SECTION 04 21 13
BRICK MASONRY

PART 1 GENERAL

1.01 SUMMARY

A. SECTION INCLUDES

1. Face brick.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each type and color of brick and colored mortar.

1.03 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product indicated.

1.04 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

B. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects.

1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches (1200 mm) long by 36 inches (900 mm) high by full thickness.

1.05 PROJECT CONDITIONS

A. 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 (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 PRODUCTS

2.01 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.02 BRICK

A. Regional Materials: Brick shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

B. General: Provide shapes indicated and as follows.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Face Brick: Facing brick complying with ASTM C 216 or hollow brick complying with ASTM C 652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
2. Grade: SW.
3. Type: FBX
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
6. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet (3 m).
7. Size (Actual Dimensions): 3-5/8 inches (92 mm) wide by 2-1/4 inches (57 mm) high by 8 inches (203 mm) long.

2.03 MORTAR MATERIALS

A. Regional Materials: Aggregate for mortar shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

B. 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 mortar color indicated.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a) Davis Colors; True Tone Mortar Colors.
b) Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c) Solomon Colors, Inc.; SGS Mortar Colors.

F. Aggregate for Mortar: ASTM C 144.

1. White-Mortar Aggregates: Natural white sand or crushed white stone.

2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Euclid Chemical Company (The); Accelguard 80.
b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ACM Chemistries, Inc.; RainBloc for Mortar.
b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

2.04 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

C. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized, carbon-steel continuous wire.

2.05 TIES AND ANCHORS

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.

C. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches (50 mm) parallel to face of veneer.

D. RIGID ANCHORS

1. Provide straps of form and length indicated, fabricated from metal strips of following width and thickness.

a. 1-1/2 inches wide by 1/4-inch thick.

2.06 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:

1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.

2. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.

2.07 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

i. Advanced Building Products Inc.; Mortar Maze weep vent.
ii. Blok-Lok Limited; Cell-Vent.
iii. Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
iv. Heckmann Building Products Inc.; No. 85 Cell Vent.
v. Hohmann & Barnard, Inc.; Quadro-Vent.
vi. Wire-Bond; Cell Vent.

2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

i. Mortar Net USA, Ltd.; Mortar Net Weep Vents.

3. Vinyl Weep Hole/Vent: One-piece, offset, T-shaped units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Architect.

   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      i. Hohmann & Barnard, Inc.; #343 Louvered Weep Hole.
      ii. Williams Products, Inc.; Williams-Goodco Brick Vent.
      iii. Wire-Bond; Louvered Weepholes.

D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Advanced Building Products Inc.; Mortar Break .
   a. Archovations, Inc.; CavClear Masonry Mat.
   b. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
   c. Mortar Net USA, Ltd.; Mortar Net.

2. Provide one of the following configurations:

   a. Strips, full-depth of cavity and 10 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep.
   b. Strips, not less than 1-1/2 inches (38 mm) thick and 10 inches (250 mm) high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.
   c. Sheets or strips full depth of cavity and installed to full height of cavity.

2.08 MASONRY CLEANERS

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

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    d. Diedrich Technologies, Inc.
    e. EaCo Chem, Inc.
    f. ProSoCo, Inc.

2.09 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

    1. Do not use calcium chloride in mortar.
    2. Use portland cement-lime mortar unless otherwise indicated.
    3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

E. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

F. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type N unless another type is indicated.

G. Pigmented Mortar: Use colored cement product.

    1. Pigments shall not exceed 10 percent of portland cement by weight.
    2. Pigments shall not exceed 5 percent of masonry cement by weight.
    3. Application: Use pigmented mortar for exposed mortar joints.

PART 3 EXECUTION

3.01 INSTALLATION , GENERAL

A. Use full-size units without cutting if possible. 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. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

H. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

I. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.02 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

J. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

K. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm); do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).

3.03 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 running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.04 MORTAR BEDDING AND JOINTING

A. Lay hollow brick as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.05 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to concrete backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors to concrete backup with metal fasteners of type 10,000 hour polymer coated steel to ASTM C954, STM A510 or Stainless Steel to ASTM 580.

2. Embed tie sections in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.

3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.

4. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 32 inches (813 mm) o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.

3.06 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

L. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

M. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.

2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.

N. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

O. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.07 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

3.08 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 is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect adjacent surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.09 MASONRY WALL DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

7. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

P. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 04 22 00
CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 SUMMARY

A. Section includes the following:

1. Concrete unit masonry.
2. Ground face stone masonry anchored to unit masonry backup.

1.02 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following installed compressive strengths (f'm):
   1. For concrete unit masonry:
      a. f'm = 1,500 pounds per square inch.
      b. As indicated on structural Drawings.

1.03 SUBMITTALS

A. Shop Drawings: Submit in accordance with Division 1, General Requirements, Shop Drawings covering the items included under this Section. Submittals shall be issued in an electronic format. Comments will be returned in an electronic format.

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

   1. Block data required consists of the following:
      a. Block grade.
      b. Block type.
      c. Weight classification.
      d. Material test data:
         i. Minimum compressive strength.
         ii. Maximum water absorption (percent).
         iii. Moisture content percent total absorption.
         iv. Linear shrinkage percent.
      e. Material Certificate of Compliance
      f. Proof of compliance of 30-day curing period.
         i. Date of manufacture.
         ii. Date of shipping.

2. Mortar data required consists of the following:
    a. Mortar.
    b. Method of manufacture (proportion or property).
    c. Material test data:
        i. Aggregate for mortar (ASTM C 144 with no exceptions to gradation limits).
        ii. Mortar composition and properties (ASTM C 780) Proportion Method.
        iii. Mortar properties (ASTM C 270) Property Method.
    d. Material Certificate of Compliance.
3. Grout data required consists of the following:
    a. Grout Mixes: Include description of type and proportion of grout ingredients.
    b. Material test data: Compressive strength (ASTM C 1019).
    c. Material Certificate of Compliance.
4. Joint reinforcement, ties, anchors, and flashing:
    a. Manufacturer's literature.
    b. Material Certificate of Compliance.

C. 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. Include special reinforcement required for openings through masonry structures.

D. Samples for initial selection purposes of the following:

1. Unit masonry samples in small-scale form showing full extent of colors and textures available for each different exposed masonry unit required.
    a. Submit a minimum of 18 standard or custom colors for CMU color selection.
2. Colored masonry mortar samples showing full extent of colors available.

E. 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.
2. Colored masonry mortar samples for each color required showing the full range of colors expected in the finished construction. Label samples to indicate type and amount of colorant used.

F. Quality Assurance Submittals:

1. Material certificates shall be signed by manufacturer and CONTRACTOR, certifying that each material complies with requirements.
2. Material test reports shall be from a qualified independent testing laboratory employed and paid by CONTRACTOR indicating and interpreting test results relative to compliance of the masonry materials with requirements:
3. Cold weather construction procedures evidencing compliance with requirements specified in "Project Conditions" paragraph of this Section.
4. Hot weather construction procedures evidencing compliance with requirements specified in "Project Conditions" paragraph of this Section.
5. Qualification data for Contractors, firms, and persons specified in Quality Assurance Article to demonstrate their capabilities and experience. Include list of completed projects with project name, address, telephone number, names of Engineers and Owners, and other information specified.
6. Results from tests and inspections performed by OWNER's Representatives shall be reported promptly and in writing to ENGINEER and CONTRACTOR.

1.04 QUALITY ASSURANCE

A. Unit Masonry Standard: Comply with ACI 530.1/ASCE 6, Specifications for Masonry Structures, except as otherwise indicated.

B. A qualified Professional Engineer must inspect foundations for compliance with dimensional tolerances specified in referenced unit masonry standard, prior to masonry wall construction.

1. Engineer Qualifications: Professional Engineer legally authorized to practice surveying in jurisdiction where Project is located.

C. Masonry Contractor Qualifications: The masonry Contractor shall submit in writing 5 projects of similar size and construction type to exhibit the experience level necessary to perform the Work. List project location, size, wall construction type, Owner contact, and telephone number.

D. Masonry Inspection:

1. A qualified Engineer or Architect must inspect masonry during construction for compliance with the Contract Documents, including conducting the pre-installation conference, inspection of the field-constructed mock-ups, and periodic wall inspection of the critical portions of masonry construction, including flashing, weep hole construction, and proper unit bedding and joint installation techniques for structural integrity and weather-tightness.

2. Grout compressive strength will be tested per ASTM C 1019 for property specification and C 476 for proportion specification.

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 ENGINEER.
   a. Build mock-ups for the following types of masonry in sizes of approximately 8 feet long by 4 feet high by full thickness, including face and backup wythes as well as accessories.
   b. Each type of exposed unit masonry construction.
2. Notify ENGINEER 1 week in advance of the dates and times when mock-ups will be erected. Do not proceed with masonry work until mock-up is inspected and accepted. If mock-up is not acceptable, remove mock-up and construct additional mock-ups incorporating corrections until acceptable.
3. Protect mock-ups from the elements with weather-resistant membrane.
4. 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 Site.

H. Pre-installation Conference: Conduct conference at Site to comply with requirements of Division 1, General Requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to Site 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.

1.06 PROJECT CONDITIONS

A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each workday. 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 multi-wythe 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 come 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 doorframes, as well as similar products with painted and integral finishes from mortar droppings.

D. Cold Weather Construction:

   1. Perform the following construction procedures while Work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation, except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 degrees F (6 degrees C).
   2. 40 degrees F (4 degrees C) to 32 degrees F (0 degrees C):
      a. Mortar: Heat mixing water to produce mortar temperature between 40 degrees F (4 degrees C) and 120 degrees F (49 degrees C).

b. Grout: Follow normal masonry procedures.

3. 32 degrees F (0 degree C) to 25 degrees F (-4 degrees C):
   a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F (4 degrees C) and 120 degrees F (49 degrees C); maintain temperature of mortar on boards above freezing.
   b. Grout: Heat grout materials to 90 degrees F (32 degrees C) to produce in-place grout temperature of 70 degrees F (21 degrees C) at end of workday.
4. 25 degrees F (-4 degrees C) to 20 degrees F (-7 degrees C):
   a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F (4 degrees C) and 120 degrees F (49 degrees C); maintain temperature of mortar on boards above freezing.
   b. Grout: Heat grout materials to 90 degrees F (32 degrees C) to produce in-place grout temperature of 70 degrees F (21 degrees C) at end of workday.
   c. Heat both sides of walls under construction using salamanders or other heat sources.
   d. Use windbreaks or enclosures when wind is in excess of 15 miles per hour.
5. 20 degrees F (-7 degrees C) and below:
   a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F (4 degrees C) and 120 degrees F (49 degrees C).
   b. Grout: Heat grout materials to 90 degrees F (32 degrees C) to produce in-place grout temperature of 70 degrees F (21 degrees C) at end of workday.
   c. Masonry Units: Heat masonry units so that they are above 20 degrees F (-7 degrees C) at time of laying.
   d. Provide enclosure and auxiliary heat to maintain an air temperature of at least 40 degrees F (4 degrees C) for 24 hours after laying units.
6. Do not heat water for mortar and grout to above 160 degrees F (71 degrees C).
7. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry temperature ranges apply to anticipated minimum night temperatures.
8. 40 degrees F (4 degrees C) to 32 degrees F (0 degree C):
   a. Protect masonry from rain or snow for at least 24 hours by covering with weather-resistant membrane.
9. 32 degrees F (0 degree C) to 25 degrees F (-4 degrees C):
   a. Completely cover masonry with weather-resistant membrane for at least 24 hours.
10. 25 degrees F (-4 degrees C) to 20 degrees F (-7 degrees C):

a. Completely cover masonry with weather-resistant insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.

11. 20 degrees F (-7 degrees C) and below:
    a. Except as otherwise indicated, maintain masonry temperature above 32 degrees F (0 degree C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps, or other methods proven to be satisfactory. For grouted masonry, maintain heated enclosure to 40 degrees F (4 degrees C) for 48 hours.
12. Do not lay masonry units that are wet or frozen.
13. Remove masonry damaged by freezing conditions.

E. Hot Weather Construction: When the ambient air temperature exceeds 100 degrees F or 90 degrees F with a wind velocity greater than 8 miles per hour, do not spread mortar beds more than 4 feet ahead of masonry. Set masonry units within 1 minute of spreading mortar.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:

1. Water-Repellent Admixture:
    a. Dry Block Water-Repellent Block Admixture by W.R. Grace and Co.
    b. Rheomix Rheopel by Master Builders, Inc.
2. Ground Face CMU
    a. Pre-finished 4x8x16 inch Ground Face CMU, Trendstone by Trenwyth Architectural Masonry Units, color: Willamsburg Grey.
    b. Special Shapes: chamfered, bullnose and double face units as indicated on drawings.
3. Acoustical Concrete Masonry Units:
    a. 12-inch, Type RSC/RF, "Soundblox" by The Proudfoot Company, Inc.
4. Integral Water-Repellent Admixture:
    a. Dry-Block Mortar Admixture by W.R. Grace and Co.
5. Joint Reinforcement:
    a. Dur-O-Wal, Inc.
    b. Heckman Building Products, Inc.
    c. Hohmann and Barnard, Inc.
    d. Masonry Reinforcing Corp. of America.
6. Ties and Anchors:

a. Dur-O-Wal, Inc.
b. Heckman Building Products, Inc.
c. Hohmann and Barnard, Inc.
d. Masonry Reinforcing Corp. of America.

7. Metal Flashing:
   a. "Cheney Flashing (Dovetail)," Cheney Flashing Company, Inc.
   b. "Cheney Flashing (Sawtooth)," Cheney Flashing Company, Inc.
   c. "Keystone Three-Way Interlocking Thruwall Flashing," Keystone Flashing Co.
8. 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.
9. Single-wythe Flashing Unit System:
   a. "Blok-Flash," Sandell Manufacturing Company, Inc.
10. Mortar Net:
   a. Hohmann and Barnard, Inc.
11. Plastic Rectangular Weep Hole:
   a. No. 342 Plastic Weep Hole, Hohmann and Barnard.
   b. Wire-Bond No. 3603 Clear Rectangular Vent, Masonry Reinforcing Corp. of America.
12. Extruded Polystrene Board Insulation:
   a. "Styrofoam Scoreboard," Dow Chemical USA.
   b. "Foamular 250," Owens Corning.
   c. "CertiFoam 25 SE," DiversiFoam Products
   d. "Green Guard SB," Pactiv Corporation.
13. Loose Granular Vermiculite Insulation:
   a. "Zonolite Masonry Insulation," Grace Construction Products.

2.02 MATERIALS

A. Comply with requirements indicated below applicable to each form of concrete masonry unit required.

1. Provide 2-core, plain-end units for walls vertically reinforced.
2. Provide special shapes where indicated and as follows:
   i. For lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
   ii. Bullnose units for outside corners of interior work only unless otherwise indicated.

B. Concrete Block: Provide units complying with characteristics indicated below for grade, face size, exposed face and, under each form included, for weight classification.

1. Normal-weight Units: Normal-weight units shall be used for exterior walls below grade and exterior units of single- and multi-wythe walls above grade. Units shall be Grade N, manufactured from normal weight aggregates conforming to ASTM C 90.
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.
    a. 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 Cured Units: Manufacturer must store units outside after manufacture a minimum of 30 days under a covered storage area to protect the units from additional moisture during the curing (drying) process.
4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
    a. Where special finishes are indicated, provide units with exposed faces of the following general description, matching color and texture of ENGINEER's sample.
        i. Standard aggregate, ground finish (two faces ground at corners).
        ii. Standard aggregate, split face finish.
5. Integral Water Repellent Admixture: An integral liquid polymer admixture mixed with concrete during production of the CMU which cross-links and becomes permanently locked into the CMU, bond beam, or CMU lintel to provide resistance to water penetration to achieve a Class E rating when tested in accordance with ASTM E 514-74.

C. 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:
    i. 1,900 pounds per square inch.
2. Weight Classification:
    i. Normal weight (greater than 125 pounds per cubic foot concrete).

2.03 MOTOR AND GROUT MATERIALS

A. Mortar and Grout

1. Compressive Strength: 2,000 pounds per square inch.

B. Portland Cement: ASTM C 150, Types 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.

C. Masonry Cement: ASTM C 91:

1. For colored pigmented mortars use pre-mixed colored masonry cements of formulation required to produce color indicated or, if not indicated, as selected from manufacturer's standard formulations.

D. Hydrated Lime: ASTM C 207, Type S.

E. Aggregate for Mortar: ASTM C 144 with the following exceptions:

1. Delete gradation limit waiver as described in Article 4.4.
2. For joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.
3. Colored Mortar Aggregates: Ground marble, granite, or other sound stone, as required to match ENGINEER's sample.

F. Aggregate for Grout: ASTM C 404.

G. Integral Water Repellent Admixture for Mortar and Grout: An integral liquid polymer admixture designed specifically for use in a mortar mix, which cross-links and becomes permanently locked into mortar to provide resistance to water penetration to achieve a Class E rating when tested in a wall section in accordance with ASTM E 514-74.

H. Colored Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

I. Water: Clean and potable.

2.04 REINFORCING STEEL

A. Provide reinforcing steel complying with requirements of referenced unit masonry standard and this Article.

B. Steel Reinforcing Bars: Material and grade as follows:

C. Deformed Reinforcing Wire: ASTM A 496.

D. Plain Welded Wire Fabric: ASTM A 185.

2.05 JOINT REINFORCEMENT

A. Provide joint reinforcement complying with requirements of referenced unit masonry standard and this Article, formed from the following:

1. Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire, and with ASTM A 153, Class B-2 (1.5 ounces per square foot of wire surface) for zinc coating applied after pre-fabrication into units.
   a. Application: Exterior and interior walls.

B. Description: Welded-wire units pre-fabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with pre-fabricated corner and tee units, and complying with requirements indicated below:

1. Wire Diameter for Side Rods: 0.1483 inch (9 gauge).
2. Wire Diameter for Cross Rods: 0.1483 inch (9 gauge).
3. For single-wythe masonry, provide type as follows with single pair of side rods:
   a. Ladder design with continuous diagonal cross rods spaced not more than 16 inches on center.
4. For multi-wythe masonry provide type as follows:
   a. Adjustable (two-piece) type; ladder design with perpendicular cross rods spaced not more than 16 inches on center with one side rod for each face shell of backing wythe with separate ties that extend into facing wythe. Ties have 2 hooks that engage eyes in reinforcement and resist movement perpendicular to wall. Ties extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face. Ties have clips to engage a continuous horizontal wire in the facing wythe.
      - Number of Side Rods for Multi-wythe Concrete Masonry: One side rod for each face shell of hollow masonry units more than 4 inches in nominal width, plus one side rod for each wythe of masonry 4 inches or less in nominal width.

2.06 FABRICATION

A. Select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings.

B. Thickness of Stone: Provide thickness indicated, but not less than the following:

1. Thickness: 4 inches (100 mm) plus or minus 1/4 inch (6 mm).

C. Shape stone for type of masonry (pattern) as indicated on drawings.

D. Finish exposed stone faces and edges to comply with requirements indicated for finish and to match approved samples.

2.07 MORTAR MIXES

A. General: Do not use admixtures unless otherwise indicated.

1. Do not use calcium chloride.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches required consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.

1. Mortar for Setting Stone: Type N.
2. Mortar for Pointing Stone: Type N .

2.08 TIES AND ANCHORS

A. Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of referenced unit masonry standard and of this Paragraph.
1. Zinc Coated (Galvanized) Steel Sheet: Carbon steel with zinc coating complying with ASTM A 525, Coating Designation G90.
a. Application: Use for dovetail slots and where indicated.
2. Hot-Dip Galvanized Carbon Steel Sheet: ASTM A 366, Class 2, or ASTM A 635; hot-dip galvanized after fabrication to comply with ASTM A 153, Class B.
a. Application: Use for anchors.

B. 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.

2.09 BENT WIRE TIES

A. Individual units pre-fabricated from bent wire to comply with requirements indicated below:

1. Type for Masonry where Coursing Between Wythes Align: Unit ties bent from one piece of wire.

2.10 RIGID ANCHORS

A. Provide straps of form and length indicated, fabricated from metal strips of following width and thickness.

1. 1-1/2 inches wide by 1/4-inch thick.

2.11 MISCELLANEOUS ANCHORS

A. Unit Type Masonry Inserts in Concrete: Cast iron or malleable iron inserts of type and size indicated.

2.12 EMBEDDED FLASHING MATERIALS

A. Exposed Sheet Metal Flashing: Fabricate from the following metal, complying with requirements specified in Section 07 62 00 and below.

1. Stainless Steel: 0.0156 inch (28 gauge) thick.
2. Fabricate through-wall metal flashings embedded in masonry as follows:
   a. With ribs formed in dovetail pattern at 3-inch intervals along length of flashing to provide a 3-way integral mortar bond and weep hole drainage.
3. Fabricate metal expansion joint strips from sheet metal indicated above, formed to shape indicated.
4. Application: Use where flashing is exposed to exterior and is partly concealed in masonry wall.

2.13 MISCELLANEOUS MASONRY ACCESSORIES

A. Nonmetallic Expansion Joint Strips: Pre-molded 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 pounds per square inch), compressible up to 35 percent, of width and thickness indicated, formulated from the following material:

1. Neoprene.

B. Mortar Net: Provide mortar net made of high-density polyethylene (HDPE) or nylon stands woven into a 90 percent open-mesh, formed into dovetail shape to break up mortar droppings and prevent mortar damming. Mortar net shall be nonreactive with common building materials, nonabsorbent, shall not support mold or fungus growth, and shall be inedible to insects.

C. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Plastic Rectangular Weep Hole: Clear Butyrate 3/8-inch wide by 1-1/2-inch high by 3-1/2-inch deep tube.

E. Weep Holes: Field-fabricated. See Part 3, Execution, Flashing/Weep Holes for requirements.

2.14 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 1 gallon of water.

2.15 MORTAR AND GROUT MIXES

A. Do not add admixtures, including air-entraining agents, accelerators, retarders, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. 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/masonry cement.
2. For masonry below grade and in contact with earth, and where indicated, use type indicated below:
   a. Type S.
   b. Type M.
3. For reinforced masonry use type indicated below unless otherwise indicated on Drawings:
   a. Type S.
   b. Type M.
4. For exterior, above-grade load-bearing and non-load-bearing walls and parapet walls, for interior load-bearing walls, for interior non-load-bearing partitions, and for other applications where another type is not indicated, use type indicated below:
   a. Type S.

D. Colored Aggregate Mortar: Produce mortar of color required by use of colored aggregates in combination with selected cementitious materials.

1. Mix to match ENGINEER's sample.

E. Grout for Unit Masonry: Comply with ASTM C 476 and referenced unit masonry standard.

2.16 SOURCE QUALITY CONTROL

A. 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

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, other specific conditions, and other conditions affecting 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.

3.02 INSTALLATION

A. Deliver anchorage items which are to be embedded in other construction before start of such work. Provide setting diagrams, templates, instructions, and directions as required for installation.

B. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.

C. Do Not Wet concrete masonry units.

D. 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.

E. When vertical reinforcement is called for, mortar face shell and web of cores containing grout and reinforcing bars.

F. 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. Masonry directly above chases or recesses wider than 12 inches shall be supported on lintels.

G. 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.

H. 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.

I. No masonry shall be supported on wood girders or other form of wood construction.

3.03 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4 inch in 10 feet, or 3/8 inch in a story height not to exceed 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/8 inch in any story or 20 feet maximum, or 1/4 inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet, 3/8 inch maximum.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in any bay or 20 feet maximum, or 1/2 inch in 40 feet or more. For top surface of bearing walls do not exceed 1/8 inch between adjacent floor elements in 10 feet or 1/16 inch within width of a single unit.

C. Variation of Linear Building Line: For position shown in plain and related portion of columns, walls, and partitions, do not exceed 3/8 inch in any bay, or 20 feet maximum, or 3/4 inch in 40 feet or more.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/8 inch or plus 1/8 inch.

E. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 3/8 inch. Do not exceed head joint thickness indicated by more than plus or minus 1/8 inch.

3.04 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 that nominal 4-inch horizontal face dimensions at corners or jambs.

D. One-half running bond with vertical joint in each course centered on units in courses above and below.

E. 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.

F. Stopping and Resuming Work: In each course, rack back 1/2-unit length for 1/2 running bond or 1/3-unit length for 1/3 running bond; do not tooth. Clean exposed surfaces of set masonry, , and remove loose masonry units and mortar prior to laying fresh masonry.

G. 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, unless otherwise indicated.
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.

3.05 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.

B. 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.

C. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

3.06 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

A. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes.

B. Corners: Provide interlocking masonry unit bond in each course at corners unless otherwise shown.

1. Provide continuity with horizontal joint reinforcement at corners using pre-fabricated L-units in addition to masonry bonding.

C. 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:

1. Provide individual metal ties.
2. Provide continuity with horizontal joint reinforcement using prefabricated T-units.

D. Nonbearing Interior Partitions: Build full height of story to underside of solid floor or roof structure above and as follows:

1. Install pressure-relieving joint filler in joint between top of partition and underside of structure above.

3.07 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 continuous horizontal joint reinforcing.

3.08 CAVITY WALL AND MASONRY CELL INSULATION

A. On units of plastic insulation, install small pads of adhesive spaced approximately 1'-0" on center 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.

1. Fill all cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.09 HORIZONTAL JOINT REINFORCEMENT

A. 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. Space continuous horizontal reinforcement as follows:

1. For multi-wythe walls (solid or cavity) where continuous horizontal reinforcement acts as structural bond or tie between wythes, space reinforcement as required by Code but not more than 16 inches on center vertically.
2. Reinforce masonry openings greater than 1'-0" wide with horizontal joint reinforcement placed in 2 horizontal joints approximately 8 inches apart immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening except at control joints.
3. Cut or interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
4. 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, column fireproofing, pipe enclosures, and other special conditions.

3.10 MOVEMENT (CONTROL AND EXPANSION) JOINTS

A. Install control and expansion joints in unit masonry where indicated and at 25 ft on center, maximum. 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:

5. 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.
1. Build flanges of factory-fabricated expansion joint units into masonry.

C. 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 Section 07 95 00.

3.11 FLASHING/WEEP HOLES

A. 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 inch 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. Turn down sheet metal flashings at exterior face of masonry to form drip.
4. Cut off concealed 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 by keeping one head joint free and clear of mortar as recommended by MIM.
2. Space weep holes 24 inches on center.

3.12 INSTALLATION OF REINFORCED UNIT MASONRY AND BOND BEAMS

A. 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.

1. 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.

E. Lay CMU units 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 shown, or if not shown, provide 3/8-inch joints.

F. Where solid CMU units are shown, lay with full mortar head and bed joints.

G. Lap all splices in horizontal and vertical reinforcing bars at least 48 bar diameters unless otherwise required by governing Building Code.

H. Reinforcing bars shall have a minimum clear spacing from inside face of masonry core of a minimum of 1 inch.

I. Clean reinforcement loose rust, mill scale, earth, ice, 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.

J. Position reinforcing accurately at the spacing indicated. Support secure vertical bars against displacement. Horizontal reinforcing shall 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).Position reinforcing accurately at the spacing indicated. Support secure vertical bars against displacement. Horizontal reinforcing shall 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).

K. Field Adjustments: If it is necessary to move bars to avoid interference with other reinforcing steel, conduits, or embedded items, and bars are moved more than 1 bar diameter or enough to exceed the specified tolerances, ENGINEER shall be notified and the resulting arrangement of bars shall be subject to acceptance.

L. Walls:

1. Pattern Bond: Lay CMU wall units in 1/2 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. 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 dimension 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. Grout fill cores of block wall 2 courses below each bond beam supporting roof, floor, and other structural members. Place metal lath under lowest block to be grouted to confine grout pour.
5. Install two No. 5 vertical bars on each side of all masonry openings extending from 1 inch below lintel bearing point to 2'-0" below the bottom of the window opening unless otherwise indicated on structural Drawings.

M. Columns, Piers, and Pilasters:

1. Use CMU units of the size, shape, and number of vertical core spaces shown. If not shown, use units which provide minimum clearances and grout coverage for number and size of vertical reinforcement bars shown.
2. Provide pattern bond shown, or if not shown, alternate head joints in vertical alignment.
3. Provide a clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameter or 1-1/2 inches, whichever is greater. Provide lateral ties as indicated.

M. Grouting:

1. Use "Fine Grout" per ASTM C 476 for filling spaces less than 4 inches in one or both horizontal directions.
2. Use "Coarse Grout" per ASTM C 476 for filling 4-inch spaces or larger in both horizontal directions.
3. Grouting Technique: At CONTRACTOR's option, use either low-lift or high-lift grouting techniques subject to requirements which follow.

N. Low-Lift Grouting:

1. Provide minimum clear dimension of 2 inches and clear area of 8-square-inch in vertical cores to be grouted.
2. Place vertical reinforcement prior to laying of CMU. Extend above elevation of maximum pour height as required for splicing. Support in position at vertical intervals not exceeding 192 bar diameters or 10 feet.

3. Lay CMU to maximum pour height. Do not exceed 5-foot height, or if bond beam occurs below 5-foot height, stop pour at course below bond beam.
4. Pour grout using chute or container with spout. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than 1 hour. Terminate grout pours 1-1/2 inches below top course of pour.
5. Bond Beams: Stop grout in vertical cells 1-1/2 inches below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

3.13 FIELD QUALITY CONTROL

A. Testing Frequency: Tests and evaluations listed in this article shall be formed during construction for each 5,000 square feet of wall area or portion thereof.

B. 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.

3.14 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 ENGINEER'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.
   a. Job-mixed detergent solution.
   b. Proprietary acidic cleaner; apply in compliance with directions of acidic cleaner manufacturer.
5. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 8-2A applicable to type of stain present on exposed surfaces.

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

END OF SECTION

SECTION 04 43 13
STONE MASONRY VENEER

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Stone masonry.

B. Related Requirements:

1. Section 04 22 00 "Concrete Unit Masonry" for horizontal joint reinforcement.

2. Division 5, Metals for furnishing steel lintels and shelf angles for stone masonry.

1.02 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Samples:

1. Minimum of three (3) 8 inch x 8 inch samples for each stone type indicated.

2. For each color of mortar required.

1.03 FIELD CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. 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 (4 deg C) and above and will remain so until masonry has dried.

C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 PRODUCTS

2.01 LIMESTONE

A. Material Standard: Comply with ASTM C 568.

1. Classification: II Medium Density.

B. Regional Materials: Limestone shall be fabricated within 500 miles (800 km) of Project site from stone that has been extracted within 500 miles (800 km) of Project site.

C. Varieties and Sources: Indiana limestone quarried in Lawrence, Monroe, or Owen Counties, Indiana.

1. Indiana Limestone Grade and Color: Standard, gray, according to grade and color classification established by ILI (Indiana Limestone Institute of America).

2.02 MOTOR MATERIALS

A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of project site.

B. Portland Cement: ASTM C 150, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

C. Hydrated Lime: ASTM C 207, Type S.

D. Aggregate: ASTM C 144 and as follows:

1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.

2. White Aggregates: Natural white sand or ground white stone.

3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

E. Water: Potable.

2.03 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim" and as follows:

1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch (0.4 mm) thick.

2.04 MISCELLANEOUS MASONRY ACCESSORIES

A. Cementitious Dampproofing for Limestone: Cementitious formulation recommended by ILI and nonstaining to stone, compatible with joint sealants, and noncorrosive to attachments.

B. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, 1/4 to 3/8 inch (6 to 10 mm) in diameter, in length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity behind stone masonry. Use only for weeps.

2. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch (10-mm) OD by thickness of stone masonry.

2.05 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

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

a. Diedrich Technologies, Inc.
b. Dominion Restoration Products.
c. EaCo Chem, Inc.
d. Hydrochemical Techniques, Inc.
e. Prosoco, Inc.

2.06 FABRICATION

A. Select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings.

B. Thickness of Stone: Provide thickness indicated, but not less than the following:

1. Thickness: 4 inches (100 mm) plus or minus 1/4 inch (6 mm).

C. Shape stone for type of masonry (pattern) as indicated on drawings.

D. Finish exposed stone faces and edges to comply with requirements indicated for finish and to match approved samples.

2.07 MORTAR MIXES

A. General: Do not use admixtures unless otherwise indicated.

1. Do not use calcium chloride.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches required consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.

1. Mortar for Setting Stone: Type N.
2. Mortar for Pointing Stone: Type N .

PART 3 EXECUTION

3.01 PREPARATION

A. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning stone installation.

B. Coat concrete and unit masonry backup with asphalt dampproofing.

3.02 SETTING OF STONE MASONRY, GENERAL

A. Perform necessary field cutting and trimming as stone is set.

1. Use power saws to cut stone that is fabricated with saw-cut surfaces.
2. Use hammer and chisel to split stone that is fabricated with split surfaces.
3. Pitch face at field-split edges as needed to match stones that are not field split.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stones in range ashlar pattern with course heights as indicated, uniform lengths, and uniform joint widths, with offset between vertical joints as indicated.

D. Arrange stones in broken-range ashlar pattern with uniform course heights, random lengths, and uniform joint widths.

E. Arrange stones in three-course, random-range ashlar pattern with random course heights, random lengths (interrupted coursed), and uniform joint widths.

F. Arrange stones in rubble pattern with joint widths within tolerances indicated.

G. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

H. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 1/4 inch (6 mm) at narrowest points or more than 1/2 inch (13 mm) at widest points.

I. Provide sealant joints of widths and at locations indicated.

1. Keep sealant joints free of mortar and other rigid materials.

2. Sealing joints is specified in Section 07 92 00 "Joint Sealants."

J. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

1. At stud-framed walls, extend flashing through stone masonry, up sheathing face at least 12 inches (300 mm) , and behind weather barrier.
2. At multiwythe masonry walls, including cavity walls, extend flashing through stone masonry, turned up a minimum of 4 inches (100 mm) , and

extend into or through inner wythe to comply with requirements in Section 042000 "Unit Masonry Assemblies."

3. At concrete backing, extend flashing through stone masonry, turned up a minimum of 6 inches (150 mm) , and insert in reglet.
4. Reglets are specified in Section 07 62 00 "Sheet Metal Flashing and Trim."
5. At lintels and shelf angles, extend flashing full length of angles but not less than 6 inches (150 mm) into masonry at each end.
6. At sills, extend flashing not less than 4 inches (100 mm) at ends.
7. At ends of head and sill flashing, turn up not less than 2 inches (50 mm) to form end dams.
8. Extend sheet metal flashing 1/2 inch (13 mm) beyond masonry face at exterior, and turn flashing down to form a drip.
9. Install metal drip edges beneath flexible flashing at exterior wall face. Stop flexible flashing 1/2 inch (13 mm) back from exterior wall face and adhere flexible flashing to top of metal drip edge.
10. Install metal flashing termination beneath flexible flashing at exterior wall face. Stop flexible flashing 1/2 inch (13 mm) back from exterior wall face and adhere flexible flashing to top of metal flashing termination.
11. Cut flexible flashing flush with wall face after completing masonry wall construction.

K. Coat limestone with cementitious dampproofing as follows:

1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches (300 mm) above finish-grade elevations.

L. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.

1. Use wicking material round plastic tubing or open head joints to form weep holes.
2. Use wicking material to form weep holes above flashing in stone sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 16 inches (400 mm) o.c.
4. Space weep holes formed from plastic tubing or wicking material 16 inches (400 mm) o.c.
5. Trim wicking material used in weep holes flush with exterior wall face after mortar has set.
6. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.03 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (10 mm in 6 m), or 1/2 inch in 40 feet (13 mm in 12 m) or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more.

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet (13 mm in 6 m) or 3/4 inch in 40 feet (19 mm in 12 m) or more.

3.04 INSTALLATION OF STONE MASONRY

A. Set stone in full bed of mortar with full head joints unless otherwise indicated.

B. Fill collar joint with mortar as stone is set.

C. Provide 1-inch (25-mm) cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.

a. Slope beds toward cavity to minimize mortar protrusions into cavity.
b. Do not attempt to trowel or remove mortar fins protruding into cavity.

D. Rake out joints for pointing with mortar to depth of not less than 1/2 inch (13 mm) before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.05 POINTING

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch (10 mm) deep until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch (10 mm) deep. Compact each layer thoroughly and allow to it become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:

1. Joint Profile: As indicated or recommended by the manufacturer for the pattern specified.

3.06 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone 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 before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.

5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.

6. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.

7. Clean limestone masonry to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.07 EXCESS MATERIALS AND WASTE

A. Excess Stone: Stack excess stone where directed by Owner for Owner's use.

B. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

END OF SECTION