SECTION 04 05 13 - MASONRY MORTAR AND GROUT

Some of the paragraphs may be deleted. When deleting, do not renumber all the paragraphs. Simply leave the section number and title as is, delete the text, and add the words "Not Used".

PART 1 SUMMARY

1.1 SCOPE

A. This Section includes all labor, materials and equipment required to complete masonry mortar and grout work required by the Contract Documents.

B. Section Includes:

1. Grout
2. Mortar
3. Admixtures
4. Masonry cleaners

1.2 REFERENCE STANDARDS

A. ASTM International (ASTM):

1. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar
2. ASTM C204 - Standard Test Methods for Fineness of Hydraulic Cement by Air-Permeability Apparatus
3. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes
4. ASTM C270 - Standard Specification for Mortar for Unit Masonry
5. ASTM C404 - Standard Specification for Aggregates for Masonry Grout
6. ASTM C476 - Standard Specification for Grout for Masonry

1.3 SUBMITTALS

A. Grout design: Indicating type and proportions of the ingredients according to the proportion requirements herein and ASTM C 476.

1. In lieu of grout design, submit the mix designs and grout strength test performed in accordance with ASTM C 476.

B. Mortar design: Indicating type and proportions of ingredients in compliance with the proportion specification herein and ASTM C 270.

1. In lieu of mortar design, submit the mix design and mortar tests performed in accordance with the property specification of ASTM C 270.

C. Color samples for Owner selection of mortar color.

D. Material certificates certifying each material is in compliance for all Mortar and Grout materials and admixtures.

E. Construction procedures for Cold Weather Construction and/or Hot Weather Construction.

F. Masonry Cleaner: Product information

1.4 QUALITY ASSURANCE

A. Testing Service -- The Owner will engage an independent testing laboratory to perform material evaluation tests and to perform required Special Inspections.

B. Materials and installed work may require testing and retesting, as directed by the Owner or Engineer, at any time during the progress of the Work. Allow free access to material stockpiles and facilities at all times. All initial testing required by the Contract Documents shall be done at the Owner's expense. Testing expenses for the retesting of rejected materials and installed work will be charged back to the Contractor.

C. Minimum Testing Frequency:

1. An independent testing agency or laboratory shall make test specimens of grout and mortar on job site.

2. One mortar test and one grout test shall be taken for each 2,000 square feet of wall area but at least one set of tests shall be taken.

3. The use of testing and inspection does not relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.

D. International Building Code (IBC):

1. Masonry construction shall be inspected and evaluated in accordance with the requirements of Chapter 17 of the IBC and shall be governed by the classification of the building or structure or nature of occupancy to either Level 1 inspection (IBC Table 1704.5.1 and 1708.1.2) or Level 2 inspection (IBC Table 1704.5.3 and Table 1708.1.4).

2. The Contract Documents shall dictate the required level of inspection per above reference or provide a project specific special inspection program.

3. If the Contract Drawings do not specify the level of required inspection, provide Level 2 inspection, or obtain written direction from the Engineer to the required level of inspection.

E. Environmental:

1. The cold weather construction provisions of ACI 530.1/ASCE6/TMS 602, Article 1.8 C shall be implemented when the ambient temperature falls below 40 degrees Fahrenheit (F), or the temperature of the masonry units is below 40 degrees F.

2. The hot weather construction provisions of ACI 530.1/ASCE 6/TMS 602, Article 1.D shall be implemented when the ambient temperature exceeds 100 degrees F or when the temperature exceeds 90 degrees F, and the wind velocity is greater than 8 miles per hour.

3. No salt, anti-freeze chemicals, or related materials permitted. Store masonry units and bagged materials off ground and protect from rain.

4. Do not build on work having film of water or frost on surfaces.

5. Protect work by covering in rainy weather; protect green masonry from freezing.

6. Before stopping work for day, cover tops of walls at new work with non-staining waterproof covering extended 2 feet minimum down both sides of wall and secured.

PART 2 PRODUCTS

2.1 MORTAR AND GROUT MATERIALS

A. Cement: Type I Portland cement conforming to ASTM C150.

B. Fine and coarse aggregate: ASTM C404 for grout.

C. Sand:

1. Clean, sharp, well graded, and free from salt, loam, clay, and other foreign matter.

2. Sand shall conform to ASTM C144 for mortar.

3. Sand shall be graded as follows:

Sieve Size	Percent Passing
4	100
8	95 - 100
16	70 - 100
30	40 - 75
50	15 - 35
100	2 - 15
200	0

D. Lime: Hydrated type conforming to ASTM C207, Type S.

E. Water: Clean, fit for drinking (potable), and free from strong acids, alkalis, oils, or organic material.

F. Waterproofing admixture: Powder.

1. Type: Grace Hydratite Plus, CemMaster Hydrolox 400, BASF Rheomix, BASF Rheopel or equal.

G. Accelerator or retardant

1. May be added when required by weather conditions.

2. Type: Anti-Hydro, Grace Dehydratine 80 or Dehydratine 80M, BASF Pozzolith, Sika Plastiment, Sonneborn Sonotard, Trimex, or equal.

H. Intrusion (water-reducing) admixture for grout.

1. Type: BASF Pozzolith, IntrusionAid or equal.

I. Water-reducing admixture for mortar.

1. Type: BASF Rheomix or equal.

J. Mortar Color.

1. Pure natural finely milled inert water insoluble non-bleeding and free of deleterious fillers or extenders.

2. Color shall be as shown on the Drawings.

3. Color shall be selected by Owner from Manufacturer's standard range of colors.

2.2 PROPORTION OF MIXES

A. Mortar

1. Conform to ASTM C270 and be of the type and color specified.

2. Type S with minimum 28-day compressive strength of 2,000 pounds per square inch (psi) minimum.

3. Mixed by volume in ratio of 1-part Portland cement (6 sacks per cubic yard minimum), 1/4- to 1/2-part lime, 2-1/4 to 3 parts (to cement-lime combined volume) sand.

4. Pointing mortar shall be 1-part cement, 1/4 lime, 3 parts sand by volume. Add 1 pound of water-reducing admix for mortar per bag of cement and 1 pound per cubic foot of lime.

5. Add waterproofing in amounts recommended by Manufacturer, 0.2 pounds of waterproofing per 100 pounds of cement minimum.

6. Do not use admixtures containing more than 0.2 percent chloride ions.

7. Limit the maximum percentage of mineral oxide or carbon black job site pigments by weight of cement as follows: For pigmented Portland cement-lime mortar; 10 percent maximum mineral oxide pigment or 2 percent maximum carbon black pigment.

B. Masonry grout

1. Conform to ASTM C476.

2. Minimum 28 days compressive strength greater than or equal to compressive strength (f'm), but not less than 2,000 psi, 7 sacks of cement minimum per cubic yard.

3. Waterproofing admix and intrusion admix in amounts recommended by Manufacturer, 0.2-pound of waterproofing per 100 pounds of cement minimum.

C. Grout for pouring:

1. Fluid consistency, 7 to 8 inches slump.

2. Accurately mix by volume 1-part Portland cement: 2 parts minimum to 3 parts maximum of damp loose sand: 2 parts maximum of 3/8-inch minus aggregate.

3. For grout spaces less than 3 inches in any dimension, omit 3/8-inch minus aggregate.

D. Grout for pumping:

1. Without segregation of the constituent parts.

2. Mixed to a consistency that has a slump between 8 to 11 inches.

E. Empty bags for waterproofing and intrusion admixes shall be retained for verification prior to their disposal. Use accelerator or retardant in strict accordance with Manufacturer's printed instructions.

2.3 MASONRY CLEANER

A. Sure Kleen #101 Lime Solvent or equal.

PART 3 EXECUTION

3.1 MIXING

A. Grout: Plant batched.

B. Mortar:

1. All tools and equipment used in mixing of mortar shall be clean and free of contaminants.

2. Measure materials by volume or equivalent weight, not by shovel.

3. Supply only as much water as necessary to obtain desired workability; required compressive strength must be met.

4. Mix by placing 1/2 of the water and sand in the operating mixer. Then add the cement, lime, and the remainder of the sand and water.

5. After all ingredients are in the batch mixer, they shall be mechanically mixed for not less than 3 minutes.

6. Hand mixing shall not be employed.

7. Heat aggregates when air temperature is below 32 degrees F to maintain mortar at 70 to 120 degrees F until used.

8. Maintain workability of mortar by re-tempering.

a. Re-temper by adding only as much water as required to maintain high plasticity.

b. Re-tempering shall only be done by adding water within a basin formed from mortar on a mortar board and working mortar into water.

c. Discard all mortar which has begun to stiffen, or which is unused after 2-1/2 hours from the initial mixing.

3.2 INSTALLATION

A. See Section 04 22 00, Concrete Unit Masonry.

B. All masonry shall be laid true straight level, plumb and neatly in accordance with the drawings; lay out in advance so that no concrete unit less than 8 inches in length occur except where necessary as in reveals, etc.

C. All units shall be saw cut accurately to fit all openings, and for electrical and plumbing work.

1. No plumbing or electrical boxes or conduit shall be placed in any cell or course that contains reinforcing.

2. All cutting shall be done with masonry saw and produce neat and true surface.

D. All units shall be sound, dry, clean, and free from cracks and chips.

E. No construction supports shall be attached to the wall except where specifically permitted by the Engineer.

F. Units shall be “air” dry at time of laying.

3.3 REINFORCEMENT

A. Refer to Section 03 21 00, Reinforcing Steel.

B. The following minimum requirements shall be met unless shown otherwise:

1. Provide #4 verticals at 4 feet maximum on center. Locate two #4 at each jamb of door, window, louver, and other openings and end of walls; run full height of wall. Reinforcement adjacent to openings need not be provided for openings smaller than 16 inches in either the horizontal or vertical direction, unless the spacing of distributed reinforcing is interrupted by such openings. Position one #4 vertical at each wall corner and each wall intersection; run full height of wall. Dowel verticals to foundation with one #4 dowel 4 feet long minimum per vertical; embed dowel 2 feet in foundation unless otherwise shown on drawings.

2. Horizontal reinforcement, unless shown otherwise, shall be two #4 rebars in the bond beams which are located at 4 feet maximum on center and at all floor and roof levels. Bend rebar at corners and intersections or supply 2 feet by 2 feet rebar of same size and number as horizontal reinforcement. Horizontal reinforcement shall be anchored around vertical reinforcing bars with a standard hook at all wall ends, corners, and intersections that are not continuous around the corner or through the intersection. For openings, minimum lintel size and reinforcement shall be two #4 rebars in bottom of 8-inch lintel for less than 4 feet span, and two #5 rebars in bottom of 16 inches lintel for 4 feet to 10 feet span. Lintel reinforcement to extend 2 feet beyond each side of jamb.

3. Before placing reinforcement remove mud, oil, mills scale, loose rust, ice, and any other coatings from it. Position reinforcement accurately; center in cells unless noted otherwise. Secure against displacement, holding vertical reinforcement firmly in place by means of frames, rebar spacers, or other suitable devices, and place horizontal reinforcement as laying progresses. Vertical bars shall be held in position at the top and bottom and at intervals not exceeding 192 diameters of the reinforcement.

4. Minimum clear distance between longitudinal bars shall be nominal diameter of bar or 1-inch, whichever is larger. Minimum thickness of mortar or grout between masonry and reinforcement shall be 1/4-inch for fine grout and 1/2-inch for coarse grout. Unless noted otherwise, reinforcing bars and dowels shall be lapped 40 bar diameters or 2-foot, 6 inches minimum, where spliced end shall be separated by one bar diameter or wired together.

5. Splice reinforcement only at points shown on Drawings or reviewed shop drawings; any other locations must be specifically reviewed by Engineer. Splices in adjacent bars shall be staggered; in horizontal reinforcement of walls separate at least 10 feet longitudinally for bars of same tier.

6. When a foundation dowel does not line up with a vertical core, it shall not be sloped more than one horizontal in six vertical. Dowel shall be grouted into a core in vertical alignment, even though it may be in cell adjacent to cell holding vertical wall reinforcing.

7. Bond beam reinforcement shall be laid continuously on webs of bond beam units. Intersecting masonry walls shall be tied to one another by horizontal reinforcement, unless noted otherwise; where masonry walls intersect with concrete walls, connect with 1/2-inch diameter by 15-inch mechanical bolts in flush shells at bond beams.

8. To allow bonding masonry, clean laitance from top of concrete foundation before proceeding. The stating joint on foundations or slabs shall be laid with full mortar coverage except at the area where grout occurs, which shall be kept free of mortar so that grout is in contact with the foundation slabs.

9. Lay units in regular running bond except where soldier or other coursing is shown on drawings; maintain even module. Corners shall have same masonry bond by overlapping units. Joints shall be uniform throughout all work having same type of masonry units.

10. At running bond, thread vertical reinforcing through alternately overlapping cells. Lay units according to “face and shell” method; provide full mortar coverage on all face shells, and on faces and webs surrounding vertical and horizontal cells to be filled with grout.

11. Do not furrow bed joints. Shove tightly each new unit against existing unit so that mortar bonds well to both.

12. Rock closures into place. Do not pound corners and jambs to fit stretcher units after they are set in position. Remove all excess grout and mortar spilled on masonry units during construction.

13. Dry brush all masonry surfaces at end of each day’s work. Stop off horizontal run of masonry by racking back one-half length of unit in each course at end of day’s work. Toothing is not permitted. Where fresh masonry joins partially set masonry, remove loose

units and mortar clean and then lightly wet exposed surface of set masonry before starting new work.

14. Joints of walls to be covered or furred may be left flush, without tooling. Joints of all walls which are to be exposed shall be tooled when "thumb right" hard mortar is partially set but still sufficiently plastic to bond) with round jointer or bar to produce a dense, slightly concave surface, well bonded at edges. All tooling shall be done with a tool which compacts the excess mortar out of joint rather than dragging it out. Joints which are not tight at the time of tooling shall be raked out, pointed, then tooled. If it is necessary to move to a unit after it has been once set in place, the unit shall be removed from wall, cleaned, and set in fresh mortar. Remove any mortar fins from joint junctions.

15. Unless shown otherwise on drawings, provide 8-inch lintel for concrete masonry openings 4 feet wide or less and 16-inch lintel for openings greater than 4 feet wide. Forms and shores for lintels shall be substantial. Brace or tie forms to maintain position and shape. Forms shall be tight with no leakage of mortar or grout. Do no remove forms and shores until masonry has hardened sufficiently to carry its own weight and other temporary loads that may be placed on it during construction, 10 days minimum.

3.4 GROUTING

A. Grouting shall be by low lift method.

B. Cells containing reinforcement or embedded items shall be solidly filled with grout. Before grouting starts, reinforcing steel shall be secured in a place and observed by Engineer and inspected by Building Inspector from governmental unit having authority.

C. Vertical cells to be filled shall have vertical alignment to maintain continuous unobstructed cell area. To confine grout to horizontal masonry beams, the tops of unfilled cell cavities or cores in masonry units under beams shall be covered with metal lath, or special bond beam or lintel units shall be used, or another method may be employed if approved by Engineer, building paper shall not be permitted.

D. All bolts, anchors, etc., inserted in walls shall be fully and solidly grouted in place. Embedment shall not be less than three-fourths of the wall thickness, unless otherwise noted.

E. Masonry shall cure at least 24 hours before grouting. Keep clean of mortar and drippings those cavities and cores which are to be grouted. Mortar projections and droppings shall be washed out of spaces and off reinforcing with a jet stream of water.

F. Grout shall be poured in lifts not exceeding 5 feet. All masonry shall be laid using the Low-Lift grouting method with maximum grout pour heights not to exceed 5 feet unless otherwise allowed in writing by the Engineer. In addition, grout pour heights shall not exceed the maximum grout pour height limits of Table 7 of ACI 530.1/ASCE6/TMS 602, based upon the minimum grout space dimensions for grouting of cells of hollow units. Lay masonry until location of a bond beam or horizontal lintel beam is reached, but not to exceed the limits of Table 7 of ACI 530.1/ASCE6/TMS 602, and then grout full the vertical cells required to be grouted and fill the beam or lintel without pause.

G. To ensure complete filling of grout space, consolidate grout at time of pouring by puddling and then reconsolidate by later puddling before the plasticity is lost. Consolidate pours exceeding 12 inches in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.

H. Solid grout hollow metal door and window frames; for all wall openings over 2 feet wide, solid grout from lintel to floor or roof above in one continuous operation.

I. Place grout within 1-1/2 hour from introducing water in the mixture and prior to initial set.

3.5 MASONRY CLEANING

A. All mortar and grout must be thoroughly set and cured before cleaning. Remove excess mortar or mortar stains or efflorescence; scraping devices shall be nonferrous. Protect all adjacent surfaces, including sash and other corrodible metalwork, from damage by cleaning solvent.

B. Saturate all exposed masonry with water immediately before cleaning, apply solution of cleaner as per Manufacturer's instructions and rinse thoroughly with fresh, clean water immediately after cleaning. Do small sections at a time, working from top to bottom. Repeat as necessary.

C. Tuckpoint any loose or defective mortar joints. At conclusion of masonry work, remove scaffolding and equipment used in work and remove debris, refuse and surplus masonry material.

END OF SECTION

SECTION 04 22 00 - CONCRETE MASONRY UNIT

Some of the paragraphs may be deleted. When deleting, do not renumber all the paragraphs. Simply leave the section number and title as is, delete the text, and add the words "Not Used".

PART 1 SUMMARY

1.1 SCOPE

A. Work included under this section shall include all materials and perform labor required to execute this work as indicated on the drawings, as specified and as necessary to complete the work, including, but not limited to, these major items:

1. Concrete masonry unit
2. Vertical and horizontal reinforcing and dowels projecting into subsequently placed concrete.
3. Setting of flashing and other work to be embedded in masonry.

1.2 RELATED SECTIONS:

Check that references to other related sections are accurate. Grout specified in Division 03 generally applies to concrete work and a separate Division 4 Mortar and Grout could be used in conjunction with Division 03 grout. Confirm there is not overlap between the two sections.

A. Section 03 21 00, Reinforcing Steel

B. Section 04 05 13, Masonry Mortar and Grout.

1.3 SUBMITTALS

A. Samples -- Before any concrete masonry unit materials are delivered to the job site, submit one sample of each proposed concrete masonry unit.

B. Submit color samples for Owner selection of concrete masonry unit colors.

C. Material Certificates -- Prior to delivery of concrete masonry materials, anchors, ties, fasteners, and metal accessories to the job site, deliver a letter from the Manufacturer of the proposed masonry units, anchors, ties, fasteners, and metal accessories certifying that all such units to be delivered to the job site are in strict conformance with the provisions of this Section.

D. Construction procedures for Cold Weather Construction and/or Hot Weather Construction for review and approval by Owner in compliance with the requirements herein prior to use on the Project.

E. A letter of certification from the Supplier of the materials prior to delivery of the materials to the site to verify the compressive strength (f'm) according to the IBC.

1.4 QUALITY ASSURANCE

A. Qualifications of Workers

1. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

2. Provide one skilled journeyman mason who shall be present at all times during execution of this portion of the work and who shall personally direct all work performed under this Section.

B. Standards, Specifications, and Codes

Comply with the applicable provision of the following codes, specifications, and standards to the extent indicated by reference thereto:

1. American Concrete Institute (ACI)

2. ASTM International (ASTM)

3. National Concrete Masonry Association (NCMA)

4. Structural Clay Products Institute (SCPI)

5. American Society of Civil Engineers (ASCE)

6. The Masonry Society (TMS)

7. The International Building Code (IBC)

Comply with building code requirements which are more stringent than the above and all Occupational Safety and Health Administration (OSHA) requirements.

C. Testing Service -- The Owner will engage an independent testing laboratory to perform material evaluation tests and to perform required Special Inspections.

Confirm that Owner will hire independent testing laboratory.

D. Materials and installed work may require testing and retesting, as directed by the Owner or Engineer, at any time during the progress of the work. Always allow free access to material stockpiles and facilities. All testing required by the contract documents shall be done at the Owner's expense. Testing expenses for the retesting of rejected materials and installed work will be charged back to the Contractor.

E. International Building Code (IBC):

1. Masonry construction shall be inspected and evaluated in accordance with the requirements of Chapter 17 of the International Building Code (IBC) and shall be governed by the classification of the building or structure or nature of occupancy to either Level 1 inspection (IBC Table 1704.5.1 & 1708.1.2) or Level 2 inspection (IBC Table 1704.5.3 & Table 1708.1.4).

2. The Contract Documents shall dictate the required level of inspection per above reference or provide a project specific special inspection program.

3. If the Contract Drawings do not specify the level of required inspection the Contractor shall provide Level 2 inspection or obtain written direction from the Engineer to the required level of inspection.

F. Minimum Testing Frequency:

1. An independent testing agency or laboratory shall verify the f'm of the proposed construction prior to construction and at regular intervals during construction as indicated in the Contract Documents, but at least one test for every 5,000 square feet during construction.

2. The f'm shall be determined for each wythe of multiwythe walls.

3. Unless specifically directed within the Contract Documents, use the unit strength method specified by ACI 530.1/ASCE6/TMS 602 or the prism test method of ASTM C 1314.

4. The use of testing and inspection does not relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.

1.5 PRODUCT HANDLING

A. Store materials under cover in a dry place and in a manner to prevent damage or intrusion of foreign matter. During freezing weather protect all masonry units with tarpaulins or other suitable material. Store masonry units under covers that will permit circulation of air and prevent excessive moisture absorption. Protect concrete masonry units from wetting.

B. Handle unit on pallets or flatbed barrows.

C. Replacements - In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner and at no additional cost to the Owner.

D. Reinforcing, metal ties, and anchors shall be protected from contact with soil and water and before being placed shall be free of loose rust and other coatings that will reduce or destroy bond.

E. Environmental Conditions - Implement the following special construction procedures based on the environmental conditions encountered during masonry construction. Failure to maintain the conditions specified below during the construction of masonry work will be just and sufficient cause for such work to be rejected.

1. Cold Weather - The cold weather construction provisions of ACI 530.1/ASCE6/TMS 602, Article 1.8 C shall be implemented when the ambient temperature falls below 40 degrees Fahrenheit (F), or the temperature of the masonry units is below 40 degrees F. All masonry units and all work on which new masonry is constructed shall be free of frost, ice, snow, and surface moisture and their temperature shall not be lower than 40 degrees F. Protect green masonry from freezing. No salt, anti-freeze chemicals, or related materials are permitted.

2. Hot Weather - The hot weather construction provisions of ACI 530.1/ASCE 6/TMS 602, Article 1.D shall be implemented when the ambient temperature exceeds 100 degrees F, or when the temperature exceeds 90 degrees F and the wind velocity is greater than 8 miles per hour.

3. Wet Weather - Store masonry units and bagged materials off ground and protected from rain. Do not build on work having a film of water on any surfaces. Protect work by covering in rainy weather. Before stopping work for the day, cover the tops of walls at new work with non-staining, waterproof covering extended 2 feet minimum down both sides of wall and secured in place.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Unit shall be in modular sizes. Exposed-to-view units in any one building shall be of the same appearance. The texture of units shall match the approved samples for the types of construction and locations designated on the plans. Units shall not contain iron spots or other substances that will stain plaster or paint.

B. Hollow load-bearing units shall conform to ASTM C90 type 1, Grade N.

C. The composition shall be 50 percent lightweight (pumice) and 50 percent sand. The lightweight aggregate shall conform to ASTM C331, and the sand shall conform to ASTM C33.

D. Minimum compressive strength of all blocks shall be 2,000 pounds per square inch based on the net area.

E. Maximum water absorption permitted for units at the time of delivery to the job site shall be 15 pounds per cubic foot of concrete as an average of five units for normal weight aggregate per ASTM C140.

F. Maximum moisture content permitted for standard weight aggregate units at time of delivery shall be 30 percent of total absorption. The tests for moisture content shall be determined from an average of five units per ASTM C140.

G. Maximum linear shrinkage shall not exceed .035-inch per unit. Concrete masonry units shall include lintel, and bond beam units, and special shapes and sizes required to complete the work indicated.

H. Certification required above shall show results of tests made not more than 12 months prior to delivery of concrete masonry units to the job site, shall show compliance with the specified values, and shall certify that the mix design, yield per batch, and curing procedures for the units delivered to the job site will be equal to those submitted for the test.

I. Unit Colors. Pure natural finely milled inert water insoluble non-bleeding and free of deleterious fillers or extenders. Colors shall be as shown on the plans. Colors shall be selected by Owner from Manufacturer's standard range of colors.

2.2 MORTAR AND GROUT

Provide mortar and grout as indicated on the drawings in conformance with the requirements of Section 04 05 13, Masonry Mortar and Grout, of these specifications.

2.3 REINFORCEMENT STEEL

Provide reinforcement steel as indicated on the drawings and in conformance with the requirements of Division 3 of these specifications and of Section 04 05 13, Masonry Mortar and Grout.

2.4 OTHER MATERIALS

All other materials, not specifically described but required of a complete and proper installation of the work of this Section, shall be as selected by the Contractor subject to the approval of the Owner.

PART 3 EXECUTION

3.1 INSPECTION

Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 COORDINATION

Carefully coordinate with all other trades to ensure proper and adequate interface of the work of other trades with the work of this Section.

3.3 INSTALLATION

A. Masonry shall be plumb, true to line, with level courses accurately spaced, and built to thickness and bond pattern indicated. Where no pattern is indicated, masonry shall be laid in running bond pattern. Concrete masonry units shall be dry when laid. Each unit shall be adjusted to final position in the wall while mortar is still soft and plastic. Any unit disturbed after mortar has stiffened shall be removed and re-laid with fresh mortar. Chases shall be built in and not cut in. Chases shall be plumb and shall be minimum one-unit length from jambs of openings. Chases and raked-out joints shall be kept from mortar or debris. Spaces around metal door frames and other built-in items shall be solidly filled with mortar as each course is laid. Anchors, wall plugs, accessories, flashings, and other items to be built in shall be installed as the masonry work progresses. All cutting and fitting of masonry, including that required to accommodate the work of other sections shall be done by masonry saws.

B. Where fresh masonry joins masonry that is partially set or totally set, clean the exposed surface of the set masonry, and remove all loose mortar. If it is necessary to “stop off” a horizontal run of masonry, this shall be done by raking back one-half brick or block length in each course. Toothing will not be permitted.

C. Before closing any pipe, duct, or similar inaccessible spaces or shafts with masonry, remove all rubbish and sweep out the area to be enclosed.

D. Provide level and solid bearing in masonry walls under all bearing structural floor and roof elements. Solid bearing shall be bond beams unless otherwise indicated.

E. All masonry walls shall extend to underside of floor beams or roof metal decking unless otherwise indicated.

F. If blowouts, misalignment, or cracking of face shells should occur during construction, the wall shall be torn down and rebuilt at no additional cost to the Owner.

G. Mortar Beds and Joints

1. Hollow units shall be laid with full mortar coverage on horizontal and vertical face shells, except that webs shall be also be bedded in all courses of the starting course on footings and solid foundation walls, and where adjacent to cells or cavities to be reinforced and/or filled with grout or concrete.

2. Horizontal and vertical face joints shall be 3/8-inch thick unless otherwise indicated. Vertical joints shall be shoved tight. Mortar joints in exposed or painted surfaces shall be tooled when thumbprint hard to a flush joint. Joints in unparged masonry below grade shall be pointed tight with a trowel. Mortar joints in surfaces to be plastered, stuccoed, or covered with other masonry shall be cut flush. Mortar protrusions extending into cells or cavities to be reinforced and filled shall be removed.

H. Placing Reinforcement

1. Splices in reinforcement shall be made only at such points and in such a manner that the structural strength of the member will not be reduced. Lapped splices shall provide enough lap to transfer the working stress of the reinforcement by bond and shear. Minimum lap shall be 40 bar diameters, where spliced end shall be separated by one bar diameter or wired together. Welded or mechanical connections shall develop the full yield strength of the reinforcement. Bond beams shall be continuous around corners.

2. Vertical reinforcement shall be rigidly secured at the top and bottom and at intervals necessary to hold the reinforcing in proper position.

3. Reinforcement shall be placed at the wall centerline unless indicated otherwise.

I. Grouting

1. Units containing reinforcement shall be filled solid with grout. All cells that are indicated to be filled shall be filled with grout as specified in this Division and as shown on the drawings.

2. Grout shall be poured in lifts not exceeding 5 feet. The maximum grout pour height shall be not exceed the limits of Table 7 of ACI 530.1/ASCE6/TMS 602. Lay masonry until location of a bond beam or horizontal lintel beam is reached, but not to exceed the limits of Table 7 of ACI 530.1/ASCE6/TMS 602, and then grout full the vertical cells required to be grouted and fill the beam or lintel without pause.

3. To ensure complete filling of grout space, consolidate grout at time of pouring by puddling and then reconsolidate by later puddling before the plasticity is lost. Consolidate pours

exceeding 12 inches in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.

4. Solid grout hollow metal door and window frames; for all wall openings over 2 feet wide, solid grout from lintel to floor or roof above in one continuous operation.

5. Place grout within 1-1/2-hour from introducing water in the mixture and prior to initial set.

J. Low-Lift Grouting

1. The repetitive construction procedure of erecting a masonry wall to a height not greater than 5 feet, grouting the wall as required and then repeating this cycle until the top of the wall is reached shall be classified as low-lift grouting. Grout shall be placed while mortar joints are still soft and plastic or the grout spaces shall be cleaned of mortar dropping and protruding mortar joints shall be removed.

2. Set steel lintels in beds of mortar. Fill spaces around jambs and head of metal door buck and frames solidly with mortar.

K. Pointing and Cleaning

1. At the completion of the work, all holes in joints of masonry surfaces to be exposed or pointed except weep holes shall be filled with mortar and suitably tooled, masonry walls shall be dry brushed at the end of each day's work and also final pointing and shall be left clean and free from mortar spots and droppings. Any cracks in masonry shall be repaired. Defective joints shall be cut out and repointed.

2. Remove efflorescence, mortar spots and other areas that appear unclean with cleaning agent to a sample wall area as directed by the Owner. The Owner retains the right to change proposed cleaning methods and shall be notified before any additional cleaning agent is used. The cleaning methods agent shall be applied to a small section of the wall at a time and work shall proceed from the top to the bottom. Protect all metal sashes, lintel, louvers, and other corrodible parts when masonry is cleaned.

END OF SECTION