

GENERIC SCOPE OF WORK BASIC CONTRACT

CONTRACT TYPE [CHECK ONE]

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

CONTRACT DATE: _____.

PROJECT NUMBER: NH 0505-043/NH 0504-053.

PROJECT LOCATION: US 50 Las Animas to Lamar – Design Projects/
US 50 East of Pueblo Safety projects.

PROJECT CODE: 17073/16004.

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

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SECTION 1

PROJECT SPECIFIC INFORMATION

1 **PROJECT BACKGROUND**

Approximately \$3 million is earmarked for construction use on US 50 from Pueblo to Kansas with use primarily in Otero, Bent or Prowers Counties. There is another earmark for approximately \$10 million of construction for use between Las Animas to Lamar only. There is an ongoing Tier 1 EIS in progress that restricts the use of these earmarked funds to safety projects. This project will involve possibly identifying, scoping, and performing preliminary and possibly final engineering for the projects on the corridor in coordination with CDOT and local agencies. CDOT will coordinate with FHWA on approval of the projects. All work approved by CDOT for the consultant will be on an as-needed basis. Projects may be a combined effort with CDOT and consultants or specialty support such as surveying, lighting, hydraulics, and environmental.

The US 50 Tiered EIS is from Pueblo to Kansas state line and is projected to be complete in late 2009 or 2010. The projects preliminary identified are as follows:

US 50 East of Pueblo Safety Projects:

- Drainage Analysis and Improvements along the corridor.
 - LaJunta drainage analysis (West of Town) and plan preparation for improvements
 - Drainage support for projects done by CDOT
- Design or design support for improvements extending passing lanes at on US 50 at the Apishipa Bridges (EB Structure L-21-G and WB Structure L-21-DA)

US 50 Las Animas to Lamar Design Projects

- Evaluate the need for passing lanes East and West of SH 196 intersection
 - CDOT Survey being conducted from MP 410-421
 - Possible passing lanes West of Hasty within CDOT ROW
 - Possible passing lanes East of Hasty (would require ROW acquisition)
- Add turning lane and acceleration lane at Hasty on US 50
- Improvements at SH 196 and US 50
 - Improve sight distance and accel/decel lanes
 - Evaluate passing lanes east and west of the junction of US 50 and SH 196
 - May involve ROW Acquisition.
- Miscellaneous projects not identified

2 **PROJECT GOALS**

This project is intended to produce the following improvements:

Improved Safety

Construct projects as soon as possible

3 **PLANNED IMPROVEMENTS**

This project is located on US 50 from milepost 316 to 467, in Pueblo, Otero, Bent, and Prowers County.

4 **PROJECT COSTS**

The construction/design cost of these projects are estimated at \$ 14 million.

5 **WORK DURATION**

The time period for the work described in this scope is approximately 3 years.

6 CONSULTANT RESPONSIBILITY AND DUTIES

The Consultant is responsible for:

Project Scoping, Plan preparation, Highway Design, Bridge Design, Hydraulics/Hydrology, Design support, Safety analysis, Survey, and preparing project schedules.

7 WORK PRODUCT

The Consultant work products are:

- A. Reports
- B. Field Inspection Review (FIR) Plans and Estimates
- C. Final Office Review (FOR) Plans, Specifications, and Estimates
- D. AD/Bid Plans, Specifications, Cost Estimate
- E. Construction Plan Package
- F. Project Coordination
- G. Schedules
- H. Meeting Minutes
- I. 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:

- A. CDOT safety analysis reports for MP 316.00 – 467.58 Jan. 14, 2003
- B. CDOT safety analysis reports for MP 329.00 – 359.00 Dec. 15, 2006
- C. CDOT safety analysis reports for MP 386.00-397.00 March 3, 2008
- D. CDOT safety analysis reports for MP 400.00- 427.00 Dec. 19, 2006
- E. US 50 Drainage Assessment Report November 2002
- F. US 50 Existing Conditions Report May 2003
- G. US 50 Traffic Conditions report
- H. US 50 Vision Report
- I. www.US50east.com (website for current EIS study)
- J. Aerial mapping for the US 50 corridor
- K. LaJunta drainage report

These documents are posted on the website. 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. 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 two 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:

Timothy Harris, Region 2.
Regional Transportation Director.

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

Name: Karen Rowe.
Title: Resident Engineer.
Address: 902 Erie Ave. , Pueblo , CO 81001
Telephone: 719-546-5438. Fax: 719-546-5702.

OR

Name: Paul Westhoff
Title: Resident Engineer.
Address: 2402 S. Main Street, Lamar, CO 81052
Telephone: 719-336-3228 Fax: 719-336-4101

2 PROJECT COORDINATION

Coordination will be required with the following:

- A. Cities
- B. Counties
- C. Railroads
- D. Metropolitan Planning Organizations (MPO's) - PACOG
- E. U.S. Army Corps of Engineers
- F. Urban Drainage & Flood Control District (UD & FCD)
- G. Federal Emergency Management Agency (FEMA)
- H. Division of Wildlife
- I. U.S. Forest Service (USFS)
- J. Environmental Protection Agency (EPA)
- K. Federal Highway Administration (FHWA)
- L. Utilities
- M. Colorado Department of Public Health and Environment (CDPHE)
- N. Other

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

See Field Log of Structures

Drainage Assessment Report November 2002

Existing conditions Report May 2003

2 UTILITIES

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

Existing Conditions Report May 2003

3 IRRIGATION DITCHES

Drainage Assessment Report November 2002

Existing Conditions Report May 2003

4 RAILROADS

Existing Conditions Report May 2003

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

Note: cross out non-applicable items

1 CURRENT CDOT MANUALS, SPECIFICATIONS, STANDARDS, ETC.

Electronic files of applicable standards. All CDOT forms specified in this document.

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

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

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.

Project Manager Requirements

Each Project Manager will provide the others with the following:

A written synopsis or copy of their respective contacts (both by telephone and in person) with others.
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 and Microstation 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
- H. Schedule MS Project Professional

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 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:

PUBLIC INVOLVEMENT:

Public involvement meetings may be required. Possibly one meeting per design site.

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

Because of the ongoing Environmental Impact Statement, all environmental items will be required for categorical exclusion for the various projects. CDOT is anticipated to perform the work required for these items but there may be a need for support from the Consultant regarding the standard environmental clearance items listed on the CDOT form 128. Knowledge of what projects can be approved with an ongoing EIS would be helpful.

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> |
|--|------------------------|-------------------|
| 1 <u>PROJECT INITIATION AND CONTINUING REQUIREMENTS</u> | | |
| 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 | _____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 |
| Submit a copy of Appendix B -Specific Design Criteria - h the appropriate items completed. | | |
| F. Initiate survey | _____X | _____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 | _____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

_____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

_____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 one month 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

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. Consultant shall prepare a project design schedule, get approved baseline, update baseline schedule, bring updated schedule for each meeting, and coordinate deadlines with appropriate parties..

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 _____ X

a Contact List _____ X _____ 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 _____ 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 _____ 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 _____ 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 _____ X _____ X

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> |
|---|------------------------|-------------------|
| a Presurvey Conference | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |
| Research shall be done as per CDOT Survey Manual and the CDOT Right-of-Way Manual. | | |
| c Secure Rights of Entry | <u> X</u> | <u> X</u> |
| Follow procedures in the CDOT Survey Manual. | | |
| d Project Control Survey: | <u> X</u> | <u> X</u> |
| i Locate or Establish HARN Stations | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| 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 | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
|---|------------------------|-------------------|
| accuracy shall be as specified in the CDOT Survey Manual for a CDOT class C or D TMOSS survey. | | |
| g | _____X | _____X |
| Terrain (Relief or Elevation) Survey Collect elevation data and submit in TMOSS format. Natural ground elevations shall be as specified in the CDOT Survey Manual. | | |
| h | _____X | _____X |
| Utility Survey 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". | | |
| i | _____X | _____X |
| Hydraulic Survey 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. | | |
| j | _____X | _____X |
| Material Sources Survey designated material sources as specified. | | |
| k | _____X | _____X |
| Supplemental Surveying: As required and specifically requested. | | |
| l | _____X | _____X |
| Survey Report: Prepare a Survey Report as required in the Survey Manual. | | |
| m | _____ | _____ |
| Photogrammetry: | | |
| i | _____ | _____ |
| Camera Calibration Report | | |
| ii | _____ | _____ |
| Flight Plan | | |
| iii | _____ | _____ |
| Flight | | |
| iv | _____ | _____ |
| Contact Prints | | |
| v | _____ | _____ |
| Negatives | | |
| vi | _____ | _____ |
| Enlargements | | |
| vii | _____ | _____ |
| Photo Index | | |
| viii | _____ | _____ |
| Supplemental Survey (wing points) | | |
| ix | _____ | _____ |
| Data Reduction | | |
| A Topographic Contours | | |
| B Planimetric (Topography) | | |
| x | _____ | _____ |
| Map Compilation | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
|---|------------------------|-------------------|
| A <i>Index Maps</i> | | |
| B <i>Finished Maps</i> | | |
| n Accuracy Tests: | _____X | _____X |
| Tests are to be performed on a regular basis throughout the project by the consultant. | | |
| o Review by Professional Land Surveyor | _____X | _____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 | _____X | _____X |
| a Traffic Related: | _____X | _____X |
| i Traffic Study. | _____X | _____X |
| A <i>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> | | |
| B <i>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 | _____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 | _____X |
| 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 | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| noise levels exceed acceptable levels will be determined for each concept and plotted on corridor maps. | <u>X</u> | <u>X</u> |
| iii Identify locations where noise abatement measures are needed, and determine which measure is feasible and cost effective. | <u>X</u> | <u>X</u> |
| iv Prepare noise assessment report for approval by CDOT. | <u>X</u> | <u>X</u> |
| c Air Quality: | <u>X</u> | <u>X</u> |
| i Air Quality Monitoring. | <u>X</u> | <u>X</u> |
| 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. | <u>X</u> | <u>X</u> |
| Prepare an air quality report and submit it to CDOT for approval. | | |
| iii Alternative Transportation Systems. | | |
| 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 | <u>X</u> | <u>X</u> |
| i Gather Data and Analyze | <u>X</u> | <u>X</u> |
| 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 | <u>X</u> | <u>X</u> |
| 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 | <u>X</u> | <u>X</u> |
| i Gather Data and Analyze | <u>X</u> | <u>X</u> |
| A Determine if paleontologic resources are present within the project site. | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| <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 | _____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 | _____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 | _____X |
| i Quality Analysis | _____X | _____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 | _____X |
| iii Quality Monitoring | _____X | _____X |
| Collect and analyze samples as required. | | |
| iv Obtain the water quality baseline data prior to construction | _____X | _____X |
| h Ecological Assessment | _____X | _____X |
| i Coordinate with other state and federal agencies as required | _____X | _____X |
| ii Research available data | _____X | _____X |
| iii Conduct a field study (work shall be performed between April 15 th and November 15 th) | _____X | _____X |
| iv Investigate the concerns raised by coordinated agencies. | _____X | _____X |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| v Write the ecological report. | <u> X</u> | <u> X</u> |
| i Historical | <u> X</u> | <u> X</u> |
| i Historical Bridge Clearance | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| i Determine the probable impacts of the project with respect to flood plain and drainage. | <u> X</u> | <u> X</u> |
| ii Develop possible mitigating actions for the adverse impacts | <u> X</u> | <u> X</u> |
| 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" | <u> X</u> | <u> X</u> |
| 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. | | |
| k Right-of-Way | <u> X</u> | <u> X</u> |
| i Perform a field inspection of each project alignment | <u> X</u> | <u> X</u> |

| | <u>CDOT/ Other</u> | <u>Consultant</u> | |
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| 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 | _____ X |
| iii | Prepare a relocation plan. | _____ X | _____ X |
| iv | Prepare a property ownership map based on tax records which identifies ownerships | _____ X | _____ X |
| v | Prepare a land use map which identifies land usage. | _____ X | _____ 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 | _____ X |
| l | 4(f)/6(f) Activity | _____ X | _____ X |
| Determine and evaluate project impacts on 4(f)/6(f) properties. Include a cost analysis with minimization and avoidance alternatives | | | |
| | | _____ X | _____ X |
| i | Prepare the applications for 4(f) clearance and 6(f) concurrence. | _____ X | _____ 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 | _____ X |
| iii | Write 4(f)/6(f) mitigation report. | _____ X | _____ X |
| m | Threatened and/or Endangered Species(T/E) | _____ X | _____ X |
| i | Determine the presence of Threatened and/or Endangered Species on the site. | _____ X | _____ 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 | _____ X |
| n | Wetlands | | |
| i | Wetlands Determination | _____ X | _____ X |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| <i>A Conduct a field evaluation for the presence of wetlands.</i> | | |
| <i>B Prepare a wetlands map which identifies the wetland boundaries within the project corridor of each alignment.</i> | | |
| <i>C Coordinate the findings with other agencies as directed by CDOT.</i> | | |
| ii Wetlands Findings Report | _____ X | _____ X |
| o Hazardous Materials | _____ X | _____ X |
| i Conduct a field survey of project area. | _____ X | _____ X |
| ii Research | _____ X | _____ X |
| Conduct a records search for possible hazardous waste using but any or all of the following: | _____ X | _____ X |
| <i>A Lists compiled by EPA or Colorado Department of Public Health and Environment (CDPHE) which identify:</i> | | |
| <i>a Hazardous waste generators</i> | | |
| <i>b Hazardous water treatment/storage/disposal facilities (current and closed)</i> | | |
| <i>c Hazardous waste transporters</i> | | |
| <i>d Locations of underground storage tanks</i> | | |
| <i>e Known suspected or abandoned hazardous waste sites</i> | | |
| <i>B Records kept by EPA or CDPHE on violations or citations.</i> | | |
| <i>C Lists kept by the appropriate FIRE department on:</i> | | |
| <i>a Underground storage tank locations</i> | | |
| <i>b HAZMAT incidents/accidents</i> | | |
| <i>c Local emergency planning/hazardous materials use reporting</i> | | |
| <i>D Available historic tax records which indicate past land use (coordinate with property ownership and land use data research)</i> | | |
| <i>E Available historic aerial photos of the corridor (e.g., USGS, Public Library, etc.)</i> | | |
| <i>F Any pertinent records maintained by CDOT</i> | | |
| iii Conduct in-situ tests: | _____ X | _____ X |
| <i>A Select locations for soil boring/monitoring wells based on information obtained above, geologic review and alignment considerations.</i> | | |
| <i>B Install monitoring wells and obtain soil and water samples for chemical analysis as well as geotechnical and geologic data.</i> | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| 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 | _____X |
| Evaluate existing conditions to assess the proposed design relative to the following: | | |
| i Roadway and structure condition | _____X | _____X |
| ii Geometry | _____X | _____X |
| iii Lighting | _____X | _____X |
| iv Traffic signal devices | _____X | _____X |
| q Construction Requirements: | _____X | _____X |
| Analyze/investigate the following: | | |
| i General construction impact (of temporary nature) | _____X | _____X |
| ii Noise impacts and mitigation | _____X | _____X |
| iii Material pits | _____X | _____X |
| iv Haul roads | _____X | _____X |
| r Aesthetic Considerations: | _____ | _____ |
| When specified, the following will be investigated: | | |
| i Wild and scenic rivers | _____X | _____X |
| ii Natural areas and trails | _____X | _____X |
| iii Scenic roads and parkways | _____X | _____X |
| iv Overall visual qualities of this project area | _____X | _____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.

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.

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.

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

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

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| 3 <u>PRELIMINARY DESIGN</u> | | |
| 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 | _____X |
| b Analyze the proposed project design with the traffic projection data | _____X | _____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 | _____X |
| d The proposed design shall be reviewed to ensure compatibility with existing signing procedures throughout the preliminary roadway design process | _____X | _____X |
| e Use traffic data appropriate to the anticipated construction timing in developing detour alternatives. | _____X | _____X |
| f Develop the total ESAL for the design life and submit to the CDOT/PM for the pavement design. | _____X | _____X |
| g Submit the traffic data and recommendations to the CDOT/PM for review. | _____X | _____X |
| B. Materials Engineering | | |
| a Preliminary Soil Investigation | _____X | _____X |
| i Determine test hole locations (horizontal and vertical) and coordinate with the CDOT/PM. | _____X | _____X |
| ii Collect soil samples and test for: | _____X | _____X |
| <i>A Classification</i> | | |
| <i>B Moisture – Density Relationship</i> | | |
| <i>C Resistance Value</i> | | |
| <i>D Corrosiveness</i> | | |
| <i>a Note locations of high corrosiveness with recommendations</i> | | |
| <i>E Bearing Capacity</i> | | |
| iii Prepare and submit a soils investigation report. | _____X | _____X |
| C. Pavement | | |
| a Pavement Rehabilitation | _____X | _____X |
| This section applies if the project includes existing pavement that is incorporated in the design for continued utilization. | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| i Determine the equivalent Design Traffic (18k ESAL) that the existing pavement can carry | <u>X</u> | <u>X</u> |
| ii Estimate the 18k ESAL's experienced by the existing pavement. | <u>X</u> | <u>X</u> |
| iii Obtain the projected 18k ESAL for rehabilitated pavement design period. | <u>X</u> | <u>X</u> |
| iv Perform a distress survey | <u>X</u> | <u>X</u> |
| <i>A Determine the types of distress present in the pavement</i> | | |
| <i>B Determine the extent of each distress type</i> | | |
| <i>C Develop a distress map for the existing pavement</i> | | |
| <i>D Determine the causes of the existing distress utilizing tests and required and analyses.</i> | | |
| <i>E Determine the drainage conditions of the existing surface and subsurface</i> | | |
| v Investigate the existing pavement structure | <u>X</u> | <u>X</u> |
| <i>A Subgrade: soil classifications, moisture/density relationship, resistance value and corrosiveness</i> | | |
| <i>B Base: thickness, gradation, plasticity index, liquid limit, resistance value, strength coefficient</i> | | |
| <i>C Pavement: thickness, strength coefficient</i> | | |
| vi Perform deflection testing to obtain the following: | <u>X</u> | <u>X</u> |
| <i>A Deflection profile</i> | | |
| <i>B Maximum deflection</i> | | |
| <i>C Deflection basin</i> | | |
| <i>D Differential deflections at transverse joints for portland cement concrete pavement (pccp)</i> | | |
| <i>E In place determination of the appropriate modulus for each layer and subgrade</i> | | |
| vii Determine the remaining load carrying capacity from the above data. | <u>X</u> | <u>X</u> |
| viii Design the feasible alternatives for the required rehabilitation (and widening if appropriate) utilizing the above investigations and test results. | <u>X</u> | <u>X</u> |
| The design of the feasible alternatives shall be checked against the following: | <u>X</u> | <u>X</u> |
| <i>A The basic cause of distress which shall be corrected</i> | | |
| <i>B Effect on the rate of future deterioration</i> | | |
| <i>C Effect on surface characteristics</i> | | |
| Where appropriate, any new pavement widening shall be included in the analysis | | |
| b New Pavement Structure | <u>X</u> | <u>X</u> |
| 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. | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| c Pavement Justification | <u> X</u> | <u> X</u> |
| i Basic factors: | <u> X</u> | <u> X</u> |
| A <i>Desired life expectancy (obtain design life from CDOT).</i> | | |
| B <i>Required maintenance activities intervals.</i> | | |
| C <i>Basis for performance life.</i> | | |
| ii Analyze life cycle cost of the selected alternatives | <u> X</u> | <u> X</u> |
| A <i>Perform analysis with unit and maintenance costs from CDOT. Determine present worth and annual costs in accordance with the procedures in the CDOT Pavement Design Guide.</i> | | |
| B <i>Compare alternatives over the same life span.</i> | | |
| C <i>Recommend the pavement structure and provide the basis for the recommendations.</i> | | |
| d Pavement Design Report | <u> X</u> | <u> X</u> |
| Include all the above tests, investigations, analyses, and calculations performed as a result of this section. Submit to the CDOT/PM for acceptance. | | |
| D. Structures | | |
| a Existing bridge condition investigation | <u> X</u> | <u> X</u> |
| Determine condition of existing bridge deck, superstructure and substructure material as required. | | |
| b Foundation Investigation Report | <u> X</u> | <u> X</u> |
| i Prepare a Foundation Investigation Request showing requested test hole locations. | <u> X</u> | <u> X</u> |
| ii Formulate drilling pattern, perform the necessary subsurface investigation and collect samples as required. | <u> X</u> | <u> X</u> |
| iii Perform the appropriate laboratory tests and analyze the data. Determine strength, allowable bearing capacity and corrosiveness of foundation material. | <u> X</u> | <u> X</u> |
| iv Perform lateral analyses (deformation, moment, and shear) for the caissons and/or piles which are subjected to lateral loadings. This may be a computer analysis which will consider the group effect and selection of the soil parameters. | <u> X</u> | <u> X</u> |
| v If appropriate, a pile driving analysis using a wave equation will be accomplished. | <u> X</u> | <u> X</u> |
| vi Submit the Foundation Investigation Report to the CDOT/PM for approval. | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| E. Hydrology/Hydraulic Engineering | <u> X</u> | <u> X</u> |
| a Hydrology | <u> X</u> | <u> X</u> |
| i Establish drainage basin data: delineate, determine size, waterway geometrics, vegetation cover, land use. | <u> X</u> | <u> X</u> |
| 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). | <u> X</u> | <u> X</u> |
| iii Select a storm frequency based on the CDOT Hydraulic (Drainage) Design Guide criteria. | <u> X</u> | <u> X</u> |
| iv Do a hydrological analysis using existing studies or approved methods (see CDOT Drainage Design Manual)? | <u> X</u> | <u> X</u> |
| v Perform a risk analysis. | <u> X</u> | <u> X</u> |
| b Hydraulics | <u> X</u> | <u> X</u> |
| i Accomplish the preliminary design of minor drainage structures: | <u> X</u> | <u> X</u> |
| <i>A Determine location and crossing alignment. Identify channel centerline by highway station or coordinates, as appropriate</i> | | |
| <i>B Determine the allowable headwater.</i> | | |
| <i>C Assess the degree of sediment and debris problems to be encountered, including abrasion and corrosion.</i> | | |
| <i>D Type, size, shape and material of the structures.</i> | | |
| <i>E 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> | | |
| <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: | <u> X</u> | <u> X</u> |
| <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> | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> | |
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| <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 | _____ X |
| iv | Recommend culvert pipe sizes, type, shape and material for proposed detours. | _____ X | _____ X |
| c | Storm Water Management Plan | _____ X | _____ 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 | _____ 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 Appendix:</i> | | |
| | <i>a Drainage basin maps</i> | | |
| | <i>b Hydrology/hydraulic worksheets</i> | | |
| F. | Utility Coordination | | |
| 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 | _____ X |
| c | Surveying Utility Locations | _____ X | _____ X |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
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| d Relocation Recommendations | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| 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. | | |
| G. Roadway Design and Roadside Development | | |
| Coordinate all design activities with required CDOT specialty units and other outside entities. | | |
| a Roadway Design | <u> X</u> | <u> X</u> |
| i Check and plot survey data | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |
| iv Provide alignments, toes of slope and pertinent design features, including permanent and temporary impacts, to the ROW, Utility and Environmental Managers. | <u> X</u> | <u> X</u> |
| v Plot/develop all required information on the plans in accordance with all applicable CDOT policies and procedures | <u> X</u> | <u> X</u> |
| vi Using current approved CDOT software, generate a 3 dimensional design model and produce preliminary quantities | <u> X</u> | <u> X</u> |
| b Roadside Development: | <u> X</u> | <u> X</u> |
| 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: | | |
| i Layouts in the plans | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
|---|------------------------|-------------------|
| <p>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.</p> | | |
| a Research | _____X | _____X |
| i Identify affected ownership from preliminary design plans | _____X | _____X |
| ii Obtain assessor's maps for the project | _____X | _____X |
| iii Locate documents which transfer title. | _____X | _____X |
| iv Prepare chain of title as directed by the CDOT ROW Manual or as directed by the CDOT Project Manager. | _____X | _____X |
| v Look for encumbrances, liens, releases, etc. | _____X | _____X |
| vi Make physical inspection of property. Note any physical evidence of apparent easements, wells, ditches, ingress, and egress. | _____X | _____X |
| vii Check with local entities such as the County Road Department or County Engineer for location of existing roads or easements. | _____X | _____X |
| viii Check for and obtain latest subdivision plats and vacations of streets. | | |
| b Ownership Map | _____X | _____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 | _____X |
| i Review preliminary design and survey report | _____X | _____X. |
| ii Review project coordinate system and basis of bearing from Control Survey prior to calculations. | _____X | _____X |
| 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 | _____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 | _____X |
| vi Establish subdivisions of sections using Bureau of Land Management Guidelines. Show all section lines and ¼ section lines on the ownership map and ROW plans. | _____X | _____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 | _____X |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
|--|------------------------|-------------------|
| 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. | <u> X</u> | <u> X</u> |
| 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: | <u> X</u> | <u> X</u> |
| 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". | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |
| xii Label all monuments found with description of monument and project coordinates (from Control Survey Diagram). | <u> X</u> | <u> X</u> |
| xiii Show improvements and topography within the ownerships and existing access to the street/county road system | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</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. | <u> X</u> | <u> X</u> |
| xvi Different land uses within a property should be cross-hatched or shaded | <u> X</u> | <u> X</u> |
| xvii In the lower right corner of the OWNERSHIP MAP, show seal, number and name of Professional Land Surveyor supervising the work. | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |

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

_____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

_____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

_____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 _____ 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 _____ 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 _____ 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 _____ 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:

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
|---|------------------------|-------------------|
| 4 FINAL DESIGN | | |
| 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 | _____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 | _____X |
| 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 | | |
| 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>Luminaire 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. <i>Location of direct burial cable</i> | | |
| J. <i>Size of wiring and/or direct burial cable</i> | | |

- 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 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 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 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 X X

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 _____ 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 _____ 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 _____ X
 - c. Authorization Plan: _____ X _____ 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.
 - ix. On the Monumentation Sheet, list the Right-of-Way, Easement, Control, etc., points to be set and the aliquot corners to be reset.

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
|--|------------------------|-------------------|
| 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 | <u> X </u> | <u> X </u> |
| 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 | <u> X </u> | <u> X </u> |
| i. ROW Plan Review | <u> X </u> | <u> X </u> |
| ii. ROW Plan Revisions, as needed throughout the negotiation and appraisal process. | <u> X </u> | <u> X </u> |
| f. Appraisals | <u> </u> | <u> </u> |
| g. Appraisal staking | <u> </u> | <u> </u> |
| 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 | <u> </u> | <u> </u> |
| 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 | <u> </u> | <u> </u> |
| F. Materials Engineering | <u> X </u> | <u> X </u> |
| a. Finalize and provide the stabilization plan/pavement design report. | <u> X </u> | <u> X </u> |
| b. Finalize geotechnical considerations and incorporate them into the plans. | <u> X </u> | <u> X </u> |
| i. Rock fall | | |
| ii. Rock cut | | |
| iii. Landslides | | |
| iv. Other | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
|---|------------------------|-------------------|
| G. Traffic Engineering | <u> X</u> | <u> X</u> |
| a. Prepare and provide permanent signing/pavement marking plans | | |
| b. Signalized intersections: | <u> X</u> | <u> X</u> |
| i. Prepare and provide the signal warrant study | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |
| c. Prepare and provide the construction traffic control plans and quantities | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| Prepare and provide the Structural Plans and Specifications, including any revisions identified during the independent check. | | |
| c. Independent design, detail and quantity check | <u> X</u> | <u> X</u> |
| d. Prepare and provide the bridge rating and field packages | <u> X</u> | <u> X</u> |
| I. Construction Phasing Plan | <u> X</u> | <u> X</u> |
| <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> | | |
| a. 401 Permit Process (Water Quality Certification) | <u> X</u> | <u> X</u> |
| b. 402 Permit Process (Point Source Discharge) | <u> X</u> | <u> X</u> |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
|--|------------------------|-------------------|
| c. 404 Permit Process (Individual Dredge and Fill) | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| e. NPDES Storm Water Permit for Construction Activities | <u> X</u> | <u> X</u> |
| K. Plan Preparation for the Final Office Review | | |
| a. Coordinate the packaging of the plans | <u> X</u> | <u> X</u> |
| 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 | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |
| e. FOR plan reproduction | <u> X</u> | <u> X</u> |
| L. Final Office Review | <u> X</u> | <u> X</u> |
| 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. | | |
| d. Submit the final revision of the plans after CDOT review. | <u> X</u> | <u> X</u> |
| M. Construction Plan Package | <u> X</u> | <u> X</u> |

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 | _____ 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 | _____ X |
|----------------------|---------|---------|

An independent set of the following shall be submitted to the CDOT Structural Reviewer for each major structure.

- A. *Structure grades*
- B. *Structure geometry*

b. Final engineering package. The consultant shall submit 2 copies, in 3-ring binders of the following:

- | | | |
|--|---------|---------|
| i. All project calculations or worksheets | _____ X | _____ X |
| ii. All final reports and their approvals: | _____ X | _____ 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 | _____ X |
| iv. Project meeting minutes | _____ X | _____ X |
| v. Utility clearance package | _____ X | _____ X |
| Utility agreements and information regarding the utility location and clearance conditions | | |
| vi. Environmental clearances, 404, 401, wetlands, endangered species, etc. | _____ X | _____ X |
| vii. Bridge construction packet | _____ X | _____ X |
| Includes bridge grades, geometry, and quantity calculations or worksheets | | |
| viii. Any other information unique to this project and deemed important to the effectiveness of construction. | | |

- | | | |
|----------------------|---------|---------|
| c. Record plans sets | _____ X | _____ 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. | <u> X</u> | <u> X</u> |
| b | Conduct periodic corridor progress meetings at an interval acceptable to the CDOT/PM. The following shall be reviewed: | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |
| d | The consultant will coordinate the technical aspects of the planning efforts such as: | <u> X</u> | <u> X</u> |
| 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. | <u> X</u> | <u> X</u> |
| | 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 | | |

| | <u>CDOT/ Other</u> | <u>Consultant</u> |
|--|------------------------|-------------------|
| 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. | _____ X | _____ X |
| 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. | _____ X | _____ X |
| The date and type of each estimate will be identified. | | |
| b Maintain a current file of existing and proposed funding for projects. | _____ X | _____ X |
| 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. | _____ X | _____ X |
| 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) | _____ X | _____ |

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> |
|--|-------------------------|--------------------|
| 1 <u>REVIEW OF SHOP DRAWINGS</u> | _____ | _____ |
| 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. | | |
| 2 <u>CONSTRUCTION SERVICES</u> | | |
| When requested by the appropriate Program Manager, the Consultant shall provide the services described below | | |
| A. Coordinate Schedule | _____ | _____ |
| 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 | _____ | _____ |
| b All major concrete pours | _____ | _____ |
| c Placement of girders | _____ | _____ |
| d Splicing of girders | _____ | _____ |
| e Post-tensioning duct and anchorage placement | _____ | _____ |
| f Post-tensioning operations | _____ | _____ |
| C. Technical Assistance | _____ | _____ |

| | <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. | _____ | _____ |
| b. Provide engineering and drafting services for design revisions required due to changes in construction or field conditions. | _____ | _____ |
| D. The following reports/submittals shall be maintained and submitted: | | |
| a. Diary | _____ | _____ |
| A complete diary will be accomplished daily for each field observation activity. | | |
| b. Documentation/justification | _____ | _____ |
| Changes/revisions/documentation justifying changes and/or revisions to plans and specifications | | |
| c. Progress reports | _____ | _____ |
| Monthly progress reports will be submitted for the Consultant's activities. | | |
| d. Calculations, drawings, and specifications as needed. | _____ | _____ |
| e. Daily time sheets | _____ | _____ |
| This will be filled out daily on a form approved by the Project Engineer. This sheet will remain with the Project Engineer. | | |
| 3 <u>POST DESIGN PLAN MODIFICATIONS</u> | _____ | _____ |
| 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 <u>POST CONSTRUCTION SERVICES</u> | | |
| A. Final Earthwork or Interim Determination | _____ | _____ |
| Compute the final or interim as-built earthwork quantities. This will include the required surveying, engineering technician, and computer support. | | |
| B. "As-Built" Plans | _____ | _____ |
| Modify the original plans so that the plans will agree with actual construction results. | | |
| C. Revisions to the Final Right-of-Way Plans | _____ | _____ |
| Review the final Right-of-Way line to identify any excess property due to construction changes. Prepare Final Plan Revisions, including legal Descriptions of excess property | | |
| D. Monument the Right-of-Way according to State Statutes and the CDOT Survey Manual | _____ | _____ |

CDOT/
Other

Consultant

- 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

Required monumentation will be as directed by the CDOT PM.

F. Deposit ROW Plans

A Record Plan Set updated for revisions and showing all monuments set subsequent to construction, must be signed and sealed by the Professional Land Surveyor responsible for the work. The Record Set must be deposited in the appropriate county office in accordance with CRS 38-50-101 and CRS 38-51-107. A copy of the deposited plan set must be delivered to the CDOT/PM.

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 | | Billings | | |
| X | | X | Meeting Minutes | | |
| X | X | | Project Schedule | | |
| X | | X | Completed Specific Design Criteria | | |
| X | X | | Survey Plan | | |
| X | X | | Approved MHT's | | |
| X | X | | Traffic Control Supervisor Certification | | |
| X | X | | Permissions to Enter | | |
| | | X | Initial Submittal of TMOSS (?) and or MOSS Compatible Data | | |
| X | X | X | Initial Submittal of an Original Plan Sheet | | |
| | | | Project Development | | |
| X | | X | Public Communication Contact List | | |
| | | | Route Location Survey | | |
| 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 | | |
| | | | Permits | | |
| X | X | | 401 Permit | | |
| X | X | | Dewatering / 402 Permit | | |
| X | X | | 404 Permit | | |
| X | X | | SB 40 Permit | | |
| X | X | | Wildlife Certification | | |
| X | X | | CDPS Storm Water Permit | | |
| X | X | | CDPHE Discharge Permit | | |
| | | | Preliminary Design | | |
| | | X | Electronic Survey Data | | |
| X | X | | Traffic Data & Recommendations | | |
| X | X | | Geology & Soils Investigation Report | | |
| X | X | | Pavement Design Report | | |
| X | X | | Existing Bridge Condition Report | | |
| X | X | | Foundation Investigation Report | | |

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 | | Preliminary Hydraulics & Hydrology Report | | |
| X | X | X | Preliminary Storm Water Management Plan | | |
| X | X | | Utility Relocation Recommendations | | |
| X | X | X | Ditch Structure Plans | | |
| | | | Right-of-way | | |
| X | X | | Memorandum of Ownership | | |
| X | X | X | Preliminary Ownership Map (include in FIR Plan set) | | |
| X | X | | Structural Selection Report | | |
| X | X | | Foundation Investigation Request | | |
| X | X | | Final Materials Recommendations | | |
| X | X | | Final Pavement Selection Report | | |
| X | X | | Intersection Traffic Report | | |
| X | X | | Traffic Report | | |
| X | X | | Preliminary Cost Estimate | | |
| X | X | X | FIR Plan Set | | |
| X | X | | List of deviations from Standard Design Criteria | | |
| X | X | X | Corrected FIR Plan Set | | |
| X | X | | Final Hydraulics & Hydrology Report | | |
| | | | Final Design | | |
| X | X | X | ROW Authorization Plans | | |
| X | X | X | Final Utility Plan Set | | |
| X | X | X | Final Railroad Plan Set | | |
| X | X | | PUC Exhibit | | |
| X | | | Bound Final Geotechnical Report _____ copies | | |
| X | X | | Correspondence with Agencies, Entities, and Public | | |
| | | | Right-of-way | | |
| 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 | | |
| | | | Traffic Engineering | | |
| X | X | | Safety Assessment | | |
| X | X | X | Signing/Pavement Marking Plans | | |
| X | X | | Signal Warrant Study | | |
| X | X | X | Signalized Intersection Plans & Specifications | | |
| X | X | X | Traffic Control Plan | | |
| | | | Roadside Planning | | |
| X | X | X | Landscape Plan & Specifications | | |
| X | X | | Certification of Plant Availability | | |
| X | X | X | Irrigation Plans & Specifications | | |
| X | X | X | Bike path Plans & Specifications | | |
| X | X | X | Sound Barrier Plans & Specifications | | |
| X | X | X | Truck Escape Ramp Plans & Specifications | | |
| X | X | X | Rest Area Plans & Specifications | | |

Table 1...SUBMITTALS (CONT.)

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

SECTION 9
CONTRACT CONCLUSION (CHECKLIST)

1 SUPPLEMENTAL WORK

It is not anticipated that this contract may be supplemented for additional scope of work items.

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. Bridge Rating Manual
- E. Project Development Manual
- F. Erosion Control and Storm Water Quality Guide
- G. Field Log of Structures
- H. Cost Data Book
- I. Drainage Design Manual
- J. CDOT Quality Manual
- K. CDOT Survey Manual
- L. CDOT Field Materials Manual
- M. CDOT Design Guide, Computer Aided Drafting (CAD)
- N. Erosion Control and Storm water Quality Guide
- O. Standard Plans, M & S Standards
- P. Standard Specifications for Road and Bridge Construction and CDOT Supplemental Specifications
- Q. Item Description and Abbreviations (with code number) compiled by Engineering Estimates and Marked Analysis Unit, CDOT
- R. Right-of-Way Manual, Chapter 2, Plans and Descriptions Procedures and General Information
- S. The State Highway Access Code

APPENDIX A
REFERENCES (CONTINUED)

- T. Utility Manual
 - U. TMOSS Generic Format
 - V. Field TMOSS Topography Coding
 - W. Topography Modeling Survey System User Manual
 - X. 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 | PACOG | Pueblo Area Council of Government |
| 48 | PAPER SIZES- | See Computer-Aided Drafting Manual (CDOT); Table 6-13 and Table 8-1 |
| 49 | PE- | Professional Engineer registered in Colorado |
| 50 | PM- | Program Manager |
| 51 | PLS- | Professional Land Surveyor registered in Colorado |
| 52 | PRT- | Project Review Team |
| 53 | PS&E- | Plans, Specifications and Estimate |
| 54 | PROJECT- | The work defined by this scope |
| 55 | ROR- | Region Office Review |
| 56 | ROW- | Right-of-Way: A general term denoting land, property, or interest therein, usually in a strip acquired for or devoted to a highway |
| 57 | ROWPR- | Right-of-Way Plan Review |
| 58 | RTD- | Regional Transportation Director |
| 59 | T/E- | Threatened and/or Endangered Species |
| 60 | SH- | State Highway Numbers |
| 61 | TMOSS- | Terrain Modeling Survey System |
| 62 | TOPOGRAPHY- | In the context of CDOT plans, topography normally refers to existing cultural or man-made details. |
| 63 | UD & FCD- | Urban Drainage and Flood Control District |
| 64 | 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.

