

Division 3

Section 3A

Concrete

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DIVISION 3

SECTION 3A

CONCRETE

1.0 SCOPE

The General Conditions, Supplementary General Conditions, and applicable portions of Division 1 of the Specifications are a part of this section.

Contractor shall furnish all plant, labor, equipment, tools and materials for the complete execution of all plain and reinforced concrete work shown on the drawings and hereinafter specified and install embedded items including, but not limited to, such items as anchor bolts, curb angles, frames, slotted anchors, shown on the drawings, whether furnished by the contractor or by others.

2.0 GENERAL

Concrete work shall conform to the American Concrete Institute (ACI) Standard Specifications for Structural Concrete for Buildings (ACI 301-66).

3.0 DETAILED REQUIREMENTS

Lists of requirements, given in ACI 301-66., are designated or specified as follows:

3.1 List A Requirements

The section numbers refer to sections in ACI 301-66.

.1 Section 302(a) Type of concrete shall be working stress concrete.

.2 Section 303(a) Concrete strength shall be 3000 psi.

.3 Section 308(b)(d) Proportioning of ingredients shall be by Method 2 or by alternate procedure with the following exception:

A minimum of 7 bags of cement per cu. yd. of concrete of the type designated in 3.3.1.

The contractor shall engage a laboratory for this proportioning work at his own expense. After the submitted proportions and sources have been approved by the owner, they may not be changed without resubmission and approval. Complete responsibility for adequacy of concrete and minimum strengths rests entirely and exclusively with the contractor. Approval of the trial mix shall not constitute any dilution of this contractor responsibility.

.4 Section 502(b) Reinforcing steel shall be of a yield point of 40,000 psi.

.5 Section 1102(a) Joints shall be located and detailed as indicated in the project drawings and as follows:

(1) Construction Joints

The use and location of construction joints not shown on the drawings shall be subject to the prior approval of the Owner. Construction joints shall conform to the details shown on the drawings, to ACI 318, 614 and to the following provision of this specification. All joints shall have keys 1/3 width of the smallest joined member, unless otherwise shown on the drawings.

For walls, the maximum length of continuous pour shall be 30 feet in either direction.

For slabs on the ground, the maximum-length of continuous pour shall be 60 feet in either direction.

For structural slabs and beams, the maximum length of continuous pour shall be 50 feet in either direction.

In order to minimize shrinkage cracks, walls, slabs on the ground and structural slabs and beams shall be poured in one of the following sequences:

(a) Alternate sections up to maximum length shall be poured (in checkerboard pattern for slabs): closure sections shall be poured after alternate sections have been cured.

(b) Sections up to maximum length shall be poured, one adjacent to the other, provided each preceding section has been cured.

(c) For walls and slabs on the ground only, approximately two feet of wall or slab shall be omitted between sections. Splices in reinforcement at each such opening shall be provided. These openings shall be filled in after the adjoining sections have been cured. See Section 1201(d) for duration of curing, applicable to all above alternates.

(2) Contraction or Dummy Joints

Contraction or weakened plane joints shall be located and have dimensions as shown on the drawings. The groove shall be made in plastic concrete by a suitable tooling device or bar pressed into the concrete.

(3) Expansion Joints

Expansion joints shall be located and have the dimensions as shown on the drawings.

All joints shall be straight, and true to the horizontal or vertical, so as not to detract from the appearance of the finished structure.

.6 Section 1601(a) Testing agency shall be furnished by the contractor in accordance with the General conditions of the contract documents.

3.2 List B Requirements

The section numbers refer to sections in ACI 301-66.

.1 Section 304(a) The concrete is subject to high sulfate conditions both in the ground and in the buildings due to ground water conditions and the process work. The high cement content specified in Section 3.1.3 and the cement type specified in Section 3.3.1 are partial requirements to counter this potentially destructive exposure. All concrete shall have air entrainment, and the air content shall conform to Table 304(b) in ACI 301-66.

.2 Section 602(b) Premoulded expansion joint filler shall conform to "Specifications for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Noneextruding and Resilient Bituminous Types)" (ASTM D 1751)

unless otherwise called for on the drawings. The size and location of the expansion joint filler shall be as shown on the drawings.

Joint sealer, where called for on the drawings shall be Colma Joint Sealer as manufactured by Sika Chemical Corporation or approved equal, and shall be installed in strict accordance with manufacturer's instructions.

3.3 List C Requirements

The section numbers refer to sections in ACI 301-66.

.1 Section 201 Cement shall be Type V, ASTM Designation C 150, for use when high sulfate resistance is required.

.2 Section 307 No admixtures containing chlorides may be used.

.3 Section 1104(h) Nonslip abrasive particles shall be fine Alundum (c.f.) aggregate, manufactured by Norton Company or approved equal, and shall be applied on all exposed concrete for stair treads, stair landings, floors at top and bottom of stairs equal in area to one tread (except where abrasive metal nosings are shown) and wherever else shown on the drawings.

3.4 List D Requirements

The section numbers refer to sections in ACI 301-66.

.1 Section 103(b) Shop drawing for formwork:

The contractor shall submit plans to the owner for the general method of shoring and bracing of forms for suspended slabs and beams, columns, and all walls over 8 feet in height, and shall obtain the Owner's approval of these plans prior to concreting. The approval of the above plans shall in no way relieve the contractor of his responsibility for the adequacy, shape, lines, dimensions strength and safety of the formwork.

.2 Section 202(a) Admixtures:

All concrete shall be designed for normal rate of hardening at around 70°F temperature. Variations in temperature and humidity under different climatic conditions will affect the rate of hardening, which will, in turn,

affect the workability and quality of the concrete. The contractor shall take all the necessary precautions during hot and cold weather concreting recommended in the Standard Specifications listed in ACI 301-66, Section 106.

The contractor may use, with approval by the Owner, admixtures to modify the rate of hardening, to improve workmanship, or as an aid to control concrete quality. Such admixtures shall be Pozzolith as manufactured by Master Builders Co., Plastiment or Sikacrete as manufactured by Sika Chemical Corporation or approved equal. The owner reserves the right to require laboratory or use test data, or other satisfactory reference material, before granting approval. The admixture shall be used in strict accordance with the manufacturer's directions.

.3 Section 604 Other embedded items:

Where shown on the drawings, the contractor shall furnish and install a vapor barrier consisting of Polyethylene film, 4 mils thick, as manufactured by Olin Mathieson Chemical Corporation, or approved equal. All joints in this film shall be sealed by taping with 2" wide Permacel P-69 tape, as manufactured by Permacel Company or approved equal.

.4 Section 1502(b)3 Expansion of grout:

The contractor shall grout under all structural steel base plates, equipment bases, and as shown on the drawings.

A non-shrink grout shall be used consisting of Portland cement, fine aggregate, Embecco aggregate as manufactured by Master Builders Company or approved equal, and water, mixed and applied in strict accordance with the manufacturer's directions. Embecco pre-mixed grout may also be used.

Where grout is over 1 inch thick, 1-1/2 parts, by volume of 1/4 inch pea gravel shall be added to the mix.

Before grouting, the concrete surface shall be washed clean, and if practicable, roughened. A bond coat of Portland cement, or equal parts Portland cement and Embecco aggregate, mixed to a brushable consistency, shall be flowed on and the grout placed.

.5 Section 1602(a)4 Additional test specimens:

(1) Test specimens shall be 6"-in diameter by 12" in height.

(2) For each class of concrete and for each day:

(a) There shall be at least three specimens from the first 50 cubic yards and one of these shall be tested at seven days.

(b) Three additional specimens shall be taken from the next 50 cubic yards, or fraction thereof, of which one specimen shall be tested at seven days.

(c) Two additional specimens shall be taken for each additional 100 cubic yards, or fraction thereof, up to the first 500 cubic yards. One specimen of each set shall be tested at seven days.

(d) Two additional specimens shall be taken for each additional 200 cubic yards, or fraction thereof, for concrete in excess of 500 cubic yards. One specimen of each set shall be tested at seven days.

(3) All strength tests of the specimens representing each class of concrete must be equal to or exceed the specified strength f_c' , except that if any five consecutive tests are made of specimens from a continuous pour in each class and poured on the same day, their average shall be equal to or exceed the specified strength, and not more than 20% of the strength tests shall have values less than the specified strength.

.6 Section 1604(d)6 Mill test reports of cement and reinforcing steel shall be furnished to the Owner.

4.0 INSTALLATION

Installation requirements are covered in the above detailed requirements and in ACI 301-66, Standard Specifications for Structural Concrete for Buildings. The latter is the basic specification for this work as indicated in Article 2.0 above.

5.0 TESTING

5.1 Testing Laboratory and Inspection Service

The contractor shall furnish an Inspection Service as part of the Testing Laboratory work required under the General conditions to do the following:

.1 Check the concrete formwork and report that it is in accordance with the plans and specifications. Reports shall cover each specific area of work and shall be issued shortly after each inspection.

.2 Check reinforcement in place and report that it is in accordance with the plans and specifications. Reports shall cover each specific area of work and shall be issued shortly after each inspection.

.3 Take samples of concrete and make up the test cylinders in accordance with these specifications.

.4 Provide other testing work in accordance with Chapter 16, Testing, in ACI 301-66.

6.0 INFORMATION TO BE SUBMITTED

The following recapitulates the information to be submitted by the contractor:

6.1 Design Mix

Submit the design mix giving proportions of ingredients and sources of aggregates in accordance with 3.1.3, Section 308 (b) (d) .

6.2 Shop Drawings

.1 Reinforcing steel in accordance with ACI 301-66, Section 103 (a).

.2 Formwork in accordance with 3.4.1, Section 103(b).

6.3 Mill Tests

Submit mill tests in accordance with 3.4.6, Section 1602(a)6.

6.4 Inspection Reports

Submit inspection reports of inspection of formwork and reinforcement in accordance with 5.1.1 and 5.1.2.

6.5 Other Test Reports

Submit reports of tests on concrete test cylinders and. on other tests as required under 5.1.4.