SECTION 03 30 00 – CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The extent of concrete work is shown on drawings.

B. Concrete curbs, gutters, pavement and walkways are included.

C. Concrete curing is included.

D. Concrete equipment bases as required.

1.02 QUALITY ASSURANCE

A. Comply with the current edition of the following codes, specifications and standards:

1. ACI 301 "Specifications for Structural Concrete for Buildings".

2. ACI 302.1R “Guide for Concrete Floor and Slab Construction”.

3. ACI 304 "Guide for Measuring, Mixing, Transporting and Placing Concrete".

4. ACI 318 “Building Code Requirements for Reinforced Concrete”.

5. ACI 117 “Specifications for Tolerances for Concrete Construction and Materials”.

6. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

7. Floor slabs must be designed to support a minimum 125 PSF live load at stock rooms and a minimum 100 PSF live Load at all other areas and shall not be less than 4 inches thick. Floor slab design shall be in conformance with all applicable Codes.

8. ASTM C 94 “Standard Specification for Ready Mix Concrete”.

9. ASTM C 157 “Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar and Concrete”.

10. ASTM E 1155-Latest Edition “Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System”.

11. ASTM F 710 - Latest Edition “Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring”.

12. ASTM F 1869-Latest Edition “Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”.

13. ASTM C 979-Latest Edition Pigments for Integrally Colored Concrete.

14. ASTM E 96-Latest Edition “Standard Test Methods for Water Vapor Transmission of Materials”.

15. ASTM E 154-Latest Edition “Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs”.

16. ASTM E 1643-Latest Edition “Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under concrete Slabs”.

17. ASTM E 1745-Latest Edition “Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs”.

18. AASHTO T 318 “Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying”.

19. ASTM C 171 - Latest Edition "Standard Specification for Sheet Materials for Curing Concrete".

20. ASTM F 2170 - Latest Edition "Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using *in situ* Probes".

B. Testing: Employ at the Landlords expense, a testing laboratory, acceptable to Walgreens, to perform the following testing. Slump, air content, water content and temperature tests must be performed with each set of compression test cylinders.

1. Compressive strength testing. Comply with ASTM C 31, ASTM C 172-Latest Edition, ASTM C 39, and as follows:
   a. Provide 4 cylinders minimum from each day’s pour.

   b. Provide 4 cylinders for each fifty- (50) cubic yards or fraction thereof poured on each date for slabs and foundations. Provide 4 cylinders for each one-hundred fifty (150) cubic yards or fraction thereof poured on each date for concrete paving and sidewalks.

   c. Samples shall be tested and reports provided for concrete samples, 1sample at 7 days, 2 at 28 days and 1 to hold.

2. Slump testing: Comply with ASTM C 143.

3. Water content testing: Comply with AASHTO T318.

4. Flatness/Levelness Testing. Comply with ASTM E 1155, but provide a minimum of one line of sampling in two perpendicular directions through each structural bay.
   a. Perform testing using a “Dipstick Profiler” within 72 hours of concrete placement.

5. Concrete not conforming to Walgreens Criteria or which fails required Quality Assurance testing, including Flatness/Levelness requirements, shall be removed and replaced at Walgreens discretion.

1.03 SUBMITTALS

A. Submit concrete mix designs to Architect/Engineer of Record for approval with copies to the Quality Control Testing Consultant.

PART II - PRODUCTS

2.01 FORMWORK

A. Construct formwork for all concrete, with plywood, metal or other panel-type materials to provide continuous, straight, smooth surfaces.

B. For site concrete: Use steel, wood or other suitable materials, free of distortion/defects of size/strength to resist movement and maintain vertical and horizontal alignment during placement.
1. Curves shall be uniform and free of form marks.

C. Form coatings: Use non-staining release agents that will not discolor, deface or impair finish or treatment of concrete.

2.02 REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, grade 60, deformed.

B. Epoxy - Coated Reinforcing Bars: ASTM A 775.

C. Welded Wire Fabric Reinforcement: ASTM A 185 welded steel wire fabric, sheets only, rolled fabric prohibited.

D. Reinforcement supports: Use chairs, spacers & bolsters complying with CRSI
1. For slabs on grade use reinforcing support to ensure proper clearance/cover. Do not lift or pull reinforcing through placed concrete.

E. Joint Filler: Provide preformed joint filler at slab expansion joints, joints between floor slabs and walls and other isolation joints. Provide one of the following:
Precompressed, impregnated open cell foam.
Asphalt saturated fiberboard complying with ASTM D 1751.
Granulated cork between saturated felt or glass fiber felt complying with ASTM D 1752 type H.

2.03 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

~~B.Fly Ash: ASTM C 618, Type C or F, not to exceed 20% of cement content by weight. Do not use when ambient air temperatures are expected to be below 35 degrees F during the first 48 hours after placement.~~

~~C.~~B. Aggregates: Normal weight: ASTM C 33 Light weight: ASTM C 330. Combined aggregate gradation shall be 8% to 18% for large topsize aggregates (1 ½ inches) or 8% to 22% for smaller topsize aggregates (1 in. or ¾ in.) retained on each sieve below the topsize and above the No. 100.

~~D.~~C. Water: Drinkable.

~~E.~~D. Air Entraining Admixture: ASTM C 260.

~~F.~~E. Calcium Chloride: Any admixtures containing more than 0.1% chloride ions content by weight are not permitted.

~~G.~~F. Water Vapor Retarder: Decay resistant materials with Permeance of less than 0.01 Perms per ASTM E 96, maintain Permeance of less than 0.02 Perms after mandatory conditioning tests per ASTM E 154 and water vapor Permeance not exceeding 0.10perms per ASTM E 1745 Class A. Provide polyethylene sheet not less than 15 mils

thick, Raven Industries “VaporBlock 15, Stego Industries 15 mil “Stego Wrap™” or W.R. Meadows Sealtight 15 mil “Perminator®”.

~~H.~~G. Densifier (Hardner/Sealer): At Stores with Polished Concrete Floors, Densifier shall be installed by Concrete Polishing Contractor.

1. Questmark 7923 Diamond Guard II

2. National Polymers, Inc. NP7936 one component water based, lithium based solution.

3. National Polymers, Inc. NP7937 one component water based, lithium based solution.

4. Convergent Concrete Technologies, LLC Pentra-Sil NL water based, lithium based solution

5. Lythic Solutions, Inc. Lythic Densifier, Colloidal Silica Concrete Hardener and Densifier.

6. Prosoco, Inc. Consolideck LS Lithium Silicate densifier.

7. The Euclid Chemical Company UltraSil Li+ water based lithium silicate densifier,sealer.

8. Concrete Polishing Solutions Armor Densifier, aqueous Lithium polysilicate solution.

~~I.~~H. Chemical Admixtures: Type A water-reducing, Type F and Type G high-range water-reducing admixtures shall comply with ASTM C 494. Do not use in cold weather conditions.

2.04 CONCRETE DESIGN/PROPORTIONING

A. Provide normal weight concrete as required by drawings as follows:
1. 3,000 PSI minimum 28 day compressive strength or stronger as required by architect/engineer of record.
2. At interior slabs, provide concrete with ultimate shrinkage less than 0.05% at 28 days as tested per ASTM C-157. Provide laboratory test results indicating the design (or comparable) mix meets the ultimate shrinkage requirements with the mix design submittal.

B. Air Entrainment: Use air-entraining admixture resulting in concrete with air content at point of placement as follows:
1. Concrete exposed to freezing/thawing, deicer chemicals, or hydraulic pressure:

4.5% (moderate exposure); 5.5% (severe exposure) 1-1/2" max. aggregate.

4.5% (moderate exposure); 6.0% (severe exposure) 1" max. aggregate.

5.0% (moderate exposure); 6.0% (severe exposure) 3/4" max. aggregate.

5.5% (moderate exposure); 7.0% (severe exposure) 1/2" max. aggregate.

2. Other Concrete/Steel troweled interior floors: 3% maximum air.

C. Water-Cementitious Ratio: Provide concrete with maximum water-cementitious (W/Cm) ratios as follows:

Subjected to freezing and thawing; W/Cm 0.50. Subjected to deicers/watertight, interior floor W/Cm 0.45.

D. Slump Limits: Provide concrete with slump at point of placement as follows:

Ramps and sloping surfaces: Not more than 3".

Reinforced foundation systems: Not less than 2" and not more than 5".

Slabs and other concrete: Not more than 5".

Concrete containing HRWR admixture shall have a maximum slump of 6". The concrete shall arrive at the job site at a slump of 2: to 3", is verified, then high-range water-reducing admixture added to increase slump to approved level.

E. Portland Cement Paving, Sidewalks and Curbs: 3,000 psi after 28 days curing.
Air Entrainment: 4% to 7%.
Slump: Not more than 4".
Water/Cement Ratio: Per article 2.04.C above.

2.05 MISCELLANEOUS MATERIALS

A. Accessible Ramps: Impart color with integrally colored concrete.
Provide Integral Red Color: (for accessible ramps) Natural or synthetic mineral oxides complying with ASTM C-979 blended at batch plant. Acceptable Products: Bayferrox iron oxide pigment by Bayer Corp., color #110 (4 lbs.).
Davis Colors, Mix-Ready®, color Baja Red #160 (2 lbs.).
Chromix®by L.M. Scofield Co., color C-22 Coral Red.
ChemSystems, Inc., color #1345 (2 ½ lbs.)

PART III - EXECUTION

3.01 REINFORCEMENT

A. Clean reinforcement of rust, mill scale, ice or materials that will reduce bond with concrete.

B. Place reinforcement to obtain proper concrete coverage in top third of slab or 2 inches below top surface.

3.02 CONCRETE PLACEMENT

A. Place concrete on/in properly prepared base or forms. Place concrete slabs directly on water vapor retarder. Provide not less than 6 inches of compacted base between water vapor retarder and ground unless otherwise recommended by the Geotechnical Engineer and approved by the Walgreens Project Architect and the Walgreens Regional Construction Manager.
1. Install water vapor retarder in compliance with manufacturer's instructions and ASTM E 1643.
2. Lap joints 6 in. and seal with manufacturers adhesive or tape.
3. Seal around all penetrations with manufacturers pipe boot or by wrapping with vapor retarder and taping.

4. Repair all punctures and cuts using vapor retarder material lapped 6 inches beyond damaged area and taped.
5. Provide photo documentation of proper installation of vapor retarder.

B. Construct slabs to correct level, maintain reinforcing in proper position.
1. Float slabs with a highway straight edge in lieu of a conventional bull float.

C. Do not place concrete on/in frozen substrate or forms.

D. Pumping Concrete: Concrete may be placed by pumping if first approved in writing the Architect/Engineer of Record for the proposed location. Pumped concrete shall only be placed in the presence of the Landlords Testing/Inspecting Agent.
1. Equipment: Pumping equipment shall be of the size and design that ensures a continuous flow of concrete at the delivery end without separation of materials. Do not pump concrete through aluminum pipes.

2. Concrete Mix: Shall conform to the architect of record's specified design requirements, except that mix may contain chemical admixtures to allow proper pumping. Include the specified high-range or mid-range water reducing admixture in the mix. Unless strictly controlled and anticipated in the development of the design mix, the addition of admixtures at the job should be prohibited.

3.03 JOINTS

A. Contraction joints at interior slabs shall be formed by saw cuts within 4 to 12 hours after finishing and before random shrinkage cracks form. Concrete surface shall not be torn or damaged by the blade. Joint spacing shall not exceed 30 times the slab thickness in feet. Joint patterns shall be generally square. Joint depth shall be ¼ slab thickness.

B. Isolation joints; provide full depth at all locations where slabs adjoin walls, columns, foundations, drain piping, sprinkler mains, existing concrete or pavement. and other immovable objects. Provide "pinwheel" isolation joints at columns.

3.04 FINISHING/CURING

A. Provide a floor surface which is true and level and achieves "F Numbers" of F_F = 30 and F_L = 20 minimum overall composite and F_F = 20 and F_L = 15 minimum at any individual section, when tested in accordance with ASTM E 1155. Remove surface irregularities to provide a continuous smooth finish free of trowel marks and trowel patterns.

B. All interior slabs to receive a smooth trowel finish.

C. Provide moisture retaining wet curing covers on interior slabs for 3 days minimum using cover materials that promote water retention and meet the performance requirements of ASTM C -171- Latest Edition. Use cover materials that will not stain or impart any texture to the concrete surface.

D. Apply non-slip broom finish to exterior platforms, walks, steps, ramps and curbs. Tool all edges to 1/2" radius unless noted otherwise.

E. Apply densifier at approximately 200 square feet per gallon using a stiff, long bristled broom. Cover the entire work area liberally and allow to soak for ten (10) minutes. Re-apply to areas where the densifyng impregnator has soaked in and allow to sit for an

additional thirty (30) minutes. Squeegee or AutoScrub excess material off of floor. Allow 1-2 hours to dry before proceeding. Apply concrete densiifer (hardener/sealer) to exposed interior floors and exterior slab at recessed entrance.

F. Floors to receive resilient flooring shall be tested for moisture vapor emission from the substrate per ASTM F 1869 or relative humidity within the substrate per ASTM F 2170. Floors to receive resilient flooring shall be tested for alkalinity of the substrate (pH testing) per ASTM F 710. Refer to Section 09 65 00 - Resilient Flooring for specific moisture vapor emission, relative humidity and alkalinity testing and compliance requirements.

G. Patch all form holes resulting from removal of form ties. Form ties ends shall be sealed or coated to prevent future rusting from spalling the concrete patch.

3.05 REPAIRS

A. Repair or replace broken, defective and stained concrete, and replace non-conforming concrete, all as directed by Walgreens.

END OF SECTION