

184 PEARL STREET

SECTION 034100 - STRUCTURAL PRECAST CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of 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. Extent of structural precast concrete work is shown on drawings and in schedules.
- B. The extent of Structural Precast Concrete is shown on drawings and includes (but not by way of limitation) 8-inch prestressed concrete planks, precast concrete stairs, all bearing materials, embedded items, accessories and grouting of plank joints.

1.03 RELATED WORK:

- A. Section 3 - Cast in Place Concrete
- B. Section 5 – Structural Steel
- C. Section 5- Metal Fabrications
- D. Section 7 - Joint Sealants

1.04 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with the provisions of the latest edition of the following except where more stringent requirements are shown or specified:
 - 1. ACI 301 "Specifications for Structural Concrete for Buildings."
 - 2. ACI 318 "Building Code Requirements for Reinforced Concrete."
 - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
 - 4. Precast/Prestressed Concrete Institute, "PCI Design Handbook, Precast and Prestressed Concrete."

5. Precast/Prestressed Concrete Institute MNL 116, "Manual for Quality Control for Plants and Production of Precast Concrete Products."
6. AWS D1.1 - 2004 "Structural Welding Code" - Steel
7. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Fabricator Qualifications:

1. Fabricator must be an active producer member of the Prestressed Concrete Institute (PCI) and participate in its Plant Certification Program. Manufacturer shall be certified at time of bidding and for duration of project in Category C2. Certificate shall be submitted for record purposes.
2. Firms must have a minimum of 5 years successful experience in fabrication of precast concrete units similar to units required for this project.
3. Fabricator must have sufficient production capacity to produce required units without causing delay in work.

C. Erector's Qualifications:

1. Regularly engaged for at least 5 years in the erection of precast structural concrete similar to requirements of this project.
2. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure."
 - a. Provide certification that welders to be employed in work have satisfactorily passed AWS D1.1 qualification tests and maintained a current certification. Current certification and/or continuity log shall be submitted and be available in the shop and field at all times.
 - b. If re-certification of welders is required, retesting will be the Contractor's responsibility.

1.05 SUBMITTALS:

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with Division 1.
- 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 and Division 1 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. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.
- H. Electronic Submittals:
 - 1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
 - 2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.
 - 3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Adobe Acrobat Professional version 7.0 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.
 - 4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.

5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.

I. Product Data:

1. Submit a copy of the fabricator's certificate indicating participation in the PCI Plant Certification Program.
2. Submit producer's or manufacturer's specifications and installation instructions for the proprietary products and bearing materials. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

J. Shop Drawings: Submit shop drawings showing complete information for fabrication and installation of precast concrete units. Reproduction of any portion of the Construction Documents for use as Shop drawings and/or Erection Drawings is prohibited. Shop drawings and/or Erection drawings created from reproduced Construction Documents will be returned without review. 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.

1. Indicate member dimensions and cross section
2. Indicate location, size and type of reinforcement, including special reinforcement and lifting devices necessary for handling and erection.
3. Indicate layout, dimensions, and identification of each precast unit corresponding to sequence and procedure of installation. Indicate all openings in units.
4. Indicate welded connections by AWS standard symbols.
5. Detail inserts, connections, and joints, including accessories and construction at openings in precast units.
6. Anchorage: Provide location and details of anchorage devices that are to be embedded in other construction. Furnish templates if required for placement.
7. Openings: Provide size and location of plant cast openings in the plank.
8. Erection Sequencing: Include erection procedure for precast units and sequence of erection.

K. Performance Design: Design Calculations:

184 PEARL STREET

1. Provide complete design calculations prepared and stamped and signed by a registered Professional Engineer licensed in the State of Maine.
2. Calculations submitted without affixed stamp and signature will be rejected and returned without review.
3. Plank and Stair Design Criteria:
 - a. Design Loads: As indicated on the drawings
 - b. Code: Comply with ACI 318, Latest Edition
 - c. Maximum Superimposed Live Load Deflection:

Floors and Stairs: Span/480

Roofs: Span/360
 - d. Where possible, design planks to be non-composite. Notify the Architect and Engineer if planks are to be designed as composite with the concrete topping.
 - e. Camber: Indicate camber in design calculations. See installation tolerances for additional information on anticipated camber.
 - f. Structural Steel Plank Headers: Design where required or indicated.
 - g. Holes and openings: Design planks to accommodate field cored holes as indicated within. See Architectural Drawings for opening layout information.
- L. Certificate of Compliance: At completion of fabrication, the precast plank fabricator shall submit a Certificate of Compliance stating that the work was performed in accordance with the construction documents.
- M. LEED Documentation: Refer to paragraph 1.06 of this section and Section 01352.
- N. Plant Concrete Mix Design:
 1. Trial Batch Method: Submit laboratory test reports for concrete materials and mix design tests.
 2. Field Experience Method: Submit required records of strength tests.
- O. Field Grout Mix Design: Minimum Strength 4,000 psi. Submit all laboratory test reports and materials. Prepare mixes by the field experience method and/or trial mixtures per the requirements of chapter 5 of ACI 318. Include calculation of average strength and standard deviation.

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. Concrete mix designs shall indicate the cement replacement percentages.

- B. 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.

1.07 DELIVERY, STORAGE AND HANDLING:

- A. Deliver precast concrete units, accessories and bearing materials to project site in such quantities and as such times to assure continuity of installation. Coordinate deliver with Structural Steel erection. Store units on appropriate dunnage at project site to prevent cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at designated lift points.
- B. Deliver anchorage items which are to be embedded in other construction before start of such work. Provide setting diagrams, templates, instructions and directions as required for installation.

PART 2 PRODUCTS:

2.01 FORMWORK

- A. Provide forms and, where required, form facing materials of metal, plastic, wood, or other acceptable material that is non-reactive with concrete and will produce required finish surfaces.
- B. Accurately construct forms, mortar-tight, of sufficient strength to withstand pressures due to concrete placing operations, temperature changes, and when

184 PEARL STREET

prestressed, pretensioning and detensioning operations. Maintain formwork to provide completed precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified in the PCI manual referenced above.

- C. Unless forms for plant manufactured prestressed concrete units are stripped prior to detensioning, design forms so that stresses are not induced in precast units due to deformation of concrete under prestress or to movement during detensioning.

2.02 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, unless otherwise indicated.
- B. Tendons:
 - 1. Uncoated, 7 wire stress relieved strand complying with ASTM A 416. Use grade 250 unless Grade 270 is required by design and has been indicated on shop drawings.
 - 2. Strand similar to the above, but having the size and ultimate strength of wires increased so that the ultimate strength of the strand is increased approximately 15%, or strand with increased strength but with fewer number of wires per strand, may be used at the manufacturer's option.
- C. Steel Wire: ASTM A 82, plain, cold-drawn, steel.
- D. Welded Wire Fabric: ASTM A 185.
- E. Deformed Welded Wire Fabric: ASTM A 497.
- F. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing, complying with CRSI recommendations.

2.03 CONCRETE AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III: Use only one brand and type of cement throughout project, unless otherwise acceptable to Architect.
- B. Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source. Local aggregates not complying with ASTM C 33, but which have shown by special test or actual service to produce concrete of adequate strength and durability, may be used when acceptable to Engineer.
- C. Water: Potable and free from foreign materials in amounts harmful to concrete and embedded steel.
- D. Air-Entraining Admixture: Not Required.

184 PEARL STREET

- E. Water-Reducing Admixture: ASTM C 494, Type A. Types B, C, D or E may be used, subject to the Architect's approval.
- F. Calcium Chloride, chloride ions or other salts are not permitted.
- G. Cement Grout: Portland cement, ASTM C 150, Type 1, and clean, natural sand, ASTM C 404. Maximum ratio of 3.0 parts sand to 1.0 part cement, by volume, or as required to attain specified strength. Grout mix requires verification indicated in Submittals section.

2.04 RELATED MATERIALS

- A. Steel Shapes: ASTM A 36.
- B. Bearing Pads: Provide bearing pads for precast hollow slab units in accordance with manufacturer's recommendations and as indicated. Bearing pads shall not stain or leach to adjacent construction.
 - 1. Plastic: Multi-monomer plastic strips, non leaching, and shall support construction loads with no visible overall expansion. Korolath or equal reviewed by Architect.
 - 2. Frictionless Pads: Tetrafluorethylene (TFE), with glass fiber reinforcing as required for service load bearing stress.
 - 3. Tempered Hardboard Pads: PS 58, smooth both sides.
- C. Accessories: Provide clips, hangers, weld plates, embedded items, anchor rods and other accessories required for installation of project units and for supports of subsequent construction or finishes.

2.05 PROPORTIONING AND DESIGN OF MIXES:

- A. Prepare design mixes for each type of concrete required.
- B. Design mixes may be prepared by independent testing facility or by qualified precast manufacturing plant personnel, at precast manufacturer's option.
- C. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. Use material, including all admixtures, proposed for use on the project.
- D. Produce standard-weight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties:
 - 1. Compressive strength: 5,000 psi minimum at 28 days.

184 PEARL STREET

2. Release strength for prestressed units: 3,500 psi minimum or per PCI requirements (which ever is more stringent).
- E. Cure compression test cylinders using same methods as used for precast concrete work.
- F. Admixtures:
1. Use water-reducing admixtures in strict compliance with manufacturer's directions. Admixtures to increase cement dispersion, or provide increased workability for low-slump concrete, may be used subject to Architect's acceptance.
 2. Use amount as recommended by admixture manufacturer for conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.

2.06 FABRICATION:

- A. General: Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of the PCI Manual referenced above and as specified for types of units required.
- B. Plant-Mix Concrete: Comply with requirements of ASTM C 94, and as modified below:
1. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to batch will not be permitted.
- C. Built-in Anchorages: Accurately position built-in anchorage devices and secure to formwork. Locate anchorage where they do not affect position of main reinforcement or placing of concrete. Do not relocate bearing plates in units unless acceptable to Architect.
- D. Holes and Openings: Cast holes and/or openings for openings larger than 10" diameter or 10" square in accordance with final shop drawings. Smaller holes will be field cut by trades requiring them, as acceptable to Architect. Planks shall be designed to allow cutting of strands anticipated with this requirement.
- E. Form Coating: Coat surfaces of forms with bond breaking compound before reinforcement is placed. Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply in compliance with manufacturer's instructions.

- F. Surface Preparation: Clean reinforcement of loose rust and mill scale, earth and other materials which reduce or destroy bond with concrete.
- G. Reinforcement:
 - 1. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations.
 - 2. Locate and support reinforcing with chairs, runners, bolsters, spacers and hangers, as required.
 - 3. Place reinforcement to obtain the specified coverages for concrete protection.
 - 4. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations.
 - 5. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- H. Tendon Pretensioning: Pretensioning of tendons for prestressed concrete may be accomplished either by single strand tensioning method or multiple-strand tensioning method. Comply with PCI MNL-116 requirements.
- I. Concrete Placement: Place concrete in a continuous operation to prevent formation of seams or planes of weakness in precast units, complying with requirements of ACI 304. Thoroughly consolidate placed concrete by internal and external vibration without dislocation or damage to reinforcement and built-in items.
- J. Plank Surface Finish:
 - 1. Bottom finish (ceiling) and top surface of planks: Provide a primer ready smooth finish, clean of debris, honey combining, imperfections, oils and other foreign materials.
- K. Identification: Provide permanent markings to identify pick-up points and orientation in structure, complying with markings indicated on final shop drawings. Imprint date of casting on each precast unit on a surface which will not show in finished structure.
- L. Concrete Curing: Curing by low-pressure steam, steam vapor, radiant heat and moisture, or other similar process may be employed to accelerate concrete hardening and to reduce curing time.
- M. Detensioning: Delay detensioning of prestressed units until concrete has attained at least 70% of design stress or per PCI requirements, as established by test cylinders.

184 PEARL STREET

1. If concrete has been heat-cured, perform detensioning while concrete is still warm and moist, to avoid dimensional changes which may cause cracking or undesirable stresses in concrete.
 2. Detensioning of pretensioned tendons may be accomplished either by gradual release of tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
- N. Finish of Formed Surfaces: Provide finishes for formed surfaces or precast concrete as indicated for each type of unit, and as follows:
1. Standard Finish: Normal plant run finish produced in forms that impart a smooth finish to concrete. Small surface holes caused by air bubbles, normal form joint marks, and minor chips and spalls will be tolerated, but no major or unsightly imperfections, honeycomb, or structural defects will be permitted.
 2. Finish of Unformed Surfaces: Apply trowel finish to unformed surfaces unless otherwise indicated. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish. Apply scratch finish to precast units which will receive a topping after installation. Following initial strikeoff, transversely scarify surface to provide ridges approximately 1/4" deep.
 3. Provide non-slip finish for stair treads and landings. Coordinate finish with Architect.
- O. Adequately reinforce slab units to resist transporting and handling stresses.
- P. Provide headers of structural steel shapes for openings larger than one slab width in accordance with hollow slab unit manufacturer's recommendations.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Bearing Pads: Install bearing pads where indicated, as precast units are being erected. Set pads on level, uniform bearing surfaces and maintain in correct position until precast units are placed.
- B. Welding:
1. Perform welding in compliance with AWS D 1.1, including qualification of welders.
 2. Protect units from damage by field welding or cutting operations and provide noncombustible shield as required.

- C. Damaged Coated Surfaces: Repair damaged coating surfaces by cleaning and applying a coat of liquid galvanizing repair compound to galvanized surfaces and compatible primer and paint to painted surfaces.
- D. Powder-Actuated Fasteners and Field Installed Mechanical Fasteners: Powder-actuated fasteners and field installed mechanical fasteners may be used for surface (top or bottom) attachment of accessory items in precast, prestressed unit. Precast manufacturer shall provide guidance documentation to Contractor indicating special instructions for the use of these fasteners in the field.
- E. Installation Tolerances:
1. Tolerances shall be verified at time of erection, and prior to joint grouting or attachment of permanent connections.
 2. Replacement or correction of structural precast members, fabricated and supplied out of tolerance shall be the responsibility of the Fabricator, and at the Fabricator's expense in a manner that shall not inhibit the progress of the project.
 3. Tolerances not indicated within shall comply with PCI's "Tolerance Manual for Precast and Prestressed Concrete Construction", MNL-135.
 4. Install precast units without exceeding following tolerance limits at time of or following erection:
 - a. Camber: Deviation from theoretical level line at supports (positive indicates upward camber) :

Maximum Camber: 1" or the span length divided by 360
(least value applies)

Minimum Camber: -1/4"
 - b. Variations from Level or Elevation: 1/4" in any 20' run; 1/2" in any 40' run; total plus or minus 1/2" at any location.
 - c. Variation from Position in Plan: Plus or minus 1/4" maximum at any location.
 - d. Offsets in alignment of Adjacent Members at Any Joint: 1/16" in any 10' run; 1/4" maximum.
- F. Temporary Shoring and Bracing: This is the sole responsibility of the Contractor. Provide temporary shoring and bracing members with connections of sufficient strength to support imposed construction loads. Contractor shall provide all shoring necessary to erect precast plank on steel supporting structure. Contractor shall employ the services of a Specialty Engineer Registered in the State of Maine to

design such shoring. Shoring design shall account for all construction loads, unbalanced loading, torsional loading and temporary lateral effects on the steel frame and precast concrete elements. The design shall account for all loadings until such time that the construction is completed. Comply with OSHA Standard referenced previous.

- G. Grouting Connections and Joints: After precast concrete units have been placed and secured, grout open spaces at connection and joints as follows:
1. Provide forms or other acceptable method to retain grout in place until sufficiently hard to support itself.
 2. Provide reinforcement in joints were indicated.
 3. Pack spaces with grout material consolidating until voids are completely filled.
 4. Place grout to finish smooth, plumb, and level with adjacent concrete surfaces.
 5. Keep grouted joints damp and warm for not less than 7 days after initial set.
 6. Promptly remove grout material from exposed surfaces before it hardens.
 7. Grout shall attain the specified 28-day strength prior to application superimposed loads including topping for the Girder Slab System.

3.02 PLANT QUALITY CONTROL EVALUATIONS DURING FABRICATION:

A. Fabricator Requirements:

1. Fabricator is responsible to provide testing to indicate compliance of plank materials and tensioning stresses with manufacturing requirements. Any plank not meeting the requirements of manufacturer shall be repaired or replaced at no cost to the Owner.
2. Fabricator must be an active producer member of the Prestressed Concrete Institute (PCI) and participate in its Plant Certification Program.

B. The Owner reserves the option to employ a separate testing laboratory to evaluate precast manufacturer's quality control and testing methods.

1. The precast manufacturer shall allow Owner's testing facility access to materials storage areas, concrete production equipment, and concrete placement and curing facilities. Cooperate with Owner's testing laboratory and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.

2. Dimensional Tolerances: Units having dimensions smaller or greater than required, and outside specified tolerance limits will be subject to additional testing as herein specified.
3. Precast units having dimensions greater than required will be rejected if appearance or function of the structure is adversely affected, or if larger dimensions interfere with other construction. Repair or remove and replace rejected units as required to meet construction conditions.
4. Strength of Units: The strength of precast concrete units will be considered potentially deficient if the manufacturing processes fail to comply with any of the requirements which may affect the strength of the precast units, including the following conditions:
 5. Failure to meet compressive strength tests requirements.
 6. Reinforcement, and pretensioning and detensioning of tendons of prestressed concrete, not conforming to specified fabrication requirements.
 7. Concrete curing, and protection of precast units against extremes in temperature, not as specified.
 8. Precast units damaged during handling and erection.
9. Testing Precast Units: When there is evidence that strength of precast concrete units does not meet specification requirements, the concrete testing service shall take cores drilled from hardened concrete for compressive strength determination, complying with ASTM C 42 and as follows:
 - a. Take at least 3 representative cores from precast units of suspect strength, from locations directed by Architect.
 - b. Test cores in a saturated-surface-dry condition per ACI 318 if concrete will be wet during use of completed structure.
 - c. Test cores in an air-dry condition per ACI 318 if concrete will be dry during use of completed structure.
 - d. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85% of 28-day design compressive strength.
 - e. Test results will be made in writing on same day that test is made, with copies to Architect, Contractor, and precast manufacturer. Include in test reports the project identification name and number, date, name of precast concrete manufacturer, name of concrete testing service, identification letter, name, and type of member or members represented by core tests, design compressive strength compression breaking

strength and type of break (corrected for length-diameter ratio), direction of applied load to core with respect to horizontal plan of concrete as placed, and moisture condition of core at time of bearing.

10. Patching: Where core test results are satisfactory and precast units are acceptable for use in work, fill core holes solid with patching mortar, and finish to match adjacent concrete surfaces.
11. Defective Work: Precast concrete units which do not conform to specified requirements, including strength, tolerance, and finishes, shall be replaced with precast concrete units that meet requirements of this section. Contractor shall also be responsible for cost of corrections to other work affected by or resulting from corrections to precast concrete work.

3.03 FIELD QUALITY CONTROL TESTING DURING CONSTRUCTION:

- A. Testing Agency/Project Special Inspector shall verify reinforcement (WWF or reinforcing bar), including joint reinforcement. 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 grout and to submit test reports. Testing shall be performed by technicians certified by the Maine Concrete Technician Certification Board and/or ACI Concrete Field Testing Technician Grade I.
- C. Grout shall be sampled and tested for quality control during placement. Quality control testing shall include the following, unless otherwise directed by the Architect.
- D. See Submittals section for report requirements.
- E. Sample fresh Grout: ASTM C-172, except modified slump to comply with ASTM C-94
- F. Slump: ASTM C-143: One test for each grout load at point of discharge and one test for each set of compressive strength specimens.
- G. Air Content: ASTM C-173: volumetric method or ASTM C-231 pressure method, one for each set of compressive strength specimens.
- H. Temperature: For each load, at time of arrival at point of discharge.
- I. Compression Test Specimens: ASTM C-31: one set of four cylinders. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
- J. Compressive Strength Tests: ASTM C39; one set for each 5 cu. yds. or fraction thereof, of grout placed in any one day or for each 4,000 sq. ft. of surface area

184 PEARL STREET

placed; 1 specimen tested at 7 days, 2 specimens tested at 28 days, 1 specimen retained in reserve for later testing if required.

- K. Refer to Section 3, "Cast-in-Place Concrete" for additional requirements. Substitute therein the word "grout" for the word "concrete."

END OF SECTION