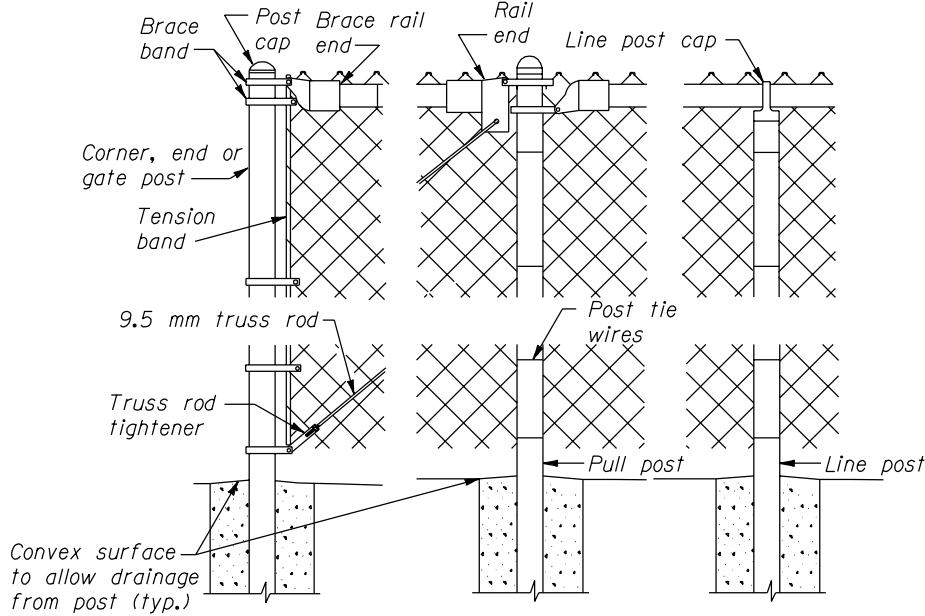


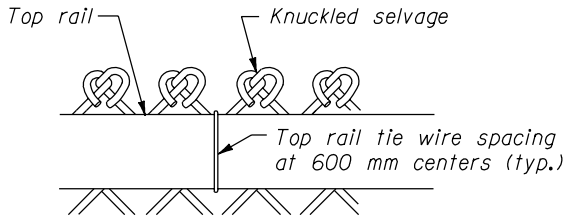
CHAIN LINK FENCE

- NOTE:**
- Dimensions not labeled are in millimeters.
 - Metal post and rails shall conform to ASTM F 761.
 - Set all posts in concrete. Set corner, end, pull posts to the dimensions shown. The minimum depth of concrete for line posts is 600 mm. Increase depth 75 mm for each additional 300 mm of fence height over 1200 mm.
 - Adjust the post top elevations to provide a smooth visual fence profile. Install corner posts at horizontal breaks in the fence of 15° or more.
 - Provide fence fabric with a 50 mm mesh. Use 3.05 mm wire in fabric heights of 1200 mm or less and 3.76 mm wire in fabric heights greater than 1200 mm. Provide a Class D coating when zinc-coated steel fence fabric is provided. Knuckle both selvages on fabric.
 - See Detail WM619-21 for hardware and gate requirements.

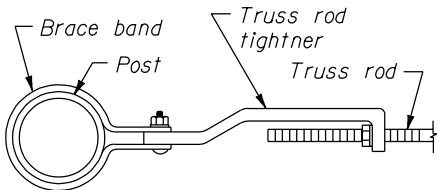


CHAIN LINK DETAIL

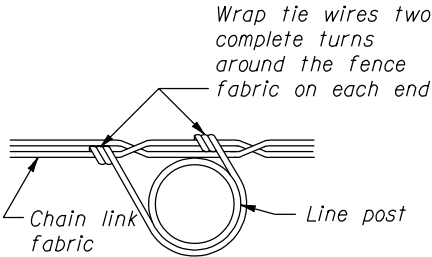
CHAIN LINK FENCE			
POST SIZE AND WEIGHT TABLE			
DESCRIPTION	FENCE HEIGHT	ROUND PIPE	
		Yield strength 172 Mpa (min.)	
		dia. mm	kg/m (min.)
Brace rail & top rail	1500 mm or less	33.40	1.10
	1800 mm	33.40	1.10
Line post	1500 mm or less	42.16	1.65
	1800 mm	48.26	1.89
End, corner & pull post	1500 mm or less	35.56	1.89
	1800 mm	60.32	2.38



WIRE SELVAGE DETAIL



TRUSS ROD TIGHTENER DETAIL



CHAIN LINK FENCE TIE DETAIL

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL

RESIDENTIAL
CHAIN LINK FENCE









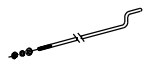





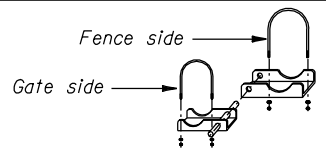
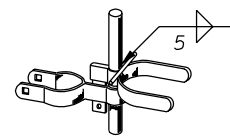
DETAIL APPROVED FOR USE 3/1996

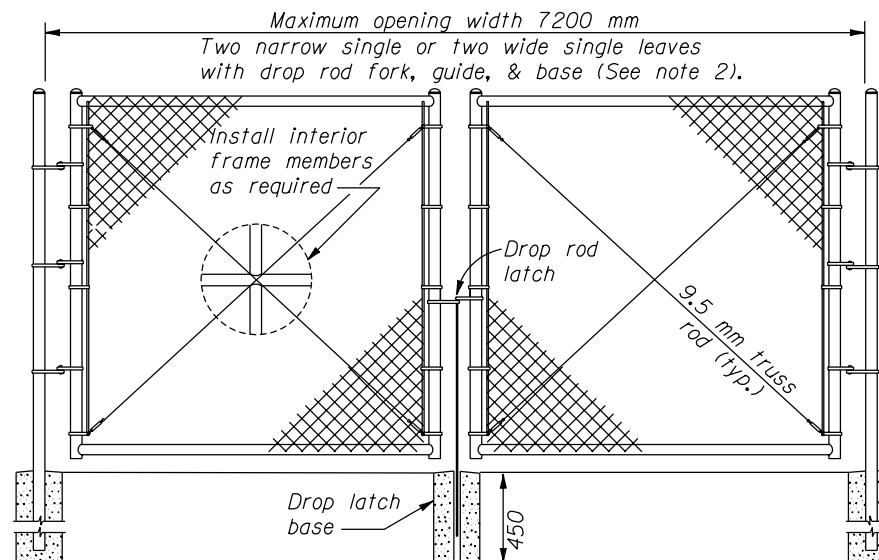
REVISED:

DETAIL

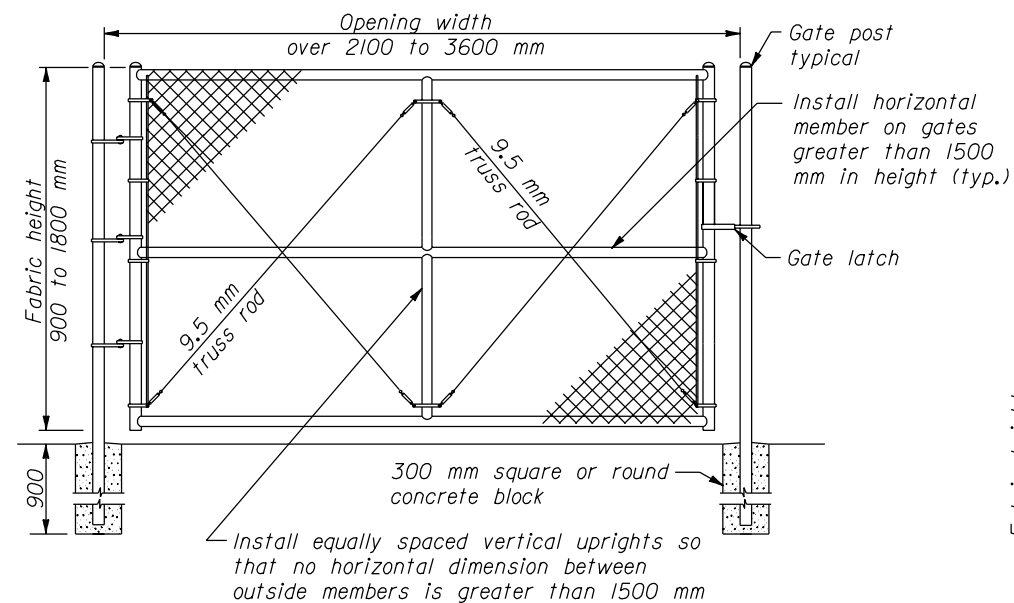
WM619-20

STATE	PROJECT	SHEET NUMBER

HARDWARE ITEM DESCRIPTION	STANDARD REQUIREMENTS
Brace rail and top rail 	See table on Detail WM619-20
Line post 	See table on Detail WM619-20
Corner, end and pull posts 	See table on Detail WM619-20
Post cap 	Cast non-ferrous alloy or galvanized pressed steel cap must fit snugly on post and gate top
Line post cap 	Galvanized pressed steel minimum 2.38 mm thickness or galvanized malleable ferrous alloy
Tension band 	Minimum 2.38 x 75 mm galvanized steel
Brace band 	Minimum 2.38 x 75 mm galvanized steel
Band bolt 	Minimum M8 x 32 mm galvanized carriage bolt, (Lock washer & flat washer for each band)
Rail end 	Galvanized pressed steel or galvanized malleable ferrous alloy minimum 9.53 mm thickness on back bolting appendage
Brace rail end 	Galvanized pressed steel or galvanized malleable ferrous alloy minimum 9.53 mm thickness on back bolting appendage
Truss rod tightener 	Minimum 6.4 mm formed galvanized steel
Truss rod 	9.5 mm galvanized, NC threaded rod, lock washer, & flat washer with two 90° bends opposite of threaded end
Top rail sleeve 	Galvanized steel 1.30 mm minimum thickness by 150 mm minimum length
Tension bar 	Minimum 4.76 x 75 mm galvanized steel
Fence fabric 	50 mm diamond mesh fabric, See note no. 5 on Detail WM619-20
Tie wires 	Minimum 3.76 mm aluminum with one hooked end
Gate latch 	Minimum 3.18 mm galvanized pressed steel or malleable ferrous alloy. 1 latch per each single gate with bent minimum M10 attachment bolt, washer & nut.
Frame hinge 	Minimum 3.18 mm galvanized pressed steel with 2 - M10 U-bolts, lockwasher & nuts per hinge. Use 2 hinges per gate leaf up to 2400 mm in width and 3 hinges per gate leaf widths greater than 2400 mm.
Drop rod latch & guide 	Minimum 3.18 mm galvanized pressed steel. Drop rod guide includes M10 x 75 mm carriage bolt with lock washer & nut. Weld drop rod fork to rod & paint with an approved zinc rich paint.



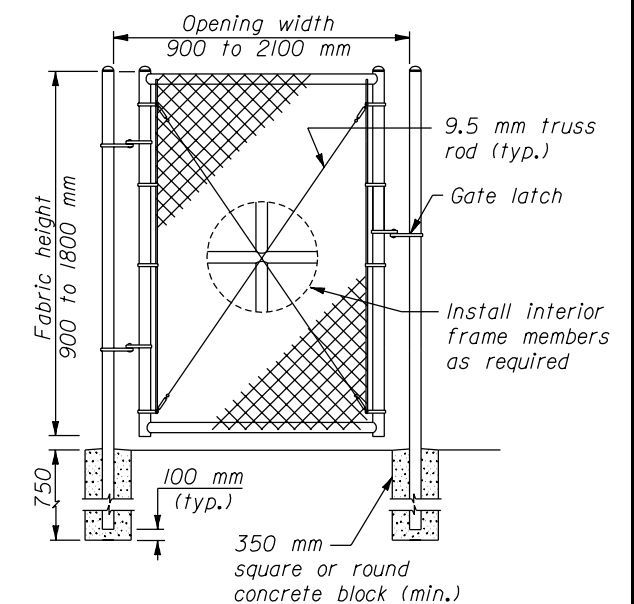
DOUBLE LEAF GATE



WIDE SINGLE LEAF GATE

NOTE:

- Dimensions not labeled are in millimeters.
- Reinforce the gate frame corners with a malleable iron or pressed steel fitting designed for the purpose or shop weld the corners. Grind smooth all welds and paint with an approved zinc rich paint. Furnish each gate with the necessary hinges, latch, and drop rod locking device designed for the type of gate posts and gate used on the project. Provide positive type latching devices with provisions for pad locking at all gates. Provide keepers to retain the gate in the open position.
- Approved alternate gate frames constructed of steel sections, other than pipe, may be used.
- The design of the chain link hardware may vary from the details shown, however, all hardware and materials used in a single installations shall be uniform and compatible.
- Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



NARROW SINGLE LEAF GATE

CHAIN LINK GATE									
POST AND FRAME SIZE AND MASS TABLE									
GATE LEAF WIDTHS		Minimum yield strength 172 Mpa.							
		ROUND TUBING				SQUARE TUBING			
		Steel		Aluminum		Steel		Aluminum	
		dia. mm	kg/m (min.)	dia. mm	kg/m (min.)	dia. mm	kg/m (min.)	dia. mm	kg/m (min.)
1200 mm or less	Gate	4.83	1.87	4.83	1.29	50x50	3.50	50x50	1.40
Over 1200 to 2100 mm	post	6.03	3.18	6.03	1.88	64x64	4.06	64x64	1.88
Over 2100 mm	size	6.03	4.64	6.03	2.98	64x64	5.78	64x64	4.32
Outside frame member	frame	3.34	1.29	3.34	0.65	32x32	1.56	32x32	0.86
Interior bracing member	size	3.34	1.29	3.34	0.65	32x32	1.56	32x32	0.86

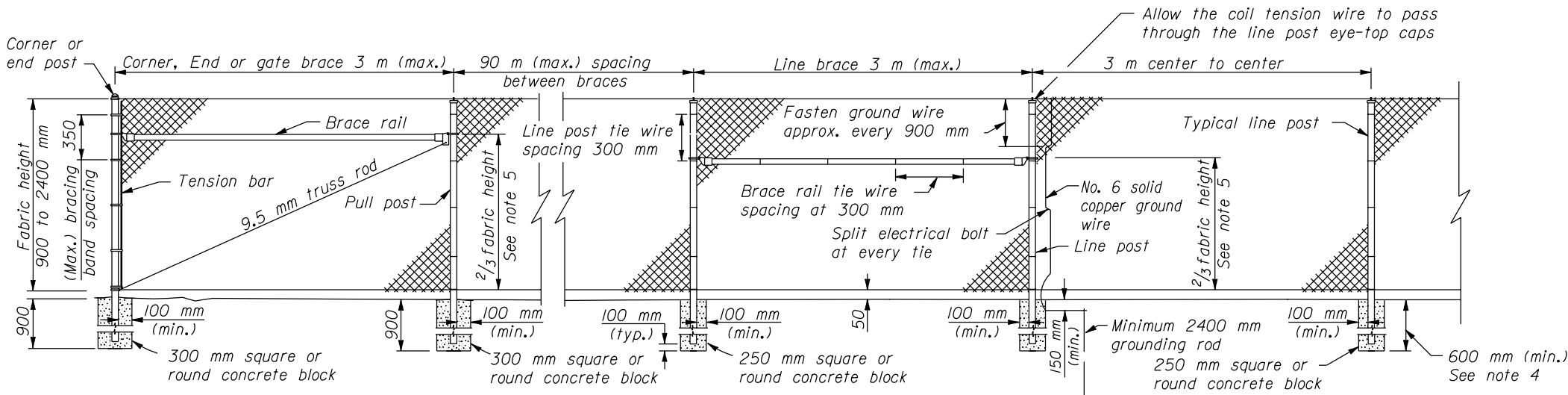
NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL**RESIDENTIAL CHAIN LINK
HARDWARE AND GATE**

DETAIL APPROVED FOR USE 3/1996
REVISED:

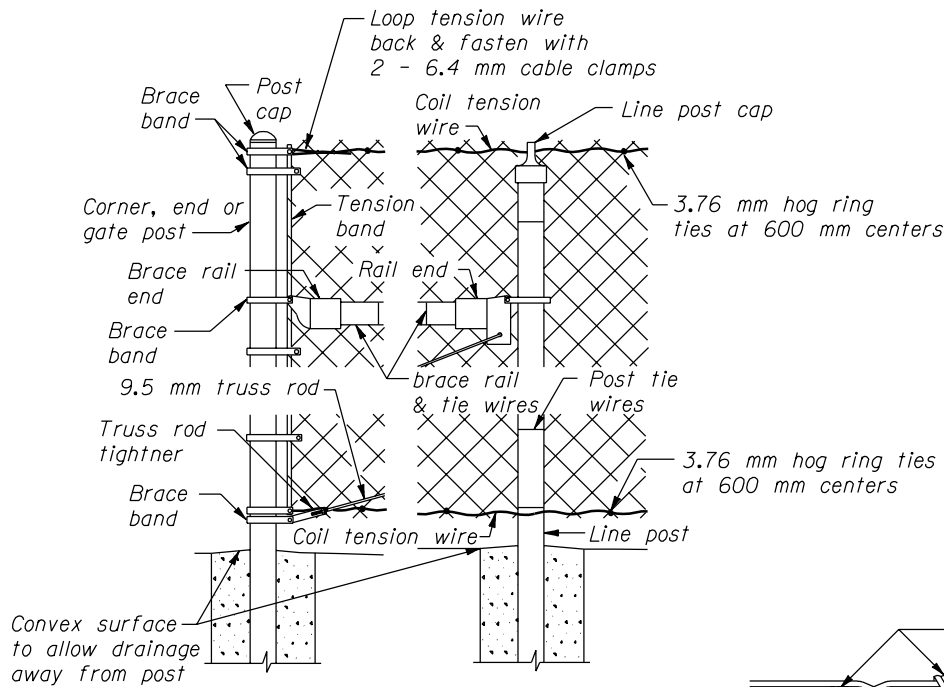
DETAIL
WM619-21



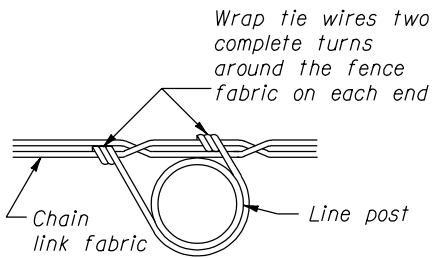
CHAIN LINK FENCE

NOTE:

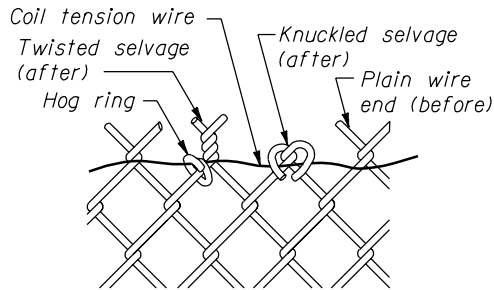
1. Dimensions not labeled are in millimeters.
2. Metal post and rails shall conform to ASTM F 669.
3. Use Type I requirements from the chain link fence table unless otherwise specified in the special contract requirements.
4. Set all posts in concrete. Set corner, end, pull posts to the dimensions shown. The minimum depth of concrete for line posts is 600 mm. Increase depth 75 mm for each additional 300 mm of fence height over 1200 mm.
5. Install braces on all terminals on fences without a top rail. No braces are required on fabric 1800 mm in height or less where a top rail is specified. Install braces where fabric is over 1800 mm in height. Where a top rail is used, attach the brace at the halfway point of the terminal post above grade and, where the rail is omitted, at the two-thirds point above grade. Do not install top rail unless so specified in the special contract requirements.
6. Adjust the post top elevations to provide a smooth visual fence profile. Install corner posts at horizontal breaks in the fence of 15° or more.
7. If alternate steel posts are used, provide fastening bands, caps, brace rail, rail ends, and truss rod attaching hardware compatible with the post sizes and styles selected.
8. Provide fence fabric with a 50 mm mesh. Use 3.05 mm wire in fabric heights of 1200 mm or less and 3.76 mm wire in fabric heights greater than 1200 mm. Provide a Class D coating when zinc-coated steel fence fabric is provided. Knuckle both selvages on fabric less than 1800 mm high. For fabric 1800 mm high or higher, knuckle one selvage and twist the other.
9. See Detail WM619-23 for hardware and gate requirements.



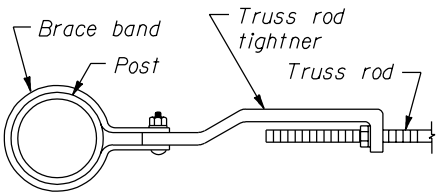
CHAIN LINK DETAIL



CHAIN LINK FENCE TIE DETAIL

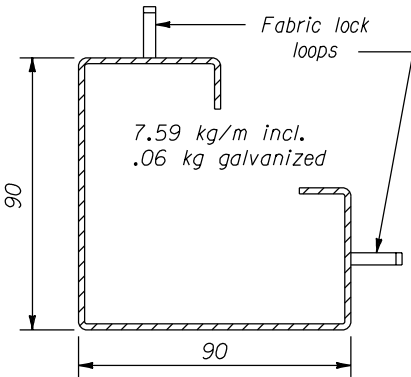


WIRE SELVAGE DETAIL



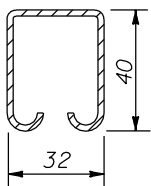
TRUSS ROD TIGHTNER DETAIL

CHAIN LINK FENCE											
POST SIZE AND WEIGHT TABLE											
DESCRIPTION	FENCE TYPE	ROUND PIPE				HOT ROLLED H-SHAPE				ROLLED FORMED	
		Steel		Aluminum		Steel		Steel		Steel	
		Minimum yield strength Mpa.									
		172		172		345		310		310	
		Size and mass									
		dia. mm	mass kg/m	dia. mm	mass kg/m	dia. mm	mass kg/m	dia. mm	mass kg/m	dia. mm	mass kg/m
Brace rail & top rail	Type 1	4.22	3.38	4.22	1.17	4.22	2.08	---	---	32x40	2.08
	Type 2	4.22	2.71	---	---	4.22	2.08	---	---	32x40	2.08
Line post	Type 1	6.03	5.45	6.03	1.88	6.03	4.64	55x43.25	4.85	57x40	4.02
	Type 2	6.03	4.40	---	---	6.03	3.44	---	---	28x40	3.36
End, corner & pull post	Type 1	7.30	8.62	7.30	2.98	7.30	6.91	---	---	90x90	7.60
	Type 2	7.30	6.98	---	---	7.30	4.84	---	---	90x90	7.60

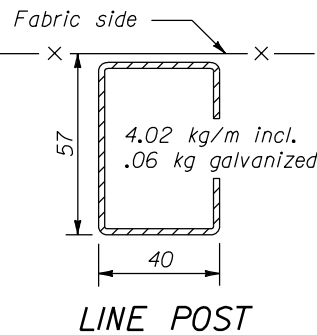
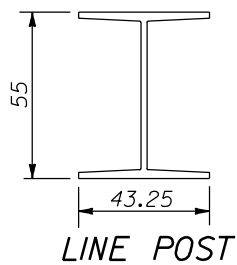


END OR CORNER POST

2.08 kg/m incl. .06 kg galvanized



TOP & BRACE RAIL



ALTERNATE STEEL POST & BRACE SECTIONS

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL



CHAIN LINK FENCE

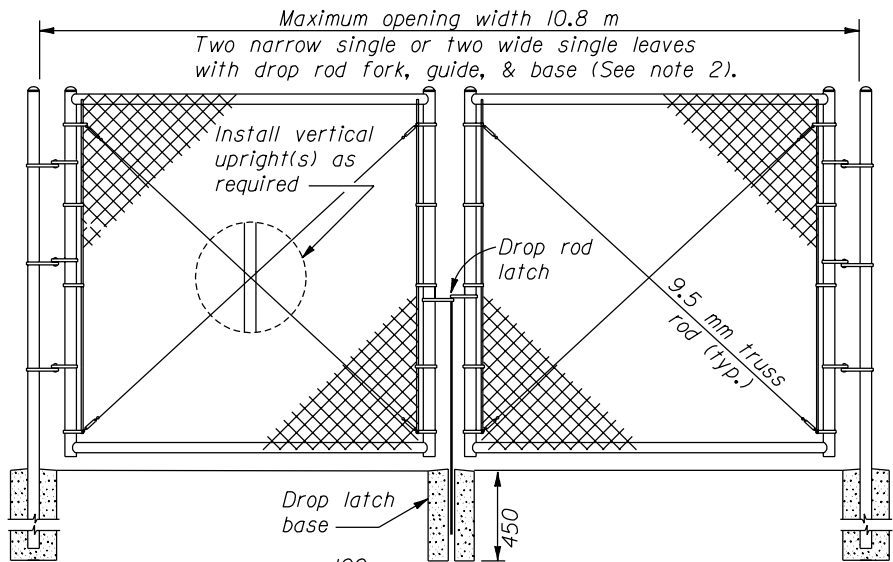
DETAIL APPROVED FOR USE 3/1996

REVISED:

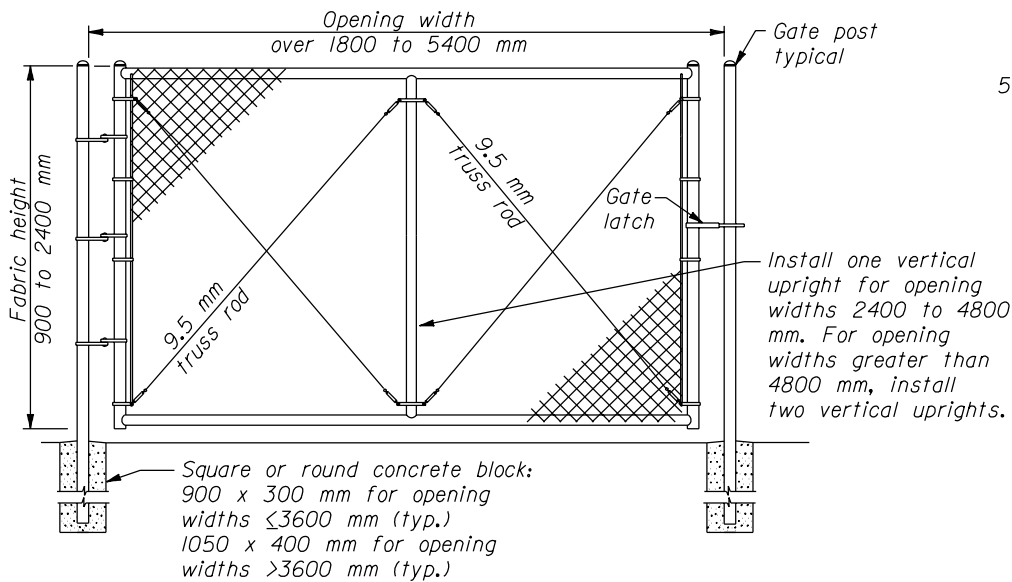
DETAIL

WM619-22

HARDWARE ITEM DESCRIPTION		STANDARD REQUIREMENTS
Brace rail and top rail		See table on Detail WM619-22
Line post		See table on Detail WM619-22
Corner, end and pull posts		See table on Detail WM619-22
Post cap		Cast non-ferrous alloy or galvanized pressed steel cap must fit snugly on post and gate top
Line post cap		Galvanized pressed steel minimum 2.38 mm thickness or galvanized malleable ferrous alloy
Tension band		Minimum 3.18 x 75 mm galvanized steel
Brace band		Minimum 3.18 x 75 mm galvanized steel
Band bolt		Minimum M10 x 45 mm galvanized carriage bolt, (Lock washer & flat washer for each band)
Rail end		Galvanized pressed steel or galvanized malleable ferrous alloy minimum 9.53 mm thickness on back bolting appendage
Brace rail end		Galvanized pressed steel or galvanized malleable ferrous alloy minimum 9.53 mm thickness on back bolting appendage
Truss rod tightner		Minimum 9.52 mm formed galvanized steel
Truss rod		9.5 mm galvanized, nc threaded rod, lock washer, & flat washer with two 90° bends opposite of threaded end
Top rail sleeve		Galvanized steel 1.30 mm minimum thickness by 150 mm minimum length
Tension bar		Minimum 4.76 x 75 mm galvanized steel
Fence fabric		50 mm diamond mesh fabric, See note no. 8 on Detail WM619-22
Tie wires		Minimum 3.76 mm aluminum with one hooked end
Coil tension wire		4.50 minimum diameter metallic coated wire
Gate latch		Minimum 3.18 mm galvanized pressed steel or malleable ferrous alloy. 1 latch per each single gate with bent minimum M10 attachment bolt, washer & nut.
Frame hinge		Minimum 3.18 mm galvanized pressed steel with 2 - M10 U-bolts, lockwasher & nuts per hinge. Use 2 hinges per gate leaf up to 2400 mm in width and 3 hinges per gate leaf widths greater than 2400 mm.
Drop rod latch & guide		Minimum 3.18 mm galvanized pressed steel. Drop rod guide includes M10 x 75 mm carriage bolt with lock washer & nut. Weld drop rod fork to rod & paint with an approved zinc rich paint.



DOUBLE LEAF GATE

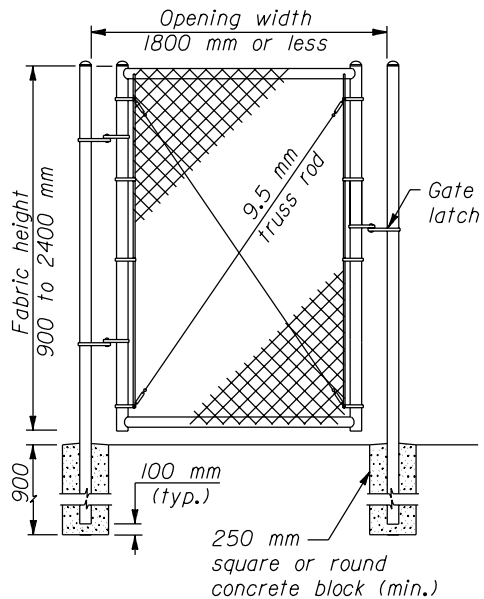


WIDE SINGLE LEAF GATE

CHAIN LINK GATE							
POST AND FRAME SIZE AND WEIGHT TABLE							
GATE LEAF WIDTHS		ROUND PIPE					
		Steel		Aluminum		Steel	
		Minimum yield strength Mpa.					
		172		172		345	
		Size and mass					
		dia. mm	kg/m (min.)	dia. mm	kg/m (min.)	dia. mm	kg/m (min.)
1800 mm or less	Gate	7.30	6.91	7.30	2.89	7.30	6.91
Over 1800 to 3600 mm	post	10.16	12.87	10.16	4.45	10.16	9.76
Over 3600 to 5400 mm	size	16.83	26.82	---	---	---	---
Outside frame member	frame	4.83	3.39	4.83	1.35	4.83	3.39
Interior bracing member	size	4.22	2.72	4.83	1.35	4.22	2.74

NOTE:

1. All dimensions on this drawing are in millimeters.
2. Reinforce the gate frame corners with a malleable iron or pressed steel fitting designed for the purpose or shop weld the corners. Grind smooth all welds and paint with an approved zinc rich paint. Furnish each gate with the necessary hinges, latch, and drop rod locking device designed for the type of gate posts and gate used on the project. Provide positive type latching devices with provisions for pad locking at all gates. Provide keepers to retain the gate in the open position.
3. Approved alternate gate frames constructed of steel sections, other than pipe, may be used.
4. The design of the chain link hardware may vary from the details shown, however, all hardware and materials used in a single installations shall be uniform and compatible.
5. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



NARROW SINGLE LEAF GATE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL

CHAIN LINK
HARDWARE AND GATE

DETAIL APPROVED FOR USE 3/1996

REVISID:

DETAIL
WM619-23

NOTE:

1. Dimensions not labeled are in millimeters.
2. Furnish either zinc coated (galvanized) or aluminum coated steel barbed wire. Fabricate zinc coated barbed wire from two strands of 2.51 mm steel wire with a Class 3 zinc coated wire. Fabricate aluminum coated barbed wire from two strands of 2.51 mm aluminum coated steel wire with 4 point barbs of 2.03 mm aluminum coated or aluminum alloy wire.
3. Furnish either zinc coated (galvanized) or aluminum coated steel wire fence fabric. If zinc coated fabric is furnished, use Grade 60 fabric with a Class 3 coating.
4. Furnish 3.43 mm tie wire or wire clamps for fasteners in metal posts. Galvanize wire stays, tie wire, wire loops, and wire clamps with a Class 1 zinc coating according to ASTM A 641.
5. Furnish either painted or galvanized steel fence posts for tee, channel or U bar shapes. Furnish galvanized steel round pipe or steel angle for posts and braces. Fit round pipe posts with snug-fitting galvanized metal caps. Fabricate steel line posts and angles from Type A steel according to AASHTO M 281. Fabricate steel pipe posts and braces according to AASHTO M 160.
6. Place fencing on Right-of-Way line or where shown on plans.
7. Manufacture gates of galvanized steel pipe not less than 25 mm nominal diameter, (nominal mass 2.50 kg per linear meter) for frame and vertical brace and wire mesh of the same design used in the fence Equip each gate with one standard adjustable diagonal truss rod from corner to corner. Provide Hinges and 2-way self closing latch of an approved rust proof malleable iron or steel. Approved alternate gates may be used.
8. Where a single opening requires two gates, provide an approved drop bar and fastener between the gates. Where two metal gates are installed in a single opening both gates will be measured for payment.
9. Construct metal walk gates up to 1200 mm in width similar to Type 2 gate but omit vertical brace and truss.

STEEL POST DIMENSIONS			
MEMBER	SHAPE	kg/m (min.) nominal	SIZE nominal
Line post	Tee, channel or U-bar	1.98	U.S. Comm. Std.
	Round pipe	3.38	approx. 40 mm OD
Brace	Angle	3.63	51 x 51 x 6.4 mm
	Round pipe	5.28	60.3 mm OD
Other posts	Round pipe	6.10	64 x 64 x 6.4 mm
	Angle	6.10	64 x 64 x 6.4 mm

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL

ALASKA
WIRE FENCE AND GATE

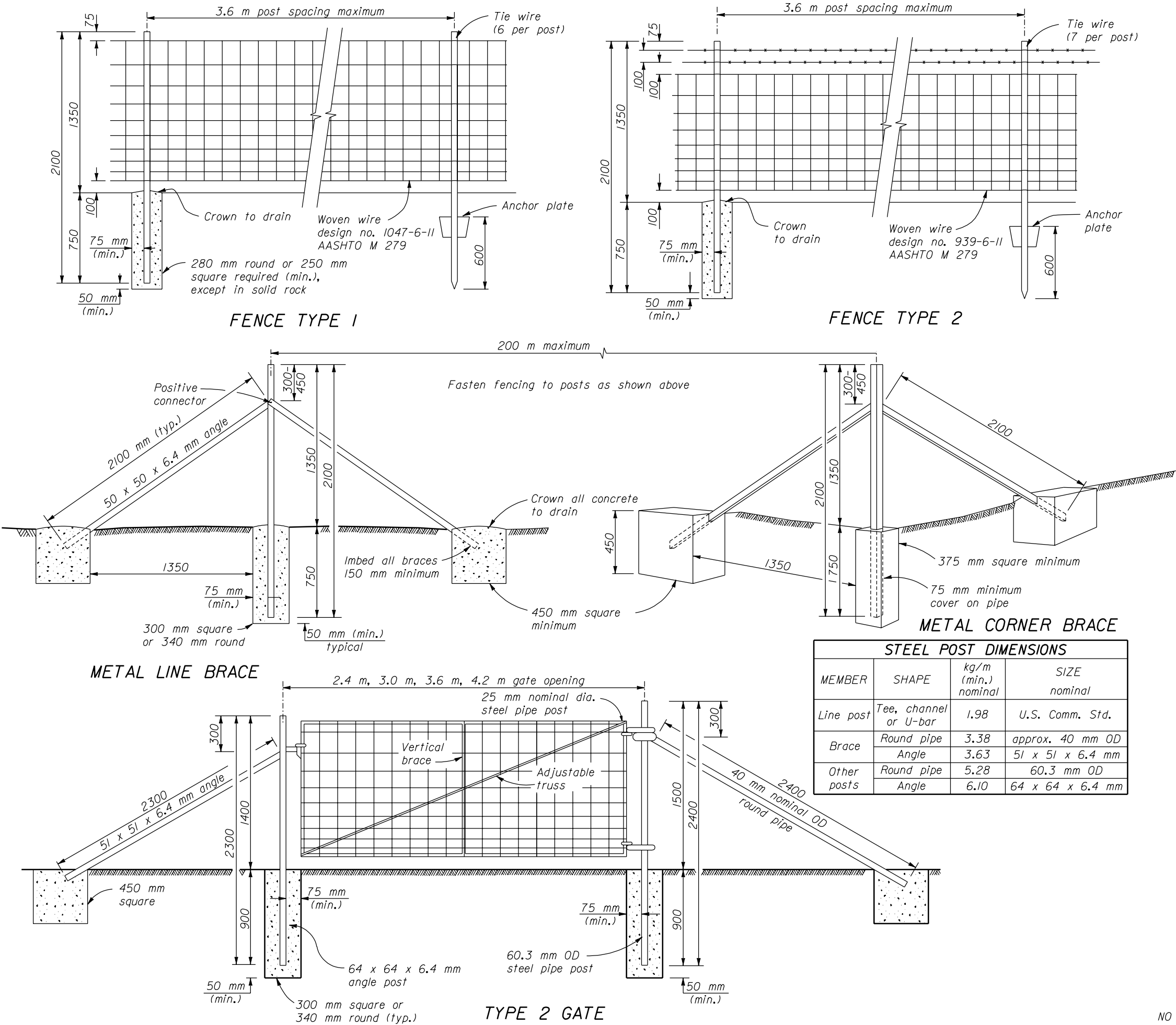
DETAIL APPROVED FOR USE 3/1996

REVISED:

DETAIL

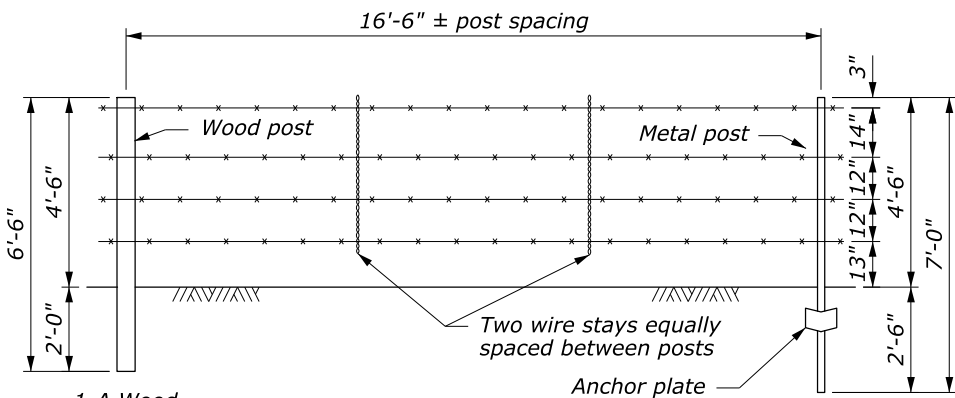
WM619-40

NO SCALE

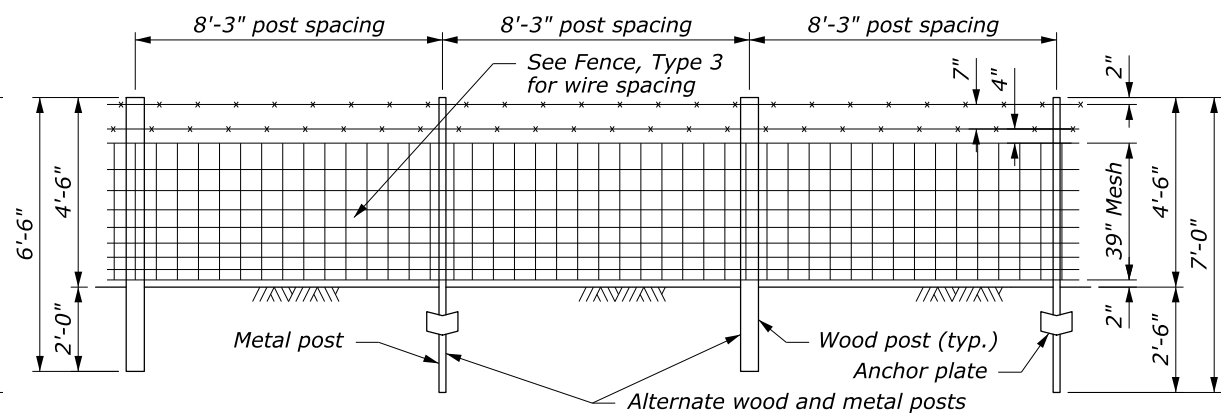


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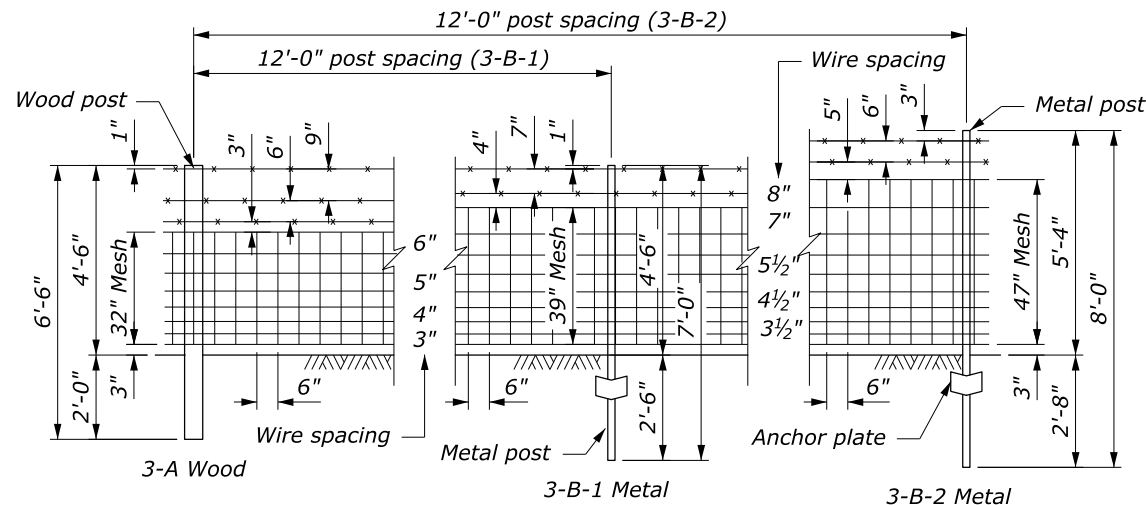
STATE	PROJECT	SHEET NUMBER



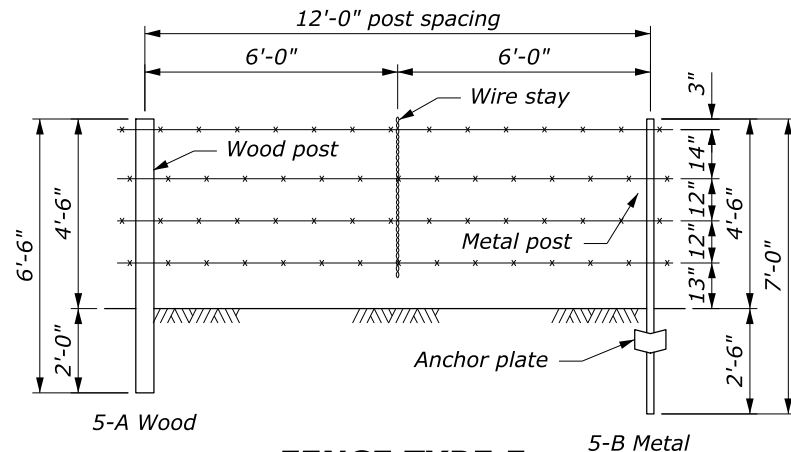
FENCE TYPE 1



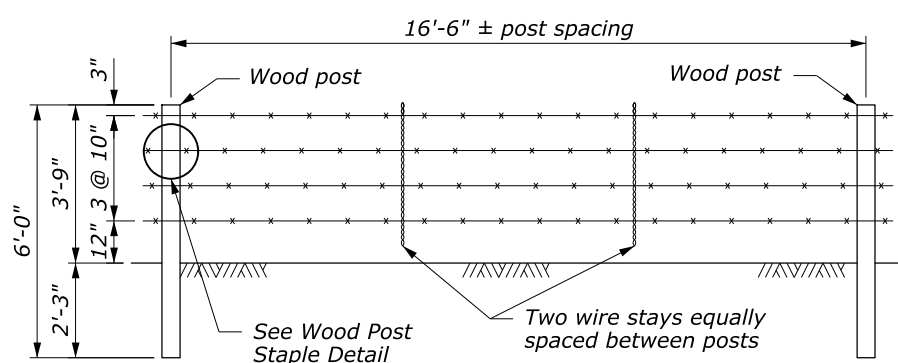
FENCE TYPE 2



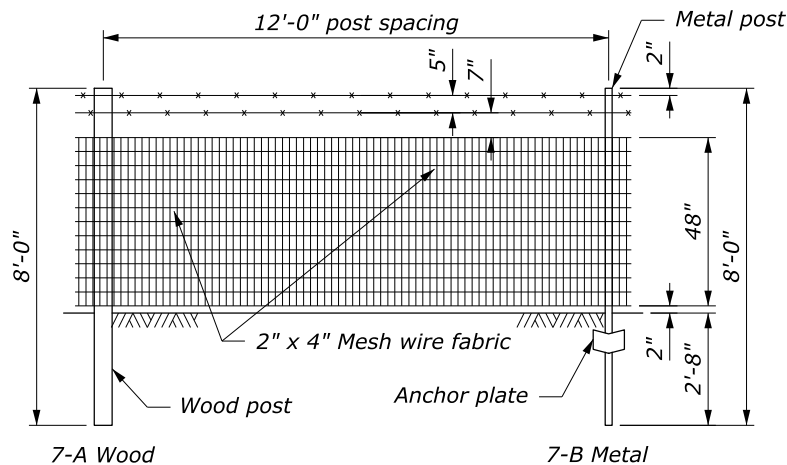
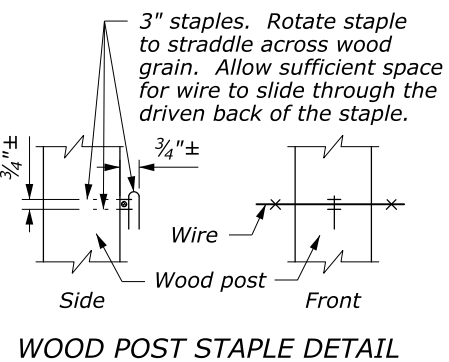
FENCE TYPE 3



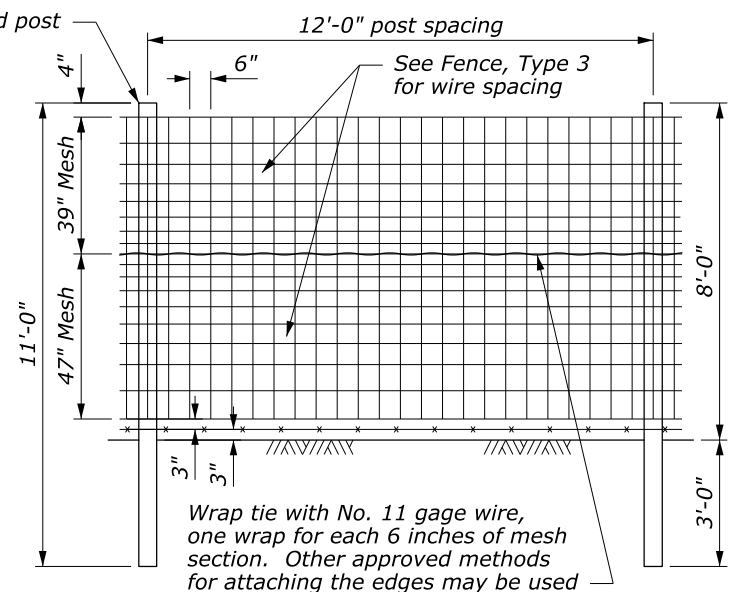
FENCE TYPE 5



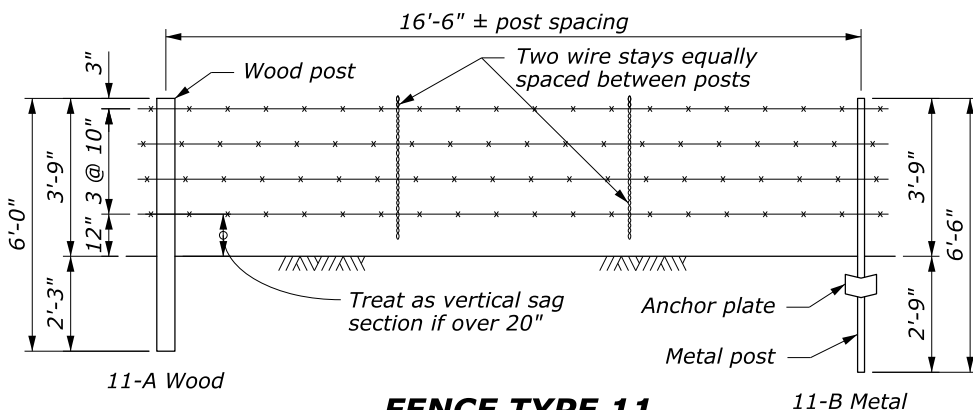
DROP FENCE TYPE 6



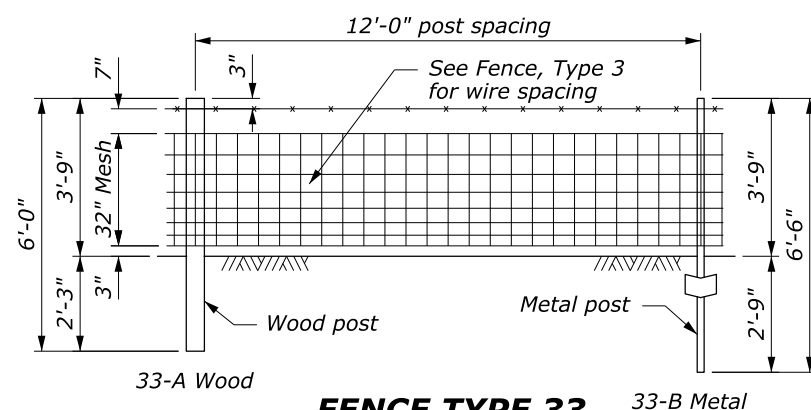
FENCE TYPE 7



DEER-PROOF FENCE TYPE 8



FENCE TYPE 11



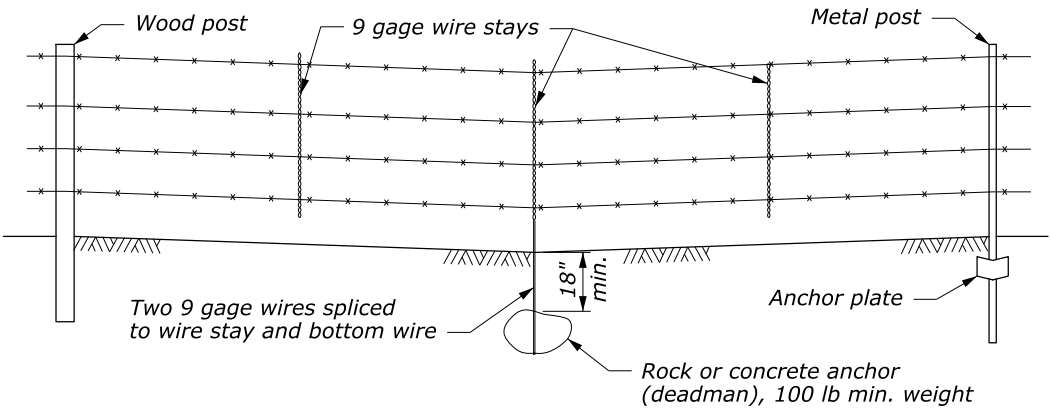
FENCE TYPE 33

NOTE:

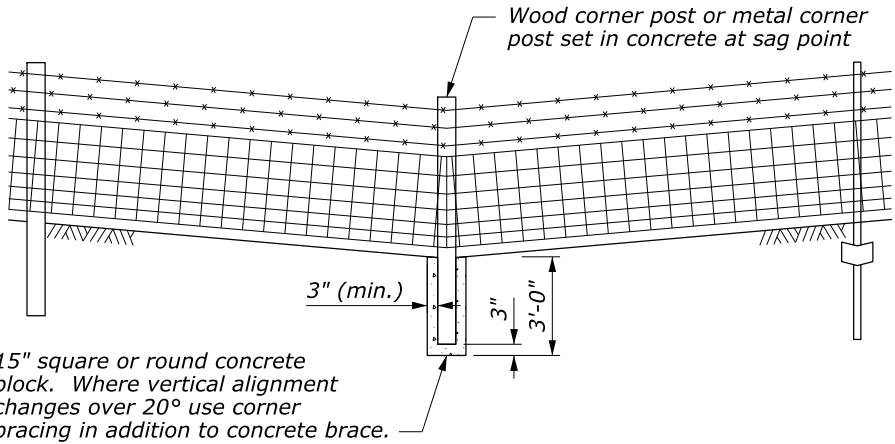
1. Furnish pressure treated wood posts consisting of either Douglas Fir, Western Larch, Cedar, or Pine of any species. Provide line posts having a minimum 10-inch post circumference and a 3-inch minimum distance between opposite faces or between any face and an opposite corner. Provide minimum 17.5-inch circumference posts for corner, terminal, or braces; and a 4-inch minimum distance between opposite faces or between any face and an opposite corner.
2. Provide woven wire conforming to ASTM A116, except wire size and strength options are limited to the following subsections of Table 1: No. 12½ Grade 60, No. 12½ Grade 125, or 14½ Grade 125.
3. Furnish 9 gage staples with a minimum length of 1.5-inch, except that 1-inch staples may be used in locust posts. Provide 9 gage stay wires and brace wires, and 12.5 gage tie wire and wire clamps. Provide galvanized stay wire, brace wire, tie wire and wire clamps conforming to ASTM A 116.

NO SCALE

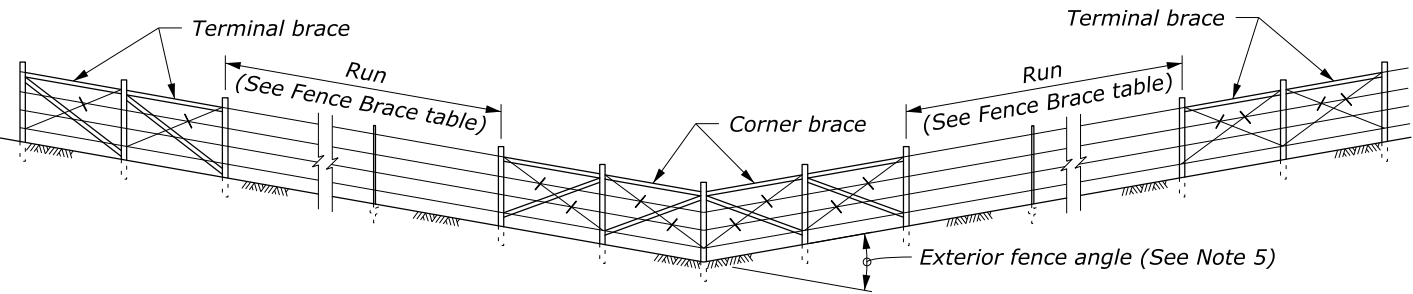
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION WESTERN FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY DETAIL	
IDAHO FENCE Sheet 1 of 3	
DETAIL APPROVED FOR USE 9/2010 REVISED:	DETAIL W619-50



TYPICAL SAG SECTION - BARBED WIRE FENCES



TYPICAL SAG SECTION FOR WOVEN WIRE, MESH OR COMBINATION FENCES

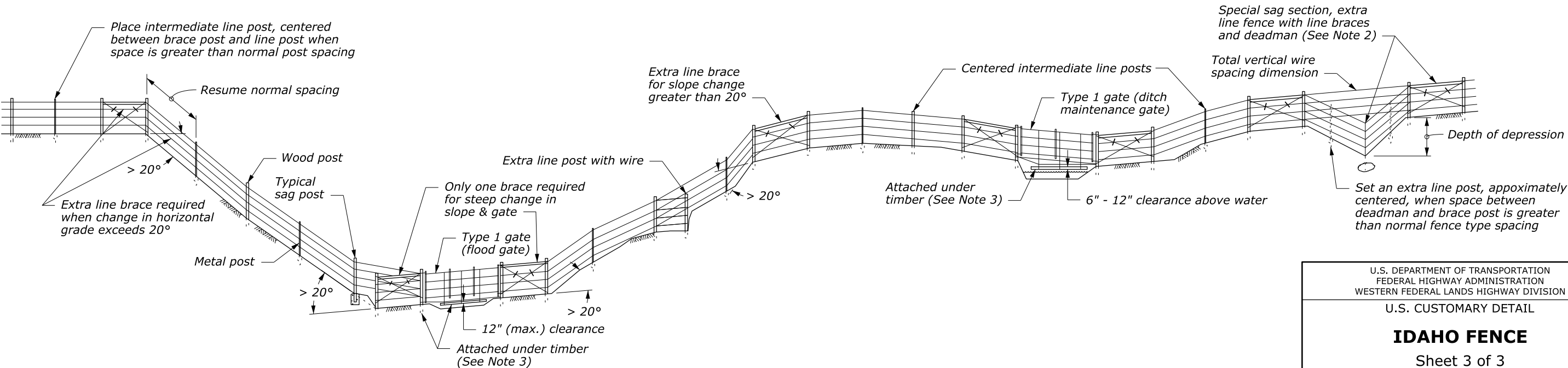


DOUBLE BRACE PANELS

FENCE BRACE TABLE			
FENCE TYPE	RUN	WOOD PANELS REQUIRED	METAL BRACES
1, 5, 6 & 11	< 66'	NONE	NONE
	66' - 660'	SINGLE	SINGLE
	660' - 990'	DOUBLE	NOT ALLOWED
8	≤ 400'	DOUBLE	NOT ALLOWED
2, 3, 7 & 33	< 33'	NONE	NONE
	33' - 330'	SINGLE	SINGLE
	330' - 660'	DOUBLE	NOT ALLOWED

NOTE:

- When a fence line approaches a ditch, gully, or depression, place the last post on level ground close enough to the edge of the drop-off that the wire may be strung to a post in the depression without touching the ground.
- When the depth of a depression on a Type 1, 5, or 11 fence exceeds the total vertical wire spacing over a maximum horizontal run of 2 spaces, construct an extra fence through the depression. Include extra line braces and a deadman in this application as shown.
- When a Type 1 gate is used in a special application as shown, include extra line braces and the attached under timber, wire, and wire stays. Wrap the horizontal wires on the under timber around the brace post (not stapled), then twice around the wire itself.
- When approved by the CO, the special applications for barbed wire fences may also be used for Types 2, 3, 7, and 33 woven wire fence. Use a Type 2 gate with these fences. Barbed wire may be used through the special areas, however the wires must match the woven wire spacing as nearly as possible. Do not attach the under timber directly to a Type 2 gate.
- When wood braces are used and the fence corner angle exceeds 30° in the exterior angle of the fence, use double panels on the corner brace. Install double panels for line and terminal braces according to the fence brace table.
- Where a fence ties into a bridge parapet or railing, do not allow the top of fence to project above the top of the parapet or railing.



SPECIAL APPLICATIONS FOR BARBED WIRE FENCES
FOR TYPE 1, 5, & 11 (See Note 4)

NO SCALE

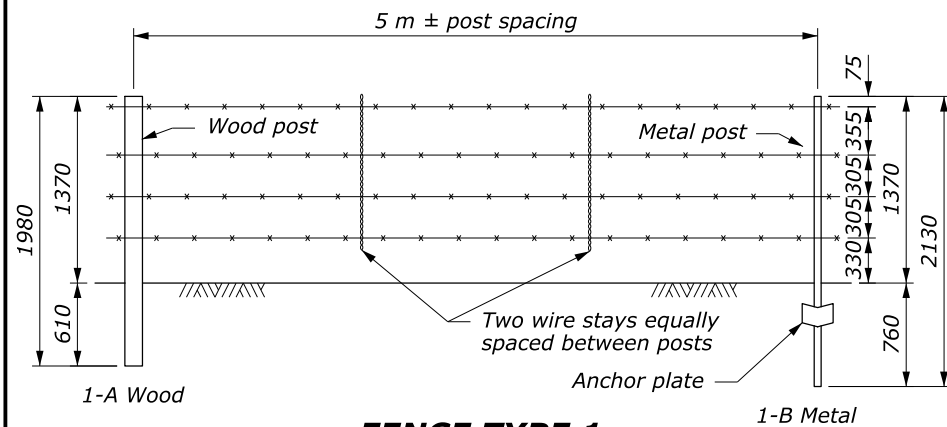
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY DETAIL

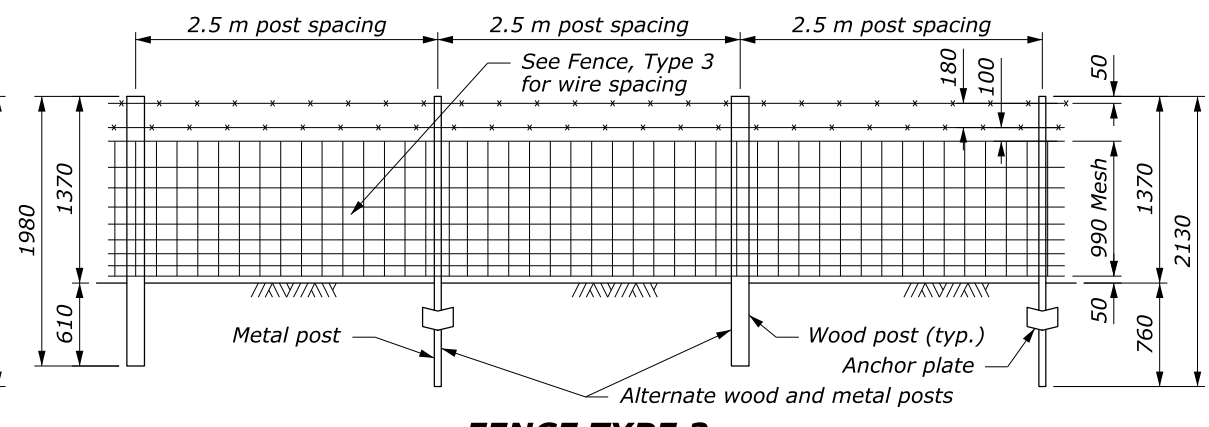
IDAHO FENCE
Sheet 3 of 3

DETAIL APPROVED FOR USE 9/2010
REVISED:

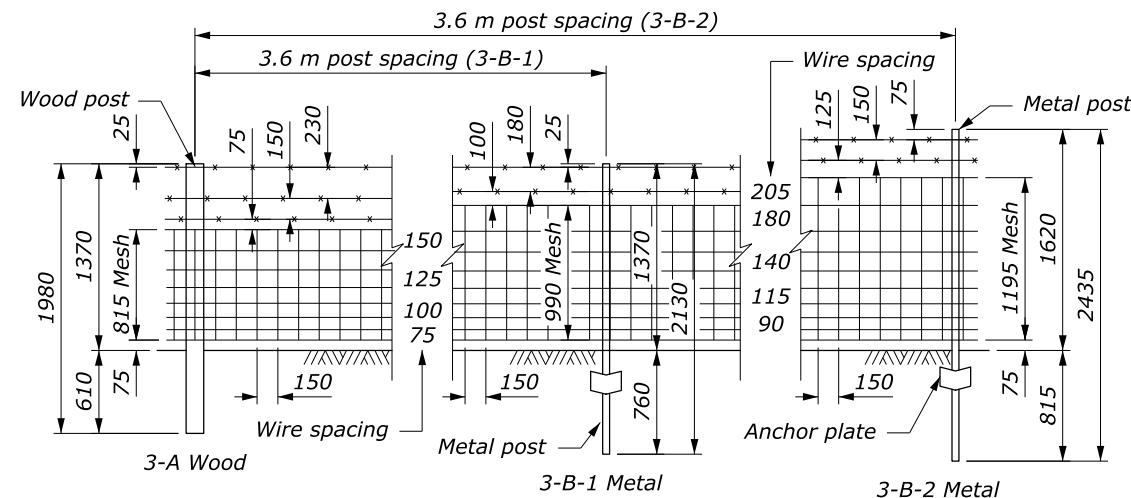
DETAIL
W619-50



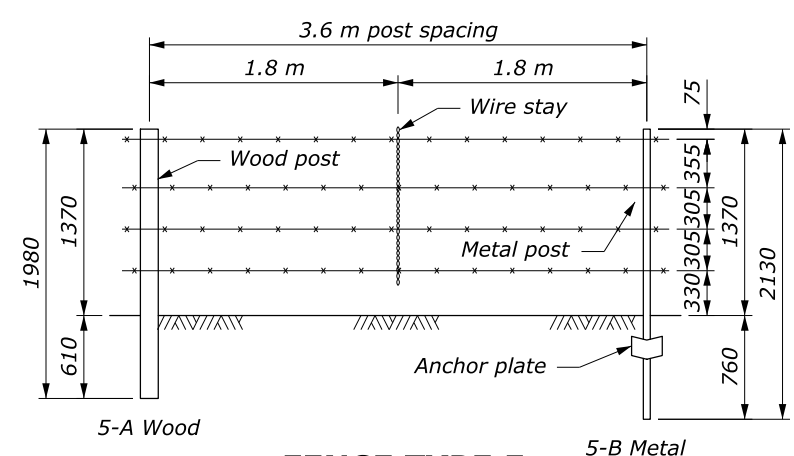
FENCE TYPE 1



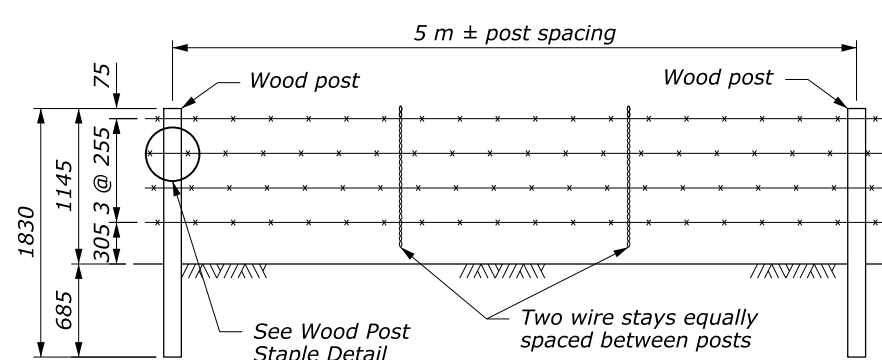
FENCE TYPE 2



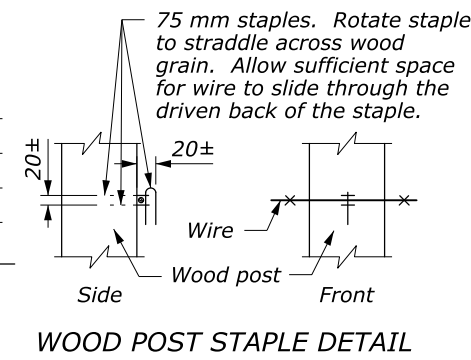
FENCE TYPE 3



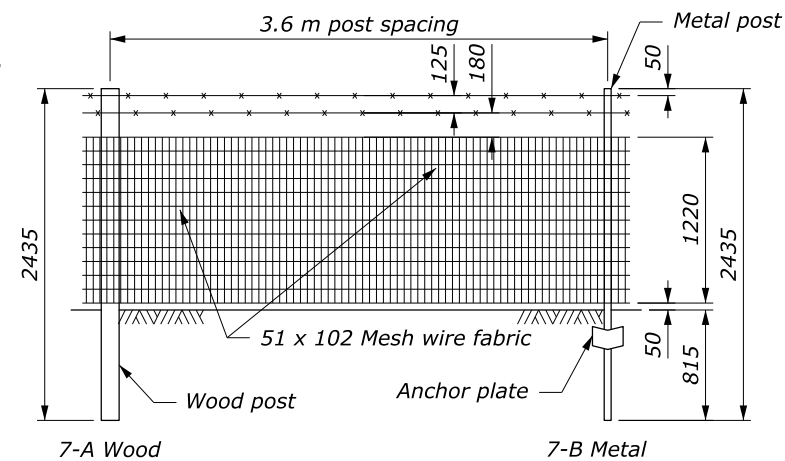
FENCE TYPE 5



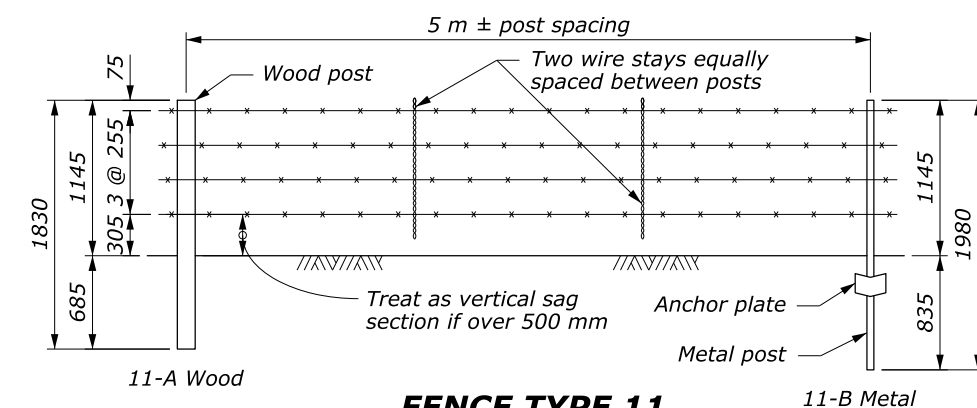
DROP FENCE TYPE 6



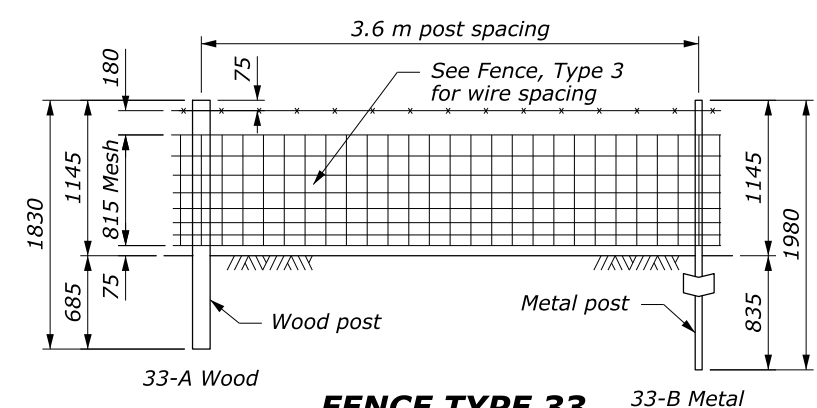
WOOD POST STAPLE DETAIL



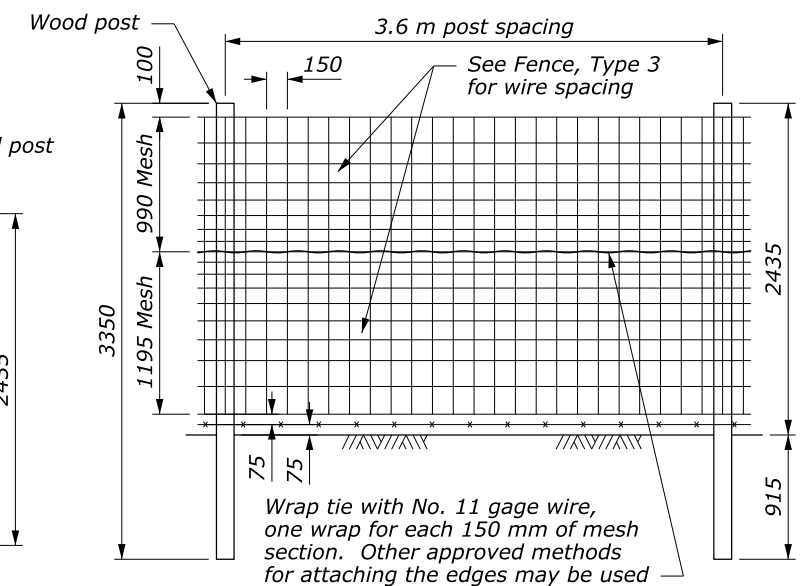
FENCE TYPE 7



FENCE TYPE 11



FENCE TYPE 33



DEER-PROOF FENCE TYPE 8

NOTE:

1. Furnish pressure treated wood posts consisting of either Douglas Fir, Western Larch, Cedar, or Pine of any species. Provide line posts having a minimum 255 mm post circumference and a 75 mm minimum distance between opposite faces or between any face and an opposite corner. Provide minimum 445 mm circumference posts for corner, terminal, or braces; and a 100 mm minimum distance between opposite faces or between any face and an opposite corner.
2. Provide woven wire conforming to ASTM A116, except wire size and strength options are limited to the following subsections of Table 1: No. 12½ Grade 60, No. 12½ Grade 125, or 14½ Grade 125.
3. Furnish 9 gage staples with a minimum length of 38 mm, except that 25 mm staples may be used in locust posts. Provide 9 gage stay wires and brace wires, and 12.5 gage tie wire and wire clamps. Provide galvanized stay wire, brace wire, tie wire and wire clamps conforming to ASTM A 116.
4. Dimensions without units are millimeters.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL

IDAHO FENCE

Sheet 1 of 3

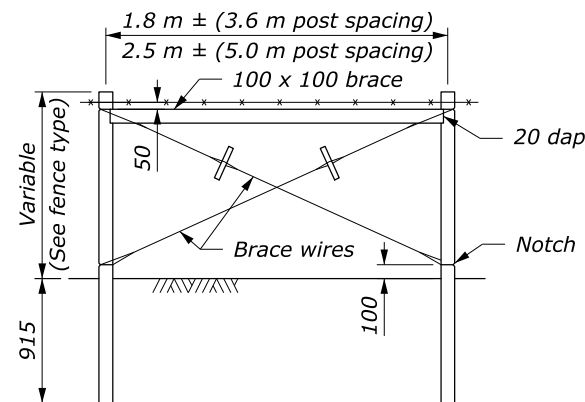
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REVISED:

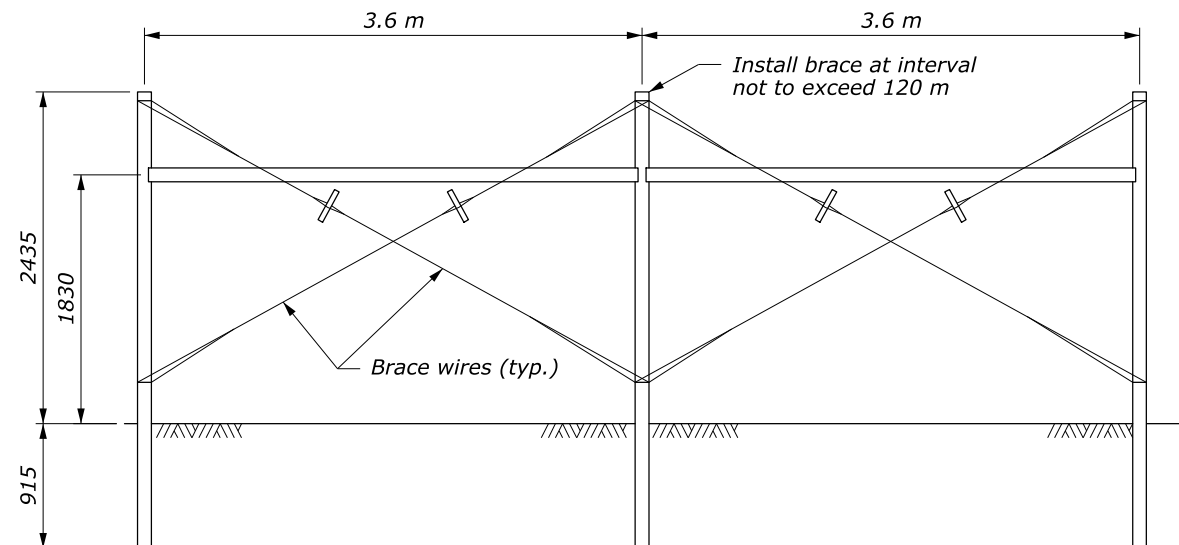
DETAIL

WM619-50

NO SCALE



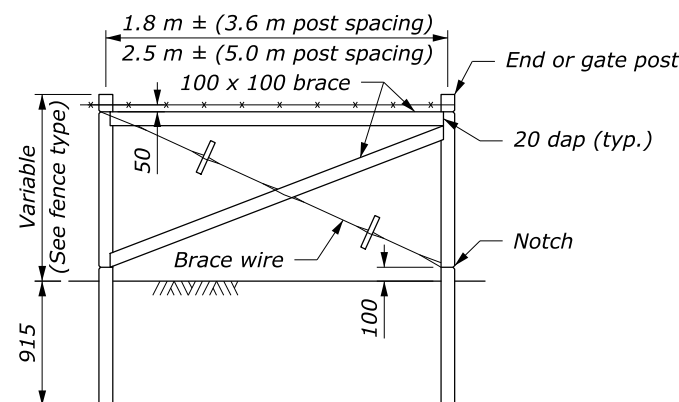
WOOD LINE BRACE



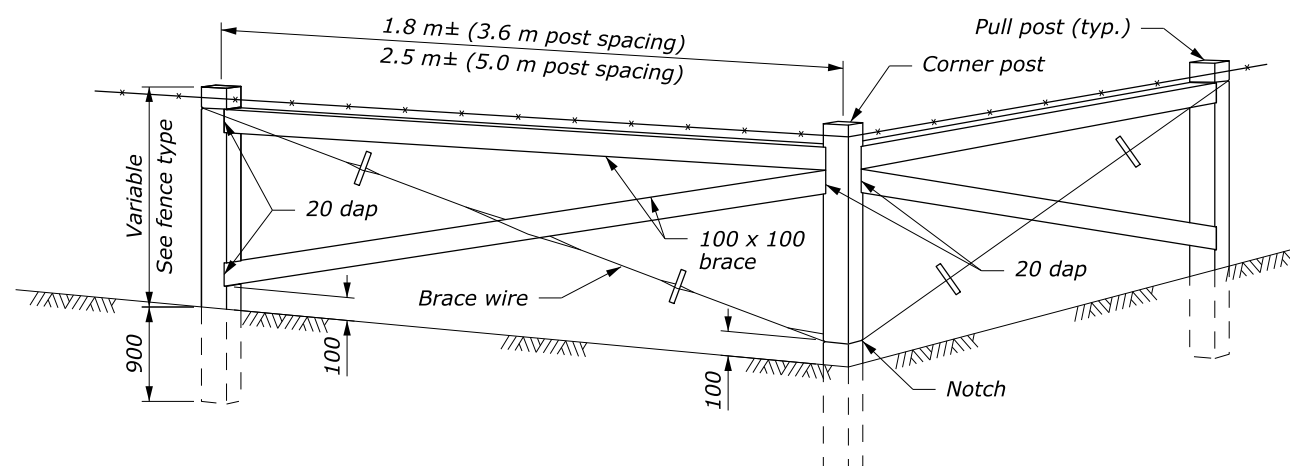
WOOD LINE BRACE FOR TYPE 8 FENCE

NOTE:

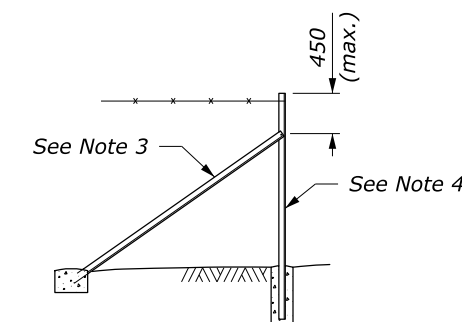
1. Furnish either painted or galvanized angles or galvanized steel round pipe posts for corner or line braces. Furnish round pipe posts with snug-fitting galvanized metal caps. Fabricate steel pipe fence posts and braces according to ASTM F 1083.
2. Connect braces to post with three 16d nails or a 9.53 x 100 mm steel dowel.
3. Provide 51 x 51 x 6.4 mm angle or 31.75 mm standard steel pipe brace.
4. Provide 64 x 64 x 6.4 mm angle or 64 mm standard steel pipe post.
5. Dimensions without units are millimeters.



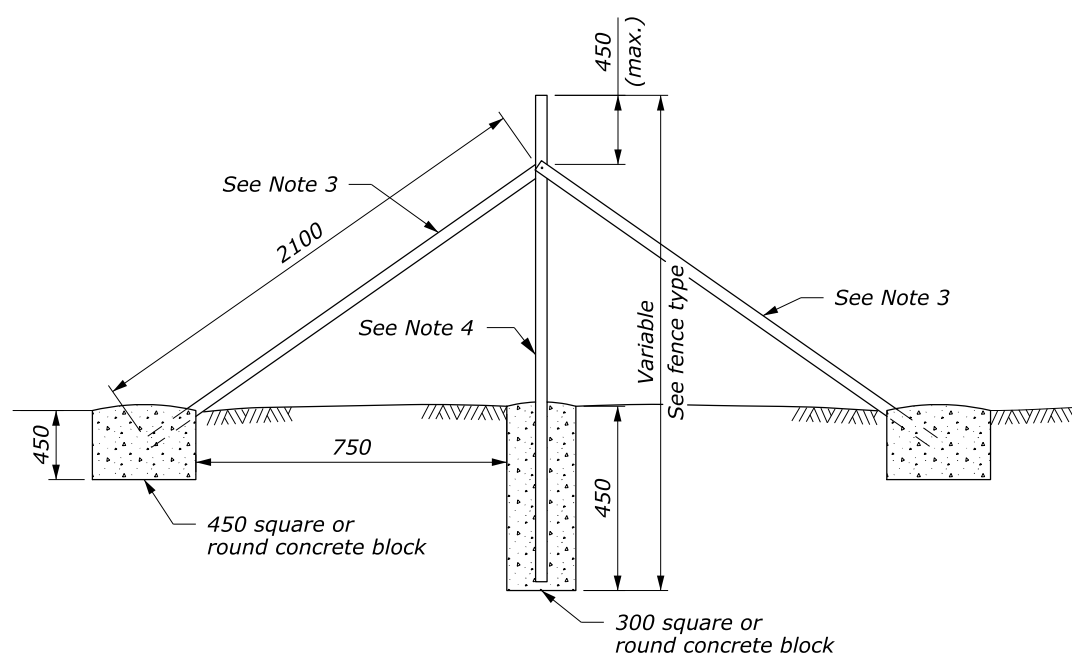
WOOD TERMINAL BRACE



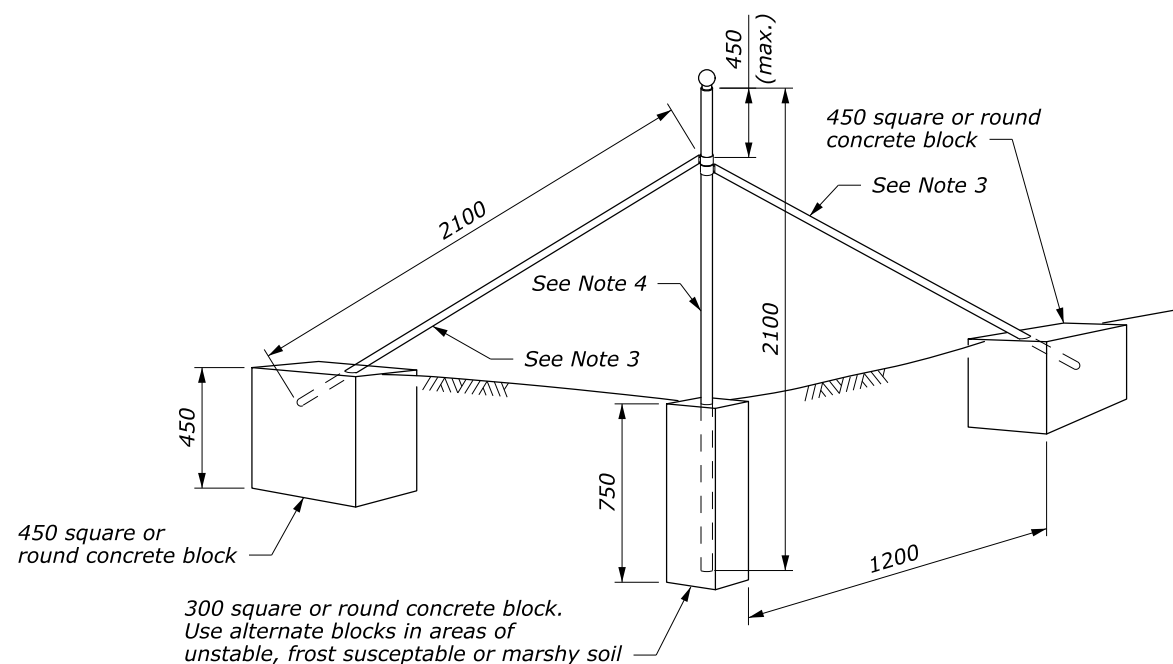
WOOD CORNER BRACE



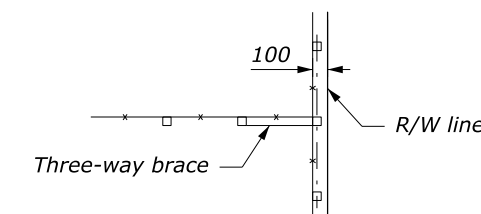
METAL END AND GATE BRACE



METAL LINE BRACE

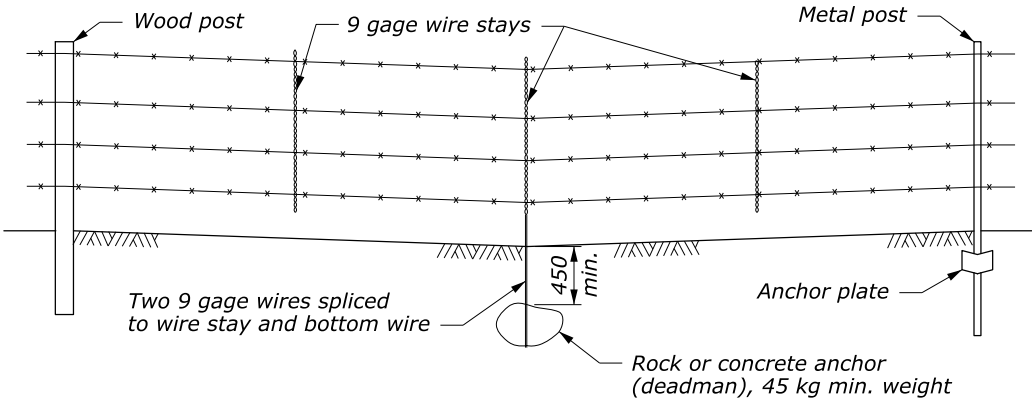


METAL CORNER BRACE

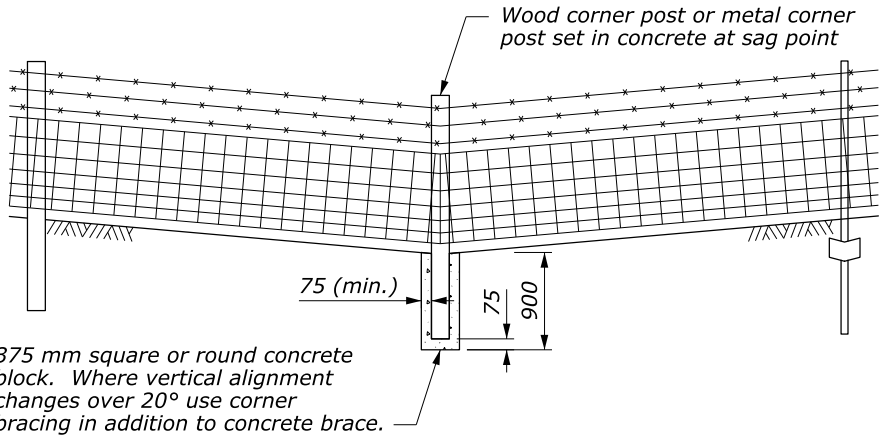


FENCE TERMINAL

NO SCALE



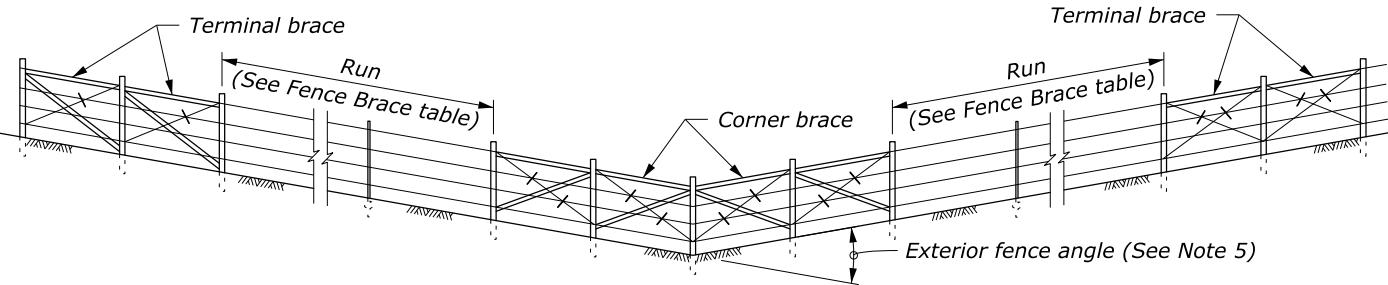
TYPICAL SAG SECTION - BARBED WIRE FENCES



TYPICAL SAG SECTION FOR WOVEN WIRE, MESH OR COMBINATION FENCES

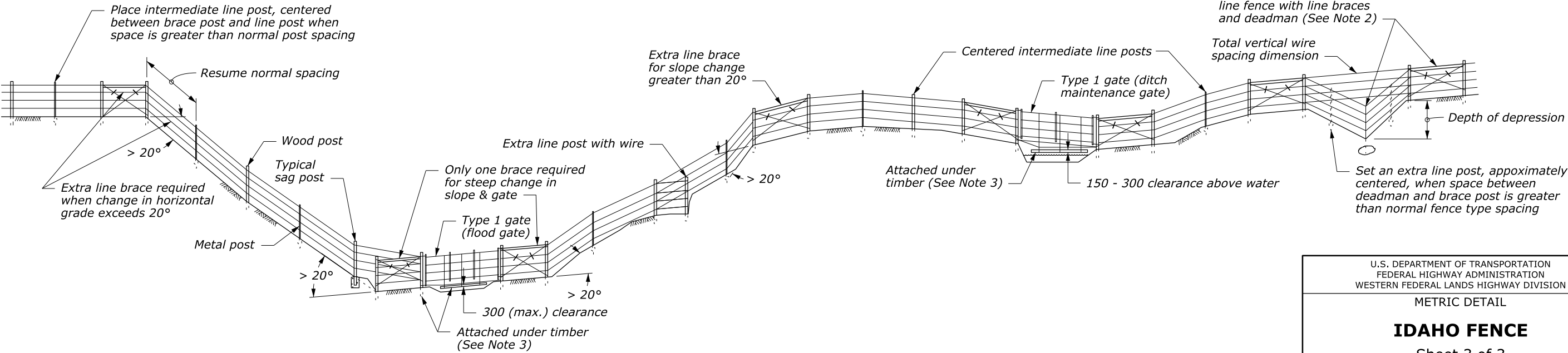
NOTE:

- When a fence line approaches a ditch, gully, or depression, place the last post on level ground close enough to the edge of the drop-off that the wire may be strung to a post in the depression without touching the ground.
- When the depth of a depression on a Type 1, 5, or 11 fence exceeds the total vertical wire spacing over a maximum horizontal run of 2 spaces, construct an extra fence through the depression. Include extra line braces and a deadman in this application as shown.
- When a Type 1 gate is used in a special application as shown, include extra line braces and the attached under timber, wire, and wire stays. Wrap the horizontal wires on the under timber around the brace post (not stapled), then twice around the wire itself.
- When approved by the CO, the special applications for barbed wire fences may also be used for Types 2, 3, 7, and 33 woven wire fence. Use a Type 2 gate with these fences. Barbed wire may be used through the special areas, however the wires must match the woven wire spacing as nearly as possible. Do not attach the under timber directly to a Type 2 gate.
- When wood braces are used and the fence corner angle exceeds 30° in the exterior angle of the fence, use double panels on the corner brace. Install double panels for line and terminal braces according to the fence brace table.
- Where a fence ties into a bridge parapet or railing, do not allow the top of fence to project above the top of the parapet or railing.
- Dimensions without units are millimeters.



DOUBLE BRACE PANELS

FENCE BRACE TABLE			
FENCE TYPE	RUN	WOOD PANELS REQUIRED	METAL BRACES
1, 5, 6 & 11	< 20 m	NONE	NONE
	20 - 200 m	SINGLE	SINGLE
	200 - 300 m	DOUBLE	NOT ALLOWED
8	≤ 120 m	DOUBLE	NOT ALLOWED
	< 10 m	NONE	NONE
2, 3, 7 & 33	10 - 100 m	SINGLE	SINGLE
	100 - 200 m	DOUBLE	NOT ALLOWED

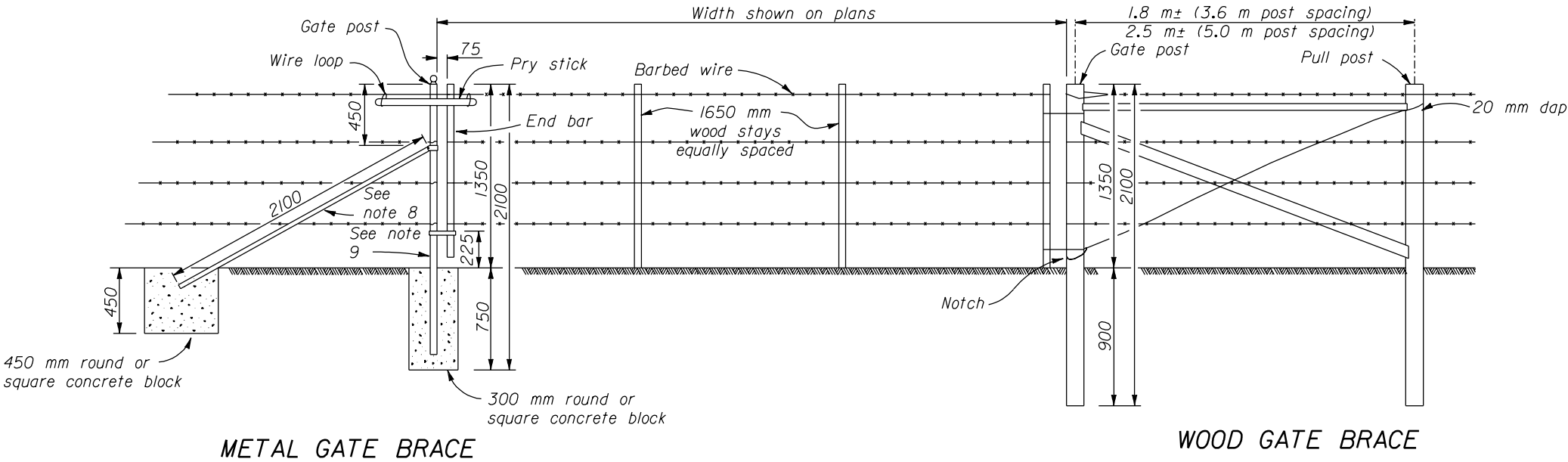


SPECIAL APPLICATIONS FOR BARBED WIRE FENCES
FOR TYPE 1, 5, & 11 (See Note 4)

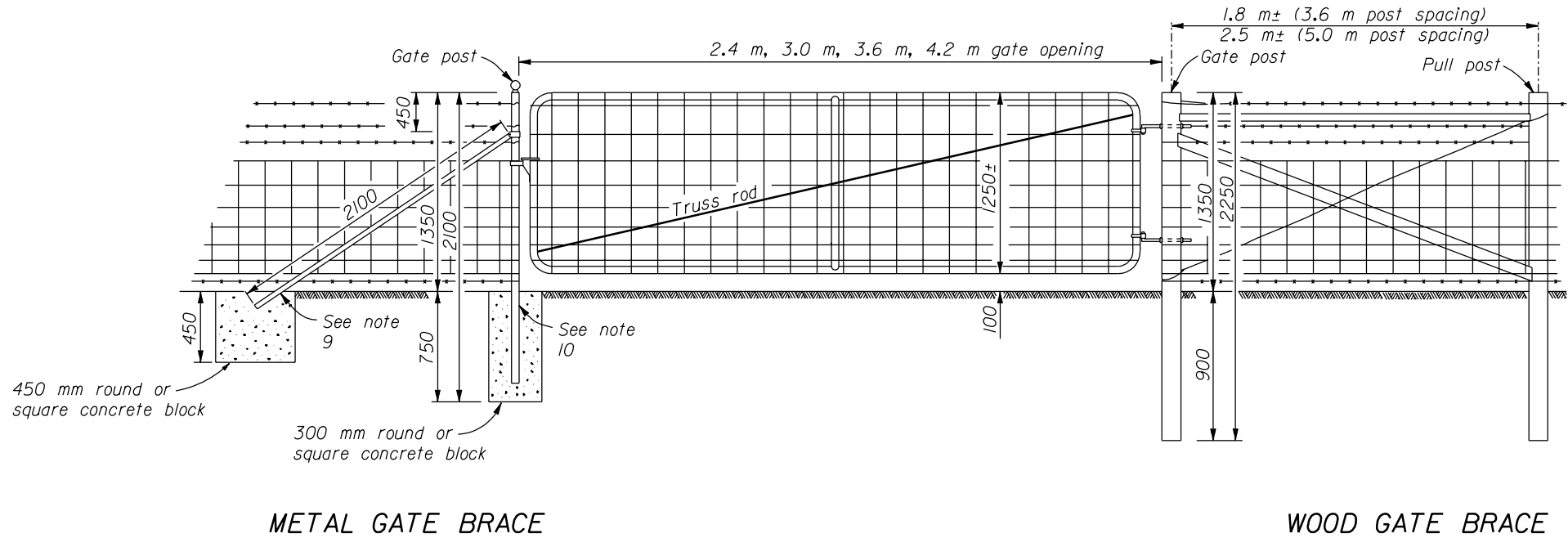
NO SCALE

NOTE:

1. Dimensions not labeled are in millimeters.
2. Match Type 1 gates with the adjacent fence.
3. Hang gates on standard metal or wood brace posts corresponding with the type of posts used in adjacent line fence.
4. Construct end post for Type 1 gate with a section of metal fence post or a round wood post 65 mm to 75 mm diameter. Provide a 600 mm length of hardwood tool handle for the pry stick. Use 3.76 mm wire for loop wire and pry stick wire or a suitable chain and adjust for length so that the gate will be neat and taut when closed. Place two wood stays, equally spaced, on each gate. Provide 50 mm minimum diameter or 40 mm square stays. Staple or tie wires to the stays and end posts.
5. Form Type 2 gate frames with 33.40 mm OD cold rolled or drawn galvanized steel tubing with a wall thickness of 2.41 mm or with 25 mm galvanized standard steel pipe. Equip each gate with one standard adjustable diagonal truss rod from corner to corner. Provide galvanized malleable iron or steel hinges and two way self closing latch.
6. Form metal walk gate frames with 26.67 mm OD cold rolled or drawn galvanized steeltubing with a wall thickness of 2.41 mm or with 19.05 mm galvanized standard steel pipe. Construct metal walk gates similar to Type 2 gate but omit vertical brace and truss.
7. Approved alternate gates may be used.
8. Where a single opening requires two gates, provide an approved drop bar, latch, chain and snap between the gates.
9. 51 x 51 x 6.4 mm angle or 31.75 mm standard steel pipe brace.
10. 64 x 64 x 6.4 mm angle or 64 mm standard steel pipe post.

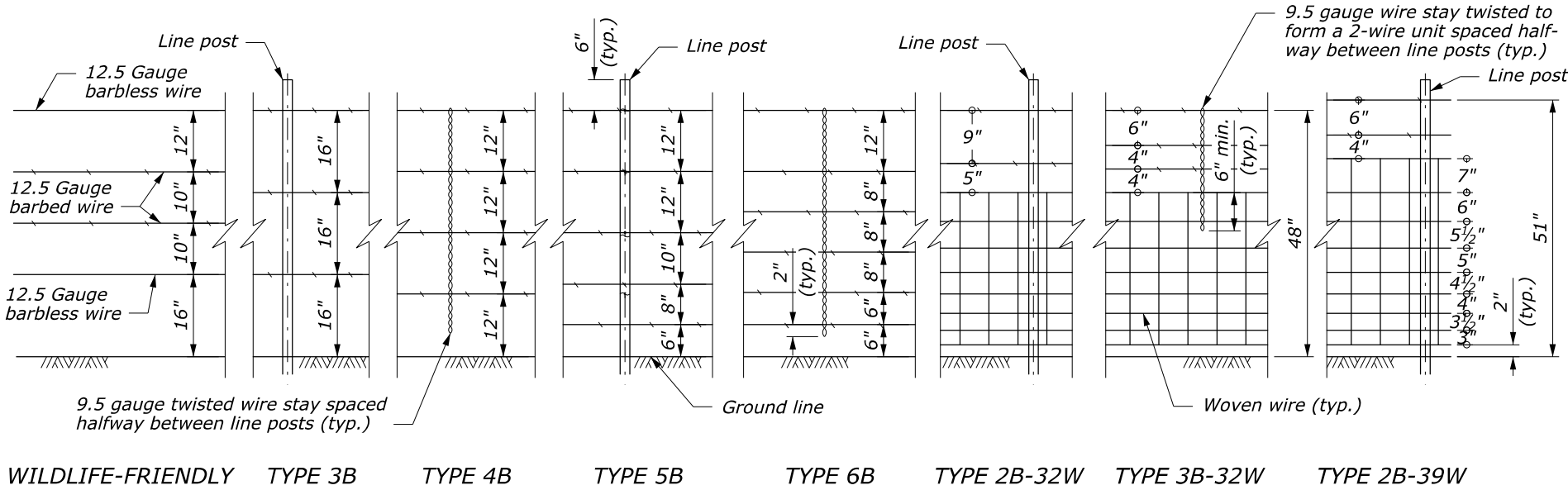


TYPE 1 GATE



TYPE 2 GATE

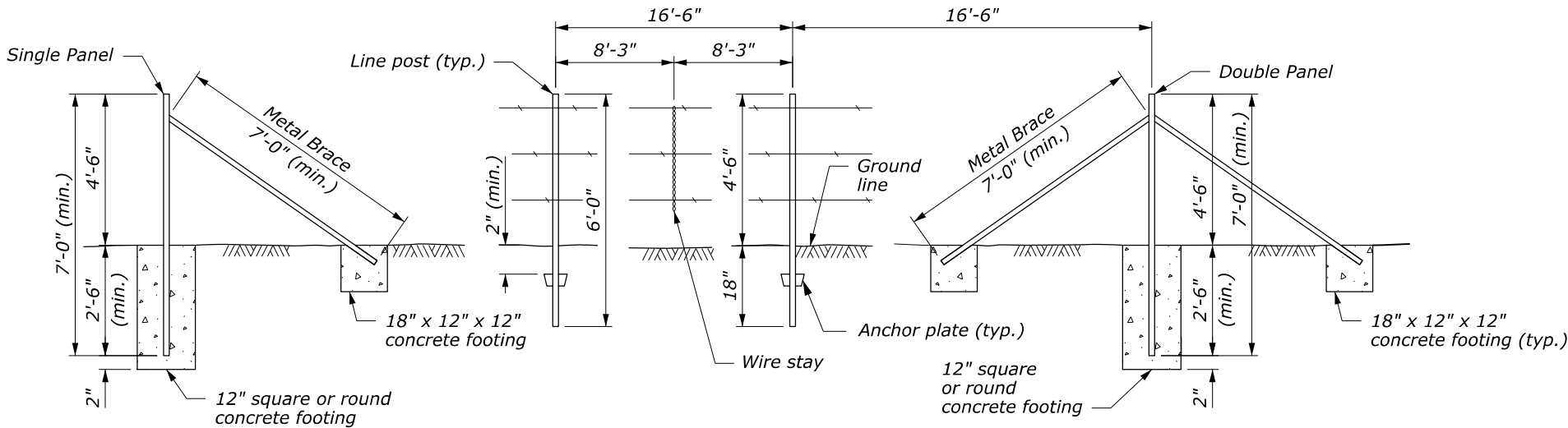
NO SCALE



FENCE WIRE DETAILS

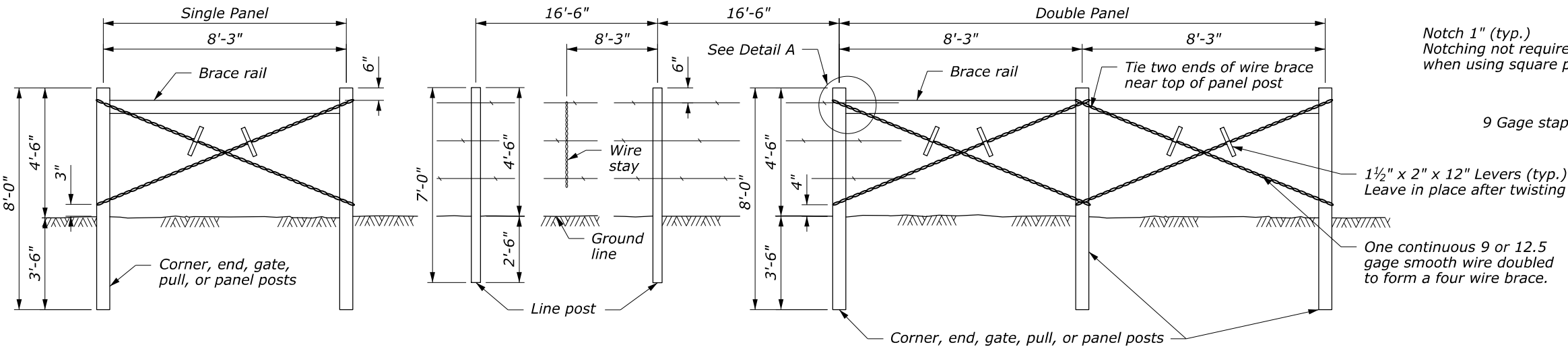
NOTE:

1. Place all fence wire on pasture side of post, except on curves place the wire on the outside of the curve. In areas subject to high winds and moving debris wires may be placed on windward side of posts (except on curves).
2. Measure post spacing parallel to ground.
3. In each 500' run of wood post fence, place one metal post in place of a wood line post for lightning protection.
4. Use wood panels on all metal fences instead of the steel panels unless otherwise specified.
5. Attach all barbed wires to posts. Attach bottom, top, center, and alternate wires of woven wire to line posts. Attach all wires of woven wire to corner posts or post used to tie-off wire. Attach wires using staples for wood posts and using ties for steel posts.
6. Use wire stays on all fences unless wood stays are specified. When wood stays are specified, use either 2" round, a rough dimension 2" x 2", or a 1½" x 3½" (nominal 2" x 4"). Provide stay of sufficient length to be placed on the ground with the top of stay extending 2" above the top wire. Attach each wire to the wood stays using 1¾" x 9 gage staples. Wood stays do not need to be treated.

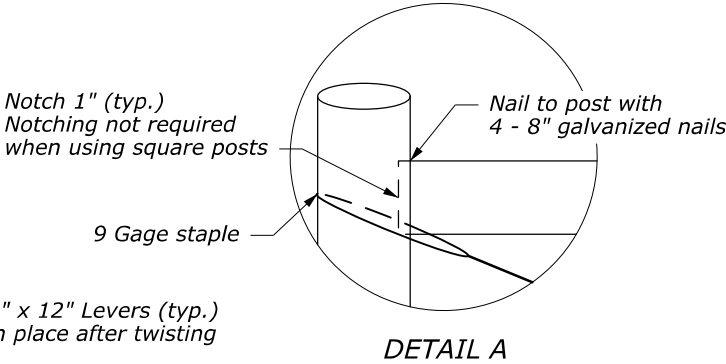


FENCE WITH STEEL POSTS

POST DIMENSIONS			
MEMBER	WOOD		STEEL
	ROUND	SQUARE	
Line post	4"	4" x 4"	1.33 lb/ft
Brace	4"	4" x 4"	2" x 2" x ¼"
Other posts	5"	5" x 5"	2½" x 2½" x ¼"



FENCE WITH WOOD POSTS



DETAIL A

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY DETAIL

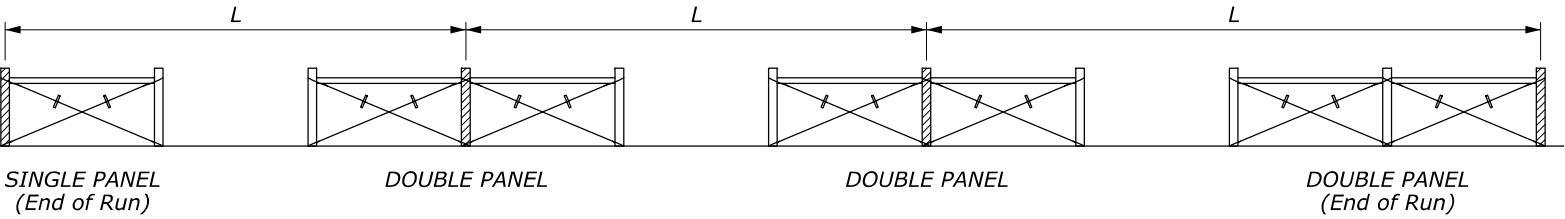
MONTANA FENCE

Sheet 1 of 2

DETAIL APPROVED FOR USE 2/2010
REVISED:

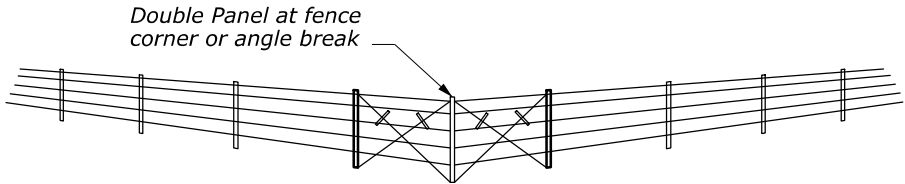
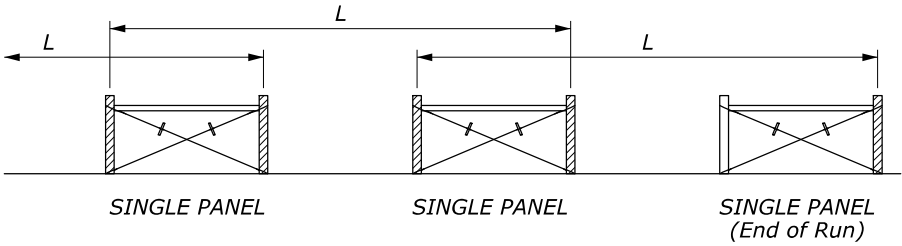
DETAIL
W619-60

NO SCALE



FENCE TYPE	RUN = L	PANELS REQUIRED
Combination Woven Wire & Barbed Wire	< 33'	None
	33' to 330'	Single
	> 330' to 660' Max.	Double
Barbed Wire	< 66'	None
	66' to 660'	Single
	> 660' to 990' Max.	Double

NOTE: Tie off on all cross hatched posts.



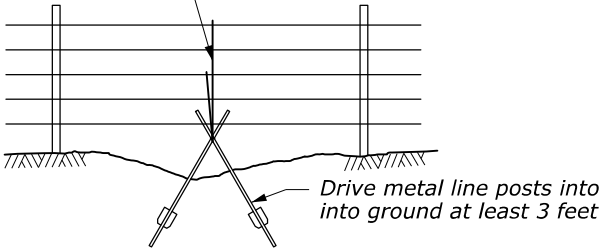
DOUBLE END PANEL

FENCE PANEL TYPES

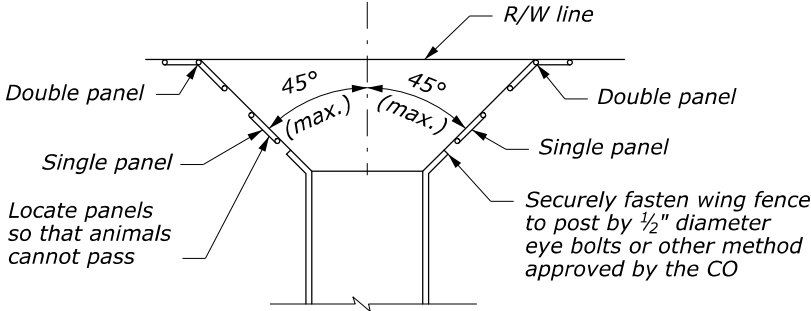
NOTE:

1. Attach barbed wires to tie-off posts by wrapping around the post at least two times, then wrapping the wires around itself five times.
2. To attach woven wire to end post, remove two or three vertical stay wires from the end of the fence. Place the first complete vertical stay wire against post. Start at the middle of the horizontal line wires, wrapping around the end post at least two times and then wrapping around itself five times.
3. A deadman may be a precast concrete block, a cast-in-place block or a rock or other approved object weighing at least 150 pounds. Bury the deadman in the ground with at least 24" cover. Attach the deadman to the fence with 3 strands of 9 gage wire or 6 strands of 12.5 gage wire. The Alternate Deadman shown on this sheet may be used when approved by the CO.
4. Offset "Interstate" fence 1 foot inside right-of-way. Increase length of metal "Interstate" posts and braces to 7'-8". Increase embedment depth to 3'-2". Increase length of metal "Interstate" line posts to 6'-6". Increase embedment depth to 2 feet.

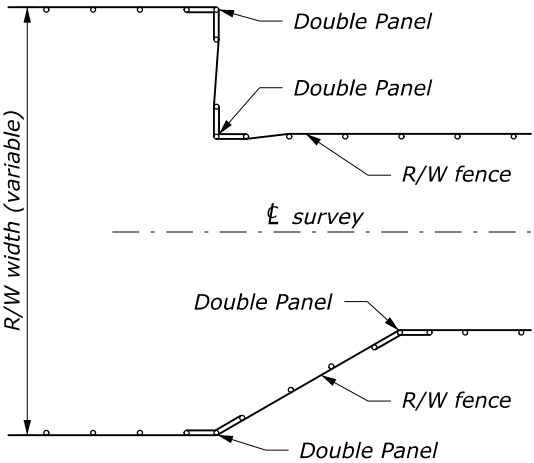
Tie 3 strands of 9 gage wire around all wires and around the junction of the metal posts



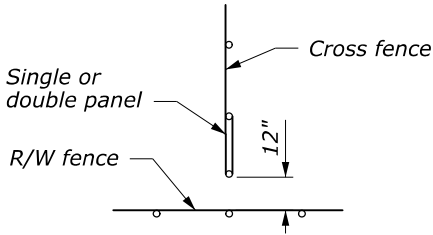
ALTERNATE DEADMAN
See Note 3 for normal deadman



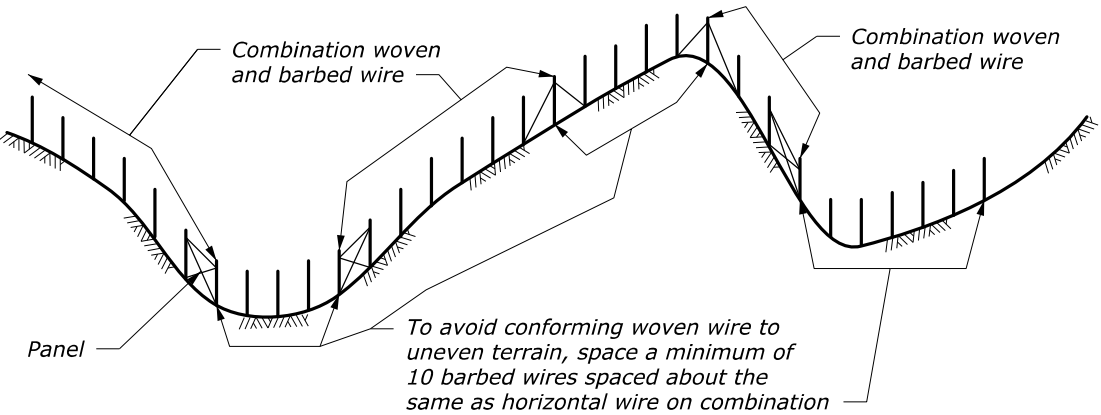
FENCE LAYOUT AT STOCKPASS



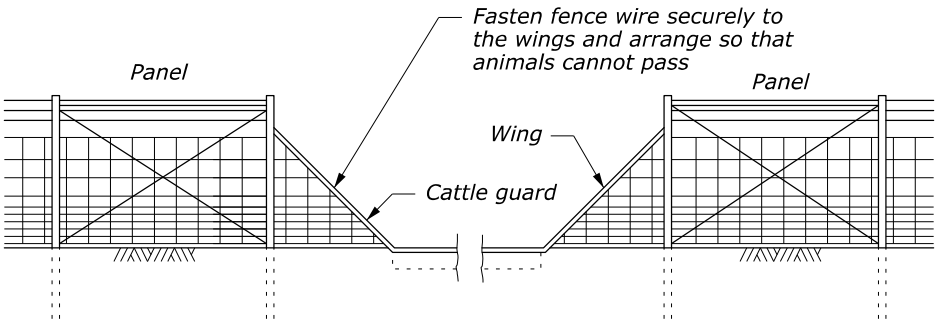
FENCE LAYOUT AT CHANGE IN R/W WIDTH



FENCE LAYOUT AT CROSS FENCE CONNECTION



FENCE LAYOUT ON SHARP VERTICAL CURVES



FENCE CONNECTION TO CATTLE GUARD

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

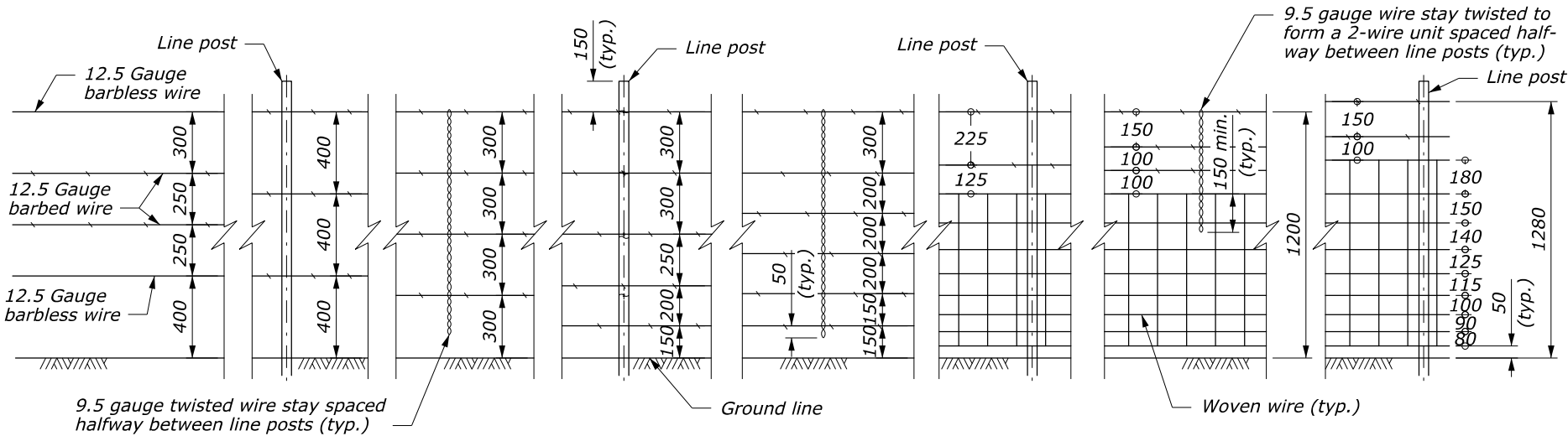
U.S. CUSTOMARY DETAIL

MONTANA FENCE

Sheet 2 of 2

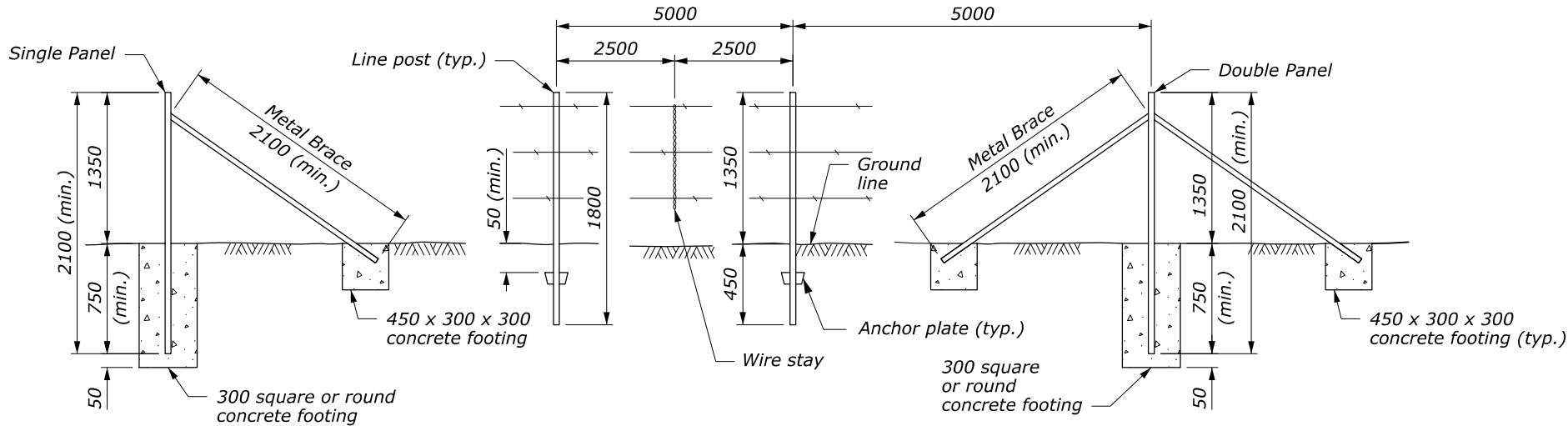
DETAIL APPROVED FOR USE 2/2010
REVISED:

DETAIL
W619-60

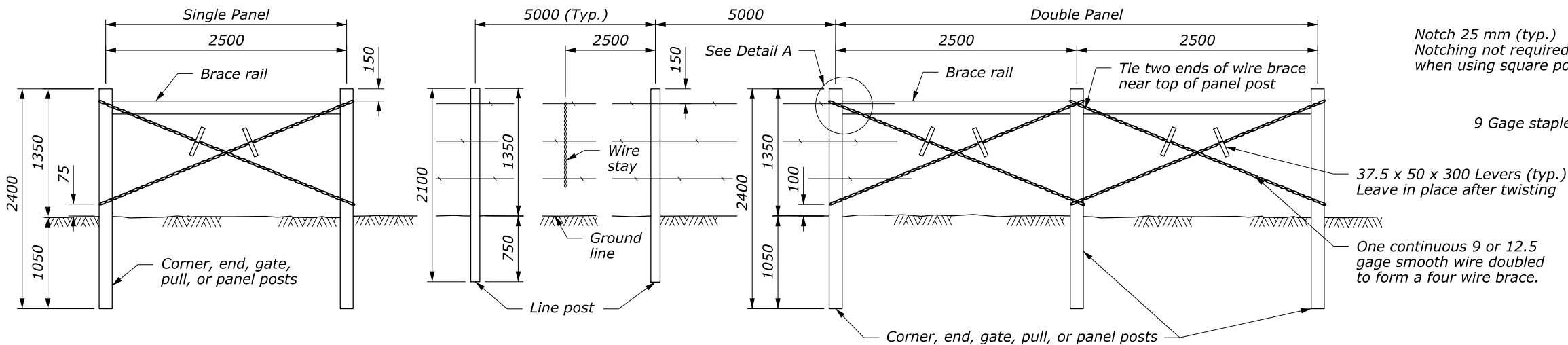


WILDLIFE-FRIENDLY TYPE 3B TYPE 4B TYPE 5B TYPE 6B TYPE 2B-813W TYPE 3B-813W TYPE 2B-990W

FENCE WIRE DETAILS



FENCE WITH STEEL POSTS



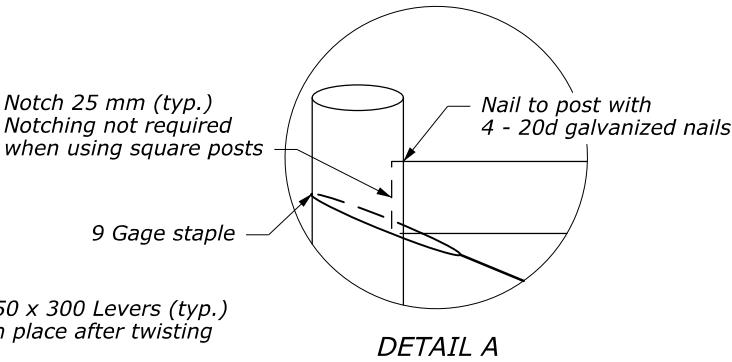
FENCE WITH WOOD POSTS

NOTE:

1. Place all fence wire on pasture side of post, except on curves place the wire on the outside of the curve. In areas subject to high winds and moving debris wires may be placed on windward side of posts (except on curves).
2. Measure post spacing parallel to ground.
3. In each 150 m run of wood post fence, place one metal post in place of a wood line post for lightning protection.
4. Use wood panels on all metal fences instead of the steel panels unless otherwise specified.
5. Attach all barbed wires to posts. Attach bottom, top, center, and alternate wires of woven wire to line posts. Attach all wires of woven wire to corner posts or post used to tie-off wire. Attach wires using staples for wood posts and using ties for steel posts.
6. Use wire stays on all fences unless wood stays are specified. When wood stays are specified use either 50 mm round, a rough dimension 50 x 50, or a 37.5 x 87.5 (nominal 50 x 100). Provide stay of sufficient length to be placed on the ground with the top of stay extending 50 mm above the top wire. Attach each wire to the wood stays using 44 mm x 9 gage staples. Wood stays do not need to be treated.
7. Dimensions without units are millimeters.

POST DIMENSIONS

MEMBER	WOOD		STEEL
	ROUND	SQUARE	
Line post	100	100 x 100	2 kg/m
Brace	100	100 x 100	51 x 51 x 6.4
Other posts	125	125 x 125	64 x 64 x 6.4



DETAIL A

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL

MONTANA FENCE

Sheet 1 of 2

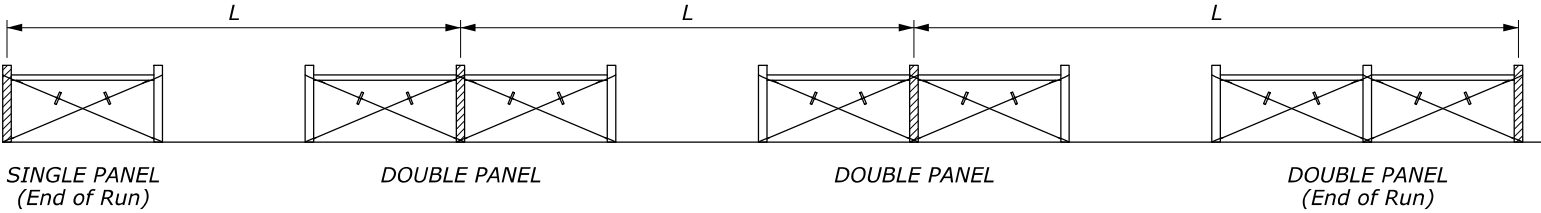
DETAIL APPROVED FOR USE 2/2010

REVISED:

DETAIL

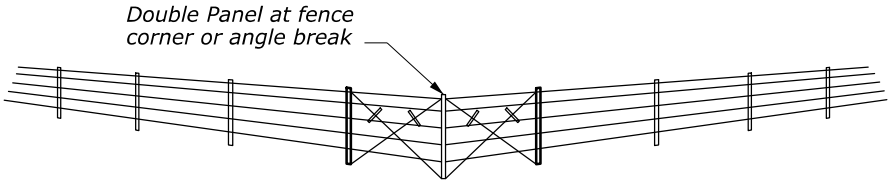
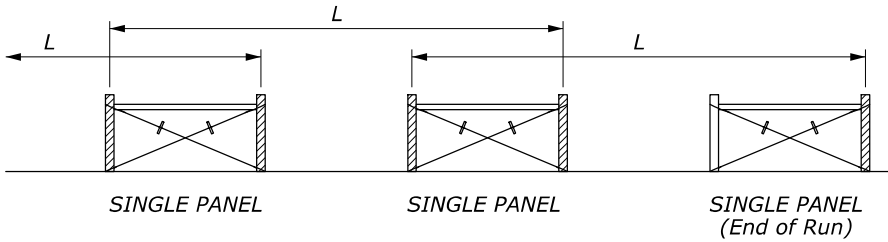
WM619-60

NO SCALE



FENCE TYPE	RUN = L	PANELS REQUIRED
Combination Woven Wire & Barbed Wire	< 10 m	None
	10 m to 100 m	Single
	> 100 m to 200 m Max.	Double
Barbed Wire	< 20 m	None
	20 m to 200 m	Single
	> 200 m to 300 m Max.	Double

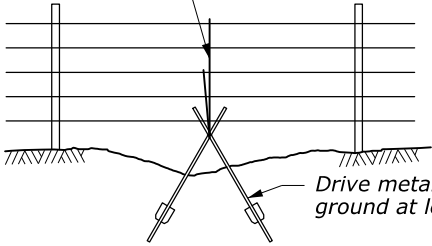
NOTE: Tie off on all cross hatched posts.



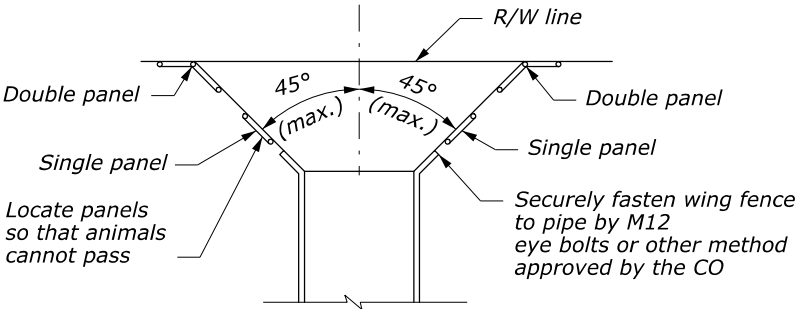
DOUBLE END PANEL

FENCE PANEL TYPES

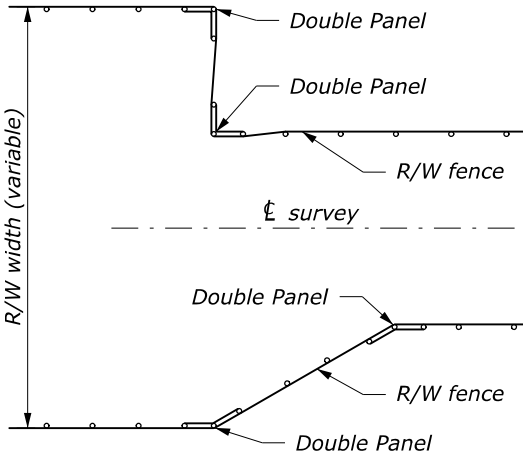
Tie 3 strands of 9 gage wire around all wires and around the junction of the metal posts



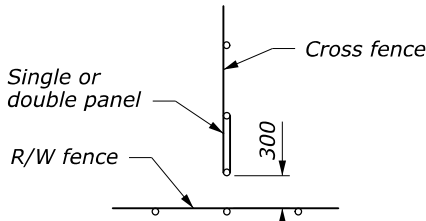
ALTERNATE DEADMAN
See Note 3 for normal deadman



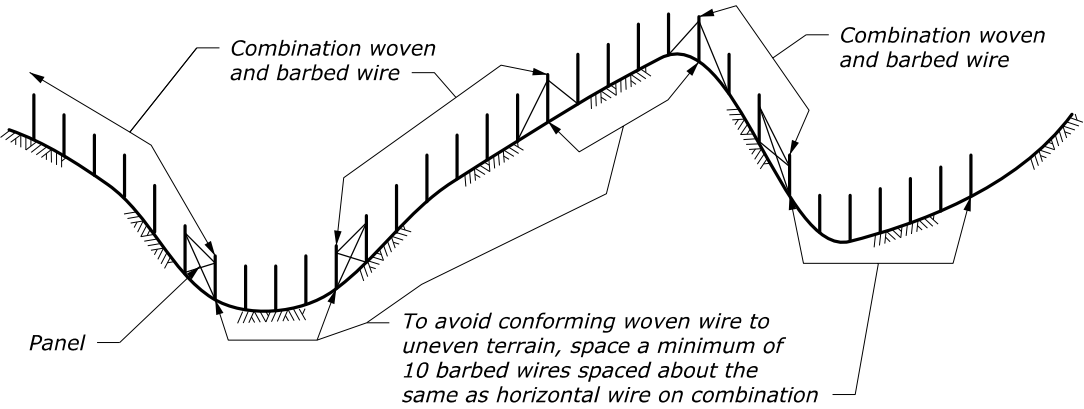
FENCE LAYOUT AT STOCKPASS



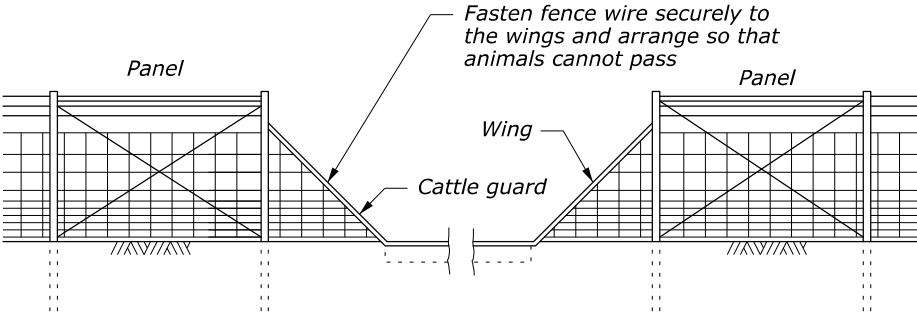
FENCE LAYOUT AT CHANGE IN R/W WIDTH



FENCE LAYOUT AT CROSS FENCE CONNECTION



FENCE LAYOUT ON SHARP VERTICAL CURVES



FENCE CONNECTION TO CATTLE GUARD

NO SCALE

NOTE:

1. Attach barbed wires to tie-off posts by wrapping around the post at least two times, then wrapping the wires around itself five times.
2. To attach woven wire to end post, remove two or three vertical stay wires from the end of the fence. Place the first complete vertical stay wire against post. Start at the middle of the horizontal line wires, wrapping around the end post at least two times and then wrapping around itself five times.
3. A deadman may be a precast concrete block, a cast-in-place block or a rock or other approved object weighing at least 70 kg. Bury the deadman in the ground with at least 600 mm cover. Attach the deadman to the fence with 3 strands of 9 gage wire or 6 strands of 12.5 gage wire. The Alternate Deadman shown on this sheet may be used when approved by the CO.
4. Offset "Interstate" fence 300 mm inside right-of-way. Increase length of metal "Interstate" posts and braces to 2.3 m. Increase embedment depth to 950 mm. Increase length of metal "Interstate" line posts to 2 m. Increase embedment depth to 650 mm.
5. Dimensions without units are millimeters.

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FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL

MONTANA FENCE

Sheet 2 of 2

DETAIL APPROVED FOR USE 2/2010
REVISED:

DETAIL
WM619-60



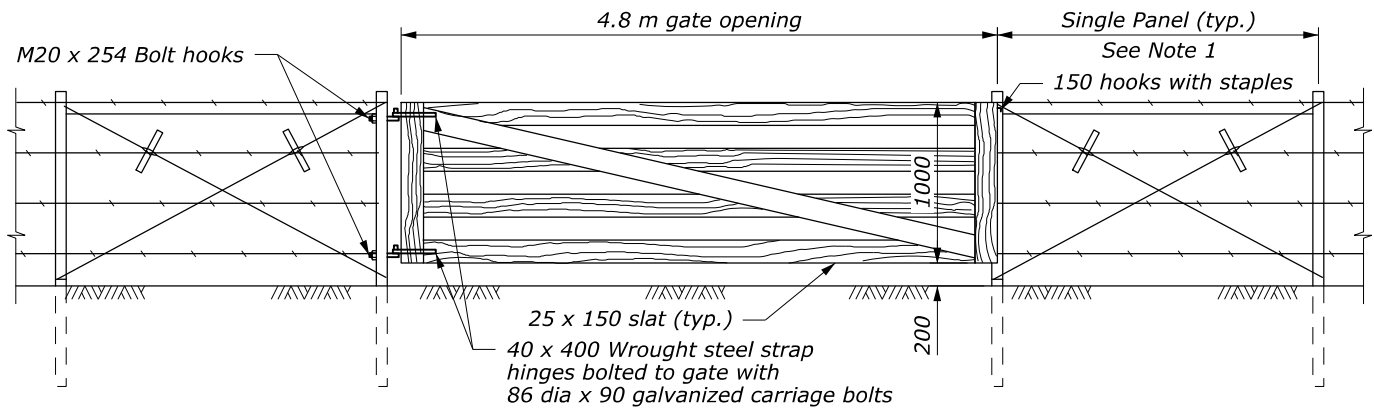
1. *Adjacent wood or metal post fence panels shown for illustrative purposes only. Match adjoining fence post type. Place either the single panel shown or a double panel at each fence end adjacent to gate. See Detail W619-60 for more information.*
2. *Use 10d nail and clinch for wood entrance gate (Type G-1) construction.*
3. *Match wire scheme on wire entrance gate (Type G-2) with that of adjacent fence unless otherwise indicated.*
4. *Furnish an approved commercial product for metal entrance gate (Type G-3). Galvanize all metal parts.*
5. *Provide a centered steel upright brace for Interstate Gates with openings of less than 14 feet, two upright steel braces at third points for gates for openings of 14 feet or greater.*
6. *Where a single opening requires two metal entrance gates, provide an approved drop bar and fastener between the gates.*
7. *Alternate gates may be used when approved by the CO.*

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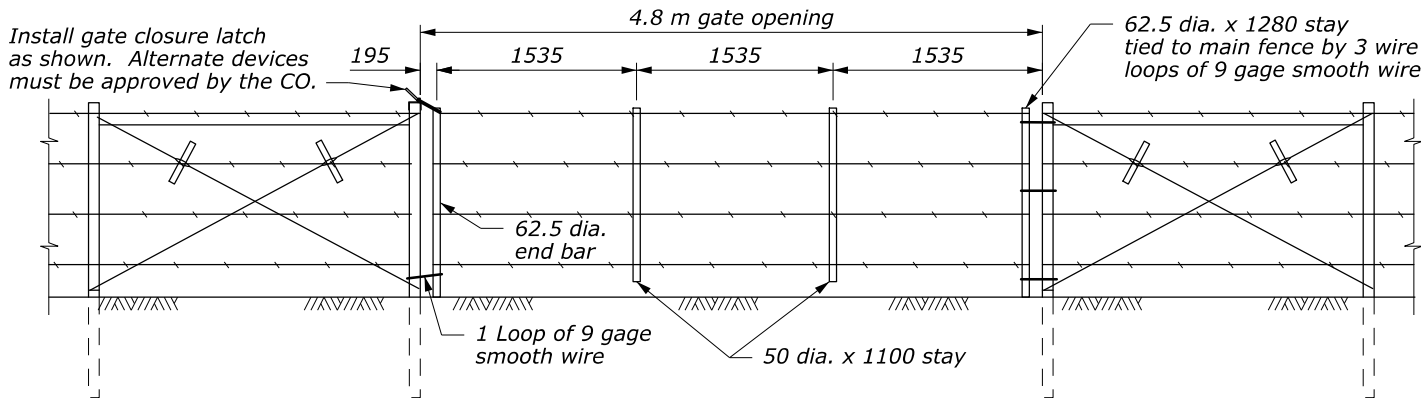
MONTANA ENTRANCE GATES

DETAIL APPROVED FOR USE 3/2010
REVISED:

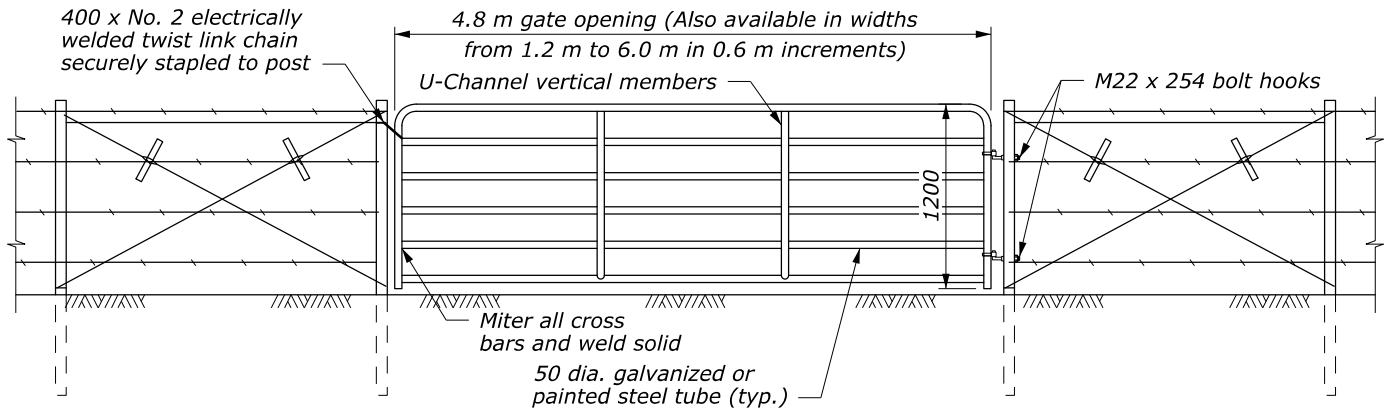
DETAIL
W619-61



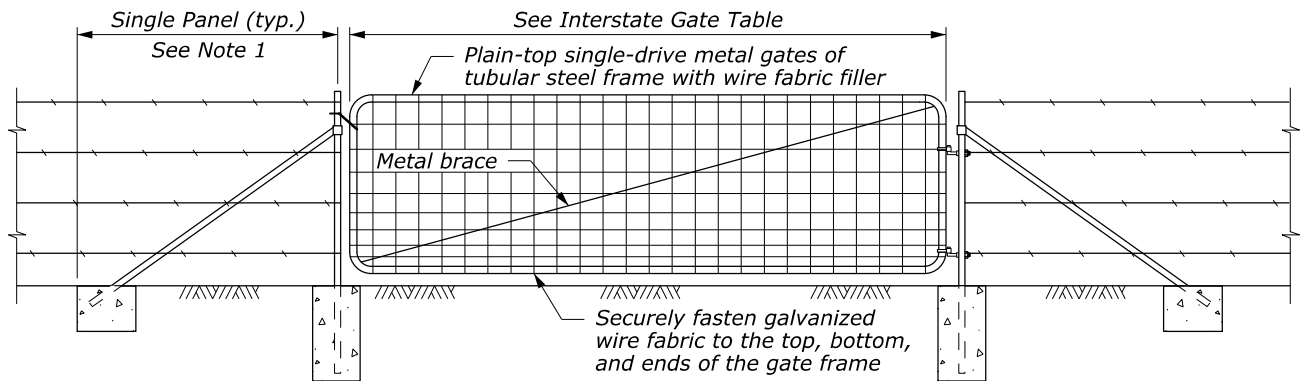
WOOD ENTRANCE GATE (TYPE G-1)



WIRE ENTRANCE GATE (TYPE G-2)



METAL ENTRANCE GATE (TYPE G-3)



INTERSTATE GATE

NOTE:

1. Adjacent wood or metal post fence panels shown for illustrative purposes only. Match adjoining fence post type. Place either the single panel shown or a double panel at each fence end adjacent to gate. See Detail WM619-60 for more information.
2. Use 10d nail and clinch for wood entrance gate (Type G-1) construction.
3. Match wire scheme on wire entrance gate (Type G-2) with that of adjacent fence unless otherwise indicated.
4. Furnish an approved commerical product for metal entrance gate (Type G-3). Galvanize all metal parts.
5. Provide a centered steel upright brace for Interstate Gates with openings of less than 4.3 meters, two upright steel braces at third points for gates for openings of 4.3 meters or greater.
6. Where a single opening requires two metal entrance gates, provide an approved drop bar and fastener between the gates.
7. Alternate gates may be used when approved by the CO.
8. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are unavailable.
9. Dimensions without units are millimeters.

**APPROXIMATE FRAME WEIGHTS
FOR INTERSTATE GATE**

WIDTH OF OPENING	APPROXIMATE WEIGHT
2.4 m	22 kg
3.0 m	25 kg
3.7 m	28 kg
4.3 m	33 kg
4.9 m	36 kg

U.S. DEPARTMENT OF TRANSPORTATION
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WESTERN FEDERAL LANDS HIGHWAY DIVISION

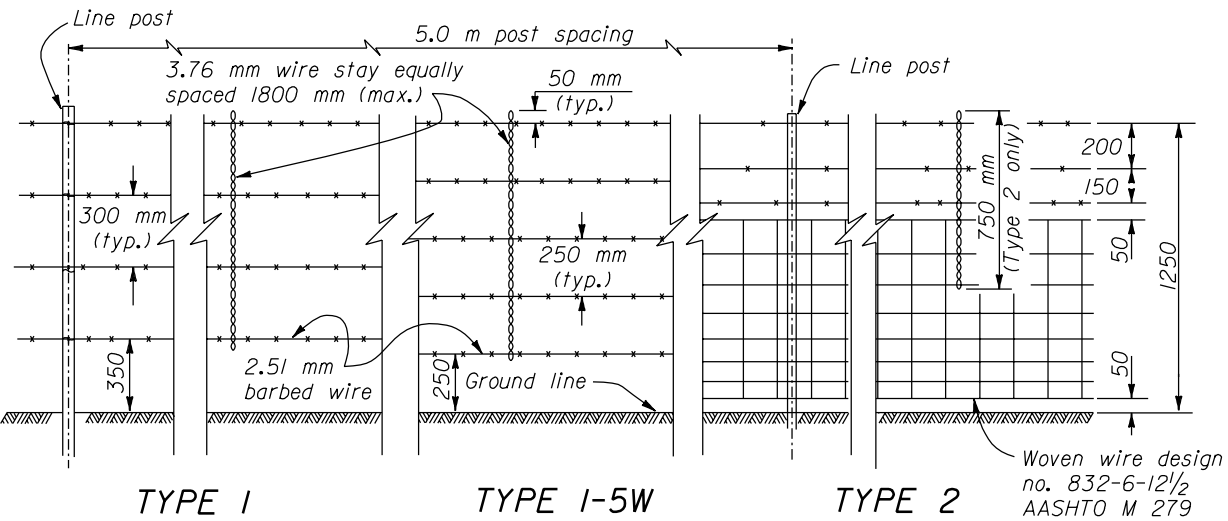
METRIC DETAIL

**MONTANA
ENTRANCE GATES**

DETAIL APPROVED FOR USE 3/2010
REVISED:

DETAIL
WM619-61

NO SCALE



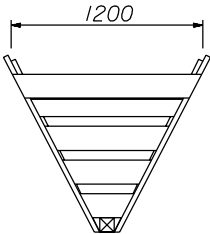
TYPE 1

TYPE 1-5W

TYPE 2

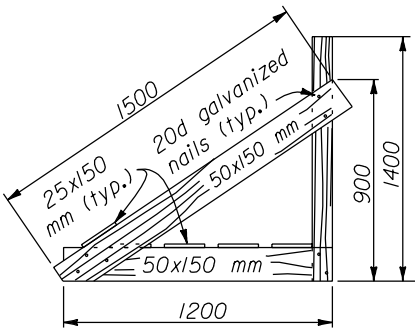
Woven wire design
no. 832-6-12 1/2
AASHTO M 279

MEMBER	WOOD			STEEL		
	ROUND		SQUARE	SHAPE	kg/m (min.) nominal	SIZE nominal
	dia. of small end	min.-max.	SIZE			
	min.-max.	min.	avg.			
Line post	75-100	75	75x75	Tee, channel or U-bar	1.98	U.S. Comm. Standard
Brace	40-140	100	100x100	Round pipe	3.38	approx. 40 mm OD
				Angle	3.63	51x51x6.4 mm
Other posts	100-175	125	125x125	Round pipe	5.43	60.3 mm OD
				Angle	6.10	64x64x6.4 mm

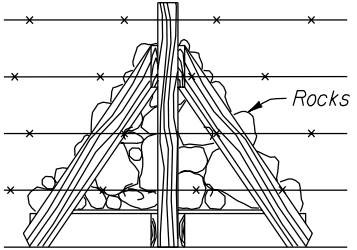


PLAN VIEW

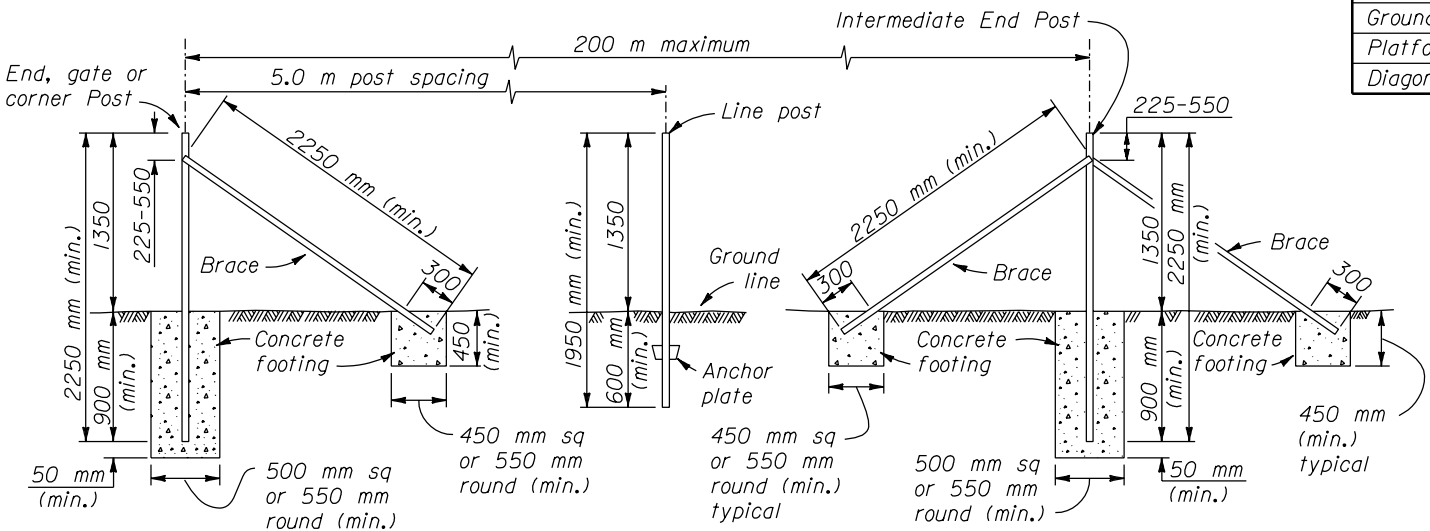
ROCK JACK LUMBER REQUIRED		
Post	1 each	100x150 x 1400 mm
Ground pieces	3 each	50x150 x 1200 mm
Platform	4 each	50x200 x 1200 mm
Diagonal brace	2 each	50x150 x 1500 mm



SIDE VIEW



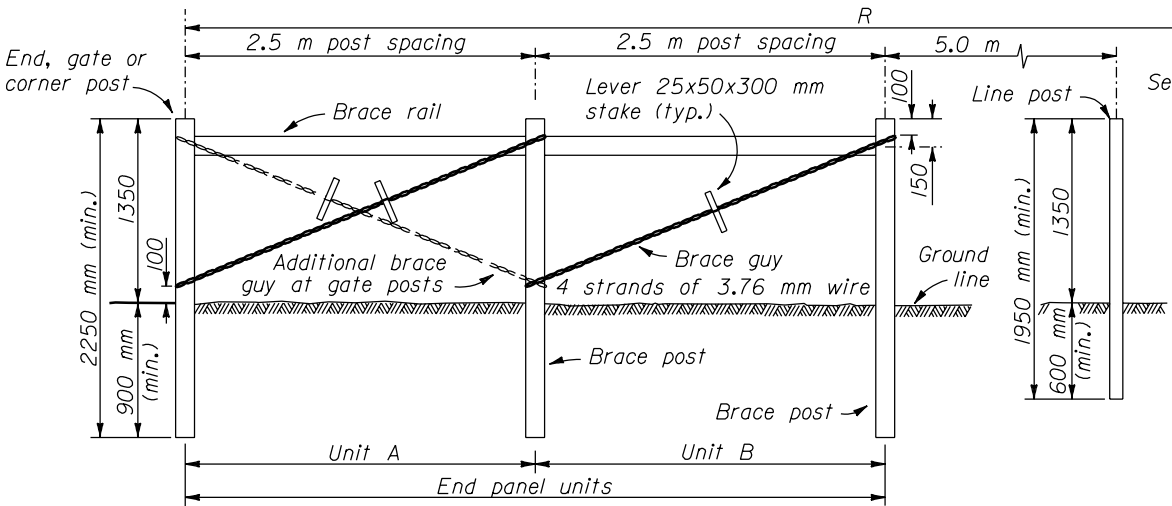
FRONT VIEW



END, GATE OR CORNER BRACE

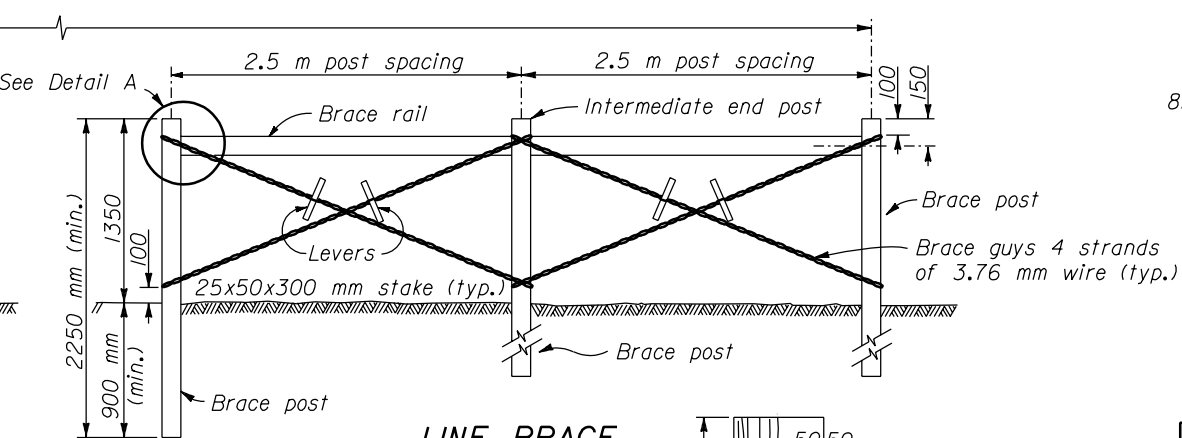
LINE BRACE

ROCK JACK

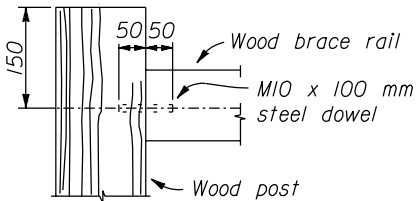


END, GATE OR CORNER BRACE

WOOD POSTS



LINE BRACE



DETAIL A

NO SCALE

END PANEL UNITS		
ALL FENCE TYPES	R	PANELS
	6 or less	None
	6 - 100	A
	Over 100	A & B

NOTE:

- Dimensions not labeled are in millimeters.
- Furnish either zinc coated (galvanized) or aluminum coated steel barbed wire. Fabricate zinc coated barbed wire from two strands of 2.51 mm steel wire with a Class 3 zinc coating and 2 point or 4 point barbs of 2.03 mm zinc coated wire. Fabricate aluminum coated barbed wire from two strands of 2.51 mm aluminum coated steel wire with 4 point barbs of 2.03 mm aluminum coated or aluminum alloy wire.
- Furnish either zinc coated (galvanized) or aluminum coated steel wire fence fabric. If zinc coated fabric is furnished, use Grade 60 fabric with a Class 1 coating.
- Furnish 3.05 mm tie wire or wire clamps for fasteners in metal posts. Galvanize wire stays, tie wire, wire loops, and wire clamps with a Class 1 zinc coating according to ASTM A 641.
- Furnish either painted or galvanized steel fence posts for tee, channel or U bar shapes. Furnish galvanized steel round pipe or steel angle for posts and braces. Fit round pipe posts with snug-fitting galvanized metal caps. Fabricate steel line posts and angles from Type A steel conforming to AASHTO M 281. Fabricate steel pipe posts and braces according to AASHTO M 160.
- Furnish Douglas fir, Western hemlock or Western pine for fence posts, brace rails, rock jacks, and wood stays. Treat the posts and brace rails with creosote, pentachlorophenol, ACZA, or CCA, Type I, A, B, or C.
- Use 50x50x1300 mm minimum length wood stays in areas of heavy snowfall or drifting (over 900 mm). Rest stays firmly on the ground and space as shown for wire stays. Staple all barbed wires, and a minimum of 4 horizontal wires for woven wire fabric, where applicable.
- Rock jacks are acceptable to support the fence across solid rock areas on lieu of posts embedded in concrete.

U.S. DEPARTMENT OF TRANSPORTATION
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WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL

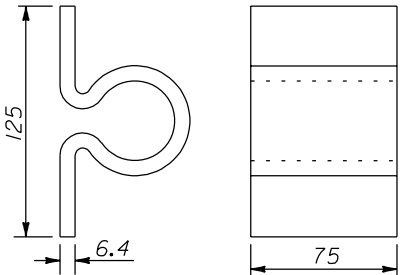
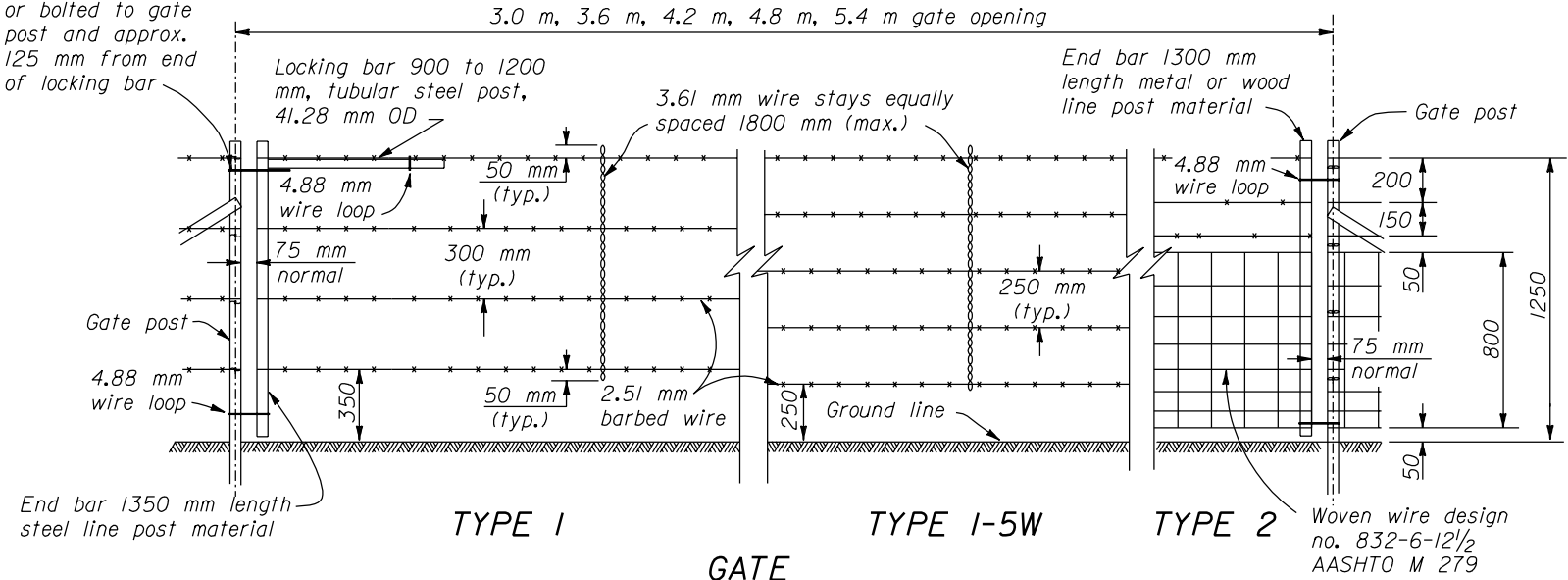
OREGON
RIGHT-OF-WAY FENCES

DETAIL APPROVED FOR USE 3/1996

REVISED:

DETAIL
WM619-70

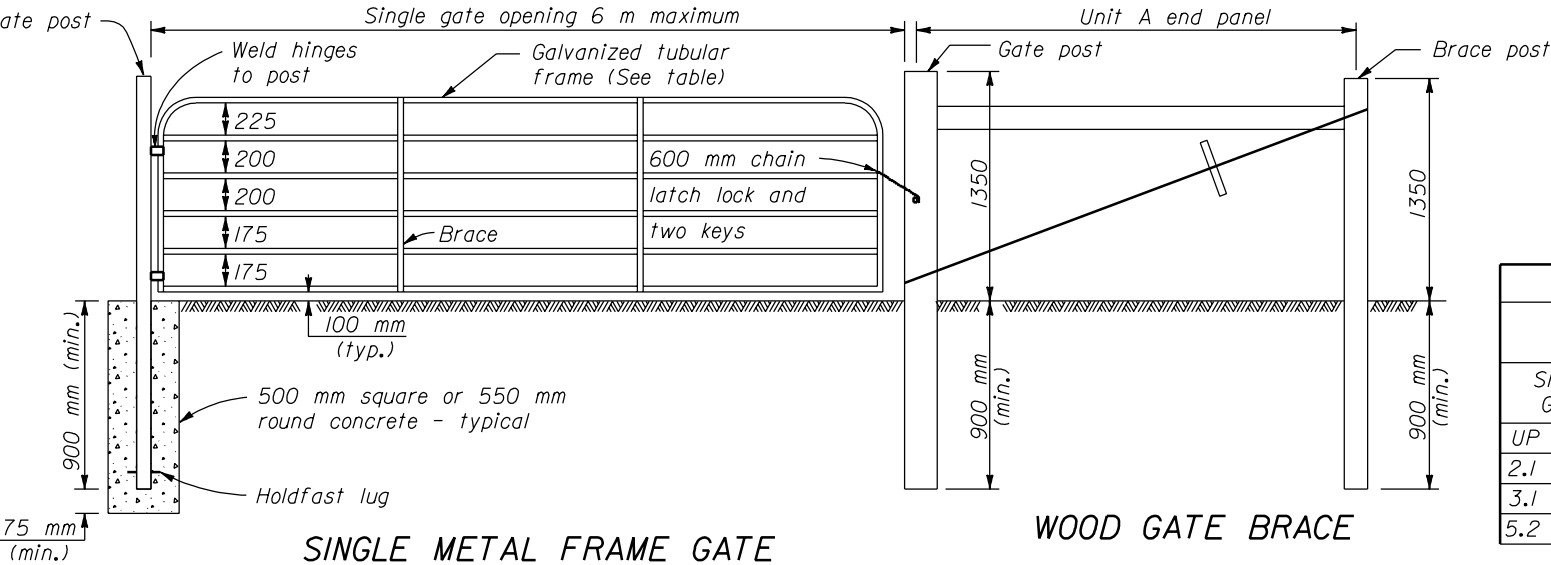
6.4 mm short link
coil chain welded
or bolted to gate
post and approx.
125 mm from end
of locking bar



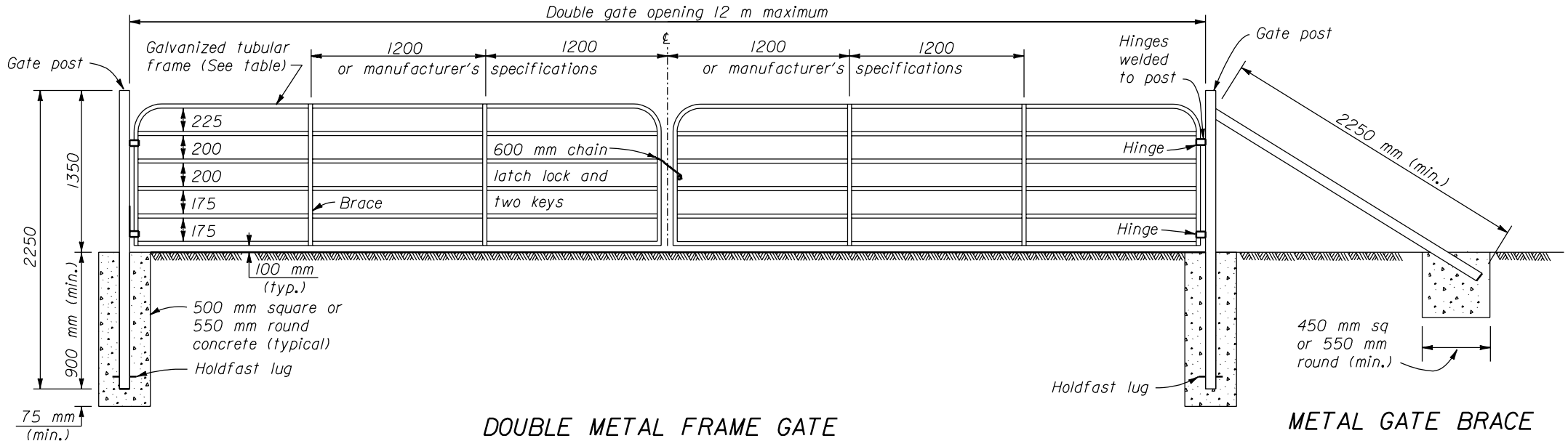
NOTE:

1. Dimensions not labeled are in millimeters.

2. Approved alternate gates may be used.



GATE COMPONENTS						GATE POSTS				
GATE OPENING IN METERS		TUBULAR FRAME		BRACES		WOOD		GALVANIZED STEEL		
						ROUND		SQUARE	TUBULAR	
SINGLE GATE	DOUBLE GATE	DIAMETER <i>nominal</i>	kg/m <i>(min.)</i>	NUMBER	DIAMETER <i>nominal</i>	DIA. OF SMALL END		SIZE <i>nominal</i>	DIAMETER <i>nominal</i>	kg/m <i>(min.)</i>
						<i>min.-max.</i>	<i>min.-avg.</i>			
UP thru 1.8	UP thru 3.1	25.40	2.50	none	---	125-175	150	150x150	6.40	8.62
2.1 thru 3.4	4.0 thru 6.7	31.75	3.38	1	25.40	125-175	150	150x150	88.90	13.56
3.1 thru 4.9	7.0 thru 9.8	38.10	4.05	2	31.75	175-225	200	200x200	152.40	28.23
5.2 thru 6.0	10.0 thru 12.0	50.80	5.43	2	31.75	225-275	250	250x250	152.40	28.23



TYPICAL SAG SECTION - TYPE 1 & 2 FENCES

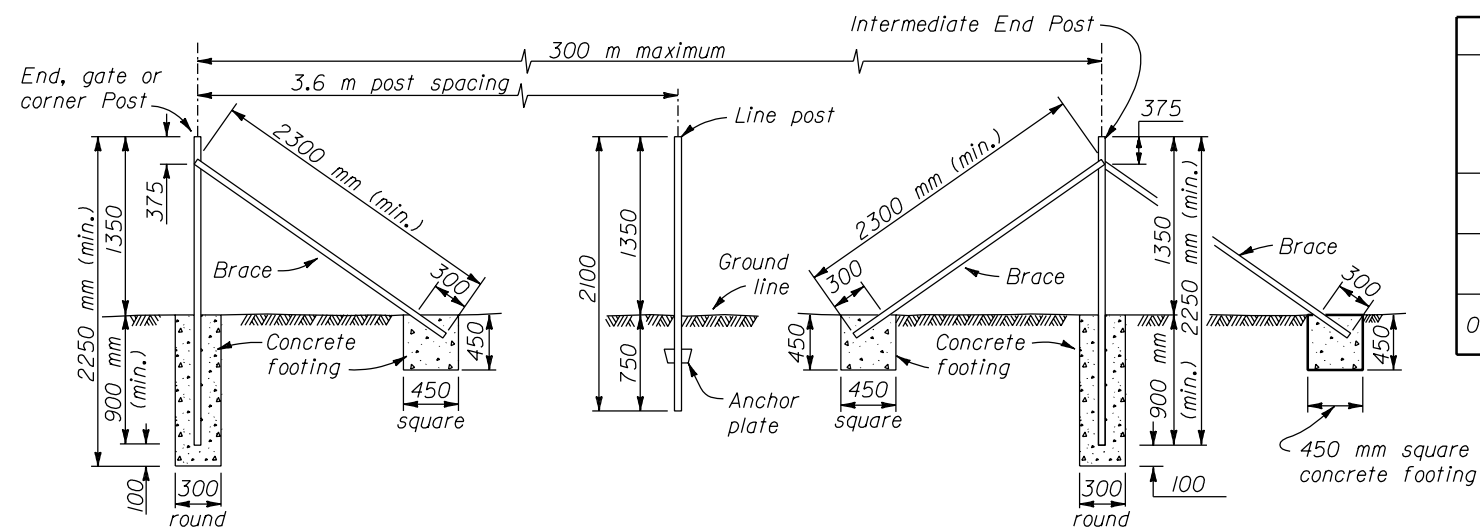
TYPE I

FENCES

NOTE:

1. Dimensions either not labeled are in millimeters.
2. Furnish either zinc coated (galvanized) or aluminum coated steel barbed wire. Fabricate zinc coated barbed wire from two strands of 2.51 mm steel wire with a Class 3 zinc coating and 2 point or 4 point barbs of 2.03 mm zinc coated wire. Fabricate aluminum coated barbed wire from two strands of 2.51 mm aluminum coated steel wire with 4 point barbs of 2.03 mm aluminum coated or aluminum alloy wire.
3. Furnish either zinc coated (galvanized) or aluminum coated steel wire fence fabric. If zinc coated fabric is furnished, use Grade 60 fabric with a Class 3 coating.
4. Furnish 3.05 mm tie wire or wire clamps for fasteners on metal posts and 3.76 mm by 40 mm long wire staples for wood posts. Galvanize wire stays, tie wire, wire loops, and wire clamps with a Class 1 zinc coating according to ASTM A 641.
5. Furnish either painted or galvanized steel fence posts for tee, channel or U bar shapes. Furnish galvanized steel round pipe or steel angle for posts and braces. Fit round pipe posts with snug-fitting galvanized metal caps. Fabricate steel line posts and angles from Type A steel according to AASHTO M 281. Fabricate steel pipe posts and braces according to AASHTO M 160.
6. Furnish Douglas fir, Western red cedar, Hemlock or Larch for fence posts, brace rails, and wood stays. Treat the posts and brace rails with creosote, penta-chlorophenol, ACZA, or CCA, Type I, A, B, or C.

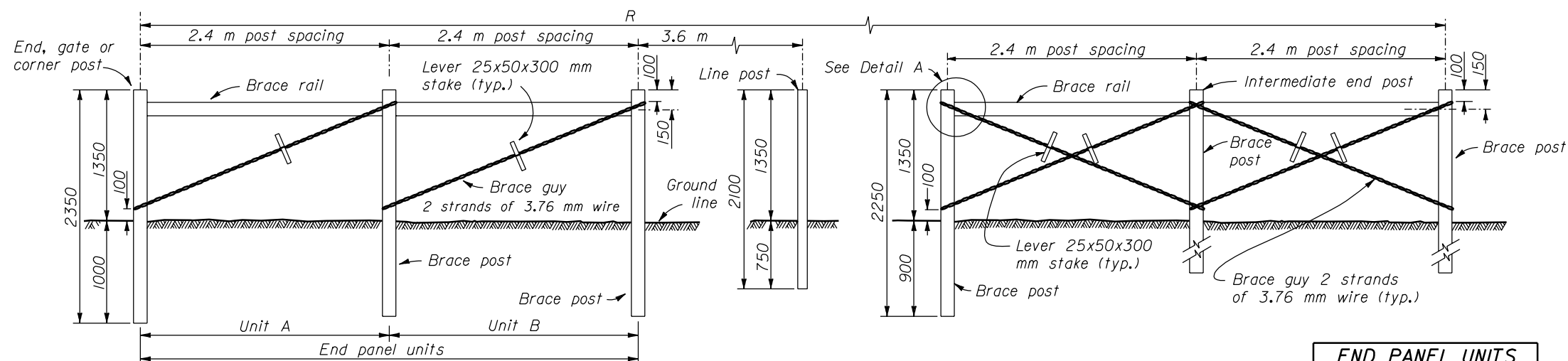
POST DIMENSIONS					
MEMBER	WOOD		STEEL		
	ROUND	SQUARE	SHAPE	kg/m (min.) nominal	SIZE nominal
	Dia. of small end (min.)	SIZE nominal			
Line post	75	75x75	Tee, channel or U-bar	1.98	U.S. Comm. Standard
Brace	150	150x150	Round pipe	3.38	approx. 40 mm OD
			Angle	3.63	51x51x6.4 mm
Other posts	150	150x150	Round pipe	5.43	60.3 mm OD
			Angle	6.10	64x64x6.4 mm



END, GATE OR CORNER BRACE

LINE BRACE

STEEL POSTS



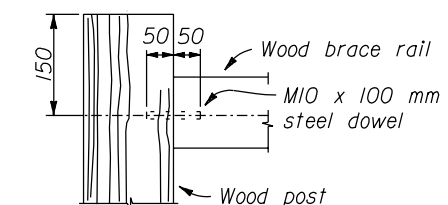
END, GATE OR CORNER BRACE

WOOD POSTS

LINE BRACE

END PANEL UNITS		
ALL FENCE TYPES	R	PANEL
	6 or less	None
	6 - 100	A
	Over 100	A &

NO SCALE



DETAIL A

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

METRIC DETAIL	
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WASHINGTON FENCE

DETAIL APPROVED FOR USE 3/1996

DETAIL
WM619-80

