206-5 METAL RAILINGS.

206-5.1 Metal Hand Railings Materials. The fabrication of metal hand railings shall be in accordance with 304-2.

Steel railing material shall be welded or seamless steel pipe conforming to ASTM A 53, structural steel conforming to ASTM A 36, or tubular sections of hot rolled-mild steel, conforming to ASTM A 501.

The base metal for aluminum railing shall be ASA alloy designation 6063-T6. Pipe and tubing shall be extruded conforming to requirements of ASTM B 429, plates and sheets shall be rolled conforming to ASTM B 209, and rods, bars, or shapes shall be extruded conforming to ASTM B 221.

206-5.2 Flexible Metal Guardrail Materials. Unless otherwise provided on the Plans or in the Specifications, materials and construction for the railings shall conform to the following requirements:

The rail elements, terminal sections, bolts, nuts, and other fittings shall conform to the specifications of AASHTO m 180, except as modified in this subsection. The edges and center of the rail element shall contact each post or block. Rail element joints shall be lapped not less than 12-1/2 inches (315 mm) and bolted. The rail metal shall be open hearth, oxygen furnace, or electric furnace steel and, in addition to conforming to the requirements of AASHTO m 180, shall withstand without cracking, a cold bend of 180 degrees around a mandrel of a diameter equal to two and one-half times the thickness of the plate.

Two certified copies of mill tests reports of each heat, from which the rail element is formed, shall be furnished to the Engineer.

The ends of each length of railing shall be fitted with terminal sections.

Workmanship shall be equivalent to commercial practice and all edges, bolt holes, and surfaces shall be free of torn metal, burrs, sharp edges, and protrusions.

Bolts shall have shoulders of such shape that will prevent them from turning.

Rail elements shall be fabricated for splicing at wood posts at intervals not to exceed 12.5 feet (4 m).

The rail element shall have full bearing at joints. When the radius of curvature is 150 feet (50 m) or less, the rail element shall be shaped in the shop.

Railing parts furnished under these specifications shall be interchangeable with similar parts regardless of source.

Unless otherwise specified, the rail elements, terminal sections, bolts, nuts, and other fittings shall be galvanized in accordance with 210-3.

Posts, including blocks, shall be "Construction" grade, Douglas fir, free of heart center.

The posts and blocks shall be pressure treated after fabrication with creosote, creosote-coal tar solution, creosote-petroleum solution (50-50), pentachlorophenol (oil borne), or copper-naphthenate (oil borne) as provided in 204-2.

206-6 CHAIN LINK FENCE.

206-6.1 General. All materials and fittings shall be new and all ferrous materials shall be coated in accordance with 210-3. Class 1A steel pipe shall additionally be coated in accordance with 210-4. When specified, Class 1 or Class 1A materials shall additionally be clad coated with PVC in accordance with 210-5. The base material for the manufacture of steel pipe used for posts, braces, top rails, and gate frames shall conform to the requirements of ASTM F 1083, Schedule 40, for Class 1 or ASTM A 569 for Class 1A. Class 1A steel shall have a minimum yield strength of 50,000 psi (345 MPa). All unit weights shall be subject to the standard mill tolerance of plus or minus 5 percent.

Posts shall be fitted with caps designed to fit securely over the posts and carry a top rail where specified. Posts shall have a total length of not less than the depth of the concrete footing, as specified

herein, plus the length required above ground. Where no top rail is required, pipe posts shall be fitted with suitable caps. Caps will not be required for "C" or "H" section posts.

Top rails shall be furnished in random lengths of approximately 20 feet (6 m) where required.

Barbed wire shall be installed on the fence only when specifically required by the Plans or Specifications. When required, it shall be installed on extension arms of a type specified under 206-6.6.

206-6.2 Materials for Posts, Rails and Braces. Materials for posts, rails, and braces shall conform to Table 206-6.2 (A).

TABLE 206-6.2 (A)

Use	Nominal[1] Type And Size	Actual O.D. inches (mm)	Weight lbs/ft (kg/m)	
			Class 1	Class 1A
End, corner, slope, and gate posts for single gates 6 feet (1.8 m) or less in width and double gates 12 feet (3.6 m) or less in width for fences less than 72 inches (1.8 m) in height.	2 NPS	2.375 (60.3)	3.65 (5.43)	3.12 (4.64)
End, corner, slope, and gate posts for single gates 6 feet (1.8 m) or less in width and double gates 12 feet (3.6 m) or less in width for fences 72 inches (1.8 m) or higher.	2-1/2 NPS	2.875 (73.0)	5.79 (8.62)	4.64 (6.91)
Gate posts for single swing gates over 13 ft (4 m) but not over 18 ft (5.5 m) in width and double swing gates over 26 ft (8 m) but not over 36 ft (11 m) in width.	3-1/2 NPS	4.0 (101.6)	9.11 (13.56)	— —
	3 NPS	3.5 (88.9)	— —	5.71 (8.50)
Gate posts for single swing gates over 13 feet (4 m) but not over 18 feet (5.5 m) in width and double swing gates over 26 feet (8 m) but not over 36 feet (11 m) in width.	6 NPS	6.625 (168.3)	18.97 (28.23)	—
Gate posts for single swing gates over 18 feet (5.5 m) in width and double-swing gates over 36 feet (11 m) in width.	8 NPS	8.625 (219.1)	24.70 (36.76)	—
Line posts for fences 72 inches (1.8 m) or higher.	2 NPS	2.375 (60.3)	3.65 (5.43)	3.12 (4.64)
	1-7/8 x 1-5/8 in (48 x 41 mm) C	—	2.15 (3.20)	— —
	2-1/4 x 1-7/8 in (57 x 48 mm) H	—	4.10 (6.10)	
Line posts for fences less than 72 inches (1.8 m) in height.	1-1/2 NPS	1.90 (48.3)	2.72 (4.05)	2.28 (3.39)
	17/8 x 1-5/8 in (48 x 41 mm) H	— —	1.85 (2.75)	
	17/8 x 1-5/8 in (48 x 41 mm) H	— —	2.80 (4.17)	—
Top rails and braces.	1-1/4 NPS	1.660 (42.2)	2.27 (3.39)	1.83 (2.72)
	1-5/8 x 1-1/4 in (41 x 32 mm) C	— —	1.35 (2.01)	— —
	1-1/2 x 1-1/4 in (38 x 32 mm) H	— —	2.20 (3.27)	— —
Frames for gates.	1-1/2 NPS	1.900 (48.3)	2.72 (4.05)	2.28 (3.39)
Stiffeners for gates.	1-1/4 NPS	1.660 (42.2)	2.27 (3.39)	1.83 (2.72)

1. Nominal Pipe Size (NPS), a non-dimensional unit as defined in ASTM F 1083.

206-6.3 Chain Link Fabric. Unless otherwise specified, shall conform to 206-3.1 or 206-6.3.2.

206-6.3.1 Galvanized Fabric. Chain link fabric shall conform to the requirements of ASTM A 392. The fabric shall be 11-gage (3.1 mm) for all fence 60 inches (1500 mm) or less in height and shall be 9-gage (3.8 mm) for all fence over 60 inches (1500 mm) in height, unless otherwise specified.

All chain link fabric shall be woven into approximately 2 inch (50 mm) mesh and galvanized either prior to or after fabrication, unless otherwise specified by the Contract Documents. Fabric 60 inches (1500 mm) or less in width shall have knuckled finish on the top and bottom edges. Fabric greater than 60 inches (1500 mm) in width shall have knuckled finish on the top edges and twisted and barbed finish on the bottom edge. Barbing shall be done by cutting the wire on the bias.

206-6.3.2 Polyvinyl Chloride (PVC) Coated Fabric. This specification covers PVC coated chain link fabric coated before weaving. PVC coated fabric shall conform to ASTM F 668. Fabric may be produced in two classes of wire defined as follows: Class 1 shall consist of PVC extruded or extruded and adhered to zinc-coated steel wire. Class 2 shall consist of PVC fusion-bonded to zinc-coated steel wire. PVC coating thickness shall be a minimum 15 mils (380 μm) for Class 1 and 7 mils (180 μm) for Class 2. The core wire for the fabric shall be 0.120 inches (3.0 mm) for all fence 60 inches (1500 mm) or less in height and shall be 0.148 inches (3.76 mm) for all fence over 60 inches (1500 mm) in height unless otherwise specified. The specified diameter is the metallic core wire diameter and the PVC coating shall not be considered when determining the diameter.

All chain link fabric shall be woven into approximately 2 inch (50 mm) mesh. All fabric widths shall have knuckled finish on the top and bottom edges. At the time of fabrication, cut ends shall be covered with acrylic enamel. Acrylic enamel shall be a PVC resin in solution, consisting of high-level pigments, ultraviolet absorbers and solvent blends applied by brush or dabbing applicator.

206-6.4 Tension Wires and Fabric Ties. Tension wires shall be at least 7-gage (4.5 mm) galvanized coil spring steel wire.

Ties used to fasten the fabric to posts, rails, and gate frames shall be not smaller than 11-gage (3.1 mm) galvanized steel, 6-gage (4.9 mm) aluminum wire, or approved noncorrosive metal bands.

Tension bars used in fastening fabric to end and corner posts and gate frames shall be galvanized high carbon steel bars not smaller than 3/16 in (9.5 mm) by 3/4 in (19 mm).

206-6.5 Truss or Tension Rods. Truss or tension rodsused in trussing gate frames and line posts adjacent to end, corner, slope or gate posts shall be adjustable 9.5 mm (3/8 inch) diameter galvanized steel rod. When used in trussing line posts, adjustment shall be provided by means of galvanized turnbuckles or other suitable tightening devices.

206-6.6 Fittings. All required fittings and hardware shall be galvanized.

Couplings to connect the individual lengths of top rail shall be of the outside sleeve type and at least 7 inches (175 mm) long. The bore of the sleeves shall be sufficiently true to maintain adjacent lengths of rail in alignment.

Extension arms for barbed wire shall be of a type that can be attached to the tops of the posts and carry three wires at approximately 140 mm (5-1/2 inch) centers in a plane approximately 45 degrees from the vertical, inclined as shown on the Plans or as directed by the Engineer.

206-6.7 Barbed Wire. Barbed wire shall be four-point pattern, composed of two strands of 12-1/2-gage (2.5 mm) galvanized steel wire with barbs spaced 5 inches (125 mm) apart and shall confirm to ASTM A 121.

206-6.8 Repair of Damaged Coatings. All welds made after galvanizing shall be ground smooth and wire brushed to remove loose or burned zinc coating, after which the cleaned areas shall be prepared and neatly coated with 50-50 solder or as prescribed in 210-3.5. Repairs to abraded or otherwise damaged zinc coating shall be made in a similar manner.