

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE J		PAGE 1 OF 2 PAGES		
2. AMENDMENT/MODIFICATION NUMBER 0006		3. EFFECTIVE DATE 14 OCT 2026		4. REQUISITION/PURCHASE REQUISITION NUMBER		5. PROJECT NUMBER (If applicable) 475034	
6. ISSUED BY W071 ENDIST PORTLAND KO CONTRACTING DIVISION, 333 SW FIRST AVE PORTLAND, OR 97204-3495 UNITED STATES CHRISTOPHER BURROUGHS, EMAIL: CHRISTOPHER.D.BURROUGHS@USACE. ARMY.MIL TELEPHONE: 503-808-4910		CODE W9127N		7. ADMINISTERED BY (If other than Item 6) SCD: PAS:		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (Number, street, county, State and ZIP Code)				☒ (X)		9A. AMENDMENT OF SOLICITATION NUMBER W9127N26BA024	
				☒ (X)		9B. DATED (SEE ITEM 11) 19 AUG 2026	
				☐		10A. MODIFICATION OF CONTRACT/ORDER NUMBER	
				☐		10B. DATED (SEE ITEM 13)	
CODE		FACILITY CODE					

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended. ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

SEE SECTION G - CONTRACT ADMINISTRATION DATA

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NUMBER AS DESCRIBED IN ITEM 14.

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NUMBER IN ITEM 10A.
☐	
☐	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
☐	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
☐	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

See Schedule

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR		16B. UNITED STATES OF AMERICA	
15C. DATE SIGNED		16C. DATE SIGNED	
(Signature of person authorized to sign)		FIGUEREDO.JUSTIN.F. 1292876188 Digitally signed by FIGUEREDO.JUSTIN.F.1292876188 Date: 2026.10.14 13:55:01 -07'00' (Signature of Contracting Officer)	

Previous edition unusable

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

Block 14 (Description of Amendment/Modification): This amendment affects changes to the Block 14 (Description of Amendment/Modification):

CHANGE IN SOLICITATION SPECIFICATIONS:

Solicitation Specifications, Section 01 45 00.00 25 QUALITY CONTROL
Paragraph 3.8.1 GOVERNING FIELD TESTING STANDARDS AND FREQUENCIES added.

Solicitation Specifications, Section 03 30 00.00 99 CAST-IN-PLACE REINFORCED CONCRETE
Paragraph 3.13.1 GENERAL added.

CHANGE IN SOLICITATION DRAWINGS:

Remove drawing C-104 and replace with C-104 - MARK 1 - AMD-0006 - UPDATE TO
DEMOLITION NOTES.

Remove drawing C-106 and replace with C-106 - MARK 1 - AMD-0006 - UPDATE TO PAVING
AREA AND NOTES, MARK 2 - AMD-0006 - UPDATE TO DEFINE FENCING AND GATE.

Remove drawing C-102 and replace with C-102 - MARK 1 - AMD-0006 - UPDATE TO
DEMOLITION NOTES.

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Bonneville Powerhouse I Navigation Lock Bridge Replacement

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Bonneville Powerhouse I Navigation Lock Bridge Replacement

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QUALITY CONTROL

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 within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C1077	(2024) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1093	(2022) Standard Practice for Accreditation of Testing Agencies for Masonry
ASTM D3666	(2016) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D3740	(2019) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E329	(2023) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

Oregon Department of Transportation (ODOT)

<u>MFTP</u>	<u>(2026) Manual of Field Test Procedures (MFTP)</u>
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1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following must be submitted in accordance with Section 01 33 00, SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor Quality Control Plan; G

Construction Quality Management for Contractors

1.3 LABORATORY VALIDATION

For tests performed under this Contract, use a testing laboratory validated by the Corps of Engineers Material Testing Center (MTC). See Paragraph entitled TESTS.

1.4 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control system, and all associated costs will be included in the applicable unit prices or lump-sum prices contained in the Price Schedule.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

3.1.1 Quality Control System

Establish and maintain an effective quality control (QC) system in compliance with Contract Clause 52.246-12, INSPECTION OF CONSTRUCTION. The quality control system must consist of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system must cover all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence.

3.1.2 Project Superintendent

Identify an individual, within the onsite work organization, as Project Superintendent. The Project Superintendent must be a Journeyman with a minimum of five years experience in a verifiable Project Superintendent role on jobs similar to this Contract. The designated Project Superintendent must be acceptable to the Contracting Officer (CO). The Project Superintendent must be held responsible for the quality of work on the job and is subject to removal by the CO for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the Project Superintendent. The Project Superintendent must maintain a physical presence at the site at all times, except as otherwise acceptable to the CO, and must be responsible for all construction and construction related activities at the site. The Project Superintendent must have no other duties; they may not perform the duties of an equipment operator, flagger, laborer, or any other position. Identify an alternate for the Project Superintendent to serve in the event of the Project Superintendent's absence or to cover work performed on additional shift. The requirements for the alternate are the same as the designated Project Superintendent.

3.2 CONTRACTOR QUALITY CONTROL PLAN

Submit no later than 30 days after receipt of Notice to Proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of Contract Clause 52.246-12, INSPECTION OF CONSTRUCTION. The Government will consider an interim plan for the first 10 days of operation. Construction will be permitted to begin only after acceptance

of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, purchasing agents:

- a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff must implement the three phase control system for all aspects of the work specified. Include in the staff a CQC System Manager.
- b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function; see Paragraph entitled QUALITY CONTROL ORGANIZATION.
- c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities must be issued by the CQC System Manager. Copies of these letters must be furnished to the Government.
- d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
- e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Use laboratory facilities approved by the CO.)
- f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
- g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
- h. Reporting procedures, including proposed reporting formats.
- i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each Section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular

Section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of CQC Plan

Acceptance of the CQC plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in the CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, notify the CO in writing of any proposed change. Proposed changes are subject to acceptance by the CO.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction and prior to acceptance by the Government of the CQC Plan, the Contractor must meet with the CO and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 10 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management, and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government and signed by both the Contractor and the CO and will become a part of the Contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure Contract compliance. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly must be included as part of the CQC organization. The Contractor's CQC staff must maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. All CQC staff members must be subject to acceptance by the CO. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules, and all other project documentation to the CQC organization. The CQC organization must maintain these documents and records at the site at all times, except as otherwise acceptable to the CO.

3.4.2 CQC System Manager Qualifications

Identify an individual, within the onsite work organization, as CQC System Manager who must be responsible for writing and executing a complete CQC plan, overall management of CQC, and have the authority to act in all CQC matters for the Contractor. The CQC System Manager must have a minimum of ten years of experience in a verifiable CQC role on jobs similar to this

Contract. This CQC System Manager must be on the site at all times during construction and be employed by the Prime Contractor. The CQC System Manager must be assigned no other duties. Identify in the plan an alternate for the CQC System Manager to serve in the event of the CQC System Manager's absence or to cover work performed on additional shifts. The requirements for the alternate are the same as the designated CQC System Manager.

3.4.3 CQC Specialized Personnel

In addition to CQC personnel specified elsewhere in the Contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical, mechanical, civil, structural, if the CQC manager is not qualified to cover these areas at the discretion of the CO. These individuals may be employees of the Prime or subcontractor; must be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; must have five years of experience in a verifiable CQC role on jobs similar to this Contract; and must be a graduate engineer, journeyman, or licensed in their own discipline. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

3.4.4 Construction Quality Management for Contractors

The CQC System Manager and Alternate CQC System Manager must have successfully completed the course entitled "Construction Quality Management For Contractors." This course is periodically offered by the Associated Builders and Constructors, Inc., or Associated General Contractor, Inc. and must be retaken every five years. The course has been coordinated with the Navy and certificates from the Navy will be accepted. For further information regarding courses in the Portland area contact: Associated General Contractors, Oregon-Columbia Chapter at (503) 682-3363 or <https://www.agc-oregon.org/training/professional-development/>. Furnish documentation that the Contractor Quality Control System Manager has completed the course.

3.4.5 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the CO for acceptance.

3.5 FAILURE TO COMPLETE PERSONNEL DUTIES

Superintendent and QC Manager are subject to dismissal if the above duties are not being effectively carried out. If the Superintendent and QC Manager are dismissed project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

3.6 SUBMITTALS AND DELIVERABLES

Submittals, if needed, must comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization must be responsible for certifying that all submittals and deliverables are in compliance with Contract requirements.

3.7 QUALITY CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the Contract. At least three phases (Preparatory, Initial, and Follow-up) of control must be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.7.1 Preparatory Phase

This phase must be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

- a. Review each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those Sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.
- b. Review of the Contract drawings.
- c. Check to assure that all materials or equipment have been tested, submitted, and approved.
- d. Review of provisions that have been made to provide required control inspection and testing.
- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.
- f. Physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- g. Review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the CO.
- j. Discussion of the initial control phase.
- k. Notify the Government at least 24 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The CQC System Manager must prepare and document the results of the preparatory phase actions by separate minutes, and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet Contract specifications.

3.7.2 Initial Phase

This phase must be accomplished at the beginning of a definable feature of work. Accomplish the following:

- a. Check work to ensure that it is in full compliance with Contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full Contract compliance. Verify required control inspection and testing.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.
- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. Notify the Government at least 24 hours in advance of beginning the initial phase. Document separate minutes of this phase, prepared by the CQC System Manager, and attach to the daily CQC report. Indicate exact location of initial phase for future reference and comparison with follow-up phases.
- g. Repeat the initial phase for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.7.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with Contract requirements, until completion of the particular feature of work. Record the daily checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.7.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision, or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.8 TESTS

3.8.1 GOVERNING FIELD TESTING STANDARDS AND FREQUENCIES

- a. Execute all field sampling, testing, specimen fabrication, laboratory analysis, and materials acceptance testing for civil, structural, and highway infrastructure features of work-including but not limited to earthwork, embankments, subgrades, aggregate bases, asphalt pavements, and structural concrete in accordance with the current edition of the Oregon Department of Transportation (ODOT) Manual of Field Test Procedures (MFTP).

- b. The Contractor's Quality Control Plan (QCP) must explicitly incorporate the testing methods, sampling frequencies, and lot/sublot definitions outlined in the ODOT MFTP Field Tested Materials Acceptance Guide (FTMAG) for each applicable material class. In the event of a conflict between USACE (UFGS) testing frequencies and the ODOT MFTP, the most stringent requirement applies.

3.8.2 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product that conforms to Contract requirements. Report all test results using industry standard forms at the frequency specified in the Contract. Upon request, furnish to the Government duplicate samples of test specimens for QA verification testing by the Government. Procure the services of a Corps of Engineers approved testing laboratory, as described in Subparagraph entitled TESTING LABORATORIES, or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with Contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.
- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Record results of all tests taken, both passing and failing, on the CQC report for the date taken. Include Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the CO, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the CO. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this Contract.

3.8.3 Testing Laboratories

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the Contract specifications and to check the laboratory technician's testing procedures and techniques.

- a. Validation. The validation of a testing laboratory is site-specific and cannot be transferred to a facility at a different location. Costs for validation by the Corps of Engineers MTC must be borne by the laboratory or the Contractor. Validation is granted only for the specific testing procedures requested to be validated. The laboratory may select the testing procedures to be validated, except for the Quality Assurance requirements of the applicable ASTM standards listed in this Paragraph.
- b. Validation Procedures. Validation of a testing laboratory consists

of either an inspection or audit, as defined below:

(1) Inspection must be performed by the MTC to verify compliance with the applicable provisions of [ASTM C1077](#), [ASTM C1093](#), [ASTM D3666](#), [ASTM D3740](#), and [ASTM E329](#).

(2) An audit would be performed by the MTC in lieu of an inspection for laboratories holding a current AASHTO accreditation. Inspection by the MTC may be required after auditing if critical testing procedures required in the Contract were not included in the applicable CCRL or AMRL inspections.

c. Validation Schedule. For aggregate, concrete, bituminous materials, soil, rock, riprap, and metal components, the frequency of validation inspections or audits is once every two years. For water quality and sediment testing the validation schedule is every 18 months. When conditions change substantially from the time of the last validation, laboratories must be re-validated.

d. Validation Process. For information on the validation process and costs contact the MTC at (601) 634-2496. Procedures for validation, including forms requesting validation may be obtained from the MTC web site at: <https://mtc.erd.c.dren.mil/>. The Contractor is cautioned that the validation process is lengthy and that it requires immediate action. Keep the CO informed about the validation process as it proceeds in a timely manner.

3.8.4 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8.5 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials must be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government must be delivered to the Portland District Contract commercial Laboratory in the District area. Coordination for each specific test, exact delivery location, and dates must be made through the Portland District Resident Office.

3.9 COMPLETION INSPECTION

3.9.1 Punch-Out Inspection

The CQC Manager must conduct an inspection of the work near the end of the work, or any increment of the work established by a time stated in the specifications, or the Contract Clause 52.211-10, COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK. As required by Paragraph DOCUMENTATION, prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff must make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.9.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the work is complete. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager must ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this Paragraph must be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.9.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the CO must be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the CO based upon results of the Pre-Final inspection. Notify the CO at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the Contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all Contract work acceptably complete for this inspection will be cause for the CO to bill the Contractor for the Government's additional inspection cost in accordance with Contract Clause 52.246-12, INSPECTION OF CONSTRUCTION.

3.10 DOCUMENTATION

Daily CQC Report:

a. Maintain current records providing factual evidence that required quality control activities and tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

- (1) Contractor/subcontractor and their area of responsibility.
- (2) Operating plant and equipment with hours worked, idle, or down for repair.
- (3) Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
- (4) Test and control activities performed with results and references to specifications and drawings requirements. Identify the control phase (Preparatory, Initial, or Follow-up). List of deficiencies noted, along with corrective action.
- (5) Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications and drawings requirements.
- (6) Submittals and deliverables reviewed, with Contract reference,

by whom, and action taken.

(7) Offsite surveillance activities, including actions taken.

(8) Job safety evaluations stating what was checked, results, and instructions or corrective actions.

(9) Instructions given or received and conflicts in plans and specifications.

(10) Contractor's verification statement.

(11) Deficiency Tracking System. Maintain a cumulative list of deficiencies identified for the duration of the project. Deficiencies to be listed include those failures, Government oral observations, and Notifications of Noncompliance. Maintain the list at the project site. Submit copies of updated listings to the Government at least every 30 days.

b. Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Electronically submit daily reports and a signed, printed copy of these records to the Government within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report for every seven days of no work and on the last day of a no work period. All calendar days must be accounted for throughout the life of the Contract. The first report following a day of no work must be for that day only. Reports must be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the Daily CQC Report.

3.11 NOTIFICATION OF NONCOMPLIANCE

The CO will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, must be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the CO may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor must make no part of the time lost due to such stop orders the subject of claim for extension of time or for excess costs or damages.

-- End of Section --

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CAST-IN-PLACE REINFORCED CONCRETE

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 within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO LRFD (9th Edition; 2020 with 2022 Interims)
Bridge Design Specifications

AASHTO M 240/M 240M (2023) Standard Specification for Blended
Hydraulic Cement

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117 (2010; R 2015) Specifications for
Tolerances for Concrete Construction and
Materials and Commentary

ACI 121R (2008) Guide for Concrete Construction
Quality Systems in Conformance with ISO
9001

ACI 301 (2020) Specifications for Structural
Concrete

ACI 304R (2000; R 2009) Guide for Measuring,
Mixing, Transporting, and Placing Concrete

ACI 308.1 (2023) Specification for Curing Concrete

ACI 347R (2014; Errata 1 2017) Guide to Formwork
for Concrete

ACI SP-2 (2007; Abstract: 10th Edition) ACI Manual
of Concrete Inspection

ACI SP-15 (2011) Field Reference Manual: Standard
Specifications for Structural Concrete ACI
301-05 with Selected ACI References

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4 (1995; R 2004) Basic Hardboard

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M (2018) Structural Welding Code -

Reinforcing Steel

AWS D1.5M/D1.5	(2020; Errata 1 2022) Bridge Welding Code
ASTM INTERNATIONAL (ASTM)	
ASTM A615/A615M	(2022) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A706/A706M	(2022a) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775/A775M	(2022) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A884/A884M	(2019; Errata 1) Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934/A934M	(2022) Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1022/A1022M	(2016b) Standard Specification for Deformed and Plain Stainless Steel Wire and Welded Wire for Concrete Reinforcement
ASTM A1044/A1044M	(2016a; Errata 1) Standard Specification for Steel Stud Assemblies for Shear Reinforcement of Concrete
ASTM A1060/A1060M	(2016b) Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A1064/A1064M	(2024) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31/C31M	(2024b) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33/C33M	(2023) Standard Specification for Concrete Aggregates
ASTM C42/C42M	(2020) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C78/C78M	(2022) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam

	with Third-Point Loading)
ASTM C94/C94M	(2024a) Standard Specification for Ready-Mixed Concrete
ASTM C150/C150M	(2022) Standard Specification for Portland Cement
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C330/C330M	(2017a) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C494/C494M	(2019; E 2022) Standard Specification for Chemical Admixtures for Concrete
ASTM C595/C595M	(2023) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2023; E 2023) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C989/C989M	(2024) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017/C1017M	(2013; E 2015) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1074	(2019; E 2021) Standard Practice for Estimating Concrete Strength by the Maturity Method
ASTM C1077	(2024) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1116/C1116M	(2023) Standard Specification for Fiber-Reinforced Concrete
ASTM C1240	(2020) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C1260	(2023) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1293	(2008; R 2015) Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
ASTM C1567	(2023) Standard Test Method for Potential

Alkali-Silica Reactivity of Combinations
of Cementitious Materials and Aggregate
(Accelerated Mortar-Bar Method)

ASTM C1602/C1602M

(2022) Standard Specification for Mixing
Water Used in Production of Hydraulic
Cement Concrete

ASTM D412

(2016; R 2021) Standard Test Methods for
Vulcanized Rubber and Thermoplastic
Elastomers - Tension

ASTM D471

(2016a) Standard Test Method for Rubber
Property - Effect of Liquids

ASTM E329

(2023) Standard Specification for Agencies
Engaged in Construction Inspection,
Testing, or Special Inspection

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP

(2023) Manual of Standard Practice

CRSI RB4.1

(2016) Supports for Reinforcement Used in
Concrete

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1

(2009) DOC Voluntary Product Standard PS
1-07, Structural Plywood

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC

(2024) Oregon Standard Specifications for
Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 513

(1974) Corps of Engineers Specifications
for Rubber Waterstops

COE CRD-C 572

(1974) Corps of Engineers Specifications
for Polyvinylchloride Waterstops

Oregon Department of Transportation (ODOT)

MFTP

(2026) Manual of Field Test Procedures
(MFTP)

1.2 DEFINITIONS

a. "Cementitious material" as used herein must include all portland
cement, pozzolan, fly ash, slag cement, and silica fume.

b. "Exposed to public view" means situated so that it can be seen from
eye level from a public location after completion of the building. A
public location is accessible to persons not responsible for operation
or maintenance of the building.

- c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.
- d. "Supplementary cementing materials" (SCM) include coal fly ash, silica fume, slag cement, natural or calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the portland cement that result in improvement to sustainability and durability and reduced cost.
- e. "Design strength" (f'_c) is the specified compressive strength of concrete at time(s) specified in this Section to meet structural design criteria.
- f. "Mass Concrete" is any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a Section thickness of 3 feet or more regardless of temperature.
- g. "Mixture proportioning" is the process of designing concrete mixture proportions to enable it to meet the strength, service life and constructability requirements of the project while minimizing the initial and life-cycle cost.
- h. "Mixture proportions" are the masses or volumes of individual ingredients used to make a unit measure (cubic meter or cubic yard) of concrete.
- i. "Pozzolan" is a siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.
- j. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).
- k. For additional definitions not shown see ODOT SSC.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Concrete Curing Plan

Quality Control Plan; G

Quality Control Personnel Certifications; G

Quality Control Organizational Chart

Laboratory Accreditation; G

Form Removal Schedule; G

Concrete Deck Pre-Placement Conferences; G

SD-02 Shop Drawings

Formwork

Reinforcing Steel; G

SD-03 Product Data

Joint Sealants

Joint Filler

Formwork Materials

Cementitious Materials

Concrete Curing Materials

Reinforcement

Admixtures

Waterstops

Local/Regional Materials

Biodegradable Form Release Agent

Pumping Concrete

Finishing Plan

Nonshrink Grout

SD-04 Samples

Slab Finish Sample

Surface Finish Samples

SD-05 Design Data

Concrete Mix Design; G

Formwork Calculations

SD-06 Test Reports

Concrete Mix Design; G

Fly Ash

Pozzolan

Slag Cement

Aggregates

Fiber-Reinforced Concrete; G

Compressive Strength Tests; G

Air Content

Slump Tests

Water

SD-07 Certificates

Reinforcing Bars

Welder Qualifications

Silica Fume Manufacturer's Representative

Safety Data Sheets

Field Testing Technician and Testing Agency

ADA Certification

SD-08 Manufacturer's Instructions

Joint Sealants

Curing Compound

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications and ODOT SSC except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer (CO). Provide concrete in accordance with AASHTO LRFD.

1.5 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301, ACI 304R and ASTM A934/A934M requirements and recommendations. Do not deliver concrete until forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces. Deliver concrete mix materials per ODOT SSC Section 00540.47. Provide handling and placement of concrete per ODOT SSC Section 00540.48. Storage of concrete will not be permitted without approval from the Government.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed. Protect concrete reinforcement steel per [ODOT SSC Section 00530.40](#).

1.5.1.1 Epoxy Coated Reinforcing Steel

Record coating lot on each shipping notice and carefully identify and re-tag bar bundles from bending plant. Provide systems for handling coated bars which have padded contact areas such as, nylon slings, all free of dirt and grit. Lift bundled coated bars with strong back, multiple supports, or platform bridge to prevent sagging and abrasion. Pad bundling bands where in contact with bars. Do not drop or drag bars or bundles. Store coated bars both in shop and in field, aboveground, on wooden or padded cribbing. Space the dunnage close enough to prevent excessive sags. Stack large quantities of straight bars with adequate protective blocking between layers. Schedule deliveries of epoxy coated bars to the job site to avoid the need for long term storage. Protect from direct sunlight and weather. Cover bars to be stored longer than 12 hours at the job site with opaque polyethylene sheeting or other suitable equivalent protective material. Protect concrete epoxy coated reinforcement steel per [ODOT SSC Section 00530.40](#). Handle epoxy coated reinforcement steel per [ODOT SSC Section 02510.11](#).

1.6 QUALITY ASSURANCE

1.6.1 Design Data

1.6.1.1 Formwork Calculations

[ACI 347R](#). Include design calculations indicating arrangement of forms, sizes and grades of supports (lumber), panels, and related components. Furnish drawings and calculations of shoring and re-shoring methods proposed for slabs, beams, and walls. Calculations must indicate concrete pressure with both live and dead loads, along with material types. Provide formwork/falsework design calculations, including temporary bracing of concrete forms on steel structures per [ODOT SSC Sections 00540.41](#) and [00150.35](#).

1.6.1.2 Concrete Mix Design

60 days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, supplementary cementitious materials, fibers, and admixtures; and applicable reference specifications. Submit mill test and all other test for cement, supplementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the CO. Indicate clearly in the

submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. Required average strength can be documented by field experience if field strength test data are available and represent a single group of at least 10 consecutive strength tests for one mixture, using materials and conditions similar to those expected for work, and encompassing a period of not less than 45 days. The average of field strength tests must equal or exceed f_{cr}' . Changes in materials, conditions, and proportions within the test record must not have been more closely restricted than those for the proposed work. Test records must not be more than 24 months old. Obtain mix design approval from the CO prior to concrete placement. Ensure concrete mix designs meet ODOT SSC Section 02001.15.

1.6.1.3 Mass Concrete Design

Concrete placements with the least dimension greater than 6 feet must be considered mass concrete. Concrete placement with the least dimension greater than 3 feet, but less than or equal than 6 feet, must require the approval of the Engineer for the use of accelerating admixtures. Shafts must not be considered mass concrete. Chloride based accelerating admixtures must not be used.

1.6.2 Shop Drawings

1.6.2.1 Formwork

a. Drawings showing details of formwork including, but not limited to; joints, supports, studding and shoring, and sequence of form and shoring removal. Indicate placement schedule, construction, location and method of forming control joints. Include locations of inserts, conduit, sleeves and other embedded items. Reproductions of Contract drawings are unacceptable. Submit form removal schedule indicating element and minimum length of time for form removal.

b. Design, fabricate, erect, support, brace, and maintain formwork so that it is able to support, without failure, all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork. Provide formwork/falsework design plans, including temporary bracing of concrete forms on steel structures per ODOT SSC Sections 00540.41 and 00150.35.

1.6.2.2 Reinforcing Steel

Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars. Reproductions of Contract drawings are unacceptable. Provide QA for reinforcing steel per ODOT SSC Section 00530.

1.6.3 Control Submittals

1.6.3.1 Concrete Curing Plan

Submit proposed materials, methods and duration for curing concrete elements in accordance with ACI 308.1 and ODOT SSC Section 00540.51.

1.6.3.2 Pumping Concrete

Submit proposed materials and methods for pumping concrete. Submittal must include mix designs, pumping equipment including type of pump and size and material for pipe, and maximum length and height concrete is to be pumped. Submit pumping concrete in accordance with ODOT SSC Sections 00540.48 and 00540.22.

1.6.3.3 Silica Fume Manufacturer's Representative

The manufacturer's representative must be present at mix plant to ensure proper mix, including high range water reducer, and batching methods during the first three days of concrete mix preparation and placement. After which the manufacturer's representative must designate a representative at the concrete producer's plant to ensure the concrete mix procedures meet the silica fume manufacturer's recommendations. Representative to attend and advise at finishing of sample slab. Perform silica fume work in accordance with ODOT SSC Sections 02001 and 02030.

1.6.3.4 Finishing Plan

Perform bridge deck roadway and sidewalk finish per ODOT SSC Section 00540.50, approach slabs per ODOT SSC Section 00545.42, and for all other surface finish provide in accordance with ODOT SSC Section 00540.53.

1.6.3.5 Safety Data Sheets

Submit Safety Data Sheets (SDS) for all materials that are regulated for hazardous health effects. SDS must be readily accessible during each work shift to employees when they are at the construction site.

1.6.4 Test Reports

1.6.4.1 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C618 for fly ash and pozzolan. Submit test results performed within six months of submittal date. Perform fly ash and pozzolan work in accordance with ODOT SSC Sections 02001 and 02030.

1.6.4.2 Slag Cement

Submit test results in accordance with ASTM C989/C989M for slag cement. Submit test results performed within six months of submittal date. Perform slag cement work in accordance with ODOT SSC Sections 02001, 02010 and 02030.

1.6.4.3 Aggregates

Submit test results in accordance with ASTM C33/C33M, or ASTM C330/C330M for lightweight aggregate, and ASTM C1293 or ASTM C1567 as required in the Paragraph titled ALKALI-AGGREGATE REACTION. Concrete aggregate quality and acceptance performed in accordance with ODOT SSC Sections 02690 and 00540.

1.6.4.4 Fiber-Reinforced Concrete

Test to determine flexural toughness index I5 in accordance with ASTM C1116/C1116M and ODOT SSC Section 02045.

1.6.5 Field Samples

1.6.5.1 Slab Finish Sample

Install minimum of 10 foot by 10 foot slab. Slab finish sample must not be part of the final project. Finish as required by specification. Silica fume manufacturer's representative must attend and advise. Allow structural concrete sampling and quality control per ODOT SSC Sections 00540 and 00165.

1.6.5.2 Surface Finish Samples

Provide a minimum of three sample concrete panels for each finish for each mix design, 3 feet by 3 feet, 3 inches thick. Use the approved concrete mix design(s). Provide sample panels on-site at locations directed. Once approved, each set of panels must be representative of each of the finishes specified and of the workmanship and finish(es) required. Do not remove or destroy samples until directed by the CO. Provide concrete surface finish per ODOT SSC Section 00540.

1.6.6 Quality Control Plan

Develop and submit for approval a concrete quality control program in accordance with the guidelines of ACI 121R and as specified herein. The plan must include approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. All quality control reports must be provided to the CO, Quality Manager and Concrete Supplier. Maintain a copy of ACI SP-15 and CRSI 10MSP at project site. Ensure quality control plan meets ODOT SSC Sections 00165 and 02001.

1.6.7 Concrete Deck Pre-Placement Conference

Concrete deck pre-placement conferences per ODOT SSC Section 00540.02.

1.6.8 Quality Control Personnel Certifications

a. The Contractor must submit for approval the responsibilities of the various quality control personnel, including the names and qualifications of the individuals in those positions and a quality control organizational chart defining the quality control hierarchy and the responsibility of the various positions. Quality control personnel must be employed by the Contractor.

b. Submit American Concrete Institute certification for the following:

- (1) CQC personnel responsible for inspection of concrete operations.
- (2) Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews.
- (3) Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

c. Quality Control Personnel Certifications must be in accordance with ODOT SSC Section 02001.

1.6.8.1 Quality Manager Qualifications

The quality manager must hold a current license as a professional engineer in a U.S. state or territory with experience on at least five similar projects. Evidence of extraordinary proven experience may be considered by the CO as sufficient to act as the Quality Manager.

1.6.8.2 Field Testing Technician and Testing Agency

a. Submit data on qualifications of proposed testing agency and technicians for approval by the CO prior to performing testing on concrete.

(1) Work on concrete under this Contract must be performed by an ACI Concrete Field Testing Technician Grade 1 qualified in accordance with ACI SP-2 or equivalent. Equivalent certification programs must include requirements for written and performance examinations as stipulated in ACI SP-2.

(2) Testing agencies that perform testing services on reinforcing steel must meet the requirements of ASTM E329.

(3) Testing agencies that perform testing services on concrete materials must meet the requirements of ASTM C1077.

b. Ensure field testing performed in accordance with ODOT SSC Section 00165.

1.6.8.3 ADA Sidewalk Certification

Concrete deck sidewalk and curb ramps ADA certification for Contractors and working drawings for curb ramp work per ODOT SSC Section 00540.03.

1.6.9 Laboratory Qualifications for Concrete Qualification Testing

The concrete testing laboratory must have the necessary equipment and experience to accomplish required testing. The laboratory must meet the requirements of ASTM C1077 and be Cement and Concrete Reference Laboratory (CCRL) inspected. Testing will be accordance with ODOT SSC Section 00165.

1.6.10 Laboratory Accreditation

Laboratory and testing facilities must be provided by and at the expense of the Contractor. The laboratories performing the tests must be accredited in accordance with ASTM C1077, including ASTM C78/C78M and ASTM C1260. The accreditation must be current and must include the required test methods, as specified. Furthermore, the testing must comply with the following requirements:

a. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies must be performed by an accredited laboratory and under the direction of a registered professional engineer in a U.S. state or territory competent in concrete materials who is competent in concrete materials and must sign all reports and designs.

b. Acceptance Testing: Furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other

facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by **ASTM C31/C31M**.

c. Contractor Quality Control: All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

d. Laboratory will be accordance with **ODOT SSC** Section 00165.

1.7 ENVIRONMENTAL REQUIREMENTS

Provide space ventilation according to material manufacturer recommendations, at a minimum, during and following installation of concrete curing compound and sealer. Maintain one of the following ventilation conditions during the curing period or for 72 hours after installation:

a. Supply 100 percent outside air 24 hours a day.

b. Supply airflow at a rate of six air changes per hour, when outside temperatures are between **55 degrees F** and **84 degrees F** and humidity is between 30 percent and 60 percent.

c. Supply airflow at a rate of one and a half air changes per hour, when outside air conditions are not within the range stipulated above.

d. Perform additional environmental requirements per **ODOT SSC** Section 00290.

1.7.1 Submittals for Environmental Performance

a. Provide data indication the percentage of post-industrial pozzolan (fly ash, slag cement) cement substitution as a percentage of the full product composite by weight.

b. Provide data indicating the percentage of post-industrial and post-consumer recycled content aggregate.

c. Provide product data indicating the percentage of post-consumer recycled steel content in each type of steel reinforcement as a percentage of the full product composite by weight.

d. Provide product data stating the location where all products were manufactured

e. For projects using FSC certified formwork, provide chain-of-custody documentation for all certified wood products.

f. For projects using reusable formwork, provide data showing how formwork is reused.

g. Provide SDS product information data showing that form release agents meet any environmental performance goals such as using vegetable and soy based products.

h. Provide SDS product information data showing that concrete adhesives meet any environmental performance goals including low emitting, low volatile organic compound products.

- i. Provide additional environmental submittals per ODOT SSC Section 00290.

1.8 SUSTAINABLE DESIGN REQUIREMENTS

1.8.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local and regional materials to total dollar value of products included in project.

1.9 QUALIFICATIONS FOR WELDING WORK

- a. Welding procedures must be in accordance with AWS D1.4/D1.4M.
- b. Verify that Welder qualifications are in accordance with AWS D1.4/D1.4M for welding of reinforcement or under an equivalent qualification test approved in advance. Welders are permitted to do only the type of welding for which each is specifically qualified.

PART 2 PRODUCTS

2.1 STRUCTURAL CONCRETE

- a. The concrete mix design and material requirements for cast-in-place structural concrete, including but not limited to aggregates, chemical admixtures, and cementitious materials, will be in accordance with ODOT SSC Sections 00540, 02001, and 02010. All cast-in-place reinforced concrete will be per the specified class on the Contract plans with the minimum compressive strength achieved at 28 days.
- b. Provide reinforced concrete bridge approach slabs per ODOT SSC Section 00545.

2.2 FORMWORK MATERIALS

Provide formwork/falsework in accordance with ODOT SSC Section 00540.

- a. Form-facing material in contact with concrete must be lumber, plywood, tempered concrete-form-grade hardboard, metal, plastic, or treated paper that creates specified appearance and texture of concrete surface. Submit product information on proposed form-facing materials if different from that specified herein. Permanent stay-in-place bridge deck forms are not allowed, use removable concrete forms on all steel structures. Do not weld or permanently attach any part of the form to any steel girder.
- b. Design formwork, shores, reshores, and backshores to support loads transmitted to them and to comply with applicable building code requirements.
- c. Design formwork and shoring for load redistribution resulting from stressing of post-tensioned reinforcement. Ensure that formwork allows movement resulting from application of prestressing force.

- d. Design formwork to withstand pressure resulting from placement and vibration of concrete and to maintain specified tolerances.
- e. Design formwork to accommodate waterstop materials in joints at locations indicated in Contract documents.
- f. Provide temporary openings in formwork if needed to facilitate cleaning and inspection.
- g. Design formwork joints to inhibit leakage of mortar.
- h. Limit deflection of facing materials for concrete surfaces exposed to view to 1/240 of center-to-center spacing of facing supports.
- i. Do not use earth cuts as forms for vertical or sloping surfaces.
- j. Submit product information on proposed form-facing materials if different from that specified herein.
- k. Submit shop drawings for formwork, shoring, reshoring, and backshoring. Shop drawings must be signed and sealed by a licensed design engineer.
- l. Submit design calculations for formwork, shoring, reshoring, and backshoring. Design calculations must be signed and sealed by a licensed design engineer.
- m. Submit procedure for reshoring and backshoring, including drawings signed and sealed by a licensed design engineer. Include on shop drawings the formwork removal procedure and magnitude of construction loads used for design of reshoring or backshoring system. Indicate in procedure the magnitude of live and dead loads assumed for required capacity of the structure at time of reshoring or backshoring.
- n. Submit manufacturer's product data on form liner proposed for use with each formed surface.

2.2.1 Wood Forms

Use lumber as follows. Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with [NIST PS 1](#), B-B concrete form panels or better or [AHA A135.4](#), hardboard for smooth form lining.

2.2.1.1 Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to [NIST PS 1](#), B-B, concrete form, not less than [5/8-inch](#) thick.

2.2.1.2 Overlaid Concrete Form Plywood (Standard Smooth)

Provide plywood that conforms to [NIST PS 1](#), B-B, high density form overlay, not less than [5/8-inch](#) thick.

2.2.2 Plastic Forms

Plastic lumber as allowed by [ODOT SSC](#) Section 00540 must be approved by the Government. Provide plastic forms that contain a minimum of 50 percent post-consumer recycled content, or a minimum of 50 percent post-industrial

recycled content.

2.2.3 Carton Forms

Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete until initial set. Provide carton forms that contain a minimum of five percent post-consumer recycled content, or a minimum of 20 percent post-industrial recycled content.

2.2.4 Steel Forms

Provide temporary steel form surfaces that do not contain irregularities, dents, or sags.

2.3 FORMWORK ACCESSORIES

a. Use commercially manufactured formwork accessories, including ties and hangers.

b. Form ties and accessories must not reduce the effective cover of the reinforcement.

2.3.1 Form Ties

a. Use form ties with ends or end fasteners that can be removed without damage to concrete.

b. Where indicated in Contract documents, use form ties with integral water barrier plates or other acceptable positive water barriers in walls.

c. The breakback distance for ferrous ties must be at least 2 in. for Surface Finish-2.0 or Surface Finish-3.0, as defined in ACI 301.

d. If the breakback distance is less than 3/4 in., use coated or corrosion-resistant ties.

e. Submit manufacturer's data sheet on form ties.

2.3.2 Waterstops

Provide waterstops per ODOT SSC Section 02440. Submit manufacturer's data sheet on waterstop materials and splices.

2.3.2.1 PVC Waterstop

Polyvinylchloride waterstops must conform to COE CRD-C 572.

2.3.2.2 Rubber Waterstop

Rubber waterstops must conform to COE CRD-C 513.

2.3.2.3 Thermoplastic Elastomeric Rubber Waterstop

Thermoplastic elastomeric rubber waterstops must conform to ASTM D471.

2.3.2.4 Hydrophilic Waterstop

Swellable strip type compound of polymer modified chloroprene rubber that

swells upon contact with water must conform to the following requirements when tested in accordance to **ASTM D412**: Tensile strength **420 psi** minimum; ultimate elongation 600 percent minimum. Hardness must be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at **70 degrees F** must be 3 to 1 minimum.

2.3.3 Biodegradable Form Release Agent

a. Provide form release agent that is colorless, biodegradable, and either rapeseed oil-based, or soy oil-based, or water-based, with a low (maximum of 55 grams/liter (g/l)) or zero VOC content. A minimum of 85 percent of the total product must be biobased material.

b. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

c. Provide form release agent that reduces formwork moisture absorption, and does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene. Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

d. Submit manufacturer's product data on formwork release agent for use on each form-facing material.

2.3.4 Chamfer Materials

Use lumber materials with dimensions of **3/4 by 3/4 in.** Provide chamfers in accordance with **ODOT SSC** Section 00540.

2.3.5 Construction Joints

Provide construction joints as shown on Contract plans and in accordance with **ODOT SSC** Section 00540.

2.4 CONCRETE MATERIALS

2.4.1 Cementitious Materials

Cementitious Materials submittals of mix design will be performed in accordance with **ODOT SSC** Sections 02001 and 02023.

2.4.1.1 Portland Cement

a. Portland Cement for concrete mixes will be in accordance with **ODOT SSC** Section 02010.

b. Unless otherwise specified, provide cement that conforms to **ASTM C150/C150M** Type I, II, or III.

c. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

d. Submit information along with evidence demonstrating compliance with referenced standards. Submittals must include types of cementitious materials, manufacturing locations, shipping locations, and certificates showing compliance.

e. Cementitious materials must be stored and kept dry and free from contaminants.

2.4.1.2 Blended Cements

a. Blended cements must conform to [ASTM C595/C595M](#) and [AASHTO M 240/M 240M](#), Type IP, IS, IL or IT per [ODOT SSC](#) Section 02010.20.

b. Slag cement added to the Type IS blend must meet [ASTM C989/C989M](#).

c. The pozzolan added to the Type IS blend must meet [ASTM C618](#) Class F or Class C, and must be interground with the cement clinker. The manufacturer must state in writing that the amount of pozzolan in the finished cement will not vary more than plus or minus five mass percent of the finished cement from lot-to-lot or within a lot. The percentage and type of pozzolan used in the blend must not change from that submitted for the aggregate evaluation and mixture proportioning.

2.4.1.3 Fly Ash

If fly ash is used for concrete mixtures, it must be done in accordance with [ODOT SSC](#) Sections 02001 and 02030.

2.4.1.4 Slag Cement

If slag cement is used for concrete mixes, it must be done in accordance with [ODOT SSC](#) Sections 02001 and 02035.

2.4.1.5 Silica Fume

a. If silica fume is used for concrete mixes, it must be done in accordance with [ODOT SSC](#) Sections 02001 and 02035.

b. Silica fume must conform to [ASTM C1240](#), including the optional limits on reactivity with cement alkalis. Silica fume may be furnished as a dry, densified material or as slurry. Proper mixing is essential to accomplish proper distribution of the silica fume and avoid agglomerated silica fume which can react with the alkali in the cement resulting in premature and extensive concrete damage. Supervision at the batch plant, finishing, and curing is essential. Provide at the Contractor's expense the services of a manufacturer's technical representative, experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume. This representative must be present on the project prior to and during at least the first four days of concrete production and placement using silica fume. A High Range Water Reducing admixture (HRWRA) must be used with silica fume.

2.4.1.6 Other Supplementary Cementitious Materials

Supplementary cementitious materials for concrete mixtures must be done in accordance with [ODOT SSC](#) Sections 02001 and 02035.

2.4.2 Water

a. Water or ice must comply with the requirements of [ASTM C1602/C1602M](#).

- b. Minimize the amount of water in the mix. Improve workability by adjusting the grading of the aggregate and using admixture rather than by adding water.
- c. Water must be potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.
- d. Protect mixing water and ice from contamination during storage and delivery.
- e. Submit test report showing water complies with [ASTM C1602/C1602M](#).
- f. When nonpotable source is proposed for use, submit documentation on effects of water on strength and setting time in compliance with [ASTM C1602/C1602M](#).
- g. Must conform to [ODOT SSC](#) Section 02020.

2.4.3 Aggregate

2.4.3.1 Normal-Weight Aggregate

- a. Aggregates must conform to [ASTM C33/C33M](#) and [ODOT SSC](#) Sections 02001 and 02690.
- b. Aggregates used in concrete must be obtained from the same sources and have the same size range as aggregates used in concrete represented by submitted field test records or used in trial mixtures.
- c. Store and handle aggregate in a manner that will avoid segregation and prevents contamination by other materials or other sizes of aggregates. Store aggregates in locations that will permit them to drain freely. Do not use aggregates that contain frozen lumps.
- d. Submit types, pit or quarry locations, producers' names, aggregate supplier statement of compliance with [ASTM C33/C33M](#), and [ASTM C1293](#) expansion data not more than 18 months old.

2.4.4 Admixtures

- a. Chemical admixtures must conform to [ASTM C494/C494M](#) and [ODOT SSC](#) Section 02040.
- b. Air-entraining admixtures must conform to [ASTM C260/C260M](#) and [ODOT SSC](#) Section 02040.
- c. Chemical admixtures for use in producing flowing concrete must conform to [ASTM C1017/C1017M](#).
- d. Do not use calcium chloride admixtures.
- e. Admixtures used in concrete must be the same as those used in the concrete represented by submitted field test records or used in trial mixtures.
- f. Protect stored admixtures against contamination, evaporation, or damage.

g. To ensure uniform distribution of constituents, provide agitating equipment for admixtures used in the form of suspensions or unstable solutions. Protect liquid admixtures from freezing and from temperature changes that would adversely affect their characteristics.

h. Submit types, brand names, producers' names, manufacturer's technical data sheets, and certificates showing compliance with standards required herein.

i. Accelerating admixtures used in accordance with the manufacturer's recommendations may be used in cast-in-place reinforced concrete, except as required here. Accelerating admixtures must not be used in bridge deck slabs, all concrete superstructures, mass concrete, and approach slabs and expansion joints.

2.5 MISCELLANEOUS MATERIALS

2.5.1 Concrete Curing Materials

Provide concrete curing material in accordance with **ACI 301** Section 5 and **ACI 308.1** Section 2, and **ODOT SSC** Section 02050. Submit product data for concrete curing compounds. Submit manufacturer's instructions for placement of curing compound. Provide concrete curing materials per **ODOT SSC** Section 02050. Provide concrete sealers per **ODOT SSC** Section 02060.

2.5.2 Nonshrink Grout

Nonshrink grout in accordance with **ASTM C1107/C1107M** and **ODOT SSC** Sections 02080 and 02440.

2.5.3 Surface Finish Materials

2.5.3.1 Deck Roadway Finish

After the deck roadway has been screeded with a finishing machine per **ODOT SSC** Section 00540.24, provide deck surface finish and the associated materials per **ODOT SSC** Section 00540.

2.5.3.2 Deck Sidewalk and Curb Finish

Provide sidewalk surface finish and the associated materials per **ODOT SSC** Sections 00540 and 00759.50.

2.5.3.3 Bridge Approach Slab Finish

Provide bridge approach slab surface finish and the associated materials per **ODOT SSC** Sections 00545.

2.5.3.4 Other Surface Finish

All other concrete exposed surfaces must be surface finished with materials and techniques per **ODOT SSC** Section 00540.53.

2.5.4 Joint Filler

Provide preformed joint fillers for concrete per **ODOT SSC** Section 02440.

2.5.5 Joint Sealants

Provide poured joint sealant for concrete per ODOT SSC Section 02440.

2.6 CONCRETE MIX DESIGN

2.6.1 Properties and Requirements

Provide concrete mix properties and requirements per ODOT SSC Section 00540, 02001, and 02010.

2.6.2 Durability

For High Performance Concrete (HPC) in the bridge deck, sidewalk, and approach panels ensure durability requirements in ODOT SSC Section 02001.20 are met.

2.6.2.1 Alkali-Aggregate Reaction

- a. Do not use any aggregate susceptible to alkali-carbonate reaction (ACR).
- b. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 must not exceed 0.04 percent at one year.

2.6.2.2 Concrete Temperature

Follow concrete temperature requirements per ODOT SSC Sections 00540 and 02001.

2.6.2.3 Concrete permeability

- a. Provide concrete meeting the requirements of ODOT SSC Section 02001.
- b. Submit documentation verifying compliance with specified requirements.

2.6.3 Trial Sampling and Testing

Trial sampling and testing must be in accordance to ODOT SSC Sections 00540 and 02001.

2.6.4 Ready-Mix Concrete

If ready-mixed concrete is utilized it must be done so in accordance with ODOT SSC Section 02001.

2.7 REINFORCEMENT

- a. Bend reinforcement cold. Fabricate reinforcement in accordance with fabricating tolerances of ACI 117 and ODOT SSC Sections 00530 and 02510.
- b. Submit manufacturer's certified test report for reinforcement.
- c. Submit placing drawings showing fabrication dimensions and placement locations of reinforcement and reinforcement supports. Placing drawings must indicate locations of splices, lengths of lap splices, and details of mechanical and welded splices.

- d. Submit request with locations and details of splices not indicated in Contract documents.

2.7.1 Reinforcing Bars

- a. Reinforcing bars must be deformed, except spirals, load-transfer dowels, and welded wire reinforcement, which may be plain.
- b. [ASTM A615/A615M](#) with the bars marked S, Grade 60; or [ASTM A706/A706M](#) with bars marked W, Grade 60 and 80. All reinforcement bars that need to be welded must be [ASTM A706/A706M](#). Provide dowels for the approach slab conforming to [ASTM A615/A615M](#) where appropriate per ODOT Standard Drawing BR165.
- c. Submit mill certificates for reinforcing bars.
- d. Ensure all requirements of [ODOT SSC](#) 00530 and 02510 are met for steel reinforcement.

2.7.1.1 Epoxy-Coated Reinforcing Bars

- a. Provide epoxy-coated reinforcing bars that conform to [ASTM A775/A775M](#), Grade 60.
- b. Coatings must be applied in plants that are certified in accordance with Concrete Reinforcing Steel Institute (CRSI) Epoxy Coating Plant Certification Program or an equivalent program acceptable to the CO.
- c. Coating damage incurred during shipment, storage, handling, and placing of epoxy-coated reinforcing bars must be repaired. Repair damaged coating areas with patching material conforming to [ASTM A775/A775M](#) as applicable and in accordance with material manufacturer's written recommendations. Damaged coating area must not exceed two percent of surface area in each linear foot of each bar or bar must not be used. The two percent limit on damaged coating area must include repaired areas damaged before shipment as required by [ASTM A775/A775M](#) as applicable. Fading of coating color will not be cause for rejection of epoxy-coated reinforcing bars.
- d. Submit concrete Reinforcing Steel Institute (CRSI) Epoxy Coating Plant Certification inspection and quality-control program of plant applying epoxy coating if proposed plant is not certified in accordance with CRSI Epoxy Coating Plant Certification Program.
- e. Epoxy coated reinforcing bars must be handled and stored in accordance with [ASTM A775/A775M](#). If the manufacturer stores bars outdoors for more than 2 months, cover coated reinforcement with opaque protective material.
- f. Ensure that epoxy-coated reinforcement steel is done in accordance with [ODOT SSC](#) Sections 00530 and 02510.

2.7.1.2 Headed Shear Stud Reinforcement

Headed studs and headed stud assemblies must conform to [ASTM A1044/A1044M](#). Fabricate shear connector studs with material, welding, and inspection according to [AWS D1.5M/D1.5](#) and [AWS D1.4/D1.4M](#).

2.7.2 Welded Wire Reinforcement

- a. Use welded wire reinforcement specified in Contract documents and conforming to one or more of the specifications given herein.
- b. Plain welded wire reinforcement must conform to [ASTM A1064/A1064M](#) with welded intersections spaced no greater than 12 inch apart in direction of principal reinforcement.
- c. Deformed welded wire reinforcement must conform to [ASTM A1064/A1064M](#), with welded intersections spaced no greater than 16 inch apart in direction of principal reinforcement.
- d. Epoxy-coated welded wire reinforcement must conform to [ASTM A884/A884M](#). Coating damage incurred during shipment, storage, handling, and placing of epoxy-coated welded wire reinforcement must be repaired in accordance with [ASTM A884/A884M](#). Repair damaged coating areas with patching material in accordance with material manufacturer's written recommendations. If damaged area exceeds two percent of surface area in each linear foot of each wire or welded wire reinforcement, the sheet containing the damaged area must not be used. The two percent limit on damaged coating area must include repaired areas damaged before shipment as required by [ASTM A884/A884M](#). Fading of coating color must not be cause for rejection of epoxy-coated welded wire reinforcement.
- e. Stainless steel welded wire reinforcement must conform to [ASTM A1022/A1022M](#).
- f. Zinc-coated (galvanized) welded wire reinforcement must conform to [ASTM A1060/A1060M](#). Coating damage incurred during shipment, storage, handling, and placing of zinc-coated (galvanized) welded wire reinforcement must be repaired in accordance with [ASTM A780/A780M](#). If damaged area exceeds two percent of surface area in each linear foot of each wire or welded wire reinforcement, the sheet containing the damaged area must not be used. The two percent limit on damaged coating area must include repaired areas damaged before shipment as required by [ASTM A1060/A1060M](#).

2.7.3 Welding

- a. Provide weldable reinforcing bars that conform to [ASTM A706/A706M](#), Grade 60 and 80, except that the maximum carbon content must be 0.55 percent.
- b. Comply with [AWS D1.4/D1.4M](#) unless otherwise specified. Do not tack weld reinforcing bars.
- c. Welded assemblies of steel reinforcement produced under factory conditions, such as welded wire reinforcement, bar mats, and deformed bar anchors, are allowed.
- d. After completing welds on zinc-coated (galvanized), epoxy-coated, or zinc and epoxy dual-coated reinforcement, coat welds and repair coating damage in accordance with Paragraphs REINFORCING BARS AND WELDED WIRE REINFORCEMENT.

PART 3 EXECUTION

3.1 EXAMINATION

- a. Do not begin installation until substrates have been properly constructed; verify that substrates are level.
- b. If substrate preparation is the responsibility of another installer, notify CO of unsatisfactory preparation before processing.
- c. Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify CO and wait for instructions before beginning installation.
- d. Provide examination requirements per **ODOT SSC** Sections 00540, 02001, and 02010. Before any cast-in-place reinforced concrete construction activities begin, the qualifications for all required Contractor Quality Control personnel must be submitted to and approved by the engineer.

3.2 CONSTRUCTION METHODS

Construction methods pertaining to structural concrete including all portions of the bridge project must be in accordance with the **ODOT SSC** Section 00540.

3.3 FORMS

- a. All construction use of temporary formwork/falsework for structural concrete must be utilized and removed in accordance with the **ODOT SSC** Section 00540.
- b. Concrete maturity method in accordance with **ASTM C1074** and **ODOT SSC**. Submit maturity method data using project materials and concrete mix proportions used on the project to demonstrate the correlation between maturity and compressive strength of laboratory cured test specimens to the CO.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

- a. Unless otherwise specified, placing reinforcement and miscellaneous materials must be in accordance to the **ODOT SSC** Section 00530. Provide bars, welded wire reinforcement, and other devices necessary to install and secure reinforcement. Provide alternating reinforcement bar splices where possible.
- b. Reinforcement must not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.
- c. Structural concrete members must have concrete cover for reinforcement given in the Contract documents.

3.4.1 General

Provide details of reinforcement that are in accordance with the Contract documents and **CRSI 10MSP**.

3.4.2 Reinforcement Supports

Provide reinforcement support in accordance with [CRSI RB4.1](#) and [ACI 301](#) Section 3 requirements. Ensure requirements are met for [ODOT SSC](#) Section 00530 as well. Supports for coated or galvanized bars must also be coated with electrically compatible material for a distance of at least [2 inches](#) beyond the point of contact with the bars.

3.4.3 Epoxy Coated Reinforcing

Epoxy Coated Reinforcing must meet the requirements of [ASTM A934/A934M](#) including Appendix X2, "Guidelines for Job Site Practices" except as otherwise specified herein. Epoxy Coated Reinforcement must adhere to [ODOT SSC](#) Sections 00530 and 02510 requirements. Epoxy Coated Reinforcement must be provided in the bridge deck, bridge approach slabs, sidewalk, and bridge rails.

3.4.3.1 Epoxy Coated Reinforcing Steel Placement and Coating Repair

Carefully handle and install bars to minimize job site patching. Use the same precautions as described in the Paragraph titled EPOXY-COATED REINFORCING BARS. Do not drag bars over other bars or over abrasive surfaces. Keep bar free of dirt and grit. When possible, assemble reinforcement as tied cages prior to final placement into the forms. Support assembled cages on padded supports. It is not expected that coated bars, when in final position ready for concrete placement, are completely free of damaged areas; however, excessive nicks and scrapes which expose steel is cause for rejection. Criteria for defects which require repair and for those that do not require repair are as indicated. Inspect for defects and provide required repairs prior to assembly. After assembly, reinspect and provide final repairs.

a. Immediately prior to application of the patching material, manually remove any rust and debonded coating from the reinforcement by suitable techniques employing devices such as wire brushes and emery paper. Exercise care during this surface preparation so that the damaged areas are not enlarged more than necessary to accomplish the repair. Clean damaged areas of dirt, debris, oil, and similar materials prior to application of the patching material.

b. Do repair and patching in accordance with the patching material manufacturer's recommendations and [ODOT SSC](#) Section 00530. These recommendations, including cure times, must be available at the job site at all times.

c. Allow adequate time for the patching materials to cure in accordance with the manufacturer's recommendation prior to concrete placement.

d. Rinse placed reinforcing bars with fresh water to remove chloride contamination prior to placing concrete.

3.4.4 Splicing

Provide steel reinforcement splicing as indicated in the Contract documents. For splices not indicated follow [ODOT SSC](#) Section 00530. Do not splice at points of maximum stress. Overlap welded wire reinforcement the spacing of the cross wires, plus [2 inches](#). Approve welded splices prior to use and per [AWS D1.4/D1.4M](#).

3.4.5 Future Bonding

Plug exposed, threaded, mechanical reinforcement bar connectors with a greased bolt. Provide bolt threads that match the connector. Countersink the connector in the concrete. Caulk the depression after the bolt is installed.

3.4.6 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement and support against displacement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.7 Fabrication

a. Shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

(1) Provide fabrication tolerances that are in accordance with [ACI 117](#).

(2) Provide hooks and bends that are in accordance with the Contract documents.

b. Reinforcement must be bent cold to shapes as indicated. Bending must be done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending must be in accordance with standard approved practice and by approved machine methods.

c. Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

d. Do not use reinforcement that has any of the following defects:

(1) Bar lengths, depths, and bends beyond specified fabrication tolerances

(2) Bends or kinks not indicated on drawings or approved shop drawings

(3) Bars with reduced cross-section due to rusting or other cause

e. Replace defective reinforcement with new reinforcement having required shape, form, and cross-section area.

3.4.8 Placing Reinforcement

a. Place reinforcement in accordance with [ACI 301](#) and [ODOT SSC Section 00530](#).

b. For slabs on grade (over earth or over capillary water barrier) and for footing reinforcement, support bars or welded wire reinforcement on precast concrete blocks, spaced at intervals required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

c. Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

- (1) Provide supports for reinforcing bars that are sufficient in number and have sufficient strength to carry the reinforcement they support, and in accordance with ACI 301, CRSI 10MSP and ODOT SSC Section 00530. Do not use supports to support runways for concrete conveying equipment and similar construction loads.
- (2) Equip supports on ground and similar surfaces with sand-plates.
- (3) Support welded wire reinforcement as required for reinforcing bars.
- (4) Secure reinforcements to supports by means of tie wire. Wire must be black, soft iron wire, not less than 16 gage.
- (5) Reinforcement must be accurately placed, securely tied at intersections, and held in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing of supports must conform to the Contract documents.
- (6) Bending of reinforcing bars partially embedded in concrete is permitted only as specified in the Contract documents.

3.4.9 Spacing of Reinforcing Bars

- a. Spacing must be as indicated in the Contract documents.
- b. Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to preapproval by the CO.

3.4.10 Concrete Protection for Reinforcement

Additional concrete protection must be in accordance with the Contract documents and ODOT SSC Section 00540.

3.4.11 Welding

Welding must be in accordance with AWS D1.4/D1.4M.

3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

All batching, measuring, mixing, and transporting of concrete must be in accordance with ODOT SSC Sections 00540, 02001, and 02010.

3.5.1 Measuring

Make measurements at intervals as specified in ODOT SSC Sections 00165 and 02001.

3.5.2 Mixing

a. Mix concrete in accordance with ODOT SSC Section 00540, ASTM C94/C94M, ACI 301 and ACI 304R.

b. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the concrete temperature is less than 84 degrees F.

c. Place concrete within 60 minutes if the concrete temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and submitted water-cementitious material ratio are not exceeded and the required concrete strength is still met. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required.

d. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture, within the manufacturer's recommended dosage, to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

3.5.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable and deliver per ODOT SSC Section 00540. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.6 PLACING CONCRETE

Place concrete in accordance with ODOT SSC Section 00540.

3.6.1 Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the CO. Excavation width must be a minimum of 4 inches greater than indicated.

3.6.2 Approach Slab Placement

Construct bridge approach slabs per ODOT SSC Section 00545.

3.6.3 Bridge Rail Placement

Refer to the Contract plans and ODOT Standard Drawings BR216 and BR220. Place concrete for bridge rails per ODOT SSC Section 00545 and Section 00587. Refer to Section 05 12 00.00 99 STRUCTURAL BRIDGE STEEL for metal railing, posts, and fixture coordination concrete bridge rail interface. Provide accommodations for concrete rails on approach slabs with roadway elements such as guardrails at approach slab ends.

3.6.4 Mass Concrete Placement

a. Produce a mass concrete placement free of cracks caused or worsened by concrete heat of hydration. Accomplish this through appropriate concrete mix design and control of concrete temperatures and temperature differences. Use of concrete pre-cooling, concrete post-cooling, application of insulation or external heat, and or selection of reduced heat of hydration concrete mix may be appropriate for this purpose.

b. Compliance with this specification may result in long durations of temperature control which could impact the sequence and schedule of planned work. The Contractor must implement procedures to control concrete temperatures that are compatible with the work plan and project schedule.

c. Provide a thermal control plan signed and stamped by licensed engineer. Unless otherwise specified, the following temperature limits apply:

(1) Maximum temperature in concrete after placement cannot exceed 160 degrees F.

(2) Maximum temperature difference between center and any surface of placement, and with ambient temperature, must not exceed 35 degrees F.

(a) The surface is 2 to 6 inches internal to the outer dimension of the placement and can include the upper surface and the sides.

(b) The center is the vertical centerline horizontally centered with the element where mass concrete is being placed.

d. Submit a thermal control plan for each mass concrete placement that includes:

(1) Concrete materials, mixture proportions, and ranges of chemical admixture dosages using ODOT SSC.

(2) Permissible changes to concrete materials and mixture proportions that do not require the thermal control plan to be updated.

(3) Calculated and measured adiabatic temperature rise of concrete.

(4) Upper limit for concrete temperature at time of placement.

(5) Description of specific measures and equipment that will be used to ensure maximum temperature in placement will not exceed the specified maximum temperature.

(6) Calculated maximum temperature difference in placement based on expected conditions at time of placement and use of proposed measures to control temperature differences.

(7) Description of equipment and procedures that will be used to monitor and log temperatures and temperature differences.

- (8) Drawings of locations for temperature sensors in placement.
- (9) Description of format and frequency of reporting temperature data.
- (10) Description of measures to address and reduces excessive temperatures and temperature differences if they occur.
- (11) Description of curing procedures, including materials and methods, and curing duration.
- (12) Description of formwork removal procedures to ensure temperature difference at temporarily exposed surface will not exceed temperature difference limit, and how curing will be maintained.

e. Update thermal control plan if changes in concrete materials or mixture proportions affect compliance with temperature limits. Unless otherwise specified, preserve moisture by maintaining forms in place. For surfaces not in contact with forms either apply water-retention sheeting material without holes or gaps, or apply membrane-forming curing compound. Control concrete temperature and temperature difference within the concrete from the time concrete is placed until internal temperature has cooled from its maximum so that the difference between average daily ambient temperature and internal temperatures at time of protection removal is less than the specified temperature difference limit. Do not use ice in the concrete mix. Place two temperature sensors (one redundant backup) at the center of the largest portion of placement, two temperature sensors (one redundant backup) at a depth 2 to 3 inches from the edge of exterior surface that is nearest to the vertical center of the placement, and two temperature sensors (one redundant backup) at a depth 3 to 4 inches from the upper surface nearest the horizontal center of the placement. In addition, place two temperature sensors (one redundant backup) in a shaded location for monitoring ambient onsite temperature. Monitor temperatures hourly using electronic sensors capable of measuring temperatures from 0 to 212 degrees F to an accuracy of 2 degrees F. Ensure temperature sensors are operational before placing concrete. Provide temperature monitoring data daily to the Engineer until the internal temperature has cooled from maximum so that the difference between the average daily ambient temperature and the internal temperature at the time of protection removal is less than 35 degrees F. Do not place fresh concrete between hardened concrete placed within the previous four weeks. If unavoidable, obtain approval from the Engineer. If temperatures are nearing the maximum temperature or maximum difference in temperature, take immediate action as described in the thermal control plan. Do not place additional concrete until the cause of excessive temperatures or temperature difference has been identified and corrections are accepted. Care must be taken to avoid construction joints where they are not specified. If unavoidable, obtain approval from the Engineer. If the temperature difference limit is exceeded, the Engineer may require additional testing at no cost to the Department to determine if a pay deduction or removal of material is required. If there is no apparent damage with the concrete, the material may remain in place. If the maximum temperature limit is exceeded, strengths may be reduced and internal expansion and cracking of concrete may not be apparent for several years after the placement; therefore, the material must be removed and replaced at the discretion of the Engineer.

3.6.5 Pumping

Pump structural concrete in accordance with ODOT SSC Section 00540. Pumping must not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment must not exceed 2 inches at discharge/placement. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of course aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well-rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

3.6.6 Cold Weather

Cold weather concrete must meet the requirements of ODOT SSC Section 00540 and ACI 301 unless otherwise specified. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 37 degrees F in any one hour and 50 degrees F per 24 hours after heat application.

3.6.7 Hot Weather

Hot weather concrete must meet the requirements of ODOT SSC Section 00540 and ACI 301 unless otherwise specified. Maintain required concrete temperature using ODOT SSC to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.6.8 Preparation of Surfaces to Receive Grout, Mortar, or Concrete

Surfaces of set concrete at joints, must be roughened and cleaned of laitance, coatings, loose particles, and foreign matter. Provide unformed surfaces that will subsequently receive grout, mortar, or concrete must be roughened to approximately 1/4 inch in amplitude to maximize the bonding strength between underlying concrete and grout/mortar/concrete interfaces. These recommended practices may include roughening, water jet blasting, scrubbing, wire brushing, and application of bonding agents, as applicable. See ODOT SSC Section 00540 for additional requirements.

3.7 WASTE MANAGEMENT

Provide as specified in the Waste Management Plan and as follows.

3.7.1 Mixing Equipment

Before concrete pours, designate Contractor-owned site meeting environmental standards for cleaning out concrete mixing trucks. Minimize water used to wash equipment.

3.7.2 Hardened, Cured Waste Concrete

Use hardened, cured waste concrete as aggregate in concrete mix if approved by CO.

3.7.3 Reinforcing Steel

Collect reinforcing steel and place in designated area for recycling.

3.7.4 Other Waste

Identify concrete manufacturer's or supplier's policy for collection or return of construction waste, unused material, deconstruction waste, and packaging material. Return excess cement to supplier or seek local recyclers to reclaim the materials if manufacturer does not accept return.

3.8 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.8.1 Defects

Repair surface defects in accordance with **ACI 301** Section 5 and **ODOT SSC** Section 02015.

3.8.2 Formed Surfaces

3.8.2.1 Tolerances

Tolerances in accordance with **ODOT SSC** Sections 00540 and 02001.

3.8.2.2 Deck Finishing Machine

Provide a deck finishing machine that can screed the concrete bridge deck in accordance with **ODOT SSC** Section 00540.

3.8.2.3 Surface Finish

Provide for exposed surface finish per Contract documents and **ODOT SSC** Section 00540.

3.9 CONCRETE SLAB AND MISCELLANEOUS CONSTRUCTION

3.9.1 Deck Roadway Texturing

Provide saw cut texturing per **ODOT SSC** Section 00540.

3.10 TOLERANCES

3.10.1 Tolerance Report

Provide Tolerance Report showing that all structural concrete components including the top of bearing elevations for the girders are within the tolerances outlined in **ODOT SSC** Section 00540.

3.11 JOINTS

3.11.1 Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Joints must be perpendicular to main reinforcement. Reinforcement must be continued and developed across construction joints. Locate permissible construction joints per Contract documents and **ODOT SSC** Section 00540.

3.11.2 Contraction Joints in Slabs on Ground

- a. Provide joints to form panels as indicated.
- b. Under and on exact line of each control joint, cut 50 percent of welded wire reinforcement before placing concrete.
- c. Sawcut contraction joints into slab on ground in accordance with **ACI 301** Section 5 and **ODOT SSC** Section 00540.

3.11.3 Sealing Joints in Slabs on Ground

- a. Contraction and control joints which are to receive finish flooring material must be sealed with joint sealing compound after concrete curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.
- b. Sealed groove must be left ready to receive filling material that is provided as part of finish floor covering work.

3.12 CURING AND PROTECTION

Curing and protection in accordance with **ODOT SSC** Section 00540.

3.12.1 Curing Periods

Conduct concrete curing periods in accordance with **ODOT SSC** Section 00540. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the CO.

3.12.2 Curing Formed Surfaces

Accomplish curing of formed surfaces per **ODOT SSC** Section 00540, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

3.12.3 Curing Unformed Surfaces

Accomplish curing of unformed surfaces such as footings and slabs on grade according to **ODOT SSC** Section 00540.

3.12.4 Temperature of Concrete During Curing

Concrete must comply with temperature requirements under weather conditions per **ODOT SSC** Section 00540.

3.12.5 Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

3.12.6 Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

3.13 FIELD QUALITY CONTROL

3.13.1 General

- a. Perform all concrete sampling, field testing, specimen fabrication, laboratory testing, and quality control/quality assurance procedures in accordance with the current edition of the Oregon Department of Transportation (ODOT) Manual of Field Test Procedures (MFTP).
- b. The MFTP must govern all material acceptance testing frequencies, lot and subplot sizes, and random sampling locations, unless specifically modified herein.

3.13.2 Aggregate Testing

Provide aggregate testing in accordance with **ODOT SSC** Section 02690.

3.13.3 Concrete Sampling

Collect samples of fresh concrete to perform tests per **ODOT SSC** Sections 00165 and 02001.

3.13.4 Concrete Testing

3.13.4.1 Slump Tests

Provide slump tests in accordance with **ODOT SSC** Sections 00540 and 02001.

3.13.4.2 Temperature Tests

Provide temperature tests in accordance with **ODOT SSC** Sections 00540 and 02001.

3.13.4.3 Compressive Strength Tests

Provide concrete compressive strength tests in accordance with **ODOT SSC** Sections 00540 and 02001.

3.13.4.4 Air Content

Provide air content in accordance with **ODOT SSC** Sections 00165 and 02001.

3.13.4.5 Strength of Concrete Structure

a. The strength of the concrete structure will be considered to be deficient if any of the following conditions are identified:

- (1) Failure to meet compressive strength tests as evaluated.
- (2) Reinforcement not conforming to requirements specified.
- (3) Concrete which differs from required dimensions or location in such a manner as to reduce strength.
- (4) Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to requirements specified.
- (5) Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration.
- (6) Poor workmanship likely to result in deficient strength.

b. Where the strength of the concrete structure is considered deficient submit a mitigation or remediation plan for review and approval by the CO.

3.13.4.6 Non-Conforming Materials

a. Factors that indicate that there are non-conforming materials include (but not limited to) excessive compressive strength, inadequate compressive strength, excessive slump, excessive voids and honeycombing, concrete delivery records that indicate excessive time between mixing and placement, or excessive water was added to the mixture during delivery and placement. Any of these indicators alone are sufficient reason for the CO to request additional sampling and testing.

b. Investigations into non-conforming materials must be conducted at the Contractor's expense. The Contractor must be responsible for the investigation and must make written recommendations to adequately mitigate or remediate the non-conforming material. The CO may accept, accept with reduced payment, require mitigation, or require removal and replacement of non-conforming material at no additional cost to the Government.

3.13.4.7 Testing Concrete Structure for Strength

a. When there is evidence that strength of concrete structure in place does not meet specification requirements or there are non-conforming materials, make cores drilled from hardened concrete for compressive strength determination in accordance with [ASTM C42/C42M](#), and as follows:

- (1) Take at least three representative cores from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by the CO.
- (2) Test cores after moisture conditioning in accordance with [ASTM C42/C42M](#) if concrete they represent is more than superficially wet under service.

(3) Air dry cores, (60 to 80 degrees F with relative humidity less than 60 percent) for seven days before test and test dry if concrete they represent is dry under service conditions.

(4) Strength of cores from each member or area are considered satisfactory if their average is equal to or greater than 85 percent of the 28-day design compressive strength of the class of concrete.

b. Fill core holes solid with patching mortar and finished to match adjacent concrete surfaces.

c. Correct concrete work that is found inadequate by core tests in a manner approved by the CO.

3.14 REPAIR, REHABILITATION AND REMOVAL

Before the CO accepts the structure the Contractor must inspect the structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. A report documenting these defects must be prepared which includes recommendations for repair, removal or remediation must be submitted to the CO for approval before any corrective work is accomplished.

3.14.1 Crack Repair

Prior to final acceptance, all cracks in excess of 0.02 inches wide must be documented and repaired. The proposed method and materials to repair the cracks must be submitted to the CO for approval. The proposal must address the amount of movement expected in the crack due to temperature changes and loading.

3.14.2 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Concrete surfaces with weak surfaces less than 1/4 inch thick must be diamond ground to remove the weak surface. Surfaces containing weak surfaces greater than 1/4 inch thick must be removed and replaced or mitigated in a manner acceptable to the CO.

3.14.3 Failure of Quality Assurance Test Results

Proposed mitigation efforts by the Contractor must be approved by the CO prior to proceeding.

-- End of Section --



