November 2022

GENERIC SCOPE OF WORK BASIC CONTRACT

CONTRACT TYPE

X Cost Plus Fixed Fee

SOW DATE: 01.03.2023

PROJECT NUMBER: NH 0243-094

PROJECT LOCATION: Region 2, El Paso County, US Hwy 24G MP 317.5 - 321.5

PROJECT CODE: 25094

THE COMPLETE SCOPE OF WORK INCLUDES THIS DOCUMENT (ATTACHED TO THE CONTRACT FOR CONSULTANT SERVICES)

Comments regarding this scope may be directed to:

CONTRACTS AND MARKET ANALYSIS BRANCH

Engineering Contracts Unit

Marci Gray, Contracting Officer
303-757-9297

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INSTRUCTIONS

This Scope of Work is to serve as a template for the Colorado Department of Transportation (CDOT) to develop and negotiate solid contracts with Consultant teams on projects and tasks. The Consultant shall coordinate all activities, tasks, meetings, communications and deliverables with the CDOT/ Project Manager (PM) (or 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, 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.

SECTION 1 PROJECT SPECIFIC INFORMATION

PROJECT BACKGROUND

In March 2018 CDOT completed a Planning and Environmental Linkages (PEL) study to examine conditions and anticipated problem areas along the US 24 corridor in El Paso County, between Powers Boulevard (CO 21) and the Town of Ramah. This study concluded that the area identified in this RFP to be a high priority need for additional lanes. This RFP will not bring to fruition the highway's ultimate build cross section but will bring about an interim cross section as described in this scope of work.

PROJECT GOALS

This project is intended to produce the following improvements:

A.	Increased capacity	X
B.	Improved Safety	X
C.	Higher level-of-service	X
D.	Improved riding surface (smoother or stronger pavement)	□
E.	Bridge Replacement	□
F.	Resurfacing, Restoration, Rehabilitation	X
G.	Reconstruction	□
H.	Other:	X

1. Implement the Access Control Plan (ACP) and modify as needed.
2. Coordinate with Local Agencies on ACP modifications including access roads.
3. Write contract agreements with Local Agencies.

1. PROJECT LIMITS

This project is located on Highway 24G, between milepost 317.5 and milepost 321.5 in El Paso County.

2. PROJECT COSTS

The construction cost of this project is estimated at $42,000,000.

3. WORK DURATION

The time for the work described in this scope is approximately 1460 calendar days.

4. CONSULTANT RESPONSIBILITY AND DUTIES

The Consultant is responsible for completing the roadway design of one new lane in each direction plus a widened paved median. The roadway design includes improving several existing at grade intersections to accommodate the widened highway. A land survey has been completed for the majority of the project needs however the Consultant will obtain supplemental land surveys as needed including but not limited to geotechnical borings and, for SUE. The Consultant will evaluate and design modifications and rehabilitations for two existing minor drainage structures and three major drainage structures. The Consultant is responsible for all utilities research and utilities design to achieve the appropriate SUE quality level. The Consultant is responsible for entering all proposed or relocated utilities into the Pointman database. The Consultant will design new drainage facilities as needed including water quality features. Offsite and onsite hydrology will be the responsibility of the consultant as well as the development of a drainage report. The Consultant is responsible for advancing this project as shown in the PEL study to the NEPA document that FHWA requires. Note that this project is Regionally Significant. The Consultant will provide all environmental services necessary to ascertain which specific NEPA document is needed to satisfy FHWA needs. The Consultant is responsible for advancing the existing PEL level traffic data to a level

necessary for design of intersections and other roadway elements within the project limits. The Consultant is responsible for fiber optic and ITS research and design including System Engineering Analysis (SEA) processes and coordination with the CDOT ITS unit. The Consultant is also responsible for all traffic related plan sheets such as but not limited to signing, striping, traffic signalization, and construction phasing. The Consultant will coordinate with CDOT and Local Agencies to achieve an approved modification to the existing ACP, which includes an access road to replace some existing access points. The Consultant follow-up the ACP work with all associated cross-agency agreements. The Consultant is also responsible for the design of any needed access roads. The completion of preconstruction tasks associated with this contract are desired to match up with the availability of construction funding, which is anticipated in the Summer of calendar year 2025.

5. WORK PRODUCT

The Consultant work products are:

A.	Reports (hard copy and/or digital, as required)	X
B.	Geographic Information Systems (GIS) Data and Layers	X
C.	Environmental Documents	X
D.	Traffic Modeling Output	X
E.	Field Inspection Review (FIR) Plans and Estimates	X
F.	Final Office Review (FOR) Plans, Specifications, and Estimates	X
G.	AD/Bid Plans, Specifications, Cost Estimate	X
H.	Construction Plan Package	X
I.	Project Coordination	X
J.	Schedules	X
K.	Meeting Minutes	X
L.	Professional Engineer Stamped Record Sets	X
~~M.~~	~~Design Support During Construction~~	
N.	Access Control Plan	X

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

WORK PRODUCT COMPLETION

All submittals must be accepted by the CDOT Contract Administrator or designee.

ADDITIONAL PROJECT INFORMATION

Additional information regarding this project is included in the following documents:

O. PEL Study Final Documents
   4. See CDOT Projects Website for all PEL documents

Copies of these documents may be requested from CDOT. A moderate fee may be required for copies.

SECTION 2 PROJECT MANAGEMENT AND COORDINATION

1. CDOT CONTACT

The Contract Administrator for this project is: Shane Ferguson, Region 2 Transportation Director. Active day-to-day administration of the contract will be delegated to the CDOT/PM:

A. Name: Andy Stecklein
B. Title: PE-1
C. Address: 1480 Quail Lake Loop, Suite A, Colorado Springs, CO. 80906
D. Office phone: 719-749-1409
E. Cell phone: 719-749-1409
F. Fax: 719-227-3298

2. PROJECT COORDINATION

Coordination will be required with the following:

A.	Cities	□
B.	Counties	□
~~C.~~	~~Irrigation Ditch Companies~~	~~□~~
~~D.~~	~~Railroads~~	~~□~~
~~E.~~	~~Regional Transportation District (RTD)~~	~~□~~
F.	~~Denver Regional Council of Governments (DRCOG)~~	□
G.	Metropolitan Planning Organizations (MPO's)	□
H.	U.S. Army Corps of Engineers (USACE)	□
I.	~~Mile High Flood District (MHFD)~~	□
J.	Federal Emergency Management Agency (FEMA)	□
K.	Colorado Division of Parks & Wildlife (CPW)	□
L.	~~U.S. Forest Service (USFS)~~	□
M.	Environmental Protection Agency (EPA)	□
N.	U.S. Fish and Wildlife Service (USFWS)	□
O.	Federal Highway Administration (FHWA)	□
P.	Federal Transit Authority (FTA)	□
Q.	Utilities	□
R.	Colorado Department of Public Health and Environment (CDPHE)	□
S.	Other	□

The consultant should anticipate that a design that affects another agency has to be accepted by that agency prior to its acceptance by CDOT. Submittals to affected agencies will be coordinated with CDOT.

SECTION 3
EXISTING FEATURES

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.

1. STRUCTURES □
- Minor and major structures are viewable on CDOT's OTIS website

2. UTILITIES □

Contact Utility Notification Center of Colorado (U.N.C.C.) at 1-800-922-1987 or 811

3. ~~IRRIGATION DITCHES~~ □

4. ~~RAILROADS~~ □

5. PERMANENT WATER QUALITY (PWQ) CONTROL MEASURES □

6. OTHER_____ □

SECTION 4
GENERAL INFORMATION

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:

A. Reviews and Approvals
B. Response and Direction

2. PROJECT COORDINATION

A. Routine Working Contact: Routine working contact shall be between the CDOT/PM and the Consultant Project Manager (C/PM) as defined in Appendix C.
B. Project Manager Requirements: Each Project Manager shall provide the others with the following:

1. A written synopsis or copy of their respective contacts by telephone and in person with others
2. Copies of pertinent written communications

3. ROUTINE REPORTING AND BILLING

The Consultant shall provide the following on a routine basis:

A. Coordination: Coordination of all contract activities by the C/PM

B. Periodic Reports and Billings: The periodic reports and billings required by CDOT.

C. 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. PERSONNEL QUALIFICATIONS

The C/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) certification or other certifications may be required for project inspectors and testers.

All tasks assigned to the Consultant must be conducted by a person on the Consultant team that is qualified and has specific expertise in that task. 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. Design of any special project features must be directed, completed, and overseen by a professional engineer with significant experience in design of those special project features.

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.
Acoustical engineering, Architecture, Bridge Design, Bridge Inspection, Civil Engineering, Electrical Engineering, Environmental Engineering, Geotechnical Engineering, Highway & Street Design, Hydrology and Hydraulics

(including PWQ), Landscape Architecture (including Stormwater Management Plans [SWMP]), Management (Contract Admin), Management (Construction), Mechanical Engineering, Materials Testing, Sanitary Engineering, Soils Engineering, Structural Engineering, Surveying, Transportation Engineering, Traffic Engineering, Tunneling, and Water Quality (including PWQ and SWMP).

5. CDOT COMPUTER/SOFTWARE INFORMATION

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

A.	Earthwork	Bently/Microstation Open Roads Designer
B.	Traffic	CDOT Statewide Travel Demand Model
C.	Drafting/CADD	ORD & Microstation w/CDOT's formatting, configurations & standards
D.	Survey/photogrammetry	CDOT TMOSS, Bently/Microstation Open Roads Designer
E.	Bridge rating	AASHTO BrR
F.	Estimating	Transport (an AASHTO sponsored software) as used by CDOT
G.	Specifications	Microsoft Word
H.	Scheduling	Microsoft Project
I.	Water Quality Data	ArcGIS
J.	Geographic Information System (GIS)	ArcGIS w/CDOT's geodatabase, formatting configurations & standards

6. COMPUTER DATA COMPATIBILITY

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. Refer to Section 8, Table 1 - Submittals, for additional information regarding current formats and the acceptable transmittal media.

7. PROJECT DESIGN DATA AND STANDARDS

A. General:
Appendix A provides a comprehensive list of state and federal reference material. However, Appendix A does not contain 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.

B. Specific Design Criteria:
Appendix B is a list of specific project criteria. The list is comprehensive and may include items that are not required for tasks defined in this scope. The Consultant shall submit any proposed changes to the pertinent criteria to the CDOT/PM at one of the periodic progress meetings prior to initiating design.

C. 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 PROJECT INITIATION AND CONTINUING REQUIREMENTS

Note: This list establishes the individual task responsibility. Those tasks identified as CDOT/Other should utilize an abbreviation system to indicate whether the task will be completed by CDOT or another agency (i.e. "C" for CDOT and abbreviations as provided below). The consultant shall maintain the ability to perform all work tasks that are indicated below by an 'X' in the consultant column, in accordance with the forms and conditions contained herein, and the applicable CDOT standards. The "+" symbol indicates that there is a potential for scope expansion in the subject area. ***If the section header is filled that indicates that all sub-sections are applicable. Otherwise only the filled sub-sections are applicable.***

	CDOT (C)/ Other*	Consultant	Not Applicable
A. PROJECT MEETINGS The types and numbers of meetings shall be flexible and determined by an interactive process as approved by the CDOT/PM.			
1. **Initial Project Kick-Off Meeting** Schedule and facilitate initial project kick-off meeting. All appropriate disciplines should be included in the scoping meeting. Create an invitation list, send notices with a draft agenda prior to the meeting, and provide meeting minutes to all those invited. Whenever possible, the kick-off meeting will include an on-site inspection to familiarize the entire project team with the character and conditions of the area. The scoping meeting will also be used to clearly identify scope elements, responsibilities and coordination necessary to complete the work.	x	x	
2. **Progress Meetings** CDOT and Consultant team will meet periodically as required (typically every two weeks). The meetings will review activities required to be completed since the last meeting, problems encountered/anticipated and potential solutions, project schedule update, action items, and coordination required with other agencies.		x	
3. **Public Meetings** The Consultant shall provide the presentation aids, and help conduct the meeting.	+	x	
a. Small Group Meetings (one-on-one) Meet with property and business owners or others directly affected by the project work to identify likely impacts and discuss possible mitigation or resolutions.			
b. Public Meetings (information, workshops, and as required by the access control plan process) The format of these meetings will be dictated by the project and goals for the meetings, in-person and virtually. These meetings may be used to establish communications with the public, add to the "contact list", and gather information regarding local concerns. The meetings may also take the form of a work session or workshop with the affected parties. Meeting materials will be posted to the CDOT project webpage in advance of the meetings.			
c. Public Review Meetings These meetings are intended to disseminate project progress information to the public and representatives of local entities. Notices will be mailed at least 14 days in advance of these meetings to those on the "contact list".			

4. **Meeting Minutes** Project meeting minutes shall be completed by the Consultant and provided to the CDOT/PM within one week of the actual meeting. When a definable task is discussed during a meeting, the minutes will identify the "Action Item", the party responsible for accomplishing it, and the proposed completion date.		x	
5. **Contact List** Establish and maintain a computerized list of all appropriate interested parties for the communication process.		x	
a. The information on the list shall include as a minimum: ii. Name iii. Firm (if any) iv. Mailing/Email address v. Phone			
b. The contacts will be compiled from the list below, as supplemented by the Project Team and the attendees at public meetings: i) Public Agencies ii) Elected/Appointed Officials iii) Neighborhood Groups iv) Property Owners/Tenants v) Business Interests vi) Special Interests vii) Railroads viii) Media Contacts ix) Attendees from public meetings			
6. **Public Notices/Advertisements** Publicize the proposed project in accordance with the CDOT policies and procedures. Copies of the publication shall also be mailed to the individuals on the "contact list".		x	
7. **Communication Aids**			
a. Graphics Support – provide graphics for presentations and project documents. This may include slides, overhead projector slides, maps and plan views of conceptual design, computerized presentations and other displays for visual presentations at meetings.		X	
b. Newsletter – a newsletter which will contain project progress information and announcements will be published at the specified interval and will be distributed to those on the "contact list" specified by the CDOT/PM.		+	
c. Local Office – Obtain and maintain an office within the project area to conduct small group meetings and provide displays/information to the public.			
d. Internet web pages – All external CDOT-related Web sites shall be hosted on CDOT's server and developed in-house with assistance from the Web Team and CDOT Communications. The use of all Web 2.0 and similar social marketing applications on behalf of CDOT (including all regions, divisions and offices) is strictly prohibited unless authorized by the Communications Director. No CDOT employee, contractor or consultant working for CDOT will post material on behalf of the agency on such applications without expressed written consent of the Communications Director.		X	

B. PROJECT MANAGEMENT At the kick-off meeting, or shortly thereafter, create and provide an approach for managing the project (i.e. involved staff, key team positions), including task orders, a schedule, document and agency reviews and other project needs. Should the overall project budget be $500 million or more, an official Project Management Plan (PMP) shall be prepared in accordance with the most recent federal authorization guidance . The Consultant shall coordinate all the work tasks being accomplished by all parties to ensure project work completion stages are on schedule.		x	
C. DEVELOP A PROJECT SCHEDULE AND ASSIGN TASKS The Consultant is responsible for coordinating the required work schedule for tasks accomplished by CDOT and other agencies. Prepare the initial project schedule for review by the CDOT/PM and consultant team, and refine to provide detail as requested. Modifications will be made as necessary in collaboration with CDOT and appropriate justification. The tasks covered by this Scope of Work are expected to take approximately 2 years for design plus 2 years for agency agreements to complete. The goal is to have an advertisement ready project as soon as possible after construction funding is available, which is anticipated in the summer of 2025.		x	
D. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) Prepare and submit a QA/QC plan as part of the planning documents noted above, and commit to adhering to the QA/QC process throughout the project.		X	
E. VALUE ENGINEERING (VE) STUDY A team of transportation design and construction experts will perform a Value Engineering (VE) study. The VE study will be conducted early enough in the project development process to allow evaluation and incorporation of VE recommendations in the NEPA document or design process, as appropriate. The VE study shall be performed in accordance with Federal Highway Administration's (FHWA) current guidelines and recognized techniques and will identify possible alternatives that may save the project cost, time, or other resources. An individual with prior experience and certification in facilitating VE studies (the VE facilitator) shall conduct each VE session. VE facilitators shall be qualified VE practitioners, experienced in performing and leading VE studies (have participated in several VE studies as a team member and several as a team leader), and have sufficient VE training, education, and experience to be recognized by the Society of American Value Engineers (SAVE) International as meeting the requirements for certification. The VE team will consist of individuals with no prior exposure to the project. Individuals that have some familiarity and history with the project shall provide briefings to the team. Consultants or firms shall not conduct studies of their own designs unless they maintain distinct organizational separation of their VE and design sections. The VE team will be assembled to review the Conceptual Background information and plans shall be provided to the team at least three weeks in advance of VE sessions. The VE facilitator will coordinate the study with CDOT, appropriate entities, and FHWA. The VE review team will formally evaluate each VE recommendation, and sufficient justification will be made for the acceptance or rejection of each. The VE facilitator will produce a document that summarizes the results, as well as the project elements investigated.		X	

The Consultant/PM shall prepare a written response detailing which recommendations were not included, the reasons for exclusion, and how all approved VE results will be incorporated into subsequent engineering efforts. These responses shall be forwarded to the CDOT/PM for distribution to the CDOT Region Transportation Director, FHWA, and other appropriate entities. All approved VE proposals shall be incorporated into the final design plans			
F. OBTAIN NECESSARY RIGHT-OF-ENTRY AND PERMITS Some activities may require work on land not controlled by CDOT. In such cases the Consultant shall obtain the necessary written permission to enter the premises. Written permission shall be coordinated with other CDOT staff and consultants that may need right-of-entry such as geotechnical and environmental personnel. Included in this written permission will be the names and telephone numbers of persons to contact should notification prior to entry be necessary.		X	
1. **Signature Copies** Permissions apply to CDOT personnel as well as Consultant personnel. CDOT Form 730 may be used for this purpose. Signed copies of written permission will be submitted to the CDOT/PM prior to entering private property for survey work.			
2. **Permits** Some activities such as materials testing on existing pavement and structures may require a permit. Permits will be obtained and copies submitted to the CDOT/PM.			

SECTION 6
ENVIRONMENTAL WORK TASK DESCRIPTIONS

Note: This Section is written specifically for projects requiring an Environmental Impact Statement (EIS), an Environmental Assessment (EA), or a Categorical Exclusion (CatEx). It includes elements that are not required for all projects requiring NEPA protocol. Contact Region environmental personnel to determine which items in this section are necessary to address the requirements of the EIS, EA, or CatEx, or post-NEPA activities (ensuring that all of the commitments made by the NEPA document are implemented in the design package). Some tasks and resources are more appropriate depending on the Class of Action. Recommendations for each are made in parentheticals.

Use the CDOT NEPA Manual when completing this section to assure that the level of detail and documentation included meets CDOT expectations and requirements and any other applicable state and federal laws and regulations. Nothing in this Section precludes federal, state, or local agencies or officials from fulfilling their responsibilities under federal, state, or local laws and regulations, NEPA, as codified in 42 United States Code (USC), section 4321, et. Seq., or any of NEPA's implementing regulations.

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

	CDOT (C)/ Other*	Consultant	Not Applicable
A. **PROJECT INITIATION**	X	X	
1. **Environmental Scoping Task (CatEx, EA, EIS)** An early environmental coordination/scoping task will occur as directed by the CDOT Project Manager. An environmental scoping meeting should be held with the Environmental Project Manager, resources specialists such as the Regional Water Quality Specialist/Water Pollution Control Manager, or appropriate members of the Environmental Programs Branch (EPB), C/PM, and staff from Right-of-Way, Maintenance, Hydraulics, DTD and Region Traffic, Property Management, FHWA, and Utilities, as appropriate. This task will include a meeting with CDOT and the local agency representatives to discuss the initial work efforts of the project. Traffic modeling usually dictates the alternative evaluation process. Determine if macroscale, mesoscale, and/or microscale modeling is required for the project.			
2. **Extent of Study Required for Resources (CatEx, EA, EIS)** Determine the extent of study required for each resource area. The extent of study can be defined in four categories: 1) complete analysis required; 2) short analysis to define resources/impacts; 3) no analysis required; or 4) analysis already completed (for example, by a previous study).			
3. **Project Study Area Limits/Logical Termini (CatEx, EA, EIS)**			

Preliminary project study area limits are established in Section 1 of the Generic Scope of Work document. Perform necessary research and data collection to propose a study area boundary for environmental resources and logical termini for use in scoping. In coordination with the CDOT/PM, prepare a recommendation to the FHWA for approval of the logical termini, if applicable.			
4. **Project File (CatEx, EA, EIS)** Maintain a Project File, set up similarly to the established process for a NEPA Administrative Record. Make available all parts of this project file to the CDOT/PM (or his or her designee), or to the Colorado Attorney General's office (as requested) at any time during the project's duration. All materials associated with the project file shall be delivered in the format specified by the CDOT/PM when closing the project. Final project invoice payments to the Consultant are conditional upon the professional and complete delivery of these materials to CDOT's office**.** Given the extent of documentation collected for the NEPA process, the consultant shall update the record regularly and provide information to CDOT electronically. See CDOT NEPA Manual for additional guidance.			
5. **Review Applicable Existing Documents (EA, EIS)** Review project-specific documents or data related to the assessment of environmental, social, and economic resources and impacts in the project area that are determined relevant. These resources may be CDOT documents or may have been created by local planning agencies or municipalities.			
B. **ENVIRONMENTAL ANALYSIS AND DOCUMENTATION**		X	
1. **Purpose and Need (EA, EIS)** Develop a solid Purpose and Need statement, reviewed, and approved by appropriate parties. The objectives of the project should be clearly identified and agreed upon early in the project process to prevent backtracking and limit schedule changes. Develop and refine, as necessary, to address information collected on the project during data collection, transportation analysis, and public and agency scoping and involvement. Review previously prepared studies to help direct Purpose and Need information as appropriate (e.g., local planning studies, engineering feasibility studies, etc.). Submit the Purpose and Need for review and approval by CDOT and FHWA.			
2. **Alternatives Development and Evaluation (EA, EIS)** Develop a range of reasonable alternatives that will satisfy the Purpose and Need requirements of the project, including, but not limited to, those identified in earlier and ongoing studies of the area. The Consultant team, in coordination with CDOT and FHWA, will determine the design year to use for the project. Changes in the design year during the project may be subject to a Scope of Work modification.			
3. **Alternatives Screening Process (EA, EIS)** Apply an alternatives screening process to identify the reasonable alternatives (practical or feasible from a technical and economic standpoint), which will be subject to a more detailed evaluation. Develop NEPA-appropriate evaluation criteria, and measures of effectiveness, and submit them for review and approval by CDOT and FHWA before beginning the screening process. The rationale for eliminating alternatives will be thoroughly discussed within the documentation.			
4. **Preliminary Design of Alternatives (EA, EIS)** For each alternative that passes the screening process, incorporate preliminary design to a level that clearly allows the identification of impacts within each environmental resource area. These alternatives may be carried through the entire analysis process until a decision document is written. If CDOT or another agency or Consultants performs selected alternative studies, the Consultant shall incorporate the results of these studies into the appropriate document.			
5. **Evaluate Alternatives Impacts (EA, EIS)**			

Apply projected design-year traffic volumes and projected opening day traffic volumes for new facilities as developed for this Scope of Work, or as modified through later studies and calculations by CDOT. Evaluate the impacts of these alternatives according to established guidelines and examine the degree to which these alternatives satisfy the Purpose and Need requirements of the project. Set out these evaluations both schematically and in narrative form for review within a reasonable time after the Notice to Proceed.			
C. **COST ESTIMATES AND FINANCIAL ANALYSIS**			
1. **Preliminary Construction Cost Estimates (EA, EIS)** Prepare preliminary construction cost estimates based on 30% design of no more than **3** alternatives identified during the NEPA process. Project right of way acquisition and project environmental mitigation costs shall be included within the cost estimate. Include enough detail to ensure a reasonable degree of accuracy for the level of design performed. Submit the format of estimates, including the year from which the unit costs were assumed, to CDOT's Project Engineer for review and approval. Incorporate the analysis into the NEPA document.		X	
2. **Develop Cost Estimates and Financial Analyses (EIS)** As part of evaluating reasonable alternatives in the NEPA document, including the No-Action Alternative, develop cost estimates and financial analyses at varying levels of detail throughout the process in coordination with FHWA. **[CDOT/PM MAY SPECIFY AT WHAT POINTS FINANCIAL ANALYSIS WILL BE REVIEWED AND TO WHAT LEVEL OF DETAIL THEY WILL BE DEVELOPED.]** Basic engineering, preliminary engineering, construction engineering, construction, and operating/maintenance for the design life shall also be analyzed. A funding package identifying the funding sources necessary to construct and maintain the projects will be developed. Review the cost estimates and financial analysis, provide supplemental analysis as needed to support the Preferred Alternative, and incorporate findings into the draft NEPA document.			

D. **DATA COLLECTION, FIELD INVESTIGATION, MITIGATION MEASURES, AND DELIVERABLES**		X	
The following analyses are required for each of the alternatives that pass the screening process. Each resource will be summarized, focusing on the project issues of concern. The scope shall define the level of documentation, project tasks, and project deliverables for each of the resource areas. Identify the required area and resources to evaluate and determine the early coordination/scoping process as discussed above. This may evolve over the life of the project as new information is discovered through analysis. The level of detail and analysis will be determined based on study and its appropriate level of environmental documentation (e.g., Feasibility Study, CatEx, EA, or EIS). Deliverables can be static reports, digital reports, and/or GIS data layers. The scope should be specific as to what type of deliverable is expected. It is anticipated that the level of detail for this NEPA document will be as appropriate for an Non-programmatic CatEx, or EA. Follow CDOT NEPA Manual for guidance on methodology and level of detail.			
1. **Air Quality (CatEx, EA, EIS)** Perform the necessary air quality assessment or modeling as required and provide the results for integration into the NEPA document and Air Quality Technical Report (with modeling data assumptions). These will include, but are not limited to, analysis or discussion of: NAAQS, PM 10 hot spot analysis, regional emissions analysis, Mobile source air toxics (MSAT) —qualitative or quantitative, greenhouse gases (GHG), climate change, construction issues such as fugitive dust emissions, and mitigation measures. CDOT staff will lead coordination with the Colorado Department of Public Health and Environment Air Pollution Control Division (CDPHE-APCD), FHWA and U.S. Environmental Protection Agency (EPA) (as necessary). The analytical methodologies (including number of intersections to be modeled) will be determined through the coordination. Each Build Alternative and the No-Action Alternative will be analyzed for impacts through the appropriate design year. Mitigation commitments will be developed, as necessary. The Consultant must get approval from the CDOT Region and/or EPB air quality specialist for any methodologies to evaluate hazardous air pollutants. Utilize the most current standard, accepted FHWA language for MSATs.			
2. **Water Quality (CatEx, EA, EIS)**		X	
a. Affected Environment: Investigate and document the status of the water resources (quality, etc.) for the purposes of describing the existing condition or "affected environment" before construction: groundwater, aquifers, lakes, rivers, streams, and springs, locations of drinking water treatment plants, Permanent Water Quality Control Measures and locations of sewage treatment facilities.			
b. Environmental Consequences: Investigate and document the impacts of the project, to Water resources (quality, etc) and quality impacts of the project during and following construction. Water Quality Modeling **WILL be** used for this task, determined by considering the project location and design concepts in relation to existing water			

	resources including groundwater or alluvial waters or aquifers (particularly sole source), drainage ditches and other State Waters as defined by CDPHE Water Quality Control Division, aquatic as well as riparian habitat, and Sensitive Waters (Class 1 Aquatic Life, Recreation 1, and Water Supply, 303[d] listed, etc).			
	c. Consultant will determine the MS4 Permit requirements applicable to this project Determine the requirements of the Municipal Separate Storm Sewer System (MS4), Colorado Discharge Permit System (CDPS), and design and permitting issues per the CDOT PWQ program.			
	d. Recommend appropriate Water Quality mitigation measures as necessary. A mitigation plan that includes conclusions of effects, permanent best management practices (BMPs), temporary/construction BMPs, erosion control measures, and definition of maintenance responsibilities.			
	e. Deliverable: Prepare Water Quality Technical Report			
3.	**Wetlands and Waters of the U.S. (WUS) (CatEx, EA, EIS)**		X	
	a. Wetlands Determination/Delineation:			
	i. Conduct a field evaluation for the presence of wetlands within the project study area. Global Positioning System (GPS) or survey equipment should be used for this activity.			
	ii. Delineate the boundaries of all anticipated jurisdictional and non-jurisdictional wetlands and waters of the US within the project area using United States Army Corps of Engineers (USACE) guidance listed in Appendix A. Data to be provided to CDOT in the correct format – i.e. shapefiles with information separated in a report or memo..			
	iii. Prepare maps that delineate the wetland boundaries within the corridor. The ordinary high water mark should also be delineated, as appropriate. GPS will be used for this mapping.			
	iv. Coordinate the findings with the CDOT Region and if requested by the region, with the USACE. If requested by the CDOT Region, obtain jurisdictional determination of the wetlands from the USACE.			
	b. Wetland Finding Report Prepare a Wetland Finding Report according to CDOT's most recent guidance/checklist. The Functional Assessment of Colorado Wetlands (FACWet) should be used, as appropriate according to current CDOT procedures. Conduct a wetland assessment based on the NEPA document addressing the amount of permanent and temporary wetlands impacts and mitigation. Wetland mitigation should be identified as early as possible in the NEPA process. All wetlands will be considered jurisdictional for mitigation purposes. CDOT will determine the type of mitigation – i.e. bank or onsite. Mitigation sites must be evaluated for availability and suitability for wetland habitat. CDOT no longer has wetland mitigation bank credits available however there is a private mitigation bank that may be available for purchase.			
4.	**Vegetation and Noxious Weeds (CatEx, EA, EIS)**		X	
	a. Affected Environment: Investigate (GIS and field) and document the status of vegetation habitat and noxious weeds for the purposes of describing the existing condition or "affected environment" before construction			
	b. Environmental Consequences: Investigate and document the impacts of the project, to vegetation habitat and noxious weeds during and following construction.			
	c. Recommend appropriate vegetation habitat and noxious weed mitigation measures as necessary.			

d. Prepare an Integrated Noxious Weed Management Plan prior to construction.			
e. Deliverable: Prepare and provide Vegetation Habitat and Noxious Weed Technical Report, and project Noxious Weed mapping in GIS as necessary.			
5. **Fish and Wildlife (CatEx, EA, EIS)** Conduct necessary field surveys and identify fish and wildlife and their habitat within the project area. As appropriate, GPS will be used to identify habitat.		X	
a. Coordination with the Colorado Parks and Wildlife (CPW) Colorado Division of Wildlife (CDOW) and US Fish and Wildlife Service (USFWS)	X		
b. Perform an impact analysis.			
c. Develop appropriate mitigation measures			
d. Prepare Wildlife Report			
6. **Threatened and Endangered (T&E) Species (CatEx, EA, EIS)**		X	
a. Coordination USFWS to determine if T&E species or their habitat exists in the project area.	X		
b. Conduct necessary desktop and field surveys and identify T&E species and/or Designated Critical Habitat.			
c. Review existing planning documents to determine any existing Habitat Conservation Plans (HCP) under Section 10, if necessary, for T&E species.			
d. Review existing planning documents to determine need for a Biological Assessment/Biological Opinion under Section 7 for the USFWS if federally listed T&E species and/or Designated Critical Habitat will be impacted and there is a federal nexus.			
e. Develop a HCP under Section 10 and/or Biological Assessments/Biological Opinions under Section 7, if necessary, with the USFWS if T&E species and/or Designated Critical Habitat will be impacted and if there is a federal nexus.			
f. Identify any impacts and develop a mitigation plan to conform to requirements of the Endangered Species Act.			
7. **Historic Properties (CatEx, EA, EIS)**	X		
a. Perform and provide the survey report for review by the CDOT Region Historian or EPB Senior Staff Historian, and incorporate the information into the NEPA document. The following lists are not meant to be exhaustive.			
b. Collection and Evaluation of Baseline Information as defined by Section 106 of the National Historic Preservation Act of 1966, as amended The scope of work for historic properties compliance varies depending on the project. The list below represents a typical scope of work, but consultants should coordinate with CDOT staff to determine the level of effort for each project. CDOT staff is very hands-on when it comes to its Section 106 compliance responsibilities. Consultants should never contact SHPO staff or submit any material without CDOT oversight and approval.			
c. Historic Clearance			
i. Identify the area of potential effect (APE), in coordination with CDOT and the State Historic Preservation Officer (SHPO).			
ii. Conduct literature and records search for previously recorded historic resources in the APE in the OAHP. Compass database.			
iii. Conduct an architectural field survey of the APE and determine National Register of Historic Places (NRHP) eligibility for			

resources at least 50 years old. Age of resources evaluated may vary depending on when the project will be constructed. Potential resources include man-made structures, ditches, railroads, etc. Level of effort (e.g., reconnaissance, intensive) for the survey may vary depending on the project scope and schedule and should be coordinated with CDOT staff.			
iv. In coordination with CDOT staff, identify and coordinate with consulting parties (e.g., public, historic preservation groups, local historical societies, museums) regarding historic properties in the project area and meetings to discuss project updates and Section 106 findings.			
v. Prepare a comprehensive Survey Report according to guidelines established by the OAHP to submit for review by the CDOT Region and/or EPB Senior Staff Historian. The report will include historical context information and other data to support eligibility determinations. Make revisions as requested by CDOT.			
vi. Determine potential effects, both direct and indirect, to historic resources and recommend strategies to avoid, minimize, or mitigate impacts. Depending on project scope, consultants may prepare a separate effects report for review by CDOT. Region or EPB historians.			
vii. Prepare draft correspondence as necessary for the CDOT Region and/or EPB Senior Staff Historian to submit to the SHPO. In some circumstances, consultants are asked to deliver submittals to SHPO and consulting parties.			
viii. When there are adverse effects, collaborate with the CDOT Region Historian or EPB Senior Historian to identify possible mitigation and assist in development of a Memorandum of Agreement, , for agency review and execution. Note that mitigation and development of MOA is typically completed by CDOT staff.			
ix. Prepare draft Section 4(f) documents as required. In most cases, CDOT staff will prepare documentation of Section 4(f) exceptions and de minimis findings Consultant assistance may be needed for programmatic and full evaluations.			
8. **Archaeology (CatEx, EA, EIS)**	X		
a. A review of historic Sanborn Fire Insurance maps and other appropriate archival sources will be completed to determine if the area may contain significant archaeological sites or features.			
b. Conduct an intensive field survey of the project corridor(s) and undertake site-specific test excavations, as necessary and appropriate, to determine NRHP eligibility. The Consultant shall not undertake test excavations before consulting with CDOT.			
c. Complete laboratory analyses of all collected artifacts and ancillary specimens.			
d. Write a comprehensive survey report according to guidelines established by the OAHP.			
e. Develop a data recovery plan to mitigate potential adverse effects to significant archaeological localities, as appropriate and necessary.			
f. Coordinate the mitigation plan with the EPB Senior Staff Archaeologist, appropriate Region staff, SHPO, and other required agencies.			
g. Conduct data recovery excavations at any significant archaeological site that cannot be avoided during construction.			
h. Analyze artifacts.			

	i. Prepare and submit a data recovery excavation report which describes, in a thorough and comprehensive fashion, the project results and the nature of the site in the context of the regional archaeological database. The report must also include site management recommendations in the context of the NRHP.			
	j. Coordinate Tribal consultation and support EPB Senior Staff Archaeologist as needed.			
	k. Prepare Section 4(f) documents as required.			
9.	**Paleontological Resources (CatEx, EA, EIS)**	X		
	a. Perform a literature and museum fossil database search and field assessment.			
	b. Determine the presence or absence of paleontological resources.			
	c. Conduct analysis to determine the scientific significance (research and/or educational value) of the resource.			
	d. Write the paleontological technical report, including mitigation proposals, if necessary. The assessment report will be reviewed by the EPB Staff Paleontologist for adequacy.			
	e. Coordinate the mitigation plan with the EPB Staff Paleontologist, and appropriate Region staff.			
10.	**Section 6(f) Evaluation (CatEx, EA, EIS)**		X	
	a. Inventory and map project area for Section 6(f) resources. using CDOT's Online Transportation Information System (OTIS).			
	b. Determine if any potential impacts or ROW acquisitions include Section 6(f) resources.			
	c. Evaluate project impacts on Section 6(f) properties using preliminary design information, and the necessary commitments for mitigation measures. Determine whether impacts qualify as a temporary non-conforming use or a park improvement. Document the level of impact, all practical alternatives to the conversion, and avoidance and minimization measures taken. Prepare the appropriate documentation in consultation with CDOT Region or EPB Staff.			
	d. If a full conversion is required, coordinate with Colorado Parks and Wildlife (CPW) to find a replacement property that is of equal fair market value and equivalent use of the property being converted. Purchase and document conversion of the property using National Park Service guidance.			
11.	**Section 4(f) Evaluation: Please note that there are separate requirements for historic and non-historic Section 4(f) evaluations (CatEx, EA, EIS)**	+	X	
	a. Inventory and map project area for possible Section 4(f) resources.			
	b. Determine if any potential impacts or ROW acquisitions include Section 4(f) resources (e.g., publicly owned parks, recreational facilities, nationally significant historic sites, wildlife refuges) .			
	c. Determine and evaluate project impacts on Section 4(f) resources using preliminary design information, and the necessary commitments for mitigation measures. Determine whether impacts require an exception, *de minimis,* programmatic, or individual 4(f) evaluation. Prepare an analysis that includes avoidance alternatives, discussion of prudent and feasible, least harm (if necessary), minimization, and mitigation related to Section 4(f) resources. This may include the development of a new			

alternative(s) as an avoidance alternative(s). Prepare the appropriate documentation in consultation with CDOT Region or EPB Staff.			
d. Develop Official with Jurisdiction (OWJ) concurrence request letters (if necessary. For non-historic resources, OWJ will vary. For historic properties, the SHPO is the OWJ and the Section 106 consultation correspondence helps to inform the Section 4(f) process..			
12. **Noise (CatEx, EA, EIS)** Prepare a technical noise assessment in accordance with the most recent CDOT Noise Analysis and Abatement Guidelines and submit a comprehensive noise assessment document to CDOT for review and acceptance. The analysis will consist of the following, each of which must be covered in the noise assessment document:		X	
a. Definition of relevant noise abatement criteria and identification of noise-sensitive land uses			
b. Determination of existing noise levels (by measurement and/or modeling).			
c. Prediction of future traffic noise levels for all alternatives, including the No-Action Alternative, using FHWA's current Traffic Noise Model**.**			
d. Determination of traffic noise impacts			
e. Identify and evaluate feasibility and reasonableness of noise abatement measures. Coordinate with Project Engineer with regards to locations and heights of proposed abatement measures			
f. Development of recommendations regarding noise abatement measures			
g. Assessment of construction related noise issues.			
h. The above items will be addressed and documented in a Noise Technical Report, which will be prepared and submitted to CDOT for review and acceptance. Prior to beginning this work, the Consultant shall meet with CDOT to review the appropriate noise methodology. Noise modeling should be completed for the model year 2045**.** The draft and final technical report will be completed and made available to the CDOT Noise Specialist and appropriate Region staff for review; the findings will be incorporated into the NEPA document.			
13. **Hazardous Materials (CatEx, EA, EIS)** Perform and document the following Initial Site Assessment (ISA) and/or Modified Environmental Site Assessment (MESA) activities:		X	
a. In accordance with CDOT Hazardous Materials Guidance, conduct regulatory research that includes the collection, mapping and evaluation of data.			
b. Analyze results of regulatory research and records review and identify potential impacts construction activities may have on existing hazardous waste sites. Assess potential liability issues and hazards to the public, construction workers, and the environment then develop potential mitigation options. Prepare the ISA/MESA Document to include the following:			
i. Prepare the draft and subsequent final ISAs to address comments provided by CDOT.			
ii. ISAs will emulate industry standards for Phase I reports (with limitations), and make a determination of the necessity of a Phase II report.			

iii. Identify how the presence of hazardous waste locations may impact each alternative, including the no-action alternative. GIS mapping will be desired.			
c. Conduct In-Situ Tests such as lead-based paint and asbestos testing as necessary, and provide a survey report, as determined on a project-specific basis.			
d. Phase II site assessment if necessary for the alternatives screening process.			
14. **Land Use (EA, EIS)** Collect, map and evaluate baseline information. Prepare information on land use and zoning, including maps of existing, planned and future uses. Prepare land use mapping. Mapping may include parcel use categories such as land in public ownership, commercial, retail, wholesale, industrial, residential, vacant, mixed etc. identifying jurisdictional boundaries and land usage along each alternative. (Information may be obtained from the Department of Local Affairs, Sanborn maps, archival aerial photos, the local city, town or county, and/or from field verification.)		X	
15. **Social and Economic Resources (EA, EIS)** Collect, map, and evaluate baseline information to investigate and document the effects of the project alternatives on community cohesion, safety and security, neighborhoods, and accessibility of facilities and services. Investigate the effects of the project alternatives on commercial and industrial enterprises, employment, local tax base, regional earnings, etc. When relevant, recent Census data shall be utilized. This will be done at the regional and corridor level, as well as part of a cumulative effects analysis, as appropriate.		X	
16. **Environmental Justice (EA, EIS)** Collect the necessary U.S. Census and other applicable data to identify existing low-income and minority populations, as well as adverse effects and mitigation measures or alternatives that would avoid or reduce the impacts according to environmental justice guidelines. Impacts to these communities will be evaluated in accordance with the CDOT NEPA Manual and Executive Order 12898. Beneficial effects of the project on these populations will also be identified. The analysis will cross-reference other resources as appropriate (e.g., noise, air and water pollution, aesthetics, community cohesion, relocation impacts). As part of the project's public participation or public involvement program, ensure that meaningful opportunities for all members of the community to provide input to the project exist. Document the degree to which affected low-income or minority populations have been afforded the opportunity to provide input in the NEPA process. As dictated by the class of action, meaningful opportunity to comment on or related to the development of purpose and need, alternatives analysis and screening, impact analysis, preferred alternative identification, and mitigation measures development. Collaborate with EPB's Environmental Justice specialist and CDOT's EEO Office to determine the level of Environmental Justice and Title VI outreach activities necessary to obtain sufficient input from low-income and/or minority populations. Document all outreach efforts and input (or feedback) for low-income and/or minority communities within an Environmental Justice Technical Report in accordance with Chapter 7 of the CDOT NEPA Manual.		X	
17. **Residential/Business/Right-of-Way (ROW) Relocations (EA, EIS)** The following activities will be performed and documented by a qualified member of the Consultant team, in coordination with the CDOT Region ROW manager (or designee), or Headquarters ROW specialist assigned to the project, in accordance with Title 23 CFR 710:	X	X	

a. Prepare a table identifying and listing all potentially affected properties including, at a minimum, ownership names, property and mailing addresses, estimated areas of impacts per parcel, type of impact i.e. – full or partial acquisition, temporary or permanent easement, and indicating which alternatives impact each property. This table will be submitted to the CDOT Region ROW Manager for review and may be included in the NEPA document (without personal property details) at the discretion of the CDOT Region and/or Headquarters ROW staff.			
b. Perform a ROW field inspection of each short-listed alternative. Ascertain number of parcels, types of improvements, and possible issues (e.g., historic sites). Estimate family sizes for residential relocations.			
c. Compile a ROW acquisition and relocation cost estimate for 2 alternatives.			
d. Prepare a property ownership map based on tax records, which identifies ownerships for 2 alternatives.			
e. Develop and document mitigation measures			
18. **Utilities and Railroads (EA, EIS)** Collect utility location key maps for all existing and planned utilities in the area in coordination with the CDOT Region utilities specialist. Conduct all field utility locates. The potential impacts on or from utilities in the project area will be analyzed as well as any appropriate mitigation measures. Follow CDOT NEPA Manual, Chapter 9 for guidance on evaluation and documentation.		X	
19. **Farmlands (EA, EIS, occasionally CatEx)** (For unique circumstances) In coordination with the Natural Resource Conservation Service (NRCS), investigate and quantify the effect of the project alternatives on farmlands—determining whether farmlands in question are classified as "prime" or "unique," as well as the extent to which impacts may affect local communities. The US Department of Agriculture Farmland Conversion Form (Form AD 1006) will be completed as necessary. Identify impacts and recommend appropriate mitigation measures as necessary. Follow CDOT NEPA Manual for additional guidance on evaluation and documentation.			
20. **Visual Resources (EA, EIS, CatEx)** Follow the current version of CDOT's Visual Impact Assessment (VIA) Guidelines as found on the CDOT Landscape Architecture Website. Complete items a, b, and c prior to obtaining a consultant or in some cases they are completed by the consultant.		X	
a. Conduct Pre-Scoping (Step E-1): The CDOT NEPA practitioner coordinates with the project team to understand the project scope, location, context, and visual attributes. The CDOT VIA practitioner and/or consultant completes Step E-1 in the VIA Guidelines, by following the sequence of steps in the Decision Tree (Figure 3), to determine if there is a potential for visual impacts and whether to proceed with the VIA Scoping Process. If a VIA is not required, based on Pre-Scoping, email Pre-Scoping documentation to the Environmental Project Manager and no further action is necessary. If the Pre-Scoping process determines that a VIA may be necessary, continue to next steps in the scoping process.			

b. Conduct Scoping: Complete steps E-2 through E-5 in the VIA Guidelines. In coordination with CDOT staff, the CDOT VIA practitioner or consultant completes the Scoping Questionnaire to determine if a VIA is required. If a VIA is not required, based on Scoping, email scoping documentation to the Environmental Project Manager and no further action is necessary. If a Memo or Standard VIA is required, proceed to part c to define the Area of Visual Effect, and Delineate Landscape Units.			
c. Plan for public involvement: Coordinate with CDOT NEPA practitioner and project engineer for determining public involvement opportunities. (Reference Chapter 7, Stakeholder Involvement Plan, in the CDOT NEPA Manual).			
d. Conduct Scoping (Steps E-6 and E-7): Define the Area of Visual Effect and Delineate Landscape Units.			
e. Prepare visualizations: Coordinate with the CDOT NEPA practitioner and project engineer to determine the appropriate level of project visualizations for communication, assessing visual impacts, and facilitating public input. The appropriate level of visualizations may vary by project, to reflect the available level of project design (conceptual, preliminary, or final), and present an accurate scale and representation of details. Refer to the Visualization Matrix (Appendix D of the VIA Guidelines) for guidance in applying 3D visualization and conceptual modeling software, and image enhancement software. Graphics may include cross-sections, hand drawn sketches, simulations (with site current site photos (whenever possible) and/or 3D graphics; or augmented/virtual reality fly through of key viewpoints.			
f. Create content for CDOT Active Projects Webpage. May include site maps, photographs, renderings, videos, and a project write up.			
g. Complete Visual Resource Inventory and Analysis: follow and apply CDOT VIA Guidelines, templates, and tools.			
h. Complete NEPA Mitigation commitments (if applicable, developing design guidelines can be made a commitment and completed after CATEX/EA/EIS) Track mitigation measures in CDOT's Mitigation Tracking Spreadsheets, NEPA Manual Tables 9-1 and 9-2.			
i. Develop Design Guidelines, to be completed prior to FIR (30% Design) in order to inform and be incorporated into the design – *if applicable.*			
j. Project Delivery - (incorporate mitigation measures and NEPA commitments into design – Preliminary and/or Final).			
k. Construction Phase - and field mitigation/design oversight, for design compliance. (CDOT LA or Region Mitigation Coordinator)			
l. Post-construction monitoring - of irrigation and plant establishment success and health. - *if applicable.* (CDOT LA)			
21. **Geologic Resources and Soil (EA, EIS)** (For unique circumstances) Perform and document in the NEPA Document, and a Geologic Technical Report, a thorough investigation of the project area to determine possible geologic influences on the alternative designs under consideration, or vice versa. Constraints, including but not limited to major excavations, unsatisfactory sub-grade materials, present and potential subsidence, potential for rockfall, the presence of abandoned mine sites, etc., will be evaluated. <u>This task includes consideration and description of the corridor water table</u> (i.e., depth/gradient).		X	

22. **Cumulative Impacts (EA, EIS)** Consistent with CEQ regulations, the cumulative effects of each proposed action on a resource, ecosystem or human community will be evaluated for each alternative. The analysis will both list and consider incremental impacts of each alternative in conjunction with all past, present, and reasonably foreseeable future actions, no matter what entity (federal, non-federal, local government, or private) is taking or has taken the action; but the analysis should only focus on meaningful effects. Develop the scope of the analysis in consultation with FHWA and CDOT, and, in general, will base temporal and spatial boundaries on the natural boundaries of resources of concern and the period of time that the proposed action's impacts will persist. The analysis will be incorporated into the NEPA document, and mitigation measures specific to cumulative impacts, if needed, will be identified. Standard FHWA global climate change language (found in NEPA Manual Appendix F) is to be incorporated within every cumulative impacts section of a NEPA document.		X	
23. **Transportation Resources (EA, EIS)**		X	
a. Develop traffic volumes using available traffic demand models; determine the design year during the scoping process for the project. The model expected to be used for this project is the official Metropolitan Planning Organization model, if one is available for the project area, or the official CDOT Statewide Travel Demand Model if the project's study area is not contained inside an MPO area is the PPACG traffic model. The method for traffic modeling will be determined at the beginning of the project upon FHWA approval. Forecasts should be based on existing roadways and roadways that are committed to be constructed (that is, "No Action"— those that will be constructed regardless of whether the project in question moves forward). Future traffic forecasts must be developed for the No-Action Alternative and any build alternatives. The results of the travel demand forecast process will be developed into a technical report.			
b. Analyze existing and future traffic operations analysis will be conducted for the No-Action Alternative and build alternative(s). Analysis will be completed in accordance with the latest edition of the Highway Capacity Manual or similar methodology. In addition, the Consultant shall use a micro simulation software package (i.e., CORSIM, VISSIM, Dynasmart-P, or others as approved by CDOT) to evaluate the operations of the entire roadway network and report the appropriate measures of effectiveness for the alternative(s). The selection of the software package for the required analyses will depend on the size and other characteristics of the network, the alternatives to be analyzed, and the measures of interest. At a minimum, analysis will consider existing traffic volumes, accident history, percent of truck traffic, directional splits on all arterials, turning movements at intersections, interchange and ramp characteristics, travel/access patterns, level of service, delays, travel times and speeds, and areas of congestion. During the alternatives development and evaluation process, the appropriate level of operations analysis will also be conducted on the alternatives being considered. The results of the operations analysis are documented into a Transportation Technical Report.			
c. Conduct safety analysis and document accident rates based on data collected from local emergency services, Colorado State Patrol, and			

CDOT Traffic Analysis Unit; obtain weighted hazard index from CDOT/PM; evaluate trends; document safety issues and how they can be addressed.			
d. Bicycle and Pedestrian Facilities Research and identify existing and future planned bicycle and pedestrian facilities in the project area. The necessary data will be collected from project design documents, community transportation plans, local land developers, open space and park trails, or local governmental agency or community interest groups to determine if any facilities will be impacted, and as a result what mitigation is necessary. If the corridor is a heavily traveled biking facility, the scope of work shall include meetings to coordinate with bike users throughout the NEPA process. Identify impacts and recommend appropriate mitigation measures as necessary.			
24. **Energy (EIS)** (For unique circumstances) Discuss in general terms the construction and operational energy requirements and conservation potential of various alternatives under consideration. The discussion should be reasonable and supportable. A calculation of energy consumption during construction should be included. If applicable, follow CDOT NEPA Manual for guidance on evaluation and documentation.			X
25. **Other**			
E. **DELIVERABLES**			
The following documents will be considered as official deliverables. Deliverables to CDOT will occur at the dates agreed to within the project contract and related agreements.			
Specific deliverables will be determined as the environmental process advances.		X	
F. **PUBLIC AND AGENCY INVOLVEMENT**		X	
1. **Develop an Agency Coordination Plan (required for an EIS, optional for an EA or CatEx)**			
2. **Stakeholder Involvement Plan (required for an EIS, optional for an EA or CatEx)** Prepare a Stakeholder Involvement Plan specific to the nature of this project. The level of effort included in the plan will be in keeping with the complexity and expected controversy of the project. Coordinate with the CDOT/PM and project team to identify the level of effort to be documented in the plan. NEPA Manual Chapter 7 has additional guidance. At a minimum, the plan should:			
a. Develop a stakeholder database			
b. Identify methods for public notification and dissemination of information, such as newsletters, social media, flyers, postcards, web site, press releases, miscellaneous informational materials, etc.			
c. Identify outreach strategies that comply with Title VI and Limited English Proficiency (LEP) requirements.			
G. **NEPA DOCUMENTATION PROCESS**		X	
Develop, coordinate, write, review, conduct QA/QC and finalize the appropriate NEPA document in accordance with CDOT NEPA Manual Chapter 8, as well as the current provisions of the following laws, regulations, and standards.			
1. **Draft and Final NEPA Document Preparation (EA or CatEx)** Assign a team leader qualified to (1) manage the NEPA process, (2) develop a schedule for document preparation, printing, review, and comment response, (3) will direct the Consultant team in the following tasks in coordination with the CDOT Region, EPB, and FHWA. The CDOT NEPA Manual specifies the			

number of copies to be provided for document review for each phase of the NEPA process. Use of Geographic Information Systems (GIS) for environmental data is required to be in compliance with CDOT GIS standards. All GIS data shall be provided to CDOT in electronic format with the annual updates for the project file.			
a. Distribute the internal draft NEPA document and relevant technical reports for review to a distribution list specified by CDOT. Prepare no more than 3 versions of the draft NEPA document and relevant technical reports with each version. Provide effort for no more than 2 review cycles of the draft NEPA document and relevant technical reports. Coordinate and conduct no more than two comment resolution meetings for distribution list comments. Respond to comments within a reasonable number of working days after received.			
b. Prepare a NEPA document outline for review by CDOT and FHWA. Prepare no more than three versions of the outline to be submitted and reviewed, with reviews and approvals being conducted by CDOT, FHWA, and other appropriate agencies.			
c. For the review cycles, prepare a comment/response matrix for each draft NEPA document and relevant technical reports that describe how each comment was addressed. This matrix will be distributed with each version of the draft document and relevant technical reports that CDOT and FHWA review.			
d. Submit the NEPA document to CDOT for signature and routing to FHWA for approval.			
e. Draft NEPA Document Distribution, Advertising and Public Review, Review and Concurrence, and Public NEPA Document Availability and Advertisement			
f. Create draft and final text for the public Notice of Availability of the NEPA document and the date, time and location of the public hearing [if appropriate for NEPA document] for placement in all appropriate local papers and within the Federal Register [if for an EIS] and provide to the FHWA Operations Engineer for processing.			
g. Provide an electronic version of the NEPA document and relevant technical reports on the CDOT website in PDF, or other read only format.			
h. Make revisions to the final draft NEPA document and relevant technical reports. The resulting NEPA document and relevant technical reports will be provided to CDOT for distribution and final review, prior to preparing the signature copy. Provide certification that all comments have been addressed. The Consultant shall submit the signature copy of the NEPA document and relevant technical reports [to CDOT] for signatures and routing to FHWA for approval, and then will provide copies of the signed final NEPA document to CDOT.			
2. **Public /Meeting OR Hearing (EA or CatEx)** Provide the following services, in coordination with the CDOT Region and in accordance with Chapter 7 of the NEPA Manual :		X	
a. Identify ADA compliant facility for public meeting t			
b. Advertise the public hearing/meeting date and location. The following media will be used for advertisement: Select from the following or add others. CDOT will advise the consultant on format and other meeting details.			

c. Hire translator, or sign language communicator, as needed			
d. Provide audio/visual equipment and support for presentations, as needed			
e. Prepare the graphics/display boards to include, at a minimum, the following features:			
i. Purpose of and need for project			
ii. Maps showing alternatives			
iii. Description of social, environmental and economic impacts			
iv. Design features			
v. Consistency with federal and local plans			
vi. Right-of-way information, acquisition, and construction			
vii. Source and amount of funding			
viii. Location of 4(f) properties if required			
ix. Any other project-specific resource impacts deemed appropriate			
x. Mitigation measures that warrant public disclosure or relevance			
xi. Anticipated project schedule and next steps			
xii. How and where the public can provide comments			
f. Provide a court reporter if deemed applicable (if public hearing) and prepare a certified transcript of the public hearing within 7 working days after the public hearing/meeting.			
3. **Decision Document (FONSI/ROD) Preparation (EA or CatEx)** There is no guarantee of the outcome of the NEPA process in order to determine next steps after an [EA/ CatEx], and therefore a scope of work cannot be prematurely developed for the NEPA decision document. This scope of work and contract will be reevaluated once the preliminary [EA/DEIS/FEIS] process is complete and the lead agency has made a decision on how to proceed. In the event that significant impacts are identified in the EA, the NEPA process would be required to continue to the preparation of an EIS rather than a FONSI. Continuing to prepare an EIS after completion of an EA is at CDOT's and FHWA's discretion and should not be considered part of the initial EA scope of work. At this point, a separate Consultant contract would be required, with a new scope of work. In the event that a decision document is deemed necessary, this contract and scope of work would be amended with the concurrence and agreement of both CDOT and FHWA (and other applicable agencies). At the conclusion of the public comment period, (if the project is determined to have no significant impact, a Finding of No Significant Impact (FONSI)) (if determined to have a significant impact then a Record of Decision (ROD)] document may be prepared. In the event a scope of work is prepared for a NEPA decision document to be drafted, the following services would be addressed in coordination with the Region and EPB:		X	
a. Prepare draft NEPA decision document and relevant supporting documentation for incorporating comments received at the public hearing/meeting or from the NEPA document public review period.			
i. Submit draft NEPA decision document, using templates when appropriate, (note how many copies: electronic vs. paper) and relevant supporting documentation to CDOT Region, EPB, and FHWA for [INSERT NUMBER] reviews.			
ii. Coordinate and conduct a draft NEPA decision document and relevant supporting documentation review meeting and modify the draft decision document to respond to comments received. Provide certification that comments have been addressed.			

iii. If necessary, re-submit the draft NEPA decision document and relevant supporting documentation for review to ensure that all comments have been made.			
iv. If necessary, modify the draft NEPA decision document and relevant supporting documentation to respond to comments received.			
v. Submit final NEPA decision document and relevant supporting documentation for signature using the signature process outlined in the CDOT NEPA Manual.			
b. This Scope of Work could be supplemented for additional as-yet unidentified work, if CDOT determines additional work is warranted or needed. In the event that none of the alternatives is selected at the conclusion of the [EA/EIS] process, this portion of the scope and contract will be voided.			

SECTION 7
PRECONSTRUCTION WORK TASK DESCRIPTIONS

Note: The following activities of communication, consensus building, project team reviews, conceptual design, data gathering, documentation, and formal public notice shall be planned by the Consultant and coordinated with the CDOT PM. The time of their accomplishment may overlap and parallel paths of activity that should be planned to finish the development phase in accordance with the shortest possible schedule. A project plan shall be developed by the Consultant that satisfies the requirements of the project development. This plan must be approved by the Contract Administrator (see Section 2.01) before starting the work. Deliverables can be static reports and products, digital reports and products, and/or GIS data layers. The scope should be specific as to what type of deliverable is expected.

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

***Other Agency Abbreviations**

	CDOT (C)/ Other*	Consultant	Not Applicable
A. PROJECT INITIATION AND CONTINUING REQUIREMENTS			
1. **Environmental Mitigation and Requirements** Ensure that any mitigation commitments within the NEPA documentation are incorporated into the project.		X	
2. **Independent Design Review** An independent design review shall be performed on any design accomplished by others that will be used in this project. A report identifying the results of these reviews shall be submitted to the CDOT/PM within one week of the review.		X	
3. **Identify Design Criteria** Submit a copy of Appendix B -Specific Design Criteria with the appropriate items completed.	X	X	
4. **Initiate Survey** Arrange Preliminary Field Survey and/or Aerial Survey. CDOT Form 1217a is an outline of a complete survey request and may be used as a guide for completing the survey plan.			X

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

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

B. PROJECT DEVELOPMENT			
1. **Survey** The bulk of land surveys have been completed by CDOT however supplemental survey should be anticipated. Those supplemental surveys will be conducted in accordance with the CDOT Survey Manual, the latest addendum thereof, and applicable state statutes. The completed survey shall be reviewed by the Region survey unit. Two weeks should be provided in the schedule to complete the review and sufficient time should be provided to address all comments provided by this review. Design shall not proceed until all comments resulting from this review have been satisfactorily addressed.		X	
a. Pre-survey Conference A pre-survey conference shall be held. The consultant shall attend the Presurvey conference prior to any right of way or survey work			
b. Survey Data Research Research shall be done as per current CDOT manuals			
c. Project Control Survey:			
i. Locate or Establish HARN Stations Project control shall be tied to the nearest Colorado High Accuracy Reference Network Station (HARN). In the event there are no HARN stations within 3 miles of the project (Order B, 1:1,000,000 accuracy), or HARN Densification (Order B-2, 1:500,000 accuracy), additional HARN Densification stations shall be set. NGS Blue Book procedures shall be followed for all HARN Densification stations. This will include proper spacing using proper monumentation, equipment, observation procedures, coordination through the Colorado State Geodetic Advisor and submission to NGS for inclusion in the National Database.			
ii. Monumentation Materials will be supplied by CDOT. Care is to be taken to install said monumentation in locations that are readily usable for the project and in a safe location so that they can be utilized throughout construction			

	(no monumentation shall be set on or near the centerline of the proposed roadway).			
	iii. Local Project Control Survey the required project control (centerline/baselines and elevation reference) as required. Prepare a control survey diagram showing graphical representation of all monuments used for control. Tabulate coordinates and physical descriptions of all found monuments and other physical evidence.			
d.	Land Survey/Boundary Survey Tie aliquot, property and other land monuments to the control survey. Prepare a Land Survey Control Diagram showing graphical representation of all found aliquot, property and land monuments and their relationship to the project control. Tabulate the coordinates and physical description of all found monuments and other physical evidence.			
e.	TMOSS (Topographic) Survey Collect the data required to produce a planimetric map and submit in TMOSS format. Features located will include, but not be limited to signs, mailboxes, fences, driveways, curb cuts, curbs, sidewalks, and edges of pavements. Horizontal accuracy shall be as specified for a CDOT class C or D TMOSS survey.			
f.	Terrain (Relief or Elevation) Survey Collect elevation data and submit in TMOSS format. Natural ground elevations shall be as specified.			
g.	Utility Survey (ONLY INCLUDE HOURS FOR TASKS NOT COMPLETED IN THE ENVIRONMENTAL SECTION ABOVE [SECTION 6]). Locate utility poles, manholes, valves, pedestals, guy wires, and other visible utility features. Survey underground utilities as marked by the utility companies. Determine invert elevations of manholes and vaults and survey the locations of utilities exposed by "potholing".			
h.	Hydraulic Survey Locate existing bridge limits, bridge high chords and low girders, culvert invert elevations and locations and sizes, storm sewers, inlets, vaults, manholes, PWQ structures, and determine invert and rim elevations and sizes and materials. Accomplish existing drainage site surveys for designated culverts and bridges in accordance with the Drainage Design Manual. Prepare a topographic survey of the waterway, overbanks, and floodplain areas upstream and downstream to limits determined by the Region Hydraulic Engineer or his/her designee. Incorporate statewide LiDAR data from State of Colorado resources whenever available at www.coloradohazardmapping.com or https://geodata.co.gov/.			
i.	Material Sources Survey designated material sources as specified.			
j.	Supplemental Surveying: As required and specifically requested.			
k.	Survey Report: Prepare a Survey Report as required in the Survey Manual.			
l.	Photogrammetry			
	i. Camera Calibration Report			
	ii. Flight Plan			
	iii. Flight			
	iv. Contact Prints			
	v. Negatives			
	vi. Enlargements			
	vii. Photo Index			

viii. Supplemental Survey (wing points)			
ix. Data Reduction a) *Topographic Contours* b) *Planimetric (Topography)*			
x. Map Compilation a) *Index Maps* b) *Finished Maps*			
m. Accuracy Tests: Tests are to be performed on a regular basis throughout the project by the consultant.			
n. Review by Professional Land Surveyor The accuracy tests are to be reviewed by the PLS in responsible charge for the project, and submitted to the project engineer and made part of the project records. Further review of all aspects of the field and office work shall also be the responsibility of the PLS in responsible charge.			
C. PRELIMINARY DESIGN			
1. **Traffic Engineering (ONLY INCLUDE HOURS FOR TASKS NOT COMPLETED IN THE ENVIRONMENTAL SECTION ABOVE [SECTION 6])**		X	
a. Review locations with "potential for accident reduction map" and or traffic operations analysis and or the safety assessment report as provided by CDOT to determine which safety improvements will be incorporated into the project.			
b. Analyze the proposed project design with the traffic projection data			
c. Recommend the appropriate geometry (i.e., number of lanes, auxiliary lanes, storage lengths, weaving distances, etc.) in accordance with the current version of Highway Capacity Manual. Transit needs are to be included in this analysis.			
d. The proposed design shall be reviewed to ensure compatibility with existing signing procedures throughout the preliminary roadway design process			
e. Use traffic data appropriate to the anticipated construction timing in developing detour alternatives.			
f. Develop the total ESAL for the design life and submit to the CDOT/PM for the pavement design.			
g. Submit the traffic data and recommendations to the CDOT/PM for review			
h. Fiber optic design and ITS component design			
i. System Engineering Analysis			
2. **Materials Engineering** A preliminary soil investigation should be conducted.		X	
a. Determine test hole locations (horizontal and vertical) and coordinate with the CDOT/PM.			
b. Collect soil samples and test for: i. Classification ii. Moisture – Density Relationship iii. Resistance Value iv. Corrosiveness – Note locations of high corrosiveness with recommendations; see CDOT pipe material selection policy. v. Bearing Capacity			
c. Prepare and submit a soils investigation report.			
d. Prepare and submit pipe material selection report.			
3. **Pavement**		X	
a. Pavement Rehabilitation This section applies if the project includes existing pavement that is incorporated in the design for continued utilization.			
i. Determine the equivalent Design Traffic (18k ESAL) that the existing pavement can carry			
ii. Estimate the 18k ESAL's experienced by the existing pavement.			

iii. Obtain the projected 18k ESAL for rehabilitated pavement design period.			
iv. Perform a distress survey a) *Determine the types of distress present in the pavement* b) *Determine the extent of each distress type* c) *Develop a distress map for the existing pavement* d) *Determine the causes of the existing distress utilizing tests and required and analyses.* e) *Determine the drainage conditions of the existing surface and subsurface*			
v. Investigate the existing pavement structure a) *Subgrade: soil classifications, moisture/density relationship, resistance value and corrosiveness* b) *Base: thickness, gradation, plasticity index, liquid limit, resistance value, strength coefficient* c) *Pavement: thickness, strength coefficient*			
vi. Perform deflection testing to obtain the following: a) *Deflection profile* b) *Maximum deflection* c) *Deflection basin* d) *Differential deflections at transverse joints for portland cement concrete pavement (pccp)* e) *In place determination of the appropriate modulus for each layer and subgrade*			X
vii. Determine the remaining load carrying capacity from the above data. Design the feasible alternatives for the required rehabilitation (and widening if appropriate) utilizing the above investigations and test results. The design of the feasible alternatives shall be checked against the following: a) *The basic cause of distress which shall be corrected* b) *Effect on the rate of future deterioration* c) *Effect on surface characteristics* Where appropriate, any new pavement widening shall be included in the analysis.			
b. New Pavement Structure The feasible alternatives of new pavement structure shall be designed utilizing procedures accepted by the CDOT/PM. New pavement designs for widening shall be compatible with adjacent rehabilitated existing pavement.			
c. Pavement Justification			
i. Basic factors: a) *Desired life expectancy (obtain design life from CDOT).* b) *Required maintenance activities intervals.* c) *Basis for performance life.*			
ii. Analyze life cycle cost of the selected alternatives a) *Perform analysis with unit and maintenance costs from CDOT. Determine present worth and annual costs in accordance with the procedures in the CDOT Pavement Design Guide.* b) *Compare alternatives over the same life span.* c) *Recommend the pavement structure and provide the basis for the recommendations.*			
d. Pavement Design Report Include all the above tests, investigations, analyses, and calculations performed. Submit to the CDOT/PM for acceptance.			

4. **Existing Structures and Foundation**		X	
a. Existing bridge condition investigation Determine condition of existing bridge deck, superstructure and substructure material as required.			
b. Foundation Investigation Report			
i. Prepare a Foundation Investigation Request showing requested test hole locations.			
ii. Formulate drilling pattern, perform the necessary subsurface investigation and collect samples as required.			
iii. Perform the appropriate laboratory tests and analyze the data. Determine strength, allowable bearing capacity and corrosiveness of foundation material.			
iv. Perform lateral analyses (deformation, moment, and shear) for the caissons and/or piles which are subjected to lateral loadings. This may be a computer analysis which will consider the group effect and selection of the soil parameters.			X
v. If appropriate, a pile driving analysis using a wave equation will be accomplished.			
vi. Submit the Foundation Investigation Report to the CDOT/PM for comment and approval prior to final version.			
vii. Prepare engineering geology plan sheet and copies of the Foundation Investigation Report foundation report with recommendations for type, size, and tip (bottom) elevation of the required foundation. Specify if pre-drilling, pile tip, casing, dewatering, etc., are needed for foundation construction.			
viii. If requested, perform a gradation analysis of the streambed/waterway native material using a sieve analysis, Wolman Count, or other acceptable method as directed by the Region Hydraulic Engineer or his/her designee.		+	
5. **Hydrology/Hydraulic Engineering**		X	
a. Data Collection and Hydrology			
i. Establish drainage basin data: delineate and determine size, waterway geometrics, vegetation cover, and land use.			
ii. Collect 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).			
iii. Complete a project site visit to evaluate channel/overbank roughness coefficients, channel stability, vegetation, condition/adequacy of existing structures, Ordinary High Water, allowable high water, etc. Document the site visit with photos.			
iv. Select a design storm frequency based on the established criteria.			
v. Complete a hydrological analysis using existing studies or approved methods.			
vi. Perform a risk analysis.			
b. Hydraulics			
i. Complete preliminary design of minor drainage structures: a) *Determine locations, sizes, and alignment based on preliminary hydraulic design. Identify locations by highway station or coordinates, as appropriate.* b) *Determine the allowable headwater.* c) *Assess the degree of sediment and debris problems to be encountered* d) *Assess abrasion and corrosion levels based on CDOT Pipe Material Selection Policy.*			

	e) *Prepare preliminary structure cross-sections and determine elevations, flow lines, slopes and lengths of the structures.* f) *Present initial designs of any necessary deck drainage or other drainage off the structure.*			
	ii. Complete preliminary design of major drainage structures: a) *Complete hydraulic analysis and water surface profiles.* b) *Determine required hydraulic size/skew of major structures/channels* c) *Determine minimum low chord elevation per CDOT criteria* d) *Determine design storm and 500-year water surface elevations.* e) *Determine scour for design storm, the 500-year event, incipient overtopping condition, and maximum scour-inducing storm (if applicable).* f) *Assess channel erosion protection for structures.* g) *Present initial designs of any necessary deck drainage or other drainage off the structure.*			
	iii. Complete preliminary design for Permanent Water Quality Control Measures (PWQ CMs) and outlet structures with details as needed. Adequate detail should be included in the FIR construction plan set if FIR-level decisions are required with respect to right-of-way, easements, maintenance, etc. to move to final design.			
	jjj. If required, identify and assist CDOT in coordinating potential funding participation of local, state, and/or federal agencies.			
	c. Prepare preliminary construction plans that include:			
	i. Drainage Plan Sheets ii. Drainage Detail Sheets as needed iii. Hydraulic Information Sheets as needed			
	d. Prepare a Preliminary Hydraulics Report or Preliminary Drainage Report in accordance with the CDOT Drainage Design Manual i. Introduction, Hydrology, Existing Structures and Design Discussion sections should be close to final at this level. Design Discussion should include CDOT and local criteria the project intends to meet. ii. Recommended design should be preliminary at this level and progress through final design. iii. All design assumptions and related design decisions shall be documented. iv. The Appendix shall contain: *a) Drainage basin maps* b) *Hydrology/hydraulic worksheets* c) *Drainage construction plan sheets.* d) *CDOT pipe material selection documentation* e) *Water Quality report and PWQ worksheets*			
	e. Perform internal QA/QC prior to submission to CDOT.			
6.	**Floodplain Assessment**		X	
	a. Identify location of regulatory floodplains and floodways published by FEMA and local agencies, and assess impacts of planned changes to those boundaries from CDOT activities or planned map revisions by others.			
	b. Add information to environmental resource mapping of existing conditions			
	c. Determine the adverse impacts of each alternative with respect to the base flood elevation (BFE), floodway boundary, and local drainage. This must include the impacts of construction and other "temporary" activities.			
	d. Analyze impacts and develop possible actions to mitigate for the adverse impacts, then coordinate with roadway and structural designers.			
	e. Analyze the impacts and mitigation. Included in the analysis will be a determination of significant impacts due to:			

	i) Single community access routes. ii) Risk for social or economic losses due to flooding iii) Alteration of beneficial floodplain values. iv) Recommend preparation of a local floodplain development permit for all work in floodplains and floodways, as required by state and federal law. v) Show all ground survey point elevations in the same vertical datum identified on the current effective FIRM. vi) 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 mapped Special Flood Hazard Area (SFHA).			
	f. Prepare a Floodplain Information Sheet for the final approved plan set.		+	
	i) Show and clearly label the current effective 100-yr floodplain and floodway boundaries, and the 500-year floodplain (as applicable). ii) Show and clearly label all cross sections and 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). iii) Show and clearly label any fluvial hazards, buffer zones or erosion management zones. iv) Show the limits of disturbance for all permanent and temporary activities, and label as such. v) Show all ground survey point elevations in the same vertical datum identified on the current effective FIRM. vi) 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. vii) Add all conditions of approval from the local agency to the notes, especially for as-built survey and P.L.S. & P.E. re-certification requirements. viii) Add a note identifying any 625 Survey specials.			
	g. Prepare a Preliminary Floodplain Report or Memo as outlined in the CDOT DDM or as directed by the Region Hydraulic Engineer or his/her designee.			
7.	**Environmental – Water Quality**		X	
	a. Storm Water Management Plan Initiate a Storm Water Management Plan in accordance with:			
	i) Municipal Separate Storm Sewer Systems (MS4) ii) CDPHE's Construction Discharge Permit System requirements iii) CDOT's Erosion Control and Storm Water Quality Guide iv) Local agency SWMP/GESC/EC requirements v) CDOT's Standard Specifications vi) CDOT Standard Plans vii) Other appropriate documents			
	b. Topsoil sampling, *if applicable.*			
	i) Determine number for revegetation units required by coordinating with SWMP designer and design team. Number of samples to be determined by Consultant and CDOT: ii) Conduct topsoil sampling and send samples to laboratory for nutrient testing; refer to *topsoil sampling procedure* for laboratory testing requirements.			

iii) Insert topsoil amendments into the SWMP using the CDOT Amendments Calculator to determine quantities.			
c. Vegetative Transects			
~~i)~~ i. Determine number of revegetation units required by coordinating with SWMP designer and Environmental Specialist. Number of transects: 1 per every 5 acres. ii. Conduct vegetation transect(s) to determine existing vegetative percent cover as required for each vegetation unit as determined in the SWMP prior to construction disturbance. iii) iii. Document transect location(s) and percent cover(s) onto an aerial map. Place map and photographs into Tab 17.			
d. Prepare preliminary Permanent Water Quality (PWQ) plans in conjunction with Section 7.C.5.b.iii of this document.			
i) Determine PWQ requirements (local agency MS4 requirements, CDOT requirements, etc.) ii) Develop PWQ alternatives that will meet CDOT and local agency MS4 requirements iii) Identify right-of-way requirements and utility impacts for alternatives iv) Identify all entities and v) Other appropriate documents			
e. Prepare preliminary water quality report as an appendix to the Hydraulic Design Report to include PWQ Evaluation and Tracking Forms, cost estimate for PWQ CMs, etc.			
f. Conduct a PWQ meeting just prior to FIR to discuss alternatives with CDOT PWQ Specialist/Water Pollution Control Manager, Hydraulics Engineer, and Project manager.			
g. Perform internal QA/QC prior to submittal to CDOT.			
8. **Utility Coordination (ONLY INCLUDE HOURS FOR TASKS NOT COMPLETED IN THE ENVIRONMENTAL SECTION ABOVE [SECTION 6]).**		X	
a. Location Maps Obtain utility location maps from the Utility Companies which identify utility features in the project area. Requests and receipt of maps will be coordinated with the Region Utility Engineer via copies of request and transmittal letters.			
b. Reviews and Investigations Perform SUE Investigation Conduct field reviews and utility investigations with the Region Utility Engineer and Utility companies, as required, to ensure correct horizontal and vertical utility data. When possible this will be done utilizing non-destructive investigative techniques. The horizontal and vertical locations will be shown in the FIR plans and cross sections. When "potholing" is required, the Consultant shall be responsible for all necessary excavations.			
c. Incorporate utility locations in plans from utility survey			
d. Relocation Recommendations Submit necessary information for the relocation or adjustments of affected utilities to the appropriate utility. Process all CDOT paperwork necessary for all relocations. Consultant will contact all utility companies that may have utility conflicts and work with the utility to develop a mitigation, removal, or relocation of the utility. Utility relocations and agreements will be developed by the consultant as directed by CDOT.			
e. Ditch Company Coordination Conflicts with Ditch companies are not anticipated. However should they be discovered the Consultant will contact ditch companies and coordinate ditch requirements and restrictions. Develop the plans for the necessary irrigation structures and submit to the Region Utility Engineer for review. Negotiate all CDOT paperwork necessary for all relocations. Consultant should contact the ditch companies that may have conflicts and work with to develop a			

mitigation, removal, or relocation. Relocations and agreements will be developed by the consultant as directed by CDOT.			
9. **Roadway Design and Roadside Development**		X	
Coordinate all design activities with required CDOT specialty units and other outside entities.			
a. Roadway Design			
i) Input, check, and plot survey data			
ii) Verify that a project specific coordinate system approved by CDOT is used to identify the horizontal locations of key points. The coordinate systems used for roadway design and ROW shall be compatible.			
iii) Input and check horizontal and vertical alignments against all design criteria. Necessary variances and/or design decisions will be identified with justification and concurrence by CDOT & FHWA.			
iv) Provide alignments, toes of slope and pertinent design features, including permanent and temporary impacts, to the ROW, Utility and Environmental Managers.			
v) Plot/develop all required information on the plans in accordance with all applicable CDOT policies and procedures.			
vi) Using current approved CDOT software, generate a 3 dimensional design model and produce preliminary quantities			
b. Roadside Development: For roadside items including but not limited to, guardrails, delineators, ditches, PWQ CMs, landscaping, sprinkler systems, sound barriers, bike paths, sidewalks, lighting, curb ramps, truck escape ramps, and rest areas provide the following layouts in the plans:			
i) Critical locations in the plans for irrigation sleeves and other utility conduits underneath the proposed roadways.			
ii) Coordinate the roadside items with the Storm Water Management Plan (SWMP).			
10. **Right-of-Way** The following work shall be done by, or under the immediate supervision of, a Professional Land Surveyor (PLS). The following work may be included as part of a Surveying contract or part of a Right-of-Way plans preparation contract.	X		
a. Research			
i) Identify affected ownership from preliminary design plans			
ii) Obtain assessor's maps for the project			
iii) Locate documents which transfer title			
iv) Prepare chain of title as described in the manual or as directed by the CDOT Project Manager			
v) Look for encumbrances, liens, releases, etc.			
vi) Make physical inspection of property. Note any physical evidence of apparent easements, wells, ditches, ingress, and egress			
vii) Check with local entities such as the County Road Department or County Engineer for location of existing roads or easements			
viii) Check for and obtain latest subdivision plats and vacations of streets			
b. Ownership Map For additional detail on required drafting software, see Section 8 Submittals. Project coordinate system ownership map shall be submitted along with a "Project Narrative".			
i) Review preliminary design and survey report.			
ii) Review project coordinate system and basis of bearing from Control Survey prior to calculations			
iii) Compute alignment of ROW centerline and store coordinates of all found monuments within the first tier of properties left and right of Centerline			
iv) Review ownership documents (Memoranda of Ownership and/or title commitments, deeds and supporting plats)			

v) Calculate coordinates of lost or obliterated aliquot corners using guidelines established by the Bureau of Land Management. (To be used in resetting corners according to Colorado Revised Statutes)			
vi) Establish subdivisions of sections using Bureau of Land Management Guidelines. Show all section lines and ¼ section lines on the ownership map and ROW plans			
vii) Determine existing Right-of-Way limits from deeds of record, CDOT plans and found ROW markers. Previous Right-of-Way plans, if available, will be provided by CDOT as an aid			
viii) Determine ownerships and their property boundary locations. Locate the intersection of these property boundary lines with the existing CDOT Right-of-Way. Determine location and ownership of existing easements of record.			
ix) Secure additional property ties and additional topography where the highway improvement may affect improvements adjacent to the Right-of-Way. This additional topography should include: *a) Proximate buildings, sheds, etc.* *b) Underground cables and conduits* *c) Wells* *d) Irrigation ditches and systems* *e) Septic tanks, cesspools, and leaching fields* *f) Landscaping* g) *Other*			
x) Reconcile overlaps and gaps in ownerships as required by CDOT, documenting method used (may require additional field work). Include reasons for decisions in the "Project Narrative".			
xi) Plot OWNERSHIP MAP. If entire ownership will not fit on the sheet at this scale, an additional abbreviated OWNERSHIP MAP may be used at a scale of 1 inch=1 mile, or other suitable scale, to show the configuration of large ownerships. Metric equivalents may be required.			
xii) Label all monuments found with description of monument and project coordinates (from Control Survey Diagram)			
xiii) Show improvements and topography within the ownerships and existing access to the street/county road system.			
xiv) Number ownerships alternately as they occur along the centerline from south to north or west to east in the same direction as the stationing. Show current names of owners and lessees			
xv) Calculate the total area of all ownerships affected, including coordinates of all property corners. Deduct areas for existing road Rights-of-Way. Bearings and distances do not need to be shown on 1" = 1 mile abbreviated OWNERSHIP MAPS			
xvi) Different land uses within a property should be cross-hatched or shaded.			
xvii) In the lower right corner of the OWNERSHIP MAP, show seal, number and name of Professional Land Surveyor supervising the work			
xviii) Transmit finished reproducible OWNERSHIP MAP, electronic drawing files, and Memoranda of Ownership to CDOT along with all calculations, field notes, and supporting data. The OWNERSHIP MAP will include a copy of the control and monumentation sheet			
11. **Major Structural Design** Major structures are bridges and culverts with a total length greater than twenty feet or retaining walls with a total height and a maximum exposed height at any section of over four feet. Overhead sign structures (sign bridges, cantilevers, and butterflies extending over traffic) are also major structures, but are exempt from the structure preliminary		X	

design activity defined here. The CDOT Structure Reviewer will participate in coordinating this activity.			
a. Structural Data Collection			
i) Obtain the structure site data. The following data, as applicable, shall be collected: (Typical roadway section, roadway plan and profile sheets showing all alignment data, topography, utilities, preliminary design plan) Right-of-Way restrictions, preliminary hydraulics and geology information, environmental constraints, lighting requirements, guardrail types, recommendations for structure type, and architectural recommendations.			
ii) Obtain data on existing structures. When applicable, collect items such as existing plans, inspection reports, structure ratings, foundation information, and shop drawings. A field investigation of existing structures will be made with notification to the Resident Engineer.			
b. Structure Selection and Layout			
i) Review the structure site data to determine the requirements that will control the structure size, layout, type, and rehabilitation alternatives. On a continuing basis, provide support data and recommendations as necessary to finalize the structure site data.			
ii) Determine the structure layout alternatives. For bridges, determine the structure length, width, and span configurations that satisfy all horizontal and vertical clearance criteria. For walls, determine the necessary top and bottom of wall profiles.			X
iii) Determine the structure type alternatives. For bridges, consider precast and cast-in-place concrete and steel superstructures and determine the spans and depths for each. For walls, determine the feasible wall types.			X
iv) Determine the foundation alternatives. Consider piles, drilled caissons, spread footings, and mechanically stabilized earth foundations based on geology information from existing structures and early estimates from the project geologist. To obtain supporting information, initiate the foundation investigation as early as possible during the preliminary design phase.			X
v) Determine the rehabilitation alternatives. Continued use of all or parts of existing structures shall be considered as applicable. The condition of existing structures shall be investigated and reported. Determine the modifications and rehabilitation necessary to use all or parts of existing structures and the associated costs.			X
vi) Develop the staged construction phasing plan, as necessary for traffic control and detours, in conjunction with the parties performing the roadway design and traffic control plan. The impact of staged construction on the structure alternatives shall be considered and reported on.			
vii) Compute preliminary quantities and preliminary cost estimates as necessary to evaluate and compare the structure layout, type, and rehabilitation alternatives.			X
viii) Evaluate the structure alternatives. Establish the criteria for evaluating and comparing the structure alternatives that, in addition to cost, encompass all aspects of the project's objectives. Based on these criteria, select the optimum structure layout, type, and rehabilitation alternative, as applicable, for recommendation to CDOT.			X
ix) Prepare preliminary general layout for the recommended structure. Prepare structure layouts in accordance with current standards. Special detail drawings and a detailed preliminary cost estimate shall accompany the general layout. The special detail drawings shall include			

the architectural treatment. Perform an independent design and detail check of the general layout.			
c. Structure Selection Report Prepare a structure selection report to document, and obtain approval for, the structure preliminary design. By means of the structure general layout, with supporting drawings, tables, and discussion, provide for the following:			x
i) Summarize the structure site data used to select and layout the structures. Include the following: *a) Existing structure data, including sufficiency rating and whether or not the structure is on the "select list".* *b) Project site plan* *c) Roadway vertical and horizontal alignments and cross sections at the structure* *d) Construction phasing* *e) Utilities on, below, and adjacent to the structure* *f) Hydraulics:* *g) Channel size and skew, design year frequency, minimum low girder elevation, design year and 500-year high water elevations, estimated design year and 500 year scour profiles, and channel erosion protection* *h) Preliminary geology information for structure foundation* i) *Architectural requirements*			
ii) Report on the structure selection and layout process. Include the following: *a) Discuss the structure layout, type, and rehabilitation alternatives considered* *b) Define the criteria used to evaluate the structure alternatives and how the recommended structure was selected* c) *Provide a detailed preliminary cost estimate and general layout of the recommended structure*			
iii) Obtain acceptance by CDOT on the recommended structure and its layout. Allow approximately two weeks for review of the structure selection report. The associated general layout, with the revisions required by the CDOT review, will be included in the FIR plans. The structure selection report, with the associated general layout, must be accepted in writing by CDOT prior to the commencement of further design activities.			
d. Foundation Investigation Request Initiate the foundation investigation as early in the preliminary design phase as is practical. On plan sheets showing the project control line, its stations and coordinates, utilities, identify the test holes needed and submit them to the project geologist. The available general layout information for the new structure shall be included in the investigation request.			
12. **Construction Phasing Plan** A construction phasing plan shall be developed for all projects which integrates the construction of all the project work elements into a practical and feasible sequence. This plan shall accommodate the existing traffic movements during construction (detours). A preliminary traffic control plan will also be developed which will be compatible with the phasing plan.		X	
13. **Preparation for the Field Inspection Review (FIR)**		X	
a. Coordinate, complete, and compile the plan inputs from other branches: materials, hydraulics, traffic, right-of-way, environmental and water quality, and Staff Bridge.			

b. If a major structure is included in the project, including a PWQ CM, a general layout (which has been accepted by CDOT) will be included in the FIR plans.			
c. Prepare the preliminary cost estimate for the work described in the FIR plans based on estimated quantities.			
d. The FIR plans shall comply with CDOT requirements and shall include a title sheet, typical sections, general notes, plan/profile sheets, and preliminary layouts of interchanges/intersections. The plan/profile sheets will include all existing topography, survey alignments, projected alignments, profile grades, ground line, existing ROW, rough structure notes (preliminary drainage design notes, including pipes, inlets, ditches and channels), and existing utility locations.			
i) The following items will be mandatory for the FIR plans: *a) The below may be omitted in lieu of a roll plot.* • *Preliminary earthwork (plotted cross sections at critical points with roadway template and existing utility lines at known or estimated depths)* • *Catch points* • *Proposed Right-of-Way* • *Pit data (if required)* • *Soil profile and stabilization data* • *Structure general layouts (if applicable)*			
ii) Typical plan sheet scales will be as follows: *a) Plan and Profile 1 inch = 50 Feet (Urban)* *b) 1 inch = 100 Feet (Rural)* c) *Intersections 1 inch = 20 feet*			
e. The ROW ownership map shall be included in the FIR plan set			
f. The plans shall be submitted to the CDOT/PM for a preliminary review prior to the FIR			
g. FIR plan reproduction not to exceed 2 sets			
h. The preliminary construction phasing including preliminary traffic control plan with proposed detours will be included in the FIR plan set			
i. CDOT form 1048 – project scoping procedures completion checklist			
14. **Field Inspection Review**		X	
a. Attend the FIR			
b. The FIR meeting minutes shall be prepared by the C/PM, approved by the CDOT/PM, and distributed as directed			
c. The FIR original plan sheets shall be revised/corrected in accordance with the FIR meeting comments within thirty (30) working days			
d. Design decisions concerning questions raised by the FIR will be resolved in cooperation with the CDOT/PM. The C/PM shall document the decision and transmit the documentation to the CDOT/PM for approval.			
e. A list of all deviations from standard design criteria along with the written justification for each one shall be submitted to the CDOT/PM			
15. **Post-FIR Revisions** The Consultant shall complete the revisions required by the FIR before this phase of work is considered to be complete		X	
a. Update project schedule			
b. Coordinate activities			
c. Finalize design decisions, variances, justification process, and traffic signal warrants			
D. FINAL DESIGN			
1. **Traffic Engineering**			
a. Prepare and provide permanent signing/pavement marking plans		X	
b. Signalized intersections:			
i) Prepare and provide the signal warrant study			

ii) Prepare plan sheet with intersection condition diagrams and required traffic signal design and forward to appropriate agency. Prepare 1 inch to 20-foot scale intersection plan sheet for each intersection which will have a traffic signal designed for it.		X	
iii) Prepare and provide the construction traffic control plans and quantities. Including for construction phasing plans.		X	
2. **Materials Engineering**			
a. Finalize and provide the stabilization plan/pavement design report.		X	
b. Finalize geotechnical considerations and incorporate them into the plans.			X
i) Rock fall			
ii) Rock cut			
iii) Landslides			
iv) Other			
3. **Environmental Permits**	+	X	
This activity is concurrent with final design and must be completed prior to the advertisement for construction. Coordinate between the agencies, the Environmental Manager and the PM and prepare and submit application and design information to the Environmental Manager for the following permits:			
a. 401 Permit Process (Water Quality Certification)			
b. 402 Permit Process (Point Source Discharge)			
c. 404 Permit Process (Discharge of Fill)			
i) Determine impacts			
ii) Coordinate with the U.S. Army Corps of Engineers, Region and Staff Design			
iii) Incorporate permit stipulations into the final plans			
d. Senate Bill 40 Certification			
e. CDPS or NPDES Storm Water Permit for Construction Activities			
4. **Structures**		X	
Ensure approval of the Foundation Investigation Report from CDOT/PM.			
5. **Hydrology, Hydraulics and Floodplain Management**		X	
a. Data Review Review data and information developed under the Preliminary Hydraulics Report, Preliminary Drainage Report, and/or Preliminary Floodplain Report, and update both/all in accordance with decisions made since the FIR.			
b. Hydrology and Hydraulics			
i) Review data and information developed under the preliminary hydraulic investigation and update per FIR decisions			
ii) Complete final design for minor drainage structures a) *Finalize horizontal and vertical locations and sizes for all drainage structures based on hydraulic design. Update locations in construction plans by highway station or coordinates, as appropriate* b) *Make final recommendations for pipe material based on CDOT Pipe Material Selection Policy guidelines. Document recommendations in a letter with supporting design information.* c) *Finalize structure cross-sections and profiles to determine the elevations, flow lines, slopes and lengths of structures.* d) *Finalize deck/structure drainage in coordination with CDOT Staff Bridge or their designee.*			
iii) Complete final design for major structures. a) *Finalize hydraulic analysis elevations, flow lines, water surface profiles and hydraulic information.* b) *Finalize configuration, size and skew of major structures and channels.* c) *Coordinate final water surface profiles and final low girder elevation for selected structures.*			

d) *Finalize channel scour profiles for design year and 500-year scour for selected structures.* e) *Finalize channel erosion protection limits and mitigation measures for selected structures and provide appropriate details.* f) *Finalize deck/structure drainage in coordination with CDOT Staff Bridge or their designee.*			
iv) Complete final design for all drainage details required for minor and major drainage structures.			
v) Recommend culvert pipe sizes, type, shape and material for proposed construction detours.			
vi) Erosion and sedimentation problems identified with solutions in place, including but not limited to erosion and scour countermeasure designs, analyses and reports.			
c. Prepare final construction plans in accordance with requirements in the CDOT Drainage Design Manual (DDM) i) Drainage Notes ii) Drainage Tabulation Sheets iii) Drainage Plan Sheets iv) Drainage Profile Sheets v) Drainage Detail Sheets vi) Bridge Hydraulic Information Sheets vii) Floodplain Information Sheet			
d. Prepare a Final Hydraulic Design Report or Final Drainage Report in accordance with the requirements of the CDOT DDM			
i) Review data and information in the Preliminary Hydraulic Design Report and/or Preliminary Drainage Report and update in accordance with decisions made at FIR ii) Finalize all sections of the report and include Bridge Hydraulic Information Sheets. All design assumptions and related design decisions shall be documented in the report.			
iii) Provide a PDF copy of the Final Hydraulic Design Report or Final Drainage Report to the CDOT Project Manager for disbursement to appropriate parties.			
iv) Floodplain & floodway information incorporated into the plan sheets			
v) Bridge hydraulic information incorporated into the plan sheet			
vi) 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			
e. Prepare Final Floodplain Report			
i) Include the Floodplain Information Sheet from the plan set in 11x17 with all other hydraulic mapping information relevant to requisite permits and certifications			
ii) List and identify all applicable ordinance or code, and describe how those specific standards were addressed and resolved			
iii) Discuss all alternatives analyzed, analysis results, recommendations, and final design direction			
iv) Record all relevant current effective floodplain information, like community number, panel number(s), effective date(s), waterway names, cross sections, BFEs, and contact name and information for local floodplain administrators contacted for the project.			
v) Provide a copy of approved floodplain development permits and no rise certifications			

vi) Identify all construction and as-built stipulations required from approved permits and certifications			
vii) Provide all background survey information on 11x17 or smaller			
viii) Identify future actions required prior to CDOT project close-out, especially as-built survey and P.L.S. certification, and final P.E. re-certification with local agencies.			
f. Perform internal QA/QC on all hydrologic, hydraulic and floodplain information prior to submittal to CDOT.			
6. **Environmental – Water Quality**		X	
a. Storm Water Management Plan Initiate a Storm Water Management Plan in accordance with:			
i) Municipal Separate Storm Sewer Systems (MS4) ii) CDPHE's Construction Discharge Permit System requirements iii) CDOT's Erosion Control and Storm Water Quality Guide iv) Local agency SWMP/GESC/EC requirements v) CDOT's Standard Specifications vi) CDOT Standard Plans vii) Other appropriate documents			
b. Permanent Water Quality			
i) Finalize PWQ design to meet CDOT and local MS4 requirements ii) Coordinate with all entities and municipalities regarding ownership and maintenance responsibilities for PWQ CMs.			
c. Prepare a Final PWQ report as an appendix to the Final Hydraulic Design Report.			
d. Conduct a PWQ meeting just prior to FOR to discuss documentation of PWQ with CDOT PWQ Specialist/Water Pollution Control Manager, Hydraulics Engineer, and Project Manager.			
e. Perform internal QA/QC prior to submittal to CDOT.			
7. **Utility Coordination** Following the finalization of the roadway horizontal alignment and profile grade and the horizontal and vertical location of drainage structures, sewers, and other underground structures, coordinate with the Utility Engineer to identify and resolve any conflicts to finalize utility clearances.		X	
a. Prepare and provide final utility plans			
i) The final utility plans shall be prepared following the resolution of the FIR comments, the completion of the final hydraulic design, and the completion of the design of the other items in the list in paragraph (b) below.			
ii) The final utility plans shall include all horizontal and vertical locations of the existing and proposed utilities and any other details which would indicate possible utility conflicts.			
iii) The new or revised utility locations will be added to the plan topography. Conflicts will be resolved and appropriate pay items and specifications added, if required, to adjust utilities.			
b. Final railroad plans Coordinate the following activities through the Region Utility Engineer and in accordance with railroad requirements.			
i) Develop the railroad encroachment plan (with cross sections)			
ii) Define construction responsibilities between the railroad and highway			
iii) Develop cost estimates based upon cost allocation previously determined			
iv) Prepare Public Utilities Commission application exhibits as required.			
8. **Roadway Design and Roadside Development**		X	
a. Roadway design. Prepare and provide final roadway design plans incorporating all input from applicable CDOT specialties and outside entities.			

b. Roadside design			
c. Landscaping			
i) Determine the most economical alternative, finalize concept, and complete the plan.			
ii) Verify that an acceptable safe recovery distance exists between traveled way and all trees to be planted.			
iii) Coordinate special permits that may be required.			
iv) Verify availability of plant materials and submit letter to the CDOT/PM certifying that designated plants are available.			
d. Prepare and provide plans for sprinkler systems, bike paths, sound barriers, truck escape ramps, rest areas, and others, as appropriate.			
e. Lighting plans			
i) Provide a foundation investigation for each high mast light location.			
ii) After approval of the locations of the lights, the lighting design will be completed with the following information shown on the plan sheets: a) *Circuit type and voltage of power source* b) *Location of power source (coordinated with the utility engineer)* c) *Lumina ire type and lumens* d) *Light standard type and mounting height* e) *Bracket arm type and length* f) *Foundation details* g) *Size and location of electrical conduit* h) *Locations of power sources(s)/lighting control center(s) (if appropriate)* i) *Location of direct burial cable* j) *Size of wiring and/or direct burial cable*			
iii) Coordinate with local entities			
f. Prepare and provide wetland mitigation plan.			
9. **Right-of-Way Plans and Activities** Reference the CDOT ROW and surveying manual' requirements for the following:	X		
a. Initiate ROW authorization process Coordinate with the CDOT/PM to initiate the ROW authorization process. Typically, the corrected FIR plans (with final hydraulic design inputs) will be used as the design basis for the ROW authorization plans.			
b. Ownership Maps			
c. Authorization Plan:			
i) Integrate toes of slopes and other design details such as lane lines, culverts, road approaches, etc. into ownership map (base map for ROW plans)			
ii) Determine new Right-of-Way requirements, access control, and easements from design plans following the FIR and plot on ownership/base maps. Normal scale, 1 inch=50 feet in urban areas, 1 inch=100 feet in rural areas. Metric units may be required as per PM. Metric scales will be as shown in the CDOT "Metric Conversion Manual". Revise numbering of ownerships to correspond to ROW acquisitions.			
iii) Calculate areas of parcels, easements, and remainders			
iv) Prepare ROW plan sheets			
v) Prepare legal descriptions of parcels, easements and access control			
vi) Prepare tabulation of properties sheet			
vii) Prepare Right-of-Way Title Sheet			
viii) Incorporate the Control Survey and Monumentation Sheets into the plans			
ix) On the Monumentation Sheet, list the ROW, Easement, Control, etc., points to be set and the aliquot corners to be reset			

x) Prepare ROW tabulation of road approaches, if applicable. Show owner milepost/station, right or left of centerline, width of approach, skew angle, and any remark			
xi) Hold ROW Plan Review (ROWPR), with Design, ROW, and Construction to determine if ROW plans are sufficient to proceed with appraisal of property to be acquired for the project			
xii) Transmit originals of the plan sheets, title sheet, tabulation of properties sheet, and revised ownership (memoranda of ownership and title commitments as directed by the ROW manager), calculations and supporting data (i.e., parcel diaries), and final electronic data for all work products.			
d. Right-of-Way Plan Revisions Revise the ROW plans as needed throughout the appraisal and negotiation process for those changes approved by the Region ROW Supervisor. All plan revisions shall be submitted to the Region ROW Supervisor within 5 working days after receiving notice from CDOT to proceed with a Plan Revision.			
e. Final ROW Plans and Monumentation			
i) ROW Plan Review			
ii) ROW Plan Revisions, as needed throughout the negotiation and appraisal process			
f. Appraisals			
g. Appraisal staking Stake the proposed ROW line, easements and existing ROW line, if required by the region supervisor. Set lath or wooden stakes at all angle points and on line as necessary to have at least three stakes visible from any point on line. Mark point numbers on all stakes and color code as required. The appraisal stakes only need to be set at an accuracy of +/- 1.0 foot, unless the point fall near improvements, then +/- 0.25 foot is necessary.			
h. Title Insurance and Closing Services Provide title insurance and closing services as described in the CDOT ROW Manual and coordinate with the CDOT Region ROW Manager.			
i. Acquire needed parcels including title insurance and closing services coordinated with the Region ROW Manager			
10. **Final Major Structural Design** During the conduct of this activity, the Consultant shall participate in structural review meetings with the CDOT Structural Reviewer.		X	
a. Structure final design			
i) Perform the structural analysis. Provide superstructure design, substructure design and document the design with design notes, detail notes, and computer outputs.			
ii) Perform final design check from design and detail notes.			
b. Preparation of structure plans and specifications Prepare and provide the Structural Plans and Specifications, including any revisions identified during the independent check.			
c. Independent design, detail and quantity check			
d. Prepare and provide the bridge rating and field packages			
11. **Construction Phasing Plan** A final construction phasing plan will be developed which integrates the construction of all project work elements into a practical and feasible sequence. This plan shall accommodate the existing traffic movements during construction, and a final traffic control plan will be developed which shall be compatible with the phasing plan.		X	
12. **Preparation for the Final Office Review (FOR)**		X	
a. Coordinate the packaging of the plans			

i) Collect plans from all design elements and collate the plan package. Include all items listed in the Project Development Manual.			
ii) Calculate plan quantities and prepare the tabulations and Summary of Approximate Quantities.			
b. In addition to the plan sheets, the special provisions shall be provided. This will consist of those unique Project Special Provisions which have to be written specifically for items, details and procedures not adequately covered by CDOT's Standard Specifications and Standard Special Provisions. Also a list of the Standard Special Provisions which are applicable to the project shall be prepared. The Project Special Provisions shall be provided in the CDOT format and submitted with the project plans. Appropriate mitigation commitments made within any environmental documents should be included in the plans and specifications.			
c. Prepare FOR Estimate. Item numbers, descriptions, units and quantities shall be listed and submitted to the CDOT/PM.			
d. Submit the FOR Plans and specifications (Originals) to the CDOT/PM for a preliminary review prior to the FOR.			
e. FOR plan reproduction not to exceed 2 sets			
13. **Final Office Review**		X	
a. Attend the FOR			
b. The FOR meeting minutes shall be prepared, approved, and distributed within two weeks of the meeting as directed.			
c. The FOR original plan sheets and the specifications shall be revised in accordance with the FOR meeting comments and submitted to the CDOT/PM within four (4) weeks after the FOR.			
d. Submit the final revision of the plans after CDOT review.			
E. PRIOR TO AD			
1. **Construction Plan Package** The bid plan construction contract package shall consist of the revised FOR plans and will completely describe the work required to build the project including project special provisions and detailed quantities.		X	
a. Electronic and hard copies of the following:			
i) Roadway *a) Horizontal and vertical data* *b) Staking data* *c) Earthwork quantities* d) *Cross sections*			
ii) Major structures An independent set of the following shall be submitted to the CDOT Structural Reviewer for each major structure. *a) Structure grades* b) *Structure geometry*			
b. Final engineering package. The consultant shall submit copies, in 3-ring binders of the following: Advertisement plans and specifications			
i) All project calculations or worksheets			
ii) All final reports and their approvals: Traffic, hydraulics, lighting, pavement design and economic analysis, geology foundation report, etc. All reports will have the latest revisions included.			
iii) Copies of variances, design decisions, and variance approvals			
iv) Project meeting minutes			
v) Utility clearance package			

vi) Utility agreements and information regarding the utility location and clearance conditions			
vii) Maintain an environmental mitigation tracking tool for all environmental document commitments.			
viii) Bridge construction packet ix) Includes bridge grades, geometry, and quantity calculations or worksheets			
x) Any other information unique to this project and deemed important to the effectiveness of construction.			
c. Record plans sets Three (3) record plan sets for final design of roadways and structures will be produced which shall bear the seal and signature of the responsible Consultant Engineer on each sheet. One (1) set shall be retained by the Consultant for three (3) years. Two sets shall be submitted to CDOT. The original plan drawings shall not bear a seal.			
2. FEMA CLOMR Submittal Prepare a Conditional Letter of Map Revision package and submit to FEMA and the local Floodplain Administrator for community concurrence, for any work in the floodway that alters the BFE or floodway boundary, or as required by the local permitting agency's Floodplain Administrator.		+	
3. Water Rights Reporting If the project includes a detention or water quality pond, water rights reporting is required once the pond is substantially complete. See Section 8, Services After Design for additional information.		+	
4. All project permits, approved and in-hand.		X	
F. CORRIDOR MANAGEMENT SUPPORT			
1. **Design Control**		X	
a. Provide the required staff, communication equipment and computer systems with appropriate software for tracking and monitoring the planning efforts.			
b. Conduct periodic corridor progress meetings at an interval acceptable to the CDOT/PM. The following shall be reviewed:			
i) Activities complete since the last meeting			
ii) Problems encountered			
iii) Late activities			
iv) Activities required by the next progress meeting			
v) Solutions for unresolved and anticipated problems			
vi) Information or items required from other agencies			
c. Develop a quality assurance program that ensures correct error-free plans are produced by the project designers.			
d. The consultant shall coordinate the technical aspects of the planning efforts such as:			
i) Ensuring that the separate projects all utilize the same reference and data base for horizontal and vertical control.			
ii) Bearings, coordinates, grades and elevations are identical for common control lines on separate projects.			
iii) Earthwork balance is accomplished where appropriate			
2. **Information Services**			
a. Provide a management information system to monitor and report progress. This System will include a computer terminal and/or software for the CDOT/PM that the consultant shall furnish and maintain. This system will:			X
i) Provide access to current project data and status (e.g., progress versus schedules and cost estimates versus budgeted funds)			
ii) Include the project schedules for submittals and key events			
iii) Identify progress with respect to the schedules			

iv) Identify critical path activities			
v) Provide upon demand the scheduled submittals/key events for designated time periods			
b. Produce and periodically update a strip map which outlines the entire corridor. The Information Shown on this Map will Include the following:			
i) Preliminary engineering project limits			
ii) Construction project limits			
iii) Construction project estimated costs			
iv) Construction project Advertise-for-Bid (AD) dates			
v) Other information that is considered appropriate			
3. **Budget Planning Support**			
a. Maintain a current file of project cost estimates. The date and type of each estimate will be identified.		X	
b. Maintain a current file of existing and proposed funding for projects. Types of funding sources will be identified.			
c. Develop a proposed ad schedule based on the estimated costs and the existing and anticipated future funding. The proposed ad schedule will be compared to the design schedule. Adjustments to the design and ad schedules may be made with CDOT concurrence.			
d. A continuing evaluation of cash flow requirements and drawdown schedules administrative, preliminary engineering, right-of-way, utility, and construction costs will be accomplished. The funding requirements will be compared with the budget, also on a continuing basis. CDOT will be notified immediately of changes in funding requirements. (this will be completed when needed)			

SECTION 8
SERVICES AFTER DESIGN

Note: The Consultant shall appoint a responsible member of the firm to be the contact person for all construction services. That person should be available until the end of construction to coordinate the following services.

Deliverables can be static reports and products, digital reports and products, and/or GIS data layers. The scope should be specific as to what type of deliverable is expected.

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

***Other Agency Abbreviations**

	CDOT (C)/ Other*	Consultant	Not Applicable
A. **REVIEW OF SHOP DRAWINGS** Review contractor shop and auxiliary drawings as directed by the CDOT/PM.		+	
1. **Maintain a log of all submittals which includes the following information:**			
a. Submittal description			
b. Date received			
c. Date transmitted back to the sender			
2. **The review of submittals shall be done by a licensed professional engineer who is acceptable to the CDOT/PM.**			
3. **Review Shop Drawings** Review the construction contractor's shop drawings for conformance and compliance with the contract documents, the provisions of the current "Standard Specifications for Road and Bridge Construction, and the period of work shown in the CDOT specifications in conjunction with the contract work.		+	
B. **CONSTRUCTION SERVICES**			X
When requested by the appropriate Program Manager, the Consultant shall provide the services described below			
1. **Coordinate Schedule** Coordinate and evaluate contractor's construction schedule at start of construction and continuously throughout construction phase.			
2. **Provide field observation prior to, and on the day of, the following:**			
a. Pile driving and/or caisson drilling			
b. All major concrete pours			
c. Placement of girders			
d. Splicing of girders			
e. Post-tensioning duct and anchorage placement			
f. Post-tensioning operations			

3. **Technical Assistance** Provide technical assistance to CDOT project personnel on an as-needed basis. This service shall include, but not be limited to, the following:			
a. Respond to questions in the field that arise relative to the plans, details or special provisions			
b. Review girder erection plan			
4. **Report Submittal** The following reports/submittals shall be maintained and submitted:			
a. Diary - A complete diary will be accomplished daily for each field observation activity.			
b. Documentation/justification - Changes/revisions/documentation justifying changes and/or revisions to plans and specifications			
c. Progress reports - Monthly progress reports will be submitted for the Consultant's activities.			
d. Calculations, drawings, and specifications as needed.			
e. Daily time sheets - This will be filled out daily on a form approved by the Project Engineer. This sheet will remain with the Project Engineer.			
C. **POST DESIGN PLAN MODIFICATIONS**			X
1. When requested by the Program Manager through the CDOT/PM, the Consultant shall provide design services for plan modifications required by unforeseen field conditions.			
2. Revisions to PWQ CMs and drainage design should be performed by the Engineer of Record.			
D. **POST CONSTRUCTION SERVICES**			X
1. **Final Earthwork or Interim Determination** Compute the final or interim as-built earthwork quantities. This will include the required surveying, engineering technician, and computer support.			
2. **"As-Built" Plans** Redline the original plan set in a "track changes" manner so that design information is shown alongside as-constructed information.			
3. **PWQ CM GIS Attribute Tables and Feature Classes** Information shall be submitted that meets all the reporting requirements of the MS4 Permit and the CDOT PWQ Program, including pond volume certification.			
4. **Revisions to the Final Right-of-Way Plans** Review the final Right-of-Way line to identify any excess property due to construction changes. Prepare Final Plan Revisions, including legal Descriptions of excess property			
5. **Monument the Right-of-Way**			
a. Reset all monuments referenced prior to construction that have been damaged or destroyed.			
b. Reset any control monuments disturbed or destroyed by construction that are necessary to set Right-of-Way monuments.			
c. Set all new Right-of-Way monuments as shown on final plans (or reference monuments, if necessary).			
6. Set property corners on all remainder parcels Required monumentation will be as directed by the CDOT/PM.			
7. Deposit ROW Plans A Record Plan Set updated for revisions and showing all monuments set subsequent to construction, must be signed and sealed by the Professional Land Surveyor responsible for the work. The Record Set must be deposited in the appropriate county office in accordance with CRS 38-50-101 and CRS 38-51-107. A copy of the deposited plan set must be delivered to the CDOT/PM.			

8. **FEMA LOMR Submittal** Prepare a Letter of Map Revision package and submit to FEMA after receiving approval from the community Floodplain Administrator. This LOMR shall be based on the P.L.S. certified as-built topographic information and corresponding modifications to the modeling and report that were submitted to FEMA for the CLOMR application for all work that will alter the regulatory floodplain or floodway, or as required by the local permitting agency's Floodplain Administrator.			
9. **Update Floodway No Rise Certification** Stipulations for no rise in regulatory floodways often include as-built surveys, certifications, and other operational standards. Check project specials from CDOT and floodplain development permit stipulations from local agencies issuing the permit to determine what is required.			
10. **Water Rights Reporting** Submit pond information to the water rights reporting website. Pond information submitted should reflect the as-built condition for pond volume and stage/storage/discharge relationships, and any other information requested by the water rights reporting website during upload.			

SECTION 9
CONTRACT CONCLUSION (CHECKLIST)

1. SUPPLEMENTAL WORK

It is anticipated that this contract may be supplemented for:

A. Preliminary Design
B. Final Design
~~C. Construction Services~~
~~D. Construction Engineering~~
~~E. Final Earthwork Determination~~
~~F. Completion of the "as-built" plans, PWQ Operation and Maintenance Plan sheet and/or final ROW plans~~

2. CONTRACT COMPLETION

This Contract will be satisfied upon acceptance of the following items if applicable:

A. Project Schedule
B. Project Progress Meeting Minutes
C. Traffic Control Plan(s)
D. All documents found In Research
F. All Permission to Enter Property forms
G. Monumented & Surveyed Ground Control Diagram(s)
H. Legally Deposited Control Survey Diagram(s)
I. Digital TMOSS Data
J. Photography Products
K. Ownership Map
L. Survey Report (including monument recovery forms)
M. Monumented and Sealed ROW Plans
N. Legally Deposited Survey Plans
O. Legal Descriptions (Signed and Sealed)
P. NOAA-NGS Blue Book
Q. Completion of review of contract submittals
R. Design Plans, Specifications, and Final Estimate
S. All Environmental Permits
T. All Environmental, Utility, and ROW Clearances
U. Floodplain Report
V. Hydraulic Design Report, including PWQ design (signed and sealed)
W. Structural Report (signed and sealed)
X. Geotechnical Report (signed and sealed)
Y. Materials Report
Z. Environmental Technical Resource Reports
AA. Environmental NEPA Documents
AB. Floodplain Development Permit & No Rise Documents
AC. GIS shape files

TABLE 1 – SUBMITTALS

Note: This list establishes the individual task responsibility. Those tasks identified as CDOT/Other should utilize an abbreviation system to indicate whether the task will be completed by CDOT or another agency (i.e. "C" for CDOT and abbreviations as provided below). The consultant shall maintain the ability to perform all work tasks which are indicated below by an 'X' in the consultant column, in accordance with the forms and conditions contained herein, and the applicable CDOT standards. Where appropriate, mark "N/A" for not applicable items. ***If an 'X' is in the top box of a section then all sub-section tasks are included in that column.***

***Other Agency Abbreviations**

Hard Copy	Electronic Copy		Work Tasks	CDOT (C)/ Other*	Consultant	Not Applicable
	PDF	Orig				
		X	Periodic Reports		X	
	X		Billings		X	
		X	Meeting Minutes		X	
	X		Project Schedule		X	
		X	Completed Specific Design Criteria		X	
	X		Survey Plan		X	
	X		Approved MHT's			X
	X		Traffic Control Supervisor Certification			X
	X		Permissions to Enter		X	
		X	Initial Submittal of TMOSS (?) and or MOSS Compatible Data		X	
	X	X	Initial Submittal of an Original Plan Sheet		x	
			Project Development			
		X	Public Communication Contact List		X	
			Route Location Survey			X
	X		Traffic Control Supervisor Certification			
	X		Approved MHT's			
		X	Survey data in raw, unedited formats			
		X	Pothole data including invert elevations			
	X		Existing culverts report			
	X		Access report			
	X		Topographic survey notes			
	X	X	Contour plan checked for errors			
	X	X	Survey control diagram			
			Field books			
		X	Electronic Survey Files			
		X	Survey TMOSS Data			
		X	Monument Records			
	X	X	Control & Monumentation Plan Sheets			
	X		Aerial Photography Index Map Sheets			
	X		Aerial Photography Contact Sheets			
			Permits		X	

	X		401 Permit			
	X		Dewatering / 402 Permit			
	X		404 Permit			
	X		SB 40 Permit			
	X		Wildlife Certification			
			CDPS Storm Water Permit			
			CDPHE Discharge Permit			
	X		Floodplain Development Permit (approved)			
	X		No Rise Certification (approved)			
	X		No Rise Recertification at As-Built (approved)			
			Environmental Work Tasks		X	
	X	X	Appropriate NEPA Document (CatEx, EA, EIS, FONSI or ROD)			
	X	X	Figures and Exhibits from NEPA Document			
	X	X	Air Quality Technical Report			
	X	X	Geologic Technical Report			
	X	X	Water Quality Technical Report			
	X	X	Wetland Finding Report			
	X	X	Integrated Noxious Weed Management Plan			
	X	X	Biological Resources Report			
	X	X	Biological Assessment			
	X	X	Historic Resource Technical Reports	X		
	X	X	Section 4(f) Documents			
	X	X	Paleontological Technical Report	X		
	X	X	Environmental Justice Technical Report			
	X	X	Transportation Technical Report			
	X	X	Noise Technical Report			
	X	X	Hazardous Materials Documentation (ISA/MESA)			
	x	x	Visual impact assessment			
			PRELMINARY DESIGN		X	
		X	Electronic Survey Data	X		
	X		Traffic Data & Recommendations			
	X		Geology & Soils Investigation Report			
	X		Pavement Design Report			
	X		Existing Bridge Condition Report			
	X		Foundation Investigation Report			
	X		Engineering Geology Plan Sheet(s)			
	X		Preliminary Hydraulic Design Report, including preliminary PWQ design			
	X		Preliminary Floodplain Report			
	X	X	Preliminary Storm Water Management Plan			
	X		Utility Relocation Recommendations			
	X	X	Irrigation Ditch Structure Plans			
			Right-of-way	X		
	X		Memorandum of Ownership	X		
	X	X	Preliminary Ownership Map (include in FIR Plan set)	X	X	
	X		Structural Selection Report		X	
	X		Foundation Investigation Request		X	
	X		Final Materials Recommendations		X	
	X		Final Pavement Selection Report		X	
	X		Intersection Traffic Report		X	
	X		Traffic Report		X	

	X		Preliminary Cost Estimate		X	
	X	X	FIR Plan Set		X	
	X		List of deviations from Standard Design Criteria		X	
	X	X	Corrected FIR Plan Set		X	
			FINAL DESIGN		X	
	X	X	ROW Authorization Plans	X		
	X		Final Hydraulic Design Report, including preliminary PWQ design		X	
	X		Final Floodplain Report		X	
	X	X	Final Utility Plan Set		X	
	X	X	Final Railroad Plan Set		X	
	X		PUC Exhibit		X	
	X		Bound Final Geotechnical Report		X	
	X		Correspondence with Agencies, Entities, and Public			
			Right-of-way	X		
	X		Area Calculations			
	X	X	Authorization Plans			
	X		Legal Descriptions			
	X	X	Final Right-of-way Ownership Map			
	X	X	Stabilization Plans			
			Traffic Engineering			
	X		Safety Assessment		X	
	X	X	Signing/Pavement Marking Plans		X	
	X		Signal Warrant Study		+	
	X	X	Signalized Intersection Plans & Specifications		X	
	X	X	Traffic Control Plan		x	
			Roadside Planning		X	
	X	X	Landscape Plan & Specifications		X	
	X		Certification of Plant Availability		X	
	X	X	Irrigation Plans & Specifications			
	X	X	Bike path Plans & Specifications		X	
	X	X	Sound Barrier Plans & Specifications		X	
	X	X	Truck Escape Ramp Plans & Specifications			
	X	X	Rest Area Plans & Specifications			
	X	X	Lighting Plans & Specifications		X	
	X	X	Structure Final Review Plans & Specifications		X	
	X	X	Construction Phasing Plan		X	
	X	X	Storm Water Management Plan		X	
	X		FOR Plans & Specifications		X	
	X		FOR Cost Estimate		X	
	X	X	Final Review Revisions		X	
			Construction Plan Package		X	
	X	X	Final Plans (11X17), Specifications (duplex) & Estimate Package for Ad.		X	
	X	X	Final Cross Sections		X	
	X		Schedule of Quantities		X	
	X		Design Decisions		X	
	X		Variances		X	
	X		Findings In the Public Interest		X	
		X	Original Surface Digital Terrain		X	
		X	Final Surface Digital Terrain Model		X	
		X	Design Digital Terrain Model		X	
		X	Staking Data		X	

	X	X	Earthwork Quantities		X	
	X	X	Mass/Haul diagram			X
	X		Project Calculations (2 copies)			X
	X		Worksheets (2 copies)			X
	X		Design Notes			X
	X		Independent Design Review Reports			X
	X		Roadway Design Data Submittal		X	
	X		Major Structure Design Final Submittal		X	
	X		Bridge Construction Pack		X	
			Record Plan Sets		X	
	X		As-Built Plan Sets (if required)			
	X		Approved no rise recertification or written and approved evidence that all floodplain permit conditions are resolved		X	

APPENDIX A
REFERENCES

1. **AMERICAN ASSOCIATON OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) PUBLICATIONS** (using latest approved versions):

A. A Policy on Design Standards-Interstate System

B. A Policy on Geometric Design of Highways and Streets

C. Guide for Design of Pavement Structures

D. LRDF Bridge Design Specifications

E. Guide for the Design of High Occupancy Vehicle and Public Transfer Facilities

F. Guide for the Development of Bicycle Facilities

G. Standard Specifications for Transportation Materials and Methods of Sampling and Testing – Part 1, Specifications and Part II, Tests

H. Highway Design and Operational Practices Related to Highway Safety

I. Roadside Design Guide

J. Load Resistance Factor Design (LRFD) Specifications

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

A. Design Guide (all volumes)

B. Bridge Design Manual

C. Bridge Detailing Manual

D. Bridge Rating Manual

E. Project Development Manual

F. Erosion Control and Stormwater Quality Guide

G. Field Log of Structures

H. Cost Data Book

I. CDOT Traffic Analysis and Forecasting Guidelines

J. Drainage Design Manual

K. Landscape Architecture Manual

L. NEPA Manual

M. Environmental Stewardship Guide

N. Various CDOT Environmental Resource Guidance (i.e Air Quality, Hazardous Materials, Noise, Visual)

O. Quality Manual

P. Survey Manual

Q. Field Materials Manual

R. Standard Plans, M & S Standards

S. Standard Specifications for Road and Bridge Construction and Supplemental Specifications

T. Item Description and Abbreviations (with code number) compiled by Engineering Estimates and Market Analysis Unit ("Item Book")

U. Right-of-Way Manual

V. The State Highway Access Code

W. Utility Manual

X. TMOSS Generic Format

Y. Field TMOSS Topography Coding

Z. Topography Modeling Survey System User Manual

AA. Interactive Graphics System Symbol Table

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

A. No. 27.1 Social Marketing – Use of Web 2.0 and Similar Applications

B. No. 31.1 Web Site Development

C. No. 400.2 No. 400.2 Monitoring Consultant Contracts

D. No. 501.1 Requirements for Storm Drainage Facilities and Municipal Separate Storm Sewer System Facilities

E. No. 503.1 Landscaping with CO Native Plant Species and Managing the CO Pollinator Highway

F. No. 514.1 Field Inspection Review (FIR)

G. No. 516.1 Final Office Review (FOR)

H. No. 1050.1 Contracts with Local Agencies for Maintenance of State Highways

I. No. 1217a Survey Request

J. No. 1304.1 Right-of-Way Plan Revisions

K. No. 1305.1 Land Surveys

L. No. 1601 Interchange Approval Process

M. No. 1700.1 Certification Acceptance (CA) Procedures for Location and Design Approval

N. No. 1700.3 Plans, Specifications and Estimates (PS&E) and Authorization to Advertise for Bids under Certifications Acceptance (CA)

O. No. 1700.5 Local Entity/State Contracts and Local Entity/Consultant Contracts and Local Entity/R.R. Contracts under C.A

P. No. 1700.6 Railroad/Highway Contracts (Under Certification Acceptance)

Q. No. 1905.1 Preparation of Plans and Specifications for Structures prepared by Staff Bridge Branch

4. FEDERAL PUBLICATIONS (using latest approved versions):

A. Manual on Uniform Traffic Control Devices

B. Highway Capacity Manual

C. Urban Transportation Operations Training – Design of Urban Streets, Student Workbook

D. Reference Guide Outline – Specifications for Aerial Surveys and Mapping by Photogrammetric Methods for Highways

E. Executive Order 12898

F. Executive Order 11988 & 13690 FHWA Federal-Aid Policy Guide

G. FHWA NHI Hydraulic Circular (HEC) and Hydraulic Design Series (HDS) Reports
H. Technical Advisory T6640.8A

I. U.S. Department of Transportation Order 5610.1E

J. Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques

K. ADAAG Americans With Disabilities Act Accessibility Guidelines

L. 23 CFR 771, the FHWA Technical Advisory T6640.8A

M. 44 CFR 59-72, standards of the National Flood Insurance Program (NFIP)

N. U.S. Army Corps of Engineers Wetlands Delineation Manual of 1987 and appropriate regional supplements

5. AREA:

A. Manual for Railway Engineering

B. Urban Storm Drainage Criteria Manual (MHFD, formerly UDFCD)

C. Any appropriate local agencies references as appropriate

APPENDIX B
SPECIFIC DESIGN CRITERIA

Note: The following criteria will be developed by the consultant and coordinated with the CDOT/PM prior to starting the design. The Consultant shall develop the CDOT Form 463 and insert a copy upon completion.

1. ROADWAY

A. BASIC DESIGN

The basis for design will be the data in CDOT Form 463, Design Data. A copy of the latest applicable Design Data form will be furnished to the consultant.

B. GEOMETRIC AND STRUCTURE STANDARDS:

a Design Speed, horizontal alignment, curvature, vertical alignment, sight distance and superelevation is specified in Form 463.

b Use of Spirals – [NO]

c Passing Sight Distance

d Decision Sight Distance

e Frontage Roads, Separation Width

f CDOT Access Code

g Airway – Highway Clearances Design Guide

h Bridges and Grade Separation Structures, Clearances to Structures and Obstructions, CDOT Design Guide

i Curb and Gutters, Type

C. GEOMETRIC CROSS SECTION are as specified in Form 463

D. INTERSECTIONS AT GRADE:

a. Type
b. Special Considerations

~~E. TRAFFIC INTERCHANGES:~~

a. Type
b. Ramp Type
c. Special Considerations

F. DESIGN OF PAVEMENT STRUCTURE:

a. Pavement Type & Percent Trucks are as specified in Form 463
b. Economic Analysis Period
c. Design Life

G. MISCELLANEOUS DESIGN CONSIDERATIONS:

a. Fence Type
b. FEMA Flood Zone
c. Design Flood Frequency

H. ROADSIDE DEVELOPMENT

a. Landscaping
b. Specifications for Revegetating Disturbed Areas to be provided by CDOT
c. PWQ Design
d. Noise Control – To be determined
e. Type
f. Guardrail and End Treatments

I. LIGHTING:

a. Type – To be determined

APPENDIX C
DEFINITIONS

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

AASHTO	American Association of State Highway & Transportation Officials
ADT	Average two-way 24-hour Traffic in Number of Vehicles
AREA	American Railway Engineering Association
ATSSA	American Traffic Safety Services Association
AT&SF	Atchison, Topeka & Santa Fe Railway Company
ADAAG	Americans with Disabilities Accessibility Act Guidelines
BAMS	Bid Analysis and Management Systems
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BNRR	Burlington Northern Railroad
CA	Contract Administrator – The CDOT Manager responsible for the satisfactory completion of the contract by the consultant
CAP	CDOT's Action Plan
CBC	Concrete Box Culvert
CDOT	Colorado Department of Transportation
CDOT/PM	Colorado Department of Transportation Project Manager – The CDOT Engineer responsible for the day to day direction and CDOT Consultant coordination of the design effort (as defined in Section 2 of this document)
CDOT/STR	Colorado Department of Transportation Structure Reviewer – The CDOT Engineer responsible for reviewing and coordinating major structural design
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
COG	Council of Governments
COGO	Coordinate Geometry Output
CONSULTANT	Consultant for the project
CONTRACT ADMINISTRATOR	Typically, a Region Engineer or Branch Head. The CDOT employee directly responsible for the satisfactory completion of the contract by the Consultant. The contract administration is usually delegated to a CDOT Project Manager (as defined in Section 2 of this document).
C/PM	Consultant Project Manager – The Consultant Engineer responsible for combining the various inputs in the process of completing the project plans and managing the Consultant design effort.
CWCB	Colorado Water Conservation Board
DDM	Drainage Design Manual
DEIS	Draft Environmental Impact Statement
DHV	Future Design Hourly Volume (two-way unless specified otherwise)
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
GIS	Geographic Information Systems
GPS	Global Positioning System
LA	Professional Landscape Architect registered in Colorado
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 as well as overhead structures including (bridge signs, cantilevers and butterflies extending over traffic) are also considered major structures.
MHFD	Mile High Flood District (formerly UDFCD)
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.
USACE	United States Army Corp of Engineers