11.0 EARTHWORK

11.1 Construction Requirements

11.1.1. Removal of Structures

The Contractor shall raze, remove, and dispose of all structures and obstructions which are identified on the Project for removal, except Utilities, Structures and obstructions removed under other contractual agreements, and salvable material designated to remain the property of the Colorado Department of Transportation (CDOT).

Substructures of existing Structures, regardless of location, shall be removed a minimum of 2 feet below the existing natural ground surface or the proposed ground surface, whichever is at a lower elevation, and a minimum of 5 feet horizontally from proposed underground structures if a conflict exists.

11.1.2. Clearing and Grubbing

Trees, logs, limbs, stumps, brush, trash, unsuitable materials, and any other items identified under clearing and grubbing shall become the property of the Contractor and shall be disposed of off-site unless directed otherwise by CDOT.

The Contractor shall conduct a landscape walkthrough prior to the start of any construction activities according to requirements of Book 2, Section 17.

11.1.3. Excavations and Embankments

New embankment shall be benched into the existing slopes, where required, in accordance with Section 203.06 of CDOT *Standard Specifications*. The Contractor shall expect to encounter rubblized concrete under portions of existing Interstate 25 (I-25). Core data is available in the Reference Documents.

11.1.3.1 Protection of Processed Soil

A large amount of existing soil will be processed in-place. The Contractor shall provide a method to protect soil that has been processed so that it does not become over wetted and unworkable. If treated soil becomes over wetted, i.e. exposure to surface runoff or a temporary drainage condition, the Contractor shall be responsible for returning the soil to an acceptable condition prior to placement of pavement, at the sole expense of the Contractor.

11.1.4. I-25 Mainline, New Auxiliary Lanes, and Ramps Swell Mitigation Measures

11.1.4.1 Treatment of Swelling Soils

It is the Contractor's responsibility to mitigate swelling soils, if found. Treatment of expansive or swelling soils is addressed in Section 4.9 of the CDOT *2017 M-E Pavement Design Manual*. CDOT requires treatment of expansive soils on all interstate highways and CDOT's treatment of expansive soils is based on plasticity index (PI).

11.1.4.2 Chemical Stabilization

Chemical stabilization such as lime treatment, cement stabilization, or other methods shall not be allowed.

11.1.4.3 Soil Survey

The Contractor shall utilize the soils information included in the Reference Documents and conduct a supplemental soil survey to confirm or ascertain whether the existing roadway soil satisfies the above conditions if it is desired to re-use the on-site materials in the roadway prism. This supplemental soil survey in conjunction with the soil survey in the Reference Documents shall conform to the requirements as stated in the 2017 CDOT *Field Materials Manual* (2017 CDOT *FMM*). The Contractor shall provide any additional mitigation required as a result of the supplemental soil survey.

The results of the supplemental soil survey, along with any additional mitigation measures required, shall be submitted to CDOT for Approval before submittal of Preliminary Pavement Design Report and any embankment, aggregate base course, 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 per 2017 CDOT *FMM* direction.

If the on-site materials are allowed to be re-used, the material will be tested as stated in the 2017 CDOT *FMM* during construction.

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.

All Work shall be conducted per the CDOT *2017 M-E Pavement Design Manual* and the 2017 CDOT *FMM*.

Alternative subgrade treatment shall be submitted to CDOT for Approval concurrent with submission of Preliminary Pavement Design Report.

11.1.5. Trails

Trails shall be underlain by 4 inches of aggregate base course (ABC) Class 6 material and 12 inches of R-20 minimum embankment. The ABC Class 6 material, the R-20 material, and the subgrade moisture treatment and recompaction shall extend to the outer limits of the trail, plus 1 foot on each side. Refer to Exhibit 13-B, Poudre River Trail Design Criteria for further requirements.

The detached, 5-foot wide crusher fine path shall be underlain by 6 inches of moisture-density controlled subgrade.

11.1.6. Compaction Requirements

The type of compaction for the Project shall be per the CDOT *Standard Specifications* unless superseded by Project or *Standard Special Provisions* with depth of moisture-density control as follows:

1. Full depth of all embankments
2. 6 inches for bases of cuts and fills unless otherwise specified.
3. Compaction shall comply with American Association of State Highway and Transportation Officials (AASHTO) T-180 or T-99 testing procedures per Revision of Sections 203, 206, 304 and 613 – Compaction
4. Any applicable Standard Special Provisions as referenced in Book 2 or Contract Documents

11.1.7. Settlement

Fills greater than 10 feet shall be evaluated for potential settlement. Primary settlement must be complete prior to construction of any pavement section or structure. The Contractor is responsible for development of a measurement method and mitigation to be included in the Quality Management Plan (QMP). Any impacts to the schedule due to settlement shall be the responsibility of the Contractor.

11.1.8. Reuse of Materials

The Contractor is allowed to use broken concrete that is less than 6 inches in maximum dimension or broken asphalt that is less than 6 inches in maximum dimension for embankment material provided it is placed in accordance with Section 203.06 of the Standard Specifications unless otherwise noted. The contractor shall assume all the risk for materials placed in embankments and potential conflicts with the proposed landscaping, utilities, drainage and other sub surface features.

Recycled concrete shall not be allowed for re-use in new concrete pavement.

All fill, reused materials, and import materials, shall be tested for sulfates and shall have a Severity of Sulfate Exposure Class less than Class 2.

The Contractor should anticipate that any planned removal of existing rubblized concrete shall require additional effort for removal. Additional effort for removal shall not be paid for separately but shall be included in the original cost for the work at time of proposal.

A minimum of 2 weeks before any embankment, aggregate base course, pavement and pavement related Work commences, the Contractor shall submit a proposal to use broken concrete, broken asphalt, or asphalt millings as embankment material. The proposal shall include specific locations, methods, and Quality processes for processing and placement of material in compliance with the contract requirements for reuse of materials.

The Approved locations for all buried broken concrete, broken asphalt, or asphalt millings shall be clearly delineated on the As-Built Documents.

Asphalt millings are allowed to be used in embankment material up to a mixture of 50% asphalt millings and 50% embankment material as long as specified material strengths and other contract requirements are met. Asphalt millings will not be allowed within the top 2 feet of embankment material immediately below proposed pavement structure. Milled asphalt requirements per Standard Special Revision 401 Reclaimed Asphalt Pavement shall be followed. Millings shall not be substituted for Aggregate Base Course.

With Approval of CDOT, the existing subgrade may remain in place if it meets all other Contract Document requirements before any embankment, aggregate base course, pavement and pavement related Work commences. Proposal shall be submitted a minimum of 30 days before any embankment, aggregate base course, pavement and pavement related Work commences

11.1.9. Available Potential Source of Material

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

11.2 Deliverables

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

Table 11-1 Deliverables

Deliverable	Review, Acceptance or Approval	Schedule
Alternative subgrade treatment	Approval	Alternative subgrade treatment proposal shall be submitted at time of Preliminary Pavement Design Report.
Use of broken concrete or broken asphalt or asphalt millings as embankment Material	Acceptance	Proposal shall be submitted a minimum of 2 weeks before any embankment, aggregate base course, pavement and pavement related Work commences
Existing subgrade allowed to remain in place	Approval	Proposal shall be submitted a minimum of 30 days before any embankment, aggregate base course, pavement and pavement related Work commences
Supplemental Soil Survey and Additional Mitigation Measures	Approval	Prior to submittal of Preliminary Pavement Design Report and before any embankment, aggregate base course, pavement and pavement related Work commences
Method and Equipment for Moisture Conditioning	Approval	Proposal shall be submitted a minimum of 2 weeks before any embankment, aggregate base course, pavement and pavement related Work commences

11.3 Project Special Provisions

The following specifications modify and take precedence over the Standard Specifications

REVISION OF SECTION 203
R-40 Embankment

Section 203 of the Standard Specifications is hereby revised for this project as follows:

Delete the first paragraph of subsection 203.03(a), and replace with the following:

(a) *R-40 Embankment.* R-40 Embankment shall consist of soil placed in embankments under the roadway section shall be two feet in depth. Approval of the R-40 Embankment will be contingent on the material having a resistance value of at least 40 when tested by the Hveem Stabilometer. The material must be stable when tested in accordance with Colorado Procedure L-3102. All borrow material imported to the site shall meet the resistance criteria in its natural state – no mixing or treatment will be allowed. Prior to transport of the entire material, a representative sample shall be submitted to the Engineer for testing and approval. If requested, the Contractor shall inform CDOT of the location of the proposed borrow source and provide access for the Engineer to inspect and test material at the source.

In Subsection 203.07, the fifth paragraph shall include the following:

The amount of water to be used in compacting R-40 Embankment shall be in the moisture content range of 2 percent below optimum to 2 percent above optimum as determined by AASHTO T-180.

In Subsection 203.07, the table at the end of the subsection shall include the following:

> R-40 Embankment shall be compacted to at least 95% of maximum modified Proctor dry density in accordance with AASHTO T-180.