PART 0 DESIGN STANDARDS

0.01 GENERAL DESIGN GUIDELINES

A. Inspection by Owner's Testing Agency does not relieve A/E of contract responsibilities.

1. Observe concrete pours.
2. Observe formwork and reinforcing prior to concrete placement.

B. Reinforcement shall be designed by the A/E.

C. Inspection of formwork and reinforcing is required before concrete is placed.

D. Specify bonding agents and indicate where each type shall be used.

E. Expansion and control joints shall be indicated by size, type and location.

F. Coordinate design of exterior flatwork, walks and paving with other Division 2 standards.

G. Use of pigmented and stained concrete is prohibited without approval of the DPS Project Manager.

0.02 SPECIAL FLOOR SLAB DESIGN REQUIREMENTS

A. Where any type of seamless flooring is to be applied to a finished slab on grade, provide a membrane vapor barrier below the slab to prevent the migration of moisture up through the slab.

1. Where small areas of seamless flooring are to be installed, it may be more efficient to recess the slab in that area so that a liquid applied membrane and a topping slab can be used in lieu of a sheet membrane over a larger floor slab area.

B. Design sloping requirements to floor drains and provide indications on the drawings showing the complete thickness of the slabs in these areas.

C. Refer to standard Section 03345 for coordination of floor slab curing requirements with manufacturer's requirements for all flooring materials.

PART 1 GENERAL No standards

PART 2 PRODUCTS

2.01 CONCRETE MIXING

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

2.02 CONCRETE MIX (GENERAL CONCRETE)

A. Cement type

B. Strength: Minimum 3,500 psi compressive strength at 28 days

C. Mix: 5-1/2 sack/cy minimum

D. Flyash

1. Flyash is discouraged. 100% cement mix is preferred.
2. At Structural Engineer's discretion, flyash may may be used provided that the flyash content shall not exceed 20% of the total weight of cementitious material.

E. Water: Potable

F. Air entraining admixture

1. 4% - 7% for structural concrete
2. Not required for slabs on grade

G. Slump: 4" (maximum)

2.03 CONCRETE MIX (EXTERIOR FLATWORK, WALKS AND PAVING)

A. Cement type

B. Concrete strength: 4,000 psi minimum compressive strength at 28 days

C. Mix: 6 sack/cy minimum

D. Flyash: Flyash content of cast-in-place concrete shall not exceed 20% of the weight of cementitious material.

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

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

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.

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 03300