

## SECTION TABLE OF CONTENTS

## DIVISION 03 - CONCRETE

## SECTION 03307

## CONCRETE FOR MINOR STRUCTURES

## PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 DESIGN AND PERFORMANCE REQUIREMENTS
  - 1.2.1 Strength
  - 1.2.2 Construction Tolerances
  - 1.2.3 Concrete Mixture Proportions
- 1.3 SUBMITTALS

## PART 2 PRODUCTS

- 2.1 MATERIALS
  - 2.1.1 Cementitious Materials
    - 2.1.1.1 Portland Cement
    - 2.1.1.2 Pozzolan
  - 2.1.2 Aggregates
  - 2.1.3 Admixtures
    - 2.1.3.1 Air-Entraining Admixture
    - 2.1.3.2 Water-Reducing or Retarding Admixture
  - 2.1.4 Water
  - 2.1.5 Reinforcing Steel/Dowels
  - 2.1.6 Expansion Joint Filler Strips, Premolded
  - 2.1.7 Joint Sealants - Field Molded Sealants
  - 2.1.8 Waterstops
  - 2.1.9 Formwork
  - 2.1.10 Form Coatings
  - 2.1.11 Curing Materials
    - 2.1.11.1 Impervious Sheet Materials
    - 2.1.11.2 Membrane-Forming Curing Compound
  - 2.1.12 Epoxy Resin

## PART 3 EXECUTION

- 3.1 PREPARATION
  - 3.1.1 General
  - 3.1.2 Embedded Items
  - 3.1.3 Formwork Installation
  - 3.1.4 Production of Concrete
    - 3.1.4.1 Ready-Mixed Concrete
    - 3.1.4.2 Concrete Made by Volumetric Batching and Continuous Mixing
    - 3.1.4.3 Batching and Mixing Equipment
  - 3.1.5 Waterstops
  - 3.1.6 Drill and Bond Dowels
- 3.2 CONVEYING AND PLACING CONCRETE
  - 3.2.1 General

- 3.2.2 Consolidation
- 3.2.3 Cold-Weather Requirements
- 3.2.4 Hot-Weather Requirements
- 3.3 FORM REMOVAL
- 3.4 FINISHING
  - 3.4.1 General
  - 3.4.2 Finishing Formed Surfaces
  - 3.4.3 Finishing Unformed Surfaces
    - 3.4.3.1 Float Finish
    - 3.4.3.2 Broom Finish
    - 3.4.3.3 Expansion and Contraction Joints
- 3.5 CURING AND PROTECTION
- 3.6 TESTS AND INSPECTIONS
  - 3.6.1 General
  - 3.6.2 Inspection Details and Frequency of Testing
    - 3.6.2.1 Preparations for Placing
    - 3.6.2.2 Air Content
    - 3.6.2.3 Slump
    - 3.6.2.4 Consolidation and Protection
  - 3.6.3 Action Required
    - 3.6.3.1 Placing
    - 3.6.3.2 Air Content
    - 3.6.3.3 Slump
  - 3.6.4 Reports

-- End of Section Table of Contents --

## SECTION 03307

## CONCRETE FOR MINOR STRUCTURES

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## ACI INTERNATIONAL (ACI)

ACI 305R	(1991) Hot Weather Concreting
ACI 318/318R	(1992) Building Code Requirements for Structural Concrete and Commentary
ACI 347R	(1994) Guide to Formwork for Concrete

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 615/A 615M	(1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 31/C 31M	(1998) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(1999a) Concrete Aggregates
ASTM C 39	(1996) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 94	(1999) Ready-Mixed Concrete
ASTM C 143	(1998) Slump of Hydraulic Cement Concrete
ASTM C 150	(1998a) Portland Cement
ASTM C 171	(1990) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 231	(1997) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(1994) Air-Entraining Admixtures for Concrete
ASTM C 309	(1998a) Liquid Membrane-Forming Compounds

	for Curing Concrete
ASTM C 494	(1999) Chemical Admixtures for Concrete
ASTM C 618	(1999) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 685	(1994) Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C 920	(1994) Elastomeric Joint Sealants
ASTM D 75	(1987; R 1992) Sampling Aggregates
ASTM D 1752	(1984; R 1996) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

## CORPS OF ENGINEERS (COE)

COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstop

## 1.2 DESIGN AND PERFORMANCE REQUIREMENTS

The Government will maintain the option to sample and test joint sealer, joint filler material, waterstop, aggregates and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary to assist the Government in procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Concrete will be sampled in accordance with ASTM C 172. Slump and air content will be determined in accordance with ASTM C 143 and ASTM C 231, respectively, when cylinders are molded. Compression test specimens will be made, cured, and transported in accordance with ASTM C 31/C 31M. Compression test specimens will be tested in accordance with ASTM C 39. Samples for strength tests will be taken not less than once each shift in which concrete is produced from each class of concrete required. A minimum of three specimens will be made from each sample; two will be tested at 28 days for acceptance, and one will be tested at 7 days for information.

## 1.2.1 Strength

Acceptance test results will be the average strengths of two specimens tested at 28 days. The strength of the concrete will be considered

satisfactory so long as the average of all set of three consecutive acceptance test (average of two cylinder results) equal or exceed the specified compressive strength,  $f'c$ , and no individual acceptance test result falls below  $f'c$  by more than 500 psi.

### 1.2.2 Construction Tolerances

A class "B" finish will be applied to all surfaces which will be exposed to flowing water. A Class "D" finish shall apply to all surfaces which will be permanently concealed after construction. A Class "C" finish shall apply to all surfaces except those specified to receive a Class "B" or "D" finish. The surface requirements for the classes of finish required shall be as specified in ACI 347R.

### 1.2.3 Concrete Mixture Proportions

Concrete mixture proportions shall be the responsibility of the Contractor. Prior to concrete placement, the Contractor shall submit mixture proportions for approval that will produce concrete of the qualities required. Mixture proportions shall include the dry weights of cementitious material(s); the nominal maximum size of the coarse aggregate; the specific gravities, absorptions, and saturated surface-dry weights of fine and coarse aggregates; the quantities, types, and names of admixtures; and quantity of water per cubic yard of concrete. All materials included in the mixture proportions shall be of the same type and from the same source as will be used on the project. Minimum compressive strengths and maximum water/cement ratios shall be as indicated in the table below. The maximum nominal size coarse aggregate shall be 1 inch for wall and piers, 1-1/2 inches for footings and pile caps, in accordance with ACI 318/318R. The air content shall be between 4 and 6 percent. The slump shall be between 2 and 5 inches.

Structural Element	Minimum 28-Day Compressive Strength ( $f'c$ ) (psi)	Maximum Water/Cement Ratio
Bridge Piers, Pile caps, Footings, Slabs	4,000	0.45
Box Sections	4,000	0.50
Other elements not described elsewhere	3,000	0.55

### 1.3 SUBMITTALS

Government approval is required for all submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Air-Entraining Admixture; FIO. Accelerating Admixture; FIO.  
Water-Reducing or Retarding Admixture; FIO. Curing Materials; FIO.  
Reinforcing Steel; FIO. Expansion Joint Filler Strips, Premolded; FIO.  
Joint Sealants - Field Molded Sealants; FIO. Waterstops; FIO.

Manufacturer's literature is available from suppliers which demonstrates compliance with applicable specifications for the above materials.

Batching and Mixing Equipment; FIO.

Batching and mixing equipment will be accepted on the basis of manufacturer's data which demonstrates compliance with the applicable specifications.

Conveying and Placing Concrete; FIO.

The methods and equipment for transporting, handling, depositing, and consolidating the concrete shall be submitted prior to the first concrete placement.

#### SD-08 Statements

Formwork; FIO.

Formwork design shall be submitted prior to the first concrete placement.

#### SD-09 Reports

Aggregates; FIO.

Aggregates will be accepted on the basis of certificates of compliance and test reports that show the material(s) meets the quality and grading requirements of the specifications under which it is furnished.

Concrete Mixture Proportions; FIO.

Ten days prior to placement of concrete, the contractor shall submit the mixture proportions that will produce concrete of the quality required. Applicable test reports shall be submitted to verify that the concrete mixture proportions selected will produce concrete of the quality specified.

#### SD-13 Certificates

Cementitious Materials; FIO.

Certificates of compliance attesting that the concrete materials meet the requirements of the specifications shall be submitted in accordance with the Special Clause "CERTIFICATES OF COMPLIANCE". Cementitious material will be accepted on the basis of a manufacturer's certificate of compliance, accompanied by mill test reports that the material(s) meet the requirements of the specification under which it is furnished.

Aggregates; FIO.

Aggregates will be accepted on the basis of certificates of compliance and tests reports that show the material(s) meet the quality and grading requirements of the specifications under which it is furnished.

Batching and Mixing Equipment; FIO

Batching and mixing equipment will be accepted on the basis of manufacturer's data which demonstrates compliance with the applicable specifications.

## PART 2 PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Cementitious Materials

Cementitious materials shall conform to the appropriate specifications listed:

##### 2.1.1.1 Portland Cement

ASTM C 150, Type II, low alkali.

##### 2.1.1.2 Pozzolan

Pozzolan shall conform to ASTM C 618, Class F, except that the loss on ignition shall be limited to 6 percent.

#### 2.1.2 Aggregates

Aggregates shall meet the quality and grading requirements of ASTM C 33, Class Designations 4M or better.

#### 2.1.3 Admixtures

Admixtures to be used, when required or approved, shall comply with the appropriate specification listed. Chemical admixtures that have been in storage at the project site for longer than 6 months or that have been subjected to freezing shall be retested at the expense of the contractor at the request of the Contracting Officer and shall be rejected if test results are not satisfactory.

##### 2.1.3.1 Air-Entraining Admixture

Air-entraining admixture shall meet the requirements of ASTM C 260.

##### 2.1.3.2 Water-Reducing or Retarding Admixture

Water-reducing or retarding admixture shall meet the requirements of ASTM C 494, Type A, B, or D.

#### 2.1.4 Water

Water for mixing and curing shall be fresh, clean, potable, and free from

injurious amounts of oil, acid, salt, or alkali, except that unpotable water may be used if it meets the requirements of COE CRD-C 400.

#### 2.1.5 Reinforcing Steel/Dowels

Reinforcing steel bar and Dowels shall conform to the requirements of ASTM A 615/A 615M, Grade 60. Details of reinforcement not shown shall be in accordance with ACI 318/318R, Chapters 7 and 12.

#### 2.1.6 Expansion Joint Filler Strips, Premolded

Expansion joint filler strips, premolded shall be sponge rubber conforming to ASTM D 1752, Type I.

#### 2.1.7 Joint Sealants - Field Molded Sealants

Joint sealants - field molded sealants shall conform to ASTM C 920, Type M, Grade NS, Class 25, use NT for vertical joints and Type M, Grade P, Class 25, use T for horizontal joints. Bond-breaker material shall be polyethylene tape, coated paper, metal foil, or similar type materials. The backup material shall be compressible, nonshrink, nonreactive with the sealant, and a nonabsorptive material such as extruded butyl or polychloroprene foam rubber. Immediately prior to installation of field-molded sealants, the joint shall be cleaned of all debris and further cleaned using water, chemical solvents, or other means as recommended by the sealant manufacturer or directed.

#### 2.1.8 Waterstops

Waterstops shall conform to COE CRD-C 572.

#### 2.1.9 Formwork

The design and engineering of the formwork as well as its construction, shall be the responsibility of the Contractor.

#### 2.1.10 Form Coatings

Forms for exposed surfaces shall be coated with a bonding, nonstaining form oil, which shall be applied shortly before concrete is placed. The form coating will not affect the wetting of concrete surfaces to be cured with water or curing compounds.

#### 2.1.11 Curing Materials

Curing materials shall conform to the following requirements.

##### 2.1.11.1 Impervious Sheet Materials

Impervious sheet materials, ASTM C 171, type optional, except polyethylene film, if used, shall be white opaque.

##### 2.1.11.2 Membrane-Forming Curing Compound

ASTM C 309, Type 1-D.

#### 2.1.12 Epoxy Resin

All epoxy resin materials shall be of two component materials conforming to the requirement of ASTM C 881, Class C. The materials for bonding freshly mixed Portland cement concrete or mortar or freshly mixed epoxy resin concrete to hardened concrete shall be Type II materials, Grade 2. The epoxy resin materials use as patching materials for complete filling of spalls, wide cracks, and other voids; embedding dowels and anchor bolts with concrete shall be Type III materials, Grade 3.

### PART 3 EXECUTION

#### 3.1 PREPARATION

##### 3.1.1 General

Construction joints shall be prepared to expose coarse aggregate, and the surface shall be clean, damp, and free of laitance. Ramps and walkways, as necessary, shall be constructed to allow safe and expeditious access for concrete and workmen. Snow, ice, standing or flowing water, loose particles, debris, and foreign matter shall have been removed. Earth foundations shall be satisfactorily compacted. Spare vibrators shall be available. The entire preparation shall be accepted by the Government prior to placing.

##### 3.1.2 Embedded Items

Reinforcement shall be secured in place; joints, anchors, and other embedded items shall have been positioned. Internal ties shall be arranged so that when the forms are removed all metal will be not less than 2 inches from concrete surfaces permanently exposed to view or exposed to water on the finished structures. Embedded items shall be free of oil and other foreign matters such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. All equipment needed to place, consolidate, protect, and cure the concrete shall be at the placement site and in good operating condition.

##### 3.1.3 Formwork Installation

Forms shall be properly aligned, adequately supported, and mortar-tight. The form surfaces shall be smooth and free from irregularities, dents, sags, or holes when used for permanently exposed faces. All exposed joints and edges shall be chamfered, unless otherwise indicated.

##### 3.1.4 Production of Concrete

###### 3.1.4.1 Ready-Mixed Concrete

Ready-mixed concrete shall conform to ASTM C 94 except as otherwise specified.

#### 3.1.4.2 Concrete Made by Volumetric Batching and Continuous Mixing

Concrete made by volumetric batching and continuous mixing shall conform to ASTM C 685.

#### 3.1.4.3 Batching and Mixing Equipment

The contractor shall have the option of using an on-site batching and mixing facility. The facility shall provide sufficient batching and mixing equipment capacity to prevent cold joints. The method of measuring materials, batching operation, and mixer shall be submitted for review. On-site plant shall conform to the requirements of either ASTM C 94 or ASTM C 685.

#### 3.1.5 Waterstops

Waterstops shall be installed and spliced as directed by the manufacturer.

#### 3.1.6 Drill and Bond Dowels

Holes shall be drilled by methods that will not shatter or damage the concrete adjacent to the hole. The diameter of the drilled hole shall be 1/4 inch larger than the nominal diameter of the dowels. The drilled holes shall be clean and dry at the time of placing the Epoxy Resin bonding material and the steel dowels. Epoxy Resin bonding material and dowel shall completely fill the drilled hole. Dowels that are improperly bonded, as determined by the Contracting Officer, shall be removed. The holes shall be cleaned or new holes shall be drilled and the dowels replaced and securely bonded to the concrete. Removing, redrilling, and replacing improperly bonded dowels shall be performed at the Contractor's expense.

### 3.2 CONVEYING AND PLACING CONCRETE

Conveying and placing concrete shall conform to the following requirements.

#### 3.2.1 General

Concrete placement shall not be permitted when weather conditions prevent proper placement and consolidation without approval. When concrete is mixed and/or transported by a truck mixer, the concrete shall be delivered to the site of the work and discharge shall be completed within 1-1/2 hours and shall not be placed at temperatures exceeding 85 degrees F. Concrete shall be conveyed from the mixer to the forms as rapidly as practicable by methods which prevent segregation or loss of ingredients. Concrete shall be in place and consolidated within 15 minutes after discharge from the mixer. Concrete shall be deposited as close as possible to its final position in the forms and be so regulated that it may be effectively consolidated in horizontal layers 18 inches or less in thickness with a minimum of lateral movement. The placement shall be carried on at such a rate that the formation of cold joints will be prevented.

#### 3.2.2 Consolidation

Each layer of concrete shall be consolidated by internal vibrating

equipment. Internal vibration shall be systematically accomplished by inserting the vibrator through the fresh concrete in the layer below at a uniform spacing over the entire area of placement. The distance between insertions shall be approximately 1.5 times the radius of action of the vibrator and overlay the adjacent, just-vibrated area by approximately a few inches. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the layer below, if such a layer exists. It shall be held stationary until the concrete is consolidated and then withdrawn slowly at the rate of about 3 inches per second.

### 3.2.3 Cold-Weather Requirements

No concrete placement shall be made when the ambient temperature is below 35 degrees F or if the ambient temperature is below 40 degrees F and falling. Suitable covering and other means as approved shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing and at a temperature above freezing for the remainder of the curing period. Salt, chemicals, or other foreign materials shall not be mixed with the concrete to prevent freezing. Any concrete damaged by freezing shall be removed and replaced at the expense of the contractor.

### 3.2.4 Hot-Weather Requirements

When the rate of evaporation of surface moisture, as determined by use of Figure 2.1.5 of ACI 305R, is expected to exceed 0.2 pound per square foot per hour, provisions for windbreaks, shading, fog spraying, or covering with a light-colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as finishing operations will allow.

## 3.3 FORM REMOVAL

Forms shall not be removed before the expiration of 24 hours after concrete placement except where otherwise specifically authorized. Supporting forms and shoring shall not be removed until the concrete has cured for at least 5 days. When conditions on the work are such as to justify the requirement, forms will be required to remain in place for longer periods.

## 3.4 FINISHING

### 3.4.1 General

No finishing or repair will be done when either the concrete or the ambient temperature is below 50 degrees F.

### 3.4.2 Finishing Formed Surfaces

All fins and loose materials shall be removed, and surface defects including tie holes shall be filled. All honeycomb areas and other defects shall be repaired. All unsound concrete shall be removed from areas to be repaired. Surface defects greater than 1/2 inch in diameter and holes left by removal of tie rods in all surfaces not to receive additional concrete shall be reamed or chipped and filled with dry-pack mortar. The prepared

area shall be brush-coated with an approved epoxy resin or latex bonding compound or with a neat cement grout after dampening and filled with mortar or concrete. The cement used in mortar or concrete for repairs to all surfaces permanently exposed to view shall be a blend of portland cement and white cement so that the final color when cured will be the same as adjacent concrete.

### 3.4.3 Finishing Unformed Surfaces

All unformed surfaces that are not to be covered by additional concrete or backfill shall be float finished to elevations shown, unless otherwise specified. Surfaces to receive additional concrete or backfill shall be brought to the elevations shown and left as a true and regular surface. Exterior surfaces shall be sloped for drainage unless otherwise shown. Joints shall be carefully made with a jointing tool. Unformed surfaces shall be finished to a tolerance of 3/8 inch for a float finish as determined by a 10 foot straightedge placed on surfaces shown on the plans to be level or having a constant slope. Finishing shall not be performed while there is excess moisture or bleeding water on the surface. No water or cement shall be added to the surface during finishing.

#### 3.4.3.1 Float Finish

Surfaces to be float finished shall be screeded and darbied or bullfloated to eliminate the ridges and to fill in the voids left by the screed. In addition, the darby or bullfloat shall fill all surface voids and only slightly embed the coarse aggregate below the surface of the fresh concrete. When the water sheen disappears and the concrete will support a person's weight without deep imprint, floating should be completed. Floating should embed large aggregates just beneath the surface, remove slight imperfections, humps, and voids to produce a plane surface, compact the concrete, and consolidate mortar at the surface.

#### 3.4.3.2 Broom Finish

A broom finish shall be applied to horizontal surfaces in the underpass and at other locations as directed. The concrete shall be screeded and floated to required finish plane with no coarse aggregate visible. After surface moisture disappears, the surface shall be broomed or brushed with a broom or fiber bristle brush in a direction transverse to that of the main traffic or as directed.

#### 3.4.3.3 Expansion and Contraction Joints

Expansion and contraction joints shall be made in accordance with the details shown or as otherwise specified. Provide 12 mm (1/2 inch) thick transverse expansion joints where new work abuts existing concrete.

### 3.5 CURING AND PROTECTION

Beginning immediately after placement and continuing for at least 7 days, all concrete shall be cured and protected from premature drying, extremes in temperature, rapid temperature change, freezing, mechanical damage, and exposure to rain or flowing water. All materials and equipment needed for

adequate curing and protection shall be available and at the site of the placement prior to the start of concrete placement. Preservation of moisture for concrete surfaces not in contact with forms shall be accomplished by one of the following methods:

- a. Application of impervious sheet material conforming to ASTM C 171. However, impervious sheet shall not be allowed for walls and piers concrete.
- b. Application of membrane-forming curing compound conforming to ASTM C 309, Type 1-D shall be accomplished in accordance with manufacturer's instructions.

The preservation of moisture for concrete surfaces placed against wooden forms shall be accomplished by keeping the forms continuously wet for 7 days. If forms are removed prior to end of the required curing period, other curing methods shall be used for the balance of the curing period. During the period of protection removal, the temperature of the air in contact with the concrete shall not be allowed to drop more than 25 degrees F within a 24 hour period.

### 3.6 TESTS AND INSPECTIONS

#### 3.6.1 General

The individuals who sample and test concrete as required in this specification shall have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I.

#### 3.6.2 Inspection Details and Frequency of Testing

##### 3.6.2.1 Preparations for Placing

Foundation or construction joints, forms, and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor to certify that it is ready to receive concrete.

##### 3.6.2.2 Air Content

Air content shall be checked at least twice during each shift that concrete is placed for each class of concrete required. Samples shall be obtained in accordance with ASTM C 172 and tested in accordance with ASTM C 231.

##### 3.6.2.3 Slump

Slump shall be checked twice during each shift that concrete is produced for each class of concrete required. Samples shall be obtained in accordance with ASTM C 172 and tested in accordance with ASTM C 143.

##### 3.6.2.4 Consolidation and Protection

The Contractor shall ensure that the concrete is properly consolidated, finished, protected, and cured.

### 3.6.3 Action Required

#### 3.6.3.1 Placing

The placing foreman shall not permit placing to begin until he has verified that an adequate number of acceptable vibrators, which are in working order and have competent operators, are available. Placing shall not be continued if any pile is inadequately consolidated.

#### 3.6.3.2 Air Content

Whenever a test result is outside the specification limits, the concrete shall not be delivered to the forms and an adjustment shall be made to the dosage of the air-entrainment admixture.

#### 3.6.3.3 Slump

Whenever a test result is outside the specification limits, the concrete shall not be delivered to the forms and an adjustment should be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the water-cement ratio does not exceed that specified in the submitted concrete mixture proportion.

### 3.6.4 Reports

The results of all tests and inspections conducted at the project site shall be reported informally at the end of each shift and in writing weekly and shall be delivered within 3 days after the end of each weekly reporting period. All concrete reports, including compressive strength, concrete temperatures, ambient temperatures, slump, air content, mix design number, test number and location of concrete placement shall be submitted in a spreadsheet format and on computer disk(s) to the Contracting Officer. The Contracting Officer has the right to examine all Contractor quality control records.

-- End of Section --