SCOPE OF WORK

PART 1

NON PROJECT SPECIFIC for REGION 2

April 18, 2024

PROJECT NUMBER: Non Project Specific for Surveying and Right of Way Services

PROJECT LOCATION: Region 2 or other CDOT regions in Colorado

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

PART 2, Dated: April 18, 2024
PART 3, Dated: April 18, 2024

PART 2 and PART 3 ARE AVAILABLE AS SEPARATE DOCUMENTS.

PROJECT SCOPING AND SPECIAL PROVISION

SECTION 1
Project Specific Information

1.01 **Project Goal.** This project is intended to provide project support for specific surveying and right-of-way activities in Region 2.

1.02 **Project Location.** Consultant activities will be in the Region 2 area. Region 2 includes the following counties: Baca, Bent, Custer, Crowley, El Paso, Fremont, Huerfano, Kiowa, Las Animas, Otero, Park, Prowers, Pueblo and Teller in Colorado. The contract may be used in other regions within the state of Colorado, if necessary.

1.03 **Work Duration.** The work on this contract will be subject to supplements and funding from projects for specific work tasks as needed for a period of five years.

1.04 **Consultant Responsibility.** The Consultant is responsible for (defined by project Scope of Work):

A. Presurvey Meeting
B. Progress Meetings
C. Secure Right(s) of Entry
D. Traffic Control and Traffic Control Plan
E. Underground Utility Locates
F. Survey Data Research
G. Establish Ground Control
H. Property/Boundary Surveys as needed
I. TMOSS Survey
J. Map Compilation
K. Right-of-Way Research including adjoiners vesting deeds, title commitments, or Memoranda of Ownership
L. Right-of-Way Plan/Map preparation
M. Right of Way (ROW) Mapping (Mapping of existing right of way only)
N. Right-of-Way Staking (Existing ROW, new ROW, and easements as necessary delineated for Appraisal)
O. Right-of-Way Monumentation (CDOT Monument)
P. Property Monumented Land Survey (As required per Colorado Revised Statutes)
Q. Review by a licensed Professional Surveyor
R. Slope and Structure Staking
S. Final TMOSS Survey

1.05 **Work Product.** The Consultant work products are (defined by project Scope of Work):

A. Project Schedule
B. Man-hour Proposal
C. Cost Proposal
D. Project Progress Meeting Minutes

E. Traffic Control Plan(s)
F. Monumented & Surveyed Ground Control
G. Project Control and Land Survey Diagram(s)
H. Digital TMOSS Data
I. Photography Products
J. All Documents Found In Research
K. Preliminary and Final Ownership Map
L. Original Field Notes
M. Survey Reports
N. Monuments on Right-of-Way Lines
O. Sealed ROW Plans and copies as filed in the County
P. Quality Control Reports
Q. Electronic Data

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

1.06 **Work Product Completion.** All submittals are subject to approval by the CDOT Contract Administrator or his designee.

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

A. CDOT Survey Manual (Current Ed.)
B. CDOT Right-of-Way Manual (Current Ed.)
C. CDOT Standard Specifications for Road and Bridge Construction (Current Ed.)
D. CDOT Engineering Computing Manual (Current Ed.) (InRoads TMOSS, InRoads Geometry for ROW, etc.)
E. CDOT M & S Standards (Current Ed.)
F. FHWA Manual on Uniform Traffic Control Devices for streets and roads (MUTCD) (Current Ed.)
G. CDOT InRoads TMOSS coding booklet (Current Ed.)
H. CDOT Task Order Manual (Current Ed.)
I. CDOT CADD and/or other CDOT manuals not mentioned above.

Copies of these documents are available for free download on the CDOT website, the others may be obtained from CDOT Reproduction, or request from the CDOT/PM

1.08 **Scope of Work Organization.** Project Scopes of Work are divided into parts; Part 1, a project specific section; Part 2, includes general descriptions of preconstruction tasks, and

Part 3, includes services after the design. Part 1 is attached to the contract. Part 2 and Part 3 are included in the scope but are distributed separately from the contract.

This draft scope of work has been carefully reviewed by the Department and reflects a plan of approach based on the known goals. One factor determining the selection of a Consultant is the ability of that consultant to analyze the project goals, evaluate the work elements, and formulate a work plan. This process may produce new approaches or modification to the project work elements. Because of that, all consultants should be aware that the Final Scope of Work for a project will be produced with the input of the selected Consultant.

SECTION 2
PROJECT MANAGEMENT AND COORDINATION

2.01 CDOT Contacts

The Contract Administrator for this project is:

Shane Ferguson,
Region Transportation Director, Region 2

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

Paul Mandarich
Professional Land Surveyor II, Region 2

Colorado Department Of Transportation
Region 2 Right of Way
5615 Wills Blvd.
Pueblo, Colorado 81008

Telephone (719) 546-5736
Email: paul.mandarich@state.co.us

SECTION 3
PROJECT DESCRIPTION

The consultant shall provide support in the following work disciplines:

3.01 SURVEYING

A. Surveying general procedures
B. Global Positioning System (GPS) surveys
C. Aerial surveys
D. Preliminary surveys
E. Construction surveys
F. Perform survey data research and preliminary field reconnaissance
G. Secure right of entry using CDOT forms (Form 730a)
H. Geodetic surveys using FGCC Standards & Techniques including Blue Booking (Conventional & GPS)
I. Project Control Networks tied to geodetic surveys based on NAD 83(2011) (Conventional or Fast Static GPS) or current datum used by CDOT.
J. Vertical Control based on NAVD 88 datum
K. Blue Book Vertical control with the National Geodetic Survey
L. Locate & Survey BLM & GLO Aliquot & Public Land Survey System Corners.
M. TMOSS survey (InRoads TMOSS Coding format) (Total Station, GPS RTK, etc.).
N. Right-of-Way Surveys
O. Locate & Survey all private property monumentation required to resolve property ownerships and locations and their intersections with the existing and proposed CDOT Right of Way.
P. Property Surveys
Q. Prepare preliminary ownership maps
R. ALTA/ACSM Surveys (As required per ACSM.)
S. Prepare monument recovery forms and records (CDOT, NGS, USGS, BLM or required by Colorado survey laws)
T. Stake ROW Parcels, TE's, SE's, and PE's for appraisers
U. Final Monumentation of ROW Line, SE's and PE's
V. Comply with all applicable Colorado Revised Statutes
W. Prepare survey report using MicroStation V8 or newer, and InRoads. Using CDOT's latest configuration
X. Prepare a quality-control report
Y. Slope and Structure Staking using design data. (Post-design/Pre-construction)
Z. Compute As-Constructed InRoads TMOSS survey and final earthwork. (Post Const.)

3.02 RIGHT OF WAY PLANS PREPARATION

A. Perform research, calculations and drafting to determine existing CDOT Right-of-Way within project limits defined by metes and bounds on the project coordinate system. Deliver electronic data in InRoads and MicroStation.
B. Resolve private property/boundary locations and the intersection of these boundary lines with the existing and proposed CDOT ROW.
C. Research ownership deeds
D. Prepare Right-of-Way Plans and Legal Descriptions. See - Scope of Work - Part 2, Section **1.02** D. and Section **1.03** C. for more detail.

3.03 PHOTOGRAMMETRY

A. Compile point #, Y, X, Z, code, and comment data using InRoads TMOSS codes (not a conversion to InRoads TMOSS codes). InRoads TMOSS format and methodology is described in the InRoads TMOSS booklet and InRoads Survey Data Reduction training manual.
B. Through ground supplemental survey (1) find & locate any ROW Markers and property corners (2) define all features on the project - fences, signs, culverts, all underground features, utilities, pavement and features with sensitive elevation requirements.
C. Provide digital ortho-rectified photos in TIF World (TIFW) format.
D. Provide MicroStation drawings of InRoads TMOSS survey data

3.04 ADMINISTRATIVE SUPPORT

A. Perform clerical or word processing duties
B. Prepare billings and monthly progress reports

3.05 TRAFFIC CONTROL

A. Perform traffic control with planning, signing and properly trained personnel, using MUTCD manual as a guide
B. Provide traffic control plans to be reviewed by the R-2 Traffic Engineer prior to implementation.
C. Traffic Control Procedural Directive 1502.1 shall apply to all contractors, consultants, and those permitted by CDOT to plan, design, install, and maintain traffic control work zones.

3.06 QUALITY CONTROL

A. Prepare a report that describes the procedures incorporated into the work to assure and control the quality.

3.07 TITLE WORK

A. Performs title research and prepares memoranda of ownership for parcels to be acquired by CDOT.

B. Arranges for title policies for and on behalf of the Colorado Department of Transportation.

SECTION 4
GENERAL INFORMATION

4.01 **Contract Provisions.** The contract between CDOT and the Consultant shall be a specific rate-of-pay contract. This basic non-project specific contract will set up the framework for project specific task orders. Funds for actual work will be committed only by task order and not by the NPS contract. The task order shall be initiated by:

A. Preparing a project specific Scope of Work.
B. Negotiating the number of hours by classification for each work element with the project manager.
C. Identifying the other direct costs needed to accomplish the Scope of Work.
D. Applying the pre-approved rates as established in the basic contract.
E. Negotiating the product delivery dates.
F. Identifying the total cost of work and resources needed to meet the project schedules.

Each task order shall include a Scope of Work that describes the specific work to be done. This Scope of Work shall be in specific detail in order to provide a basis for the negotiation of the number of work hours. A meeting on the project site with the CDOT (Survey) Project Manager (CDOT/PM) is required for each Scope of Work prepared. In the event the consultant experiences unexpected cost/rate changes, annual rate changes, changes in the project team and/or costs, delays during the term of the task order that require that the performance time of a task order be extended the consultant shall request an amended task order. The consultant shall submit three copies with original signatures to the project manager of an amended task order request letter as outlined in the CDOT Task Order Manual (Current Edition) specifying the items to amend and the reasons for the amendment. Back up documentation supporting the request such as certified payroll reports detailing the salary or personnel change or documentation that substantiates any delays are required with the request. The CDOT Project Manager then requests an amended task order from the CDOT Agreements and Consultant Management section. Approval of the amended task order is by the Chief Engineer or designee. All amendments to the task order require this formal process. Changes during the course of a task order are not permitted unless the consultant has requested an amendment. No payments will be made for work accomplished after the expiration date of the task order. Payments of rates differing from or not included in the original task order cannot be made without a formal amendment to the task order.

4.02 **Authorization to Proceed.** Work will not commence until the written notice-to-proceed is received by the Consultant and all work will be completed within the allotted time. No payments can be made for work accomplished outside the limits of the timelines set up by the task order.

Unanticipated changes that require that the performance time be extended must be documented. These are unanticipated changes to the work schedule not caused by the

consultant. The consultant shall request that the task order be formally amended to extend the time. The consultant shall submit a letter to the project manager detailing the reasons for the request, documenting the time lost, and asking for the amendment for a time extension.

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

A. Synopses of their respective contacts (both by telephone and in person) with others
B. Copies of pertinent written communications

The Consultant is responsible for coordinating all sub-consultants and team members.

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

A. Coordination of all contract activities by the C/PM
B. The periodic reports and billings required by CDOT Procedural Directive 400.2
C. Minutes of all Meetings. The minutes will be completed and will be provided to the CDOT/PM within five (5) working days after the meeting. When a definable task is discussed during a meeting, the minutes will identify the "Action Item", the agency responsible for accomplishing it, and the proposed completion date.
D. In general, all reports and submittals must be accepted by CDOT prior to their content being utilized in follow-up work efforts.
E. The consultant shall submit a progress report with each billing.
F. The progress report shall include a statement addressing the project schedule and any delays encountered.
G. The primary consultant shall be responsible for checking and verifying all sub consultant and team member billings for compliance with the contract before submitting to CDOT for payment.
H. The consultant must use the following personnel classifications for their firm's personnel when submitting task order proposals and billings to CDOT:

ROW Manager
Professional Land Surveyor II
Professional Land Surveyor I
Engineering/Physical Science Technician (E/PST) III
E/PST II
E/PST I
E/PST Assistant 1
E/PST Assistant 2
E/PST Assistant 3

The consultant shall assign each employee a title from the preceding list in lieu of the terms Project Manager, Party Chief, Instrument operator, draftsman, CADD operator, office tech, etc.

I. Monthly Status Reports. Each billing shall include a status report that includes the total man-hours bid compared to the total billed to date for each position, a percent complete for each work element.

4.05 **Personnel Qualifications.** The Consultant Project Manager (C/PM), must be approved by the CDOT Contract Administrator. Tasks must be supervised by Licensed Professional Surveyors who are registered with the Colorado State Board of Licensure for Architects, Professional Engineers and Professional Land Surveyors.

4.06 **CDOT Computer/Software Requirements.** The primary hardware used by CDOT is a Personal Computer - Windows based operating system, and the types of software are:

Earthwork - InRoads
Drafting - MicroStation
Survey Control - Trimble Business Center (TBC).
Survey - InRoads TMOSS coding (developed by CDOT to convert total station surveys, GPS and aerial surveys to MicroStation formats) and InRoads Survey.
Geometry - InRoads
ProjectWise, Microsoft Word, Excel, Access, Outlook, Power Point and Project are used at CDOT.

4.07 **Computer Data Compatibility.** CDOT presently utilizes three data formats which consultants shall be required to use for submitting survey and design data: TMOSS (Topography Modeling Survey System using the InRoads coding), InRoads and MicroStation.

The data format used by the consultant to submit surveying data shall be as determined by the CDOT/PM. The data format for submitting design computer files shall be compatible with InRoads Software. The data format shall be submitted in English Units in US Survey feet unless otherwise determined by the CDOT/PM.

The consultant shall immediately notify the CDOT/PM if the firm is unable to produce the desired format for any reason and cease work until the problem(s) is/are resolved.

Refer to Part 2 Section 2, Submittals, for additional information regarding InRoads TMOSS, InRoads, MicroStation and the acceptable transmittal media.

4.08 **Project Standards**

A. General. The following is a list of technical references applicable to CDOT work. The Consultant is responsible for ensuring compliance with the listed references. Conflicts in criteria shall be resolved by the CDOT/PM.

Colorado Revised Statutes, CDOT Survey Manual, Bureau of Land Management Instructions to Surveyors, State Board of Registration Bylaws and Rules, CDOT ROW Manual, NOAA National Geodetic Survey Specifications, Code of Federal Regulations, CDOT Road and Bridge Specifications, CDOT Computing Manual, Geometric Geodetic Accuracy Standards for Using GPS Equipment, Code of Ethics for Surveyors and Employees, ALTA/ACSM standards

B. Specific Criteria. Attachment B is a list of specific project criteria (not applicable to a NPS contract and not attached). The list is comprehensive and may include items that are not required for tasks defined in this scope. The Consultant shall submit the pertinent criteria to the CDOT/PM at one of the periodic progress meetings prior to initiating work.

SECTION 5
WORK ACTIVITY ASSIGNMENTS

This list encompasses the consultant's individual task responsibility. The consultant shall perform all work tasks which are indicated below by an 'X' mark in the consultant column, in accordance with the forms and conditions of Part 2, Part 3, and the standards described in the manuals and documents associated with this contract in 1.07 and 4.08 after coordination and consultation with CDOT. The Consultant is also responsible for coordinating the required work schedule for those tasks accomplished by CDOT and other agencies.

PRECONSTRUCTION- See Part 2 for Work Tasks and Task Descriptions.

		CDOT/OTHER	CONSULTANT &/or SUBS
5.01	**Project Initiation and Continuing Requirements**		
	A. Initial Project Meeting	X	X
	B. Project Schedule Reviews (Deliverables Deadlines)	X	X
	C. Initiate Survey	X	X
	D. Right of Entry & Permits		X
	E. Traffic Control		X
	F. Initial Submittals		X
	G. Progress Meetings		X
	H. Safety		X
	I. Project Management		X
5.02	**Project Development**		
	A. Communication and Consensus Building		
	B. Contact List		X
	C. General Meetings		
	1. Small Group	X	X
	2. Project Review		X
	D. Communication Aids		X
	1. Graphics Support		X
	E. Route Location Surveys		
	F. Survey Manual General Procedures		
	1. Equipment Checking		X
	2. Calibration		X
	3. Error reduction		X
	4. Field notes		X
	5. Preliminary Survey scope	X	X
	6. Presurvey conference	X	X
	7. Special use permit		X
	8. MUTCD Traffic Control		X
	9. Permission to Enter Property		X
	10. Underground utility locates		X
		CDOT/OTHER	CONSULTANT

			&/or SUBS
G.	GPS Surveys		
	1. GPS survey specifications		X
	2. Error reduction		X
	3. Equipment checking and calibration		X
	4. GPS survey methods		X
	5. Static & Fast Static Network design		X
	6. GPS planning		X
	7. GPS vertical survey		X
	8. GPS Horizontal survey		X
	9. Project and LS Control Diagrams		X
	10. CORS		X
	11. OPUS		X
H.	Aerial Surveys		
	1. General		X
	2. Ground control		X
	3. Photo control (Horizontal)		X
	4. Photo control (Vertical)		X
	5. Photo control survey report		X
	6. InRoads TMOSS Coding		X
	7. Tolerance verification		X
	8. Photogrammetry Specifications		X
	9. Deliverables		X
I.	ROW		X
	1. Early ROW		X
	2. ROW Review	X	X

5.03 Preliminary Design

		CDOT/OTHER	CONSULTANT &/or SUBS
A.	Preliminary Surveys		
	1. General		X
	2. Reconnaissance		X
	3. Research		X
	4. Railroad Research		X
	5. Horizontal Tolerance verification		X
	6. Control Survey		X
	7. Horizontal Control Survey		X
	8. Vertical Control Survey		X
	9. Differential Leveling		X
	10. Project Control Diagram		X
	11. ROW Survey		X
	12. Land Survey Control Diagram		X
	13. Boundary Analysis		X
	14. InRoads TMOSS Coding		X

15. Topographic Survey		X
16. Drainage Survey		X
17. Utility Survey		X
18. Staking for Appraisal		X
B. Utility Coordination		
1. Location Maps		X
2. Contact Locate Services		X
3. Reviews and Investigations		X
4. Underground Locates		X
5. Ditch Co. Coordination		X
C. ROW		
1. Research		X
2. Ownership Map		X
D. Final Design		
1. ROW Plans and Authorization Plans	X	X
2. Post Field Inspection Review Revisions		X

SECTION 6
SUBMITTALS

		CDOT/OTHER	CONSULTANT &/or SUBS
Part 1, Section 4 - Project Initiation and Continuing Requirements			
4.04-B	Periodic Reports & Billings		X
4.04-C	Meeting Minutes		X
Part 2, Section 1.01 – Project Initiation and Continuing Requirements			
1.01-A	Man-hour Estimates	X	X
1.01-A	Project Cost Worksheet	X	X
1.01-B	Project Schedule		X
1.01-C	Survey Plan		X
1.01-D	Permission to Enter Forms		X
1.01-E	Traffic Control Plan		X
1.01-F	Initial Submittal of InRoads TMOSS		X
1.01-F	Initial Submittal of an Original Plan Sheet		X
1.01-G	Meeting Minutes		X
Part 2, Section 1.02 - Project Development			
1.02-A-1	Permission to Enter Contact List		X
1.02-E-1-b	Equipment Calibration		X
1.02-E-1-d	Field Notes		X
1.02-E-1-f	Preliminary Survey Conference Minutes		X
1.02-E-1-g	Special Use Permits		X
1.02-E-1-h	Traffic Control Plan		X
1.02-E-1-i	Executed Permission to Enter Forms		X
1.02-E-1-j	Underground Utility Reports		X
1.02-E-2-a to 1.02-E-2-h	GPS Quality Control Report		X
1.02-E-3-e	Photo control survey report		X
1.02-E-3-f	Raw unedited file, .DC or .SDR, InRoads .CTL, .FWD and .DGN electronic files		X
1.02-E-3-g	Quality control report		X
1.02-E-3-h	Specifications called for		X
1.02-E-3-i	Planning maps, flight plan, camera calibration report, negatives, contact prints, photo index, photo enlargement prints, digital images, analytical aerial triangulation report, planimetric feature identification, InRoads TMOSS supplemental survey, mapping sheets, digital terrain models, digital elevation models, contours, ortho-photography data		X
1.02-E-4-a-(3)	ROW Preliminary Cost Estimate		X
		CDOT/OTHER	CONSULTANT

			&/or SUBS
1.02-E-4-a-(4) Relocation Study			X
1.02-E-4-a-(9) Plat of Existing ROW		X	
Part 2, Section 1.03 - Preliminary Design			
1.03-A-3 Researched materials			X
1.03-A-10 Project Control Survey Diagram			X
1.03-A-12 Land Survey Control Diagram			X
1.03-A-14 InRoads Files (.FWD, .ALG, .DTM			X
1.03-A-15 Digital Topographic Survey (.DGN)			X
1.03-A-16 Drainage Survey			X
1.03-A-17 Utility Survey			X
1.03-A Survey Field Notes (Hardcopy and/or Electronic)			X
1.03-B Utility Location Maps			X
1.03-C-1 Right of Way Research			X
1.03-C-1 Memoranda of Ownership			X
1.03-C-2 Preliminary Ownership Map (for Field Inspection Review plan set)			X
Part 2, Section 1.04 - Final Design			
1.04-A Right of Way Authorization Plans			X
1.04-A-4 Area Calculations			X
1.04-A-5 Authorization Plans			X
1.04-A-6 Legal Descriptions			X
Part 2, Section 1.05 - Data			X
Part 2, Section 1.06 - Survey Plats			X
Part 2, Section 1.06 – Right of Way COGO Data			X
Part 2, Section 1.07 - Plans			X
Part 2, Section 1.08 - Electronic Data Submittals			X
Part 3, Section 1 - Post Design Plan Modifications			
Part 3, Section 2 – Pre-construction Services			
2.01-A Stake Project Alignment Centerline			X
2.01-B Slope Stake			X
2.01-C Stake Clearing Line			X
2.01-D Stake Minor Structures (culverts)			X
2.01-E Stake Major Structures (CBC's & Bridges)			X
2.01-F Stake ROW Parcels and Easements for Appraisal and Acquisition			X
2.01-G Restaking if required based on Project Engineer's inspection and/or revisions to design			X
Part 3, Section 3 - Post Construction Services			
3.01 Final Earthwork Determination			X
3.02 "As-Built" Plans			X
3.03 Revisions to Final Right of Way Plans			X
3.04 Monument Right of Way			X

3.06	Record Plan Set	_____	X

SECTION 7
CONTRACT CONCLUSIONS

7.01 Supplemental Work. This contract will be supplemented by task orders for specific tasks during a two-year period.

7.02 Contract Completion. This Contract will be satisfied upon acceptance of the following items if applicable to supplement(s) by task order:

Project Schedule
Project Progress Meeting Minutes
Traffic Control Plan(s)
All Documents Found In Research
All Permission to Enter Forms
Monumented & Surveyed Ground Control
Digital InRoads TMOSS Data
All Electronic Data from InRoads and MicroStation packages
Photography Products
Legally Filed Survey Plans
Preliminary Ownership Map
Original Field Notes
Sealed Project Control and Land Survey Control Diagram(s)
Survey Report (Including monument recovery forms)
Quality Control Report
Monumented and Sealed ROW Plans
Legal Descriptions, Signed and Sealed
NOAA - NGS Blue Book
Memoranda of Ownership
Title Commitments and policies
Deposited ROW Plans

and the completion of review of contract submittals.

COLORADO
Department of Transportation

SCOPE OF WORK

PART 2

PRECONSTRUCTION TASK DESCRIPTIONS

April 18, 2024

THE COMPLETE SCOPE OF WORK FOR CONSULTANT SERVICES INCLUDES:

PART 1 – NON-PROJECT SPECIFIC for REGION 2 (Which is attached to the Contract for Consultant Services)

PART 2 - PRECONSTRUCTION TASK DESCRIPTIONS

PART 3 - SERVICES AFTER DESIGN (as applicable)

Part 1 and Part 3 are available as separate documents. These apply to specific task orders when referenced in the task order. These and the external references referred to are the controlling specifications for the work activity assignments listed in Part 1.

Table of Contents

SECTION 1
PRECONSTRUCTION WORK TASK DESCRIPTIONS

The following includes work descriptions for all tasks normally accomplished during this phase of the work. Work items listed may need to be advanced in time period in order to meet compressed schedules.

The tasks that could be the responsibility of the consultant are identified in Part 1 of this scope. The Consultant should review this entire section to identify applicable material. Contact the CDOT/PM if clarification is required.

The following activities of communication and consensus building, project team reviews, conceptual design, gather data, documentation, and formal public notice should be planned by the Consultant and coordinated with the CDOT/PM (CDOT Project Manager) to satisfy the requirements of the "Procedures for Public Involvement and Participation in the Project Development an Environmental Analysis Process". The time of their accomplishment, which 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 will be developed by the Consultant that satisfies the requirements of the project. This plan must be approved by the CDOT/PM before starting the work.

1.01 Project Initiation and Continuing Requirements

A. Initial Project Meeting. An initial meeting will be held and an on-site inspection (when appropriate) will be made to ensure that the Consultant is familiar with the existing conditions as well as the project requirements. This meeting will be coordinated by the Consultant and conducted by the CDOT/PM. Notices for the meeting are to be sent by the Consultant. A scope of work, man-hour estimate and the project cost work sheet designated by the NPS contract will be developed from this meeting.

1. If this contract is for the production of ROW Plans, the consultant or sub-consultant actually designing the ROW Plans shall attend a Presurvey Conference with the CDOT/PM.

2. A Pre-Survey Conference between the consultant and the CDOT/PM will be held prior to any survey work performed. The CDOT Survey Manual provides several agendas for the Pre-Survey Conferences.

B. The consultant shall submit a proposed schedule to complete each survey task with each task order proposal. The schedule shall be negotiated with the CDOT/PM before the task order proposal is accepted. A Gantt chart showing all work tasks, the

duration of each task, the resources assigned to each task, and the relationship of each dependant task shall be prepared and submitted to the CDOT/PM. It is the consultant's responsibility to communicate and document any delays or set-backs in the schedule in the monthly status reports and submit a revised schedule Gantt chart.

C. The survey is initiated by the "Notice to Proceed" from CDOT. The consultant is then responsible to begin the work. A CDOT Form 1217 *Preliminary Survey Scope* shall be used as a guide for completing the survey scope. An example of the Form 1217 is included in the CDOT Survey Manual.

D. Obtain necessary right of entry (Permission to Enter - Form 730a) and permits. It is useful to start the project contact list called for in Part 2 Section 1.02 A. at this stage with the names of the adjoiners to the project. This list in spreadsheet format (i.e. Microsoft Excel) is used to make mailing labels and can be used to merge fields into subsequent documents and communications with landowners adjoining the corridor. The digital file of the list is a required submittal.

1. Some activities may require work on land not controlled by the CDOT. In such cases the Consultant shall obtain the necessary written permission to enter the premises. Included in this written permission will be the names and telephone numbers of persons to contact should notification prior to entry be necessary. These written permissions will apply to CDOT personnel as well as Consultant personnel. CDOT Form 730a must be used for this purpose. Signed copies of the written permission will be submitted to the CDOT/PM prior to entering private property for survey work. Include County Tax Plat parcel number on Form 730a when submitting to CDOT so completed Permission to Enter can be located on County Tax Plat.

2. Some activities such as materials testing on existing pavement and structures may require a special use permit or temporary easement from the landowner. Permits and temporary easements will be obtained by the consultant and copies submitted to the CDOT/PM.

E. Traffic Control. Consultant field activities that interfere with traffic operation within existing roadways will require control of existing traffic. The Consultant will plan and provide any required traffic control for the survey, testing, or design process. Traffic control operations will be in accordance with the MUTCD. The Consultant will note that the proposed method for handling traffic must be acknowledged in writing by the CDOT/PM. Also, certification of the Traffic Control Supervisor as a Worksite Traffic Supervisor by the American Traffic Safety Services Association (ATSSA) will be required. The consultant should schedule a two-week review period for the approval of the traffic control plan. Region Two has in place an extensive lane closure strategy that provides authoritative guidance for scheduling lane closures in

Region Two. Copies of the technical report are available from the R-2 Traffic unit.

F. Initial Submittals. Submit the following samples to the CDOT/PM for approval:
- An original plan sheet that complies with Part 2, Section 2 of this scope.
- Photogrammetric and/or survey data and a drawing or photograph in accordance with the requirements specified in Part 2, Section 2.

NO ORIGINAL PLAN SHEETS OR PHOTOGRAMMETRIC SURVEY WORK WILL BE DONE UNTIL SATISFACTORY SAMPLES HAVE BEEN RECEIVED AND APPROVED BY THE CDOT/PM.

G. Progress Meetings

1. The CDOT and Consultant Project Manager will meet periodically as required (typically at one month intervals). These Progress Meetings will be used to coordinate the work effort and resolve problems. The meetings will review the following:

   a. Activities completed since the last meeting.
   b. Problems encountered.
   c. Delayed and behind-schedule activities.
   d. Activities required by the next progress meeting.
   e. Solutions for unresolved and anticipated problems.
   f. Information or items required from other agencies.

2. Other required meetings are described in the following sections.

H. Safety

1. Consultants working within the CDOT Right of Way (ROW) are subject to all safety requirements of the department and OSHA. See Chapter 7 of the CDOT Survey Manual for a list of the CDOT policy and procedural directives and other references to CDOT safety manuals and guides. The consultants engaged by this non-project specific contract shall assume the responsibilities listed in the CDOT Survey Manual for the region survey coordinator for all consultant employees and crew members.

I. Project Management – The consultant will coordinate all the work tasks being accomplished by all parties to ensure project completion on schedule.

1.02 Project Development

A. Communication and Consensus Building. Establish and maintain a computerized list or database of all appropriate receptors for the communication process. The data shall be in Microsoft Excel format.

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

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

The information on the list shall include as a minimum:

Name
Firm (if any)
Mailing address
Phone number

1. Contact List:

Property owners adjoining the project
Public Agencies
Neighborhood Groups
Property Owners/Tenants
Business Interests
Special Interests
Railroads

The contact list shall be delivered to CDOT in Microsoft Excel format.

2. General Meetings. The types and number of meetings shall be flexible and determined by an interactive process as approved by the CDOT/PM.

   a. Small Group Meetings (one-on-one). Meet with property and business owners or others directly affected by the project work to identify likely impacts and discuss possible mitigation or resolutions. Minutes of these meetings will be provided to all participants by the consultant.
   b. Project Review Meetings. These meetings are intended to disseminate project progress information to the public and representatives of local entities. Notices will be mailed at least 14 days in advance of these meetings to those on the contact list. The Consultant will provide the presentation aids, conduct the meeting, and provide complete minutes of the meetings to CDOT.

3. Communication Aids

    a. Graphics Support. Provide the graphics for public presentations and environmental documents. This may include 35mm slides, computer-projector slides, maps and plan views of conceptual design, and other displays for visual presentations at meetings.

B. Route Location Surveys. Surveys will be conducted in accordance with the CDOT Survey Manual and the latest addendum thereof.

1. See the CDOT Survey Manual General Procedures (CDOT Survey Manual Chapter 2) for a detailed description of the following work tasks and elements.

    a. Equipment Checking and Calibration (CDOT Survey Manual Chapter 2.1)
    b. Calibrations (CDOT Survey Manual Chapter 2.2)
    c. Error Sources in Surveying (CDOT Survey Manual Chapter 2.3)
    d. Field notes (CDOT Survey Manual Chapter 2.4)
    e. Preliminary Survey Scope Form 1217a (CDOT Survey Manual Chapter 2.5)
    f. Presurvey Conference (CDOT Survey Manual Chapter 2.6)
    g. Special Use Permit Form 1283a (CDOT Survey Manual Chapter 2.7)
    h. Manual of Uniform Traffic Control Devices (MUTCD) 6H-16 & 6H-10 (CDOT Survey Manual Chapter 2.8). Region two has a lane closure strategy technical report that is available from the Traffic engineer. The lane closure strategy is a guiding document on when lanes can be closed for work.
    i. Permission to Enter Property Form 730a (CDOT Survey Manual Chapter 2.9)
    j. Underground Utility Locates Prior to Installing Monumentation (CDOT Survey Manual Chapter 2.10)

2. Global Positioning System Surveys (CDOT Survey Manual Chapter 3 and Appendices)

    a. GPS Survey Specifications (CDOT Survey Manual Chapter 3.1 and Appendices). This includes GPS reports and a submittal for the CDOT GPS control monument database and specifications for blue book data for submittal to the NSRS. The appropriate GPS report is required for each survey performed.
    b. Error Sources in GPS (CDOT Survey Manual Chapter 3.2). Procedures are required to reduce errors.
    c. GPS Equipment Checking and Calibration (CDOT Survey Manual Chapter 3.3). A CDOT approved method is required for each project.
    d. GPS Survey Methods (CDOT Survey Manual Chapter 3.4). The project survey scope will specify the survey required.

e. Static and Fast Static Network Design (CDOT Survey Manual Chapter 3.5). Consultant is responsible for network design.
f. GPS Planning (CDOT Survey Manual Chapter 3.6) procedures are to be adhered to.
g. GPS Vertical Procedures (CDOT Survey Manual Chapter 3.7). GPS derived orthometric heights are used to check and trouble shoot differential leveling on CDOT control monuments. GPS vertical procedures may not be used to establish elevations.
h. GPS Horizontal Procedures (CDOT Survey Manual Chapter 3.8) shall be followed for the survey type requested.
i. Project Control Diagram and Land Survey Control Diagram (CDOT Survey Manual Chapter 3.9) shall be prepared for the survey performed. (See the General Cell Library in the CDOT configuration in MicroStation for the appropriate sheets to use.)
j. Continually Operating Reference Stations (CORS) (CDOT Survey Manual Chapter 3.10) the consultant must supply the eight items listed to the survey coordinator for the prior approval of the use of CORS stations. The final constrained adjustment must also be provided.
k. On-Line Positioning User Service (OPUS) (CDOT Survey Manual Chapter 3.11) is used to check prior processing.
l. Remote Sensing Methods. The consultant must have expertise in 3D laser scanning, such as Light Detection and Ranging (LIDAR), including processing data acquired by 3D scanning.

C. Aerial Surveys (refer to CDOT Survey Manual Chapter 4 for specifications and deliverables)

D. Right of Way (ROW)

a. Early ROW

(1) Perform a field inspection of each short-listed alignment. Ascertain number of parcels, types of improvements, and possible problem areas (i.e., mobile homes, functional replacements, historical sites, etc.). Identify parcels which could require relocation activities.
(2) Using city surveys, courthouse records, and real estate listings, compile information on neighborhood characteristics, price ranges for land and improvements, housing available, minority percentages, etc.
(3) Compile a ROW cost estimate for each alignment.
(4) Prepare a conceptual relocation study.
(5) Identify potential problem areas.
(6) Prepare a property ownership map based on tax assessors' records that identify owners for each alignment.

(7) Prepare a land use map that identifies land usage along each alignment. The parcel use categories shall utilize appropriate categories including:
   (a) Land in public ownership: specific use and responsible agency/jurisdiction
   (b) Commercial: retail, wholesale, industrial, other commercial
   (c) Residential: single or multi-family
   (d) Vacant
   (e) Mixed Uses
   (f) Other (specific)
(8) Ownership Maps
(9) Monumentation - Set ROW monuments at all angle points, points of curvature, end of curvature, and no more than 1400' apart on tangent & curve sections of the ROW (per CDOT MOU). If no monuments are found then monuments must be set on all preliminary ROW surveys. Preliminary ROW mapping projects also require monuments if field investigations uncover a lack of monuments at each angle point or change in curvature on a curve, or on tangent sections of the ROW longer than 1400'. This preliminary ROW survey to establish, calculate, monument and plat the existing ROW line is called ROW mapping or a monumented land survey of the ROW in the project scope. A plat suitable for filing in the county records is required.

b. ROW Review

(1) Review the impact of each proposed alignment on existing and known future land use.
(2) Prepare a ROW report that summarizes the findings and includes:
   (a) A cost estimate for each alignment
   (b) A relocation evaluation for each alignment
   (c) Identified problem areas
   (d) Ownership map
   (e) Land Use Map

1.03 Preliminary Design

A. Preliminary Surveys. This work shall be done in accordance with the CDOT Survey Manual, State Board of Registration rules and policies and applicable state statutes.

1. See General procedures in the CDOT Survey Manual Chapter 5.
2. In addition to the reconnaissance survey described in the CDOT Survey Manual reconnaissance is done on the project site to determine an effective survey plan. GPS satellite visibility, project accessibility, and the general lay of the land are determined.

3. Research is conducted for all applicable materials, recorded and field data, as described in the CDOT Survey Manual.
4. Railroad research and permission to enter the railroad is conducted as described in the CDOT Survey Manual. The survey consultant is responsible for training personnel in railroad safety procedures and guidelines.
5. Horizontal tolerance verification is documented as called for in the CDOT Survey Manual. The surveyor is responsible for choosing the proper method to meet the prescribed tolerances.
6. A control survey is established as described in the CDOT Survey Manual.
7. The horizontal control for the project is established by a method described in the CDOT Survey Manual. Primary and secondary control is described.
8. The vertical control survey is established according to the CDOT Survey Manual. Tolerances and documentation are described.
9. Differential leveling is required on the primary control points, CDOT class A. Differential leveling may be required on asphalt and concrete surfaces under this contract.
10. A Project Control Survey Diagram is prepared as described in the CDOT Survey Manual. The minimum standards and required notes and certifications are described.
11. A ROW survey is performed according to the CDOT Survey Manual. This is a monumented land survey according to Colorado Revised Statutes.
12. A Land Survey Control Diagram is prepared according to the CDOT Survey Manual. The general format and minimum standards, notes, and certifications are described.
13. Boundary analysis and platting is performed according to the CDOT Survey Manual. The determination of the boundary must be made by a PLS. The preponderance of evidence gathered including the recorded documents, field and topographic data, parol evidence, other found monuments, interviews of other surveyors among other things are all weighed and the decisions made presented in the project narrative.
14. TMOSS data is gathered and coded according to the CDOT Survey Manual. The coding method is based upon the file structure (columns and rows) described in the CDOT Survey Manual.
15. The topographic survey is performed according to the CDOT Survey Manual using the approved CDOT coding method. Coding is applied to every topographic field shot in order to produce an electronic scale model of the terrain, improvements, and all existing features desired for the design of the project.
16. The drainage survey is included in the topographic survey as directed by the CDOT Survey Manual.
17. The utility survey is to include all underground utilities from surface located stakes and markings. The utility survey is included in the topographic survey.
18. Staking for appraisal includes establishing temporary stakes for proposed parcels for the purpose of the appraisal and negotiations with the present owner.

B. Utility Coordination

1. Location maps are to be procured from the utility and included in the survey report.
2. Contact Utilities and Utility Notification Center of Colorado to field mark utilities for InRoads TMOSS surveying.
3. Reviews and investigations. When "pot-holing" is designated by task order, the Consultant shall be responsible for the excavation. If designated in Part 1, the Consultant shall be responsible for surveying utility locations.
4. Underground utility locates. The consultant is responsible for contracting with an underground utility locator for surface marking underground utilities when called for in the task order.
5. Ditch Companies. Contact information is to be compiled and delivered to CDOT. Research into the title, rights and interest of the ditch companies is to be provided.

C. Right of Way. The following work shall be done by or under the immediate supervision of a PLS. The following work may be included as part of a surveying task order. The following work may also be included as part of ROW Plans preparation task order.

1. Research. See CDOT ROW Manual.

    a. Identify affected ownership from preliminary design plans and assessors maps.
    b. Obtain assessors map, locating project limits.
    c. Locate documents that transfer title.
    d. Prepare 60-year-long chain of title as directed by the CDOT/PM.
    e. Look for encumbrances, releases, etc.
    f. Make physical inspection of property. Note any physical evidence of easements, wells, ditches, ingress and egress.
    g. Check with County Road Department or County Engineer for location of existing roads.
    h. Check for latest subdivision plats and street vacations.
    i. Memoranda of Ownership shall be as described in the Right of Manual Chapter 2.

2. Ownership Map. See CDOT ROW Manual. For additional detail on required drafting software, COGO, and project coordinate system see SECTION 2 - SUBMITTALS. Ownership map shall be submitted along with a "Project Narrative" see SUBMITTALS - C.3.b

a. Review preliminary design and field survey notebooks.
b. Review Basis of Bearing and Project Coordinate system from the Control Survey prior to calculations.
c. Compute alignment of ROW and store coordinates of all found monuments within the first tier of properties within the project limits.
d. Obtain and review ownership documents (Memoranda of Ownership and/or title commitment and supporting plats).
e. Calculate coordinates of lost or obliterated corners using guidelines established by the Bureau of Land Management. (To be used by field surveyor in resetting the monuments.)
f. 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.
g. Determine existing ROW limits from deeds of record, CDOT plans and found ROW markers. Previous ROW Plans, if available, will be provided by CDOT as an aid.
h. Determine ownership and their property/boundary line locations. Locate the intersection of these property boundary lines with the existing CDOT ROW. Determine location and ownership of existing easements of record. Show as measured dimensions compared to record dimensions where they differ.
i. Secure additional property owner ties and additional topography where the highway improvement may affect improvements adjacent to the ROW. This additional topography should include:
   (1) Underground cables and conduits and any overhead utilities.
   (2) Wells
   (3) Irrigation ditches and systems
   (4) Septic tanks, cesspools, and leaching fields.
j. Reconcile overlaps and gaps in ownerships as required by CDOT, documenting method used (may require additional field work). Include reasons and supporting evidence in the project narrative.
k. Plot ownership map on 11-inch x 17-inch sheets in accordance with specifications. The Sheet cell (see the Sheet cells provided in the General Cell Library in the CDOT MicroStation configuration) 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.
l. Label all monuments found with description of monument, point number, and project coordinates.
m. Show improvements and topography within the ownerships as well as existing access to the street system.
n. 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.

o. Calculate the total area of all ownerships affected, including coordinates of all property corners. Deduct areas for existing road rights of way. Establish bearings and distances on all ownership lines, including coordinates of all property corners.
p. Show areas of complex ownerships graphically by cross hatching different land uses.
q. In the lower right corner of the ownership map, show seal, number, name, and signature of Professional Land Surveyor supervising the work.
r. Transmit finished reproducible ownership map and Memoranda of Ownership to CDOT along with an electronic Drawing of the ownership map drawn to scale in MicroStation, all calculations, field notes, and supporting data. The ownership map will include a Control and Monument Sheet. Note that only the project control data needs to be completed at this time.
s. The Ownership Map in electronic format shall be delivered and be suitable as the base map or master drawing from which all ROW Plans and exhibits are developed in the next phase of the project.
t. Ownership Map shall be as described in the ROW Manual Chapter 2 with the addition of the following five items:
   (1) The map shall include a description of monuments found.
   (2) All measured and record distances shall be shown.
   (3) A statement by the land surveyor in responsible charge shall be included.
   (4) The signature of the land surveyor in responsible charge
   (5) The seal of the land surveyor in responsible charge.
u. The ownership map shall be submitted electronically in MicroStation format with the understanding that this drawing will become the master drawing for any right of plans developed in the corridor.
v. This ownership drawing is to be completed to the standards of Land Survey Plat.
w. Monumented Land Survey of ROW includes all requirements as called for in the Colorado Revised Statutes. This includes CRS 38-51, 38-52, 38-53, All Colorado *State Board of Licensure for Architects, Professional Engineers and Professional Land Surveyors* (heretofore State Board of Registration) by laws and rules including Rules and Standards for Property Boundary Surveys, Definition of Property Boundary Surveys, 6.4, and 6.5. All Policies of the State Board of Registration are to be followed. Nothing in this scope relieves the consultant from complying with state statutes and Colorado State Board of Registration rules and policies.

NOTE: The Project Control Diagram and a preliminary ROW Ownership Map shall be available for review at the time of the FIR.

1.04 Final Design

A. ROW Plans and Authorization Plan.
   1. Verify toes of slope on base map from earthwork data.
   2. Plot existing ownership lines from preliminary ownership map.
   3. Plot new ROW requirements and access control from design plans following the FIR on base map. Normal scale, 1" = 50' in urban areas, 1" = 100' in rural areas.
   4. Calculate areas of parcels, easements, and remainders in accordance with CDOT ROW Manual.
   5. Prepare ROW Plan Sheets as outlined in CDOT ROW Manual. (See the sheet cell provided in the General Cell Library in the CDOT MicroStation configuration.) Note that distances on parcels shall be given in feet.
   6. Prepare legal descriptions of parcels, easements and access control as directed by the CDOT ROW Manual. Note that distances are to be given in feet.
   7. Prepare Tabulation of Properties sheet as directed by CDOT ROW Manual (See the sheet cell provided in the General Cell Library in the CDOT MicroStation configuration).
   8. Plot new ROW, access control, new easements, and lane lines on the preliminary Ownership Map. Revise numbering of ownerships to correspond to ROW acquisitions.
   9. Prepare ROW Title Sheet as directed by CDOT ROW Manual. (See the sheet cell provided in the General Cell Library in the CDOT MicroStation configuration.)
   10. Prepare Land Survey Control Diagram for inclusion in plans. See CDOT Survey Manual and the CDOT CADD Manual that can be found at, *https://www.codot.gov/business/designsupport/cadd/manuals-training-resources/2011-cadd-manual* for a sample.
   11. Prepare Control and Monumentation Sheet (CDOT Survey Manual) including a complete list of ROW points to be set (i.e. ROW Angle Points), Permanent and Slope Easement points, Section Corner, Control Monuments per CDOT ROW Manual.
   12. Transmit originals of the plan sheets, title sheet, tabulation of properties sheet, and revised Ownership Map to CDOT. Transmit current updated title work (Memorandum of Ownership and/or Title Commitments per CDOT PM/ROW manager); calculations and supporting data (i.e. parcel diaries). Original sheets shall comply with Part 2 Section 2. Project narrative is included in this submittal.

13. The ROW Plans at the time of the Right Of Way Plan Review (ROWPR) shall include:

    Title Sheet
    Tabulation of Properties Sheet(s)
    Project Control Diagram
    Land Survey Control Diagram
    ROW Plan Sheets with the *Final* Toes of Slope and Tops of Cuts as provided by the Design Engineer
    Final Ownership Map

    NOTE: This list may not include all the necessary, and the content of the plans will be as approved by CDOT PLS II.

    The final ROW Plans submitted must be authorized by the Colorado State Transportation Commission (TC) and must meet the standards set by the Federal Highway Administration (FHWA). If FHWA requires changes in the submitted plans the changes required by FHWA will be at the consultant's expense.

    Post Field Inspection Review Revisions. When specified by part one and included in a task order, the Consultant shall complete the revisions required by the FIR before this phase of work is considered to be complete.

B. ROW Plan Revisions:
    1. The Consultant shall make revisions to the ROW Plans as needed throughout the appraisal and negotiation process.
    2. Plan revisions shall be submitted by the Consultant to the CDOT/PM within five (5) working days after receiving notice from CDOT.
    3. ROW Plan revisions caused by design changes after the ROW Plan Review (ROWPR) shall be billed by the Consultant at the agreed rates. Revisions caused by Consultant error shall be made at the expense of the Consultant.

SECTION 2
SUBMITTALS

2.01 Reports

From Section 1.01-A – A completed Preliminary Survey Scope Form 1217a, a man hour estimate, and a project cost work sheet for a specific rate of pay contract shall be submitted.

From Section 1.01-A-1 & 1.01-A-2 – A Pre-Survey conference agenda form is to be filled out and provided to the CDOT/PM after the pre-survey conference is held.

From Section 1.01-B – A project schedule is to be approved by the CDOT PM before any task order is approved. The consultant shall submit a written schedule with any task order proposal. The schedule shall include a Gantt chart as described.

From Section 1.01-C – Preliminary Survey Scope Form 1217a

From Section 1.01-D-1 & 1.01-D-2 – Original *Permission to Enter* forms, CDOT Form 730a, shall be submitted. A county assessors map or equivalent map of the project map is also to be submitted. This map is to be used as a base map for tracking the status of the completion of the permission to enter forms. Temporary easements or use permits Form 1283a may be required in lieu of or in addition to completed permission to enter forms.

From Section 1.01-E – When the consultant is required for safety reasons to close a lane of traffic, a traffic control plan shall be submitted for CDOT review before the traffic lane is closed.

From Section 1.01-F – Initial submittal of InRoads TMOSS, InRoads, and MicroStation data refers to a small sample of electronic data in InRoads TMOSS format which is submitted early in the project to assure CDOT that the final data will be in the correct format. CDOT's survey processing software is InRoads and Microstation. Submittals will be Inroads/Microstation files.

From Section 1.01-G – Minutes of progress meetings are required.

From Section 1.01-H – Confined space entry permits may apply.

From Section 1.02-A and 1.02-B – The contact list developed shall be in a Microsoft Excel format. This same format is used to create the tabulation of property owners for the ROW sheets. This contact list may include the permission to enter contacts. Additional contacts must be delivered in a separate spreadsheet

file. Mailing lists may be required.

From Section 1.02-A-3 - Communication aids include digital aerial photos merged with survey data for computer projection, court exhibits, posters for public meetings and presentations, Microsoft Power Point presentations, etc.

From Section 1.02-B-1 & 1.02-B-2 – Survey Report and GPS Bluebook. One copy of the survey report shall be delivered by the consultant with any final submittal for each task order. The report shall be bound in a ring binder. The report in addition to the NGS blue book requirements shall include the following sections:

- A project description and scope of work
- Quality Control Report. Submit a report that itemizes the procedures taken to assure that the survey data is of specified quality. The report shall address the steps taken to assure quality in the following work elements: The horizontal control survey, the vertical control survey, the TMOSS survey, the property tie survey, and the aliquot corner survey. The report shall include actual closures, ratios, tolerances, and differences detected while performing the work and evaluating quality. The report is to be signed by the PLS in responsible charge of the survey work.
- From the CDOT Survey Manual products to be delivered to CDOT or deliverables in the project development stage may include:

- A copy of the Project Control Diagram or Land Survey Control Diagram
- Equipment calibration reports including calibration baseline work sheets
- Field notes
- Preliminary survey scope form
- Pre-survey conference minutes
- Special use permits
- Traffic control plans
- GPS specifications
- GPS planning and network design reports
- GPS quality control reports
- Project Control Diagrams
- Land Survey Control Diagrams
- GPS control files
- InRoads .CTL file (text file used to process conventional surveys)
- InRoads PPT.CTL file (text file used for property ties)
- SDR 20 format file (Unedited and edited - real time kinematic survey or conventional survey, free of errors)
- Trimble .DC file (Raw and edited)
- NGS adjust input and output files

- GPS station visibility diagrams
- GPS monument photograph log
- GPS observation logs
- GPS monument rubbing logs
- GPS fast static observation logs
- NGS station description / recovery forms
- Documentation showing that the horizontal control survey meets specifications
- Documentation showing that the vertical control meets specifications
- Documentation that the TMOSS survey meets specifications
- Monument records used in the survey along with photos of aliquot corners included in the survey. Monument records are as prescribed by Colorado Revised Statutes governing Land Surveying. See Colorado Standard Specifications for Road and Bridge Construction section 629 for CDOT monument record requirements.
- Copies of utility maps
- Copies of Assessors Maps
- Copies of deeds used in the survey
- Original copies of permission to enter forms
- Copies of maps or plats used in the survey
- Electronic data on a CD ROM
- Any photographs requested in the Preliminary Survey Scope
- All project related correspondence

Survey Plats. The Professional Land Surveyor Consultant that sets or accepts a monument shall prepare and file a plat in accordance with Colorado Revised Statutes. A copy of the plat and filing shall also be submitted to the CDOT/PM.

The surveyor in responsible charge of the work shall submit a Project Control Diagram for each task order that included a primary control survey and/or a Land Survey Control Diagram if the project makes ties to property corners or public land survey monuments. See CDOT Survey Manual for requirements for each type of Control Diagram. The Project Control Diagram shall be submitted before the FIR for the first project in the corridor. The Project Control Diagram shall include a table of geodetic coordinate values as well as a table of project coordinate values. The diagram shall include descriptions of all monuments. A statement if monuments were found or set must be included. A Basis Of Bearings statement as described in Board of Registration rules must be included. A basis of elevation statement detailing the origin of the project elevation, a detailed description of the project bench mark and the project vertical datum. A statement defining the horizontal coordinate datum. A statement and formula of how the project coordinates were derived. A statute of limitation statement as called for in state statutes for land survey plats. A surveyor's statement that certifies to the accuracy of the survey is needed. A scale drawing of

the surveyed area which accurately locates all monuments found and set in relation to all improvements surveyed is required. The Section, Township, and Range designation must be shown. The highway and milepost limits and the county must be included.

CDOT survey data processing will be accomplished with InRoads and MicroStation. These submittals shall use the CDOT configuration

From Section 1.02-B-3 - All aerial products listed in the CDOT Survey Manual as deliverables:

- Presurvey Conference
- Photo Control Survey Report
- Flight Plan
- Camera Calibration Report
- Original Negatives
- Photo Index
- Contact Prints
- Photo Enlargement Prints
- Analytical Aerial Triangulation Report
- Planimetric Feature Identifications
- InRoads TMOSS Supplemental Survey (FWD)
- 2D Planimetric Features
- Mapping Sheets
- 3D Break Lines with Mass Elevation Points
- Triangulation Irregular Network
- Digital Terrain Model (DTM)
- Digital Elevation Model (DEM)
- Contours
- Orthophotography
- Electronic data is to be in InRoads TMOSS format. Sample aerial InRoads TMOSS data is to be submitted early in the project development. Base map sheets are to include planimetric sheets, contour map sheets, and index maps as called for in the CDOT Survey Manual.
- Rectified digital photos. When designated in Part 1 the Consultant shall submit rectified photography (at the designated approximate scale) with Mylar original plan sheets.
- Any other mapping or Photogrammetric products required by the task order

From Section 1.02-B-4-a-(5) - Project narrative includes all decisions made on property boundary locations. It includes the evidence used and the evidence accepted and rejected.

From Section 1.02-B-4-a-(6) - Copies of researched data including assessor's information, documents that transfer title in order from newest to oldest for each adjacent owner, County road records, subdivision plats, re-plats, exemption plats, vacation documents and Memorandum of Ownership.

From Section 1.02-B-4-b-(2) – ROW report that includes a cost estimate, a relocation evaluation, identified problem areas, Ownership Maps, land use maps, and impacts on future uses for each proposed alignment. ROW mapping and Monumented Land Survey plat of existing ROW may be required at this phase of the project. The plat must be filed in the appropriate county records.

From Section 1.04-A-4 - Area calculations shall include ROW COGO - A Coordinate Geometry Output file shall be submitted. See the CDOT ROW Manual Chapter 2. This is the basis of the ROW plan development and shall be "built" in a logical sequential order paralleling the plans development. Use the point numbering scheme as defined by the CDOT/PM. The generous use of notes and comments is desired in this COGO file. Area calculations shall be reported to the nearest square foot and to the nearest .001 acre.

From Section 1.04-A-12 - ROW Authorization Plans. Submit a progress report detailing the percentage of completion. Attach the "Project Narrative" (see below) along with the progress report. A progress report and narrative, as well as any other attachments, shall be submitted no less than at a one month interval.

Plan and map sheets shall comply with the following requirements:

- The original plan sheets shall be 11"x17". See the project task order for the amount of copies.
- For ROW Plans, see the sheet cell provided in the General Cell Library in the CDOT MicroStation configuration, sheets shall be provided as pre-setup ROW MicroStation drawings. All plan sheets shall utilize this drawing format. (See Electronic Data Submittals).
- The Consultant shall submit an example of an original plan sheet and receive approval from the CDOT/PM prior to drafting the plans.
- One set of 24" x 36" Mylar shall be plotted for filing in the county records. This set is to be signed and sealed by the responsible PLS in charge of the work.
- A signed and sealed 11"x17" plan set for the record set.

2.02 Electronic Data Submittals

Photogrammetric data. Prior to generating mapping data the Consultant shall submit a sample of data and receive approval to continue the work. A sealed and signed hard copy (map sheets when appropriate) shall be submitted with all electronic data.

TMOSS data. Submittal of TMOSS data shall be on a CD-ROM. The final TMOSS data shall include the raw data collector files, the edited data collector files, the combined data collector segment files, a control file and any property pin files. The data shall run through InRoads with no errors or warnings when processed. The DTM shall produce no crossing break lines when processed through InRoads-Surface-View Surface-Crossing Segments. The data shall produce an accurate contour model of the actual ground with no elevation or rod height busts. The codes and notes shall be sufficient to allow a Design Engineer to accurately identify every feature surveyed without returning to the field. Each traffic sign shall be dimensioned and the text or symbol on the sign shall be included in a note immediately following the record for the sign location and include those items called for in the Preliminary Survey Scope. Each culvert and drainage structure shall be associated with a Drainage code 283 note described in the InRoads TMOSS Code Book. Each access opening, driveway, field access, and side road shall be associated with an Access code 277 note as described in the InRoads TMOSS Code Book. The InRoads TMOSS data file naming conventions are explained in Chapter 9 of the CDOT Survey Manual. There shall not be any duplicate point numbers.

ROW data.

- ROW Plans shall be submitted as a *.DGN electronic drawing, prepared using the current CDOT standard naming convention.
- A MicroStation drawing of the entire ROW plan from beginning to end shall be included as a referenced MicroStation drawing for each plan sheet.
- The Consultant will use the drawings folders in the MicroStation file structures setup by the CDOT PM.
- MicroStation drawing files with the required CDOT borders will be supplied.
- A PDF file will be supplied in half-size (11"x17") for plotting purposes.
- All Electronic drawing files and plot files shall be submitted on a CD ROM or as approved by the CDOT/PM.
- All files created by the COGO software package (input, output, archive, etc.) shall be submitted.
- The parcel descriptions shall be submitted in Microsoft Word format.
- All other electronic files (spreadsheets, databases, etc.) shall be submitted.

The CDOT/PM shall be contacted prior to creation of magnetic media to verify the current submission requirements or to discuss any questions concerning the ability to satisfy the current submission requirements.

CDOT Computer/Software Information. The primary hardware used by CDOT is a PC-Windows system and the types of software are:

Drafting	-	MicroStation (Compatible with current CDOT Edition)
Survey	-	InRoads Survey using the CDOT configuration
Geometry	-	InRoads Geometry

Electronic media submittals. CDOT can accept media of the following types and format: CD ROM, and/or other electronic deliverable methods as approved by the PLS II

Required documentation. CDOT requires that each unit of the electronic media submitted be identified with adhesive labels affixed to the media containing the following MINIMUM information as applicable, depending on the media, format, etc. used to create the magnetic media being submitted:

- CDOT Project Number, Project code, and CDOT/PM's name
- Highway Number
- Begin Milepost # - End Milepost #
- Files name(s) and type(s) {ex. InRoads .FWD, MicroStation .DGN}
- Date created
- Contact Person and Telephone number(s)

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

Either contains a description of the operating system commands used to create the electronic media or an attached computer generated listing of the actual process which created the electronic media (preferred). A task order may call for data to be submitted in fragments or partial submittals. If the submittal is a partial submittal, then it must be identified as a partial submittal on the transmittal letter and on the CD ROM. All information contained in any preliminary or incomplete submittals shall be resubmitted by the consultant with the final submittal.

A copy of the Project Control Diagram shall be submitted in electronic MicroStation format with the understanding that CDOT personnel for subsequent projects in the corridor may change the project numbers. The project control survey diagram is included in the construction plans and therefore requires an original signature and seal from the surveyor in responsible charge on the record set of plans. The record set of plans is circulated for signatures after the project is advertised. This final review of the plans will not be paid for separately and shall be included in all task orders issued under this contract.

All material must be submitted to the CDOT/PM.

SCOPE OF WORK

PART 3

SERVICES AFTER DESIGN
CDOT REGION 2

April 18, 2024

THE COMPLETE SCOPE OF WORK FOR CONSULTANT SERVICES INCLUDES:

PART 1 – NON-PROJECT SPECIFIC for REGION 2 (Which is attached to the Contract for Consultant Services)

PART 2 - PRECONSTRUCTION TASK DESCRIPTIONS

PART 3 - SERVICES AFTER DESIGN (as applicable)

Part 1 and Part 2 are available as separate documents. These apply to specific task orders when referenced in the task order. These and the external references referred to are the controlling specifications for the work activity assignments listed in Part 1.

Table of Contents

SECTION 1
SERVICES AFTER DESIGN

Section 1.01 - Post Design Plan Modifications

A. When requested by the CDOT/PM, the Consultant shall provide survey services as needed for plan modifications required by unforeseen field conditions.

Section 1.02 - Pre-Construction Services

A. When requested by the CDOT/PM, the Consultant shall provide surveying services in a timely manner prior to the project ad date to:

1. Stake project alignment centerline.
2. Slope stake.
3. Stake clearing line.
4. Stake minor structures (pipes).
5. Stake major structures (CBC's and bridges).
6. Stake ROW parcels and easements for appraisal and acquisition.
7. Restake above items as required due to revisions.

Section 1.03 - Post Construction Services

A. Final Earthwork Determination. Compute the final as-built earthwork quantities. This will include the required surveying, and computer support.

B. "As-Built" Plans. Modify the original plans so that the plans will agree with actual construction results, or provide InRoads TMOSS survey of actual construction.

C. Revisions to the Final Right of Way (ROW) Plans. (This will normally occur following construction and after ROW acquisitions are resolved.)

1. Review changes in design affecting the ROW Limits including updated information on alignment, slope requirements, structures, easements and access. Make necessary revisions to the plans and ownership map.

2. Review changes brought about by the appraisers and negotiators. Make necessary revisions to the plans and ownership map.

3. Review changes brought about by updated Memoranda of Ownership and/or Title Commitments. Make necessary revisions to the Plans, Tabulation of Properties Sheet, and the Ownership Map.

4. Revise Calculations and Legal Descriptions if necessitated by revisions.

5. Submit reproducible sheets (Title Sheet, Plan Sheets, Monumentation Sheet, Control Survey Plot, Tabulation of Properties, Tabulation of Road Approaches, and Ownership Map) to CDOT. Submit Final Calculations, Legal Descriptions, current Memoranda of Ownership and or Title Commitments, and Supporting Data (i.e. parcel diaries) to CDOT.

D. Monument the ROW according to state statutes and the CDOT Survey Manual.

1. Reset all monuments referenced prior to construction that have been damaged or destroyed.

2. Reset any control monuments disturbed or destroyed by construction that are necessary to set right-of-way monuments.

3. Set all new right-of-way monuments (or reference monuments) as shown on final plans.

4. Set property corners on all remainder parcels. Required monumentation will be as directed by the CDOT/PM.

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

6. Reviewing, signing and sealing the record set of construction plans. Project Control Diagrams included in the construction set of plans shall be signed and sealed by the P.L.S. in responsible charge of the work. The Project Control Diagram is to be reviewed, signed and sealed by the consultant.