

## **11.0 EARTHWORK**

### **11.1 Construction Requirements**

#### **11.1.1 Clearing and Grubbing**

The trees, logs, limbs, stumps, brush, trash, and other unsuitable materials cleared and grubbed from the Project shall be removed from the Site to an off-Site location by the Contractor.

#### **11.1.2 Excavations and Embankments**

##### **11.1.2.1. Material Requirements**

Embankment Material that is not used within the ultimate configuration Roadway prism shall have a minimum resistance value (R-value) of 10 when tested by the Hveem Stabilometer.

To provide for adequate sulfate resistance in all concrete supplied, Severity of Potential Exposure shall be Class 2 for this project. All embankment material shall have water soluble sulfate (SO<sub>4</sub>) levels in dry soil less than 2 percent. The Contractor may, at their own expense, have a certified laboratory test the subgrade as per the Field Materials Manual. Testing shall be at the same schedule and frequency as required for a preliminary soil survey. The Contractor may propose a different Class of Exposure for the Project based on those test results

All compaction shall be in accordance with the CDOT Standard Specifications.

##### **11.1.2.1.1 Federal Boulevard, Mainline I-25 and US6, Ramps, and Collector-Distributor Roads**

Flexible and rigid pavement alternatives defined in Section 10, shall be underlain by 6 inches of Aggregate Base Course (ABC) Class 6 and 2 feet of minimum R-value subgrade. Soil within 1 foot beneath the minimum R-value subgrade shall be treated per the CDOT Standard Specifications.

Facility	Station	Subgrade Minimum R-value
US6, Knox Court to Bryant Street	N/A	10
US6, Bryant Street to South Platte River	N/A	20
US6, South Platte River to I-25	N/A	10
US6, I-25 to BNSF	N/A	10
I-25, Mainline	N/A	10
I-25, SB Ramp to WB US6 and SB Ramp to EB US6	N/A	10

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I-25, NB Ramp to WB US6 and NB Ramp to EB US6	N/A	10
Federal Blvd	N/A	10
US6 and Federal Blvd Interchange Ramps	N/A	10
Federal to EB US6 Braided Ramp	N/A	10
Federal Blvd to EB US6 CD Road Ramp	N/A	10
Federal Blvd to Bryant Street Ramp	N/A	10
West 6 <sup>th</sup> Avenue (Frontage Road)	N/A	10
5 <sup>th</sup> Avenue	N/A	10
Side Streets	N/A	10
Canosa Court (Cul-de-sac)	N/A	10
Bryant Street	N/A	10

Table 11.1 Minimum R-values for facility subgrade.

The facility pavement design shall require that the soil shall have a percent swell less than or equal to 1 to a depth of 3 feet below the bottom of the proposed ABC Class 6. A percent swell less than or equal to 1 corresponds to a low probable swell damage risk.

The minimum horizontal limits for the ABC Class 6, 24 inches of the required, location-specific minimum R-value material (Section 11 and the required subgrade treatment shall be the outer limits of the pavement, plus two feet on each side. At locations with unprotected side slopes the ABC Class 6, 24 inches of the required, location-specific minimum R-value material, and the subgrade treatment shall be extended to the side slope as shown in Chapter 4 of the CDOT Roadway Design Guide. In areas with curb and gutter, this should extend for a minimum distance of 12 inches beyond the back face of the curb.

The Contractor shall utilize the soils information included in Book 3 and conduct a supplemental soil survey to confirm/ascertain whether the existing soil satisfies the above conditions. This supplemental soil survey shall conform to the requirements as stated in the 2013 CDOT Field Materials Manual. Test holes are required at least every 1,000 feet. The Contractor shall provide any additional mitigation required as a result of the supplemental soil survey.

Swell tests, using materials from the supplemental soil survey, are required to verify the percent swell of the existing soil is less than or equal to 1 percent. If the swell index is greater than 1 percent, mitigation is required to a minimum depth of three feet below the base of the proposed

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ABC Class 6. The Contractor shall provide any additional mitigation measures required that will result in a percent swell less than or equal to 1 percent when tested with a 200 psf surcharge.

Where Roadway embankment is retained by structurally designed walls (retaining walls), the retained embankment material properties must be compatible with the soil parameters used in design of the walls. This applies to both externally stabilized and internally stabilized wall systems.

The results of the supplemental soil survey, along with any additional mitigation measures required, shall be submitted to CDOT for Approval before any pavement and pavement related Work commences. The above information shall be submitted in a report format that clearly and concisely describes the existing soil conditions, delineates areas needing additional mitigation, and defines the required mitigation measures. The report shall include a soil profile, boring log, and the test results.

All Work shall be conducted per the 2013 CDOT Pavement Design Manual and the 2013 CDOT Field Materials Manual.

Alternative subgrade treatment shall be submitted to CDOT for Approval prior to incorporation into the Work.

**11.1.2.1.2 Local Streets**

The subgrade shall meet the minimum resistance values (R-value, k-value, classification) as specified in Table 11.1, unless otherwise provided elsewhere in the Contract Documents.

**11.1.2.1.3 Bikeway**

Bikeways shall be underlain by 6 inches of ABC Class 6 material. Soil 1 foot beneath the ABC Class 6 material shall be treated per the CDOT Standards. The ABC Class 6 material, and the subgrade moisture treatment/recompaction shall extend to the outer limits of the bikeway pavement, plus two feet on each side. CCD bikeways and trails shall conform to current CCD standards.

**11.1.2.2 Compaction Requirements**

The type of compaction for the Project shall be per the 2011 CDOT Standard Specifications with depth of moisture-density control as follows:

1. Full depth of all embankments
2. Six (6) inches for bases of cuts and fills unless otherwise specified.
3. Twelve (12) inches underneath the proposed pavement section (pavement/base course/min R-value soil).

**11.1.2.3 Reuse of Materials**

Per the Standard Specifications, the Contractor shall be allowed to use broken concrete or broken asphalt or asphalt millings as embankment Material as Approved by CDOT.

Asphalt millings may be substituted for ABC Class 6 as Approved by CDOT. Any use of asphalt millings that does not meet the Approved requirements shall be removed and replaced at the Contractor's expense.

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The existing subgrade will be allowed to remain in-place, with the Approval of CDOT, if it meets all other requirements herein.

**11.1.2.4 Available Potential Source of Material**

An available potential source of material has not been identified for this Project.

**11.1.2.5 Geotextiles**

Geotextiles shall meet the requirements for Geotextile Class I (Per AASHTO M 288) and be approved for stabilization and separation applications. The geotextile shall be selected from the New York State Department of Transportation list of approved products available at:

<https://www.nysdot.gov/divisions/engineering/technical-services/technical-services-repository/alme/pages/470-1a.html>.

Locations requiring geotextile installation shall be as Approved by CDOT. Where geotextile installation is required, in-situ soil shall be scarified to a depth of at least 12 inches and then compacted, following requirements of the Standard Specifications.

The geotextile shall be installed per manufacturer's recommendations.

## 11.2 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>
Results of the supplemental soil survey along with any proposed mitigation measures	Approval	Results shall be submitted a minimum of two months before any pavement and pavement related Work commences
Alternative subgrade treatment	Approval	Proposal shall be submitted a minimum of one month before any pavement and pavement related Work commences
Use of broken concrete or broken asphalt or asphalt millings as embankment Material	Approval	Proposal shall be submitted a minimum of one month before any pavement and pavement related Work commences
Any asphalt millings substituted for ABC Class 6 meeting the grading requirements of ABC Class 6 Special.	Approval	Proposal shall be submitted a minimum of one month before any pavement and pavement related Work commences
The existing subgrade will be allowed to remain in-place	Approval	Proposal shall be submitted a minimum of one month before any pavement and pavement related Work commences
Locations requiring geotextile installation	Approval	Proposal shall be submitted a minimum of one month before any pavement and pavement related Work commences

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