

## SECTION 1110—RIGHT-OF-WAY FENCE

**1110.01 WIRE FABRIC AND COMPONENTS**—As shown on the [Standard Drawings](#) and as follows:

**(a) Type 1 Right-of-Way Fence.**

**1. Fabric.** AASHTO M 181, Type I, II, or IV, 3.76 mm (No. 9 gage) coated wire size with the same type of coating throughout the project. Galvanize Type I fabric with a Class D coating.

**2. Fasteners.**

- For attaching the fabric to line posts: 4.87 mm (No. 6 gage) aluminum wire or 3.76 mm (No. 9 gage) galvanized preformed clips.
- For attaching the fabric to tension wires: 3.43 mm (No. 10 gage) galvanized steel wire or aluminum hog rings of comparable size.

Galvanize at a minimum of 488 g/m<sup>2</sup> (1.6 ounces per square foot) of actual surface area.

**3. Tension Wire.** AASHTO M 181

**(b) Type 2 and Type 5 Right-of-Way Fence.**

**1. Fabric.** Galvanized, 3.76 mm (No. 9 gage) steel wire, 3.06 mm (No. 11 gage) aluminum coated steel wire conforming to [ASTM A 491](#), or galvanized 3.76 mm (No. 9 gage) steel wire top and bottom with galvanized 3.06 mm (No. 11 gage) steel intermediate wires.

Join vertical stays at each horizontal wire by electric arc welding or by a hinge-type method, consisting of not less than 1 1/4 tightly wrapped twists.

Galvanize at a minimum of 180 g/m<sup>2</sup> (0.6 ounce per square foot) of actual surface area, as specified in [Section 1110.04](#).

**2. Fasteners.** For attaching the fabric to posts; aluminum or galvanized steel bands or clamps, galvanized staples set in the post flanges, or another acceptable method.

**1110.02 END POSTS, CORNER AND PULL POSTS, LINE POSTS, BRACES, STRETCHER BARS, TRUSS RODS, FITTINGS, AND HARDWARE**—As shown on the [Standard Drawings](#) and as follows:

- Straight posts true to section.
- Braces, fittings, and hardware of commercial-quality steel or malleable iron.
- Posts of commercial quality steel or malleable iron, or Aluminum Alloys 6063-T6, 6005-T5, or 6061-T6, according to [ASTM B 221/B 221M](#); tubular and open type sections.
- Moisture-excluding caps, firmly and rigidly secured to the post top.

Galvanize or coat both the inside and outside of tubular and open-type sections, according to AASHTO M 111. Either of two alternate coating systems may be used, as follows:

- **Outside.** Hot-dipped zinc coating, according to [ASTM B 6](#), at a minimum of  $305 \text{ g/m}^2 \pm 30 \text{ g/m}^2$  ( $1.0 \pm 0.1$  ounce per square foot) of actual surface area; chromate conversion coating at  $50 \text{ mg/m}^2 \pm 25 \text{ mg/m}^2$  (30 micrograms per square inch  $\pm$  15 micrograms per square inch) of actual surface area; thermoplastic electrostatically applied acrylic coating,  $0.01 \text{ mm} \pm 0.005 \text{ mm}$  ( $0.5 \text{ mil} \pm 0.2 \text{ mil}$ ) in thickness.

and

- **Inside.** Zinc base coating,  $0.01 \text{ mm} \pm 0.005 \text{ mm}$  ( $0.5 \text{ mil} \pm 0.2 \text{ mil}$ ) thickness ( $92 \text{ g/m}^2 \pm 15 \text{ g/m}^2$ ) ( $0.3$  ounce per square foot  $\pm$   $0.05$  ounce per square foot) with a minimum of 80% zinc powder by mass (weight).

or

- **Outside and Inside.** Hot-dipped, pure, aluminum coating, commonly identified as Type 2, with a minimum mass (weight) of coating of  $230 \text{ g/m}^2$  ( $0.75$  ounce per square foot) of actual surface area, triple spot test, and  $215 \text{ g/m}^2$  ( $0.70$  ounce per square foot) of actual surface area, single spot test, as measured according to AASHTO T 213; a chromate conversion coating; and a thin acrylic resin film.

**(a) Type 1 Right-of-Way Fence.**

**1. End Posts.** Round, rectangular, or square tubular sections, conforming to the requirements of Table A; if acceptable, other posts sections, conforming to the requirements of Table A.

**TABLE A (Metric)**  
**Minimum Section Modulus About Major & Minor Axis ( $\text{mm}^3$ )**

Fabric Height (mm)	Minimum Yield Point Stress (MPa)					
	310 or greater		310 to 241		241 to 172	
	Major	Minor	Major	Minor	Major	Minor
1220	5000	1800	6400	2300	9000	3200
1520	6300	2800	8000	3600	11 200	5100
1830	7500	4100	9600	5200	13 500	7300
2130	8700	5500	11 200	7100	15 700	9900
2440	10 000	7200	12 800	9300	18 000	13 000

**TABLE A (English)**  
**Minimum Section Modulus About Major & Minor Axis ( $\text{inch}^3$ )**

Fabric Height (feet)	Minimum Yield Point Stress (ksi)					
	45 or greater		45 to 35		35 to 25	
	Major	Minor	Major	Minor	Major	Minor
4	0.304	0.110	0.392	0.141	0.548	0.197
5	0.381	0.171	0.489	0.220	0.686	0.308
6	0.457	0.247	0.588	0.317	0.823	0.444
7	0.533	0.336	0.685	0.432	0.960	0.605
8	0.609	0.439	0.784	0.564	1.097	0.790

**2. Corner and Pull Posts.** [Section 1110.02\(a\)1.](#), except finish brace clamps or attaching devices, adjustable to various horizontal and vertical angles.

**3. Line Posts.** Tubular, H-column, or I-beam sections, conforming to the requirements of Table B; if acceptable, other post sections, conforming to the requirements of Table B.

**TABLE B (Metric)**  
**Minimum Section Modulus About Major Axis (mm<sup>3</sup>)**

Fabric Height (mm)	Minimum Yield Point Stress (MPa)			Test Force* (kN)
	310 or greater	310 to 241	241 to 172	
1220	4400	5600	7900	7.2
1520	5500	7000	9800	8.9
1830	6600	8400	11 800	10.7
2130	7600	9800	13 800	12.5
2440	8700	11 200	15 700	14.2

\* Test load a 914 mm section of line post for bending capacity about the major axis of its cross section. Apply a concentrated force at span center with supports spaced at 610 mm. Ensure that the test section supports the minimum force as indicated in Table B, within the elastic limit of the material.

**TABLE B (English)**  
**Minimum Section Modulus About Major Axis (inch<sup>3</sup>)**

Fabric Height (feet)	Minimum Yield Point Stress (ksi)			Test Load* (kips)
	45 or greater	45 to 35	35 to 25	
4	0.267	0.343	0.480	1.6
5	0.333	0.429	0.600	2.0
6	0.400	0.514	0.720	2.4
7	0.466	0.600	0.840	2.8
8	0.533	0.686	0.960	3.2

\* Test load a 36-inch section of line post for bending capacity about the major axis of its cross section. Apply a concentrated load at span center with supports spaced at 24 inches. Ensure that the test section supports the minimum load as indicated in Table B, within the elastic limit of the material.

#### 4. Braces, Stretcher Bars, and Truss Rods.

- Braces, 42.2 mm (1.66-inch) O.D., tubular steel section at nominal 3.4 kg/m (2.27 pounds per linear foot), 41.3 mm x 31.8 mm (1 5/8 inches by 1 1/4 inches) roll formed, U-shaped steel section, at nominal 2 kg/m (1.35 pounds per linear foot), or equal.
- Stretcher Bars (for attaching the fabric), at least 5 mm x 19 mm (3/16-inch by 3/4-inch) flat steel, or equal.
- Truss Rods, 10 mm (3/8-inch) nominal diameter, good quality steel, or equal, with a turnbuckle or other provision for adjustment.

#### (b) Type 2 and Type 5 Right-of-Way Fence.

**1. End, Corner, and Pull Posts.** Tubular, angle, or other acceptable section, conforming to the requirements of Table A.

**2. Line Posts.** Tubular, ribbed tee, U-shaped, angle, or other acceptable section, conforming to the requirements of Table B.

Attach an acceptable plate or other device to the posts to hold plumb and to keep properly aligned. Fasten the plate or device by welding or riveting (not less than two rivets), or by another acceptable method.

**3. Braces.** 42.2 mm (1.66-inch) O.D. tubular steel section at nominal 3.4 kg/m (2.27 pounds per linear foot); 51 mm x 51 mm x 6.4 mm (2-inch by 2-inch by 1/4-inch) angle or equal.

**1110.03 GATES**—As shown on the [Standard Drawings](#) and as follows:

- Swing-type gates, with latches, stops, keepers, hinges, and locks.
- Steel wire fabric of same type material as the fence.
- Hinges of adequate strength to support the gate, and that do not twist or turn under the gate's action.
- Plungebar-type latches that can be locked, full gate height, and located in a manner that engages the gate stop.

Forked latches may be allowed, for single gates less than 3 m (10 feet) wide.

- Stops are to consist of a flush plate, anchored in concrete, to engage the plungebar of the latch.
- Other types of stops may be allowed, for single gates less than 3 m (10 feet) wide.
- Substantial devices are necessary for securing and supporting the free end of the gate in an open position.

**1110.04 GALVANIZING**—Galvanize fabric, posts, post caps, braces, fittings, and hardware, by electrolytic, hot-dip, mechanical, or other acceptable methods as specified in [Section 1105.02\(s\)](#) and as follows:

For electrolytic method: [ASTM B 633](#)

For hot-dip method:

- Posts, braces, and fittings—[ASTM A 123](#) or [ASTM A 53](#)
- Fabric—[ASTM A 392](#)
- Hardware—[ASTM A 153](#)

For mechanical method (hardware only): [ASTM B 695](#)

Test galvanizing by mass (weight), according to [ASTM A 90](#).

**1110.05 INSPECTION**—Material will be inspected, if considered necessary, at the place of manufacture, before shipment. Provide facilities for the Department inspector to determine that the material is being furnished as indicated.

**1110.06 CERTIFICATION**—[Section 106.03\(b\)3](#)

**1110.07 DRIVE ANCHOR**—Anchors from a manufacturer listed in [Bulletin 15](#).