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Design & Construction Standards:
TECHNICAL GUIDELINES

Division 03

03 10 00 Concrete Forming and Accessories

03 30 00 Cast In Place Concrete

03 35 00 Concrete Finishing

03 60 00 Grouting

FACILITY MANAGEMENT

April 2016

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. Formwork design and construction to comply with guidelines of ACI 347R complying with tolerances of ACI 117.

PART 2 PRODUCTS

2.01 FORM TIES

- A. Formwork Panels: Specify material appropriate for finish desired.
- B. Form release treatment
 - 1. Coordinate form release oils or other products with materials to be applied over concrete (i.e. dampproofing, waterproofing and finish materials).
- C. Form ties shall be plastic cone type – break-away only.
 - 1. Exception: For high lift pours where concrete pressure will exceed the capabilities of the plastic cone ties, design a form tie system that will withstand pressures and that can be patched in a manner suitable to receive applied dampproofing and waterproofing.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Notification: Contractor shall work with the Owner to schedule Owner's inspections and testing.
- B. Owner will provide formwork inspection for Owner's information at Owner's expense. Inspection of formwork and reinforcing is required before concrete is placed.
- C. Contractor will be provided with Owner's inspection information and may use information as a part of Contractor's quality control. However, Owner does not represent that the frequency or type of inspection is adequate to assure compliance with contract requirements. Contractor shall provide additional testing and inspections needed to assure contract compliance, at Contractor's expense.
- D. Additional inspections or re-inspections required for quality control shall be at Contractor's expense.

END OF SECTION 03 10 00

SECTION 03 30 00

CAST IN PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. Coordinate design of exterior flatwork, walks and paving with other Division 2 standards.
- B. Related Work:
 - 1. Division 32
 - 2. Membrane Vapor Barrier
 - 3. Concrete Finishes

PART 2 PRODUCTS

2.01 CONCRETE MIXING

- A. Addition of water is prohibited unless authorized by the A/E.

2.02 CONCRETE MIX MINIMUM STANDARDS (INTERIOR CONCRETE)

- A. Cement type, ASTM C150
- B. Strength: Minimum 3,500 psi compressive strength at 28 days per ASTM C39
- C. Water-Cement Ratio: 0.60 max
- D. Water: Potable
- E. Slump: 4" (maximum) without superplasticizer, 9" (maximum) with superplasticizer. These parameters do not apply to self-consolidating concrete.

2.03 CONCRETE MIX (EXTERIOR FLATWORK, WALKS AND PAVING)

- A. Cement type, ASTM C150.
- B. Concrete strength: 4,500 psi minimum compressive strength at 28 days per ASTM C39.
- C. Water-Cement Ratio: 0.40 max.
- D. Flyash: No Flyash permitted.
- E. Water: Potable. Water/cement ratio shall not exceed 0.42 (water to total weight of cementitious materials).
- F. Air entraining admixture: 5% - 8%
- G. Water reducing admixture: Specify brand or generic description and ounces per unit of cement.
- H. Slump: 4" (maximum) without superplasticizer, 9" (maximum) with superplasticizer. These parameters do not apply to self-consolidating concrete.
- I. City mix: Specify mix approved by City and County of Denver for work in public right-of-way.

2.04 AGGREGATE

- A. Specify maximum sizes of aggregates.
- B. Recycled concrete aggregate shall not be used on floor slabs which will receive finish floor coverings.
- C. Concrete aggregate shall have ph level of less than 11.

2.05 PROHIBITIONS

- A. Calcium chloride
- B. Accelerators: High range water-reducing agents or additional cement may be added only at discretion of Structural Engineer.
- C. Other chemical antifreeze or accelerant agents

- D. Liquid nitrogen
- E. Ice or other frozen materials
- F. Waterproofing admixtures, silane, siloxane

2.06 ACCESSORIES

- A. Veneer support inserts and anchors: Galvanized
- B. Post-installed concrete anchors: Galvanized if exposed to earth/weather or located in wall cavity. Provide code-approved anchors only.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Concrete placement
 - 1. No concrete shall be placed which has reached a temperature of 90 degrees F.
 - 1. Specify restrictions for cold and hot weather placement.
- B. Tolerances
 - 1. Specify tolerances.
 - 2. List any special or unusual tolerance requirements separately.
- C. Protection and curing
 - 1. Specify concrete protection during curing as well as materials to be used. Specify the curing period and curing record requirements.
 - 2. Interior flat slab curing shall be by application of moisture through use of water mist and/or covering of slab surfaces with fabric or other moisture retaining materials. Maintain moisture content of coverings by regular application of water as required. Cure and seal products may be specified at exposed floors only.

3.02 FIELD QUALITY CONTROL

- A. Notifications: Contractor shall work with the Owner to schedule Owner's inspections and testing.
- B. An independent testing laboratory will be employed by the Owner to perform tests and submit results to the A/E and Contractor.
 - 1. Slump: Per ASTM C-143, one test at point of discharge for each load
 - 2. Compressive strength: Per ASTM C 39, one set of six cylinders per test. Two tests at seven days, two at 28 days, two in reserve
 - 3. Air Entrainment: One test for each set of cylinders
 - 4. Concrete temperature for each slump test
 - 5. Frequency of testing (six cylinders per set)
 - a) One set of cylinders for first 25 cubic yard poured each day
 - b) One set of cylinders for each additional 50 cubic yards
 - c) Minimum of one set cylinders for each structural placement regardless of quantity
- C. Contractor's testing
 - 1. The Contractor shall perform, at his own expense, such quality control testing as may be needed to assure that the construction is in compliance with the Contract Documents. Testing by Owner's agents shall not be relied upon by the Contractor as sufficient to assure Contract Document compliance. Contractor's test results shall be forwarded to the A/E and Owner for their records.
- D. Additional tests or re-tests required for quality control shall be at Contractor's expense.
- E. Concrete which fails to meet specified requirements shall be removed and replaced at the Contractor's expense. Testing of replacement concrete shall be at the Contractor's expense.

END OF SECTION 03 30 00

SECTION 03 35 00
CONCRETE FINISHING

PART 1 GENERAL

1.01 SUMMARY

- A. Coordinate with standards in Section 03 30 00.

1.02 SUBMITTALS

- A. Specify site samples for all special concrete finishes.

PART 2 PRODUCTS No Requirements

PART 3 EXECUTION

3.01 FLOOR FLATNESS AND LEVELNESS REQUIREMENTS

- A. Maximum Variation of Surface Flatness:
 - 1. Exposed Concrete Floors: 1/4" in 10 feet
 - 2. Under Seamless Resilient Flooring: 1/4" in 10 feet
 - 3. Under Carpeting: 1/4" in 10 feet

3.02 CONCRETE FINISHING

- A. Exposed interior concrete floors to receive carpeting: Troweled finish.
- B. Floors to receive thin-set ceramic tile, resilient flooring and vinyl tile: Flat troweled finish.
- C. Exterior stoop slabs: Broom finish (or similar non-slip finish).

END OF SECTION 03 35 00

SECTION 03 60 00

GROUTING

PART 1 GENERAL

1.01 TESTING

- A. Contractor shall perform quality control testing for structural grout to assure minimum load carrying capacities are met. Such testing shall be at the Contractor's expense. Provide test results to Architect and Owner.
- B. Owner may request testing by Owner's Testing Agent if Owner so desires. Contractor shall fully cooperate in providing access and samples for Testing Agent.

PART 2 PRODUCTS

2.01 GENERAL DESIGN GUIDELINES

- A. All structural and non-structural grout shall contain no metallic elements.
- B. All grouts shall be non-shrink.

PART 3 EXECUTION No Requirements

END OF SECTION 03 60 00