SECTION 04 23 00

REINFORCED UNIT MASONRY

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Related Documents: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to work specified in this section.

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

A. Reinforced masonry work includes all labor, materials, and equipment necessary and required for reinforced concrete masonry, reinforced brick masonry, and reinforced utility brick hollow bonded walls. This section applies only to reinforced masonry work in conjunction with Section 04200, “Unit Masonry”.

B. Extent of work to be performed and/or coordinated shown on the drawings and indicated in the specifications including, but not limited to masonry units, reinforcing, accessories, and grout.

C. Coordinate work with all other trades, including but not limited to concrete reinforcement and structural steel.

1.03 RELATED WORK

A. Unit Masonry: Section 04200

B. Cast-in-Place Concrete: Section 03300

C. Expansion/Adhesive Anchors: Section 05120

D. Embedded Items: Section 05500

E. Joint Sealants: Section 07900

1.04 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:

1. ACI 530 “Building Code Requirements for Masonry Structures”.

2. ACI 530.1 “Specification for Masonry Structures”.

3. ACI “Detailing Manual for Reinforced Concrete” (SP-66).

4. CRSI “Manual of Standard Practice”

5. CRSI “Placing Reinforcing Bars”

6. “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined by ASTM E119, by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

C. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 SUBMITTALS:

A. Unless otherwise specified, submittals required in this section shall be submitted for review.

B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner’s Notice to Proceed.

C. All submittals shall be reviewed and returned to the Architect within 10 working days.

D. Incomplete submittals will not be reviewed.

E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section have been complied with.

F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

G. Product Data: Submit producer’s or manufacturer’s specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. Reinforcement certified mill reports covering chemical and physical properties and yield strength.

2. Masonry sizes, shapes, weights, densities, strengths, material composition, admixtures, colors, and manufacturing processes and procedures.

3. Mortar and/or Grout.

4. Accessories, Ties, and Joint Reinforcement

5. Admixtures.

6. Expansion/Adhesive Anchors.

H. Shop Drawings:

1. Shop Drawing Review: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Submit shop drawings for fabrication, bending and placement of masonry reinforcement. Comply with ACI 315, showing bar schedules, stirrup and tie spacing, diagrams of bent bars, and arrangement of masonry reinforcement. Include special reinforcement required at openings through masonry. Include supplemental reinforcing and bar supports necessary to support reinforcing steel at proper location within masonry units and bond beams. Coordinate masonry reinforcement with concrete reinforcement.

2. Review of the shop drawings will be made for the size and arrangement of reinforcement. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility. Submit one print and one reproducible. Print will be reviewed and a reproducible will be returned to Contractor for printing and distribution. Multiple copies will not be marked by Engineer.

3. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided all items listed prior. Incomplete submittals will not be reviewed.

4. Mix designs: Submit all laboratory test reports and materials for each mix design listed within. Prepare mixes by the field experience method and/or trial mixtures per the requirements of chapter 5 of ACI 318. Proportioning by water cement ratio method will not be permitted.

5. LEED Documentation: Refer to paragraph 1.06 of this section and Section 01352.

6. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources and descriptions.

7. Contraction/Construction Joints: Submit plan indicating proposed location of contraction and construction joints in masonry walls.

1.06 LEED Requirements

A. Material Recycled Content: Slag or Fly Ash Cement Replacement

1. Blast Furnace Slag: Granulated blast furnace slag conforming to ASTM C989, included in the calculation of water-cementitious materials, and shall be included in the concrete mix. The weight of granulated blast-furnace slag shall be 40 percent of cementitious materials. The slag used in the manufacture of a Type IS or ISM blended hydraulic cement conforming to ASTM C595 shall be included in the calculated percentage.

2. Fly Ash: As an alternate to Blast Furnace Slag, Fly Ash and pozzolan conforming to ASTM C618, included in the calculation of water-cementitious materials, shall be included in the concrete mix. If used the Fly ash shall be included in the percentages prescribed above. The fly ash and pozzolan present in ASTM Type IP or IPM blended cement, conforming to ASTM C595, shall be included in the calculated percentage.

3. Grout mix designs shall indicate the cement replacement percentages.

4. Substitution of 4,000 psi grout for 3,000 psi grout is not acceptable.

B. Material Recycled Content: Concrete Reinforcing Steel

1. The sum of the post-consumer and half pre-consumer recycled content: 60% minimum

2. Submit invoices and documentation from manufacturer of the amounts of post-consumer and post-industrial recycled content by weight for products with specified recycled content.

D. Local/Regional Materials: Ready-mix concrete supplier shall be located within 500 miles of the project location. In addition, all ingredients within the concrete mix shall be extracted, harvested or recovered within 500 miles of the project location. Submit documentation of manufacturing locations and origins of materials.

E. Low emitting adhesives and sealants: Provide water-based, biodegradable form coating with maximum VOC content of 55 grams/liter. Provide cut sheet and/or material safety data sheet for form coating with VOC levels highlighted.

F. Waste Management:

1. Before concrete pours, designate locations or uses for excess concrete. Options include the following:

a. Additional paving.

b. Post footing anchorage.

c. Swale, riprap reinforcing.

d. Flowable fill.

e. Footing bottom, retaining wall footing ballast.

f. Storm structure covers.

g. Underground utility pipe kickers.

h. Storm pipe flared end section.

i. Toe wash protection, and shoulder and toe outfall restraints for temporary erosion pipes.

2. Before grout pours, designate a location for cleaning out concrete trucks. Options include the following:

a. Company-owned site for that purpose (meeting environmental standards).

b. On-site area to be paved later in Project.

3. Collect waste reinforcing steel and place in designated area for recycling

PART 2- PRODUCTS

2.01 MASONRY MATERIALS

A. Load Bearing Units:

1. Hollow Load Bearing Units: ASTM C-90

a. Normal weight units

b. Minimum average net area compressive strength = 1,900 psi.

2. Solid Load Bearing Units: ASTM C-145

a. Normal weights units

b. Minimum average net area compressive strength = 1,900 psi

3. Nominal Dimensions:

a. 12” units: 15-5/8”x11-5/8”x7-5/8” actual

b. 8” units: 15-5/8x7-5/8”x7-5/8” actual

c. Provide other nominal sizes as indicated on the Architectural Drawings or in related specifications.

d. Construct lintels using reinforced concrete masonry units with grouted joints where shown. Lintels may be prefabricated for incorporation into work.

4. Single Source for Masonry Units: Obtain masonry units of uniform texture and color as specified from single manufacturer.

B. Fire Rating Requirements: Concrete masonry units shall have a U.L. listed fire rating of as indicated on the Architectural Drawings or in related specifications.

2.02 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold weather construction. Provide natural color unless otherwise indicated.

B. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified here within, combined with set-controlling admixtures to produce ready-mixed mortar complying with ASTM C1142.

C. Aggregate for Mortar: ASTM C144, except for joints less than 1/4" thick, use aggregate graded with 100 percent passing No. 16 Sieve.

D. Aggregate for Grout: ASTM C 404.

E. Water: Clean and potable

F. Additives: None permitted.

2.03 MORTAR AND GROUT MIXES:

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

B. Mortar:

1. Job mixed mortar: Comply with ASTM C270, Proportion Specification for job mixed mortar
2. Ready-mixed mortar: ASTM C 1142
3. Masonry cement shall consist of portland-cement lime; mortar cement is acceptable, masonry cement is not acceptable.
4. Mortar shall be Type S, unless otherwise noted.
5. Mortar compressive stress when tested per ASTM C270 at 28-days shall be a minimum of 1,800 psi.
6. Single Source for Mortar Units: Obtain mortar materials of uniform texture and color as specified from single manufacturer.

C. Grout:

1. Comply with ASTM C476.

2.03 MASONRY REINFORCEMENT:

A. General: Comply with this specification for placing reinforcement. Comply with Division 3, Section 03300 for other requirements. Shop fabricate, whenever possible, reinforcing bars shown as bent or hooked.

B. Deformed Bars: Provide ASTM A615 Grade 60 deformed bars. Except provide ASTM A615 Grade 60s where field bending of reinforcement is required or intended, and ASTM A-706 Grade 60 for all conditions where welding of reinforcement is required.

C. Smooth Steel Wire: Provide ASTM A675 Grade 80 for all #2 bars of smooth, round stock, where noted on the drawings for use in columns or pilasters as ties.

2.04 MASONRY ACCESSORIES:

Q. General: Provide accessories and other items as required herein and in related specification sections and as indicated on the drawings. For all types of accessories, hot-dip galvanize after fabrication with 1.5 oz. zinc coating, ASTM A-153, Class B2.

R. Prefabricated Joint Reinforcing: Provide continuous welded wire units prefabricated in straight lengths of not less than 10', with matching corner and tee units. Fabricate from cold-drawn steel wire complying with ASTM A-82, deformed continuous side rods with 3/16" diameter and plain 9 gage cross-rods, unit width of 1-1/2" less than thickness of wall/partition. Subject to compliance, provide products manufactured by "Dur-O-Wal", "AA Wire Products Company", or approved equal.

a. Single Width Walls: Truss type fabricated with single pair 3/16 gauge side rods and 9 gage continuous diagonal cross-rods.

S. Reinforcing Bar Positioners: Provide reinforcing bar supports/positioners for accurate positioning of horizontal and vertical reinforcement in walls, bond beams, and lintels. Fabricate from cold-drawn plain 9 gage steel wire complying with ASTM A-82. Subject to compliance, provide products manufactured by "Dur-O-Wal", "AA Wire Products Company", or approved equal.

D. Masonry Anchors and Ties: Provide straps, bars, bolts, rods, dovetail slots, metal fasteners indicated and other required accessory items of type, size, spacing, and at locations as required in related specification sections as identified on the drawings. Where masonry is indicated to be anchored to structural framework with flexible anchors, provide 2-piece anchors which will permit horizontal and vertical movement but will provide lateral restraint out of plane of wall.

E. Related Masonry Items: Provide joint fillers, insulation, flashings, weepholes, and other items related to masonry work as required in related specification sections and as identified on the drawings.

PART 3- EXECUTION

3.01 INSTALLATION:

A. General: Build masonry construction as required in related specification sections and as identified on the drawings. Build masonry construction to full thickness shown, except, single-wythe walls to actual thickness of masonry units, using units of nominal thickness shown or specified.

B. Do not use frozen materials or materials mixed/coated with ice or frost. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing. Do not wet concrete masonry units (CMU).

C. Mortar: Provide <u>full mortar coverage</u> on all horizontal and vertical surfaces including face shells and webs.

D. Reinforced Concrete Masonry Unit Walls: Lay CMU wall units in running bond with vertical joints in each course centered on units above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections. Use special shaped units where shown, and/or as required for corners, jambs, sash, control joints, lintels, bond beams, and other special conditions.

5. Maintain vertical continuity of core or cell cavities which are to be reinforced and grouted Keep cavities free of mortar. Solidly bed webs of masonry with mortar where adjacent to cells to be grouted.

6. Use special units or modify standard units, where horizontal reinforcing is shown to provide for continuous placement of reinforcing and grout. Place small mesh expanded metal lath or wire

screening in joints under bond beam courses above cells of non-reinforced or non-grouted masonry elements or provide bond beam units with solid bottoms (lintel block units). Provide open end bond beam units where horizontal and vertical reinforcing pass through same units.

3.02 PLACING REINFORCEMENT:

A. General: Clean reinforcement of loose rust, mill scale, earth, ice, or other materials which will reduce bond to mortar or grout. Do not use reinforcement with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes. Position reinforcement accurately at spacing shown on contract drawings.

B. Vertical Reinforcing: Support and secure vertical reinforcing against displacement. Vertical reinforcing shall be held in position at the top and bottom and at intervals not exceeding 192 bar diameters nor 10'-0" with a minimum clearance of ¼" from the face of the masonry
and not less than one bar diameter or 1", whichever is greater, between adjacent bars.

4. For columns, piers, and pilasters, provide a clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameter or 1-1/2", whichever is greater. Provide lateral ties as indicated in the details.

5. All dowels shall be grouted even if the dowel is in a cell adjacent to the vertical reinforcing. Unless detailed otherwise on the drawings, dowels shall be the same size, number, and spacing as the vertical reinforcing. Provide lap length of dowels to vertical reinforcing equal to forty-eight (48) times nominal diameter of dowel, unless indicated otherwise on the drawings. Dowels for columns and pilasters shall be installed using steel or wood templates to accurately position dowels as indicated on the drawings.

C. Horizontal Reinforcing: Support and secure horizontal reinforcing against displacement. Horizontal reinforcing shall be held in position at intervals not exceeding 100 bar diameters with a minimum clearance of ¼" from the face of the masonry and not less than one bar diameter or 1", whichever is greater, between adjacent bars. Provide laps or dowels around corners and across intersections as indicated on the drawings.

1. Horizontal reinforcing shall be placed in continuous bond beam or lintel block units and shall be solidly grouted in place. Horizontal reinforcement shall be CONTINUOUS THROUGH CONTROL JOINTS, but shall be DISCONTINOUS AT EXPANSION JOINTS. Horizontal reinforcement may be placed as masonry work progresses.

D. Splices: Splice reinforcement where shown or indicated on the drawings. Do not splice at other locations unless acceptable to the Structural Engineer. Minimum lap splice length shall be 48 bar diameters, of the smaller bar diameter, unless indicated otherwise on the drawings. Stagger adjacent splices at least one full lap length so that no more than 25% of the number of bars are spliced at any one location. Where splicing at vertical bars or at dowels, provide full contact, lap ends of bars, and wire tie.

E. Reinforcing Bar Positioners: Provide where required and at required spacing to support and secure horizontal and vertical reinforcing against displacement and to accurately align and position splices in reinforcement.

F. Prefabricated Joint Reinforcing: Provide continuous horizontal joint reinforcing as shown/specified. Fully embed longitudinal side rods in mortar for entire length with minimum cover of 5/8" on exterior side of walls and ½" at other locations. Lap reinforcement a minimum of 6" at ends of units. Do not bridge control/expansion joints with joint reinforcing. Provide continuity at corners/wall intersections by the use of prefabricated "L" and "T" sections. Cut/bend units as directed by manufacturer for continuity at returns/offsets/column fireproofing,

pipe enclosures, and/or special conditions. Space continuous horizontal reinforcing as follows:

1. For multi-wythe walls (solid composite or cavity) where continuous horizontal reinforcing also acts as structural bond or tie between wythes, space as required by code but not less than 16" o.c. vertically.

2. For single-wythe walls, space 16" o.c. vertically, unless indicated.

3. For parapets, space at 8' o.c. vertically, unless indicated.

G. Metal Ties: Where indicate, install in mortar joints as work progresses, with a minimum mortar cover of at least 5/8" on exterior faces and ½" on interior faces of masonry work.

H. Anchors: Install anchors for reinforced masonry elements to supporting structure as indicated on the drawings or required in the specifications.

3.03 FORMWORK AND SHORING:

A. General: Provide temporary formwork and/or shoring as required for temporary support of reinforced masonry work. Refer to Division 3, Section 03300 for additional requirements.

B. Removal: Formwork and/or shoring shall not be removed until the reinforced masonry element has cured sufficiently to carry its own weight and any other loads that may be placed on it during construction. It is the contractor's sole responsibility to determine formwork and shoring requirements and durations. In no case shall formwork or shores be removed before the following periods:

1.	Lintels and beams:	10 days
2.	Masonry soffits:	7 days
3.	Columns and pilasters:	7 days

3.04 GROUTING

A. General: Grout mix and grout materials shall conform to ASTM C 476. Refer to Division 3, Section 03300, "Cast-In-Place Concrete" for requirements.

1. Use "Fine Grout" for filling spaces less than 2" in either horizontal dimension. Where shown solid, use mortar for cavities less than ¾" in width or spaces less than 1-1/2" x 2" in horizontal dimensions.

2. Use "Coarse Grout" for filling cavities 2" or larger in width or cells 2"x3" or larger in horizontal dimensions.

3. Use "Concrete", 3000 psi normal weight, for filling spaces ten (10) inches or larger in both horizontal dimensions.

B. Preparation: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry, and other foreign materials. Clean and position reinforcing. Clean top surface of structural members to ensure bond. After final cleaning and inspection, close and brace clean out holes.

1. Do not grout until entire height of masonry to be grouted has attained sufficient strength to resist forces and pressures of grouting operation. Install shores and braces, if required, before beginning grouting.

C. Cold Weather Grouting: No grouting shall be performed unless temperature of surrounding air is 32 degree F and rising. No grouting shall be performed if water will freeze when poured onto reinforcing bars. Remove any ice/snow blocking openings in masonry to be grouted.

1. Use of accelerating admixtures, superplasticizers, and other admixtures in grout shall be permitted as provided under Section 03300 "Cast-In-Place Concrete". Use of "anti-freeze" and calcium carbonate IS PROHIBITED.

2. Provide temporary protection of grouted masonry to insure a minimum 48 hours curing at a minimum 32 degree F. When air temperature is between 32 and 40 degree F heat aggregate, sand and mixing water to produce grout temperature between 40 degree F and 120 degree F.

D. Grouting Method: Grouting shall conform to low-lift or high-lift grouting, at Contractor's option, subject to following requirements.

1. Low-Lift Grouting:

a. Low-Lift Grouting SHALL NOT exceed a pour of more than five (5) feet in height not the "Maximum Grout Pour Height" identified below.

b. Provide minimum clear dimension of two (2) inches and minimum clear area of eight (8) sq. inches in vertical cavities, cells, or cores to be grouted.

c. Place vertical reinforcement prior to laying of masonry units. Extend above elevation of maximum pour height as required to allow for splicing. Support and secure reinforcing as masonry is built.

d. Lay masonry to maximum pour height. Do not exceed five feet (5 ft.) or if bond beam occurs below five feet (5 ft.) height, stop pour or course below bond beam.

2. High-Lift Grouting:

a. High-Lift Grouting SHALL NOT exceed a pour of one story, but in no case more than twenty-four (24) feet in height nor the "Maximum Grout Pour Height" identified below.

b. High-Lift Grouting is NOT PERMITTED unless minimum cavity dimension exceeds three (3) inches and minimum cavity area exceeds ten (10) sq. inches.

c. Cleanout holes ARE REQUIRED where high-lift grouting will be employed. Provide cleanouts at the bottom course of masonry at each cell to be grouted for each pour. For solid grouted masonry space cleanouts at 32 in. o.c.

d. Cleanout holes shall have minimum width of 3 inches and a minimum height of 6 inches. After cleaning, close cleanouts and brace closures to resist hydrostatic grout pressure.

e. Prior to grouting, construct masonry elements and place and secure reinforcing to full height of maximum grout pour. Place horizontal bond beam reinforcing as masonry units are laid.

f. Where lateral tie reinforcing is shown, embed in mortar joints at vertical spacing indicated as units are laid. Where lateral ties wrap vertical reinforcing, embed additional lateral tie reinforcing in mortar joints to resist hydrostatic rupture of masonry face shells. Provide not less than No. 2 bars or 8 gage wire ties spaced at 16 in. o.c. for members with side dimensions of 20 in. or less and at 8 in. o.c. where side dimensions exceed 20 in.

E. Maximum Grout Pour Height: In no case shall total grout pour height exceed the following heights regardless of grouting method used.

Grout Type	Max. Height	Min. Cavity	Min. Cell
Fine	1’-0”	¾”	1-1/2” x 2”
Fine	5’-0”	2”	2” x 3”
Fine	12’-0”	2-1/2”	2-1/2” x 3”
Fine	24’-0”	3”	3” x 3”
Coarse	1’-0”	2”	2” x 3”
Coarse	5’-0”	2”	2-1/2” x 3”
Coarse	12’-0”	2-1/2”	3” x 3”
Coarse	24’-0”	3”	3” x 4”

Min. Cavity applies to grouting between wythes of cavity walls. Min. Cell applies to grouting of masonry cells where dimension shown equals grout space width minus horizontal reinforcing bar diameter.

F. Grout Placement: Limit grout pours to sections which can be completed in one working day with not more than one (1) hour of interruption of pouring operation. Allow not less than thirty (30) minutes, nor more than one (1) hour between lifts of given pour. Rod or vibrate each lift during pouring operation.

1. Place grout in lifts not to exceed a maximum height of five (5) feet each, regardless of the maximum height of the pour.

2. Place grout in lintels and beams over openings in one continuous pour.

3. Pour grout using chute or container with spout. Terminate pour 1-1/2” below top course to form key for next pour.

4. Where bond beams occur, terminate grouting of vertical cells 1-1/2” below bond beam course. After placing horizontal reinforcing and prior to filling vertical cells above bond beam, pour grout into bond beam and strike off flush with top of bond beam course.

G. Lintels: Install loose lintels of steel and other materials where shown. Provide masonry lintels where shown and wherever openings of more than 1’-0” are shown without structural steel or other supporting lintels. Provide formed-in-place masonry lintels. Provide minimum bearing at each jamb, of 4” at openings less than 4’-0” wide and 8’ for wider openings.

H. Other Items: Provide vertical expansion, control and isolation joints, and provide concealed flashing and weep holes in masonry where shown. Build-in related masonry accessory items as the masonry work progresses. Refer to Section 04200, “Unit Masonry” and related specifications sections and to drawings.

1. Comply with requirements for repair, pointing and cleaning in accordance with Section 04200, “Unit Masonry”.

I. Construction Tolerances: Variations in reinforced masonry work from plumb and level, locations of built-in or embedded items, and other required tolerances shall be as required in related specification sections or as identified on the drawings.

J. Protection of Work: Do not apply uniform loading for at least 12 hours after building masonry walls or columns. Do not apply concentrated loads for at least 3 days after building masonry walls, lintels, beams, columns, pilasters, and piers.

K. Responsibility for Errors: Contractor shall bear all costs associated with corrective work resulting from errors or poor workmanship, including costs of architectural and engineering services associated with required correction.

3.05 QUALITY CONTROL TESTING DURING CONSTRUCTION:

A. Testing Agency/Project Special Inspector shall verify reinforcement, including all masonry reinforcement and slab reinforcement (WWF or reinforcing bar). Agent shall verify reinforcement has been chair/placed with proper clearances.

B. The Owner shall employ a Testing Laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports. Masonry testing shall be performed by technicians certified by the Maine Concrete Technician Certification Board and/or ACI Concrete Field Testing Technician Grade I.

1. Verify that grouting operations are performed and grout is placed and consolidated in accordance with the specifications.

2. Verify that contractor is using approved admixtures for grout.

3. Sample Fresh Grout: ASTM C-172, except modified for slump to comply with ASTM C-94.

a. Slump: ASTM C-143; one (1) test for each grout load at point of discharge; one (1) test for each set of compressive strength test specimens.

b. Air Content: ASTM C-173; volumetric method or ASTM C-231 pressure method for normal weight concrete; one (1) for each of compressive strength test specimens.

c. Grout Temperature; For each load, at time of arrival, at point of discharge test hourly when air temperature is 40 degree F and above; and each time a set of compression test specimens are made.

d. Compression Test Specimens: ASTM C-31; one (1) set of four (4) standard cylinders for each truck or mixer load of grout taken when load is 50% discharged from truck, unless other wise directed. Mold/store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

e. Refer to Section 03300, “Cast-In-Place Concrete” for remaining test requirements. Substitute therein the work “grout” for the word “concrete”.

END OF SECTION