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**FENCING****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Description of Work
- B. Chain Link Fencing Installation
- C. Removal and Replacement of Existing Fences
- D. Temporary Fence

**1.02 DESCRIPTION OF WORK**

This section shall include the furnishing of materials, erection, and installation of new chain link and PVC-coated chain link fencing and gates, the relocation of existing fences and gates, removal and salvage of other types of fences, and all incidental work necessary for completed fencing work as specified in the contract documents.

**1.03 SUBMITTALS**

Follow the General Provisions (Requirements) and Covenants.

**1.04 SUBSTITUTIONS**

Follow the General Provisions (Requirements) and Covenants.

**1.05 DELIVERY, STORAGE, AND HANDLING**

Follow the General Provisions (Requirements) and Covenants.

**1.06 SCHEDULING AND CONFLICTS**

Follow the General Provisions (Requirements) and Covenants, as well as the following.

Notify the Engineer at least 3 days prior to start of fence installation.

**1.07 SPECIAL REQUIREMENTS**

- A. Provide chain link fencing and gates as completed units constructed by a single source including necessary erection accessories, fittings, and fastenings.
- B. Similar parts with different shapes or protective coatings shall not be intermingled within the Project.
- C. Comply with the Voluntary Standard for Chain Link Fence Installation as per Chain Link Fence Manufacturer's Institute (CLFMI).

**1.08 MEASUREMENT FOR PAYMENT**

**A. Units:** Measure for all types of fences including new construction and/or removal, and/or replacement, shall be in linear feet of fence as follows:

- 1. New Construction:** Linear feet of fence constructed.
- 2. Removal Only:** Linear feet removed.
- 3. Removal & Replacement:** Linear feet reconstructed from first post behind grading limits.
- 4. Gates:** Number of each type constructed. When gates are not included as a separate bid item, they shall be measured as lineal feet of the type of fence being constructed.

**B. Lump Sum:** Lump sum items shall not be measured.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. The Contractor shall provide all new materials; used, re-rolled, regalvanized, or open seam posts or rails are not acceptable.
- B. Where specified in the Contract Documents, the Contractor shall provide a PVC-coated finish of the color as specified for all fabric and framework with fittings, accessories, fasteners, wire, and gates to match.

**2.02 FABRIC**

- A. The fabric shall be chain link, zinc coated (galvanized) or aluminum coated No. 9 gauge wire woven in a 2 inch mesh. On all fabric the top and bottom salvage is to have a knuckled finish, unless specified otherwise in the drawings. Fabric height shall be the same as height of fence specified.
- B. Zinc coated fabric shall meet the requirements of ASTM A 392, Class II coating. Aluminum coated fabric shall meet the requirements of ASTM A 491.
- C. Tennis court fabric shall be woven in a 1 3/4 inch mesh and shall be aluminum coated.
- D. Where specified in contract documents, Contractor shall provide PVC-coated over galvanized steel wire in accordance with ASTM F 668, Type 2B, 7 mil, thermally fused polyvinyl chloride in the color specified.

**2.03 POSTS, RAILS, AND BRACES**

Either hot-rolled or cold-rolled posts, rails, and braces shall be used and be the lengths shown on the plans and/or details. The steel strip used in the manufacture of the pipe shall conform to ASTM A 1011.

**A. Hot-Rolled Manufactured Posts, Rails, and Braces (Type I Pipe):**

- 1. No used, rerolled or open seam material will be permitted in posts or rails.
- 2. Posts, rails, and braces shall be galvanized standard weight steel pipe meeting requirements of ASTM A 53 of the lengths shown on the plans and Standard Detail Plates.
- 3. Unless otherwise specified, the following nominal sizes for the respective uses are to be provided:

USE IN FENCE	HOT ROLLED (TYPE I PIPE) FENCE HEIGHT					
	48" & Under		Greater than 48" to 96"		Greater than 96"	
	Outside Diameter (inches)	Weight (lb/ft)	Outside Diameter (inches)	Weight (lb/ft)	Outside Diameter (inches)	Weight (lb/ft)
Line Post	2	2.74	2 1/2	3.65	3	5.79
*Terminal Post	2 1/2	3.65	3	5.79	4	9.11
Top/Intermediate Rail & Bracings	1 5/8	2.28	1 5/8	2.28	1 5/8	2.28
** Gate Post						

\*Includes corner, angle, brace, and pull posts.  
\*\*As shown on Standard Detail Plates.

**2.03 POSTS, RAILS, AND BRACES (Continued)**

**B. Cold-Rolled Manufactured Posts, Rails, and Braces (Type II - Pipe):**

1. The pipe shall be manufactured by cold rolling electric resistance welding and shall be given corrosion protection by in-line application of hot-dip galvanized zinc, followed by a chromate conversion coating and electrostatically sprayed thermoplastic acrylic coating on the outside surface.
  - a. Hot-dipped zinc coating per ASTM B 6 high grade and special high grade. The weight of the hot-dipped zinc coating shall be 1.0 ounce/foot<sup>2</sup> ± 0.1. The weight of zinc coating shall be determined in accordance with ASTM A 90.
  - b. Chromate conversion coating: The chromate coating weight shall be 30 micro-grams/square inch ± 10 micro-grams/inch<sup>2</sup>. The coating weight shall be determined by a quantitative method.
  - c. The thermoplastic electrostatically applied acrylic coating shall be 0.5 mils ± 0.1 mils thick.
2. The inside surface shall be given corrosion protection by in-line application of a full zinc base organic coating after fabrication.
3. Unless otherwise specified, the following nominal sizes for the respective uses are to be provided:

USE IN FENCE	COLD ROLLED (TYPE II PIPE) FENCE HEIGHT					
	48" & Under		Greater than 48" to 96"		Greater than 96"	
	Outside Diameter (inches)	Weight (lb/ft)	Outside Diameter (inches)	Weight (lb/ft)	Outside Diameter (inches)	Weight (lb/ft)
Line Post	2	2.28	2 1/2	3.11	3	4.64
*Terminal Post	2 1/2	3.11	3	4.64	4	6.56
Top/Intermediate Rail & Bracings	1 5/8	1.84	1 5/8	1.84	1 5/8	1.84

\*Includes corner, angle, brace, and pull posts.

**C. PVC Coating:** Where specified in the contract documents, Contractor shall provide for all framework, posts, and gates, a PVC-coated finish in accordance with ASTM F 1234, apply supplemental color coating of 10 to 14 mils of thermally fused polyvinyl chloride in the color specified to match fabric.

**2.04 FITTINGS**

- A. All special fittings except aluminum fittings, shall have a galvanized coating applied by the hot-dip process of not less than 0.8 ounce per square foot.
- B. Braces shall be attached to posts by fittings that will hold both post and brace rigidly.
- C. Diagonal tension rods shall be 3/8 inch round steel rods with an appropriate commercial means for tightening.
- D. A locknut or other device shall be provided to hold the tightening device in place.
- E. A suitable sleeve or coupling device, recommended by the manufacturer, shall be provided to connect sections of top rail and shall provide for expansion and contraction.
- F. Posts shall be provided with a suitable cap which is secured. Stretcher bars not less than 3/8 inch diameter, or equivalent cross-section area, with suitable clamps shall be used for attaching fabric to corner, end, or gate posts.

**2.05 BOTTOM TENSION WIRE**

No. 7 gauge hot-dipped galvanized wire or aluminum-coated steel wire. Coatings shall meet requirements of 64-2.1, Fabric Material.

- A. Minimum weight of galvanized coating shall be 0.40 ounce per square foot of wire surface.
- B. Minimum weight of aluminum coating shall be 0.25 ounce per square foot.

**2.06 FASTENERS**

Fasteners to attach the fabric to braces and rails shall be aluminum 9 gauge tie wires. Each end of the tie wire will be secured to the fabric with a double turn.

**2.07 BARBED WIRE SUPPORTING ARMS**

- A. Heavy pressed steel or cast iron hot-dipped galvanized, complete with provisions for anchorage to tubular end, corner, and pull post attaching 3 rows of barbed wire to each arm.
- B. Barbed wire arms are not required on roll-formed terminal posts. Single or double arms shall be integral with post top weather cap. Intermediate arms shall have hole for passage of top rail.
- C. Arms shall be capable of withstanding, without failure, 250 pounds downward pull at outermost end of arm.
- D. Arms shall be fitted with clips or other positive means for attaching 3 strands of barbed wire.

**2.08 BARBED WIRE**

Two-strand, 12 1/2 gauge wire with 14 gauge, 4 point round barbs spaced approximately 5 inches on center finishes as follows:

- A. **Galvanized:** ASTM A 121, Class 3
- B. **Metallic-Coated:** ASTM A 121

**2.09 GATES**

The type and width of gates shall be as specified on the plans, Standard Detail Plates, or special provisions.

**2.10 CONCRETE**

All concrete used shall have a minimum compressive strength of 4,000 psi at 28 days.

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**PART 3 - EXECUTION****3.01 CHAIN LINK FENCING INSTALLATION****A. General:**

1. Construct fencing and gates at the location and height as shown on the plans and in accordance with the contract documents.
2. Installation to conform to ASTM F 567.
3. Construct all posts plumb in alignment, and with the top of fabric conforming to the proposed ground surface.

**B. Posts:**

1. **Post Spacing:** Place posts in the line of the fence with equal spacing not to exceed 10 feet on center.
2. **Post Setting:**
  - a. Posts shall be set in a concrete foundation as specified on Standard Detail Plates.
  - b. All posts are to be set plumb and shall be set not less than 24 hours prior to stretching the fabric.
  - c. Top of footing to be 1 inch above grade and sloped to direct water away from posts. Footing to be uniform size full depth without flair at top of grade, to prevent frost heave.
  - d. Gate post foundation shall be as specified on the Standard Detail Plates.
  - e. All terminal, corner, angle, pull, and gate posts shall be set with the required brace-post assembly as shown on the Standard Detail Plates.

**C. Rails:**

1. **Top Rail:** The top rail shall pass through the base of the line post caps and form a continuous brace from end to end of each stretch of fence. The top rail shall be securely fastened to the terminal posts by pressed steel connectors.
2. **Intermediate Rail (When Specified):** The intermediate rail (when specified) shall be securely fastened between all line posts and terminal posts with pressed steel fasteners.

**D. Braces:**

1. Braces shall be securely fastened to the post by means of malleable iron or pressed steel connections, then trussed from the line post back to the end, gate, or corner post.
2. The diagonal tension rod (truss rod) shall be tightened to produce proper tension.

**E. Pull Posts:**

1. Pull posts shall be placed midway between end, angle, corner, and gate posts as necessary so that no section of fence longer than 300 feet shall be constructed with line posts only.
2. Pull post sizes shall conform to sizes defined as terminal posts.

**F. Fabric:**

1. Fabric shall be installed on the outside of the posts from the area being fenced.
2. Pull fabric taut with bottom salvage a maximum of 1 inch above grade.

**3.01 CHAIN LINK FENCING INSTALLATION (Continued)**

3. Each end of each run of chain link fabric shall be tightened and secured by a stretcher bar inserted in the final link of the fabric.
4. The length of the stretcher bar shall be the same as the width of the fabric. This bar and the tight fabric shall be secured to the end post by tension bands equally spaced not more than 15 inches apart.
5. The chain link fabric shall be attached securely to the braces top rail, tension wire, and all intermediate posts at intervals of not more than 15 inches by wire ties or bands.
6. The ground surface along the line of the fence shall be uniformly smoothed for a width of 2 feet so that the fabric will conform to the ground surface.

**G. Bottom Tension Wire (5-Foot Fence and Over):**

1. Bottom tension wire shall be stretched taut from terminal post to terminal post and securely fastened to each intermediate post 1 inch above the lower edge of fabric.
2. Tension wire shall be attached to the fence fabric with approved wire ties or clamps every 12 inches.

**H. Barbed Wire (When Specified):**

1. Install 3 parallel wires on each barbed wire supporting arm on the outside of the area being secured, unless otherwise shown.
2. Pull wires taut, without kinks or twists for tension.

**I. Gates:** Gates shall be erected as shown on the plans and the Standard Detail Plates.**J. Electrical Grounds:**

1. Electrical grounds shall be constructed where a power line passes over the fence or at 500 foot intervals or at least one location, whichever is more restrictive.
2. The ground shall be accomplished with a copper-clad rod 8 feet long and a minimum of 5/8 inch in diameter driven vertically until the top is 6 inches below the ground surface.
3. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded.
4. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction.

**3.02 REMOVAL AND REPLACEMENT OF EXISTING FENCES**

- A. Work Area:** The work area for removal of existing fences shall include all property designated within the grading limits of the project.
- B. Removal:** The Contractor shall remove all fences within work areas; unless otherwise shown on the plans or designated by the Engineer.
  1. Remove fence to first line post beyond grading limits.
  2. Removal of fencing includes all footings of posts.
  3. Remove all concrete from posts prior to storing or reinstalling.

**3.02 REMOVAL AND REPLACEMENT OF EXISTING FENCES (Continued)**

4. Removal of fencing shall be done in a careful manner for the salvaging of all materials; roll all fabric for storage.
5. Store all salvageable materials in a neat pile near the site, as approved by the Engineer.

**C. Replacement:**

1. Replacement of fences as designated on plans or by the Engineer.
2. Replace any materials missing or damaged during removal operations with materials of equal or better quality than original fence materials.
3. Provide any additional fasteners, posts, and braces required to reconstruct the fence.
4. All fences adjacent to street right-of-way shall be replaced 6 inches behind the property line unless otherwise designated.
5. Existing posts set in concrete shall be reset in concrete.

**D. Fences Removed and Not Designated for Replacement:**

1. Salvaged material shall be the property of the property owner and shall be stored on this property.
2. If the property owner notifies the Contractor in writing that they do not want the salvaged material at the time of removal, remove the material from the project.
3. Replace materials damaged when it can be shown that the damage was caused by the Contractor's negligence; obtain concurrence of Engineer prior to fence removal.

**3.03 TEMPORARY FENCE**

- A. Furnish and install chain-link fence fabric, posts, fabric ties, and other materials for the height specified in the plans.
- B. Installation shall be in accordance with permanent fence with the exceptions as follows:
  1. Posts shall be driven into the ground.
  2. Posts will not be set in concrete except at corner or temporary gate posts.
  3. Top rail, tension wire, and bracing shall not be required.
- C. Remove temporary fence and materials when the intended purposes has been served. Materials shall remain the property of the Contractor and removed from the site.

**3.04 CLEANUP**

- A. Perform cleanup operations during installation of work and upon completion of work.
- B. Remove from site all excess materials, debris, and equipment.
- C. Hose down and/or broom clean all paved surfaces.
- D. Repair any damage resulting from fencing operations.

END OF SECTION