

January 8, 2007

**PART I  
SCOPE OF WORK  
PROJECT SPECIFIC**

CONTRACT TYPE: Project Specific / Non Task Specific

CONTRACT DATE:

PROJECT NUMBER: PLHD 0702-263

PROJECT LOCATION: West Vail Pass Habitat Linkage Project

PROJECT CODE: 15865

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

PART 2, Dated: January 8, 2007

PART 3, Dated: January 8, 2007

ATTACHMENTS, Dated: January 8, 2007

NOTE: PART 2, PART 3, AND ATTACHMENTS 1, B, AND C ARE INCLUDED AS PART OF THIS DOCUMENT.

**PROJECT SPECIFIC  
PART I  
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## SECTION 1 PROJECT SPECIFIC INFORMATION

**1.01 Planned Improvements.** The general planned improvements are:

Support the Colorado Department of Transportation (CDOT), by aiding in the understanding of appropriate location, configuration and associated elements of a vegetated wildlife overpass on the west side of Vail Pass between mileposts 185.0 and 190.0.

**1.02 Project Goal.** The project is intended to produce the following improvements:

- Improved safety
- Aid CDOT in understanding the issues surrounding the placement, configuration and implementation of a vegetated wildlife overpass (i.e. geographic constraints, size, fencing requirements, maintenance, animal behavior...)
- Identify the proper location and configuration of a vegetated wildlife overpass
- Support the preparation of an environmental clearance for said vegetated wildlife overpass

The goals and objectives of the project shall be further defined by CDOT upon initiation of the contract. All work will be identified by writing individual task orders on an as needed basis for each phase of the project.

**1.03 Project Location.** The project is located on and along Interstate 70 (I-70) from approximately milepost 185.0 to 190.0 in Eagle County within the defined Region 3 boundaries of the Colorado Department of Transportation.

**1.04 Project Costs.** Currently, \$420,000 has been allocated for monitoring, evaluation, design and environmental services.

**1.05 Work Duration.** The time period for the work described in this scope is approximately 400 calendar days.

**1.06 Consultant Responsibility.** Currently the Interstate 70 Mountain Corridor Programmatic Environmental Impact Statement (I-70 PEIS) and Interstate 70 West Vail Pass Environmental Assessment (I-70 WVP EA) are being conducted. This project is located on the west side of Vail Pass between mileposts 185.0 and 190.0, and is located within the limits of the I-70 PEIS and I-70 WVP EA. This project is believed to have independent utility, and will move forward as an independent project. The consultant is responsible for performing the separate action justification, supporting the CDOT in an evaluation of vegetated wildlife overpass locations and configurations, and the elements necessary to support the preparation of the appropriate NEPA clearance for said vegetated wildlife overpass.

The evaluation shall consider the upper half of West Vail Pass from approximately milepost 185.0 to 190.0, and shall include, but are not limited to, migration patterns, geographic / topographic constraints, fencing needs, land use, bike path location, safety of I-70 corridor travelers and associated mitigation and build strategies identified in the I-70 PEIS and I-70 WVP EA.

As appropriate, the consultant shall utilize and collect monitoring information to support the evaluation. Following the evaluation, the consultant is responsible for providing the necessary elements to assist the CDOT in the preparation of the appropriate NEPA clearance. Said aid may include, but is not limited to, preliminary design, graphics, simulations, cost estimates, public involvement, mitigation strategies and resource identification, evaluation and quantification.

Maximize the available budget by utilizing as much information as possible from the I-70 PEIS and I-70 WVP EA.

**1.07 Work Product.** The Consultant work products are:

- Monitoring
- Reports
- Design
- Environmental Support

Detailed work product requirements are described in the following sections and in Part 2.

**1.08 Work Product Completion.** All submittals must be accepted by the CDOT Contract Administrator or his designee.

**1.09 Additional Project Information.** Additional information regarding this project is included in the following documents:

- Draft I-70 Mountain Corridor Programmatic Environmental Impact Statement (December 2004)
- West Vail Pass EA data developed to-date (available at CDOT Eagle, CO Office 970-328-6385)

Copies of these documents may be obtained from CDOT Printing and Visual Communications Center, Phone 303-757-9214, 4201 East Arkansas Avenue, Room 107, Denver, Colorado 80222. A moderate fee, determined by document size, will be charged. A \$3.00 additional charge will be added for requests by mail or for billing. Please provide a notice of two working days prior to obtaining the document(s) in person.

**1.10 Scope of Work Organization.** Project Scopes of Work are divided into three parts, a project specific section (Part 1), Part 2 which includes general descriptions of preconstruction tasks description, and Part 3 which includes services to be furnished after the design is accepted. Part 1 is attached to the contract. The remaining Parts 2 & 3 and Attachments A, B, and C are included in the scope but are distributed separately from the contract.

This draft scope of work has been carefully 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 2  
PROJECT MANAGEMENT AND COORDINATION**

**2.01 CDOT Contacts.** The Contract Administrator for this project is:

Name: Joseph Elsen, P.E.  
Title: Program Engineer  
Address: 202 Centennial Street  
Glenwood Springs, CO 81601  
Telephone: 970-384-3335  
Fax: 970-947-5133

Active day-to-day administration of the contract will be delegated to:

Name: Peter Kozinski, P.E.  
Title: Resident Engineer  
Address: 714 Grand Avenue  
P.O. Box 5334  
Eagle, CO 81631  
Telephone: 970-328-6385  
Fax: 970-328-2368

**2.02 Project Coordination.** Coordination will be required with the following known agencies:

- Town of Vail
- Eagle County
- ECOTrail
- U.S. Forest Service
- U.S. Environmental Protection Agency
- Federal Highway Administration
- U.S. Army Corps of Engineers
- Colorado Division of Wildlife
- US Fish and Wildlife Service
- Other Agencies as identified in the Scoping Process

The Consultant should anticipate that a design which affects an agency will have to be accepted by that agency prior to its acceptance by the Colorado Department of Transportation. Submittals to affected agencies will be coordinated with CDOT. The above is a list of known agencies, it should not be considered as complete.

## **SECTION 3 PROJECT DESCRIPTION**

### **3.01 Background.**

Federal funding is provided to assist states and federal agencies in providing transportation services through the various Federal Highway Administration (FHWA) programs. By law, the nature of the majority of these federal programs is federal assistance for states administered programs.

In 1994, the FHWA and CDOT jointly established a Stewardship Agreement to define how they will work together to provide project and program oversight. The Stewardship Agreement was updated in 2000. Under the Stewardship Agreement, FHWA and CDOT will share the responsibility for oversight of projects using Federal-aid funds.

In the fall of 2006 approximately \$420,000 of Public Lands Highway Discretionary Programs funds were granted to initiate the construction of a vegetated wildlife overpass over Interstate 70.

The Colorado Department of Transportation, through its Stewardship Agreement with FHWA, will administer these funds and initiate activities necessary to expend the funds in accordance with the grant.

Uncertainty in the location, configuration and associated elements of a vegetated wildlife overpass necessitate the needed additional information.

The grant will support the development of the appropriate NEPA clearance and prepare the CDOT to construct a vegetated wildlife overpass, should appropriate funds be identified.

**3.02 Project Limits.** The limits of this project are from approximately milepost 185.0 to 190.0 along I-70.

### **3.03 Work Elements.**

The work may include but not be limited to the following tasks:

- Verification and compilation of existing data
- Evaluate and recommend further action based on existing data
- Develop and conduct wildlife monitoring program
- Coordinate with ongoing efforts
- Identify location and configuration of vegetated wildlife overpass
- Conduct preliminary design
- Aid in public understanding (photo simulations, renderings)

Refer to Sections 7 and 8, and Part 2 for more detailed information on the above work items.

## **SECTION 4 KNOWN EXISTING FEATURES**

**4.01 Structures.** Reference Point (RP) RP 185.29 STRN F-12-AS EB; RP 185.29 STRN F-12-AT WB; RP 185.55 WB Truck Escape Ramp and STRN F-12-BK WB; RP 185.83 STRN F-12-BL WB; RP 190.10 STRN F-12-AJ

**4.02 Utilities.** The Consultant will be responsible for determining and tabulating a comprehensive list of all utilities that would be impacted during construction. The Consultant will be responsible for contacting the Utility Notification Center of Colorado (UNCC) at 1-800-922-1987 for locating of member utilities that are to be shown on design plans. Non-member utilities must be contacted directly.

**Note: The above is a list of the known features in the area. It should not be considered as complete. The Consultant should be alert to the existence of other possible conflicts.**

## **SECTION 5 ITEMS TO BE FURNISHED BY CDOT**

**5.01 CDOT Manuals, Specifications, Standards, etc.** can be obtained from CDOT Printing and Visual Communication Center (303-757-9214). A moderate fee, determined by document size will be charged. Electronic files of applicable CDOT standards and forms specified in this document will be provided free of charge.

**5.02 Project Specific Items:**

- Geotechnical drill information, if available
- As-constructed roadway, structure, and existing ROW plans of previous projects, if available
- I-70 Mountain Corridor Programmatic Environmental Impact Statement
- Mapping and all additional information developed thus far for the West Vail Pass EA

**SECTION 6  
GENERAL INFORMATION**

**6.01 Authorization to Proceed.** Work shall not commence until the written Notice-to-Proceed is issued by the State and received by the Consultant. In addition, prior to work commencing, the Consultant must certify in writing that the work will be completed by the time specified in the task order(s) issued. Payment to the Consultant may be withheld if work is not completed within the allotted time. The time charged by Consultants will be exclusive of time lost for the following:

- a. Reviews and Approvals
- b. Delays in not receiving responses/direction.
- c. Work may be required, night or day, on weekends, on holidays, or on split shifts.

The CDOT Project Manager, or his designee, must concur in time lost reports prior to the time lost delays being subtracted from time charges.

Where work performed is unsatisfactory, CDOT shall notify the Consultant in writing that work shall cease and all subsequent payments withheld until the problem(s) is resolved to the satisfaction of CDOT. Once satisfied and resolved a written authorization to continue with the work effort shall be provided to the Consultant by CDOT.

**6.02 Project Coordination.** The routine working contact will be between the CDOT Project Manager (CDOT/PM) and the Consultant Project Manager (C/PM) as defined in Attachment C. Each Project Manager will provide the other with:

- a. Written synopses or copy of their respective contacts (both by telephone and in person) with others.
- b. Copies of pertinent written communications.

**6.03 Routine Reporting and Billing.** The Consultant will provide the following on a routine basis:

- a. Coordination of all contract activities by the C/PM.
- b. The periodic reports and billings required by CDOT Procedural Directive 400.2 (Monitoring Consultant Contracts).
- c. Minutes of Meetings: The minutes will be completed and will be provided to the CDOT/PM within five (5) working days after the meeting. When a definable task is discussed during a meeting, the minutes will identify the "Action Item", the agency responsible for accomplishing it, and the proposed completion date.
- d. In general, all reports and submittals must be accepted by CDOT prior to their content being utilized in follow-up work effort.

**6.04 Personnel Qualifications.** The Consultant Project Manager (C/PM) must be approved by the CDOT Contract Administrator. Certain tasks must be done by Licensed Professional Engineers or Professional Land Surveyors (PLS) who are registered with the Colorado State Board of Registration for Professional Engineers and Land Surveyors.

**6.05 CDOT Computer/Software Information.** The primary hardware used by CDOT is a DEC-VAX system, and the types of software are:

Earthwork:	Bentley InRoads
Drafting-Auto:	MicroStation



Survey:	TMOSS (developed by CDOT to convert topographic survey to format – translated to Bentley InRoads.
Geometry:	CDOT COGO (Coordinate Geometry)
Bridge:	Staff Bridge software shall be used in either design or design check
Estimating:	Trns*port (Bid Analysis and Management Systems), an AASHTO-sponsored software
Specifications:	Microsoft Word
Traffic:	Highway capacity software (HCS) Passer 11-90 Quick Response system (QRS) II
Hydraulics:	Hydrologic Engineering Center’s River Analysis System (HEC-RAS)
Pavement Design:	DARWin (AASHTO)
Construction:	Site Manager
Scheduling:	Microsoft Project
Misc.:	Excel, Power Point

**6.06 Computer Data Compatibility.** CDOT presently utilizes two data formats which Consultants shall be required to use for submitting survey, photogrammetry, and design data:

- a. TMOSS (Topography) Modeling Survey System
- b. MOSS

The data format used by the Consultant to submit surveying and photogrammetric data shall be as determined by the CDOT/PM in coordinating with the respective Region PLS. The data format for submitting design computer files shall be compatible with the CDOT MOSS program.

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(s) is (are) resolved. Refer to Part 2 Section 2, Submittals, for additional information regarding the MOSS and TMOSS formats and the acceptable transmittal media.

**6.07 Project Design Data and Standards**

- a. General. Attachment A is a list of technical references applicable to CDOT work. The Consultant is responsible for ensuring compliance with the listed references. Conflicts in criteria shall be resolved by the CDOT/PM.
- b. Specific Criteria. Attachment B is a list of specific project criteria. The list is comprehensive and may include items that are not required for a task defined in this scope. The Consultant shall submit the pertinent criteria to the CDOT/PM at one of the periodic progress meetings prior to initiating design.
- c. Construction Materials/Methods. The materials specified for construction and any indicated construction methods 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 7  
WORK ACTIVITY ASSIGNMENTS**

This list establishes the Consultant’s individual task responsibility. The Consultant shall maintain the ability to perform all work tasks which are indicated below by an ‘X’ mark in the Consultant column, in accordance with the forms and conditions of Part 2, Part 3, and the applicable CDOT standards. Selected work tasks shall be assigned only after coordination and consultation with CDOT. The Consultant is also responsible for coordinating the required work schedule for those tasks accomplished by CDOT and other agencies.

**PRECONSTRUCTION**  
(See Part 2 for Task Descriptions)

	<u>CDOT/OTHER</u>	<u>CONSULTANT</u>
<b>A. Project Initiation and Continuing Requirements:</b>		
1. Initial Project Meeting (Presurvey)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2. Review Environmental Mitigation Requirements	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3. Scoping, Feasibility Study & Needs Determination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4. Project Schedule	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5. Develop Design Criteria	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6. Initiate Survey	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Right-of-Entry and Permits	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8. Traffic Control	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Initial Submittals	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Progress Meetings	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11. Structure Review Meetings	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
12. Project Management	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>B. Project Development:</b>		
1. Communication and Consensus Building		
a. Contact List	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. Public Notices/Advertisements	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. General Meetings		
(1) Small Group	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(2) General Public	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(3) Project Review	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. Communication Aids		
(1) Graphics Support	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Newsletter	<input type="checkbox"/>	<input type="checkbox"/>
(3) Wall Displays	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(4) Study Model	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(5) Local Office	<input type="checkbox"/>	<input type="checkbox"/>
2. Project Review Team	<input type="checkbox"/>	<input type="checkbox"/>
3. Route Location Surveys	<input type="checkbox"/>	<input type="checkbox"/>
a. Presurvey Conference	<input type="checkbox"/>	<input type="checkbox"/>
b. Survey Data Research	<input type="checkbox"/>	<input type="checkbox"/>
c. Secure Rights of Entry	<input type="checkbox"/>	<input type="checkbox"/>

CDOT/OTHER

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- d. Project Control Survey
  - (1) Locate or establish HARN Stations
  - (2) Monumentation
  - (3) Project Control
- e. Photogrammetry
  - (1) Camera Calibration Report
  - (2) Flight Plan
  - (3) Flight
  - (4) Contact Prints
  - (5) Negatives
  - (6) Enlargements
  - (7) Photo Index
  - (8) Supplemental Survey (wing points)
- f. Supplemental Surveying
- g. Accuracy Tests
- h. Review (by Registered Professional Land Surveyor)
- i. Reviewed (by CDOT Registered Professional Land Surveyor)
- 4. Conceptual Design
  - a. Urban Planning and Esthetics
  - b. System Feasibility for Interchanges
  - c. Alternatives Analysis
  - d. Final Alternatives Reports
  - e. Interchange Approval Process
- 5. Data Gathering Analysis and Mitigation Development
  - a. Traffic Related
    - (1) Traffic Study
    - (2) Accident Study
    - (3) Noise Study
    - (4) Air Quality  
      - (a) Air Quality Monitoring
      - (b) Air Quality Analysis
    - (5) Alternate Transportation System
  - b. Archaeology
    - (1) Gather Data & Analysis
    - (2) Mitigation Implementation
  - c. Paleontology
    - (1) Gather Data & Analysis
    - (2) Mitigation Implementation
  - d. Initial Geology Investigation
  - e. Water Quality
    - (1) Quality Analysis
    - (2) Quality Monitoring
  - f. Ecological Assessment
  - g. Historical
    - (1) Historical Bridge Clearance
    - (2) Historical Study & Clearance

	<u>CDOT/OTHER</u>	<u>CONSULTANT</u>
h. Floodplain and Drainage Assessment	<input type="checkbox"/>	<input type="checkbox"/>
i. Right-of-Way		
(1) Early ROW	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(2) ROW Review	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
j. 4(f)/6(f) Activity		
(1) Evaluation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Clearance/Concurrence	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
k. Threatened and/or Endangered Species		
(1) Determination of Presence	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Implement Mitigation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
l. Wetlands		
(1) Wetlands Determination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Wetlands Findings Report	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
m. Hazardous Materials		
(1) Field Search	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Research	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(3) Conduct in-situ tests	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(4) Analyze and Assess Impacts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
n. Existing Roadway/Major Structures	<input type="checkbox"/>	<input checked="" type="checkbox"/>
o. Construction Requirements	<input type="checkbox"/>	<input checked="" type="checkbox"/>
p. Aesthetic Considerations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
q. Utilities	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
r. Economics	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
s. Farmlands	<input type="checkbox"/>	<input type="checkbox"/>
t. Energy Usage	<input type="checkbox"/>	<input type="checkbox"/>
6. Environmental Assessment (EA) Process	<input type="checkbox"/>	<input type="checkbox"/>
7. Environmental Impact Study (EIS) Process	<input type="checkbox"/>	<input type="checkbox"/>
8. Design Report Process	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Obtain Permits (NPDES only)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

C. Preliminary Design:

1. Design Field Surveys		
a. Presurvey Conference	<input type="checkbox"/>	<input type="checkbox"/>
b. Survey Data Research	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. Secure Rights of Entry	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
d. Project Control Survey		
(1) Locate or establish HARN Stations	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Monumentation	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(3) Local Project Control	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e. Land Survey/Boundary Survey	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f. TMOSS Survey	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g. Terrain Survey	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h. Utility Survey	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i. Hydraulic Survey	<input type="checkbox"/>	<input type="checkbox"/>

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j. Material Survey	<input type="checkbox"/>	<input checked="" type="checkbox"/>
k. Supplemental Surveying	<input type="checkbox"/>	<input checked="" type="checkbox"/>
l. Survey Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
m. Accuracy Tests	<input type="checkbox"/>	<input checked="" type="checkbox"/>
n. Review (by Registered Professional Land Surveyor)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Traffic Engineering	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Materials Engineering	<input type="checkbox"/>	<input checked="" type="checkbox"/>
a. Preliminary Soil Investigation	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. Pavement Rehabilitation	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. New Pavement Structure	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. Pavement Justification	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e. Pavement Design Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f. Existing Bridge Investigation	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g. Foundation Investigation (Structures)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Hydrology/Hydraulics Engineering		
a. Hydrology	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. Hydraulics	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. Preliminary Hydraulics Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Utility Coordination		
a. Location Maps	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. Reviews and investigations	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(1) 'Potholing' – Excavation	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(2) 'Potholing' – Surveying Utility Locations	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. Relocation recommendations	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. Ditch Company coordination	<input type="checkbox"/>	<input type="checkbox"/>
6. Roadway Design and Roadside Development		
a. Roadway Design	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. Roadside Development	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(1) Guardrail and Delineator	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Landscaping	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(3) Sprinkler Systems	<input type="checkbox"/>	<input type="checkbox"/>
(4) Sound Barriers	<input type="checkbox"/>	<input type="checkbox"/>
(5) Bike paths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(6) Truck Escape Ramps	<input type="checkbox"/>	<input type="checkbox"/>
(7) Rest Areas	<input type="checkbox"/>	<input type="checkbox"/>
(8) Safety analysis	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. Lighting Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Right-of-Way		
a. Research	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
b. Ownership Map	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8. Major Structural Design		
a. Structural Data Collection	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. Structure Concept Study	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. Structure Selection Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. Foundation Investigation Request	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	<u>CDOT/OTHER</u>	<u>CONSULTANT</u>
9. Construction Phasing Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Preparation for the FIR	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11. Field Inspection Review	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12. Post FIR Revisions	<input type="checkbox"/>	<input type="checkbox"/>

D. Final Design:

1. Project Review	<input type="checkbox"/>	<input type="checkbox"/>
2. Design Coordination	<input type="checkbox"/>	<input type="checkbox"/>
3. Utility Coordination	<input type="checkbox"/>	<input type="checkbox"/>
4. Hydraulic Design	<input type="checkbox"/>	<input type="checkbox"/>
a. Data Review	<input type="checkbox"/>	<input type="checkbox"/>
b. Storm Water Pollution Prevention	<input type="checkbox"/>	<input type="checkbox"/>
c. Major Structure Channel Design	<input type="checkbox"/>	<input type="checkbox"/>
d. Final Hydraulics Report	<input type="checkbox"/>	<input type="checkbox"/>
5. Interim Plans		
a. Initiate ROW Authorization Process	<input type="checkbox"/>	<input type="checkbox"/>
b. Final Utility Plans	<input type="checkbox"/>	<input type="checkbox"/>
c. Final Railroad Plans	<input type="checkbox"/>	<input type="checkbox"/>
6. Right-of-Way		
a. ROW Plans Content	<input type="checkbox"/>	<input type="checkbox"/>
b. Title Insurance and Closing Services	<input type="checkbox"/>	<input type="checkbox"/>
c. Authorization Plan	<input type="checkbox"/>	<input type="checkbox"/>
d. Appraisal Staking	<input type="checkbox"/>	<input type="checkbox"/>
e. ROW Plan Revisions (During negotiations)	<input type="checkbox"/>	<input type="checkbox"/>
7. Materials Engineering		
a. Materials Data	<input type="checkbox"/>	<input type="checkbox"/>
b. Stabilization Validity	<input type="checkbox"/>	<input type="checkbox"/>
c. Stabilization Plan	<input type="checkbox"/>	<input type="checkbox"/>
8. Traffic Engineering		
a. Permanent Signing/Pavement Marking Plans	<input type="checkbox"/>	<input type="checkbox"/>
b. Signalized Intersections	<input type="checkbox"/>	<input type="checkbox"/>
c. Traffic Control Plan	<input type="checkbox"/>	<input type="checkbox"/>
9. Roadside Planning		
a. Landscaping	<input type="checkbox"/>	<input type="checkbox"/>
b. Other	<input type="checkbox"/>	<input type="checkbox"/>
(1) Guardrail and delineator	<input type="checkbox"/>	<input type="checkbox"/>
(2) Sprinkler Systems	<input type="checkbox"/>	<input type="checkbox"/>
(3) Sound Barriers	<input type="checkbox"/>	<input type="checkbox"/>
(4) Bike paths	<input type="checkbox"/>	<input type="checkbox"/>
(5) Truck Escape Ramps	<input type="checkbox"/>	<input type="checkbox"/>
(6) Rest Areas	<input type="checkbox"/>	<input type="checkbox"/>
(7) Safety analysis	<input type="checkbox"/>	<input type="checkbox"/>
(8) Seeding & Erosion Control	<input type="checkbox"/>	<input type="checkbox"/>
c. Lighting Plans	<input type="checkbox"/>	<input type="checkbox"/>
10. Roadway Design	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CDOT/OTHER

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- |   |                          |                                     |
|---|--------------------------|-------------------------------------|
| 11. Final Major Structural Design<br>(Walls & Cantilevered Roadway) |                          |                                     |
| a. Structure Final Design   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b. Preparation of Structure Plans and Specifications                | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c. Independent Design, Detail and Quantity Check                    | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d. Bridge Rating and Field Packages                                 | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e. Structure Final Review Plans and Specifications                  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 12. Construction Phasing Plan                                       | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 13. Plan Preparation for FOR  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 14. Final Office Review   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 15. Construction Plan Package                                       | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| <br>  |                          |                                     |
| E. Corridor Management Support:                                     |                          |                                     |
| 1. Design Control   | <input type="checkbox"/> | <input type="checkbox"/>            |
| 2. Information Services   | <input type="checkbox"/> | <input type="checkbox"/>            |
| 3. Budget Planning Support  | <input type="checkbox"/> | <input type="checkbox"/>            |
| <br>  |                          |                                     |
| F. Value Engineering:   | <input type="checkbox"/> | <input type="checkbox"/>            |

**SERVICES AFTER DESIGN**  
(See Part 3 for Task Descriptions)

	<u>CDOT/OTHER</u>	<u>CONSULTANT</u>
A. Review of Shop Drawings	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. Construction Services:		
1. Coordinate Schedule	<input type="checkbox"/>	<input type="checkbox"/>
2. Provide field observation	<input type="checkbox"/>	<input type="checkbox"/>
a. Pile driving/caisson drilling	<input type="checkbox"/>	<input type="checkbox"/>
b. Major concrete pours	<input type="checkbox"/>	<input type="checkbox"/>
c. Placement of girders	<input type="checkbox"/>	<input type="checkbox"/>
d. Splicing of girders	<input type="checkbox"/>	<input type="checkbox"/>
e. Post-tensioning duct and anchorage placement	<input type="checkbox"/>	<input type="checkbox"/>
f. Post-tensioning operations	<input type="checkbox"/>	<input type="checkbox"/>
3. Technical assistance	<input type="checkbox"/>	<input type="checkbox"/>
4. Submittals	<input type="checkbox"/>	<input type="checkbox"/>
a. Diary	<input type="checkbox"/>	<input type="checkbox"/>
b. Documentation/justification	<input type="checkbox"/>	<input type="checkbox"/>
c. Progress reports	<input type="checkbox"/>	<input type="checkbox"/>
d. Calculations, drawings, and specifications	<input type="checkbox"/>	<input type="checkbox"/>
e. Daily time sheets	<input type="checkbox"/>	<input type="checkbox"/>
C. Post Design Plan Modifications	<input type="checkbox"/>	<input type="checkbox"/>
D. Post Construction Services:		
1. Final earthwork determination	<input type="checkbox"/>	<input type="checkbox"/>
2. As-built plans	<input type="checkbox"/>	<input type="checkbox"/>
3. Revisions to Right-of-Way Plans (Excess Land)	<input type="checkbox"/>	<input type="checkbox"/>
4. Monument ROW	<input type="checkbox"/>	<input type="checkbox"/>
5. Set Property Corners (Remainders)	<input type="checkbox"/>	<input type="checkbox"/>
6. Deposit ROW Plans	<input type="checkbox"/>	<input type="checkbox"/>
E. Construction Engineering:	<input type="checkbox"/>	<input type="checkbox"/>



**SECTION 8  
SUBMITTALS**

CDOT/OTHER

CONSULTANT

A. Project Initiation and Continuing Requirements:

Part 1

6.01.b.	Periodic Reports & Billings	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6.01.c.	Meeting Minutes	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Part 2

A.4.	Project Schedule	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A.5.	Completed Specific Design Criteria (Attachment B)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A.6.	Survey Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A.7.	Permissions to Enter (Form 730)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.8.	Traffic Control Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A.9.a	Initial Submittal of an Original Plan Sheet	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A.9.b	Initial Submittal of TMOSS and/or MOSS Compatible Data	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

B. Project Development:

B.1.a.	Public Communication Contact List	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.3.	Route Location Survey:		
	Electronic Survey Files	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Survey TMOSS Data	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Monument Records	<input type="checkbox"/>	<input type="checkbox"/>
	Control & Monumentation Plan Sheets	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Aerial Photography Index Map Sheets	<input type="checkbox"/>	<input type="checkbox"/>
	Aerial Photography Contact Prints	<input type="checkbox"/>	<input type="checkbox"/>
	Aerial Photography Negatives	<input type="checkbox"/>	<input type="checkbox"/>
	Photogrammetry		
	Electronic Data	<input type="checkbox"/>	<input type="checkbox"/>
	Base Map Sheets	<input type="checkbox"/>	<input type="checkbox"/>
	Bas Map Index Sheet(s)	<input type="checkbox"/>	<input type="checkbox"/>
	Rectified Photos with Mylar Originals	<input type="checkbox"/>	<input type="checkbox"/>
B.4.b.	System Feasibility Study	<input type="checkbox"/>	<input type="checkbox"/>
B.4.d.	Final Alternatives Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B.4.e.	System Feasibility Study-Interchange Approval Process	<input type="checkbox"/>	<input type="checkbox"/>
B.5.a.(3)(d)	Noise Assessment Report	<input type="checkbox"/>	<input type="checkbox"/>
B.5.a.(4)(b)	Air Quality Report	<input type="checkbox"/>	<input type="checkbox"/>
B.5.b.(2)(d)	Archaeology Survey Report & Mitigation Plan	<input type="checkbox"/>	<input type="checkbox"/>
B.5.c.(2)(d)	Paleontology Preliminary Report & Mitigation Plan	<input type="checkbox"/>	<input type="checkbox"/>
B.5.e.(1)(d)	Water Quality Report	<input type="checkbox"/>	<input type="checkbox"/>
B.5.f.(5)	Ecology Report	<input type="checkbox"/>	<input type="checkbox"/>
B.5.g.(1)	Historical Bridge Clearance or Mitigation Plan	<input type="checkbox"/>	<input type="checkbox"/>
B.5.g.(2)	Historical Cultural Resources Report	<input type="checkbox"/>	<input type="checkbox"/>
B.5.h.(5)	Floodplain and Drainage Assessment Report & Mitigation Plan	<input type="checkbox"/>	<input type="checkbox"/>
B.5.i.(2)(b)	ROW Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>

		<u>CDOT/OTHER</u>	<u>CONSULTANT</u>
B.5.j.(2)(e)	4(f)/6(f) Mitigation Plan	<input type="checkbox"/>	<input type="checkbox"/>
B.5.k.(1)(c)	Threatened and/or Endangered Species Assessment	<input type="checkbox"/>	<input type="checkbox"/>
B.5.l.(2)(b)	Wetlands Findings Report	<input type="checkbox"/>	<input type="checkbox"/>
B.5.m.(4)	Hazardous Materials Findings Environmental Assessment (EA)	<input type="checkbox"/>	<input type="checkbox"/>
B.6.a.(3)	Preliminary EA	<input type="checkbox"/>	<input type="checkbox"/>
B.6.d.(3)	Certified Verbatim Transcript	<input type="checkbox"/>	<input type="checkbox"/>
B.6.e.	Finding of No Significant Impact (FONSI)	<input type="checkbox"/>	<input type="checkbox"/>
B.7.a.(2)	Draft EIS	<input type="checkbox"/>	<input type="checkbox"/>
B.7.d.(3)	Certified Transcript of Meeting	<input type="checkbox"/>	<input type="checkbox"/>
B.7.e.(7)	Final EIS Design Report Process	<input type="checkbox"/>	<input type="checkbox"/>
B.8.b.	Preliminary Design Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B.8.e	Final Design Report	<input type="checkbox"/>	<input type="checkbox"/>
	Permits:		
B.9.a.	401 Permit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B.9.b.	402 Permit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B.9.c.	404 Permit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B.9.d.	Wildlife Certification	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B.9.e.	NPDES Storm Water Permit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. Preliminary Design:			
C.1.	Electronic Survey	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C.2.g.	Traffic Data & Recommendations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C.3.a.(4)	Soils Investigation Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.3.e.	Pavement Design Report	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C.3.f.	Existing Bridge Condition Report	<input type="checkbox"/>	<input type="checkbox"/>
C.3.g.(6)	Foundation Investigation Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.3.g.(7)	Engineering Geology Plan Sheet(s)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.4.c.	Preliminary Hydraulics Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.5.c.	Utility Relocation Recommendations	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.5.d.	Ditch Structure Plans	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Part 2			
Right-of-Way:			
C.7.a.(4)	Memoranda of Ownership	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C.7.b.	Preliminary Ownership Map (include in the FIR plan set)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C.8.c.	Structural Selection Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.8.d.	Foundation Investigation Request	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.10.c.	Preliminary Cost Estimate	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.10.d.	FIR Plan Set	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.11.e.	List of Deviations from Standard Design Criteria	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.12.	Corrected FIR Plan Set	<input type="checkbox"/>	<input checked="" type="checkbox"/>

		<u>CDOT/OTHER</u>	<u>CONSULTANT</u>
D. Final Design:			
D.4.d.	Final Hydraulics Report	<input type="checkbox"/>	<input type="checkbox"/>
D.5.a..	ROW Authorization Plans	<input type="checkbox"/>	<input type="checkbox"/>
D.5.b.	Final Utility Plan Set	<input type="checkbox"/>	<input type="checkbox"/>
D.5.c.(4)	Final Railroad Plan Set	<input type="checkbox"/>	<input type="checkbox"/>
D.5.c.(5)	PUC Application Exhibits	<input type="checkbox"/>	<input type="checkbox"/>
Right-of-Way:			
D.6.c.(3)	Area Calculations	<input type="checkbox"/>	<input type="checkbox"/>
D.6.c.(4)	Authorization Plans	<input type="checkbox"/>	<input type="checkbox"/>
D.6.c.(5)	Legal Descriptions	<input type="checkbox"/>	<input type="checkbox"/>
D.7.c.	Stabilization Plan	<input type="checkbox"/>	<input type="checkbox"/>
Traffic Engineering:			
D.8.a.	Signing/Pavement Marking Plans	<input type="checkbox"/>	<input type="checkbox"/>
D.8.b.(1)	Signal Warrants	<input type="checkbox"/>	<input type="checkbox"/>
D.8.b.(2)	Signalized Intersection Plans	<input type="checkbox"/>	<input type="checkbox"/>
D.8.c.(3)	Traffic Control Plan Roadside Planning	<input type="checkbox"/>	<input type="checkbox"/>
D.9.a.(6)	Landscaping Plans & Specs.	<input type="checkbox"/>	<input type="checkbox"/>
D.9.a.(7)	Certification of plant availability	<input type="checkbox"/>	<input type="checkbox"/>
D.9.b.	Sprinkler System Plans & Specs.	<input type="checkbox"/>	<input type="checkbox"/>
D.9.b.	Bike path Plans & Specs.	<input type="checkbox"/>	<input type="checkbox"/>
D.9.b.	Sound Barrier Plans & Specs.	<input type="checkbox"/>	<input type="checkbox"/>
D.9.b.	Truck Escape Ramp Plans & Specs.	<input type="checkbox"/>	<input type="checkbox"/>
D.9.b.	Rest Area Plans & Specs.	<input type="checkbox"/>	<input type="checkbox"/>
D.9.c.	Lighting Plans	<input type="checkbox"/>	<input type="checkbox"/>
D.11.c.	Structure Final Review Plans and Special Provisions	<input type="checkbox"/>	<input type="checkbox"/>
D.12.	Construction Phasing Plan	<input type="checkbox"/>	<input type="checkbox"/>
D.13.d.	FOR Plan Sheets and Special Provisions	<input type="checkbox"/>	<input type="checkbox"/>
D.13.e.	FOR Cost Estimate	<input type="checkbox"/>	<input type="checkbox"/>
D.15.a.	FOR Revised Plans and Special Provisions	<input type="checkbox"/>	<input type="checkbox"/>
D.15.c.	Final Review Revisions	<input type="checkbox"/>	<input type="checkbox"/>
Construction Plan Package:			
D.15.d.(1)	Roadway Design Data Submittal	<input type="checkbox"/>	<input type="checkbox"/>
D.15.d.(2)	Major Structure Design Final Submittal	<input type="checkbox"/>	<input type="checkbox"/>
D.15.e	Construction Engineer's Action Plan	<input type="checkbox"/>	<input type="checkbox"/>
D.15.f.	Record Plan Sets	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION 9  
CONTRACT CONCLUSION**

**9.01 Supplemental Work.** It is anticipated that this contract will be supplemented for:

- Preliminary Design
- Final Design
- Construction Services
- Construction Engineering
- Final Earthwork Determination
- Completion of the 'As-Built' plans and/or final ROW plans

**9.02 Contract Completion.** This Contract will be satisfied upon acceptance of the following items if applicable:

- Project Schedule
- Project Progress Meeting Minutes
- Traffic Control Plan(s)
- All Documents Found in Research
- All Permission to Enter Forms
- Monumented & Surveyed Ground Control - Control Diagram(s)
- Legally Deposited Control Survey Diagram(s)
- Digital TMOSS Data
- Photography Products
- Ownership Map(s)
- Original Field Notes
- Survey Report (Including monument recovery forms)
- Monumented and Sealed ROW Plans
- Legally Deposited Survey Plans
- Legal Descriptions (Signed and Sealed)
- NOAA-NGS Blue Book

and the completion of review of contract submittals.

**PROJECT SCOPE OF WORK  
ATTACHMENTS  
DOCUMENT DATE: January 8, 2007**

- A. References
- B. Specific Design Criteria
- C. Definitions
- D. Consultant Survey Request Form

Comments regarding this scope  
May be directed to:  
**Bernie Rasmussen**  
CDOT Agreements Office  
(303) 757-9400

**ATTACHMENT A**  
**References**

## REFERENCES

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

1. A Policy on Design Standards – Interstate System
2. A Policy on Geometric Design of Highways and Streets
3. Guide for Design of Pavement Structures
4. Standard Specifications for Highway Bridges
5. Guide for the Design of High Occupancy Vehicle and Public Transfer Facilities
6. Guide for Development on New Bicycle Facilities
7. Standard Specifications for Transportation Materials and Methods of Sampling and Testing – Part I, Specifications and Part II, Tests
8. Highway Design and Operational Practices Related to Highway Safety
9. Roadside Design Guide
10. Roadside Design Guide

B. COLORADO DIVISION OF HIGHWAYS PUBLICATIONS (using latest approved versions):

1. Action Plan
2. CDOT Design Guide (all volumes)
3. CDOT Bridge Design Guide
4. CDOT Bridge Detailing Manual
5. Bridge Rating Manual
6. Project Development Manual
7. Wetlands and Water Quality
8. Field Log of Structures
9. Cost Data Book
10. Drainage Design Manual
11. CDOT Quality Manual (when updated)

12. Survey Manual
13. Field Materials Manual
14. CDOT Design Guide, Computer Aided Drafting (CAD)
15. Erosion Control and Stormwater Quality Guide
16. Standard Plans, M & S Standards (also available on the internet)
17. Standard Specifications for Road and Bridge Construction and CDOT Supplemental Specifications
18. Item Description and Abbreviations (with code numbers) compiled by Construction Cost Estimates & Market Analysis Unit, CDOT (also available on the internet)
19. Right-of-Way Manual, Chapter 2, Plans and Descriptions, Procedures, and General Information
20. The State Highway Access Code
21. Utility Manual
22. TMOSS Generic Format
23. Field TMOSS Topography Coding
24. Topography Modeling Survey System User Manual
25. Interactive Graphics System Symbol Table

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

<u>Number</u>	<u>Title</u>
400.2	Monitoring Consultant Contracts
501.2	Cooperative Storm Drainage System
514.1	Field Inspection Review (FIR)
516.1	Final Office Review (FOR)
1304.1	Right-of-Way Plan Revisions
1305.1	Land Surveys
1601.0	Interchange Approval Process
1700.3	Plans, Specifications and Estimates (PS & E) and Authorization to Advertise for Bids under Certification Acceptance (CA)
1700.7	Plans and Specifications for Structure Plans under CA
1700.8	Plans and Specifications for Traffic Engineering Plans under Certifications Acceptance
1905.1	Preparation of Plans and Specifications for Structures prepared by Staff Bridge Branch



D. FEDERAL PUBLICATIONS (using latest approved versions):

1. Manual on Uniform Traffic Control Devices
2. Highway Capacity Manual
3. Urban Transportation Operations Training – Design of Urban Streets, Student Workbook
4. Reference Guide Outline – Specifications for Aerial Surveys and Mapping by Photogrammetric Methods for Highways
5. FHWA Federal-Aid Policy Guide
6. Technical Advisory T6640.8A
7. U.S. Department of Transportation Order 5610.1E
8. Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques

E. AREA:

1. Manual for Railway Engineering

**ATTACHMENT B**  
**Specific Design Criteria**

## SPECIFIC DESIGN CRITERIA

**Note: The following criteria will be developed by the Consultant and coordinated with the CDOT/PM prior to starting the design.**

### A. ROADWAY

#### 1. 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.

#### 2. GEOMETRIC AND STRUCTURE STANDARDS:

- a. Horizontal Curvature:
  - (1) Applicable Superelevation Standards-
  - (2) Minimum radius of Curvature-
  - (3) Use of Spirals-
- b. Vertical Alignment:
  - (1) Maximum gradient – Current CDOT Design Guide
  - (2) Length – Current CDOT Design Guide
- c. Sight Distance:
  - (1) Stopping-
  - (2) Passing-
  - (3) Decision-
- d. Superelevation:
  - (1) Applicable Standard-
- e. Frontage Roads:
  - (1) Separation Width-
- f. Access:
  - (1) Current CDOT Design Guide
- g. Airway – Highway Clearances:
  - (1) Current CDOT Design Guide
- h. Bridges and Grade Separation Structures:
  - (1) Current CDOT Design Guide
  - (2) Clearances to Structures and Obstructions
- i. Curbs and Gutters:
  - (1) Type-

#### 3. GEOMETRIC CROSS SECTION:

- a. Travel Lane:
  - (1) Width-
  - (2) Crown Slope-
- b. Shoulder:
  - (1) Width-
  - (2) Slope-
  - (3) Paved/Nonpaved-
- c. Side Ditches:
  - (1) Current CDOT Design Guide

- d. Side Slopes:
  - (1) Cut-Greater than 3:1
  - (2) Current CDOT Design Guide
- e. Median:
  - (1) Width-
  - (2) Treatment-
- 4. INTERSECTIONS AT GRADE:
  - a. Type-
  - b. Special Considerations-
- 5. TRAFFIC INTERCHANGES:
  - a. Type-
  - b. Special Considerations-
  - c. Ramp Type-
- 6. DESIGN OF PAVEMENT STRUCTURE:
  - a. Pavement Type-
  - b. Economic Analysis Period-
  - c. Design Life-
- 7. MISCELLANEOUS DESIGN CONSIDERATIONS:
  - a. Fence Type-
  - b. FEMA Category-
  - c. Design Flood Frequency-
- 8. DRAINAGE DESIGN INFORMATION:
  - a. Current CDOT Design Guide
  - b. Current CDOT Drainage Design Guide
- 9. ROADSIDE DEVELOPMENT:
  - a. Landscaping
    - (1) Specifications for revegetating disturbed areas to be provided by CDOT
  - b. Noise Control
    - (1) Type-
- 10. LIGHTING:
  - a. Type-

**ATTACHMENT C**  
**Definitions**

## DEFINITIONS

<b>AASHTO</b>	American Association of State Highway & Transportation Officials
<b>ADT</b>	Average two-way 24-hour Traffic in Number of Vehicles
<b>AREA</b>	American Railway Engineering Association
<b>ATSSA</b>	American Traffic Safety Services Association
<b>AT &amp; SF</b>	Atchison, Topeka & Santa Fe Railway Company
<b>BLM</b>	Bureau of Land Management
<b>BNRR</b>	Burlington Northern Railroad
<b>CA</b>	Contract Administrator – the CDOT Manager responsible for the satisfactory completion of the contract by the Consultant.
<b>CAP</b>	CDOT’s Action Plan
<b>CBC</b>	Concrete Box Culvert
<b>CDOT</b>	Colorado Department of Transportation
<b>CDOT/PE</b>	Colorado Department of Transportation Project Manager – the CDOT Engineer responsible for the day to day direction and coordination of the CDOT/Consultant design effort.
<b>CDOT/STR</b>	Colorado Department of Transportation Structure Reviewer – the CDOT Engineer responsible for reviewing and coordinating major structural design.
<b>CEA</b>	Council on Environmental Quality
<b>COG</b>	Council of Governments
<b>COGO</b>	Coordinate Geometry Output
<b>CONSULTANT</b>	Consultant for this project
<b>CONTRACT ADMINISTRATOR</b>	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.
<b>C/PM</b>	Consultant Project Manager. The Consultant Engineer responsible for combining the various inputs in the process of completing the project plans and managing the Consultant’s design effort.
<b>DEIS</b>	Draft Environmental Impact Statement

<b>DHV</b>	Future Design Hourly Volume (two way unless specified otherwise)
<b>DOR</b>	Region Office Review
<b>DRCOG</b>	Denver Regional Council of Governments
<b>D&amp;RGW</b>	Denver & Rio Grande Western Railroad
<b>EA</b>	Environmental Assessment
<b>EIS</b>	Environmental Impact Statement
<b>ESAL</b>	Equivalent Single Axle Load
<b>ESE</b>	Economic, Social and Environmental
<b>FEIS</b>	Final Environmental Impact Statement
<b>FEMA</b>	Federal Emergency Management Agency
<b>FHPM</b>	Federal-Aid Highway Policy Guide
<b>FHWA</b>	Federal Highway Administration
<b>FIR</b>	Field Inspection Review
<b>FONSI</b>	Finding of No Significant Impact
<b>FOR</b>	Final Office Review
<b>GPS</b>	Global Positioning System
<b>MAJOR STRUCTURES</b>	Bridges and culverts with a total length greater than hundred feet and maximum exposed height at any section of over five feet. This length is measured along the centerline of roadway for bridges and culverts, and is the horizontal distance along the top of wall for retaining walls. Overhead structures (sign bridges, cantilevers and butterflies extending over traffic) are also major structures.
<b>MOSS</b>	‘Modeling of Surfaces and Strings’ computer program
<b>MPO</b>	Metropolitan Planning Organization, Denver Regional Council of Governments, Piles Peak Area Council of Governments, Grand Junction MPO, Pueblo MPO, North Front Range Council of Governments.
<b>NEPA</b>	National Environment Policy Act
<b>NGS</b>	National Geodetic Survey
<b>NICET</b>	National Institute for Certification in Technology
<b>NOAA</b>	National Oceanic and Atmospheric Administration

<b>PAPER-SIZES</b>	See CDOT Computer-Aided Drafting Manual – Tables 6-13 and 8-1
<b>PE</b>	Professional Engineer registered in Colorado
<b>PM</b>	Program Manager
<b>PLS</b>	Professional Land Surveyor registered in Colorado
<b>PRT</b>	Project Review Team
<b>PS &amp; E</b>	Plans, Specifications and Estimate
<b>PROJECT</b>	The work defined by this scope
<b>ROW</b>	Right-of-Way: A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to a highway.
<b>ROWPR</b>	Right-of-Way Plan Review
<b>RTD</b>	Regional Transportation Director
<b>T/E</b>	Threatened and/or Endangered Species
<b>Trns*port</b>	AASHTO sponsored product for preconstruction and construction project management.
<b>SH</b>	State Highway Numbers
<b>TMOSS</b>	Terrain Modeling Survey System
<b>TOPOGRAPHY</b>	In the context of CDOT plans, topography normally refers to existing cultural or man-made details
<b>UD &amp; FCD</b>	Urban Drainage and Flood Control Region

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



**PART 2**  
**SCOPE OF WORK**  
**PRECONSTRUCTION TASK DESCRIPTIONS**

THE COMPLETE SCOPE OF WORK FOR CONSULTANT SERVICES  
INCLUDES:

PART 1 - PROJECT SPECIFIC (Which is attached to the Contract for  
Consultant Services)

PART 2 - PRECONSTRUCTION TASK DESCRIPTIONS

PART 3 - SERVICES AFTER DESIGN (as applicable)

AND THE ATTACHMENTS

Part 2, Part 3, and the attachments are  
available as separate documents and apply  
to the contract only if referenced.

Comments regarding this scope may be directed to:

**Bernie Rasmussen**  
CDOT Agreements Office,  
(303) 757-9400

**PART 2**  
**PROJECT SPECIFIC**  
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## SECTION 1 PRECONSTRUCTION WORK TASK DESCRIPTIONS

The following includes work descriptions for all task normally accomplished during this phase of the work.

The tasks that are the responsibility of the Consultant are identified in Part 1 of “Scope of Work”. The Consultant should review this entire section to identify applicable material. Contact the Colorado Department of Transportation Project Manager (CDOT/PM) if clarification is required. (See Section 2.01.)

The following activities of communication, consensus building, project team reviews, conceptual design, data gathering, documentation, and formal public notice should be planned by the Consultant and coordinated with the CDOT/PM to satisfy the requirements of the CDOT Action Plan (see Attachment A).

The time of their accomplishment will overlap and parallel paths of activity should be planned to finish the development phase in accordance with the shortest possible schedule. The type and number of meetings, documents, etc., will depend on the category and characteristics of the project work. A project plan shall be developed by the Consultant which satisfies the requirements of the project development. This plan must be approved by the Contract Administrator (see Section 2.01) before starting the work.

### A. Project Initiation and Continuing Requirements

- 1a. If this contract is for the production of Right-of-Way plans, the Consultant or Sub-consultant actually designing the Right-of-Way plans shall attend a ‘pre-survey’ conference with the CDOT/PM.
- 1b. Initial Project Meeting. A ‘pre-survey’ conference between the Consultant and the CDOT/PM will be held prior to any survey work being performed.
2. Review environmental mitigation requirements and ensure that they are included in the plan for design.
3. Scoping Feasibility Study and Needs: An independent design review shall be performed on any design accomplished by others that will be used in this project.
4. Develop a Project Schedule and assign tasks.
5. Identify design criteria. Submit a copy of Attachment B with the appropriate items completed.
6. 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. The Survey Manual provides an agenda for the Pre-Survey Conference.
7. Obtain necessary Right-of-Entry and permits.
  - a. Some activities which may require work on land are not controlled by the CDOT. In such cases the Consultant shall obtain the necessary written permission to enter the premises. Included in this written permission will be the names and telephone numbers of persons to contact should notification prior to entry be necessary. These written permissions apply to CDOT personnel as well as Consultant personnel. CDOT Form 730 will be used for this purpose. Signed copies of the written permission will be submitted to the CDOT/PM prior to entering private property for survey work.

- b. 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.
8. Traffic Control. Consultant field activities that interfere with traffic operation within existing roadways will require control of existing traffic. The Consultant will plan and provide any required traffic control for the survey, testing, or design process. Traffic control operations will be in accordance with the MUTCD. The Consultant will note that the proposed method for handling traffic must be acknowledged in writing by the CDOT/PM. Also, certification of the Traffic Control Supervisor as a Worksite Traffic Supervisor by the American Traffic Safety Services Association (ATSSA) shall be required.
9. Initial Submittals. Submit the following samples to the CDOT/PM for approval:
- a. An original plan sheet that complies with Part 2 Section 2 of this scope of work.
  - b. Photogrammetric and/or survey data and a drawing or photograph in accordance with the requirements specified in Part 2 Section 2 of 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.**

10. Progress Meetings:
- a. The CDOT and Consultant Project Manager will meet periodically as required (typically at two-week intervals). These Progress Meetings will be used to coordinate and track the work effort and resolve problems. The meetings will review the following:
    - (1) Activities required to be completed since the last meeting.
    - (2) Problems encountered and effectiveness of previous meeting.
    - (3) Late activities.
    - (4) Activities required to be completed by the next meeting.
    - (5) Solutions proposed for unresolved and anticipated.
    - (6) Information or items required from other agencies.
  - b. Other required meetings are described in subsequent sections.
11. 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. Minutes of these meetings shall be prepared by the Consultant and submitted to the CDOT/PM, with a copy to the CDOT Structure Reviewer. Typically, these Structure Review Meetings shall be no less than once every two months nor more than once every two weeks. The complexity of the structure shall be considered by the CDOT Structure Reviewer to determine the frequency of review meetings.
12. Project Management. The Consultant will coordinate all the work tasks being accomplished by all parties to ensure project work completion stages are on schedule.

## B. Project Development

1. **Communication and Consensus Building.** Establish and maintain a computerized list of all appropriate receptors for the communication process.  
The contacts will be compiled from the general 'contact list' below as supplemented by the Project Review Team and the attendees at public meetings.

The list will be used for notices regarding public meetings, mailing newsletters, or other communications as appropriate.

The information on the list shall include as a minimum:

- Name
- Firm (if applicable)
- Mailing/email address
- Phone/Fax numbers

- a. **Contact List:**

- Public Agencies
- Elected/Appointed Officials
- Neighborhood Groups
- Property Owners/Tenants
- Business Interests
- Special Interests
- Railroads
- Media Contacts

2. **Public Notices/Advertisement**

Advertise the proposed project in accordance with the CDOT Action Plan. Copies of the advertisement shall also be mailed to the individuals on the 'contact list'.

Following the public notice, conduct small group and general public meetings to gather information which will be used to formulate and test the alternative designs.

- a. **General Meetings.** The types and number of public meetings shall be flexible and determined by an interactive process as approved by the CDOT/PM. Minutes shall be provided by CDOT/PM.
  - (1) **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 of resolutions. Minutes of these meetings will be provided to all participants.
  - (2) **General Public Meetings (informal and workshops).** The format of these meetings will be dictated by the project and goals for the meetings. Informal meetings may be used to establish communication with the public, add to the 'contact list', and gather information regarding local concerns. The meetings may also take a work session or workshop approach so that the community members who are those closest to local problems and the local decision-making process will have an opportunity to informally test and evaluate various alternatives and constraints.

- (3) Project 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'. The Consultant will provide the presentation aids, conduct the meeting, and provide complete minutes of the meetings to CDOT.
- b. Communication Aids
- (1) Graphics Support. Provide the graphics for public presentations and environmental documents. This may include 35mm slides, overhead projector slides, maps and plan views of conceptual design, and other displays for visual presentations at meetings.
  - (2) 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.
  - (3) Wall Displays. Wall displays shall be developed which communicate the project goals and mitigations. These displays will be approved by the CDOT/PM prior to the work commencement and will be placed in areas approved/selected by CDOT.
  - (4) Study Model. Construct a study model to depict the project's physical characteristics for public display.
  - (5) Local Office. Obtain and maintain an office within the project area to conduct small group meetings and provide displays/information to the public.
3. Route Location Surveys. Surveys will be conducted in accordance with the CDOT Survey Manual, the latest addendum thereof, and applicable state statutes.
- a. Presurvey Conference: (See CDOT Form 1217a). A Presurvey conference shall be held as per CDOT Survey Manual (as revised).
  - b. Survey Data Research: Research shall be done as per CDOT Survey Manual as amended and the CDOT Right-of-Way Manual, Chapter 2 (as revised).
  - c. Secure Rights of Entry: Use Form 730 as revised, following procedures in the CDOT Survey Manual Chapter 03 as amended.
  - d. Project Control Survey:
    - (1) 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.
    - (2) Monumentation: Materials will be supplied by CDOT and care is to be taken to install said monumentation in locations that are readily usable for the project and in as safe a location so

that they can be utilized throughout construction. (No monumentation shall be set on or near the centerline of the proposed roadway.)

- (3) 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 the coordinates and physical description of all found monuments and other physical evidence.

e. Photogrammetry:

- (1) Camera Calibration Report
- (2) Flight Plan
- (3) Flight
- (4) Contact Prints
- (5) Negatives
- (6) Enlargements
- (7) Photo Index
- (8) Supplemental Survey (wing points)

f. Supplemental Surveying: As required and specifically requested.

- g. Accuracy Test: Tests are to be performed on a regular basis throughout the project by the Consultant.

- h. 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.

- i. Reviewed by CDOT Professional Land Surveyor: 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.

4. Conceptual Design. The following conceptual design development shall be managed by the Consultant to occur along with the communications, project team reviews, data gathering, socioeconomic mitigations, environmental mitigations, and documentation activities in parallel paths as appropriate to complete the process in the minimum time feasible.

- a. Urban Planning Esthetics. Provide conceptual designs for multi-modal paths and open space connections for each alternative. Develop planting and open space concepts that consider access to adjacent areas, the creation of open space, and impacts on existing and future adjacent development.

Develop preliminary sketch concepts of structures and landscape/streetscape improvements for each of the short-listed alternatives. Develop plan and elevation drawings of bridge structures, planting masses, and plans illustrating access and development potential of adjacent areas for the alternatives to be analyzed in the Environmental Assessment (EA) (assumed to be to-build alternatives).

Relative visual qualities of the alternatives, including visual impacts of proposed improvements on adjacent areas and views from the roadway, will be considered. Determination of minimum visual

impacts from adjacent areas and acceptable views from the roadway will be made as part of the alternatives analysis. Four sketch-photo simulations will be prepared for each alternative. Each simulation will contain a 'before' and 'after' illustration of existing conditions and proposed design.

- b. System Feasibility Study of Interchanges. When required, a System Feasibility Study will be prepared in accordance with Procedural Directive 1601.0. Typically, the System Feasibility Study must consider, as a minimum: alternate routes, accident history, congestion, effects of the interchange on the existing highway system, effects on adjacent interchanges, economic development impact, and local commitment to improving local roadway. Refer to this Procedural Directive for additional details.

A draft study shall be submitted to CDOT for review and comment prior to final submission.

- c. Alternatives Analysis

- (1) Develop Alternatives. Develop an agreed number of alternatives which will satisfy the operational requirements of the project. When required, conceptual layouts will be developed for major structures for each alternate which shows satisfaction of the required span arrangement and the horizontal and vertical clearances.

Examples of items to consider while developing alternatives are alternate routes, accident history, congestion, effects of the interchange on the existing highway system, effects on adjacent interchanges, economic development impact, and location commitment to improving local roadway. These alternatives must respond to projected design year traffic volumes as developed for this scope. Evaluate the impacts of these alternative concepts and the degree to which they accomplish the objectives. These concepts will be described schematically and narratively, and reviewed by CDOT.

- (2) Screen Alternatives. A preliminary screening process will be used on the universe of alternatives to identify a limited number of feasible and significantly different alternatives which will be subject to more detailed evaluation in the 'Test Alternatives Analysis'. The purpose of this screening is to eliminate the obviously unfeasible or unsuitable alternates.

The criteria used in the preliminary screening should include items identified in "Data Gather Analysis, and Mitigation". Examples of concerns used in the screening process are environmental (air, noise, water quality and open space), historic and archaeological impacts, cost and engineering feasibility, construction staging options, transportation impacts, design year level of service and other performance measures, socioeconomic impacts and community acceptability, consistency with adopted plans, and urban design issues and opportunities. The do-nothing alternative must be carried through the entire evaluation and assessment process.

This limited number of design alternatives, probably no more than five, will be described in a final design alternatives memorandum. For this limited set of alternatives, horizontal and vertical alignment studies, at a scale of 1" = 200', will be examined.



- (3) Test Alternatives Analysis. Following the development of the short-list of alternatives, perform a comprehensive test of each of the short-listed alternatives. This test shall utilize a decision process which includes a compilation of all appropriate criteria. These criteria will be developed from the activities specified in B.5, “Data Gathering Analysis, and Mitigation Development”. In addition to the socioeconomic and environmental concerns, the decision criteria shall include design standards.

The criteria will be compiled in coordination with other activities. Following that, a decision matrix shall be created which combines a list of the alternatives under consideration with the results of the test with each criterion.

- (4) Complete an initial design of the designated alternatives. Once the alternatives have been tested, general profile and cross section studies will be developed for critical areas to analyze the designated alternatives. This information shall be sufficient to determine general cut and fill limits, Right-of-Way and Easement requirements, and earthwork and structural requirements. Design parameters and Standards such as design speeds, maximum grades, typical sections, intersection designs, and pedestrian routing will be determined at the beginning of the study.

The conceptual design for the roadway alignments, detours, and major structures will also be completed sufficiently so that preliminary cost estimates can be developed and the satisfaction of pertinent design criteria can be demonstrated. Necessary variances (Design Exceptions) will be identified with justification.

The following shall be available from the design:

- Typical sections and plan and profile of roadway alignment and detours
- Preliminary Hydraulic recommendations
- Preliminary Right-of-Way requirements
- Recommended construction sequence

- (5) Perform a financial analysis on the alternatives designated by the CDOT/PM. A total cost estimate will be developed for each preliminary engineering, construction engineering, construction, and maintenance for the design life will be analyzed. A funding package identifying the funding sources necessary to construct and maintain the project will be developed.

- d. Final Alternatives Reports. Complete the determination of the selected alternative. If specified, a ‘Final Alternatives Report’ will be submitted documenting the analysis process. This shall include the final staging plan, socioeconomic and environmental concerns, utility conflicts, drainage, Right-of-Way requirements, and total cost for the recommended alternatives.

A draft of the report shall be submitted for review and comment prior to the submittal of the final report.

**Note: The Consultant is responsible for ensuring that the recommended alternative complies with applicable standards requirements and design criteria. Where appropriate, proposed variances will be identified, justified and have concurrence from CDOT and FHWA where required.**

- e. Interchange Approval Process. A system feasibility study shall be prepared in accordance with Procedural Directive 1601.0 to obtain access approval from FHWA.
5. Gathering Data, Analysis, and Mitigation Development. These activities shall be accomplished in accordance with the CDOT Action Plan concurrently with the other activities in this scope as required.
- a. Traffic Related
    - (1) Traffic Study. Obtain the available present day and design year traffic volumes for the existing and planned improvements. When possible, local traffic patterns will be defined. The data shall include percentage of trucks, directional splits, and turning movements.  
  
The no-build and alternative designs will be analyzed with the traffic projection data to develop the appropriate roadway geometry (i.e., number of lanes, auxiliary lanes, storage lengths, weaving distances, etc.) in accordance with the latest version of Highway Capacity Manual.
    - (2) Accident Study. Obtain accident reports Provide the data for the alternatives analysis activities.
    - (3) Noise Study. Prepare a noise assessment analysis in accordance with FHWA noise impact regulations described in FHPM 7-7-3. As a minimum, this activity will consist of the following:
      - (a) Predict or measure present noise levels.
      - (b) Analyze noise levels for all alternatives, including the no-build Noise level models will be made with at least CDOT's stamina noise computer model or better. Distances at which noise levels exceed acceptable levels will be determined for each alternate and plotted on corridor maps.
      - (c) Identify locations where noise abatement measures are needed, determine which measure is feasible and cost effective, and estimate construction and maintenance costs.
      - (d) Prepare a noise assessment report for acceptance by CDOT.
    - (4) Air Quality
      - (a) Air Quality Monitoring. Monitor this air quality for carbon monoxide during the months of December and January and ozone during July and August, to obtain the required data.
      - (b) Air Quality Analysis. Prepare an air quality report and submit it to CDOT for acceptance.
    - (5) Alternate Transportation Systems. Evaluate the effect of other transportation systems on the proposed alternates when required.
  - b. Archaeology
    - (1) Gather Data and Analyze
      - (a) Conduct a field survey and test excavations as specified.
      - (b) Accomplish a laboratory analysis of the diagnostic specimens.
      - (c) Write the archaeology survey report to recount the analysis of artifacts and describe the culture and importance.
      - (d) Develop and write the archaeology mitigation plan.

- (e) Coordinate the plan with the State Historic Preservation Office and other agencies as required (via the Region Environmental Manager).
- (2) Mitigation Implementation
  - (a) Coordinate activities with the designated agencies
  - (b) Excavate the site
  - (c) Analyze artifacts
  - (d) Prepare and print an archaeology survey report which describes the culture and importance of the artifacts.
- c. Paleontology
  - (1) Gather Data and Analyze
    - (a) Determine if paleontologic resources are present WITHIN THE PROJECT SITE.
    - (b) Conduct a field survey.
    - (c) Conduct a literature survey.
    - (d) If any resources are found, conduct an analysis to determine their significance. Determine the potential for additional resources.
    - (e) Write a preliminary paleontology report.
    - (f) Develop the paleontology mitigation report and coordinate with FHWA.
  - (2) Mitigation Implementation
    - (a) Coordinate activities as required.
    - (b) Excavation the site.
    - (c) Analyze the resources.
    - (d) Prepare the final paleontology report.
- d. Initial Geology Investigation. A visual inspection of the project area shall be performed to determine possible geologic impacts on the alternative designs under consideration. Impact such as major rock cuts, unsatisfactory subgrade materials, etc. shall be evaluated.
- e. Water Quality
  - (1) Quality Analysis
    - (a) Determine the impact of the project during and following construction by considering the project location and design concept in relation to existing water resources such as:
      - Streams & rivers (both surface and underground)
      - Lakes
      - Aquifers, particularly sole source
    - (b) Develop a mitigation plan which includes erosion control measures.
    - (c) Identify necessary permits.
    - (d) Write the water quality report.
  - (2) Quality Monitoring
    - (a) Obtain the water quality baseline data prior to construction.
    - (b) Collect and analyze samples as required.

f. Ecological Assessment

- (1) Coordinate with other state and federal agencies as required.
- (2) Research available data.
- (3) Conduct a field study (work shall be performed between April 15<sup>th</sup> and November 15<sup>th</sup>).
- (4) Investigate the concerns raised by coordinated agencies
- (5) Write the ecological report.

g. Historical

(1) Historical Bridge Clearance

- (a) Conduct a literature and records search.
- (b) Consult with the State Historic Preservation Office via the Region Environmental Manager, FHWA, and Staff Historian.
- (c) Obtain clearance for non-eligible bridges.

(2) Historical Study and Clearance

- (a) Conduct a literature and records search.
- (b) Consult with the State Historic Preservation Office via the Region Environmental Manager, FHWA, and Advisory Council.
- (c) Write the cultural resources report.
- (d) Determine effects.
- (e) Develop a mitigation plan.
- (f) Develop memorandum of agreement.

h. Floodplain and Drainage Assessment

- (1) Determine the probable impacts of the proposed alternatives on the project area with respect to the floodplain and drainage.
- (2) Identify adverse effects on the project area with respect to floodplain and drainage for each alternative.
- (3) Develop possible mitigating actions for the adverse impacts on each alternative.
- (4) Analyze the impacts and mitigations (if any) for each alternate. Included in the analysis shall be a determination of significant impacts due to:
  - Single community access routes
  - Significant risk for social or economic losses due to flooding
  - Alteration of beneficial floodplain values
- (5) Complete a written 'Floodplain and Drainage Assessment Report' which includes a detailed discussion of the pertinent aspects of the analysis, identification of the significant floodplain/drainage impacts, and the possible practical mitigating actions for the alternatives.

i. Right-of-Way

(1) Early ROW

- (a) Perform a field inspection of each short-listed alignment. Ascertain number of parcels, types of improvements, and possible problem areas (i.e. mobile homes, functional replacements, historical sites, etc.). Try to estimate family sizes on residential relocations.
- (b) Using city surveys, courthouse records, and real estate listings, compile information on neighborhood characteristics, price ranges for land and improvements, housing available, minority percentages, etc.
- (c) Compile a ROW cost estimate for each alignment.
- (d) Prepare a conceptual relocation study.
- (e) Identify potential problem areas.
- (f) Prepare a property ownership map based on tax records which identifies ownerships for each alignment.
- (g) Prepare a land use map which identifies land usage along each alignment. The parcel use categories shall utilize appropriate categories including:
  - Land in public ownership: specific use and responsible agency/jurisdiction
  - Commercial: retail, wholesale, industrial, or other commercial
  - Residential: single or multi-family
  - Vacant
  - Mixed Uses
  - Other (specific)

(2) ROW Review

- (a) Review the impact of each proposed alignment on existing and known future land use.
- (b) Prepare a ROW report, which summarizes the findings and includes:
  - A cost estimate for each alignment
  - A relocation evaluation for each alignment
  - Identified problem area
  - Ownership map
  - Land use map

j. 4(f)/6(f) Activity

(1) Evaluation

- (a) Determine if any potential ROW acquisitions include Section 4(f)/6(f) property (e.g., parks, recreation, wildlife refuges, lakes, streams, school playgrounds, etc.)
- (b) Initiate 4(f)/6(f) clearance/concurrence if appropriate land usage exists.

(2) Clearance/Concurrence

- (a) Determine and evaluate project impact on 4(f)/6(f) properties.
- (b) Prepare the applications for 4(f) clearance and 6(f) concurrence.
- (c) Coordinate with affected agencies (e.g., HUD, US Forest Service, Depart. Of Interior, local governments, etc.)

- (d) Prepare and coordinate determination with FHWA
  - (e) Write 4(f)/6(f) mitigation reports.
- k. Threatened and/or Endangered Species
- (1) Determination of presence
    - (a) Write letter to Division of Wildlife.
    - (b) Coordinate with FHWA and USFWS.
    - (c) Prepare the threatened and/or endangered species assessment.
  - (2) Implement Mitigation. Implement the preconstruction phases of the T/E Mitigation Plan.
- l. Wetlands
- (1) Wetlands Determination
    - (a) Conduct a field evaluation of each alignment for the presence of wetlands.
    - (b) Determine the boundaries and size of all wetlands that may be affected by the project work.
    - (c) Prepare a wetlands map which identifies the wetland boundaries within the corridor of each alignment.
    - (d) Coordinate the findings with other agencies as directed by CDOT.
  - (2) Wetlands Findings Report
    - (a) Write wetland assessment (major and intermediate category projects only).
    - (b) Write wetland findings.
- m. Hazardous Materials
- (1) Conduct a field search of project area.
  - (2) Research:
    - (a) Lists compiled by EPA or Colorado Department of Health which identify:
      - Hazardous waste generators.
      - Hazardous water treatment/storage/disposal facilities (current and closed).
      - Hazardous waste transporters.
      - Locations of underground storage tanks.
      - Known, suspected or abandoned hazardous waste sites.
    - (b) Records kept by EPA or Colorado Department of Health on hazardous water regulation violations or citations.
    - (c) Lists kept by the appropriate fire department on:
      - Underground storage tank locations.
      - HAZMAT incidents/accidents.
      - Local emergency planning/hazardous materials use reporting.

- (d) Available historic tax records which indicate past land use (coordinate with property ownership and land use data research).
  - (e) Available historic aerial photos of the corridor (e.g., USGS, public library, etc.).
  - (f) Any pertinent records maintained by CDOT.
- (3) Conduct in-situ tests:
- (a) Select locations for soil boring/monitoring wells based on information obtained above, geologic review and alignment considerations.
  - (b) Install monitoring wells and obtain soil and water samples for chemical analysis as well as geotechnical and geologic data.
- (4) Analyze and assess impacts. Analyze results of chemical analyses and records review and identify potential impacts to the construction from hazardous waste. Assess potential hazards to the public and construction workers and develop potential mitigation options.
- n. Existing roadway and major structures. Evaluate existing conditions to assess the merits relative to the following:
- (1) Accident history
  - (2) Roadway and structure condition
  - (3) Geometry
  - (4) Lighting
  - (5) Traffic signal devices
- o. Construction requirements: Analyze/investigate the following:
- (1) General construction impact (of temporary nature)
  - (2) Material pits
  - (3) Haul roads
- p. Aesthetic Considerations: When specified, the following will be investigated:
- (1) Wild and scenic rivers
  - (2) Natural areas and trails
  - (3) Scenic roads and parkways
  - (4) Overall visual qualities of this project area
- q. Utilities: When specified, the effect of utilities will be investigated for the alternatives. Collect the utility location maps for all utilities in the area.
- r. Economics: When specified, the effect of the project on commercial and industrial enterprise, employment, local tax base, etc. will be investigated.
- s. Farmlands: When specified, the effect of the project on farmlands.
- t. Energy Usages: When specified, the effect of the project on energy usage.
6. Environmental Assessment (EA) Process: The following activities will be accomplished in accordance with the CDOT Action Plan.

- a. Preliminary EA Preparation
    - (1) Compile the data and mitigations developed under activity B.5 ‘Gathering Data, Mitigation Development and Implementation’.
    - (2) Coordinate the findings and mitigations. Take necessary actions to resolve issues.
    - (3) Write the EA document incorporating the inputs from the social, economic, and environmental investigations.
    - (4) Distribute the preliminary EA for review to the distribution specified.
    - (5) Coordinate the issues and recommended mitigation with appropriate local government agencies and CDOT personnel.
  
  - b. Review and Concurrence
    - (1) Distribute for review.
    - (2) Develop response to comments.
    - (3) Forward to FHWA for review and comment.
    - (4) Return title page to the contract administrator.
  
  - c. Public EA Availability and Advertisement
    - (1) Arrange for the public notice.
    - (2) Provide for public review of the EA.
    - (3) Compile public comments
  - d. Location Public Hearing
    - (1) Advertise the route location public hearing.
    - (2) Prepare the presentation addressing the following concerns:
      - Need for project
      - Maps showing alternative alignments
      - Description of significant social, environment, and economic impacts
      - Present design features
      - Consistency with federal and local plans
      - Time table for Right-of-Way acquisition and construction
      - Source and amount of funding
      - Present mitigating measures
    - (3) Prepare a certified verbatim transcript of the public hearing.
  
  - e. Finding of no Significant Impact (FONSI) Preparation
    - (1) Address the EA review comments.
    - (2) Revise the EA and write the FONSI
  
  - f. Adoption of FONSI: Submit the FONSI to CDOT for the adoption process.
  
  - g. Route Location Approval: (To be accomplished by CDOT.)
7. Environmental Impact Study (EIS) Process: The following activities will be accomplished in accordance with the CDOT Action Plan.



- a. Preliminary Draft EIS (DEIS) Preparation:
  - (1) Compile the data (i.e. issues, mitigations, etc.) for each alternate route.
  - (2) Write the environmental document incorporating all appropriate issues.
  - (3) Coordinate the issues with all appropriate agencies.
  
- b. Review and Adoption:
  - (1) Distribute the DEIS to all appropriate agencies and personnel for review.
  - (2) Develop response to comments
  - (3) Forward the completed DEIS to FHWA for approval and signature.
  - (4) Return title page to contract administrator.
  
- c. DEIS Distribution, Advertisement, and Public Review:
  - (1) Publish the public notice regarding the availability of the DEIS for public review and the notice for the route location public hearing.
  - (2) Maintain the availability of the DEIS for public review and compile public comments.
  
- d. Location Public Hearing:
  - (1) Prepare data for the hearing integrating the graphics produced in previous steps. As a minimum the following topics should be discussed:
    - Need for the project.
    - Maps showing alternate alignments.
    - Description of significant social, environmental, and economic impacts.
    - Present design features.
    - Consistency with federal and local plans.
    - Time table for Right-of-Way acquisition and construction.
    - Source and amount of funding.
    - Present mitigating measures.
  - (2) Conduct hearing (if designated) and record the event for transcript.
  - (3) Prepare a certified transcript of this hearing and submit it to CDOT.
  
- e. Final EIS (FEIS) Completion:
  - (1) Assess and respond to all public comments.
  - (2) Complete 4(f) evaluation.
  - (3) Identify recommended alternative alignments.
  - (4) Discuss mitigating measures.
  - (5) Obtain concurrence of recommended alignment.
  - (6) Provide summary of all comments received.
  - (7) Prepare FEIS for public review.
  
- f. CDOT Review and Adoption
  - (1) Distribute for review.
  - (2) Develop the response to comments.
  - (3) Forward to FHWA for signature and adoption.

- (4) Return title page and record of decision to the contract administrator.
- g. Route Location Approval
  - (1) Print FEIS.
  - (2) Distribute FEIS.
    - To all designated agencies including EPA
    - Enter the FEIS in the Federal Register (30-day waiting period required)
  - (3) Review response to comments.
  - (4) Coordinate with FHWA.
  - (5) Notify the contract administrator that location phases requirements have been completed.
- 8. Design Report Process: The following activities will be accomplished in accordance with the CDOT Action Plan.
  - a. Initial Public Meeting: (may not be required for intermediate projects.)
  - b. Preliminary Design Report Preparation: Write the preliminary design report incorporating the inputs from the investigations conducted above.
  - c. CDOT Staff Review: (may not be required for intermediate projects.)
  - d. Public Hearing: (may not be required for intermediate projects.)
    - (1) Prepare draft design report.
    - (2) Present alternatives under consideration, including general design details, environmental consequences, costs, real estate procedures, etc.
    - (3) Record hearing and respond to questions.
    - (4) Prepare verbatim transcript of hearing or hearing opportunity and forward copy to FHWA.
    - (5) Prepare final design report.
    - (6) Obtain management approval of final design report.
  - e. Finalize the Design Report Completion: Revise as necessary based on review comments received on final design report.
  - f. Review Design Report:
    - (1) Distribute for review.
    - (2) Develop response to comments.
    - (3) Forward to FHWA (informational copy).
    - (4) Concurrence from FHWA to Chief Engineer.
    - (5) Begin preliminary design approval process.
  - g. Design Report Approval:
    - (1) Obtain Executive Director concurrence in preliminary design approval.
    - (2) Notify Chief Engineer that project may be advanced to the final design phase.

9. Obtain Permits: This activity is concurrent with final design and must be completed prior to the advertisement for construction.
  - a. 401 Permit Process:
    - (1) Submit application and design information to the Colorado Department of Health.
    - (2) Coordinate between the agency and the Region Environmental Manager any questions concerning the application.
    - (3) Submit permit to Region Environmental Manager.
  - b. 402 Permit Process:
    - (1) Submit application and design information to the Colorado Department of Health.
    - (2) Coordinate between the agency and the Region Environmental Manager any questions concerning the application.
    - (3) Submit permit to Region Environmental Manager.
  - c. 404 Permit Process:
    - (1) Determine impacts.
    - (2) Prepare and submit 404 permit applications.
    - (3) Coordinate with Corps of Engineers, Region and Staff Design.
    - (4) Obtain Regional Transportation Directors signature on permit
    - (5) Transmit permit stipulations to Region and Staff Design.
  - d. Wildlife Certification:
    - (1) Submit application and design information to Colorado Division of Wildlife.
    - (2) Coordinate with the Region Environmental Manager any questions concerning the application.
    - (3) Submit certification to Region Environmental Manager.
  - e. NPDES Storm Water Permit for construction activities:
    - (1) Prepare NPDES permit application. Coordinate with the Region Environmental Manager any questions concerning the application.
    - (2) Submit application to the Region Environmental Manager.

C. Preliminary Design

1. Design Field Survey: This work shall be done in accordance with the CDOT Survey Manual and applicable state statutes.
  - a. Presurvey Conference: (See CDOT Form 1217a). A Presurvey conference shall be held as per CDOT Survey Manual (as revised).
  - b. Presurvey Data Research: Research shall be done as per CDOT Survey Manual as amended and the CDOT Right-of-Way Manual, Chapter 2 (as revised).
  - c. Secure Rights of Entry: Use Form 730 as revised, following procedures in the CDOT survey Manual Chapter.
  - d. Project Control Survey:
    - (1) 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.
    - (2) Monumentation: Materials will be supplied by CDOT and care is to be taken to install said monumentation in locations that are readily usable for the project and in as safe a location so that they can be utilized throughout construction. (No monumentation shall be set on or near the centerline of the proposed roadway.)
    - (3) 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 the coordinates and physical description of all found monuments and other physical evidence.
  - e. Land Survey/Boundary Survey: Tie aliquot, property and other land monuments to the control survey. Prepare a Control Survey Diagram showing graphical representation of all found aliquot, property and land monuments. Tabulate the coordinates and physical description of all found monuments and other physical evidence.
  - f. 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 and curb cuts, curbs, sidewalks, and edges of pavements. Horizontal accuracy shall be as prescribed in the CDOT Survey Manual Chapter 5.
  - g. Terrain (relief or elevation) survey: Collect elevation data and submit in TMOSS format. Vertical accuracy shall be as prescribed in the CDOT Survey Manual Chapter 5.
  - h. Utility Survey: Located utility poles, manholes, valves, pedestals, guy wires, and other visible utility features. Survey underground utilities as marked by utility companies. Determine invert elevations of manholes and vaults. Survey the locations of utilities exposed by 'potholing' done in accordance with Section 7.03.05.

- i. Hydraulic Survey: Locate culvert and storm sewer pipes and determine invert elevations. Locate inlets and determine invert elevation of pipes. Accomplish drainage situation surveys for designated culverts and bridges.
- j. Material sources: Survey designated material sources as specified.
- k. Supplemental surveying: As required and specifically requested.
- l. Survey Report: Prepare a Survey Report as required in Section 2B of this Scope of Work.
- 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.
- o. Reviewed by CDOT Professional Land Surveyor: 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.**

2. Traffic Engineering

- a. Obtain the necessary data and accomplish the necessary traffic counts (including percentage of trucks, directional split, and turning movements) and produce traffic projections for the design year in accordance with generally accepted procedures.
- b. Review accident data as provided by CDOT to determine desirable safety improvements.
- c. Analyze the proposed project design with the traffic projection data and recommend the appropriate geometry (i.e., number of lanes, auxiliary lanes, storage lengths, etc.) in accordance with the current or most recent version of Highway Capacity Manual.
- d. The proposed design shall be reviewed by CDOT for compatibility with existing signing procedures prior to the preliminary roadway design phases involving laneage, typical sections, earthwork, etc.
- e. Use current traffic data in developing detour alternatives.

- f. Develop the total ESAL for the design period and submit to the CDOT/PM for the pavement design.
  - g. Submit data and recommendations to the CDOT/PM for acceptance.
3. Materials Engineering
- a. Preliminary Soil Investigation:
    - (1) Determine test hole locations (horizontal and vertical), and coordinate with the CDOT/PM.
    - (2) Collect soil samples and test for:
      - (a) Classification
      - (b) Moisture - Density Relationship
      - (c) Resistance Value
    - (3) Analyze the test data to determine the soil structural capability.
    - (4) Prepare and submit a soils investigation report with recommendations to the CDOT/PM for review.
  - b. Pavement Rehabilitation. This section applies if the project includes existing pavement that is included in the design for continued utilization.
    - (1) Obtain Design Traffic Data:
      - (a) For existing pavement:
        - Determine the equivalent Design Traffic (18k ESAL) that the existing pavement can carry.
        - Estimate the 18k ESAL's experienced by the existing pavement.
      - (b) Obtain the projected 18k ESAL for rehabilitated pavement design period.
    - (2) 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 analyses required.
      - (e) Determine the drainage conditions of the existing surface and subsurface.
    - (3) Investigate the existing pavement structure
      - (a) Material test results
        - Subgrade: Soil classifications, Moisture/Density Relationship, Resistance Value.
        - Base: Thickness, Gradation, Plastic Index, and Liquid Limit, Resistance Value, Strength Coefficient.
        - Pavement: Thickness, Strength Coefficient.

- (b) Perform deflection testing to obtain the following:
  - Deflection profile.
  - Maximum deflection.
  - Deflection basin.
  - Differential deflections at transverse joints for PCC pavements.
  - In place determination of the appropriate Modulus for each layer and subgrade.
- (c) Determine the remaining load carrying capacity from the above data.
- (4) Design the feasible alternatives for the required rehabilitation (and widening if appropriate) utilizing the above investigations and test results.
- (5) The design of the feasible alternatives shall be checked against the following criteria:
  - (a) The basic cause of distress shall be corrected.
  - (b) Affect on the rate of future deterioration.
  - (c) Affect on surface characteristics.
- (6) Where appropriate, any new pavement widening shall be included in the analysis.
- c. 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.
- d. Pavement Justification
  - (1) Basic factors:
    - (a) Desired life expectancy (obtain Design Life from CDOT).
    - (b) Required maintenance activities and the responsible agency's ability and commitment to accomplish them.
    - (c) Basis for performance life assigned to the alternatives.
  - (2) Analyze life cycle cost of the selected alternatives.
    - (a) Perform analysis with unit and maintenance cost from CDOT. Determine present worth and annual costs in accordance with the procedure in the CDOT Design Guide.
    - (b) Compare alternatives over the same life span.
    - (c) Recommend the pavement structure and provide the basis for the recommendation.
- e. Pavement Design Report. Include all the above tests, investigations, analyses, and calculations performed as a result of this section. Submit to the CDOT/PM for acceptance.
- f. Existing Bridge Condition Investigation. Determine condition of existing bridge deck and substructure material as required.
- g. Foundation Investigation Report.
  - (1) Obtain the Foundation Investigation Request showing requested test hole locations.

- (2) Formulate drilling pattern and perform the necessary subsurface investigation and collect samples as required.
  - (3) Perform the appropriate laboratory tests and analyze the data. Determine strength and allowable bearing capacity of foundation material.
  - (4) Perform lateral analyses (deformation, moment, and shear) of 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.
  - (5) If appropriate, a pile driving analysis using a wave equation will be accomplished.
  - (6) Submit the Foundation Investigation Report to the CDOT/PM for approval.
  - (7) Prepare engineering geology plan sheet and foundation report with recommendations for type, size, and tip (bottom) elevation of the required foundation. Specify if pre-drilling, pile tip, casing, deterring, etc., are needed for foundation construction.
4. Hydrology/Hydraulic Engineering
- a. Hydrology
    - (1) Establish drainage basin data: delineate, determine size, waterway geometric, vegetal cover, and land use.
    - (2) Collect historical data; research flood history and previous designs in the proximity; and obtain data from other sources (e.g., Urban Drainage & Flood Control Region, Colorado Water Conservation, CDOT Maintenance, and local residents).
    - (3) Select a storm frequency based on the CDOT Design Guide criteria. If it is not possible to use the CDOT Design Guide storm frequency criteria for a bridge or culvert design, the CDOT/PM should be notified. A risk analysis may be required but will not be accomplished without prior written approval from CDOT.
    - (4) Do a hydrological analysis using existing studies or approved methods (see CDOT Design Guide. For example: Compile precipitation and stream gauge data, select runoff parameters, analyze gauge data, and predict peak flows. Calculate run-off and design flow rates. Create runoff hydrograph as if storm routing is necessary.
  - b. Hydraulics
    - (1) Accomplish the preliminary design of minor drainage structures:
      - (a) Determine location and crossing alignment. Identify channel centerline 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) Type, size and shape of the structures.
      - (e) Prepare preliminary structure cross-sections to determine the elevations, flowlines, slopes and lengths of the structures. Indicate the flow quantity on the sections.



- (f) Complete the design computations and documentations in accordance with the CDOT Drainage Design Guide.
  - (g) Determine high water level.
- (2) If required, identify and assist CDOT in coordinating any required potential funding participation of local municipalities or agencies. (See CDOT Procedural Directive 501.2)
- (3) A water surface profile and complete hydraulic analysis is required for major structures.

Determine the following:

- Required hydraulic size and skew of the bridge including the minimum low girder elevation using CDOT Design Guide criteria.
  - The design year frequency.
  - The design year and 500 year high water elevations.
  - Predicted total scour profile for design year and 500 year scour.
  - The channel erosion protection for structures.
- (4) Recommend culvert pipe sizes for proposed detours.
- (5) Storm Water Pollution Prevention Plan. Prepare a Storm Water Pollution Prevention Plan in accordance with:
- CDOT's Erosion Control and Stormwater Quality Guide.
  - CDOT's Standard Specifications, Water Quality Control, Section 107.25.
  - Colorado's Revised Standard Plans, Standard M-107-1.
  - Other appropriate documents.

In the Storm Water Pollution Prevention Plan include the following:

- (a) Erosion and sediment control Best Management Practices (BMPs) to reduce pollutants in storm water discharges during construction operations.

Consider:

- Vegetative practices.
  - Structural practices.
  - Other practices
  - Construction Waste Disposal (including excess excavation).
  - Compliance with applicable state or local sanitary sewer or septic systems regulations.
  - Maintenance practices for sediment and erosion control features during construction.
- (b) Storm water management BMPs to reduce pollutants in storm water discharges after construction operations have been completed.

Consider:

- Vegetative practices.

- Structural practices.
- c. Preliminary Hydraulics Report.  
Include the following:
  - (1) Hydrology analysis.
  - (2) Minor structure hydraulic designs.
  - (3) Major structure hydraulic designs.
  - (4) Structure cross-sections.
  - (5) Storm Water Pollution Prevention Plan.
  - (6) Appendix:
    - Drainage basin maps
    - Hydrology/hydraulic worksheets

## 5. Utility Coordination

- a. Location Maps: Obtain utility location maps from the Utility Companies which identify utility facility locations 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: 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.
  - (1) When "potholing" is designated by Part 1, the Consultant shall be responsible for the excavation.
  - (2) If designated in Part 1, the Consultant shall be responsible for surveying utility locations.
- c. Relocation recommendations: Submit necessary information for the relocation or adjustments of affected utilities to the Region Utility Engineer. The Region Utility Engineer will process the required agreements.
- d. Ditch Co. coordination: Contact ditch companies through the Region Utility Engineer to coordinate design requirements for existing ditch relocations and/or modifications. Develop the plans for the necessary irrigation structures and submit to the Region Utility Engineer for Ditch Company Review.

## 6. Roadway Design and Roadside Development

- a. Roadway Design:
  - (1) Coordinate efforts with other design activities as required.
  - (2) Check and plot survey data.
  - (3) Draw a geometric layout. Determine (or verify) horizontal and vertical alignment. A project specific coordinate system approved by CDOT shall be used to identify the horizontal locations of key points. The coordinate systems used for roadway design and ROW shall be compatible. Check horizontal and vertical clearances against design criteria.

- (4) Provide alignments and required ROW (Preliminary Design Plans) to the manager responsible for producing the ROW ownership map.
  - (5) Plot/develop all required information on the plans in accordance with CDOT Procedural Directive 514.1.
  - (6) Compute preliminary earthwork quantities. Computer electronic data outputs shall be in a format compatible with the CDOT MOSS software unless the CDOT/PM waives this requirement.
- b. Roadside Development:
- (1) Accomplish the following for landscaping, sprinkler systems, sound barriers, bike paths, truck escape ramps, and rest areas:
    - (a) Provide layouts in the FIR plans for landscaping sound barriers, bike paths, escape ramps, and rest areas.
    - (b) Based on design guidelines, provide critical locations in the FIR plans for sprinkler system sleeves underneath the proposed roadways.
    - (c) Coordinate efforts with the hydraulics design activity in the preparation of erosion control practices to be included in the Storm Water Pollution Prevention Plan.
    - (d) Provide estimates of quantities of native seeding and mulching for the FIR plans.
  - (2) Submit plans to C/PM for inclusion in the FIR plans.
- c. Lighting Plan: A preliminary lighting plan will be developed if warranted. The lighting plan shall conform to the requirements and warrants in the CDOT Design Guide, Volume III, Beyond Geometric Design.
7. 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. The following work may also be included as part of Right-of-Way Plans preparation contract.
- a. Research
- (1) Identify affected ownership from preliminary design plans.
  - (2) Obtain assessor's maps, locating project limits.
  - (3) Locate documents which transfer title.
  - (4) Prepare chain of title as directed by the CDOT ROW Manual, Chapter 2, Section 4-B, "Instructions to Abstractors" or as per Project Manager.
  - (5) Look for encumbrances, releases, etc.
  - (6) Make physical inspection of property. Note any physical evidence of apparent easements, wells, ditches, ingress, and egress.
  - (7) Check with County Road Department or County Engineer for location of existing roads.
  - (8) Check for and obtain latest subdivision plats and vacations of streets.
- b. Ownership Map

For additional detail on required drafting software, COGO, and project coordinate system see SECTION 2 - SUBMITTALS.

Ownership map shall be submitted along with a "Project Narrative" see SUBMITTALS - B.4

- (1) Review preliminary design and survey report.
- (2) Review project coordinate system and basis of bearing from Control Survey prior to calculations.
- (3) Compute alignment of ROW centerline and store coordinates of all found monuments within the first tier of properties left and right of Centerline.
- (4) Review ownership documents (Memoranda of Ownership and/or title commitments, deeds and supporting plats).
- (5) 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)
- (6) Establish subdivisions of sections using Bureau of Land Management Guidelines. Show all section lines and 1/4 section lines on the ownership map and ROW plans.
- (7) 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.
- (8) 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.
- (9) 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.
- (10) 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".
- (11) Plot OWNERSHIP MAP on 11 inch x 17 inch paper sheets in accordance with specifications. A form will be provided by CDOT for this purpose. Normal scale, 1" = 400' in rural areas, 1" = 200' in urban areas. 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" = 1 mile, or other suitable scale, to show the configuration of large ownerships.
- (12) Label all monuments found with description of monument and project coordinates (from Control Survey Diagram).
- (13) Show improvements and topography within the ownerships and existing access to the street/county road system.
- (14) 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.
- (15) 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" to mile abbreviated OWNERSHIP MAPS.
- (16) Different land uses within a property should be cross-hatched or shaded.
- (17) In the lower right corner of the OWNERSHIP MAP, show seal, number, and name of Professional Land Surveyor supervising the work.
- (18) 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. (Note that only the project control data needs to be completed at this time.)

8. Major Structural Design: Major structures are bridges and culverts with a total length greater than twenty feet and retaining walls with a total length greater than one hundred feet and a maximum exposed height at any section of over five feet. This length is measured along centerline of roadway for bridges and culverts, and along the top of wall for retaining walls. Overhead signs structures (sign bridges, cantilevers, and butterflies extending over traffic) are also major structures, but are exempt from the structure preliminary design activity defined here.

Major structures shall be designed in accordance with the AASHTO Standard Specifications for Highway Bridges and the CDOT Bridge Design Guide. The CDOT Structure Reviewer will participate in coordinating this activity.

- a. Structural Data Collection

- (1) Obtain the structure site data. The following data, as applicable, shall be collected (see Procedural Directive 1905.1): 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.
- (2) 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 of the Resident Engineer.

- b. Structure Selection and Layout

- (1) 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.
- (2) 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.
- (3) 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 in accordance with the CDOT Bridge Design Guide Section 5.
- (4) 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 (8.d) as early as possible during the preliminary design phase.
- (5) 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.
- (6) 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.
- (7) Compute preliminary quantities and preliminary cost estimates as necessary to evaluate and compare the structure layout, type, and rehabilitation alternatives.

- (8) 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 the CDOT.
  - (9) Prepare preliminary general layout for the recommended structure. Prepare structure layouts in accordance with the CDOT Bridge Detailing Manual. 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 structures preliminary design. By means of the structure general layout, with supporting drawings, tables, and discussion, provide for the following:
- (1) Summarize the structure site data used to select and layout the structures. Include the following:
    - Existing structure data, including sufficiency rating and whether or not the structure is on the "select list".
    - Project site plan.
    - Roadway vertical and horizontal alignments and cross sections at the structure.
    - Construction phasing.
    - Utilities on, below, and adjacent to the structure.
    - Hydraulics: 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.
    - Preliminary geology information for structure foundation.
    - Architectural requirements.
  - (2) Report on the structure selection and layout process. Include the following:
    - Discuss the structure layout, type, and rehabilitation alternatives considered.
    - Define the criteria used to evaluate the structure alternatives and how the recommended structure was selected.
    - Provide a detailed preliminary cost estimate and general layout of the recommended structure.
  - (3) 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 work schedule shall be planned accordingly. 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, as well as any 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.

9. 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.

10. Preparation for the FIR:

- a. Coordinate, complete, and compile the plan inputs from other activities: materials, hydraulics, traffic, right-of-way, and major structures.
- b. If a major structure is included in the project, 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 the requirements of the CDOT Procedural Directive 514.1 and 1905.1 and will include: title sheet, typical sections, general notes, plan/profile sheets, and preliminary layouts of interchanges/intersections. The plan/profile sheets will include the following: all existing topography, survey alignments, projected alignments, profile grades, ground line, existing ROW, rough structure notes (preliminary drainage design notes), and existing utility locations.

The following items which are listed as "desired items" in the Procedural Directives will be mandatory for the FIR plans:

- 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).

Typical plan sheet scales will be as follows:

Plan and Profile	1 Inch = 50 Feet (urban)
	1 Inch = 100 Feet (Rural)
Intersection	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. The plans will be reproduced by CDOT Reproduction.
- h. The construction phasing and the preliminary traffic control plan with proposed detours will be included in the FIR plan set.
- i. 1048 form.

11. Field Inspection Review:

- 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 ten (10) 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.
12. Post-FIR Revisions. When specified by Part 1, the Consultant shall complete the revisions required by the FIR before this phase of work is considered to be complete.

D. Final Design

1. Project Review
  - a. Update Project schedule.
  - b. Coordinate activities.
  - c. Initiate design decisions, variances, justification process, and traffic signal warrants.
2. Design Coordination. The design for each aspect of the project shall be reviewed during periodic meetings and approved by the CDOT/PM prior to inclusion in the final plans. Specifically the designs for each of the following must be coordinated:
  - Roadway Geometry
  - Hydraulics
  - Roadside Lighting
  - Landscaping
  - Signalization
  - Permanent Signing & Striping
  - Construction Phasing
  - Guardrail and delineators
  - Noise Barriers
3. Utility Coordination. Following the finalization of the roadway horizontal alignment and profile grade and the horizontal location of drainage structures, sewers, and other underground structures, coordinate with the Utility Engineer to finalize utility clearances.



#### 4. Hydraulic Design.

- a. Data Review. Review data and information developed under the Preliminary Hydraulic Investigation and update in accordance with decisions made at the FIR.
- b. Storm Water Pollution Prevention Plan. Update the Storm Water Pollution Prevention Plan in accordance with decisions made at the FIR and on additional investigation since the FIR.
- c. Major Structure Channel Design. The final design shall include:
  - (1) The configuration, size and skew of the channel.
  - (2) Water surface elevations.
  - (3) Elevations, flowlines and hydraulic information as described in the CDOT Design Guide.
  - (4) Channel erosion protection limits for the structure.
  - (5) Recommend a low girder elevation for the type of structure proposed by CDOT.
  - (6) Predict scour depth in the channel for the proposed structure, and recommend mitigation measures.
- d. Final Hydraulics Report will consist of the following:
  - (1) Revised pages to the preliminary hydraulics report (3 copies of each revised page) that can be easily replaced in preliminary report.
  - (2) Bridge hydraulic information on an original plan sheet (1 copy) which complies with the requirements included in Part 2, Section 2. This is part of the bridge plan.

The format of the report will be in accordance with the CDOT Design Guide.

#### 5. Interim Plans

- 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. Final Utility Plans:
  - (1) 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 (2) below.
  - (2) The final utility plans shall include:
    - Title sheet.
    - Typical section.
    - Plan and profile sheets.
    - Drainage plans.
    - Traffic Signal Plans, Street Lighting plans, Signing, and other items which require a power source
    - Cross sections.
    - Any other details which would indicate possible utility conflicts.
  - (3) 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.

- c. Final Railroad Plans: Coordinate the following activities through the Region Utility Engineer.
  - (1) Develop the railroad encroachment plan (with cross sections) in accordance with railroad requirements.
  - (2) Define construction responsibilities between the railroad and highway.
  - (3) Develop cost estimates based upon cost allocation previously determined.
  - (4) Submit plans to the CDOT/PM for authorizations and acceptance.
  - (5) Prepare Public Utilities Commission application exhibits as required.

6. Right-of-Way

- a. In accordance with the CDOT Right-of-Way Manual, Right-of-Way plan contents will include:

- Sheet No. 1 TITLE SHEET
- Sheet No. 2 TABULATION OF PROPERTIES. If more than one sheet is required, the following sheets will be numbered 2A, 2B etc.
- Sheet No. 3 CONTROL SURVEY DIAGRAM. Tabulate the coordinates and physical description of all found monuments and other physical evidence. It will also be depicted in a diagram form per the CDOT Survey and Right-of-Way Manuals. As above, additional sheets after the first will be numbered 3A, 3B, etc.
- Sheet No. 4 MONUMENTATION SHEET. Tabulate coordinates and type of all monuments to be set. Same numbering as above.
- Sheet No. 5 TABULATION OF ROAD APPROACHES. Same numbering as above.
- Sheet No. 6 PLAN SHEET. If more than one sheet is required, the sheets will be number sequentially 6, 7, 8 etc.
- As appropriate: OWNERSHIP MAPS. These sheets will be the following number after the "plan sheets".

- b. Title insurance and Closing Services: A Title Company shall be contracted to provide title insurance in the amount of the value of the parcel being acquired. Title insurance will not be necessary for certain easements where, at the discretion of the Region Right-of-Way Supervisor, it is determined that it is not cost effective to purchase the title insurance. However, in all cases a title commitment, with copies of all conveyance documents, shall be furnished to the Department along with a 5 year history of all changes in ownership to the property. The Title Company shall also provide automatic updates of any change in ownership during the acquisition process up to the date of closing.

The Title Company shall arrange for all necessary closing, and all related activities, including, but not limited to, escrow services, update title commitments as to the amount to be insured, satisfaction of liens, calculate final settlement figures and prepare all closing documents, except CDOT deeds, per instructions from CDOT. The Title Company shall disburse settlement funds as applicable and assist in recording title documents and issue a 1099-S to the property owner and the Internal Revenue Service (IRS) in accordance with Federal Law.

- c. Authorization Plan:

- (1) Integrate toes of slopes and other design details such as lane lines, culverts, road approaches, etc. into ownership map (base map for ROW plans).

- (2) 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"=50' in urban areas, 1"=100' in rural areas. Revise numbering of ownerships to correspond to ROW acquisitions.
  - (3) Calculate areas of parcels, easements, and remainders in accordance with CDOT Right-of-Way Manual.
  - (4) Prepare ROW plan sheets on CDOT form or equivalent MicroStation format, as outlined in CDOT Right-of-Way Manual.
  - (5) Prepare legal descriptions of parcels, easements and access control as directed by the CDOT ROW Manual, Chapter 2, Section 4, D-ROW Parcel Descriptions.
  - (6) Prepare tabulation of properties sheet on CDOT Form or equivalent MicroStation format, as outlined in CDOT Right-of-Way Manual.
  - (7) Prepare Right-of-Way Title Sheet as directed by CDOT Right-of-Way Manual.
  - (8) Incorporate the Control Survey and Monumentation Sheets into the plans. (See Survey Manual for a sample.)
  - (9) On the Monumentation Sheet, list the Right-of-Way, Easement, Control, etc., points to be set and the aliquot corners to be reset per CDOT Right-of-Way Manual.
  - (10) Prepare Right-of-Way Tabulation of Road Approaches, if applicable. Show owner, milepost/station, right or left of centerline, width of approach, skew angle, and any remarks as directed by the CDOT Right-of-Way Manual.
  - (11) Hold ROW Plan Review, as directed by the CDOT Right-of-Way Manual, with Design, ROW, and Construction to determine if ROW plans are sufficient to proceed with appraisal of property to be acquired for the project.
  - (12) 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. Appraisal Staking: Stake the Proposed ROW line, Easements and Existing ROW line, if required by the Region ROW Supervisor. Set lathes 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 COGO point numbers on all stakes and color code per CDOT Survey Manual. The Appraisal Stakes only need to be set to an accuracy as prescribed in the CDOT Survey Manual Chapter 5.
- e. Right-of-Way Plan Revisions:
- (1) The Consultant shall make revisions to the Right-of-Way plans as needed through out the appraisal and negotiation process for those changes approved by the Region Right-of-Way Supervisor.
  - (2) All plan revisions shall be submitted by the Consultant to the Region Right-of-Way Supervisor within 5 working days after receiving notice from CDOT to proceed with a Plan Revision.
  - (3) Right-of-Way plan revisions caused by design changes or corrections after the Right-of-Way Plan Review (ROWPR) shall be made at the expense of the Consultant.

7. Materials Engineering

a. Materials Data

- (1) Formulate all job-mix formulae.
- (2) Formulate and submit the reclamation plans, construction requirements, and pit sketches for any designated sources of materials.

b. Review the Pavement Design Report and the Field Inspection Review plans to verify the validity of the pavement and stabilization design.

c. Prepare the Stabilization Plan and submit it to the CDOT/PM for acceptance.

8. Traffic Engineering

a. Permanent Signing/Pavement Marking Plans:

- (1) Inventory existing traffic controls.
- (2) Prepare plan sheet with existing roadway, edge-of-travel way (ETW) shoulder, signs, structures, and topography.
- (3) Locate and place on the plans the required traffic controls (pavement markings, signs, etc.).
- (4) Prepare the "Tabulation of Signing Quantities".
- (5) Prepare the "Tabulation of Pavement Markings" and pavement marking quantities.
- (6) Prepare Traffic Specifications/Special Provisions.
- (7) Submit plans and specifications to the CDOT/PM for acceptance.
- (8) Submit the approved plans to the Design Engineer for inclusion in the project plans.

b. Signalized Intersections:

- (1) Document the signal warrant study.
- (2) 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.

c. Traffic Control Plan:

- (1) Prepare the traffic control plan.
- (2) Estimate quantities.
- (3) Submit the approved plans and quantities to the Design Engineer for inclusion in the project plans.

9. Roadside Planning:

a. Landscaping

- (1) Determine most economic alternative, finalize concept, and complete the plan.
- (2) Verify that an acceptable safe recovery distance exists between traveled way and all trees to be planted.
- (3) Coordinate special permits that may be required.
- (4) Coordinate ROW requirements.
- (5) Write Special Provisions and submit to the CDOT/PM with the completed roadside plans.

- (6) Submit the approved plan/special provisions to the Design Engineer for inclusion in the Project Plans.
  - (7) Verify availability of plant materials and submit letter to the CDOT/PM certifying that designated plants are available.
- b. Sprinkler systems, bike paths, sound barriers, truck escape ramps, rest areas, and others, as appropriate.
- (1) Prepare the plans.
  - (2) Submit to the CDOT/PM for acceptance.
  - (3) Submit the accepted plan/special provisions to the Design Engineer for inclusion in the project plans.
- c. Lighting Plans
- (1) Prepare the plan.
  - (2) Present it to the CDOT/PM for acceptance.
  - (3) For high mast lighting - after the lighting locations are approved, the C/PM will request a foundation investigation for each location.
  - (4) After approval of the locations of the lights, the lighting design will be completed with the following information shown on the plans sheets:
    - Circuit type and voltage of power source
    - Location of power source (coordinated with the utility engineer)
    - Luminaire type and lumens
    - Light standard type and mounting height
    - Bracket arm type and length
    - Foundation Details
    - Size and location of electrical conduit
    - Locations of power source(s)/lighting control center(s) (if appropriate)
    - Location of direct burial cable
    - Size of wiring and/or direct burial cable
  - (5) Submit to the Design Engineer for inclusion in the project plans.
10. Roadway Design: Complete the roadway design based on the input from all applicable entities and agencies. The plans shall comply with the aforementioned design standards and shall be prepared in accordance with the applicable manuals listed in Attachment A.
11. Final Major Structural Design: During the conduct of this activity the Consultant shall participate in structural review meetings as specified in A.11 with the CDOT Structural Reviewer. The design shall be in accordance with the AASHTO Standard Specifications for Highway Bridges, and the CDOT Bridge Design Guide.
- a. Structure Final Design
- (1) Review CDOT accepted general layouts and comments.
  - (2) Review CDOT accepted foundation recommendations.
  - (3) Review CDOT accepted hydraulic report.
  - (4) Revise the general layouts and proceed with the final design as necessary to incorporate all review comments.

- (5) Perform the structural analysis. Provide the superstructure and substructure design. Document with the design notes, detail notes, and computer output.
  - (6) Perform preliminary design check from design and detail notes.
- b. Preparation of Structural Plans and Specifications
- (1) Request the standard details and specifications from CDOT Structure Reviewer (i.e., expansion devices, bearings and railings).
  - (2) Prepare all detail drawings in accordance with the CDOT Bridge Detailing Manual, CDOT Design Guide, and CDOT Drafting Manual.
  - (3) Complete the computer runs/calculations.
  - (4) Prepare the plan sheets.
  - (5) Prepare special provisions applicable to the project.
  - (6) Compute quantities and complete the quantity summary.
- c. Independent Design, Detail, and Quantity Check
- (1) Perform independent detail check and design check from plans.
  - (2) Revise all plan sheets and design notes to reflect any deficiencies found in the design and detail check.
  - (3) Check quantities.
- d. Bridge Rating and Field Packages
- (1) Prepare the rating packages in accordance with the CDOT Bridge Rating Manual. Prepare the Structure Field Packages in accordance with the CDOT Bridge Detailing Manual.
- e. Structure Final Review Plans and Specifications
- (1) Make final plan and special provision corrections.
  - (2) Complete cross-referencing of plans.
  - (3) Assemble the complete plans and special provisions and submit for the FOR plans.
12. 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 developed which shall be compatible with the phasing plan.
13. Plan Preparation for the Final Office Review
- a. Coordinate the Packaging of the Plans
- (1) Collect plans from all design elements and collate the plan package.
  - (2) The construction phasing plan shall be included.
  - (3) Calculate plan quantities and prepare the tabulations and Summary of Quantities.
  - (4) Plan sheet scales will be as follows:

Plan & Profile	As Determined by the
Intersection	1 Inch = 20 Feet
Interchange Contour Grading	1 Inch = 50 Feet

- b. New or revised utility locations shall be added to the plan topography. Conflicts shall be resolved and appropriate pay items/specifications added, to adjust utilities.
- c. The Final Office Review (FOR) plans shall include the following sheets (as appropriate):

- Title Sheet
- Standard Plans List
- Typical Sections
- General Notes
- Summary of Approximate Quantities
- Appropriate Individual Quantity Tabulations
- Special Details
- Structure Details
- Bridge Hydraulic Information Sheet
- Roadway Plan and Profiles
- Bike path
- Interchange and Intersection Layouts
- Interchange Contour Grading and Drainage Plans
- Utility locations
- Irrigation Reconstruction
- Landscaping
- Storm Water Pollution Prevention Plan
- Lighting Plans
- Signalization Plans
- Signing and Striping
- Construction Phasing
- Detour
- Structure Cross Sections
- Roadway Cross Sections with Quantities
- Road Approach Plan and Profiles with side drain cross sections

**Note:** This list may not include all the necessary sheets and may include some subjects not applicable to this particular project. The content of the plans will be as approved by CDOT.

- d. 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.
- e. Prepare the FOR estimate. Item numbers, descriptions, units and quantities shall be listed and submitted to the CDOT/PM.
- f. Submit the FOR plans and specifications (originals) to the CDOT/PM for a preliminary review prior to the FOR.
- g. The plans will be reproduced by CDOT Reproduction.

14. Final Office Review

- a. Attend the FOR.
- b. The FOR meeting minutes shall be prepared by the C/PM, approved by the CDOT/PM, and distributed as directed.

15. Construction Plan Package

- a. 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 two (2) weeks after the FOR.
- b. The final review of the plans by the CDOT may require final revision of the plans which shall be done by the Consultant.
- c. 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 dated special provisions and detailed quantities.
- d. The Consultant shall submit a hard copy of the following:

(1) Roadway

- Profile
- Staking
- Earthwork Quantities
- Mass Diagram
- Terrain Listing
- Roadbed Listing

When required the Consultant shall also submit design data in an electronic MOSS compatible format outlined in Part 2 Section 2, SUBMITTALS.

(2) Major structures: An independent set of the following shall be submitted to the CDOT Structural Reviewer for each major structure.

- (1) A letter to CDOT certifying that the Structural Plans and Specifications have been prepared in accordance with the present design standards of the Colorado Department of Transportation.
- (2) The complete and final set of original design notes for each bridge, overhead sign structure, and retaining wall (including output from computer programs). These notes shall include revisions reconciling any differences between the original design, the independent design check and any design changes resulting from subsequent reviews.
- (3) The complete and final set of design check notes for each bridge, overhead sign structure, and retaining walls.
- (4) Two sets of field packages: The final quantity calculations as described in the CDOT Bridge Detailing Manual, a copy of the geology report, and as-constructed plans for existing structures on the project, where applicable.
- (5) The bridge rating package: Rating Summary sheet for girders and deck, rating information and hand calculation sheets, rating computer output, and electronic copy of rating input file. Refer to the Bridge Rating Manual for a description of these items.



- e. Construction Engineer's action package. The Consultant shall submit 2 copies, in 3-ring binders of the following:
  - (1) All project calculations or worksheets.
  - (2) 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.
  - (3) Copies of variances, design decisions, and variance approvals.
  - (4) The FIR, all DOR's, and FOR meeting minutes.
  - (5) Utility clearance package, utility agreements and information regarding the utility location and clearance conditions.
  - (6) Environmental clearances, 404, 401, wetlands, endangered species, etc.
  - (7) Bridge Construction packet, which includes bridge grades, geometry, and quantity calculations or worksheets.
  - (8) Any other information unique to this project and deemed important to the effectiveness of construction.
- f. Record Plan Sets. Two (2) 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. The other set shall be submitted to CDOT per CRS 12-25-117, as amended. The original plan drawings shall not bear a seal.
- g. The Consultant's complete submittals shall comply with Part 2 Section 2.

E. Corridor Management Support

- 1. Design Control:
  - 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 meetings shall review the following:
    - (1) Activities completed since the last meeting
    - (2) Problems encountered
    - (3) Late activities
    - (4) Activities required by the next progress meeting
    - (5) Solutions for unresolved and anticipated problems
    - (6) 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 will coordinate the technical aspects of the planning efforts such as:
    - (1) Ensuring that the separate projects all utilize the same references and data base for horizontal and vertical control.

- (2) Bearings, coordinates, grades, and elevations are identical for common control lines on separate projects.
- (3) 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 which the Consultant will furnish and maintain. This system will:
  - (1) Provide access to current project data and status. (e.g., progress versus schedules and cost estimates versus budgeted funds)
  - (2) Include the project schedules for submittals and key events.
  - (3) Identify progress with respect to the schedules.
  - (4) Identify critical path activities.
  - (5) 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:
  - Preliminary engineering project limits
  - Construction project limits
  - Construction project estimated costs
  - Construction project Advertise-for-Bid (Ad) dates
  - Other information that is considered appropriate

## 3. Budget Planning Support

### F. Value Engineering

- a. Maintain a current file of project cost estimates. The date and type of each estimate will be identified.
- 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 anticipating 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 for 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 complete when needed.)

## **SECTION 2** **SUBMITTALS**

### A. Reports

1. All required reports and studies shall be submitted for review to the CDOT/PM. Final submittals shall incorporate the corrections and/or revisions resulting from the review.
2. Final Alternatives Report: Ensure that the general design characteristics presented in the Final Alternatives Report are practical, feasible and economical. Design of the project will be completed sufficiently so that design standards and criteria may be evaluated and a cost estimate prepared prior to the approval of the document.

**Note: The Consultant is responsible for ensuring that the recommended alternative complies with applicable standards and criteria. Where appropriate, required variances will be identified.**

3. Environmental Assessment and/or Environmental Impact Statement:

The compilation of the documents (EA or EIS) will be in accord with CDOT's Action Plan (CAP), U. S. Department of Transportation (DOT) Order 5610.1E, the Federal Highway Administration's (FHWA) Federal-Aid Highway Policy Guide (FHPM), Technical Advisory T 6640.8A and the Council on Environmental Quality's (CEA) Regulations, as amended.

Ensure that the general design characteristics presented in the EA/FONSI (or DEI/FEIS) are practical, feasible and economical. Design of the project will be completed sufficiently so that design standards and criteria may be evaluated and a cost estimate prepared prior to the approval of the documents.

4. Survey Plats: The Professional Land Surveyor Consultant who sets a monument shall prepare and file a plat in accordance with Section 1, 38-51-107 Colorado Revised Statutes, as amended. A copy of the plat and filing shall also be submitted to the CDOT/PM.
5. Design: Submit the review plan set with a written response to each item discussed for each plan review, and hydraulic report covering all drainage items requiring project plan work.
6. Right-of-Way Plans: Submit a progress report detailing the percentage of completion. Attach the "Project Narrative" (see below) along with the progress report. A progress report and narrative, as well as any other attachments, shall be submitted no less than at 2 week intervals.

### B. Data

The following field survey data must be submitted if produced during the work. Three copies of the Survey Report, as described in the CDOT Survey Manual (Sealed and signed by PLS). The following will be included in the report or as attachments:

1. Handwritten field notes: This shall be the original notes that have been sealed and signed by the supervising Professional Land Surveyor registered with the Colorado State Board for Professional Engineers and Land Surveyors. Legible sealed and signed copies of the original field notes may be submitted in lieu of the original field notes only if approved by the CDOT/PM.

2. Electronic field data: Prior to collecting data by electronic means the Consultant shall submit a sample and receive approval to continue the work. A sealed and signed hard copy shall be submitted with all electronic data. Electronic data shall comply with the requirements outlined below.
  - One three-ring binder containing GPS Bluebook and one bound copy for submission to NGS.
  - Photogrammetric Data: Prior to generating mapping data the Consultant shall submit a sample of data and receive approval to continue the work. A sealed and signed hard copy (map sheets when appropriate) shall be submitted with all electronic data.
3. Right-of-Way COGO - A Coordinate Geometry Output file shall be submitted. This is the basis of the ROW plan development and shall be "built" in a logical sequential order paralleling the plans development.

The generous use of notes and comments is required in this COGO file. For example, a COGO point assigned to a found property pin shall be augmented with a comment such as:

STO 200 10280.50 12440.80 / 1 ½" ALUM. CAP L.S. 25938 or to a calculated point such as:

STO 201 10500.50 12550.80 / CALC. NE COR. SCOTT /PROPERTY

4. Right-of-Way Plans - A "Project Narrative" of the plans development shall be submitted. Items to be included in this narrative are:
  - a. Method and points used as basis for establishing existing alignment and Right-of-Way limits.
  - b. Procedures, property pins/points used to resolve ownership and property boundary locations.
  - c. Procedures, property pins/points used to resolve or identify any gaps or overlaps discovered.
  - d. Date, details and reasoning for any requests for additional survey data or ties.
  - e. The Digital Terrain Model (DTM) and the Triangulated Irregular Network (TIN) must represent actual topographic features and conditions, therefore, the accuracy of the DTM and TIN is of paramount importance for all subsequent ROW and Design operations, it MUST be error free.

All topographic breakline features shall be identified using the appropriate InRoads Survey feature codes and 3D (X-Y-Z) coordinates to accurately represent said ground features in the CAD/Earthwork modeling software.

The maximum shot density along topographic features shall be no more than 25 feet. Random shots not usually associated with a specific topographic feature shall also follow the 25 foot maximum shot density. Smaller shot intervals will be allowed to adequately describe topographic features mathematically.

A complete DTM/TIN model of all topographic data shall be submitted and certified by the consultant and approved by the CDOT Project Manager. Any errors found in the DTM/TIN ground model will be repaired and verified by the consultant at no further cost to the project.

### C. Plans

Plan and map sheets shall comply with the following requirements:

1. All Review plans shall be provided in half-size (11"x17") format, unless otherwise specified by the CDOT P.M.
2. The sheet size and number of complete Plans Sets for the final submittal shall be specified by the CDOT P.M. or the Region ROW Supervisor.
3. For Right-of-Way plans, CDOT Form 126, Title Sheet, and Tabulation Sheets shall be provided as pre-setup Right-of-Way MicroStation drawings. All plan sheets shall utilize this drawing format. (See "Electronic Data Submittals".)
4. For all other plan sheets (Design, Traffic, etc.) Title Sheet, Tabulation Sheets, for example, prototype drawings shall be provided as Microstation drawings and cell libraries. All plan sheets shall utilize this drawing format. (See "Electronic Data Submittals").

### D. Electronic Data Submittals

The consultant **MUST** use the latest CDOT Microstation/InRoads configuration, directory structure, and file naming conventions in the preparation of all electronic project data.

All consultant drawings shall be prepared using the latest CDOT developed prototype plan drawings and corresponding/supporting drawing cell libraries.

The consultant shall be required to obtain approval from the CDOT Project Manager to deviate from the established CDOT standard configuration in the preparation of the proposed design model(s) and project plan drawings. All modeling and plan preparation deviations approved by the CDOT Project Manager shall be fully documented and all electronic files supporting such deviations shall be submitted as well.

Any project related data in all forms generated by the consultant **MUST** be able to be reproduced **without error** on CDOT computer equipment. Project data containing errors shall be repaired by the consultant at no cost to the project.

All material must be submitted to the CDOT Project Manager. Acceptance of submitted material is at the sole discretion and responsibility of the CDOT Project Manager.

#### 1. Computer drawings

Microstation will be the required drafting package. All plan drawings shall be submitted as a \*.dgn electronic drawing prepared using Microstation/InRoads format. "Master" drawings of the entire ROW plan, Design model(s), etc., from beginning to end shall be included as part of the electronic and hard copy submittals. All master drawings shall be created in "World Coordinates" (to be the same coordinate system used in the survey).

Electronic Plot Files of the plan set in Adobe .PDF file format shall also be provided. The PDF files shall be compatible with Adobe 5.0(PDF 1.4). All material must be submitted to the CDOT Project Manager. All Electronic drawing files and plot files shall be submitted on CD disk, uncompressed as directed by CDOT Project Manager.

It is suggested that the CDOT Project Manager be contacted prior to creation of electronic media to verify the current submission requirements or to discuss any questions concerning the ability to satisfy the current submission requirements.

CDOT Computer/Software Information. The primary hardware used by CDOT is Intel based PC's with Window XP (Service Pack 1). The types of software are:

Earthwork:	InRoads (PC based)
Drafting:	Microstation (PC based,)
Survey:	InRoads Survey
Geometry:	Inroads COGO
Bridge:	Staff Bridge software shall be used in either design or design check
Estimating:	TRNS*PORT (Bid Analysis and Management Systems), an AASHTO-sponsored software

## 2. Computer Data Compatibility

- a. Survey information: All terrain and topographic surveys shall be completed utilizing InRoads Survey methodology. The survey data shall be submitted in an edited raw format, free of any and all coding errors.
- b. Design/drafting information: Two options are available to the consultant:
  - (1) The original and design models shall be provided in an acceptable and compatible electronic format.
  - (2) Project Data may be converted using a version of LandXML that is compatible with Microstation/InRoads..

Submit the preliminary survey (terrain and topographic) in the original edited raw InRoads Survey format.

Submit cross-section strings from beginning to ending termini at a maximum 25-foot interval. Cross-section intervals may be modified as necessary to properly show features of the project area. A cross-section string consists of a string generated perpendicular to an alignment. In addition, structure cross sections will be required at all cross culvert locations, bridge abutments. Cross sections will also be required for pavement width angle points, superelevation station points, and other locations as determined by the project manager.

The cross-section string shall include all points necessary to satisfactorily define the ground features of the area. As a minimum, this includes all break points and template information sufficient to define the roadway.

The electronic file shall be organized so that all cross-section strings proceed up-station from beginning to end. The points in the cross-section shall be organized from left to right. Each point shall be defined by northing, easting, and elevations in that order.

The design information shall be submitted in InRoads/Micro Station format. The consultant shall use InRoads and/or Micro Station. All design decisions within InRoads, such as labeling conventions, shall be fully documented and included in the electronic files.

3. Electronic media submittals: CDOT can accept media of the following types and format:

5 ¼" CD ROM Disks, uncompressed, CD's should be formatted so they can be read from any PC. CD submitted for approval that is found to be defective shall be immediately rejected by the CDOT Project manager. The consultant will then be required to resubmit the offending CD(s) at no further cost to the project.

4. Required documentation: CDOT requires that each unit of the CD media submitted be identified with adhesive labels affixed to the CD case containing the following MINIMUM information as applicable of the CD being submitted:

- Computer make, model, and operating system
- CDOT Project Number and CDOT project Manager name
- Date created
- Contact Person and telephone number

A letter MUST accompany the electronic media which contains the same information as required on the media AND:

Either contain a description of the operating system commands used to create the electronic media, or an attached computer generated listing of the actual process which created the electronic media (preferred).

**PART 3  
SCOPE OF WORK  
SERVICES AFTER DESIGN**

THE COMPLETE SCOPE OF WORK FOR CONSULTANT SERVICES INCLUDES:

- PART 1 - PROJECT SPECIFIC (Which is attached to the Contract for Consultant Services)
- PART 2 - PRECONSTRUCTION TASK DESCRIPTIONS
- PART 3 - SERVICES AFTER DESIGN (as applicable)

AND THE ATTACHMENTS

Part 2, Part 3, and the attachments are available as separate documents and apply to the contract only if referenced.

Comments regarding this scope may be directed to:

**Bernie Rasmussen**  
CDOT Agreements Office,  
(303) 757-9400



**PART 3  
SCOPE OF WORK  
SERVICES AFTER DESIGN  
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IV. **SERVICES AFTER DESIGN:** 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.

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:

- Submittal description
- Date received
- 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 the construction contractor's shop drawings for conformance with the contract documents and compliance with the provisions of the current "Standard Specifications for Road and Bridge Construction" in connection with the contract work.

B. Construction Services: When requested by the appropriate Program Manager, the Consultant shall provide the services described below.

1. Coordinate the schedule at the start of construction and continuously throughout construction phase.

2. Provide field observation prior to, and on the day of, the following:

- Pile driving and/or caisson drilling
- All major concrete pours
- Placement of girders
- Splicing of girders
- Post-tensioning duct and anchorage placement
- Post-tensioning operations

3. Provide technical assistance to CDOT project personnel on an as-needed basis. This service shall include, but not be limited to, the following:

- Respond to questions in the field that arise relative to the plans, details or special provisions.
- Provide engineering and drafting services for design revisions required due to changes in construction or field conditions.

4. The following reports/submittals shall be maintained and submitted:

- Diary - a complete diary will be accomplished daily for each field observation activity.
- Changes/revisions - documentation justifying changes and/or revisions to plans and specifications.
- Progress reports - monthly progress reports will be submitted for the Consultant's activities.
- Calculations, drawings, and specifications as needed.
- Daily time sheet - 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: When requested by the Program Manager through the CDOT/PM, the Consultant shall provide design services for plan modifications required by unforeseen field conditions.

D. Post Construction Services

1. Final Earthwork Determination: Compute the final as-built earthwork quantities. This will include the required surveying, engineering technician, and computer support.
2. "As-Built" Plans: Modify the original plans so that the plans will agree with actual construction results.
3. 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 Revision, including legal Descriptions of excess property.
4. Monument the Right-of-Way according to State Statutes and the CDOT Survey Manual.
  - (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).
5. Set property corners on all remainder parcels. Required monumentation will be as directed by the CDOT PM.
6. 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 Plan 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.

V. CONSTRUCTION ENGINEERING: Construction Management, Inspection & Materials Testing Scope of Work

Scope Date \_\_\_\_\_

Region \_\_\_\_\_

The Contract Administrator for this Task Order will be:

Resident Engineer: \_\_\_\_\_

Residency: \_\_\_\_\_

Region: \_\_\_\_\_

Active Day to Day administration and monitoring of this contract will be delegated to the following CDOT employee:

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Telephone: \_\_\_\_\_  
Fax: \_\_\_\_\_

**A. General Requirements:**

Definitions:

CDOT Resident Engineer -

The CDOT Resident Engineer is responsible to the Region Program Engineer for the quality and successful completion of a transportation project. The Resident Engineer authorizes interim and final payments and all changes to Contracts for all Consultants and Contractors.

Consultant Engineer -

The Consultant's Professional engineer in responsible charge of services performed as described in this Contract The Consultant's Professional engineer must be licensed in the State of Colorado.

Consultant Inspector or Materials Testing Technician -

The Consultant's employees who perform inspection and testing services under the responsible charge of the Consultant's Professional Engineer.

Contractor -

The individual, firm or corporation contracting with CDOT to construct a transportation project.

CDOT Project Engineer-

The CDOT employee assigned by the Resident Engineer who is the Chief Engineer's duly authorized representative. The CDOT Project Engineer is in direct charge of the work and is responsible for the administration and satisfactory completion of the project under contract. The Project Engineer duties are further described in the CDOT Construction Manual.

Consultant Project Engineer -

The Consultant employee who is assigned duties per the Consultant's scope of work in the contract with CDOT. The Consultant Project Engineer works under the responsible charge of the Consultant's Professional Engineer. The duties of the Consultant Project Engineer are limited to those duties in the scope of work and as delegated by CDOT Resident Engineer.

General Work - Initial Project Meeting:

The Consultant and CDOT project personnel shall meet to coordinate and schedule the required work prior to active construction. The Consultant shall prepare a schedule to perform the required scope of work for the project. The Consultant shall complete all work in accordance with the approved schedule or as approved by the Engineer.

Work Duration:

The time period for the work described in this scope of work covers the period from \_\_\_\_\_ to \_\_\_\_\_] [or \_\_\_\_\_ calendar days]. (Note to RE: when using this scope of work strike out inappropriate section after filling in appropriate section.) Work may be required night and/or day, on weekends, holidays, and/or on a split shift basis. Workweeks may be in excess of or less than the standard 40-hour week.

Authorization to Proceed:

Work shall not commence until the written Notice to proceed is received by the Consultant, and shall be completed in the time specified.

Routine Billing & Reporting:

The Consultant shall provide the following on a regular basis:

- A) Monthly billing formats, suitable to the CDOT Engineer, for all contract activities performed by the Consultant's Project Engineer, inspectors and field Material Testing Technician (MTT).
- B) Periodic reports and billings required by CDOT Procedural Directive 400.2

Status of Contract:

The Consultant shall monitor the fiscal status of the contract, and advise the CDOT Resident Engineer of any potential for supplementing their contract or negotiating an additional task order. Failure to monitor contract status and provide timely notification may result in discontinuation of the Consultant's services on the project until a supplemental agreement can be affected.

Project Standards:

All construction management, sampling, testing, documentation, and inspection shall be in accordance with the latest versions of the Colorado Department of Transportation's Construction Manual, Field Materials Manual, Colorado Department of Transportation Inspector's Checklist, Standard Specifications for Road & Bridge Construction, the Supplemental Specifications, applicable M & S Standards, and the plans and specifications currently in use when the construction project is advertised or revised under advertisement. All Consultant construction management, inspection, or testing activities performed shall be as authorized by the Resident Engineer.

For the purposes of this document, Construction Management, Inspection, and Testing shall be known as "the work" and references to "the specifications" shall include all applicable CDOT Standard Specifications for Road and Bridge Construction including Supplemental Specifications, Project Standard Revisions and Project Special Provisions, and project plans and specifications.

#### Labor, Materials, Vehicles & Equipment:

The consultant shall furnish all personnel, materials, equipment and transportation required to perform the work. Consultant personnel shall have appropriate vehicles (equipped with flashing amber beacon and cellular phone), computer and miscellaneous equipment (calculator, office supplies, safety equipment, etc.) required to perform the work. Office space may be provided by Contractor pay item or provided by CDOT. The Consultant may be required to provide their own field offices and laboratories if not furnished by CDOT. (Resident Engineer will need to modify this section to fit the availability of field offices and labs to the project and the particular needs of the Region).

Personnel qualifications, staffing level, and number and types of vehicles shall be subject to the approval of the Engineer. The Consultant shall assign personnel for the duration of the Contract unless otherwise approved by the Engineer.

The Consultant Engineer, inspector, and material technician must be thoroughly familiar with CDOT specification, manuals, forms and documentation requirements. Personnel provided by the Consultant who do not meet all of the specified requirements, or who fail to perform their work in an acceptable manner, shall be removed from the project when determined and directed by the CDOT Resident Engineer.

#### Documentation:

Each of the Consultant's personnel shall maintain a daily diary for each day they perform work on the project on an approved form. CDOT's Form 103 or Automated Form 103a - Project Diary and SiteManager diary (when SiteManager is used on the associated project). The contents of the diary shall be brief and accurate statements of progress and conditions encountered during the prosecution of the work. Editorial comments are not to be incorporated in the diaries or on any written correspondence applicable to the project. A copy of the daily diary shall be given to the CDOT Resident Engineer within one working day of its date.

#### Engineer's Certification:

The Consultant shall provide a Professional Engineer registered in the State of Colorado who will be in responsible charge of Construction Observation. This Engineer shall certify in writing that all inspection, materials testing, and Construction Management conforms to the plans, specifications, and purpose of design. The Consultant Engineer shall be available to review work, resolve problems and make decisions in a timely manner as requested by the CDOT. The CDOT Resident Engineer shall be the final authority regarding acceptance of work not conforming to the plans and specifications. The Consultant Engineer must be experienced and competent in road and bridge construction management, inspection, and materials testing.

The Consultant Engineer, inspector, material technician shall provide daily or routine certifications as shown below. The Consultant Engineer in responsible charge of all the Consultant inspectors and material technicians shall also provide this certification on a monthly basis.

"The items listed above this certification were tested or inspected and found to be in reasonably close conformity to the plans and specifications except as noted".

Note to Resident Engineer: The following certification sections are used when using Construction Management. They may be deleted if only using Inspection and Material Testing services.

When performing Construction Management services the Consultant's Professional Engineer shall also provide monthly certifications prior to processing monthly Contractor interim progress payments as shown:

"The construction on this project is being conducted in reasonable close conformance with the plans and specifications".

When performing Construction Management services the Consultant's Professional Engineer shall also provide a final certification at the completion of the project as shown:

"The construction on this project is being conducted in reasonable close conformance with the plans and specifications".

When performing Construction Management services the Consultant's Professional Engineer shall also provide a final certification at the completion of the project as shown:

"The project has been completed in reasonably close conformity with the plans and specifications including authorized changes. The project has been reviewed for obvious safety deficiencies. The project Right of Way appears to be free from unauthorized encroachments resulting from construction on this project. The Form FHWA - 47 has been completed and submitted".

Note: The Following three Sections describe Construction Management, Inspection, and Materials Inspection Services required of the Consultants.

**B. CONSTRUCTION MANAGEMENT REQUIREMENTS**

*This Section is intended to be used when the Region wants Consultant Project Engineer to manage the project. The Region can choose which duties the Consultant Engineer will do and which duties CDOT staff will be responsible for.*

The following checklist shall be utilized to establish the Construction Management responsibilities of the individual parties for this project.

The checklist shall be prepared by placing an "X" under the responsible Party opposite each of the tasks listed below.

When a task does not apply to the project, non-applicable (N/A) shall be placed under both.

Tasks, which will be performed by CDOT headquarters staff, will be so indicated.

The Region in accordance with established policies and procedures shall determine who will perform all other tasks, which are the responsibility of CDOT.

DESCRIPTION OF TASK:	<u>CDOT</u>	<u>CONSULTANT</u>
1. Conduct the pre-bid conference, answer all questions. Maintain a log of all decisions given and/or made.	<input type="checkbox"/>	<input type="checkbox"/>
2. Show project work site to prospective bidders, answer all questions regarding plans & specifications, maintain a log of all decisions given and/or made.	<input type="checkbox"/>	<input type="checkbox"/>
3. Coordinate all construction contract activities with appropriate stakeholders.	<input type="checkbox"/>	<input type="checkbox"/>
4. Distribute appropriate 'Award Sets' of plans and specifications to CDOT Resident Engineer.	<input type="checkbox"/>	<input type="checkbox"/>

Note: R.E. may modify the number of plan sets needed. (further distribution will then be made to the Region Program Engineer (RPE), CDOT Staff Construction & Materials (2 sets), the Region Materials Engineer (RME) and others as required. CDOT Printing and Visual Communications Center, Division of Human Resources and Administration when CDOT is responsible.)

5. Issue Notice-to-Proceed to the Contractor (CDOT Construction Contracts Unit, Staff Design Branch, when CDOT is responsible.)	<input type="checkbox"/>	<input type="checkbox"/>
6. Schedule, conduct and prepare minutes of all project meetings as described on 26-c to 26-h of current Construction Manual.	<input type="checkbox"/>	<input type="checkbox"/>

Job Showing:

a. Preconstruction Conference (Prepare Preconstruction packet)	<input type="checkbox"/>	<input type="checkbox"/>
b. Partnering Workshop	<input type="checkbox"/>	<input type="checkbox"/>



DESCRIPTION OF TASK:	<u>CDOT</u>	<u>CONSULTANT</u>
c. Weekly Project Meetings	<input type="checkbox"/>	<input type="checkbox"/>
d. Presurvey Conference	<input type="checkbox"/>	<input type="checkbox"/>
(1) Construction staking	<input type="checkbox"/>	<input type="checkbox"/>
(2) Survey Monumentation	<input type="checkbox"/>	<input type="checkbox"/>
e. Bridge Construction	<input type="checkbox"/>	<input type="checkbox"/>
f. Communications	<input type="checkbox"/>	<input type="checkbox"/>
g. Structural Concrete Prepour Conference	<input type="checkbox"/>	<input type="checkbox"/>
h. Concrete Pavement Prepaving Conference	<input type="checkbox"/>	<input type="checkbox"/>
i. HMA Prepaving Conference	<input type="checkbox"/>	<input type="checkbox"/>
j. Contractor Weekly Safety Meeting	<input type="checkbox"/>	<input type="checkbox"/>
7. Construction Observation:		
a. Professional Engineer (PE) registered in Colorado, who will be 'in responsible charge of construction observation'.	<input type="checkbox"/>	<input type="checkbox"/>
Consultant P.E. name: _____		
P.E. #: _____		
8. Public Relations:		
a. Prepare and coordinate with CDOT and others to publish and distribute public notices of all planned construction activities and schedules to the media, property owners, local residents, tenants, any other appropriate stakeholders affected by the project.	<input type="checkbox"/>	<input type="checkbox"/>
b. Perform public relation tasks with appropriate individuals as requested by CDOT.	<input type="checkbox"/>	<input type="checkbox"/>
c. Explain Construction and work with adjacent property owners to resolve issues that arises during construction.	<input type="checkbox"/>	<input type="checkbox"/>

Review, comment, accept and/or approve as appropriate the following submittals:

**Note: This list is not all-inclusive and other submittals may require action as directed by CDOT.**

9. Submittals Required at Preconstruction Conference:

DESCRIPTION OF TASK:	<u>CDOT</u>	<u>CONSULTANT</u>
a. CDOT Form #205 - Sublet Permit Application: after Form #713 has been checked by the Region EEO Administrative Program Specialist.	<input type="checkbox"/>	<input type="checkbox"/>
b. Method of Handling Traffic	<input type="checkbox"/>	<input type="checkbox"/>
c. Progress Schedules	<input type="checkbox"/>	<input type="checkbox"/>
d. Method statements	<input type="checkbox"/>	<input type="checkbox"/>
e. Shop drawings per 105.02	<input type="checkbox"/>	<input type="checkbox"/>
f. Working drawings per 105.02	<input type="checkbox"/>	<input type="checkbox"/>
g. Other submittals per 105.02	<input type="checkbox"/>	<input type="checkbox"/>
h. All EEO, Labor compliance requirements	<input type="checkbox"/>	<input type="checkbox"/>
i. Other submittals as directed	<input type="checkbox"/>	<input type="checkbox"/>
10. Construction inspection including calculations, measurements, and documentation of interim and final pay quantities.	<input type="checkbox"/>	<input type="checkbox"/>
11. Perform required EEO/AA/DBE/OJT or labor compliance tasks as requested as follows:		
a. Conduct Contractor/Subcontractors reviews to ensure conformance with the Equal Employment Opportunity (EEO) /Affirmative Action (AA)/DBE/OJT requirements contained in the Contract. (Standard Special Provisions, Project Special Provisions and FHWA Form 1273)	<input type="checkbox"/>	<input type="checkbox"/>
b. Complete and submit to the CDOT Region EEO Administrative Program Specialist, the required number of CDOT Form #280 - Equal Employment Opportunity and Labor Compliance Verification.	<input type="checkbox"/>	<input type="checkbox"/>
c. Monitor DBE participation to ensure compliance with the "Commercially Useful Function" requirements.	<input type="checkbox"/>	<input type="checkbox"/>
d. Complete and submit to the CDOT Region EEO Administrative program Specialist, the applicable number CDOT Form #200 - OJT Training Questionnaire, when project utilizes OJTs.	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF TASK:	<u>CDOT</u>	<u>CONSULTANT</u>
e. Check certified payrolls to verify Contractor/subcontractors are in compliance with Contract requirements. The checking shall be completed by project personnel trained in payroll checking. (Contact the Region EEO Administrative Program Specialist for training requirements.)	<input type="checkbox"/>	<input type="checkbox"/>
f. Coordinate submittals by Contractor and all subcontractors of FHWA Form 1391 (Highway Construction Contractor's Annual EEO Report) to the CDOT Region EEO Administrative Program Specialist. The Report is due to the Region EEO Administrative Program Specialist by August 10 for all construction projects Active during the last complete week of July.	<input type="checkbox"/>	<input type="checkbox"/>
12. Materials:		
a. CDOT Form #250 - Materials Documentation Record:		
(1) Fill out and distribute CDOT Form #250 before the Contractor commences work.	<input type="checkbox"/>	<input type="checkbox"/>
(2) Complete Form #250 after work is completed distribute per instructions in CDOT Materials Manual.	<input type="checkbox"/>	<input type="checkbox"/>
b. Approve changes to typical section. (requires a CMO).	<input type="checkbox"/>	<input type="checkbox"/>
c. Development, Checking, and Design mix approvals:		
(1) Concrete	<input type="checkbox"/>	<input type="checkbox"/>
(2) Hot Mix Asphalt (HMA)	<input type="checkbox"/>	<input type="checkbox"/>
d. Acceptance of manufactured products	<input type="checkbox"/>	<input type="checkbox"/>
e. Inspecting fabrication of structural steel and prestressed concrete structural components.	<input type="checkbox"/>	<input type="checkbox"/>
<i>Note that Staff Bridge may perform this service.</i>		

DESCRIPTION OF TASK:	<u>CDOT</u>	<u>CONSULTANT</u>
f. Inspecting fabrication of bearing devices devices.	<input type="checkbox"/>	<input type="checkbox"/>
g. Laboratory Check testing	<input type="checkbox"/>	<input type="checkbox"/>
h. Acceptance testing	<input type="checkbox"/>	<input type="checkbox"/>
i. Independent assurance testing	<input type="checkbox"/>	<input type="checkbox"/>
j. Approve sources of materials	<input type="checkbox"/>	<input type="checkbox"/>

(Region Materials Laboratory will develop, complete, and distribute CDOT Form #379 - Project Independent Assurance Sampling Schedule).

**Note: RE should check with Region Materials to see if this should be CDOT**

13. Maintain time counts	<input type="checkbox"/>	<input type="checkbox"/>
14. Maintain Project files for all documentation	<input type="checkbox"/>	<input type="checkbox"/>
15. Obtain, accept, and approve all required contractor submittals	<input type="checkbox"/>	<input type="checkbox"/>
16. Approve shop drawings	<input type="checkbox"/>	<input type="checkbox"/>
17. Perform Traffic Control Inspections	<input type="checkbox"/>	<input type="checkbox"/>
18. Approve traffic signal equipment	<input type="checkbox"/>	<input type="checkbox"/>
19. Construction surveying	<input type="checkbox"/>	<input type="checkbox"/>
20. ROW monumentation	<input type="checkbox"/>	<input type="checkbox"/>
21. Prepare monthly estimates of the Contractor's work performed, materials placed or stockpile materials on hand in accordance with the Contract.	<input type="checkbox"/>	<input type="checkbox"/>

**NOTE: Only a CDOT Resident Engineer can approve and sign vouchers for interim and final Contractor pay estimates.**

22. Review interim and final billings for Utility relocation work.	<input type="checkbox"/>	<input type="checkbox"/>
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**NOTE: Only a CDOT employee can prepare, approve and sign vouchers for interim and final Utility Company billings.**

DESCRIPTION OF TASK:	<u>CDOT</u>	<u>CONSULTANT</u>
23. Prepare CDOT Form #90 and/or 94 Minor Contract Revision (MCR) CDOT Form #90 - Contract Modification Order (CMO) Including letter of explanation for CMO/MCR The CDOT or Consultant PE is required to write the letter of explanations.	<input type="checkbox"/>	<input type="checkbox"/>
<b>NOTE: The Consultant may negotiate costs for extra work but only CDOT can approve costs. Only the CDOT Resident Engineer can approve and sign MCR/CMOs for modifying CDOT's Contract or paying the contractor.</b>		
<b>NOTE: Only CDOT or FHWA can approve Federal-Aid funding for MCRs/CMOs.</b>		
24. Monitor project financial status and submit monthly in a format acceptable to the Region, such as CDOT Form #65a Project Financial Status Report.	<input type="checkbox"/>	<input type="checkbox"/>
25. Prepare and submit monthly progress reports to the Region Program Engineer: CDOT Form #110a - Status of active Construction Projects, and CDOT Form #517a - Status of Construction Project Finals.	<input type="checkbox"/>	<input type="checkbox"/>
26. Prepare appropriate responses to Contractor Subcontractor or supplier requests for information, submittals, disputes, claims, change notices, or other correspondence.	<input type="checkbox"/>	<input type="checkbox"/>
27. Prepare response for Project Engineer status of Claim	<input type="checkbox"/>	<input type="checkbox"/>
28. Prepare complete claim record	<input type="checkbox"/>	<input type="checkbox"/>
29. Give oral or written presentation to Region Director for claims	<input type="checkbox"/>	<input type="checkbox"/>
30. Give presentation for Claim Review Board or AAA Arbitration board.	<input type="checkbox"/>	<input type="checkbox"/>
31. Conduct routine, random, project reviews to ensure the project is being administered in accordance with the terms of the construction Contract.	<input type="checkbox"/>	<input type="checkbox"/>
32. Conduct final project inspection of completed or unacceptable work and prepare punch list for final acceptance.	<input type="checkbox"/>	<input type="checkbox"/>

- |   |                          |                          |
|---|--------------------------|--------------------------|
| 33. Prepare and submit CDOT Form #1212a Final Acceptance Report.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Prepare final project acceptance letter and distribute per procedures in the CDOT Construction Manual.                                  | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. Advertise for final settlement (CDOT Staff Construction when CDOT is responsible).  | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. Maintain accurate as constructed notes and prepare and distribute final as constructed plans per procedures in the Construction Manual. | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Check final quantities, final plans and the final pay estimate.   | <input type="checkbox"/> | <input type="checkbox"/> |

**NOTE: Only CDOT can sign final pay estimate sheets and voucher**

- |  |                          |                          |
|--|--------------------------|--------------------------|
| 38. Check material records   | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. Submit final materials certification   | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Obtain and review CDOT Form #17 Contractor DBE Payment Certification, from the Contractor and submit to Region Program Engineer.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. Obtain and review FHWA Form PR 47 (Statement of Materials and Labor Used) from the Contractor, check and submit to Region. (REQUIRED ONLY ON NHS PROJECTS WITH TOTAL FINAL PAYMENT EXCEEDING \$1,000,000). | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. Complete and submit CDOT Form #950 Project Closure.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Submit original of all project records to the CDOT Resident Engineer. (CDOT will retain the project records for six years from date of project closure).   | <input type="checkbox"/> | <input type="checkbox"/> |

### **C. Inspection Requirements:**

*This section is intended for use when the Regions require Consultant inspection services.*

#### General Work Description:

The Consultant shall provide support to the CDOT project staff through assignment of personnel to construction inspection responsibilities. Inspection work shall conform to the CDOT Construction Manual, the Inspector Checklist and SiteManager (when applicable on the project). Inspection responsibilities include but are not limited to the following:

Assist the CDOT Project Engineer in performance of the following Construction activities:

Preparing and transmitting updates of construction activities to the CDOT's Public Information Office.

Periodic reports and billings required by CDOT Procedural Directive 400.2.

Monitoring contractor payroll compliance.

Participation in weekly progress meetings with contractor, subs, utilities and other interested parties.

Securing project documentation from the contractor.

Anticipating project problems and directing solutions to CDOT Resident Engineer.

Reviewing drawings and data submitted by the construction contractor and suppliers for conformance with the intent of the specifications. Inform and obtain concurrence as needed from the CDOT Project Engineer and keep relative documentation for project records.

Maintaining accurate notes reflecting actual construction details to be used in preparation of as constructed plans.

Communicating with adjacent landowners as required resolving issues that arise due to construction.

Review and approve the Contractor's Method of Handling Traffic if delegated by the CDOT Resident Engineer.

Monitoring compliance with and taking appropriate action to preserve safety on the project for all workers and traveling public in accordance with Method of Handling Traffic (MHT) and the Manual of Uniform Traffic Control Devices (MUTCD).

Initial, follow up, and final inspections of work in progress including interim and final measurements.

Notifying contractors and Engineer of non-compliance with the contract plans and specifications.

Performance of special tests, investigations, or monitoring which are required to fulfill the intent of the CDOT inspection program.

Preparation of inspection documentation for development of progress payments for the contractor in accordance with prescribed procedures.

Submittal of standard documentation reports no later than the following working day.

Preparation of routine correspondence to the contractor, CDOT Staff, local agencies, etc.

Providing liaison and communication to contractor field crews.

Preparation of final "As Constructed" plans upon project completion.

Miscellaneous related duties as requested by the Project Engineer.

Assist in preparing punch lists of uncompleted work, non-conformance reports, and deficiency notices.

Assist in preparing responses to contractors' and suppliers' requests for information, submittals, change notices, claims, and correspondence.

#### **D. Materials Testing Requirements:**

*This section is intended for use when the Region needs Consultant material testing services.*

##### Project Standards:

If the required method is not described in the CDOT Field Materials Manual, the required work shall be completed in accordance with:

1. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing (as revised and supplemented) or
2. The ASTM Standards and Tentatives, in this order.

Proposed work procedures shall be coordinated with the CDOT Resident Engineer prior to the start of work. SiteManager may be required when applicable to the project.

##### General Work Description:

The Consultant shall sample, test, inspect and document all materials generated and produced on the project. This includes materials delivered to the project that are listed in the Summary of Approximate Quantities in accordance with the SCHEDULE in the Field Materials Manual, Any materials necessary for a Design/Build project, materials that may be added to the project through contract modification, and altered material quantities whether increased or decreased. The Consultant's Engineer, field tester(s) and CDOT's Engineer shall be required to review project quantities on a monthly basis to ensure that sufficient tests have been performed for the material placed to date. The Consultant shall also provide any other services as requested by the CDOT Engineer.

Initial Project Meeting. The Consultant, Project Engineer, Resident Engineer, and Resident Head Tester (Or Region Testing personnel) shall meet to coordinate and schedule the required work. The Consultant shall complete all work in accordance with the approved schedule.

Testing of materials that are specifically designated to be pre-inspected or pretested shall performed by CDOT staff or the Consultant as requested by CDOT. The Consultant shall document and transport samples of any and all materials to the CDOT Central Laboratory that are required to be tested by CDOT



Central Laboratory unless they have been transported by the manufacturer. The items and test frequencies of tested materials shall be in accordance with the column titled "Central Laboratory" in the SCHEDULE.

The minimum number of tests required shall be in accordance with the Frequency Guide Schedule for minimum Materials Sampling, Testing, and Inspection in the Field Materials Manual.

The Engineer may require additional testing or other services for adequate Quality Control or Quality Assurance.

The Consultant Tester and CDOT Engineer shall review project quantities on a weekly basis to ensure that sufficient tests have been performed for all material placed to date on the project.

Test results and observations shall be documented on proper CDOT forms and submitted to the Project Engineer for approval. The Project Engineer and the Contractor shall be promptly notified of any failing tests. This notification shall be on a CDOT form 626 or other approved form.

#### Labor, Vehicles, and Equipment:

The Consultant shall furnish all personnel, materials, equipment and transportation required to perform the work. CDOT may provide a field laboratory when available. If laboratory facilities are not available from CDOT the Consultant shall use his own facilities.

The following equipment shall be furnished by the Consultant tester for each project in sufficient quantity and in good working order to ensure accurate performance of all work required in a timely manner:

1. Nuclear Asphalt Content Gauge and/or extraction equipment and solvents.
2. Nuclear Moisture-Density Gauge
3. Concrete air meter, slump cone, and other concrete testing equipment.
4. Sieves for aggregates and soil gradations
5. Electronic scales
6. Sample containers and small tools
7. Proctor equipment for soil curves and one point tests
8. Atterburg, Rice value, and Sand Equivalent equipment
9. Sample drying equipment
10. Concrete cylinder molds, which meet AASHTO requirements except that paper molds, shall not be used, and plastic molds shall not be reused.
11. Cellular phone
12. Computer with printer and Microsoft office software or software compatible with CDOT communication needs.
13. Miscellaneous equipment for performing the required soils, asphalt and concrete tests

#### Documentation:

Each of the Consultant's field inspectors shall maintain a daily diary for each day the Consultant performs work on the project. They shall use CDOT's Form 103 or automated 103a - Project Diary, or other form approved by the Engineer. SiteManager may also be required for documentation when applicable. The contents of the diary shall be brief and accurate statements of progress and conditions encountered during the prosecution of the work. Editorial comments are not to be incorporated in the diaries or on any written correspondence applicable to the project. A copy of the daily diary shall be given to the CDOT Project Engineer within one working day of its date.

Test results and sample submittals transmitted to CDOT's Region or Central Laboratory shall be recorded on appropriate CDOT Forms. The Consultant may use CDOT worksheets or worksheets approved by the CDOT Project Engineer. CDOT Forms and worksheets are available through the CDOT Project Engineer.

The Consultant shall furnish the CDOT Engineer with original copies of all worksheets and test results on a daily basis. The Consultant shall also keep the CDOT Form 626 up to date at all times and provide copies of this form to the CDOT Project Engineer within 12 hours. The CDOT Project Engineer shall be informed immediately of any non-specification material. At the discretion of the CDOT Project Engineer, the Consultant may also be required to provide the CDOT Form 626 to the contractor within 12 hours for any non-specification material.

The Consultant shall provide all correspondence and applicable CDOT forms to the CDOT Project Engineer or his authorized representative for review and signature.

#### Assurance Sampling and Testing:

The Consultant shall coordinate the schedule of the Independent Assurance Tests (IAT) for the project with the Region Materials Section in accordance with the CDOT Form 379. Advance notice of 48 hours is required for proper coordination.

#### Submittal of Final Documentation:

Final documentation shall be submitted to the CDOT Project Engineer within 20 working days after completion of all work. A completed CDOT Form 250 shall be submitted to the CDOT Project Engineer 10 days after the Consultant has been notified of final quantities. Failure to submit final documentation as required will result in withholding of Consultant payments.

#### Personnel Qualifications:

Personnel qualifications and staffing levels for the project shall be subject to the approval of the CDOT Resident Engineer and Region Materials Engineer.

The Consultant supplied materials testing technicians (MTT) shall be permanently assigned to a project and shall have the following minimum qualifications:

1. Certified or have made application to and be working towards a Level 2 Certification under the National Institute for Certification in Engineering Technology (NICET) Certification Program. This certification must be in Construction Materials Testing and Inspecting for the types of work being performed, e.g., aggregates, asphalt, concrete and soils. A degree in an engineering related field may be substituted for the NICET requirement. A copy of the NICET Certification and/or Engineering degree shall be provided to the CDOT Engineer.
2. The materials testing technician(s) performing the tests must have a minimum of one year experience in each specialty field (soils, aggregates, asphalt paving, concrete, etc.) that is being tested.
3. Technicians performing concrete tests shall be certified by the American Concrete Institute (ACI).
4. The MTT performing Hot Mix Asphalt tests shall be certified by the Colorado Asphalt Technician Certification Program (LabCAT). The MTT shall be thoroughly familiar with CDOT forms and documentation requirements. Personnel provided by the Consultant who do not meet all of the

specified requirements, or who fail to perform their work in an acceptable manner, shall be removed from the project when determined by the CDOT Resident Engineer.

Specific Testing Requirements:

The Consultant shall sample, test, and document all materials generated and produced on the project. This includes: materials delivered to the project that are listed in the Summary of Approximate Quantities or referred to in the Design/Build Plans and Specifications. The number of tests required shall be in accordance with the Schedule in the Field Materials Manual. Additional quantities may be added by Contract Modification Order, or plan approximate quantities may increased or decreased. The MTT and CDOTs Project Engineer shall review project quantities on a weekly basis to ensure that sufficient tests have been performed for all material placed to date. The Consultant shall also provide any other services as requested by the CDOT Engineer.

Testing of materials that are specifically designated to be pre-inspected or pretested by this or any other Department of Transportation shall remain the responsibility of CDOT. The MTT shall document and transport samples of any and all materials to the CDOT Region or Central Laboratory that are required to be tested by CDOT regardless of pre-inspection or pre-testing responsibilities. The items and test frequencies of CDOT tested materials shall be in accordance with the column titled Central Laboratory in the Schedule in the Field Materials Manual.