SECTION 02520

PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:
   1. Concrete paving.
   2. Curbs and gutters.
   5. Dumpster pads at all new trash collection facilities.

B. Related Sections:
   1. Section 02200 - Earthwork.
   2. Section 03300 - Cast-in-Place Concrete.

1.2 INTENT:

1.3 CODES & STANDARDS:

   A. The most recent City of Boulder Design & Construction Standards are incorporated by reference into the University’s Standards. When there is a conflict between standards, the more stringent requirement shall apply. The University’s Civil Engineer must approve in writing any deviation from these standards prior to construction.

1.4 SYSTEM DESCRIPTION:

   A. For handicap accessible curb ramps, conform to the Campus Standard Curb Ramp detail following this section.

1.5 SUBMITTALS:

   A. Shop Drawings: Submit sections and details where not fully dimensioned on the drawings.
B. Manufacturer's Data: Submit for proprietary products.

C. Mix Design: Submit mix design for review by the Architect / Engineer

D. LEED MRc5: Regional Materials
   Provide a statement from the manufacturer stating the materials provided were manufactured within a 500 mile radius of the project site. Include the location in the submittal.

1.6 QUALITY ASSURANCE:

   A. Record of Work: Provide record of time and date of placement, temperature, and weather conditions.

   B. Conform to applicable requirements of ACI 301.

1.7 JOB CONDITIONS:

   A. Cold Weather: Cease concreting when descending air temperature in shade and away from artificial heat falls below 35 degrees F., and there is frost in subgrade.

PART 2 - PRODUCTS

2.1 MATERIALS:

   A. Ready Mixed Concrete: ASTM C94.

   B. Cement: ASTM C150, Type I except use Type II or V as required by Soils Report, 6 sacks per cubic yard minimum.

   C. Aggregates: ASTM C33, 0.75" maximum size.

   D. Water: Potable.

   E. Slump: 1" to 4".

   F. Water Cement Ratio: 0.44-0.48 maximum.

   G. Compressive Strength: 4000 psi minimum.

   H. Admixtures:

      1. Air Entraining Agent: ASTM C260, certified by manufacturer to be compatible with other required admixtures, to achieve 5 to 7 percent entrained air.
2. **Water-Reducing Admixture**: ASTM C494, Type A.

3. **Recycled Content**: 100% post-industrial fly ash.
   
   a. Up to 15%, by weight, of the portland cement may be substituted by fly ash.
   
   b. Fly shall not be used in concrete for sidewalks, curb ramps, curb and gutters, valley gutters, crossspans, concrete paths, driveway, storm drainage structures, and alley approaches.

4. **Prohibited Admixtures**: Calcium chloride or thiocyanate.

I. Reinforcing:

   1. One type of reinforcing is required for all sidewalks/concrete paving subject to vehicle traffic or as additional structural capacity to bridge potential backfill/settlement zone (e.g. in the backfill zone around a new building). Sidewalks containing reinforcement shall adhere to all provisions of ACI 318 for maintaining proper clear cover.

      a. Reinforcing Bars: ASTM A615 and Supplement 1, Grade 60.
      
      b. Reinforcing Bars: ASTM A615 and Supplement 1, Grade 60, epoxy coated. Required for entrance and exit points to parking facilities.
      
      
      d. Fibrous Reinforcement: Collated fibrillated, polypropylene fibers containing no reprocessed olefin materials and having a tensile strength of 70,000 psi. Use 1.5 lbs. per cubic yard of concrete minimum. Subject to approval by the owner’s representative.

   J. Joint Material: 0.5" thick, closed cell polyethylene foam, Texmastic "Vinyltex 3600", Sonneborn "Sonoflex F", or approved substitute.

K. Curing Materials:

   
   2. Liquid Membrane Type: ASTM C309, Type 1, Class B.
   
PART 3 - EXECUTION

3.1 PREPARATION:

A. Check for soft spots prior to setting forms. Remove soft yielding material and replace. Compact to specifications.

B. Test for crown and elevation by subgrade planer to assure specified thickness.

C. Forms shall be capable of supporting loads imposed by construction equipment:
   1. Maximum deflection of 1/4".
   2. Straight and free from warp, with maximum deviation of surface 1/8.

D. Set dowels, expansion joints, preformed construction joins, and header boards and preformed baskets.

3.2 PLACEMENT:

A. Deposit concrete near final position on grade with minimum segregation and without damage of subgrade.

B. Final surfaces shall not have holes or honeycombs.

C. Minimum Thicknesses:
   1. Sidewalks not Subject to Vehicle Traffic: 6".
   2. Sidewalks and Drives Subject to Vehicle Traffic: 6" with reinforcement
   3. Structurally Supported Slabs (Such as Over Tunnels): As required to meet potential loading conditions. All structurally supported slabs shall, at a minimum, meet HS20 loading conditions.
   4. Loading docks: 8” with reinforcement

3.3 FINISHING:

A. Use equipment designed to spread, consolidate, screed and float freshly placed concrete in one pass, providing well consolidated, homogeneous mixture, requiring minimum of hand finishing to meet surface tolerances.

B. Finished surface tolerances:
   1. Tested with 10' straight edge parallel to center line immediately following first
floating of surface.

2. Advance straight edge 5'; space under straight edge shall no exceed 3/16”.

3. Special finishes: Do not use special finishes such as colored concrete, exposed aggregate, etc. unless specific approval from UCB staff is obtained. Evaluation will be made on a job-by-job basis. Do not use metal nosings on exterior concrete stairs

   B. Curbs, gutter and cross pans finished with burlap drag or wood float. Do not plaster surfaces.

   C. Immediately after float finishing sidewalks and ramps, slightly roughen the concrete surface by brooming in the direction perpendicular to the main traffic route. Use fine hair fiber-bristle broom except on inclined slab surfaces provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to the line of traffic.

3.4 JOINTS:

   A. Contraction joints, minimum depth 1/4 thickness of concrete. Space at even intervals and match existing adjacent work (if any).

   B. Longitudinal joints in conformance with drawings.

   C. Expansion joints with preformed joint filler in a vertical position, deviating not more than 1/4" from a straight line. Install at all existing and proposed structures projecting through, into, or against pavement, in accordance with drawings.

3.5 CURING:

   A. Apply curing compounds, sheets, or burlap immediately after finishing and water film has evaporated from surface. Do not use liquid membrane type on surfaces to receive mortar bed finishes.

3.6 PROTECTION:

   A. Protect fresh uncured surfaces from rain.

   B. Cold Weather: Maintain temperature of concrete above 50 degrees F. for minimum five days from placement.

      A. No vehicle loads exceeding design loading. No equipment permitted on new pavement until design strength is attained.

END OF SECTION 02520