SECTION 03001

CONCRETE

PART 1 GENERAL

1.1 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 318 - Standard Building Code Requirements for Reinforced Concrete, Latest Revision.

C. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

D. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

E. ASTM C33 - Concrete Aggregates.

F. ASTM C94 - Ready-Mixed Concrete.

G. ASTM C150 - Portland Cement.

H. ASTM C260 - Air Entraining Admixtures for Concrete.

I. ASTM C494 - Water Reducing Admixture.

J. ASTM D2103 - Polyethylene Film and Sheeting.

K. ASTM C309 - Liquid Membrane Forming Compounds for Curing Concrete.

1.2 SHOP DRAWINGS

A. Submit shop drawings of reinforcing steel under provisions of Section 01300.

B. Submit shop drawings in accordance with ACI Detailing Manual 315 and Manual of Standard Practice by the Concrete Reinforcing Steel Institute.

C. Indicate reinforcement sizes, spacings, locations and quantities of reinforcing steel and wire fabric bending and cutting schedules, splicing, supporting and spacing devices.

D. Indicate formwork dimensioning, materials, arrangement of joints and ties.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with ACI 318.

B. Maintain copy of ACI 301 on site.

C. Confirm compatibility of curing and sealing materials with adhesives used in finish flooring application as specified in Division 9 - Finishes.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable codes for site.

1.5 TESTS

A. Testing and analysis of concrete shall be performed under provisions of Section 01400 by an ACI-certified Concrete Field-Testing Technician, Grade I.

B. Submit proposed mix design per Chapter 5 of ACI 318-89 for each class of concrete to WSD for review prior to commencement of work. Report should be not more than six months old.

C. Tests of cement and aggregates will be performed to ensure conformance with requirements stated herein.

D. Three concrete test cylinders will be taken for every 50 or less cu. yds. of each class of concrete placed each day.

E. One additional test cylinder will be taken during cold weather and be cured on site under same conditions as concrete it represents.

F. One slump test and one air entrainment will be taken for each set of test cylinders taken.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Conform to ACI 301.

2.2 REINFORCING STEEL

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade, billet steel deformed bars; uncoated finish.
   1. Reinforcing Bars, 3/8 inch Diameter: 40 ksi yield grade.

B. Welded Steel Wire Fabric: Plain type, ANSI/ASTM A185; uncoated finish.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150 normal - Type 1 Portland.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: Clean and not detrimental to concrete.

2.4 ADMIXTURES

A. Air Entraining Admixture: ASTM C260, with the following limits: 3% for maximum 2" aggregate, 5% for maximum 3/4" aggregate, and 6% for maximum 1/2" aggregate.

B. Water Reducing Admixture: ANSI/ASTM C494, Type A.

2.5 ACCESSORIES

A. Epoxy Bonding Agent:
   1. "Brutem"; Master Builders.
   2. Substitutions: Under provisions of Section 01600.

B. Bonding Agent: High solids content, water dispersion of acrylic bonding polymers specifically compounded for use as a bonding agent between new to old or new to new concrete.

C. Vapor Barrier: ASTM D2103, 6 mil thick clear polyethylene film.

D. Non-Shrink Grout: Corps of Engineers CRD-C 621, premixed compound with non-metallic aggregate, cement, water reducing and plasticizing agents; capable of minimum compressive strength of 5000 psi.

E. Dovetail Anchor Slots: Minimum 18 gage thick galvanized steel; foam non-filled; release tapes; sealed slots; bent tab anchors.

F. Waterstops: Polyvinylchloride; Corps of Engineers C-572-74; size to suit joints; heat sealed joints; profiles as indicated on Drawings.

G. Construction Joints: Tongue and Groove metal joint material.

H. Joint Filler: ASTM D994, bituminous impregnated fiberboard.

I. Form Release Agent: Colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete.

2.6 CURING MATERIALS

A. Membrane Curing and Sealing Compound: ASTM C309, Type I, Class B; clear, non-yellowing, acrylic polymer compound suspended in solvents, to cure and seal concrete.

B. Water: Clean and drinkable.

C. Absorptive Mat: Burlap fabric, clean roll goods.

2.7 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94.

B. Structural Concrete:
1. Compressive Strength (28 days): 4000 psi. Slump: 4 inch.

C. Foundation and Slab on Fill Concrete:
1. Compressive Strength (28 days): 3000 psi. Slump: 4 inch.

D. Manhole Bases:
1. Minimum Cement Content: 6.0 bags (564 lbs) per cubic yard.
2. Minimum 28-Day Compressive Strength: 3500 psi - average of any three cylinders.
3. Anticipated 28-Day Compressive Strength: 3700 psi, plus.
4. Slump: 2-1/2" to 5".

E. Concrete used for Encasement for Sewer Lines, Man-hole Drop Connections, and Inverts:
1. Minimum Cement Content: 5.0 bags (470 lbs) per cubic yard.
2. Minimum 28-Day Compressive Strength: 2500 psi - average of any three cylinders.
3. Slump: 5" to 8".

F. Add air entraining agent ASTM C260 to mix for concrete exposed to freeze-thaw cycling.

G. Use water reducing admixtures.

H. Calcium Chloride: Admixtures shall not exceed 0.1% chloride ions.

PART 3 EXECUTION

3.1 FORMWORK ERECTION

A. Verify lines, levels and measurement before proceeding with formwork.

B. Hand trim sides and bottom of earth forms; remove loose dirt.

C. Align form joints.

D. Do not apply form release agent where concrete surfaces receive special finishes or applied coatings which may be affected by agent.

E. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts.

3.2 REINFORCEMENT

A. Place, support and secure reinforcement against displacement.

B. Locate reinforcing splices where indicated and required. At splices, lap reinforcing steel 30 bar diameters with 2'-0" minimum and wire together.

3.3 PLACING CONCRETE

A. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.
   1. Place concrete in accordance with ACI 301.
   2. Hot Weather Placement: ACI 301.
   3. Cold Weather Placement: ACI 301.

B. Install vapor barrier under interior floor slabs on fill. Lap joints minimum 6 inches and seal. Do not disturb vapor barrier while placing reinforcement.

3.4 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill in holes and openings left in concrete, including passage of work by other trades.

3.5 TOLERANCES

A. Provide random traffic floor slab with overall flatness and levelness value of F25/17 and minimum local value of F13/10 according to ASTM E1155. Pitch to drains 1/4 inch per foot nominal.

3.6 EXISTING WORK

A. Where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-shrinking grout.

B. Prepare previously placed concrete by cleaning with steel brush and apply bonding agent in accordance with manufacturer's instructions.

3.7 SCHEDULE OF FORMED SURFACES

A. Rough form finish at concrete surfaces not exposed to view.

B. Smooth form finish at concrete surfaces exposed to view and at surfaces that are to be covered with a coating material applied directly to concrete, such as waterproofing, dampproofing, painting or similar system.

C. Broom finishes on sidewalks and driveways.

END OF SECTION 03001 - CONCRETE