

# **Draft Request for Proposals (RFP)**

**Design – Professional Services**

**Scope of Work**



## **I-270 Critical Bridge Replacements Project**

**Mile Marker (MM) 0 to MM 3**

**PROJECT NUMBERS: FBR 2706-044/C R100-364**

**PROJECT LOCATION: I-270 in Commerce City**

**PROJECT CODE: 24947/24527**

September 1, 2022 **Updated September 16, 2022**

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 Colorado Department of Transportation (CDOT) to develop and negotiate 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 his or her designee) for this Project. All submittals will be through the CDOT/PM or a designee, who will make appropriate distribution. Upon notice to proceed (NTP), the Consultant shall be responsible and will account for all effort contained in the Final Scope of Work.**

**This Draft 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. The Final Scope of Work submitted will be generated by CDOT personnel and be on CDOT letterhead.**



## **SECTION 1 – PROJECT SPECIFIC INFORMATION**

### **1.1. PROJECT BACKGROUND**

The I-270 corridor provides a vital connection from I-70 to I-25. Over 100,000 vehicles per day utilize this corridor to bypass the friction of downtown Denver to move goods, services, information, and people between northern and eastern parts of the city.

Within the I-270 corridor there are eight (8) bridge structures within a one mile stretch between York Street and Vasquez Boulevard that have been the source of many challenges to the mission of this corridor. These structures have been in service for over 50 years and have been requiring frequent emergency repairs. Over 300 emergency repairs have been performed to the bridges along this corridor since 2006. These deck repairs always require significant lane closures affecting travel times in this corridor. This corridor lacks redundancy, and any detours during these emergency repairs require use of local roads or significant out-of-direction movements. Bridge inspections have rated 6 of the 8 bridges in this one-mile segment as ‘poor’, which made them eligible for Bridge & Tunnel Enterprise (BTE) funding for full replacement.

The Tier 2 NEPA Environmental Assessment (EA) study for I-270 Corridor Improvements began in 2020 and is nearing completion. The study shows that up to 12 total bridges will eventually need replacement throughout the 6-mile corridor, however, the Critical Bridge Replacements Project will replace only 8 of those bridges. For more information and status on the I-270 EA visit: <https://www.codot.gov/projects/i270>.

### **1.2. PROJECT LIMITS**

The Project is located within Adams County and Commerce City on I-270 and extends from approximate mile marker (MM) 0.5 to MM 2.5, between York Street and Vasquez Boulevard. The bridges to be replaced are located from approximate MM 1 to MM 2. See section 1.5 for specific bridges to be replaced.

### **1.3. PROJECT GOALS**

The CDOT Project Goals reflect the values that this Project holds and expects. An exceptional proposal will demonstrate how each of the Project Goals will be pursued by the Proposer.

1. Traffic Control and phasing concepts shall seek to limit impacts to the traveling public by minimizing lane closure variances, formal detours, and additional traffic to other roadways.
2. Replace and decommission all deteriorating structures as efficiently as possible.
3. Anticipate and accommodate environmental requirements for design and construction.

### **1.4. PROJECT FUNDING**

Funding for the Critical Bridge Replacements project is currently available from state sources including BTE and SB-267. Additional federal discretionary funding may become available through the FHWA Bridge Improvement Program.



## **1.5. PROJECT INFORMATION AND DEFINITION**

Project Scope Elements include but are not limited to:

- Replacement of 8 existing I-270 mainline structures:
  - E-17-ID WB over South Platte River
  - E-17-IE EB over South Platte River
  - E-17-IF WB over Burlington Irrigation Ditch (FRICO)
  - E-17-IG EB over Burlington Irrigation Ditch (FRICO)
  - E-17-IH WB over Brighton Blvd, UPRR & BNSF
  - \*E-17-II EB over Brighton Blvd, UPRR & BNSF
  - E-17-IJ WB over E. 60th, BNSF Railroad
  - \*E-17-IK EB over E. 60th, BNSF Railroad
    - \* (NOT eligible for Bridge & Tunnel Enterprise (BTE) funds)
- Pavement reconstruction at bridge approaches where required for roadway profile changes
- Retaining walls as needed to reduce toe-of-slope impacts
- ROW/Easements for permanent features and temporary construction access
- Floodplain Management Coordination (MHFD/Adams County)

The Project Scope Elements may be modified based on available funding, packaging, Construction Manager input, Stakeholder input, and final design refinements. If it is determined to be in the interest of the Department, or to meet funding constraints, portions of the design scope may be procured separately.

## **1.6. PROJECT ROLES**

### Lead and Supporting Agencies:

- CDOT is the lead agency and Owner of the Project.
- Oversight is provided by FHWA.

Stakeholders: Primary Project stakeholders and their role or involvement in the Project are listed in the following table:



**Primary Stakeholders**

Agency/Stakeholder	Role or Involvement
Federal Highway Administration (“FHWA”)	<ul style="list-style-type: none"> <li>● Project oversight</li> <li>● Member of the Project Leadership Team (PLT) and Technical Team (TT)</li> </ul>
Adams County	<ul style="list-style-type: none"> <li>● Member of the Project Leadership Team (PLT) and Technical Team (TT)</li> </ul>
City of Commerce City	<ul style="list-style-type: none"> <li>● All bridges fall within City limits</li> <li>● Member of the Project Leadership Team (PLT) and Technical Team (TT)</li> </ul>
Colorado Motor Carriers Association	<ul style="list-style-type: none"> <li>● Input on freight consideration, HazMat route maintenance and temporary detour decisions</li> <li>● Member of the Technical Team (TT)</li> </ul>
UPRR	<ul style="list-style-type: none"> <li>● Reviews and agreements required for proposed I-270 overpass reconstruction</li> </ul>
BNSF	<ul style="list-style-type: none"> <li>● Reviews and agreements required for proposed I-270 overpass reconstruction</li> </ul>
The Farmers Reservoir and Irrigation Company (FRICO)	<ul style="list-style-type: none"> <li>● Reviews and agreements for proposed E-17-IF/IG crossing over Burlington Ditch</li> </ul>



**Additional Coordination Contacts**

Other Stakeholders	Role or Involvement
Private Property Owners	<ul style="list-style-type: none"> <li>● ROW/Easement impacts</li> <li>● Will want to know travel impacts/delays/detours</li> </ul>
RTD and Traveling public	<ul style="list-style-type: none"> <li>● Roadway safety/trip reliability input</li> <li>● Will want to know travel impacts/delay/detours</li> </ul>
Recreational users	<ul style="list-style-type: none"> <li>● Colorado Front Range Trail temporary detours</li> <li>● Sand Creek Greenway temporary detours</li> </ul>
Emergency Responders/Incident Command	<ul style="list-style-type: none"> <li>● Emergency response/access input</li> <li>● Will want to know travel impacts/delay/detours</li> <li>● Members of local emergency responders are on the Project’s Technical Team</li> <li>● Incident Management and Planning for all potential impacts</li> <li>● CDOT Executive Leadership</li> <li>● CDOT Traffic Operations Center (CDOT TOC)</li> </ul>
Utilities	See section 3.2 for anticipated utility coordination/relocations

**1.7. WORK DURATION**

The time period for this work described in this scope is estimated to begin in January, 2023 and end December 1, 2025. It is estimated that the project can be constructed in approximately two years from commencement of construction. The Consultant should expect to have design and construction overlap should the team proceed with concurrent packages.

**1.8. COLLABORATION**

This project will be delivered via Construction Manager/General Contractor (CM/GC) procurement. The Consultant will need to work in conjunction with the Construction Manager (CM) to collaborate on innovation and constructability throughout the duration of the project, as well as follow the CM/GC process.

**1.9. CONSULTANT RESPONSIBILITY AND DUTIES**

All work shall be in accordance with CDOT’s latest manuals, directives, and generally accepted practices in place at the time of this Final RFP. The Consultant shall work closely with CDOT’s Project Manager, Independent Cost Estimator (ICE) , Construction Manager, and consultant construction management personnel. The Consultant shall supply Engineer-signed and sealed electronic plans and reports. The Consultant shall collaborate with the ongoing NEPA effort and include the mitigation measures identified in the EA into the plans and specifications.

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 for Construction Agreed Price (“CAP”) negotiations of the planned improvements. Additionally, the Consultant is required to develop concepts and associated quantities to allow the Independent Cost Estimator (ICE) to create cost estimates that will assist CDOT decision making. The work will include, but is not limited to, the design of the roadway, structures, retaining walls, environmental, visual/aesthetic, traffic, hydraulics, geohazards/geotechnical, survey, railroad, utility, and water quality (permanent water quality and temporary stormwater management).

The Project will be delivered via a Construction Manager/General Contractor (CM/GC) procurement. The Consultant must work in conjunction with the Construction Manager to collaborate on innovation, constructability, schedule, and risk throughout the duration of the project in addition to adherence to the CM/GC process. The Consultant is also required to collaborate with the ongoing EA process, stakeholders, and Issue Task Force (ITF) groups by providing design updates and necessary design files as needed to support the EA process and work toward a decision document.

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
- Attend project meetings
- Meet all project milestones
- Create and maintain project CPM schedules for design and construction
- Develop concepts and quantities for cost estimates
- Participate in public outreach meetings (if needed)
- Provide environmental support for NEPA re-evaluations and other clearances as needed.
- Support the development of third party agreements
- Attend site meetings and site visits.
- Assist the project team in establishing controlling and critical constraints of the project.
- Provide FIR, DOR, FOR, and final project design, specifications, and quantities for estimates
- Provide design cost estimates at critical milestones
- Provide a robust Quality Control plan specifically focused on the mitigation of error and omission risk.
- Provide phasing and detour concepts that will meet project goals
- Track project action items and deliverables

#### **1.10. PERSONNEL QUALIFICATIONS**

- The Consultant PM must be approved by the CDOT Contract Administrator.
- Certain tasks must be done by Licensed Professional Engineers (PE) or Professional Land Surveyors (PLS) who are registered with the Colorado State Board of Registration for Professional Engineers and Land Surveyors. National Institute for Certification in Engineering Technology (NICET) or other certifications may be required for project inspectors and testers.
- 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.
- This 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:



- AC – Acoustical Engineering
  - AR – Architecture
  - BI - Bridge Inspection
  - BR – Bridge Design
  - CE – Civil Engineering
  - EL – Electrical Engineering
  - EN – Environmental Engineering
  - GE – Geotechnical Engineering
  - GL – Geological Engineering
  - HD – Highway & Street Design
  - HY – Hydraulics
  - LA - Landscape Architecture
  - MA – Management (Contract Admin)
  - ME – Mechanical Engineering
  - MT - Materials Testing
  - SE – Structural Engineering
  - SO – Soils Engineering
  - SU – Surveying
  - TP – Transportation Engineering
  - TR – Traffic Engineering
  - VE – Value Engineering
- Key Personnel in the Statement of Interest section of the Proposal, see **Section 6** of the Design RFP, constitutes an agreement by the Proposer to make the Key Personnel available to complete the services of the contract at the level the Project requires. CDOT requires that all Key Personnel be engaged to perform their specialty for all services required by this contract, and the Key Personnel shall be retained for the life of this contract to the extent practicable and to the extent that such services maximize the quality of work hereunder.

If the Consultant or a subconsultant decides to replace any of its Key Personnel, the Consultant shall notify the CDOT Project Manager in writing of the desired change. No such changes shall be made until at least two qualified replacement candidates are recommended by the Consultant and a replacement is approved in writing by the Project Manager or its designated representative. The approval shall not be unreasonably withheld. Failure of the Consultant to comply with the requirements of this provision may be the cause for CDOT’s termination of the contract.

The Project Manager or its designated representative will respond to the Consultant’s written notice regarding replacement of Key Personnel within fifteen working days after receipt of the list of proposed changes. If the Project Manager or its designated representative does not respond within that time, the listed changes shall be deemed to be approved.

If, during the term of the contract, the Project Manager or its designated representative determines that the performance of approved Key Personnel is not acceptable, a notification shall be sent to the Consultant. The notification shall include a reasonable timeframe to correct such performance. Thereafter, the Consultant may be required to reassign or replace such Key Personnel. If the Project Manager or its designated representative notifies the Consultant that certain Key Personnel of a subconsultant should be replaced, the Consultant shall use its best efforts to replace such Key Personnel within a reasonable time, but not to exceed fifteen working days from the date of the notice.

## **1.11. COMPUTER SOFTWARE INFORMATION**



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

- Earthwork - OpenRoads Designer – Bentley Systems
- Drafting/CADD - OpenRoads Designer – Bentley Systems with CDOT’s formatting configurations and standards.
- Survey/Photogrammetry - CDOT TMOSS, OpenRoads Designer – Bentley Systems, allowable systems in the CDOT Survey Manual
- Bridge - CDOT Staff Bridge software shall be used in either design or design check, refer to the CDOT Bridge Design Manual
- Estimating - Transport (an AASHTO sponsored software) as used by CDOT
- LIMS
- ProjectWise (a/k/a ProjectWise Explorer or ProjectWise Cloud)
- Specifications - Microsoft Word
- Scheduling - Microsoft Project or Primavera
- Water Quality Data – ArcView
- 3D graphic imaging - As approved
- B2GNow System for DBE/ESB tracking and prompt payment

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.



### **1.12. PROJECT COORDINATION AND MEETINGS**

The Consultant will be required to provide primary coordination with the CDOT PM and specialty units as approved. The list of stakeholders for this project is included in **Section 1.6 Project Roles** in this SOW.

The Partnering Workshop will emphasize the importance of partnering within the CM/GC delivery method by focusing on team building and partnering over a 2-day period. This workshop is mandatory for all key team members including key subcontractors. This workshop will be facilitated by CDOT and will cover at a minimum the following items:

- Introduction to: the Project, CM/GC, partnering, Project stakeholder engagement, and Identification of roles and responsibilities. Subcontractors performing major and high-risk work items should be in attendance.
- The Team will review Project status, vision, goals, objectives, funding, preliminary pre-construction schedule, what success would look like, current design, etc.
- Initial discussion of innovations, phasing, and risk mitigations being proposed by the CM, Design Consultant, and Independent Cost Estimator (ICE).
- Cost Model review and coordination with the ICE during OPCCs.
- Cost Model components.
- Project Schedule meetings in accordance with the schedule developed by the CM.
- Agreement on progress meeting frequencies. Progress meetings may include project management meetings, design meetings, discipline/specialty meetings, stakeholder meetings, OPCC meetings, public meetings, and others as required.
- Initiate working groups for various elements of the Project. Strategy, timing, and approach for the Project Innovation and Value Engineering Workshop.

The Project Innovation and Value Engineering Workshop will be co-facilitated by CDOT, the CM, Independent Cost Estimator (ICE), and the Design Consultant. Attendance and duration will be determined at the Kick-Off Meeting. It is also anticipated that Project stakeholders' input will also be incorporated into this workshop. The approach, agenda, format, and duration for the workshop will be developed in collaboration with CDOT, the CM, Independent Cost Estimator (ICE), and the Design Consultant. The CM shall provide input into how to achieve the desired results for the Project. This workshop could require several sessions, over an extended period. The purpose of this workshop is to consider any CM innovations or design refinements for the Project, and incorporate value engineering principles to the Project.

The Consultant shall be prepared to participate in Project Vision Meetings to analyze how Project progress is aligning and tracking with Project Goals. Items of focus include priorities, commitments, approach, scope, schedule, and cost reasonableness. The Project Vision Meetings are anticipated to be scheduled quarterly at a minimum to achieve the Project Goals and will be conducted by the CM.

### **1.13. SUPPLEMENTAL WORK**

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 to complete them under the approved task order. The consultant shall not perform work out of scope without prior written approval from the PM. Per the contract, subconsultants and vendors may not go over task order or contract budget.



#### **1.14. WORK PRODUCT**

The following work products include all 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. The Consultant work products may include:

- Project Management and Coordination
- Preliminary Engineering Effort
- FHWA Value Engineering Requirements
- Utility Coordination / Final SUE Work
- Schedules
- Meeting Minutes
- Survey
- Wetlands / 404
- Permanent water quality and temporary water quality and stormwater permitting
- Geotechnical Investigation
- Structural Engineering
- Highway Design and Traffic/Safety Engineering
- Hydraulics and Hydrology
- Environmental Compliance and EA Reevaluation
- ITS Components
- FHWA Controlling Criteria Variances
- Work Activity Assignments
- Field Inspection Review (FIR) 30% Plans and Estimates
- Design Office Review (DOR) 60% Plans and Estimates
- Final Office Review (FOR) 90% Plans, Specifications, and Quantities for estimates
- AD/CAP Plans, Specifications, Cost Estimate
- Construction Plan Package(s)
- Professional Engineer Stamped Record Sets
- Design Support During Construction
- Submittals
- Invoice Formatting and 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.

#### **1.15. ADDITIONAL PROJECT INFORMATION**

Additional preexisting preliminary design resources and downloadable documentation are available on the CDOT webpage alongside the RFP and SOW:

<https://www.codot.gov/business/consultants/advertised-projects/2022>



## **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:  
Katie Dawson, PE  
Project Director I-270 Corridor Reconstruction Project  
4670 Holly Street  
Denver, CO 80216  
C: 720-794-7874  
[katie.dawson@state.co.us](mailto:katie.dawson@state.co.us)
- B. Active day-to-day administration of the contract will be delegated to the CDOT PM:  
Katie Dawson, PE  
Project Director I-270 Corridor Reconstruction Project  
4670 Holly Street  
Denver, CO 80216  
C: 720-794-7874  
[katie.dawson@state.co.us](mailto:katie.dawson@state.co.us)

### **2.2. PROJECT MANAGEMENT**

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

- The consultant shall provide the Key Personnel as identified in the Design RFP for the overall interdisciplinary needs of the Project.
- Attend CDOT PM check-in meetings with all Consultant PM and Task Leads present as needed
- Provide monthly progress reports and invoicing, track progress of deliverables against the developed schedule, and ensure internal project controls are being followed. If the project falls behind schedule, provide a recovery plan to meet all project milestones .
- Assist with maintaining the CDOT Project webpage with appropriate updates.
- Provide Project Management efforts in following areas at a minimum:
  - Risk Management – develop and execute a plan for risk management which will include the following:
    - The plan for how to identify, track, analyze, quantify and respond to project risks
    - Track risks and provide recommendations to either avoid, transfer, mitigate or accept individual risks to the project scope, schedule, and budget
  - Roles and responsibilities
    - Maintain the contact list for the project and all stakeholders
    - Document decision making hierarchy for the project
  - 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. Include an approach to challenge the assumptions of the Construction Manager to ensure that all scope is essential and cost effective.
  - Contract Management – develop and execute a plan for contract management including working with the CDOT PM to develop the task orders.
    - The plan shall include planning, managing, and controlling the costs for the prime consultant and the subconsultants to stay on task and meet the budget goals.
    - Task orders will be written to define the task order scope.



- Notify the CDOT PM about potential out of scope items.
- Cost Management – develop the quantities required for the construction cost estimate at major project milestones, and a design estimate at major milestones. Since this project will be delivered via CM/GC, this project will have an independent cost estimator that will complete the actual construction estimate.
- Schedule Management – develop and execute a schedule management plan including:
  - The plan to develop, maintain and communicate the project schedule for the time and resources on the project.
  - The schedule shall be a detailed schedule using one of the programs allowed in **Section 1.11** in this SOW tracking all major milestones, deliverables for the design process, and tied to CM/GC deliverables. 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.
- Change Management – develop and execute a change management plan that will include the following:
  - Define how project deliverables and documentation will be controlled, changed, and approved.
  - Note how changes could impact the project scope, schedule, and budget.
  - Identify who should approve the changes and how they will be communicated and documented.
- Communication Management – ~~assist in developing~~ develop and execute a communication management plan for the design development process. It should be noted that communication management needs for the completion of the I-270 Corridor NEPA process and decision document will continue to be the responsibility of the current consultant team. ~~CDOT envisions that consultant support for Communication Management during the design development and construction phase(s) of the Project will be contracted through a separate contract. The Consultant shall support CDOT as needed, and~~ The plan shall include the following:
  - The processes that are required to ensure timely and appropriate planning, collection, creation, distribution, management, control and monitoring of project information.
  - Ensure that project information is consistently distributed in a timely manner to the team members that need it in the appropriate format.
  - Meeting planning
    - Participate in establishing the frequency of meetings and the most effective team members to invite and attend
    - For major meetings establish a meeting plan template defining who, what, where, when, why, how, etc.
    - For all stakeholder meetings, including public, PLT, TT, ITF, small group stakeholder and others the following shall apply:
      - A Consultant liaison shall be available to participate as needed.
      - Specific Coordination Meetings will require Consultant participation for major stakeholder meetings like PLT, TT, ITF and Public meetings.
  - Track crucial project decisions in a communications log
  - Provide communication as appropriate with internal CDOT Specialty units as directed by the CDOT PM
  - Contact and coordinate project needs with CDOT personnel and additional entities noted in **Section 1.6** of this SOW.



- Document and report to CDOT PM when items have been submitted for review and log and track responses.
- Project Newsletters: Create and provide graphical email updates to the PLT, TT, and ITF stakeholders. Graphics shall be gathered from the entire project effort to report back on each discipline/action that is progressing.
- Quality Management – Develop and execute a quality management plan for all project deliverables. The plan shall include quality assurance and quality control:
  - Ensure accuracy and reductions of error and omission reducing the need for rework
  - Provide interdisciplinary oversight ensuring that the documents capture not only the correct detail but are tied to the larger overall picture/concept of the project
  - Provide contract documents that take into consideration constructability and maintainability
  - Provide quality control 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.
  - Provide a quality process in which all deliverables and construction documents will be considered to have a high level of quality, especially in consideration of error and omission.
- Action Items and Deliverables tracking:
  - Track action items and note date assigned, date completed, item description, and who is responsible. Provide management of consultant team tasks and team members, including sub consultants and vendors, and work or task leads.
  - Report progress to CDOT PM. Deliverables are part of the project schedule but require their own communication tool for tracking progress.
  - Create a separate deliverable tracking log indicating planned due date versus actual date submitted. Report progress to CDOT PM.
- Routine Reporting and Billing
  - Coordinate all activities with the CDOT PM
  - See requirements for monthly billing in **Section 4** General Information in this SOW.
  - 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.
  - Provide Vendor backup as part of all executed Task Orders

### **2.3. PRELIMINARY ENGINEERING / CONSTRUCTION PLANS**

The Consultant shall follow the latest version of the CDOT Project Development Manual for project delivery procedures and requirements and follow all CDOT and FHWA required design guidelines and Procedural Directives. The Consultant shall act as the Engineer in Responsible Charge for all Traffic Control needs for design field work as required to complete this SOW. Consultant shall supply a vendor for traffic control services. Submit an MHT to CDOT PM for review. Coordinate field work with CDOT Maintenance and any active construction projects to avoid conflicts.

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

- Project Scoping: Host a formal project scoping meeting to address the following items:
  - Establish and layout the plan to deliver the project to construction
  - Prepare a plan for preliminary quantities
  - Prepare preliminary plan and profile of improvements





- Applicable traffic data and traffic review of scope items
- Environmental considerations
- Establish and confirm the design requirements for the following items:
  - Typical sections
  - Horizontal and vertical alignment
  - Detour alignment
  - Drainage and hydraulics
  - Approach of project
  - Aesthetic features
  - Pedestrian and bicycle facilities
  - Landscaping
  - Lighting
  - Major structures
  - Minor structures
  - Walls
  - Pedestrians/recreation
  - Signs/miscellaneous
  - Safety
  - ITS components
  - Traffic control
  - Access control
  - Source of materials
  - Roadway and roadside clearances
  - Stormwater management / erosion control
  - Permanent Water Quality
  - Pavement options
  - Wetland / 404 Permit
- Review construction requirements
- NEPA Commitments
- Maintenance concerns
- ROW
- Survey
- Traffic and safety issues
- Utility
- Contract
- Geotechnical and Geohazards
- Coordination of all disciplines
- ITS components
- Other
- Reference 23 CFR Part 625, Design Standards for Highways
- Field Inspection Review (FIR): Host a formal FIR Meeting:
  - The purpose of the meeting will be to ensure the project is on track. Plan level shall be at least 30% complete showing integration of all identified improvements.
  - Provide a detailed preliminary cost estimate.
- Design Office Review (DOR): Host a formal DOR Meeting:
  - The DOR package shall incorporate all the ongoing TT/ITF efforts.
  - This shall be a 60% design development issue package that provides plan sheets and details for all of the planned improvements items and also includes:
    - Title Sheet



- Standard Plans List
- Typical Sections
- General Notes
- Summary of Approximate Quantities
- Tabulation Sheets
- Plan and Profiles
- Wall layouts
- Structure layouts
- Drainage plans (including Permanent Water Quality)
- ITS concepts and coordination
- Preliminary construction Phasing
- Traffic Control
- Stormwater Management Plans
- Custom Detail Concepts as required for construction
- Identify required Project Specifications
- Provide a preliminary detailed cost estimate with summary of approximate quantities
- FOR: Host a formal Final Office Review of the plans, specifications, and cost estimate
  - Address all comments from the DOR plan set
  - Update all plans and specs to a 90% design development issue level.
  - Submit all required reports
  - All TT/ITF efforts shall be completed

This project is a CM/GC project, the Consultant need only provide quantities for the cost estimates. Cost estimating will be performed by an independent cost estimator. However, the Consultant should plan on the preparation of cost estimates as noted above for FIR, DOR, and FOR.

When applicable, the engineering and overall process must consider ALL of the proposed Project Scope Elements as part of the EA and plan for their future implementation and mitigation measures such that one improvement does not preclude a future improvement. Traffic engineering expertise must be utilized for continued evaluation of options and alignments as well as interactions of the additional highway improvements.

In addition to the deliverables described above, the following are also required:

- Final PSE: Provide final Plans, Specs and Estimate for review prior to final AD/CAP set. 99% Design Development Plans
- Final AD/CAP set of plans. 100% construction documents

#### **2.4. SURVEY COORDINATION**

Topographic survey in TMOSS format was collected using aerial mapping and mobile lidar and is available for use. Additional detail may be needed or desired around structures or other improvement locations. The consultant is to provide complete ROW Plan development services for any property acquisition. Prepare legal descriptions for any private property acquisitions. It is the intent of this SOW to follow the guidelines of the latest version of the CDOT Survey Manual. The manual defines the minimum specifications that shall be followed while performing surveys in order to secure an optimum degree of statewide uniformity in surveying, and to establish and maintain survey standards. It is a



reference source for statewide surveying policies, procedures and information required to complete this SOW.

- The State has obtained a topographic survey of the project limits and does not anticipate that another survey of the entire project limits is required. The Consultant shall review the existing information and recommend areas that may need additional detail. Any additional survey efforts must be approved by the CDOT PM.
- Verify existing CDOT Control. Additional control may need to be added to the existing CDOT Control.
- The surveyor shall coordinate and provide all other needs, such as surveying wetland flags, geotechnical borings or other field delineated areas by others to complete this SOW.
- If existing SUE plans must be supplemented, the surveyor shall obtain utility locates and field survey markings. Field survey the top of utilities at locations that are potholed. Coordinate with a pothole company for timing of survey. It is expected that the Consultant will adhere to SUE requirements in Section 2.11 of this SOW.
- The consultant shall complete CDOT PM Form 1217 to determine the precise survey limits.
- Attend Pre-Survey Conference.
- Prepare and obtain “Permission to Enter Property” forms for the purpose of surveying within private ownership parcels.
- Acquire a Special Use Permit from CDOT to survey within the right-of-way and travel lanes. This process includes the preparation of a traffic control plan, Method of Handling Traffic (MHT), which conforms to the Manual on Uniform Traffic Control Devices (MUTCD) and CDOT M&S Standards and Policies and a certificate of insurance naming the Colorado Department of Transportation as additionally insured. Submit the MHT to the CDOT PM and for Special Use Permit. If the surveyor already has a standing Special Use Permit with the State, still submit the MHT to the CDOT PM for review. The Consultant PE shall be the Engineer in Responsible Charge of the MHT.
- Land Survey/Boundary Survey will include tying aliquot, property, and other land monuments to the control survey. Prepare a combination Project Control / Land Survey Control Diagram showing graphical representation of the found aliquot, property and land monuments and their relationship to the project control. Tabulation of the coordinates and physical description of the found monuments and other physical evidence will be included.
- Determine Existing Right of Way and HED limits.
- Prepare TMOSS Topographic survey of designated areas
  - Wetlands will be marked by Environmental Consultant and coordinated with the survey crew in the field on site. Flagged wetlands shall be surveyed.
  - Designate and locate the Ordinary (visible) High Water Mark of waterways
  - If existing SUE plans must be supplemented, provide utility locates for design purposes and survey located underground and above ground utilities. Provide coordination with local utility companies. Provide inverts of manholes as is best reasonably possible. (See also Section 2.11 of this SOW)
  - Provide potholing for establishment of utility profiles and survey locations and depths to utilities.
  - Survey all inverts of the storm sewer system and measure culvert size. Survey inverts/rims of all storm sewer inlets and manholes. Make note of pipe direction and sizes as they enter and exit the storm sewer system.
  - Coordinate with CDOT Hydraulic Engineer for cross sections, bathymetry and flow lines of the rivers. Locate existing bridge limits, bridge high chords and low girders. Accomplish existing drainage site surveys for designated median ditches and bridges in



accordance with the Drainage Design Manual. Confirm sufficiency of existing 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 <https://coloradohazardmapping.com/lidarDownload>

- Provide a DGN file of the existing Right of Way Model.
- Locate Geotechnical Borings.
- Obtain Title Commitments for any private properties from which ROW or easements may be required.
- Provide Survey Report
- Prepare right-of-way plans in CDOT format for impacted private properties based on title commitments. Attend a right-of-way plan review meeting (ROWPR) with the appropriate staff personnel from CDOT and finalize the right-of-way plans and legal descriptions for CDOT authorization.
- Stake the proposed parcels and easements for appraisal purposes. A one-time staking effort may be assumed.
- Once the proposed parcels have been acquired and CDOT has provided the recorded deeds, monument the new right-of-way lines within the project limits and deposit the final right-of-way plans in the Adams County Clerk and Recorder's office.
- All Survey deliverables shall be submitted in MicroStation Open Roads (ORD) format.

## **2.5. GEOTECHNICAL INVESTIGATION**

- Incorporate geotechnical mitigation requirements from the EA into project design and recommendations.
- The elements of the work shall include recommendations for Pavement Design set forth in the latest CDOT Pavement Design Manual (Coordinate with Regional Materials Program for final needs), foundations, retaining walls, culverts, and embankments.
- The consultant shall follow the guidelines set forth in the latest CDOT Geotechnical Design Manual for the preparation of the Geotechnical Investigation Report. Including, but not limited to:
  - Standards for CDOT Geotechnical Work Table 2-1
  - Accepted Geotechnical Software for CDOT Projects Table 2-2
  - A full literature review
  - Field Reconnaissance
  - Minimum Requirements for Subsurface Explorations Table 3-2 for:
    - Pavement Design
    - Foundations
    - Retaining Walls
    - Culverts
    - Landslide Evaluation
    - Cut Slopes
    - Embankments
    - Topsoil for revegetation
    - PWQ infiltration areas
  - Follow the prescribed methods for subsurface exploration.
- Refer to the latest CDOT Bridge Design Manual for other requirements and requirements for geology sheets.



- Provide information on site conditions, subsurface conditions, groundwater, and geochemical properties with recommendations for spread footings foundations, drilled shafts, driven piles, and different wall types such as mechanically stabilized earth, typical cantilevered, soil nail/shotcrete, and other types as required by the Structural Engineer. Recommendations shall mitigate for any and all existing landfills in the area including those that extend under I-270.
- The Geotechnical Report shall include bore logs, summary of laboratory testing, retaining wall foundation recommendations, shallow foundation recommendations, deep foundation recommendations, global stability analysis, heave/settlement, construction recommendations, lateral resistance values. Coordinate with the Designer for any potential other needs prior to starting work. The report will include Engineering Geology sheets indicating location of borings.
- Borings are anticipated to be advanced into competent bedrock through cobbles, boulders and landfill materials. Soil and bedrock samples will be collected by in-situ testing and sampling methods outlined in Section 3.6 of the CDOT Geotechnical Design Manual. Selected soil samples will be tested to determine classifications, moisture, density, resistance values, pH, sulfides, and strength parameters. All work shall be conducted per current health and safety requirements including OSHA and CDPHE guidelines regarding worker safety, monitoring, containerizing, labeling, and disposing of soil and water from field investigations.
- Review geotechnical hazard maps provided as part of the EA and provide appropriate recommendations as needed in collaboration with the CDOT Geohazards Program.
- The report shall identify geotechnical hazards, such as landfills and mine workings, in the vicinity of the project, and shall determine if these features will be impacted by construction. In the event disturbance is anticipated due to construction, mitigation to reduce the risks of disturbance to the sensitive area shall be recommended.
- Identification of geotechnical issues and concerns associated with locations.
- Provide a draft report for CDOT specialty unit and PM review prior to issuing the final stamped version. Final engineer stamped versions are required.
- Provide for the minimum FHWA and CDOT required number of borings/test holes per wall, bridge, poles, or other features as required. Alternate field collection methods such as geophysics and cone penetration testing can be used in place of borings at CDOT's approval.
- A pavement type analysis memo for reconstructed pavement tie-ins

## **2.6. STRUCTURAL ENGINEERING**

- The Consultant shall provide Structural Engineering services for the design and construction of walls, bridges, and other structural items as required including structure selection reports, wall selection reports and plan sheets. Provide cost effective innovation in collaboration with the construction manager and coordinate with the CDOT PM and CM for alternative selection. Collaboration with the aesthetic and landscaping requirements is to be expected.
- The Consultant shall follow the latest CDOT Bridge Design Manual Policies and Procedures. At the time of this SOW there is a February 2022 version.
- The Consultant shall follow the latest Bridge and Tunnel Enterprise (BTE) Guidelines for service life for applicable structures.
- The Consultant shall provide a bridge-specific preventative maintenance plan or “Owner’s Manual”, which identifies the recommended type, timing, and cost of future preventative maintenance treatments in accordance with BTE Guidelines.
- The Consultant shall assist the CDOT PM with the development of exhibits to be used for the determination of BTE program funding eligibility limits.



- Project scoping shall also include a determination that a new structure is required, or rehabilitation of an existing structure is feasible. This determination shall be confirmed through preliminary design.
- Provide structure inspection services of existing walls.
- The consultant shall provide inspection services on existing bridge structures.
- Due to the size of this project, recurring monthly meetings with a Staff Bridge representative prior to each milestone will be required for all FIR, DOR and FOR meetings.
- The preliminary design for major and minor structures, walls, and other miscellaneous structures within CDOT ROW shall be conducted as required to ensure that CDOT obtains a structure layout and type selection that achieves the project’s objectives and minimizes revisions during the final design and construction phases.
- The Structure Selection Report is due by DOR.
- Coordinate required recommendations with the geotechnical engineer.
- The general scope of work includes, but is not limited to:
  - Bridge Replacement
  - Bridge Rehabilitation
  - Wall Design
  - Wall Rehabilitation
  - New bridges
  - Overhead sign Structures
  - Poles
  - Fence
  - Gates
  - Any additional major/minor structures
- The design effort on this project may require alteration of existing walls to accommodate the desired roadway alignment and improvements.
- Participate in the survey SOW needs.

## **2.7. HIGHWAY DESIGN AND TRAFFIC/SAFETY ENGINEERING**

- Provide geometric highway design and traffic engineering expertise for the Project Scope Elements.
- The Consultant shall follow the latest version of the CDOT Roadway Design Guide, AASHTO A Policy on Geometric Design of Highway and Streets 2018, and the MUTCD.
- Provide for Traffic and Safety Engineering recommendations.
- A preliminary alignment has been designed for the proposed improvements as part of the EA. The Consultant shall confirm or modify the EA alignment to provide the most cost effective and safest layout that still meets the Project Goals. The safety revision and optimization effort shall be documented in a final memo.
- Provide traffic engineering expertise for crash reduction evaluation.
- Provide detailed site grading expertise for the identifications of walls and conforming the roadway to the adjacent landscape. Coordinate efforts with the geotechnical, structural, and other areas of expertise as required to complete the Project.
- Provide a Traffic Engineering plan for management of traffic during construction for phasing purposes. Evaluate the current Region 1 Lane Closure Strategy and make recommendations for implementation on the Project.
- Coordinate with Structural Engineer for Structure Selection Report requirements.
- Provide recommendations for and layout of ITS, lighting, and overhead signing components.



## **2.8. HYDRAULICS ENGINEERING**

- The Consultant shall adhere to guidelines in CDOT’s Drainage Design Manual and applicable Procedural Directives for drainage and Bridge design work.
- Prepare Hydrology and Hydraulic Design Reports and hydrology/hydraulic analysis. Follow the CDOT Drainage Design Manual and refer to chapter 10, Bridges.
  - Introduction, Hydrology, Existing Structures and Design Discussion should be close to final at FIR Design Discussion should include CDOT and local criteria the project intends to meet.
  - All design assumptions and related design decisions shall be documented.
  - The Appendix shall contain:
    - Hydrology/hydraulic worksheets
    - Drainage construction plan sheets.
    - Water Quality report and PWQ worksheets
  - Perform internal QA/QC on all hydrologic, hydraulic and floodplain information prior to submittal to CDOT
- Data Collection and Hydrology:
  - Determine the watershed hydrology and establish waterway flows, waterway geometrics
  - Utilize historical data: research flood history and previous designs in the project proximity; obtain data from other sources (e.g., MHFD, CWCB, CDOT Maintenance, and local residents).
  - Complete a project site visit to evaluate channel/overbank roughness coefficients, channel stability, vegetation, Ordinary High Water, allowable high water, etc. Document the site visit with photos
  - Perform a risk analysis
- Hydraulics Design Activities:
  - Complete Preliminary Design of major drainage structures:
    - Complete hydraulic analysis and water surface profiles.
    - Determine required hydraulic size/skew of major structures/channels.
    - Locate and place the bridge crossings. Coordinate with CDOT Region 1 for input on the alternative evaluation to come to a consensus on the recommended plan.
    - Determine minimum low chord elevation per CDOT criteria.
    - Determine 100-yr and 500-year water surface elevations.
    - Determine scour for design storm, the 500-year event, incipient overtopping condition, and maximum scour-inducing storm (if applicable).
    - Assess channel erosion protection for structures.
    - Present designs of any necessary deck drainage or other drainage off the structure.
  - Review data and information developed under the preliminary hydraulic investigation and update per FIR decisions
  - Complete Final Design for major drainage structures.
    - Finalize hydraulic analysis, elevations, flow lines, water surface profiles and hydraulic information.
    - Finalize configuration, size and skew of major structures and channels.
    - Coordinate final water surface profiles and final low girder elevation for selected structures.



- Finalize channel scour profiles for design year and 500-year scour for selected structures.
- Finalize channel erosion protection limits and mitigation measures for selected structures and provide appropriate details.
- Finalize deck/structure drainage in coordination with CDOT Staff Bridge or their designee.
- Complete final design for all drainage details required for major drainage structures.
- Recommend culvert pipe sizes, type, shape and material for proposed construction detours.
- Erosion and sedimentation problems identified with solutions in place, including but not limited to erosion and scour countermeasure designs, analyses and reports.
- Conduct 2-D modeling in SRH-2D
- Design revetment(s) if required
- Provide additional information as required by Region 1 Hydraulics Engineer (CDOT)
- Provide preliminary design information, as noted above, for the FIR meeting
- Provide required plans per the CDOT Drainage Design Manual as well appropriate project specifications
  - Drainage Notes
  - Drainage Tabulation Sheets
  - Drainage Plan Sheets
  - Drainage Profile Sheets
  - Drainage Detail Sheets
  - Bridge Hydraulic Information Sheets
  - Floodplain Information Sheet (as described below)
  - Provide digital linework from all drainage and floodplain analysis in GIS Shapefiles, AutoCAD/Civil3D drawings, or MicroStation/InRoads drawings. All CAD or MicroStation drawings must be compressed into a single drawing. All surfaces (DTMs, TINs, Rasters, etc.) must be separated and labeled clearly for archiving and rediscovery
- Coordination between Hydraulics, Geotechnical and Bridge Engineer will be required for FIR/DOR/FOR submittal timing
- Floodplain Assessment
  - Identify location of regulatory floodplains and floodways published by FEMA and local agencies, and planned changes to those boundaries for Bridge Replacements
  - Prepare of a local floodplain development permit for all work in floodplains and floodways, as required by state and federal law.
  - Determine level of FEMA/CWCB coordination for a LOMR or LOMC if required
- Prepare a Floodplain Information Sheet for the final approved plan set.
  - Show and clearly label the current effective 100-yr floodplain and floodway boundaries, and the 500-year floodplain.
  - Show and clearly label all cross sections and Base Flood Elevation (BFE) lines published on the current effective FIRM (note; all elevations must be reported in the same vertical datum identified on the current effective FIRM).
  - Show and clearly label any fluvial hazards, buffer zones or erosion management zones.
  - Show the limits of disturbance for all permanent and temporary activities, and label as such.
  - Add notes to indicate the waterway name, jurisdiction and community number, panel number, date of current effective information, a sentence describing which local code





requires permits, a sentence for permitting and no rise compliance, and a note recognizing that flooding may occur outside the SFHA.

## **2.9. ENVIRONMENTAL COMPLIANCE AND NEPA REEVALUATION(S)**

- The Designer shall monitor and ensure that the Project adheres to all of the mitigations noted in the pending EA and decision document.
- Provide Environmental expertise as required to review project materials and ensure compliance with the EA and decision document.
- If the design effort will require a Reevaluation of the I-270 Corridor EA, the environmental portion of the work may be completed by the previously selected consultant team tasked with completing the I-270 Corridor decision document. The newly selected Consultant’s role in this process shall be to provide design support to the existing EA team to advance toward a NEPA decision document or Reevaluation. If additional changes warrant a Reevaluation(s) after the decision document, the Consultant may become responsible for performing the NEPA scope in addition to the design scope.
- Provide guidance, expertise and coordination with FHWA for confirmation of the proposed action.
- The EA evaluated the following items for impacts and mitigation. The Consultant shall have the ability to reassess the following areas if impacted by changes after a decision document is issued that follows the appropriate NEPA guidelines and direction. Following are the required areas of expertise:
  - Air Quality
  - Biological Resources - wildlife, Threatened and Endangered species, migratory birds, Senate Bill 40 resources, aquatic species and resources, vegetation, noxious weeds
  - Floodplains
  - Geologic Resources
  - Hazardous Materials
  - Cultural Resources - Section 106, Archaeology, Paleontology
  - Social Resources - Land Use, Right of Way, Social and Economic Resources, EJ/DIC
  - Noise: This resource also requires a pre-construction benefitted receptor survey to determine whether or not the recommended noise wall will be built, which the Consultant will be required to develop and administer.
  - Section 4(f) Historic and Non-Historic
  - Section 6(f)
  - Recreational Resources
  - Transportation Resources (safety, traffic, multimodal, etc.)
  - Utilities
  - Water Quality
  - Wetlands and Waters of the U.S.
  - Visual
  - Vegetation

## **2.10. WETLANDS AND 404 PERMIT**

- Provide expertise in identifying jurisdictional waters of the US (WOTUS) including wetlands per current laws, regulations, and guidance pertaining to Section 404 of the Clean Water Act, and per current US Army Corps of Engineers regional wetland delineation standards and special requirements of the Omaha District and provide the appropriate level of 404 permitting. Guide



CDOT through the permitting process and establish the timeline to keep the project on schedule for the desired construction start date.

- Update Wetland Determination, Field Delineation, and FACWet Functional Assessment if necessary due to changes after the decision document.
  - Ensure digital maps of wetland polygons, other waters of the US and ordinary high water mark (OHWM) areas are included in appropriate FIR, DOR, FOR and AD/CAP plan sheets. Coordinate with Project Surveyor to have wetland flags surveyed as necessary. All wetland mapping and reporting should be in accordance with the Corps Omaha District's Minimum Standards.
- Obtain Approved Jurisdictional Determination of wetlands and waters of the US from the US Army Corps of Engineers (USACE) Omaha District, if necessary, after coordination with CDOT R1 Wetland Biologist with the 404 permit application or pre-construction notification (PCN).
- Assist the State in obtaining a permit from the Army Corps for construction impacts and mitigation of wetlands. The actual impacts identified in the EA may change based on refined design and the Consultant shall be prepared for either a Nationwide permit or an Individual permit process:
  - Provide services required to obtain an Individual Permit through the Army Corps, or
  - Request for Nationwide Permit Authorization
    - Prepare a complete Pre-Construction Notification (PCN) for Section 404 Permitting. The PCN will include the wetlands delineation, Section 7 and Section 106 reports, and all relevant plan and profile sheets showing wetland mapping and impacts, including information related to fills below OHWM in all waters of the US. Include appropriate volumes of riprap, and appropriate grading and structure plans. Depending on the type and amount of impacts, the project may require a stream functional assessment (e.g. the Colorado Stream Quantification Tool) to determine mitigation requirements for permanent impacts below the OHWM and/or a compensatory wetland mitigation plan with monitoring requirements. Coordinate the appropriate information with the CDOT R1 Wetland Biologist prior to submitting to the Corps.
    - Review plans for compliance with 404 permit.
- Provide: Plan sheets with revegetation recommendations; seed mixes, plant lists and revegetation notes; Draft Permit to CDOT, Final Permit submitted to Corps including final conceptual wetland mitigation and monitoring plans; stream functional assessment (if required); and comments on drawings and specifications.
- If there is any indication that the project could result in a "loss of waters" exceeding 3/100 acre, the USACE may require a stream functional assessment to determine compensatory mitigation requirements. Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for Page 3 of 6 an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the acres or linear feet of stream bed that are filled or excavated as a result of the regulated activity. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under



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section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the United States.



## **2.11. PERMANENT WATER QUALITY**

- Complete preliminary design for Permanent Water Quality Control Measures (PWQ CMs) and outlet structures with details as needed. Adequate detail should be included with respect to right-of-way, easements, maintenance, etc. to move to final design.
  - Prepare water quality report as an appendix to the Hydraulic Design Report to include PWQ Evaluation and Tracking Forms, cost estimate for PWQ CMs, etc.
  - Conduct a PWQ meeting just prior to FIR to discuss alternatives with CDOT PWQ Specialist/Water Pollution Control Manager, Hydraulics Engineer, and Project manager.
  - Perform internal QA/QC of the water quality report prior to submittal to CDOT.

## **2.12 RAILROADS, ITS AND UTILITIES**

Coordinate the following activities through the CDOT Project Manager as directed by the CDOT Railroad Coordinator and in accordance with Union Pacific Railroad – BNSF Railway, Guidelines for Railroad Grade Separation Projects.

- A. Develop and package railroad submittals:
    - a. 30% Plan including estimate of Flagging hours
    - b. 60% Plan including 30% Comments from Railroad, design plans and calculations, Geotechnical Report, Project Specifications and/or Special Provisions, Drainage Report and Plan and Construction Phasing
    - c. Final Plans including 60% Comments from Railroad, design plans and calculations, Geotechnical Report, Project Specifications and/or Special Provisions, Drainage Report and Plan and Construction Phasing
  - B. Define construction responsibilities between the railroad and highway including Temporary Access Exhibit for both Railroads to review and one round of comments.
  - C. Fencing Plan for both Railroads to review and one round of comments.
  - D. Develop cost estimates based upon cost allocation previously determined
  - E. Prepare Public Utilities Commission application exhibits as required for PUC Application
  - F. Draft Public Utilities Commission applications for CDOT.
  - G. Prepare Construction Maintenance Agreements (C&M) exhibits as required for CDOT.
  - H. Draft C&M Agreements for CDOT.
  - I. Prepare Utility License Agreements if needed.
- ITS components shall be designed such that they are fully integrated into the CDOT ITS Network.
  - The Designer shall coordinate with the CTIO and CDOT ITS to determine the equipment and infrastructure needed for the Project Scope Elements.
  - The Designer shall provide design plans for all required utility installations for all ITS components of the project.
  - Provide all required expertise for areas requiring lighting and electronic components.
  - Provide one-line diagrams as required for power sources.
  - As part of the scoping process, prepare an assessment of all the utility needs and all Intelligent Transportations Systems (ITS) and Network Services.
  - Follow CDOT SUE guidelines for existing conditions survey.



## **Subsurface Utility Engineering (SUE)**

SUE drawings and data for the project area were completed in 2021 and are available for use. Additional SUE investigations as described below may be conducted by the Consultant only if deemed necessary by the CDOT PM on an as-needed basis.

Utility Investigation Activities - the scope of work for utility investigation may include:

- a. The Consultant shall conduct and document an investigation of the project area to determine existing utility conditions within the project limits. As part of the investigation the Consultant will meet with all utility providers and collect utility key maps for all utilities in the project area, identify all known utilities: including lighting, irrigation, ITS, storm sewer, ownership, type, size and special conditions should utility relocation be required, and research and obtain copies of utility easements (public and private) and utility franchise agreements to determine conditions under which the utility was established in its present location (e.g. by revocable permit or by a privately owned easement. The utility investigation requirements are to meet Quality Levels A and/or B as required under CI/ASCE 38 or explain why QLA/B could not be achieved. The Consultant shall employ Professional Engineers who are able to stamp plans.
- b. **Project Goals**
  - 1) Quality Level B involves the use of Quality Level D and C methods of utility investigation plus the use of surface geophysical techniques to determine the existence and horizontal position of underground utilities. This activity is called "designating." The information obtained in this manner is surveyed to project control. Two-dimensional mapping information is obtained. This information is usually sufficient to accomplish preliminary engineering goals.
  - 2) Quality Level A involves the use of Quality Level D, C and B methods of investigation plus the use of minimally intrusive excavation methods at critical points to determine the precise horizontal and vertical position of underground utilities, as well as the type, size, condition, material, and other characteristics. This activity uses test holes (sometimes called Locating). It is the highest level presently available. When surveyed and mapped, precise plan and profile information is available for making final design decisions. Records research shall include but limited to the following sources:
    - 811 Notification
    - Contacts List
    - Public Agencies
    - Utility Owner
    - Colorado 811
    - County Clerk's Office
    - Landowner
    - Internet Search
    - Visual Site Inspection
    - Irrigation Companies



- 3) 3D Modeling involves the use of CADD to depict the precise horizontal and vertical profile of each utility in areas of high conflict. This tool is only utilized where precision locating and design of utilities is essential for project success. Some areas of the project may require 3D modeling and will be determined after 60% design, but the ability to model utilities within CDOT's MicroStation workspace may be required in a supplemental SOW.
- c. Utility Investigation Methodology
- 1) Project Scoping
    - a) Quality Level B Utility Investigation
    - b) Use existing survey project control data, GIS data, plans and electronic data from utility providers, and field survey to prepare utility design plans that meet ASCE Quality Level (QL) B identified within the project limits identified within CDOT's SUE checklist (provided by CDOT). The QLB areas will be determined between the SUE Consultant and CDOT's UEPM. Survey accuracy of all observations shall be in accordance with CDOT's Survey Manual.
  - 2) FIR (Field Inspection Review)
    - a) This work is performed at 30% design, prior to FOR Plan development
    - b) Quality Level A Utility Investigation
  - 3) FOR (Final Office Review)
    - a) This work is performed at 60% design, during FOR Plan development
    - b) 3D Modeling
  - 4) PS&E (Plans, Specifications & Estimate)
    - a) Ready for Utility Clearance and Advertisement
- d. Deliverables
- 1) Project Scoping:
    - a) PointMan CDOT's live Subsurface Utility Mapping mobile application will be available for all designated utilities during the SUE survey or submit a shape file of all existing utilities found during the SUE survey if PointMan is not used.
    - b) The end product (the CADD file and project plans) that contain the horizontal location of utilities, ownership, type, and size of the line including any special conditions of the line.
    - c) The CADD file and project plans should depict the lines in approved CDOT utility line type standards and colors, include all utility easements, and power source locations with easements, per CDOT's available CADD workspace.
    - d) Define limits of work SUE work and include SUE report per ASCE 38 Standards. SUE report shall be included, and will include the following if requested by CDOT:
      - I) All overhead utilities and pole inventory and including guy anchors-Power source diagrams
      - II) Telephone source diagrams
      - III) Fiber optic diagrams
      - IV) Storm sewer diagrams



- V) Water diagrams
  - VI) Sewer diagrams
  - VII) Vault diagrams
  - VIII) Easements shown on plans
  - e) Produce a utility contact list: Including utility provider, contact name, email address, work & cell phone numbers. Used for both utility notes and specifications.
  - f) The utility plan sheets will include the utility line work with proper designation colors.
  - g) Complete scoping design for utility plans.
  - h) Include service line locations for water, sewer, electrical, communications and natural gas.
  - i) Show transmission main lines and secondary feed lines with labels.
  - j) Distinguish lines between CDOT owned facilities, local agency facilities and utility provider facilities.
  - k) Produce utility plan sheets for review with utility providers including an oversize plan sheet for coordination and meetings.
  - l) Include known easements for the utility providers; inside, adjacent to and outside CDOT ROW on the utility plans.
  - m) Provide a table for each utility provider that includes size and type of the providers' facilities.
  - n) Include manhole rim labels and inverts in and out labels that match CDOT project datum elevation.
- 2) FIR (Field Inspection Review)
- a) Provide for and manage the test hole services, including permitting.
  - b) Provide a test hole map for survey locates.
  - c) Provide a test hole test hole chart and incorporate test hole location into the FIR Utility Plans. In the event there is insufficient design available to perform the test hole activities prior to FIR, the consultant shall coordinate the final test hole work into the FOR plan level submittal
  - d) Sewer/Storm manholes will be verified; rim elevations, inverts in and inverts out, include pipe size and pipe material. Include labels for other sewer appurtenances, lift stations, drop manholes, vents and force mains.
  - e) Water lines to be verified; elevations for valve boxes including size, pipe size and pipe material. Include labels for other water appurtenances, air vacs, PRV vaults, vents and curb stops.
  - f) Dry utility labels for vaults, pull boxes, manholes, drop down transformers and other providers attached to all overhead utility line poles.
- 3) FOR (Final Office Review)
- a) If requested provide Utility 3-D modeling in high conflict areas where precision placement of utilities is deemed essential.
  - b) Support CDOT with the development of cross sections leveraging SUE deliverables with both vertical and horizontal data.
  - c) Support the development of drainage profiles leveraging SUE deliverables with both vertical and horizontal data.
  - d) Support wall and bridge profiles leveraging SUE deliverables with both vertical and horizontal data.



- e) Support CDOT with Landscape plans leveraging SUE deliverables with both vertical and horizontal data.
- f) Support CDOT with signal and lighting plans leveraging SUE deliverables with both vertical and horizontal data.

### **Utility Coordination, Design Phase**

#### 1) Project Scoping

- a) Act as liaison between CDOT and the utility companies during design as it pertains to information, scheduling, coordination and documents.
- b) The Consultant will be responsible for obtaining all permits for work within CDOT ROW related to SUE investigations separate from the SUE consultant.
- c) Coordination of scoping meetings with all utility providers and meeting minutes.
  - Using CDOT Utility Checklist for each utility provider.
  - Coordinating work with SUE consultant
  - Obtain GIS information from utility providers
- d) Request and receipt of utility maps and easements from utility companies will be coordinated with CDOT project manager and with CDOT Utility Engineering Program Manager (UEPM).
- e) The consultant will conduct a review of utility information share findings with SUE consultant and CDOT UEPM.
- f) Request franchise agreements from the local agencies. Determine responsible party for cost implications.
- g) Request any secondary utility provider feeds, laterals, services and other attachments to the main utility provider's facility.
- h) Consultant to work with SUE consultant, surveyor and CDOT UEPM that information is adjusted and matches CDOT project datum.
- i) Provide photos of existing utility facilities and conditions in the project limits.
- j) Review and comment on SUE related plans with CDOT project manager and CDOT UEPM.
- k) Develop mapping and associated pertinent information of existing utilities, street lighting, and irrigation ditch facilities within the project limits of each construction project. underground-at grade-overhead utilities
- l) Ascertain and define all utility, street lighting, and irrigation ditch conflicts within the highway construction project limits by an in-depth review of complex highway plans. Contact individual utility, and irrigation companies to convey and jointly resolve these conflicts. The typical construction project requires contact with 4-6 individual companies.
- m) Schedule and conduct subsequent meetings with utilities to resolve complex issues.

#### 2) FIR (Field Inspection Review)

- a) Coordination of FIR meetings with all utility providers and meeting minutes. (Both Office and Field)





- b) Review, recommend revisions, and approve relocation and/or installation plans developed by utility companies to insure compatibility with CDOT construction plans. This process requires input from and coordination with CDOT construction and design personnel, and appropriate State and Local agencies.
  - c) Use CDOT’s Work Plan (template to be provided) document for non-reimbursable relocation, modification and/or adjustment of existing utilities, irrigation ditches and street lighting companies. These documents describe work that must be performed in a prescribed time and method and require signatory concurrence from the affected company and appropriate CDOT personnel.
  - d) Use CDOT’s Utility Conflict Matrix plan sheet (template to be provided) to develop and review utility matrix conflicts with CDOT UEPM and work on a preliminary plan of action.
  - e) Produce and review a proposed test hole location map with CDOT UEPM.
  - f) The consultant will coordinate with SUE consultant, CDOT UEPM, test hole provider and survey company on test hole schedule along with field site coordination.
  - g) The Consultant will be responsible for obtaining all permits for work within CDOT ROW related to SUE investigations separate from the SUE consultant.
  - h) Provide a matrix of potential utility conflicts utilizing CDOT’s standard utility conflict matrix plan sheet.
  - i) Produce utility plan sheets for review with utility providers including an oversize plan sheet for coordination and meetings.
  - j) Complete FIR design for utility plans.
  - k) The utility plan sheets will include the utility line work with proper designation colors, per CDOT’s MicroStation workspace.
  - l) The consultant will coordinate with CDOT project manager and CDOT UEPM and utility companies on the FIR design plans for review and comment.
  - m) Review and interpret all FIR plans to insure that utility facilities have been accurately and completely depicted, including field verification of all utility locations.
  - n) Schedule and conduct subsequent meetings with utilities to resolve complex issues.
  - o) Responsible for creation of draft utility specification documents, utility notes and preparation of subsequent written certification to proceed with construction. The utility specification defines the process to be followed for performance of utility, street lighting, railroad, and irrigation ditch relocations or installations. This includes who will perform the work, when it will be performed, time allotted for the work, and method of construction.
- 3) FOR (Final Office Review)
- a) Coordination of FOR meetings with all utility providers and meeting minutes. (Both Office and Field)



- b) Assist the development of utility plan sheets to include the utility line work with proper designation colors.
- c) Include utility notes and specifications.
- d) Assist in the completion of FOR level utility plans.
- e) The consultant will finalize the identification of existing utilities (both wet and dry) that will be impacted by design and finalize the existing utility plans with call-outs indicating which existing utilities are impacted by the project.
- f) Produce and/or obtain from the owner utility cost estimates to be used for utility reimbursement agreements.
- g) Coordination with the utility providers and CDOT UEPM on potential relocation areas.
- h) Review, recommend revisions, and approve relocation and/or installation plans developed by utility and railroad companies to insure compatibility with CDOT construction projects. This process requires input from and coordination with CDOT construction and design personnel, and appropriate State and Local agencies.
- i) Create documents for non-reimbursable relocation, modification and/or adjustment of existing utilities, irrigation ditches and street lighting companies. These documents describe work that must be performed in a prescribed time and method and require signatory concurrence from the affected company and appropriate CDOT personnel.
- j) Produce and coordinate draft utility notification letters for review.
- k) Prepare and coordinate preliminary utility cost relocation estimates for budget for review.
- l) The consultant will coordinate with SUE consultant, CDOT project manager, CDOT UEPM and utility companies on the FOR design plans for review and comment.
- m) Review and interpret all FOR design plans to insure that utility facilities have been accurately and completely depicted, including field verification of all utility locations.
- n) Schedule and conduct subsequent meetings with utilities to resolve complex issues.
- o) Determine eligibility for reimbursable expenses associated with utility and railroad company installations, modifications, and/or relocations according to CDOT, State and Federal rules and regulations. This process includes obtaining and verifying legal documentation to determine property ownership and right of occupancy.
- p) Initiate and prepare contracts with utility companies for reimbursable modifications. Review estimates for content, check mathematical accuracy, and submit for CDOT signatures and authorization, in compliance with all CDOT, State and Federal rules and regulations. Following issuance of the notice to proceed, act as primary contact for coordination of design, bidding, construction and billings.
- q) Responsible for creation of final utility specification documents and preparation of subsequent written certification to proceed with construction. The utility specification defines the process to be followed for performance of utility, street lighting, railroad, and irrigation ditch relocations or installations. This includes who will perform the work,



when it will be performed, time allotted for the work, and method of construction.

- 4) PS&E (Advertisement)
  - a) Coordination of PS&E meetings with all utility providers and meeting minutes. (Both Office and Field)
  - b) Final coordination with the utility providers on the potential relocation areas.
  - c) Produce and coordinate final utility notification letters for review.
  - d) Prepare and coordinate final utility cost relocation estimates for budget and utility contracts.
  - e) The consultant will coordinate with SUE consultant, CDOT project manager, CDOT UEPM and utility companies on the PS&E design plans for review and comment.
  - f) Review and interpret all PS&E design plans to ensure that utility facilities have been accurately and completely depicted, including field verification of all utility locations.
  - g) Schedule and conduct subsequent meetings with utilities to resolve complex issues. Review billings and preparation of payment documentation pertaining to work performed under utility and railroad reimbursable contracts to insure compliance with CDOT, State and Federal rules and regulations. This process includes obtaining written concurrence from CDOT personnel, and/or performing personal site inspection, to verify that work was performed in accordance with said contracts.



### **2.13. PROJECT COORDINATION**

In addition to the stakeholders listed in **Section 1.6.**, the CM shall partner and coordinate with the groups below. The CDOT Project Management Team (defined below) shall be included in all coordination.

- Executive Oversight Committee
- CDOT Project Management Team
  - CDOT Program Engineer – Stephen Henry, PE
  - CDOT Regional Environmental Manager – Basil Ryer
  - CDOT Design Project Manager – Katie Dawson, PE
  - CDOT Construction Project Manager – Katie Dawson, PE
- CDOT Specialty Groups
  - Region 1 Materials
  - Region 1 Traffic
  - Region 1 Hydrology and Hydraulics
  - Region 1 Survey
  - Region 1 Environmental
  - Region 1 Right-of-Way
  - Region 1 Utilities
  - CDOT Staff Bridge
  - CDOT Soils & Geotechnical Services
  - CDOT Public Information Office
  - CDOT Operations Center
- Design Consultant and Subconsultants
- Project Construction Manager (Owner's representative in construction) and any subcontractors
- ICE
- CDOT Engineering Estimates and Market Analysis (EEMA) Group
- CDOT Maintenance Forces
- Headquarters and Regional Civil Rights Manager
- CTIO
- Bridge & Tunnel Enterprise



#### **2.14. PROJECT CO-LOCATION**

Plans to co-locate with the Design Team and CM for the preconstruction phase of this Project and throughout construction will be determined after selection. The location and timeframe for co-location is to be determined but is anticipated to be in the Denver Metro or within the Project vicinity. Co-location is at the discretion of CDOT.

#### **2.15. STAKEHOLDER EFFORTS**

The Consultant shall collaborate with CDOT and the Contractor to prepare for distribution of public information and stakeholder outreach.

This section covers the Project Leadership Team (PLT) meetings, Technical Team (TT) meetings and Issue Task Force (ITF) meetings. The following are the estimated required meetings:

- Project Leadership Team (PLT) Meetings – 5 estimated
- Technical Team (TT) Meetings – 5 estimated
- Issue Task Force (ITF) Meetings
- Emergency Response Meetings - 4 estimated
- Sand Creek/South Platte Greenway Meetings - 4 estimated

## SECTION 3 – EXISTING FEATURES

### 3.1. STRUCTURES

Note: This Section lists known features in the area. It should not be considered as complete, and should include, as appropriate, information from Section 2 Project Management and Coordination. The Consultant should be alert to the existence of other possible conflicts.

- E-17-ID
- E-17-IE
- E-17-IF
- E-17-IG
- E-17-IH
- E-17-II
- E-17-IJ
- E-17-IK
- Sign E-17-RO
- Sign E-17-XO
- Sign E-17-ADT
- Sign E-17-XM
- Sign E-17-VQ
- Sign E-17-ADV
- Sign E-17-LC

Potential Conflicts:

- E-17-WP
- COMC-4A-01-RR
- COMC-4A-02-RR
- COMC-5A-03-RR

### 3.2. UTILITIES

**Anticipated Utility Relocation/Coordination:**

Utility Identification	Facility type	Relocation Required?
Electric (Xcel Energy)	Overhead and buried lines	TBD
Telecommunications (CDOT, Zayo, Sprint, CenturyLink, Level 3)	CDOT continuous fiber optic conduit runs along I-270 and services CDOT’s variable message signs	Yes
Gas (Xcel, Suncor, Magellan)	Low and High Pressure lines within the project area	TBD
Sanitary Sewers (MWRD, Adams CO Water and Sanitation)	Location and potential conflicts to be further investigated	TBD
Water (Adams CO Water and Sanitation)	Location and potential conflicts to be further investigated	TBD
Storm Sewer (CDOT)	CDOT has a storm sewer collection system within the corridor	Yes

**3.3. IRRIGATION DITCHES**

- Burlington Irrigation Ditch owned by Farmers Reservoir and Irrigation Company (FRICO)

**3.4. RAILROADS**

- UPRR
- BNSF

**3.5. PERMANENT WATER QUALITY CONTROL MEASURES**

- To be determined

**3.6. WATER FEATURES**

- Sand Creek
- South Platte River

**SECTION 4 – GENERAL INFORMATION**

**4.1. NOTICE TO PROCEED**

Work shall not commence until the written Notice-to-Proceed is issued by CDOT. 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:

- Reviews and Approvals
- Response and Direction

**4.2. PROJECT COORDINATION**

See Section 2 – Project Management and Coordination

**4.3. ROUTINE REPORTING AND BILLING**

The Consultant shall provide the following on a routine basis:

- Coordination:
  - Coordination of all contract activities by the C/PM
- Periodic Reports and Billings:
  - The periodic reports and billings required by CDOT Procedural Directive 400.2 (Monitoring Consultant Contracts), including monthly drawdown schedules.
  - Consultant Invoicing Guidelines. Please provide the following seven sections and information in each invoice in the following order:
    1. Form 1313
    2. Invoice
      - Provide invoice in a similar format to the original PCW
        - Noting each employee, time worked, multiplier, Fee
        - Sum total hours worked and labor, subtotal fixed fees, subtotal sub-consultants, subtotal vendor under prime (sub consultants should note 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
      - Provide columns next to employees ensuring Consultant has reviewed for:
        - Employee on original TO
        - Employee on MPA and date
        - Employee added to TO by letter and date



- Employee added to MPA Date and documentation
- Provide a header for the invoice noting:
  - SAP OL#, SAP PO#, Invoice Date, Invoice #, Project # and subaccount #, current billing period, TO# and any other pertinent information
- 3. Progress Report shall be submitted 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.
  - 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.
  - A report 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.
  - A description of the cause for delays beyond the planned completion of time of work activities or milestones contained in the project.
  - 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 showing 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.
  - 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.
  - Documentation of meetings that were held during the subject time period.
  - A report on the participation of DBE sub-consultants.
- 4. 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)
- 5. Labor backup – timesheets
  - The Prime, Sub-consultants and Vendors shall submit detailed hourly back up of effort noting time/date of activities and number of hours or costs. Lodging backup shall be submitted through ODC backup.
- 6. ODC backup – Only Submit documentation pertaining to the project and the invoice
  - Provide a summary of ODC Cover sheet
    - Purpose of trip, Date of Trip, Who went
  - 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.
- 7. Sub-consultant billings and Vendors - should have the same documentation as prime, except Form 1313, which is optional.
- 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.

#### **4.4. PROJECT DESIGN DATA AND STANDARDS**



- **General:** Appendix A provides a comprehensive list of state and federal reference material. However, Appendix A does not contain all local agency reference material that may be pertinent to some projects. The Consultant is responsible for obtaining and ensuring compliance with the most recent CDOT-adopted version of the listed references including standards and specifications, manuals, and software, or as directed by the CDOT/PM. Conflicts in criteria shall be resolved by the CDOT/PM.
- **Construction Materials/Methods:** The materials and methods specified for construction will be selected to minimize the initial construction and long-term maintenance cost to the State of Colorado. Non-typical construction materials and methods must be approved in writing by CDOT.



### SECTION 5 – WORK ACTIVITY ASSIGNMENTS

This list establishes the consultant's individual task responsibility. The consultant shall maintain the ability to perform all work tasks which are indicated below by an 'X' mark in the consultant column in accordance with the applicable CDOT standards. Selected work tasks shall be assigned only after coordination and consultation with CDOT. The Project Team is responsible for coordinating the required work schedule for those tasks accomplished by CDOT and other agencies. **Many of the included Consultant Responsibilities revolve around maintaining and providing the appropriate NEPA expertise if required. Some are marked with an \* asterisk.**

<b><u>PRECONSTRUCTION</u></b>	CDOT/Other	Consultant	Notes
<b>A. Project Initiation and Continuing Requirements:</b>			
Initial Project Meeting		X	
Review Environmental Mitigation Requirements		X	
Independent Design Review		X	
Project Schedule		X	
Develop Design Criteria		X	
Initiate Survey (Map Preparation)		X	
Right-of-Entry and Permits		X	
Traffic Control		X	
Initial Submittals		X	
Progress Meetings		X	
Structure Review Meetings		X	
Project Management		X	
<b>B. Project Development:</b>			
<b>Communication and Consensus Building</b>			
Contact List		X	
Public Notices/Advertisements		X	
<b>General Meetings</b>			
Small Group		X	
General Public		X	
Project Review		X	
<b>Communication Aids</b>			
Graphics Support		X	
Newsletter		X	
Wall Displays		X	
Study Model		X	
Project Review Team		X	
<b>Survey</b>			
Presurvey Conference		X	
Survey Data Research		X	
Secure Rights of Entry		X	
<b>Project Control Survey</b>			
Locate or establish HARN Stations		X	
Monumentation		X	



Project Control			X	
Photogrammetry			na	
Camera Calibration Report			na	
Flight Plan			na	
Flight			na	
Contact Prints			na	
Negatives			na	
Enlargements			na	
Photo Index			na	
Supplemental Survey (wing points)			na	
Supplemental Surveying			X	
Accuracy Tests			X	
Review (by Registered Professional Land Surveyor)			X	
<b>Conceptual Design</b>				
Aesthetics			X	
System Feasibility			X	
Alternatives Analysis			X	
Final Alternatives Reports			X	
Interchange Approval Process			na	
<b>Data Gathering Analysis, and Mitigation Development</b>				
<b>Traffic Related</b>				
Traffic Study			X	
Accident Study			na	
Noise Study	O			
<b>Air Quality</b>				
Air Quality Monitoring			X	
Air Quality Analysis	O			
<b>Archaeology</b>				
Gather Data & Analysis			X	
Mitigation Implementation			X	
<b>Paleontology</b>				
Gather Data & Analysis			X	
Mitigation Implementation			X	
Initial Geology Investigation			X	
<b>Water Quality</b>				
Quality Analysis			X	
Quality Monitoring			X	
Ecological Assessment			X	
<b>Historical</b>				
Historical Bridge Clearance	O			
Historical Study & Clearance	O			
Floodplain and Drainage Assessment			X	



<b>Right-of-Way</b>			
Early ROW			X
ROW Review			X
<b>4(f)/6(f) Activity</b>			
Evaluation			X
Clearance/Concurrence			X
<b>Threatened and/or Endangered Species</b>			
Determination of Presence			X
<b>Implement Mitigation</b>			X
Wetlands			
Wetlands Determination			X
Wetlands Findings Report			X
<b>Hazardous Materials</b>			
Field Search			X
Research			X
Conduct in-situ tests			X
Analyze and Assess Impacts			X
Existing Roadway/Major Structure			X
Construction Requirements			X
Aesthetic Considerations			X
Utilities			X
Economics			X
<b>Farmland</b>			
Energy Usage			X
Environmental Assessment (EA) Process	O		
Environmental Impact Study (EIS) Process	na		
Design Report Process			X
Obtain Permits			X
<b>C. Preliminary Design:</b>			
<b>Design Field Surveys</b>			
Presurvey Conference			X
Survey Data Research			X
Secure Rights of Entry			X
<b>Project Control Survey</b>			
Locate or Establish HARN Stations			X
Monumentation			X
Local Project Control	O		
InRoads TMOSS Survey Openroads Designer			X
Terrain Survey	O		
Utility Survey	O		
Hydraulic Survey			X
Material Survey			X
Supplemental Surveying			X



Survey Report		X	
Accuracy Tests		X	
Review (by Registered PLS)		X	
Wetland Boundary		X	
Traffic Engineering		X	
<b>Materials Engineering</b>			
Preliminary Soil Investigation	O		
Pavement Justification Report		X	
Life Cycle Cost Analysis		X	
Existing Bridge Investigation		X	
Foundation Investigation		X	
Geotechnical		X	
Hydrology/Hydraulics Engineering		X	
Hydrology		X	
Hydraulics		X	
Preliminary Hydraulics Report		X	
Utility Coordination		X	
Location Maps		X	
Reviews and investigations		X	
"Potholing"-Excavation		X	
"Potholing"-Surveying Utility Locations		X	
Relocation recommendations		X	
Ditch Company coordination		X	
<b>Roadway Design and Roadside Development</b>			
Roadway Design		X	
Roadside Development		X	
Guardrail and delineator		X	
Curb Ramps and Sidewalk		X	
Landscaping		X	
Sound Barriers		X	
Bike paths		X	
Truck Escape Ramps		na	
Rest Areas		na	
Safety analysis		X	
Lighting Plan		X	
Right-of-Way		X	
Research		X	
Ownership Map		X	
Appraisal		X	
Acquisition		X	
<b>Major Structural Design</b>			
Structural Data Collection		X	
Structure concept study		X	
Value Engineering		X	

Structure Selection Report			X	
Foundation Investigation Request			X	
Construction Phasing Plan			X	
Preparation for the FIR			X	
Field Inspection Review			X	
Post FIR Revisions			X	
<b>D. Final Design:</b>				
Project Review			X	
Design Coordination			X	
Utility Coordination			X	
<b>Hydraulic Design</b>				
Data Review			X	
Storm Water Pollution Prevention Plan			X	
Major Structure Channel Design			X	
Final Hydraulics Report			X	
<b>Interim Plans</b>				
Initiate ROW Authorization Process			X	
Final Utility Plans			X	
Final Railroad Plans				
<b>Right-of-Way</b>				
ROW Plans Content			X	
Title Insurance and Closing Services			X	
Authorization Plan			X	
Appraisal Staking			X	
ROW Plan Revisions (During Negotiations)			X	
ROW Acquisition	X			
<b>Materials Engineering</b>				
Materials Data			X	
Stabilization validity			X	
Stabilization Plan			X	
<b>Traffic Engineering</b>				
Permanent Signing/Pavement Marking Plans			X	
Signalized Intersections			na	
Traffic Control Plan			X	
<b>Roadside Planning</b>				
Landscaping			X	
Other			X	
Sprinkler systems/Liquid Anti-Icing			X	
Bike paths			X	
Sound barriers			na	
Truck escape ramps			na	
Rest Areas			na	
Guardrail and delineator			X	
Safety analysis			X	



Lighting Plans			X	
Roadway Design			X	
Final Major Structural Design			X	
Structure Final Design			X	
Preparation of Structure Plans and Specifications			X	
Independent Design, Detail, and Quantity Check			X	
Bridge Rating and Field Packages			X	
Structure Final Review Plans and Specifications			X	
Construction Phasing Plan			X	
Plan Preparation for FOR			X	
Final Office Review			X	
Construction Plan Package			X	
Respond to Job Showing Questions			X	
Revise Plans during Advertisement – if necessary			X	
<b>E. Corridor Management Support:</b>				
Design Control			X	
Information Services			X	
Budget Planning Support			X	
<b>F. Value Engineering</b>			X	

<b>SERVICES AFTER DESIGN</b>	CDOT/Other	Consultant	Notes
. Review of Shop Drawings		X	
<b>B. Construction Services</b>			
1. Coordinate Schedule		X	
0. Provide field observation			
. Pile driving/caisson drilling		X	
b. Major concrete pours		X	
c. Placement of girders		X	
d. Splicing of girders		X	
e. Post-tensioning duct and anchorage placement		X	
f. Post-tensioning operations		X	
0. Technical assistance			
. Design Support during Construction		X	Provide services after submittal of construction package, not full CM services
0. Submittals			
. Diary		X	
b. Documentation/justification		X	
c. Progress reports		X	
d. Calculations, drawings, and specifications		X	
e. Daily time sheets		X	
<b>C. Post Design Plan Modifications</b>		X	



D. Post Construction Services:			
1. Final earthwork determination			
0. As-built plans			
0. Revisions to Right-of-Way Plans (Excess Land)		X	
0. Monument ROW		X	
0. Set Property Corners (Remainders)		X	
0. Deposit ROW Plans		X	
E. Construction Engineering			





## SECTION 6 – SUBMITTALS

<u>SUBMITTALS</u>	CDOT/Other	Consultant	Notes
Project Initiation and Continuing Requirements:			
1. Periodic Reports & Billings		X	
0. Meeting Minutes		X	
0. Project Schedule		X	
0. Completed Specific Design		X	
0. Survey Plan		X	
0. Permissions to Enter (Form 730)		X	
0. Traffic Control Plan		X	
0. Initial Submittal of InRoads TMOSS and/or MOSS Compatible Data – Openroads Designer		X	
0. Initial Submittal of an Original Plan Sheet			
<b>B. Project Development:</b>			
1. Public Communication Contact List		X	
0. Route Location Survey:			
. Electronic Survey Files		X	
b. Survey InRoads TMOSS Data Openroads Designer		X	
c. Monument Records		X	
d. Control & Monumentation Plan Sheets		X	
e. Aerial Photography Index Map Sheets			
f. Aerial Photography Contact Prints			
g. Aerial Photography Negatives			
h. Photogrammetry			
1. Electronic Data			
0. Base Map Sheets			
0. Base Map Index Sheet(s)			
i. Rectified Photos with Mylar Originals			
0. System Feasibility Study			
0. Final Alternatives Report			
0. Noise Assessment Report		X*	
0. Air Quality Report		X*	
0. Archaeology Survey Report & Mitigation Plan		X*	



0. Paleontology Preliminary Report & Mitigation Plan			X*	
0. Water Quality Report (SCMP)			X*	
0. Ecology Report			X*	
0. Historical Bridge Clearance or Mitigation Plan			X*	
0. Historical Cultural Resources Report			X*	
0. Floodplain and Drainage Assessment Report & Mitigation Plan			X*	
0. ROW Report			X*	
0. 4(f)/6(f) Mitigation Plan			X*	
0. Threatened and/or Endangered Species Assessment			X*	
0. Wetlands Findings Report			X*	
0. Hazardous Materials Findings			X*	
0. Environmental Assessment (EA)				
. Preliminary EA				
b. Certified Verbatim Transcript				
c. Finding of No Significant Impact (FONSI)				* This project needs to cover the mitigation requirements from the EA AND the Consultant needs to provide the expertise for and develop a Reevaluation if necessary (after a decision document is issued)
0. Environmental Impact Statement				
. Draft EIS				
b. Certified Transcript of Meeting				
c. Final EIS				
0. Design Report Process				
. Preliminary Design Report			X	
b. Final Design Report			X	
0. Permits				
. 401 Permit			X	
b. 402 Permit			X	
c. 404 Permit			X	
d. Wildlife Certification			X	
e. NPDES Storm Water Permit			X	
0. Preliminary Design			X	
. Electronic Survey				
b. Traffic Data & Recommendations			X	
c. Soils Investigation Report			X	
d. Pavement Design Report			X	



e. Existing Bridge Condition Report			X	
f. Foundation Investigation Report			X	
g. Engineering Geology Plan Sheet(s)			X	
h. Preliminary Hydraulics Report			X	
i. Utility Relocation Recommendations			X	
j. Ditch Structure Plans			X	
k. Stabilization Plan			X	
l. FIR Plan Set			X	
0. Final Design				
. Corrected FIR Plan Set			X	
b. Preliminary Cost Estimate			X	
c. List of Deviations from Standard Design Criteria			X	
d. Final Hydraulics Report			X	
e. Signing/Pavement Marking Plans			X	
f. Signal Warrants				
g. Signalized Intersection Plans and specifications				
h. Traffic Control Plan			X	
i. Structural Selection Report			X	
j. Foundation Investigation Request			X	
k. Structure Final Review Plans and Special Provisions			X	
l. Construction Phasing Plan			X	
m. FOR Plan Sheets and Special Provisions			X	
n. FOR Cost Estimate			X	
o. FOR Revised Plans and Special Provisions			X	
p. Final Review Revisions			X	
q. Final Utility Plan Set			X	
0. Roadside Planning				
. SWMP Plans & Specs.			X	
b. Certification of plant Availability			X	
c. Sprinkler System Plans & Specs.			X	
d. Bike path Plans & Specs.			X	



e. Sound Barrier Plans & Specs.			X	* Provide expertise for and develop a Reevaluation after a decision document if necessary
f. Truck Escape Ramp Plans & Specs.				
g. Rest Area Plans & Specs.				
h. Lighting Plans			X	
<b>C. Right-of-Way</b>				
1. Title Commitments			X	
0. Preliminary Ownership Map (include in the FIR plan set)			X	
0. Area Calculations			X	
0. Authorization Plans			X	
0. Legal Descriptions			X	
0. ROW Authorization Plans			X	
<b>D. Construction Plan Package</b>				
1. Roadway Design Data Submittal (Form 463)			X	
0. Major Structure Design Final Submittal			X	
0. Record Plan Sets			X	

## APPENDIX A: REFERENCES

### A.1. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) PUBLICATIONS (using latest approved versions):

- A Policy on Design Standards-Interstate System
- A Policy on Geometric Design of Highways and Streets
- Guide for Design of Pavement Structures
- Standard Specifications for Highway Bridges
- Guide for the Design of High Occupancy Vehicle and Public Transfer Facilities
- Guide for the Development of Bicycle Facilities
- Standard Specifications for Transportation Materials and Methods of Sampling and Testing – Part I, Specifications and Part II, Tests
- Highway Design and Operational Practices Related to Highway Safety
- Roadside Design Guide
- Load Resistance Factor Design (LRFD) Specifications

### A.2. COLORADO DEPARTMENT OF TRANSPORTATION PUBLICATIONS (using latest approved versions):

- Design Guide (all volumes)
- Bridge Design Guide
- Bridge Detailing Manual
- Bridge Rating Manual
- Project Development Manual
- Erosion Control and Stormwater Quality Guide
- Field Log of Structures
- Cost Data Book
- Drainage Design Manual
- NEPA Manual
- Environmental Stewardship Guide
- Quality Manual
- Survey Manual
- Field Materials Manual
- Standard Plans, M & S Standards
- Standard Specifications for Road and Bridge Construction and Supplemental Specifications
- Item Description and Abbreviations (with code number) compiled by Engineering Estimates and Market Analysis Unit (“Item Book”)
- Right-of-Way Manual
- The State Highway Access Code
- Utility Manual
- TMOSS Generic Format
- Field TMOSS Topography Coding
- Topography Modeling Survey System User Manual
- Interactive Graphics System Symbol Table



**A.3. CDOT PROCEDURAL DIRECTIVES** (using latest approved versions):

- No. 27.1 Social Marketing – Use of Web 2.0 and Similar Applications
- No. 31.1 Website Development
- No. 400.2 Monitoring Consultant Contracts
- No. 501.2 Cooperative Storm Drainage System
- No. 514.1 Field Inspection Review (FIR)
- No. 516.1 Final Office Review (FOR)
- No. 1217a Survey Request
- No. 1304.1 Right-of-Way Plan Revisions
- No. 1305.1 Land Surveys
- No. 1601 Interchange Approval Process
- No. 1700.1 Certification Acceptance (CA) Procedures for Location and Design Approval
- No. 1700.3 Plans, Specifications and Estimates (PS&E) and Authorization to Advertise for Bids under Certifications Acceptance (CA)
- No. 1700.5 Local Entity/State Contracts and Local Entity/Consultant Contracts and Local Entity/R.R. Contracts under C.A
- No. 1700.6 Railroad/Highway Contracts (Under Certification Acceptance)
- No. 1905.1 Preparation of Plans and Specifications for Structures prepared by Staff Bridge Branch

**A.4. FEDERAL PUBLICATIONS** (using latest approved versions):

- Manual on Uniform Traffic Control Devices
- Highway Capacity Manual
- Urban Transportation Operations Training – Design of Urban Streets, Student Workbook
- Reference Guide Outline – Specifications for Aerial Surveys and Mapping by Photogrammetric Methods for Highways
- Executive Order 12898
- Executive Order 11988 & 13690 FHWA Federal-Aid Policy Guide
- FHWA NHI Hydraulic Circular (HEC) and Hydraulic Design Series (HDS) Reports
- Technical Advisory T6640.8A
- U.S. Department of Transportation Order 5610.1E
- Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques
- ADAAG Americans with Disabilities Act Accessibility Guidelines
- 23 CFR 771, the FHWA Technical Advisory T6640.8A
- 44 CFR 59-72, standards of the National Flood Insurance Program (NFIP)



## 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
ADAAG	Americans with Disabilities Accessibility Act Guidelines
BAMS	Bid Analysis and Management Systems
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BNSF	Burlington Northern /Santa Fe Railroad
BTE	Colorado Bridge and Tunnel Enterprise
CA	Contract Administrator – The CDOT Manager responsible for the satisfactory completion of the contract by the Consultant.
CAP	Construction Agreed Price
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
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.
CTIO	Colorado Transportation Investment Office
CWCB	Colorado Water Conservation Board
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
D&RGW	Denver & Rio Grande Western Railroad
EA	Environmental Assessment
EIS	Environmental Impact Statement



ESAL	Equivalent Single Axle Load
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
FIR	Field Inspection Review
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 four 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.
MHFD	Mile High Flood District
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
PAPER SIZES	See Computer-Aided Drafting Manual (CDOT); Table 6-13 and Table 8-1
PE	Professional Engineer registered in Colorado
PM	Program 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
SFHA	Special Flood Hazard Area
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.





**COLORADO**  
Department of Transportation

**Appendix B**

Draft Design Scope of Work – 9/1/2022  
Project No. FBR 2706-044/C R100-364  
I-270 Critical Bridge Replacements Project

UPRR  
USCOE

Union Pacific Railroad  
United States Army Corp of Engineer