

SECTION VI
(Sub-section 292)
Chain Link Fencing

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CHAIN LINK FENCING SUB-SECTION 292

1.0 SCOPE OF WORK

The work under this section includes the furnishing and installation of fencing as set forth on the plans and as outlined herein or shown in the standard details.

2.0 GENERAL REQUIREMENTS

All fencing work shall conform to these specifications except as modified in Sub-Section 433, as applicable.

3.0 MATERIALS

Fencing materials shall conform to the requirements of FS-RR-F-191, and be as specified. Pipe sizes indicated are the nominal outside diameter and shall conform to ASTM A 53, Grade B, Type S, Schedule 40 pipe.

3.1 ZINC COATING

Ferrous-metal components and accessories, except as otherwise specified, shall be hot-dip galvanized after fabrication.

Weight of zinc coating shall not be less than 1.8 ounces per square foot, as determined from the average result of two specimens, when tested in accordance with ASTM A 90/A 90M. Zinc coating shall conform to the requirements of the following:

Pipe: FS-RR-F-191 / 3D Class 1 Grade A in accordance with ASTM F 1083 and ASTM F 1234.

Pipe: ASTM A 53.

Hardware and accessories: ASTM A, Table 1

Galvanizing repair material shall be a cold-applied zinc-rich coating conforming to ASTM A 780.

3.2 FABRIC

Fabric shall consist of No. 9-gage aluminized steel wires in accordance with ASTM A 491 woven into a 2-inch diamond mesh, with dimensions of fabric and wire conforming to FS-RR-F-191 and FS-RR-F-191/1, Type 1 with 0.4 ounces per square foot aluminum coating. Fence height shall have one-piece fabric widths.

3.3 TOP AND BOTTOM SELVANGES

Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.

3.4 LINE POSTS

Minimum acceptable line posts shall be as follows:

Over 6-feet high:

2.375 inch O.D., Schedule 40 pipe weighing 3.65 pounds per linear foot.

3.5 END, CORNER, AND PULL POSTS

Minimum acceptable end, corner, and pull posts shall be as follows:

Over 6 feet high:

Grade A: 3.500 inch O.D., Schedule 40 pipe weighing 7.58 pounds per linear foot.

3.6 SLEEVES

Sleeves for setting into concrete construction shall be of the same material as post sections. Size shall be 1-inch greater than the diameter or dimension of the post. Flat plates shall be welded to each sleeve base to provide anchorage and prevent intrusion of concrete.

3.7 TOP RAIL

Rails shall be a minimum of 1.660 inches O.D. Schedule 40 pipe Grade A weighing 2.27 pounds per linear foot. Expansion couplings 6-inches long shall be provided at each joint in top rails.

3.8 CENTER RAILS BETWEEN LINE POSTS

For fencing over 6-feet high, center rails shall be 1.660 inches O.D., Schedule 40 pipe, Grade A weighing 2.27 pounds per linear foot.

3.9 POST-BRACE ASSEMBLY

Bracing shall consist of 1.660 inches O.D. Schedule 40 pipe Grade A weighing 2.27 pounds per linear foot and 3/8 inch adjustable truss rods and turnbuckles.

3.10 TENSION WIRE

Wire shall be galvanized, No. 7-gage, coiled spring wire, provided at the bottom of the fabric only. Zinc coating shall weigh not less than 1.6 ounces per square foot. Tension wire shall be attached to fence fabric with No. 9-gage wire ties, twisted no less than two times at each end at intervals not to exceed 24 inches.

3.11 STRETCHER BARS

Bars shall be one-piece lengths equal to the full height of the fabric with a minimum cross section of 3/16 by 3/4 inch, in accordance with FS-RR-F-191.

3.12 POST TOPS

Tops shall be steel, wrought iron, or malleable iron designed as a weathertight closure cap. One cap shall be provided for each post. Caps shall have an opening to permit through passage of the top rail.

3.13 STRETCHER BAR BANDS

Bar bands for securing stretcher bars to posts shall be steel, wrought iron, or malleable iron spaced not over 15 inches on center. Bands may also be used in conjunction with special fittings for securing rails to posts. Bands shall have projecting edges chamfered or eased.

3.14 GATE POSTS

Contractor shall provide a gatepost for supporting each gate leaf as follows:

Twelve-feet and up to 18-feet wide:

Provide 6.625 inch O.D. pipe weighing 18.97 pounds per linear foot.

3.15 GATES

For gate leaves over 6 feet high or 6 feet wide, perimeter gate frames shall be 1.90-inch O.D. pipe Grade A weighing 2.72 pounds per linear foot.

Gate frame assembly shall be welded or assembled with special malleable or pressed-steel fittings and rivets to provide rigid connections. Fabric shall be installed with stretcher bars at vertical edges; stretcher bars may also be used at top and bottom edges. Stretcher bars and fabric shall be attached to gate frames on all sides at intervals not exceeding 15 inches. Hardware shall be attached with rivets or by other means that will provide equal security against breakage or removal.

Diagonal cross-bracing, consisting of 3/8-inch diameter adjustable – length truss rods on welded gate frames, shall be provided where necessary to obtain frame rigidity without sag or twist. Nonwelded gate frames shall have diagonal bracing.

3.16 GATE HARDWARE AND ACCESSORIES

Gate hardware and accessories shall conform to FS-RR-F-191, shall be secured in place by peening or spot welding to allow proper operation of components, but prevent disassembly of fencing or removal of gates, and be as specified:

Hinges shall be malleable iron, forged steel, or pressed steel to suit gate size, non-lift-off type, offset to permit 180-degree opening.

Latch shall permit operation from either side of the gate, with a padlock eye provided as an integral part of the latch.

Stops and holders of malleable iron shall be provided for vehicular gates. Stops shall automatically engage the gate and hold it in the open position until manually released.

Double gates shall be provided with a cane bolt and ground-set keeper, with latch or locking device and padlock eye designed as an integral part.

Manufacturer's standard heavy-duty track ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, and accessories shall be provided as required for easy operation of manual sliding gates.

3.17 MISCELLANEOUS HARDWARE

Miscellaneous hardware shall be provided as required and shall be hot-dip galvanized.

3.18 FABRIC TIES / BANDS / RINGS

Fabric to line post bands shall be A58 series, self-locking fabric bands as manufactured by Page Aluminized Steel Corporation or approved equal spaced 12 inches on center. For tying fabric to rails and braces, bands shall be spaced 24 inches on center. For tying fabric to tension wire, 0.015-inch hot rings shall be spaced 24 inches on center.

Manufacturer's standard procedure will be accepted if of equal strength and durability.

3.19 BARBED WIRE SUPPORTING ARMS

Supporting arms for barbed wire shall be steel, wrought iron, or malleable iron, complete with provisions for anchorage to posts and for attaching 3 rows of barbed wire to each arm. Supporting arms may either be attached to posts or integral with the post top weather cap.

Contractor shall provide a single 45-degree arm for three strands of wire for each post where barbed wire is indicated.

3.20 BARBED WIRE

Wire shall conform to ASTM A 121 and ASTM A 585 two-strand, 12-1/2-gage wire with 14-gage 4-point round barbs spaced 5 inches on center.

3.21 CONCRETE

Concrete shall conform to ASTM C 94. Mix shall be designed to obtain concrete with a minimum 28-day compressive strength of 2,500 psi.

3.22 INSTALLATION GENERAL

Fencing installation shall not begin before the final grading has been completed and finish elevations have been established, unless otherwise approved.

3.23 EXCAVATION

Excavations for post footings shall be drilled holes in virgin or compacted soil, of minimum sizes as indicated.

Footings shall be spaced for line posts 10 feet on center maximum and at closer intervals when indicated.

Bottoms of the holes shall be approximately 3-inches below the bottoms of the posts. Bottom of each post shall be set no less than 36-inches below finished grade when in firm, undisturbed soil. Posts shall be set deeper, as required, in soft and problem soils and for heavy, lateral loads.

Soil from excavations shall be spread uniformly adjacent to the fence line or on areas of Contractor property, as directed.

When solid rock is encountered near the surface, the Subcontractor shall drill into the rock at least 12 inches for line posts and at least 18 inches for end, pull, corner, and gate posts. Holes shall be drilled at least 1 inch greater in diameter than the largest dimension of the placed post.

If solid rock is below the soil overburden, Contractor shall drill to the full depth required except that penetration into rock need not exceed the minimum depths specified above.

3.24 SETTING POSTS

Loose and foreign materials shall be removed from holes and the soil moistened prior to placing concrete.

Tops of footings shall be trowel finished and sloped or domed to shed water away from posts. Hold-open devices, sleeves, and other accessories shall be set in concrete.

Exposed concrete shall be kept moist for at least 7 days after placement or cured with a membrane curing material, as approved.

Posts set into sleeved holes in concrete shall be grouted in with an approved grouting material.

Posts set in concrete construction shall be set vertically, with tops aligned and held in position until concrete has set.

3.25 CONCRETE STRENGTH

Concrete shall have attained at least 75 percent of its minimum 28-day compressive strength, but in no case sooner than 7 days after placement, before rails, tension wires or fabric are installed. Fabric and wires shall not be stretched or gates hung until the concrete has attained its full design strength. Samples and test concrete shall be taken to determine strength as specified in Sub-Section 237, structural concrete.

3.26 CONTINUOUS TOP RAILS

Top rails shall run continuously through post caps or extension arms, bending to radius for curved runs. Expansion couplings shall be provided as recommended by the fencing manufacturer.

3.27 CENTER RAILS

Center rails shall be one piece between posts set flush with posts on the fabric side, using special offset fittings where necessary.

3.28 BRACE ASSEMBLY

Contractor shall provide bracing assemblies at end and gateposts and at both sides of corner and pull posts, with the horizontal brace located at mid-height of the fabric. Brace assemblies shall be installed so posts are plumb when the diagonal rod is under proper tension. Two complete brace assemblies shall be provided at corner and pull posts where required for stiffness and as indicated.

3.29 TENSION WIRE INSTALLATION

Tension wires shall be installed by weaving them through the fabric and tying them to each post with not less than 7-gage galvanized wire or by securing the wire to the fabric with 10-gage ties or clips spaced 24 inches on center.

3.30 FABRIC INSTALLATION

Fabric shall be provided in single lengths between stretch bars with bottom barbs placed not higher than 1-inch above the finished floor line. Fabric shall be pulled taut and tied to posts, rails, and tension wires with wire ties and bands. Fabric shall be installed on the security side of fence, unless otherwise directed. Fabric shall remain under tension after the pulling force is released.

3.31 STRETCHER BAR INSTALLATION

Stretcher bars shall be threaded through or clamped to fabric 4 inches on center and secured to posts with metal bands spaced 15 inches on center.

3.32 GATE INSTALLATION

Gates shall be installed plumb, level, and secure, with full opening without interference. Ground-set items shall be installed in concrete for anchorage as recommended by the fence manufacturer. Hardware shall be adjusted for smooth operation and lubricated where necessary.

3.33 TIE WIRES

Tie wires shall be U-shaped to the pipe diameters to which attached. Ends of tie wires shall be twisted not less than two full turns and bent so as not to present a hazard.

3.34 FASTENERS

Nuts for tension bands and hardware shall be installed on the side of the fence opposite the fabric side. Ends of bolts shall be peened to prevent removal of nuts.

3.35 BARBED WIRE INSTALLATION

Three parallel strands of barbed wire shall be installed on the security side of the fence as specified or indicated. Wire shall be pulled taut and fastened securely to each support arm.

3.36 ZINC-COATING REPAIR

Galvanized surfaces damaged by welding or abrasions, and cut ends of fabric, barbed wire, or other cut sections shall be cleaned and repaired with specified galvanizing repair material applied in strict conformance with the manufacturer's printed instructions.

3.37 TOLERANCES

Posts shall be straight and plumb within a vertical tolerance of ¼ inch after the fabric has been stretched. Fencing and gates shall be true to line with no more than ½ inch deviation from the established centerline between line posts. Defects shall be repaired as directed.

4.0 MEASUREMENT & PAYMENT

Except as otherwise provided the length of fence at the specified height to be paid for shall be measured along the bottom of the fabric, out-to-out of end posts, in the completed and accepted fence. The number of corner post assemblies to be paid for shall be the number of such post assemblies constructed and accepted. Cost of all gate components shall be included in the contract unit price for gate assemblies according to the width of the gate opening.

Chain Link Fencing, _____ft. fabric height	per linear foot
Corner Post Assemblies	Each
Pull and End Post Assemblies	Each
Gate Assemblies, _____ft. width	Each