," Dur-O-Wal, Inc.
  2. "DW-10," Hohmann & Barnard, Inc.
  3. "DW-10HS," Hohmann & Barnard, Inc.
  4. "DW-10-X," Hohmann & Barnard, Inc.

## 2.12 MISCELLANEOUS ANCHORS

- A. Unit Type Masonry Inserts in Concrete: Cast iron or malleable iron inserts of type and size indicated or required.
- B. Dovetail Slots: Furnish dovetail slots, with filler strips, of slot size indicated, fabricated from 0.0336-inch (22-gage) sheet metal.
- C. Anchor Bolts: Steel bolts complying with A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:
1. Headed bolts.
  2. Nonheaded bolts, straight.

3. Nonheaded bolts, bent in manner indicated.

## 2.13 POSTINSTALLED ANCHORS

Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing laboratory.

- A. Type: Chemical anchors.
- B. Type: Expansion anchors.
- C. Type: Undercut anchors.
- D. Corrosion Protection: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
- E. Corrosion Protection: Stainless steel components complying with ASTM F 593 and ASTM F 594, Group 1 alloy 304 or 316 for bolts and nuts; alloy 304 or 316 for anchor.
- F. For cast-in-place and postinstalled anchors in concrete: Capability to sustain, without failure, a load equal to 4 times loads imposed by masonry.
- G. For postinstalled anchors in grouted concrete masonry units: Capability to sustain, without failure, a load equal to 6 times loads imposed by masonry.

## 2.14 EMBEDDED FLASHING MATERIALS

- A. Sheet Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Flashing and Sheet Metal" and below:
  1. Stainless Steel: 0.0156 inch (28 gage) thick.
  2. Copper: 10-oz. weight (0.0135 inch thick) for fully concealed flashing, 16 oz. (0.0216 inch thick) elsewhere.
  3. Fabricate through-wall metal flashings embedded in masonry as follows:
  4. Application: Use where flashing is fully or partly concealed in masonry wall.
- B. Laminated Flashing: Manufacturer's standard laminated flashing of type indicated below:

1. Copper-Fabric Laminate: Copper sheet of weight per sq. ft. indicated below, bonded with asphalt between 2 layers of glass fiber cloth. Weight: 5 oz.
  2. Application: Use where flashing is fully concealed in masonry.
- C. Asphalt-Coated Copper Flashing: Manufacturer's standard product consisting of sheet copper of weight per sq. ft. indicated below coated with flexible asphalt.
1. Weight: 5 oz.
  2. Application: Use where flashing is fully concealed in masonry.
- D. Reinforced Plastic Flashing: Manufacturer's standard composite plastic flashing as described below:
1. Polyester film bonded to 20 by 10 fiberglass scrim reinforcement and 1.25-mil black vinyl ethylene film, with a total thickness of 8 mils.
  2. Application: Use where flashing is fully concealed in masonry.
- E. Rubberized Asphalt Sheet Flashing: Manufacturer's standard composite flashing product consisting of 32-mil-thick pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 8-mil-thick, high-density, cross-laminated polyethylene film to produce an overall thickness of 40 mils.
- F. Vinyl Sheet Flashing: Flexible sheet flashings especially formulated from virgin polyvinyl chloride with plasticizers and other modifiers to remain flexible and waterproof in concealed masonry applications, black in color and of thickness indicated below:
1. Thickness: 30 mils.
  2. Thickness: 56 mils.
  3. Application: Use where flashing is fully concealed in masonry.
- G. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 section "Flashing and Sheet Metal."
- H. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.
- I. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

- J. Products: Subject to compliance with requirements, provide one of the following:
1. Metal Flashing:
    - a. "Cheney Flashing (Sawtooth)," Cheney Flashing Company, Inc.
    - b. "Keystone Three-Way Interlocking Thruwall Flashing," Keystone Flashing Co.
  2. Copper Fabric Laminate Flashing:
    - a. "Copper Fabric," Afco Products Inc.
    - b. "Type FCC-Fabric Covered Copper," Phoenix Building Products.
    - c. "Copper Fabric Flashing," Sandell Manufacturing Co., Inc.
    - d. "York Copper Fabric Flashing," York Manufacturing, Inc.
  3. Asphalt-Coated Copper Flashing:
    - a. "Cop-A-Cote," Afco Products Inc.
    - b. "Type ACC-Asphalt Bituminous Coated," Phoenix Building Products.
    - c. "Coated Copper Flashing," Sandell Manufacturing Co., Inc.
    - d. "Copperseal," York Manufacturing, Inc.
  4. Reinforced Plastic Flashing:
    - a. "Fiberweb 300," Fiberweb International Corp.
    - b. "Fiberweb 200," Fiberweb International Corp.
  5. Rubberized Asphalt Sheet Flashing: "Perm-A-Barrier Wall Flashing," W.R. Grace & Co.
  6. Vinyl Sheet Flashing:
    - a. "Lexsuco Water Barrier," International Permalite Inc.
    - b. "Nervastral," Nervastral, Inc.

## 2.15 MISCELLANEOUS MASONRY ACCESSORIES

- A. Nonmetallic Expansion Joint Strips: Premolded filler strips complying with ASTM D 1056, Type 2 (closed cell), Class A (cellular rubber and rubber-like materials with specific resistance to petroleum base oils), Grade 1 (compression-deflection range of 2-5 psi), compressible up to 35 percent, of width and thickness indicated, formulated from the following material:

1. Neoprene.
  2. Urethane.
  3. Polyvinyl chloride.
- B. Preformed Control Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
1. Styrene-Butadiene Rubber Compound: ASTM D 2000, Designation 2AA-805.
  2. Polyvinyl Chloride: ASTM D 2287, General Purpose Grade, Type PVC-65406.
- C. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Weep Holes: Provide the following:
1. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch outside diameter by 4 inches long.
  2. Rectangular Plastic Tubing: Clear butyrate, 3/8 inch by 1-1/2 inches by 3-1/2 inches long.
  3. Wicking Material: Material as indicated below, in length required to produce 2 inches exposure on exterior and 18 inches in cavity between wythes:
    - a. Cotton sash cord.
    - b. Fibrous glass rope.
  4. Plastic Weep Hole/Vent: One-piece flexible extrusion manufactured from ultraviolet-resistant polypropylene co-polymer, designed to weep moisture in masonry cavity to exterior, sized to fill head joints with outside face held back 1/8 inch from exterior face of masonry, in color selected from manufacturer's standard.

## 2.16 INSULATION

- A. Foil-Faced Polyisocyanurate Cavity Wall Insulation: Composed of a uniform closed-cell polyiso foam core bonded on each side during its manufacture to trilaminate foil facers; in manufacturer's standard lengths and widths; thickness as

indicated. R = 7.2 per inch, minimum.

- B. Adhesive: Type recommended by insulation board manufacturer for application indicated.

## 2.17 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.
- B. Job-Mixed Muriatic Solution: Solution of 1 part muriatic acid and 10 parts clean water, mixed in a nonmetallic container with acid added to water.
- C. Proprietary Acidic Cleaner: Manufacturer's standard-strength, 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 units 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. Available Products: Subject to compliance with requirements, a product that may be used to clean unit masonry surfaces includes, but is not limited to, the following:
  - 5. Products: Subject to compliance with requirements, provide the following:
    - a. "Sure Klean No. 600 Detergent," ProSoCo, Inc.
    - b. "Sure Klean No. 101 Lime Solvent," ProSoCo., Inc.
    - c. "Sure Klean Vana Trol," ProSoCo, Inc.

## 2.18 MORTAR AND GROUT MIXES

- A. General: Do not add admixtures including coloring pigments, air-entraining agents,

accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride in mortar or grout.

- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification for job-mixed mortar and ASTM C 1142 for ready-mixed mortar, of types indicated below:
  - 1. Limit cementitious materials in mortar to portland cement-lime.
  - 2. For masonry below grade and in contact with earth, and where indicated, use type indicated below: Type S or RS.
  - 3. For reinforced masonry and where indicated, use type indicated below: Type S or RS.
  - 4. For exterior, above-grade loadbearing and nonloadbearing walls and parapet walls; for interior loadbearing walls; for interior nonloadbearing partitions, and for other applications where another type is not indicated, use type indicated below: Type N or RN.
- D. Colored Pigmented Mortar: None this job.
- E. Colored Aggregate Mortar: None this job.
- F. Grout for Unit Masonry: Comply with ASTM C 476 and referenced unit masonry standard.

## 2.19 SOURCE QUALITY CONTROL

- A. Brick Tests: For each type and grade of brick indicated, units will be tested by qualified independent testing laboratory per ASTM C 67 except 5 bricks will be selected at random for each 100,000 units or fraction thereof installed.
- B. Concrete Masonry Unit Tests: For each type, class, and grade of concrete masonry unit indicated, units will be tested by qualified independent testing laboratory for strength, absorption, and moisture content per ASTM C 140.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.
- C. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.
- B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- C. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.
- D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.
- E. 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.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of new masonry with existing masonry.

### 3.3 CONSTRUCTION TOLERANCES

Comply with construction tolerances of referenced unit masonry standard.

### 3.4 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, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

- B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs. One-half running bond with vertical joint in each course centered on units in courses above and below.
- D. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- E. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third 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.
- F. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
  - 1. Fill space between hollow metal frames and masonry solidly with mortar, in new masonry walls. At exterior frames insert extruded polystyrene board insulation around perimeter of frame in thickness indicated but not less than 3/4 inch to act as a thermal break between frame and masonry.
  - 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
  - 3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

### 3.5 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 of piers, columns, and pilasters, 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.
- B. Cut joints flush for masonry walls to be concealed or to be covered by other materials, unless otherwise indicated.

### 3.6 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

- A. Use individual metal ties installed in horizontal joints to bond wythes together.
- B. Use structural bonding system indicated on Drawings.
- C. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown. Provide continuity with horizontal joint reinforcement at corners using prefabricated "L" units, in addition to masonry bonding.
- D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows: Provide continuity with horizontal joint reinforcement using prefabricated "T" units.
- E. Nonbearing Interior Partitions: Unless otherwise indicated, build full height of story to underside of roof structure above and as follows: Install pressure-relieving joint filler in joint between top of partition and underside of structure above.

### 3.7 CAVITIES/AIR SPACES

- A. Keep cavities/air spaces clean of mortar droppings and other materials during construction. Strike joints facing cavities/air spaces flush.
- B. Tie exterior wythe to backup with individual metal ties. Stagger alternate courses.
- C. Tie exterior wythe to backup with continuous horizontal joint reinforcing.
- D. Install vents in vertical head joints at the top of each continuous cavity/air space. Space vents and close off cavities/air spaces vertically and horizontally with blocking in manner indicated.

### 3.8 CAVITY WALL AND MASONRY-CELL INSULATION

On units of plastic insulation, install small pads of adhesive spaced approximately 1'-0" o.c. both ways on inside face or attach to inside face with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown. Fill all cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

### 3.9 HORIZONTAL JOINT REINFORCEMENT

- A. General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcing a minimum of 6 inches.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, pipe enclosures, and other special conditions.

### 3.10 ANCHORING MASONRY TO STRUCTURAL MEMBERS

Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

- A. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
- B. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
- C. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

### 3.11 MOVEMENT (CONTROL AND EXPANSION) JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

- B. Form control joints in concrete masonry as follows:
1. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.
  2. Install preformed control joint gaskets designed to fit standard sash block.
  3. Install special shapes designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake joint.
- C. Form expansion joints in brick made from clay or shale as follows:
1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints, if any.
  2. Build flanges of factory-fabricated expansion joint units into masonry.
  3. Build in joint fillers where indicated.
  4. Form open joint of width indicated but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealers." Maintain joint free and clear of mortar.
- D. Build in horizontal pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting nonmetallic 50 percent compressible joint filler of width required to permit installation of sealant and backer rod specified in Division 7 Section "Joint Sealers." Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

### 3.12 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels. For hollow concrete masonry unit walls, use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout.

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

### 3.13 FLASHING/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, and where indicated.
- B. Prepare masonry surfaces so that 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/tape as recommended by flashing manufacturer before covering with mortar.
- C. Install flashings as follows:
  - 1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. 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 1/2 inches of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches, unless otherwise indicated.
  - 2. At heads and sills, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.
  - 3. Install flashing in masonry veneer walls as specified above but carry flashing up face of sheathing at least 8 inches and behind air infiltration barrier/building paper.
  - 4. Interlock end joints of ribbed sheet metal flashings by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer and seal lap with elastomeric sealant complying with requirements of Division 7 Section "Joint Sealers" for application indicated.
  - 5. Turn down sheet metal flashings at exterior face of masonry to form drip.
  - 6. Cut off flashing flush with face of wall after masonry wall construction is completed.
- D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashings and as 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.
  4. In insulated cavities/air spaces cover cavity/air space side of open weep holes with copper or plastic insect screening before placing insulation in cavity.
- E. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

### 3.14 INSTALLATION OF REINFORCED UNIT MASONRY

- A. General: Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.
- B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction. 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.
- C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
- D. 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.

### 3.15 FIELD QUALITY CONTROL

- A. 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.
1. Mortar properties will be tested per property specification of ASTM C 270.
  2. Mortar composition and properties will be evaluated per ASTM C 780.
  3. Grout compressive strength will be sampled and tested per ASTM C 1019.
- B. Prism Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM E 447, Method B, and as follows: Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

- C. Evaluation of Quality Control Tests: In 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.

### 3.16 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 and in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
  - 4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
  - 5. Clean brick by means of bucket and brush hand-cleaning method described in BIA "Technical Note No. 20 Revised" using the following masonry cleaner:
    - a. Job-mixed detergent solution.
    - b. Job-mixed acidic solution.
    - c. Proprietary acidic cleaner; apply in compliance with directions of acidic cleaner manufacturer.
  - 6. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 45 applicable to type of stain present on exposed surfaces.

- D. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION 04200

## SECTION 04500

## MASONRY RESTORATION AND CLEANING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

## 1.2 DESCRIPTION OF WORK:

- A. Extent of masonry restoration work is indicated on drawings.
- B. Masonry restoration work includes the following:
  - 1. Repairing damaged masonry.
  - 2. Cleaning exposed masonry surfaces.
- C. Masonry construction is specified in other Division-4 sections.

## 1.3 QUALITY ASSURANCE:

Restoration Specialist: Work must be performed by a firm having not less than 5 years successful experience in comparable masonry restoration projects and employing personnel skilled in the restoration processes and operations indicated.

- A. Masonry Repair: Prepare schedule for each type of masonry material required to be patched, rebuilt or replaced.
- B. Source of Materials: Obtain materials for masonry restoration from a single source for each type material required (face brick, cement, sand, etc.) to ensure match of quality, color, pattern, and texture.

## 1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements.

- B. Restoration Program: Submit written program for each phase of demolition and remodel process including protection of surrounding materials on building and site during operations. Describe in detail materials, methods and equipment to be used for each phase of restoration work. If alternative methods and materials to those indicated are proposed for any phase of restoration and/or remodel work, provide written description, including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this project.

#### 1.5 DELIVERY, STORAGE AND HANDLING:

- A. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets or in heavy cartons. Unload and handle to prevent chipping and breakage.
- B. Deliver other materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.
- C. Protect masonry restoration materials during storage and construction from wetting by rain, snow or ground water, and from staining or intermixture with earth or other types of materials.
- D. Protect grout, mortar and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

#### 1.6 PROJECT CONDITIONS:

- A. Clean masonry surfaces only when air temperatures are 40 deg.F (4 deg.C) and above and will remain so until masonry has dried out, but for not less than 7 days after completion of cleaning.
- B. Do not repair masonry unless air temperatures are between 40 deg.F (4 deg.C) and 80 deg.F (27 deg.C) and will remain so for at least 48 hours after completion of work.
- C. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Remove immediately grout and mortar in contact with exposed masonry and other surfaces.
- D. Protect sills, ledges and projections from mortar droppings.

## 1.7 SEQUENCING/SCHEDULING:

Perform masonry restoration work in the following sequence:

- A. Repair existing masonry including replacing existing masonry with new masonry materials.
- B. Clean existing masonry surfaces.

## PART 2 - PRODUCTS

### 2.1 MASONRY MATERIALS:

- A. Face Brick and Accessories: Provide face brick and accessories, including units for lintels, corners, and other special ground, cut, or sawed shapes where required to complete masonry restoration work.
  - 1. Provide units with color, surface texture and size to match existing brick work.
  - 2. Provide units with color, surface texture, and physical properties to match those specified.
- B. Building Brick: Provide building brick complying with Section 04200, "Unit Masonry".

### 2.2 MORTAR MATERIALS:

- A. Portland Cement: ASTM C 150, Type I.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Aggregate for Mortar: ASTM C 144, unless otherwise indicated.
  - 1. For pointing mortar provide sand with rounded edges.
  - 2. Match size, texture and gradation of existing mortar as closely as possible.
- D. Water: Clean, free of oils, acids, alkalis and organic matter.
- E. Aggregate for Grout: ASTM C 404.

### 2.3 CLEANING MATERIALS AND EQUIPMENT:

- A. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts, and organic matter.
- B. Warm Water: Heat water to temperature of 140 deg.F-180 deg.F (60 deg.C-82 deg.C).
- C. Brushes: Fiber bristle only.
- D. Alkaline Prewash Cleaner: Manufacturer's standard alkaline cleaner for prewash applications only which are followed by acidic cleaner of type indicated for afterwash. Product: Subject to compliance with requirements, provide "Sure Klean 766 Prewash", ProSoCo, Inc., or approved equal.
- E. Chemical Paint Remover: Manufacturer's standard thixotropic/ alkaline formulation for removing paint coatings from masonry. Available products subject to compliance with requirements that may be incorporated in the work include, but are not limited to, the following:
  - 1. "Diedrich 505/606/606X Paint Remover"; Diedrich Chemicals.
  - 2. "Sure Klean Heavy-Duty Paint Stripper"; ProSoCo, Inc.
- F. Water-Rinsible Chemical Paint Remover: Manufacturer's standard thixotropic water-rinsible solvent formulation for removing paint coatings from masonry. Product subject to compliance with requirements are "Sure Klean 509 Paint Stripper", ProSoCo, Inc.
- G. Spray Equipment: Provide equipment for controlled spray application of water and chemical cleaners, if any, at rates indicated for pressure, measured at spray tip, and for volume.
  - 1. For spray application of chemical cleaners provide low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray-tip.
  - 2. For spray application of water provide fan-shaped spray-tip which disperses water at angle of not less than 15 degrees.
  - 3. For spray application of heated water provide equipment capable of maintaining temperature, at flow rates indicated, between 140 deg. and 180 deg.F (60 deg. and 82 deg.C).
  - 4. For application of steam provide a steam generator capable of delivering

live steam at nozzle head.

## 2.4 MORTAR MIXES:

### A. General:

1. Measurement and Mixing: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean mechanical batch mixer.
2. Do not use admixtures of any kind in mortar, unless otherwise indicated.

### B. Mortar Proportions:

1. Rebuilding Mortar: One part white portland cement, 2 parts lime and 6 parts colored mortar aggregate.
2. Grout: ASTM C 476.

## 2.5 CHEMICAL CLEANING SOLUTIONS:

- A. General: Unless otherwise indicated, dilute chemical cleaning materials with water to produce solutions of concentration indicated but not greater than that recommended by chemical cleaner manufacturer.
- B. Acidic Cleaner Solution for Brick: Maximum hydrofluoric acid content: 3%.
- C. Chemical Paint Remover: In concentration recommended by chemical cleaner manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION:

- A. General: Comply with recommendations of manufacturers of chemical cleaners for protecting building surfaces against damage from exposure to their products.
- B. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, and surrounding buildings from injury resulting from masonry restoration work.
  1. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings and other surfaces which

could be injured by such contact.

2. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
  3. Dispose of run-off from cleaning operations by legal means and in manner which prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
  4. Erect temporary protection covers over pedestrian areas and at points of entrance and exit for persons and vehicles which must remain in operation during any course of masonry restoration work.
- C. Protect glass, unpainted metal trim and any damagable items from contact with acidic chemical cleaners by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer's recommendations. Do not apply liquid masking agent to painted or porous surfaces. Protection can be eliminated subject to Contracting Officer's approval, if testing demonstrates no detrimental effect from exposure to cleaning solutions.
- D. Protect unpainted metal from contact with alkali chemical cleaners by covering them either with liquid strippable masking agent or polyethylene film and waterproof masking tape.

### 3.2 CLEANING EXISTING MASONRY, GENERAL:

- A. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other.
- B. Use only those cleaning methods indicated for each masonry material and location.
- C. Perform each cleaning method indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces an even effect without streaking or damage to masonry surfaces.
- D. Rinse off chemical residue and soil by working upwards from bottom to top of each treated area at each stage or scaffold setting.
- E. Water Application Methods:
  1. Prolonged Spraying: Soak masonry surfaces by applying water continuously and uniformly to a limited area for time period indicated. Apply water at low pressures and low volumes in form of multiple fine sprays using perforated hoses or multiple spray nozzles. Erect protective

enclosure constructed of polyethylene sheeting to cover area being sprayed.

2. Spray Applications: Spray-apply water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume and equipment. Unless otherwise indicated, hold spray nozzle not less than 6" from surface of masonry and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.
  - a. Low Pressure Spray: 100-400 psi; 3-6 gallons per minute.
  - b. Medium Pressure Spray: 400-800 psi; 3-6 gallons per minute.
  - c. High Pressure Spray: 800-1200 psi; 3-6 gallons per minute.
3. Steam Wash: Apply steam to masonry surfaces at pressures not exceeding 80 psi. Hold nozzle no less than 6" from surface of masonry and apply steam from side to side or in direction of tooling in overlapping bands to produce uniform coverage and an even effect.

F. Chemical Cleaner Application Methods:

1. General: Apply chemical cleaners to masonry surfaces to comply with chemical manufacturer's recommendations using brush or spray application methods, at Contractor's option, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than that indicated or recommended by manufacturer.
2. Spray Application: Apply to pressures not exceeding 50 psi, unless otherwise indicated.
3. Reapplication of Chemical Cleaners: Do not apply chemical cleaners to same masonry surfaces more than twice. If additional cleaning is required use steam wash.

3.3 CLEANING BRICKWORK:

- A. Cold Water Wash: At locations required, clean brick masonry surface with cold water applied as follows: Low pressure spray.
- B. Warm Water Wash: At locations required, lean brick masonry surfaces with warm water applied as follows: Low pressure spray.
- C. Chemical Cleaning: At locations required, clean brick masonry surfaces with acidic cleaner applied as follows:
  1. Prewet masonry with warm water applied by low pressure spray.

2. Apply acidic cleaner to masonry. Let cleaner remain on surface for period as recommended by chemical cleaner manufacturer before rinsing away:
3. Rinse masonry with warm water to remove chemicals and soil with low pressure spray.
4. Repeat chemical cleaning procedure above where required to produce effect established by mock-up. Do not apply more than twice.

### 3.4 BRICK REMOVAL AND REBUILDING:

#### A. Brick Removal:

1. Carefully remove at locations required any brick which are damaged, spalled or deteriorated. Cut out full units from joint to joint and in manner to permit replacement with full size units.
2. Support and protect masonry indicated to remain which surrounds removal area.
3. Salvage as many whole, undamaged bricks as possible.
4. Remove mortar, loose particles and soil from salvaged brick by required and/or necessary cleaning. Store brick for reuse.
5. Clean remaining brick at edges of removal areas by removing mortar, dust, and loose debris in preparation for rebuilding.

#### B. Brick Rebuilding:

1. Install new or salvaged brick to replace removed brick. Fit replacement units into bonding and coursing pattern of existing brick. If cutting is required use mortar driven saw designed to cut masonry with clean, sharp unchipped edges.
2. Lay replacement brick with completely filled bed, head and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet clay brick which have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure that units are nearly saturated but surface dry when laid. Maintain joint width for replacement units to match existing.
3. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.

3.5 FINAL CLEANING:

- A. After mortar has fully hardened thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, spray applied at low pressure.
- B. Use of metal scrapers or brushes will not be permitted.
- C. Use of acid or alkali cleaning agents will not be permitted.

END OF SECTION 04500