### Section 00305 – Construction Survey Work

Section 00305, which is not a Standard Construction Specification, is included for this Project by Unique Special Provision.

**Description**

**00305.00 Scope** - This work consists of all surveying activities necessary to control the phases of work required to construct the project to the lines and grades as shown, specified, or established in the Contract Documents.

Make all supporting computations and field notes required for control of the work and as necessary to establish the exact position, orientation, and elevation of the work from control stations, including furnishing and setting construction stakes and marks, reference marks, and additional control stations.

**00305.01 Definitions:**

**Survey or DTM Confidence Points** - Random points collected in the field within the boundary of a digital terrain model (DTM). The purpose is to:

1. Verify the accuracy of the DTM
2. Provide a level of confidence and evidence to the Owner just prior to construction that the DTM is a reasonable representation of the original ground for computation of volumes and pay quantities.
3. To verify that a surface is constructed accurately per the Contract Documents.

Confidence report will be completed by Owner survey and be in accordance to Industry Standard.

**Control Network** - An array of control stations either established by the Contractor or provided by the Owner.

**Control Station** - Any item identified in the Contract Documents as having a position or elevation on the project datum and intended to be used to control the phases of the construction work.

**Cut Sheets –** Any reduced document provided by the surveyor to report station, grade, offset or other information to the Owner or Contractor for any staking performed.

**Digital Terrain Model (DTM)** - An electronic computer model of the shape of the ground.

**Survey Industry Standards** - Defined by applicable ORS, 2018 ODOT Standard Specifications, 2014 ODOT Survey Policy and Procedure Manual, 2019 ODOT Construction Survey Manual and Oregon State Board of Examiners for Engineering and Land Surveying and incorporated by reference herein. Survey professional is responsible for using the most current version. Should any of these documents be updated, it will be assumed that the most current version is authoritative.

**Reference Stakes** - Stakes set away from but with information relating back to the intended location and/or grade.

**Slope Catch** - The location where a design slope intersects the existing ground and where excavation or embankment work should begin to provide the intended earthwork.

**Slope Staking** - The process of using measurements and calculations in the field to determine the slope catch. Slope staking shall normally include setting stakes to mark the slope catch and setting a reference stake for every catch stake.

**Stakes** - Stakes, nails, marks, string lines, or other devices or mechanisms set or established for the purpose of indicating or controlling the location, orientation, or grade of any feature intended for construction, or for the purpose of limiting or influencing the construction work.

**Staking** - The act of placing stakes.

**Survey Marker** - Any survey monument, control station, or stake.

**Survey Monument** - Any natural or man-made item specified or identified in a property deed, boundary survey, government document, or other instrument of public record, when the purpose of said item is to mark or reference a property boundary, geographical location, elevation, or other position.

**Surveyor** - The individual designated by the Contractor and licensed in the state of Oregon as a Professional Land Surveyor (PLS) and placed in "responsible charge" of the survey work as defined in ORS 672.002(6)(b), or any staff working under the direct supervision of a PLS.

**Temporary Benchmark (TBM)** - A control station established for the purpose of providing vertical control for the Project. A TBM may or may not have an established horizontal position.

**00305.02 Mandatory Pre-Survey Conference** - The prime Contractor, subcontractors, surveyor, survey crew lead, and surveyor shall meet with the Owner two weeks prior to beginning survey work. The purpose of this meeting will be to discuss methods and practices of accomplishing required survey work. This meeting may be concurrent with the pre-construction meeting.

**00305.03 Review by the Owner** - The Owner may periodically review the notes, calculations and layout work, including field locations, for compliance with these specifications the Contract Documents. Survey work that does not meet the tolerances in section 00305.40 may be rejected, and the work redone at no cost to the Owner, at the Contractor’s expense.

Review by the Owner does not constitute approval or acceptance of the work, nor does it relieve the Contractor of responsibility for performing work in conformance with the Contract Documents.

**00305.04 Responsibilities**

1. **Owner Responsibilities-** Perform of provide the following:
2. Provide copies of Contract Documents
3. Provide initial horizontal and vertical control stations in the proximity of the project
4. Provide horizontal and vertical alignment data
5. Provide cross section finish grade elevations
6. **Contractor Responsibilities -**Perform or provide the following:
7. When the Owner provides and sets construction stakes establishing lines and grades as may be necessary for the Work, the Contractor shall notify the Owner’s Representative not less than five (5) working days advance of when survey services are required in connection with the layout of the Work.
8. Provide work requests to the Owner’s Representative for approval. Survey crew will have five (5) working days to begin work. Work requests will be submitted electronically in accordance with the Contract Documents. Owner reserves the right to request additional documentation.
9. Contractor is responsible for planning and scheduling the Work and notifying the Owner to avoid project delays and extra cost. Preserve any and all stakes through completion of the staked work. Costs for the replacement of stakes due to negligence, poor scheduling and sequencing of work or other reasons will be borne by Contractor.
10. Upon completion of the project, remove and dispose of all flagging, lath, stakes and other temporary staking material.

**c) Surveyor Responsibilities –** The Surveyor may be designated as Owner surveyor or Contractor surveyor per the Contract Documents. Provide survey services per the following:

1. Perform measurements and calculations for pay quantities (Owner surveyor only)
2. Perform final "as constructed" measurements (Owner surveyor only)
3. Make calculations, field notes and survey drawings for the layout and control of the work as are necessary to construct the project as specified
4. Provide original or copies of notes, calculations and drawings as requested
5. Replace and set any necessary survey monuments according to section 00305.70 and as governed by applicable law (Owner surveyor only)
6. Replace and augment control stations as necessary to control the project
7. Establish additional control stations as necessary to control the project
8. Perform slope staking necessary for construction of earthwork including intersections and matchlines
9. Set stakes defining limits for clearing. Set stakes defining approximate right-of-way and easements
10. Set stakes to define construction centerline or other lines necessary for control of the project work
11. Set stakes to define the work, that may include but is not limited to the following:
12. Roadway location and grade
13. Poles and footings, cabinets, junction boxes, sensors, and other features associated with illumination and signal facilities
14. Curbs, walks, walls, and other miscellaneous structures requiring precise positioning or grades.
15. New pipes, manholes, inlets, weirs, settlement basins and other permeant drainage and water quality structures and facilities
16. Earthwork features including stream cross-sections, berms, and mounds
17. Buildings and other structures and facilities
18. Environmental protection or mitigation features and clearing limits.
19. Provide As-Built Information at the Owners direction.

**00305.06 Survey Methods** - Survey procedures shall be appropriate for the equipment being used and completed per industry standards.

Survey procedures in accordance with industry standards shall be submitted to the Owner for review 21 days prior to conducting the work. The surveyor is required to demonstrate the capabilities, accuracy, and reliability of the intended procedure. The Owner will evaluate the procedure and intended application. Work to proceed immediately upon approval of procedures by the Owner.

Test and adjust survey equipment according to Owner’s procedures and maintain records of test results and submit copies to the Owner upon request.

**00305.07 Survey Work Records** - Contractor’s survey personnel shall maintain a daily record of work performed by the survey crew. The daily record shall contain the date, crew names, type and location of work, and work accomplished. Upon request, furnish a copy to the Owner.

Surveyor will keep and maintain copies of all field notes, computations, electronic data and other records in accordance with industry standards. This information will be kept and be available upon request by Owner up to the end of the warranty period and is considered property of Owner.

All cut sheets shall be sent concurrently to the Owner and Contractor in a manner consistent with Owner’s current practice for maintaining contract and project documentation.

**00305.08 Communication with the Surveyor** - The Owner has the right to communicate directly with the surveyor.

Owner Surveyor(s) perform work only at the direction and approval of Owner. Contractor should submit any requests of the Owner Surveyor to Owner per the guidelines under Contractor responsibilities outlined above.

**00305.09 Electronic Data** - The Owner will not be responsible for any data translations. Compressed data provided by the Owner or the Contractor will be in a "self-expanding executable" format. The method of exchange of electronic data will be mutually agreed upon at the pre-survey conference and be in accordance with Owner’s current practice for maintaining contract and project documentation.

Data will be formatted in accordance with Owners current drafting/CAD standards and modified as needed during the pre-construction or pre-survey meeting.

**00305.10 Materials** - Surveyor will furnish all its own materials including supplies, clothing, and incidentals required to accomplish the work. Use materials of good quality and suitable for the purpose intended. Stakes, hubs, and guinnies are to be of sufficient length and nature to provide a solid set in the ground. Mark the stakes in such a way as to remain legible for the intended duration. Surveyor will provide and use personal protective equipment as required by State and federal regulations.

**Equipment**

**00305.20 Survey Equipment** - Furnish survey equipment required to accomplish the work that meets the following requirements and is appropriate per industry standards:

1. Components designed to work together
2. Suitable for the purpose intended
3. Capable of achieving specified tolerances
4. In good operating condition
5. Maintained to meet manufacturers specifications
6. Kept in proper adjustment throughout the duration of the Project

For survey equipment that is new to the industry, provide documentation and job references where the new survey equipment has been used to the Owner for review 21 days prior to its use. The Owner will review the request and provide a response within the time allowed by the Contract Documents.

**Labor**

**00305.30 Personnel** - Provide technically qualified personnel capable of performing required tasks in a timely and accurate manner. Perform work under the direction and review of the a PLS.

1. The PLS is responsible for:
2. Maintaining registration as a Professional Land Surveyor in the State of Oregon
3. Performing or validating requirements for procedures and testing of equipment
4. Maintaining familiarity with the site conditions and progress of the Project
5. Becoming familiar with the plans and specifications
6. Determining notes and documentation required for types of survey work
7. Determining the accuracy required for each survey stake
8. Using appropriate equipment and methods
9. Keeping close communication with the project inspector(s), Construction Manager, and Owner/Contractor Surveyor as needed.
10. Being familiar with the varying construction survey requirements of each aspect of the Project, including the various bridge construction techniques when applicable
11. Notifying the project inspector of conflicts and changes necessary due to utilities, match point variations, design revisions, or other variables
12. The survey crew leader is responsible for:
13. Becoming familiar with the plans and specifications
14. Keeping close communication with the project inspector(s) and Construction Manager.
15. Notifying the project inspector of conflicts and changes necessary due to utilities, match point variations, design revisions, or other variables

**Construction**

**00305.40 Construction Staking Tolerances** - Set stakes or other devices in accordance with industry standards.

**Temporary**

**00305.60 Temporary Protection and Direction of Traffic** - Signs for use by the survey crew may be constructed of plywood, sheet aluminum or fabric. Signs, flaggers and flagger equipment shall conform to the requirements of sections 00220 and 00225.

Contractor will provide appropriate work zone safety and temporary traffic control for the surveyor. This will include, but not be limited to signs, cones, safety fencing and flagging services.

**Maintenance and Monumentation**

**00305.70 Preservation of Survey Markers**:

**(a) Project Control Points Established by the Owner** - Maintain, relocate or replace existing survey monuments, control points, and stakes, as determined by the Owner. Perform the work to produce the same level of accuracy as the original monument(s) in a timely manner, and at the Contractor’s expense.

**(b) Monuments of Record** - Preserve survey monuments according to section 00170.82(c), and ORS 209.140 and 209.150. If such monuments are to be disturbed or destroyed – beyond the shown grading and demolition limits – these shall be replaced at the Contractor’s expense.

**00305.71 Project Monumentation** - The Owner surveyor will be responsible for performing right-of-way monumentation.

**00305.72 Post-Construction Record of Survey** - Any post construction record of survey to be filed or completed will be done by Owner surveyor.

**Measurement**

**00305.80 General** - No separate measurement will be made for construction survey work.

**Payment**

**00305.90 General** - Payment for performing construction survey work by Contractor surveyor will be made at the contract lump sum amount for the item "construction survey work".

If “construction survey work” is not a bid item, all work will be done by Owner surveyor.

Payment will be payment in full for furnishing and placing all material, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified. Payment includes all temporary protection and direction of traffic measures including flaggers and signing necessary for the performance of the construction survey work.

No separate payment will be made for preparing surveying documents including but not limited to office time, preparing and checking survey notes, and all other related preparation work.

The amount to be allowed for "construction survey work" in the progress payments will not be in excess of the reasonable value of the surveying work performed under this specification as said reasonable value is estimated by the Owner.

Costs incurred as a result of Contractor Surveyor errors will be borne by the Contractor. Such costs include price adjustments for failure to meet requirements of the Contract Documents, repair or removal and replacement of deficient product, and over-run of material.