



Request for Proposals (RFP)

Design – Professional Services Scope of Work

EJMT LED Lighting Upgrade Project

Mile Point (MP) 215.3 to MP 213.7



COLORADO
Department of Transportation

PROJECT NUMBER: C 0703-535

LOCATION: Eisenhower-Johnson Memorial Tunnel (EJMT)

PROJECT CODE: 26276

June 20, 2024

Colorado Department of Transportation

2829 West Howard Place

Denver, CO 80204



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INSTRUCTIONS

This Scope of Work is to serve as a template for the Colorado Department of Transportation (CDOT) to develop and negotiate solid contracts with Consultant teams on projects and tasks. The Consultant shall coordinate all activities, tasks, meetings, communications, and deliverables with the CDOT/Project Manager (PM) or a designee, who will make appropriate distribution. Upon notice to proceed, the Consultant shall be responsible and will account for all effort contained in the Final Scope of Work.

This Scope of Work has been reviewed by the Department and reflects a plan of approach based on the known goals. One factor determining the selection of a Consultant is the ability of that Consultant to analyze the project goals, evaluate the work elements, and formulate a work plan. This process may produce new approaches or modification to the project work elements. Because of that, all Consultants should be aware that the Final Scope of Work for a project will be produced with input from the selected Consultant.



SECTION 1 - PROJECT SPECIFIC INFORMATION

1.1 PROJECT BACKGROUND

EJMT Overview

The Eisenhower-Johnson Memorial Tunnel (EJMT), located about 60 miles west of Denver on the Interstate 70 Mountain Corridor, traverses the Continental Divide. At an average elevation of 11,112 feet, it is the highest vehicular tunnel in North America. Each tunnel is over 8900-feet in length and at peak travel carries as many as 3,500 vehicles per hour in each direction. The I-70 Mountain Corridor is a part of the only contiguous east/west interstate in Colorado, making it vital to the state. I-70 is a critical corridor for moving goods and services, including medical supplies, food, and other essential items. This makes EJMT a crucial piece of Colorado infrastructure with a historic and cultural significance to the state and country.

Opened in 1973 (Eisenhower Tunnel) and 1979 (Johnson Tunnel), EJMT is faced with outdated and aging infrastructure which CDOT has been repairing. As a part of CDOT's 10-Year Plan vision, EJMT restoration projects will assess the condition of the tunnel and conduct improvements on the various systems and structures that make up the facility. These improvements will focus on preservation, enhancing the safety and mobility of the traveling public as well as CDOT Maintenance & Operations (M&O) crews, resiliency of the facility, and economic vitality by continuing to connect for the freight network in the United States for years to come.

The tunnel bores are horseshoe shaped, with fully transverse ventilation above the roadway with exhaust and fresh air plenums. The tunnel is fed power independently from the utility providing substations from the east and west. The electrical distribution system has been upgraded since the original.

The current fluorescent lighting system was installed in 2001 in the Johnson Tunnel (F-13-X) and 2007 in the Eisenhower Tunnel (F-13-Y). The light fixtures have reached the end of their 20-year life-span. Additionally, tunnel inspections have found the current fluorescent fixtures and mounting structures are deteriorating from corrosion requiring full replacement. Advances in tunnel lighting technology will also allow for less energy usage and reduction in re-lamping and lane closures for the 24 hour per day, 7 days per week light operations.

1.2 PROJECT LIMITS

The Project is located within the confines of the EJMT facility on Interstate 70 from MP 215.3 (EJMT West Portal Entrance) to MP 213.7 (EJMT East Portal Entrance), not limited to but including the I-70 operations center; East and West Portal buildings; East and West Electrical rooms; East, Center and West crosscut electrical rooms; ventilation plenums; and inside the entire lengths of the North and South bores.

1.3 PROJECT GOALS

The overall goal of the Project is to modernize the lighting system in the tunnels while preserving the aesthetic of the facility as a protected piece of historic infrastructure. The following CDOT Project Goals reflect the values that this Project holds and expects. An exceptional proposal will demonstrate how the Proposer will pursue each of the Project Goals.



A. Improve Safety, Mobility, Operations, and Maintenance

Improve the safety, mobility, operations, and maintenance of the tunnel lighting. This will include improvements to reliability and resiliency of the lighting system while ensuring the lighting and associated lighting controls system can reliably operate during normal and irregular operation scenarios, while minimizing the impacts to the traveling public and CDOT M&O during and after construction. The improved system will allow M&O to respond to any issues or system alarms in a timely manner to ensure any luminaires are repaired and addressed as soon as possible as to prevent any unsafe travel conditions at any point in the tunnel.

B. Improve Environmental Impact

Improve energy efficiency at the EJMT facility by pursuing the most energy efficient and environmentally conscious design option to reduce overall energy consumption of the facility. Reduce annual costs and resolve current issues with the EJMT lighting system and upgrade it to Light Emitting Diodes (LEDs) to improve reliability for CDOT M&O.

C. Historical Preservation

Avoid and minimize adverse impacts to existing tunnel infrastructure to extent feasible. Explore feasibility of alternatives that preserve the aesthetic and visual integrity of the tunnel as a historically significant structure in Colorado, including luminaries that match or closely correspond with the current look and style.

D. Optimize Scope, Schedule, and Budget

Balance schedule and budget to maximize the scope and potential benefits of the Project. Utilize innovation and manage risk to recover budget to invest in the project.

1.4 PROJECT COST AND FUNDING

The planning level total project cost estimate is \$45,000,000.

The funding for design and construction of this project will utilize Bridge and Tunnel Enterprise (BTE) funds. Tunnel Asset Construction Tunnel Program (CTP) will supply supplemental funding if needed for the design and/or construction phases.

1.5 PROJECT APPROACH & INFORMATION

Project Approach

The delivery method for this project will be Design-Bid-Build based on the nature of the electrical work. The Project Team will function under an “Owner-Client” relationship with each party united in the pursuit of achieving the Project’s goals and will integrate consultant staff with CDOT Engineering, ITS, and Maintenance personnel to ensure the full needs of the scope are met.

Project Information



The successful Proposer will evaluate the existing lighting system at the EJMT facility and provide design for an upgraded lighting system that will replace the lighting through both bores, including transition zones and external high masts at the East and West portal faces, to energy efficient LEDs.

Project Scope Elements

- Provide results of a comprehensive evaluation of the existing lighting system.
- High quality, corrosion resistant lighting system that will withstand extreme temperatures and have certified fixtures.
- Replace electrical runs in all electrical rooms, including any electrical conduit that needs to be replaced to meet all current electrical code requirements.
- Ensure replacement LED luminaires and lighting control system is compatible with current EJMT facility SCADA network.
- Light level and visibility improvements to satisfy Tunnel Lighting Standards.
- ASCE National Historic Civil Engineering Landmark Nomination Application.

1.6 PROJECT ROLES

Primary Stakeholders

- EJMT Maintenance & Operations -Section 9
 - Paul Fox, R1 Tunnel Program Manager, paul.fox@state.co.us
 - Will be responsible for project oversight as it relates to daily operations at EJMT. The coordination for concerns as they relate to the daily operations during construction.
- Bridge and Tunnel Enterprise (BTE)
 - Patrick Holinda, BTE Manager, patrick.holinda@state.co.us,
 - Tyler Weldon, BTE Deputy Program Manager, tyler.weldon@state.co.us
 - Will require correspondence as it relates to funding sources and projected estimates throughout design.
- State Historic Preservation Office (SHPO)
 - Main point of contact: Barbara Stocklin-Steely, R1 Sr Historian, barbara.stocklin@state.co.us
 - Will require correspondence as it relates to potential design options that may have adverse effects on the historic and aesthetic nature of the facility

1.7 WORK DURATION

The time period for the work described in this scope for design is estimated to begin September 1, 2024 and end on approximately September 1, 2025. It is CDOT's goal to begin construction in 2026 (CY), with a need for Design Services During Construction from the Consultant throughout the construction duration. Design support will be necessary to address possible issues that may arise in the field that would trigger any redesign or general design questions.



1.8 CONSULTANT RESPONSIBILITIES AND DUTIES

All work shall be in accordance with CDOT's latest manuals, policy directives, and generally accepted practices. The Consultant shall supply Engineer signed and sealed electronic plans and reports.

The Consultant will develop an all-encompassing scope of the Project and prepare a written recommendation of activities that coincide with the Project costs, goals, and planned improvements.

The Consultant is responsible for developing complete Plans, Specifications, and Cost Estimate (PS&E) packages of the planned improvements. Additionally, the Consultant is required to develop concepts and associated quantities to create cost estimates to assist with CDOT decision making. The work will include but is not limited to, the design of the lighting, the lighting controls system, and any ITS elements.

The Consultant shall work closely with the CDOT Project Manager and will be required to collaborate with stakeholders.

The Consultant shall be prepared for the following duties:

- Provide a full time Project Manager and Project Team capable of providing project deliverables on time,
- Program Management,
- Project Coordination,
- Meet all project milestones,
- Create and maintain CPM schedules,
- Develop concepts, quantities, and cost estimates,
- Attend site meetings and site visits,
- Provide 30% FIR, 60% DOR, 90% FOR, and final project design, specifications, and quantities,
- Provide phasing and detour concepts that will meet project goals,
- Track project action items and deliverables,
- Create and maintain a project risk matrix,
- Create and maintain a project communication log,
- Perform and document quality management activities,
- Perform and document contract management including earned value analysis,
- Develop and maintain a project change log,
- Develop and maintain a project decision log,
- All other efforts and deliverables as indicated in this contract.

1.9 PERSONNEL QUALIFICATIONS

The Consultant PM must be approved by the CDOT Contract Administrator.

Certain tasks must be done by a Licensed Professional Engineer (PE) who is registered with the Colorado State Board of Registration for Professional Engineers.



All tasks assigned to the Consultant must be conducted by a qualified person on the Consultant team. The qualified person is a professional with the necessary education, certifications (including registrations and licenses), skills, experience, qualities, or attributes to complete a particular task.

The contract requires that the prime firm or any member of its team, be pre-qualified in the following disciplines for the entire length of the contract:

- Electrical Engineering (EE)
- Mechanical Engineering (ME)
- Civil Engineering (CE)
- Environmental Engineering (EN)
- Management (MA-Contract Admin)
- Value Engineering (VE)

1.10 COMPUTER SOFTWARE INFORMATION

The consultant shall utilize the most recent CDOT adopted software (if applicable). The primary software used by CDOT is as follows:

- Drafting- OpenRoads Designer and MicroStation SS4- Bentley Systems with CDOT's formatting configurations and standards
- Estimating- Transport (an AASHTO sponsored software) as used by CDOT
- Document Control- Project Wise (ProjectWise Explorer or ProjectWise Cloud)
- Specifications - Microsoft Word
- Scheduling - Microsoft Project
- Integration Software - Allen Bradley Software & Instrumentation and FactoryTalk
- Project Management – PMWeb

The data format for submitting design computer files shall be compatible with the latest version of the adopted CDOT software as of Notice to Proceed for the contract. The Consultant shall immediately notify the CDOT/PM if the firm is unable to produce the desired format for any reason and cease work until the problem is resolved.

1.11 PROJECT COORDINATION

The Consultant will be required to provide primary coordination with the CDOT/PM and specialty units as approved. Including but not limited to:

- Regular coordination with CDOT Specialty Units
- Regular coordination with CDOT ITS
- Regular coordination with CDOT R1 Environmental (Historic)
 - To ensure the involvement of the State Historic Preservation Office (SHPO) throughout the design process.



1.12 SUPPLEMENTAL WORK

The work on other investigations, coordination and design tasks as related to the project and as directed by the PM shall be limited to the available budget. The Consultant shall not perform work out of the scope of the project without prior written approval from the PM. Per the contract, any subconsultants and vendors may not go over task order or contract budget.

1.13 WORK PRODUCT

The work products include reports, studies, field investigations, and professionally engineered design of the following. The State shall retain all work products and backup materials, both in progress or completed. Consultant work products may include:

- Project Management and Correspondence
- Field Inspection Review (FIR) 30% Plans and Estimates
- Design Office Review (DOR) 60% Plans and Estimates
- Final Office Review (FOR) 90% Plans and Estimates
- Advertisement Plans, Specifications, Cost Estimate
- Construction Plan Package
- Professional Engineer Stamped Record Sets
- Design Services During Construction
- Submittals
- Invoice Information

Requirements are further described in the sections that follow. All work required to complete this Scope of Work requires the use of English Units.

1.14 ADDITIONAL PROJECT INFORMATION

Additional information regarding the current conditions of the electrical rooms and EJMT and the lighting system and distribution can be found in the most recent Lighting Study performed in 2022. The report can be accessed in Appendix A.

Additional information regarding current guidelines related to the aesthetics of the I-70 Mountain Corridor can be found in the Crest of the Rockies Design Segment-Aesthetic Guidance Index. The document is referenced in Appendix A.



SECTION 2 - PROJECT MANAGEMENT AND COORDINATION

2.1 CDOT CONTACT

The Consultant shall utilize the following project administration contacts for the Project:

- A. The Contract Administrator for this project is:
Jeff Hampton, PE
Resident Engineer
425 Corporate Circle
Golden, CO 80401
Phone: 720-497-6957
jeffery.hampton@state.co.us
- B. Active day-to-day administration of the contract will be delegated to the CDOT/PM:
Shannon Mero
Project Manager
425 Corporate Circle
Golden, CO 80401
Phone: (720) 537-1177
shannon.mero@state.co.us

2.2 PROJECT MANAGEMENT

The Consultant shall supply Project Management services to meet the following requirements:

2.2.1 The Consultant shall provide the following for the overall interdisciplinary needs of the Project:

- A. Project Manager
- B. Engineering Task Lead
- C. Environmental/Historic Task Lead
- D. Electrical Engineering Task Lead

2.2.2 Attend CDOT/ PM check-in meetings with all Consultant PM and Task Leads present as needed.

The project will be managed with the following deliverables:

- Scoping
- FIR
- DSR
- FOR
- Advertisement
- Revisions under Ad
- Design Services During Construction



2.2.3 Provide monthly progress reports and invoicing, track progress of deliverables against the developed schedule, and ensure internal project controls are being followed. Utilize earned value management. If the project falls behind schedule, provide a plan to get back on track.

2.2.4 Assist with maintaining the CDOT Project webpage and appropriate updates.

2.2.5 Provide Project Management efforts in following areas at a minimum:

2.2.5.1 Risk Management - Develop and execute a plan for risk management which will include:

- a. A plan for how to identify, track, analyze, and respond to project risks.
- b. Track risks and provide recommendations to either avoid, transfer, mitigate or accept individual risks to the project scope, schedule, and budget.
- c. Consider various EJMT facility related risks, including asbestos mitigation and emergency responses to power outages.

2.2.5.2 Roles and Responsibilities

- a. Maintain the contact list for the project and all stakeholders.
- b. Document the decision-making hierarchy.

2.2.5.3 Scope Management - Develop and execute a plan for scope management including collecting requirements, defining, and validating project scope, and a plan for assessing scope changes.

2.2.5.4 Contract Management - Develop and execute a plan for contract management including working with the CDOT/PM to develop the task order.

- a. The plan shall include planning, managing, and controlling the costs for the prime Consultant and subconsultants to stay on track.

2.2.5.5 Cost Management - Develop the quantities required for the construction cost estimate at major cost milestones.

2.2.5.6 Schedule Management - Develop and execute a schedule management plan including:

- a. The plan to develop, maintain and communicate the project schedule for the time and resources on the project.
- b. The schedule shall be a detailed schedule using one of the programs allowed in Section 1.10 in this SOW tracking all major milestones, and deliverables for the design process. The schedule shall be used as a baseline to track progress. If the schedule is at risk of slipping, notify the CDOT PM and recommend options for schedule recovery.

2.2.5.7 Change Management - Develop and execute a change management plan that will include:

- a. Define how project deliverables and documentation will be controlled, changed, and approved. Note how changes could affect project, scope, schedule, and budget.
- b. Identify who will approve changes and how they will be documented.



2.2.5.8 Communication Management - Develop and execute a communication management plan that will include:

- a. The required processes to ensure timely and appropriate planning, collection, creation, distribution, management, control, and monitoring of project information.
- b. Ensure that project information is distributed in a timely manner to the required team members in an acceptable format.
- c. Meeting Planning - Determine the frequency of meetings and the most effective team members to include a clear goal for each meeting and documented in an agenda.
- d. Maintain a communications log to track crucial project decisions.
- e. Provide communication with internal CDOT Specialty units as directed by CDOT/PM
- f. Contact and coordinate project needs with CDOT personnel and additional entities noted in Section 1.6 of this SOW.
- g. Document and report to CDOT/PM when items have been submitted for review and log and track responses.

2.2.5.9 Quality Management - Develop and execute a Quality Management Plan (QMP) for all project deliverables. The plan shall include quality assurance and quality control:

- a. Ensure accuracy and elimination of errors on deliverables and submittals.
- b. Provide interdisciplinary oversight ensuring that the documents capture correct details.
- c. Provide contract documents that take into consideration constructability and maintainability.
- d. Provide quality assurance practices to reduce defects in work products. If the Consultant completing the work is not the Prime consultant, the Prime Consultant shall complete an additional quality assurance practice to ensure the goal of the work product has been met.

2.2.5.10 Action Items and Deliverables Tracking - Track action items and include the following information in regular progress reports to CDOT/PM:

- a. Date assigned.
- b. Date completed.
- c. Responsible party.

2.2.6 Routine Billing and Reporting

2.2.6.1 Coordinate all activities with the CDOT/PM.

2.2.6.2 Requirements are further described in the sections that follow.

- a. Reports and submittals: In general, all reports and submittals must be approved by the CDOT/PM prior to their content being utilized in follow-up work effort.

2.2.6.3 Provide Vendor backup as part of the contract.



2.3 PRELIMINARY ENGINEERING

The Consultant shall follow the latest version of the CDOT Project Development Manual for project delivery procedures and requirements. All CDOT required design guidelines and Procedural Directives shall be followed. The Consultant shall act as the Engineer in Responsible Charge (EIRC) for design as required to complete this SOW. Consultant shall supply a vendor for applicable traffic control services. Submit a Method of Handling Traffic (MHT) to CDOT/PM For review. Coordinate fieldwork and site visits with CDOT EJMT M&O and any active construction projects to avoid conflicts.

The Consultant shall host the following meetings as a part of the plan development process:

2.3.1 Project Scoping - Host a formal project scoping meeting to address the following items:

2.3.1.1 This project requires early identification of all required variables at the initial scoping meeting. The Consultant shall be familiar with the scope of improvements.

2.3.1.2 Establish and lay out the plan to deliver the project to construction.

2.3.1.3 Prepare preliminary quantities.

2.3.1.4 Prepare preliminary design plans.

2.3.1.5 Identify Environmental/Historic considerations.

- a. Prepare information and diagrams necessary for the Colorado State Register Act compliance.
- b. Correspond with Region 1 Environmental.

2.3.1.6 Establish the following:

- a. Design criteria,
- b. Luminaire selection,
- c. Luminaire mounting options,
- d. Electrical requirements,
- e. Necessary electrical distribution modifications,
- f. Necessary ITS components,
- g. Traffic Control Requirements (Accommodating/coordinating alternating full-bore closures).

2.3.1.7 Verify lighting requirements are satisfied in specific zones such that all NFPA requirements are satisfied.

2.3.1.8 Organize and coordinate an M&O Plan and establish training requirements.

2.3.2 Field Inspection Review (FIR) - Host a formal FIR meeting to address the following items:

2.3.2.1 Report plan level at 30% design completed

2.3.2.3 Provide a preliminary Cost Estimate



2.3.2.3 Finalize comprehensive submittal with any information or diagrams necessary for the Colorado State Register Act compliance.

- a. Correspond with Region 1 Environmental for comments on the submittal and diagrams prior to submission for Colorado State Register Act compliance that CDOT will submit to the SHPO for review.

2.3.3 Design Office Review (DOR) - Host a formal DOR meeting to address the following items:

2.3.3.1 Address all comments from the FIR plan set.

2.3.3.2 Report plan level at 60% design completed.

2.3.3.3 Identify required Project Specifications.

2.3.3.4 Provide a preliminary cost estimate.

2.3.3.5 Provide a Summary of Approximate Quantities (Fixtures, luminaires, electronic components, etc.).

2.3.3.6 Establish an Emergency Response Plan for EJMT M&O.

2.3.4 Final Office Review (FOR) - Host a formal FOR meeting to address the following items:

2.3.4.1 Address all comments from the DOR plan set.

2.3.4.2 Report plan level at 90% design completed.

2.3.4.3 Provide a 90% design cost estimate.

2.3.4.4 Provide an updated Summary of Approximate Quantities.

2.3.4.5 Submit all required reports.

2.3.5 Final Plans, Specifications, Estimate packet prior to final AD set (99% Design Development Plans)

2.3.6 Final AD Set: 100% Construction Ready Documents

2.3.7 Revisions under Advertisement Plans and Specifications: Provide any revised plans or specifications under Advertisement as needed.

2.3.8 Final Stamped and Sealed Plan and Specifications: Provide final Engineer signed and sealed Plans and Specifications. To be facilitated by CDOT through Adobe Sign. Submit a final version of the plans after the project is awarded.

2.4 ITS COMPONENTS

2.4.1 Systems Engineering Analysis (SEA) Process



The Consultant shall follow the federally required System Engineering Analysis (SEA) Process for all the technology implemented on the project. Complete all required SEA documents throughout the design process.

2.4.2 The Consultant shall design ITS components such that they are fully and securely connected into the CDOT ITS Network and comply with all OIT CISP requirements wherever is applicable. Ensure the lighting controls are compatible with the EJMT greater, independent SCADA network.

2.4.3 Consultant shall provide design plans and specifications for all ITS components of the project.

2.5 PROJECT COORDINATION

In addition to stakeholders described in Section 1.6, the Consultant shall collaborate and coordinate with the groups below. Include the CDOT Project Management Team in coordination.

- CDOT Project Management Team:
 - CDOT Program Engineer-Jana Brink, PE
 - CDOT Design Resident Engineer- Jeff Hampton, PE
 - CDOT Design Project Manager-Shannon Mero
- CDOT Specialty Groups
 - Region 1 Environmental
 - CDOT Staff Bridge
 - Region 1 Historic
 - Region 1 Utilities
 - CDOT ITS
- CDOT Engineering Estimates and Market Analysis Group (EEMA)
- Bridge & Tunnel Enterprise
 - BTE Manager - Patrick Holinda (patrick.holinda@state.co.us)
 - Deputy BTE Program Manager - Tyler Weldon (tyler.weldon@state.co.us)
- Design Subconsultants
- CDOT Maintenance
 - R1 Tunnel Program Manager - Paul Fox (paul.fox@state.co.us)
 - EJMT Master Electrician - Richard Roybal (richard.roybal@state.co.us)
- The State Historic Preservation Office (SHPO)
 - R1 Environmental Sr Historian - Barbara Stocklin-Steely (barbara.stocklin@state.co.us)
- CDOT HQ and Region1 Civil Rights Office
 - R1 Civil Rights Manager - Patty Bowling (patricia.bowling@state.co.us)

2.6 FHWA VALUE ENGINEERING EFFORT

A team of transportation design and construction experts will perform a Value Engineering (VE) study as needed. If necessary, the VE study will be conducted early enough in the project development process to allow evaluation and incorporation of VE recommendations in the NEPA document or design process, as appropriate. The VE study shall be performed in accordance with Federal Highway Administration's (FHWA) current guidelines and recognized techniques and will identify possible alternatives that may save the project cost, time, or other resources. An individual with prior experience and certification in



facilitating VE studies (the VE facilitator) shall conduct each VE session. VE facilitators shall be qualified VE practitioners, experienced in performing and leading VE studies (have participated in several VE studies as a team member and several as a team leader), and have sufficient VE training, education, and experience to be recognized by the Society of American Value Engineers (SAVE) International as meeting the requirements for certification.



SECTION 3 - ENVIRONMENTAL PROCESS REQUIREMENTS

3.1 PROJECT INITIATION

3.1.1 Environmental Scoping

The Consultant shall hold an early environmental scoping meeting as directed by the CDOT/PM. Attendees will include the Region 1 Environmental Project Manager and the Region 1 CDOT Historian. This task will include a meeting with CDOT to discuss the initial work efforts of the project.

3.2 HISTORIC PROPERTY EARLY COORDINATION

Due to the Historic nature of the Eisenhower-Johnson Memorial Tunnels, special considerations will be needed to minimize, avoid, and mitigate adverse effects to the protected aesthetics and historic features of the facility in order to comply with the CDOT Environmental Stewardship Guide and the Colorado State Historic Register Act.

3.2.1 Develop and consider lighting options that closely correspond with the placement, appearance and style of existing tubular lighting, and which minimize impacts to historic features of the Tunnel.

3.2.2 Coordinate with CDOT Region 1 Historian regarding the historic character defining features of the Tunnel, and the development and consideration of alternatives that are consistent and sensitive to these features.

3.2.3 Understand and implement the I-70 Mountain Corridor Crest of the Rockies Design Guide

3.3 HISTORIC CLEARANCE REQUIREMENTS

3.3.1 Analyze and determine the potential adverse effects of design elements on the historic Tunnel to meet Colorado State Historic Property Register Act requirements in coordination with the CDOT R1 Historian:

3.3.1.1 Consider and develop design options that avoid or minimize adverse effects to the Historic Tunnel to the extent feasible.

3.3.1.2 Develop graphics, documentation and other materials needed for the Region 1 Historian to coordinate and complete the Colorado State Historic Register Act compliance process with the State Historic Preservation Office (SHPO).

3.3.2 While federal historic compliance will not be required for this project, CDOT anticipates a potential adverse effect on the Tunnel under the Colorado State Historic Register Act. In addition to design efforts to minimize and avoid adverse effects, additional mitigation to offset adverse effects should be planned. While the final mitigation plan will be developed by CDOT in coordination with the SHPO, minimizing and avoiding adverse effects to the extent feasible, the project should anticipate completion of a historic mitigation documentation effort. This is approval from the SHPO on the mitigation plan acts as part of the CDOT Environmental Clearance process, also referred to as a Form 128. Anticipated mitigation documentation is anticipated to include:



3.3.2.1 Completion of a Historic Civil Engineering Landmark application in coordination with CDOT Historians and American Society of Civil Engineers (ASCE). This would require a Consultant Historian to compile documentation and prepare the designation application as mitigation, including edits/supplementation information required by CDOT and/or ASCE. The application, to be drafted by the Consultant with guidance from the CDOT PM and the R1 Historian, will be then submitted to the SHPO by CDOT as a part of the Final Letter and Coordination Package. CDOT will provide Consultant with research and documentation previously compiled and prepared by CDOT, with no primary research by Consultant Historian anticipated. Link to the ASCE Historic Civil Engineering Landmark Nomination form can be referenced in Appendix A.

3.3.5 Visual Resources

3.3.5.1 Identify and inventory the highway corridor landscape units/types/themes and project view shed. Analyze existing visual resources, view response/exposure, and any impacts expected from the project. Reference Project Specific Areas of Special Attention and Aesthetic Guidelines as depicted in the Crest of the Rockies Aesthetic Guidance Index.

3.4 PUBLIC ENGAGEMENT AND AGENCY INVOLVEMENT

3.4.1 Develop an Agency Coordination Plan

3.4.2 Prepare a Stakeholder Involvement Plan

3.4.2.1 The plan shall support the Project Work Plan and the level of effort included in the plan shall reflect the complexity and expected controversy of the project.

3.4.2.2 Develop a stakeholder database.

3.4.2.3 Identify methods for public notification and dissemination of information, such as newsletters, flyers, postcards, website updates, press releases, miscellaneous informational materials, etc.

3.5 NEPA DOCUMENTATION PROCESS

Consultant support will not be required for NEPA documentation, or resource clearances, with the exception of historic resources.



SECTION 4 - EXISTING FEATURES

4.1 NORTH BORE

4.1.1 Structure Details

The Eisenhower Tunnel, commonly referred to as the North Bore or the North Tunnel, was completed and opened to the traveling public in 1973. It contains two lanes of westbound traffic. The CDOT Structure Number for the North Bore is F-13-Y.

4.1.2 Bore Length

The North Bore is approximately 8900 feet long and lies between MP 213.7 and MP 215.3.

4.1.3 Utilities

- a. Fiber Optic-CDOT & Zayo
- b. Natural Gas- Xcel Energy

4.1.4 Existing Luminaires and Hanger/Mounting System

The current luminaires in the North Bore consist of a series of continuous fluorescent luminaires through the entire length of the tunnel. There are also supplemental Metal Halide luminaires placed at the portal faces to act as transition zones for vehicles entering the tunnel from the outside ambient lighting and returning to the ambient lighting when exiting the tunnel. These lights were installed in a lighting project that completed construction in 2003, making the existing fluorescent luminaires approximately 21 years old.

Depending on the location at any given point along the length of the tunnel, the luminaires are either mounted with stainless steel bolts and anchors to the wall plates or they are mounted on angled plates with stainless steel bolts that are attached to the existing wall panels. These different fixtures and different mounting systems are to accommodate the different lighting zones throughout the North Bore.

4.1.5 Voltage/Electrical Distribution

The North Tunnel operates off of a main dual utility feed at 24.9kV. Through a series of transformers, this is stepped down to 480V and 2400V feeds that is distributed to the East and West Electrical Rooms (located in the portal buildings) and the cross-cut electrical rooms situated along the length of the tunnel. This main feed supplies power to the lighting in the North Bore as well various tunnel systems, including ventilation systems, cameras, traffic signals, and others. The East and West Electrical Rooms are identical in layout and distribution.

4.1.5.1 Cross-Cut Electrical Rooms - There is a North East Cross-cut, North Center Cross-cut, and North West Cross-cut. These cross-cuts act as intermediate electrical rooms that connect the North and South Bores. They provide lighting to the North Tunnel lighting as well as various other systems that have electrical lines that run through the cross-cuts, including the variable message signs (VMS), lane usage signs (LUS), and heat



trace terminals. The existing cross-cut panelboards shall be assessed by the Consultant for their condition and determine whether or not they can require any modifications for the replacement lighting electrical runs.

4.1.6 Available Space in Electrical Rooms and Cross-Cuts

The East and West Electrical rooms and all cross-cuts have a limited footprint, which poses restrictions on any additional installations. The Consultant shall need to evaluate the existing space for usage and ensure any design is within the confines of the available cabinets and walls, as to not interfere with M&O's daily operations.

4.1.7 Potential Risks

Asbestos mitigation will need to be considered when implementing any of the fixtures or work in the East Electrical Room.

The East and West Electrical Rooms, that house electrical equipment for the North Bore systems, have high voltages present (600V and higher). Precautions need to be taken when working on or near live electrical equipment during on-site investigations. All NFPA 70E recommendations regarding arc flash safety when performing circuit evaluations must be adhered to by the Consultant.

4.1.8 Backup Generator Details

The East and West Portal facilities house two 500kW natural gas generators that are utilized in power outage scenarios at EJMT. In the event of a power outage, the generators will provide backup power to the lighting system in the North and South Bores. CDOT requires the standby generator to be capable of powering every 9th fixture in the North tunnel as a source of emergency lighting.

4.2 SOUTH BORE

4.2.1 Structure Details

The Johnson Tunnel, commonly referred to as the South Bore or the South Tunnel, was completed and opened to the traveling public in 1979. It contains two lanes of eastbound traffic. The CDOT Structure Number for the South Bore is F-13-X.

4.2.2 Bore Length

The South Bore is approximately 8900 feet long and lies between MP 213.7 and MP 215.3.

4.2.3 Utilities

- a. Fiber Optic-CDOT & Zayo
- b. Natural Gas- Xcel Energy

4.2.4 Existing Luminaires and Hanger/Mounting System



The current luminaires in the South Bore consist of a series of continuous fluorescent luminaires through the entire length of the tunnel. There are also supplemental Metal Halide luminaires placed at the portal faces to act as transition zones for vehicles entering the tunnel from the outside ambient lighting and returning to the ambient lighting when exiting the tunnel. These fluorescent luminaires were installed in a lighting project that completed construction in 2006.

Depending on the location at any given point along the length of the tunnel, the luminaires are either mounted with stainless steel bolts and anchors to the wall plates or they are mounted on angled plates with stainless steel bolts that are attached to the existing wall panels. These different fixtures and different mounting systems are to accommodate the different lighting zones throughout the South Bore.

4.2.5 Voltage/Electrical Distribution

The South Tunnel operates off of a main dual utility feed at 24.9kV. Through a series of transformers, this is stepped down to 480V and 2400V feeds that is distributed to the East and West Electrical Rooms (located in the portal buildings) and the cross-cut electrical rooms situated along the length of the tunnel. This main feed supplies power to the lighting in the South Bore as well various tunnel systems, including cameras, traffic signals, ventilation systems, and other controls/instrumentation necessary for daily operations at EJMT. The East and West Electrical Rooms are identical in layout and distribution.

4.2.5.1 Cross-Cut Electrical Rooms - There is a South East Cross-cut, a South Center Cross-cut, and a South West Cross-Cut at EJMT. These cross-cuts act as intermediate electrical rooms that connect the North and South Bores. The cross-cut rooms house the panelboards that connect the 480V wiring to accommodate voltage drop across the length of the tunnel. They provide lighting to the South Tunnel lighting as well as various other systems that have electrical lines that run through the cross-cuts, including the variable message signs (VMS), lane usage signs (LUS), and heat trace terminals. The existing cross-cut panelboards shall be assessed by the Consultant for their condition and determine whether or not they can require any modifications for the replacement lighting electrical runs.

The existing panelboards shall be assessed by the Consultant for their condition and determine whether or not they can be reused.

4.2.6 Available Space in Electrical Rooms and Cross-Cuts

The East and West Electrical rooms and all cross-cuts have a limited footprint, which poses restrictions on any additional installations. The Consultant shall need to evaluate the existing space for usage and ensure any design is within the confines of the available cabinets and walls, as to not interfere with M&O's daily operations.

4.2.7 Potential Risks

Asbestos mitigation will need to be considered when implementing any of the fixtures or work in the East Electrical Room.



High voltage (600V or greater) is present at the East and West Electrical Rooms where the electrical equipment for the South Bore systems are housed. Precautions need to be taken when working on or near live electrical equipment during on-site investigations. All NFPA 70E recommendations regarding arc flash safety when performing circuit evaluations must be adhered to by the Consultant.

4.2.8 Backup Generator Details

The East and West Portal facilities house two 500kW natural gas generators that are utilized in power outage scenarios at EJMT. CDOT requires the standby generator to be capable of powering every 9th fixture in the South tunnel as a source of emergency lighting.



SECTION 5 - GENERAL INFORMATION

5.1 NOTICE TO PROCEED

Work shall not commence until CDOT issues the written Notice-to-Proceed. Work may be required, night or day, and/or weekends, and/or holidays, and/or split shifts. CDOT must concur in time lost reports prior to the time lost delays being subtracted from time charges. Subject to CDOT prior approval, the time charged may exclude time lost for:

- Review and approvals
- Response and direction

5.2 PROJECT COORDINATION

Refer to Section 2- Project Management and Coordination

5.3 ROUTINE REPORTING AND BILLING

The Consultant shall provide the following on a routine basis:

5.3.1 Coordination

All contract activities to be coordinated by the Consultant PM

5.3.2 Periodic Reports and Billings

5.3.2.1 All current CDOT Engineering Contracts policies, procedures and guidance shall be followed

5.3.2.2 Consultant Invoicing Guidelines: Please provide the following seven sections and information in each invoice in the following order:

- a. Form 1313
- b. Invoice
 - a. Provide invoice in a similar format to the original Project Cost Worksheet (PCW)
 - i. Note each employee, time worked, multiplier, and fee.
 - ii. Sum of total hours worked and labor, subtotal fixed fees, subtotal sub-consultants, subtotal vendor under prime (sub-consultants should not their own vendors on their invoices), provide invoice total, total billed to date and total amount left on TO for Prime, Sub and Vendor for ease of tracking.
 - b. Provide columns next to employees ensuring Consultant has reviewed for:
 - i. Employee on original TO
 - ii. Employee on MPA and date
 - iii. Employee added to Task Order by letter and date.



- iv. Employee added to MPA Date and documentation
- c. Provide a header for the invoice noting:
 - i. SAP OL#, SAP PO#, Invoice Date, Invoice #, Project # and subaccount #, current billing period, TO# and any other pertinent information.
- c. Submit Progress Reports per the contract documents. The progress report shall also summarize all the work performed by the Prime, Sub Consultants and Vendors. Provide header as noted in 2c. Each item below requires a section in the Progress Report.
 - a. Monthly schedule update and report on progress of each work activity or milestone identified in the contract, to show the amount of work accomplished during the current month and the amount of work accomplished overall.
 - b. Earned value reporting on the time scheduled for each work activity or milestone identified in the contract to show planned time completion and actual times used to do the work.
 - c. A description of the cause for delays beyond the planned completion of time of work activities or milestones within the project.
 - d. A report on the cost incurred to date on each work activity or milestone contained in the contract and a comparison to the cost estimates for such activity or milestone. Monthly billings will include a monthly budget forecast sheet that shows invoicing from start estimated through completion tracking the project budget. In other words, verify the burn rate of prime, subs, and vendors to ensure they are on track and on task.
 - e. A description of possible remedies to get activities or milestones that are behind schedule, back on schedule, and to get activities or milestones that are exceeding cost estimates, back within planned costs.
 - f. Documentation of meetings that were held during the subject time period.
 - g. A report on the participation of any applicable DBE Sub-consultants.
- d. Letter(s) adding employee(s) to task order with all required information (should have been approved by CDOT/PM prior to any work done by employee per HQ Contract/Agreement Unit-see Add Employee Process document).
- e. Labor backup – Timesheets
 - a. The Prime, Sub-consultants and Vendors shall submit detailed hourly backup of effort noting time and date of activities and number of hours or costs. Submit lodging backup through ODC backup.
- f. ODC backup – only submit documentation pertaining to the project and the invoice
 - a. Provide a summary of ODC cover sheet Purpose of trip, Date of Trip, Who attended.
 - b. Mileage logs, per diem and/or meals documents (listing of days and rates or receipts for actuals), lodging receipts, receipt or documentation of other ODC items including vendor receipts/invoices.
- g. Sub-consultant billings and Vendors - should have the same documentation as prime, except Form 1313, which is optional.



5.3.3 General Reports and Submittals: In general, all reports and submittals must be approved by CDOT prior to their content being utilized in follow-up work effort.

5.4 PROJECT DESIGN DATA AND STANDARDS

All applicable national codes and standards shall be followed. Design shall adhere to CDOT's most current M&S Standards. The Consultant is responsible for obtaining and ensuring compliance with these most recent versions of the codes and standards related to electrical standards (IESNA) and National Fire Protection (NFPA).



SECTION 6 - WORK ACTIVITY ASSIGNMENTS

Note: This list establishes the individual task responsibility. Those tasks identified as CDOT/Other should utilize an abbreviation system to indicate whether the task will be completed by CDOT or another agency (i.e. “C” for CDOT and abbreviations as provided below). The consultant shall maintain the ability to perform all work tasks that are indicated below by an ‘X’ in the consultant column, in accordance with the forms and conditions contained herein, and the applicable CDOT standards. Where appropriate, mark “N/A” for not applicable items.

	CDOT (C)/ Other *	Consultant	N/A
A. PROJECT INITIATION AND CONTINUING REQUIREMENTS			
1. Environmental Mitigation and Requirements Ensure that any mitigation commitments within the NEPA documentation are incorporated into the project.	C	X	
2. Independent Design Review An independent design review shall be performed on any design accomplished by others that will be used in this project. A report identifying the results of these reviews shall be submitted to the CDOT/PM within one week of the review.		X	
3. Identify Design Criteria Submit a copy of Appendix B -Specific Design Criteria with the appropriate items completed.		X	
4. Initiate Survey Arrange Preliminary Field Survey and/or Aerial Survey. CDOT Form 1217a is an outline of a complete survey request and may be used as a guide for completing the survey plan.		X	



<p>5. Traffic Control</p> <p>Consultant field activities that interfere with traffic operations within existing roadways will require control of traffic. The Consultant shall plan and provide any required traffic control for the survey, testing, or the design process. Traffic control operations will be in accordance with the MUTCD. The proposed Method for Handling Traffic (MHT) must be submitted to the CDOT/PM. Also, certification of the Traffic Control Supervisor as a Worksite Traffic Supervisor by the American Traffic Safety Services Association (ATSSA) or as a TCS (Traffic Control Supervisor) by the Colorado Contractors Association (CCA) shall be required.</p>		<p>X</p>	
<p>6. Structure Review Meeting</p> <p>While the major structural design work is progressing, the Consultant shall meet periodically with the CDOT Structure Reviewer to review the work. These meetings may be in addition to, or in conjunction with, the Project Progress Meetings. The complexity of the structure shall be considered by the CDOT Structure Reviewer to determine the frequency of review meetings. Other required meetings are described in subsequent sections.</p>		<p>X</p>	
<p>7. Initial Submittals</p> <p>Submit the following samples to the CDOT/PM for approval:</p>		<p>X</p>	
<p>a. An original plan sheet that complies with this scope of work</p>		<p>X</p>	
<p>b. Photogrammetric and/or survey data and a drawing or photograph in accordance with the requirements specified in this scope of work</p>		<p>X</p>	



Note: No original plan sheets or photogrammetric survey work will be accomplished until satisfactory samples have been received and approved by the CDOT/PM.

B. PROJECT DEVELOPMENT

1. Survey

Surveys will be conducted in accordance with the CDOT Survey Manual, the latest addendum thereof, and applicable state statutes. The completed survey shall be reviewed by the Region survey unit. Two weeks should be provided in the schedule to complete the review and sufficient time should be provided to address all comments provided by this review. Design shall not proceed until all comments resulting from this review have been satisfactorily addressed.

X

a. Pre-survey Conference

A pre-survey conference shall be held. The consultant shall attend the Presurvey conference prior to any right of way or survey work

X

b. Survey Data Research

Research shall be done as per current CDOT manuals

c. Project Control Survey:

X

i. Locate or Establish HARN Stations

Project control shall be tied to the nearest Colorado High Accuracy Reference Network Station (HARN). In the event there are no HARN

X



<p>stations within 3 miles of the project (Order B, 1:1,000,000 accuracy), or HARN Densification (Order B-2, 1:500,000 accuracy), additional HARN Densification stations shall be set. NGS Blue Book procedures shall be followed for all HARN Densification stations. This will include proper spacing using proper monumentation, equipment, observation procedures, coordination through the Colorado State Geodetic Advisor and submission to NGS for inclusion in the National Database.</p>			
<p>ii. Monumentation</p> <p>Materials will be supplied by CDOT. Care is to be taken to install said monumentation in locations that are readily usable for the project and in a safe location so that they can be utilized throughout construction (no monumentation shall be set on or near the centerline of the proposed roadway).</p>			<p>X</p>
<p>iii. Local Project Control</p> <p>Survey the required project control (centerline/baselines and elevation reference) as required. Prepare a control survey diagram showing graphical representation of all monuments used for control. Tabulate coordinates and physical descriptions of all found monuments and other physical evidence.</p>			<p>X</p>



<p>d. Land Survey/Boundary Survey</p> <p>Tie aliquot, property and other land monuments to the control survey. Prepare a Land Survey Control Diagram showing graphical representation of all found aliquot, property and land monuments and their relationship to the project control. Tabulate the coordinates and physical description of all found monuments and other physical evidence.</p>			<p>X</p>
<p>e. TMOSS (Topographic) Survey</p> <p>Collect the data required to produce a planimetric map and submit in TMOSS format. Features located will include, but not be limited to signs, mailboxes, fences, driveways, curb cuts, curbs, sidewalks, and edges of pavements. Horizontal accuracy shall be as specified for a CDOT class C or D TMOSS survey.</p>			<p>X</p>
<p>f. Terrain (Relief or Elevation) Survey</p> <p>Collect elevation data and submit in TMOSS format. Natural ground elevations shall be as specified.</p>			<p>X</p>
<p>g. Utility Survey (ONLY INCLUDE HOURS FOR TASKS NOT COMPLETED IN THE ENVIRONMENTAL SECTION ABOVE [SECTION 6]).</p> <p>Locate utility poles, manholes, valves, pedestals, guy wires, and other visible utility features. Survey underground utilities as marked by the utility companies. Determine invert elevations of manholes and vaults and survey the locations of utilities exposed by “potholing”.</p>		<p>X</p>	



<p>h. Hydraulic Survey</p> <p>Locate existing bridge limits, bridge high chords and low girders, culvert invert elevations and locations and sizes, storm sewers, inlets, vaults, manholes, PWQ structures, and determine invert and rim elevations and sizes and materials. Accomplish existing drainage site surveys for designated culverts and bridges in accordance with the Drainage Design Manual. Prepare a topographic survey of the waterway, overbanks, and floodplain areas upstream and downstream to limits determined by the Region Hydraulic Engineer or his/her designee. Incorporate statewide LiDAR data from State of Colorado resources whenever available at www.coloradohazardmapping.com or https://geodata.co.gov/.</p>			X
<p>i. Material Sources</p> <p>Survey designated material sources as specified.</p>			X
<p>j. Supplemental Surveying:</p> <p>As required and specifically requested.</p>		X	
<p>k. Survey Report:</p> <p>Prepare a Survey Report as required in the Survey Manual.</p>			X
<p>l. Photogrammetry</p>			X
<p>i. Camera Calibration Report</p>			X
<p>ii. Flight Plan</p>			X
<p>iii. Flight</p>			X



iv. Contact Prints			X
v. Negatives			X
vi. Enlargements			X
vii. Photo Index			X
viii. Supplemental Survey (wing points)			X
ix. Data Reduction a) Topographic Contours b) Planimetric (Topography)			X
x. Map Compilation a) Index Maps b) Finished Maps			X
13. Accuracy Tests: Tests are to be performed on a regular basis throughout the project by the consultant.			X
14. Review by Professional Land Surveyor The accuracy tests are to be reviewed by the PLS in responsible charge for the project, and submitted to the project engineer and made part of the project records. Further review of all aspects of the field and office work shall also be the responsibility of the PLS in responsible charge.			X
C. PRELIMINARY DESIGN			



<p>1. Traffic Engineering (ONLY INCLUDE HOURS FOR TASKS NOT COMPLETED IN THE ENVIRONMENTAL SECTION ABOVE)</p>			<p>X</p>
<p>a. Review locations with “potential for accident reduction map” and or traffic operations analysis and or the safety assessment report as provided by CDOT to determine which safety improvements will be incorporated into the project.</p>			<p>X</p>
<p>b. Analyze the proposed project design with the traffic projection data</p>		<p>X</p>	
<p>c. Recommend the appropriate geometry (i.e., number of lanes, auxiliary lanes, storage lengths, weaving distances, etc.) in accordance with the current version of Highway Capacity Manual.</p>			<p>X</p>
<p>d. The proposed design shall be reviewed to ensure compatibility with existing signing procedures throughout the preliminary roadway design process</p>		<p>X</p>	
<p>e. Use traffic data appropriate to the anticipated construction timing in developing detour alternatives.</p>		<p>X</p>	
<p>f. Develop the total ESAL for the design life and submit to the CDOT/PM for the pavement design.</p>			<p>X</p>
<p>g. Submit the traffic data and recommendations to the CDOT/PM for review.</p>			<p>X</p>
<p>2. Materials Engineering</p> <p>A preliminary soil investigation should be conducted.</p>			<p>X</p>



<p>a. Determine test hole locations (horizontal and vertical) and coordinate with the CDOT/PM.</p>			<p>X</p>
<p>b. Collect soil samples and test for:</p> <p>i. Classification</p> <p>ii. Moisture – Density Relationship</p> <p>iii. Resistance Value</p> <p>iv. Corrosiveness – Note locations of high corrosiveness with recommendations; see CDOT pipe material selection policy.</p> <p>v. Bearing Capacity</p>			<p>X</p>
<p>c. Prepare and submit a soils investigation report.</p>			<p>X</p>
<p>d. Prepare and submit pipe material selection report.</p>			<p>X</p>
<p>3. Pavement</p>			<p>X</p>
<p>a. Pavement Rehabilitation</p> <p>This section applies if the project includes existing pavement that is incorporated in the design for continued utilization.</p>			<p>X</p>
<p>i. Determine the equivalent Design Traffic (18k ESAL) that the existing pavement can carry</p>			<p>X</p>
<p>ii. Estimate the 18k ESAL’s experienced by the existing pavement.</p>			<p>X</p>
<p>iii. Obtain the projected 18k ESAL for rehabilitated pavement design period.</p>			<p>X</p>



<p>iv. Perform a distress survey</p> <p><i>a) Determine the types of distress present in the pavement</i></p> <p><i>b) Determine the extent of each distress type</i></p> <p><i>c) Develop a distress map for the existing pavement</i></p> <p><i>d) Determine the causes of the existing distress utilizing tests and required and analyses.</i></p> <p><i>e) Determine the drainage conditions of the existing surface and subsurface</i></p>			<p>X</p>
<p>v. Investigate the existing pavement structure</p> <p><i>a) Subgrade: soil classifications, moisture/density relationship, resistance value and corrosiveness</i></p> <p><i>b) Base: thickness, gradation, plasticity index, liquid limit, resistance value, strength coefficient</i></p> <p><i>c) Pavement: thickness, strength coefficient</i></p>			<p>X</p>



<p>vi. Perform deflection testing to obtain the following:</p> <p>a) <i>Deflection profile</i></p> <p>b) <i>Maximum deflection</i></p> <p>c) <i>Deflection basin</i></p> <p>d) <i>Differential deflections at transverse joints for portland cement concrete pavement (pccp)</i></p> <p>e) <i>In place determination of the appropriate modulus for each layer and subgrade</i></p>			<p>X</p>
<p>vii. Determine the remaining load carrying capacity from the above data.</p> <p>Design the feasible alternatives for the required rehabilitation (and widening if appropriate) utilizing the above investigations and test results. The design of the feasible alternatives shall be checked against the following:</p> <p>a) <i>The basic cause of distress which shall be corrected</i></p> <p>b) <i>Effect on the rate of future deterioration</i></p> <p>c) <i>Effect on surface characteristics</i></p> <p>Where appropriate, any new pavement widening shall be included in the analysis.</p>			<p>X</p>



<p>b. New Pavement Structure</p> <p>The feasible alternatives of new pavement structure shall be designed utilizing procedures accepted by the CDOT/PM. New pavement designs for widening shall be compatible with adjacent rehabilitated existing pavement.</p>			<p>X</p>
<p>c. Pavement Justification</p>			<p>X</p>
<p>i. Basic factors:</p> <p>a) <i>Desired life expectancy (obtain design life from CDOT).</i></p> <p>b) <i>Required maintenance activities intervals.</i></p> <p>c) <i>Basis for performance life.</i></p>			<p>X</p>
<p>ii. Analyze life cycle cost of the selected alternatives</p> <p>a) <i>Perform analysis with unit and maintenance costs from CDOT. Determine present worth and annual costs in accordance with the procedures in the CDOT Pavement Design Guide.</i></p> <p>b) <i>Compare alternatives over the same life span.</i></p> <p>c) <i>Recommend the pavement structure and provide the basis for the recommendations.</i></p>			<p>X</p>
<p>d. Pavement Design Report</p> <p>Include all the above tests, investigations, analyses, and calculations performed. Submit to the CDOT/PM for acceptance.</p>			<p>X</p>



SECTION 7 - SUBMITTALS

TABLE 1 – SUBMITTALS

Note: This list establishes the individual task responsibility. Those tasks identified as CDOT/Other should utilize an abbreviation system to indicate whether the task will be completed by CDOT or another agency (i.e. “C” for CDOT and abbreviations as provided below). The consultant shall maintain the ability to perform all work tasks which are indicated below by an ‘X’ in the consultant column, in accordance with the forms and conditions contained herein, and the applicable CDOT standards. Where appropriate, mark “N/A” for not applicable items.

***Other Agency Abbreviations:**

Electronic Copy		Work Tasks	CDOT (C)/ Other*	Consultant	Not Applicable
PDF	Orig.	Pre-Construction			
	X	Periodic Reports		X	
X		Billings		X	
	X	Meeting Minutes		X	
X		Project Schedule		X	
	X	Completed Specific Design Criteria		X	
X		Survey Plan			X
X		Approved MHT's		X	
X		Traffic Control Supervisor Certification		X	
X		Permissions to Enter		X	



	X	Initial Submittal of TMOSS (?) and or MOSS Compatible Data			X
X	X	Initial Submittal of an Original Plan Sheet			X
PROJECT DEVELOPMENT					
	X	Public Communication Contact List		X	
		Route Location Survey			X
X		Traffic Control Supervisor Certification		X	
X		Approved MHT's		X	
	X	Survey data in raw, unedited formats			X
	X	Pothole data including invert elevations			X
X		Existing culverts report			X
X		Access report			X
X		Topographic survey notes			X



X	X	Contour plan checked for errors			X
X	X	Survey control diagram			X
X		Field books		X	
	X	Electronic Survey Files			X
	X	Survey TMOSS Data			X
	X	Monument Records			X
X	X	Control & Monumentation Plan Sheets			X
X		Aerial Photography Index Map Sheets			X
X		Aerial Photography Contact Sheets			X
X		Permits		X	
X		401 Permit		X	
X		Dewatering / 402 Permit			X
X		404 Permit			X
X		SB 40 Permit			X
X		Wildlife Certification			X



X		CDPS Storm Water Permit			X
X		CDPHE Discharge Permit			X
X		Floodplain Development Permit (approved)			X
X		No Rise Certification (approved)			X
X		No Rise Recertification at As-Built (approved)			X
X	X	Environmental Work Tasks		X	
X	X	Appropriate NEPA Document (CatEx, EA, EIS, FONSI or ROD)	C	X	
X	X	Figures and Exhibits from NEPA Document	C	X	
X	X	Air Quality Technical Report			X
X	X	Geologic Technical Report			X
X	X	Water Quality Technical Report			X
X	X	Wetland Finding Report			X



X	X	Integrated Noxious Weed Management Plan			X
X	X	Biological Resources Report			X
X	X	Biological Assessment			X
X	X	Historic Resource Technical Reports		X	
X	X	Section 4(f) Documents			X
X	X	Paleontological Technical Report			X
X	X	Environmental Justice Technical Report			X
X	X	Transportation Technical Report			X
X	X	Noise Technical Report			X
X	X	Hazardous Materials Documentation (ISA/MESA)			X
X	X	SEA Assessment Documentation	C	X	
PRELIMINARY DESIGN					
	X	Electronic Survey Data			X



X		Traffic Data & Recommendations			X
X		Geology & Soils Investigation Report			X
X		Pavement Design Report			X
X		Existing Bridge Condition Report			X
X		Foundation Investigation Report			X
X		Engineering Geology Plan Sheet(s)			X
X		Preliminary Hydraulic Design Report, including preliminary PWQ design			X
X		Preliminary Floodplain Report			X
X	X	Preliminary Storm Water Management Plan			X
X		Utility Relocation Recommendations			X
X	X	Irrigation Ditch Structure Plans			X
		Right-of-way			X



X		Memorandum of Ownership			X
X	X	Preliminary Ownership Map (include in FIR Plan set)			X
X		Structural Selection Report			X
X		Foundation Investigation Request			X
X		Final Materials Recommendations			X
X		Final Pavement Selection Report			X
X		Intersection Traffic Report			X
X		Traffic Report			X
X		Preliminary Cost Estimate		X	
X	X	FIR Plan Set		X	
X		List of deviations from Standard Design Criteria	C	X	
X	X	Corrected FIR Plan Set		X	



FINAL DESIGN					
X	X	ROW Authorization Plans			X
X		Final Hydraulic Design Report, including preliminary PWQ design			X
X		Final Floodplain Report			X
X	X	Final Utility Plan Set			X
X	X	Final Railroad Plan Set			X
X		PUC Exhibit			X
		Bound Final Geotechnical Report _____ copies			X
X		Correspondence with Agencies, Entities, and Public			X
		Right-of-way			X
X		Calculations		X	
X	X	Authorization Plans			X
X		Legal Descriptions			X



X	X	Final Right-of-way Ownership Map			X
X	X	Stabilization Plans			X
		Traffic Engineering			X
X		Safety Assessment		X	
X	X	Signing/Pavement Marking Plans			X
X		Signal Warrant Study			X
X	X	Signalized Intersection Plans & Specifications			X
X	X	Traffic Control Plan		X	
		Roadside Planning			X
X	X	Landscape Plan & Specifications			X
X		Certification of Plant Availability			X
X	X	Irrigation Plans & Specifications			X
X	X	Bike path Plans & Specifications			X



X	X	Sound Barrier Plans & Specifications			X
X	X	Truck Escape Ramp Plans & Specifications			X
X	X	Rest Area Plans & Specifications			X
X	X	Lighting Plans & Specifications		X	
X	X	Structure Final Review Plans & Specifications		X	
X	X	Construction Phasing Plan		X	
X	X	Storm Water Management Plan		X	
X		FOR Plans & Specifications		X	
X		FOR Cost Estimate		X	
X	X	Final Review Revisions	C	X	
		Construction Plan Package		X	
X	X	Final Plans (11X17), Specifications (duplex) & Estimate Package for Ad.		X	



X	X	Final Electrical Diagrams		X	
X		Schedule of Quantities		X	
X		Design Decisions		X	
X		Variances		X	
X		Findings In the Public Interest			X
	X	Original Surface Digital Terrain			X
	X	Final Surface Digital Terrain Model			X
	X	Design Digital Terrain Model			X
	X	Staking Data			X
X	X	Earthwork Quantities			X
X	X	Mass/Haul diagram			X
X		Project Calculations (2 copies)		X	
X		Worksheets (2 copies)		X	
X		Design Notes		X	



X		Independent Design Review Reports		X	
X		Roadway Design Data Submittal			X
X		Major Structure Design Final Submittal			X
X		Bridge Construction Pack			X
X		Record Plan Sets		X	
X		As-Built Plan Sets (if required)		X	
X		Approved no rise recertification or written and approved evidence that all floodplain permit conditions are resolved			X



APPENDIX A: REFERENCES

A.1 EJMT Lighting Study

<https://drive.google.com/drive/folders/1qMTyymLmq3r-DA7rsLLZSRjt2igMz1YR>

A.2 NFPA/IESNA Guidelines

All applicable codes and standards must be followed.

A.3 Crest of the Rockies Design Guide

<https://www.codot.gov/projects/i70mountaincss/assets/docs/aesthetics/aesthetics-design-segment-guidance/110331-crest-of-the-rockies.pdf>

A.4 ASCE Historic Civil Engineering Landmark Nomination Application

<https://www.asce.org/-/media/asce-images-and-files/history-and-heritage/documents/2020historic-civil-engineering-landmark-nominationform.pdf>

A.5 2003 North Bore Tunnel Lighting (13166) As-Builts

<https://drive.google.com/drive/folders/1qMTyymLmq3r-DA7rsLLZSRjt2igMz1YR>



APPENDIX B: DEFINITIONS

Note: For other definitions and terms, refer to Section 101 of the CDOT Standard Specifications for Road and Bridge Construction and the CDOT Design Guide.

AASHTO - American Association of State Highway & Transportation Officials

ADT - Average two-way 24-hour Traffic in Number of Vehicles

AREA - American Railway Engineering Association

ATSSA - American Traffic Safety Services Association

AT&SF - Atchison, Topeka & Santa Fe Railway Company

ADAAG - Americans with Disabilities Accessibility Act Guidelines

BAMS - Bid Analysis and Management Systems

BFE - Base Flood Elevation

BLM - Bureau of Land Management

BNRR - Burlington Northern Railroad

CA Contract Administrator – The CDOT Manager responsible for the satisfactory completion of the contract by the Consultant.

CAP - CDOT's Action Plan

CBC - Concrete Box Culvert

CDOT - Colorado Department of Transportation

CDOT/PM - Colorado Department of Transportation Project Manager – The CDOT Engineer responsible for the day-to-day direction and CDOT Consultant coordination of the design effort (as defined in Section 2 of this document)

CDOT/STR - Colorado Department of Transportation Structure Reviewer – The CDOT Engineer responsible for reviewing and coordinating major structural design

CDPHE - Colorado Department of Public Health and Environment

CEQ - Council on Environmental Quality

CISP - Colorado Information Security Policy

CMGC - Construction Manager / General Contractor Project Delivery Method



COG - Council of Governments

COGO - Coordinate Geometry Output

CONSULTANT - Consultant for the Project

CONTRACT ADMINISTRATOR - Typically a Region Engineer or Branch Head. The CDOT employee directly responsible for the satisfactory completion of the contract by the Consultant. The contract administration is usually delegated to a CDOT Project Manager (as defined in Section 2 of this document).

C/PM Consultant Project Manager – The Consultant Engineer responsible for combining the various inputs in the process of completing the project plans and managing the Consultant design effort.

CWCB - Colorado Water Conservation Board

CY - Calendar Year

DEIS - Draft Environmental Impact Statement

DHV - Future Design Hourly Volume (two-way unless specified otherwise)

DOR - Design Office Review

DRCOG - Denver Regional Council of Governments

DSB - Disadvantaged Business Enterprise

D&RGW - Denver & Rio Grande Western Railroad

EA - Environmental Assessment

EIS - Environmental Impact Statement

ESAL - Equivalent Single Axle Load

ESB - Emerging Small Business Enterprise

ESE - Economic, Social and Environmental

FEIS - Final Environmental Impact Statement

FEMA - Federal Emergency Management Agency

FHPG - Federal Aid Highway Policy Guide

FHWA - Federal Highway Administration

FIPI - Finding In Public Interest



FONSI - Finding of No Significant Impact

FOR - Final Office Review

GPS - Global Positioning System

MAJOR STRUCTURES - Bridges and culverts with a total clear span length greater than twenty feet. This length is measured along the centerline of roadway for bridges and culverts, from abutment face to abutment face, retaining structures are measured along the horizontal distance along the top of the wall. Structures with exposed heights at any section over five feet and total lengths greater than a hundred feet as well as overhead structures including (bridge signs, cantilevers and butterflies extending over traffic) are also considered major structures.

MPO - Metropolitan Planning Organization (i.e. Denver Regional Council of Governments, Pikes Peak Area Council of Governments, Grand Junction MPO, Pueblo MPO, and North Front Range Council of Governments).

MS4 - Municipal Separate Storm Sewer System

NEPA - National Environmental Policy Act

NFIP - National Flood Insurance Program

NGS - National Geodetic Survey

NICET - National Institute for Certification in Technology

NOAA - National Oceanic and Atmospheric Administration

OIT - Office of Information Technology

PAPER SIZES See Computer-Aided Drafting Manual (CDOT); Table 6-13 and Table 8-1

PE - Professional Engineer registered in Colorado

PM - Project Manager

PLS - Professional Land Surveyor registered in Colorado

PRT - Project Review Team

PS&E - Plans, Specifications and Estimate

PROJECT The work defined by this scope

PWQ CM - Permanent Water Quality Control Measure



ROR - Region Office Review

ROW - Right-of-Way: A general term denoting land, property, or interest therein, usually in a strip acquired for or devoted to a highway

ROWPR - Right-of-Way Plan Review

RTD - Regional Transportation Director

T/E - Threatened and/or Endangered Species

SEA - System Engineering Analysis

SFHA - Special Flood Hazard Area

SUE - Subsurface Utility Engineering

SH - State Highway Numbers

TMOSS - Terrain Modeling Survey System

TOPOGRAPHY In the context of CDOT plans, topography normally refers to existing cultural or manmade details.

UDFCD - Urban Drainage and Flood Control District

USCOE - United States Army Corp of Engineers