

SECTION 01 71 23

**CONSTRUCTION SURVEYING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This item shall govern the performance of construction staking including all labor, materials, submittals, tools and equipment necessary to perform all construction layout, control and reference staking for satisfactory completion of the project.

**1.2 SURVEY REFERENCE POINTS**

- A. Known basic horizontal and vertical control points for the Project are indicated.
- B. Locate and protect survey control points prior to starting site work, and preserve all permanent reference points during construction.
- C. Notify ENGINEER in writing within 24-hours of any survey work changes or clarifications required for Project. Secure written authorization prior to making any changes or relocations.
- D. Report in writing when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- E. Replace construction stakes damaged or destroyed by CONTRACTOR at no additional cost to OWNER.

**1.3 MEASUREMENT AND PAYMENT**

Measurement and payment for this item shall be based on a lump sum for construction staking completed in accordance with these specifications and shall include all labor, materials, testing, submittals, tools and equipment necessary to complete the work as specified. Partial payments will be made for this item based on the percentage completed of the overall work, as determined by the Engineer.

**---OR---**

All costs associated with surveying shall be subsidiary to the various bid items.

**1.4 SUBMITTALS**

- A. Prior to contract closeout submit:
  - 1. Documentation to verify accuracy of survey work.
  - 2. When required by Laws and Regulations, submit a certificate signed by a licensed professional certifying that elevations and locations of improvements conform with the Contract Documents.
  - 3. All survey data, survey information showing dimensions, location angles and elevations of construction are shown on contract record documents.

**PART 2 - PRODUCTS**

Hubs shall be 1-1/2 inch x 1-1/2 inch x 16 inch oak and witness stakes shall be 1 inch x 1 inch x 36 inch oak or other hardwood.

**---OR---**

N/A

**PART 3 - EXECUTION****3.1 PROJECT SURVEY REQUIREMENTS**

- A. Any work done without line and grade established by CONTRACTOR is at CONTRACTOR's own risk.
- B. Hubs with tacks shall be used for all control points, centerline or baseline offsets and structure stakeout and shall be accompanied by witness stakes marked with the pertinent information. For supplemental stakeout only, witness stakes alone may be used. For laser grade control and the verification of the laser elevation a hub with witness shall be provided.
- C. All staking shall be performed under the direct supervision of a Registered Public Land Surveyor licensed by the State of Texas.
- D. The surveyor shall submit certified cut sheets to the City Engineer within twenty (24) hours of performing staking. All stakes shall be set on an offset that will be clear of the excavation of the intended facility. All cut sheets shall identify benchmarks used, benchmark elevations, actual hub elevations, proposed elevations and cuts or fills for all entries. The Contractor and Project Representative for the City shall have cut sheets in hand prior to construction.
- E. If impacted during construction activities, each removed marker shall be re-established by the Contractor's surveyor.
- F. Minimum staking requirements are as follows:
  - a. Rough Grade Stakes for Lot Grading – Provide stakes at all corners.
  - b. Sanitary Sewer Lines
    - i. Line and grade stakes shall be set every 25' for the first 100' out of the downstream manhole, and every 100' thereafter to the next manhole. Stakes shall be set on centerline stationing.
    - ii. A line reference stake shall be set for each manhole location.
    - iii. Wye locations, stationing from the downstream manhole, shall be staked and the stationing shown on the cut sheets.
    - iv. Proposed elevations of service inverts at 15' past the right-of-way line or end of service shall be staked and shown on the cut sheets.
    - v. Proposed structure top elevation and upstream and downstream invert elevations shall be shown on the cut sheets (manhole castings shall be set 0.05' below finished street grade).

- c. Water Mains
  - i. Line and grade stakes shall be set every 100' on centerline stationing.
  - ii. Fitting locations shall be staked and the stationing shown on the cut sheets.
  - iii. Line and grade stakes shall be set for all hydrants (normally, the top of the operating nut shall be set 18"-24" above the top of curb). A line reference stake shall be set for each hydrant location.
  - iv. Proposed elevations of the tops of curb boxes shall be staked and shown on the cut sheets. Line reference stakes shall be set for curb box locations.
- d. Storm Sewer
  - i. Line and grade stakes shall be set every 25' for the first 100' out of the downstream manhole, and every 100' thereafter to the next manhole or catch basin.
  - ii. An offset hub and line reference stake to back of curb shall be set for all catch basins and catch basin manholes.
  - iii. Catch basin top, invert elevations, manhole top elevation and upstream & downstream invert elevations shall be shown on the cut sheets.
  - iv. Line and grade shall be set every 25' from the downstream structure for all drain tile.
  - v. Wye locations, cleanouts stationed from downstream structure shall be staked.
  - vi. An offset hub and line reference stake to end of drain tile service stub.
- e. Streets
  - i. Set stakes to roadway centerline and edge of pavement at 50' intervals, all grade breaks, and at ¼ points on vertical curves for roadway subgrade.
  - ii. When centerline stakes are set for grading subgrade, cut sheets shall be provided (unless blue tops are set).
  - iii. Set stakes at finish rock grade at 50' intervals on center of the roadway. For roadways with a raised median island, stakes are required for the roadway on each side of the median.
  - iv. Line and grade stakes shall be set every 25' and for all begin, mid and end rad points at all street intersections.
  - v. Set stakes at 25' intervals, at BC and EC for all curvilinear alignment and at midpoint of curb returns.
  - vi. Cut sheets shall be provided for all curb and gutter construction.
- f. Retaining/Sound Walls
  - i. Set stakes at 50' intervals on centerline stationing. At all top and bottom of steps in the footing and wall.

**END OF SECTION**