

Project: I-70 Vail Pass Various Wall Repairs

Project Sub Acct. No: 21897

Date: November 1, 2018

## **Technical Requirements**

### **Section 10 – Geotechnical**

#### **GEOTECHNICAL INVESTIGATIONS**

Geotechnical information is provided on some of the original as-built drawings that can be found in the Reference Documents. See project website at [Project Website - I-70 Vail Pass Various Wall Repairs](#).

The Contractor has, prior to submitting its Proposal, in accordance with prudent and generally accepted engineering and construction practices, reviewed the boring logs provided in the Reference Documents, inspected and examined the Sites and surrounding locations, and undertaken other appropriate activities sufficient to familiarize itself with surface conditions and subsurface conditions affecting the Project, to the extent the Contractor deemed necessary or advisable for submittal of a Proposal. As a result of such review, inspection, examination and other activities, the Contractor is familiar with and accepts the physical requirements of the Work. The Contractor acknowledges and agrees that changes in conditions at the Site may occur after the Proposal Due Date, and that the Contractor shall not be entitled to any Change Order.

Before commencing any Work on a particular aspect of the Project, the Contractor shall verify all governing dimensions and conditions at the Site and shall examine all adjoining work, which may have an impact on such Work. The Contractor shall be responsible for ensuring that the Design Documents and Construction Documents accurately depict all governing and adjoining dimensions and conditions.

The Contractor shall be responsible for any supplemental subsurface investigation necessary to complete the Work including both design and construction activities. Geotechnical investigations shall comply with the requirements of the latest versions of the following:

- CDOT Geotechnical Design Manual
- CDOT Field Materials Manual
- AASHTO LRFD Bridge Design Specifications, Section 10 in effect at the time of bidding

All supplemental investigations made by the Contractor shall be documented in a geotechnical investigation report and submitted to CDOT for Acceptance. Supplemental investigations must be signed and stamped by a professional engineer, licensed in the State of Colorado. Geotechnical Field Investigations and Laboratory Testing shall comply with Chapters 3 and 4 of the CDOT Geotechnical Design Manual and referenced documents. Minimum boring frequencies and depths shall comply with Section 3.4 of the CDOT Geotechnical Design Manual. Geotechnical Investigations, Testing Programs, and Design Methodologies and Software shall be presented to CDOT for approval prior to commencing these activities.

#### ***Geotechnical Design Methodology and Criteria***

The following presents the design publications, methodologies, codes and specific requirements for anticipated wall repair designs. All designs shall be prepared by a Professional Engineer licensed by the State of Colorado.

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#### **Soil Nails:**

- CDOT Geotechnical Design Manual, April 2017
- CDOT Bridge Design Manual, January 2018
- AASHTO LRFD Bridge Design Specifications, Section 10 in effect at the time of bidding
- Publication No. FHWA-NHI-14-007, Geotechnical Engineering Circular No. 7, “Soil Nail Walls Reference Manual”, February 2015
- Publication No. FHWA-SA-96-069R "Manual for Design & Construction of Soil Nail Walls", 1999
- Publication No. FHWA-IF-03-017, Geotechnical Engineering Circular No. 7, “Soil Nail Walls”, March 2003

#### **Ground Anchors/Tieback Anchors:**

- CDOT Geotechnical Design Manual, April 2017
- AASHTO LRFD Bridge Design Specifications, Section 10 in effect at the time of bidding
- Publication No. FHWA-IF-99-015, Geotechnical Engineering Circular No. 4, “Ground Anchors and Anchored Systems”
- Post-Tensioning Institute (PTI) “Recommendations for Prestressed Rock and Soil Anchors”, 1996

All nailed and anchored wall repairs shall be designed as permanent nails/anchors. Minimum factors of safety for global stability shall meet that presented in Table 5.3 of the CDOT Geotechnical Design Manual. Additional external and internal factors of safety or resistance factors shall meet the requirements presented in Publication No. FHWA-NHI-14-007, Geotechnical Engineering Circular No. 7, “Soil Nail Walls Reference Manual”, February 2015. All soil parameters utilized shall be based on the results of the design-build team supplemental soil investigations and laboratory test results.

#### ***Roadway Embankment Requirements***

Excavation and Embankment materials and construction shall conform to the requirements of Section 203 of the CDOT Standard Specifications for Road and Bridge Construction, 2017 (Standard Specifications). Where imported roadway embankment material is required it shall meet the requirements of Section 203.03, and be compatible with structures constructed on and adjacent to the embankment. It shall consist of materials within the AASHTO Classification of A-1, A-2 or A-3 with a maximum Plasticity Index of 20. If imported material is required below temporary detour/widening or permanent reconstructed pavement sections, it shall also have a minimum resistance (R-value) of 40 and extend a minimum of 2 feet beyond the edge of pavement.

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#### **Roadway Pavement**

##### ***Permanent Pavement***

Asphalt pavement materials, mix designs, and construction shall conform to Section 401 of the Standard Specifications. Construction of permanent pavements shall include 9 inches or match existing, whichever is greater of Hot Mix Asphalt (Patching)(Asphalt) over 10 inches of Aggregate Base Course. Aggregate Base Course shall be Class 6. Joints for subsequent lifts of asphalt shall be offset per Section 401.16 of the CDOT Standard Specifications for Road and Bridge Construction, 2017.

##### ***Temporary Detour/Widening Pavements***

Section 621 is hereby added to the Standard Specifications for this Project and shall include the following:

621.01 This work consists of constructing temporary detours/pavement widenings as shown in the plans; maintenance of the detours; removal of the detours; and removal and replacement of appurtenances required to construct and operate the detours including but not limited to guardrail, curb and gutter, detour pavement, embankment material and unclassified excavations.

621.02 All materials required for detour shall comply with project standard specifications and special provisions. Detour pavements shall utilize at a minimum grading, gyrations, and binder equivalent to Hot Mix Asphalt (Patching)(Asphalt) Where detour pavement abuts existing pavement which has a base of aggregate base course, the detour must include a layer of aggregate base course which shall serve to convey potential under-pavement drainage away from the permanent pavement. The Contractor shall be responsible for quality control required to assure adequate quality of embankment material, aggregate base course, HMA used in the construction of the detour.

621.03 The detour locations and dimensions for all phases of construction shall be as shown on the plans.

If the materials and thickness furnished for the detour pavement result in an inadequate detour structure, the Contractor will provide additional thickness, materials, or other measures necessary to provide a satisfactory pavement for the life of the detour. These additional improvements shall be furnished at no additional cost. All necessary signs, pavement markings and other traffic control devices shall be provided in accordance with the traffic control plan.

621.04 The Contractor shall maintain the detour for the entire period that it is open to traffic. Any distress that affects the ride, safety, or serviceability of the detour roadway shall be corrected to the satisfaction of the CDOT at the expense of the Contractor.

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The Contractor shall have a maintenance plan for all hours of the day (7 days a week) for executing a long-term patch of damaged detour pavement and have forces available to perform this work within 2 hours of notice of such damage. The Contractor shall designate a person to be “on call” during all non-working hours, including no work periods as a point of contact for this work.

If CDOT determines the detour has deteriorated to the point where the safety of the traveling public is compromised (i.e. failure, potholes, uneven surface), the lane(s) in question shall be closed and the Contractor shall be directed to execute their maintenance plan. If the Contractor is unresponsive to this order by CDOT, CDOT maintenance forces will be mobilized to close the lane and maintain the closure until such time as the Contractor is available to perform this work. CDOT Maintenance forces will be responsible for the lane closure only, and only until such time as the Contractor arrives on site and relieves them. CDOT Maintenance will not be responsible for repair of any of the contract installed detour. All time and expense for CDOT Maintenance work will be tracked by CDOT and deducted from money due to the Contractor. Any lane closures that are required outside of the allowable lane closure hours will be charged as 'working time violation' as established in this contract.

#### ***Smoothness Requirements***

Pavement smoothness shall be measured with a 10 feet straight edge. Pavement smoothness requirements, testing procedures, and corrective actions shall conform to Section 105.07 of the CDOT Standard Specifications for Road and Bridge Construction, 2017.

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**Deliverables**

<b>Deliverable</b>	<b>Acceptance or Approval</b>	<b>Schedule</b>
Geotechnical Investigation, Testing, and Design Methodology (Memo)	Approval	2 weeks prior to commencing geotechnical investigation activities
Supplemental Geotechnical Investigations (Reports)	Acceptance	Submit with Design Packages
Geotechnical Design Calculations for Soil Nails and Anchor System	Acceptance	Submit with Design Packages
HMA Mix Design	Acceptance	2 weeks prior to paving. Mix submittal shall follow all requirements in CP 52 and CP 59.
Detour/Widening Plan	Acceptance	Two weeks prior to any detour/widening construction activities