

## **SUBSURFACE UTILITY ENGINEERING**

### **A. DESCRIPTION OF WORK:**

Subsurface Utility Engineering (SUE) is required on this project. It has been determined that SUE Level XX will be suitable between the following areas along this project. SUE Level XX will be needed for the remaining areas along the project.

### **B. STATE TO PROVIDE:**

1. For Quality Level D:
  - a. 811 Search
  - b. Utilities- names of known utilities, addresses and permits listing use and occupancy permit data.
  - c. Policy for Accommodating Utilities on State highway Right of Way, 2001 or latest.
2. For Quality Level C:
  - a. Topographic Survey
  - b. Supplemental Survey
3. For Quality Level B:
  - a. Final Limits of proposed Quality Level B Survey
4. For Quality Level A:
  - a. Conflict Analysis provided by Utility Company from Quality Level B Data.
5. For K Sheets:
  - a. Additional existing utility locations as identified by individual utility companies.
  - b. Relocation plans from individual Utility Companies.

### **C. PROJECT MANAGEMENT**

This task includes roadway design services, further defined under the following sub-tasks/categories:

1. General Project Management
  - a. This task includes effort for progress reports, invoices, and overall project management; coordination with NDOT Divisions and all applicable consultant team members.
2. Meetings
  - a. This task allows for (1) Quality Level C meeting between NDOT and the Consultant to discuss Existing Utility Sheets and the Technical Memo documenting the Correlated data as well as identifying the work areas where Quality Level B and Quality Level A SUE work will be required. Within three working days after the close of each meeting, the Consultant

shall prepare and submit to the State one copy of a report summarizing the decisions reached.

**D. SUBSURFACE UTILITY ENGINEERING**

**1. Quality Level D**

- a. **Conduct utility facility records research** to assist in identifying utility owners that may have facilities on or be affected by the project. Sources of information may include, but are not limited to:
- Utility section of the Nebraska Department of Transportation or other public agency
  - One-call notification center
  - Public Service Commission or similar organization
  - County Clerk's office
  - Landowner
  - Internet or computer database search
  - Visual site inspection
  - Utility owners
- b. **Collect applicable utility owner records.** Applicable records may include:
- Previous construction plans in area
  - Conduit maps
  - Direct-buried cable records
  - Distribution maps
  - Transmission maps
  - Service record cards
  - "As-builts" and record drawings
  - Field notes
  - County, city, utility owner or other geographic information system databases
  - Circuit diagrams
  - Oral histories
- c. **Review records for:**
- Indications of additional available records
  - Duplicate information and credibility of such duplicate information
  - Need for clarifications by utility owners
  - This work will need to be documented in a Technical Memo.
- d. **Develop Utility Composite Drawing:**  
Professional judgments should be made regarding the validity and location of topographic features on records versus current topographic features (when available) and conflicting references of utilities. Develop Utility Composite Drawings to indicate quality levels; utility type and/or ownership; date of depiction; accuracy of depicted appurtenances (i.e. quality level C vs. quality level D); end points of any utility data; active, abandoned, or out-of-service status; size; condition; number of jointly buried cables; and encasement. These drawings will be prepared in ProjectWise and submitted as a .dgn file.
- e. **Develop Existing Utility Sheets:** Utilizing the Utility Composite Drawings and all available supporting data and ownership documentation, develop the Existing Utility Sheets and include them as K Sheets with all plan set submittals. This task involves (4) Existing Utility Sheets.

- f. **QA/QC:** This task includes effort to conduct internal quality reviews of the design and plan sets during the preliminary design of the project.
  - g. **Deliverables:**
    - 1) Utility Composite Drawings: .dgn file depicting all utility facilities in the project area.
    - 2) Existing Utility Sheets (K Sheets): K Sheets developed to highlight the utility facilities which include station and offsets (pdf set) submitted included with all plan set submittals.
    - 3) Technical memo detailing Review Records findings.
2. **Quality Level C** (If Quality Level C is being utilized, Quality Level D must also be completed)
- a. **Identify surface features** on the topographic plan and ground surface that are surface appurtenances of existing subsurface utility facilities.
  - b. **Evaluate existing survey** and request supplemental survey for identified features not fully captured.
  - c. **Correlate and Evaluate** applicable utility facility and ownership records to these surveyed features, taking into account the geometries and indications on the records of these surface features. When records and features do not agree, resolve discrepancies via coordination with utility owner. This information will be compiled onto the Utility Composite Drawings and Existing Utility Plan Sheets. This work will need to be documented in a Technical Memo along with Review Records findings from Quality Level D.
  - d. **QA/QC:** This task includes effort to conduct internal quality reviews of the design and plan sets during the preliminary design of the project.
  - e. **Deliverables:**
    - 1) Utility Composite Drawings: .dgn file depicting all utility facilities in the project area. This deliverable shall be combined with .dgn from Quality Level D for a single deliverable.
    - 2) Existing Utility Sheets (K Sheets): K Sheets developed to highlight the utility facilities which include station and offsets (pdf set) included with all plan set submittals. This deliverable shall be combined with the K Sheets from Quality Level D for a single deliverable.
    - 3) Technical Memo detailing findings of Correlate and Evaluate task. This memo shall be combined with memo from Quality Level D for a single deliverable.
3. Utility Rehabilitation Sheets - K Sheets:
- a. **Utility Rehabilitation Sheets (K Sheets):** This task includes effort to develop Utility Rehabilitation Sheets displaying existing utilities, relocation plans generated by others, utility owners, facility type, and all applicable Subgrade Utility Engineering data for purposes of coordination with NDOT Utility Section and providing information during the construction phase. This task involves (4) Utility Rehabilitation Sheets ("K Sheets"). When this section is utilized, the Utility Rehabilitation Sheets will replace the Existing Utility Plans being submitted at the Design and Plan Detail Phases.
  - b. Utility Conflict Memo and Plans: This task includes effort to develop a memo identifying locations where existing utilities will be impacted by our construction efforts. This memo will be utilized by NDOT Staff to coordinate with respective Utilities and provide subsequent relocation plans. A copy of the Utility Rehabilitation Sheets with conflicts

clearly identified will accompany this submittal. This Memo will be updated when project changes occur that remove or add conflicts.

- c. **QA/QC:** This task includes effort to conduct internal quality reviews of the design and plan sets during the preliminary design of the project.
- d. **Deliverables:**
  - 1) Final Utility Composite Drawings: .dgn file depicting all utility facilities in the project area. Final Utility Composite Drawings to indicate quality levels; utility type and/or ownership; date of depiction; accuracy of depicted appurtenances (i.e. quality level C vs. quality level D); end points of any utility data; active, abandoned, or out-of-service status; size; condition; number of jointly buried cables; and encasement. These drawings will be prepared in ProjectWise and submitted as a .dgn file.
  - 2) Utility Rehabilitation Sheets to be included with all Plan Submittals.

**A. PROJECT MANAGEMENT**

This task includes roadway design services, further defined under the following sub-tasks/categories:

- 1. General Project Management
  - a. This task includes effort for progress reports, invoices, and overall project management; coordination with NDOT Divisions and all applicable consultant team members.
- 2. Meetings
  - a. This task allows for (1) SUE Findings meeting between NDOT and the Consultant to discuss Existing Utility Sheets and the Technical Memo documenting the Correlated data as well as identifying the work areas where Quality Level B and Quality Level A SUE work will be required. Within three working days after the close of each meeting, the Consultant shall prepare and submit to the State one copy of a report summarizing the decisions reached.
- 4. **Quality Level B** (If Quality Level B is being utilized, Quality Level C and D must also be completed)
  - a. **Perform and interpret the necessary geophysics:** Apply appropriate surface geophysics to search for utility facilities within the project limits and perform necessary evaluations where construction activities will be taking place and/or where deemed necessary by consultation with NDOT.
  - b. **Mark the indications of utilities on the ground surface for subsequent survey.** Coordinate with Local utility owners, agencies, and/or one-call statutes to verify that the markings' colors, sizes, and/or other labeling do not conflict with their marking styles. Care should be taken to differentiate markings placed on the ground for design purposes from those placed on the ground for damage prevention purposes. (Note: If a particular surface geophysical method allows for field data collection or storage for future computer downloading and evaluation, if a utility search technique that allows for comprehensive area coverage is used, and if a survey grid or line is laid out that allows for future correlations of surface geophysical data to points depicted on a map, then ground markings may be unnecessary.)

- c. **Survey all markings that indicate the presence of a subsurface utility facility.** This survey should be to the accuracies and precision dictated in the Roadway Design Manual Appendix F and utilize the project's Survey Control Point Tie Sheet. This survey is to be done concurrently with any supplemental survey identified in Quality Level C: Evaluate Existing Survey.
  - d. **Depict all designated utilities.** Quality level B data should be reproducible by surface geophysics at any point of their depiction. These depictions will be added to the Utility Composite Drawings and Existing Utility Sheets scoped in Quality Level C and D. The following additional depictions will be submitted to NDOT:
    - 1) Develop Utility Matrix: Create a Utility Matrix by analyzing the design plans overlaid with the utility as-builts, Utility Records/Agreements, and any available SUE information. This matrix will show pertinent utility information such as owner, contact information, conflict location by station and offset, type of facility in conflict.
    - 2) Other appropriate documents.
  - e. **Correlate and Resolve differences:** Evaluate the designated utilities' depictions with utility records and/or surveyed appurtenances to identify utilities that may exist but were not able to be designated. Resolve differences between designated utilities and utility records and surveyed appurtenances. This may take the form of additional surface geophysical searches or depiction of designated or non-designated utilities. Situations may require judgment that a designated utility and a utility of record are actually identical, even if not interpreted as geographically coincident. If unable to resolve differences a Quality Level A may be necessary. A supplemental agreement will be discussed in these cases. This work will need to be documented in a Technical Memo.
  - f. **QA/QC:** This task includes effort to conduct internal quality reviews of the design and plan sets during the preliminary design of the project.
  - g. **Deliverables:**
    - 1) Utility Matrix
    - 2) Other supporting utility information gathered through Quality Level B analysis.
    - 3) Summary of all Utility Facilities Identified and Operators contacted as part of correlating and resolving differences of utility facility present on project. This memo shall be combined with memo from Quality Level C for a single deliverable.
    - 4) Existing Utility Sheets (K Sheets): K Sheets developed to highlight the utility facilities which include station and offsets (pdf set) included with all plan set submittals. This deliverable shall be combined with the K Sheets from Quality Level D for a single deliverable.
5. **Quality Level A** (If Quality Level A is being utilized, Quality Level B, C and D must also be completed)
- a. Gather Level A Data: Use nondestructive digging equipment (such as vacuum excavation) to expose and survey the utilities in the identified area where Quality Level A data is necessary. Survey will be to an accuracy of 15- mm vertical and to existing applicable horizontal survey and mapping accuracy.
    - Test holes will be required every 100' along each facility and at critical points along the project's design, and at other critical points as designated by the Designer.

- Excavated test holes needed to expose the utility to be measured will be made in such a manner that protects the integrity of the utility to be measured.
  - Consultant will comply with applicable utility damage prevention laws, permits, and specifications, and coordinate with utility and other inspectors, as required.
  - Back fill and compact test holes in 6" lifts with excavated material.
  - Restore all locate holes to the condition they were in before, or better.
  - Replace asphalt/concrete with equal or greater thickness as needed to repair roadway
- b. Determine and document:**
- a) The horizontal and vertical location of the top and/or bottom of the utility referenced to the project survey datum.
  - b) The elevation of the existing grade over the utility at a test hole referenced to the project survey datum.
  - c) The outside diameter of the utility and configuration of non-encased, multiconduit systems.
  - d) The utility structure material composition, when reasonably ascertainable.
  - e) The paving thickness and type, where applicable.
  - f) The general soil type and site conditions.
  - g) Such other pertinent information as is reasonably ascertainable from each test hole site.
- c. Depict all designated utilities:** Add Quality level A data to the Utility Composite Drawings, Existing Utility Sheets and Utility Matrix scoped in Quality Level B, C and D. The following additional depictions will be submitted to NDOT.
- d. Correlate and Resolve differences:** Evaluate the designated utilities' depictions with utility records and/or surveyed appurtenances to identify utilities that may exist but were not able to be designated. Resolve differences between depicted Quality Level A data and other quality levels. This may take the form of additional surface geophysical searches or a depiction of adjacent or nearby data points at a lower quality level. It may require that utilities already depicted at Quality Level B, C, or D should be re-depicted to coincide with the more accurate Quality Level A data. It may take the form of additional upgrades at appropriate points to Quality Level A information. This work will need to be documented in a Technical Memo, this memo shall be combined with memo from Quality Level B for a single deliverable.
- e. QA/QC:** This task includes effort to conduct internal quality reviews of the design and plan sets during the preliminary design of the project.
- f. Deliverables:**
- 1) Utility Matrix
  - 2) Other supporting utility information gathered through Quality Level A analysis.
  - 3) Summary of all Utility Facilities Identified and Operators contacted as part of correlating and resolving differences of utility facility present on project. This memo shall be combined with memo from Quality Level BC for a single deliverable.
  - 4) Existing Utility Sheets (K Sheets): K Sheets developed to highlight the utility facilities which include station and offsets (pdf set) included with all plan set submittals. This

deliverable shall be combined with the K Sheets from Quality Level D for a single deliverable.