

# GENERIC SCOPE OF WORK BASIC CONTRACT

CONTRACT TYPE [CHECK ONE]

- Specific Rate of Pay
- Cost Plus Fixed Fee
- Lump Sum

CONTRACT DATE: \_\_\_\_\_.

PROJECT NUMBER: IM 2254-076.

PROJECT LOCATION: I-225 Parker Road to Mississippi Ave.

PROJECT CODE: 17083.

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

SECTION 1	PROJECT SPECIFIC INFORMATION	Dated:
SECTION 2	PROJECT MANAGEMENT AND COORDINATION	Dated:
SECTION 3	EXISTING FEATURES	Dated:
SECTION 4	REFERENCE ITEMS NEEDED BY THE CONSULTANT	Dated:
SECTION 5	GENERAL INFORMATION	Dated:
SECTION 6	ENVIRONMENTAL WORK TASK DESCRIPTIONS	Dated:
SECTION 7	PRECONSTRUCTION WORK TASK DESCRIPTIONS	Dated:
SECTION 8	SERVICES AFTER DESIGN	Dated:
SECTION 9	CONTRACT CONCLUSION (CHECKLIST)	Dated:
APPENDICES		Dated:

SECTIONS 3 AND 4 AND SECTION 6 ARE AVAILABLE AS SEPARATE DOCUMENTS AND APPLY TO THE CONTRACT ONLY BY REFERENCE

Comments regarding this scope may be directed to:

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CDOT Agreements Office,  
(303)757-9400

**TABLE OF CONTENTS**

**SECTION 1 - PROJECTION SPECIFIC INFORMATION ..... 4**

1 PROJECT BACKGROUND..... 4

2 PROJECT GOALS ..... 4

3 PLANNED IMPROVEMENTS ..... 4

4 PROJECT COSTS ..... 4

5 WORK DURATION ..... 4

6 CONSULTANT RESPONSIBILITY AND DUTIES ..... 5

7 WORK PRODUCT..... 6

8 WORK PRODUCT COMPLETION ..... 6

9 ADDITIONAL PROJECT INFORMATION ..... 6

10 SCOPE OF WORK ORGANIZATION ..... 6

  

**SECTION 2 - PROJECT MANAGEMENT AND COORDINATION..... 8**

1 CDOT CONTACT..... 8

2 PROJECT COORDINATION ..... 8

  

**SECTION 3 - EXISTING FEATURES..... 9**

1 STRUCTURES ..... 9

2 UTILITIES..... 9

3 IRRIGATION DITCHES ..... 9

4 RAILROADS..... 9

  

**SECTION 4 - REFERENCE ITEMS NEEDED BY THE CONSULTANT .....10**

1 CURRENT CDOT MANUALS, SPECIFICATIONS, STANDARDS, ETC.....10

  

**SECTION 5 - GENERAL INFORMATION .....11**

1 NOTICE TO PROCEED .....11

2 PROJECT COORDINATION .....11

3 ROUTINE REPORTING AND BILLING .....11

4 PERSONNEL QUALIFICATIONS .....12

5 CDOT COMPUTER/SOFTWARE INFORMATION.....12

6 COMPUTER DATA COMPATIBILITY .....12

7 PROJECT DESIGN DATA AND STANDARDS.....12

  

**SECTION 6 - ENVIRONMENTAL WORK TASK DESCRIPTIONS .....13**

**SECTION 7 - PRECONSTRUCTION WORK TASK DESCRIPTIONS .....14**

1 PROJECT INITIATION AND CONTINUING REQUIREMENTS.....14

2 PROJECT DEVELOPMENT .....16

3 PRELIMINARY DESIGN.....28

4 FINAL DESIGN .....41

5 CORRIDOR MANAGEMENT SUPPORT.....48

**SECTION 8 - SERVICES AFTER DESIGN.....50**

1 REVIEW OF SHOP DRAWINGS .....50

2 CONSTRUCTION SERVICES.....50

3 POST DESIGN PLAN MODIFICATIONS .....51

4 POST CONSTRUCTION SERVICES .....51

5 CONSTRUCTION ENGINEERING.....52

**SECTION 9 - CONTRACT CONCLUSION (CHECKLIST) .....56**

1 SUPPLEMENTAL WORK .....56

2 CONTRACT COMPLETION .....56

**APPENDICES**

APPENDIX A - REFERENCES.....59

APPENDIX B - SPECIFIC DESIGN CRITERIA.....61

APPENDIX C - DEFINITIONS .....64

**TABLES**

*Table 1...SUBMITTALS*.....53

# SECTION 1

## PROJECT SPECIFIC INFORMATION

### 1 **PROJECT BACKGROUND**

This project is a continuation of highway widening and associated improvements that have been occurring in stages along I-225 from Parker Road to Colfax. The main purpose of this project is to increase the number of through lanes from 2 to 3 between Parker Road and Mississippi Ave. The primary NEPA action which authorizes this project is a 2000 Environmental Assessment for I-225 from Parker Road to North of 6<sup>th</sup> Ave., and it's associated 2001 FONSI. The EA and FONSI will be refreshed as part of this project.

### 2 **PROJECT GOALS**

This project is intended to produce the following improvements:

- A. Increased capacity
- B. Improved Safety
- C. Higher level-of-service
- D. Improved riding surface (smoother or stronger pavement)
- E. Reconstruction
- F. Noise Mitigation
- G. Improved Water Quality Management

### 3 **PLANNED IMPROVEMENTS**

This project is located on I-225 between Parker Road (milepost 3.946) and Mississippi Ave. (milepost 7.989), in Arapahoe County.

The project includes:

Widening I-225 from 2 to 3 through lanes, with auxiliary lanes between interchanges, from Parker Road to Mississippi Ave.;

Construction of any required retaining walls, lighting, signing and striping associated with highway widening;

Construction of a noise mitigation wall north of Yale Ave. on the western edge of CDOT right-of-way, and possibly another noise mitigation wall north of Jewell Ave., on the western edge of CDOT right-of-way;

Construction of water quality permanent BMP's;

### 4 **PROJECT COSTS**

The constructions costs are grossly estimated to be approximately: \$45 M for Parker Road to Iliff, and \$37 M for Iliff to Mississippi, for a total of \$82 M.

### 5 **WORK DURATION**

The time period for the work described in this scope is approximately 365 calendar days.

The work described in this scope shall be performed such that final plans will be produced in two phases:

Phase I - Iliff to Mississippi: Plans for reconstructing this segment of I-225 shall be completed on an accelerated schedule, and must be ready to advertise by April 14, 2011. The following milestones are suggested dates in order to accomplish this, but will be negotiated with the consultant:

Field Inspection Review Meeting	September, 2010
Final Office Review Meeting	January, 2010
Final Plans Completed	February 22, 2010

Phase II – Parker Rd. to Iliff: Plans for reconstructing this segment of I-225 shall be completed by August 31, 2011.

## **6 CONSULTANT RESPONSIBILITY AND DUTIES**

The consultant will utilize all preliminary plans prepared by CDOT, RTD, and other consultants in order to prepare final plans. The consultant will coordinate work with CDOT, RTD, the City of Aurora and other consultants. The Consultant is responsible for:

- Final design of the highway roadway, roadside and median barrier, and fencing; CDOT will prepare preliminary roadway plans. Prior to beginning final design, the consultant will perform an independent design check of all preliminary roadway plans, will prepare recommendations for modifications of the preliminary plans for CDOT review, and will perform any necessary or authorized modifications to the preliminary roadway plans.
- For Phase II - Parker Road to Iliff, the consultant shall perform both preliminary and final design of the highway drainage system, including MS-4 permanent BMPs and connections to adjoining systems. This includes production of a drainage report, water quality report, pipe selection letter, and plan, profile, detail and tabulation sheets. For Phase I – Iliff to Mississippi, drainage will be designed by a separate consultant under NPS contract. The consultants working on the two separate Phases will need to coordinate their design efforts. The Consultant doing work under this contract will need to incorporate Phase I drainage plans into all other design plans done under this contract.
- As part of the preliminary hydrology report for Phase II, the consultant will characterize subsurface hydrology, assess the potential impact of groundwater upon the proposed roadway and storm drainage system, and determine whether or not a groundwater drainage system is required. Geotechnical boring information has been collected by RTD for their I-225 FasTracks project. To the extent that this data is made available to CDOT, it will be provided to the consultant. The consultant may need to supplement this information through additional boring, as directed and authorized by CDOT.
- If a groundwater drainage system is required for Phase II, supplemental work under this contract may include the design of such system. Also, if a groundwater drainage system is required, groundwater quality will likely need to be assessed and the collection and testing of the groundwater may be supplemental work.
- If groundwater is found to be contaminated, the design of a groundwater treatment system may be required, which may be supplemental design work.
- Design of sound barrier walls and retaining walls, and associated foundations; and performance of any geotechnical investigation work associated with the design of such walls.
- Assessment of both existing and proposed future Yale Bridge guardrail requirements, and design of any special guardrail that is needed.
- Pavement design and Life Cycle Cost Analysis. Alternatives analyzed should include full-depth reconstruction and explore the use of existing pavement.
- Geotechnical field sampling and laboratory analyses for pavement design. Specific design parameters to be characterized will be discussed in more detail with the consultant after selection.
- Falling Weight Deflectometer Analysis of existing pavement shoulders and crossovers where traffic will be detoured during construction.
- Grading Plans
- Erosion Control Plans
- Stormwater Management Plans
- Utilities Plans
- Lighting design

- Signing and Striping Plans
- Construction Phasing Plans
- Value Engineering Study
- File Management (ProjectWise and/or Microsoft Windows) assistance as needed.
- Microstation and/or InRoads assistance as needed.
- Assistance with preparing public information displays and attendance at a minimum of one public meeting.
- Meeting minutes.

Descriptions of the consultant responsibilities and duties are further described in this document.

## **7 WORK PRODUCT**

The Consultant work products are:

- Reports
- Field Inspection Review (FIR) Plans
- Final Office Review (FOR) Plans, Specifications
- AD/Bid Plans, Specifications
- Construction Plan Package
- Project Coordination
- Schedules
- Meeting Minutes
- Professional Engineer Stamped Record Sets

Detailed work product requirements are described in the following sections. All work required to complete this Scope of Work requires the use of English Units.

## **8 WORK PRODUCT COMPLETION**

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

## **9 ADDITIONAL PROJECT INFORMATION**

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

- 2000 Environmental Assessment and 2001 FONSI for I-225 Parker Road to North of 6<sup>th</sup> Avenue.
- EA FIR-level plans
- As-Constructed or design plans for adjoining projects - Parker Road Interchange, Iliff Interchange, Mississippi to 2<sup>nd</sup> Widening, RTD I-225 FasTracks
- RTD aerial survey
- CDOT ground survey data
- Preliminary roadway plans in electronic format
- Previously performed survey control/datum information will be provided to the consultant. Survey data and roadway plans are being developed using the UTM coordinate system being used for RTD FasTracks project. All plans prepared for this project will conform to this coordinate system and associated datum.

Copies of these documents may be obtained from CDOT Printing and Visual communications Center, Phone no. 303-757-9214, Room 117, 4201 East Arkansas Avenue, Denver, Colorado 80222, after first contacting the Region 6 design project manager at 303-757-9350 or 303-757-9672. A moderate fee, determined by document size, will be charged. An additional charge will be added for requests by mail or for billing. Please provide a notice of three working days prior to obtaining the document(s) in person.

## **10 SCOPE OF WORK ORGANIZATION**

This draft scope of work has been reviewed by the Department and reflects a plan of approach based on the known goals. One factor determining the selection of a consultant is the ability of that consultant to analyze the project

goals, evaluate the work elements, and formulate a work plan. This process may produce new approaches or modification to the project work elements. Because of that, all consultants should be aware that the Final Scope of Work for a project will be produced with input from the selected Consultant.

**SECTION 2**  
PROJECT MANAGEMENT AND COORDINATION

**1 CDOT CONTACT**

The Contract Administrator for this project is: Reza Akhavan, Region 6 Regional Transportation Director.

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

- A. Name: Rick Erjavec
- B. Title: Resident Engineer
- C. Address: 2000 South Holly Street
- D. Telephone: 303-757-9350
- E. Fax: 303-757-9004

**2 PROJECT COORDINATION**

Coordination will be required with the following:

- A. City of Aurora
- B. Arapahoe County
- C. Regional Transportation District (RTD)
- D. Federal Highway Administration (FHWA)
- E. Utilities
- F. Colorado Department of Public Health and Environment (CDPHE)
- G. CDOT Staff Bridge, ITS, other CDOT organizations

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.

## **SECTION 3**

### **EXISTING FEATURES**

#### **1 STRUCTURES**

Parker Road Interchange  
Iliff Avenue Interchange  
Mississippi Avenue over I-225 – Structure F-17-KL

#### **2 UTILITIES**

Contact Utility Notification Center of Colorado (U.N.C.C.) at 1-800-922-1987  
Fiber Optics – Adesta and CDOT  
Xcel Energy  
Comcast  
Qwest  
City of Aurora Water Department

#### **3 IRRIGATION DITCHES**

none

#### **4 RAILROADS**

none

**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 4**

### **REFERENCE ITEMS NEEDED BY THE CONSULTANT**

#### **1 CURRENT CDOT MANUALS, SPECIFICATIONS, STANDARDS, ETC.**

The consultant shall obtain and utilize the most recent CDOT adopted references including standards and specifications, manuals and software, and any other reference materials as directed by the CDOT/PM.

MS-4 Permanent BMPs are to be selected and designed to satisfy the requirements of the CDOT MS-4 Permit and associated CDOT guidelines and policies.

All survey work, CADD and plansheets will utilize the UTM coordinate system being employed by RTD in the study and design of its FasTracks system.

## **SECTION 5**

### **GENERAL INFORMATION**

#### **1 NOTICE TO PROCEED**

Work will not commence until the written Notice-to-Proceed is issued by the State with certification from the Consultant that the work will be completed within the allotted time. Work may be required, night or day, on weekends, on holidays, or on split shifts. CDOT must concur in time lost reports prior to the time lost delays being subtracted from time charges. Subject to CDOT prior approval the time charged may exclude the time lost for:

- A. Reviews and Approvals.
- B. Response and Direction

#### **2 PROJECT COORDINATION**

##### A. Routine Working Contact

The routine working contact will be between the CDOT Project Manager (CDOT/PM) and the Consultant Project Manager (C/PM) as defined in Appendix C.

##### B. Project Manager Requirements

Each Project Manager will provide the others with the following:

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

#### **3 ROUTINE REPORTING AND BILLING**

The Consultant will provide the following on a routine basis:

##### Coordination

Coordination of all contract activities by the C/PM

##### Periodic Reports and Billings

The periodic reports and billings required by CDOT Procedural Directive 400.2 (Monitoring Consultant Contracts).

##### Minutes of all Meetings:

The minutes will be completed and 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 party responsible for accomplishing it, and the proposed completion date.

##### General Reports and Submittals

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

#### **4 PERSONNEL QUALIFICATIONS**

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

#### **5 CDOT COMPUTER/SOFTWARE INFORMATION**

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

- A. Earthwork            InRoads
- B. Drafting/CADD    InRoads XM and Microstation XM, with CDOT's formatting configurations and standards.
- C. Survey                CDOT Inroads TMOSS
- D. Geometry            CDOT COGO (Coordinate Geometry)
- E. Bridge                Staff Bridge software shall be used in either design or design check
- F. Estimating          Transport (an ASHTO sponsored software)
- G. Specifications      Microsoft Word

#### **6 COMPUTER DATA COMPATIBILITY**

CDOT presently utilizes a data format which Consultants shall be required to use for submitting survey, photogrammetry and the design data: Inroads

The data format used by the Consultant to submit surveying and photogrammetric data shall be as determined by the CDOT/PM in coordination with the respective Region PLS. The data format for submitting design computer files shall be compatible with the latest version of the adopted CDOT 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 is resolved. Refer to Table 1, Submittals, for additional information regarding the InRoads and TMOSS formats and the acceptable transmittal media.

#### **7 PROJECT DESIGN DATA AND STANDARDS**

General:

Appendix A is a list of technical references applicable to CDOT work. The consultant is responsible for ensuring compliance with the latest CDOT adopted version of the listed references. Conflicts in criteria shall be resolved by the CDOT/PM.

Specific Design Criteria:

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

Construction Materials/Methods:

The materials and methods specified for construction will be selected to minimize the initial construction and long-term maintenance cost to the State of Colorado. Non-typical construction materials and methods must be approved in writing by CDOT.

**SECTION 6**  
ENVIRONMENTAL WORK TASK DESCRIPTIONS

## SECTION 7 PRECONSTRUCTION WORK TASK DESCRIPTIONS

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’ in the consultant column, in accordance with the forms and conditions contained herein, 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. 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. 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.

	<u>CDOT/ Other</u>	<u>Consultant</u>
<b>1 <u>PROJECT INITIATION AND CONTINUING REQUIREMENTS</u></b>		
A. Initial Project Scoping Meeting	_____X_____	X_____
Identify scope elements, responsibilities and coordination necessary to complete the work.		
B. Review applicable environmental documents and requirements	_____X_____	X_____
Ensure that any mitigation or commitments are addressed.		
C. Independent design review	_____	X_____
An independent design review shall be performed on any design accomplished by others that will be used in this project. A report identifying the results of these reviews shall be submitted to the CDOT/PM within one week of the review.		
D. Develop a Project Schedule and assign tasks	_____X_____	X_____
E. Identify design criteria.	_____X_____	X_____
Submit a copy of Appendix B -Specific Design Criteria - h the appropriate items completed.		
F. Initiate survey	_____X_____	_____
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.		
G. Obtain necessary Right-of-Entry and permits	_____	X_____
a Some activities may require work on land not controlled by CDOT. In such cases the Consultant shall obtain the necessary written permission to enter the premises.		

- b 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
- c Permissions apply to CDOT personnel as well as Consultant personnel. CDOT Form 730 may be used for this purpose. Signed copies of written permission will be submitted to the CDOT/PM prior to entering private property for survey work.
- d 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.

H. Traffic Control

\_\_\_\_\_ X\_\_\_\_\_

Consultant field activities that interfere with traffic operations within existing roadways will require control of traffic. The Consultant will plan and provide any required traffic control for the survey, testing, or the design process. Traffic control operations will be in accordance with the MUTCD. The proposed Method for Handling Traffic (MHT) must be submitted to the CDOT/PM. Also, certification of the Traffic Control Supervisor as a Worksite Traffic Supervisor by the American Traffic Safety Services Association (ATSSA) or as a TCS (Traffic Control Supervisor) by the Colorado Contractors Association (CCA) shall be required.

I. Initial Submittals

\_\_\_\_\_ X\_\_\_\_\_

Submit the following samples to the CDOT/PM for approval:

- a An original plan sheet that complies with this scope of work
- b Photogrammetric and/or survey data and a drawing or photograph in accordance with the requirements specified in this scope of work.

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

J. Progress Meetings

a CDOT and Consultant Project Managers

\_\_\_\_\_ X \_\_\_\_\_ X\_\_\_\_\_

The managers 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:

- i Activities required to be complete since the last meeting
- ii Problems encountered/anticipated and potential solutions
- iii Project Schedule Update
- iv Action Items
- v Coordination required with other agencies

The consultant will provide meeting minutes.

b Structure Review Meeting

\_\_\_\_\_ X \_\_\_\_\_ X\_\_\_\_\_

While the major structural design work is progressing, the Consultant shall meet periodically with the CDOT Structure Reviewer to review the work. These meetings

CDOT/  
Other

Consultant

may be in addition to, or in conjunction with, the Project Progress Meetings. The complexity of the structure shall be considered by the CDOT Structure Reviewer to determine the frequency of review meetings. Other required meetings are described in subsequent sections.

K. Project Management \_\_\_\_\_X X\_\_\_\_\_

The Consultant will coordinate all the work tasks being accomplished by all parties to ensure project work completion stages are on schedule.

L. Project Meeting Minutes \_\_\_\_\_X X\_\_\_\_\_

Project Meeting Minutes shall be completed and provided to the CDOT Project Manager within one week of the actual meeting

## 2 PROJECT DEVELOPMENT

A. Communication and Consensus Building \_\_\_\_\_X \_\_\_\_\_

a Contact List \_\_\_\_\_X \_\_\_\_\_

Establish and maintain a computerized list of all appropriate interested parties for the communication process. The list will be used for notices regarding public meetings, mailings, newsletters, or other communication as appropriate.

i The information on the list shall include as a minimum:

*A Name*

*B firm (if any)*

*C Mailing/E-mail address*

*D Phone/Fax number*

ii The contacts will be compiled from the list below and as supplemented by the Project Team, and the attendees at public meetings.

*A Public Agencies*

*B Elected/Appointed Officials*

*C Neighborhood Groups*

*D Property Owners/Tenants*

*E Business Interests*

*F Special Interests*

*G Railroads*

*H Media Contacts*

B. Public Notices/Advertisement \_\_\_\_\_X \_\_\_\_\_

Publicize the proposed project in accordance with the CDOT policies and procedures. Copies of the publication shall also be mailed to the individuals on the "contact list".

Information obtained from small group and general public meetings shall be used in the project development process.

a Meetings

The types and number of meetings shall be flexible and determined by an interactive process as approved by the CDOT/PM. Minutes of these meetings shall be provided to the CDOT/PM and all participants.

i Small Group Meetings (one-on-one)

\_\_\_\_\_X\_\_\_\_\_X\_\_\_\_\_

Meet with property and business owners or others directly affected by the project work to identify likely impacts and discuss possible mitigation or resolutions.

ii General Public Meetings (informal and workshops)

\_\_\_\_\_X\_\_\_\_\_X\_\_\_\_\_

The format of these meetings will be dictated by the project and goals for the meetings. These meetings may be used to establish communications with the public, add to the “contact list”, and gather information regarding local concerns. The meetings may also take the form of a work session or workshop with the affected parties.

iii Progress Review Meetings

\_\_\_\_\_X\_\_\_\_\_X\_\_\_\_\_

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, and help conduct the meeting.

b Communication Aids

i Graphics Support

\_\_\_\_\_X\_\_\_\_\_

Provide the graphics for presentations and project documents. This may include slides, overhead projector slides, maps and plan views of conceptual design, computerized presentations and other displays for visual presentations at meetings.

ii Newsletter

\_\_\_\_\_X\_\_\_\_\_

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.

iii Local Office

\_\_\_\_\_NA\_\_\_\_\_

Obtain and maintain an office within the project area to conduct small group meetings and provide displays/information to the public.

C. Survey

Surveys will be conducted in accordance with the CDOT Survey Manual, the latest addendum thereof, and applicable state statutes.

	<u>CDOT/ Other</u>	<u>Consultant</u>
Survey work done under this contract/task order is to be done using UTM coordinate system being used for RTD FasTracks project.		
a Presurvey Conference	_____ X	_____
A presurvey conference shall be held as per CDOT Survey Manual. The consultant shall attend the Presurvey conference prior to any right of way or survey work		
b Survey Data Research.	_____ X	_____
Research shall be done as per CDOT Survey Manual and the CDOT Right-of-Way Manual.		
c Secure Rights of Entry	_____ X	_____
Follow procedures in the CDOT Survey Manual.		
d Project Control Survey:	_____ X	_____
i Locate or Establish HARN Stations	_____ X	_____
Project control shall be tied to the nearest Colorado High Accuracy Reference Network Station (HARN). In the event there are no HARN stations within 3 miles of the project (Order B, 1:1,000,000 accuracy), or HARN Densification (Order B-2, 1:500,000 accuracy), additional HARN Densification stations shall be set. NGS Blue Book procedures shall be followed for all HARN Densification stations. This will include proper spacing using proper monumentation, equipment, observation procedures, coordination through the Colorado State Geodetic Advisor and submission to NGS for inclusion in the National Database.		
ii Monumentation	_____ X	_____
Materials will be supplied by CDOT care is to be taken to install said monumentation in locations that are readily usable for the project and in a safe location so that they can be utilized throughout construction (no monumentation shall be set on or near the centerline of the proposed roadway).		
iii Local Project Control	_____ X	_____
Survey the required project control (centerline/baselines and elevation reference) as required. Prepare a control survey diagram showing graphical representation of all monuments used for control. Tabulate coordinates and physical descriptions of all found monuments and other physical evidence.		
e Land Survey/Boundary Survey	_____ X	_____
Tie aliquot, property and other land monuments to the control survey. Prepare a Land Survey Control Diagram showing graphical representation of all found aliquot, property and land monuments and their relationship to the project control. Tabulate the coordinates and physical description of all found monuments and other physical evidence.		
f TMOSS (Topographic) Survey	_____ X	_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
<p>Collect the data required to produce a planimetric map and submit in TMOSS format. Features located will include, but not be limited to signs, mailboxes, fences, driveways, curb cuts, curbs, sidewalks, and edges of pavements. Horizontal accuracy shall be as specified in the CDOT Survey Manual for a CDOT class C or D TMOSS survey.</p>		
g Terrain (Relief or Elevation) Survey	_____ X _____	_____
<p>Collect elevation data and submit in TMOSS format. Natural ground elevations shall be as specified in the CDOT Survey Manual.</p>		
h Utility Survey	_____ X _____	_____
<p>Locate utility poles, manholes, valves, pedestals, guy wires, and other visible utility features. Survey underground utilities as marked by the utility companies. Determine invert elevations of manholes and vaults and survey the locations of utilities exposed by "potholing".</p>		
i Hydraulic Survey	_____ X _____	_____
<p>Locate culverts, storm sewer pipes, inlets, vaults, manholes and determine invert elevations. Locate inlets and determine invert elevation of pipes. Accomplish drainage situation surveys for designated culverts and bridges.</p>		
j Material Sources	_____ X _____	_____
<p>Survey designated material sources as specified.</p>		
k Supplemental Surveying:	_____ X _____	_____
<p>As required and specifically requested.</p>		
l Survey Report:	_____ X _____	_____
<p>Prepare a Survey Report as required in the Survey Manual.</p>		
m Photogrammetry:	_____ NA _____	_____
i Camera Calibration Report	_____ NA _____	_____
ii Flight Plan	_____ NA _____	_____
iii Flight	_____ NA _____	_____
iv Contact Prints	_____ NA _____	_____
v Negatives	_____ NA _____	_____
vi Enlargements	_____ NA _____	_____
vii Photo Index	_____ NA _____	_____
viii Supplemental Survey (wing points)	_____ NA _____	_____
ix Data Reduction	_____ NA _____	_____
A Topographic Contours		
B Planimetric (Topography)		

	<u>CDOT/ Other</u>	<u>Consultant</u>
x Map Compilation	_____	NA _____
<i>A Index Maps</i>		
<i>B Finished Maps</i>		
n Accuracy Tests:	_____ X _____	_____
Tests are to be performed on a regular basis throughout the project by the consultant.		
o Review by Professional Land Surveyor	_____ X _____	_____
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.		

**Note:**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.

**Note:**This section of the scope of work applies after the environmental clearance document and clearances have been completed. The consultant will obtain and review the applicable environmental clearance documentation (Cat. Ex., EA, EIS) and ensure that all of the commitments within the document are implemented in the design package. This includes but is not limited to the following:

Noise, Air Quality, Alternate Modes, Archaeology, Paleontology, Hydraulics, Hydrology, Water Quality, Ecological Assessment, Historical, Floodplains, Wetlands, ROW, 4f/6f, As well as the following: Threatened and Endangered Species, Hazardous Materials, Traffic and Safety, Environmental Justice and cumulative and indirect impacts.

**Note:**The following requirements for the listed categories “a” through “s” may have been completed in the environmental phase of the project. This list includes those items which require additional refinement or additional study not completed in the Cat. Ex., EA., or EIS.

D. Gathering Data, Analysis, and Mitigation Development	_____	_____
a Traffic Related:	_____	_____
i Traffic Study.	_____ X _____	_____
<i>A Obtain the necessary data and perform 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.</i>		
<i>B The consultant is required to request the appropriate safety document through the CDOT/PM and incorporate the recommendations into the project design.</i>		
b Noise Study:	_____ X _____	_____
Prepare a noise assessment analysis in accordance with FHWA noise impact regulations. As a minimum, this activity will consist of the following:		
i Predict or measure present noise levels.	_____ X _____	_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
ii Analyze noise levels for all concepts. Noise level models will be made with CDOT's noise computer model or as otherwise approved. Distances at which noise levels exceed acceptable levels will be determined for each concept and plotted on corridor maps.	_____X	_____
iii Identify locations where noise abatement measures are needed, and determine which measure is feasible and cost effective.	_____X	_____
iv Prepare noise assessment report for approval by CDOT.	_____X	_____
c Air Quality:	_____X	_____
i Air Quality Monitoring.	_____X	_____
Monitor the air quality including but not limited to particulates, carbon monoxide (during the months of December and January) and ozone (during July and August), to obtain the required data.		
ii Air Quality Analysis.	_____X	_____
Prepare an air quality report and submit it to CDOT for approval.		
iii Alternative Transportation Systems.	_____X	_____
Evaluate the effect of other transportation systems on the proposed concepts when required, including but not limited to alternative modes, TDM (Traffic Demand Modeling) and TSM (Traffic Systems Management).		
d Archaeology	_____X	_____
i Gather Data and Analyze	_____X	_____
A Conduct a field survey and test excavations as specified.		
B Complete 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 (SHPO) and other agencies as required (via the Region Environmental Manager).		
ii Mitigation Implementation	_____X	_____
A Coordinate activities with the designated agencies		
B Excavate the site		
C Analyze artifacts		
D Finalize and submit an archaeology survey report which describes the culture and importance of the artifacts.		
e Paleontology	_____X	_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
i Gather Data and Analyze	_____X	_____
<i>A Determine if paleontologic resources are present within the project site.</i>		
<i>B Conduct a field survey.</i>		
<i>C Conduct a literature survey.</i>		
<i>D If any resources are found, conduct an analysis to determine their significance. Determine the potential for additional resources.</i>		
<i>E Write a preliminary paleontology report.</i>		
<i>F Develop the paleontology mitigation report and coordinate with FHWA.</i>		
ii Mitigation Implementation	_____X	_____
<i>A Coordinate activities as required.</i>		
<i>B Excavate the site.</i>		
<i>C Analyze the resources.</i>		
<i>D Prepare and submit the final paleontology report.</i>		
f Initial Geology Investigation	_____X	_____
A visual inspection of the project area shall be performed to determine possible geologic impacts on the design concepts under consideration. Impacts such as major rock cuts, unsatisfactory subgrade materials, etc., shall be evaluated.		
g Water Quality	_____	X_____
i Quality Analysis	_____	X_____
<i>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: including streams, rivers, lakes, ponds and aquifers.</i>		
<i>B Develop a mitigation plan which includes construction and permanent best management practices for erosion control measures.</i>		
<i>C Identify necessary permits</i>		
ii Write the water quality report	_____	X_____
iii Quality Monitoring	_____	X_____
Collect and analyze samples as required.		
iv Obtain the water quality baseline data prior to construction	_____	X_____
h Ecological Assessment	_____X	_____
i Coordinate with other state and federal agencies as required	_____X	_____
ii Research available data	_____X	_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
iii Conduct a field study (work shall be performed between April 15 <sup>th</sup> and November 15 <sup>th</sup> )	_____ X _____	_____ _____
iv Investigate the concerns raised by coordinated agencies.	_____ X _____	_____ _____
v Write the ecological report.	_____ X _____	_____ _____
i Historical	_____ X _____	_____ _____
i Historical Bridge Clearance	_____ _____	NA _____
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		
ii Historical Study and Clearance	_____ _____	NA _____
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 Determine effects		
D Develop a mitigation plan		
E Develop memorandum of understanding.		
F Write the cultural resources report.		
j Floodplain and Drainage Assessment	_____ _____	NA _____
i Determine the probable impacts of the project with respect to flood plain and drainage.	_____ _____	NA _____
ii Develop possible mitigating actions for the adverse impacts	_____ _____	NA _____
Analyze the impacts and mitigations. Included in the analysis shall be a determination of significant impacts due to:		
A Single community access routes		
B Significant risk for social or economic losses due to flooding		
C Alteration of beneficial floodplain values.		
iii Complete a written “Floodplain and Drainage Assessment Report”	_____ _____	NA _____
The report includes:		
A A detailed discussion of the pertinent aspects of the analysis		
B Identification of the significant floodplain/drainage impacts		
C Possible practical mitigating actions.		

	<u>CDOT/ Other</u>	<u>Consultant</u>
k Right-of-Way	_____ X	_____
i Perform a field inspection of each project alignment	_____ X	_____
Ascertain number of parcels, affected improvements, and possible problem areas (i.e., mobile homes, functional replacements, historical sites, etc.) Try to estimate family sizes on residential relocations.		
ii Compile a ROW cost estimate.	_____ X	_____
iii Prepare a relocation plan.	_____ X	_____
iv Prepare a property ownership map based on tax records which identifies ownerships	_____ X	_____
v Prepare a land use map which identifies land usage.	_____ X	_____
The parcel use categories shall utilize appropriate categories including:		
<i>A Land in public ownership: specific use and responsible agency/jurisdiction</i>		
<i>B Commercial: retail, wholesale, industrial, other commercial</i>		
<i>C Residential: single or multi-family</i>		
<i>D Vacant</i>		
<i>E Mixed Uses</i>		
<i>F Other (specific)</i>		
vi Review the impacts on existing and future land use.	_____ X	_____
l 4(f)/6(f) Activity	_____ X	_____
Determine and evaluate project impacts on 4(f)/6(f) properties. Include a cost analysis with minimization and avoidance alternatives		
i Prepare the applications for 4(f) clearance and 6(f) concurrence.	_____ X	_____
Coordinate with affected agencies (e.g. HUD, US Forest Service, Dept. of Interior, Local Governments. Etc).		
ii Prepare and coordinate determination with FHWA	_____ X	_____
iii Write 4(f)/6(f) mitigation report.	_____ X	_____
m Threatened and/or Endangered Species(T/E)	_____ X	_____
i Determine the presence of Threatened and/or Endangered Species on the site.	_____ X	_____
<i>A Write findings letter to Division of Wildlife.</i>		
<i>B Coordinate with FHWA and USFWS</i>		
<i>C Prepare the Threatened and/or Endangered Species assessment.</i>		
ii Prepare and provide the T/E mitigation plan.	_____ X	_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
n Wetlands		
i Wetlands Determination	_____X	_____
A Conduct a field evaluation for the presence of wetlands.		
B Prepare a wetlands map which identifies the wetland boundaries within the project corridor of each alignment.		
C Coordinate the findings with other agencies as directed by CDOT.		
ii Wetlands Findings Report	_____X	_____
o Hazardous Materials	_____X	_____
i Conduct a field survey of project area.	_____X	_____
ii Research	_____X	_____
Conduct a records search for possible hazardous waste using but any or all of the following:	_____X	_____
A Lists compiled by EPA or Colorado Department of Public Health and Environment (CDPHE) which identify:		
a Hazardous waste generators		
b Hazardous water treatment/storage/disposal facilities (current and closed)		
c Hazardous waste transporters		
d Locations of underground storage tanks		
e Known suspected or abandoned hazardous waste sites		
B Records kept by EPA or CDPHE on violations or citations.		
C Lists kept by the appropriate FIRE department on:		
a Underground storage tank locations		
b HAZMAT incidents/accidents		
c 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		
iii Conduct in-situ tests:	_____X	_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
A <i>Select locations for soil boring/monitoring wells based on information obtained above, geologic review and alignment considerations.</i>		
B <i>Install monitoring wells and obtain soil and water samples for chemical analysis as well as geotechnical and geologic data.</i>		
iv 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.		
p Existing Roadway and Major Structures.	_____	X_____
Evaluate existing conditions to assess the proposed design relative to the following:		
i Roadway and structure condition	_____	X_____
ii Geometry	_____	X_____
iii Lighting	_____	X_____
iv Traffic signal devices	_____	X_____
q Construction Requirements:	_____	X_____
Analyze/investigate the following:		
i General construction impact (of temporary nature)	_____	X_____
ii Noise impacts and mitigation	_____X	_____
iii Material pits	_____	X_____
iv Haul roads	_____	X_____
r Aesthetic Considerations:	_____X	_____
When specified, the following will be investigated:		
i Wild and scenic rivers	_____X	_____
ii Natural areas and trails	_____X	_____
iii Scenic roads and parkways	_____X	_____
iv Overall visual qualities of this project area	_____X	_____
s Utilities	_____X	X_____
When specified, the effect on utilities will be investigated. Work with the Region Utilities Engineer to collect the utility location maps for all utilities in the area.		

**Note: The scope user should include the following wording in consultant contracts for all Federal-aid highway projects on the National Highway System (NHS) with an estimated cost of \$25 million or more (includes environmental studies, preliminary engineering, final design, right-of-way, and construction costs), per 23CFR Part 627. It can also be used on other projects when there is a high potential for significant ratio of savings to study cost, or substantial improvements in project or program effectiveness. User should remove this “usage” text before incorporation into the final scope of work.**

Value Engineering (VE) STUDY

A team of transportation design and construction experts will perform a Value Engineering (VE) study. The VE study will be conducted early enough in the project development process to allow evaluation and incorporation of VE recommendations in the NEPA document or design process, as appropriate.

\_\_\_\_\_ X\_\_\_\_\_

The VE study shall be performed in accordance with Federal Highway Administration’s (FHWA) guidelines and recognized techniques, and will identify possible alternatives that may save the project cost, time or other resources. An individual with prior experience and certification in facilitating VE studies (the VE facilitator) shall conduct each VE session. It is strongly recommended that VE facilitators be qualified VE practitioners, experienced in performing and leading VE studies (have participated in several VE studies as a team member and several as a team leader), and have sufficient VE training, education, and experience to be recognized by the Society of American Value Engineers (SAVE) International as meeting the requirements for certification.

\_\_\_\_\_ X\_\_\_\_\_

The VE team will consist of individuals with no prior exposure to the project in order to ensure that their comments are fair and unbiased. Individuals that have some familiarity and history with the project may provide briefings to the team. Consultants or firms should not conduct studies of their own designs unless they maintain distinct organizational separation of their VE and design sections. At the direction of the CDOT/PM, the VE team will be assembled to review the Conceptual,. Background information and plans shall be provided to the team at least three weeks in advance of VE sessions. The VE facilitator will coordinate the study with CDOT, appropriate entities, and FHWA.

\_\_\_\_\_ X\_\_\_\_\_ X\_\_\_\_\_

The VE review team will formally evaluate each VE recommendation, and sufficient justification will be made for the acceptance or rejection of each. The VE facilitator will produce a document that summarizes the results, as well as the project elements investigated

\_\_\_\_\_ X\_\_\_\_\_ X\_\_\_\_\_.

The Consultant/PM shall prepare a written response detailing which recommendations were not included, the reasons for exclusion, and how all approved VE results will be incorporated into subsequent engineering efforts. These responses shall be forwarded to the CDOT/PM for distribution to the CDOT Region Transportation Director, FHWA, and other appropriate entities. All approved VE proposals shall be incorporated into the final design plans

\_\_\_\_\_ X\_\_\_\_\_ X\_\_\_\_\_

3 **PRELIMINARY DESIGN**

A. Traffic Engineering

- |   |   |             |        |
|---|---|-------------|--------|
| a | Review locations with “potential for accident reduction map” and or traffic operations analysis and or the safety assessment report. As provided by CDOT to determine which safety improvements will be incorporated into the project.  | _____X_____ | _____  |
| b | Analyze the proposed project design with the traffic projection data  | _____X_____ | _____  |
| c | Recommend the appropriate geometry (i.e., number of lanes, auxiliary lanes, storage lengths, weaving distances, etc.) In accordance with the current or most recent version of Highway Capacity Manual.                                 | _____X_____ | _____  |
| d | The proposed design shall be reviewed to ensure compatibility with existing signing procedures throughout the preliminary roadway design process  | _____X_____ | _____  |
| e | Use traffic data appropriate to the anticipated construction timing in developing detour alternatives.  | _____X_____ | _____  |
| f | Develop the total ESAL for the design life and submit to the CDOT/PM for the pavement design. Twenty-year flexible ESALS and 30-year rigid ESALS will be required. The base year shall be the anticipated construction completion date. | _____       | X_____ |
| g | Submit the traffic data and recommendations to the CDOT/PM for review.  | _____       | X_____ |

B. Materials Engineering

- |     |  |       |        |
|-----|--|-------|--------|
| a   | Preliminary Soil Investigation   | _____ | X_____ |
| i   | Determine test hole locations (horizontal and vertical) and coordinate with the CDOT/PM.                                   | _____ | X_____ |
| ii  | Collect soil samples and test for:   | _____ | X_____ |
|     | <i>A Classification</i>  |       |        |
|     | <i>B Moisture – Density Relationship</i>   |       |        |
|     | <i>C Resistance Value</i>  |       |        |
|     | <i>D Corrosiveness</i>   |       |        |
|     | <b>a</b> <i>Note locations of high corrosiveness with recommendations</i>  |       |        |
|     | <i>E Bearing Capacity</i>  |       |        |
|     | <i>F Swell / Consolidation</i>   |       |        |
|     | <i>G Sulfate Levels</i>  |       |        |
|     | <i>H Static Modulus of Subgrade Reaction (k) – using correlation testing (See 2009 CDOT Pavement Design Guide) and FWD</i> |       |        |
| iii | Prepare and submit a soils investigation report.   | _____ | X_____ |

	<u>CDOT/ Other</u>	<u>Consultant</u>
C. Pavement		
a Pavement Rehabilitation	_____	X_____
This section applies if the project includes existing pavement that is incorporated in the design for continued utilization.		
The analyses of existing pavement conditions shall include existing shoulder areas that may be used to temporarily carry traffic during construction and to points of tie-in into existing pavement, as specified by the CDOT PM.		
i Determine the equivalent Design Traffic (18k ESAL) that the existing pavement can carry	_____	X_____
ii Estimate the 18k ESAL's experienced by the existing pavement.	_____	X_____
iii Obtain the projected 18k ESAL for rehabilitated pavement design period.	_____	X_____
iv Perform a distress survey	_____	X_____
A Determine the types of distress present in the pavement		
B Determine the extent of each distress type		
C Develop a distress map for the existing pavement		
D Determine the causes of the existing distress utilizing tests and required and analyses.		
E Determine the drainage conditions of the existing surface and subsurface		
v Investigate the existing pavement structure	_____	X_____
A Subgrade: soil classifications, moisture/density relationship, resistance value and corrosiveness		
B Base: thickness, gradation, plasticity index, liquid limit, resistance value, strength coefficient		
C Pavement: thickness (overall thickness and, if applicable, thickness of individual layers), strength coefficient		
vi Perform deflection testing to obtain the following:	_____	X_____
A Deflection profile		
B Maximum deflection		
C Deflection basin		
D Differential deflections at transverse joints for portland cement concrete pavement (pccp)		
E In place determination of the appropriate modulus for each layer and subgrade		
vii Determine the remaining load carrying capacity from the above data.	_____	X_____
viii Design the feasible alternatives for the required rehabilitation (and widening if appropriate) utilizing the above investigations and test results.	_____	X_____
The design of the feasible alternatives shall be checked against the following:	_____	X_____
A The basic cause of distress which shall be corrected		

	<u>CDOT/ Other</u>	<u>Consultant</u>
<p><i>B Effect on the rate of future deterioration</i></p> <p><i>C Effect on surface characteristics</i></p> <p>Where appropriate, any new pavement widening shall be included in the analysis</p>		
b New Pavement Structure	_____	X_____
<p>The feasible alternatives of new pavement structure shall be designed utilizing procedures accepted by the CDOT/PM. New pavement designs for widening shall be compatible with adjacent rehabilitated existing pavement.</p>		
c Pavement Justification	_____	X_____
i Basic factors:	_____	X_____
<p><i>A Desired life expectancy (obtain design life from CDOT).</i></p> <p><i>B Required maintenance activities intervals.</i></p> <p><i>C Basis for performance life.</i></p>		
ii Analyze life cycle cost of the selected alternatives	_____	X_____
<p><i>A Perform deterministic and probabilistic analyses with unit and maintenance costs from CDOT. Determine present worth and annual costs in accordance with the procedures in the CDOT Pavement Design Guide.</i></p> <p><i>B Compare alternatives over the same life span.</i></p> <p><i>C Recommend the pavement structure and provide the basis for the recommendations.</i></p>		
d Pavement Design Report	_____	X_____
<p>Include all the above tests, investigations, analyses, and calculations performed as a result of this section. Submit to the CDOT/PM for acceptance.</p>		
D. Structures		
a Existing bridge condition investigation	_____	X_____
<p>Determine condition of existing bridge deck, superstructure and substructure material as required.</p>		
b Foundation Investigation Report	_____	X_____
i Prepare a Foundation Investigation Request showing requested test hole locations.	_____	X_____
ii Formulate drilling pattern, perform the necessary subsurface investigation and collect samples as required.	_____	X_____
iii Perform the appropriate laboratory tests and analyze the data. Determine strength, allowable bearing capacity and corrosiveness of foundation material.	_____	X_____
iv Perform lateral analyses (deformation, moment, and shear) for the caissons and/or piles which are subjected to lateral loadings. This may be a computer		

	<u>CDOT/ Other</u>	<u>Consultant</u>
analysis which will consider the group effect and selection of the soil parameters.	_____	X_____
v If appropriate, a pile driving analysis using a wave equation will be accomplished.	_____	X_____
vi Submit the Foundation Investigation Report to the CDOT/PM for approval.	_____	X_____
vii Prepare engineering geology plan sheet and copies of the Foundation Investigation Report foundation report with recommendations for type, size, and tip (bottom) elevation of the required foundation. Specify if pre-drilling, pile tip, casing, dewatering, etc., are needed for foundation construction.	_____	X_____
E. Hydrology/Hydraulic Engineering (for Phase II – Parker Road to Iliff)	_____	X_____
a Hydrology	_____	X_____
i Establish drainage basin data: delineate, determine size, waterway geometrics, vegetation cover, land use.	_____	X_____
ii Collect historical data; research flood history and previous designs in the project proximity; and obtain data from other sources (e.g., Urban Drainage & Flood Control District, Colorado Water Conservation, CDOT Maintenance, and local residents).	_____	X_____
iii Select a storm frequency based on the CDOT Hydraulic (Drainage) Design Guide criteria.	_____	X_____
iv Do a hydrological analysis using existing studies or approved methods (see CDOT Drainage Design Manual)?	_____	X_____
v Perform a risk analysis.	_____	X_____
vi <i>Characterization of subsurface hydrology in the vicinity of the Alameda Bridge</i>	_____	X_____
<b>a</b> <i>Groundwater levels</i>		
<b>b</b> <i>Assessment of potential impacts to roadway and storm drainage system</i>		
<b>c</b> <i>Determination of need for groundwater drainage system</i>		
b Hydraulics	_____	X_____
i Accomplish the preliminary design of minor drainage structures:	_____	X_____
A <i>Determine location and crossing alignment. Identify channel centerline by highway station or coordinates, as appropriate</i>		
B <i>Determine the allowable headwater.</i>		
C <i>Assess the degree of sediment and debris problems to be encountered, including abrasion and corrosion.</i>		
D <i>Type, size, shape and material of the structures.</i>		
E <i>Prepare preliminary structure cross-sections to determine the elevations, flow lines, slopes and lengths of the structures. Show the flow quantity on the sections</i>		

	<u>CDOT/ Other</u>	<u>Consultant</u>
<i>F Complete the design computations and documentation in accordance with the CDOT Drainage Design Manual.</i>		
<i>G Determine high water level.</i>		
ii A water surface profile and complete hydraulic analysis is required for major structures. Determine the following:	_____	NA _____
<i>A Water surface profile and hydraulic analysis</i>		
<i>B Required hydraulic size and skew of the bridge</i>		
<i>C Minimum low girder elevation using CDOT Drainage Design Manual criteria</i>		
<i>D The design year frequency</i>		
<i>E The design year and 500 year high water elevations</i>		
<i>F Predicted total scour profile for design year and 500 year scour</i>		
<i>G The channel erosion protection for structures</i>		
iii If required, identify and assist CDOT in coordinating any required potential funding participation of local municipalities or agencies.	_____	X_____
iv Recommend culvert pipe sizes, type, shape and material for proposed detours.	_____	X_____
c Storm Water Management Plan	_____	X_____
i Initiate a Storm Water Management Plan in accordance with:		
<i>A Municipal Separate Storm Sewer Systems (MS4)</i>		
<i>B CDOT's Erosion Control and Storm Water Quality Guide</i>		
<i>C CDOT's Standard Specifications</i>		
<i>D CDOT Standard Plans</i>		
<i>E Other appropriate documents</i>		
d Preliminary Hydraulics and Hydrology Report. Include the following:	_____	X_____
<i>A Hydrology analysis</i>		
<i>B Minor structure hydraulic designs</i>		
<i>C Major structure hydraulic designs</i>		
<i>D Detour hydraulic designs</i>		
<i>E Structure cross-sections</i>		
<i>F Storm Water Management Plan</i>		
<i>G Characterization of subsurface hydrology in the vicinity of the Alameda Bridge</i>		
<i>a Groundwater levels</i>		
<i>b Assessment of potential impacts to roadway and storm drainage system</i>		
<i>c Determination of need for groundwater drainage system</i>		
<i>H Appendix:</i>		
<i>a Drainage basin maps</i>		
<i>b Hydrology/hydraulic worksheets</i>		

	<u>CDOT/ Other</u>	<u>Consultant</u>
<b>F. Utility Coordination</b>		
a Location Maps	_____X	X_____
Obtain utility location maps from the Utility Companies which identify utility features in the project area. Requests and receipt of maps will be coordinated with the Region Utility Engineer via copies of request and transmittal letters.		
b Reviews and Investigations	_____X	X_____
Conduct field reviews and utility investigations with the Region Utility Engineer and Utility companies, as required, to ensure correct horizontal and vertical utility data. When possible this will be done utilizing non-destructive investigative techniques. The horizontal and vertical locations will be shown in the FIR plans and cross sections.		
		When “potholing” is required, the Consultant shall be responsible for the excavation
	_____	X_____
c Surveying Utility Locations	_____X	_____
d Relocation Recommendations	_____	X_____
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.		
e Ditch Company Coordination	_____	NA _____
Contact ditch companies through the Region Utility Engineer to coordinate ditch requirements and restrictions. Develop the plans for the necessary irrigation structures and submit to the Region Utility Engineer for Ditch Company review.		
<b>G. Roadway Design and Roadside Development</b>		
Coordinate all design activities with required CDOT specialty units and other outside entities.		
a Roadway Design	_____X	_____
i Check and plot survey data	_____X	_____
ii Verify that a project specific coordinate system approved by CDOT is used to identify the horizontal locations of key points. The coordinate systems used for roadway design and ROW shall be compatible.	_____X	_____
iii Check horizontal and vertical alignments against all design criteria. Necessary variances and/or design decisions will be identified with justification and concurrence by CDOT & FHWA.	_____X	_____
iv Provide alignments, toes of slope and pertinent design features, including permanent and temporary impacts, to the ROW, Utility and Environmental Managers.	_____X	_____
v Plot/develop all required information on the plans in accordance with all applicable CDOT policies and procedures	_____X	_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
vi Using current approved CDOT software, generate a 3 dimensional design model and produce preliminary quantities	_____X	_____
b Roadside Development:	_____X	_____
For roadside items including but not limited to, guardrails, delineators, landscaping, sprinkler systems, sound barriers, bike paths, sidewalks, lighting, curb ramps, truck escape ramps, and rest areas provide the following:	_____X	_____
i Layouts in the plans		
ii Critical locations in the plans for irrigation sleeves and other utility conduits underneath the proposed roadways.		
iii Coordinate the roadside items with the Storm Water Management Plan (SWMP).		
H. Right-of-Way.	_____X	_____
The following work shall be done by, or under the immediate supervision of, a Professional Land Surveyor (PLS). The following work may be included as part of a Surveying contract or part of a Right-of-Way plans preparation contract.		
a Research	_____X	_____
i Identify affected ownership from preliminary design plans	_____X	_____
ii Obtain assessor's maps for the project	_____X	_____
iii Locate documents which transfer title.	_____X	_____
iv Prepare chain of title as directed by the CDOT ROW Manual or as directed by the CDOT Project Manager.	_____X	_____
v Look for encumbrances, liens, releases, etc.	_____X	_____
vi Make physical inspection of property. Note any physical evidence of apparent easements, wells, ditches, ingress, and egress.	_____X	_____
vii Check with local entities such as the County Road Department or County Engineer for location of existing roads or easements.	_____X	_____
viii Check for and obtain latest subdivision plats and vacations of streets.		
b Ownership Map	_____X	_____
For additional detail on required drafting software, see Section 8 Submittals. Project coordinate system ownership map shall be submitted along with a "Project Narrative".	_____X	_____
i Review preliminary design and survey report	_____X	_____
ii Review project coordinate system and basis of bearing from Control Survey prior to calculations.	_____X	_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
iii Compute alignment of ROW centerline and store coordinates of all found monuments within the FIRst tier of properties left and right of Centerline.		
iv Review ownership documents (Memoranda of Ownership and/or title commitments, deeds and supporting plats).	_____X	_____
v Calculate coordinates of lost or obliterated aliquot corners using guidelines established by the Bureau of Land Management. (To be used in resetting corners according to Colorado Revised Statutes).	_____X	_____
vi 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.	_____X	_____
vii Determine existing Right-of-Way limits from deeds of record, CDOT plans and found ROW markers. Previous Right-of-Way plans, if available, will be provided by CDOT as an aid.	_____X	_____
viii Determine ownerships and their property boundary locations. Locate the intersection of these property boundary lines with the existing CDOT Right-of-Way. Determine location and ownership of existing easements of record.	_____X	_____
ix Secure additional property ties and additional topography where the highway improvement may affect improvements adjacent to the Right-of-Way. This additional topography should include:	_____X	_____
A Proximate buildings, sheds, etc.		
B Underground cables and conduits		
C Wells		
D Irrigation ditches and systems		
E Septic tanks, cesspools, and leaching fields		
x Reconcile overlaps and gaps in ownerships as required by CDOT, documenting method used (may require additional field work). Include reasons for decisions in the "Project Narrative".	_____X	_____
xi Plot OWNERSHIP MAP on 22 inch x 34 inch Mylar sheets in accordance with specifications. DOT Form 126-R 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. Metric equivalents may be required.	_____X	_____
xii Label all monuments found with description of monument and project coordinates (from Control Survey Diagram).	_____X	_____
xiii Show improvements and topography within the ownerships and existing access to the street/county road system	_____X	_____
xiv Number ownerships alternately as they occur along the centerline from south to north or west to east in the same direction as the stationing. Show current names of owners and lessees.	_____X	_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
xv Calculate the total area of all ownerships affected, including coordinates of all property corners. Deduct areas for existing road Rights-of-Way. Bearings and distances do not need to be shown on 1" = 1 mile abbreviated OWNERSHIP MAPS.	_____ X	_____
xvi Different land uses within a property should be cross-hatched or shaded	_____ X	_____
xvii In the lower right corner of the OWNERSHIP MAP, show seal, number and name of Professional Land Surveyor supervising the work.	_____ X	_____
xviii Transmit finished reproducible OWNERSHIP MAP, electronic drawing files, and Memoranda of Ownership to CDOT along with all calculations, field notes, and supporting data. The OWNERSHIP MAP will include a copy of the control and monumentation sheet	_____ X	_____

**Note that only the project control data needs to be completed at this time.**

I. Major Structural Design:

Major structures are bridges and culverts with a total length greater than twenty feet or 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 sign structures (sign bridges, cantilevers, and butterflies extending over traffic) are also major structures, but are exempt from the structure preliminary design activity defined here.

\_\_\_\_\_ X \_\_\_\_\_

Major structures shall be designed in accordance with the AASHTO Load Resistance Factor Design (LRFD) Specifications and the CDOT Bridge Design Manual. The CDOT Structure Reviewer will participate in coordinating this activity.

a Structural Data Collection

\_\_\_\_\_ X \_\_\_\_\_

i Obtain the structure site data. The following data, as applicable, shall be collected: (Typical roadway section, roadway plan and profile sheets showing all alignment data, topography, utilities, preliminary design plan) Right-of-Way restrictions, preliminary hydraulics and geology information, environmental constraints, lighting requirements, guardrail types, recommendations for structure type, and architectural recommendations.

ii Obtain data on existing structures. When applicable, collect items such as existing plans, inspection reports, structure ratings, foundation information, and shop drawings. A field investigation of existing structures will be made with notification to the Resident Engineer.

b Structure Selection and Layout

\_\_\_\_\_ X \_\_\_\_\_

i Review the structure site data to determine the requirements that will control the structure size, layout, type, and rehabilitation alternatives. On a continuing basis, provide support data and recommendations as necessary to finalize the structure site data.

ii Determine the structure layout alternatives. For bridges, determine the structure length, width, and span configurations that satisfy all horizontal and vertical

clearance criteria. For walls, determine the necessary top and bottom of wall profiles.

- iii Determine the structure type alternatives. For bridges, consider precast and cast-in-place concrete and steel superstructures and determine the spans and depths for each. For walls, determine the feasible wall types in accordance with the CDOT Bridge Design Manual.
- iv Determine the foundation alternatives. Consider piles, drilled caissons, spread footings, and mechanically stabilized earth foundations based on geology information from existing structures and early estimates from the project geologist. To obtain supporting information, initiate the foundation investigation as early as possible during the preliminary design phase.
- v Determine the rehabilitation alternatives. Continued use of all or parts of existing structures shall be considered as applicable. The condition of existing structures shall be investigated and reported. Determine the modifications and rehabilitation necessary to use all or parts of existing structures and the associated costs.
- vi Develop the staged construction phasing plan, as necessary for traffic control and detours, in conjunction with the parties performing the roadway design and traffic control plan. The impact of staged construction on the structure alternatives shall be considered and reported on.
- vii Compute preliminary quantities and preliminary cost estimates as necessary to evaluate and compare the structure layout, type, and rehabilitation alternatives.
- viii Evaluate the structure alternatives. Establish the criteria for evaluating and comparing the structure alternatives that, in addition to cost, encompass all aspects of the project's objectives. Based on these criteria, select the optimum structure layout, type, and rehabilitation alternative, as applicable, for recommendation to CDOT.
- ix 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

\_\_\_\_\_ X\_\_\_\_\_

Prepare a structure selection report to document, and obtain approval for, the structure preliminary design. By means of the structure general layout, with supporting drawings, tables, and discussion, provide for the following:

- i Summarize the structure site data used to select and layout the structures. Include the following:
  - A Existing structure data, including sufficiency rating and whether or not the structure is on the "select list".
  - B Project site plan

*C Roadway vertical and horizontal alignments and cross sections at the structure*

*D Construction phasing*

*E Utilities on, below, and adjacent to the structure*

*F Hydraulics:*

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

*G Preliminary geology information for structure foundation*

*H Architectural requirements*

ii Report on the structure selection and layout process. Include the following:

*A Discuss the structure layout, type, and rehabilitation alternatives considered*

*B Define the criteria used to evaluate the structure alternatives and how the recommended structure was selected*

*C Provide a detailed preliminary cost estimate and general layout of the recommended structure*

iii Obtain acceptance by CDOT on the recommended structure and its layout.

Allow approximately two weeks for review of the structure selection report. The associated general layout, with the revisions required by the CDOT review, will be included in the FIR plans. The 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 \_\_\_\_\_ X\_\_\_\_\_

Initiate the foundation investigation as early in the preliminary design phase as is practical. On plan sheets showing the project control line, its stations and coordinates, utilities, identify the test holes needed and submit them to the project geologist. The available general layout information for the new structure shall be included in the investigation request.

J. Construction Phasing Plan \_\_\_\_\_ X\_\_\_\_\_

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.

K. Preparation for the FIR \_\_\_\_\_ X\_\_\_\_\_

a Coordinate, complete, and compile the plan inputs from other branches: materials, hydraulics, traffic, right-of-way, and Staff Bridge.

- 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 base on estimated quantities.
- d The FIR plans shall comply with CDOT requirements and shall 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, including pipes, inlets, ditches and channels), and existing utility locations.

- i The following items will be mandatory for the FIR plans:

- A *Preliminary earthwork (plotted cross sections at critical points with roadway template and existing utility lines at known or estimated depths)*
- B *Catch points*
- C *Proposed Right-of-Way*
- D *Pit data (if required)*
- E *Soil profile and stabilization data*
- F *Structure general layouts (if applicable)*

- ii Typical plan sheet scales will be as follows:

- A *Plan and Profile*                      *1 inch = 50 Feet (Urban)*  
*1 inch = 100 Feet (Rural)*
- B *Intersections*                      *1 inch = 20 feet*

- e The ROW ownership map shall be included in the FIR plan set.
- f The plans shall be submitted to the CDOT/PM for a preliminary review prior to the FIR.
- g The plans will be reproduced by CDOT.
- h The construction phasing and the preliminary traffic control plan with proposed detours will be included in the FIR plan set.
- i CDOT form 1048 – project scoping procedures completion checklist

L. Field Inspection Review

\_\_\_\_\_ X                      X \_\_\_\_\_

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

CDOT/  
Other

Consultant

- c The FIR original plan sheets shall be revised/corrected in accordance with the FIR meeting comments within thirty (30) working days.
- d Design decisions concerning questions raised by the FIR will be resolved in cooperation with the CDOT/PM. The C/PM shall document the decision and transmit the documentation to the CDOT/PM for approval.
- e A list of all deviations from standard design criteria along with the written justification for each one shall be submitted to the CDOT/PM.

M. Post-FIR Revisions

\_\_\_\_\_

X\_\_\_\_\_

The Consultant shall complete the revisions required by the FIR before this phase of work is considered to be complete.

	<u>CDOT/ Other</u>	<u>Consultant</u>
4 <b><u>FINAL DESIGN</u></b>		
A. Project Review	_____X	X_____
a. Update Project Schedule		
b. Coordinate Activities		
c. Finalize design decisions, variances, justification process, and traffic signal warrants.		
B. Roadway Design and Roadside Development	_____	X_____
a. Roadway design. Prepare and provide final roadway design plans incorporating all input from applicable CDOT specialties and outside entities.		
b. Roadside design		
c. Landscaping	_____	X_____
<p>The consultant will develop plans for restoration of City of Aurora landscaping in the vicinity of the Alameda Bridge in coordination with the City of Aurora, and as directed by the CDOT PM.</p>		
i. Determine most economic alternative, finalize concept, and complete the plan.		
ii. Verify that an acceptable safe recovery distance exists between traveled way and all trees to be planted.		
iii. Coordinate special permits that may be required.		
iv. Verify availability of plant materials and submit letter to the CDOT/PM certifying that designated plants are available.		
d. Prepare and provide plans for sprinkler systems, bike paths, sound barriers, truck escape ramps, rest areas, and others, as appropriate.		
e. Lighting plans	_____	X_____
i. Provide a foundation investigation for each high mast light location.		
ii. After approval of the locations of the lights, the lighting design will be completed with the following information shown on the plan sheets:		
A. <i>Circuit type and voltage of power source</i>		
B. <i>Location of power source (coordinated with the utility engineer)</i>		
C. <i>Lumina ire type and lumens</i>		
D. <i>Light standard type and mounting height</i>		
E. <i>Bracket arm type and length</i>		
F. <i>Foundation details</i>		
G. <i>Size and location of electrical conduit</i>		
H. <i>Locations of power sources(s)/lighting control center(s) (if appropriate)</i>		

- I. Location of direct burial cable
- J. Size of wiring and/or direct burial cable

- iii. Coordinate with local entities
  - f. Prepare and provide wetland mitigation plan.
- C. Utility Coordination.

Following the finalization of the roadway horizontal alignment and profile grade and the horizontal and vertical location of drainage structures, sewers, and other underground structures, coordinate with the Utility Engineer to identify and resolve any conflicts to finalize utility clearances.

- a. Prepare and provide final utility plans \_\_\_\_\_ X\_\_\_\_\_
  - i. The final utility plans shall be prepared following the resolution of the FIR comments, the completion of the final hydraulic design, and the completion of the design of the other items in the list in paragraph (b) below.
  - ii. The final utility plans shall include all horizontal and vertical locations of the existing and proposed utilities and any other details which would indicate possible utility conflicts.
  - iii. The new or revised utility locations will be added to the plan topography. Conflicts will be resolved and appropriate pay items and specifications added, if required, to adjust utilities.
- b. Final railroad plans  
Coordinate the following activities through the Region Utility Engineer
  - i. Develop the railroad encroachment plan (with cross sections) in accordance with railroad requirements.
  - ii. Define construction responsibilities between the railroad and highway
  - iii. Develop cost estimates based upon cost allocation previously determined
  - iv. Prepare Public Utilities Commission application exhibits as required.

D. Hydraulic Design

- a. Data Review \_\_\_\_\_ X\_\_\_\_\_

Review data and information developed under the Preliminary Hydraulic Investigation and update in accordance with decisions made at the FIR.
- b. Storm Water Management Plan \_\_\_\_\_ X\_\_\_\_\_
  - i. Update the Storm Water Management Plan in accordance with decisions made at the FIR and on additional investigation since the FIR.
  - ii. Identify and incorporate MS4 requirements into the final plans.
- c. Major Structure Channel Design \_\_\_\_\_ NA \_\_\_\_\_

The final design shall include:

- i. The configuration, size and skew of the channel(s)
  - ii. Water surface elevations
  - iii. Elevations, flow lines and hydraulic information
  - iv. Channel erosion protection limits for the structure(s)
  - v. Recommend a low girder elevation for the selected structure(s)
  - vi. Predict scour depth in the channel for the selected structure(s), and recommend mitigation measures
- d. Final Hydraulics Report \_\_\_\_\_ X\_\_\_\_\_
- i. Review and update the preliminary hydraulics report and provide 5 copies of the final hydraulics report containing all of the revisions
  - ii. Bridge hydraulic information incorporated into the plan sheets
- E. Right-of-Way Plans and activities - reference the CDOT ROW and surveying manual' requirements for the following:
- a. Initiate ROW authorization process \_\_\_\_\_ X \_\_\_\_\_  

Coordinate with the CDOT/PM to initiate the ROW authorization process. Typically, the corrected FIR plans (with final hydraulic design inputs) will be used as the design basis for the ROW authorization plans.
  - b. Ownership Maps \_\_\_\_\_ X \_\_\_\_\_
  - c. Authorization Plan: \_\_\_\_\_ X \_\_\_\_\_
    - i. Integrate toes of slopes and other design details such as lane lines, culverts, road approaches, etc. into ownership map (base map for ROW plans).
    - ii. Determine new Right-of-Way requirements, access control, and easements from design plans following the FIR and plot on ownership/base maps. Normal scale, 1"=50' in urban areas, 1"=100' in rural areas. Metric units may be required as per PM. Metric scales will be as shown in the CDOT "Metric Conversion Manual". Revise numbering of ownerships to correspond to ROW acquisitions.
    - iii. Calculate areas of parcels, easements, and remainders in accordance with CDOT Right-of-Way Manual.
    - iv. Prepare ROW plan sheets
    - v. Prepare legal descriptions of parcels, easements and access control as directed by the CDOT ROW Manual
    - vi. Prepare tabulation of properties sheet
    - vii. Prepare Right-of-Way Title Sheet
    - viii. Incorporate the Control Survey and Monumentation Sheets into the plans.

	<u>CDOT/ Other</u>	<u>Consultant</u>
ix. On the Monumentation Sheet, list the Right-of-Way, Easement, Control, etc., points to be set and the aliquot corners to be reset.		
x. 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.		
xi. Hold ROW Plan Review, with Design, ROW, and Construction to determine if ROW plans are sufficient to proceed with appraisal of property to be acquired for the project.		
xii. Transmit originals of the plan sheets, title sheet, tabulation of properties sheet, and revised ownership (memoranda of ownership and title commitments as directed by the ROW manager), calculations and supporting data (i.e., parcel diaries), and final electronic data for all work products.		
d. Right-of-Way Plan Revisions	_____X_____	_____
Revise 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. All plan revisions shall be submitted to the Region Right-of-Way Supervisor within 5 working days after receiving notice from CDOT to proceed with a Plan Revision.		
e. Final ROW plans and monumentation	_____X_____	_____
i. ROW Plan Review	_____X_____	_____
ii. ROW Plan Revisions, as needed throughout the negotiation and appraisal process.	_____X_____	_____
f. Appraisals	_____X_____	_____
g. Appraisal staking	_____X_____	_____
Stake the proposed ROW line, easements and existing ROW line, if required by the region supervisor. Set lath or wooden stakes at all angle points and on line as necessary to have at least three stakes visible from any point on line. Mark COGO point numbers on all stakes and color code per CDOT Survey Manual. The appraisal stakes only need to be set at an accuracy of +/- 1.0 foot, unless the point fall near improvements, then +/- 0.25 foot is necessary.		
h. Title Insurance and Closing Services	_____X_____	_____
Provide title insurance and closing services as described in the CDOT ROW Manual and coordinate with the CDOT Region ROW Manager.		
i. Acquire needed parcels including title insurance and closing services coordinated with the Region ROW Manager	_____X_____	_____
F. Materials Engineering	_____	X_____
a. Finalize and provide the stabilization plan/pavement design report.	_____	X_____
b. Finalize geotechnical considerations and incorporate them into the plans.	_____	X_____
i. Rock fall		

	<u>CDOT/ Other</u>	<u>Consultant</u>
ii. Rock cut		
iii. Landslides		
iv. Other		
G. Traffic Engineering	_____	X_____
a. Prepare and provide permanent signing/pavement marking plans		
b. Signalized intersections:	_____	X_____
i. Prepare and provide the signal warrant study	_____	X_____
ii. Prepare plan sheet with intersection condition diagrams and required traffic signal design and forward to appropriate agency. Prepare 1 inch to 20 foot scale intersection plan sheet for each intersection which will have a traffic signal designed for it.	_____	X_____
c. Prepare and provide the construction traffic control plans and quantities	_____	X_____
H. Final Major Structural Design		
<p>During the conduct of this activity the Consultant shall participate in structural review meetings with the CDOT Structural Reviewer. The design shall be in accordance with the AASHTO LRFD and the CDOT Bridge Design Manual.</p>		
a. Structure final design	_____	X_____
i. Perform the structural analysis. Provide superstructure design, substructure design and document the design with design notes, detail notes, and computer outputs.		
ii. Perform final design check from design and detail notes.		
b. Preparation of structure plans and specifications	_____	X_____
Prepare and provide the Structural Plans and Specifications, including any revisions identified during the independent check.		
c. Independent design, detail and quantity check	_____	X_____
d. Prepare and provide the bridge rating and field packages	_____	X_____
I. Construction Phasing Plan	_____	X_____
<p>A final construction phasing plan will be developed which integrates the construction of all project work elements into a practical and feasible sequence. This plan shall accommodate the existing traffic movements during construction, and a final traffic control plan will be developed which shall be compatible with the phasing plan.</p>		
J. Obtain Permits		
<p>This activity is concurrent with final design and must be completed prior to the advertisement for construction. Coordinate between the agencies, the Region Environmental Manager and the CDOT/PM and prepare and submit application and design information to the Region Environmental Manager for the following permits:</p>		

	<u>CDOT/ Other</u>	<u>Consultant</u>
a. 401 Permit Process (Water Quality Certification)	_____	X_____
b. 402 Permit Process (Point Source Discharge)	_____	X_____
c. 404 Permit Process (Individual Dredge and Fill)	_____	X_____
i. Determine impacts		
ii. Coordinate with the U.S. Army Corps of Engineers, Region and Staff Design		
iii. Incorporate permit stipulations into the final plans		
d. Wildlife Certification	_____	X_____
e. NPDES Storm Water Permit for Construction Activities	_____	X_____
K. Plan Preparation for the Final Office Review		
a. Coordinate the packaging of the plans	_____X	X_____
i. Collect plans from all design elements and collate the plan package. Include all items listed in the Project Development Manual.		
ii. Calculate plan quantities and prepare the tabulations and Summary of Approximate Quantities.		
b. In addition to the plan sheets, the special provisions shall be provided	_____X	X_____
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.		
c. Prepare FOR Estimate.	_____X	X_____
Item numbers, descriptions, units and quantities shall be listed and submitted to the CDOT/PM.		
d. Submit the FOR Plans and specifications (Originals) to the CDOT/PM for a preliminary review prior to the FOR.	_____	X_____
e. FOR plan reproduction ( _Approximately 60___) sets	_____	X_____
L. Final Office Review	_____	X_____
a. Attend the FOR		
b. The FOR meeting minutes shall be prepared by the C/PM, Approved by the CDOT/PM, and distributed within two weeks of the meeting as directed.		
c. The FOR original plan sheets and the specifications shall be revised in accordance with the FOR meeting comments and submitted to the CDOT/PM within four (4) weeks after the FOR.		

	<u>CDOT/ Other</u>	<u>Consultant</u>
d. Submit the final revision of the plans after CDOT review.	_____	X_____
M. Construction Plan Package	_____	X_____
The bid plan construction contract package shall consist of the revised FOR plans and will completely describe the work required to build the project including project special provisions and detailed quantities.		
a. Electronic and hard copies of the following:		
i. Roadway	_____	X_____
A. <i>Horizontal and vertical data</i>		
B. <i>Staking data</i>		
C. <i>Earthwork quantities</i>		
D. <i>Mass haul diagram</i>		
E. <i>Cross sections</i>		
ii. Major structures	_____	X_____
An independent set of the following shall be submitted to the CDOT Structural Reviewer for each major structure.		
A. <i>Structure grades</i>		
B. <i>Structure geometry</i>		
b. Final engineering package. The consultant shall submit 2 copies, in 3-ring binders of the following:		
i. All project calculations or worksheets	_____	X_____
ii. All final reports and their approvals:	_____	X_____
Traffic, hydraulics, lighting, pavement design and economic analysis, geology foundation report, etc. All reports will have the latest revisions included.		
iii. Copies of variances, design decisions, and variance approvals	_____	X_____
iv. Project meeting minutes	_____	X_____
v. Utility clearance package	_____	_____
Utility agreements and information regarding the utility location and clearance conditions		
vi. Environmental clearances, 404, 401, wetlands, endangered species, etc.	_____	X_____
vii. Bridge construction packet	_____	NA_____
Includes bridge grades, geometry, and quantity calculations or worksheets		

	<u>CDOT/ Other</u>	<u>Consultant</u>
viii. Any other information unique to this project and deemed important to the effectiveness of construction.	_____	X_____
c. Record plans sets	_____	X_____

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. The original plan drawings shall not bear a seal.

5 **CORRIDOR MANAGEMENT SUPPORT**

A. Design Control

a Provide the required staff, communication equipment and computer systems with appropriate software for tracking and monitoring the planning efforts.	_____ NA _____	_____
b Conduct periodic corridor progress meetings at an interval acceptable to the CDOT/PM. The following shall be reviewed:	_____ NA _____	_____
i Activities complete since the last meeting		
ii Problems encountered		
iii Late activities		
iv Activities required by the next progress meeting		
v Solutions for unresolved and anticipated problems		
vi Information or items required from other agencies		
c Develop a quality assurance program that ensures correct error-free plans are produced by the project designers.	_____ NA _____	_____
d The consultant will coordinate the technical aspects of the planning efforts such as:	_____ NA _____	_____
i Ensuring that the separate projects all utilize the same reference and data base for horizontal and vertical control.		
ii Bearings, coordinates, grades and elevations are identical for common control lines on separate projects.		
iii Earthwork balance is accomplished where appropriate		

B. Information Services

a Provide a management information system to monitor and report progress.	_____ NA _____	_____
This System will include a computer terminal and/or software for the CDOT/PM which the consultant will furnish and maintain. This system will:		
i Provide access to current project data and status (e.g., progress versus schedules and cost estimates versus budgeted funds)		
ii Include the project schedules for submittals and key events		

- iii Identify progress with respect to the schedules
  - iv Identify critical path activities
  - v Provide upon demand the scheduled submittals/key events for designated time periods
- b Produce and periodically update a strip map which outlines the entire corridor. \_\_\_\_\_ NA \_\_\_\_\_
- The Information Shown on this Map will Include the Following:
- i Preliminary engineering project limits
  - ii Construction project limits
  - iii Construction project estimated costs
  - iv Construction project Advertise-for-Bid (AD) dates
  - v Other information that is considered appropriate
- C. Budget Planning Support
- a Maintain a current file of project cost estimates. \_\_\_\_\_ NA \_\_\_\_\_  
The date and type of each estimate will be identified.
  - b Maintain a current file of existing and proposed funding for projects. \_\_\_\_\_ NA \_\_\_\_\_  
Types of funding sources will be identified.
  - c Develop a proposed ad schedule based on the estimated costs and the existing and anticipated future funding. \_\_\_\_\_ NA \_\_\_\_\_  
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 completed when needed) \_\_\_\_\_ NA \_\_\_\_\_

**SECTION 8**  
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 serves:

	<u>CDOT/ Others</u>	<u>Consultants</u>
<b>1 <u>REVIEW OF SHOP DRAWINGS</u></b>	_____X_____	X_____
Review contractor shop and auxiliary drawings as directed by the CDOT/PM.		
A. Maintain a log of all submittals which includes the following information:		
a Submittal description		
b Date received		
c Date transmitted back to the sender		
B. The review of submittals shall be done by a licensed professional engineer who is acceptable to the CDOT/PM.		
C. Review the construction contractor’s shop drawings for conformance and compliance with the contract documents, the provisions of the current “Standard Specifications for Road and Bridge Construction and with the time frames shown in the CDOT specifications in conjunction with the contract work.		
<b>2 <u>CONSTRUCTION SERVICES</u></b>		
When requested by the appropriate Program Manager, the Consultant shall provide the services described below		
A. Coordinate Schedule	_____X_____	_____
Coordinate the schedule at the start of construction and continuously throughout construction phase		
B. Provide field observation prior to, and on the day of, the following:		
a Pile driving and/or caisson drilling	_____X_____	X_____
b All major concrete pours	_____X_____	X_____
c Placement of girders	_____NA_____	_____
d Splicing of girders	_____NA_____	_____
e Post-tensioning duct and anchorage placement	_____NA_____	_____
f Post-tensioning operations	_____NA_____	_____
C. Technical Assistance	_____	X_____

	<u>CDOT/ Other</u>	<u>Consultant</u>
Provide technical assistance to CDOT project personnel on an as-needed basis. This service shall include, but not be limited to, the following:		
a. Respond to questions in the field that arise relative to the plans, details or special provisions.	_____	X_____
b. Provide engineering and drafting services for design revisions required due to changes in construction or field conditions.	_____	X_____
D. The following reports/submittals shall be maintained and submitted:		
a. Diary	_____X	X_____
A complete diary will be accomplished daily for each field observation activity.		
b. Documentation/justification	_____X	X_____
Changes/revisions/documentation justifying changes and/or revisions to plans and specifications		
c. Progress reports	_____	X_____
Monthly progress reports will be submitted for the Consultant's activities.		
d. Calculations, drawings, and specifications as needed.	_____	X_____
e. Daily time sheets	_____	X_____
This will be filled out daily on a form approved by the Project Engineer. This sheet will remain with the Project Engineer.		
3 <b><u>POST DESIGN PLAN MODIFICATIONS</u></b>	_____	X_____
When requested by the Program Manager through the CDOT/PM, the Consultant shall provide design services for plan modifications required by unforeseen field conditions.		
4 <b><u>POST CONSTRUCTION SERVICES</u></b>		
A. Final Earthwork or Interim Determination	_____X	_____
Compute the final or interim as-built earthwork quantities. This will include the required surveying, engineering technician, and computer support.		
B. "As-Built" Plans	_____	X_____
Modify the original plans so that the plans will agree with actual construction results.		
C. Revisions to the Final Right-of-Way Plans	_____X	_____
Review the final Right-of-Way line to identify any excess property due to construction changes. Prepare Final Plan Revisions, including legal Descriptions of excess property		
D. Monument the Right-of-Way according to State Statutes and the CDOT Survey Manual	_____X	_____

- 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).
- E. Set property corners on all remainder parcels \_\_\_\_\_ X \_\_\_\_\_
- Required monumentation will be as directed by the CDOT PM.
- F. Deposit ROW Plans \_\_\_\_\_ X \_\_\_\_\_
- A Record Plan Set updated for revisions and showing all monuments set subsequent to construction, must be signed and sealed by the Professional Land Surveyor responsible for the work. The Record Set must be deposited in the appropriate county office in accordance with CRS 38-50-101 and CRS 38-51-107. A copy of the deposited plan set must be delivered to the CDOT/PM.

5 **CONSTRUCTION ENGINEERING**

A. Construction Management

Inspection & Materials Testing  
Scope of Work

- a Scope Date \_\_\_\_\_.
- b Region \_\_\_\_\_.

B. The Contract Administrator for this Task Order will be:

- a Resident Engineer \_\_\_\_\_.
- b Residency \_\_\_\_
- c Region \_\_\_\_\_.

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

- a Name: \_\_\_\_\_.
- b Title: \_\_\_\_\_.
- c Address: \_\_\_\_\_.
- d City, State, Zip: \_\_\_\_\_.
- e Voice phone: \_\_\_\_\_.
- f Fax Phone: \_\_\_\_\_.

TABLE 1...SUBMITTALS

Hard Copy	Electronic Copy		Project Initiation and Continuing Requirements	CDOT/OTHER	CONSULTANT
	PDF	Orig.			
X		X	Periodic Reports		X
X	X		Billings		X
X		X	Meeting Minutes		X
X		X	Project Schedule		X
X		X	Completed Specific Design Criteria		X
X	X		Survey Plan		X
X	X		Approved MHT's		X
X	X		Traffic Control Supervisor Certification		X
X	X		Permissions to Enter		X
		X	Initial Submittal of TMOSS (?) and or MOSS Compatible Data		
X	X	X	Initial Submittal of an Original Plan Sheet		X
<b>Project Development</b>					
X		X	Public Communication Contact List		
<b>Route Location Survey</b>					
X	X		Traffic Control Supervisor Certification		
X	X		Approved MHT's		
		X	Survey data in raw, unedited formats		
X		X	Pothole data including invert elevations		
X	X		Culverts report		
X	X		Access report		
X	X		Topographic survey notes		
X	X	X	Contour plan checked for errors		
X	X	X	Survey control diagram		
X			Field books		
		X	Electronic Survey Files		
		X	Survey TMOSS Data		
X		X	Monument Records		
X	X	X	Control & Monumentation Plan Sheets		
X	X		Aerial Photography Index Map Sheets		
X	X		Aerial Photography Contact Sheets		
<b>Permits</b>					
X	X		401 Permit		X
X	X		Dewatering / 402 Permit		
X	X		404 Permit		X
X	X		SB 40 Permit		X
X	X		Wildlife Certification		X
X	X		CDPS Storm Water Permit		X
X	X		CDPHE Discharge Permit		X
<b>Preliminary Design</b>					
		X	Electronic Survey Data		X
X	X		Traffic Data & Recommendations		X
X	X		Geology & Soils Investigation Report		X
X	X		Pavement Design Report		X
X	X		Existing Bridge Condition Report		
X	X		Foundation Investigation Report		X

Table 1...SUBMITTALS (CONT.)

Hard Copy	Electronic Copy		Preliminary Design (Cont.)	CDOT/OTHER	CONSULTANT
	PDF	Orig.			
X	X		Engineering Geology Plan Sheet(s)		X
X	X		Preliminary Hydraulics & Hydrology Report		X
X	X	X	Preliminary Storm Water Management Plan		X
X	X		Utility Relocation Recommendations		X
X	X	X	Ditch Structure Plans		
			<b>Right-of-way</b>		
X	X		Memorandum of Ownership		
X	X	X	Preliminary Ownership Map (include in FIR Plan set)		
X	X		Structural Selection Report		X
X	X		Foundation Investigation Request		X
X	X		Final Materials Recommendations		X
X	X		Final Pavement Selection Report		X
X	X		Intersection Traffic Report		
X	X		Traffic Report		X
X	X		Preliminary Cost Estimate		X
X	X	X	FIR Plan Set		X
X	X		List of deviations from Standard Design Criteria		X
X	X	X	Corrected FIR Plan Set		X
X	X		Final Hydraulics & Hydrology Report		X
			<b>Final Design</b>		
X	X	X	ROW Authorization Plans		
X	X	X	Final Utility Plan Set		X
X	X	X	Final Railroad Plan Set		
X	X		PUC Exhibit		
X			Bound Final Geotechnical Report ___5___ copies		X
X	X		Correspondence with Agencies, Entities, and Public		
			<b>Right-of-way</b>		
X	X		Area Calculations		
X	X	X	Authorization Plans		
X	X		Legal Descriptions		
X	X	X	Final Right-of-way Ownership Map		
X	X	X	Stabilization Plans		
			<b>Traffic Engineering</b>		
X	X		Safety Assessment		
X	X	X	Signing/Pavement Marking Plans		X
X	X		Signal Warrant Study		
X	X	X	Signalized Intersection Plans & Specifications		
X	X	X	Traffic Control Plan		
			<b>Roadside Planning</b>		
X	X	X	Landscape Plan & Specifications		X
X	X	X	Certification of Plant Availability		X
X	X	X	Irrigation Plans & Specifications		X
X	X	X	Bike path Plans & Specifications		
X	X	X	Sound Barrier Plans & Specifications		X
X	X	X	Truck Escape Ramp Plans & Specifications		

X	X	X	Rest Area Plans & Specifications		
<i>Table 1...SUBMITTALS (CONT.)</i>					
<b>Hard Copy</b>	<b>Electronic Copy</b>		<b>Roadside Planning (Cont.)</b>	<b>CDOT/OTHER</b>	<b>CONSULTANT</b>
	<b>PDF</b>	<b>Orig.</b>			
X	X	X	Lighting Plans & Specifications		X
X	X	X	Structure Final Review Plans & Specifications		X
X	X	X	Construction Phasing Plan		X
X	X	X	Storm Water Management Plan		X
X	X	X	FOR Plans & Specifications		X
X	X	X	FOR Cost Estimate		X
X	X	X	Final Review Revisions		X
			<b>Construction Plan Package</b>		
X	X	X	Final Plans (11X17), Specifications (duplex) & Estimate Package for Ad.		X
X	X	X	Final Cross Sections		X
X	X	X	Schedule of Quantities		X
X	X		Design Decisions		X
X	X		Variances		X
X	X		Findings In the Public Interest		X
		X	Original Surface Digital Terrain		
		X	Final Surface Digital Terrain Model		X
		X	Design Digital Terrain Model		X
X		X	Staking Data		X
X	X	X	Earthwork Quantities		X
X	X	X	Mass/Haul diagram		
X	X		Project Calculations (2 copies)		X
X	X		Worksheets (2 copies)		X
X	X		Design Notes		X
X	X		Independent Design Review Reports		
X	X		Roadway Design Data Submittal		X
X	X		Major Structure Design Final Submittal		X
X	X		Bridge Construction Pack		
X			Record Plan Sets		X

**SECTION 9**  
CONTRACT CONCLUSION (CHECKLIST)

**1 SUPPLEMENTAL WORK**

It is anticipated that this contract may be supplemented for:

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

**Note: cross out items that are not appropriate.**

**2 CONTRACT COMPLETION**

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

- A. Project Schedule
- B. Project Progress Meeting Minutes
- C. Traffic Control Plan(s)
- D. All documents found In Research
- E. All Permission to Enter forms
- F. Monumented & Surveyed Ground Control Diagram(s)
- G. Legally Deposited Control Survey Diagram(s)\_
- H. Digital TMOSS Data
- I. Photography Products
- J. Ownership Map
- K. Original Field Notes
- L. Survey Report (including monument recovery forms)
- M. Monumented and Sealed ROW Plans
- N. Legally Deposited Survey Plans
- O. Legal Descriptions (Signed and Sealed)
- P. NOAA-NGS Blue Book
- Q. Completion of review of contract submittals
- R. Design Plans, Specifications, and Final Estimate
- S. All Environmental Permits
- T. All environmental , Utility and ROW Clearances
- U. Hydraulic Report

- V. Structural Report
- W. Geotechnical Report
- X. Materials Report
- Y. Noise Study

## APPENDICES

- A. REFERENCES
- B. SPECIFIC DESIGN CRITERIA
- C. DEFINITIONS

Comments regarding this scope may be directed to:

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

## **APPENDIX A**

### **REFERENCES**

- 1 **AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) PUBLICATIONS** (using latest approved versions):
  - A. A Policy on Design Standards-Interstate System
  - B. A Policy on Geometric Design of Highways and Streets
  - C. Guide for Design of Pavement Structures
  - D. Standard Specifications for Highway Bridges
  - E. Guide for the Design of High Occupancy Vehicle and Public Transfer Facilities
  - F. Guide for the Development of Bicycle Facilities
  - G. Standard Specifications for Transportation Materials and Methods of Sampling and Testing – Part 1, Specifications and Part II, Tests
  - H. Highway Design and Operational Practices Related to Highway Safety
  - I. Roadside Design Guide
  
- 2 **COLORADO DEPARTMENT OF TRANSPORTATION PUBLICATIONS** (using latest approved versions):
  - A. CDOT Design Guide (all volumes)
  - B. CDOT Bridge Design Guide
  - C. CDOT Bridge Detailing Manual
  - D. CDOT Pavement Design Manual
  - E. Bridge Rating Manual
  - F. Project Development Manual
  - G. Erosion Control and Storm Water Quality Guide
  - H. Field Log of Structures
  - I. Cost Data Book
  - J. Drainage Design Manual
  - K. CDOT Quality Manual
  - L. CDOT Survey Manual
  - M. CDOT Field Materials Manual
  - N. CDOT Design Guide, Computer Aided Drafting (CAD)
  - O. Erosion Control and Storm water Quality Guide
  - P. Standard Plans, M & S Standards
  - Q. Standard Specifications for Road and Bridge Construction and CDOT Supplemental Specifications
  - R. Item Description and Abbreviations (with code number) compiled by Engineering Estimates and Marked Analysis Unit, CDOT
  - S. Right-of-Way Manual, Chapter 2, Plans and Descriptions Procedures and General Information
  - T. The State Highway Access Code

**APPENDIX A**  
REFERENCES (CONTINUED)

- U. Utility Manual
- V. TMOSS Generic Format
- W. Field TMOSS Topography Coding
- X. Topography Modeling Survey System User Manual
- Y. Interactive Graphics System Symbol Table

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

- A. No. 400.2            Monitoring Consultant Contracts
- B. No. 501.2            Cooperative Storm Drainage System
- C. No. 514.1            Field Inspection Review (FIR)
- D. No. 516.1            Final Office Review (FOR)
- E. No. 1217a            Survey Request
- F. No. 1304.1           Right-of-Way Plan Revisions
- G. No. 1305.1           Land Surveys
- H. No. 1601             Interchange Approval Process
- I. No. 1700.1            Certification Acceptance (CA) Procedures for Location and Design Approval
- J. No. 1700.3            Plans, Specifications and Estimates (PS&E) and Authorization to Advertise for Bids under Certifications Acceptance (CA)
- K. No. 1700.5            Local Entity/State Contracts and Local Entity/Consultant Contracts and Local Entity/R.R. Contracts under C.A
- L. No. 1700.6            Railroad/Highway Contracts (Under Certification Acceptance)
- M. No. 1905.1           Preparation of Plans and Specifications for Structures prepared by Staff Bridge Branch

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

- A. Manual on Uniform Traffic Control Devices
- B. Highway Capacity Manual
- C. Urban Transportation Operations Training – Design of Urban Streets, Student Workbook
- D. Reference Guide Outline – Specifications for Aerial Surveys and Mapping by Photogrammetric Methods for Highways
- E. FHWA Federal-Aid Policy Guide
- F. Technical Advisory T6640.8A
- G. U.S. Department of Transportation Order 5610.1E
- H. Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques
- I. ADAAG Americans With Disabilities Act Accessibility Guidelines

5 **AREA:**

- A. Manual for Railway Engineering

## **APPENDIX B**

### SPECIFIC DESIGN CRITERIA

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

#### **1. ROADWAY**

##### **A. BASIC DESIGN**

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

##### **B. GEOMETRIC AND STRUCTURE STANDARDS**

- a Design Speed
- b Horizontal Alignment and Curvature
  - i Applicable Superelevation Standards
  - ii Minimum radius of Curvature
  - iii Use of Spirals
- c Vertical Alignment:
  - i Maximum gradient – CDOT Design Guide
  - ii Length – CDOT Design Guide
- d Sight Distance:
  - i Stopping -
  - ii Passing -
  - iii Decision -
- e Superelevation, Applicable Standard
- f Frontage Roads, Separation Width
- g CDOT Access Code
- h Airway – Highway Clearances Design Guide
- i Bridges and Grade Separation Structures, Clearances to Structures and Obstructions, CDOT Design Guide
- j Curb and Gutters, Type

**APPENDIX B**  
SPECIFIC DESIGN CRITERIA (CONTINUED)

C. GEOMETRIC CROSS SECTION

- a Travel Lane:
  - i Width –
  - ii Cross Slope –
  
- b Shoulder:
  - i Width –
  - ii Slope –
  - iii Paved/Nonpaved
  
- c Side Ditches:

CDOT Design Guide
  
- d Side Slopes
  - i Cut-Less than 3:1
  - ii CDOT Design Guide
  - iii Clear zone
  
- e Median:
  - i Width –
  - ii Treatment –

D. INTERSECTIONS AT GRADE:

- a Type - \_\_\_\_\_
- b Special Considerations –

E. TRAFFIC INTERCHANGES:

- a Type –
- b Ramp Type –
- c Special Considerations –

F. DESIGN OF PAVEMENT STRUCTURE:

- a Pavement Type - \_\_\_\_\_
- b Percent Trucks

**APPENDIX B**  
SPECIFIC DESIGN CRITERIA (CONTINUED)

- c Economic Analysis Period –
- d Design Life –

G. MISCELLANEOUS DESIGN CONSIDERATIONS

- a Fence Type -
- b FEMA Category –
- c Design Flood Frequency

H. ROADSIDE DEVELOPMENT

- a Landscaping
- b Specifications for Revegetating Disturbed Areas to be provided by CDOT.
- c Noise Control
- d Type
- e Guardrail and End Treatments

I. LIGHTING

- a Type

## **APPENDIX C**

### DEFINITIONS

1	AASHTO-	American Association of State Highway & Transportation Officials
2	ADT-	Average two-way 24-hour Traffic in Number of Vehicles
3	AREA-	American Railway Engineering Association
4	ATSSA-	American Traffic Safety Services Association
5	AT&SF-	Atchison, Topeka & Santa Fe Railway Company
6	ADAAG-	Americans with Disabilities Accessibility Act Guidelines
7	BAMS-	Bid Analysis and Management Systems
8	BLM-	Bureau of Land Management
9	BNRR-	Burlington Northern Railroad
10	CA-	Contract Administrator. The CDOT Manager responsible for the satisfactory completion of the contract by the consultant.
11	CAP-	CDOT's Action Plan
12	CBC-	Concrete Box Culvert
13	CDOT-	Colorado Department of Transportation
14	CDOT/PM-	Colorado Department of Transportation Project Manager – The CDOT Engineer responsible for the day to day direction and CDOT Consultant coordination of the design effort.
15	CDOT/STR-	Colorado Department of Transportation Structure Reviewer – The CDOT Engineer responsible for reviewing and coordinating major structural design
16	CDPHE-	Colorado Department of Public Health and Environment
17	CEQ-	Council on Environmental Quality
18	COG-	Council of Governments
19	COGO-	Coordinate Geometry Output
20	CONSULTANT-	Consultant for this project
21	CONTRACT ADMINISTRATOR-	Typically a Region Engineer or Branch Head. The CDOT employee directly responsible for the satisfactory completion of the contract by the Consultant. The contract administration is usually delegated to a CDOT Project Manager.

**APPENDIX C**  
DEFINITIONS (CONTINUED)

22	C/PM-	Consultant Project Manager – The Consultant Engineer responsible for combining the various inputs in the process of completing the project plans and managing the Consultant design effort.
23	DEIS-	Draft Environmental Impact Statement
24	DHV-	Future Design Hourly Volume (two-way unless specified otherwise)
25	DRCOG-	Denver Regional Council of Governments
26	D&RGW-	Denver & Rio Grande Western Railroad
27	EA-	Environmental Assessment
28	EIS-	Environmental Impact Statement
29	ESAL-	Equivalent Single Axle Load
30	ESE-	Economic, Social and Environmental
31	FEIS-	Final Environmental Impact Statement
32	FEMA-	Federal Emergency Management Agency
33	FHPG-	Federal Aid Highway Policy Guide
34	FHWA-	Federal Highway Administration
35	FIPI-	Finding In Public Interest
36	FIR-	Field Inspection Review
37	FONSI-	Finding of No Significant Impact
38	FOR-	Final Office Review
39	GPS-	Global Positioning System
40	MAJOR STRUCTURES-	Bridges and culverts with a total clear span length greater than twenty feet. This length is measured along the centerline of roadway for bridges and culverts, from abutment face to abutment face, Retaining structures are measured along the horizontal distance along the top of the wall. Structures with exposed heights at any section over five feet and total lengths greater than a hundred feet as well as overhead structures including (bridge signs, cantilevers and butterflies extending over traffic) are also considered major structures.

**APPENDIX C**  
DEFINITIONS (CONTINUED)

41	MPO-	Metropolitan Planning Organization (i.e. Denver Regional Council of Governments, Pikes Peak Area Council of Governments, Grand Junction MPO, Pueblo MPO, and North Front Range Council of Governments).
42	MS4-	Municipal Separate Storm Sewer System
43	NEPA-	National Environment Policy Act
44	NGS-	National Geodetic Survey
45	NICET-	National Institute for Certification in Technology
46	NOAA-	National Oceanic and Atmospheric Administration
47	PAPER SIZES-	See Computer-Aided Drafting Manual (CDOT); Table 6-13 and Table 8-1
48	PE-	Professional Engineer registered in Colorado
49	PM-	Program Manager
50	PLS-	Professional Land Surveyor registered in Colorado
51	PRT-	Project Review Team
52	PS&E-	Plans, Specifications and Estimate
53	PROJECT-	The work defined by this scope
54	ROR-	Region Office Review
55	ROW-	Right-of-Way: A general term denoting land, property, or interest therein, usually in a strip acquired for or devoted to a highway
56	ROWPR-	Right-of-Way Plan Review
57	RTD-	Regional Transportation Director
58	T/E-	Threatened and/or Endangered Species
59	SH-	State Highway Numbers
60	TMOSS-	Terrain Modeling Survey System
61	TOPOGRAPHY-	In the context of CDOT plans, topography normally refers to existing cultural or man-made details.
62	UD & FCD-	Urban Drainage and Flood Control District
63	USCOE-	United States Army Corp of Engineers

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