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## 10.0 Geotechnical and Roadway Pavements

### 10.1 Design Requirements

#### 10.1.1 Geotechnical Investigations

Geotechnical investigations performed by CDOT are provided in Book 5 - Reference Documents.

The Contractor shall be responsible for any supplemental subsurface investigation necessary to complete the Work. Geotechnical investigations shall comply with the requirements of the 2014 CDOT Field Materials Manual, the 2014 CDOT Pavement Design Manual and any other applicable standards necessary to perform the Work. All supplemental investigations made by the Contractor shall be documented in geotechnical investigation reports of similar format as those referenced geotechnical documents and submitted to CDOT for review and comment within 30 days following completion of the fieldwork. The reports shall be signed and sealed by a Professional Engineer and must be Accepted by CDOT prior to Release for Construction drawings.

#### 10.1.2 Roadway Pavement Analysis and Design

CDOT has performed the pavement design and Life Cycle Cost Analysis to determine the pavement type, thickness, and minimum sub-grade stabilization requirements that will be used on this project. Alternative Configuration Concepts (ACCs) involving a reduction in thickness or change in type of the materials included in the pavement section elements; including Hot Mix Asphalt (HMA), Aggregate Base Course (ABC), and minimum subgrade thicknesses, classifications, and support values, will be not considered for this project. The Contractor shall be responsible for all other aspects of pavement design, including the HMA Mix Design, except as otherwise provided for in the Contract Documents.

### 10.2 Construction Requirements

#### 10.2.1 Pavement Structure

The Pavement Structure is defined as the combination of one or more of the following courses placed on a subgrade to support and distribute the traffic load to the roadbed:

- *Subbase*. The layer or layers of specified or selected material placed on a subgrade to support a base course, surface course, or both.
- *Base Course*. The layer or layers of specified or selected material placed on a subbase or a subgrade to support a surface course.
- *Surface Course*. One or more layers of a pavement structure designed to accommodate the traffic load. The top layer of the Surface Course resists skidding, traffic abrasion, and the disintegrating effects of climate.

The Contractor shall construct the Pavement Structure in accordance with the requirements of the Contract Documents. Where it is required to cut existing pavement, the cutting shall be done to a neat work line full depth with a pavement cutting saw or other method as approved by CDOT.

The Contractor shall be responsible for constructing a Safety Edge in accordance with the requirements of the Contract Documents.

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To provide for adequate sulfate resistance, all concrete supplied to the project shall be designed for Class 2, Severity of Sulfate Exposure. The Contractor may, at their expense, have a certified laboratory test the subgrade as per the 2014 CDOT Field Materials Manual. Testing shall be at the same schedule and frequency as required for preliminary soil survey. The Contractor may propose a different Class of Exposure for the Project based on the test results. Concrete for foundation elements shall be designed for Class 2, Severity of Sulfate Exposure.

Any existing item which is to remain and is damaged as a result of the Contractor's operation, including but not limited to curb and gutter, sidewalk, drainage pans, and driveways shall be replaced at the Contractor's expense.

### **10.2.2 Roadway Pavement Construction Requirements**

A minimum of three weeks prior to the proposed use of any pavement on the Project, a Pre-paving Conference shall be conducted. At the Pre-paving Conference, the Contractor shall present to CDOT mix designs for HMA and a Paving Quality Control Plan for Approval. If the Hot Mix Asphalt will contain Recycled Asphalt Pavement (RAP), a RAP Quality Control Plan shall be submitted at that time as well.

### **10.2.3 Roadway Pavement Types and Thickness Requirements**

A tack coat is required between all layers of HMA. Diluted emulsified asphalt for tack coat shall consist of 1 part emulsified asphalt and 1 part water. Rates of application shall be 0.10 Gal/Sq. Yd. (Diluted) or as determined by CDOT at the time of application. Any layer of HMA that has to have a succeeding layer placed thereon shall be completed full-width before a succeeding layer is placed, unless prior Approval is given by the CDOT Project Manager.

### **10.2.4 Composite Section Hot Mix Asphalt**

The Contractor shall use HMA Grading SX(100)(PG 64-22) and HMA Grading SX(100)(PG 76-28) for the HMA composite asphalt section and comply with the requirements in this Section and the specifications in Section 19 – Modifications to Standard Specifications. HMA mixes shall be subject to voids acceptance criteria.

The pavement joint plan and pavement striping plan shall be submitted to the CDOT Project Manager for review and Approval prior to beginning paving operations. Paving shall not occur until these documents have been reviewed and Approved by the CDOT Project Manager.

The Contractor shall use the following section for the HMA composite asphalt section on I-25 Mainline and Ramps:

- Top layer: 2-inches of HMA (Grading SX)(100)(PG 76-28)
- Bottom Layers: Two, 2 ½-inch layers of HMA (Grading SX)(100) (PG 64-22)

The Contractor shall use the following section for the HMA composite asphalt section on Santa Fe Avenue, Clark Street, D Street, 1<sup>st</sup> Street, Mesa Avenue, Northern Avenue, Bennett Street, and Gruma:

- Top layer: 2 1/2-inches of HMA (Grading SX)(100)(PG 76-28)
- Bottom Layer: 2 1/2-inches of HMA (Grading SX)(100)(PG 64-22)

The Contractor shall use HMA (Grading SX) for HMA patching and comply with the specifications in this Section 10.

**10.2.5 Hot Mix Asphalt Overlays**

The Contractor shall remove 2 inches of existing asphalt by planing prior to placing 2 inches of HMA for the overlay transitions and tie-in locations. HMA overlays shall be full-width. Overlay transitions to and from structures and all other tie-in locations shall have a thickness taper of 1 inch per 100 feet. Locations with ruts shall be milled to a depth of ½” below the bottom of the ruts. All milled surfaces shall be covered with new HMA within 5 working days.

**10.2.6 Pavement Thickness**

The Contractor shall construct the HMA pavement to the thickness requirements for the Project, as set forth in the Table below:

Location	Subgrade Minimum R-value (Top 2')	Required Pavement Section Thickness (inches)			Pavement Smoothness Category
		HMA	Aggregate Base Course (Class 6)	Embankment	
I-25 Mainline and Ramps	60	7	6	See Section 11	II
Santa Fe Ave./D St./Clark St./1 <sup>st</sup> St./Mesa Ave./Northern Ave./Bennett St./Gruma	60	5	6	See Section 11	II
Mill/Fill Tie-Ins – Ilex and Ilex to 1 <sup>st</sup> Street segments only	-	2		-	II

**10.2.7 Existing Pavement Sections**

If the existing pavement section of any roadway is modified as part of the Work, the Contractor shall demonstrate through a pavement section analysis that the modified pavement section will serve a 20-yr design life. If the modified section does not meet a 20-yr design life the Contractor shall design and construct a section to meet this requirement. The Contractor shall submit to CDOT this analysis and design for Approval prior to Release for Construction drawings.

**10.2.8 Trail Pavement Mix Designs, Types, Thickness Requirements and Sections**

The Contractor shall present mix designs for concrete 3 weeks prior to concrete placement to CDOT for Approval.

The Contractor shall construct the trail concrete pavement to the thickness requirements for the Project, as set forth in the Table below:

Location	Required Pavement Section Thickness (inches)		
	Concrete	Aggregate Base Course (Class 6)	Embankment
All Trails	6	6	See Section 11

The all trails shall be 12 feet wide with 6 foot by 6 foot joints.

**10.3 Deliverables**

At a minimum, the Contractor shall submit the following to CDOT for review, Approval and/or Acceptance:

<b>Deliverable</b>	<b>review, Acceptance or Approval</b>	<b>Schedule</b>
Geotechnical investigation reports	Acceptance	Prior to Release for Construction drawings
HMA mix designs	Approval	At the Pre-Paving Conference and at a minimum of 3 weeks prior to the planned placement of any HMA on the Project
Paving Quality Control Plan	Approval	At the Pre-Paving Conference and at a minimum of 3 weeks prior to the planned placement of any HMA on the Project
RAP Quality Control Plan	Approval	At the Pre-Paving Conference and at a minimum of 3 weeks prior to the planned placement of any HMA on the Project
Pavement joint plan	Approval	Prior to beginning paving operations
Pavement marking plan	Approval	Prior to beginning paving operations
Pavement section analysis and design	Approval	Prior to Release for Construction drawings
Concrete mix designs	Approval	3 weeks prior to concrete placement

All deliverables shall also conform to the requirements of Section 3 – Quality Management.