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PART 1- GENERAL

1.1 DESCRIPTION

Work Included

Work under this SECTION covers requirements for materials, tools, equipment and services necessary to complete installation of fence for this project. The work shall include, but is not necessarily limited to, completion of the following work:

- A. Field engineering.
- B. Removal and salvage to landowners of existing fence.
- C. Installation of field fence.
- D. Installation of field gates.

1.2 REFERENCE SPECIFICATIONS

- A. The following specifications or applicable standards are incorporated by reference into this SECTION:
 - 1. SECTION 02100 – MOBILIZATION, SITE CLEARING & PREPARATION.
 - 2. SECTION 02700 – PERMANENT SEEDING.
 - 3. American Society for Testing and Materials (ASTM).
 - a. A 116: Zinc-Coated (Galvanized) Steel Woven Wire Fence and Brace Wire.
 - b. A 121: Zinc-Coated (Galvanized) Steel Barbed Wire.
 - 4. Iowa Department of Transportation (IDOT).
- B. Above-mentioned references, which do not appear printed with the Contract Documents, can be provided to Contractor upon request.

1.3 QUALITY ASSURANCE

- A. Contractor shall use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this Section.
- B. Contractor shall use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, Contractor shall comply with the directives of Engineer and Division.

1.4 JOB CONDITIONS

- A. Where existing fences are to be removed and subsequently replaced as a part of the work, Contractor shall field establish such reference points and ties as are necessary to ensure replacement fencing will follow the same alignment as existing fencing. If it is noted to salvage the fence to the landowner, then the existing fencing shall be carefully removed where noted on the Plans and salvaged as described in SECTION 02100 MOBILIZATION, SITE CLEARING, AND PREPARATION, Part 3.4. Also refer to paragraph 4-05 in the General Conditions (*Document N*) for other requirements regarding existing and new fencing.
- B. Where new fencing is located along property lines, all affected landowners and/or public agencies shall mutually agree on location of the new fencing. In the event the location of the new fencing cannot be agreed upon by all parties, the affected portion in contention shall not be installed.
- C. In the event fencing is installed during or after seeding work in SECTION 02700 – PERMANENT SEEDING, Contractor shall exercise care not to damage the seedbed or seeded area. In the event of damage, re-dress, re-seed, re-plant and re-mulch as applicable.
- D. Installation of some fencing may be impacted by the location of existing buried utilities or those placed as part of the project. Contractor shall have all the utilities properly marked prior to installation of the fence and is responsible for any damage that may occur as a result of this work.
- E. Areas where the fence line crosses a stream, channel or other structure will require the use of special fencing. These areas are addressed in the Supplemental Specifications.

1.5 SUBMITTALS

Contractor shall submit the suppliers' certifications to Engineer that fencing, posts, gates and hardware meet the indicated specifications.

1.6 DELIVERY, STORAGE AND HANDLING

Contractor shall store and handle materials in accordance with applicable requirements of the General and Special Conditions and in accordance with the supplier's requirements.

PART 2 - PRODUCTS

2.1 GENERAL

Materials that are considered to be "standard products" of a manufacturer may be used when such products conform to the Specifications.

2.2 POSTS AND BRACING

- A. Posts
 - 1. Wood posts shall meet the requirements of IDOT Section 4154.07. Metal posts as shown on IDOT Standard Road Plan, MI-103, Sheet 2 are not allowed, except at water crossings.

2. All posts shall be pressure treated for ground contact; creosote treated posts are acceptable.

B. Steel Braces

Steel braces shall meet the requirements of IDOT Section 4154.08.

C. Brace Wires

Brace wires shall be two double strands of No. 9 wire twisted tight with a short stick or board which shall be left in place for future tightening. Bracing wire shall meet the requirements of IDOT Section 4154.05.

2.3 FENCING

A. Woven Wire

Woven wire fencing shall meet the requirements of IDOT Section 4154.02, and shall conform to ASTM A-116, Class 3 zinc coating. It shall be forty-seven (47) inches high with a fabric design meeting ASTM Design Number 1047-6-11.

B. Barbed Wire

1. Barbed wire shall be galvanized steel with a four (4) point pattern of round barbs spaced five (5) inches on center that meets the requirements of IDOT Section 4154.04.
2. When woven wire fence is used, note that only a single top strand of barb wire is required. The bottom strand as shown on IDOT Standard Road Plan, MI-103, Sheet 2, is not to be installed
3. When barbed wire fence is used, five (5) stands shall be used and evenly placed.

C. Staples

Staples shall be hot-dipped galvanized and shall consist of either screw shank type (or equivalent) with a minimum length of one one-quarter inches (1 1/4") or No. 9 plain wire with a minimum length of one three-quarter inches (1 3/4"). All staples used shall meet the requirements of IDOT Section 4154.06.

2.4 GATES AND HARDWARE

A. Gates shall be installed as indicated on the Plans or Supplemental Specifications.

1. All gate panels shall be fabricated from two (2) inch diameter rolled steel tubing with 16 ga. wall thickness and shall be shop painted. Each gate panel shall be fifty (50) inches in height.
2. Single gates shall be comprised of one (1) gate panel having installed width as shown on the plans. Minimum single gate panel width shall be twelve (12) feet. Maximum single gate panel width shall be sixteen (16) feet.

3. Double gates shall be comprised of two (2) equal-width gate panels. The default double gate panel width shall be twelve (12) feet but longer gate panels may be specified where an overlap is desired when gates are closed or where a wider opening is required.
- B. Mounting hardware, including hinges and latches, shall be as recommended by the gate manufacturer for the particular site installation. Contractor shall provide case hardened chain of suitable length to secure gate if not provided by gate manufacturer.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Contractor shall install fencing in accordance with these Construction Specifications and Plans.
- B. All six (6) inch wood posts shall be set a minimum of forty-two (42) inches below grade. All four (4) inch posts shall be set a minimum of thirty (30) inches below grade. If post holes are bored, backfill around wood posts with tamped material from excavation or with concrete. Posts may be driven into the ground in lieu of boring post holes.
- C. Wood posts shall be placed at a maximum spacing of twelve (12) feet except for braces, where the maximum spacing shall be eight (8) feet.
- D. Contractor shall provide brace assemblies consisting of with steel braces and diagonal bracing wires to brace the wood posts at the following locations:
 1. Points of connection to existing fence.
 2. End posts.
 3. Points of deflection in horizontal alignment exceeding ten (10) degrees.
 4. Points of deflection in vertical alignment exceeding thirty (30) degrees.
 5. On in-line sections exceeding five hundred (500) feet, evenly spaced so as not to exceed five hundred (500) feet.
- E. Contractor shall stretch the woven wire fabric and barbed wire on outward face of posts at corners and along curves.
- F. Contractor shall attach woven wire fabric and barbed wire to each wood post with at least four (4) staples.
- G. Contractor shall cut and tie off the woven wire fabric and barbed wire at all end posts and brace posts adjacent to corner and angle posts.
- H. Contractor shall hand tension the woven wire fabric and barbed wire at all corner post assemblies from the brace post around the corner post.
- I. All materials and installation procedures shall be similar to IDOT Standard Road Plan MI-103 which is included in the Appendix for reference. Differences are noted in Items 2.2A and 2.3B of this SECTION.
- J. Where gates will be installed:

1. Contractor shall provide sufficient clear opening between gate posts to accommodate the specified width of gate panel(s) with their hinges.
2. Both ends of the clear opening shall be a brace assembly.
3. If an overlap is required for double gates adjust clear opening to provide a minimum twelve (12) inches to a maximum twenty-four (24) inches overlap when gates are closed.
4. Contractor shall install the gates and hardware in accordance with manufacturer's recommendations and secure with a chain unless another device is provided by manufacturer.

PART 4 - MEASUREMENT AND PAYMENT

4.1 UNIT PRICES

- A. Construction cost of all work included in this SECTION of the Construction Specifications shall be included in Contractor's unit prices set forth in the Proposal and Schedule of Prices (*Document C*) for the work items described below. Unit price for each of these items shall include its pro rata share of overhead so that the sum of the products obtained by multiplying the unit prices so set forth by the amount of the work actually constructed, measured as described herein, shall constitute full payment to Contractor for performance of the work included in this SECTION of the Construction Specifications or on the Plans, including field engineering.
- B. Measurement and payment for each work item in this SECTION shall be in accordance with the following:
 1. *Field Fence:* New fencing shall be paid for at the unit price per linear foot, rounded to the nearest foot, for fencing furnished and installed according to the Plans and as specified herein. Only new fencing as shown on the Plans shall be measured for payment. Any existing fencing otherwise removed and replaced by Contractor, whether replaced with salvaged fencing or with new fencing, shall not be measured for payment. The length of fence approved for payment will be jointly measured in the field by Contractor and Engineer.
 2. *Single Gate:* Single gate and all gate hardware shall be paid for at the unit price for each single gate furnished and installed in accordance with this SECTION.
 3. *Double Gate:* A double gate, consisting of two (2) gate panels, and all gate hardware shall be considered one (1) unit and paid for at the unit price for each double gate furnished and installed in accordance with this SECTION.

4.2 SUMMARY – UNITS OF MEASUREMENT:

Units of measurement for bid items applicable to work covered by this SECTION are as follows:

<u>Description</u>	<u>Unit</u>
Field Fence	Lineal Foot
Single Gate (1 gate panel)	Each
Double Gate (2 gate panels)	Each

END OF SECTION 02500