



Subsurface Utility Engineering (SUE) Scope of Work

Type of work may include all or parts of the following activities:

Utility Investigation Activities - the scope of work for utility investigation may include:

- a. The Consultant shall conduct and document an investigation of the project area to determine existing utility conditions within the project limits. As part of the investigation the Consultant will meet with all utility providers and collect utility key maps for all utilities in the project area, identify all known utilities: including lighting, irrigation, ITS, storm sewer, ownership, type, size and special conditions should utility relocation be required, and research and obtain copies of utility easements (public and private) and utility franchise agreements to determine conditions under which the utility was established in its present location (e.g. by revocable permit or by a privately owned easement. The utility investigation requirements are to meet Quality Levels A and/or B as required under CI/ASCE 38 or explain why QLA/B could not be achieved. The Consultant shall employ Professional Engineers who are able to stamp plans.
- b. **Project Goals**
 - 1) Quality Level B involves the use of Quality Level D and C methods of utility investigation plus the use of surface geophysical techniques to determine the existence and horizontal position of underground utilities. This activity is called "designating." The information obtained in this manner is surveyed to project control. Two-dimensional mapping information is obtained. This information is usually sufficient to accomplish preliminary engineering goals.
 - 2) Quality Level A involves the use of Quality Level D, C and B methods of investigation plus the use of minimally intrusive excavation methods at critical points to determine the precise horizontal and vertical position of underground utilities, as well as the type, size, condition, material, and other characteristics. This activity uses test holes (sometimes called Locating). It is the highest level presently available. When surveyed and mapped, precise plan and profile information is available for making final design decisions. Records research shall include but limited to the following sources:
 - 811 Notification
 - Contacts List
 - Public Agencies
 - Utility Owner
 - Colorado 811
 - County Clerk's Office
 - Landowner
 - Internet Search
 - Visual Site Inspection
 - Irrigation Companies

- 3) 3D Modeling involves the use of CADD to depict the precise horizontal and vertical profile of each utility in areas of high conflict. This tool is only utilized where precision locating and design of utilities is essential for project success. Some areas of the project may require 3D modeling and will be determined after 60% design, but the ability to model utilities within CDOT's MicroStation workspace may be required in a supplemental SOW.

c. Utility Investigation Methodology

- 1) Project Scoping
 - a) This work is included in the Project Scoping Plan Set for the Project Scoping meeting, complete CDOT's SUE checklist form.
 - b) Quality Level B Utility Investigation per C.R.S. 9-1.5-103.
 - c) Use existing survey project control data, GIS data, plans and electronic data from utility providers, and field survey to prepare utility design plans that meet ASCE Quality Level (QL) B identified within the project limits identified within CDOT's SUE checklist (provided by CDOT). The QLB areas will be determined between the SUE Consultant and CDOT's UEPM. Survey accuracy of all observations shall be in accordance with CDOT's Survey Manual.
- 2) FIR (Field Inspection Review)
 - a) This work is performed at 30% design, prior to FOR Plan development
 - b) Quality Level A Utility Investigation
- 3) FOR (Final Office Review)
 - a) This work is performed at 60% design, during FOR Plan development
 - b) 3D Modeling
- 4) PS&E (Plans, Specifications & Estimate)
 - a) Ready for Utility Clearance and Advertisement

d. Deliverables

- 1) Project Scoping:
 - a) CDOT's Subsurface Utility Mapping mobile application will be available for utility records research and or the collection of any designated utilities during the SUE surveying.
 - b) Final SUE survey data shall be submitted in a GIS shapefile format for all existing utilities found during the SUE survey unless CDOT's Subsurface Utility Mapping mobile application is used during designating.
 - c) Final MicroStation .dgn file containing the horizontal and vertical (if applicable) locations of utilities, ownership, type, size, special conditions of the line and within the established CDOT project coordinate datum.
 - d) The CADD file and project plans should depict the lines in approved CDOT utility line type standards and colors, include all utility easements, and power source locations with easements, per CDOT's available CADD work space.
 - e) Define limits of work SUE work and include SUE report per ASCE 38 Standards. SUE report shall be included, and will include the following if requested by CDOT:

- f) All overhead utilities and pole inventory and including guy anchors-Power source diagrams
- g) Telephone source diagrams
- h) Fiber optic diagrams
- i) Storm sewer diagrams
- j) Water diagrams
- k) Sewer diagrams
- l) Irrigation systems
- m) Vault diagrams
- n) Easements shown on plans
- o) Produce a utility contact list: Including utility provider, contact name, email address, work & cell phone numbers. Used for both utility notes and specifications.
- p) The utility plan sheets will include the utility line work with proper designation colors.
- q) Complete scoping design for utility plans.
- r) Include service line locations for water, sewer, electrical, communications and natural gas.
- s) Show transmission main lines and secondary feed lines with labels.
- t) Distinguish lines between CDOT owned facilities, local agency facilities and utility provider facilities.
- u) Produce utility plan sheets for review with utility providers including an oversize plan sheet for coordination and meetings.
- v) Include known easements for the utility providers; inside, adjacent to and outside CDOT ROW on the utility plans.
- l) Provide a table for each utility provider that includes size and type of the providers' facilities.
- m) Include manhole rim labels and inverts in and out labels that match CDOT project datum elevation.

2) **FIR (Field Inspection Review)**

- a) Provide for and manage the test hole services, including permitting.
- b) Provide a test hole map for survey locates.
- c) Provide a test hole test hole chart and incorporate test hole location into the FIR Utility Plans. In the event there is insufficient design available to perform the test hole activities pre FIR, the consultant shall coordinate the final test hole work into the FOR plan level submittal
- d) Sewer/Storm manholes will be verified; rim elevations, inverts in and inverts out, include pipe size and pipe material. Include labels for other sewer appurtenances, lift stations, drop manholes, vents and force mains.
- e) Water lines to be verified; elevations for valve boxes including size, pipe size and pipe material. Include labels for other water appurtenances, air vacs, PRV vaults, vents and curb stops.
- f) Dry utility labels for vaults, pull boxes, manholes, drop down transformers and other providers attached to all overhead utility line poles.

- 3) **FOR (Final Office Review)**
 - a) If requested provide Utility 3-D modeling in high conflict areas where precision placement of utilities is deemed essential.
 - l) Support CDOT with the development of cross sections leveraging SUE deliverables with both vertical and horizontal data.
 - b) Support the development of drainage profiles leveraging SUE deliverables with both vertical and horizontal data.
 - l) Support wall and bridge profiles leveraging SUE deliverables with both vertical and horizontal data.
 - m) Support CDOT with Landscape plans leveraging SUE deliverables with both vertical and horizontal data.
 - n) Support CDOT with signal and lighting plans leveraging SUE deliverables with both vertical and horizontal data.

DESIGN PHASE – Utility Coordination

1. Scoping

- a. Act as liaison between CDOT and the utility companies during design as it pertains to information, scheduling, coordination and documents.
- b. The Consultant will be responsible for obtaining all permits for work within CDOT ROW related to SUE investigations separate from the SUE consultant.
- c. Coordination of scoping meetings with all utility providers and meeting minutes.
 - i. Using CDOT Utility Checklist for each utility provider.
 - ii. Coordinating work with SUE consultant
 - iii. Obtain GIS information from utility providers
- d. Request and receipt of utility maps and easements from utility companies will be coordinated with CDOT project manager and with CDOT Utility Engineering Program Manager (UEPM).
- e. The consultant will conduct a review of utility information share findings with SUE consultant and CDOT UEPM.
- f. Request franchise agreements from the local agencies. Determine responsible party for cost implications.
- g. Request any secondary utility provider feeds, laterals, services and other attachments to the main utility provider's facility.
- h. Consultant to work with SUE consultant, surveyor and CDOT UEPM that information is adjusted and matches CDOT project datum.
- i. Provide photos of existing utility facilities and conditions in the project limits.
- j. Review and comment on SUE related plans with CDOT project manager and CDOT UEPM.
- k. Develop mapping and associated pertinent information of existing utilities, street lighting, and irrigation ditch facilities within the project limits of each construction project .underground-at grade-overhead utilities
- l. Ascertain and define all utility, street lighting, and irrigation ditch conflicts within the highway construction project limits by an in-depth review of complex highway plans. Contact individual utility, and irrigation companies to convey and jointly resolve these conflicts. The typical construction project requires contact with 4-6 individual companies.
- m. Schedule and conduct subsequent meetings with utilities to resolve complex issues.

2. FIR (Field Inspection Review)

- a. Coordination of FIR meetings with all utility providers and meeting minutes. (Both Office and Field)
- b. Review, recommend revisions, and approve relocation and/or installation plans developed by utility companies to insure compatibility with CDOT construction plans. This process requires input from and coordination with CDOT construction and design personnel, and appropriate State and Local agencies.
- c. Use CDOT's Work Plan (template to be provided) document for non-reimbursable relocation, modification and/or adjustment of existing utilities, irrigation ditches and street lighting companies. These documents describe work that must be performed in a prescribed time and method and require signatory concurrence from the affected company and appropriate CDOT personnel.
- d. Use CDOT's Utility Conflict Matrix plan sheet (template to be provided) to develop and review utility matrix conflicts with CDOT UEPM and work on a preliminary plan of action.
- e. Produce and review a proposed test hole location map with CDOT UEPM.
- f. The consultant will coordinate with SUE consultant, CDOT UEPM, test hole provider and survey company on test hole schedule along with field site coordination.
- g. The Consultant will be responsible for obtaining all permits for work within CDOT ROW related to SUE investigations separate from the SUE consultant.
- h. Provide a matrix of potential utility conflicts utilizing CDOT's standard utility conflict matrix plan sheet.
- i. Produce utility plan sheets for review with utility providers including an oversize plan sheet for coordination and meetings.
- j. Complete FIR design for utility plans.
- k. The utility plan sheets will include the utility line work with proper designation colors, per CDOT's MicroStation workspace.
- l. The consultant will coordinate with CDOT project manager and CDOT UEPM and utility companies on the FIR design plans for review and comment.
- m. Review and interpret all FIR plans to insure that utility facilities have been accurately and completely depicted, including field verification of all utility locations.
- n. Schedule and conduct subsequent meetings with utilities to resolve complex issues.
- o. Responsible for creation of draft utility and irrigation relocation agreements, draft utility specification documents, utility notes and preparation of subsequent written certification to proceed with construction. The utility specification defines the process to be followed for performance of utility, street lighting, railroad, and irrigation ditch relocations or installations. This includes who will perform the work, when it will be performed, time allotted for the work, and method of construction.

3. FOR (Final Office Review)

- a. Coordination of FOR meetings with all utility providers and meeting minutes. (Both Office and Field)
- b. Assist the development of utility plan sheets to include the utility line work with proper designation colors.
- c. Include utility notes and specifications.
- d. Assist in the completion of FOR level utility plans.
- e. The consultant will finalize the identification of existing utilities (both wet and dry) that will be impacted by design and finalize the existing utility plans with call-outs indicating which existing utilities are impacted by the project.
- f. Produce and/or obtain from the owner utility cost estimates to be used for utility reimbursement agreements.
- g. Coordination with the utility providers and CDOT UEPM on potential relocation areas.
- h. Review, recommend revisions, and approve relocation and/or installation plans developed by utility and railroad companies to insure compatibility with CDOT construction projects. This process requires input from and coordination with CDOT construction and design personnel, and appropriate State and Local agencies.

- i. Create documents for non-reimbursable relocation, modification and/or adjustment of existing utilities, irrigation ditches and street lighting companies. These documents describe work that must be performed in a prescribed time and method and require signatory concurrence from the affected company and appropriate CDOT personnel.
- j. Produce and coordinate draft utility notification letters for review.
- k. Prepare and coordinate preliminary utility cost relocation estimates for budget for review.
- l. The consultant will coordinate with SUE consultant, CDOT project manager, CDOT UEPM and utility companies on the FOR design plans for review and comment.
- m. Review and interpret all FOR design plans to insure that utility facilities have been accurately and completely depicted, including field verification of all utility locations.
- n. Schedule and conduct subsequent meetings with utilities to resolve complex issues.
- o. Determine eligibility for reimbursable expenses associated with utility and railroad company installations, modifications, and/or relocations according to CDOT, State and Federal rules and regulations. This process includes obtaining and verifying legal documentation to determine property ownership and right of occupancy.
- p. Initiate and prepare contracts with utility companies for reimbursable modifications. Review estimates for content, check mathematical accuracy, and submit for CDOT signatures and authorization, in compliance with all CDOT, State and Federal rules and regulations. Following issuance of the notice to proceed, act as primary contact for coordination of design, bidding, construction and billings.
- q. Responsible for creation of final utility specification documents and preparation of subsequent written certification to proceed with construction. The utility specification defines the process to be followed for performance of utility, street lighting, railroad, and irrigation ditch relocations or installations. This includes who will perform the work, when it will be performed, time allotted for the work, and method of construction.

4. PS&E (Advertisement)

- a. Coordination of PS&E meetings with all utility providers and meeting minutes. (Both Office and Field)
- b. Final coordination with the utility providers on the potential relocation areas.
- c. Produce and coordinate final utility notification letters for review.
- d. Prepare and coordinate final utility cost relocation estimates for budget and utility contracts.
- e. The consultant will coordinate with SUE consultant, CDOT project manager, CDOT UEPM and utility companies on the PS&E design plans for review and comment.
- f. Review and interpret all PS&E design plans to insure that utility facilities have been accurately and completely depicted, including field verification of all utility locations.
- g. Schedule and conduct subsequent meetings with utilities to resolve complex issues. Review billings and preparation of payment documentation pertaining to work performed under utility and railroad reimbursable contracts to insure compliance with CDOT, State and Federal rules and regulations. This process includes obtaining written concurrence from CDOT personnel, and/or performing personal site inspection, to verify that work was performed in accordance with said contracts.

Construction Management (CM) Utility Coordination/Inspection

Construction Management Support

- 1) Provide CDOT Project Engineer with the following construction inspection support:
- 2) Utility Coordination Oversight during Construction Conduct activities to schedule, monitor, instruct, and guide Contractor, utility companies, railroads, irrigation companies and governmental agencies in the relocation of utility facilities in conflict with CDOT construction projects. The position would insure that these activities are conducted in accordance with CDOT, State and Federal regulations, guidelines and policies. Prepare for the Utility Managers concurrence and/or signature, Standard Utility Agreements, specifications, Irrigation Agreements and project related Utility Permits for the relocation of utilities within CDOT right-of-way. Field inspects utility installations for conformance with plans and specifications and audit utility billings and prepares documentation for payment. Overview of construction schedule and integration with utility company relocation schedules. UC CM will review preliminary schedule, baseline schedule, and applicable schedule revisions to confirm that the Contractor has adequately incorporated utility relocation processes (including easements or right-of-way acquisitions) and identify any critical path issues related to utility relocations. For the purposes of this scope, this role is noted as UC CM (Utility Coordinator for the Construction Manager). Additional support may include:
- 3) Conduct activities to schedule, monitor, instruct, and guide Contractor, utility companies, irrigation companies and governmental agencies in the relocation of utility facilities in conflict with CDOT construction projects. The position would monitor these activities and document utility projects are conducted in accordance with CDOT, State and Federal regulations, guidelines and policies. Field inspects utility installations for conformance with plans and specifications and audit utility billings and prepares documentation for payment.
- 4) Additional utility coordination to proactively resolve potential utility relocation delays. This may include phone calls, meetings, or field meetings with utility companies and contractor.
- 5) Utility Conflict Matrix – UC CM will manage updates to (and develop if matrix if not provided with construction documents) the utility matrix to track actual relocation milestones against commitments in utility agreements.
- 6) UC CM will provide update to CDOT CM PM when utility relocation work is not proceeding according to plans, specifications, and agreements. UC CM will identify steps to recover schedule and present to CDOT CM PM, up to and including escalation protocol.
- 7) UC CM will set-up, facilitate, and document the pre-construction meeting for each utility relocation. If pre-construction meetings are in contractor's scope, UC CM will attend.
- 8) Contractor shall follow Article 1.5 of Title 9, CRS ("Excavation Requirements") when excavation or grading is planned in the area of underground utility facilities. When QL B and QL A SUE depiction differs from one-call excavation marks, it may be necessary for UC CM to review SUE deliverables against field conditions. Evaluate and document discrepancies and provide a recommendation to resolve.
- 9) In the case of unanticipated field conditions or design modifications that affect existing or proposed utilities, UC CM shall coordinate additional utility relocations.

- 10) Relocation inspection - monitor and track to utility relocations through on-site observations including inspection log.
- 11) As built requirements –UC CM will obtain bore logs and/or utility company provided survey and coordinate data transfer to CDOT for incorporation in PointMan or other management system.

Deliverables

- 12) Utility Conflict Matrix – progress updates for relocations
- 13) Minutes from construction meetings with utility companies
- 14) Correspondence/design decision log and documentation of utility coordination with utility companies
- 15) Utility observation log and other as built data
- 16) Quality Control Inspection & Quantity Control: Perform quality control inspections of construction activities to document activities performed and assessment of conformance with the contract documents in accordance with Section 2 of this Scope. Inspection items will include but may not be limited to excavation, backfill, and compaction operations, utilities and traffic control installations for utility operations.
- 17) Quantities of work elements constructed will be measured and recorded to support the preparation and processing of progress pay estimates to the contractor. Quantities will be documented in an interim quantity book for tracking of quantities constructed as compared to the original design quantities on the project. Consultant Utility Coordinator shall assist CDOT in resolving disputes in quantities with the contractor prior to the preparation of the pay estimate.
- 18) Performing duties described in the CDOT *Inspector's Checklist*.
- 19) Preparing and transmitting updates of construction activities to the CDOT's Public Information Office.
- 20) Preparing and transmitting periodic reports and billings required by CDOT Procedural Directive 400.2.
- 21) Participating in weekly progress meetings with contractor, subs, utilities, and other interested parties.
- 22) Securing project documentation from the contractor.
- 23) Anticipating project problems and directing recommended solutions to the CDOT Project Engineer/Manager.
- 24) Reviewing drawings and data submitted by the CDOT or Consultant designer for conformance with the intent of the specifications. Informing and obtaining concurrence as needed from the CDOT Project Engineer and keep relevant documentation for project records.
- 25) Maintaining accurate notes reflecting actual construction details to be used in preparation of as-constructed plans.
- 26) Daily diary of utility construction activity.

- 27) Communicating with adjacent landowners to resolve issues that may arise due to construction as required.
- 28) Reviewing and approving the Contractor's Method of handling Traffic (MHT) if delegated by the CDOT Project Engineer. Depends
- 29) Monitoring compliance with and taking appropriate action to preserve safety on the project for all workers and traveling public in accordance with Method of Handling Traffic (MHT) and the Manual of Uniform Traffic Control Devices (MUTCD).
- 30) Notifying contractors and the CDOT Project Engineer of non-compliance with the contract plans and specifications in a timely manner.
- 31) Preparing inspection documentation for development of progress payments for the contractor in accordance with prescribed procedures.
- 32) Submitting standard documentation reports no later than the following working day.
- 33) Preparing routine correspondence to the contractor, CDOT staff, local agencies, etc.
- 34) Providing liaison and communication to contractor field crews.
- 35) Assisting in preparing the final "As-Constructed" plans upon project completion. Including x,y,z coordinate surveys of all newly installed or relocated utilities
- 36) Assisting in preparing punch lists of uncompleted work, non-conformance reports, and deficiency notices.
- 37) Assisting in preparing responses to contractors and suppliers' requests for information, submittals, change notices, claims, and correspondences. Does it relate to utilities?
- 38) Project Documentation: Prepare inspectors progress reports and complete appropriate CDOT paperwork and forms. Provide documentation list
- 39) Contaminated Material Notification: Monitor construction operations and notify the CDOT Project Engineer immediately when contaminated material or otherwise unacceptable material is encountered or developed on the project.

Post Construction Support

- 40) As-Constructed Drawings: Assist with completion of 11"x 17" as-constructed drawings of utility work completed.
- 41) Preparation of Final Pay Estimate: Assist in determining final pay quantities with appropriate supporting documentation.
- 42) Project Management
- 43) Progress Reports: Prepare monthly progress reports for the CDOT Resident Engineer documenting project progress in accordance with the basic contract.

- 44) Deliverables generated during the project will include the following and will be submitted throughout the duration of the project, or at specific dates commensurate with the deliverable's intent:
- 45) Monthly Progress Reports.
- 46) Project diaries, inspection reports, quantity records, and other documentation prepared during the course of construction in accordance with CDOT requirements.

TEST HOLE PROVIDER

Provide Test hole methods of investigation, plus the use of minimally intrusive excavation methods at critical points to determine the precise horizontal and vertical position of underground utilities, as well as the type, size, condition, material and other characteristics. The excavation and data documentation activity is called "test holing" (sometimes called Potholing). It is the highest level of utility certainty presently available. When surveyed and mapped, precise plan and profile information is available for making final design decisions.

1. CDOT PERMIT APPLICATION

- a. Complete CDOT Permit Application
 - i. Check SUE Box on application
 - ii. Include test hole location map
 - iii. Include traffic control plan
- b. Complete utility provider research in the area to perform work
 - i. Provide estimate
 - ii. Provide utility provider contact information
 - iii. Provide schedule to start and complete work
 - iv. Provide test hole log information
 1. Horizontal locate
 2. Vertical locate (Include measure down from top of surface)
 3. Type and size of material
 - v. Provide field survey test hole locates tied to CDOT project control
 1. Horizontal and Vertical

2. SITE WORK

- a. Provider is to find source of water and obtain necessary permits.
- b. Provider is to find a place to dispose of waste material and obtain necessary permits.
- c. Provider to supply proper material to backfill test holes and obtain necessary permits.
- d. Provider to keep site clean at all times and restore the site back to existing conditions.
- e. Site specific conditions shall be considered.