SECTION 02750

RIGID PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Portland Cement Concrete (PCC) pavement.

B. Related Sections:
   1. Section 02315 – Excavation.
   2. Section 02721 – Aggregate Base Course.
   3. Section 03300 – Cast-in-Place Concrete.

1.2 REFERENCES

A. Colorado Department of Transportation:
   1. 2005 CDOT Standard Specifications for Road and Bridge Construction.

B. American Concrete Pavement Association (ACPA):
   1. Municipal Concrete Pavement Manual.

C. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   2. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
   3. ACI 305 - Hot Weather Concreting.
   4. ACI 306 - Cold Weather Concreting.
   5. ACI 318 - Building Code Requirements for Structural Concrete.

D. American Association of State Highway and Transportation Officials:
   1. AASHTO M31.

E. American Society for Testing and Materials:
   1. ASTM C39.
   2. ASTM C78.
   3. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
   4. ASTM C1107.
   5. ASTM D5893.

1.3 PERFORMANCE REQUIREMENTS

A. Paving: Designed for parking, residential streets, and main street arteries.

B. Concrete Pavement: Required compressive strength shall be 4200 psi at 28 days per ASTM C39. Required flexural strength (modulus of rupture) shall be 600 psi at 28 days per ASTM C78, third-point loading.

C. Surface Tolerances: Surface deviation shall not be in excess of 3/16 inch in 10 feet.

D. Thickness Tolerances: Thickness shall not be 1/2 inch more or less than that specified for an average of no more than 30 percent of the area of the slab.

E. Elevation Tolerances: Variation from indicated elevation within 1/4 inch.

F. Cracking: All cracking shall occur within cut or hand tooled control joints.

1.4 SUBMITTALS

A. Product Data: Submit data on joint filler, admixtures, and curing compounds.

B. Concrete Mix Design: Submit current mix design with aggregate gradation, cylinder compression test results, and mix proportioning prior to beginning work. Design shall not be dated prior to three years before start date, which is indicated on the Notice to Proceed.

C. Delivery Tickets: Submit concrete delivery tickets, indicating mix I.D. number, time water was added, elapsed time from when water was added and concrete placed, and amounts of additional water added.

D. Work Schedule: Submit schedule to allow at least 24 hours notice of work to be performed or concrete poured to allow for appropriate schedules for testing and inspection.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI, ACPA, Section 03300, and the City of Cañon City standards.

B. Maintain one copy of each document on site.

C. Obtain cementitious and aggregate materials from same source throughout.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with documented experience.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F unless approved by Engineer, or surface is wet or frozen.

B. Concrete placed in cold weather conditions shall be done in accordance with ACI 306.

C. Conform to ACI 305 when concreting during hot weather.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Form Materials: As specified in Section 03300.

2.2 REINFORCEMENT

A. Reinforcing Joint Steel: AASHTO M31; 40 ksi yield grade; #4;deformed billet steel bars; 24 inches long.

B. Reinforcing (Transverse Construction Joint) Steel: AASHTO M31; 40 ksi yield grade; #5; smooth billet steel bars; 12 inches long; lubricated one end.

2.3 CONCRETE MATERIALS

A. Concrete Materials: As specified in Section 03300

2.4 ACCESSORIES

A. Bonding Agent: Two component, moisture insensitive epoxy.

B. Non-Shrink Grout: ASTM C1107; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 in 48 hours and 7,000 psi in 28 days.

C. Curing Compound: membrane forming, ASTM C309.

D. Joint Sealers: Crafco Roadsaver Silicone (SL) Sealant Part No. 34903 installed with approved backer rod, meeting requirements of ASTM D5893.

2.5 CONCRETE MIX

A. Concrete Mix and Delivery: As specified in Section 03300.

PART 3 EXECUTION

3.1 EXAMINATION

A. Per Section 03300.

3.2 SUBBASE

A. Aggregate Subbase: Fine grade and compact to 97% Standard Proctor.

3.3 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole, catch basin, and valve box frames with oil to prevent bond with concrete pavement.

C. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

3.4 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Only one half of the street width shall be formed and placed at a time, with a longitudinal construction joint in the center of the street.

3.5 REINFORCEMENT

A. Place reinforcement as indicated. Do not deviate from required position.

B. Place reinforcement to achieve pavement and curb alignment as detailed.

C. Place, support, and secure reinforcement against displacement.

D. Provide doweled joints as indicated at interruptions of concrete (construction joint), at curb and gutter, and all longitudinal joints.

3.6 PLACING CONCRETE

A. Place concrete in accordance with ACI 301 and 304, and ACPA Municipal Concrete Pavement Manual.

B. Place concrete using mechanical screed, slipform or form paving type equipment, which will strike off, consolidate, and finish the pavement to the required cross section. A minimum 10 foot bull float or “bump cutter” shall be used following any paving equipment.

C. Ensure reinforcement, inserts, embedded parts, formed joints and manhole or valve box lids are not disturbed during concrete placement.

D. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

E. Use a vibrator of proper speed and size to properly consolidate the concrete when screeding by hand or using a bridge deck finisher.

3.7 JOINTS

A. Place joints at 12 foot intervals maximum both directions. Align curb, gutter, and sidewalk joints when at all possible.

B. Joints shall be constructed by sawing concrete after it has set or by hand forming in the plastic concrete with an appropriate jointing tool. The tranverse joints at 48 foot intervals shall be hand tooled before the concrete has set.

C. Sawing shall begin as soon as the concrete has hardened sufficiently as to not allow raveling and before uncontrolled cracking occurs. Sawing shall take place regardless of time of day or weather conditions to assure proper joints.

D. Saw cut contraction joints to the width and depth indicated.

3.8 FINISHING

A. Paving: Heavy broom.

B. Direction of Texturing: Transverse to pavement direction.

3.9 JOINT SEALING

A. Proper cleaning and preparation of joints shall be completed prior to sealing operations, including but not limited to sandblasting per the sealant manufacturer's instructions. A clean joint shall be dry and have no visible signs of residual sealant or debris on the joint face, and will leave no residual cement powder or dust on your finger after rubbing the joint face.

B. All joints, including between pavement and curb and gutter, shall be sealed with joint sealant and backer rod.

C. Do not install sealant when temperature is below the dew point. If rain or other inclement weather occurs during joint preparation or sealing, all operations should cease and sufficient time must be allowed so that the joints are dry prior to starting or continuing the sealing operation.

D. A field adhesion test must be performed on a test section as follows:
   1. Make a knife cut horizontally from one side of the joint to the other.
   2. Make two vertical cuts (from horizontal cut) approximately 3-inches long, at both sides of the joint.
   3. Place a mark 1-inch from the point where the 3-inch cuts stop.
   4. Grasp the 2-inch piece of sealant firmly just beyond the 1-inch mark and pull at a 90-degree angle.
   5. If dissimilar substrates are being sealed, check the adhesion of sealant to each substrate separately. This is accomplished by extending the vertical cut along one side of the joint, checking adhesion to the opposite side and then repeating for the other surface.
   6. The adhesion test is considered passing when 1-inch of sealant is elongated to 4-inches without bond loss.

3.10 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed in accordance with ACI 301.

B. Provide free access to Work and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

D. Tests of concrete may be performed at random to ensure conformance with specified requirements. Engineer may request cylinder compressions, slump, aggregate sieve designation and deleterious substance tests to be performed by a qualified designee.

E. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.11 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, wind, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Apply curing compound to unformed surfaces immediately after finishing, not to exceed 300 SF per gallon.

D. Remove forms only after concrete has attained sufficient strength to support all dead and live loads.

E. Contractor shall provide barricading or personnel as necessary to protect freshly finished concrete from vandalism or other damage.

F. Do not permit vehicular traffic over pavement for 7 days minimum after finishing.

3.12 SCHEDULES

A. Pavement: Single course of 6-inch thickness minimum. Design engineer shall verify minimum requirements are adequate based on site conditions and propose necessary changes to Engineer accordingly for approval.

B. Street widths shall be as indicated in the Major Thoroughfare Plan or as otherwise indicated by Engineer.

C. Streets having no outlet shall be no longer than 500 feet and shall end in a cul-de-sac with a minimum radius of 45 feet center to curb flow-line.

END OF SECTION