

SECTION 01100  
CONSTRUCTION SERVICES

PART 1 GENERAL

1.01 - Section Includes

- A. Mobilization.
- B. Construction Surveys.
- C. Record Documents.

1.02 – Description Of Work

- A. Mobilization: includes the preparatory work and operations for the items included in this project. Included in this item is that effort necessary for the movement of personnel, equipment, supplies and incidentals to the project site. Also included are obtaining permits, preparation of schedules, presentation of submittals, and the establishment of all temporary offices, buildings and other facilities and utilities, and other tasks which must be performed or costs which must be incurred in completing the project. This may include, but is not limited to, demobilization costs, bonding costs and insurance costs associated with this project.
- B. Construction Surveys: includes placing construction stakes and replacement of benchmarks, property corners, and monuments as required by the Contractor to complete the work and as required by the Engineer to verify compliance with the Contract Documents. The requirements set forth in the Contract Documents are a minimum for the project. The Contractor may require additional surveys.
- C. Record Documents: includes the collection of information pertaining to the project which differs from information in the Contract Documents. This information includes the location, dimension, quality/quantity of materials and quality of workmanship for both proposed facilities constructed and existing facilities encountered.

1.03 - Special Requirements

- A. **All construction surveys shall be performed with a Licensed Professional Engineer or Licensed Land Surveyor in responsible charge, in accordance with provisions of Chapter 542B, Code of Iowa.**
- B. **Prior to construction, the Licensed Professional Engineer or Licensed Land Surveyor in responsible charge of construction survey shall physically locate and examine survey control points shown in contract documents, verify they are intact and at specified locations and elevations. Additionally, the Engineer or Surveyor shall determine if the control points are sufficient to provide control for construction survey on the project.**
- C. **Prior to construction, the Licensed Professional Engineer or Licensed Land Surveyor in responsible charge of construction survey shall physically locate and determine conditions where new construction will match existing features. The engineer or land surveyor shall determine location and elevation of said features and compare this information to corresponding information in the contract documents. This requirement applies to, but is not limited to, existing pavements; sidewalks and drives; sanitary and storm sewer structures, including flow lines and rims; traffic signal facilities; water valves and hydrants; existing utility fixtures and structures; railroad crossings, including associated signal facilities; and bridge abutments.**
- D. **After locating and examining survey control points shown in contract documents, the Licensed Professional Engineer or Licensed Land Surveyor in responsible charge of construction survey shall do one of the following:**
  - 1. **If survey control points are intact and judged sufficient for use during construction survey, the Engineer or Surveyor shall sign, date, and affix seal to the Construction Use Acceptance Signature Block on the Survey Control Plan in the Contract Documents and provide three (3) copies to the jurisdictional project engineer. In lieu**

- of this, the Engineer or Surveyor may provide a signed letter, with seal affixed, stating control points are intact and sufficient for construction survey.
2. If survey control points are not intact, or are judged insufficient for use during construction survey, the Engineer or Surveyor shall provide a signed letter, with seal affixed, describing issues with the control points to the jurisdictional project engineer.
- E. After locating and determining conditions where new construction will match existing features, and after determining location and elevation of said features and comparing this information to corresponding information in the contract documents, the Licensed Professional Engineer or Licensed Land Surveyor in responsible charge of construction survey shall do one of the following:
1. If accuracy of locations and elevations of existing features as noted in the contract documents is judged sufficient for use during construction survey, the engineer or surveyor shall specifically note this, on the survey control plan in the contract documents and provide three (3) copies to the jurisdictional project engineer. If applicable, the note may be included on the copies addressing accuracy of survey control points.
  2. In lieu of the above, the engineer or surveyor may provide a signed letter, with seal affixed, stating locations and elevations of existing features in contract documents are sufficiently accurate for construction survey.
  3. If accuracy of locations and elevations of existing features in contract documents is judged insufficient for construction survey, the engineer or surveyor shall provide a signed letter, with seal affixed, plus annotated excerpts from the contract documents describing issues to the jurisdictional project engineer.

## PART 2 PRODUCTS

### 2.01 – Hubs

- A. Provide hardwood, metal or heavy plastic stakes of sufficient size, strength and length to endure pounding for placement and to prevent movement due to adjacent construction activity.
- B. Use of nails in lieu of hubs not allowed.

### 2.02 - Lath

- A. Provide wood lath approximately 3/8-inch thick by 1-1/2-inches wide by 48 inches long. One end may be pointed.

## PART 3 EXECUTION

### 3.01 - Mobilization

- A. Mobilize and demobilize in a timely and efficient manner.
- B. Provide all required Bonds and insurance as set forth in the Contract Documents.
- C. Attend meetings pertaining to the work, including the preconstruction meeting and project progress meetings. In addition, the Engineer **and/or contract documents** may require progress schedules in order to monitor progress.
- D. Provide and maintain suitable temporary facilities and utilities as may be required to complete the work. This includes, but is not limited to, job site office, telephone and electricity, restroom facilities, access and parking, and protective fencing and barricades. In addition, the project shall be kept clean and orderly. If, in the judgment of the Engineer, this is not the case, the Contractor shall correct the condition in a timely manner.
- E. If a project identification sign is required, it shall be constructed, erected, maintained, and removed in accordance with the Contract Documents and considered part of this item.

### 3.02 - Construction Surveys

- A. The Engineer shall provide design stationing and horizontal and vertical control for the work as set forth in the Contract Documents. The Contractor shall be responsible to provide staking for the proposed improvements per the station and control data set forth in the Contract Documents. **The Licensed Professional Engineer or Licensed Land Surveyor in responsible charge of construction survey shall locate and examine survey control points, determine sufficiency and document status to the Engineer.**
- B. The following is the minimum requirement for construction staking to be provided in order to allow the Engineer to verify compliance with the Contract Documents. The Contractor may provide additional surveys if, in the judgement of the Contractor, they are required (for example, for easement lines).
1. **Verify location and elevation of existing features where new construction will match including, but not limited to existing pavements; sidewalks and drives, sanitary sewer and storm sewer structures, including flow lines and rims; traffic signal facilities; water valves and hydrants; existing utility fixtures and structures; railroad crossings, including associated signal facilities; and bridge abutments.**
  2. Property Limits
    - a. **Mark Temporary Construction Easement limits with flagged lath at 100- foot intervals on a tangent, at the PC and PT of a curve, at 25-foot intervals on a curve, and at angle points.**
    - b. **Mark Permanent Easement limits with flagged lath at 100- foot intervals on a tangent, at the PC and PT of a curve, at 25-foot intervals on a curve, and at angle points.**
    - c. **Mark Right-of-way limits with flagged lath at 100-foot intervals on a tangent, at the PC and PT of a curve, at 25-foot intervals on a curve, and at angle points.**
  3. Clearing Limits
    - a. The limits of clearing and grubbing shall be marked by flagged lath at 100-foot intervals on a tangent, at the PC and PT of a curve, 50-foot intervals on a curve, and at turning points. The lath shall be placed at the limits of the area to be cleared and clearly marked "CLEARING LIMITS". If an offset to the clearing limits is used, the lath shall be marked to indicate the offset.
  4. Earthwork for sites, roadways and drainage ways
    - a. **Conventional Grading**
      - 1) **Site Grading**
        - a) **Set lath at 100-foot grid, and at grade breaks.**
        - b) **Mark cut or fill to pavement subgrade in paved areas and to finished grade (topsoil) in unpaved areas.**
      - 2) **Roadway Grading**
        - a) **For new construction, set slope stakes (hubs) left and right at 100-foot maximum intervals on tangents, at beginnings and ends of horizontal and vertical curves, at 50-foot intervals within horizontal and vertical curves, plus at other critical points as required. Mark slope stakes with lath depicting station, offset and elevation reference (cut or fill) to critical hinge points at that location.**
        - b) **For reconstruction within developed right-of-way, contractor may elect to set hub lines left and right at intervals and at other critical points as described elsewhere herein to provide required staking for both grading and paving operations.**
        - c) **Contractor may elect to set finished grade stakes (blue tops) at 50-foot maximum intervals and at other critical points along roadway centerline and both edges of paving.**
    - b. **GPS Machine-Controlled Grading**

- a) **Establish GPS control points consisting of a minimum of five (5) semi-permanent points around perimeter of site and no further than 300-feet apart.**
  - b) **Points may be established horizontally using GPS, but transfer elevations of said points from original benchmark in contract documents using a total station or level.**
  - c) **Provide grade check stakes at 100-foot intervals on roadways.**
5. Sanitary Sewer
- a. Stake sanitary sewer manhole locations with two offset stakes from the manhole location. One offset stake shall be marked with a cut to the outlet invert and a cut/fill to the rim and an offset to the center of the manhole. The second offset stake shall be marked with an offset to the center of the manhole.
  - b. Stake drop manholes and cleanouts in a similar manner as manholes.
  - c. The pipe does not require additional staking if the alignment is on a tangent and pipe grade is equal to or greater than 0.4%. If pipe with tangent alignment has a grade less than 0.4%, the pipe shall be staked with offsets at 50-foot intervals. If the alignment is curvilinear, the pipe shall be staked with offsets at 25-foot intervals. The offsets shall be marked with cuts to the invert of the pipe and the offset to the pipe centerline.
  - d. Stake sanitary sewer services with offset stakes for the wye perpendicular to the main and opposite to the service pipe, and perpendicular to the end of the service pipe. Location and elevation of the end of the service pipe shall be indicated in the Contract Documents. Centerline stakes may be placed at Contractor's option. The offset stakes shall be marked offset to the pipe and with cuts to the invert of the service line at both the end of the service line and highest elbow at the main.
6. Water
- a. Stake water main with offsets at 100-foot intervals on tangents, at PCs and PTs of curves, and at 25-foot intervals on horizontal and vertical curves. Stake valve and fitting locations with offsets to the center of the pipe. Mark stakes with offsets to the centerline of the pipe. Cuts may be indicated to the top, flow line, or bottom of pipe.
  - b. Water service locations shall be staked from lot corners. If the water main is to be installed before permanent lot corners are set, temporary corners may be set with stakes or hubs. On curvilinear alignments, the end of the water service line shall be staked. The stakes shall be marked with offsets to the centerline of the pipe. Cuts shall be indicated to the top of pipe.
  - c. Stake fire hydrant locations with an offset stake to the hydrant location and an offset stake to the water main centerline. The offset shall be marked with an offset to the center of the fire hydrant and a cut/fill to the flange at the base of the hydrant.
  - d. Offset stakes shall be perpendicular to the centerline, and more than one offset stake shall be placed at angle points in the water main alignment.
  - e. Centerline stakes may be placed at Contractor's option.
7. Storm Sewer, Drain Tile, and Culverts
- a. Stake storm sewer manhole locations with two offset stakes from the manhole location. One offset stake shall be marked with a cut to the outlet invert and a cut/fill to the rim and an offset to the center of the manhole. The second offset stake shall be marked with an offset to the center of the manhole.
  - b. Stake storm sewer intake locations with two offset stakes parallel to the back of curb line. Mark offset stakes with a cut to the outlet invert, a cut/fill from form grade elevation for curb intakes or to the grate for area intakes and an offset to the location station.
  - c. The pipe does not require additional staking if the alignment is on a tangent and grade is greater than 0.5%. **If pipe with tangent has a grade less than 0.5%, the pipe shall be staked with offsets at 100-foot intervals.** If the alignment is curvilinear, the pipe shall

- be staked with offsets at 25-foot intervals. The offsets shall be marked with cuts to the invert of the pipe and the offset to the pipe.
- d. Stake drain tile cleanout locations with two offset stakes from the cleanout location. One offset stake shall be marked with a cut to the outlet invert and a cut/fill to the rim and an offset to the center of the manhole. The second offset stake shall be marked with an offset to the center of the cleanout.
  - e. Stake drain tile pipe with offsets at 100-foot intervals on tangents, at PCs and PTs of curves, and at 25-foot intervals on curves. Stake location of fittings and tile connections. Mark stakes with offsets to the center of pipe and cuts to the top of curb or top of slab if no curb. If the pavement is in place prior to placing drain tile, the pipe does not require staking.
  - f. Stake culverts with offsets and line stakes at each end. Mark offset with a cut/fill to the invert at the end of the pipe including any flared end section and an offset to the end of the pipe including any flared end section.
8. Paving
- a. **Stake mainline paving as follows:**
    - 1) **Offsets at 50-foot intervals**
      - a) **Horizontal and vertical tangents where grades are greater than 1%.**
      - b) **Slip-form paving machine is used.**
    - 2) **Offsets at 25-foot intervals**
      - a) **Horizontal and vertical tangents where grades are less than 1%.**
      - b) **Fixed-form or hand paving methods are used.**
      - c) **Horizontal and vertical curves**
    - 3) **Grade breaks with no vertical curve (algebraic difference between grades less than 1%).**
    - 4) **Beginning and end points of horizontal and vertical curves.**
    - 5) **Vertical curve high and low points, plus offsets at 10-foot intervals 50-feet each direction from high point or low point.**
    - 6) **Place stakes on both sides of pavement.**
  - b. **Mark stakes as follows:**
    - 1) **Offset to edge of paving or to back of curb as applicable.**
    - 2) **Cut or fill to pavement slab elevation at edge of paving on back of curb as applicable.**
  - c. Stake intersection returns at radius point, beginning of the return, end of the return, curb corners, quarter points, and grade breaks.
  - d. Stake parking islands placing the radius points and referencing the end of returns.
  - e. Warped pavements and curbs shall be staked as required to construct the work.
- C. The Contractor shall be responsible to preserve and replace all construction stakes and control points until the work is accepted.
- D. The Contractor shall be responsible to preserve or replace bench marks and survey monuments within the project site. Property corner monuments disturbed or removed shall be replaced by a Land Surveyor licensed in the State of Iowa.
- E. The Contractor shall provide copies of survey notes for staking to the Engineer following completion of each days staking activity, including, but not limited to, cut and fill, control used and offsets.
- F. The Contractor shall notify all affected property owners prior to surveys of project property corners, when access to private property is required.

3.03 - Record Documents

- 
- A. Provide location records of newly constructed underground facilities using horizontal and vertical control shown in contract documents.
  - B. Provide location records of previously existing underground utility facilities, including water main, as follows:
    - 1. Dimension and material data
    - 2. Location if existing facilities differ from contract documents by more than 1 foot horizontally and/or 0.5 feet vertically or are not shown
  - C. Provide location records of previously existing sanitary sewers and/or storm sewers as follows:
    - 1. Dimension and material data
    - 2. Location if existing facilities differ from contract documents by more than 1 foot horizontally and/or 0.25 feet vertically or are not shown
  - D. Provide location records of previously existing and newly constructed above ground facilities.

END OF SECTION 01100