JOINT BASE LEWIS-McCHORD

DESIGN STANDARDS

DIVISION 03 - CONCRETE SECTION 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE

07/20

PART 1 GENERAL

1.1 SUMMARY

Perform all work in accordance with ACI 318MACI 318.

1.2 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 CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI	117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI	301	(2016) Specifications for Structural Concrete
ACI	301M	(2016) Metric Specifications for Structural Concrete
ACI	302.1R	(2015) Guide for Concrete Floor and Slab Construction
ACI	304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI	305R	(2010) Guide to Hot Weather Concreting
ACI	306R	(2016) Guide to Cold Weather Concreting
ACI	318	(2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7-9 2017) Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14)
ACI	318M	(2014; ERTA 2015) Building Code Requirements for Structural Concrete & Commentary
ACI	347R	(2014; Errata 1 2017) Guide to Formwork for Concrete
ACI	SP-66	(2004) ACI Detailing Manual

ASTM	A1064/A1064M	(2017) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM	A615/A615M	(2016) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM	C1064/C1064M	(2017) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM	C1157/C1157M	(2017) Standard Performance Specification for Hydraulic Cement
ASTM	C1260	(2014) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM	C143/C143M	(2015) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM	C150/C150M	(2017) Standard Specification for Portland Cement
ASTM	C1567	(2013) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM	C1602/C1602M	(2012) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM	C172/C172M	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM	C173/C173M	(2016) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM	C231/C231M	(2017a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM	C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM	C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM	C31/C31M	(2018) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM	C33/C33M	(2016) Standard Specification for Concrete Aggregates

ASTM	С39/С39М	(2018) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM	C494/C494M	(2017) Standard Specification for Chemical Admixtures for Concrete
ASTM	С595/С595М	(2017) Standard Specification for Blended Hydraulic Cements
ASTM	C618	(2017a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural
		Pozzolan for use in concrete
ASTM	C685/C685M	(2017) Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM	C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM	C94/C94M	(2017a) Standard Specification for Ready-Mixed Concrete
ASTM	С989/С989М	(2017) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM	D1752	(2004a; R 2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM	D412	(2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM	D471	(2016a) Standard Test Method for Rubber Property - Effect of Liquids
ASTM	D75/D75M	(2014) Standard Practice for Sampling Aggregates
ASTM	D98	(2015) Calcium Chloride
ASTM	E1155	(2014) Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers
ASTM	E1155M	(2014) Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers (Metric)
ASTM	E1643	(2018a) Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
ASTM	E1745	(2017) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

SECTION 03 30 53 Page 3

ASTM E1993/E1993M (1998; R 2013; E 2013) Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs

ASTM E96/E96M (2016) Standard Test Methods for Water Vapor Transmission of Materials

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

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40	CFR 247	Comprehensive Procurement Guideline for
		Products Containing Recovered Materials

1.3 SUBMITTALS

building weatherproofing, ensure the applicable category is included under "SD-01 Preconstruction Submittals" and "SD-11 Closeout Submittals" and contains the following after it: (VOC Content); S.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the [Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING] [Environmental Records Binder, in conformance to Section 01 57 19.01 20 SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS]. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Concrete (Recycled Content); S Concrete Sealers (Biobased Content); S Concrete Stains (Biobased Content); S Form Release Agents (Biobased Content); S Concrete Curing Agents (Biobased Content); S Concrete Leveling or Patching Materials (Biobased Content); S

SD-02 Shop Drawings

Installation Drawings; G

SECTION 03 30 53 Page 4

SD-03 Product Data

Air-Entraining Admixture Accelerating Admixture Water-Reducing or Retarding Admixture Curing Materials Expansion Joint Filler Strips, Premolded Joint Sealants - Field Molded Sealants Waterstops Chemical Floor Hardener Batching and Mixing Equipment Conveying and Placing Concrete Formwork Mix Design Data; G Ready-Mix Concrete Curing Compound Mechanical Reinforcing Bar Connectors

SD-06 Test Reports

Aggregates Concrete Mixture Proportions; G Measurement of Floor Tolerances Compressive Strength Testing; G Slump; G Air Content Water

SD-07 Certificates

Cementitious Materials Pozzolan Aggregates Delivery Tickets

SD-08 Manufacturer's Instructions

Chemical Floor Hardener Curing Compound

SD-11 Closeout Submittals

Cement and Concrete (Recycled Content); S
Concrete Sealers (Biobased Content); S
Concrete Stains (Biobased Content); S
Form Release Agents (Biobased Content); S
Concrete Curing Agents (Biobased Content); S
Concrete Leveling or Patching Materials (Biobased Content); S

1.4 QUALITY ASSURANCE

Indicate specific locations of Concrete Placement, Forms, Steel, Reinforcement, Accessories, Expansion Joints, Construction Joints, Contraction Joints, Control Joints on installation drawings and include, but not be limited to, square meters feet of concrete placements, thicknesses and widths, plan dimensions, and arrangement of cast-in-place concrete section.

1.4.1 Regulatory Requirements

NOTE: If 01 33 29 is incorporated in the specifications, select

that option below. If not, select the option for 01 57 19.01 20 and incorporate bracketed sustainable acquisition language within that section. Select bracket options in the second paragraph as applicable based on project scope.

For concrete, provide materials and documentation meeting the requirements at Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19.01 20 SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS] paragraph RECYCLED CONTENT. See https://sftool.gov/greenprocurement/green-products/l/construction-materials/29/cement-concrete/0?addon=False for more information. Note that ground granulated blast furnace slag is likely more conformant with guidance at FAR Part 23.7 than are coal derivatives such as fly ash, cenospheres, and silica fume.

For form release agents[,][and]concrete curing agents[,][concrete leveling or patching materials][,][concrete stains][,][and][concrete sealers], provide products and documentation meeting the requirements at Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19.0 20 SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS] paragraph BIO-BASED PRODUCTS. See https://sftool.gov/greenprocurement for more information.

1.4.2 Flatness and Levelness of Floor Slabs

Conduct floor flatness and levelness test, (FF and FL respectively), on floor slabs in accordance with the provisions set forth in ASTM E1155M or ASTM E1155. Make floor tolerance measurements by the approved laboratory and inspection service within 24 hours after completion of final troweling operation and before forms and shores have been removed. Provide results of floor tolerance tests, including formal notice of acceptance or rejection of the work, to the Contracting Officer within 24 hours after data collection.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

The Government retains the option to sample and test joint sealer, joint filler material, waterstop, aggregates and concrete to determine compliance with the specifications. Provide facilities and labor as may be necessary to assist the Government in procurement of representative test samples. Obtain samples of aggregates at the point of batching in accordance with ASTM D75/D75M. Sample concrete in accordance with ASTM C172/C172M. Determine slump and air content in accordance with ASTM C143/C143M and ASTM C231/C231M, respectively, when cylinders are molded. Prepare, cure, and transport compression test specimens in accordance with ASTM C31/C31M. Test compression test specimens in accordance with ASTM C39/C39M. Take samples for strength tests not less than once each shift in which concrete is produced from each strength of concrete required. Provide a minimum of five specimens from each sample; two to be tested at 28 days, 90 days if pozzolan is used, for acceptance, two will be tested at 7 days for information and one held in reserve.

2.1.1 Strength

Acceptance test results are the average strengths of two specimens tested at 28 days, 90 days if pozzolan is used. The strength of the concrete is considered satisfactory so long as the average of three consecutive acceptance test results equal or exceed the specified compressive strength, f'c, but not more than 20 percent, and no individual acceptance test result falls below f'c by more than 3.4 MPa 500 psi.

2.1.2 Construction Tolerances

Apply a Class "C" finish to all surfaces except those specified to receive a Class "D" finish. Apply a Class "D" finish to all post-construction surfaces which will be permanently concealed. Surface requirements for the classes of finish required are as specified in ACI 117.

2.1.3 Concrete Mixture Proportions

Concrete mixture proportions are the responsibility of the Contractor. Mixture proportions must include the dry weights of cementitious material(s); the nominal maximum size of the coarse aggregate; the specific gravities, absorptions, and saturated surface-dry weights of fine and coarse aggregates; the quantities, types, and names of admixtures; and quantity of water per cubic meter yard of concrete. Provide materials included in the mixture proportions of the same type and from the same source as will be used on the project. The specified compressive strength f'c is 20.7 MPa 3,000 psi at 28 days, 90 days if pozzolan is used. The maximum nominal size coarse aggregate is 19 mm 3/4 inch, in accordance with ACI 304R. The air content must be between 4.5 and 7.5 percent with a slump between 50 and 125 mm 2 and 5 inches. The maximum water-cementitious material ratio is 0.50. Submit the applicable test reports and mixture proportions that will produce concrete of the quality required, ten days prior to placement of concrete.

2.2 MATERIALS

Submit manufacturer's literature from suppliers which demonstrates compliance with applicable specifications for the specified materials.

2.2.1 Cementitious Materials

Submit Manufacturer's certificates of compliance, accompanied by mill test reports, attesting that the concrete materials meet the requirements of the specifications in accordance with the Special Clause "CERTIFICATES OF COMPLIANCE". Also, certificates for all material conforming to EPA's Comprehensive Procurement Guidelines (CPG), in accordance with 40 CFR 247. Provide cementitious materials that conform to the appropriate specifications listed:

2.2.1.1 Portland Cement

ASTM C150/C150M, Type II/III, Low alkali, with tri-calcium aluminates (C3A) content less than 10 percent and a maximum cement-alkali content of 0.80 percent Na2Oe (sodium oxide) equivalent.

2.2.1.2 Pozzolan

Provide pozzolan that conforms to ASTM C618, Class F, including requirements of Tables 1A and 2A.

2.2.2 Aggregates

NOTE: See language at paragraph REGULATORY REQUIREMENTS in this section and ensure final specification language/specified products comply.

For fine and coarse aggregates meet the quality and grading requirements of ASTM C33/C33M and test and evaluate for alkali-aggregate reactivity in accordance with ASTM C1260. Perform evaluation of fine and coarse aggregates separately and in combination, matching the proposed mix design proportioning. All results of the separate and combination testing must 28 days after casting. If the test data indicates an expansion of 0.08 percent or greater, reject the aggregate(s) or perform additional testing using ASTM C1260 and ASTM C1567. Perform the additional testing using ASTM C1260 and ASTM C1567. Perform the additional testing using ASTM C1260 and ASTM C1567 using the low alkali portland cement in combination with ground granulated blast furnace (GGBF) slag, or Class F fly ash. Use GGBF slag in the range of 40 to 50 percent of the total cementitious material by mass. Use Class F fly ash in the range of 25 to 40 percent of the total cementitious material by mass. Submit certificates of compliance and test reports for aggregates showing the material(s) meets the quality and grading requirements of the specifications under which it is furnished.

2.2.3 Admixtures

Provide admixtures, when required or approved, in compliance with the appropriate specification listed. Retest chemical admixtures that have been in storage at the project site, for longer than 6 months or that have been subjected to freezing, at the expense of the Contractor at the request of the Contracting Officer and will be rejected if test results are not satisfactory.

2.2.3.1 Air-Entraining Admixture

Provide air-entraining admixture that meets the requirements of ASTM C260/C260M.

2.2.3.2 Accelerating Admixture

Provide calcium chloride meeting the requirements of ASTM D98. Other accelerators must meet the requirements of ASTM C494/C494M, Type C or E.

2.2.3.3 Water-Reducing or Retarding Admixture

Provide water-reducing or retarding admixture meeting the requirements of ASTM C494/C494M, Type A, B, or D. High-range water reducing admixture Type F or G may be used only when approved, approval being contingent upon particular placement requirements as described in the Contractor's Quality Control Plan.

2.2.4 Water

Mixing and curing water in compliance with the requirements of ASTM C1602/C1602M; potable, and free of injurious amounts of oil, acid, salt, or alkali. Submit test report showing water complies with ASTM C1602/C1602M.

2.2.5 Joint Sealants - Field Molded Sealants

NOTE: If 01 33 29 is incorporated in the specifications, select that option below. If not, select the option for 01 57 19.01

20 and incorporate bracketed sustainable acquisition language within that section.

Conform to ASTM C920, Type M, Grade NS, Class 25, use NT for vertical joints and Type M, Grade P, Class 25, use T for horizontal joints. Provide polyethylene tape, coated paper, metal foil, or similar type bond breaker materials. The backup material needs to be compressible, nonshrink, nonreactive with the sealant, and a nonabsorptive material such as extruded butyl or polychloroprene foam rubber. Immediately prior to installation of field-molded sealants, clean the joint of all debris and further cleaned using water, chemical solvents, or other means as recommended by the sealant manufacturer or directed. If applied within the building weatherproofing, provide materials and documentation meeting the requirements at Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19.01 20 SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS] paragraph Reduce Volatile Organic Compounds (VOC) (Low Emitting Materials).

[2.2.6 Formwork

Design and engineer the formwork as well as its construction in accordance with ACI 301M ACI 301 Section 2 and 5 and ACI 347R. Fabrication of wood, steel, or other approved material. Submit formwork design prior to the first concrete placement.

][2.2.7 Form Coatings

Provide form coating in accordance with ACI 301M ACI 301. Provide materials and documentation meeting the requirements at Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19.01 20 SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS] paragraph BIO-BASED PRODUCTS.

]2.2.8 Vapor Retarder and Vapor Barrier

[ASTM E1745 Class [C] [A] [B] polyethylene sheeting, minimum 0.38 mm 15 mil thickness or other equivalent material with a maximum permeance rating of 0.04 perms per ASTM E96/E96M.]

Consider plastic vapor retarders and adhesives with a high recycled content, low toxicity low VOC (Volatile Organic Compounds) levels. If applied within the building weatherproofing, provide materials and documentation meeting the requirements at Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19.01 20 SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS] paragraph REDUCE VOLATILE ORGANIC COMPOUNDS (VOC) (LOW EMITTING MATERIALS).

2.2.9 Curing Materials

Provide curing materials in accordance with ACI 301M ACI 301, Section 5. Provide materials and documentation meeting the requirements at Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19.01 20 SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS] paragraph BIO-BASED PRODUCTS.

2.3 READY-MIX CONCRETE

Provide ready-mix concrete with mix design data conforming to ACI 301M ACI 301 Part 2. Provide materials and documentation meeting the requirements at Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19.01 20 SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS] paragraph RECYCLED CONTENT. Submit delivery tickets in accordance with ASTM C94/C94M for each ready-mix concrete delivery, include the following additional information:

- a. Type and brand cement
- b. Cement content in 43 kilogram 94-pound bags per cubic meter yard of concrete
- c. Maximum size of aggregate
- d. Amount and brand name of admixture
- e. Total water content expressed by water cementitious material ratio
- 2.4 ACCESSORIES
- 2.4.1 Waterstops
- 2.4.1.1 PVC Waterstop

Polyvinylchloride waterstops conforming to COE CRD-C 572.

2.4.1.2 Rubber Waterstop

Rubber waterstops conforming to COE CRD-C 513.

2.4.1.3 Thermoplastic Elastomeric Rubber Waterstop

Thermoplastic elastomeric rubber waterstops conforming to ASTM D471.

2.4.1.4 Hydrophilic Waterstop

Swellable strip type compound of polymer modified chloroprene rubber that SECTION 03 30 53 Page 10

swells upon contact with water conforming to ASTM D412 as follows: Tensile strength 2.9 MPa 420 psi minimum; ultimate elongation 600 percent minimum. Minimum hardness of 50 on the type A durometer and the volumetric expansion ratio in distilled water at 20 degrees C 70 degrees F; 3 to 1 minimum.

2.4.2 Chemical Floor Hardener

Provide hardener which is a colorless aqueous solution containing a blend of inorganic silicate or siliconate material and proprietary components combined with a wetting agent; that penetrates, hardens, and densifies concrete surfaces. Submit manufactures instructions for placement of liquid chemical floor hardener.

2.4.3 Curing Compound

Provide curing compound conforming to ASTM C309. Submit manufacturer's instructions for placing curing compound.

PART 3 EXECUTION

3.1 PREPARATION

Prepare construction joints to expose coarse aggregate. The surface must be clean, damp, and free of laitance. Construct ramps and walkways, as necessary, to allow safe and expeditious access for concrete and workmen. Remove snow, ice, standing or flowing water, loose particles, debris, and foreign matter. Satisfactorily compact earth foundations. Make spare vibrators available. Placement cannot begin until the entire preparation has been accepted by the Government.

3.1.1 Embedded Items

Secure reinforcement in place after joints, anchors, and other embedded items have been positioned. Arrange internal ties so that when the forms are removed the metal part of the tie is not less than 50 mm 2 inches from concrete surfaces permanently exposed to view or exposed to water on the finished structures. Prepare embedded items so they are be free of oil and other foreign matters such as loose coatings or rust, paint, and scale. The embedding of wood in concrete is permitted only when specifically authorized or directed. Provide all equipment needed to place, consolidate, protect, and cure the concrete at the placement site and in good operating condition.

3.1.2 Formwork Installation

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

3.1.3 Vapor Retarder and Vapor Barrier Installation

Install in accordance with ASTM E1643. Apply vapor retarder and barrier over gravel fill. Lap edges not less than 300 mm 12 inches. Seal all joints with pressure-sensitive adhesive not less than 50 mm 2 inches wide. Protect the vapor barrier at all times to prevent injury or displacement prior to and during concrete placement.

3.1.4 Production of Concrete

3.1.4.1 Ready-Mixed Concrete

Provide ready-mixed concrete conforming to ASTM C94/C94M except as otherwise specified.

3.1.4.2 Concrete Made by Volumetric Batching and Continuous Mixing

Conform to ASTM C685/C685M.

3.1.4.3 Batching and Mixing Equipment

The option of using an on-site batching and mixing facility is available. The facility must provide sufficient batching and mixing equipment capacity to prevent cold joints. Submit the method of measuring materials, batching operation, and mixer for review, and manufacturer's data for batching and mixing equipment demonstrating compliance with the applicable specifications.

3.2 FINISHING

3.2.1 Temperature Requirement

Do not finish or repair concrete when either the concrete or the ambient temperature is below 10 degrees C 50 degrees F.

3.2.2 Finishing Formed Surfaces

Remove all fins and loose materials, and surface defects including filling of tie holes. Repair all honeycomb areas and other defects. Remove all unsound concrete from areas to be repaired. Ream or chip surface defects greater than 13 mm 1/2 inch in diameter and holes left by removal of tie rods in all surfaces not to receive additional concrete and fill with drypack mortar. Brush-coat the prepared area with an approved epoxy resin or latex bonding compound or with a neat cement grout after dampening and filling with mortar or concrete. Use a blend of portland cement and white cement in mortar or concrete for repairs to all surfaces permanently exposed to view shall be so that the final color when cured is the same as adjacent concrete.

3.2.3 Finishing Unformed Surfaces

Finish unformed surfaces in accordance with ACI 301M ACI 301, Section 5.

3.2.3.1 Flat Floor Finishes

In accordance with ACI 302.1R, construct in accordance with one of the methods recommended in Table below "Typical Composite FF/FL Values for Various Construction Methods." ACI 117 for tolerances tested by ASTM E1155M or ASTM E1155. These requirements are based upon the latest FF/FL method.

3.2.3.1.1 Floor Slabs

Conform floor slabs on grade to the following ACI F-number requirements unless noted otherwise:

Specified Overall Values	FF30/FL23 minimum [FF/FL]
Minimum Local Values	FF17/FL15 minimum [FF/FL]

3.2.3.1.2 Subject to Vehicular Traffic

Floor slabs on grade subject to vehicular traffic or receiving thin-set flooring shall conform to the following ACI F-number requirements:

Specified Overall Values	FF35/FL25 minimum [FF/FL]
Minimum Local Values	FF25/FL17 minimum [FF/FL]

3.3.3.2 Measurement of Floor Tolerances

Test floor slabs within 24 hours of the final troweling. Submit test results to Contracting Officer within 12 hours after collecting data. Floor flatness inspector must provide a tolerance report which includes:

- a. Name of Project
- b. Name of Contractor
- c. Date of Data Collection
- d. Date of Tolerance Report
- e. A Key Plan Showing Location of Data Collected
- f. Results Required by ASTM E1155M ASTM E1155
- 3.3.3.3 Expansion and Contraction Joints

Make expansion and contraction joints in accordance with the details shown or as otherwise specified. Provide 13 mm 1/2 inch thick transverse expansion joints where new work abuts an existing concrete. Provide expansion joints at a maximum spacing of 10 m 30 feet on center in sidewalks and at a maximum spacing of 3 meters 10 feet in slabs, unless otherwise indicated. Provide contraction joints at a maximum spacing of 2 linear meters 6 linear feet in sidewalks. Cut contraction joints at a minimum of 25 mm 1 inch deep with a jointing tool after the surface has been finished.

3.4 CURING AND PROTECTION

Cure and protect in accordance with ACI 301M ACI 301, Section 5.

3.5 FORM WORK

Provide form work in accordance with ACI 301M ACI 301, Section 2 and Section 5.

3.5.1 Removal of Forms

Remove forms in accordance with ACI 301M ACI 301, Section 2.

3.6 STEEL REINFORCING

Reinforcement must be free from loose, flaky rust and scale, and free from oil, grease, or other coating which might destroy or reduce the reinforcement's bond with the concrete.

3.6.1 Fabrication

Shop fabricate steel reinforcement in accordance with ACI 318 and ACI SP-66. Provide shop details and bending in accordance with ACI 318 and ACI SP-66.

3.6.2 Splicing

Perform splices in accordance with ACI 318 and ACI SP-66.

3.6.3 Supports

Secure reinforcement in place by the use of metal or concrete supports, spacers, or ties.

3.7 EMBEDDED ITEMS

Before placing concrete, take care to determine that all embedded items are firmly and securely fastened in place. Provide embedded items free of oil and other foreign matter, such as loose coatings of rust, paint and scale. Embedding of wood in concrete is permitted only when specifically authorized or directed.

3.8 CHEMICAL FLOOR HARDENER

Apply Chemical Floor Hardener where indicated, after curing and drying concrete surface. Dilute liquid hardener with water and apply in three coats. First coat is one-third strength, second coat one-half strength, and third coat two-thirds strength. Apply each coat evenly and allow it to dry 24 hours before applying next coat. Apply proprietary chemical hardeners in accordance with manufacturer's printed directions.

3.9 TESTING AND INSPECTING

Report the results of all tests and inspections conducted at the project site informally at the end of each shift. Submit written reports weekly. Deliver within three days after the end of each weekly reporting period. See Section 01 45 00.00 10 QUALITY CONTROL.

3.9.1 Field Testing Technicians

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

3.9.2 Preparations for Placing

Inspect foundation or construction joints, forms, and embedded items in sufficient time prior to each concrete placement to certify that it is ready to receive concrete.

3.9.3 Sampling and Testing

- a. Obtain samples and test concrete for quality control during placement. Sample fresh concrete for testing in accordance with ASTM C172/C172M. Make six test cylinders.
- b. Test concrete for compressive strength at 7 and 28 days for each design mix and for every 77 cubic meters or 100 cubic yards of concrete. Test two cylinders at 7 days; two cylinders at 28 days; and hold two cylinders in reserve. Conform test specimens to ASTM C31/C31M. Perform compressive strength testing conforming to ASTM C39/C39M.

- c. Test slump at the site of discharge for each design mix in accordance with ASTM C143/C143M. Check slump twice during each shift that concrete is produced for each strength of concrete required.
- d. Test air content for air-entrained concrete in accordance with ASTM C231/C231M. Test concrete using lightweight or extremely porous aggregates in accordance with ASTM C173/C173M. Check air content at least twice during each shift that concrete is placed.
- e. Determine temperature of concrete at time of placement in accordance with ASTM C1064/C1064M. Check concrete temperature at least twice during each shift that concrete is placed.
- 3.9.4 Action Required

3.9.4.1 Placing

Do not begin placement until the availability of an adequate number of acceptable vibrators, which are in working order and have competent operators, has been verified. Discontinue placing if any lift is inadequately consolidated.

3.9.4.2 Air Content

Whenever an air content test result is outside the specification limits, adjust the dosage of the air-entrainment admixture prior to delivery of concrete to forms.

3.9.4.3 Slump

Whenever a slump test result is outside the specification limits, adjust the batch weights of water and fine aggregate prior to delivery of concrete to the forms. Make the adjustments so that the water-cementitious material ratio does not exceed that specified in the submitted concrete mixture proportion and the required concrete strength is still met.

-- End of Section --