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**PART 1- GENERAL**

**1.1 DESCRIPTION**

A. 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:

1. Field engineering
2. Removal and salvage to landowners of existing fence
3. Installation of field fence
4. Installation of field gates

**1.2 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.
- D. Applicable Standards
  1. American Society for Testing and Materials (ASTM)  
A 116: Zinc-Coated (Galvanized) Steel Woven Wire Fence and Brace Wire  
A 121: Zinc-Coated (Galvanized) Steel Barbed Wire
  2. Iowa Department of Transportation (IDOT)

**1.3 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.

#### **1.4 SUBMITTALS**

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

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- A. 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**

- A. 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.
- B. Steel Braces
  - 1. Steel braces shall meet the requirements of IDOT Section 4154.08.
- C. Brace Wires
  - 1. 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
  - 1. 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
  - 1. Staples shall be hot-dipped galvanized and shall consist of either screw shank type (or equivalent) with a minimum length of one and one-quarter inches (1-1/4") or No. 9 plain wire with a minimum length of one and three-quarter inches (1-3/4"). All staples used shall meet the requirements of IDOT Section 4154.06.

## 2.4 GATES AND HARDWARE

- A. All gates shall be comprised of twelve (12) foot panels. The panels shall be fabricated from rolled steel tubing with a diameter of two (2) inches and shall be shop painted. Single gates will have one (1) panel and double gates shall have two (2) panels. Gates shall be installed as indicated on the Plans or in the Supplemental Specifications.
- B. Mounting hardware, including hinges and latches, shall be as recommended by the gate manufacturer for the particular site installation. Provide case hardened chain of suitable length to secure gate if not provided by 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 sixteen (16) 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 outside of posts on corners and 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. 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.

**3.2 MEASUREMENT AND PAYMENT**

The 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. The 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 Constructions Specifications or on the Plans, including field engineering.

Measurement and payment for each work item in this SECTION shall be in accordance with the following:

- A. *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.
- B. *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.
- C. *Double Gate:* Double gate and all gate hardware shall be paid for at the unit price for each double gate furnished and installed in accordance with this SECTION
- D. *Summary:* Proposal 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 – 12 foot panel)	Each
Double Gate (2 – 12 foot panels)	Each

**END OF SECTION 02500**