SECTION 04050

MORTAR, GROUT AND MASONRY ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This section specifies furnishing mortar, grout, and accessories for masonry work, including brick masonry, concrete unit masonry, granite and other stone masonry. The installation of such material is specified in the various masonry sections.

B. Related Work Specified Elsewhere:
1. Brick masonry: Section 04215.
2. Concrete unit masonry: Section 04220.
3. Granite: Section 04415.
4. Seals and sealants: Section 07900.
5. Flashing and sheetmetal: Section 07600.
6. Miscellaneous metals: Section 05500.
7. Concrete formwork: Section 03100.

1.02 SUBMITTALS:

A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
1. Shop Drawings:
   a. Manufacturer's data: Recommendations for use of materials, preparation of substrate, limitations and special instructions for materials necessary to the work.
   b. Granite: Section 04415.
2. Samples:
   a. Three of each type of the following products used in the work:
      1) Mortars: Cured samples showing color of each type.
      2) Accessories: Representative samples of each type.
      3) Certification.

1.02 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:
1. Comply with codes and regulations of the jurisdictional authorities.
2. ASTM: A36, A82, A153, A276, A666, A775, C114, C144, C150, C207, C270, C476, C665, C780, C881, C1019, D570, D638, D695, D1525, D2000, D2240, F593, F594.
3. FS: HH-I-521.

B. Source Quality Control:
1. Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver products to job site in their original unopened containers clearly labeled with manufacturer's name and brand designation, referenced specification number, type and class as applicable.

B. Store products so as to prevent water intrusion, dampness and deterioration. Store loose materials sand and aggregates so as to prevent intrusion of foreign materials.

C. Handle products so as to prevent breakage of containers and damage to products.

1.05 JOB CONDITIONS:

A. Environmental Requirements:
1. Do not use materials or aggregates that are covered with frost. Do not mix mortar when the temperature is below that specified for masonry work.
2. Provide protective covering and heat as specified for masonry work.
3. Perform work under environmental conditions consistent with manufacturer's recommendations for materials being used in the work.

PART 2 - PRODUCTS

2.01 MORTAR AND GROUT MATERIALS:

A. Cement:
1. ASTM C150, Type I, portland cement, packaged in one-cubic-foot waterproof bags.
   a. For exterior walls, use low alkali cement; maximum 0.60 percent total alkali when tested according to ASTM C114.
   b. For below grade use type II cement and lime.
2. Cement for brick masonry:
   a. Factory-prepared, color-blended with nonstaining, inorganic coloring pigment.
   b. Pigments not to exceed 10 percent of weight of cement.
   c. Pigment blended in such quantity to produce cured mortar color matching face brick when mixed with hydrated lime and fine aggregate.

B. Hydrated Lime:
1. ASTM C207, Type S.
2. Uniform color for similar work.

C. Fine Aggregate: Clean, sharp, masonry sand, ASTM C144. For joints less than 1/4 inch, grade aggregate with 100 percent passing the Number 16 sieve.

D. Water: Potable.

E. Pigment: As necessary to produce colored mortar matching color of brick unless otherwise indicated.

F. Admixtures: Do not add admixtures including air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

G. Epoxy for Epoxy Mortar: Two-component, ASTM C881, Type 3, Grade 3, Class C, with the following additional requirements:
1. Component A: Modified-epoxy resin of epichlorohydrin bisphenol A-type, containing suitable viscosity control agents and having epoxide equivalent of 180-200.
2. Component B: Primarily reaction product of aromatic amine and an aliphatic amine with epoxy resin of epichlorohydrin bisphenol A-type.
3. Ratio of Component A to Component B: By volume, 1:2.
4. Properties of mixed components:
   a. Solids content: 100 percent by weight.

b. Pot life: 20 to 30 minutes at 73F.
c. Tack-free time, thin film: Two to four hours at 73F.
d. Final cure, 75-percent ultimate strength, ASTM D695: Two days at 73F.
e. Initial viscosity, A plus B: 250 to 350 cps at 73F.

5. Properties of cured material:
   a. Tensile strength, ASTM D638: 5,000-psi minimum at 14 days, 73F cure.
   b. Tensile elongation, ASTM D638 modified: One to three percent at 14 days, 73F cure.
   c. Compressive strength, ASTM D695: 10,500-psi minimum at 28 days, 73F cure.
   d. Water absorption, ASTM D570: One-percent maximum.
   e. Bond strength: 2,000-psi minimum at 14 days.
   f. Hardened to hardened: 73F cure.
   g. Vicat softening temperature, ASTM D1525: 121F minimum.

H. Aggregate for Epoxy Mortar: Silica sand, Size 20 to Size 40, dust-free and moisture-free.

2.02 MORTAR AND GROUT MIXES:

A. Mortar Mixes for Brick Masonry: ASTM C270, types as follows:
1. Type S: For exterior loadbearing masonry and for masonry in contact with earth, proportioned by volume as follows:
   a. Portland cement: One part.
   b. Hydrated lime: 1/4 to 1/2 part.
   c. Fine aggregate: Not less than 2-1/2 nor more than three times sum of volumes of cement and lime.
   d. Pigment: As necessary to produce colored mortar matching color of brick unless otherwise indicated.
2. Type N: For interior non loadbearing masonry, proportioned by volume as specified for Type S, except 1/2 to 1-1/4 parts hydrated lime.
3. Color: As shown or as selected by the Engineer.

B. Mortar Mixes for Concrete Unit Masonry: As specified for brick masonry, except pigment not required.

C. Mortar Mixes for Granite Setting Bed:
1. Granite, except paving, apron at pylons, platform edging, stair treads and landings: Nonstaining mortar composed of one-part portland cement and one-part plastic lime hydrate to four or five parts fine aggregate, ASTM C270, Type N. Pointing mortar of same composition, colored to matched granite.
2. Granite paving and granite apron at pylons: Nonstaining mortar composed of one-part portland cement to no more than four parts natural sand. For pointing use specified preshrunk mortar.
3. Stair treads and landings: Epoxy mortar consisting of one-part epoxy to 3-1/4 parts of aggregate by loose volume.
4. Platform edging: Epoxy mortar consisting of one-part epoxy to 1-1/2 parts of aggregate by loose volume.

D. Grout: For setting steel lintels and similar items, grouting mortar composed of one-part portland cement and two parts fine aggregate with sufficient lime putty added to obtain quick set.

E. Preshrunk Mortar: Dry, premixed, ready-to-use formulation.

2.03 ACCESSORIES:

A. Continuous joint reinforcement:

1. Accessories for Brick and Concrete Unit Masonry:
    a. Prefabricated continuous-reinforcing tie system fabricated of wire conforming to ASTM A82. Flush-welded cross ties, nine-gauge wire, hot-dip galvanized after fabrication in accordance with ASTM A153, Class B2, 1.50 ounces for side and cross rods.
    b. Fabricate joint reinforcement in straight lengths of not less than 10 feet of truss design with continuous diagonal cross ties spaced maximum 16 inches o.c.
        1) Make width of unit 1-1/2 inches to two inches less than thickness of wall.
        2) For multi-wythe wall, provide one side rod for each face shell of masonry more than four inches in width; plus one side rod for each wythe of masonry four inches or less in width.
        3) At cavity walls, provide integral drips on cross rods.Where horizontal joints of outer wythe does not align with back-up joints, provide adjustable two-piece tab design to engage the outer wythe by at least 1-1/2 inches.
    c. Corner reinforcement: Prefabricated, shop-welded corner-L and intersection-T units matching the continuous wall units.
    d. Spacing: See related work sections.
2. Dovetail anchors:
    a. Flexible, adjustable or corrugated 1-inch wide dovetail anchors of 12 gauge galvanized steel. Place anchors every 16 inches in height of wall at intersections of masonry walls and concrete, and for masonry furring of concrete. Dovetail slots are specified in Section 03100, by same manufacturer of anchors.
3. Wall plugs:
    a. Galvanized 26-gauge corrugated metal, approximately three inches long and of standard manufacture, where necessary for attaching other work.
4. Z-type rigid-steel anchors: Steel, ASTM A36, 1/4-inch thick by 1-1/2 inches wide by 28 inches long, galvanized; with one two-inch opposing 90-degree bend at each end.
5. Corrugated-steel anchors: 14 gauge by 1-1/4 inches by 20 inches with one two-inch 90-degree bend, with 18 inches of corrugation.
6. Steel framing anchors: Fabricated of 3/16-inch galvanized wire tie and galvanized flat-steel strap one-inch wide by 22 gauge or 3/4-inch wide by 12 gauge.
7. Weep-hole tubes: 3/8-inch OD, medium density, nonstaining, polyethylene tubes of lengths ensuring complete panel penetration and unobstructed flow.Fire-resistant compressible filler: Inorganic, non-asbestos mineral fiber safing insulation, with foil facing to impede smoke passage; moisture resistant, mildew-proof and vermin-proof, noncorrosive and nondeteriorating; UL-listed; meeting ASTM C665 and FS HH-I-521 Type III, except for identification marking.
8. Control joint gasket: Solid styrene-butadiene-rubber compound per ASTM D2000, 2AA-805, factory extruded into shapes for use with standard sashblock to provide stability to masonry walls at expansion and control joints; minimum shear strength 540 psi, durometer hardness 80 (plus or minus 5) per ASTM D2240. Provide T-shape and X-shape for vertical joints as appropriate, flat shape beneath load-relieving angles.
9. Cavity Drainage System: 1 inch thick by 10 inches high by 5 feet long section of high density polyethylene or nylon mesh designed to allow moisture to flow downward in cavity joint.
10. Masonry Cell Insulation: Molded polystyrene Insulation Units - Rigid, cellular thermal insulation formed by the expansion of polystyrene - resin beads or granules in a closed mold to comply with ASTM 578, Type I. Provide specially shaped units designed for installing in cores of masonry units.

B. Accessories for Granite:
   1. Stainless steel, ASTM A276 or A666, Type 304, for anchors, cramps, angles, dowels, plates, bolts or other accessories in contact with stone.
   2. Anchor sizes:
      a. Anchors with dowels: 3/16 inch by one inch in cross section.
      b. Two-way anchors: 1/8 inch by two inches in cross section.
      c. One-way anchors: 1/8 inch by one inch in cross section.
      d. Anchors to stone: Anchors of necessary length and of type that turn into stone minimum of 1/2 inch.
      e. Anchors to concrete: Heavy-duty sleeve style or wedge-type anchors with 3,000-pound hold-fast strength or anchors suitable for use with dovetail slots.
      f. Lewis anchors for lifting stones: 3/4 inch in diameter.
      g. Other anchors: Sizes as shown on approved shop drawings.
      h. Fasteners for Stainless-Steel Anchors: Annealed stainless-steel bolts, nuts, and washers; ASTM F593 for bolts and ASTM F594 for nuts.
      i. Setting Shims: Strips of vulcanized neoprene, 50 to 70 Shore A durometer, nonstaining to stone, sized to suit joint thicknesses and depths of stone supports without intruding into required depths of joint sealants or causing third-side adhesion between sealant and setting shims.
      j. Weep and Vent Tubes: Medium-density polyethylene tubing, 1/4-inch OD and of length required to extend from exterior face of stone to cavity behind.
   3. Sizes for other accessories:
      a. Dowels: Minimum of 1/2 inch in diameter, designed to extend two inches into stone and two inches into concrete.
      b. Cramps: 1/8-inch by one-inch plate with 3/8-inch dowels at each end designed to extend into stone and concrete a minimum of one inch.
      c. Angles, plates, and bolts: Sizes as shown on approved shop drawings.

C. Steel lintels: Section 05500.

D. Masonry lintels: Section 04220.

E. Flashing: Section 07600.

PART 3 - EXECUTION

3.01 MIXING OF MORTAR:

A. Mix mortar materials in an approved clean mechanical mixer for at least three minutes and not more than five minutes with a minimum amount of water to produce workable consistency.

B. Mortar which has stiffened because of evaporation of water may be retempered by adding water as needed to restore necessary consistency. Use mortar within 2-1/2 hours of initial mixing.

C. Use an approved method of measuring materials and mortar that will control and accurately maintain specified proportions throughout the work. Shovel measure is prohibited. Measure sand in damp, loose condition.

D. Apply pre-shrunk mortar in accordance with the manufacturer's instructions.

E. For alteration and restoration work, tint or modify mix to match mortar of existing masonry.

F. The Engineer may direct a test of the mortar in accordance with ASTM C780 and a test of the grout for compressive strength per ASTM C1019 to establish compliance with specified requirements.

END OF SECTION

SECTION 04215

BRICK MASONRY

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This section specifies providing brick masonry.

B. Related Work Specified Elsewhere:
1. Mortar, grout and masonry accessories: Section 04050.
2. Miscellaneous metal: Section 05500.
3. Seals and sealants: Section 07900.
4. Demolition: Section 02220.
5. Concrete Unit Masonry: Section 04220.

1.02 SUBMITTALS:

A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
1. Samples:
a. Three sets of each type of the following products used in the work:
1) Face brick: Assemble each set to show the complete variation and percentage proportion of color, texture and other variable properties of appearance.
(a) Size and shape for general use.
(b) Special shapes and sizes used in the work.
2) Common brick.
b. Brick panels:
1) Construct sample masonry panels of exposed brick masonry, of size not less than four feet square by eight inches thick incorporating reinforcement, flashing, face brick and backup units. Construct sample panel on site, with face brick facing same direction as major facade of the work.
2) If necessary to produce an acceptable standard of appearance and workmanship, construct additional panels until approved.
3) Use types of material, color variation, mortar, bond, thickness and tooling of joints, method of laying and workmanship typical and standard for the installation. Clean sample panel as specified for finished work.
4) Maintain panels in good condition and protect from moisture penetration until completion of masonry work and removal is directed.
2. Certification.

1.03 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:
1. Comply with codes and regulations of the jurisdictional authorities.
2. BIA: Technical Notes on Brick Construction No. 7B.
3. ASTM: C62, C216.

B. Source Quality Control:

1. All brick used in the work to be from the same run.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver products to the job site in good condition.

B. Keep products dry. Prevent contact with soil.

C. Handle products so as to prevent chipping and breaking.

1.05 JOB CONDITIONS:

A. Environmental Requirements:
   1. The following are prohibited:
      a. Use of products that are covered with frost.
      b. Erection of masonry when temperature is below 40F or tending to fall below 40F, unless suitable fireproof protective covering and heat are provided to maintain work and materials above 40F.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. General:
   1. For alteration and restoration work:
      a. Provide bricks of same size, type, grade and appearance as existing brick work.
      b. Brick salvaged under Section 02220 may be used if approved.

B. Face Brick:
   1. ASTM C216, Type FBS, Grade SW, wire-cut.
   2. Size 2-1/4 inches by 3-5/8 inches by 7-5/8 inches.
   3. Color: Richtex No. 761M by Richland Shale Products Company, Columbia, SC; No. 320 Grey Wirecut by Taylor Clay Products Company, Salisbury, NC.; or approved equal.
   4. Special shapes: 100-percent solid for the following locations:
      a. Flat header wall caps.
      b. End units on rowlock header wall caps.
      c. Corners of soldier courses.
      d. Corbels.
      e. Pierced screen walls.
      f. Where construction would result in exposed cores.
      g. Where shown.

C. Common Brick:
   1. ASTM C62, wire-cut; Grade SW.
   2. First quality, hard grade, standard size.

D. Cleaning Solution:
   1. Formulated for cleaning new brick work, containing no acid.
   2. Type which will not stain, discolor or otherwise adversely affect surfaces with which it comes into contact.

E. Accessories: Section 04050.

F. Steel Lintels and Shelf Angles: Section 05500.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Remove dirt, debris, oil, grease and other foreign matter from surfaces to receive brick masonry.

B. Built-In Work:
1. Verify and coordinate locations of chases and openings for pipes, conduit, ducts and locations of flashing and weep holes.
2. Establish layout lines and verify proper setting of bucks and frames.

3.02 ERECTION:

A. Construct masonry as recommended in BIA Technical Notes on Brick Construction Number 7B, Water Resistance of Brick Masonry Construction and Workmanship Part III of III.

B. Erect new masonry to conform to approved sample panels. For alteration and restoration work, match existing masonry.

C. Erect adjoining walls simultaneously. Do not erect walls more than five feet above adjoining walls. Toothing is prohibited. Cover and protect tops of unfinished walls. Protect cavities from mortar and debris.

D. Plumb piers and walls. Level brick courses using uniform joint thickness. Use power-driven, masonry saws for cutting material. Build external corners square, unless otherwise shown.

E. Provide structural and pattern bonding as shown or as specified.

F. Place reinforcement and build in openings for pipes, conduits, ducts, chases and other work as shown.

G. Grout and set in place steel lintels furnished by other trades for openings in masonry walls.

H. Install flashing, reglets and weep holes over lintels and where shown. Lap joints in flashing four inches minimum and bond with mastic. Install through-wall flashing to within ½ inch of inside and outside faces of wall. Set flashing in full bed of mortar and trowel full bed of mortar to ensure complete contact.

I. Use facing brick for exposed brickwork. Select face brick from various stock piles so that they may be integrated to prevent segregating color ranges and bricks from different runs. Use same color mortar proportions throughout work.

J. Prior to laying face brick, lay out work so that bond and design are maintained plumb and level and joints are of uniform width throughout the work.

K. Do not use segments of bricks less than one half in size at corners or at openings. Use same sizes of bricks or same sizes of brick segments in same course at each side of jambs of openings or piers. Where cutting of units is necessary, use motor driven masonry saw.

L. Thoroughly drench brick with water just before laying. Cover brick uniformly with mortar, shove and press into place, with no voids in wall joints, at window frames or at door frames.

M. Where dovetail anchors are required, provide anchors vertically at each slot, maximum 16 inches on center and solidly fill in joints against concrete with mortar. Ensure that joints at anchors and bond courses are filled.

N. Unless otherwise shown, use 3/8-inch concave joints, carefully tooled to form smooth, dense surface. Avoid burrs at intersections and mortar discoloration.

O. Lay face brick from exterior with bed joints, head joints and collar joints full and level, faces plumb, joints uniform and bonds accurate.

P. For alteration and restoration work, provide beds, coursing and face joints to match existing brick masonry precisely.

Q. Place continuous joint reinforcement in courses 16 inches on center as shown. Use specially fabricated sections at corners and intersections.

R. Provide expansion and control joints in masonry walls as shown. Ensure that joints are straight, uniform and of thickness shown. Ensure that clear joints are free of water, mortar and other obstructions. Leave continuous open joint for caulking and sealing in accordance with Section 07900. Provide cavity drainage system on top of the flashing inside the cavity. Drainage system shall be continuous at cell cavity flashing.

S. Masonry anchors and accessories: In accordance with Sections 04050 and 04220.

T. Accessories: Section 04050.

U. Fill jambs of hollow metal frames solid with grout, as laying of brick progresses.

V. As the work progresses, clean masonry with stiff brush before mortar sets.

W. Install steel lintels where shown on Contract Documents or approved shop drawings.

3.03 REPAIRING, POINTING AND CLEANING:

A. Repairing:
1. Remove and replace units that are loose, chipped, broken, stained or otherwise damaged; or if units do not blend properly with adjoining units. Install item units to match adjoining units and in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing:
1. When approved, point holes in joints of exposed brick masonry surfaces by completely filling with preshrunk mortar.
   a. Pre-wet joint and holes before pointing.
   b. Tool to match adjacent joints. Protect from premature drying.
2. Correct defective joints by cutting out mortar and solidly refilling with new mortar.
3. Point exposed raked joints of brick masonry with mortar and tool to match approved sample panel.
4. Pre-wet holes and joints before pointing. Protect masonry from premature drying.

C. Cleaning:
1. After pointing, wet exposed brick-masonry surfaces and clean with soap-and-water solution applied with stiff-fiber brushes leaving masonry clean, free of mortar daubs and with tight mortar joints throughout. The use of acid is prohibited.

2. Allow masonry walls to cure at least three weeks in summer and five weeks in winter before final cleaning.
3. Test clean methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain approval of sample cleaning before proceeding with cleaning of masonry.
4. Begin cleaning at top and work down.
    a. Remove as much mortar from brick as is possible with scrapers or wire brushes; taking care not to discolor mortar or brick.
    b. Dampen walls thoroughly with water to prevent loose materials from being drawn into pores of dry brick below and to prevent build-up of dry detergents.
5. Clean surfaces thoroughly with specified cleaning solution. Rinse and flush with clean water immediately after cleaning.
6. Leave work in first class condition, free from mortar stain or other defacement.

END OF SECTION

SECTION 04220

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This section specifies providing concrete unit masonry and glazed concrete masonry.

B. Related Work Specified Elsewhere:
1. Mortar, grout and masonry accessories: Section 04050.
2. Brick masonry: Section 04215.
3. Miscellaneous metal: Section 05500
4. Flashing and sheet metal: Section 07600.
5. Seals and sealants: Section 07900.
6. Concrete reinforcement: Section 03200.
7. Cast-in-place structural concrete: Section 03300.
8. Structural precast concrete: Section 03400.

1.03 SUBMITTALS:

A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
1. Samples for Initial Selection: Samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
2. Samples:
   a. Three sets of each type of the following products used in the work.
      1) Concrete masonry units (CMU):
         a) Lightweight.
         b) Normal weight.
         c) Special shapes.
         d) Glazed.
      2) Precast lintels.
      3) CMU lintels.
   b. Concrete masonry panels:
      1) Construct sample panels for exposed work only. Build panels not less than four feet square by eight inches thick, incorporating reinforcement and concrete masonry units. See Section 04215 for brick panels. Construct one panel of concrete glazed and unglazed masonry units.
      2) Use types of material, color variation, mortar, bond, tooling of joints, method of laying and workmanship shown or specified.
      3) Maintain panels in good condition and protect from moisture penetration until completion of masonry work and removal is directed.
      4) Approval of mock ups is for color, texture and blending of masonry unit; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
      5) Maintain panel in good condition and protect from moisture penetration until completion of masonry work. Panel may remain as part of finished work after approval.
3. Shop Drawings: Show fabrication and installation details for the following:
   a. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

B. Certification.

1.02 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:
1. Comply with codes and regulations of the jurisdictional authorities.
2. NCMA: TEK Manual for Concrete Masonry Design and Construction.
3. ASTM: A615, C33, C55, C90, C129, C150, C744, E119.
4. ACI: 315, 530.1-99.
5. UL: Fire Resistance Directory.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

C. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver products to jobsite in good condition.

B. Keep products clean and dry. Prevent contact with soil.

C. Handle products so as to prevent chipping and breakage.

1.05 JOB CONDITIONS:

A. Environmental Requirements:
1. The following are prohibited:
a. Use of products that are covered with frost.
b. Erection of masonry when the temperature is below 40F or tending to fall below 40F, unless suitable fireproof protection covering and heat are provided to maintain work and materials above 40F.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. CMU:
1. General:
a. Nominal dimensions:
1) Face size: 7-5/8 inches by 15-5/8 inches.
2) Thickness: As shown.
b. For exposed work, units of uniform medium texture, free from defects and of uniform dimensions. Furnish special units as necessary.
c. Units having UL Fire Resistance Directory ratings to achieve fire ratings for walls as required by local building codes and as shown.
d. Units free from iron and other substances that will stain plaster or paint.
2. Lightweight CMU:
a. Hollow, lightweight loadbearing concrete units: ASTM C90, Type I.
b. Solid, lightweight loadbearing concrete units: ASTM C90, Type I.

c. Lightweight concrete brick: ASTM C55, Type I, Grade N.
d. Aggregate: Limited to expanded shale or slate.
e. Hollow, light-weight non-load bearing concrete units: ASTM C129, Type 1

3. Normal-weight CMU:
a. Solid loadbearing units: ASTM C90, Type I.
b. Exposed alteration and restoration work: Units of same type, grade, size, color variation, texture and appearance as existing masonry work.

4. Concrete fill for CMU bond beams and reinforced masonry unit cores: Class 3500; maximum aggregate size, 3/4 inch, and in accordance with Section 03300.

B. Glazed CMU:
1. Prefaced or glazed concrete masonry ynits shall conform to the requirements specified above for C90 concrete masonry units, and the facing to the following requirements:
a. Glazing (Facing): ASTM C744.

C. Lintels:
1. General:
a. Provide lintels of same height and width, texture and density as CMU and 16 inches longer than width of opening, free of cracks and chipped and broken edges.
b. Concrete:
1) Portland cement in accordance with Section 03300: ASTM C150, Type I.
2) Reinforcing steel bars in accordance with Section 03200: ASTM A615, Grade 60.
3) Aggregate: ASTM C33, graded from 1/8 inch to 3/8 inch.

2. Precast lintels: Class 3500 concrete in accordance with Section 03400, reinforced full length with No. 5 reinforcing bars in accordance with Section 03200, one at top and one at bottom for each four inches nominal width, and No. 2 ties at eight inches on center at each end, unless otherwise shown.
a. CMU lintels:
b. Lightweight loadbearing lintel-type CMU complying with specified requirements.
c. Filled with Class-3000 concrete minimum in accordance with Section 03300 and reinforced in accordance with Section 03200 for width and span as specified for precast lintels, unless otherwise shown.

3. Steel Lintels: Section 05500.

D. Masonry Accessories: Section 04050.

E. Cleaning Solution: Section 04215.

F. Mortar and Grout: Sections 04050 and 03300.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Clean foreign substances which would affect bond of mortar from surfaces to receive CMU.

B. Built-In Work.
1. Verify locations of chases and openings for pipes, conduits and ducts.
2. Establish locations for walls and partitions; verify that door frames and other built-in work provided by others are or can be properly located.

3.02 ERECTION:

A. Erect exposed CMU masonry work to conform to approved sample panel.

B. Use of loadbearing and non-loadbearing units shall be governed by locations and purposes to be served. Except as otherwise shown, follow these general uses:
   1. Loadbearing: Backup loadbearing masonry walls and for bearing partitions.
   2. Non-loadbearing: Furring, non-bearing partitions and backup non-loadbearing masonry walls.
   3. Solid: Where specifically required by drawings, for fireproofing structural steel and for partitions with fire ratings.

C. Erect adjoining walls simultaneously. Do not erect walls more than five feet above adjoining walls. Toothing is prohibited. Cover and protect the tops of unfinished walls.

D. Plumb piers, walls and partitions. Level courses using uniform joint thickness for interior work, build external corners with bullnose units.

E. Place reinforcement and build in openings for pipes, conduits, ducts, chases, frames and other work as shown.

F. Grout in accordance with Sections 04050 and 03300 and set in place miscellaneous steel lintels furnished by other trades for openings in masonry walls in accordance with Section 05500. Provide eight-inch minimum bearing on adjacent masonry unless otherwise indicated.

G. As the work progresses, keep masonry clean by stiff brushing with fiber brush. Do not wet units before laying up. Unless otherwise shown, lay units in running bond.
   1. Set cored units with cells vertical, unless manufactured with horizontal cores. Open ends not permitted.
   2. Lay out so that at jambs and internal and external angles, the headers in alternate courses are at least 2 inches long. Use “Z shapes if necessary , especially with glazed masonry units.
   3. Lay units out so that no cut piece is less than 5 inches long; not less that 2 inches high
   4. Lay concrete units up suitable for painting. See finish schedules.

H. Prevent smearing mortar on surface of exposed units. If mortar smears occur, remove while soft.

I. Carefully cut faces of units for electrical or other outlets and cut-out backs for conduit and other piping. Where possible, use full-size units. Do not use portions of units shorter than four inches. Perform cutting with power-driven masonry saws.

J. Build partitions straight, plumb, true to line and uniform in thickness unless shown otherwise. Anchor partitions at junctions with CMU exterior walls using Z-type steel anchors, rigid or corrugated, Z-bar anchors vertically 24 inches on center maximum unless otherwise shown. Use dovetail anchors spaced not over 16 inches on vertical centers where partitions abut concrete walls or concrete columns and steel framing anchors where partitions abut steel columns. Start partitions on concrete slabs and extend to structure above, except where shown to be erected only to ceiling.

K. Use CMU or precast lintels except where steel lintels are shown. Use precast lintels for four-inch CMU partitions. For other CMU partitions and walls, use lintels fabricated at plant or at jobsite from concrete-masonry lintel units. Provide eight-inch minimum bearing on adjacent masonry unless otherwise indicated.

L. Fill cells of CMU with mortar in accordance with Section 04050, adjacent to openings and around built-in and embedded items.

M. Place prefabricated continuous joint reinforcement in alternate horizontal joints above grade and each horizontal joint below grade. Terminate each side of expansion joints. Use specially fabricated sections at corners and intersections.

N. Fill cells solid with grout in accordance with Sections 04050 and 03300 where vertical reinforcement is installed within CMU walls.

O. Fill heads and jambs of hollow metal frames solid with mortar in accordance with Section 04050, as laying of units progresses.

P. Tooling joints:
1. After mortar has attained initial set, finish and compact with non-staining metal jointing tool, forcing mortar tight against masonry units and closing all hair line cracks and crevices.
2. All interior and exterior joints tooled concave type, except as stated below or noted otherwise.
    a. At wall faces to receive other facing materials having mortar backing, strike joints flush.
    b. At concealed joints and joints on cavity side of cavity walls, strike flush.

Q. Mortar Bedding in accordance with Section 04050:
1. Hollow units shall be laid with full mortar coverage on horizontal and vertical face shells, except that webs shall also be bedded in all courses of piers, columns, and pilasters, and in the starting course of footings and solid foundation walls, and where adjacent to cells or cavities to be reinforced and/or filled with mortar or grout.
2. Solid units laid with full head and bed joints.
3. Masonry units:
    a. Laid in beds of mortar of such plasticity and fullness and spread with trowel so that pressing and shoving units will obviate dashing or slushing joints after units are laid. Mortar shall not be “furrowed”.
    b. In cavity walls, mortar shall be beveled on cavity side to prevent protruding mortar fins and subsequent dropping of mortar into cavity.
    c. For interior and exterior faces of walls, prior to placing units, one end of each stretcher shall be fully covered with mortar.
    d. For any wall thickness, leave no voids whatever, except space in cavity walls.

R. Top of Non-Loadbearing Partitions: Build non-loadbearing interior partitions full height of story to underside of solid floor or roof structure above, unless shown otherwise. Build as follows depending on the movement requirements of floor or structure above, and as shown:
1. Install fire resistant compressible filler in joint between top of partition and underside of structure above.
2. Fill top joint with mortar in accordance with Section 04050, after dead-load deflection of structure above approaches final position.

S. Installation of Masonry Accessories:
1. Wall anchors:

a. Space Z-type rigid-steel anchors at intersections of loadbearing CMU walls and control joints.
b. Space corrugated-steel anchors 16 inches on centers vertically at control joints located not more than two feet from intersections of CMU walls.

2. Steel framing anchors: Install anchors to attach CMU walls to structural steel building frame at 16 inches on centers horizontally and vertically. Weld anchors to structural steel so as to achieve full strength of anchor system.
3. Soldier-course anchors: Install corrugated-steel anchors in horizontal mortar joints of soldier coursing, except where continuous wall reinforcement is used. Space anchors 24 inches on centers horizontally.
4. Flashing: Install flashing to provide positive keying to mortar.
5. Weep holes: Install at two feet on centers at terminations of through-wall flashing, base flashings, lintels, or relief angles, and as shown.
6. Control joint gasket: Install in sash-type CMU and between wythes in accordance with manufacturer's instructions and as shown. Seal weather side of control joints with sealant and backup rod as specified in Section 07900.

T. Bond Beams:
1. Provide bond beams in walls where shown.
2. Construct similar to CMU lintels, except beams to be continuous, except at control joints.

3.03 POINTING AND CLEANING:

A. Pointing:
1. When approved, point holes in joints of exposed CMU masonry surfaces by completely filling with preshrunk mortar.
2. Point exposed raked joints of CMU masonry with mortar and tool to match approved samples panels.

B. Cleaning:
1. After pointing, wet and clean exposed CMU masonry surfaces with soap-and-water solution, applied with stiff-fiber brushes leaving masonry clean, free of mortar daubs and with tight mortar joints throughout. The use of acid is prohibited.
2. Allow masonry walls to cure at least three weeks in summer and five weeks in winter before cleaning.
3. Begin cleaning at top and work down.
4. Remove as much mortar from masonry as is possible by hand with wooden paddles and nonmetallic scraper hoes or chisels or stiff bristle brushes taking care not to deface masonry units.
5. Remove specific stains by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.
6. Clean surfaces thoroughly and carefully with specified cleaning solution.
7. Rinse and flush with clean water immediately after cleaning.
8. Leave work in clean condition, free from mortar stain or other defacement.

END OF SECTION

SECTION 04415

GRANITE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This section specifies providing granite for architectural work.

B. Related Work Specified Elsewhere:
1. Mortar, grout and masonry accessories: Section 04050.
2. Seals and sealants: Section 07900.
3. Cast-in-place structural concrete: Section 03300.
4. Platform edge light glass lenses and sealant: Section 08800.

1.02 PERFORMANCE REQUIREMENTS:

A. Stone Abrasion Resistance: Minimum abrasive-hardness value of 12, as determined per ASTM C241.

B. Static Coefficient of Friction: ASTM C1028, values as follows:
1. Level Surfaces: A minimum of 0.6.
2. Step Treads: A minimum of 0.6.
3. Ramp Surfaces: A minimum of 0.8.

1.03 SUBMITTALS:

A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
1. Shop Drawings:
   a. Show the following:
      1) Bedding, bonding and jointing of granite, including typical and special anchoring, expansion-joint details and interface with other work.
      2) Dimensions and setting numbers of each stone in plan and elevation, including grading data for drainage.
2. Working Drawings:
   a. Include full explanation of erection methods and installation procedures, temporary loading, anchor design, surface preparation, setting materials, bonding, testing and other work as directed.
   b. For granite walls, include structural analysis data signed and sealed by the qualified professional structural engineer responsible for their preparation.
3. Samples:
   a. Submit three sets of samples of each type of granite used in the work, showing full range of color, texture, veining, fissures and finish of each type; each sample 12 inches square by one-inch thick. Include a minimum of two pieces in each set with maximum number of pieces in each set as necessary to demonstrate full range and variations.
      1) Material delivered or erected not within approved range samples will be rejected.
   b. Epoxy for mortar dams and epoxy fill and for setting dowels: Manufacturer's standard container.
   c. Non-staining wedge.

d. Stainless steel dowel.
e. Platform edge glass lens and sealant: Section 08800.
1) Cured six-inch long strip of grout matching existing white granite grout joint color for granite slab transverse joint grouting: Section 04050.
2) Platform joint sealant: Section 07900.

4. Documentation:
a. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
b. Quality-Assurance Program.

5. Certification.

1.04 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications.
1. Comply with codes and regulations of the jurisdictional authorities.
2. NBGQA: Specifications for Architectural Granite.
3. ASTM: C241, C615, C1028.

B. Qualifications of Granite Quarries:
1. Obtain granite from approved quarries having capacity and facilities for furnishing the quantity, size and quality of granite required.
2. Provide the product of one quarry matching approved samples.
3. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from a single quarry with resources to provide materials of consistent quality in appearance and physical properties.
4. Installer Qualifications: An experienced installer who has completed dimension stone cladding systems similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Quality Assurance Program: Before installing granite edging, walls and stairs, construct mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed work.
1. Granite edging:
a. Demonstration installation:
1) Demonstration installation to consist of three adjacent units to be installed in the work or as otherwise directed.
2) Perform work as shown and in accordance with approved shop drawings and working drawings, using specified materials.
b. Testing:
1) In the presence of the Engineer and in accordance with approved working drawings, test each unit of the demonstration installation by placing end of crowbar at each end of unit and prying with a force that would lift an unbonded piece of stone with 50 psf live load. Protect stone from touching crowbar directly. In the presence of the Engineer, before joint sealants are installed, test the bonded strength of each unit after two-hour cure time by applying an uplift load of 2,000 pounds at each drainage opening below the granite as approved.
2) If a unit fails to pass test by lifting or cracking of unit or setting bed, remove unit, revise setting procedures and reset unit. Repeat, as necessary, until approval is obtained.

3) Do not proceed with remainder of the work until demonstration installation, procedures and personnel are approved.

2. Stair treads and landings:
   a. Prior to erection at site, test each stair tread and stair landing to withstand live load of 300 psf for duration of not less than 15 minutes. Test only components which perform a structural function and are not supported over their entire length by cast-in-place concrete.
3. Granite walls:
   a. Build mockups of typical exterior wall with dimension stone cladding, approximately 72 inches long by 48 inches high or as directed by the Engineer.
   b. Show typical components, attachments to building structure, and methods of installation. Include sealant-filled joint complying with requirements in Section 07900.

D. Professional Structural Engineer Qualifications: A professional structural engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of granite wall cladding systems that are similar to those indicated for this Project in material, design, and extent.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Pack granite so as to prevent damage in transit, and deliver in accordance with Contract schedule and setting sequence.

B. Deliver each piece of granite with code mark on unexposed face, corresponding to shop drawings using nonstaining paint. Deliver and unload granite. Prevent damage and soiling during delivery and unloading of granite.

C. Protect from disfiguring elements.

D. Separate granite from wood skids with polyethylene or other nonstaining material. Store under waterproof covering, and keep dry.

E. Remove rejected stones from jobsite immediately.

1.06 JOB CONDITIONS:

A. Environmental Requirements:
   1. Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace dimension stone cladding damaged by frost or freezing conditions.
   2. Erection and pointing of granite when ambient temperature is below 50F and or tending to fall below 50F is prohibited.

B. Cold-Weather Protection: When night-time temperature is forecasted within 50 to 25 Deg F: Cover dimension stone cladding with a weather-resistant membrane for 48 hours after construction. Do not install granite when night time temperature is forecasted below 25 Deg.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Granite:
   1. Granite Building Stone Standard: ASTM C615.

2. NBGQA Specifications for Architectural Granite, free from starts, cracks or seams which might impair its structural integrity or appearance.
3. Color classification: Granite matching grain, color and variegation of all white, fine-to-medium-grain granite as listed in referenced NBGQA standard.
4. Exposed surfaces finished in accordance with the following and as shown:
   a. Type 1: Thermal finish or four-cut, slip-resistant.
   b. Type 2: Six-cut, stippled.
   c. Type 3: Honed-dull sheen without reflections.
   d. Type 4: Split face, nominal depth of 3-1/2 inches. Use Type 4 for all Granite Sets.
5. Where stone thickness permits, provide lewis holes for lifting stones weighing over 100 pounds. Make lewis holes not closer than two inches from finished face of stone nor in exposed portions of stone.
6. For alteration and restoration work, use granite salvaged from existing work. If salvaged granite is not sufficient, provide new granite to match existing granite in type, size and appearance.

B. Mortar Materials and Granite Accessories: Section 04050.

C. Portland Cement Paste: Section 03300.

D. Granite platform edge glass lenses and setting materials:
1. Glass lenses: Salvage and reuse existing lenses to greatest extent possible. If Engineer determines existing lenses cannot be reused: Section 08800.
2. Glass lens sealant: Section 08800.
3. Lead shims or lead rope: Section 08800.

E. Dowels: Salvage and reuse existing dowels to greatest extent possible. If Engineer determines existing dowels cannot be reused: Dowels for platform edge granite slab dowels: Section 04050, minimum 1/2-inch diameter, of sufficient length to extend into stone 1/2 thickness of stone and to extend two inches into structural concrete.

F. Epoxy mortar and epoxy fill for mortar dams and epoxy for setting dowels for Granite Edge Slabs: Section 04050.

G. Non-staining shim wedges to support granite slabs during curing of epoxy mortar dams: As approved.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Examine surfaces to receive dimension stone cladding and conditions under which dimension stone cladding will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of dimension stone cladding.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION:

A. Runways, Scaffolds and Hoists: Provide and move scaffolding, temporary runways, temporary floors, staging and hoists in accordance with specified safety requirements.

B. Substrate: Remove foreign substances that would affect bond of mortar from surfaces to receive granite.

C. Advise installers of other work about specific requirements for placement of inserts, flashing reglets, and similar items to be used by dimension stone cladding Installer for anchoring, supporting, and flashing of dimension stone cladding system. Furnish installers of other work with Drawings or templates showing locations of these items.

3.03 FABRICATION AND ERECTION:

A. General:
1. Fabricate granite in sizes and with joint patterns shown on Contract Drawings and approved shop drawings.
2. Installation of granite which is not within the approved range of color, texture, finish, veining and fissures; is mismatched; shows flaws or imperfection in cutting; or has other defects is prohibited.
3. Provide openings for installation of work of other trades in accordance with approved shop drawings. Coordinate size of rabbet at expansion joint in granite platform edging with the expansion joint dimension and the size of compression seal.
4. Provide 1/4-inch joints, unless otherwise shown on Contract Drawings and approved shop drawings.
5. Unless otherwise shown, completely fill joints in granite work and rake out to depth of 3/4 inch, except paving joints and pylon-apron joints showing grout.
6. Set stones accurately in alignment with other stones and adjacent work. Set stones in full mortar beds. Level and plumb stones as work progresses.
7. Set finish surfaces in true and even planes, with uniform jointing. Take up and reset loose, hollow sounding slabs. Leave surface free of mortar stain and other defacements.
8. Where epoxy materials are used, follow manufacturer's recommendations.
9. Granite paving over waterproofing: Carefully place granite and setting materials over waterproofing so protection materials are not displaced and waterproofing is not punctured or otherwise damaged. Replace protection materials that become displaced and arrange for repair of damaged waterproofing before covering with paving.
    a. Provide cork joint filler in accordance with Section 07900, where indicated, at waterproofing that is turned up on vertical surfaces or, if not indicated, provide temporary filler or protection until granite paving installation is complete.

B. Tolerances: Meet NBGQA Specifications for Architectural Granite.

C. Paving and Granite Apron at Pylons:
1. Do not put down more setting bed than can be covered in the same day.
2. Dust setting bed with portland cement and butter underside of stone with neat portland cement paste in accordance with Section 03300 and pound into place at proper elevation.
3. Where concrete is to be cast against stone, parge contact surface with not less than 1/2 inch of nonstaining setting mortar in accordance with Section 04050.

D. Benches: Provide bench seats and backs in one piece with no joints.

E. Walls:
1. Fabrication: Fabricate granite wall units in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.

a. Cut and drill sinkages and holes in granite for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone securely in place; shape beds to fit supports.
b. Cut granite to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.
c. Minimum Thickness: 1-½ inches.
d. Cut granite panels to produce joints of uniform width and in locations indicated.
e. Provide minimum anchorage as follows and in accordance with standard practice:
    1) Not less than one anchor for every six square feet of stone.
    2) Minimum of two anchors at each head and bed joint.

F. Application to Floor Hatches and Other Metal Items:
1. Apply granite to recessed floor hatches and other metal surfaces by the use of epoxy mortar in accordance with Section 04050.
2. Use epoxy of type and brand recommended by manufacturer to set granite on metal and in accordance with Section 04050. Continue paving pattern of adjacent surfaces over hatch covers.

G. Application of Granite Platform Edging:
1. Set granite with epoxy mortar in accordance with recommendations of epoxy manufacturer, and with Section 04050 and with approved quality-assurance program.
2. Set dowels with epoxy mortar not less than 1-1/2 inches into granite. Allow mortar to cure to not less than 75 percent of its ultimate compressive strength.
3. Place epoxy mortar as shown, using mortar dams or other approved method of forming. Adjust as required to obtain full contact of epoxy mortar with granite. Apply epoxy mortar in a self-leveling consistency. Set granite, embedding it into epoxy mortar. To permit drainage, maintain spaces between mortar dams as shown.
4. Expansion joints: Coordinate the distance between granite edge stones with the required expansion joint size (width) for the temperature of the structure at the time stones are set. See structural drawings.
5. Install lamps in accordance with Division 16 and install lead shims, glass lenses, and seal lenses in accordance with Section 08800.
6. Resetting platform edge granite slabs:
    a. The following is Red Tag work and is limited to only the number of granite slabs that can be reset in one work shift:
        1) Preparation for raising granite slabs: Remove IRIIS screw anchors and metal wireway sections. Sawcut granite edge slabs' transverse joints both vertically and horizontally. Remove platform edge light lenses and lamps. Dig out epoxy bedding material.
        2) Provide and move staging and hoists in accordance with safety requirements and as approved. Lift up existing granite slab edge unit(s). Store units to be reset so as to prevent damage and discoloration. Replacement of damaged and broken slabs in kind is the responsibility of the Contractor.
        3) Remove dowels and salvage as many as possible of the existing stainless steel granite anchoring pins for re-use. Replacement of damaged and missing items in kind is the responsibility of the Contractor.
        4) Demolish existing epoxy setting dams that support granite and remove to expose structural slab.

5) Clean and prepare surfaces of unit(s) and structural slab to receive new epoxy setting dams. Where existing concrete has not been treated with MMA, scarify slab to provide proper substrate for new epoxy mortar dams. Do not scarify MMA patches or MMA-treated concrete. Remove foreign substances that would affect bond of epoxy mortar from surfaces of concrete slab receiving granite.

6) Laser survey or set string line as necessary to establish elevations for granite slabs as necessary.

7) Mix epoxy mortar in accordance with manufacturer's instructions and place mortar bulkheads or other approved forming method to form setting dams at a width to match existing and at a height as required to set granite slabs to proper elevation, leaving eight-inch wide drainage channels between setting dams. Pour neat epoxy between epoxy mortar bulkheads to a slighter higher elevation. Remove excess mortar and neat epoxy and adjust as required to obtain full contact between epoxy and granite.

8) Reset dowels or set new dowels as necessary at not less than two inches into concrete structural slab and to extend into granite 1/2 depth of granite. Set non-staining wedges for support to allow proper curing of epoxy dams when granite is reset.

9) Set original granite slab unit(s) on intermittent epoxy dams and dowels at proper elevations, providing uniform 1/4-inch joints between adjacent units, except as necessary to match existing. Set granite slabs accurately to corrective alignment between adjacent slabs and existing work and with finish surfaces in true and even planes. After each granite edge unit is set, take measurements to verify that unit is at proper elevation and location. Level and plumb granite slabs as work progresses. Take up and reset loose, hollow sounding units.

10) Install lead shims, reinstall platform edge lamps, and reinstall glass lenses and reseal lenses in accordance with Section 08800.

11) Remount IRIIS metal wireway sections with screw anchors.

12) After epoxy dams have cured, perform bond strength testing as previously specified.

H. Granite Sets:

1. Random ashlar pattern with broken course and range or stacked bond, as shown.

3.04 POINTING AND CLEANING:

A. Pointing:

1. After setting mortar has cured, point voids in joints of exposed granite paving and pylon aprons with preshrunk mortar. Remove excess mortar.
2. Seal joints in granite work with sealants in accordance with Section 07900, except paving joints and pylon-apron joints.

B. Cleaning:

1. Clean joint surfaces and remove dirt, coatings, moisture and other foreign substances which could interfere with bond. Recaulk granite edge slabs' transverse joints both vertically and horizontally with grout and let cure.
2. Thoroughly and carefully clean work by approved means and leave in first class condition, free from mortar or other defacement. Clean all exposed granite surfaces, including joints, with water and washing compound soap powder solution in accordance with recommendations of manufacturer. Sponge and wash thoroughly. Use of acid or acid cleaners is prohibited. Remove stains by approved means. Clean granite masonry surfaces, including those grouted or sealed, with soap-

powder solution and fiber brushes to remove stains. Thoroughly and carefully clean work and leave in first-class condition, free from mortar stains or other defacement. Immediately after cleaning, rinse surfaces with clear water. Polish with clean dry cloths.

C. Protection:
1. Protect granite work from damage after erection. Provide protective boxing or other suitable means whenever necessary in the absence of specific instructions from the Engineer. Do not use materials that will stain or deface granite. Use galvanized nails in protective boxing.
2. Continuously protect granite work from water during construction and until installation is complete and is approved.
3. Protect granite work from traffic of any kind for not less than two hours after setting. Remove protection immediately after two hours curing.

3.05 FIELD QUALITY ASSURANCE:

A. Granite Platform Edging:
1. Perform work in accordance with approved quality-assurance program.
2. Change of procedures and personnel without approval is prohibited.

END OF SECTION

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