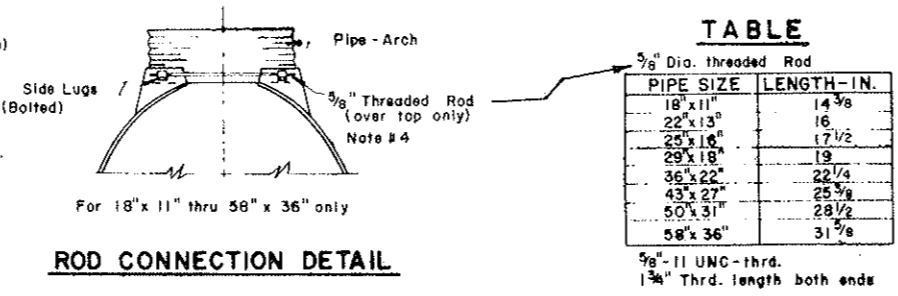
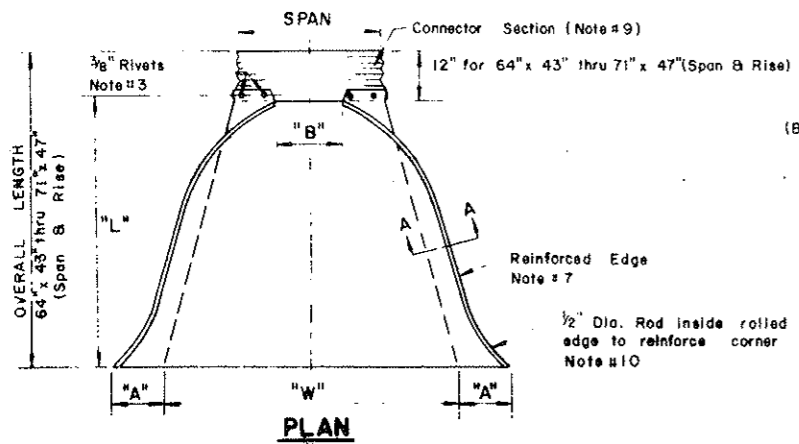


CORRUGATED ALUMINUM PIPE ARCH CULVERTS AND END SECTIONS



TABLE

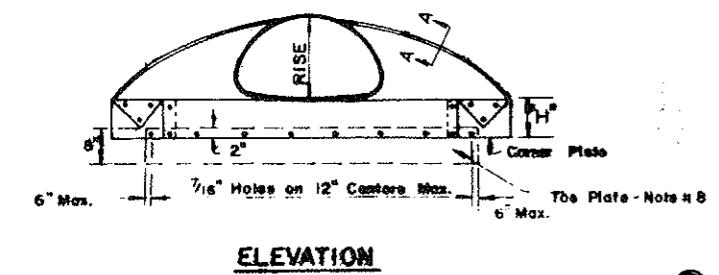
PIPE SIZE	LENGTH-IN.
18"x11"	14 3/8
22"x13"	16
25"x16"	17 1/2
29"x18"	19
36"x22"	22 1/4
43"x27"	25 3/8
50"x31"	28 1/2
58"x36"	31 3/8

5/8" Dia. threaded Rod
5/8"-11 UNC-thrd.
1 3/4" Thrd. length both ends

PIPE ARCH DIMENSION		THICK.	END SECTION DIMENSIONS					APPROX. SLOPE RATE	BODY PIECE
SPAN	RISE		A	B	H	L	W		
In.	In.		In.	In.	In.	In.	In.		
17	13	.060	7	9	6	19	30	2 1/2:1	1
21	15	.060	7	10	6	23	36	2 1/2:1	1
24	18	.080	8	12	6	28	42	2 1/2:1	1
28	20	.060	9	14	6	32	48	2 1/2:1	1
35	24	.075	10	16	6	39	60	2 1/2:1	1
42	29	.075	12	18	8	47	75	2 1/2:1	1
49	33	.105	13	21	9	53	85	2 1/2:1	2
57	38	.105	18	26	12	63	90	2 1/2:1	2
64	43	.105	18	30	12	70	102	2 1/4:1	2
71	47	.105	18	33	12	77	114	2 1/4:1	3

- END SECTION NOTES:**
- End Section shall be made in accordance with specifications M-196.
 - Corner Plate shall be the same material and thickness as end section.
 - Rivets shall be Aluminum Alloy 6053-T4.
 - Threaded Rods shall be Aluminum Alloy 6061-T6.
 - Side Lugs, Bolts and Nuts shall be Hot-Dipped Galvanized Steel.
 - Multiple panel bodies shall have 2" Lap Seams which are to be tightly joined with 3/8" diameter rivets spaced 6" C-C.
 - Top edge of all End Sections to have rolled edge reinforcement (See Section A-A).
 - Aluminum Alloy Toe Plate required on End Sections for Pipe Arch of 29" rise or larger. Plate to be fastened to End Section in field thickness of Toe Plate to be same as End Section. Where Toe Plate is needed, the Toe Plate, Nuts & Bolts are to be included in price bid for End Sections.
 - Connector Section, when specified, shall be Corrugated Aluminum Alloy Pipe Arch Culvert.
 - Reinforcement for edge of End Section shall be alloy 6063-F.
 - Connecting Bands shall conform to AASHTO M-196.

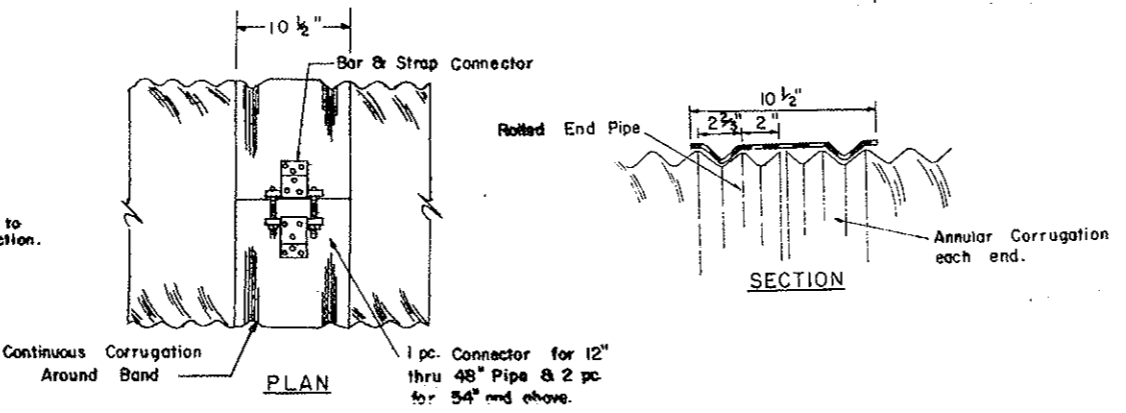
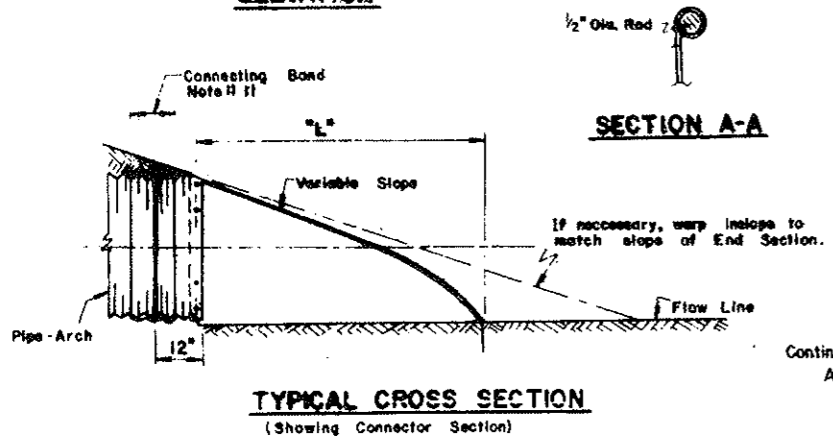
* These sizes have 0.135 in. thick center panels.
Manufacturers tolerances of above dimensions will be allowed.



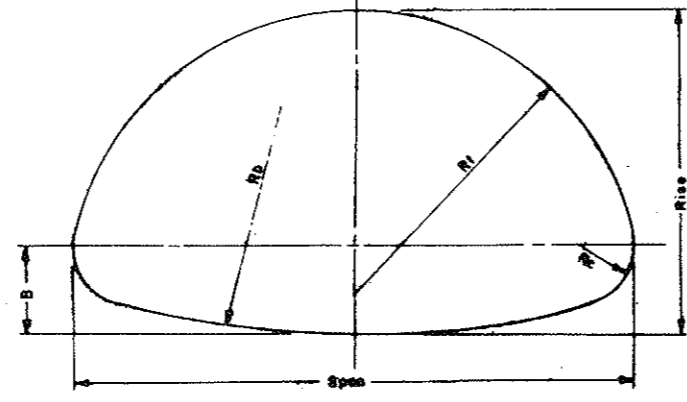
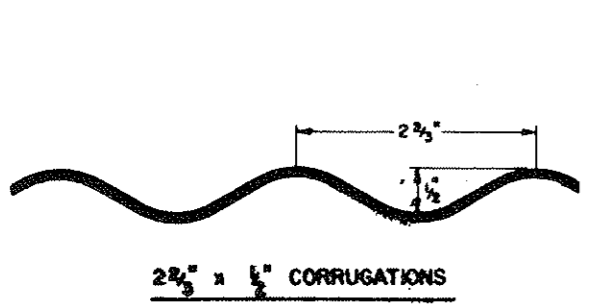
**RIVETED OR HELICAL FABRICATION
2 3/8" x 1/2" INCH CORRUGATIONS**

SPAN	RISE	MIN. COVER	MAXIMUM FILL HEIGHT (FEET) FOR METAL THICKNESS				
			.060	.075	.105	.135	.164
18	11	18	15				
22	13	18	14				
25	16	18	12				
29	18	18	10				
36	22	18	9				
43	27	18	9				
50	31	18		8			
58	36	18			8		
65	40	18				8	
72	44	18					8

- Fill Height Table is based on the following criteria:
- Embankment weight = 120 lb/ft³.
 - Max. pipe deflection = 5%
 - Bedding - Class C
 - Compaction = 95% Proctor Density
 - Modulus of passive soil resistance (E') = 1400 psi
 - H = 20 Live Load
 - Corner bearing pressure = 2 tons/ft²



CONNECTING BAND DETAILS FOR HELICAL, WELDED-SEAM CULVERT



- PIPE ARCH CULVERT NOTES:**
- All dimensions are measured from the inside crests of the corrugations. A tolerance of plus or minus one inch will be permissible in span, rise, and B. The dimension B shall be measured vertically from a horizontal line drawn across the widest portion of the arch.

The lapped longitudinal seams shall be factory riveted and shall be staggered so as to alternate on each side of the center of the top of the arch by approximately fifteen per cent of the periphery.

Pipe Arch Culverts shall conform to the applicable requirements of AASHTO M-196 or M219-66.

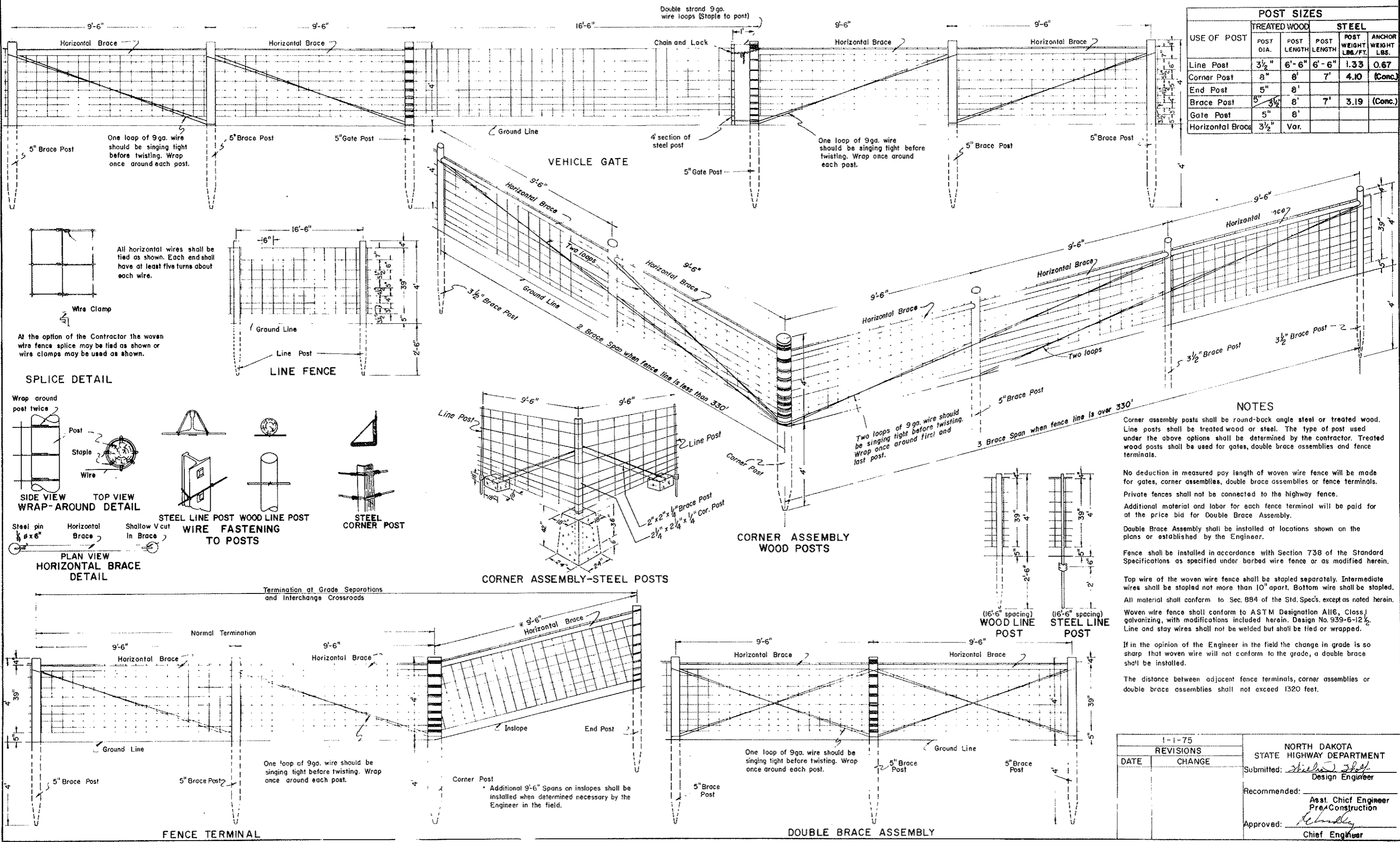
DIAM. OF PIPE OF EQUAL PERIPHERY	SPAN	RISE	WATERWAY	LAYOUT DIMENSIONS			
				B	Rc	Rt	Rb
IN.	IN.	IN.	SQ.FT.	IN.	IN.	IN.	IN.
15	18	11	1.1	4 1/2	3 1/2	10 1/2	19 1/2
18	22	13	1.6	4 3/4	4	11 1/2	37 1/2
21	25	16	2.2	5 1/4	4	12 3/4	33 1/2
24	29	18	2.8	5 1/2	4 1/2	14 3/4	55
30	36	22	4.4	6 1/4	5	18 1/4	73 1/2
36	43	27	6.4	7	5 1/2	21 3/8	91 1/2
42	50	31	8.7	8	6	25 1/2	97 1/2
48	58	36	11.4	9 1/4	7	29 1/2	115 1/2
54	65	40	14.3	10 1/2	8	32 1/4	129 1/2
60	72	44	17.6	11 3/4	9	36 3/8	142 1/2

8-1-74		NORTH DAKOTA STATE HIGHWAY DEPARTMENT
REVISIONS		
DATE	CHANGE	Submitted: <i>R. Johnson</i> Design Engineer
R-5-74 1-1-75	General Connecting Band	Recommended: <i>Asst. Chief Engineer Pre-Construction</i>
		Approved: <i>Chief Engineer</i>

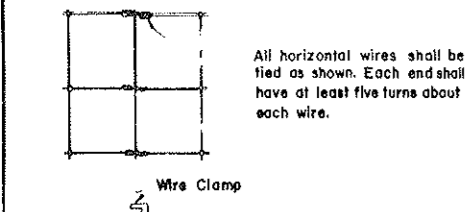
STANDARD WOVEN WIRE FENCE

FID. ROAD DIV. NO.	STATE	FID. AND PROJ. NO.	DATE
8	N.D.	F-1-094(03)	94

D-738-3

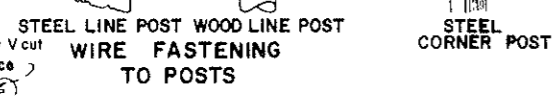
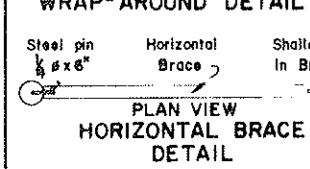
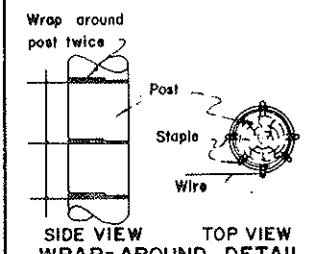


USE OF POST	TREATED WOOD		STEEL	
	POST DIA.	POST LENGTH	POST LENGTH	ANCHOR WEIGHT LBS.
Line Post	3 1/2"	6'-6"	6'-6"	0.67
Corner Post	5"	8'	7'	4.10 (Conc.)
Brace Post	5"	8'	7'	3.19 (Conc.)
Gate Post	5"	8'		
Horizontal Brace	3 1/2"	Var.		

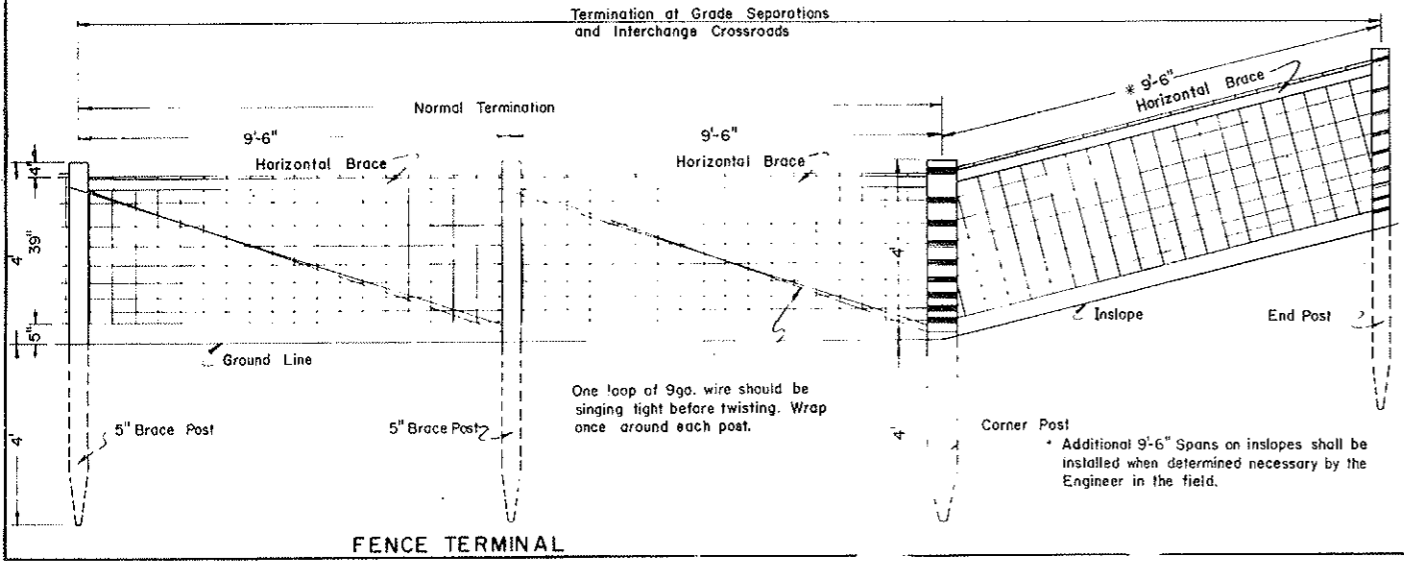


At the option of the Contractor the woven wire fence splice may be tied as shown or wire clamps may be used as shown.

SPLICE DETAIL

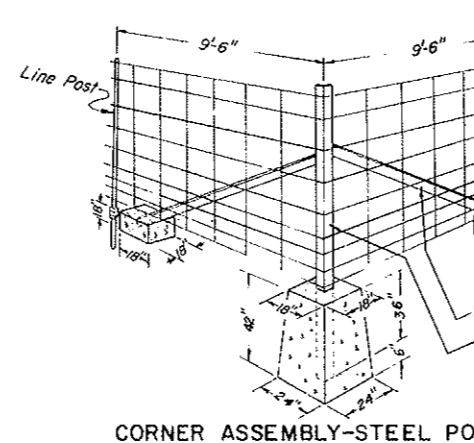
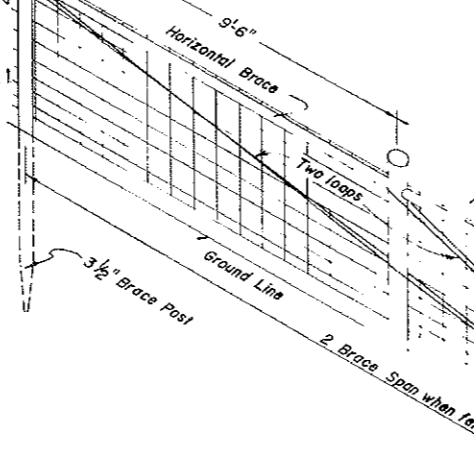


STEEL LINE POST WOOD LINE POST
WIRE FASTENING TO POSTS
STEEL CORNER POST

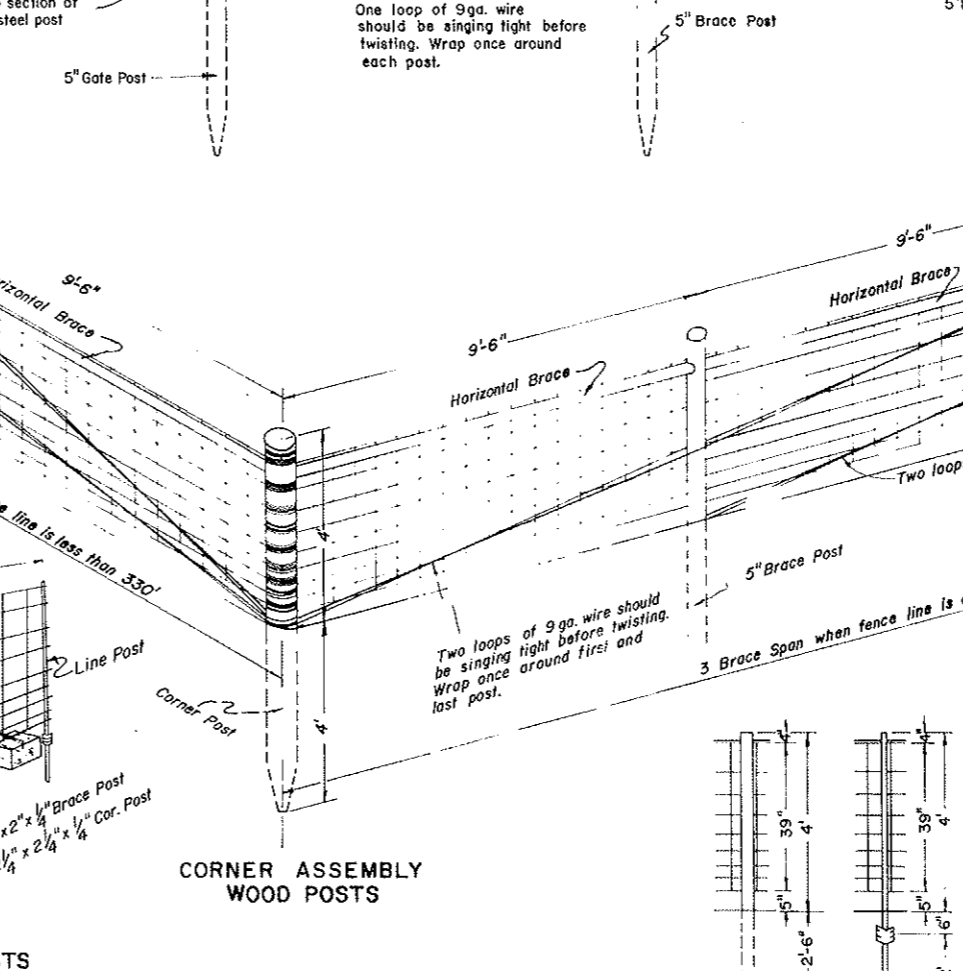


FENCE TERMINAL

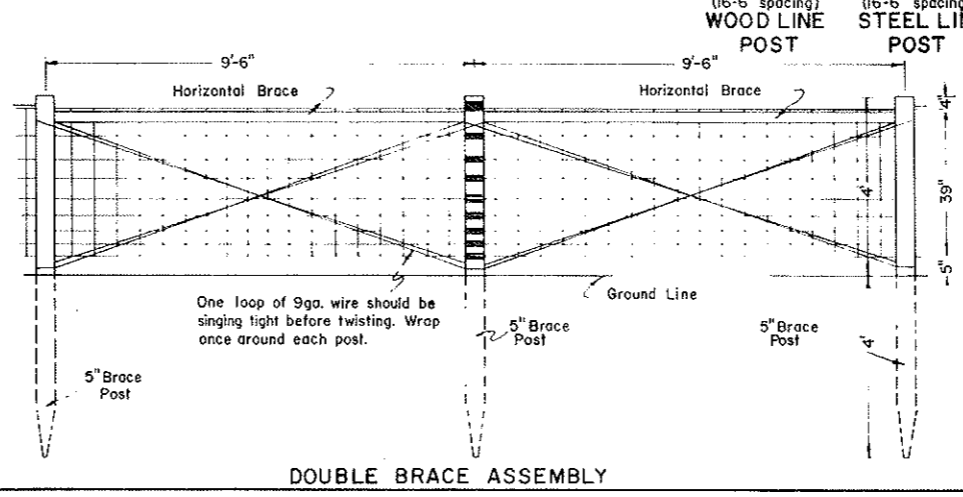
VEHICLE GATE



CORNER ASSEMBLY-STEEL POSTS



CORNER ASSEMBLY WOOD POSTS



DOUBLE BRACE ASSEMBLY

NOTES

Corner assembly posts shall be round-back steel or treated wood. Line posts shall be treated wood or steel. The type of post used under the above options shall be determined by the contractor. Treated wood posts shall be used for gates, double brace assemblies and fence terminals.

No deduction in measured pay length of woven wire fence will be made for gates, corner assemblies, double brace assemblies or fence terminals. Private fences shall not be connected to the highway fence. Additional material and labor for each fence terminal will be paid for at the price bid for Double Brace Assembly.

Double Brace Assembly shall be installed at locations shown on the plans or established by the Engineer.

Fence shall be installed in accordance with Section 738 of the Standard Specifications as specified under barbed wire fence or as modified herein.

Top wire of the woven wire fence shall be stapled separately. Intermediate wires shall be stapled not more than 10' apart. Bottom wire shall be stapled. All material shall conform to Sec. 884 of the Std. Specs. except as noted herein.

Woven wire fence shall conform to ASTM Designation A116, Class 1 galvanizing, with modifications included herein. Design No. 939-6-12 1/2. Line and stay wires shall not be welded but shall be tied or wrapped.

If in the opinion of the Engineer in the field the change in grade is so sharp that woven wire will not conform to the grade, a double brace shall be installed.

The distance between adjacent fence terminals, corner assemblies or double brace assemblies shall not exceed 1320 feet.

1-1-75		NORTH DAKOTA STATE HIGHWAY DEPARTMENT
REVISIONS		
DATE	CHANGE	Submitted: <i>Stewart J. [Signature]</i> Design Engineer
		Recommended: <i>[Signature]</i> Asst. Chief Engineer Pre-Construction
		Approved: <i>[Signature]</i> Chief Engineer

73B