



U.S. DEPARTMENT OF COMMERCE BUREAU OF PUBLIC ROADS

PLANS FOR PROPOSED COLORADO FOREST HIGHWAY PROJECT 15-2(2) MCCLURE PASS LENGTH 4.460 MILES CLASS 2 WHITE RIVER & GUNNISON NATIONAL FORESTS PITKIN & GUNNISON COUNTIES

REGION 9 STATE COLORADO
PROJECT 15-2(2), McClure Pass
SHEET 1 OF SHEETS

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1	Title Sheet	
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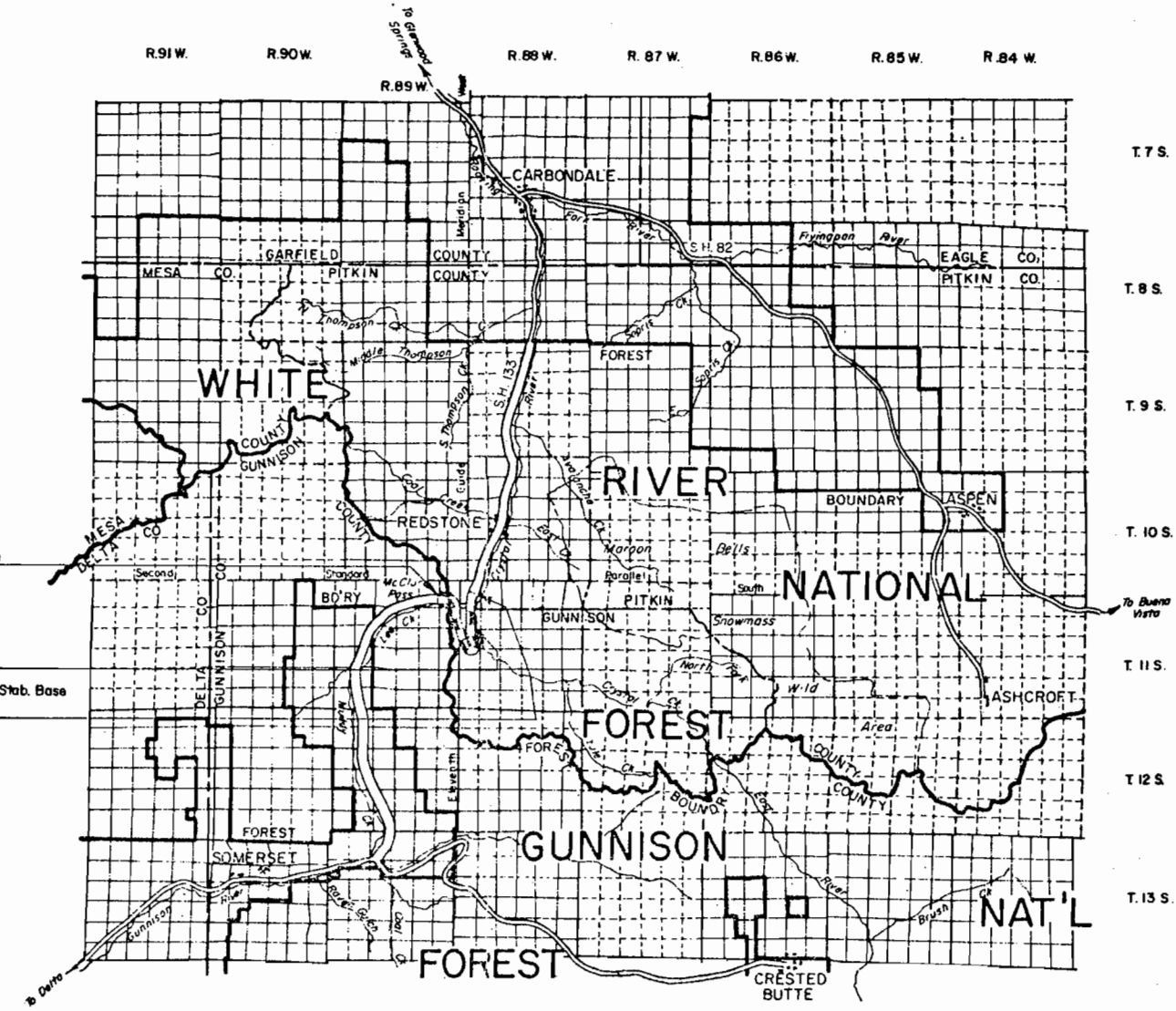
Plans prepared by B.P.R.
Date: August, 1965

Description of Project
Improvements: Grading & Bit. Stab. Base
Roadbed Width:
Grading: 42'
Base: 30'
Type Code: 2013

Traffic Volume
A.D.T. (1965): 100
A.D.T. (1985): 300
D.H.V.: 45
D: 65%
T: 10%
V: 30



Begin Proj. 15-2(2)
Sta. 1130+20
Bit. Stab. Base
Sta. 1294+50
Grading & Bit. Stab. Base
End Proj. 15-2(2)
Sta. 1365+52.33

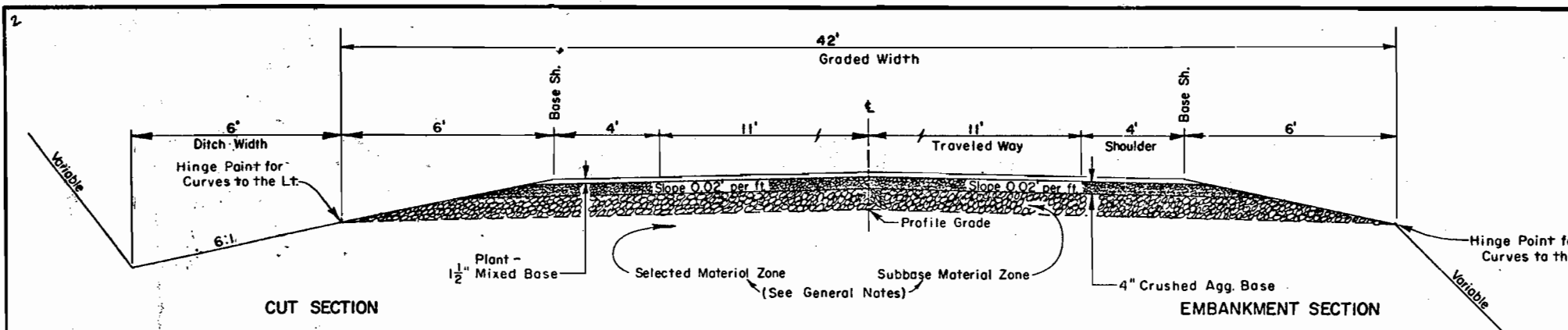


LEGEND

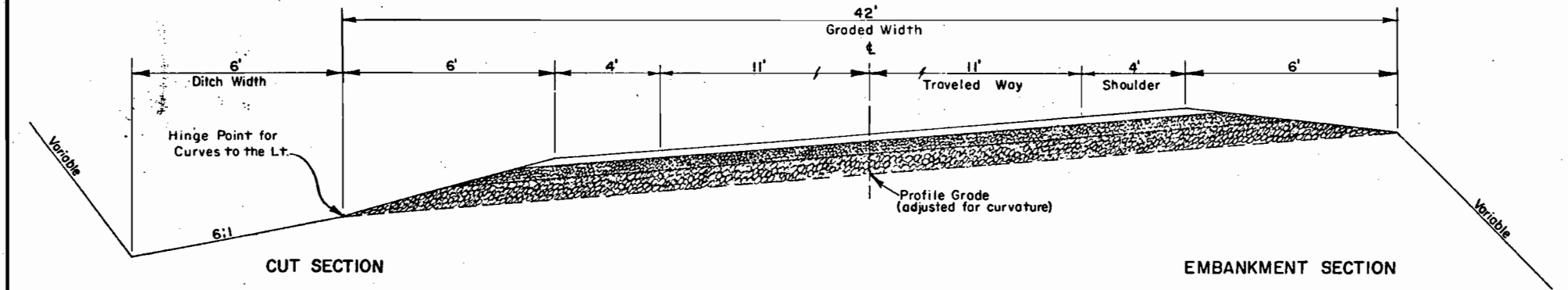
EXISTING ROAD	UNIMPROVED	GRADED	REINFORCED	BASE	SURFACE	NO. ON PLANT	CONCRETE

U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

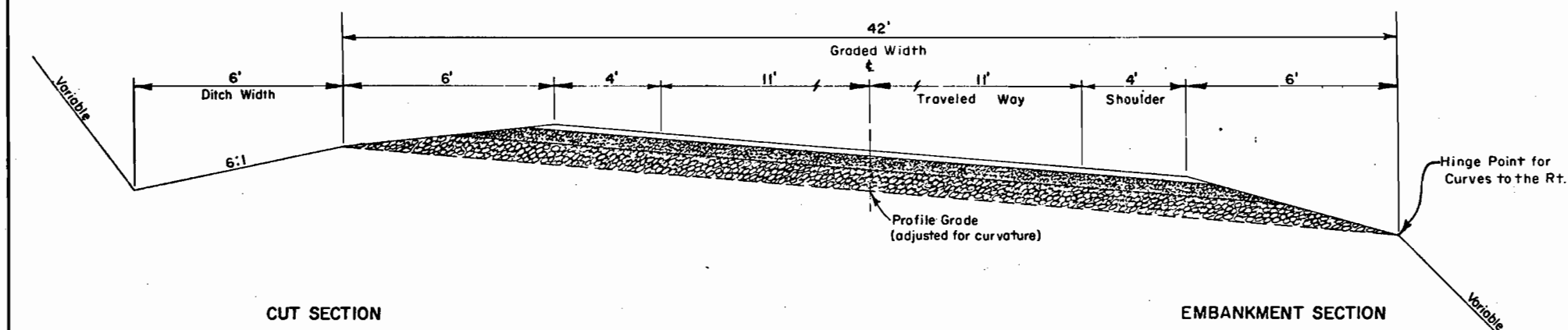
APPROVED: _____ DATE _____ 19__
REGIONAL ENGINEER



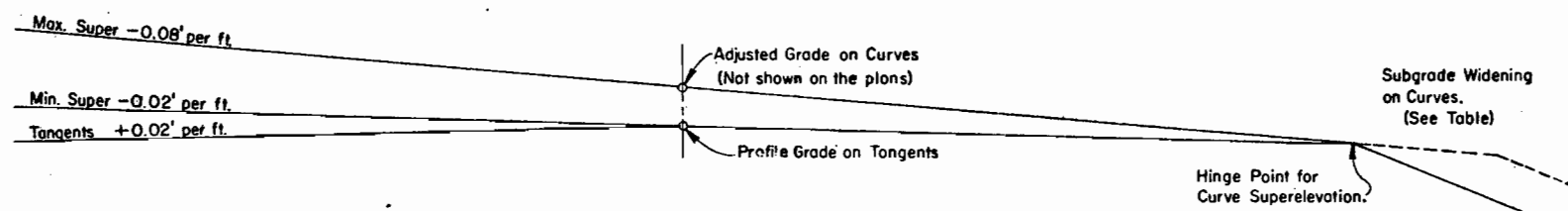
TYPICAL SECTION ON TANGENTS



TYPICAL SECTION FOR CURVES LT.
(MAXIMUM SUPERELEVATION)



TYPICAL SECTION FOR CURVES RT.
(MAXIMUM SUPERELEVATION)

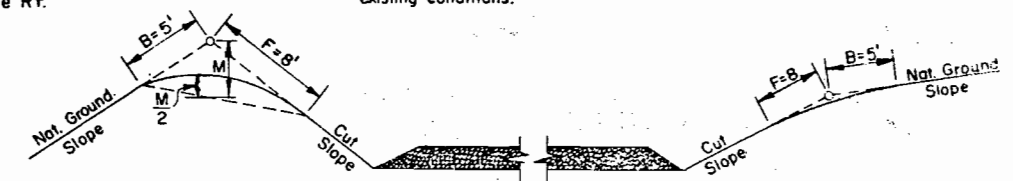


METHOD OF SUPERELEVATING ON CURVES

HEIGHT	EMBANKMENT SLOPE
0' to 3'	6:1
3' to 6'	4:1
6' to 12'	2:1
12' and up	2:1

HEIGHT	CUT SLOPE
0' to 5'	3:1
5' to 10'	2:1
10' and up	1 1/2:1

The above tables are to be used as a guide in the design and construction of the project. The designer or field engineer may vary from these to fit existing conditions.



CUT SLOPE ROUNDING

When the cut slope is less than 8', reduce B & F distance to the actual slope distance.

Slope Rounding shall be considered as a subsidiary part of the work required in dressing the cut slopes and no allowance will be made for materials moved.

Rounding, Warping, and Finishing slopes shall be as provided in Standard Specifications and/or Special Provisions.

STABILIZING MATERIALS

STATION TO STATION	Subbase Material Zone		Selected Material Zone	
	Item	Depth	Item	Depth
1130+20 to 1365+52.33	104(2)	6"		

GENERAL NOTES

The Typical Section and the table above show a "Selected Material Zone" and a "Subbase Material Zone". These terms are for defining locations and depths of materials only, and are not to be considered as pay items having similar names. The "Selected Material Zone" lies below the profile grade (adjusted for curvature where appropriate). The "Subbase Material Zone" lies above the profile grade and just below the base course zone.

Where the plans show special material to be placed in the "Selected Material Zone", the roadway excavations and embankments shall be constructed to the grade that will allow for the required thickness. The thicknesses of materials shown in the above table are based on laboratory analysis of samples taken at random along the proposed construction. During construction, the engineer will adjust the thicknesses as necessary to insure adequate structural stability, including the placing of Section 104 materials in the "Selected Material Zone", and the placing of Section 102 materials in the "Subbase Material Zone". Section 102 materials will not be placed on top of Section 104 materials.

On grades of 3% or less, where wet or unstable conditions exist, the engineer may increase the ditch width 3 feet or more.

Any subsurface data represented on these plans is limited to the specific locations shown and those locations alone.

CURVE WIDENING*

Degree of Curve	Pavement Width		
	20'	22'	24'
5°-10°	2'	-	-
11°-21°	3'	2'	-
22° & Up	4'	3'	2'

* Widen Subgrade, Base and Surfacing.

U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

TYPICAL CROSS SECTIONS

NATIONAL FOREST HIGHWAYS

ROUTE: McClure Pass ROADBED WIL-1-11
 PROJECT: 15-2(2), Grading & Bit Starp Base GRADED: 4.2' SH 11
 NATIONAL FOREST: White River & Gunnison BASE: 30' SH 11
 COUNTY: Pitkin & Gunnison SURFACE: 5.1' SH 11
 STATE: Colorado

DESIGNED BY: 4-1961
 DRAWN BY: 4-1961

Revisions 7/1961, 9/1964

SUMMARY OF ESTIMATED QUANTITIES

The following quantities are approximate. Payment will be made only for the quantities of work performed or materials furnished in accordance with the contract.

SUMMARY OF QUANTITIES

ITEM NO.	100(1)	106	102(1)				102(4)	104(2)	105(2)	108(1)	109(1)	200(4)	217(1)	217(2)	310(4)	
STATION TO STATION	Clearing and Grubbing	Embank- ment Prism	Unclassified Excavation				Borrow Excava- tion, Case 1	Special Subbase, Grading B	Yard Mile Overhaul	Watering	Rolling	Crushed Aggregate Base, Grading E	Plant- Mixed Base	Asphalt Cement, 120-150 Pen., Plant- Mixed Base	Asphalt, Grade MC-0 or 1, Prime Coat	
			Prism	Channel Changes	Subgrade and Stripping and Storing Topsoil	Slides and Cleaning Existing Ditches										
	Acres	Cu. Yd.	Cu. Yd.	Cu. Yd.	Cu. Yd.	Cu. Yd.	Cu. Yd.	Ton	Yd.-Mi.	Unit	Hour	Ton	Ton	Ton	Ton	
1294+50 to 1310+00	-	100	-100													
1310+00 to 1334+47	6.2	30,729	33,802	1,062			4,000		300							
1334+47 to 1343+47	1.6	8,038	8,842													
1343+47 to 1345+23	0.6	1,718	1,890													
1345+23 to 1365+52.33	2.6	9,931	9,931													
Service Road																
1304+00 to 1325+25 Lt.		1,100	50													
Approach Roads																
1294+01 Rt.		Quantities included in prism quantities														
1304+01 Rt.																
1316+00 Lt. & Rt.																
Parking Areas																
1152+50 to 1153+50 Lt.																
1176+50 to 1177+50 Lt.																
1192+00 to 1194+75 Lt.																
1192+25 to 1201+50 Lt.																
1224+00 to 1226+00 Lt.																
1244+50 to 1244+00 Lt.																
1254+50 to 1255+50 Lt.																
1274+75 to 1277+25 Rt.																
1284+25 to 1287+00 Rt.																
1294+00 to 1304+00 Rt.																
1304+25 to 1307+50 Rt.																
1314+00 to 1314+00 Rt.																
Subtotals		51,618	51,617	1,062	11,500	5,000										
Summary of Unclassified Excavation																
Prism			51,617													
Channel changes			1,062													
Subgrade and stripping and storing topsoil			11,500													
Slides and cleaning existing ditches			5,000													
Culvert inlets and outlets			15													
Total			72,194													
Subbase																
Base																
Prism																
Plant-Mixed Base																
Length	Width	Sq. Ft.	Depth	Cu. Ft.	Width	Sq. Ft.	Depth	Cu. Ft.	Width	Sq. Ft.	Width	Sq. Yds.	Width	Sq. Ft.	Depth	Cu. Ft.
Connection	120	Variable	16,380	6"	8,190	Variable	14,280	4"	4,760	Variable	14,280	1,587	Variable	11,440	1.5"	1,680
1144+25 to 1365+52	23,548	16'	84,728	6"	423,864	31.5'	741,762	4"	247,254	31.5'	741,762	82,418	30'	706,440	1.5"	88,305
Shoulders	23,548	1'	70,644	6"	35,322	2.25'	52,981	4"	17,661	4.5'	105,966	11,774	0.75'	17,661	1.5"	2,208
Curve Widening	6,300	2'	12,600	6"	6,300	2'	12,600	4"	4,200	2'	12,600	1,400	2'	12,600	1.5"	1,575
Service Road	1,725	21'	36,225	6"	18,113	19'	32,775	4"	10,925	19'	32,775	3,842	18'	31,050	1.5"	3,881
Approach Roads	Variable	Variable	12,600	6"	6,300	Variable	9,000	4"	3,000	Variable	9,000	1,000	Variable	7,800	1.5"	975
Parking Areas	Variable	Variable	41,500	6"	20,750	Variable	41,500	4"	13,833							
Totals					518,830				301,633			101,821			98,624	
Totals	11.0	51,618	72,194	-	-	-	4,000	36,319	300	2,755	707	21,114	7,249	423	122	
Use	11	-	75,000	-	-	-	4,000	39,000	400	2,900	750	22,000	7,600	1,500	130	

Project: _____

Stations: 1130+20 to 1365+52.33

Length: 4.460 miles

Widths: _____

Grading: 4.2 feet

Base: 30 feet

Special subbase, grading B, depth 6 inches, weight 110 lbs. per cu. ft.

Crushed aggregate base, grading E, depth 4 inches, weight 110 lbs. per cu. ft.

Asphalt, grade MC-0 or 1, prime coat, 0.30 gallons per sq. yd.

Plant-mixed base, depth 1.5 inches, weight 117 lbs. per cu. ft.

Asphalt cement, 120-150 penetration, plant-mixed base, 6.2 percent by weight.

Type Code: 2013

SUMMARY OF QUANTITIES

McClure Pass ROUTE: 16

PROJECT: 15-2(2), Grading and Bituminous Stabilized Base

STATE: Colorado COUNTY: Pitkin and Gunnison

NATIONAL: FOREST, White River and Gunnison

Sheet 1 of 2 Sheets

Computed by: J. L. Smith Date: 1-23-1966
 Checked by: J. L. Smith Date: 1-23-1966
 Corrected by: J. L. Smith Date: 2-23-1966

Bureau of Public Roads, Region 9, Denver, Colo.

Compiled by: J. L. Smith Date: April, 1966
Checked by: J. L. Smith Date: April, 1966
Corrected by: J. L. Smith Date: August, 1966

Bureau of Public Roads Region 9 Denver, Colo.

SUMMARY OF ESTIMATED QUANTITIES

The following quantities are approximate. Payment will be made only for the quantities of work performed or materials furnished in accordance with the contract.

SUMMARY OF STRUCTURE QUANTITIES

ITEM NO.	102(1)	103(1)	45(1)				46(2)			510(1)	STATION TO STATION	103(1)	520(1)	520(7)	560(2)	560(5)	564(1)	583(2)
STATION TO STATION	Uncl. Excav. Culvert Inlets and Outlets	Excav. for Structures	Galvanized Corrugated Metal Pipe				Metal End Sections for Pipe Culverts			Loose Riprap		Excav. for Structures	8-inch Perf. Corr. Metal Pipe Under-drain	Porous Backfill Material	Maint. Marker Posts	Delin-enters	Comb. Wire Fence, Type 3-C	Galvan. Beam-Type Guard-rail
			24-inch 14-gage	30-inch 14-gage	36-inch 12-gage	48-inch 12-gage	24-inch 14-gage	30-inch 14-gage	36-inch 14-gage									
	Cu. Yd.	Cu. Yd.	Lin. Ft.	Lin. Ft.	Lin. Ft.	Lin. Ft.	Each	Each	Each	Cu. Yd.		Cu. Yd.	Lin. Ft.	Cu. Yd.	Each	Each	Lin. Ft.	Lin. Ft.
1104+00 (Service Rd. Lt.)			30				2				Underdrain							
1116+00 (Approach Rd. Lt.)			30				2				1347+00 to 1350+00 Lt.	186	380	186				
1116+00 (Approach Rd. Rt.)			30				2				Maintenance Marker Posts							
1124+50	10	30	61		60		1-14		1-14		1320+00 to 1360+00 (Every 10 stations)				5			
1127+00											Delineators							
1131+50		15	82				1-14				1130+20 to 1360+52 (Spaced as shown in delineator interval table)					400		
1139+50		10				88					Fence							
1147+50	5	70	62				1-14				1310+50 to 1324+50 Lt. & Rt.						2,800	
1151+00		105		88							Guardrail							
1157+00		280	104								1131+70 to 1138+50 Rt.						790	
											1152+50 to 1153+50 Lt.						1,100	
											1159+50 to 1163+50 Rt.						400	
											1195+50 to 1199+50 Lt.						400	
											1200+50 to 1209+50 Lt.						500	
											1207+00 to 1219+00 Lt.						1,200	
											1221+00 to 1231+00 Lt.						2,000	
											1232+00 to 1267+00 Lt.						2,500	
											1264+00 to 1264+50 Lt.						250	
											1256+50 to 1273+50 Rt.						1,700	
											1279+00 to 1284+00 Lt.						500	
											1288+00 to 1298+00 Rt.						1,000	
											1301+00 to 1305+50 Rt.						450	
											1320+50 to 1332+75 Rt.						1,225	
											1336+50 to 1344+00 Rt.						750	
											1351+75 to 1351+25 Rt.						250	
											1356+00 to 1358+50 Rt.						350	
											Subtotal	186						
Totals	15	876	1,02	88	60	88	9	1	1	890		380	186	5	400	2,800	18,765	
Use		900	1,110	88	60	88	9	1	1	900		400	200	5	400	3,000	18,800	

RECAPITULATION OF ITEMS

ITEM NO.	NAME	UNIT	QUANTITY
10	Miscellaneous force account	C. Y.	
106(3)	Clearing and grubbing	Acres	
102(1)	Excavation for structures	Cu. Yd.	
102(1)	Borrow excavation, Case 1	Cu. Yd.	
103(1)	Excavation for structures	Cu. Yd.	
106(2)	SPALLS, CRACKS, REPAIRS	Ton	
106(2)	Yard mile overhaul	Yd. Mile	
109(1)	Waterline	Unit	
109(1)	Rolling	Hour	
200(1)	CRUSHED AGGREGATE BASE, GRAVEL	Ton	
217(1)	PAVEMENT BASE	Ton	
217(2)	Asphalt cement, 120-150 pen., plant mixed base	Ton	
310(1)	Asphalt, grade 90-10 or 1, prime coat	Ton	
453(1A)	24-inch, 14-gage, galvanized corr. metal pipe	Lin. Ft.	
453(1B)	30-inch, 14-gage, galvanized corr. metal pipe	Lin. Ft.	
453(1C)	36-inch, 12-gage, galvanized corr. metal pipe	Lin. Ft.	
453(1D)	48-inch, 12-gage, galvanized corr. metal pipe	Lin. Ft.	
460(2A)	Metal end sections for 24-inch pipe culvert	Each	
460(2B)	Metal end sections for 30-inch pipe culvert	Each	
460(2C)	Metal end sections for 36-inch pipe culvert	Each	
510(1)	Loose riprap	Cu. Yd.	
520(1)	8-inch perforated corrugated metal pipe underdrain	Lin. Ft.	
520(2)	Porous backfill material	Cu. Yd.	
560(2)	Maintenance marker posts	Each	
560(5)	Delineators	Each	
564(1)	Combination wire fence, type 3-C	Lin. Ft.	
583(2)	Galvanized beam-type guardrail	Lin. Ft.	

SUMMARY OF QUANTITIES

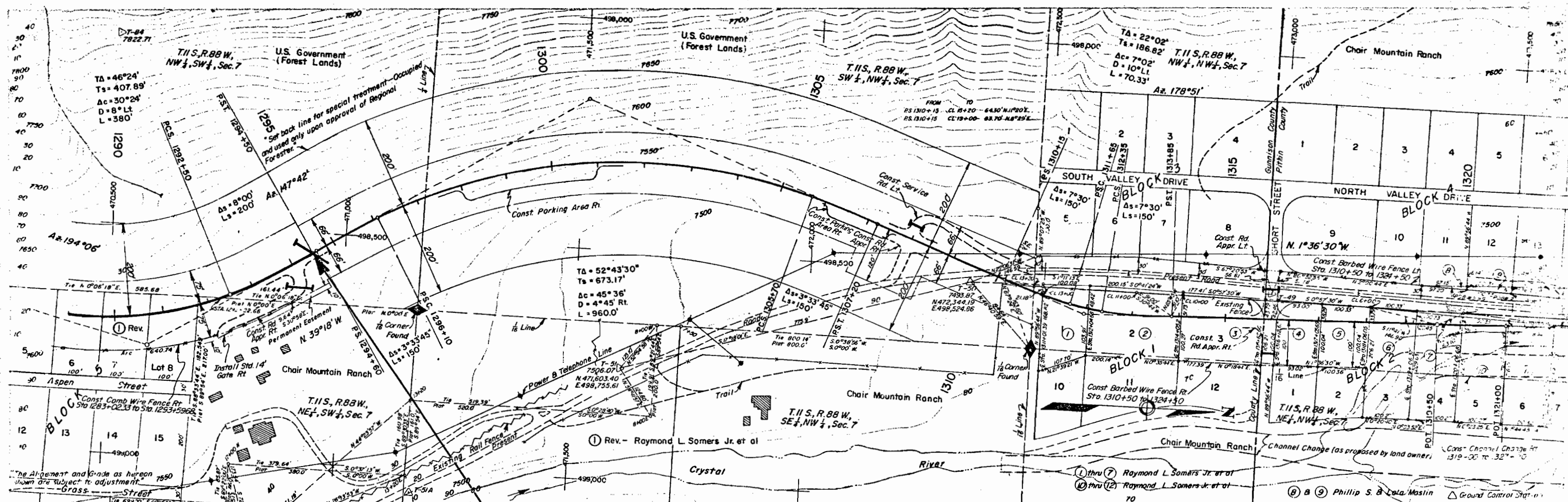
McClure Pass ROUTE: 1

PROJECT: 15-2(2), Grading and Bituminous Stabilized Base

STATE: Colorado COUNTY: Pitkin and Gunnison

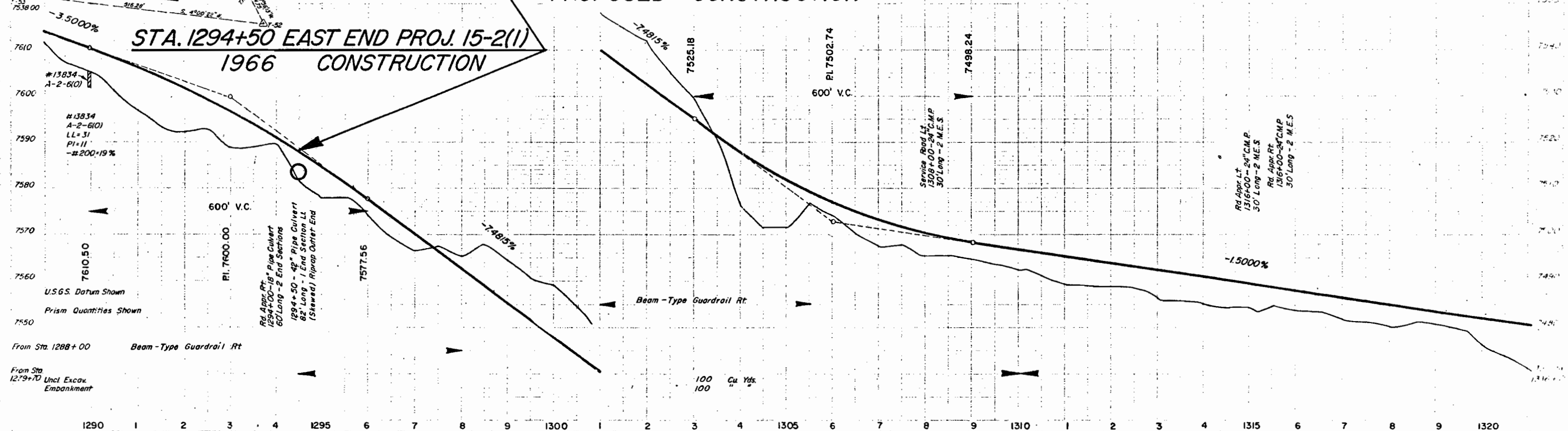
NATIONAL: FOREST: White River and Gunnison

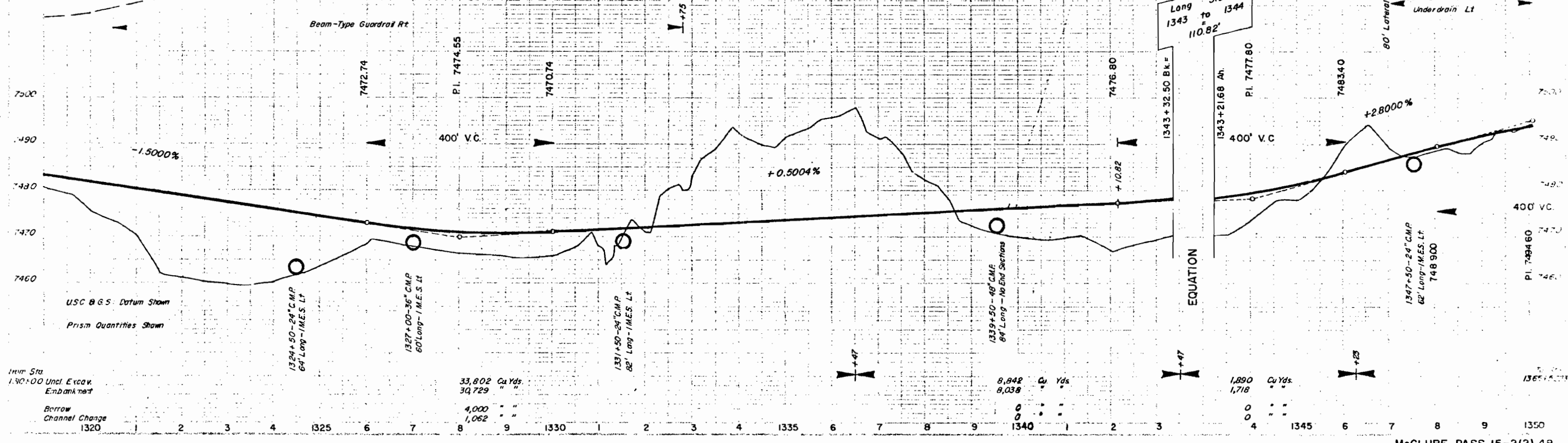
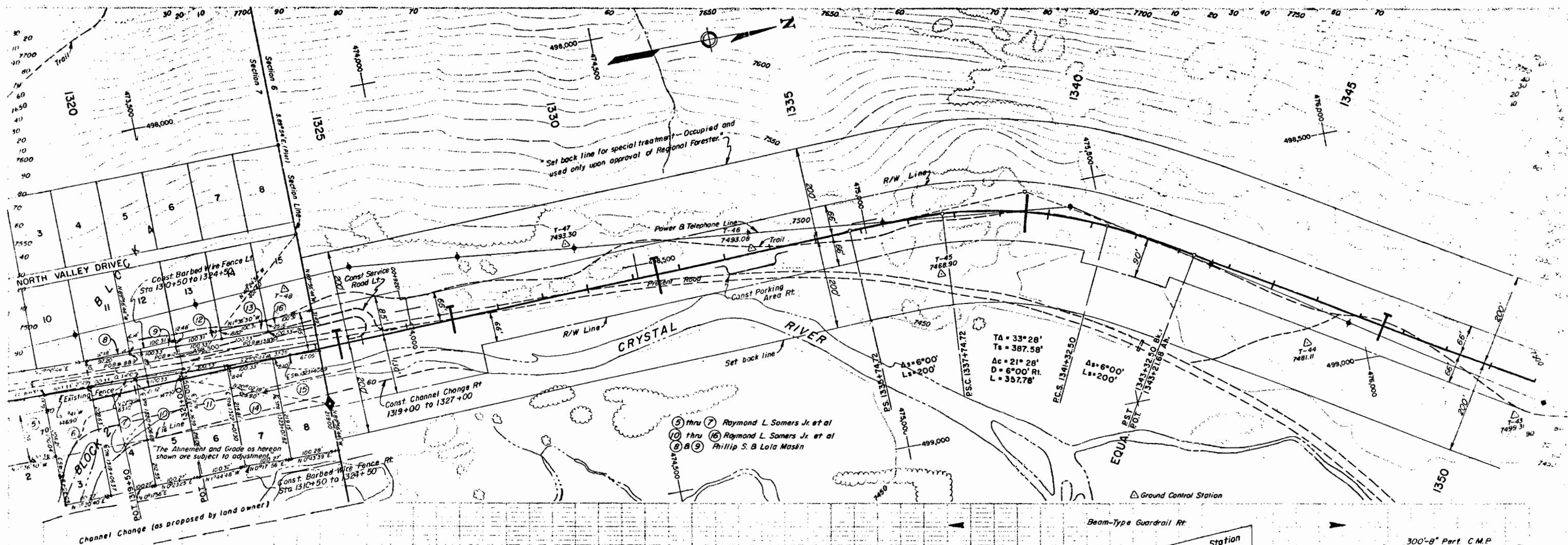
Sheet 2 of 2 Sheets

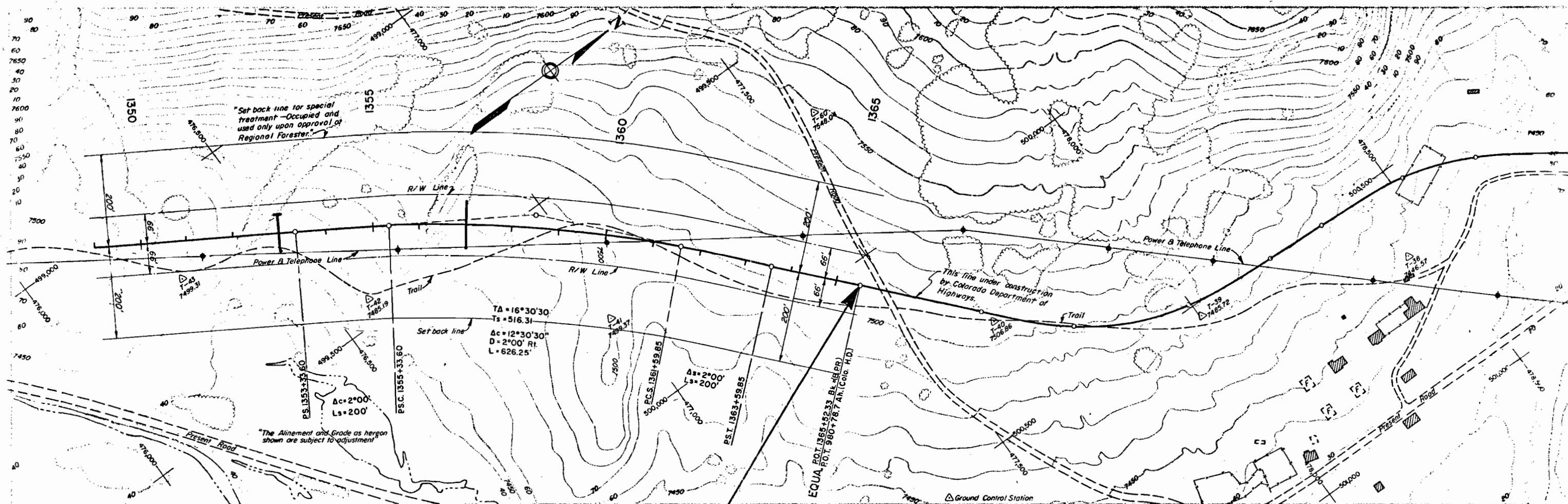


STA. 1294+50 WEST END GRADING PORTION PROJ. 15-2(2)
PROPOSED CONSTRUCTION

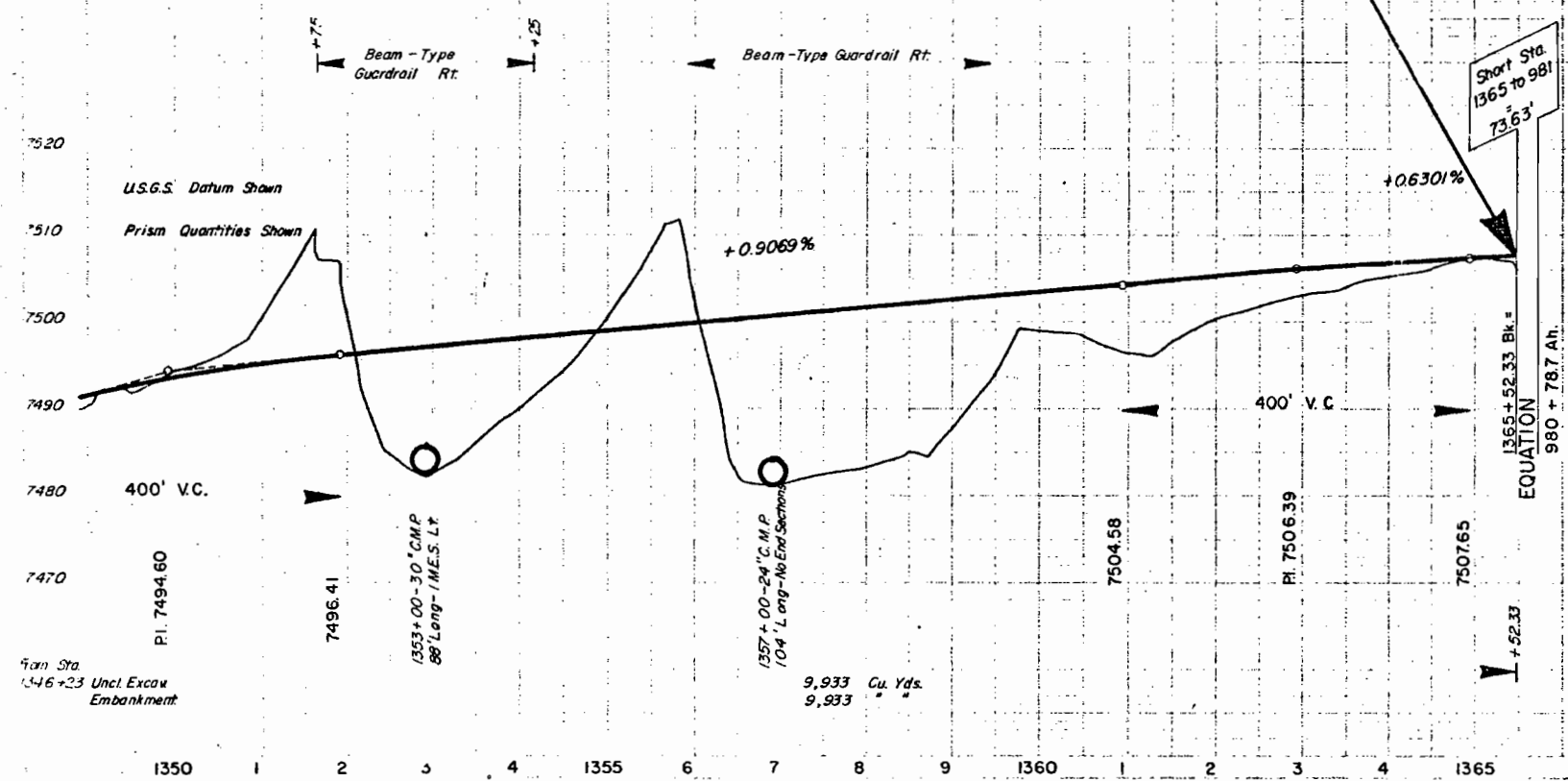
STA. 1294+50 EAST END PROJ. 15-2(1)
1966 CONSTRUCTION

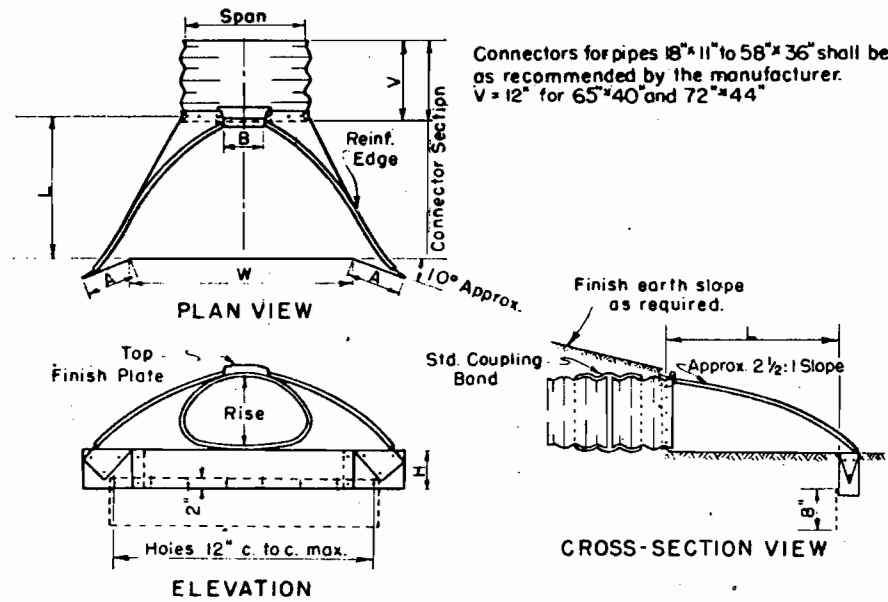






STA. 1365+52.33 EAST END PROJ. 15-2(2) **PROPOSED CONSTRUCTION**





GENERAL NOTES FOR PIPE-ARCH CULVERT METAL END SECTIONS

Toe plates shall be installed on end sections when directed by the Engineer. Toe plate shall be punched to match holes in skirt lip and shall be fastened in place with $\frac{3}{8}$ " galvanized bolts. Length of toe plate is $W + 10"$ for Pipe-Arches with Rise of 11" to 27" incl. and $W + 18"$ min. for Pipe-Arches with Rise of 31" to 44" incl.

Skirt Section for Pipe-Arches with Rise of 11" to 22" incl shall be made in one piece

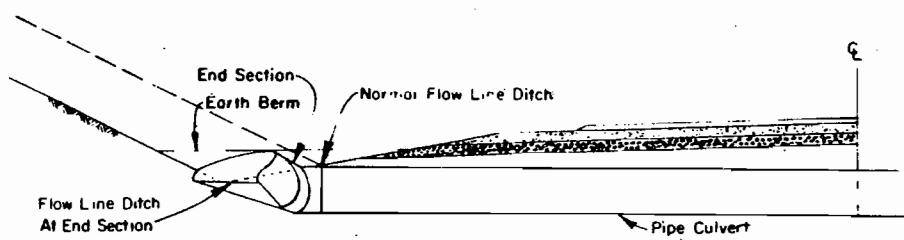
Skirt Section for Pipe-Arches with Rise of 27" to 36" incl may be made from two sheets joined by riveting or bolting on center line

Skirt Section for Pipe-Arches with Rise of 40" to 44" incl may be made from three sheets joined by riveting or bolting at equal distances from center line

Connector Section, Corner Plate and Toe Plate shall be same gage as Skirt and shall be galvanized when ferrous metal pipe is used

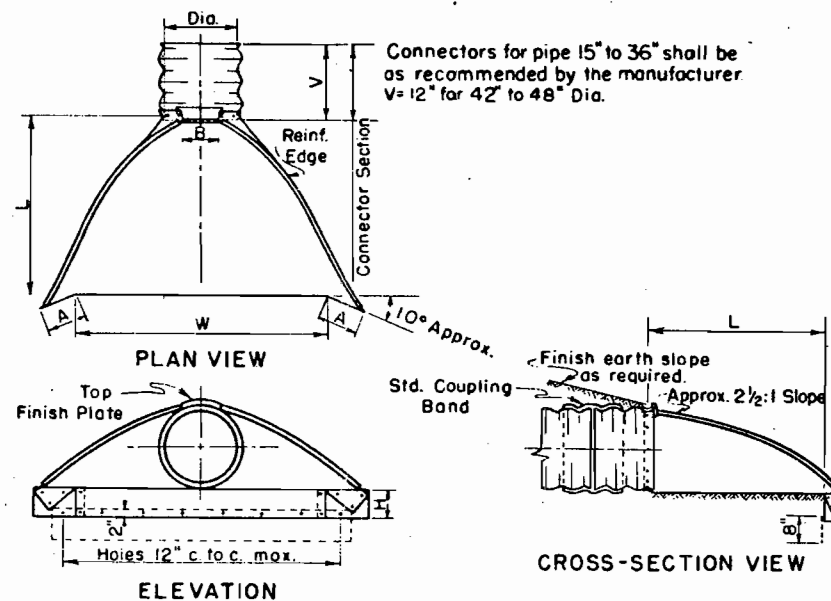
Norm. Culv. Dia.	Arch. Span	Rise	DIMENSIONS					
			Gage	A	B	H	L	W
			1" Tol.	1" Tol.	1" Tol.	1" Tol.	1" Tol.	2" Tol.
15"	18"	11"	16	4 1/2	9	6	19	30
18"	22"	13"	16	5 1/4	10	6	23	36
24"	29"	18"	16	7	14	6	31 1/2	48
30"	36"	22"	14	8 3/4	16	6	38 1/2	60
36"	43"	27"	14	10 3/8	17 1/2	7 3/8	47	75
42"	50"	31"	12	12 1/4	20	9 1/8	54	85
48"	58"	36"	12	14	26	10 3/8	63	96
54"	65"	40"	12	15 1/4	27	10 3/8	70	112
60"	72"	44"	12	17 1/4	28	12 1/8	77	128

METAL END SECTION FOR PIPE ARCH-CULVERTS



SECTION AA

TYPICAL END SECTION INSTALLATION IN CUT SECTION



GENERAL NOTES FOR ROUND PIPE CULVERT METAL END SECTIONS

Toe plates shall be installed on end sections when directed by the Engineer. Toe plate shall be punched to match holes in skirt lip and shall be fastened in place with $\frac{3}{8}$ " galvanized bolts. Length of toe plate is $W + 10"$ for 12" to 30" dia. pipe incl. and $W + 22"$ for 36" to 48" dia. pipe incl.

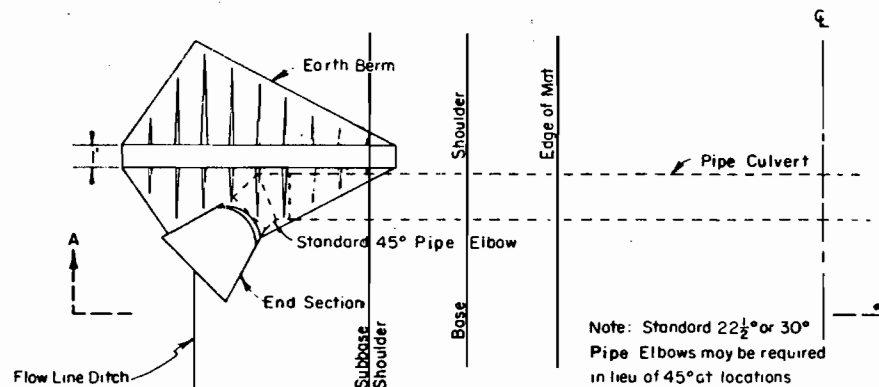
Skirt Section for 12" to 24" dia pipe incl shall be made in one piece

Skirt Section for 30" to 48" dia pipe incl may be made from two sheets joined by riveting or bolting on center line

Connector Section, Corner Plate and Toe Plate shall be same gage as skirt and shall be galvanized when ferrous metal pipe is used

Pipe Diam.	Gage	DIMENSIONS					
		A	B	H	L	W	
12"	16	4 3/4	6	6	21	24	
15"	16	6	8	6	26	30	
18"	16	7	9	6	31	36	
24"	16	9 1/2	12	6	42	48	
30"	14	12	15	7 1/2	52 1/2	60	
36"	14	14	18	9	63	72	
42"	12	16	21	10 1/2	73 1/2	84	
48"	12	18	27	12	84	90	

METAL END SECTION FOR PIPE CULVERTS



PLAN

Note: Standard 22 1/2" or 30" Pipe Elbows may be required in lieu of 45° at locations where pipe is skewed

HEIGHT OF FILL AND GAGE FOR WELDED GALVANIZED CORRUGATED METAL PIPE 1" x 3" Corrugations																
Pipe Diam.		Height of Cover (Feet)														
		1 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50	50 to 60	60 to 70	70 to 80	80 to 100		
Type 2 Seam	30"	16	16	16	16	16	16	16	16	14	14	12	12	12	Type 3 Seam	
	36"	16	16	16	16	16	16	14	14	14	14	12	12	12		
	42"	16	16	16	16	16	14	14	14	14	12	12	12	10		
	48"	14	14	14	14	12	12	12	12	12	10	8				
	54"	14	14	14	14	12	12	12	12	12	10	8				
	60"	14	14	14	12	12	12	12	12	10	8					
	66"	12	12	12	12	12	12	12	10	8						
	72"	12	12	12	12	12	12	10	8							
	78"	12	12	12	10	8	8	8								
	84"	12	12	10	10	8										
	90"	12	10	8	8											
	96"	10	10	8												
	102"	10	8													
	108"	8														
	USE STRUCTURAL PLATE PIPE															

5% Elongation Limit Line

5% Elongation Limit Line

Pipe Diam.		HEIGHT OF FILL AND GAGE FOR ALUMINUM ALLOY CORRUGATED METAL PIPE 1" x 2 3/4" Corrugations									
		Height of Cover (ft)									
		1 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50	50 to 60
18"	16	16	16	16	16	14	12				
24"	16	14	14	14	12	10					
30"	14	14	14	12	10	10					
36"	14	12	12	10	10	8					
42"	12	12	10	10	10						
48"	12	12	10	10	8						
54"	12	12	10	8							
60"	10	8	8	8							
66"	10	8	8								
72"	10	8	8								

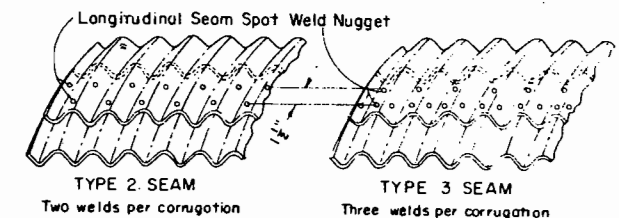
Pipe Diam.		HEIGHT OF FILL AND GAGE FOR GALVANIZED CORRUGATED METAL PIPE & GALVANIZED HELICALLY CORRUGATED METAL PIPE (Riveted or Spot Welded) 1" x 2 3/4" Corrugations															
		Height of Cover (Feet)															
		1 to 10	11 15	16 20	21 25	26 30	31 35	36 40	41 to 50	51 to 60	61 to 70	71 to 80					
18"	16	16	16	16	16	14	14	14	12	12	12						
24"	16	16	14	14	14	14	12	10	8	8							
30"	16	16	14	14	12	12	12	10	10	10							
36"	14	14	14	12	12	12	12	10	8								
42"	14	14	12	12	12	12	10	8									
48"	14	14	12	12	12	12	10	8	USE								
54"	12	12	12	12	12	10	8	STRUCTURAL									
60"	12	12	12	12	12	10	8										
66"	10	10	10	10	10	8	8										
72"	10	8	8	8	8	8	8	PLATE									
78"	8	8	8	8	8	8											
84"	8	8	8	8	8												
												PIPE					

Note:

Gages of metal culvert pipes shall be not lighter than those shown in the above tables for the various conditions.

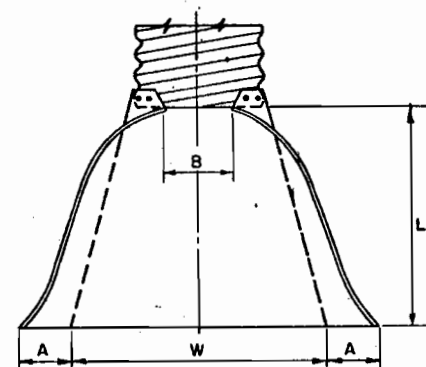
Any culvert pipe, whose diameter and height of cover places it below and to the right of the heavy lines in the above tables, shall be factory-shaped to a 5% vertical elongation.

DETAILS OF SPOT WELDED LONGITUDINAL SEAM 1" x 3" Corrugations



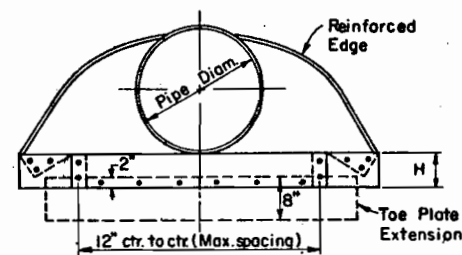
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

STANDARD METAL END SECTIONS AND FILL-GAGE TABLES FOR METAL PIPE CULVERTS

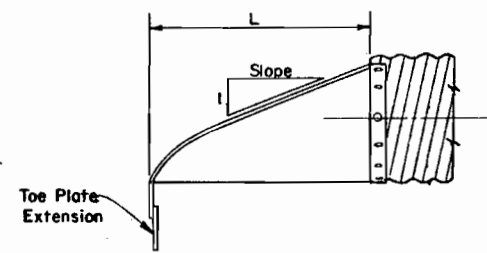


PLAN VIEW

Pipe Diam.	Gage	Dimensions					Approx. Slope	Body
		A (1" ±)	B (Max)	H (1" ±)	L (1 1/2" ±)	W (2" ±)		
12"	16	6"	6"	6"	21"	24"	2 1/2	1 Pc.
15"	16	7"	8"	6"	26"	30"	2 1/2	1 Pc.
18"	16	8"	10"	6"	31"	36"	2 1/2	1 Pc.
21"	16	9"	12"	6"	36"	42"	2 1/2	1 Pc.
24"	16	10"	13"	6"	41"	48"	2 1/2	1 Pc.
30"	14	12"	16"	8"	51"	60"	2 1/2	1 Pc.
36"	14	14"	19"	9"	60"	72"	2 1/2	2 Pc.
42"	12	16"	22"	11"	69"	84"	2 1/2	2 Pc.
48"	12	18"	27"	12"	78"	90"	2 1/2	2 Pc.
54"	12	18"	30"	12"	84"	102"	2	2 Pc.
60"	12	18"	33"	12"	87"	114"	1 3/4	3 Pc.
66"	12	18"	36"	12"	87"	120"	1 1/2	3 Pc.
72"	12	18"	39"	12"	87"	126"	1 1/2	3 Pc.
78"	12	18"	42"	12"	87"	132"	1 1/4	3 Pc.
84"	12	18"	45"	12"	87"	138"	1 1/6	3 Pc.



ELEVATION

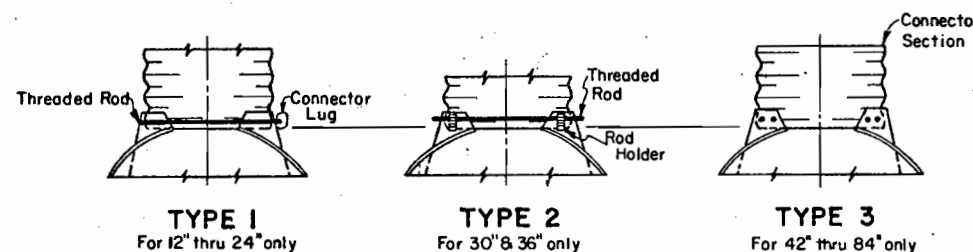


TYPICAL CROSS SECTION

GENERAL NOTES

- All 3 piece bodies to have 12 gage sides and 10 gage center panels. Width of center panels to be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams which are to be tightly joined by 3/8" galvanized rivets or bolts.
- For 60" thru 84" sizes, reinforced edges to be supplemented with galvanized stiffener angles. The angles will be 2"x2"x1/4" for 60" thru 72" diameter and 2 1/2"x2 1/2"x1/4" for 78" and 84" diameter. The angles to be attached by 3/8" galvanized nuts and bolts.
- Toe plates shall be installed on end sections when directed by the Engineer. Toe plates shall be the same gage as end section.

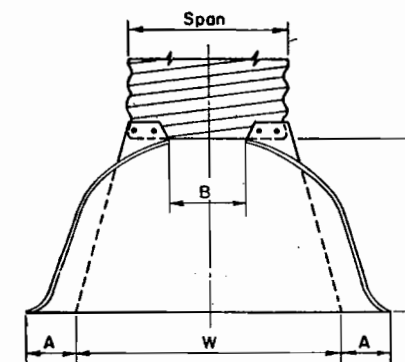
METAL END SECTION FOR PIPE CULVERTS



Note:

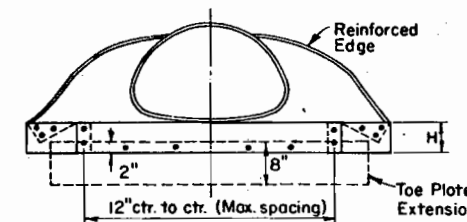
Type 3 connection includes one foot of pipe length for 42" thru 84" diameter as a connector section. The connector section will be attached to the end section by galvanized rivets or bolts and will be the same gage as the end section.

STANDARD CONNECTION FOR PIPE CULVERTS

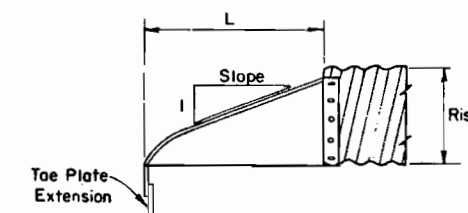


PLAN VIEW

Pipe-Arch Dimensions		Gage	Dimension					Approx. Slope	B
Span	Rise		A (1"±)	B (Max)	H (1"±)	L (1½"±)	W (2"±)		
18"	11"	16	7"	9"	6"	19"	30"	2½	1
22"	13"	16	7"	10"	6"	23"	36"	2½	1
25"	16"	16	8"	12"	6"	28"	42"	2½	1
29"	18"	16	9"	14"	6"	32"	48"	2½	1
36"	22"	14	10"	16"	6"	39"	60"	2½	1
43"	27"	14	12"	18"	8"	46"	75"	2½	1
50"	31"	12	13"	21"	9"	53"	85"	2½	2
58"	36"	12	18"	26"	12"	63"	90"	2½	2
65"	40"	12	18"	30"	12"	70"	102"	2½	2
72"	44"	12	18"	33"	12"	77"	114"	2½	3
79"	49"	12	18"	36"	12"	77"	126"	2	3
85"	54"	12	18"	39"	12"	77"	138"	2	3



ELEVATION

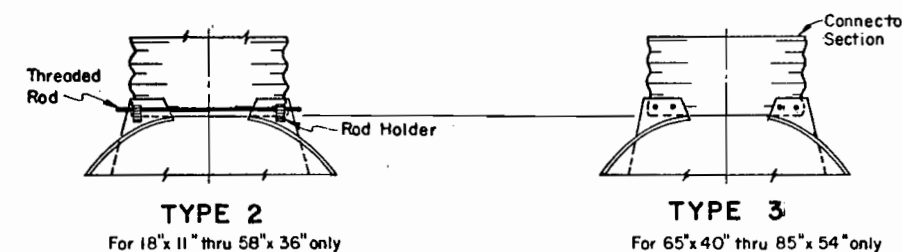


TYPICAL CROSS SECTION

GENERAL NOTES

- All 3 piece bodies to have 12 gage sides and 10 gage center panels. Width of center panels to be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams which are to be tightly joined by 3/8" galvanized rivets or bolts.
- For the 79"x49" and 85"x54" sizes, reinforced edge to be supplemented by 2"x2"x1/4" galvanized angles. The angles to be attached by 3/8" galvanized nuts and bolts.
- Angle reinforcement will be placed under the center panel seams on the 79"x49" and 85"x54" sizes.
- Toe plates shall be installed on end sections when directed by the Engineer. Toe plates shall be the same gage as end section.

METAL END SECTION FOR PIPE-ARCH CULVERTS



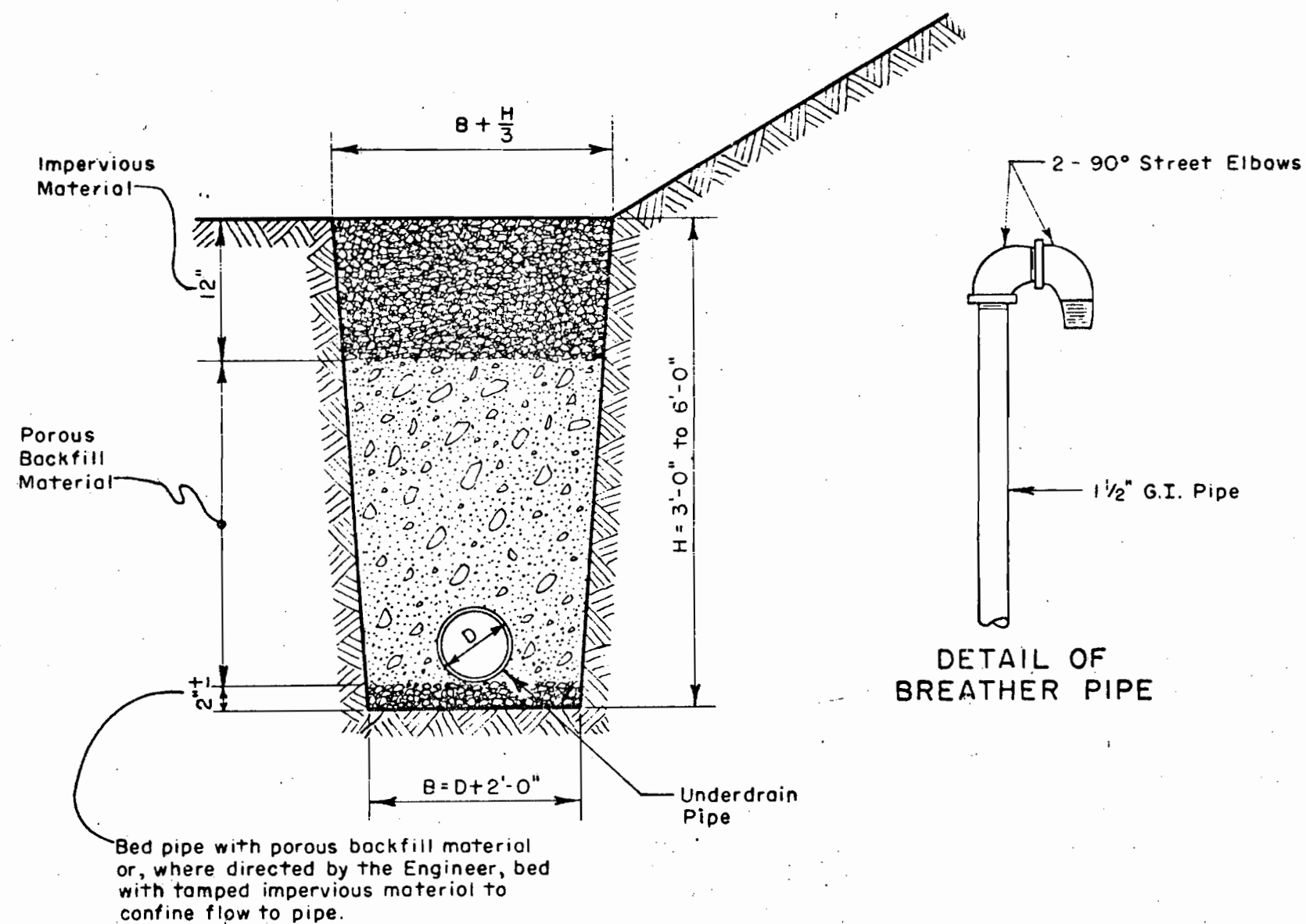
Note:

Type 3 connection includes one foot of the pipe length for 65"x40" thru 85"x54" sizes as a connector section. The connector section will be attached to the end section by galvanized rivets or bolts and will be the same gage as the end section.

STANDARD CONNECTION FOR PIPE-ARCH CULVERTS

U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

STANDARD METAL END SECTIONS FOR METAL PIPE CULVERTS



PIPE UNDERDRAIN

GENERAL NOTES

SPECIFICATIONS Current B.P.R. Standard Specifications.

MATERIAL Porous granular backfill shall be clean, coarse sand and shall conform to the following gradation requirements:

- Passing 3" Sieve 100%
- Passing #4 Sieve 50% Min.

All porous material passing the #4 sieve shall conform to the following

- Passing #50 Sieve 10 - 30%
- Passing #100 Sieve 0 - 10%
- Passing #200 Sieve 0 - 2%

Impervious material shall contain sufficient granular material to be stable when wet and compacted in place.

CONSTRUCTION: When trench is under the roadbed, paved ditch, or other structure, the porous material shall completely fill the trench and the porous material shall be tamped into place. The material shall be dampened prior to placing if necessary to prevent segregation. If soft, mucky trench bottoms are encountered they shall be stabilized prior to placing bedding material by working granular material into the trench bottom.

The outfall end of underdrain pipe shall be covered with galvanized, No. 17 gage hardware cloth screen having approximately 1/2" x 1/2" mesh openings. The screen shall be held securely in place with standard coupling bands.

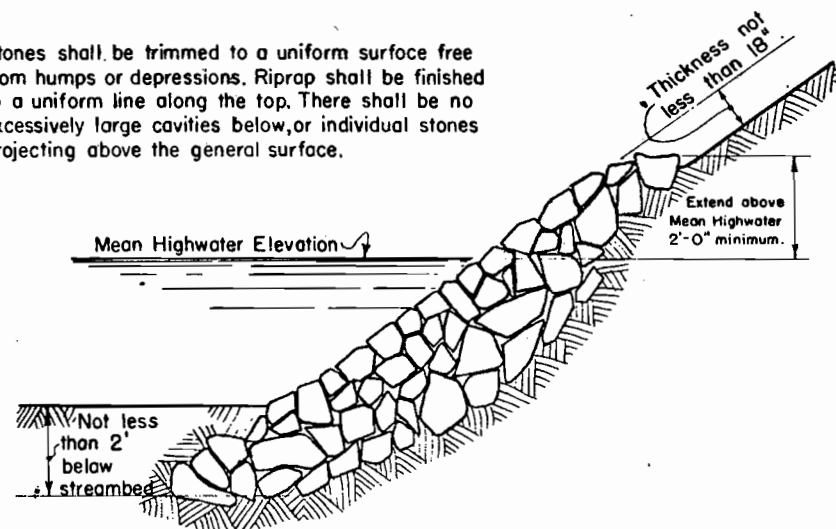
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

STANDARD
UNDERDRAIN

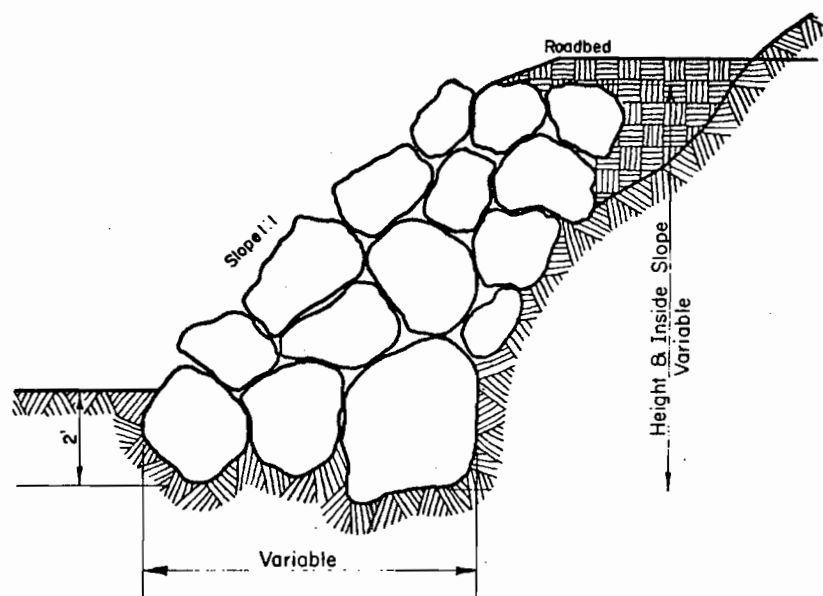
Revision 9/1963

STD 119

Stones shall be trimmed to a uniform surface free from humps or depressions. Riprap shall be finished to a uniform line along the top. There shall be no excessively large cavities below, or individual stones projecting above the general surface.

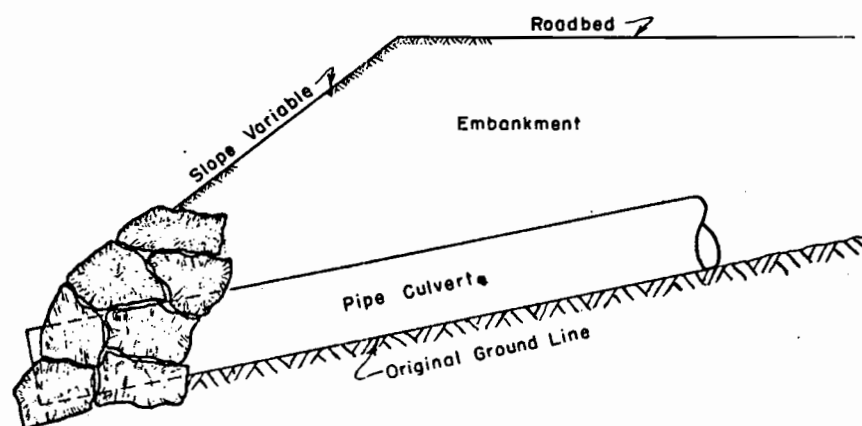


LOOSE RIPRAP
USE

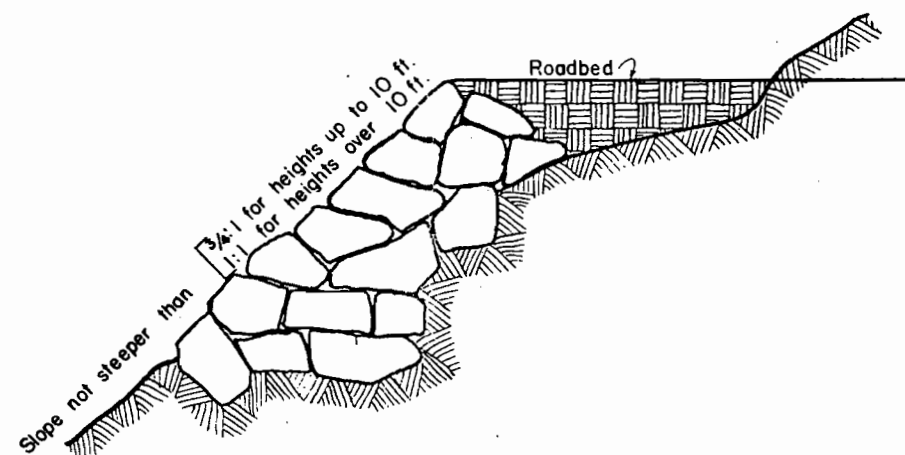


Embankment will be constructed on a foundation bed satisfactory to the Engineer. The stones shall be not less than one Cu. Ft. in volume with 50% of the stones at least 1/2 Cu. Yd. in volume and placed to the lines and dimensions required. The stones shall be bonded and securely bedded.

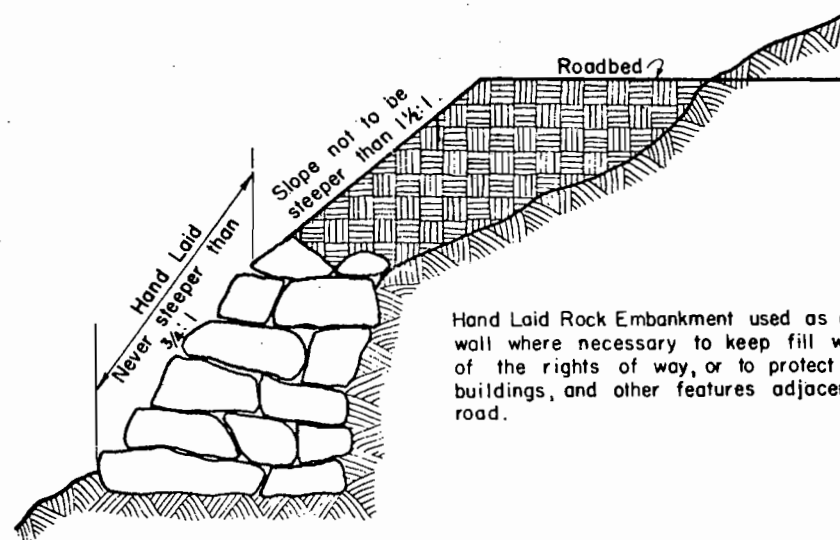
DERRICK-PLACED ROCK
FULL HEIGHT



TYPICAL SECTION AT END OF PIPE CULVERTS



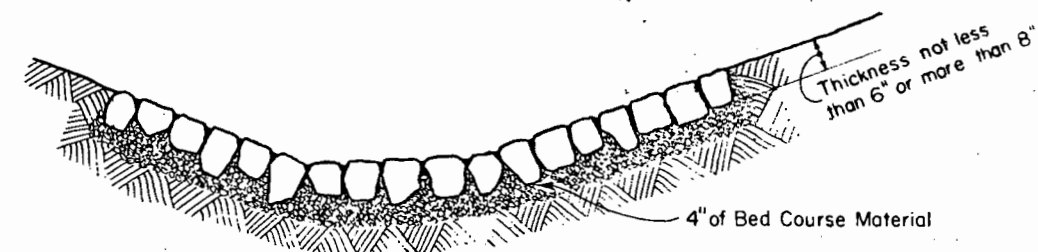
TYPICAL SECTION OF FULL HEIGHT CONSTRUCTION



TYPICAL SECTION OF TOE WALL CONSTRUCTION

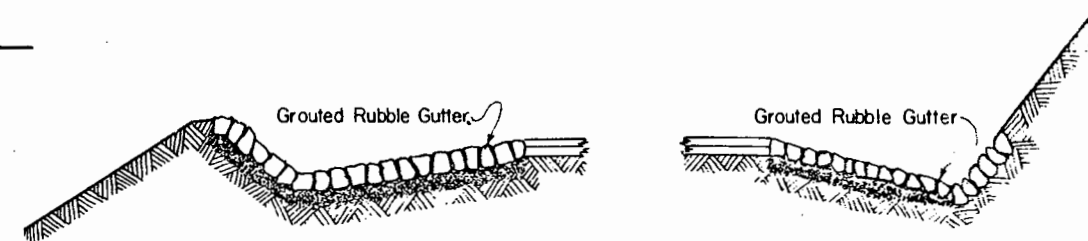
HAND LAID ROCK EMBANKMENT

Hand Laid Rock Embankment used as a toe-wall where necessary to keep fill within limits of the rights of way, or to protect trees, buildings, and other features adjacent to the road.



All stones shall be rectangular in shape and shall extend entirely through the paving. Each stone shall be carried by the underlying material and not by the adjacent stones. The surface of the rocks shall not vary more than one inch from the required finished section.

TYPICAL SECTION THROUGH GROUTED RUBBLE GUTTER

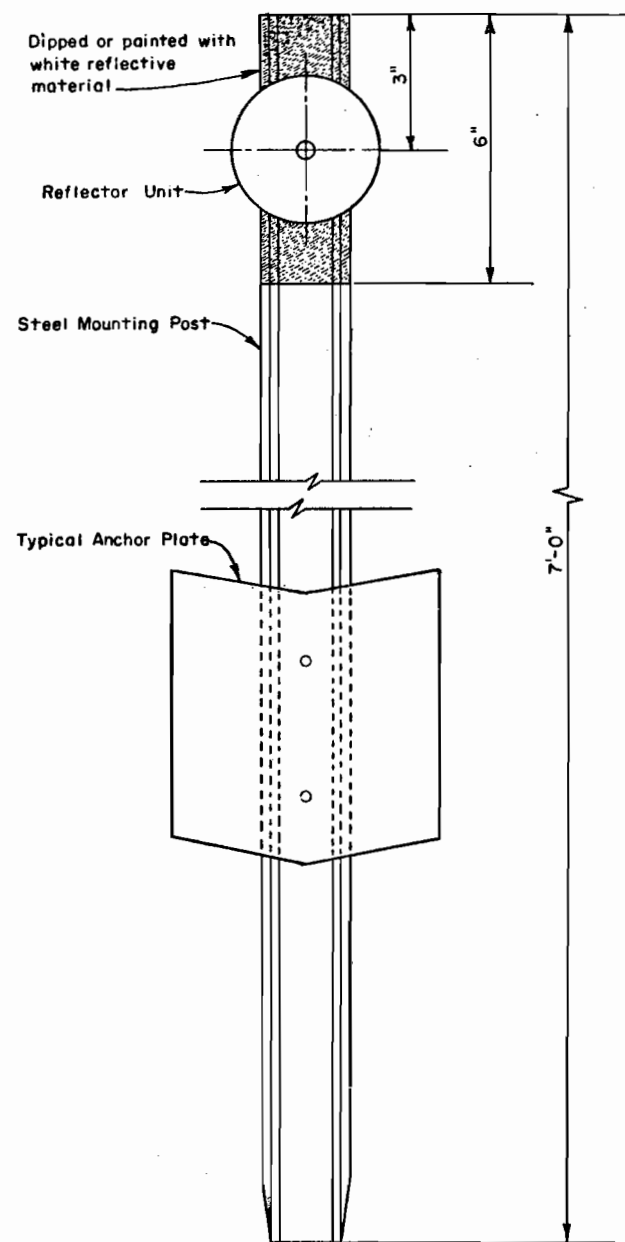
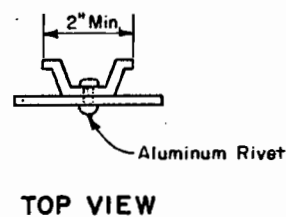


TYPICAL SECTIONS IN EMBANKMENTS AND CUTS

GROUTED RUBBLE GUTTER

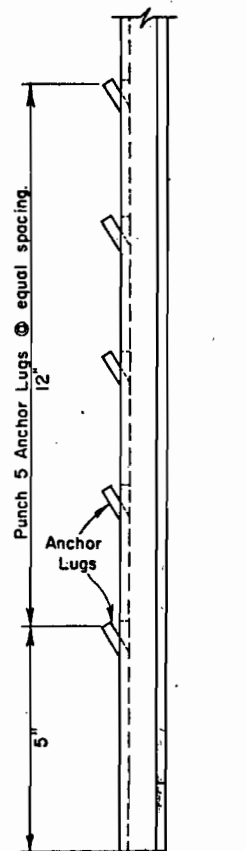
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

STANDARD ROCK STRUCTURES

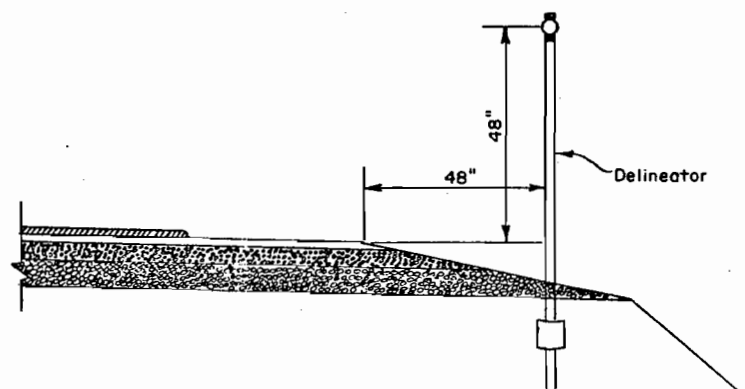


FRONT VIEW WITH
ANCHOR PLATE

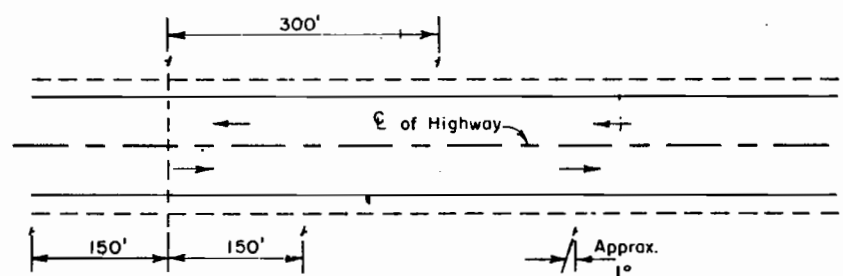
DELINEATOR
USE



SIDE VIEW WITH
ANCHOR LUGS



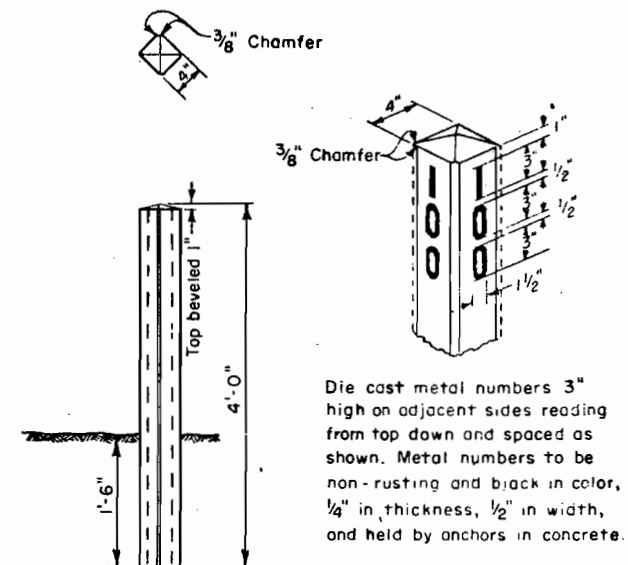
LOCATION OF DELINEATOR



DELINEATOR INTERVAL ON TANGENTS

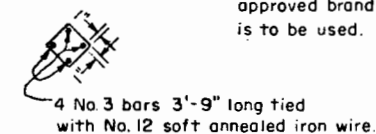
DELINEATOR INTERVAL
ON HORIZONTAL CURVES

DEGREE OF CURVE	SPACING ON CURVE FEET	SPACING ON EACH END OF CURVE		
		FIRST SPACE FEET	SECOND SPACE FEET	THIRD SPACE FEET
1	152	200	200	200
2	106	191	200	200
3	86	155	200	200
4	74	133	200	200
5	66	119	198	200
7	55	99	165	200
9	48	86	144	200
12	41	74	123	200
15	36	65	108	200
18	33	59	99	198
21	30	54	90	180
25	28	50	84	168
30	24	43	72	144



Die cast metal numbers 3" high on adjacent sides reading from top down and spaced as shown. Metal numbers to be non-rusting and black in color, 1/4" in thickness, 1/2" in width, and held by anchors in concrete.

Concrete to be Class "Y" B.P.R. Specifications except that an approved brand of white cement is to be used.



CONCRETE MAINTENANCE
MARKER POST
USE

GENERAL NOTES

MATERIALS: The steel mounting posts shall weigh at least one pound per foot. The mounting posts shall be furnished with either type of anchor shown and shall have a black baked enamel finish which is resistant to the shock of driving operations.

The top portion of the mounting post shall be either surfaced with white paint containing white reflective glass beads or painted with white paint and covered with white reflective glass beads while the paint is wet.

The delineator reflector unit shall be a sealed acrylic plastic prismatic reflex lens having a minimum of six and one-half square inches of smooth reflective area. The lens shall be housed in an aluminum frame and provided with a single grommetted mounting hole.

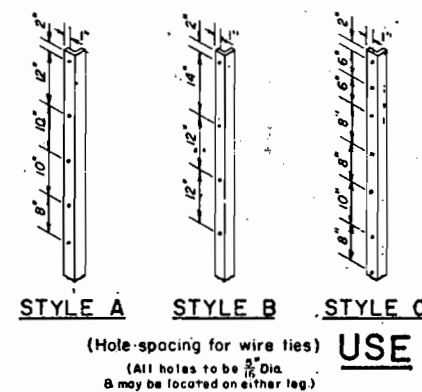
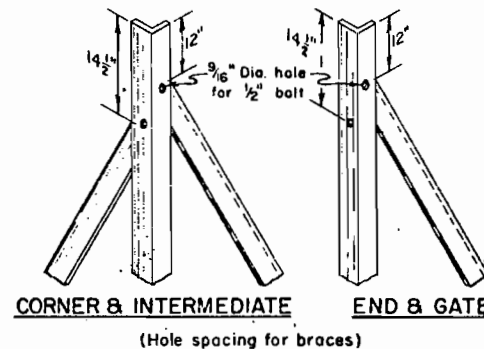
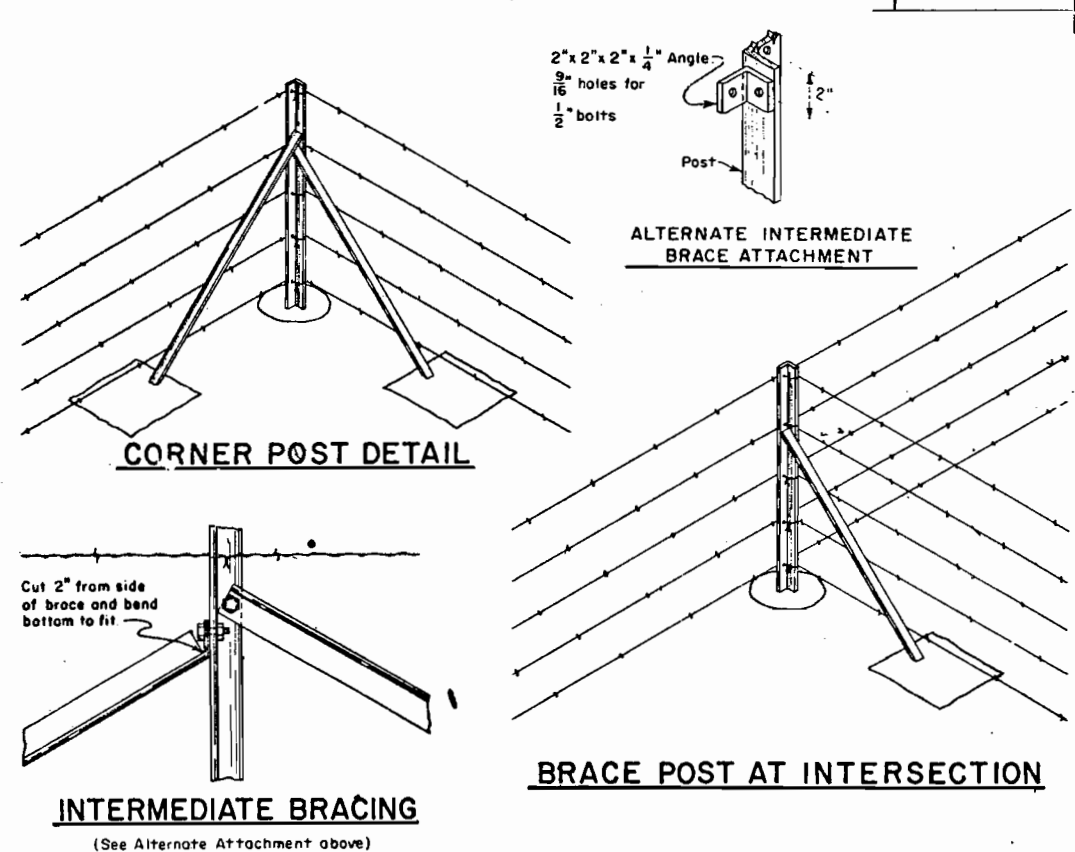
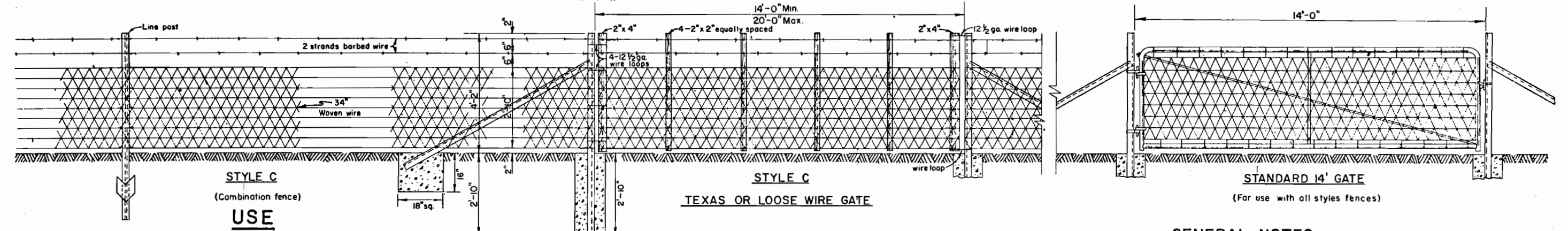
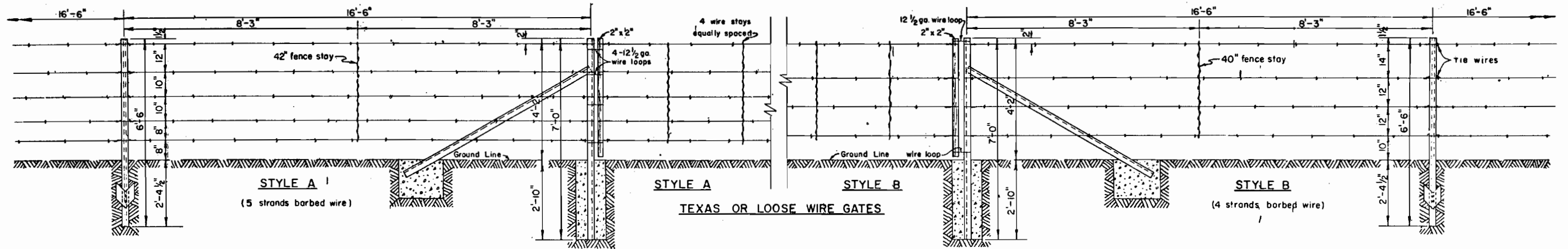
Mounting posts shall be driven to the depth shown and shall be vertical and in accurate alignment. They shall be driven by the use of a regular post driver or protected by a driving cap if any means other than a post driver is used.

The reflector unit shall be securely fastened to the steel mounting post with an approved type aluminum rivet.

U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

STANDARD
MAINTENANCE POSTS
AND DELINEATORS

STD. 131



GENERAL NOTES

- Posts and Braces:** All corner, end, gate and intermediate brace posts shall be $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{4}$ steel angle sections, 7'-0" long, weighing not less than 4.1 lbs per lin. ft. Braces shall be $2 \times 2 \times \frac{1}{4}$ structural steel angles, 7'-0" long, weighing not less than 3.19 lbs per lin. ft. Line posts shall be steel "Tees", 6'-6" long, weighing not less than 1.3 lbs. per lin. ft., and shall have an anchor plate sufficient to resist movement. All posts and braces shall be drilled or punched as shown hereon, and shall meet the requirements of paragraph 4.9t of U.S. Dept. of Commerce Commercial Standard 184-51. Line posts with studded face will be acceptable in lieu of drilled or punched posts.
- Brace Panels:** All corner, end or gate posts shall be braced as detailed hereon. Corner posts, with braces, shall be placed at all changes in alignment or grade in excess of 20 degrees. Where the distance between corners or ends is in excess of $\frac{1}{8}$ mile, intermediate brace panels shall be inserted at uniform intervals of not more than $\frac{1}{8}$ mile.
- Barbed Wire:** Barbed wire shall conform to current ASTM Specification A-121, Class 1, and shall be 2 strands of 12½ gage galvanized wire, twisted, having 2 point, double wrap, 14 gage round barbs, maximum of 4" apart. Minimum net weight shall be 78 lbs per 90-rad reel.
- Woven Wire:** Woven wire shall be 34" V-mesh, consisting of 9 horizontal cables approximately 4" apart, woven with cross wires 4" apart, to form a one piece fabric. Horizontal cables shall be 2 strands of 12½ gage galvanized wire, twisted, and the cross wires shall be single strand 14 gage galvanized wire. Minimum weight shall be 125 pounds per 10-rad reel.
- Gates:** Standard 14' gate shall be 42" high, consisting of a 1½" Q.D. galvanized steel tubular frame, with woven wire filler as specified above, except that the cross wires may be either a 2" or 4" spacing. Gates shall have a diagonal adjustable sag-rod for wire, and adjustable hinges. Latch shall be the self-engaging (pig-ear) type. All fittings shall be galvanized. Minimum weight of gate shall be 70 pounds, exclusive of fittings.
- Miscellaneous:** Fence stays shall be double strand, twisted, 9½ gage galvanized wire. Fence ties shall be a minimum of 12½ gage galvanized wire. Every strand of barbed wire, and every other strand of woven wire shall be tied to each post in accordance with standard practice. Bolts for attaching braces shall be ½" x 1" galvanized machine bolts.
- Concrete:** Concrete shall be class A, and shall be allowed to set not less than seven days before wire may be stretched.

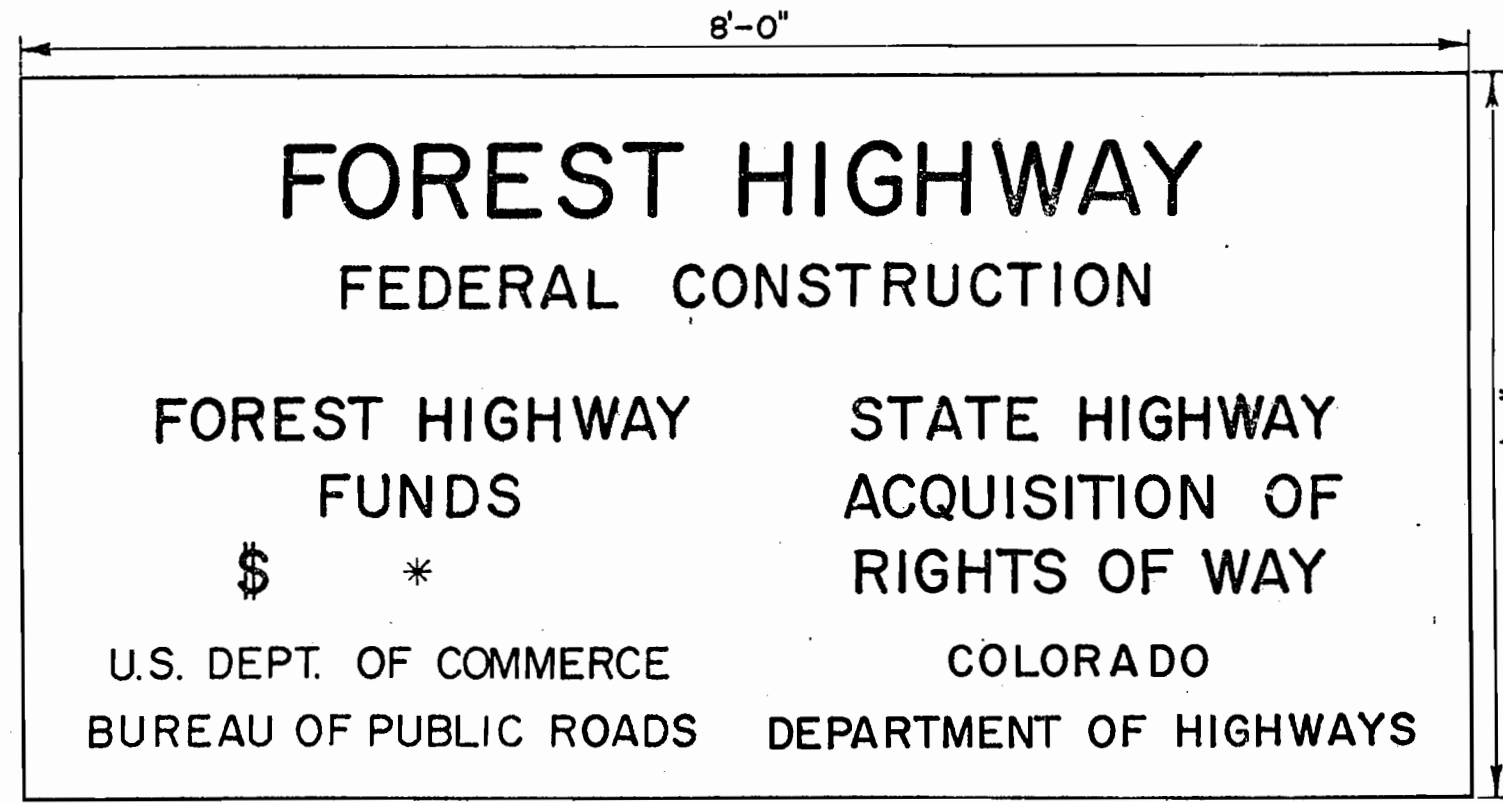
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

**STANDARD
WIRE FENCES
WITH STEEL POSTS
TYPE 3**

14

GENERAL NOTES

1. One sign of the type shown hereon shall be furnished and installed by the contractor. The sign shall be placed at one end of the project, at a location determined by the engineer, consistent with the location of other construction signs.
2. The sign shall be erected immediately upon beginning construction operations, and shall remain in place until final acceptance of the project.
3. The sign material may be either wood or metal, at the option of the contractor, but shall have sufficient stability to last throughout the estimated period of use.
4. The sign shall be painted with black letters on a white background. Lettering shall be Series "C", as specified in the B.P.R. publication "Standard Alphabets for Highway Signs," in connection with the A.A.S.H.O. "Manual on Uniform Traffic Control Devices".
- * 5. The amount for insertion in the "Funds" space will be determined by the engineer.



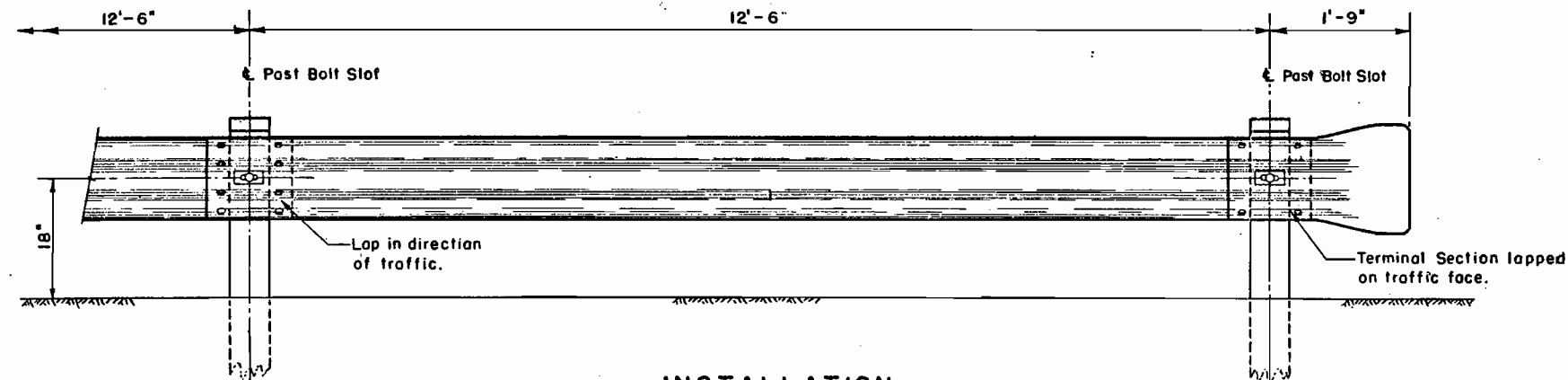
6-1964

U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

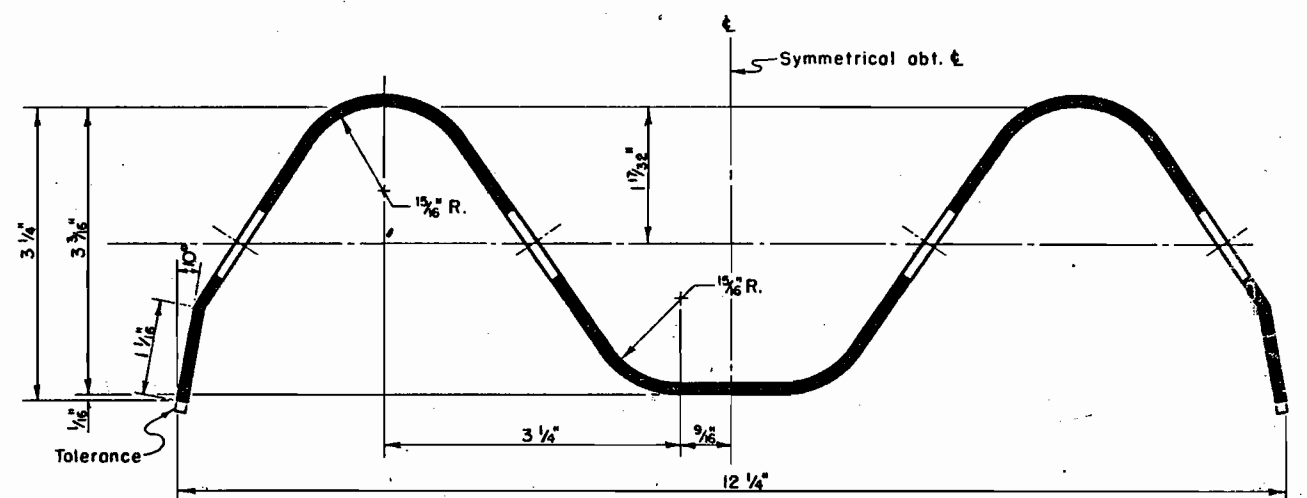
PROJECT IDENTIFICATION SIGNS

STD. 143

DESIGNED
DRAWN S.L.A. 6-1964

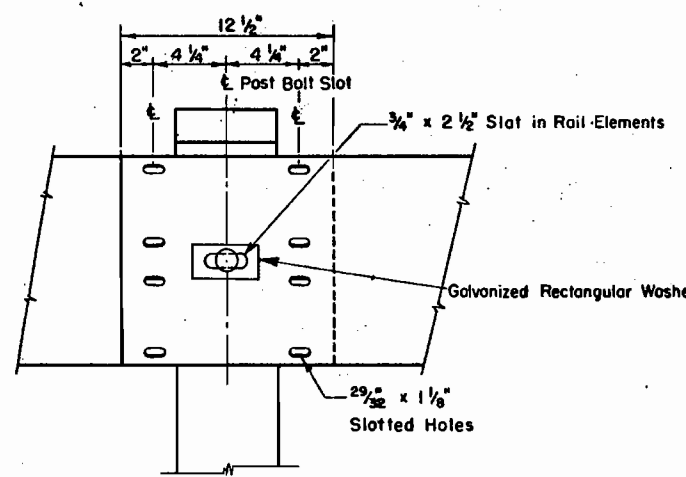


INSTALLATION

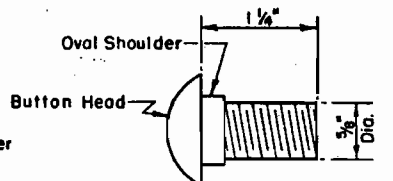


SECTION THRU RAIL ELEMENT

NOTE: All dimensions subject to manufacturing tolerances.

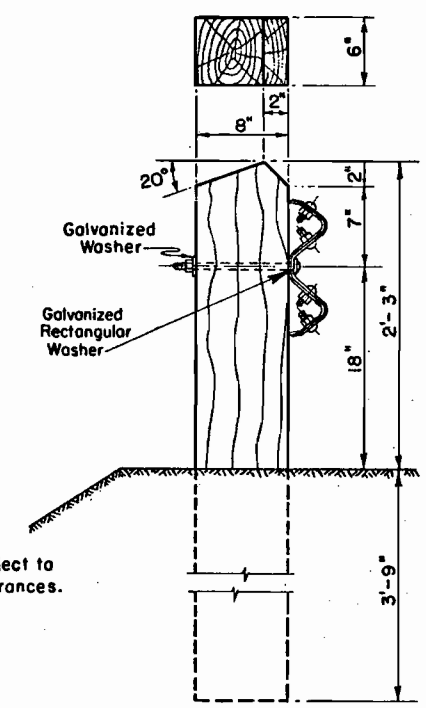


RAIL SPLICE

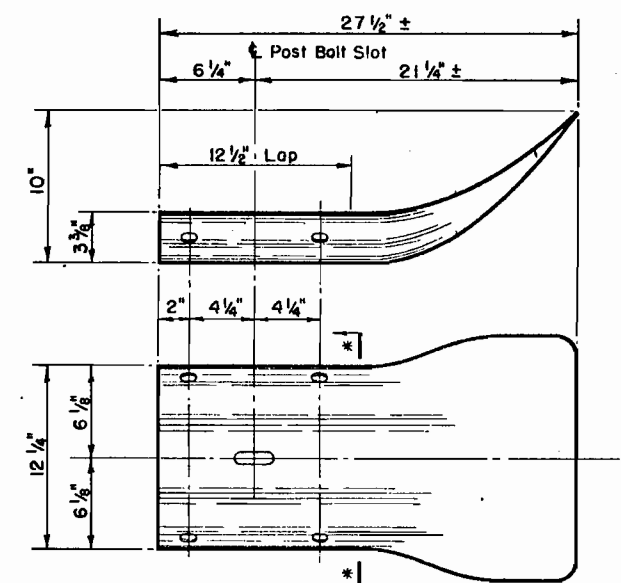


SPLICE BOLT & NUT

Note: Post Bolt similar except length.



DETAIL AT POST



TERMINAL SECTION

* Same as section thru Rail Element.

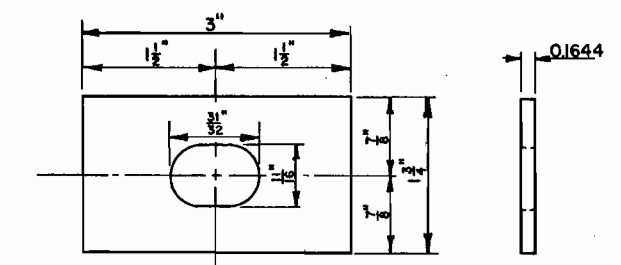
GENERAL NOTES

All posts shall be made from 6" x 8" seasoned dense Southern Yellow Pine or Douglas Fir of the Coast Region, meeting the A.A.S.H.O. Specifications for Standard Stress Grade, 1600# f.

The posts shall be set vertically to the depth shown on the plans and to the lines and grades staked by the engineer. They shall be maintained in accurate alignment while the post holes are being backfilled with suitable material, thoroughly tamped in layers.

The rail element for highway guardrail shall be not less than 12 gage. When used and paid for as Bridge Railing, the rail element shall be not less than 10 gage. The rail element and all hardware shall be galvanized in accordance with the requirements of ASTM A-93, coating class 2.50, and A.S.T.M. A-153.

All posts shall be treated as provided under "Timber Structures", Section 430 of Specifications FR 61, using Pentachlorophenol or Creosote and Creosote Solution. If Pentachlorophenol is used the minimum net retention shall be 0.30 pounds per cubic foot of wood. If Creosote is used the minimum net retention shall be 5 pounds of preservative per cubic foot of wood. After treatment by either method, all posts shall be steam cleaned to produce a dry surface free of oil not retained in the post.



GALVANIZED RECTANGULAR WASHER

U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION NO. 9 DENVER, COLORADO

**STANDARD
BEAM-TYPE
GUARDRAIL**