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The TEXT indicated with <_____> is to be selected or filled in by the Specifier to meet the requirements of the project.

If any of the SECTIONS (i.e. 1.02, 1.03, etc.) below are not required for the project do NOT delete the Section, but rather change the title of the Section to “NOT USED” (i.e. 1.02 NOT USED) so that numbering of specification references is preserved, and delete the specification language in this Section below the title.

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality assurance.
- B. Field Work.
- C. Construction stakes, lines, and grades.
- D. Survey reference points.
- E. Site survey requirements.
- F. Record documents.
- G. Submittals.

1.02 QUALITY ASSURANCE

- A. Qualifications of surveyor: CONTRACTOR shall employ a professional land surveyor registered or licensed in the State of Colorado to perform or supervise all survey activities including, but not limited to, construction staking, layout and record drawing development.
- B. UTILITIES <and Engineer> may randomly check the accuracy of stakes, alignments, and grades in accordance with the following:
 - 1. Notice of when checking will be conducted will be given at least _____ hours in advance.
 - 2. When notice of checking is given, CONTRACTOR shall postpone parts of the Work affected by stakes, alignments, or grades to be checked until checked.
 - 3. UTILITIES' <or Engineer's> check does not substitute or complement required field quality control procedures.
- C. Contractor shall submit evidence of pre-construction conditions at the Site to UTILITIES for record purposes prior to, but not more than <3> <__> weeks before, commencement of any construction activities.
- D. On request of UTILITIES, CONTRACTOR shall submit survey documentation.

1.03 FIELD WORK

- A. CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out Work and perform construction as required by Contract Documents.

- B. CONTRACTOR shall employ a land surveyor licensed in the State of Colorado and acceptable to UTILITIES <and Engineer> to.
- C. <UTILITIES will> <CONTRACTOR shall> locate and protect survey control and reference points. CONTRACTOR shall promptly notify Utilities <and Engineer> of any discrepancies discovered between the UTILITIES-located survey control and reference points and survey control or reference points identified by CONTRACTOR's land surveyor.
- D. Control datum for survey is as <established by UTILITIES provided survey.> <shown on Drawings.> <_____>.
- E. CONTRACTOR's surveyor shall verify set-backs and easement locations and confirm drawing dimensions and elevations.
- F. CONTRACTOR shall provide field engineering services. CONTRACTOR shall establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- G. CONTRACTOR shall submit a copy of <site drawing> <and> <certificate> signed by the land surveyor that the elevations and locations of the Work are in conformance with the Contract Documents.
- H. CONTRACTOR shall maintain a complete and accurate log of control and survey work as it progresses.
- I. On completion of Work, CONTRACTOR shall produce a certified survey illustrating dimensions, locations, angles, and elevations of construction <and site work>.

1.04 CONSTRUCTION STAKES, LINES, AND GRADES

- A. CONTRACTOR shall execute the Work in accordance with the lines and grades indicated.
- B. CONTRACTOR shall make distances and measurements on horizontal planes, except elevations and structural dimensions.

1.05 SURVEY REFERENCE POINTS

- A. Basic reference line, a beginning point on basic reference line, and a benchmark will be provided by UTILITIES.
- B. From these reference points, CONTRACTOR shall establish other control and reference points as required to properly lay out the Work.
- C. CONTRACTOR shall locate and protect control points prior to starting site work, and preserve permanent reference points during construction. Also CONTRACTOR shall:
 - 1. Make no changes or relocations without prior written notice.
 - 2. Promptly report to UTILITIES <and Engineer> the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
 - 3. Replace dislocated survey control points, project control points, and reference points when lost or destroyed, in accordance with original survey control upon provision of written notice to UTILITIES <and Engineer> in advance.
- D. CONTRACTOR shall set monuments for principal control points and protect them from being disturbed and displaced and:
 - 1. Re-establish disturbed monuments.
 - 2. When disturbed, postpone parts of the Work that are governed by disturbed monuments until such monuments are re-established.

1.06 SITE SURVEY REQUIREMENTS

- A. CONTRACTOR shall establish a minimum of <2> <_> permanent benchmarks on site referenced to data established by survey control points.
- B. CONTRACTOR shall record permanent benchmark locations with horizontal and vertical data on Project Record Documents.
- C. CONTRACTOR shall assume responsibility for accuracy of stakes, alignments, and grades by performing verifications and checking in accordance with standard surveying practice.
- D. Unless otherwise specified in individual specification sections, the following minimum standards apply:
 - 1. Control Surveys: Vertical shall close within 0.03 foot. Horizontal control angles shall close to the nearest 20 seconds plus or minus 10 seconds. Measured distances shall be plus or minus 0.01 feet.
 - 2. Measurement Surveys: Elevation shall be to the nearest 0.1 feet plus or minus 0.05 feet. Horizontal distances shall be plus or minus 0.1 feet.

1.07 RECORD DOCUMENTS

- A. CONTRACTOR shall prepare and submit Record Documents as specified in Section 01 77 00 - Closeout Procedures.
- B. CONTRACTOR shall maintain a complete, accurate log of control points and survey.
- C. CONTRACTOR shall record in field books original field notes, computations, and other records for the purpose of layout surveys. Field notes must be neat and legible, complete, and self-explanatory, and self-checking. Include the following, at a minimum, in the field notes:
 - 1. Complete index.
 - 2. Date of field work.
 - 3. Names of crew members.
 - 4. Description of controlling survey stations.
 - 5. Recovery descriptions of control points and temporary bench marks.
 - 6. Sketches of work where applicable.
 - 7. As-built information as specified.
 - 8. Electronic data collected and reported ASCII file in CSV format
- D. CONTRACTOR shall affix civil engineer's or professional land surveyor's signature and registration number to Record Drawings to certify accuracy of information shown.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 SUBMITTALS

- A. Submittals to be provided by the CONTRACTOR shall include but are not limited to the following:
 - 1. Name, address, telephone number, and qualifications of the surveyor, civil engineer, crew chief, superintendent and other persons who are proposed to perform surveys or survey related duties prior to start of any survey work.
 - 2. Equipment to be used for field survey.
 - 3. Verification by a Professional Land Surveyor registered in the State of Colorado that the methods and procedures for the surveying conform to the accepted practices and will achieve the required positional accuracies.

4. Submit complete As-Built of final horizontal northing and easting coordinates, elevations, stationing, and mark numbers in ASCII file in CSV format and the original field survey book. As-Built survey information shall be included for all fittings, bends, devices, equipment, and appurtenances. Submit with Record Documents specified in Section 01 77 00 - Closeout Procedures.
5. Collect and report survey coordinates in ASCII file, in CSV format to UTILITIES and copies of field books on a weekly basis accompanied with a cover letter summarizing the week's activities, what control was used for commencement of the survey and other relevant information.

END OF SECTION