

## SECTION 321040

### CHAIN LINK FENCE

#### PART 1 - GENERAL

##### 1.1 SCOPE

- A. This item shall consist of furnishing and erecting a chain link fence in accordance with these specifications, the details shown on the plans, and in conformity with the lines and grades shown on the plans.

##### 1.2 GENERAL

###### A. WORK INCLUDED

The Contractor shall, unless otherwise specified, furnish all labor, materials, equipment, tools, and all other associated appurtenances necessary to do the work required under the contract.

- B. LOCATION OF THE WORK: The location of the work is as shown on the Plans.

###### C. COORDINATION OF THE WORK

The Contractor shall be responsible for the satisfactory coordination of the installation of the fence with other construction and activities in the area. Delays in work resulting from lack of such harmony shall not in any way be a cause for extra compensation by any of the parties.

##### 1.3 METHOD OF MEASUREMENT AND PAYMENT

The work shall be measured, and the compensation determined in the following manner.

###### A. CHAIN LINK FENCE

1. The chain link fence will be measured for payment by the linear foot. Measurement will be along the top of the fence from center to center of end posts, excluding the length occupied by gate openings. Removal and disposal of any existing fence is incidental to the new fence construction and there is no separate bid item for existing fence removal and disposal, unless otherwise indicated in the project documents.

B. GATES

1. Gates will be measured as complete units. Removal and disposal of any existing gates is incidental to the new fence and gate construction and there is no separate bid item for existing fence gate removal and disposal, unless otherwise indicated in the project documents.

1.4 REFERENCED STANDARDS (LATEST REVISION)

A. ASTM Standards

1. ASTM A121 Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
2. ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
3. ASTM A392 Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
4. ASTM A491 Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric
5. ASTM A824 Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use with Chain Link Fence
6. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus
7. ASTM F567 Standard Practice for Installation of Chain-Link Fence
8. ASTM F668 Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and other Organic Polymer Coated Steel Chain-Link Fence Fabric
9. ASTM F1043 Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
10. ASTM F1083 Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
11. ASTM F1183 Standard Specification for Aluminum Alloy Chain Link Fence Fabric
12. ASTM F1345 Standard Specification for Zinc 5% Aluminum-Mischmetal Alloy Coated Steel Chain-Link Fence Fabric

13. ASTM G152 Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
14. ASTM G153 Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
15. ASTM G154 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
16. ASTM G155 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials

B. Federal Specifications (FED SPEC)

1. FED SPEC RR-F-191/3 Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces)
2. FED SPEC RR-F-191/4 Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

1.5 SUBMITTALS

- A. The Contractor shall submit in writing documentation to justify approval of these materials by NPU prior to the start of the project.

The Contractor submittals shall include the statement that the submittals have been reviewed and the materials meet the contract specifications and/or NPU Standard Details.

For materials that the Contractor is requesting deviations from this specification and/or NPU Standard Details, the Contractor shall submit in writing a minimum of 60 days prior to construction, documentation to justify approval of these materials by NPU.

No fabrication shall take place until the final shop drawings are reviewed by Engineer and NPU. Final approval is at the discretion of NPU.

PART 2 - PRODUCTS

2.1 MATERIALS

The materials used in this work shall be all new and conform to the requirements for class, kind, size and material as specified below.

- A. Fabric

1. The fabric shall six foot (6') or eight foot (8') high with woven 9-gauge black polyvinyl chloride (PVC)-coated steel wire in a 1" or 2" (one or two-inch) mesh, as shown on the plans and/or project bid form, and shall meet the requirements of ASTM F668, Class 2b. The fabric shall be woven from a 9-gauge aluminum-coated steel wire in a 1" or 2" (one or two-inch) mesh and shall conform to the requirements of ASTM A491.

B. Barbed Wire

1. Barbed wire shall be 3 (three) strand 12-1/2 gauge zinc-coated wire with 4 (four) point barbs and shall conform to the requirements of ASTM A121, Class 3, Chain Link Fence Grade.

C. Posts, Rails, and Braces: Line posts, rails, and braces shall conform to the requirements of ASTM F1043 or ASTM F1083 as follows:

1. Galvanized tubular steel pipe shall conform to the requirements of Group IA, (Schedule 40) coatings conforming to Type A, or Group IC (High Strength Pipe), External coating Type B, and internal coating Type B or D.
2. The dimensions of the posts, rails, and braces shall be in accordance with Tables I through VI of Federal Specification RR-F-191/3.

D. Gates: Gate frames shall consist of polymer-coated steel pipe and shall conform to the specifications for the same material under paragraph 162-2.3. The fabric shall be of the same type material as used in the fence.

E. Wire Ties and Tension Wires: Wire ties for use in conjunction with a given type of fabric shall be of the same material and coating weight identified with the fabric type. Tension wire shall be seven (7) gauge marcelled steel wire with the same coating as the fabric type and shall conform to ASTM A824. All material shall conform to Federal Specification RR-F-191/4.

F. Miscellaneous Fittings and Hardware: Miscellaneous steel fittings and hardware for use with zinc-coated steel fabric shall be of commercial grade steel or better quality, wrought or cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric posts, and wires of the quality specified herein. All steel fittings and hardware shall be protected with a zinc coating applied in conformance with ASTM A153. Barbed wire support arms shall withstand a load of 250 pounds applied vertically to the outermost end of the arm.

- G. Concrete: Concrete shall have a minimum 28-day compressive strength of 3,000 psi.
- H. Marking: Each roll of fabric shall carry a tag showing the kind of base metal (steel, aluminum, or aluminum alloy number), kind of coating, the gauge of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal (steel, aluminum, or aluminum alloy number), and kind of coating.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. General: The fence shall be constructed in accordance with the details on the plans and as specified here using new materials. All work shall be performed in a manner satisfactory to the City. The Contractor shall establish and mark the property line or fence line for the work. The Contractor shall layout the fence line based on the plans. The Contractor shall also span the opening below the fence with barbed wire at all locations where it is not practical to conform the fence to the general contour of the ground surface because of natural or manmade features such as drainage ditches. The new fence shall be permanently tied to the terminals of existing fences as shown on the plans. The Contractor shall stake down the woven wire fence at several points between posts as shown on the plans. The Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet. The work shall progress in this manner and at the close of the working day the newly constructed fence shall be tied to the existing fence.
- B. Clearing the Fence Line: Clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions that will interfere with proper construction of the fence. Stumps within the cleared area of the fence shall be grubbed or excavated. The bottom of the fence shall be placed a uniform distance above ground, as specified in the plans. When shown on the plans or as directed by the City or the Engineer, the existing fences and gates which interfere with the new fence location shall be removed by the Contractor as a part of the construction work unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal shall be refilled with suitable soil, gravel, or other suitable material and compacted with tampers. The cost of clearing, removing and disposing of the material shall not constitute a separate bid item and shall be considered incidental to fence construction.

- C. Installing Posts: All posts shall be set in concrete at the required dimension and depth and at the spacing shown on the plans.
1. The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within seven (7) days after the individual post footing is completed. Should rock be encountered at a depth less than the planned footing depth, a hole two (2) inches larger than the greatest dimension of the posts shall be drilled to a depth of twelve (12) inches. After the posts are set, the remainder of the drilled hole shall be filled with grout, composed of one-part Portland cement and two parts mortar sand. Any remaining space above the rock shall be filled with concrete in the manner described above. In lieu of drilling, the rock may be excavated to the required footing depth. No extra compensation shall be made for rock excavation.
  2. Posts should be spaced not more than ten (10) feet apart and should be set a minimum of 36 inches in concrete footings. The post holes shall be in proper alignment so that there is a minimum of three (3) inches of concrete on all sides of the posts.
- D. Installing Top Rails: The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion.
- E. Installing Braces: Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts.
- F. Installing Fabric: The wire fabric shall be firmly attached to the posts and braced as shown on the plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than one (1) inch or more than four (4) inches from the ground surface. Grading shall be performed where necessary to provide a neat appearance. At locations of small natural swales or drainage ditches and where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched to span the opening below the fence. The vertical clearance between strands of barbed wire shall be six (6) inches or less.

Openings below the fence may also be spanned with barbed wire fastened to stakes.

**The Engineer shall specify if tension wire is to be installed.**

- G. Electrical Grounds: Electrical grounds shall be constructed [ where a power line passes over the fence] [ at 500 feet intervals ]. [ The ground shall be installed directly below the point of crossing.] The ground shall be accomplished with a copper clad rod eight (8) feet long and a minimum of five-eighths (5/8) inches in diameter driven vertically until the top is six (6) inches below the ground surface. 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. Installation of ground rods shall not constitute a separate bid item and shall be considered incidental to fence construction.

The Engineer shall indicate the location of all electrical grounds on the plans. Grounding may not be necessary with the use of composite posts.

- H. Cleaning up: The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction. All disturbed areas shall be seeded and/or sodded per NPU Standard Specification, 321030 Restoration by Seeding or Sodding.

END OF SECTION