

EXHIBIT I

SCOPE OF SERVICES

The following information will explain and define the items of importance relating to these projects. All the elements of work that are necessary to satisfactorily complete the surveying of this project may not be listed. The lack of a specific listing of an element or item of work does not in itself constitute a basis for additional services or work supplement, and/or adjustment in compensation.

I. PROJECT

The work covered by this Agreement shall include furnishing equipment, materials, professional, technical, and personnel resources necessary for the surveying services and data required for engineering design and development of the following bridge replacement:

Job No. JNW0046, Nodaway County, RT VV, replace Bridge R0014 over Platte River

II. PROJECT LOCATIONS AND LIMITS

1. Nodaway County, RT VV, replace Bridge R0014 over Platte River

Located 1.6 miles west of Conception, MO in S22 & S27, T63N, R34W. Limits of work is defined in Exhibit B.

III. SCOPE OF WORK

The scope of work included in the section is to be performed on said bridge. The limits and specific data requested for said bridge are shown in the exhibits attached.

- 1) Records Research.** The Consultant shall be responsible for all research of:
 - a. Title records and abstracts (may include deeds of record, title certification, etc.).
 - b. Evidence from recorded surveys (and unrecorded surveys, if so recovered).
 - c. Deeds and plats for affected properties.
- 2) Property Owner Notification.** The Consultant shall be responsible for notifying property owners of the survey activity by the consultant. The consultant will make an effort to make direct contact with residents in the field before entering properties.
- 3) Linear measures.** Linear measurements will be made in the English System. The base unit will be the U.S. Survey Foot (and decimal parts thereof).

4) Control Survey. The Consultant shall be responsible for establishing horizontal and vertical control throughout the project limits.

a. Horizontal Control. Control shall be established along adjacent State Route and provide reference ties for control recovery.

- Horizontal control shall be constrained to the Missouri Department of Transportation Real-Time Network.
- Control shall be referenced to the North American Datum of 1983 (NAD83) (2011), Epoch 2010.
- Orthometric heights shall be referenced to the North American Vertical Datum of 1988 (NAVD88) using the current GEOID18 model.
- Control shall be referenced to the Missouri Coordinate System of 1983 in the west zone.
- Control point shall consist of 5/8" x 24" rebar with a 2" aluminum cap containing a defined datum point.
- 2D or 3D control point shall be placed a minimum 6 inches below the ground's surface. If set in a cultivated field, the point shall be placed 12" below ground's surface.
- Control shall be placed at the following locations and interval spacing: 1) 2 control points shall be placed at the structure location, each being placed at opposite corners of the structure, 2) remaining control shall be placed at intervals not to be greater than 1500ft and are to be visible from their nearest 3D control points.
- 2D or 3D control points shall have X, Y positional values determined by one of two GNSS methods: 1) Static GNSS observation or 2) Real-Time Kinematic GNSS observation. Static GNSS shall have a minimum of (2) four (4) hour observations with a 2-hour minimum of time differential. Real-Time Kinematic GNSS shall have a minimum of 6 observations and each observation shall have a 5-minute epoch time with a 30-minute minimum of time differential.
- Control shall meet a network accuracy of horizontal (H) $\leq 0.07\text{ft}$ (2cm) and vertical (V) $\leq 0.16\text{ft}$ (5cm) at a 95% confidence level.

- A minimum of three (3) reference ties to recoverable accessories will be made for each control station. The control station is to be described in such manner as to facilitate navigation and recovery of its location.
- b. Vertical Control (benchmarks). Control shall be established along adjacent State Route and provide reference ties for control recovery.
- Vertical control shall be referenced to the North American Vertical Datum of 1988 (NAVD88).
 - X, Y coordinates and a minimum of three (3) reference ties to recoverable accessories will be made for each benchmark. The benchmark is to be described in such manner as to facilitate navigation and recovery of its location.
 - Orthometric Heights (elevations 'Z') on benchmarks and horizontal control shall be established using differential leveling technique. Differential leveling shall meet a Third (3rd) Order accuracy.
 - Benchmarks shall be placed at an interval of 1000 feet (maximum).
 - Benchmarks shall be conveniently located and easily accessible.
 - Benchmarks should be of a stable, permanent nature; e.g., aluminum or brass disk epoxied into a drilled hole in rock or concrete, 1/4 inch deep cut or chiseled "square" in a concrete object, a 2 inch (minimum) MAG nail epoxied into a drilled hole in a concrete object, e.g., concrete headwalls, retaining walls, signal base, or concrete pads.
 - No benchmark shall be placed in the top of curbing or sidewalks along streets or highways.
 - If previous conditions are unavailable, then the use of a railroad or 8 inch (minimum) long spike driven in the root or base of a tree within public right-of-way (no spikes in phone poles), is acceptable.

5) Boundary Surveying. The Consultant shall be responsible for all the following boundary surveying services within the project limits.

- a. Collecting and verifying all land corners registered with the Department of Agriculture's Land Survey Program.
- b. Establishment of all existing horizontal alignment owned or maintained by state, county and local municipalities within limits shown.

- c. Establishment of existing boundaries (right of way and permanent easements) owned or maintained by state, county or local municipalities within project limits.
- d. Establish a tie station to the right of way centerline at the beginning of the project and an established section corner, and label bearings for Section, $\frac{1}{4}$ and $\frac{1}{4}$ $\frac{1}{4}$ lines within the new right of way.
- e. Consultant shall be responsible for obtaining deeds and title work as needed.
- f. Provide to the Commission all adjoining property owner's contact information along adjacent State Route within the project limits.

The aforementioned Boundary Surveying services shall comply with the most recent Missouri Standards for Property Boundary Surveys set forth in the Missouri Revised Statutes [Chapter 327](#) and [Chapter 60](#), Code of State Regulations - [20 CSR 2030](#), and any applicable portions of the Missouri Department of Transportation's Engineering Policy Guide (EPG) Category [238 Surveying Activities](#). Property descriptions and title work shall be in accordance with MoDOT EPG Category [236.4 Property Descriptions and Titles](#).

6) Topographic Survey. The Consultant shall be responsible for collecting the necessary field data to accurately provide topographic and planimetric information within the project limits. The services shall address the following:

- a. Topography. The mapping data shall include natural positions on the earth's surface within the project limits that determine the configuration of the terrain. The positions will be in the form of points and break lines that locate vertical and horizontal transitions.
- b. Planimetry. The mapping data shall include the positions of all natural and all man-made features within the project limits. The positions will be in a form of points and strings that define the shape, size, and position of the feature.
- c. Sub-Surface Utilities. The mapping data shall include the positions of all sub-surface utilities owned or operated by public and private companies. The Consultant shall ascertain the positional location of all utilities within the project limits and 100' outside of existing r/w, using the following resources but not limited to; Missouri One Call Service, Local Public Water Supply District, plan sheet provided by the client or utility companies indicating the current utility location, and site inspection with a utility company representative.

If a site inspection is performed to locate utilities, then the Consultant must provide documentation containing the following:

- Name of Utility Company
 - Name of Utility Company Representative
 - Consultant Surveying Representative on Site
 - Utility Type (water, gas, communication, etc.)
 - Date of site visit
- d. Position Definition. All positions mapped shall be defined by their unique identifier, coordinate value and feature code. These values are referenced to the aforementioned systems and datum. These are expressed in the format of:
- Identifier = Point number
 - Coordinate value = X (easting), Y (northing), Z (elev.)
 - Feature code = number
- e. Feature Codes. Position description will be derived from the MoDOT Surveying Feature Codes. These codes shall be used on all mapped positions.

7) Bridge and Hydraulic (Bathymetric) Survey. The Consultant shall be responsible for collecting the applicable bridge and hydraulic surveying information as outline in MoDOT EPG Categories [238.3.36 - 238.3.36.3.18 Bridge Survey](#) as well as services listed below:

- a. Surveying hydraulic features of the existing stream based on the requirements specified in the attached Bridge Survey Location Requests for said bridge.
- b. Provide existing conditions information for the Bridge Survey Report in a Word document form and provide copies of supporting information used to complete the report. See EPG 238.3.36.1 and EPG 747.2 for additional information.

- c. Providing material and worksheets to show recorded and calculated coordinate values, bearings, distances and hydraulic data surveyed in the field.

8) Property Acquisition and Location Survey. The Consultant shall be responsible for services in preparing final Commission property boundary descriptions, location survey plan, and monumentation of the Commission's final boundaries within the project limits.

- a. Prepare Commission boundary (right of way and easement) descriptions for acquisitions for each project location.
- b. Provide temporary staking of Commission boundaries (right of way and easements) for negotiation purposes.
- c. Consultant shall monument the Commission's final boundaries (right of way and permanent easement) within four weeks of request from MoDOT.
- d. Consultant shall monument the final Commission's boundary breaks at each project location with a 5/8-inch (#5) rebar having a length of 24 inches. Rebar shall contain a 2-inch aluminum cap with the following defined stamped on cap MODOT, PLS number of responsible surveyor, and a define datum point. See [MoDOT EPG Category 238.2 Land Surveying](#) for additional information.
- e. Consultant shall be responsible for the acquisition and installation of white 6 ft carsonite witness post to be installed at each monument location. Carsonite post shall contain a Boundary Marker decal or Permanent Easement decal. See [MoDOT EPG Category 238.2 Land Surveying](#) for additional information.
- f. Consultant shall prepare the final location survey plan for each project site and submit to MoDOT for review prior to filing with the County Recorder of Deeds Office. Upon the completion of MoDOT's review and any corrections the consultant shall have four weeks to record a certified copy with the County Recorder of Deeds Office, providing a certified copy to the ROW Department at the NW District Office in Saint Joseph.

9) The data shall address the following.

- a. **Review.** A review of the land corners and ties to the existing roadway centerline to be used in the preparation of MHTC Plans for Proposed Roadway Improvements with any discrepancies found and corrections suggested forwarded to MoDOT as soon as practical.

- b. Survey Limits.** The outlined area shown in the attached exhibits for reference purposes depicts the anticipated boundaries of survey work needed for this contract.
- c. Return of Source Data.** The CONSULTANT shall return to the COMMISSION all the provided source data.
- d. Standards.** The CONSULTANT shall comply with the most recent and applicable State and Federal Laws.
- e. Priority of Survey Tasks.**

Phase 1. The consultant shall complete the establishment of horizontal and vertical control points, locate all utilities, map the topography, establish existing centerline alignment and existing right of way limits, and re-establish and verify all land corners. The consultant shall provide everything listed in 7) Bridge and Hydraulic (Bathymetric) Survey section of this scope of services. This phase is to be completed and data delivered **by March 8, 2024.**

Phase 2. Write property descriptions within two weeks of receipt of MoDOT right of way plans. Mark new right of way and easements for negotiation and/or utility relocation within one week of request from MoDOT. The completion date for this phase is expected to be **February 3, 2025.**

Phase 3. Complete, submit for review and file location survey at respective courthouse within four weeks of MoDOT's final review and approval of document. Monument right of way within four weeks of request from MoDOT. The completion date for this phase is expected to be **January 29, 2027.**

- f. Deliverables.** The CONSULTANT shall provide to the COMMISSION the following items:
 - All project coordinates shall be Modified State Plane Coordinate System (ground) using the project's Projection Factor (reciprocal average grid factor). Scaling shall be based on 0.00,0.00 origin, not a point of the project. (SPC Easting x Projection Factor and SPC Northing x Project Factor)
 - Copies of all horizontal control network records, vertical control records, raw data files (both GNSS & survey controller), and adjustment reports generated while executing the 4) Control Surveying section of this scope of services.

- Five (5) ASCII or CSV coordinate files containing the following information: 1) horizontal control, 2) vertical control, 3) boundary survey data, 4) topography and planimetrics, and 4) bridge and hydraulic. All coordinate files shall be provided in Missouri State Plane and Modified State Plane as described in MoDOT EPG Category [238.1.4.4 Aerial Mapping and LiDAR Surveys](#). Each file shall be named accordingly:
 - i. JobNumber_HorizontalControl
 - ii. JobNumber_VerticalControl
 - iii. JobNumber_Boundary
 - iv. JobNumber_Topo
 - v. JobNumber_Bridge
- All ORD design files (*.dgn) shall be provided in modified state plane coordinates, using the projection factor calculated for the project as described in MoDOT EPG Category [238.1.4.4 Aerial Mapping and LiDAR Surveys](#).
- Copies of all documentation and field survey controller (data collector) files related to executing the 5) Boundary Surveying section of this scope of services.
- Copies of all field survey controller (data collector) files related to executing the 6) Topographic Surveying section of this scope of services.
- Copies of all documentation related to executing the 7) Bridge and Hydraulic Surveying section of this scope of services.
- An original recorded copy of the location survey plan from the County Recorder of Deeds Office.
- The CONSULTANT shall provide Bentley Open Roads Designer (ORD) design files for the following:
 - i. Planimetrics (mapping) and sub-surface utilities in a 3D design file. File shall have the following name:
JobNumber_SurveyGraphics.dgn

- ii. Topography (terrain model) in a 3D design file. File shall have the following be name: **JobNumber_ExistingTerrain.dgn**
- iii. Boundary (existing alignments, ROW & easements, property boundary, and USPLSS boundaries) in a 2D design file. File shall have the following name: **JobNumber_ExistingBoundaries.dgn.**
- iv. Bridge and Hydraulic (stream profiles, sections, bathymetry, etc.) in a 3D file. File shall have the following name: **JobNumber_Bridge.dgn**
- v. Provide ORD **Triangulated Irregular Network (.tin) File, Graphics File, and Terrain Model File.**
- vi. All Bentley Open Roads Designer (ORD) design files (*.dgn) shall be provided in modified state plane coordinates, using the projection factor calculated for the project as described in EPG Category [238.1.4.4 Aerial Mapping and LiDAR Surveys](#).
- vii. Bentley Open Roads Designer (ORD) design files (*.dgn) shall conform to the department's standards as specified in the MoDOT Engineering Policy Guide and the MoDOT MicroStation® CADD Standards, which are available from the department's internet site as a download package at: <https://www.modot.org/cadd-environment>

- All material shall be delivered to:

Brian Rosenthal
 Missouri Department of Transportation
 3602 North Belt Highway
 St. Joseph, MO 64506
 Brian.Rosenthal@modot.mo.gov

- g. Data Quality.** The CONSULTANT shall be responsible for the professional quality, technical accuracy and the coordination of data, documents and other services furnished for this project. The CONSULTANT shall, without additional compensation, correct or revise any errors or deficiencies in the delivered services and information.

- h. Coordination.** The CONSULTANT shall coordinate their activities with the Northwest District Right of Way Manager, Megan Atha, and the Northwest District Project Manager, Brian Rosenthal.
- i. Traffic Control.** The CONSULTANT shall provide traffic control where needed. The CONSULTANT shall contact MoDOT 7 days prior to any lane closure. See EPG Category [616.8 Typical Applications](#) for guidance.
- j. Additional Services.** The COMMISSION reserves the right to request additional work beyond the scope of services addressed in this document. In the event, a supplemental agreement shall be executed and approved prior to the performance of additional services. Changes in compensation will be addressed in the supplemental agreement.
- k. Documentation.** The CONSULTANT shall provide any documentation necessary to explain, support, and clarify the procedures used for data development. After the survey has been completed, the CONSULTANT shall be available to the COMMISSION to discuss and interpret provided data.
- l. Data Ownership.** All data and documents prepared in performance of this Scope of Services shall be delivered to and become the property of the COMMISSION upon suspension, abandonment, cancellation, termination, or completion of the CONSULTANT'S services.

IV. SERVICES AND DATA PROVIDED BY THE COMMISSION. The COMMISSION will provide available information of record to the CONSULTANT. In addition, plan sheets indicating the project location, length, and area will be furnished by the COMMISSION.