R O W Purchased under Project No. F 022-3(6) and F022-3(8)

	DIVISION	FED. NO.		TOTAL SHEETS
		F022-3(10)	1	

COLORADO
DEPARTMENT OF HIGHWAYS

PLAN AND PROFILE OF PROPOSED

FEDERAL AID PROJECT NO. F 022-3(10)

STATE HIGHWAY NO. 10

COSTILLA & HUERFANO COUNTIES

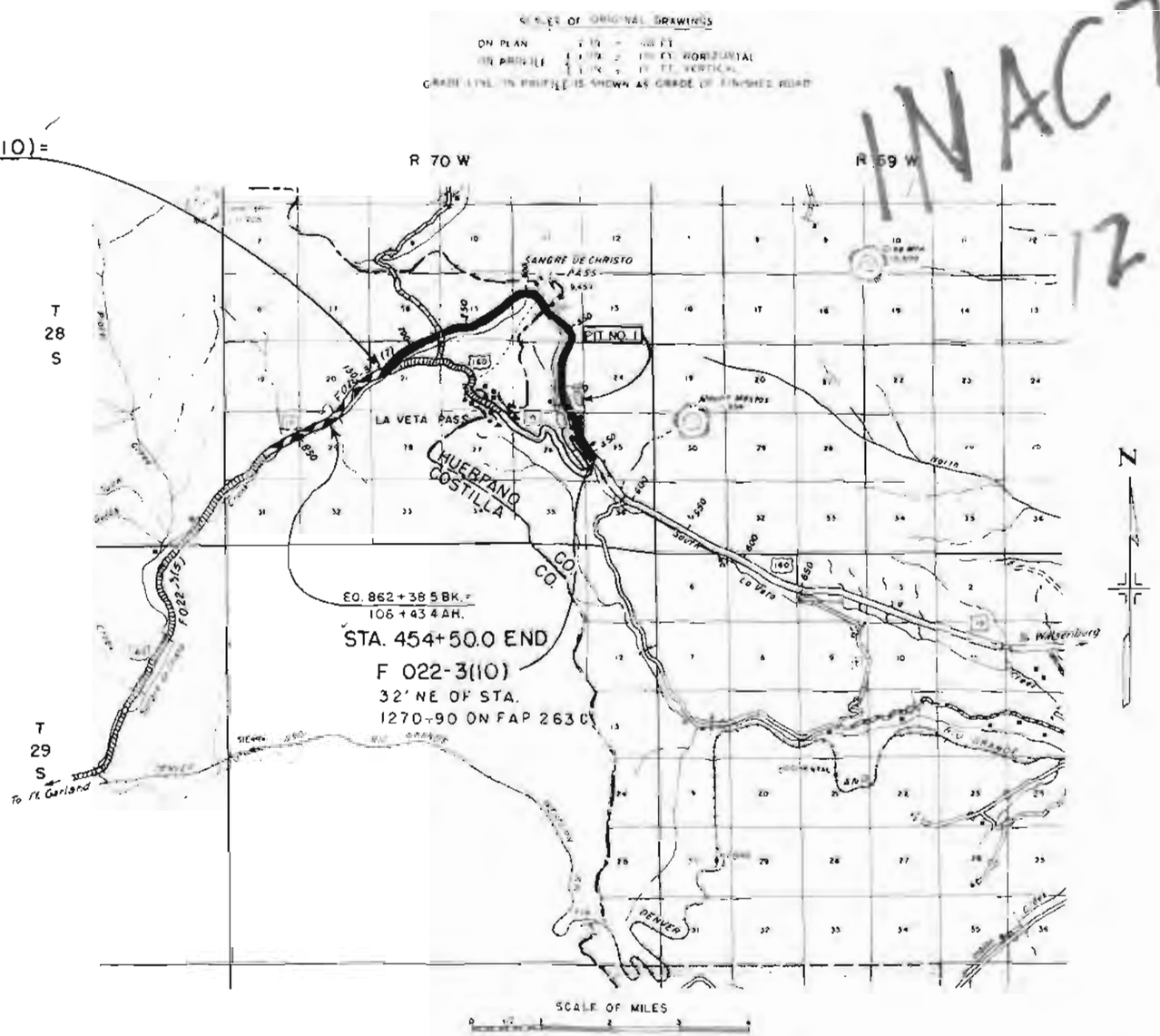
CONVENTIONAL SIGNS

CENTER LINE (PLAN SHEET / TITLE & SHEET)
RIGHT OF WAY LINE (R.O.W. MARKER)
COUNTY LINE
TOWNSHIP OR RANGE LINE
LAND LINES (SECTION LINE / 1/4 SECTION LINE / 1/8 SECTION LINE)
RAILROAD (TITLE SHEET / PLAN SHEET)
BARBED WIRE FENCE
COMBINATION WIRE FENCE
SNOW FENCE
TELEPHONE & TELEGRAPH LINES
POWER LINE
DETOUR
PRESENT ROAD (Plan Sheets)
TOP OF CUTS
TOE OF FILLS

INDEX OF SHEETS

SCALE OF ORIGINAL DRAWINGS
ON PLAN 1 IN. = 400 FT.
ON PROFILE 1 IN. = 100 FT. HORIZONTAL
1 IN. = 10 FT. VERTICAL
GRADE LINE IN PROFILE IS SHOWN AS GRADE OF FINISHED ROAD

STA. 179 + 19.7 BEGIN F 022-3(10) =
STA. 179 + 19.7 ON F 022-3(7)



TABULATION OF LENGTH & DESIGN DATA

STATION	ROADWAY LIN. FT.
STA 179+19.7 BEGIN F 022-3(10) = 179+19.7 ON F 022-3(7)	14,343.8
322+63.5 END F022-3(7)	6,266.4
385+29.9 BK. = 385+60.6 AH	6,889.4
454+50.0 END F022-3(10), 32' NE OF STA. 1270+90 ON FAP 263 C	
TOTAL	27,499.6

SUMMARY	LIN. FT.	MILES
ROADWAY COSTILLA CO.	14,343.8	2.716
ROADWAY HUERFANO CO.	13,155.8	2.492
TOTAL NET & GROSS LENGTH	27,499.6	5.208

DESIGN DATA	
MAXIMUM DEGREE OF CURVE	4°00'
MAXIMUM GRADE	6.25%
MINIMUM S.S.D. VERTICAL	615'
MINIMUM S.S.D. HORIZONTAL	710'
MAXIMUM DESIGN SPEED	60 M.P.H.

*COSTILLA - HUERFANO COUNTY LINE

SEE SPECIAL PROVISIONS FOR NOTICE TO BIDDERS

COLORADO
DEPARTMENT OF HIGHWAYS
APPROVED:
CHIEF ENGINEER
DATE 7-25-62

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
APPROVED:
DATE
DIVISION ENGINEER

INACTIVE 12-31-74

DHH

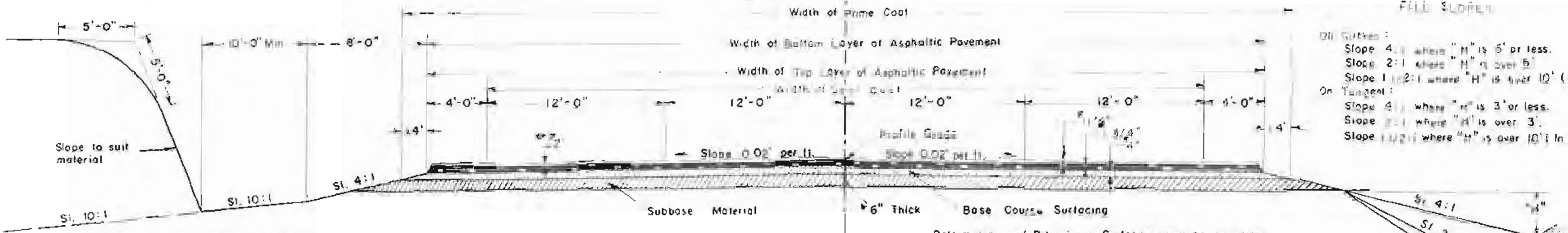
Federal Road District No.	State	Proj. No.
8	Colorado	F 022-3 (10)

TYPICAL CROSS SECTIONS OF IMPROVEMENT

NOTE:

See Standard M-2-A for details of cut slope treatment, flaring and widening.

SECTION ℄ A



Excavation below 4:1 slope and/or 10:1 slope will not be permitted.

The depth and width of the side ditch shall be varied where necessary in order to provide proper drainage and/or entrance to drainage structures.

* All thicknesses on Typical Sections are approximate only.

⊕ 2" Asphaltic Pavement future construction.

Bottom Layer of Bituminous Surfacing shall be completed for full width before Top Layer of Bituminous Surfacing is placed. Paving joints in Top Layer will overlap min 1 ft over joints in Bottom Layer.

FILL SLOPES

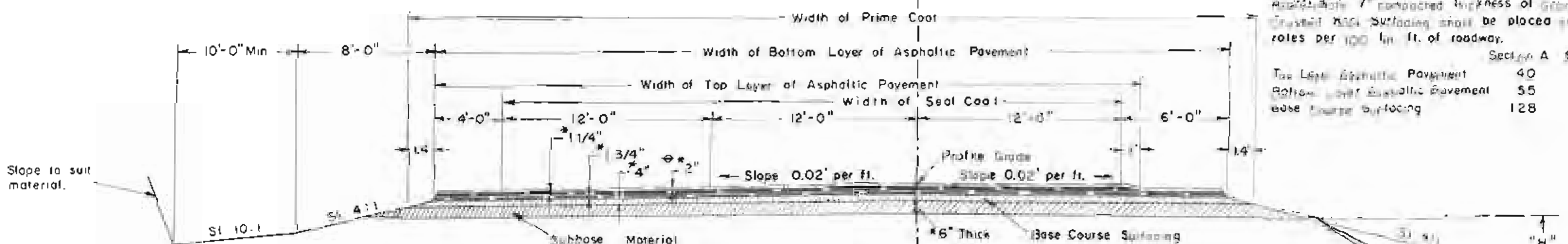
On Curves:

Slope 4:1 where "H" is 5' or less.
Slope 2:1 where "H" is over 5'.
Slope 1 1/2:1 where "H" is over 10' (In Rock).

On Tangent:

Slope 4:1 where "H" is 3' or less.
Slope 2:1 where "H" is over 3'.
Slope 1 1/2:1 where "H" is over 10' (In Rock).

SECTION ℄ B



Material above the subgrade is to be constructed of Subbase Material at locations designated in the Subbase material tabulation. Estimated quantities involved in this operation and thickness of material required are tabulated in the Subbase Plan.

Approximately 7" compacted thickness of Gravel or Crushed Rock Surfacing shall be placed at the following rates per 100 lin. ft. of roadway.

	Section A	Sections B & C	
Top Layer Asphaltic Pavement	40	29	tons
Bottom Layer Asphaltic Pavement	55	45	tons
Base Course Surfacing	128	106	tons

TABULATION OF TYPICAL SECTIONS

STATION	TYPICAL SECTION
179+19.7 – 309+00	C
309+00 – 316+50	Transition
316+50 – 329+00	A
329+00 – 336+50	Transition
336+50 – 454+50	B

GENERAL NOTES – CONTINUED

For preliminary plan quantities of Asphaltic Road Materials and Stone Scr… following rates of application were used.

PRIME COAT MC @ 0.4 Gals per
PAVING ASPHALT (200 - 300 PENETRATION) @ 6.82 Lbs per
SEAL COAT RC (FORTIFIED) @ 0.27 Gals per
STONE SCREENINGS (TYPE 1) @ 24 Lbs per

Rate of application and grade of Asphaltic Material shall be as determ… at time of application.

Road Approaches which require Plant Mixed Asphaltic Surfacing in the "… shall be primed and a 1 3/4" thickness of Asphaltic Surfacing placed as… Public Approaches and Approaches to houses and appurtenances to… out from edge of shoulder or to the R.O.W. line, whichever is less… shall be surfaced 4 ft. out from edge of shoulder.

GENERAL NOTES

This project is to be constructed in conformity with the Standard Specifications of the Colorado Department of Highways, adopted January 1, 1938.

All quantities on preliminary plans are to be considered approximate only.

All poles encroaching on construction are to be moved by the owners.

Approximate location and quantities involved in construction of Intercepting Ditches are tabulated in Summary of Earthwork Quantities.

If excavation operations develop materials which will stand on slopes steeper than slope stake lines, the Department reserves the right to change cut slopes during the progress of such excavations.

During construction of this project, traffic will use the present traveled roadway except where detours are shown on plans.

Thickness of Subbase, Surfacing and Asphaltic Pavement materials as shown on plans is approximate only. These materials are to be placed on the basis of tonnages shown on plans.

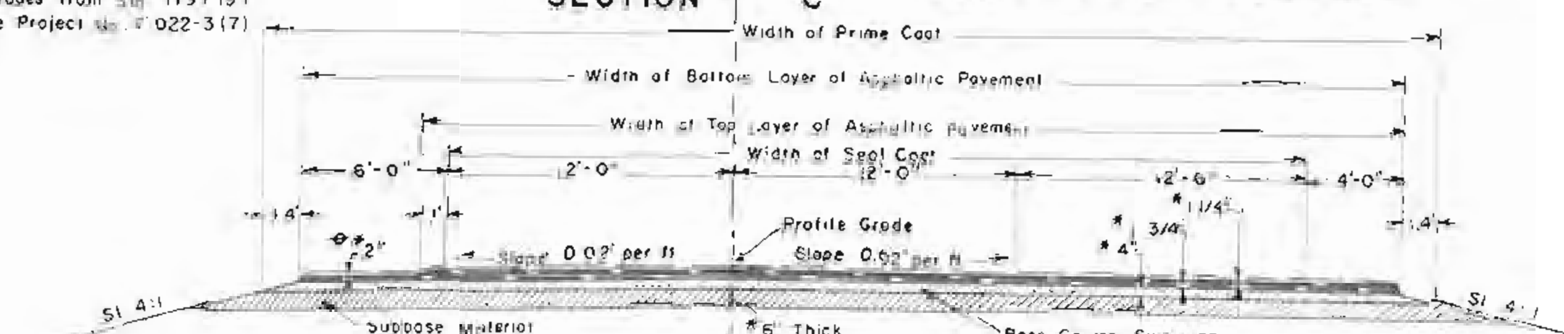
It is estimated that old road is to be obliterated at the following locations: Sta 441+ to Sta. 453+.

GENERAL NOTES – CONTINUED

The force account item "Clearing of Building Sites, etc." shall include removal of all foundations, wells, outhouses and other appurtenances not removed by the owner, and any necessary backfilling of cellars, cess pools, wells etc. to provide neat road-side conditions. It is estimated that this item applies at the following locations: Sta. 425+ & 450+.

For Alignments and Grades from Sta. 179+19.7 to Sta. 022+63.5 see Project No. F 022-3(7)

SECTION ℄ C



SUMMARY OF EARTHWORK QUANTITIES

EXCAVATION		
FROM I B M SHEETS	CU YDS.	658,096
EST FOR OVERBREAK & SUBSIDENCE	CU.YDS.	65,810
LIST OF STRUCTURES AS EXCAVATION	CU.YDS	310
LIST OF STRUCTURES AS EMBANKMENT	CU YDS	18,000
EST. FOR CUT SLOPE TREATMENT	CU YDS.	600
MUCK REMOVAL	CU.YDS.	200
TOTALS	CU YDS	743,016
EXCAVATION		
FROM I.B.M. SHEETS	CU.YDS	658,096
EXCAVATION X FACTOR	CU YDS.	658,096
EMBANKMENT		
FROM I B M SHEETS	CU YDS	658,096
STATION YARD OVERHAUL		
FROM MASS DIAGRAM	STA.YDS.	2,700,893
EST. FOR OVERBREAK & SUBSIDENCE		270,089
TOTALS	STA.YDS	2,970,982
YARD MILE OVERHAUL		
FROM MASS DIAGRAM	YD MI.	17,937
EST. FOR OVERBREAK & SUBSIDENCE	YD.MI.	1,794
TOTALS	YD.MI.	19,731

UNCLASSIFIED DITCH EXCAVATION INTERCEPTING DITCHES

STATION			SIDE	CU.YDS.
325+	TO	329+	LT	104
335+	TO	344+	LT.	260
351+	TO	357+	LT.	238
364+	TO	374+	LT.	260
377+	TO	389+	LT.	408
392+	TO	400+	LT.	196
403+	TO	405+50	LT.	60
409+	TO	412+50	LT	78
415+50	TO	421+	LT.	204
427+	TO	449+	LT.	750
451+	TO	453+	LT	52
SUB-TOTAL				2,610
FROM LIST OF STRUCTURES				20
TOTAL				2,630

COMPACTION

TOTAL UNCLASSIFIED EXCAVATION	CU.YDS.	742,816
BASE OF CUTS & FILLS	CU YDS	27,082
TOTALS	CU YDS	769,898

SUMMARY OF APPROXIMATE QUANTITIES

FEDERAL ROAD REGION NO	DIVISION	PROJECT NO.	SHEET NO
9	COLORADO	F 022-3(10)	3

SPECIFICATION ITEM NO	ITEM	UNIT	TOTALS HUERFANO COUNTY	TOTALS COSTILLA COUNTY	PROJECT TOTALS
10	CLEARING AND GRUBBING ENTIRE PROJECT	LUMP SUM	•		•
11	REMOVAL OF 1 STRUCTURE	LUMP SUM	•		•
12	REMOVING FENCE	LIN FT	4,900		4,900
3	UNCLASSIFIED EXCAVATION	CU YDS	743,000		743,000
13	UNCLASSIFIED DITCH EXCAVATION	CU YDS	2,700		2,700
13	STRIPING	CU YDS	600	600	1,200
14	UNCLASSIFIED STRUCTURAL EXCAVATION - MISCELLANEOUS	CU YDS	1,400		1,400
16	STRUCTURE BACKFILL (CLASS X)	CU YDS	780		780
17	COMPACTION (MODIFIED)	CU YDS	770,000		770,000
17	WETTING	M GAL	6,390	650	7,040
18	STATION YARD OVERHAUL	STA YDS	2,971,000		2,971,000
18	YARD MILE OVERHAUL	YD MI	19,800		19,800
18	TON MILE OVERHAUL	TON MI	47,400	167,800	215,200
23	SUBBASE MATERIAL (CLASS 1)	TONS	25,000	27,200	52,200
26	GRAVEL OR CRUSHED ROCK SURFACING (GRADING C)	TONS	16,100	15,700	31,800
29	ASPHALT (200 to 300 PENETRATION)	TONS	810	820	1,630
30	ASPHALTIC ROAD MATERIAL MC (PRIME)	GALS	31,700	32,000	63,700
30	ASPHALTIC ROAD MATERIAL RC (SEAL) (FORTIFIED)	GALS	15,600	15,900	31,500
31	STONE SCREENINGS (TYPE 1)	TONS	730	740	1,470
32	PLANT MIXED ASPHALTIC SURFACING	TONS	10,760	10,880	21,640
46	CLASS "A" CONCRETE	CU YDS	68		68
47	REINFORCING STEEL	LBS	5,400		5,400
53	48" CORRUGATED METAL CULVERT PIPE (10 GA)	LIN FT	164		164
53	18" CORRUGATED METAL CULVERT PIPE (16 GA)	LIN FT	86		86
53	24" CORRUGATED METAL CULVERT PIPE (12 GA)	LIN FT	104		104
53	24" CORRUGATED METAL CULVERT PIPE (14 GA)	LIN FT	580		580
53	24" CORRUGATED METAL CULVERT PIPE (16 GA)	LIN FT	1,108		1,108
53	48" CORRUGATED METAL CULVERT PIPE (8 GA)	LIN FT	256		256
53	48" CORRUGATED METAL CULVERT PIPE (10 GA)	LIN FT	218		218
53	60" CORRUGATED METAL CULVERT PIPE (10 GA)	LIN FT	134		134
63	GROUTED RUBBLE SLOPE AND DITCH PAVING	CU YDS	20		20
75	METAL PLATE GUARD FENCE (BEAM TYPE)	LIN FT	7,500	2,450	9,950
76	COMB. WIRE FENCE WITH METAL POSTS	LIN FT	26,800		26,800
76	DRIVEWAY GATES	EACH	13		13
76	CORNER AND LINE BRACE POSTS	EACH	50		50
76	END POSTS	EACH	37		37
76	WALK GATES	EACH	2		2
81	RIGHT OF WAY MARKERS	EACH	14		14
95	24" METAL APRONS FOR CORRUGATED METAL PIPE CULVERTS	EACH	6		6
52	TIMBER GUARD POSTS	EACH	52	74	126
	FORCE ACCOUNT				
20	OBLITERATING OLD ROAD	LUMP SUM	•		•
	RELOCATE WATER LINE, STA 425+	LUMP SUM	•		•
①	RELOCATE POWER LINE (WORK BY SAN ISABEL ELECTRICAL ASSOC FORCES)	LUMP SUM	•		•
	CLEARING OF BUILDING SITES, ETC	LUMP SUM	•		•
	STATE FORCES				
①	SIGNING AND STRIPING ENTIRE PROJECT	LUMP SUM	•	•	•

① NON-FEDERAL AID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	F 022-3 (6)	4

FENCING TABULATION

STATION	SIDE	REMOVE FENCE LIN. FT.	BUILD COMB. WIRE FENCE LIN. FT.	GATES NO. DRIVE	GATES NO. WALK
322+63.5 - 456+65	LT.		13,360		
322+63.5 - 426+00	RT.		10,225		
428+00 - 458+80	RT.		3,170		
344+60	LT.			1	
358+00	LT.			1	
360+	LT.			1	
374+50	LT.			1	
378+00	LT.			1	
389+00	LT.			1	
405+40	LT.			1	
425+	LT.				1
450+70	LT.			1	
325+00	RT.			1	
344+60	RT.			1	
356+00	RT.			1	
364+35	RT.			1	
403+00	RT.			1	
425+	RT.				1
322+63.5	X	250			
406+75	X	290			
436+00 - 453+	RT.	2,870			
455+50 - 458+80	RT.	350			
447+50	LT.	125			
448+80 - 456+65	LT.	940			
TOTALS - HUERFANO CO.		4,825	26,755	13	2

It is estimated that 50 Line brace posts and corner posts and 37 end posts will be required.

TIMBER GUARD POSTS

STATION	SIDE	SPACING	NO.
195+00 To 201+00	Lt.	200'	4
202+00 To 204+00	Rt	200'	2
211+00 To 213+00	Rt	200'	2
213+00	Lt.	—	1
222+00 To 228+00	Lt & Rt	200'	8
229+20 To 244+00	Lt & Rt	130' Curve	26
256+50 To 259+08	Rt	3° Curve	4
264+50 To 274+50	Lt	200'	6
275+00 To 279+00	Rt	200'	3
279+00	Lt.	Culvert	1
308+00 To 317+65	Rt.	4° Curve	14
318+60 To 320+50	Rt.	2°30' Curve	3
TOTAL - COSTILLA CO.			74
331+00 To 334+00	Lt.	100'	4
335+50 To 337+00	Rt.	150'	2
337+00	Lt.	Culvert	1
351+95 To 353+55	Rt	3°30' Curve	3
357+60 To 364+00	Rt.	3°30' Curve	9
358+40 To 364+00	Lt.	3°30' Curve	8
374+00 To 376+22	Lt.	4° Curve	4
390+00 To 390+80	Lt.	80'	2
401+00 To 402+60	Lt.	3°30' Curve	3
415+92	Lt.	Culvert	1
418+51 To 420+49	Rt.	5° Curve	4
423+02 To 425+00	Lt.	5° Curve	4
435+50 To 445+50	Rt.	200'	6
435+50	Lt.	Culvert	1
TOTAL - HUERFANO CO.			52

RIGHT OF WAY MARKERS

STATION	SIDE	NO.
333+45.4	RT & LT	2
363+60.6	RT & LT	2
385+29.98K	RT & LT	2
397+60.6	RT. & LT	2
414+89.2	RT. & LT.	2
427+04	RT & LT	2
451+60	RT. & LT	2
TOTAL - HUERFANO CO.		14

GUARD FENCE

STATION	SIDE	LENGTH
195+00 To 200+50	Rt	550'
264+50 To 274+00	Rt.	350
298+00 To 301+50	Lt.	350
297+00 To 303+00	Rt.	600
TOTAL - COSTILLA CO.		2,450
325+50 To 334+50	Rt.	900'
345+50 To 350+25	Lt.	475'
345+00 To 351+50	Rt	650
354+00 To 357+00	Rt	300
373+00 To 378+50	Rt.	550'
383+50 To 391+50	Rt	800'
400+00 To 408+50	Rt.	850'
406+10 To 408+60	Lt	250'
412+25 To 418+00	Rt	575'
421+00 To 430+00	Rt.	900'
445+50 To 458+00	Rt.	1,250'
TOTAL - HUERFANO CO.		7,500'

PIT NO. 1

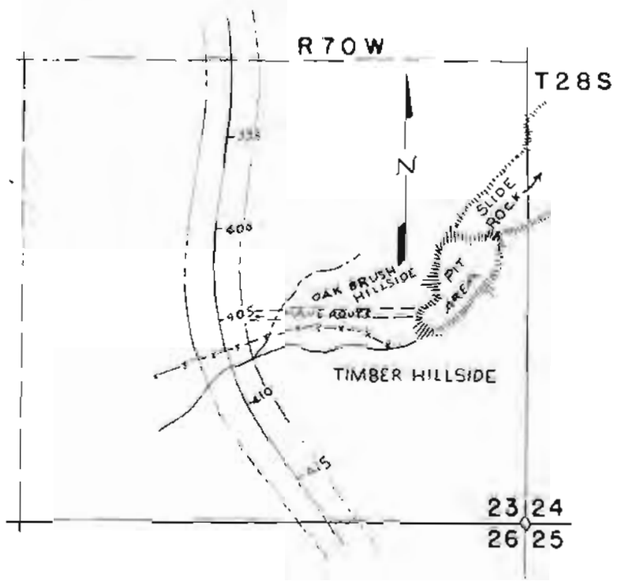
STONE SCREENINGS, SUBBASE, SURF. & AGGREGATE FOR PLANT MIX

LOCATION - S.E. 1/4, SEC. 23, T28S, R70W

OWNER - E. M. ESTES

QUANTITY AVAILABLE - AMPLE

Distance from Center of Pit to Sta. 405+00 of Project over route of haul is approximately 1,200 Feet.



Field Sample No. 2497
Material in Pit is Slide Rock
Estimated Stripping = 1,000 Cu Yds.

It is estimated that Gravel Surfacing and Subbase Material for the Project is available in the vicinity of the Pit indicated in the following Tabulations. Estimated quantities involved in these operations are shown below.

Alteration of the Surfacing Plan or the Subbase Plan as here outlined will be allowed only on written permission from the Department.

SURFACING & SUBBASE PLAN

MATERIAL TO BE PLACED	SOURCE QUANTITY & "R" VALUE	QUANTITY TONS USED: PLANT MIX TOP LAYER	QUANTITY TONS USED: PLANT MIX BOT. LAYER	QUANTITY TONS USED: BASE COURSE GRADING	TON MILE OVERHAUL: PLANT MIX TOP LAYER	TON MILE OVERHAUL: PLANT MIX BOT. LAYER	TON MILE OVERHAUL: BASE COURSE GRADING	SOURCE QUANTITY & "R" VALUE	SUBBASE * THICKNESS INCHES	SUBBASE QUANTITY TONS CLASS 1	SUBBASE OVERHAUL TON MILE
179+19.7 To 309+00	PIT NO. 1 AMPLE R = 79	3,764	5,841	13,759	12,304	19,093	44,976	PIT NO. 1 AMPLE R = 78	6	22,067	72,138
309+00 To 316+50		259	375	878	510	738	1,728		6	1,403	2,762
316+50 To 322+63.5		245	337	785	451	620	1,444		6	1,252	2,309
Road Approaches, 221+45, 255+70, 296+75 & 304+00 Estimated for correcting Irregularities in Subgrade			51	255		159	796			2,472	7,720
TOTALS - COSTILLA CO.		4,268	6,604	15,677	13,265	20,610	48,944			27,194	84,929
322+63.5 To 329+00		255	350	815	439	602	1,403		6	1,298	2,234
329+00 To 336+50		259	375	878	412	596	1,396		6	1,403	2,231
336+50 To 385+29.9 BK.		1,415	2,196	5,173	1,495	2,321	5,466		6	8,296	8,760
385+60 Ah To 405+00		562	873	2,056	231	359	845		6	3,291	1,353
405+00 To 454+50		1,436	2,228	5,247	999	1,551	3,652		6	8,415	3,859
454+50 To 464+90.1		244	421	1,071	308	532	1,353				
From Structure Quantities Tab. Estimated for correcting Irregularities in Subgrade			139	880		129	815			2,271	2,044
TOTALS - HUERFANO CO.		4,171	6,582	16,120	3,884	6,090	14,930			24,980	22,487

* Based on Design Curve "D" with minimum 6" Leveling Course

COLORADO DEPARTMENT OF HIGHWAYS
FORM C.D.H. 125
OCTOBER 1961

STRUCTURE QUANTITIES

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	F 022-3(10)	5

LOCATION	DESCRIPTION	REMOVAL OF STRUCTURES	EXCAVATION CUBIC YARDS			UNCLASSIFIED STRUCTURAL EXCAVATION		STRUCTURE BACKFILL		GRAVEL OR CRUSHED ROCK SURFACING	P.M. ASPHALTIC SURFACING	CONCRETE	REINFORCING STEEL	CORRUGATED METAL CULVERT PIPE LINEAR FEET								GROUTED RUBBLE SLOPE AND DITCH PAVING	METAL APRONS NO.
		NO	UNCL	EMB	UNCL. DITCH	CUBIC YARDS MISC		CUBIC YARDS CL. X		TONS	TONS	CUBIC YARDS CL. "A"	LBS.	18" 6 GA	24" 12 GA	24" 14 GA	24" 16 GA	48" 8 GA	48" 12 GA	48" 10 GA	60" 10 GA	CU. YDS.	24"
325+00	Req'd Road Approach, Rt.		30							41	2												
332+45	Req'd 24"x146' Cross Culvert					30		30								64 | 46 / 36							
337+00	Req'd 24"x56' Cross Culvert with Metal Apron and Grouted Rubble Slope Paving at Inlet Inlet Ditch				5	25		15								56						5	1
344+60	Req'd 18"x34' Side Drain, Lt., Road Approach Rt. & Lt.			280		5		5		100	4			34									
348+60	Req'd 48"x370' Cross Culvert					125		165										256 | 64 / 50					
358+00	Req'd 18"x26' Side Drain, Lt. Road Approach Rt. & Lt.			500						13	4			26									
358+40	Req'd 6'x7'x65' Stock Pass (Type 6A), Inlet Channel (W-12')		30			115		70				67.53	5363										
359+45	Req'd 60"x134' Cross Culvert, Fill Old Channel Upstream to Fork & Downstream to R.O.W.			5000				90													134		
360+00	Req'd Road Approach Lt.			500						41	2												
363+00 361+ to 363+	Req'd 24"x132' Cross Culvert Remove Unsuitable Material and Backfill with Suitable Material Lt.		250	250		100		25								64 | [illegible] / 25							
364+35	Req'd Road Approach, Rt.			100						12	2												
373+75	Req'd 24"x112' Cross Culvert with Metal Apron at Inlet.					15		20								112							1
374+50	Req'd 18"x44' Side Drain & Road Appr. Lt.			175		5		5		30	2			44									
376+00	Req'd 24"x112' Cross Culvert, Inlet Ditch.				5	10		20								112							
385+65	Req'd 24"x94' Cross Culvert with Metal Apron and Grouted Rubble Slope Paving at Inlet.					15		20								94						5	1
390+65	Req'd 24"x186' Cross Culvert.					25		35								114 | 28 / 44							
401+92	Req'd 24"x272' Cross Culvert, Inlet Ditch.				5	40		50								104 | 64 / 34 | 44 / 26							
405+40	Req'd 18"x42' Side Drain & Road Approach, Lt. Road Approach, Rt.			1000		5		10		[illegible]	4			42									
407+88	Req'd 48"x268' Cross Culvert					110		110											44 / 60 | 164				

COLORADO DEPARTMENT OF HIGHWAYS
FORM C.D.H. 125
OCTOBER 1961

STRUCTURE QUANTITIES

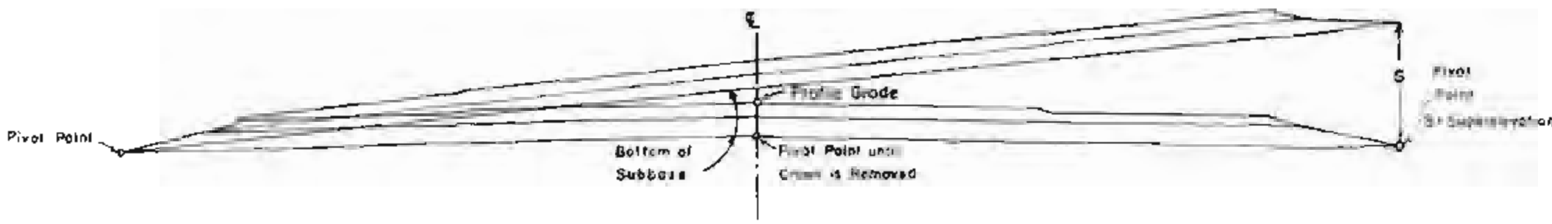
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
[illegible]	COLORADO	[illegible]	6

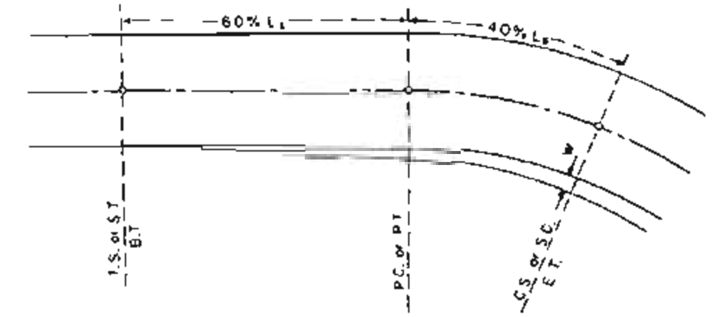
LOCATION	DESCRIPTION	REMOVAL OF STRUCTURES NO.	EXCAVATION CUBIC YARDS UNCL.	EXCAVATION CUBIC YARDS EMB.	EXCAVATION CUBIC YARDS UNCL. DITCH	UNCLASSIFIED STRUCTURAL EXCAVATION CUBIC YARDS MISC		STRUCTURE BACKFILL CUBIC YARDS CL. X		GRAVEL OR CRUSHED ROCK SURFACING TONS	P.M. ASPHALTIC SURFACING TONS	CONCRETE CUBIC YARDS CL. "A"	REINFORCING STEEL LBS.	CORRUGATED METAL CULVERT PIPE LINEAR FEET (18" 16 GA., 24" 14 GA., 30" 14 GA., 36" 12 GA., 42" 8 GA., 48" 12 GA., 54" 10 GA., 60" 10 GA.)	GROUTED RUBBLE SLOPE AND DITCH PAVING CU. YDS.	METAL APRONS NO. 24"
415+92	Req'd 24" x 66' Cross Culvert. Apron at Inlet					10		15						53		1
421+75	Req'd 24" x 82' Cross Culvert with Metal Apron at Inlet, etc.			5		10		15						82		1
422+00	Req'd Road Approach, Lt.			120						41	2					
424+38	Req'd 24" x 252' Cross Culvert					100		50						[illegible]		
424+50	Req'd Road Approach, Lt.			100						41	2					
435+43	Req'd 24" x 102' Cross Culvert with Metal Apron & Grouted Rubble Slope Paving at Inlet [illegible]				5	75		20						102	[illegible]	1
441+ to 445+	Req'd 18" x 40' Side Drain Rt. at 441+50 and Road Approach, Rt.			7900		5		5		225	113			40		
450+43	Req'd 24" x 130' Cross Culvert					20		25						[illegible]		
450+70	Req'd Road Approach Lt.			120						40	2					
454+ to 464+	Req'd Approach to Project			▲												
457+55	Remove 24" CMP	1														
	TOTALS	1	310	8,100	20	1,315		150		[illegible]	[illegible]	8753	5363	[illegible] 104 [illegible] 1100 256 218 164 154	10	8

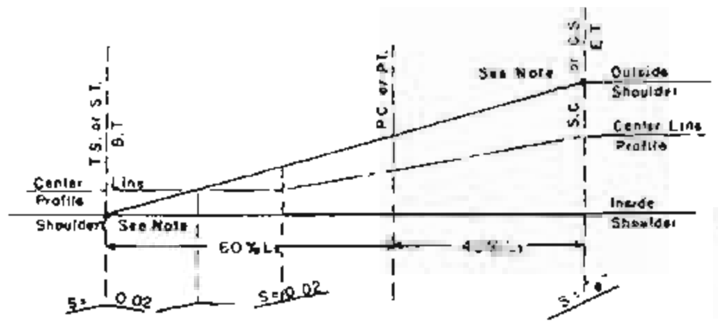
▲ Included in Earthwork Quantities.

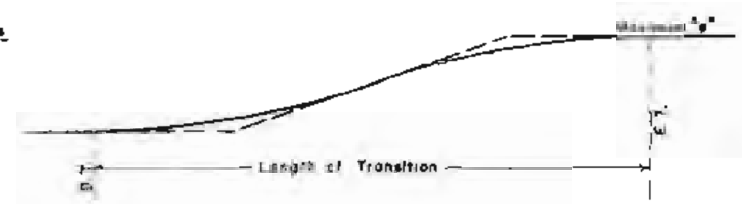
STANDARD M-I-D
(MAY 1, 1962)

STATE	PROJECT NO.	SHEET NO.
COLORADO	F022-3 (10)	7









● NOTE – For obtaining smooth profiles on pavement edges vertical curves can be inserted between the angular breaks at the beginning and the end of the superelevation transition.

PAVEMENT WIDENING

Pavement Width	20 Ft.	22 Ft.	24 Ft.
Degree of Curve			
0° - 3°	0 Ft.	0 Ft.	0 Ft.
4° - 6°	2.0 Ft.	0 Ft.	0 Ft.
7° - 10°	2.5 Ft.	0 Ft.	0 Ft.
11° - 17°	3.0 Ft.	2.0 Ft.	0 Ft.
18° - 21°	3.5 Ft.	2.5 Ft.	0 Ft.
22° - Up	4.0 Ft.	3.0 Ft.	2.0 Ft.

Widening is to be on the inside edge of the pavement and its transition is to extend over the same transition length as the superelevation.

REVISIONS

SUPERELEVATION RATES FOR TWO LANE CROWNED SECTION
TABLE 1

Degree of Curve	Max. Superelevation = 0.08: Super Rate Ft./Ft.	Max. Superelevation = 0.08: Maximum Design Speed M.P.H.	Max. Superelevation = 0.08: Minimum Transition or Spiral Length	Max. Superelevation = 0.10: Super Rate Ft./Ft.	Max. Superelevation = 0.10: Maximum Design Speed M.P.H.	Max. Superelevation = 0.10: Minimum Transition or Spiral Length
0°15'	R C	70	200'	R C	70	200'
0°30'	R C	70	200'	R C	70	200'
0°45'	.021	70	200'	.021	70	200'
1°00'	.028	70	200'	.028	70	200'
1°30'	.042	70	200'	.042	70	200'
2°00'	.056	70	200'	.055	70	200'
2°30'	.069	70	200'	.069	70	200'
3°00'	.076	70	250'	.083	70	250'
3°30'	.080	70	250'	.096	70	300'
4°	.080	65	250'	.100	65	300'
5°	.080	60	250'	.100	60	300'
6°	.080	55	200'	.100	55	250'
7°	.080	50	200'	.100	50	250'
8°	.080	45	200'	.100	50	250'
9°	.080	45	200'	.100	45	250'
10°	.080	40	200'	.100	45	250'
11°	.080	40	200'	.100	40	200'
12°	.080	40	200'	.100	40	200'
13°	.080	35	150'	.100	40	200'
14°	.080	35	150'	.100	35	200'
15°	.080	35	150'	.100	35	200'
16°	.080	35	150'	.100	35	200'
17°	.080	30	150'	.100	35	200'
18°	.080	30	150'	.100	30	200'
19°	.080	30	150'	.100	30	200'
20°	.080	30	150'	.100	30	200'
21°	.080	30	150'	.100	30	200'
22°	.080	30	150'	.100	30	200'
23°	.080	30	150'	.100	30	200'
24°				.100	30	200'
25°				.100	30	200'

NOTES – Plains Areas use 0.10 Maximum Superelevation Rate.
Mountainous Areas & areas where icing conditions frequently exist, use 0.08 Maximum Superelevation Rate.

SUPERELEVATION RATES FOR SPECIAL CASES ■
TABLE 2

Degree of Curve	30 M.P.H. Required Superelevation Rate Ft./Ft. 0.08	30 M.P.H. 0.10	30 M.P.H. Minimum Length of Transition or Spiral	35 M.P.H. Required Superelevation Rate Ft./Ft. 0.08	35 M.P.H. 0.10	35 M.P.H. Minimum Length of Transition or Spiral	40 M.P.H. Required Superelevation Rate Ft./Ft. 0.08	40 M.P.H. 0.10	40 M.P.H. Minimum Length of Transition or Spiral
0°15'	N C	N C	0	N C	N C	0	N C	N C	0
0°30'	N C	N C	0	N C	N C	0	N C	N C	0
0°45'	N C	N C	0	R C	N C	0	R C	R C	150'
1°00'	N C	N C	0	R C	R C	150'	R C	R C	150'
1°30'	R C	R C	100'	R C	R C	150'	R C	R C	150'
2°00'	R C	R C	100'	R C	.021	150'	.025	.027	150'
2°30'	R C	R C	100'	.025	.026	150'	.030	.033	150'
3°00'	.023	.024	100'	.028	.031	150'	.036	.038	150'
3°30'	.026	.027	100'	.033	.035	150'	.040	.045	150'
4°	.029	.030	100'	.037	.040	150'	.044	.050	150'
5°	.035	.038	100'	.044	.048	150'	.053	.060	150'
6°	.041	.044	100'	.050	.056	150'	.060	.068	150'
7°	.045	.050	100'	.056	.063	150'	.066	.076	150'
8°	.050	.055	100'	.061	.069	150'	.071	.084	200'
9°	.054	.061	100'	.065	.075	150'	.074	.088	200'
10°	.058	.065	150'	.069	.081	150'	.077	.092	200'
11°	.061	.070	150'	.072	.085	200'	.079	.096	200'
12°	.065	.074	150'	.075	.089	200'	.080	.098	200'
13°	.067	.078	150'	.077	.092	200'		.100	200'
14°	.070	.082	150'	.078	.095	200'			
15°	.072	.085	150'	.079	.097	200'			
16°	.074	.087	150'	.080	.099	200'			
17°	.076	.090	150'		.100	200'			
18°	.077	.093	200'		.100	200'			
19°	.078	.095	200'						
20°	.079	.096	200'						
21°	.080	.098	200'						
22°	.080	.099	200'						
23°	.080	.099	200'						
24°		.100	200'						
25°		.100	200'						

Degree of Curve	45 M.P.H. Required Superelevation Rate Ft./Ft. 0.08	45 M.P.H. 0.10	45 M.P.H. Minimum Length of Transition or Spiral	50 M.P.H. Required Superelevation Rate Ft./Ft. 0.08	50 M.P.H. 0.10	50 M.P.H. Minimum Length of Transition or Spiral	55 M.P.H. Required Superelevation Rate Ft./Ft. 0.08	55 M.P.H. 0.10	55 M.P.H. Minimum Length of Transition or Spiral	60 M.P.H. Required Superelevation Rate Ft./Ft. 0.08	60 M.P.H. 0.10	60 M.P.H. Minimum Length of Transition or Spiral
0°15'	N C	N C	0	N C	N C	0	N C	N C	0	N C	N C	0
0°30'	N C	N C	0	R C	R C	150'	R C	R C	200'	R C	R C	200'
0°45'	R C	R C	150'	R C	R C	150'	R C	R C	200'	R C	R C	200'
1°00'	R C	R C	150'	R C	R C	150'	.021	.021	200'	.022	.022	200'
1°30'	.023	.024	150'	.027	.027	150'	.031	.031	200'	.035	.034	200'
2°00'	.030	.032	150'	.035	.036	150'	.041	.042	200'	.047	.046	200'
2°30'	.036	.039	150'	.043	.046	150'	.050	.052	200'	.057	.059	200'
3°00'	.042	.046	150'	.050	.054	150'	.057	.062	200'	.066	.070	200'
3°30'	.048	.053	150'	.056	.063	150'	.064	.072	200'	.072	.081	250'
4°	.053	.060	150'	.062	.070	200'	.069	.079	200'	.076	.090	250'
5°	.062	.071	200'	.070	.083	200'	.077	.091	250'	.080	.099	300'
6°	.069	.080	200'	.076	.093	250'	.080	.098	250'		.100	300'
7°	.074	.086	200'	.079	.097	250'		.100	250'			
8°	.078	.094	200'	.080	.100	250'						
9°	.080	.097	250'									
10°	.080	.100	250'									
11°												
12°												
13°												

■ Table 2 also may be used for City Streets & Interchanges.
N C = Normal Crown section.
R C = Remove adverse crown, superelevate at normal crown slope.

NOTES – Transition or Spiral Lengths are shown in the tables for 2 Lane Crowned Highways.
For 3 Lane Crowned Highways use 1.2 times the lengths shown, rounded to the nearest 50 feet.
" 4 " " " " " 1.5 " " " " " " " "
Width of Crowned Highway to be figured for Superelevation – left pivot point to right pivot point.

COLORADO DEPARTMENT OF HIGHWAYS

SUPERELEVATION & WIDENING OF CURVES CROWNED HIGHWAYS

Designed by S.B.L.
Made by S.B.L.
Checked by L.E.O.
Approved by
Date

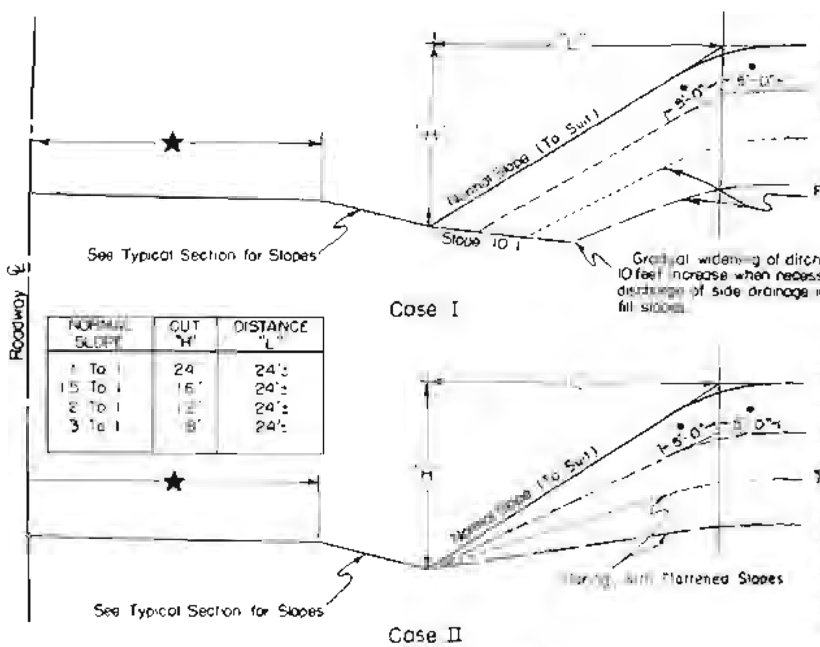
STANDARD SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT & WIDENING AT BRIDGES AND AT CREST OF GRADES

STANDARD M-2-A
(MAY 1, 1962)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
6	COLO.	F022-3 (10)	8

REVISIONS

GENERAL DETAILS FOR FLARING OF EARTH CUTS, CUT SLOPE TREATMENT & WIDENING AT BRIDGES



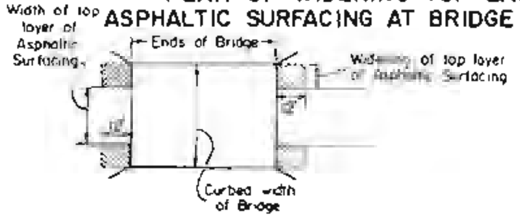
NORMAL SLOPE	CUT "H"	DISTANCE "L"
1 To 1	24'	24'±
1.5 To 1	16'	24'±
2 To 1	12'	24'±
3 To 1	8'	24'±

FLARING OF EARTH CUTS. - The backslopes at ends of all earth cuts shall be flattened & where necessary the ditch shall be widened gradually to discharge side ditch drainage away from the toes of adjacent fill slopes in order to avoid erosion & to improve appearance. The transition of flattened backslopes & widened ditch shall be constructed in such a manner that a uniform appearance of slope & ditch results. Backslopes shall be flared to the approximate "L" distance shown on Slope Table included with this detail. Rock cuts shall not be flared.

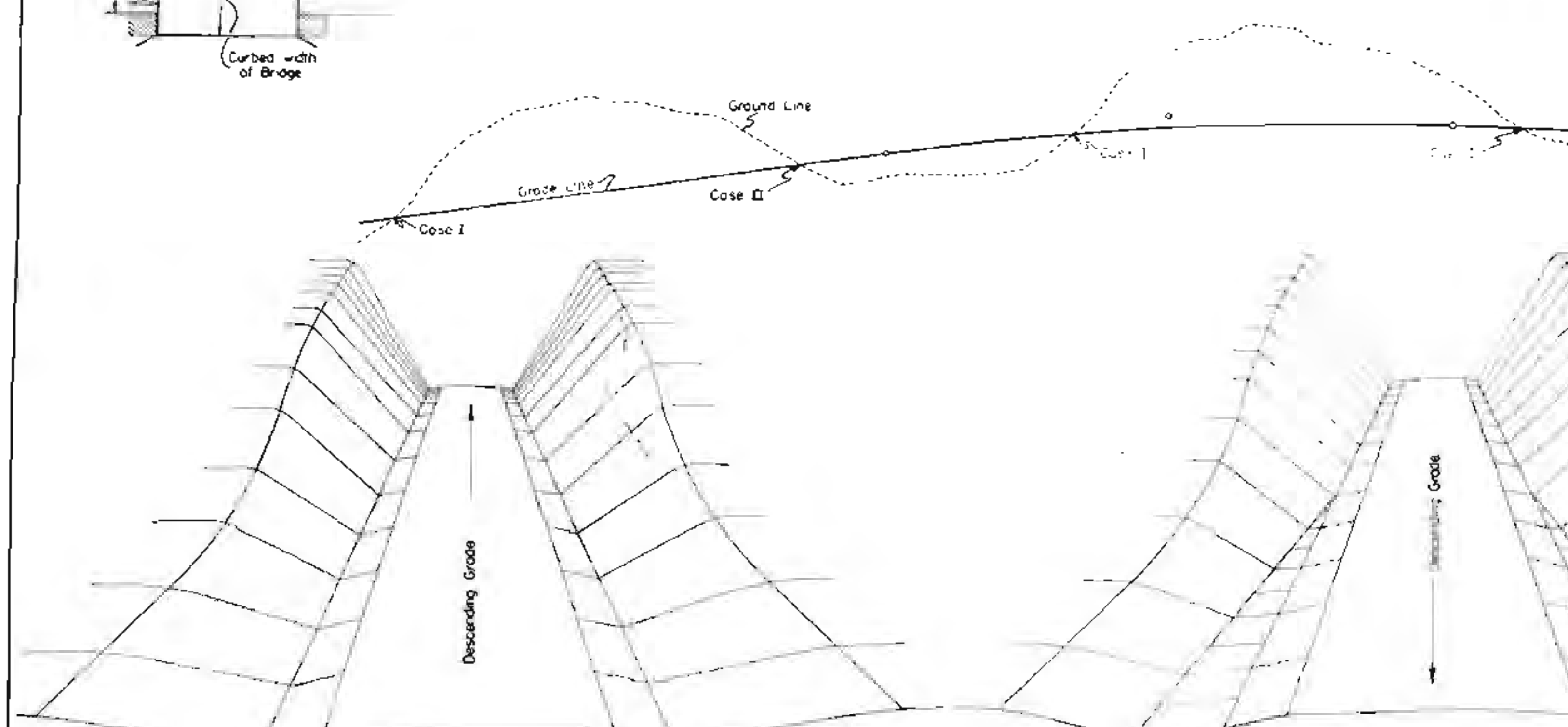
• CUT SLOPE TREATMENT IN EARTH CUTS. The intersection of cut slopes with the existing ground shall be rounded in earth cuts, beginning 5 ft outside the slope stake and extending 5 ft down the cut slope. Where the cut slope is less than 5 ft reduce each of the above widths of slope treatment to the actual slope distance. Quantities shall be included in "Unclassified Excavation".

★ WIDENING AT BRIDGE APPROACHES. Roadway embankment at bridge approaches shall be so constructed that [illegible] of surfacing at shoulder point is [illegible] 2 ft beyond the outside edge of bridge deck. Where widening of the section is necessary to achieve this result it shall take place gradually over a distance of 300 ft. The bottom layer of Asphaltic Surfacing shall be placed in widened sections to conform with dimensions shown on typical section. This is done to accommodate guard fence and/or guard posts at bridge approaches. The top layer of Asphaltic Surfacing shall be widened to meet the curbed width of the bridge as shown in sketch, left.

PLAN OF WIDENING TOP LAYER OF ASPHALTIC SURFACING AT BRIDGE APPROACHES



PLAN OF FLARING IN EARTH CUTS



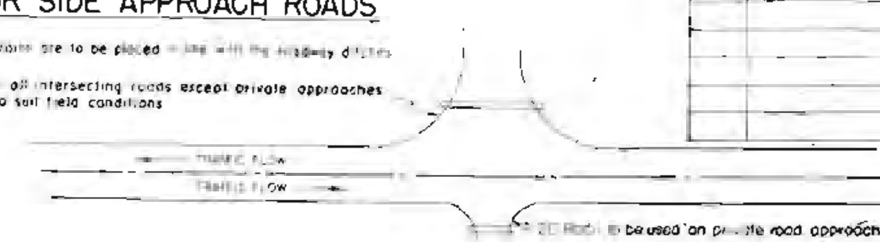
Case II

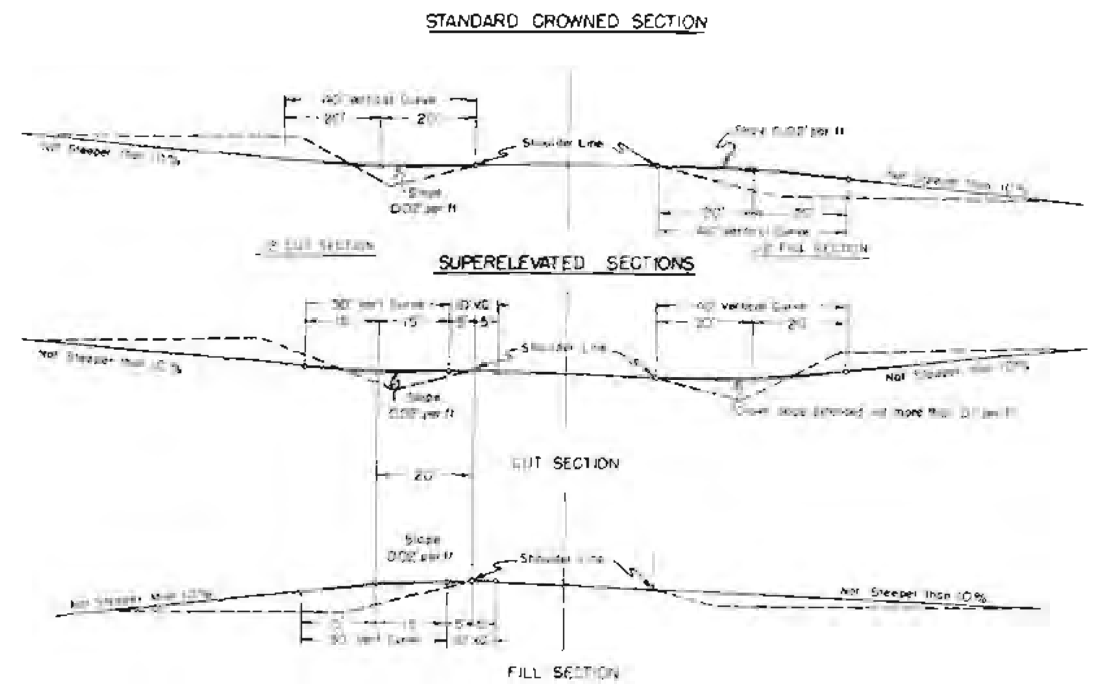
Case I

TYPICAL PLANS FOR SIDE APPROACH ROADS

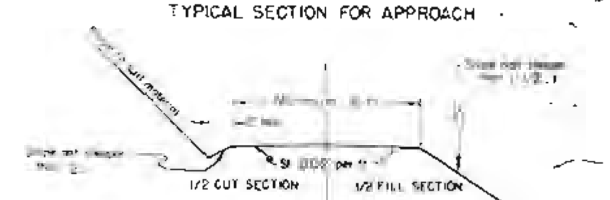
Where practical Side Drains are to be placed in line with the roadway ditches.

50' Radii to be used on all intersecting roads except private approaches. Radii may be varied to suit field conditions.





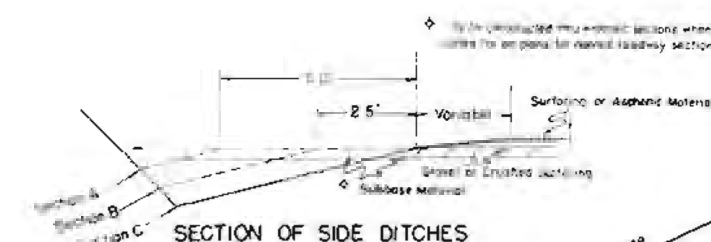
TYPICAL SECTION FOR APPROACH



NOTE.
ROAD APPROACHES. To conform to the above details unless otherwise indicated on plans by Special Details. The width of the crowned section shall be not less than the width of the crowned section of the existing approach road and in no case shall the new construction be less than sixteen (16) feet in width.

DETAILS FOR DITCH & WIDENED SHOULDERS AT CREST OF GRADES

(TO BE USED ONLY WHERE SIGHT DISTANCE AT CREST OF GRADE IS 600 FT. OR LESS)



SECTION OF SIDE DITCHES

Section A is a shallow ditch section.
Section C is normal ditch section.
Section B shall be on a uniform transition between Sections A and C.
The modification of the ditch indicated shall be used only at the crest of grades from which drainage breaks both ways.

Formula for finding the Crest of Grade

PROFILE VIEW SHOWING DISTANCES AND RELATIVE POSITIONS OF DITCH-TREATMENT SECTIONS

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the Project.

[illegible]

COLORADO DEPARTMENT OF HIGHWAYS

APPROACH ROADS, FLARING, CUT SLOPE TREATMENT, BRIDGE & CREST WIDENING

Designed by [illegible] | Approved by [illegible]
Made by [illegible]
Checked by [illegible] | Date: November 1, 1955

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

STANDARD M-6-B

(SHEET 1 OF 2 SHEETS)

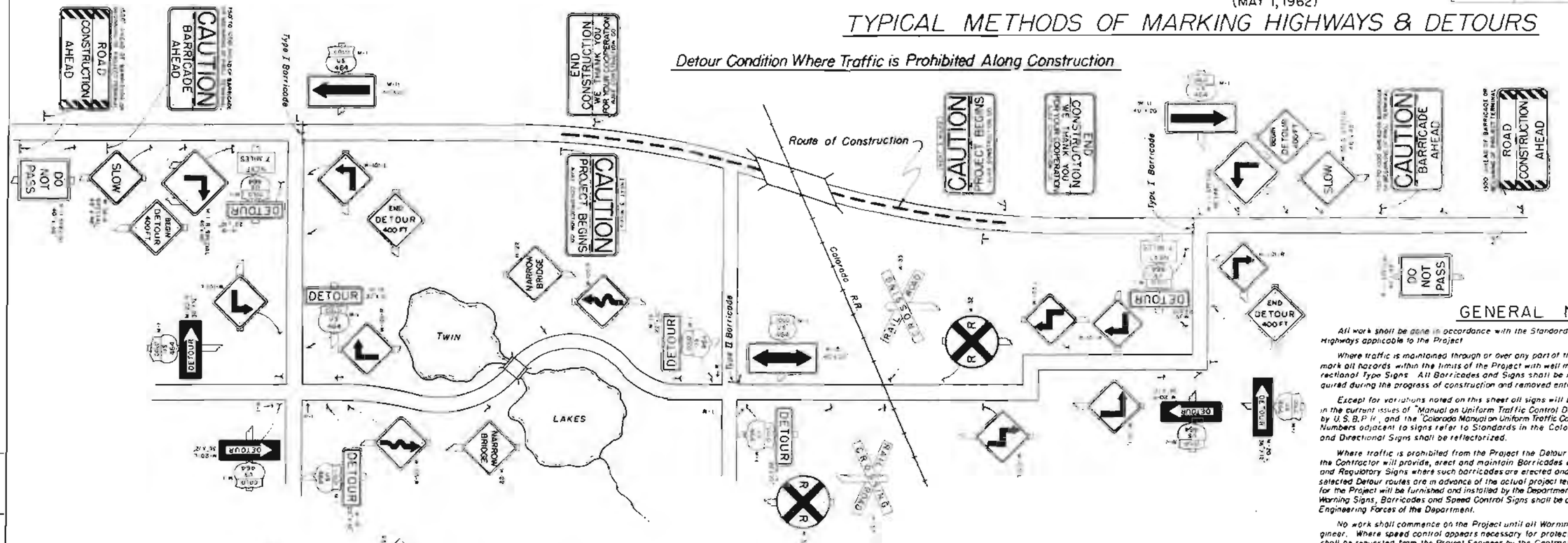
(MAY 1, 1962)

DIVISION	PROJECT NO	SHEET NO.
COLO.	F022-3(10)	9

REVISIONS

TYPICAL METHODS OF MARKING HIGHWAYS & DETOURS

Detour Condition Where Traffic is Prohibited Along Construction



Condition Where Traffic is Permitted Along Construction

NOTE

Typical examples for marking Projects as shown hereon constitute a minimum of signs required and is subject to alteration to fit actual conditions encountered in the field. Additional markings and any special signs required for the guidance and protection of traffic will be placed as required on the project at the Contractor's expense.

All Signs and Barricades must be maintained in good condition and kept clean and free of dirt at all times to give the appearance of new signing. Contractor's and Engineers' equipment must be parked so that signs and barricades are visible to approaching traffic at all times.

LEGEND

(1) NEW GRADE, TRAFFIC USING SHOULDERS

(2) TRAFFIC USING DETOUR AROUND STRUCTURE

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the Project.

Where traffic is maintained through or over any part of the Project, the Contractor will be required to mark all hazards within the limits of the Project with well maintained Barricades, Warning Signs and Directional Type Signs. All Barricades and Signs shall be moved, added to, changed or removed as required during the progress of construction and removed entirely when project is completed.

Except for variations noted on this sheet all signs will be in conformity with the specification outlined in the current issues of "Manual on Uniform Traffic Control Devices for Streets & Highways," issued by U.S.B.P.R., and the "Colorado Manual on Uniform Traffic Control Devices for Streets & Highways." Numbers adjacent to signs refer to Standards in the Colorado manual. Standard Warning, Regulatory and Directional Signs shall be reflectorized.

Where traffic is prohibited from the Project the Detour will be marked by the Department except that the Contractor will provide, erect and maintain Barricades complete with approved Directional Arrows and Regulatory Signs where such barricades are erected and maintained at the ends of the Project or where selected Detour routes are in advance of the actual project terminal. U.S. or State Route Markers required for the Project will be furnished and installed by the Department. The location and positioning of Advance Warning Signs, Barricades and Speed Control Signs shall be as recommended by the appropriate District Engineering Forces of the Department.

No work shall commence on the Project until all Warning Signs are in place and approved by the Engineer. Where speed control appears necessary for protection of the travelling public, such speed control shall be requested from the Project Engineer by the Contractor.

All signs are to be in clear view of approaching traffic and are not to be obstructed by equipment, weeds or otherwise.

Where two identical type signs are used for dual posting they are to be staggered on the two sides of the Highway for at least a distance of 75' to avoid a tunneling effect.

SEE SHEET 2 OF 2 THIS STANDARD FOR ADDITIONAL NOTES AND DETAILS

COLORADO
DEPARTMENT OF HIGHWAYS

Construction Traffic Signs

Designed by	J.C.R.	Approved by	[illegible]
Made by	J.C.R.	Engineer, Bureau of Public	
Checked by	—	Date:	July 22, 1955

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

STANDARD M-6-B

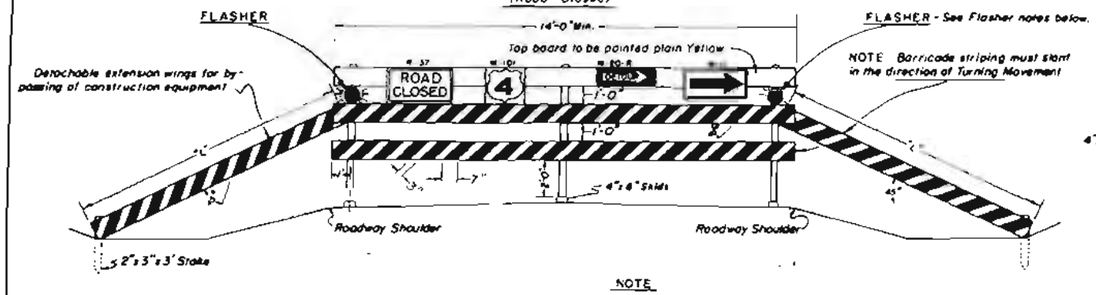
(SHEET 2 OF 2 SHEETS)
(MAY 1, 1962)

FEDERAL ROAD DIVISION NO.	DIVISION	PROJECT NO
9	COLORADO	FOLL-30

REVISION
5-16-62 Rev. Margin & Border

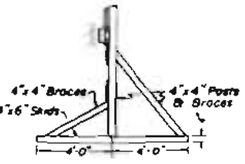
DETAILS OF BARRICADES

Type I
(Road Closed)



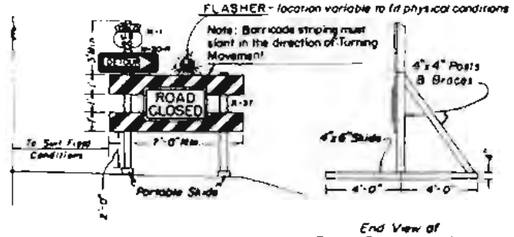
"L" Variable, length to be adequate to provide closing of borrow pit and shoulder.

NOTE
The various types & combinations of approved Signs and Beacons for Barricades required for each project will be governed by field conditions and subject to approval by the Engineer.



End View of
Type I Portable Barricade
(Optional)

Type II
(Beg. of Detour, By-Pass Areas within Proj; Extreme Hazards, etc.)



End View of
Type II Portable Barricade
(Optional)

NOTE: Alternate materials or other reflective elements on Construction Traffic Signs and Barricades will be permitted only after approval of such material by the Department.

SPECIFICATIONS

PAINT – All paint and methods of painting shall be in conformity with Item 38 Specifications

STRIPING – Planking and Wings on all Barricades shall be painted with Main both sides before adding Reflective Strips.
Reflective Strips shall be "Cutout Smooth Surface Yellow," of a type approv 3" wide and spaced 7" apart as shown in the detail

Diversion of traffic will be accomplished as follows:
1- Stripes for Barricades diverting traffic to the left shall start on the rig lowest plank and progress up to the left with the stripes making an angle the horizontal axis of the board as shown in the detail. Traffic diversi just the opposite
2- Stripes on Barricades diverting traffic in both directions shall begin a lower plank and progress up in both directions.

TIMBER – All timber used shall conform to the Standard Specifications fo Untreated Timber.

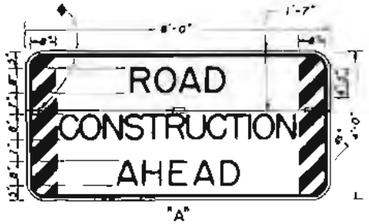
Planking	1"x12" or 2"x12" S4S
Posts (Barricades)	4"x 4" S4S
Posts (Signs)	4"x 4" S4S

Barricades may be either portable as shown or fixed with posts set into

All skids, braces and posts to be painted yellow and nailed together w

Bases to be weighted where necessary to provide stability

DETAILS OF CONSTRUCTION SIGNS



"A"

"B"

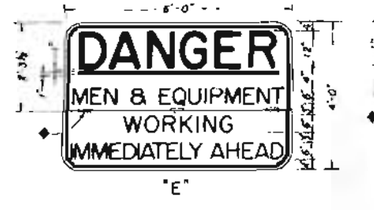
"C"

MARGIN AND BORDER COLOR

Signs "A" through "F"
Upper Portion — Margin – Same as Background; Border – Same as Legend
Lower Portion — Margin – Same as Background; Border – Same as Legend

Signs "G" and "I"
Margin – Reflectorized "Smooth Surface Yellow"
Border – Painted Black

"D"



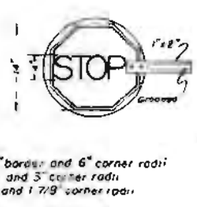
"E"

"F"

◆SEE DETAIL 1

"G"

Signs "A" through "E" shall have 1" margin, 1" border and 6" corner radii
Sign "F" shall have 3/4" margin, 7/8" border and 3" corner radii
Signs "G" shall have 1/2" margin, 5/8" border and 1 7/8" corner radii



"H"

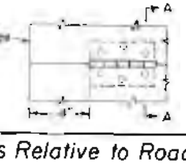
"I"

"J"

NOTES

1 Signs "A" through "F" shall be of the hinge and fold type to facilitate the clo when the road is not prevalent. These signs shall be hinged with 3-4" Butt mounted into the face surface of the sign
2 The reflective sheeting used on the sign background shall be placed over t hinges
3 Hinges shall be fastened to the sign with flat head stove bolts having a flat nut on back of sign.
4 All hinges, bolts, nuts and washers to be rust resistant
5 Sign panels to be held in the open position with hooks and eyes or other app devices

DETAIL 1



DETAILS OF SIGN AND BEACON FABRICATION AND USAGE

Construction Signs "A" through "G" shall be made of 5/8" min Plywood or other material approved by the Department and as per details above

Signs having reflectorized Yellow or Red surfaces shall be fabricated from "Flexible Reflective Sheeting" of the "Non-Exposed Lens" type approved by the Department. Signs having reflectorized White surfaces shall be fabricated from "Flexible Reflective Sheeting" of the "Exposed Lens" type approved by the Department

Construction Sign "A" – Reflectorized White background with painted Black lettering and stripes as shown above

Construction Signs "B" through "D" – Top background to be reflectorized "Smooth Surface Red" with the legend and 1" Underline to be a White process paint. Balance of lettering to be painted Black over a reflectorized White background.

Construction Sign "E" – The word "DANGER" and the 1" Underline only are to be of a White process paint over a reflectorized "Smooth Surface Red" Balance of lettering to be painted Black over a reflectorized White background

Construction Sign "F" – The words "End Construction" and "Contractors Name" shall be painted Black over a reflectorized White background. Balance of lettering to be applied with a White process paint over a reflectorized "Smooth Surface Red" background

Construction Sign "G" – The legend to be painted Black over a reflectorized "Smooth Surface Yellow" background

Flagman Warning Sign "H" – This sign shall be made of Plastic or other lightweight material approved by the Department, having a painted Red background with White lettering on the "Stop" side and a painted Green background with White lettering on the "Go" side. Handle to be grooved on one side to indicate reading of sign to Flagman. This sign will be used whenever Flagmen are necessary. Sign to be reflectorized if used to stop traffic at night

Detour Warning Sign "I" – This sign shall be made of 3/8" (Min.) Plywood or other material suitable to the Department. Legend to be painted Black on a reflectorized "Smooth Surface Yellow" background

Construction Sign "J" – 3/4" x 9" metal slides to be placed between "NEXT ___ MILES," spaced so as to accommodate appropriate sized numerals. Required numerals to be furnished by the Department and installed by the Contractor. Numerals calculated to the nearest Mile.

Signs "A" through "F" shall be given 2 coats of white paint on the back side.

Construction Sign "D" – To be provided with a detachable Panel of 3/4" Plywood bolted to the sign as shown. This Panel shall be painted White with Black lettering. (Indicate to nearest Mile)

Construction Signs shall be placed as follows:

Sign "A" – This is the first advance warning sign and shall be placed 1,500 feet ahead of barricade or beginning of project terminal and on both sides of the traveled way in all cases

Sign "B" – This is the second advance warning sign and shall be placed 1,000 feet ahead of barricade or beginning of project terminal and on both sides of the traveled way on divided highways and singly on two-lane highways

Sign "C" – This is the third advance warning sign in cases where barricades are used and shall be placed 750 to 1,000 feet ahead of barricade or beginning of project terminal and on both sides of the traveled way on divided highways and singly on two-lane highways

Sign "D" – This sign shall be placed to mark the beginning of the Project. It shall be placed singly and may be placed opposite barricade if desirable.

Sign "E" – This sign shall be placed 500 feet ahead of the situation being advised of.

Sign "F" – This sign shall be placed to mark the end of the Project. It shall be placed singly and may be placed opposite barricade if desirable.

Sign "G" – This sign shall be used frequently within the limits of the Project.

All material shall be sound and durable. Barricades, signs, symbols and lettering shown herein will be of good workmanship and well maintained. Uneven lettering will not be accepted.

Flares and Torches shall be either of the oil burning or electrical type approved by the Department and shall be placed 3 feet to 5 feet ahead of the object to be illuminated. Particular care shall be taken to protect all signs and barricades from smoke and smudge arising from the use thereof.

Flashers used on Type I or II Barricade shall be of the Battery or Electrical Type and shall have no less than 12.566 sq. inches of light area (4" dia. lens). The illuminating element in a flashing amber beacon or signal shall be flashed continuously at a rate between 50 or 60 flashes per minute which will be clearly distinguishable to traffic. The duration in which Flashers will be left in operation will be governed by field conditions and subject to approval by the Engineer.

Alternate methods of processing signs or the substitution of symbols or other reflecting elements for painted symbols will be permitted only after approval of such methods or materials by the Department.

The Department shall furnish and install the following as required OUTSIDE THE LIMITS of the Project:

1	"ROAD CONSTRUCTION AHEAD"	Minimum 4
2	"CAUTION OBEY TRAFFIC CONTROLS"	Minimum 2
3	"CAUTION BARRICADE AHEAD"	As Required
4 #	Standard Warning & Directional Signs	As Required

The Contractor shall furnish and install the following as required WITHIN THE LIMITS of the Project

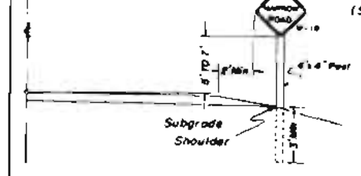
1	All Barricades	As Required
2	"CAUTION PROJECT BEGINS"	Minimum 2
3	"DANGER MEN & EQUIPMENT WORKING IMMEDIATELY AHEAD"	As Required
4	"END CONSTRUCTION WE THANK YOU FOR YOUR COOPERATION"	Minimum 2
5	"SLOW PLEASE"	As Required
6	Standard Warning & Directional Signs	As Required
7	Approved Directional Arrows & Regulatory Signs for Barricades	As Required
8	Torches and Flares as follows: Type I Barricade	Minimum 3
	Type II Barricade	Minimum 1
9	Flashers - Type I Barricade	2 Required
	Type II Barricade	As Required

Including Type I Barricade located immediately inside of Project terminal points

Layout of signs will be furnished the Contractor by the Traffic Operations Section indicating the details as to letter size, symbols, spacing, etc. which are required for these signs

Position of Signs Relative to Roadbed & R

Top View
(Showing angle of sign in rel



Plane on which torized Signs shall

NOTE:
Warning Signs to be made of 3/8" (Min.) plywood or other material suitable to the Department and shall be reflectorized.
Location to be governed by field conditions. Exact location to be staked by the Engineer. In all cases warning signs are to be placed well in advance of hazard, the distance depending on topography, and existing approach speeds.
For all signs prefixed with the letters "R," "M" or "W" refer to the "Colorado Manual on Uniform Traffic Control Devices for Streets and Highways" of current issue.

COLORA
DEPARTMENT OF

Construction Tra

Designed by J.C.R	Approve
Made by J.C.R	Engine
Checked by	Date: J

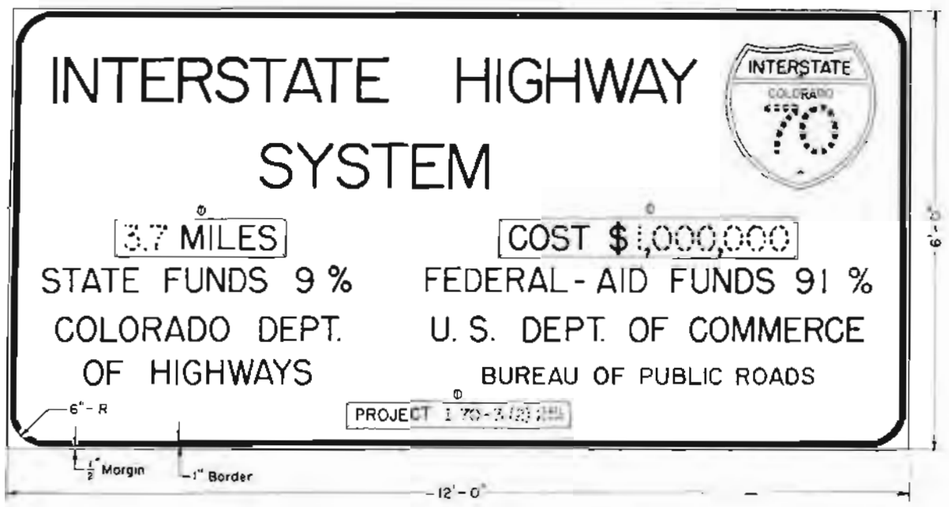
TYPICAL SIGNS

STANDARD M-6-C
(MAY 1, 1962)

DIVISION	PROJECT NO.	SHEET NO.
5	F022-3 (10)	11

REVISIONS

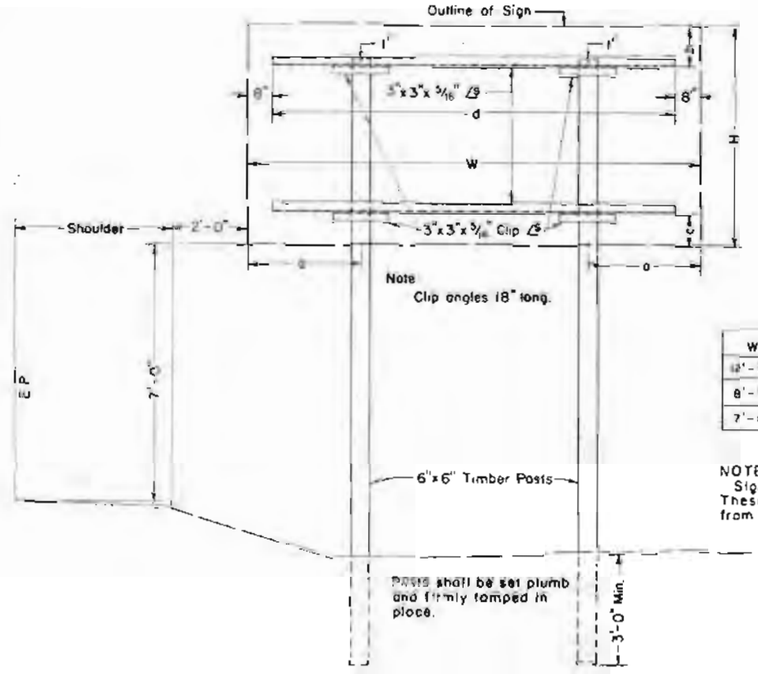
INTERSTATE SYSTEM



① Plaque length variable, as determined by message.

24" Standard Interstate Shield, for dimensions see "Interstate Signing Manual." Background, letters and numerals plain (nonreflective - Red, White and Blue) (Removable Plaque)

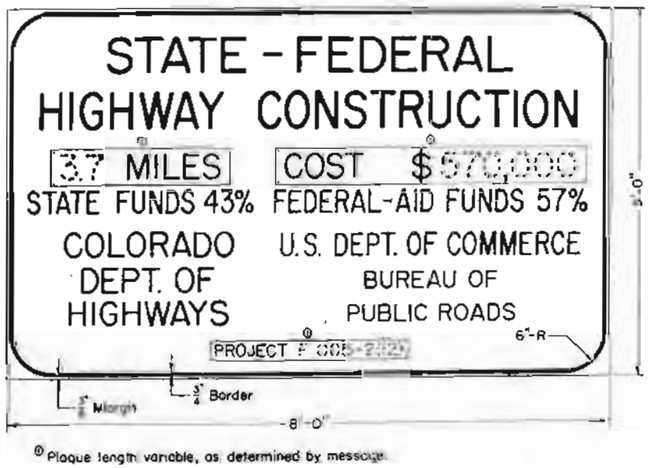
INSTALLATION DETAIL



W	H	a	b	c	d
12'-0"	8'-0"	3'-3"	1'-1½"	6'-10½"	10'-8"
8'-0"	5'-0"	2'-3"	1'-1½"	0'-10½"	6'-8"
7'-0"	4'-0"	1'-9"	1'-1½"	0'-10½"	5'-8"

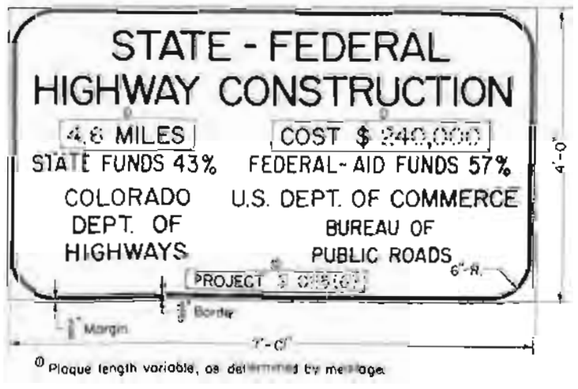
NOTE
Signs are to be placed facing traffic approaching the work. These signs should be located so as not to obscure or detract from the effectiveness of other official signs.

PRIMARY SYSTEM



① Plaque length variable, as determined by message.

SECONDARY SYSTEM



① Plaque length variable, as determined by message.

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways, applicable to the Project

Signs shall be made of ¾" Plywood or other material approved by the Department

Background to be painted plain white with stencil block letters, numerals and border.

Posts shall be 6"X6" S4S timber or other material approved by the Department and shall be painted white.

Layout of signs will be furnished the Contractor by the Traffic Operations Section indicating the details as to letter size, symbols, spacing, etc. which are required for these signs.

Figure for cost of project to be furnished contractor by Department.

If signs are for a single structure or interchange, name will be used in lieu of mileage. Such as:
COLORADO RIVER BRIDGE or ARAPAHOE INTERCHANGE.

COLORADO
DEPARTMENT OF HIGHWAYS

IDENTIFICATION SIGNS

Designed by V.H.	Approved by
Made by C.M.E.	Chief Surveys & Plans
Checked by E.E.O.	Date MAY 15 1962

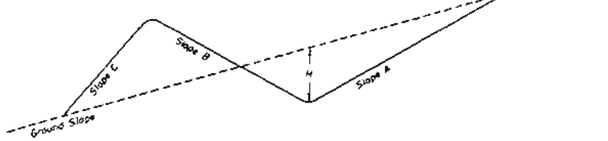
STANDARD TYPES of DITCHES and CONSTRUCTION METHODS

STANDARD M-13-A
(MAY 1, 1962)

STATE HIGHWAY REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO	F022-3(10)	12

DETAILS for CONTOUR INTERCEPTING DITCHES

Typical Section for Contour Intercepting Ditches



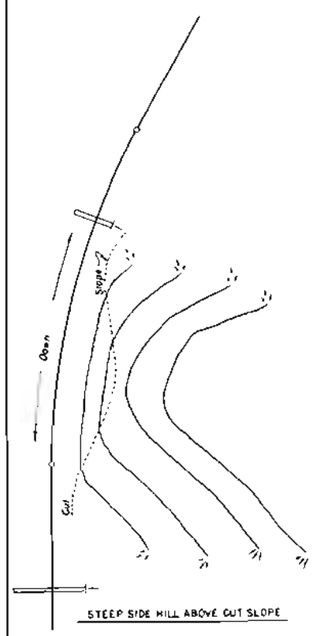
PURPOSE & USE OF THE TABLE

The primary purpose of the information for Contour and Intercepting Ditches shown on this sheet is to serve as a guide in construction and to readily arrive at yardages of excavation involved.

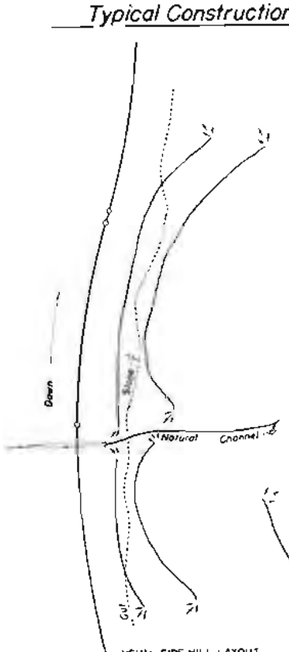
Foremost consideration in constructing these ditches is given first to the natural ground line slope contronted in construction, thence to the other values shown on the Typical Section.

By properly arriving at the combination of values shown on the Typical Section and in the Table for a specified condition, the number of cubic yards of excavation per 100 lin. ft. of ditch may be read under the appropriate column for this item.

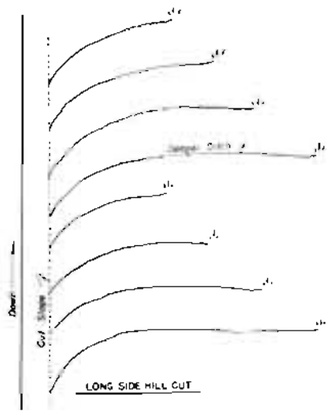
Typical Construction Layouts



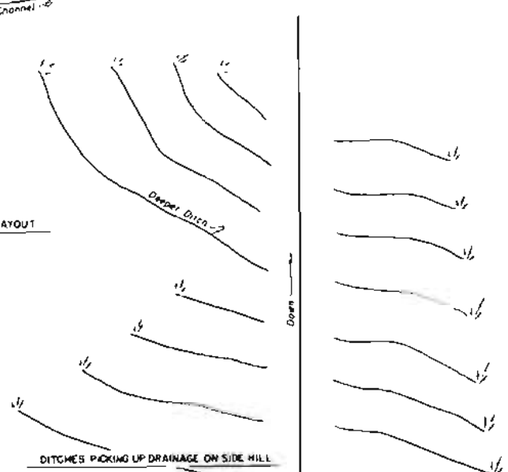
STEEP SIDE HILL ABOVE CUT SLOPE



USUAL SIDE HILL LAYOUT



LONG SIDE HILL CUT



DITCHES PICKING UP DRAINAGE ON SIDE HILL

Scale of Sketches in Feet

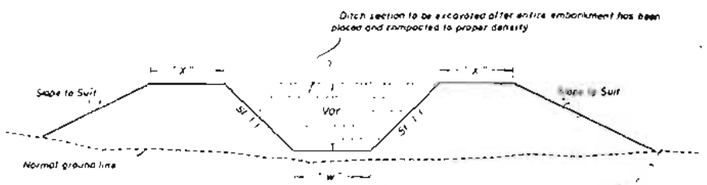
100 0 100 200 300 400

Table of Slopes and Yardages

SLOPES ▲ Ground	A	B	C	H	Cubic Yards per 100 lin ft of Ditch
5:1 Or Flatter	2:1	4:1	2:1	15"	16
				18"	23
				21"	32
		3:1		15"	15
				18"	22
				21"	30
		2:1		15"	14
				18"	20
				21"	27
		1-1/2:1		15"	13
				18"	19
				21"	25
	1-1/2:1	4:1	1-1/2:1	15"	12
				18"	16
				21"	25
		3:1		15"	12
				18"	17
				21"	23
		2:1		15"	10
				18"	15
				21"	20
		1-1/2:1		15"	10
				18"	14
				21"	19
4:1	2:1	4:1	2:1	15"	17
				18"	25
				21"	34
		3:1		15"	17
				18"	24
				21"	32
		2:1		15"	15
				18"	22
				21"	30
		1-1/2:1		15"	15
				18"	21
				21"	29
	1-1/2:1	4:1	1-1/2:1	15"	13
				18"	19
				21"	25
		3:1		15"	12
				18"	17
				21"	23
		2:1		15"	11
				18"	16
				21"	21
		1-1/2:1		15"	10
				18"	14
				21"	20
3:1	2:1	3:1	2:1	15"	22
				18"	31
				21"	43
		2:1		15"	21
				18"	30
				21"	41
		1-1/2:1		15"	20
				18"	29
				21"	40
	1-1/2:1	3:1	1-1/2:1	15"	13
				18"	19
				21"	26
		2:1		15"	12
				18"	17
				21"	24
		1-1/2:1		15"	12
				18"	17
				21"	23
2:1	1-1/2:1	2:1	1-1/2:1	15"	20
				18"	29
				21"	40
		1-1/2:1		15"	20
				18"	28
				21"	39
	1:1	2:1	1:1	15"	9
				18"	13
				21"	17
		1-1/2:1		15"	8
				18"	12
				21"	16
1-1/2:1	1:1	1-1/2:1	1:1	15"	11
				18"	16
				21"	21

▲ Slopes are approximate and may be varied to suit conditions encountered during construction

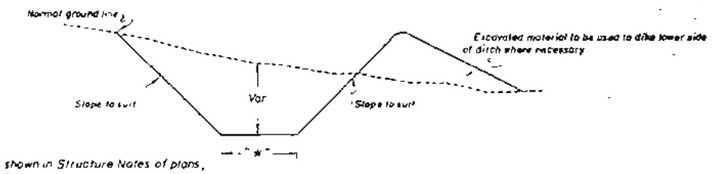
TYPICAL SECTIONS for DRAINAGE, IRRIGATION DITCHES and CHANNEL CHANGES



NOTE –
See Structure Notes on plans for dimension "W".
Dimension "X" = $\frac{W}{2}$ with minimum of 2 feet.

For Embankment Sections

(Generally for use in Irrigation Ditches & Channel Changes)



NOTE –
Unless otherwise shown in Structure Notes of plans, dimension "X" = 1 foot

For Cut Sections

REVISIONS

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project.

All ditches are to be constructed to lines and grades as staked by the Engineer using the ditch section shown on plans or as ordered by the Engineer.

CONTOUR INTERCEPTING DITCHES: Ditches are to be laid out along the ground contour on a grade of not over 1% (Type of soil shall govern the grade).

Ends of ditches are to be lined up so that concentration of flow from a higher contour ditch into one of lower contour is, as far as possible avoided. The use of a deeper ditch is recommended where this condition is encountered.

The following horizontal spacing of ditches is recommended:

4% to 6%	Approximately 70' Centers
8% to 10%	Approximately 60' Centers
20% to 4:1 Slope	Approximately 55' Centers
30% to 1-1/2:1 Slope	Approximately 50' Centers

Where ditch checks are required the intervening ditch between one set of ditch checks shall not exceed a grade of 1.0%. Details of checks will be shown on plans when required.

COLORADO
DEPARTMENT OF HIGHWAYS

DITCH TYPES

Designed by C.G.M.	Approved by: [illegible]
Made by C.G.M.	Engineer of Surveys & Plans
Checked by	Date: [illegible]

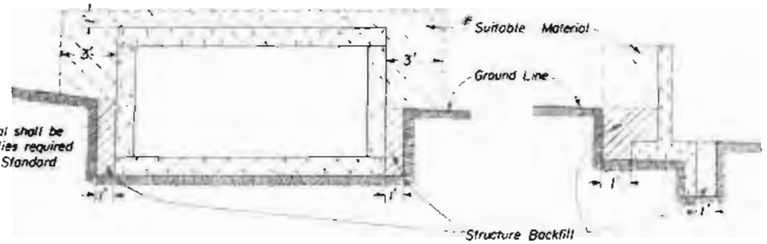
STANDARD M-16-A

(MAY 1, 1962)

DIVISION	PROJECT NO.	SHEET NO.
COLO.	F022-3(10)	13

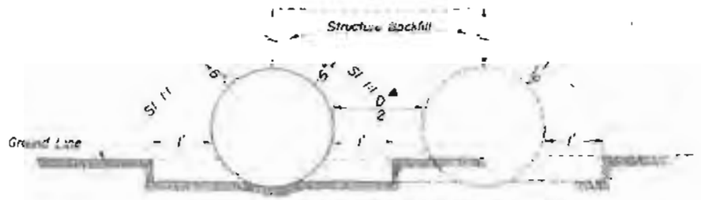
REVISION

CONCRETE BOX CULVERTS & WINGWALLS



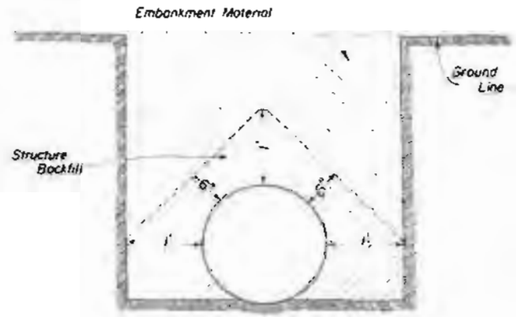
* Suitable Material shall be compacted to densities required for Item 17 of the Standard Specifications

CIRCULAR CONDUIT



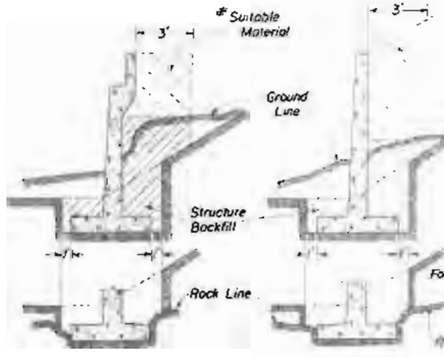
▲ When two or more conduits are layed side by side, the distance between conduits shall be 1/2 the conduit diameter but not less than 1'-0"

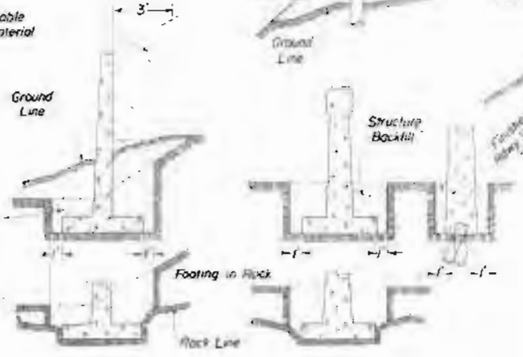
SIPHONS OR CONDUIT IN TRENCH

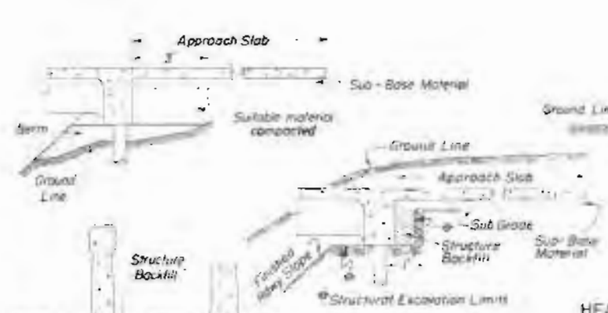


PIERS, ABUTMENTS, RETAINING WALLS ETC.

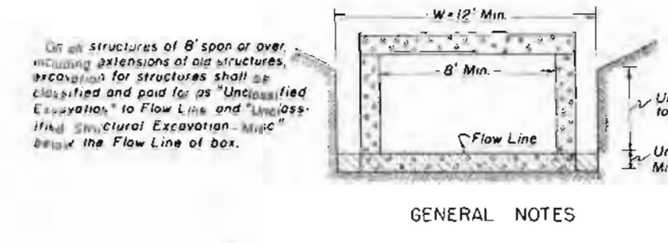
All material that is to be compacted shall be placed in horizontal layers not more than 6" inches in depth and compacted before the next layer is placed. For Arches, Rigid Frames and Box Culverts the fill shall be brought up uniformly on both sides of the center of structure to avoid stresses in the structure caused by unsymmetrical loading





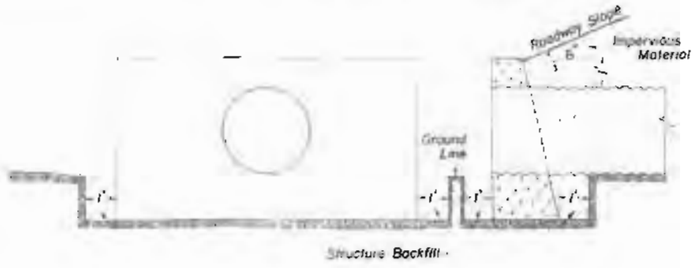


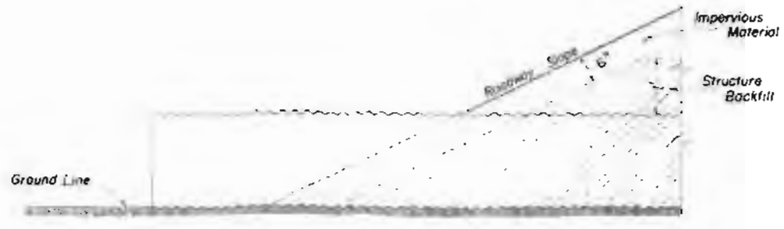
ELLIPTICAL OR ARCH CONDUIT



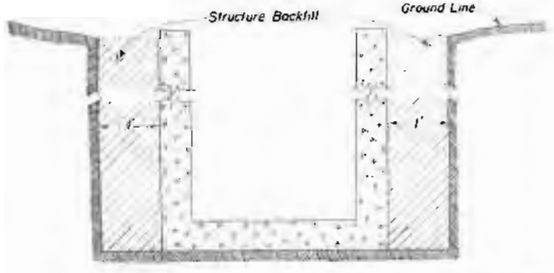
On all structures of 8' span or over, including extensions of old structures, excavation for structures shall be classified and paid for as "Unclassified Excavation" to Flow Line and "Unclassified Structural Excavation - Misc" below the Flow Line of box.

HEADWALLS AND END OF CULVERTS





DROP INLETS, DIVISION BOXES, INTERCEPTING HEADWALLS ETC.



GENERAL NOTES

All work shall be done according to the Standard Specifications of the Colorado Department of Highways applicable to the Project

If, in the opinion of the Engineer, the material beneath the Structure is of such character as to cause unequal settlement along the length of the Structure, the material shall be removed to such a depth ordered, and backfilled with gravel or other suitable material and compacted in accordance with Item 16 of the Standard Specifications

Suitable Material shall be any "Unclassified Excavation" material developed on the project except large rock, boulders or other materials considered by the Engineer to be undesirable for backfill around culverts, boxes etc

For concrete box culverts located where roadway cross section is in Fill, embankment shall be built up and compacted to a point one (1) ft above flow line of box. The trench shall then be excavated as shown to accommodate construction of the box.

COLORADO
DEPARTMENT OF HIGHWAYS

BACKFILL
AROUND STRUCTURES

Designed by H.E.P	Approved by [illegible]
Made by O.M.E.	Bridge Engineer
Checked by L.E.O.	Date: [illegible]

STANDARD M-46-C
(MAY 1, 1962)

Fed. Road Div.	Division	Project No.
9	COLORADO	F022-3(

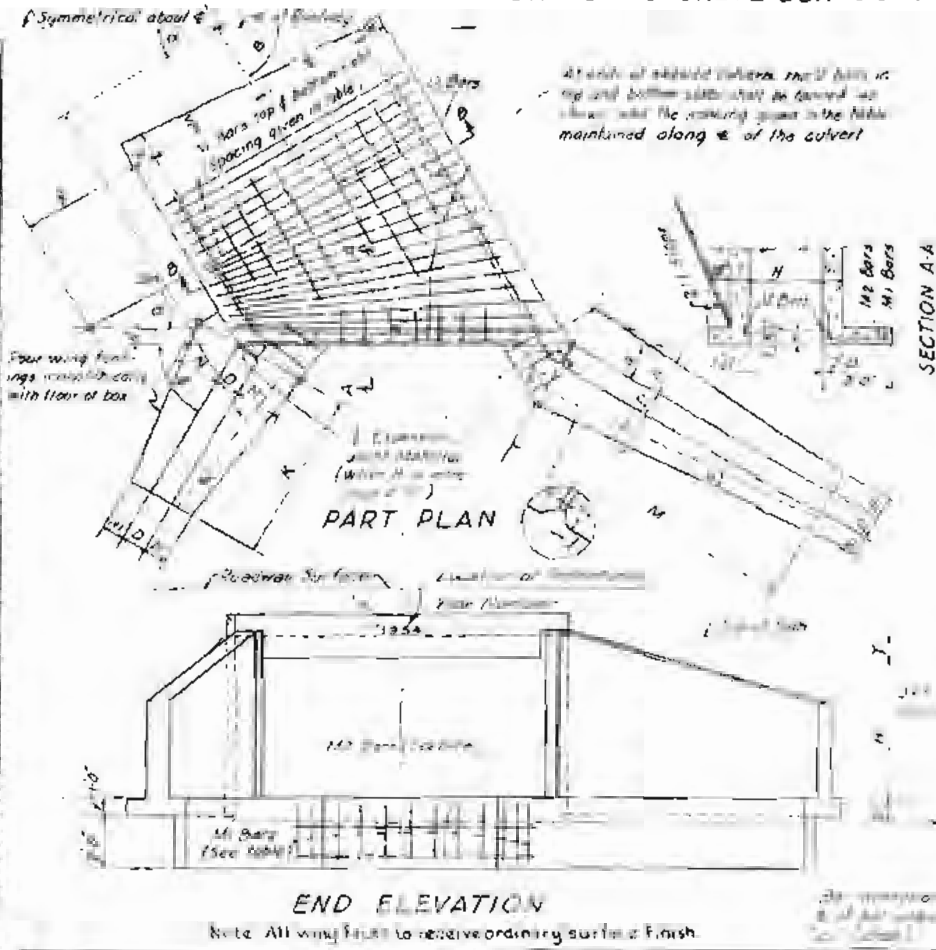
SINGLE CONCRETE BOX CULVERT

Dimensions & Quantities (see Wingwall Standard for Wings)

Height of Fill	Type	S	T	W
30'0"	3A	3'0"	7	8
20'0"	4A	4'0"	7½	8
[illegible]	5A	5'0"	8	[illegible]
20'0"	5B	5'0"	8½	[illegible]
14'0"	6A	6'0"	8½	8
20'0"	6B	6'0"	10	8
12'0"	7A	7'0"	9	9
15'0"	7B	7'0"	10	9
20'0"	7C	7'0"	11	9
[illegible]	8A	8'0"	9½	10
16'0"	8B	8'0"	11½	10
20'0"	8C	8'0"	12½	10
7'0"	9A	9'0"	10	11
14'0"	9B	9'0"	[illegible]	[illegible]
[illegible]	9C	9'0"	[illegible]	11
5'0"	10A	10'0"	[illegible]	[illegible]
10'0"	10B	10'0"	12	12
[illegible]	10C	10'0"	14	[illegible]
[illegible]	11A	11'0"	11	12
9'0"	11B	11'0"	[illegible]	[illegible]
13'0"	11C	11'0"	14	12
5'0"	12A	12'0"	12	[illegible]
10'0"	12B	12'0"	14	[illegible]
4'5"	13A	13'0"	12½	12
6'0"	13B	13'0"	14	[illegible]
4'0"	14A	14'0"	13½	12
8'0"	14B	14'0"	15	[illegible]

Quantities for one culvert shall be (quantity for one lin. ft. of box times L) plus (quantity for two Head Walls) plus (quantities for four wings).

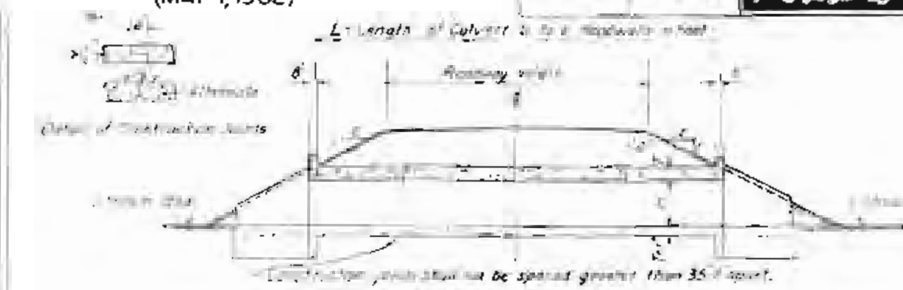
Note: This design not to be used when height of fill exceeds the allowed amount tabulated.



Note: All wing faces to receive ordinary surface finish.

Bar List for Culvert & Headwalls (See Wingwall Standard for Wings)

Possible Combinations (Span & Height)



TYPICAL SECTION THROUGH CULVERT

REVISIONS

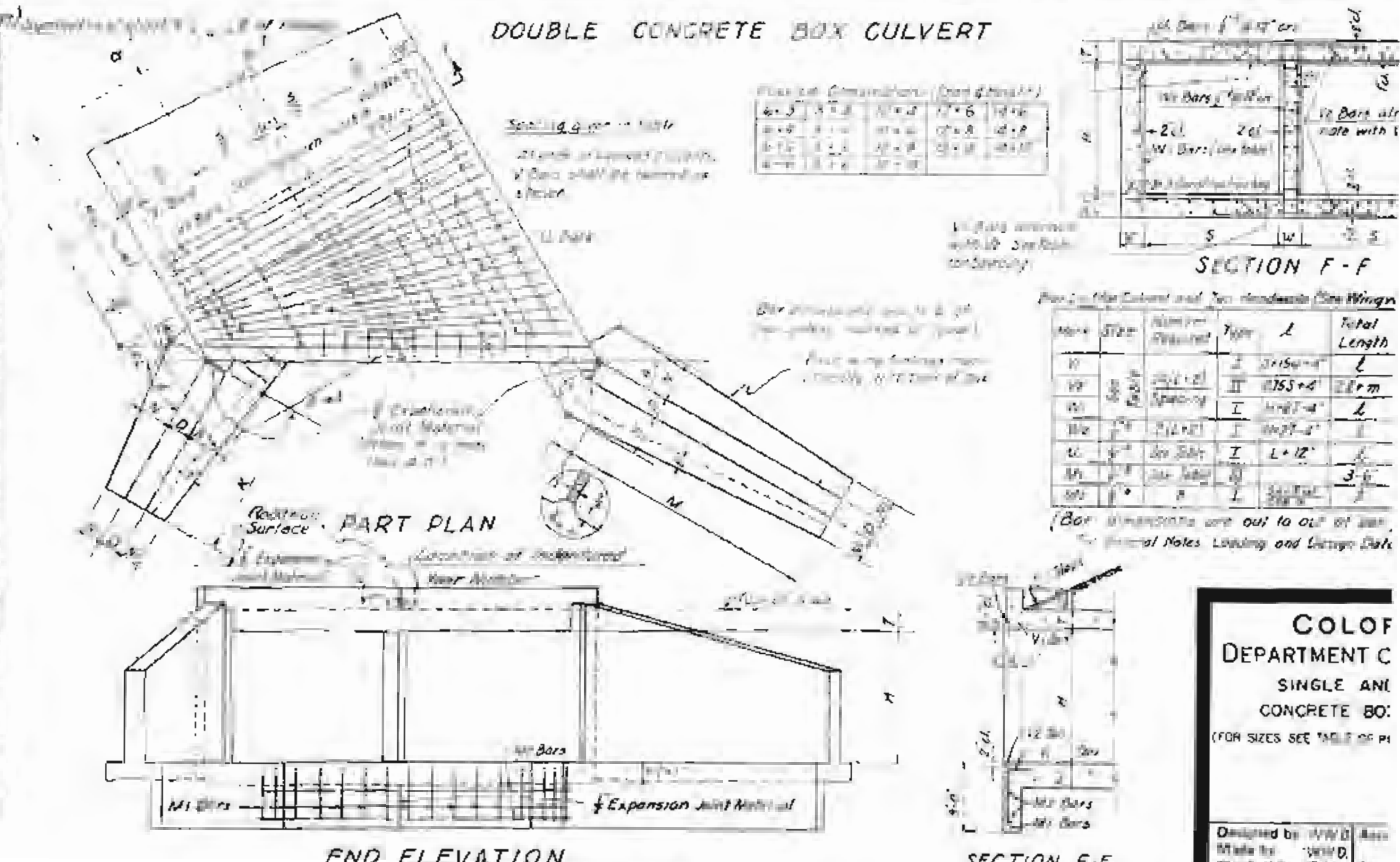
Note: A, M, N, and D are dimensioned on Wingwall Standard for the various heights of culvert.

DOUBLE CONCRETE BOX CULVERT

Dimensions & Quantities (see Wingwall Standard for Wings)

Height of Fill	Type	S
[illegible]	6-6-A	6'0"
[illegible]	6-6-B	6'0"
20'0"	6-6-C	6'0"
[illegible]	8-8-A	8'0"
15'0"	8-8-B	8'0"
[illegible]	8-8-C	8'0"
5'0"	10-10-A	[illegible]
10'0"	10-10-B	10'0"
[illegible]	10-10-C	10'0"
5'0"	12-12-A	12'0"
10'0"	12-12-B	12'0"
15'0"	12-12-C	12'0"
5'0"	14-14-A	14'0"
10'0"	14-14-B	14'0"

Quantities for one culvert shall be (quantity for one lin. ft. of box times L) plus (quantity for two head walls) plus (quantities for four wings).



Note: All wing faces to receive ordinary surface finish.

(Bar dimensions are out to out of bar)

COLORADO DEPARTMENT OF HIGHWAYS

SINGLE AND DOUBLE CONCRETE BOX CULVERTS

(FOR SIZES SEE TABLE OF PLANS)

Designed by WWD
Made by WWD
Checked by TJM

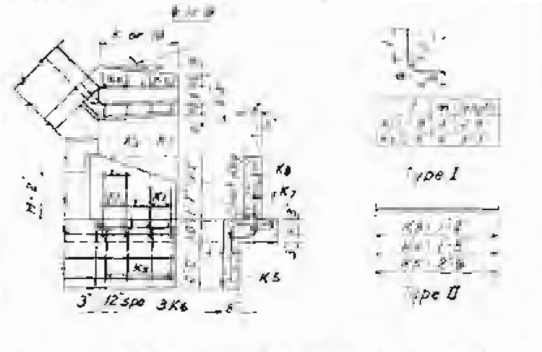
STANDARD M-46-E
(MAY 1, 1962)

[illegible]	DIVISION	PROJECT NO.	SHEET NO.
9	COLO	F022-3 (10)	15

TABLE SHOWING VALUES OF K AND M WHEN β AND H ARE GIVEN

β	α	φ	θ	H=2'0" K	H=2'0" M	H=3'0" K	H=3'0" M	H=4'0" K	H=4'0" M	H=5'0" K	H=5'0" M	H=6'0" K	H=6'0" M	H=7'0" K	H=7'0" M	H=8'0" K	H=8'0" M	H=9'0" K	H=9'0" M	H=10'0" K	H=10'0" M
45°	45°	67°30'	22°30'	2'-4"	6'-2"	3'-7"	8'-7"	4'-10"	11'-7"	5'-11"	14'-2"	6'-0"	16'-5"	7'-5"	18'-8"	8'-8"	20'-10"	9'-8"	23'-2"	10'-7"	25'-5"
60°	30°	60°	30°	2'-9"	4'-9"	3'-10"	6'-7"	5'-2"	8'-10"	6'-3"	10'-[illegible]	7'-3"	12'-7"	8'-3"	14'-5"	9'-3"	16'-0"	10'-3"	17'-9"	11'-3"	19'-6"
75°	15°	52°30'	37°30'	3'-0"	3'-[illegible]	4'-2"	5'-5"	5'-7"	7'-3"	6'-10"	8'-11"	7'-11"	10'-4"	9'-0"	11'-9"	10'-1"	13'-2"	11'-2"	14'-7"	12'-3"	16'-0"
90°	0°	45°	45°	3'-4"	3'-4"	4'-8"	4'-8"	6'-3"	6'-3"	7'-8"	7'-8"	8'-11"	8'-11"	10'-2"	10'-2"	11'-4"	11'-4"	12'-7"	12'-7"	13'-9"	13'-9"
105°	15°	37°30'	52°30'	3'-11"	3'-0"	5'-5"	4'-2"	7'-3"	5'-7"	8'-11"	6'-10"	10'-4"	7'-11"	11'-9"	9'-0"	13'-2"	10'-1"	14'-7"	11'-2"	16'-0"	12'-3"
120°	30°	30°	60°	4'-9"	2'-9"	6'-7"	3'-10"	8'-10"	5'-2"	10'-10"	6'-3"	12'-7"	7'-3"	14'-5"	8'-3"	16'-0"	9'-3"	17'-9"	10'-3"	19'-6"	11'-3"
135°	45°	22°30'	67°30'	6'-2"	2'-4"	8'-7"	3'-7"	11'-7"	4'-10"	14'-2"	5'-11"	16'-5"	6'-10"	18'-8"	7'-9"	20'-10"	8'-8"	23'-2"	9'-8"	25'-5"	10'-7"

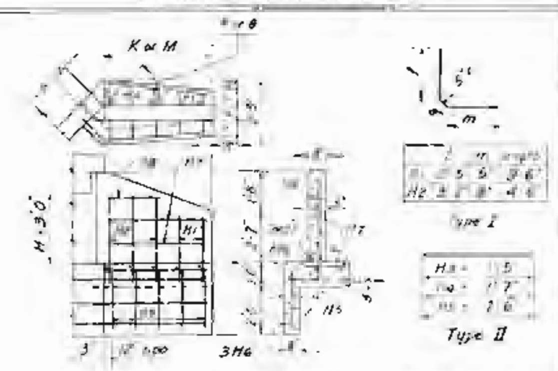
β equals the angle between ℄ of culvert and ℄ of roadway. α equals the angle between ℄ of culvert and a normal to ℄ of roadway.
φ and θ are angles between the wingwall and a line parallel with the center line of roadway.
Example for using the above table: Suppose a stream makes an angle of [illegible] with the center line of roadway, then, from the table, select the nearest angle β = [illegible]. Then α, φ and θ equal [illegible] respectively. If the desired height "H" of culvert is [illegible], then K and M will be [illegible] and [illegible]. Locate the wing detail when H = [illegible] on this sheet.



BAR LIST & QUANTITIES FOR ONE WING WHEN H=2'0"

When φ or θ equals	K1 Type I	K2 Type I	K3 Type II	K4 Type II	K5 Type II	3 K6 Type II	3 K7 Type II	K8 Type II	Concrete Cu. Yds.	Steel Lbs.
22°30'	4	3	4	[illegible]	[illegible]	8'-3"	5'-10"	[illegible]	1.07	64
30°	3	2	3	2	[illegible]	6'-[illegible]	[illegible]	[illegible]	0.82	47
37°30'	2	2	2	2	6	5'-0"	3'-7"	1'-8"	0.68	40
45°	2	2	2	2	3	4'-4"	3'-0"	[illegible]	0.57	36
52°30'	2	2	2	3	4	4'-0"	2'-8"	[illegible]	0.52	33
60°	2	1	2	[illegible]	4	3'-6"	2'-5"	[illegible]	0.48	28
67°30'	2	1	2	1	4	3'-8"	[illegible]	[illegible]	0.40	26

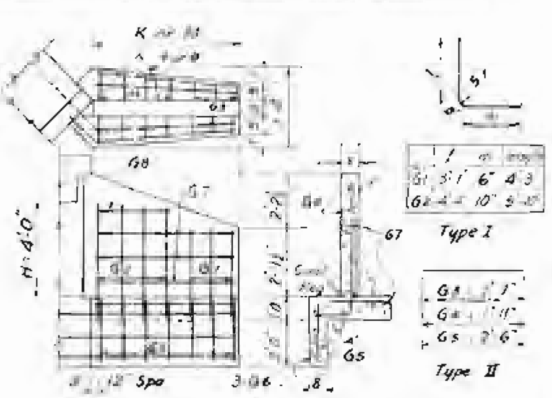
WING DETAIL WHEN H=2'0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H=3'0"

When φ or θ equals	H1 Type I	H2 Type I	H3 Type II	H4 Type II	H5 Type II	3-H6 Type II	4-H7 Type II	1-H8 Type II	Concrete Cu. Yds.	Steel Lbs.
22°30'	4	5	4	5	11	[illegible]	8'-8"	4'-2"	1.72	99
30°	3	4	3	4	8	8'-4"	6'-3"	3'-2"	1.36	76
37°30'	3	3	3	3	7	6'-8"	5'-1"	2'-2"	1.12	63
45°	2	3	2	3	6	5'-10"	4'-4"	2'-2"	0.97	54
52°30'	2	3	2	3	6	5'-4"	3'-10"	2'-2"	0.86	52
60°	2	2	2	2	5	4'-10"	3'-6"	1'-2"	[illegible]	44
67°30'	2	[illegible]	2	[illegible]	5	4'-5"	3'-5"	[illegible]	[illegible]	43

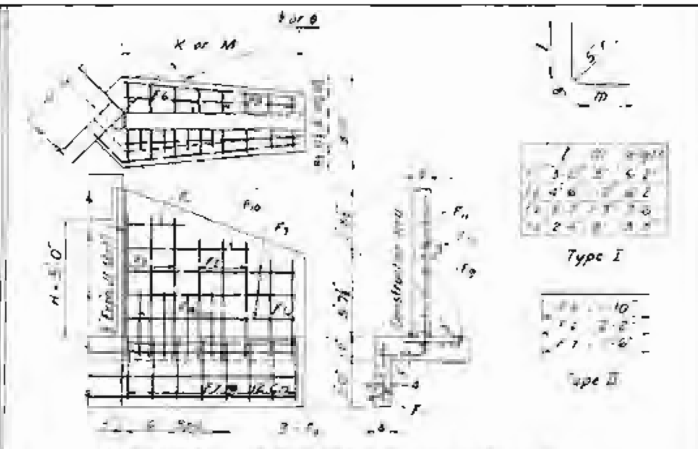
WING DETAIL WHEN H=3'0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H=4'0"

When φ or θ equals	G1 Type I	G2 Type I	G3 Type II	G4 Type II	G5 Type II	3-G6 Type II	7-G7 Type II	1-G8 Type II	Concrete Cu. Yds.	Steel Lbs.
22°30'	[illegible]	[illegible]	[illegible]	6	[illegible]	[illegible]	[illegible]3"	5'-2"	2.82	164
30°	4	[illegible]	4	5	[illegible]	[illegible]	[illegible]	4'-5"	2.21	125
37°30'	[illegible]	4	3	4	9	[illegible]	[illegible]	3'-2"	1.81	[illegible]
45°	3	4	3	4	8	[illegible]	5'-11"	[illegible]	1.56	[illegible]
52°30'	[illegible]	3	3	3	[illegible]	6'-9"	5'-3"	[illegible]	1.40	79
60°	3	3	3	3	[illegible]	6'-4"	4'-10"	[illegible]	[illegible]	77
67°30'	2	3	2	[illegible]	6	6'-0"	4'-6"	[illegible]	[illegible]	69

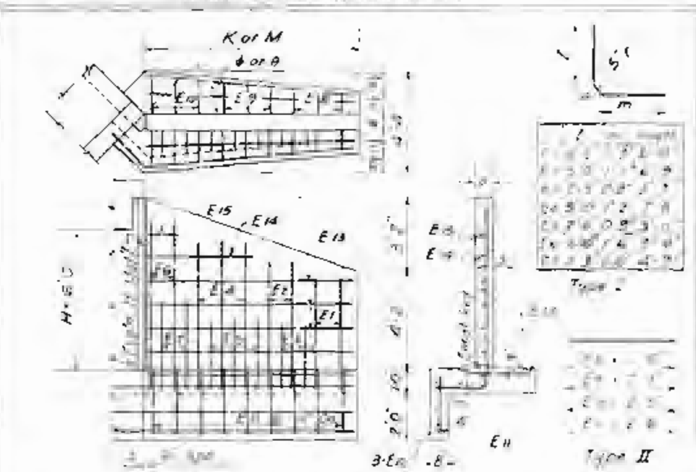
WING DETAIL WHEN H=4'0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H=5'0"

When φ or θ equals	Number of Bars Required	Length of Bars	Concrete Cu. Yds.	Steel Lbs.
22°30'	[illegible]	[illegible]	4.06	237
30°	[illegible]	[illegible]	3.10	180
37°30'	[illegible]	[illegible]	2.55	[illegible]
45°	[illegible]	[illegible]	[illegible]	[illegible]
52°30'	[illegible]	[illegible]	[illegible]	[illegible]
60°	[illegible]	[illegible]	[illegible]	[illegible]
67°30'	[illegible]	[illegible]	[illegible]	[illegible]

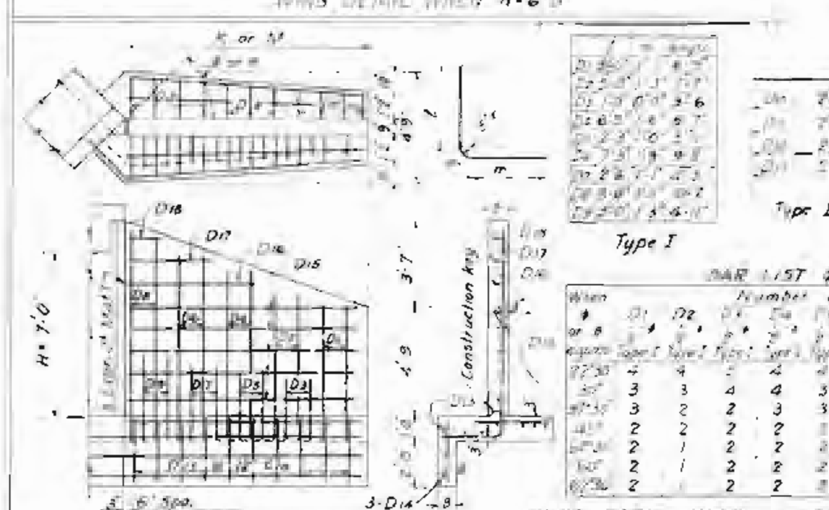
WING DETAIL WHEN H=5'0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H=6'0"

When φ or θ equals	Number of Bars Required	Length of Bars	Concrete Cu. Yds.	Steel Lbs.
22°30'	[illegible]	[illegible]	[illegible]	[illegible]
30°	[illegible]	[illegible]	[illegible]	[illegible]
37°30'	[illegible]	[illegible]	[illegible]	[illegible]
45°	[illegible]	[illegible]	[illegible]	[illegible]
52°30'	[illegible]	[illegible]	[illegible]	[illegible]
60°	[illegible]	[illegible]	[illegible]	[illegible]
67°30'	[illegible]	[illegible]	[illegible]	[illegible]

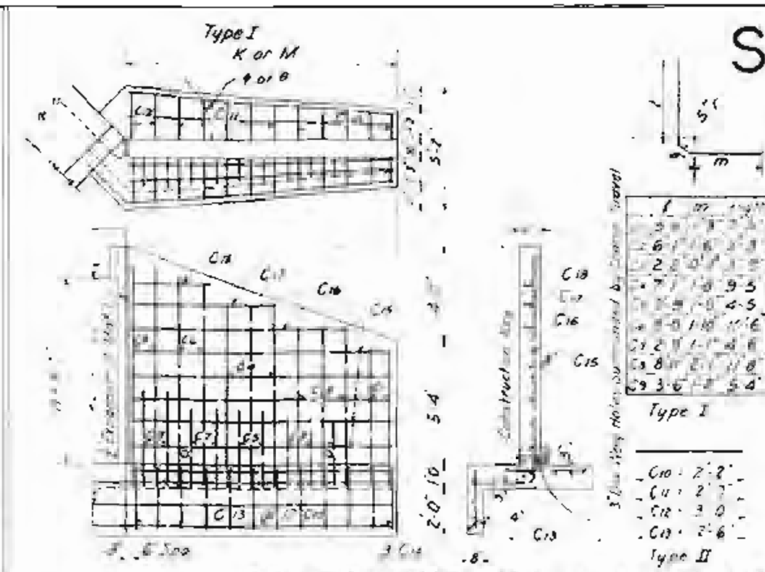
WING DETAIL WHEN H=6'0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H=7'0"

When φ or θ equals	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	3-D14	10-D15	1-D16	1-D17	1-D18	Concrete Cu. Yds.	Steel Lbs.
22°30'	4	4	[illegible]	4	4	[illegible]	3	3	[illegible]	6	[illegible]	7	22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30°	3	3	4	4	3	3	3	2	[illegible]	5	[illegible]	5	18	17'-6"	[illegible]	[illegible]	[illegible]	[illegible]	5.42	339
37°30'	3	2	2	3	3	2	2	2	2	4	4	4	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45°	2	2	2	2	[illegible]	2	2	2	2	4	3	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.82	[illegible]
52°30'	2	1	2	2	[illegible]	2	2	2	1	3	3	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	212
60°	2	1	2	2	[illegible]	2	2	1	1	3	3	3	[illegible]	[illegible]	[illegible]	4'-2"	[illegible]	[illegible]	[illegible]	191
67°30'	2	[illegible]	2	2	[illegible]	[illegible]	2	[illegible]	1	2	3	3	9	9'-6"	[illegible]	4'-2"	[illegible]	[illegible]	[illegible]	184

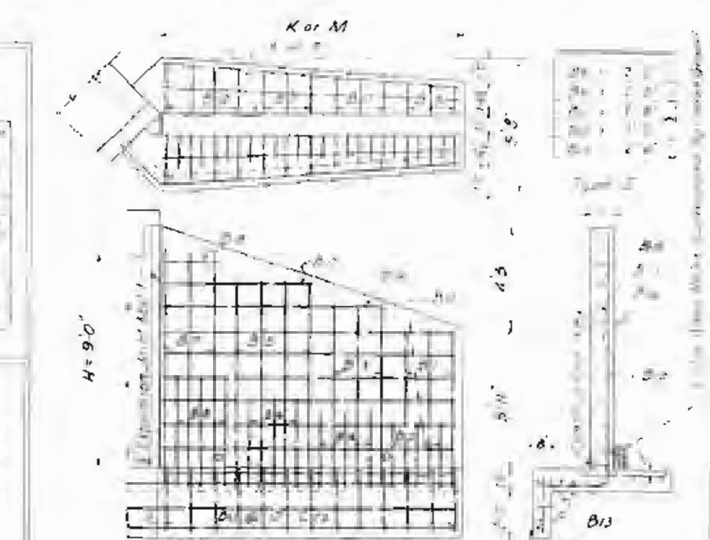
WING DETAIL WHEN H=7'0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H=8'0"

When φ or θ equals	Number of Bars Required	Length of Bars	Concrete Cu. Yds.	Steel Lbs.
22°30'	[illegible]	[illegible]	[illegible]	[illegible]
30°	[illegible]	[illegible]	[illegible]	[illegible]
37°30'	[illegible]	[illegible]	[illegible]	[illegible]
45°	[illegible]	[illegible]	[illegible]	[illegible]
52°30'	[illegible]	[illegible]	[illegible]	[illegible]
60°	[illegible]	[illegible]	3.99	242
67°30'	[illegible]	[illegible]	3.74	228

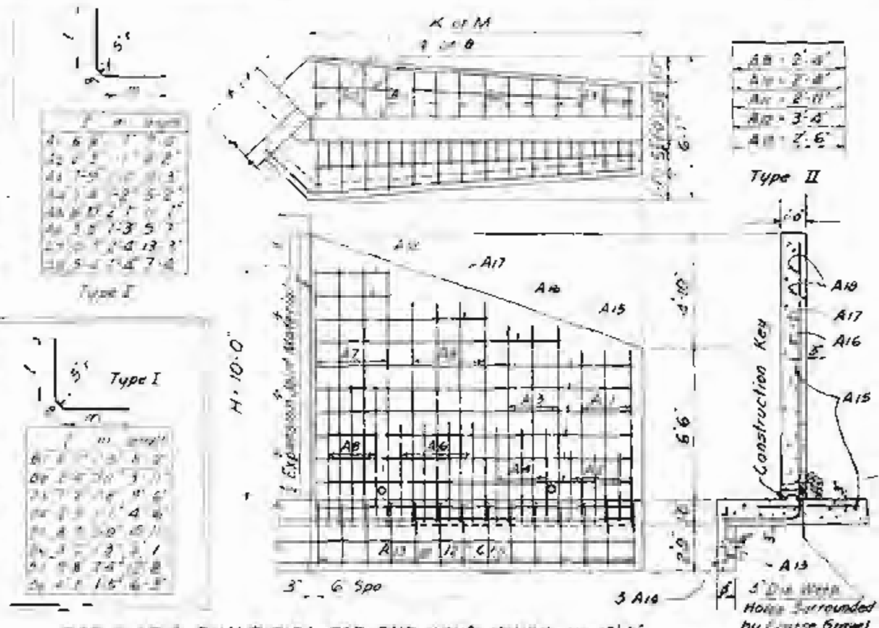
WING DETAIL WHEN H=8'0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H=9'0"

When φ or θ equals	Number of Bars Required	Length of Bars	Concrete Cu. Yds.	Steel Lbs.
22°30'	[illegible]	[illegible]	[illegible]	666
30°	[illegible]	[illegible]	[illegible]	[illegible]
37°30'	[illegible]	[illegible]	7.27	427
45°	[illegible]	[illegible]	[illegible]	[illegible]
52°30'	[illegible]	[illegible]	[illegible]	[illegible]
60°	[illegible]	[illegible]	[illegible]	294
67°30'	[illegible]	[illegible]	4.82	279

WING DETAIL WHEN H=9'0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H=10'0"

When φ or θ equals	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	3-A14	A15	A16	A17	2-A18	Concrete Cu. Yds.	Steel Lbs.
22°30'	[illegible]	[illegible]	[illegible]	[illegible]	6	8	[illegible]	6	6	[illegible]	5	6	30	30'-0"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	830
30°	[illegible]	[illegible]	4	4	[illegible]	[illegible]	[illegible]	5	6	6	4	4	23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	636
37°30'	3	[illegible]	4	[illegible]	4	[illegible]	5	4	4	4	4	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.03	521
45°	3	[illegible]	3	[illegible]	4	[illegible]	4	3	4	4	3	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.76	440
52°30'	[illegible]	[illegible]	2	[illegible]	3	[illegible]	[illegible]	[illegible]	4	3	3	3	[illegible]	[illegible]	11'-11"	[illegible]	[illegible]	[illegible]	6.92	394
60°	[illegible]	[illegible]	[illegible]	[illegible]	3	3	3	[illegible]	3	3	3	3	[illegible]	[illegible]	10'-11"	8'-2"	[illegible]	[illegible]	6.35	363
67°30'	[illegible]	[illegible]	[illegible]	2	3	3	3	[illegible]	3	3	3	2	[illegible]	[illegible]	10'-3"	[illegible]	[illegible]	[illegible]	[illegible]	348

WING DETAIL WHEN H=10'0"

GENERAL NOTES

[illegible]

ALL WING SURFACES TO RECEIVE ORDINARY SURFACE FINISH.

[illegible]

ALL REINFORCING STEEL SHALL BE [illegible]

CONSTRUCTION JOINTS SHOWN BETWEEN FOOTINGS AND WALLS ARE [illegible]

[illegible]

LOADING DATA INTERSTATE ALTERNATE

[illegible] CONCRETE [illegible] POUNDS PER CUBIC FOOT
EARTH [illegible] POUNDS PER CUBIC FOOT

DESIGNING DATA

[illegible]
Reinforcing Steel fs [illegible]
[illegible] Steel fs [illegible]
fc 1200 lbs per sq. in.
n 10

COLORADO
DEPARTMENT OF HIGHWAYS
WINGWALLS FOR
CONCRETE BOX CULVERTS

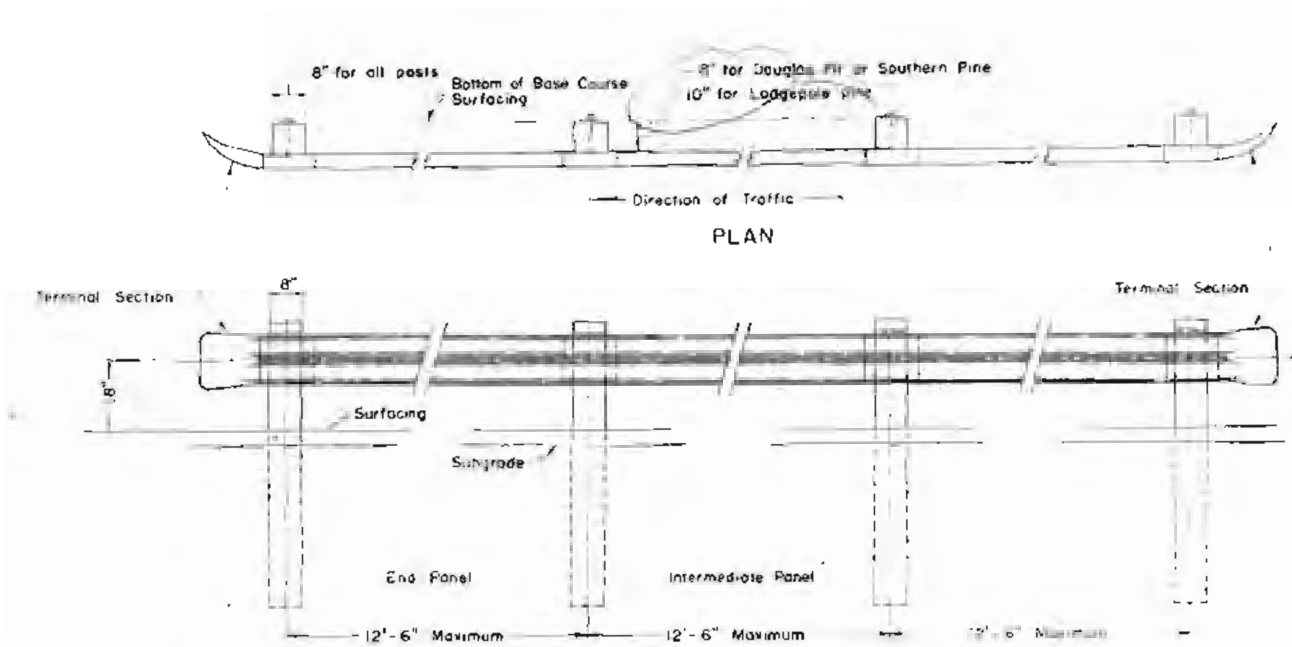
Designed by W.W.D. | Approved by [illegible] Bridge Engineer
Made by W.W.D.
Checked by T.A.M. | Date [illegible]

STANDARD M-75-A

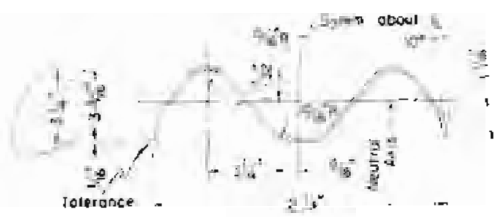
(MAY 1, 1962)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.	F022-3(10)	76

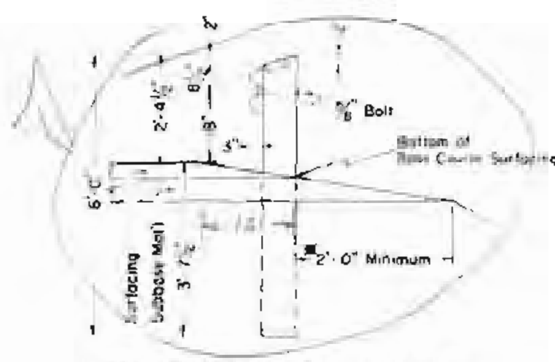
REVISIONS



TYPICAL METAL PLATE GUARD RAIL

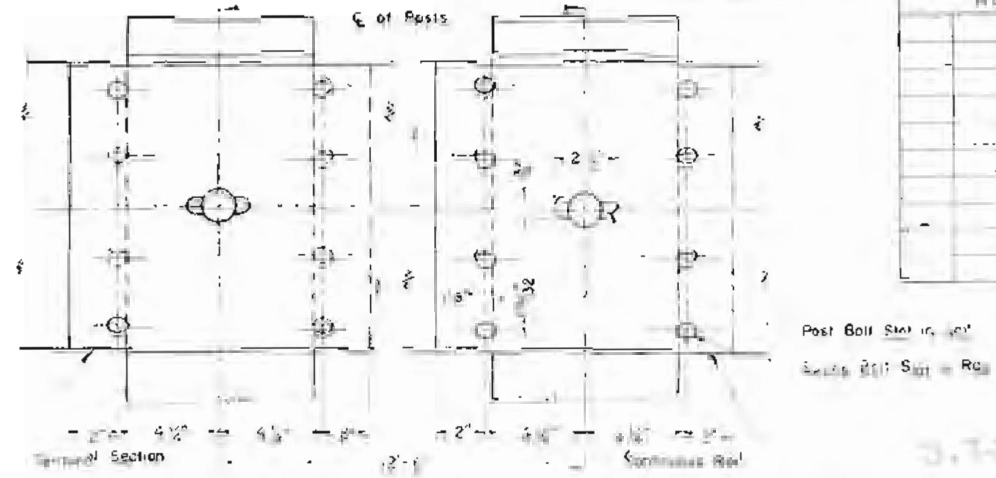


SECTION THRU RAIL ELEMENT

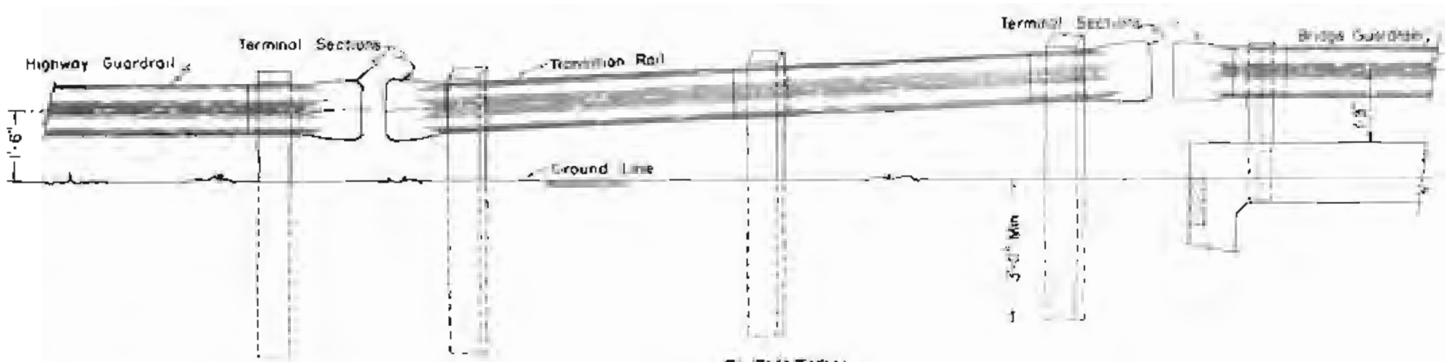


■ Where Subbase width does not give the two feet, subgrade shall be widened for lateral support

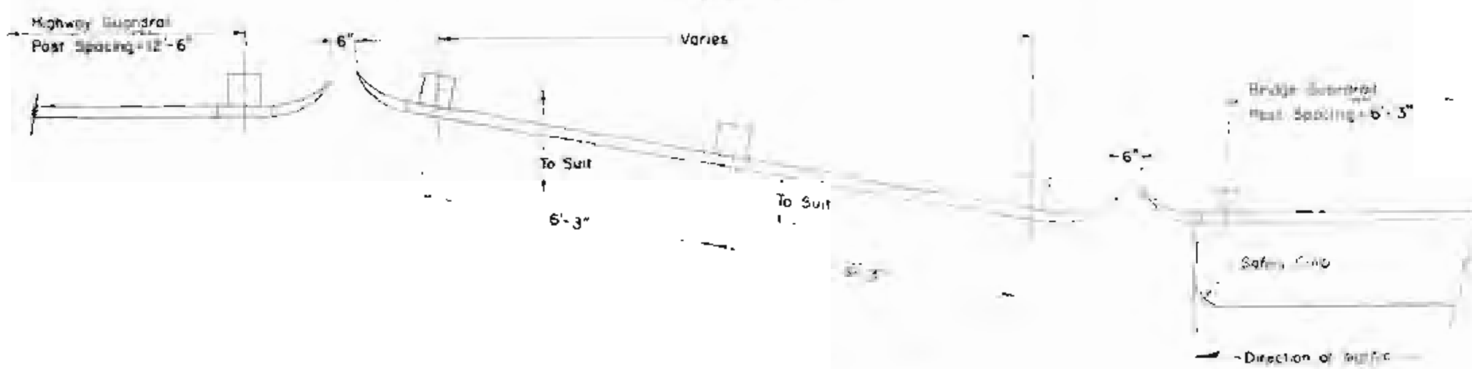
DETAIL SHOWING TYPICAL LOCATION OF GUARD FENCE

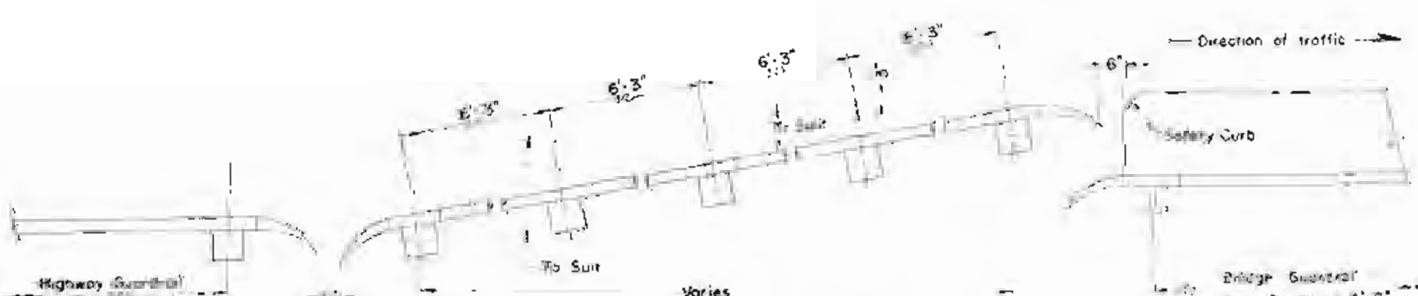


DETAIL OF RAIL SPLICE



ELEVATION





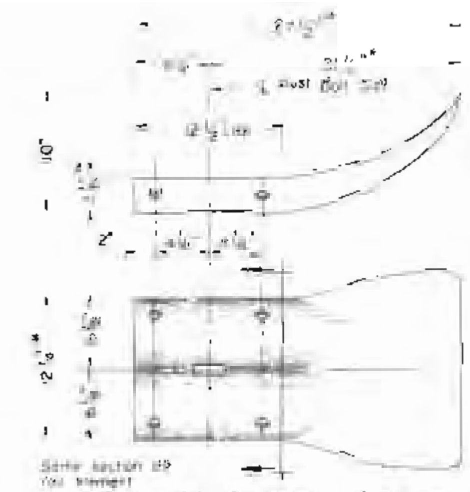
PLAN

(Work by State Forces)

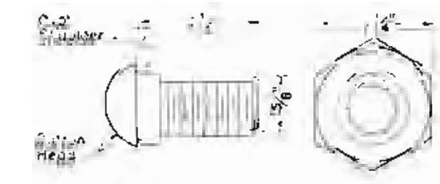
Reflective delineators shall be furnished and installed by State Forces after the Contractor has finished his operations

TRANSITION RAIL AT BRIDGES ONLY

INSTALLATION DETAILS OF REFLECTORIZED STRIP (Work by State Forces)



DETAIL OF TERMINAL SECTION



SPLICE BOLT
8 Req'd per splice
4 Req'd per terminal

NUT

GENERAL NOTES

All work shall be done according to the Standard Specifications of the Colorado Department of Highways, applicable to the project.

All wood posts shall be close grained Douglas Fir of the Coast Region, Dense Longleaf or Shortleaf Southern Pine or Lodgepole Pine.

All wood posts shall be square edged, full sawn, with tops beveled as shown. All bolt holes are to be drilled [illegible] larger than diameter of bolt before treatment is applied. All wood posts shall be pressure treated for the full length of the posts as provided for in the specifications.

Timber posts fabricated from Douglas Fir or Southern Pine shall be 8" x 8" square. Timber posts fabricated from Lodgepole Pine shall be 8" x 10" and shall be installed with the 8" face parallel to the center line of the roadway.

All wood posts shall be set and tamped in plumb and firm to the lines and grades as directed by the Engineer.

Where sidewalks are constructed adjacent to the line for traffic, guard fence shall be placed in such a manner that the fence lies on the line between the sidewalk and the normal roadway shoulder.

Where guard fences are constructed on the approaches to bridges with sidewalks, the fence at bridge shall be placed in line with the face of the curbing on the bridge.

METAL PLATE GUARD FENCE (STEEL) SPECIFICATIONS

Metal plate guard rail shall be painted in accordance with standard specifications.

Metal plate guard rail galvanized in accordance with Table I of A.S.T.M. A-93 may be furnished in lieu of painting requirements.

Metal plates shall not be lighter than No. 12 U.S. standard gauge.

Standard galvanized wrought steel washers shall be used under all bolt heads and nuts coming in contact with wood posts.

METAL PLATE GUARD FENCE (ALUMINUM) SPECIFICATIONS

Aluminum plates shall have a nominal thickness of not less than 0.125 inches.

No painting of the aluminum guard rail elements, end sections or fasteners will be required.

MATERIAL SPECIFICATIONS: The following members shall be of the alloy and temper specified, and shall conform to the A.S.T.M. specification listed below.

Member	▲Alloy	A.S.T.M. Specification
Rail elements	2024-T3	B 209
Terminal Sections	2024-T42	B 209
Bolts	2024-T4	B 211
Nuts	6061-T6	B 211
Washers	2024-T4	B 211

Dimensions marked by (*) may vary by not more than [illegible] inch.

▲All rail elements, terminal sections and appurtenances shall be treated to prevent oxidation.

COLORADO DEPARTMENT OF HIGHWAYS

METAL PLATE GUARD FENCE

Designed by
Made by
Checked by

Approved: [illegible]
Bridge Engineer
Date: May 1, 1962

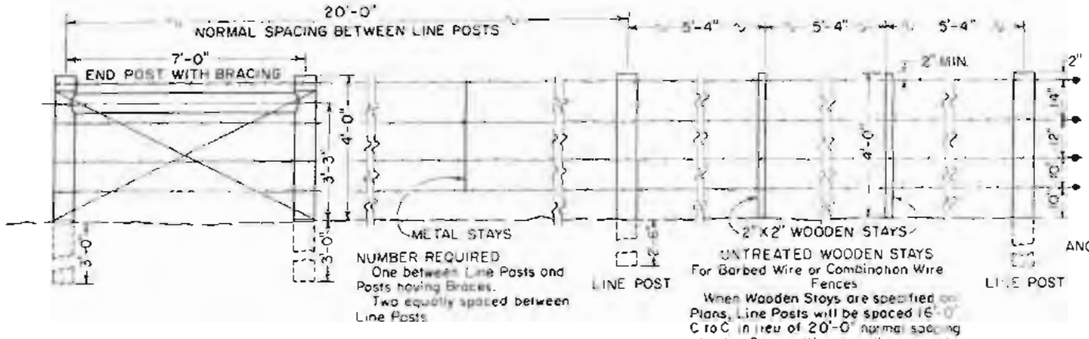
STANDARD M-76-A

(SHEET 1 OF 2 SHEETS)
(MAY 1, 1962)

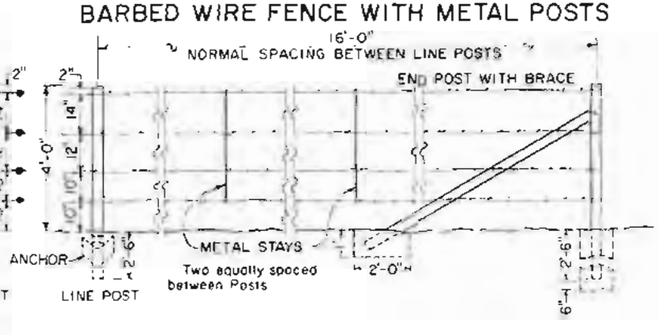
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	F022-2(10)	17

REVISIONS		
5-23-62	Rev. Line Brace Detail For Steel Posts	C.O.
6-6-62	Rev. Fig. 1 for Wood Posts	L.E.O.
8-9-62	Rev. Line Brace Detail For Metal Post	J.C.R.

BARBED WIRE FENCE WITH WOODEN POSTS



BARBED WIRE FENCE WITH METAL POSTS

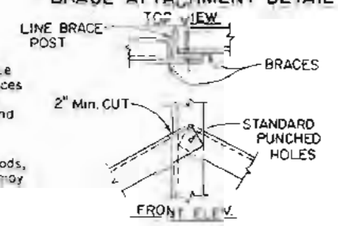


CROSS BRACE DOWELING DETAIL

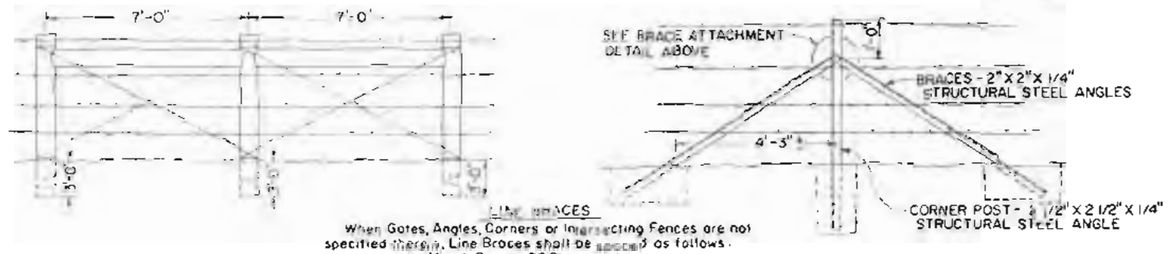
Bore a 3/8" X 2" Hole in each Post and Brace to receive the Pins. Wrap the ends of the Braces tightly with several turns of 12 1/2 ga. smooth Galv. Wire to prevent splitting or Notch Post and Nail with 40 d Common Nails.

*Alternate Attachment methods, acceptable to the Engineer, may be used.

*BRACE ATTACHMENT DETAIL



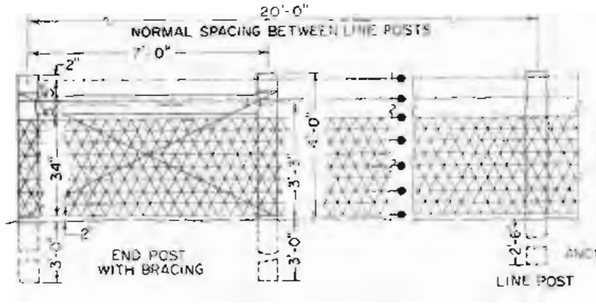
LINE BRACES



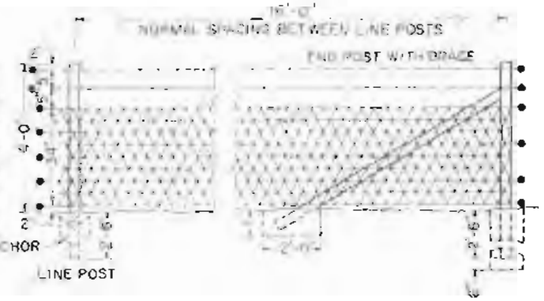
LINE BRACES

When Gates, Angles, Corners or Intersecting Fences are not specified thereon, Line Braces shall be placed as follows:
Metal Posts - 800' Intervals
Wooden Posts - 1,400' Intervals

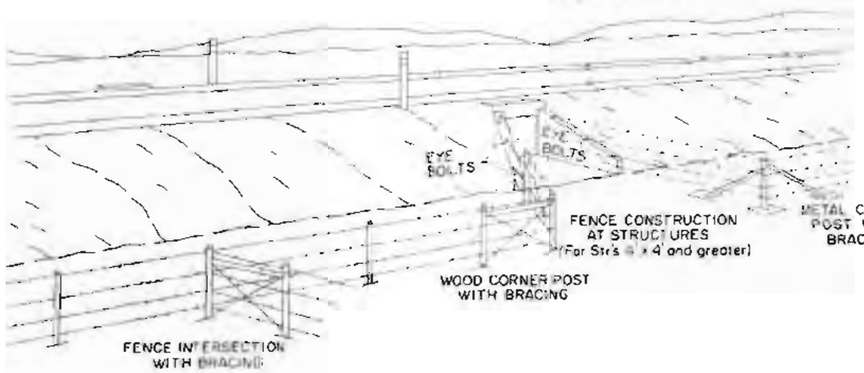
COMBINATION WIRE FENCE WITH WOODEN POSTS



COMBINATION WIRE FENCE WITH METAL POSTS



ILLUSTRATIVE SKETCH SHOWING TYPICAL EXAMPLES FOR CONSTRUCTING FENCES

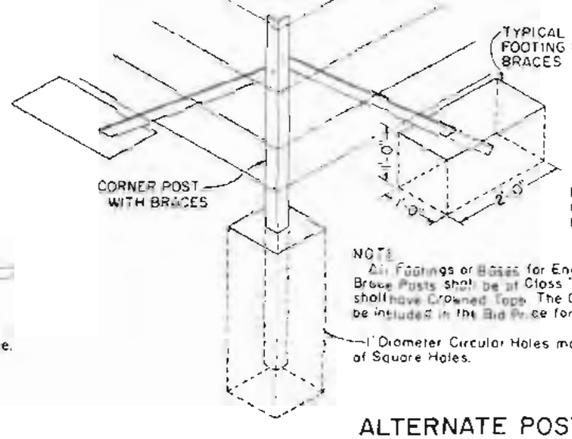


NOTE
At all structures of 4'x4' and over, the fence shall be ended at eye-bolts in the wings of the structure. Where the type of structure prohibits the use of eye-bolts, an end post with brace shall be used.
Eye-bolts shall be made of 1/2" round bars with a minimum of six (6) inches of body length embedded in the concrete and a minimum of 1" inside eye diameter.

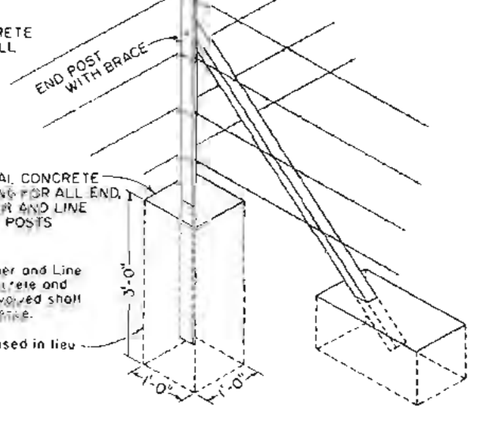
ACCEPTABLE WIRE SPLICE

Splicing Sleeve shall be approved by the Department Materials Laboratory before use.

TYPICAL CORNER POST INSTALLATION



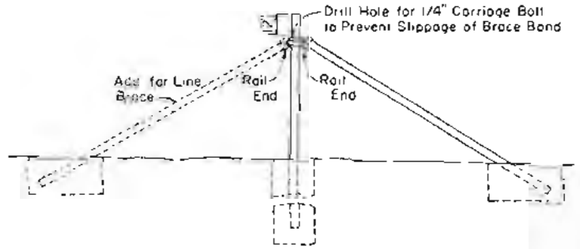
TYPICAL INSTALLATION AT FENCE INTERSECTIONS



NOTE
All Footings or Bases for End, Corner and Line Brace Posts shall be of Class "A" Concrete and shall have Crowned Tops. The Cost involved shall be included in the Bid Price for the Fence.
1' Diameter Circular Holes may be used in lieu of Square Holes.

ALTERNATE POST

(FOR END, CORNER OR LINE BRACE POSTS)



COLORADO
DEPARTMENT OF HIGHWAYS
WIRE FENCES
AND
GATES

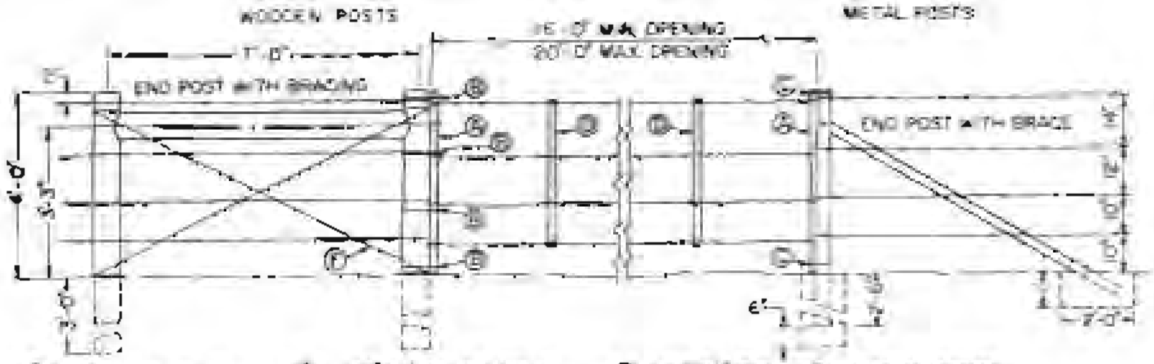
Designed by L.E.O.	Approved by [signature]
Made by [illegible]	Engr. Surveys & Plans
Checked by L.E.O.	Date: 6-12-1961

STANDARD M-76-A
(SHEET 2 OF 2 SHEETS)
(MAY 1, 1962)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
8	COLO	F022-3 (17)	18

REVISIONS		
5-23-62	Tie For Angle Post	L.E.O.
6-9-62	Brace Rail Size	J.E.R.

*BARBED WIRE GATE



* For Combination Wire Gate use 34" Mesh and 2 strands of Barbed Wire. Extend Wooden Stays to Ground.

(B) 2"x4"x4' Wooden Stays

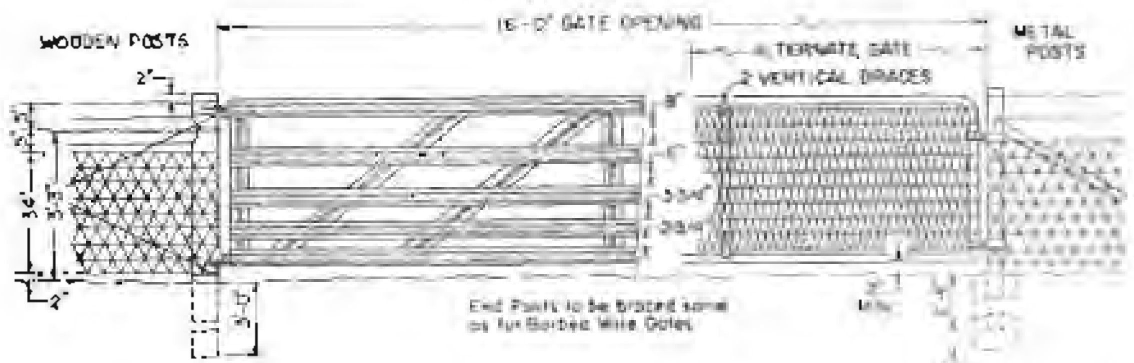
(C) 2-2"x2" Wooden Stays equally spaced

(D) 4-No 12 1/2 Ga. Wire Loops to act as Hinges

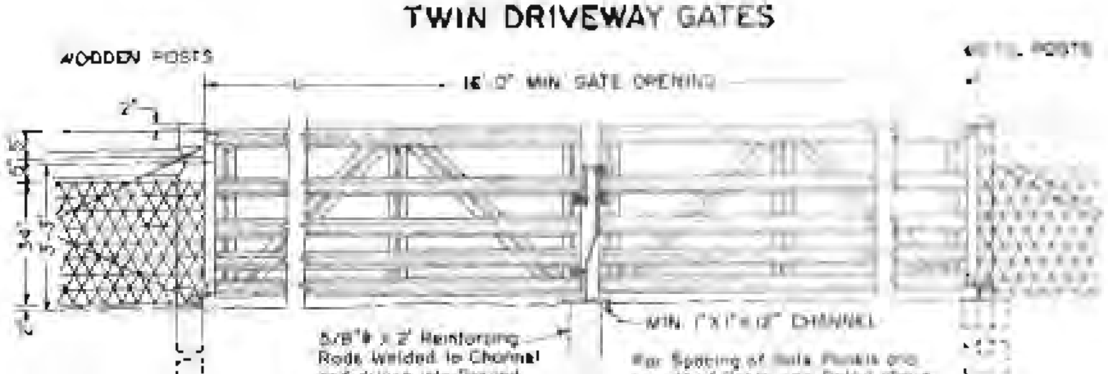
(E) No 12 1/2 Ga Wire Loops

(F) No 12 1/2 Ga Brace Wire

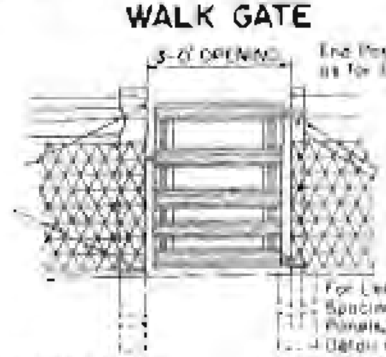
DRIVEWAY GATES



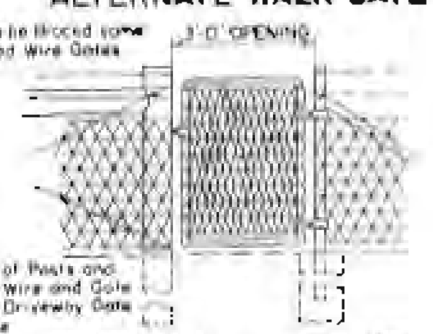
TWIN DRIVEWAY GATES



WALK GATE



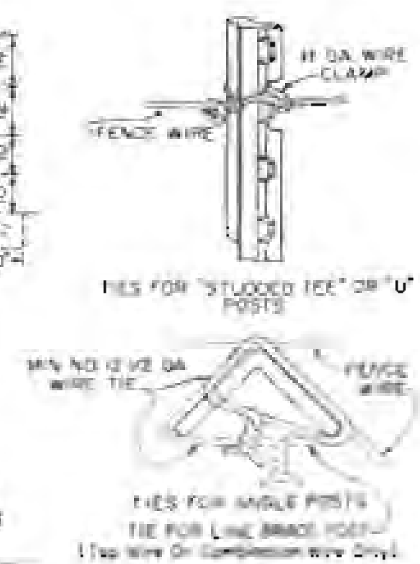
ALTERNATE WALK GATE

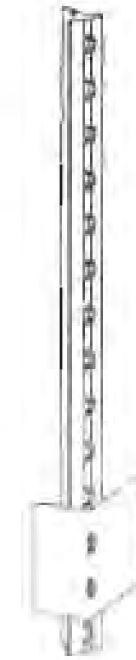


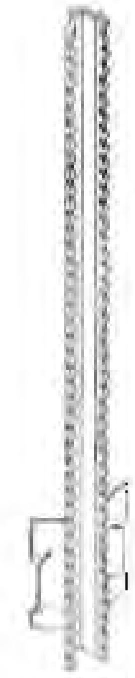
End Posts to be Braced same as for Barbed Wire Gates

For Length of Posts and Spacing of Wire and Gate Panels, see Driveway Gate Detail above

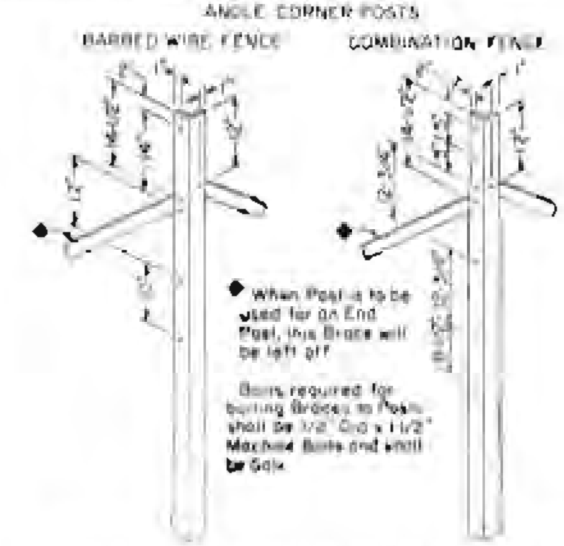
FENCE WIRE TIES







TYPICAL METAL POSTS



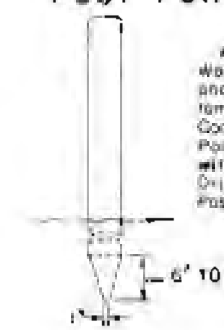
◆ When Post is to be used for an End Post, this Brace will be left off.

Bolts required for bolting Braces to Posts shall be 1/2" Dia x 1 1/2" Machine Bolts and shall be Galv.

HOLE SPACING FOR FASTENING BRACES AND FENCE WIRE TO METAL END, CORNER AND LINE BRACE POSTS

NOTE:
All Holes for wire to be 1/4" diameter. Fence wire to be securely fastened with No 12 1/2 Ga. (Min.) Galvanized wire bound around fence wire and passed through hole in post.
Holes may be in either leg of angle post. For convenience, the Department will approve the use of angle posts with holes spaced for barbed wire fence on one leg and combination wire fence on the other leg.

POST POINTING DETAILS



Where field conditions permit, Wooden Posts may be pointed and driven in lieu of setting and tamping, at the option of the Contractor.
Pointing shall be in conformity with details shown at left.
Driving methods shall not damage Post.

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the Project.

Fence wire to be placed on either road or field side of posts depending on [illegible] conditions, i.e. on curves the wire should be placed on the side of the post which would prevent tension [illegible] from the [illegible] where [illegible] pressure against the wire.

WOOD POSTS
All line posts shall have a [illegible] of four (4) inches and be 6'-6" long.
All end, corner, intersection and brace posts shall have a minimum diameter of five (5) inches and be 7'-0" long.
Fence wire will be stapled to wooden posts or tied to metal posts as shown [illegible] barbed wire or combination wire fence details.

METAL POSTS
All posts and braces shall be of the types and weights shown or [illegible] equivalents.
Holes to be provided in end, corner and gate posts as detailed.

CORNER POSTS
Type - 2 1/2" x 2 1/2" x 1/4" Structural Steel Angles
Weight - 3.91 lbs./lin. ft. Min.
Length - 6'-6" Min.
No. of Braces - 2

LINE POSTS
Type - "Studded Tee" or "U"
Weight - 1.28 lbs./lin. ft. Min. (without Anchor)
Length - 6'-6" Min.
Anchor - Securely fastened with bearing surface sufficient to resist movement of post. Weight - 0.67 lb. Min.

END POSTS
Type - 2 1/2" x 2 1/2" x 1/4" Structural Steel Angles
Weight - 3.91 lbs./lin. ft. Min.
Length - 6'-6" Min.
No. of Braces - 1

BRACES (For Corner, End or Line Brace Posts)
Type - 2" x 2" x 1/4" Structural Steel Angles
Weight - 3.08 lbs./lin. ft. Min.
Length - Same as corner and end posts used
Posts shall meet US Dept. of Commerce Commercial Standard 184-51

ALTERNATES
END, CORNER AND LINE BRACE POSTS
Type - 2 1/2" O.D. Galvanized Tubular Steel
Weight - 3.47 lbs./lin. ft. Min.

BRACES
Type - 1 5/8" O.D. Tubular Steel with 2 1/2" Brace Band Hinge and with 3/8" I.D. Rod End, all Galvanized
Weight - [illegible] lbs./lin. ft. Min.
Length - 6'-6" Min.

BARBED WIRE
Barbed wire shall conform to Standard Specifications and shall have No. 14 Gauge Galvanized double wrapped barbs. 80 rod reels shall weigh a min. of 78 lbs. net & shall meet ASTM A121-57, Class 1.

4"x4" WIRE MESH
Wire mesh used in combination wire fence as shown shall be galvanized and conform to the following:
Height - 34"
Weight - 0.76 lbs./lin. ft. Min.
Horizontal Wires - 2 strands, No. 12 1/2 ga. wire
Cross Wires - 1 strand, No. 14 ga. wire
Construction - cross wires to be woven with horizontal wires making a one piece fabric
Shall meet ASTM A116-57, Class 1

GATES
DRIVEWAY GATES
Height - approximately 42" (5 panels)
Weight - Galvanized Steel, 92 lbs. Min. / Tempered Aluminum, 45 lbs. Min.
Width of gate opening - 16'-0"

ALTERNATE DRIVEWAY GATES
Height - 42"
Weight - Not less than 79 lbs. complete with latch and hinges
Width of gate opening - 16'-0"
Gate Frame - 1" I.D. Standard Galvanized Pipe or acceptable equivalent and shall be of all welded construction.
Mesh to be of same construction as shown for 4"x4" wire mesh except it shall be 2"x4" mesh 42" high.

WALK GATES
Height - approx. 42" (5 panels)
Weight - Galvanized Steel, 18 lbs. Min. / Tempered Aluminum, 10 lbs. Min.
Width of gate opening - 3'-0"

ALTERNATE WALK GATES
Height - 42"
Weight - Not less than 16 lbs. complete with latch and hinges
Width of gate opening - 3'-0"
Gate Frame - 3/4" I.D. Standard Galvanized Pipe or acceptable equivalent and shall be of all welded construction.
Mesh to be of same construction as shown for Driveway Gate.

Alternate equivalent standard metal gates other than shown will be acceptable subject to the Engineer's approval.

In lieu of galvanized finish on gate frames, Cadmium Plated pipe or Aluminum painting with Zinc Chromate Primer as per Specifications will be considered to be equivalent.

LATCHES AND HINGES
Galvanized steel or Aluminum of standard make.

In lieu of standard make latches it will be permissible to use an electro-galvanized chain, eyebolt and snaphook type latch. Eyebolt, chain and snaphook assembly to be secured to latch side of gate. Gate closure effected by wrapping chain around end post and snapping hook into chain.

COLORADO
DEPARTMENT OF HIGHWAYS
WIRE FENCES
AND
GATES

Designed by	L.E.O.	Approved by	[illegible]
Made by	T.E.F.	Engr. Surveys & Plans	
Checked by	E.E.O.	Date	[illegible]

RIGHT OF WAY MARKER POST STANDARD M-81-A

(MAY 1, 1962)

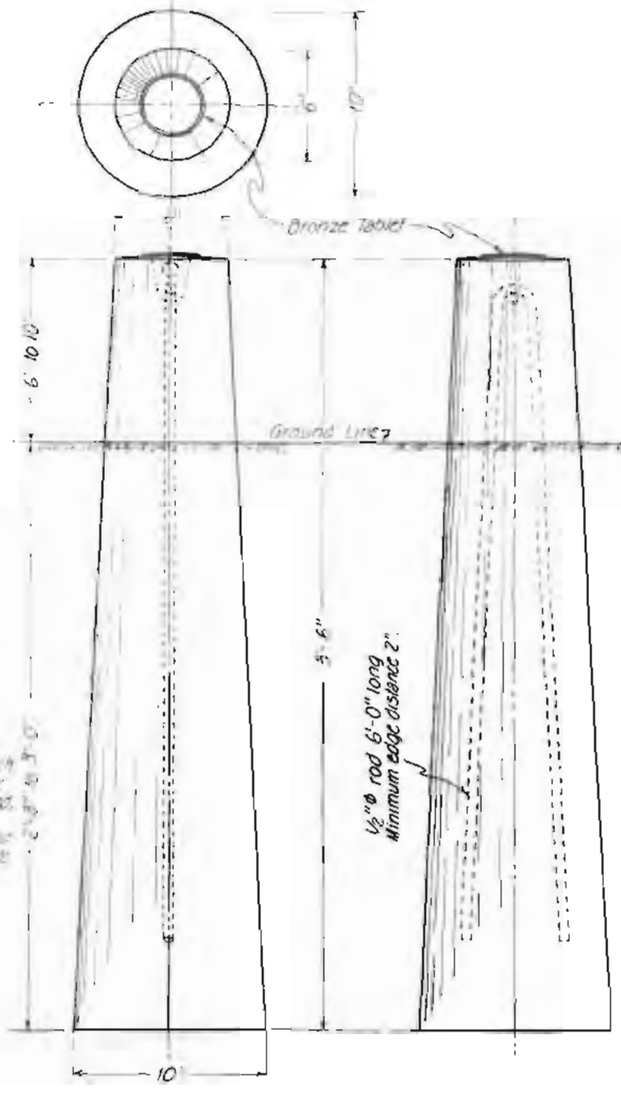
FEDERAL AID PROJ. NO.	DIVISION	PROJECT NO.	SHEET NO.
?	COLORADO	F022-3(10)	19

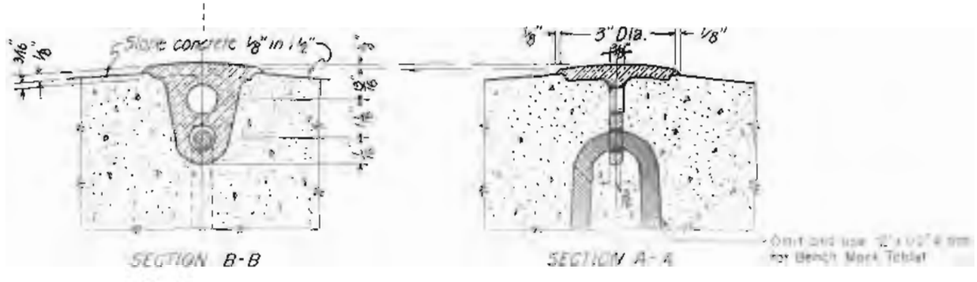
REVISIONS

NOTES FOR R.O.W. MARKER POSTS

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the project. Posts shall be made of Class 'A' Concrete. The upper 12 inches of marker posts shall be rubbed free of form marks and the top surface of the post must be constructed to drain thoroughly.

All exposed surfaces of the bronze tablet are to be ground to a smooth surface. All letters are to be depressed a minimum of 1/16 inch. Information on the bronze tablet indicated by pen lines is to be stamped in field by the engineering party after post is placed. 3/16 inch letters and figures to be used. Project designations on tablets shall be properly shown (i.e. I for Fed Aid Interstate, F for Fed Aid Primary, S for Fed Aid Secondary, etc. B & C for State Projects, see detail below.)





BENCH MARK

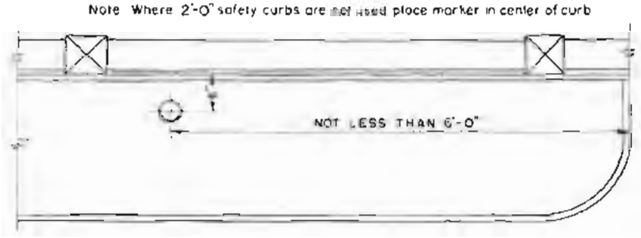
All work shall be done in accordance with Standard Specifications of the Colorado Department of Highways applicable to the project.

All exposed surfaces of the bronze tablet are to be ground to a smooth surface. All letters are to be depressed a minimum of 1/16 inch. Information on the bronze tablet indicated by pen lines is to be stamped in field by the engineering party after marker is placed. 3/16 inch letters and figures to be used. Project designation on tablets shall be properly shown (i.e. I for Fed Aid Interstate, F for Fed Aid Primary, S for Fed Aid Secondary, etc. B & C for State Projects. See details below.)

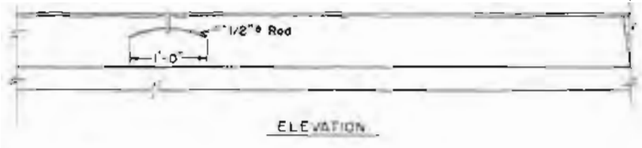
Bronze Bench Mark Tablets will be furnished by the Department at no expense to the Contractor.

Installation of Bronze Bench Mark Tablets will not be paid for directly, but shall be included in the price bid for Concrete.

Note: Where 2'-0" safety curbs are not used place marker in center of curb



PLAN



ELEVATION

One marker to be placed on Bridges as shown. The station shown on marker shall be the centerline stationing directly opposite the marker.

DETAIL OF BRONZE TABLET
FOR RIGHT OF WAY MARKER POST AND BENCH MARK

COLORADO
DEPARTMENT OF HIGHWAYS

MARKER POSTS
AND
BENCH MARKS

Designed by R.E.L.	Approved by G. Julian
Made by E.E.O.	
Checked by R.E.L.	Date: Nov. 12, 1953

STANDARD TIMBER GUARD POSTS

STANDARD M-92-A

(MAY 1, 1962)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	Colorado	F022-3(10)	20

REVISIONS

(Work By Contractor)

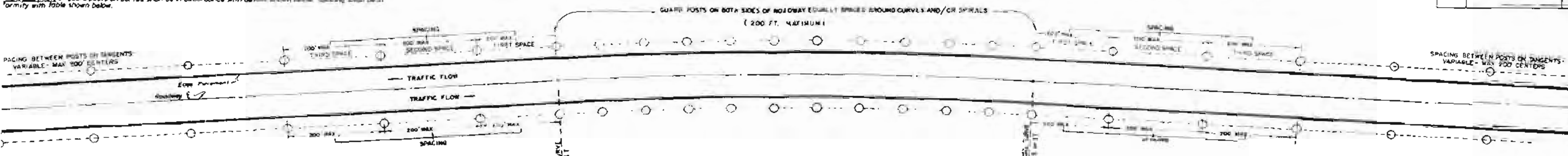
PAINTING - Posts shall be painted [illegible] Number of coats and type of paint [illegible] shall be in accordance with specifications.

(Work By State Forces)

REFLECTIVE SHEETING - In accordance with the details hereon, State Forces will furnish and place the required 2" x 6" smooth surfaced reflective delineators fabricated from [illegible] aluminum alloy, minimum thickness 0.025", reflectorized with reflective sheeting strips or other approved reflective materials. Strips shall be suitable for placement around a curved surface.

Typical Installation on Curves & Tangents

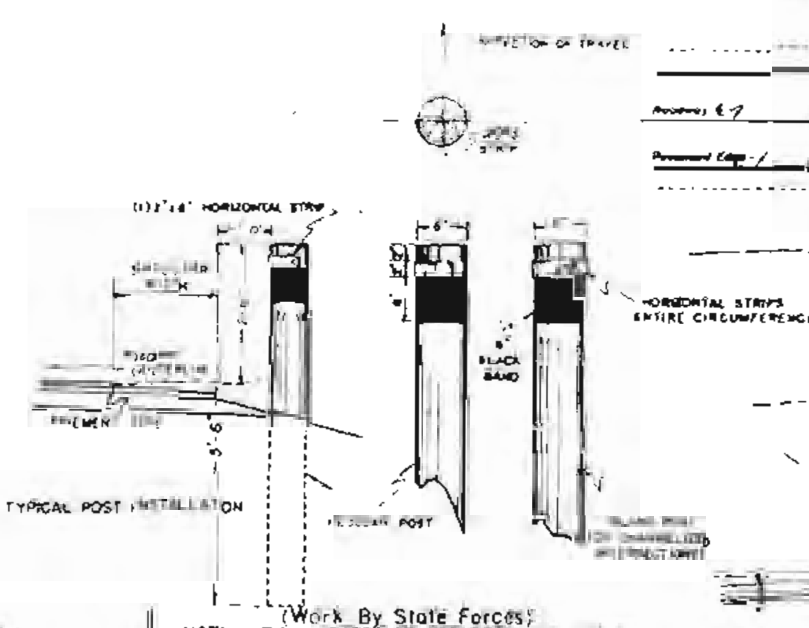
INSTALLATION of guard posts on curves shall be in accordance with details shown below. Spacing shall be in conformity with Table shown below.



SPACING FOR DELINEATORS ON HORIZONTAL CURVES

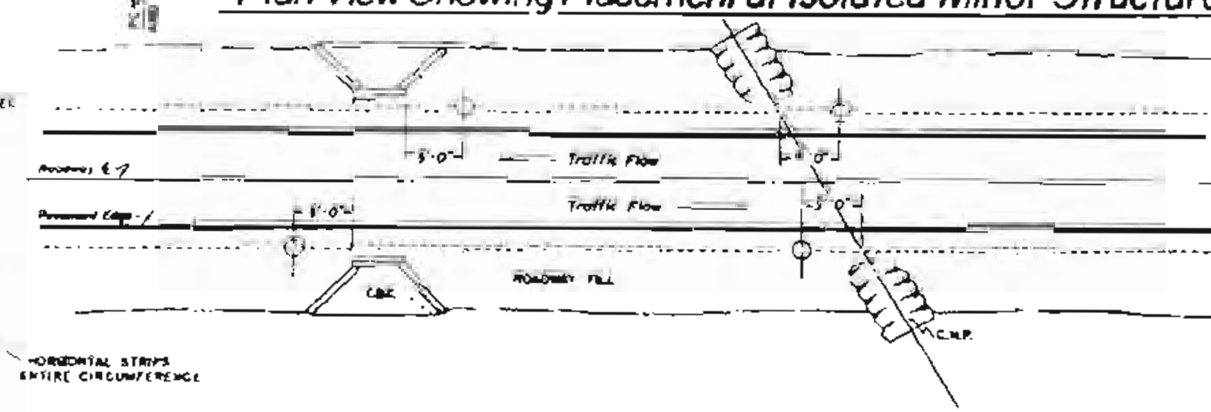
DEGREE OF CURVE	RADIUS	° SPACING ON CURVE	SPACING IN ADVANCE OF AND BEYOND CURVE			DEGREE OF CURVE	RADIUS	° SPACING ON CURVE	SPACING IN ADVANCE OF AND BEYOND CURVE		
			FIRST SPACE	SECOND SPACE	THIRD SPACE				FIRST SPACE	SECOND SPACE	THIRD SPACE
		FEET	FEET	FEET	FEET			FEET	FEET	FEET	FEET
0°30'	11460.0'	200	200	200	200	8°00'	716.3'	52	94	156	200
1°00'	5730.0'	151	200	200	200	8°30'	674.1'	50	90	150	200
1°30'	3820.0'	125	200	200	200	9°00'	636.7'	48	86	144	200
2°00'	2865.0'	106	191	200	200	9°30'	603.2'	47	86	141	200
2°30'	2292.0'	95	171	200	200	10°00'	573.0'	46	83	138	200
3°00'	1910.0'	86	155	200	200	10°30'	545.7'	45	81	135	200
3°30'	1637.1'	80	144	200	200	11°00'	520.9'	43	77	129	200
4°00'	1432.5'	74	133	200	200	11°30'	498.5'	42	76	126	200
4°30'	1273.5'	70	126	200	200	12°00'	477.5'	41	74	123	200
5°00'	1146.0'	66	119	198	200	15°00'	382.0'	36	65	108	200
5°30'	1041.8'	63	113	189	200	18°00'	318.3'	33	59	98	198
6°00'	955.0'	60	108	180	200	21°00'	272.9'	30	54	90	180
6°30'	881.5'	58	104	174	200	25°00'	229.2'	27	49	81	[illegible]
7°00'	818.6'	55	99	165	200	30°00'	191.0'	24	43	72	144
7°30'	764.0'	53	96	159	200						

° $S = 2\sqrt{R-50}$ 1-ST. SPACE = 1.8S 2-ND. SPACE = 3S 3-RD. SPACE = [illegible]
NO SPACES TO EXCEED 200 FT.

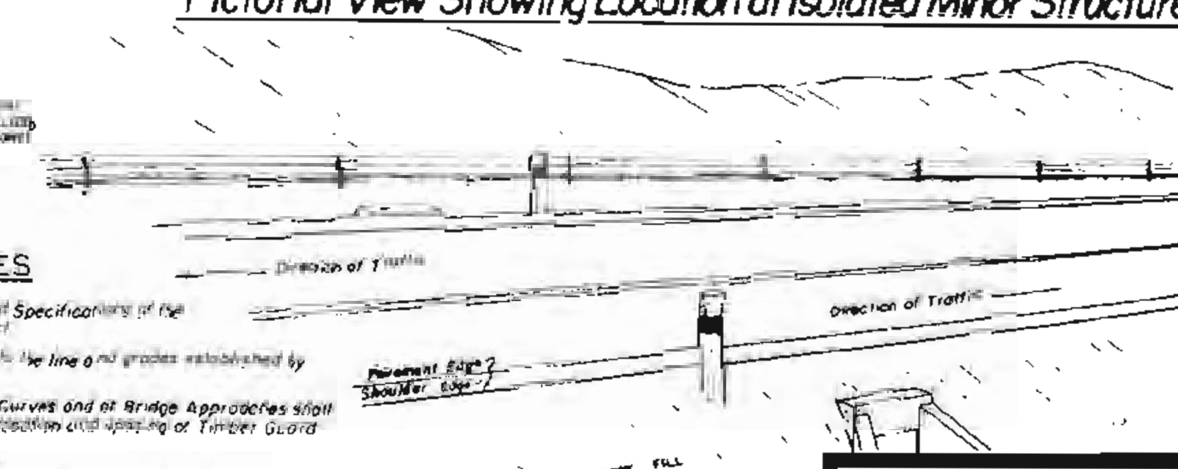


(Work By State Forces)
INSTALLATION DETAILS OF REFLECTORIZED STRIPS

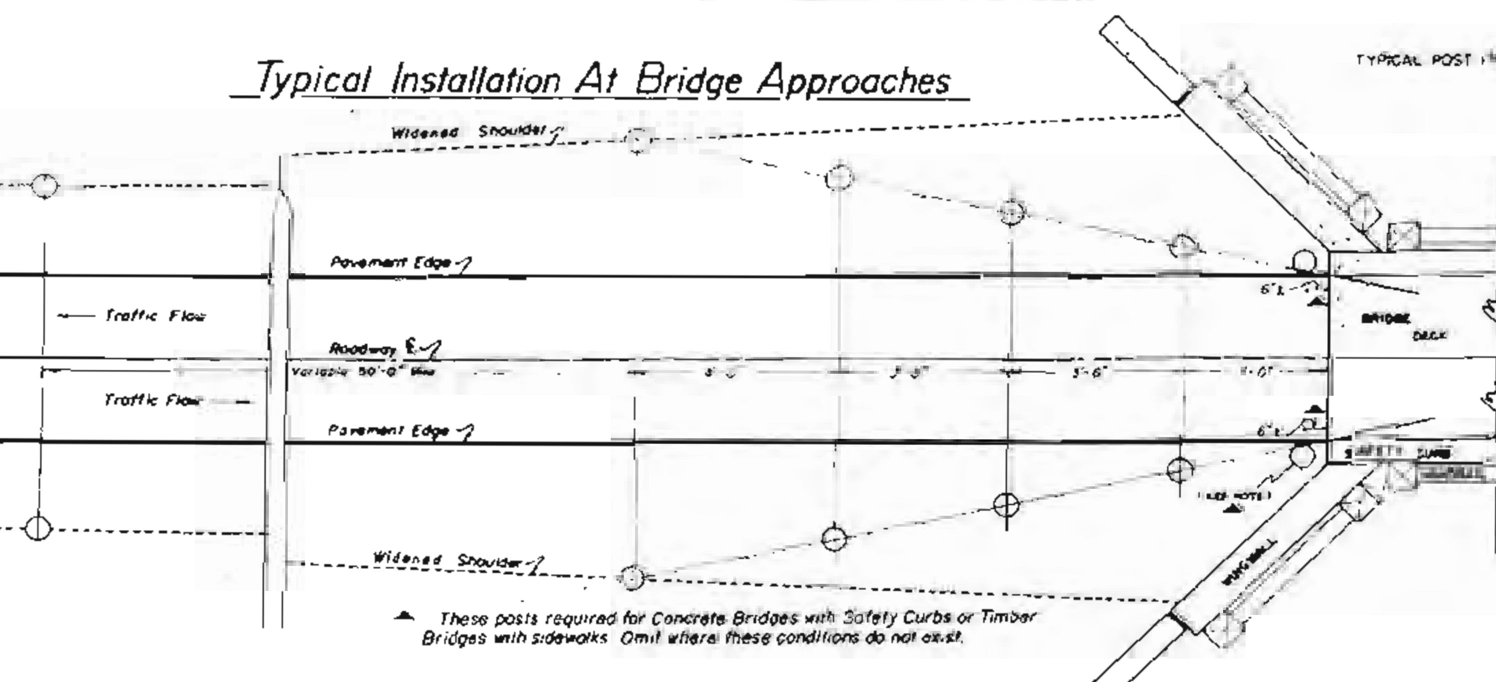
Plan View Showing Placement at Isolated Minor Structures



Pictorial View Showing Location at Isolated Minor Structures



Typical Installation At Bridge Approaches



▲ These posts required for Concrete Bridges with Safety Curbs or Timber Bridges with sidewalks. Omit where these conditions do not exist.

GENERAL NOTES

(Work By Contractor)

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the project.

All posts shall be set and tamped in, plumb and firm, to the line and grades established by the Engineer.

INSTALLATION of Timber Guard Posts on Tangents, Curves and at Bridge Approaches shall be in conformity with details on this sheet. The number, location and spacing of Timber Guard Posts is shown on plans.

(Work By State Forces)

Reflective delineators shall be furnished and installed by State Forces after the Contractor has finished his operations.

Installation of reflective delineators shall be in accordance with the following. Wrap Around Reflective Sheeting Strips shall be installed horizontally one (1) sheet on all posts. [illegible] posts shall have Wrap Around Reflective Sheeting Strips placed horizontally to cover entire circumference of Post.

On Divided Highways and Islands, Reflective Sheeting Strips shall be placed in a manner to obtain maximum visibility for the primary direction of travel; in all instances tests shall be made to insure the maximum effectiveness of reflective delineators.

All traffic islands shall be marked with Island Posts as indicated hereon.

COLORADO DEPARTMENT OF HIGHWAYS

TIMBER GUARD POSTS

Designed by
Made by
Checked by

Approved by [illegible]
Engineer, Surveys & Plans
Date: March 29, 1955

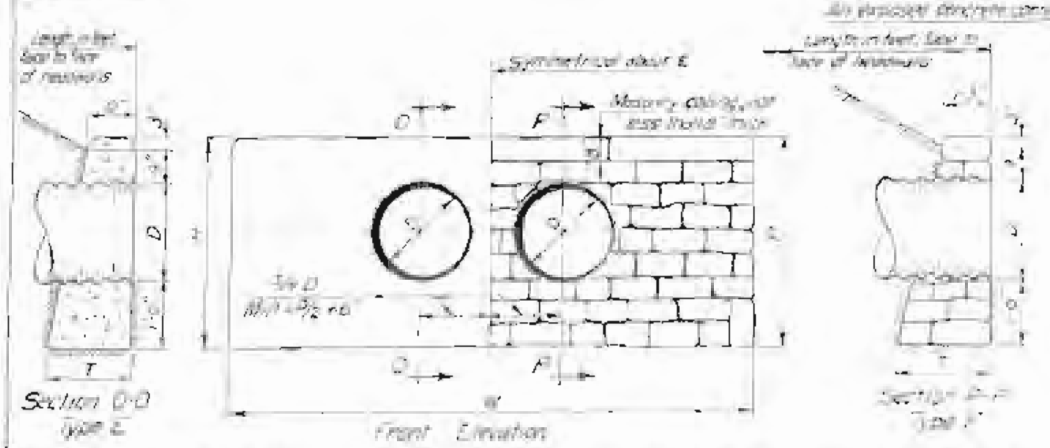
FEDERAL ROAD DIV. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	F022-3(10)	21

STANDARD M-95-A

(MAY 1, 1962)

REVISIONS

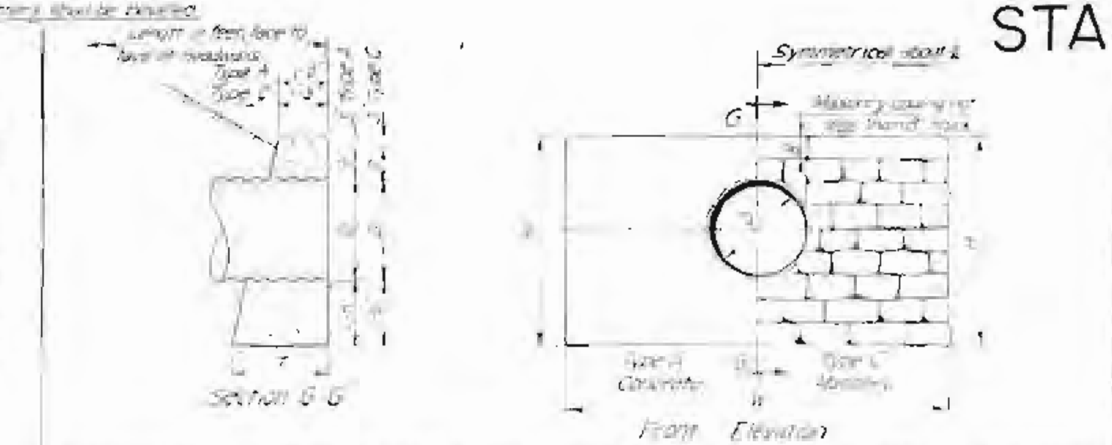
All exposed concrete corners shall be chamfered.



STANDARD HEADWALLS FOR DOUBLE CORRUGATED METAL PIPE CULVERTS

Table of Dimensions and Quantities

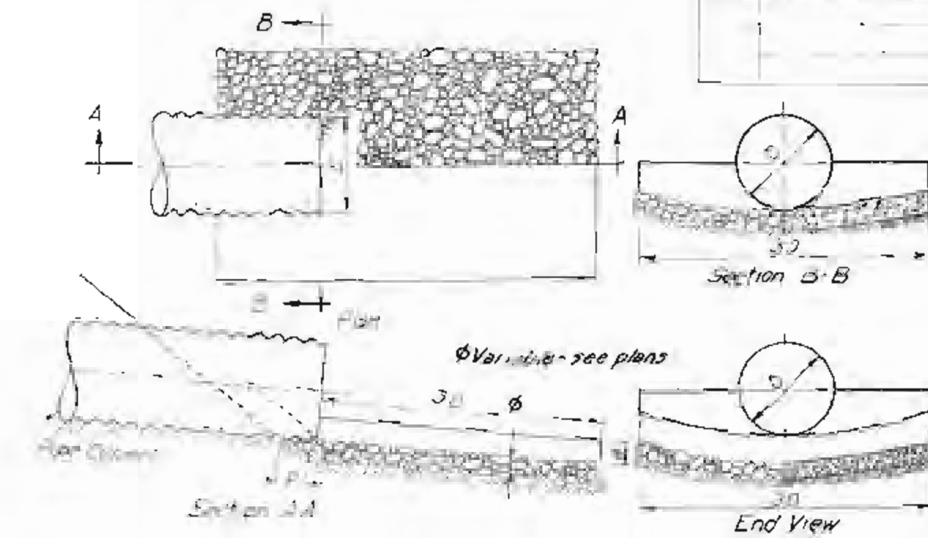
Type E: D Diam.	Type E: T	Type E: * Concrete in Two Headwalls	Both Types: W	Both Types: H	Type F: Cement Rubble Masonry in Two Headwalls	Type F: T	D Diam.
15"	1'-6"	2.2 Cu. Yds.	7'-6"	3'-9"	3.1 Cu. Yds.	2'-0"	15"
18"	1'-7"	3.0 Do	8'-6"	4'-0"	3.8 Do	2'-1"	18"
24"	1'-10"	4.4 Do	10'-6"	4'-6"	5.2 Do	2'-4"	24"
30	2'-0"	5.7 Do	12'-3"	5'-0"	7.5 Do	2'-6"	30"
36	2'-2"	8.1 Do	15'-0"	5'-6"	10.9 Do	2'-8"	36
42	2'-5"	10.8 Do	17'-3"	6'-0"	12.4 Do	2'-0"	42"
48	2'-7"	13.0 Do	19'-6"	6'-6"	16.3 Do	3'-0"	48"



STANDARD HEADWALLS FOR SINGLE CORRUGATED METAL PIPE CULVERTS

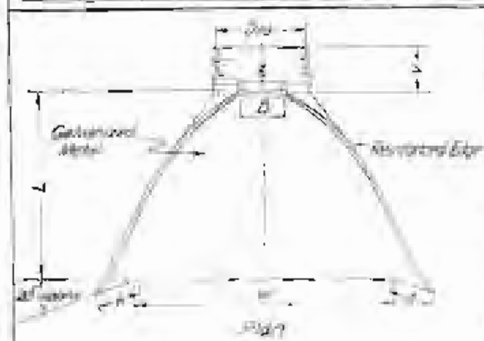
Table of Dimensions and Quantities

Type A: D Diam.	Type A: T	Type A: * Concrete in Two Headwalls	Both Types: W	Both Types: H	Type C: Cement Rubble Masonry in Two Headwalls	Type C: T	D Diam.
15	[illegible]	[illegible] Cu. Yds.	[illegible]	3'-9"	[illegible] Cu. Yds.	[illegible]	15
18	[illegible]	[illegible]	[illegible]	4'-0"	[illegible]	[illegible]	18
24	[illegible]	[illegible]	[illegible]	4'-6"	[illegible]	[illegible]	24
30	[illegible]	[illegible]	[illegible]	5'-0"	[illegible]	[illegible]	30
36	[illegible]	[illegible]	[illegible]	5'-6"	[illegible]	[illegible]	36
42	[illegible]	[illegible]	[illegible]	6'-0"	[illegible]	[illegible]	42
48	[illegible]	[illegible]	[illegible]	6'-6"	[illegible]	[illegible]	48



CONCRETE OR GROUTED RUBBLE APRON FOR PIPE CULVERT

Square Yards of Slope and Ditch Paving



Type K — Dimensions — Remarks

Splices to be the lap riveted type.

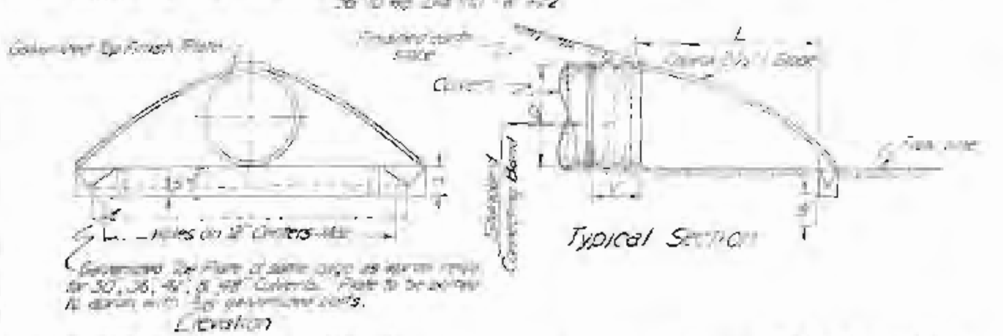
- Galvanized Connector Section, Corner Plate & Toe Plate to be same gage as skirt section.
- ▲ Culvert diameter is equal to dimension D of connector section.

Note: Length of Toe Plate for Culverts 15" to 30" Dia. incl. "W"+10"; 36" to 48" Dia. incl. "W"+22"

Type L — Dimensions — Remarks

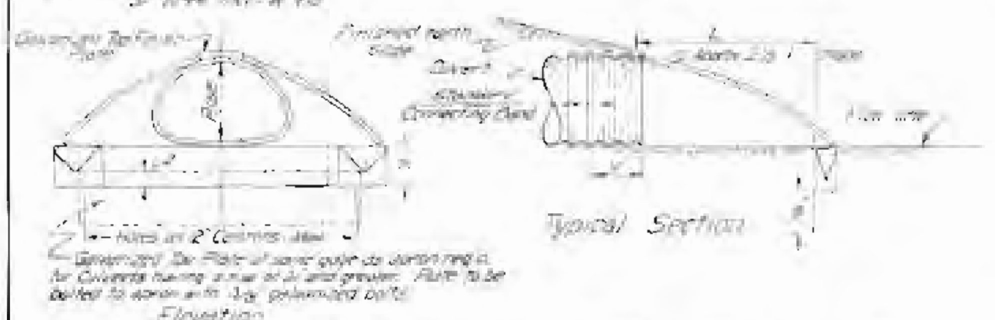
- * Splices to be the lap riveted or bolted on ℄.
- Sections to be joined by riveting or bolting equal distance from ℄. Galvanized Connector Section, Corner Plate & Toe Plate to be same gage as skirt section.

Note: Length of Toe Plate for Pipe Arch Culverts



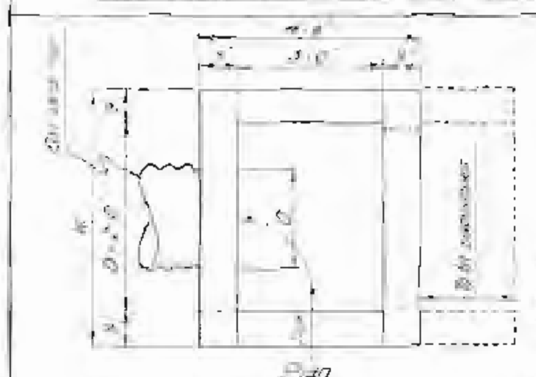
Galvanized Toe Finish Plate
Finished earth slope
Culvert
Connecting Band
Flow line
Holes on 12" Centers
Galvanized Toe Plate of same gage as apron required for 30, 36, 42 & 48" Culverts. Plate to be bolted to apron with galvanized bolts.
Typical Section
Elevation

STANDARD METAL APRONS FOR CORRUGATED METAL PIPE CULVERTS TYPE K



Galvanized Toe Finish Plate
Finished earth slope
Culvert
Connecting Band
Flow line
Holes on 12" Centers
Galvanized Toe Plate of same gage as apron required for Culverts having a rise of 21" and greater. Plate to be bolted to apron with galvanized bolts.
Typical Section
Elevation

STANDARD METAL APRONS FOR CORRUGATED METAL PIPE ARCH CULVERTS TYPE L



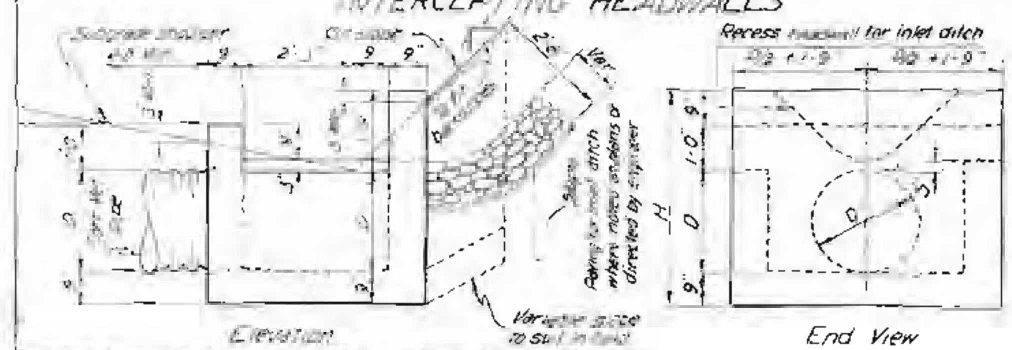
Quantities of * Concrete or Cement Rubble Masonry

Size of Pipe D	Width of Wall W	Height of Wall H	Quantities in One Headwall Cu. Yds.
15	4'-6"	2'-9"	1.48
18	5'-0"	3'-0"	1.64
24	5'-6"	3'-6"	1.86
30	6'-0"	3'-6"	2.38
36	6'-6"	3'-6"	2.72

Note: Headwall to be eliminated and side walls connected to back slope where ordered by the Engineer. Floor slab is to be extended with side walls if in common material and is to be omitted when inlet is in rock. Actual quantities required in such operation shall be allowed and paid for.

* See plan sheets for concrete classification.

INTERCEPTING HEADWALLS



General Notes for All Structures

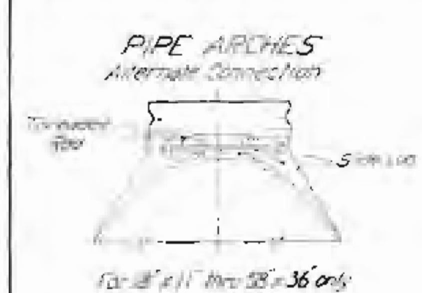
All work shall be done according to the standard specifications of the Colorado Department of Highways applicable to the project.

All construction joints shall be thoroughly cleaned before fresh concrete is poured.

When culvert is skewed, headwalls shall be placed parallel to ℄ of roadway.

ROUND METAL PIPE Alternate Connections

PIPE ARCHES Alternate Connection

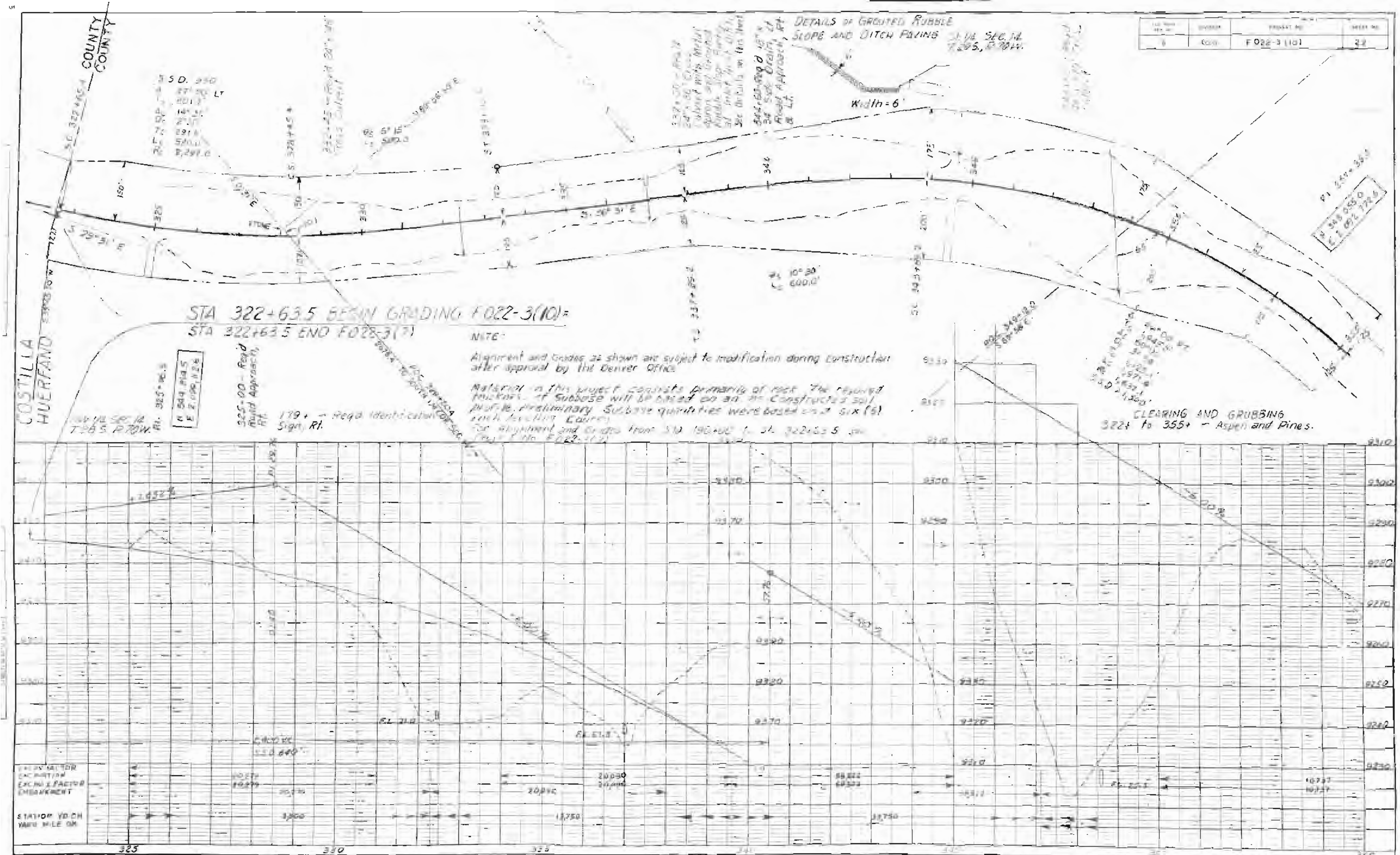


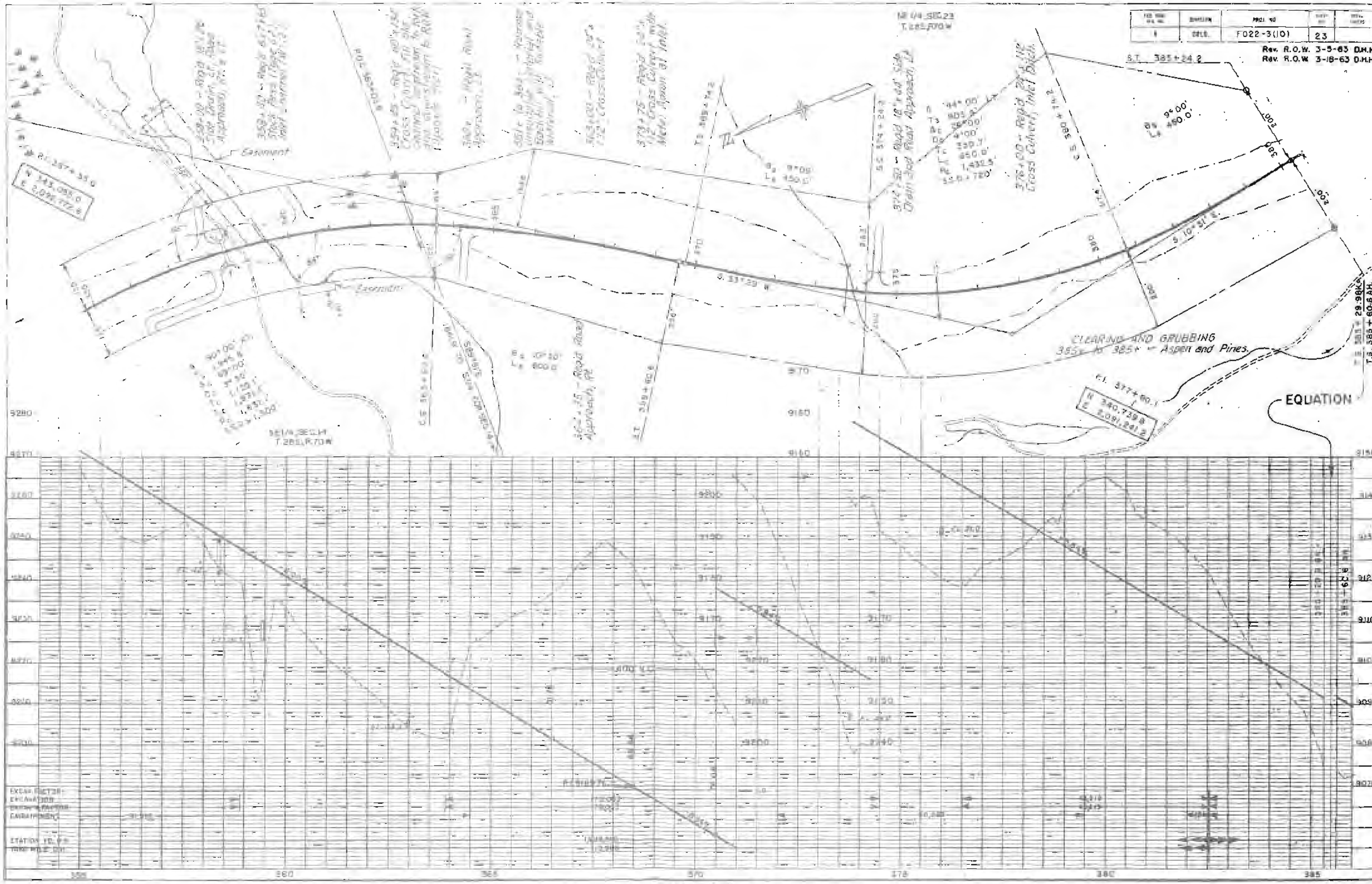
COLORADO DEPARTMENT OF HIGHWAYS

HEADWALLS AND APRONS FOR C.M.P. CULVERTS

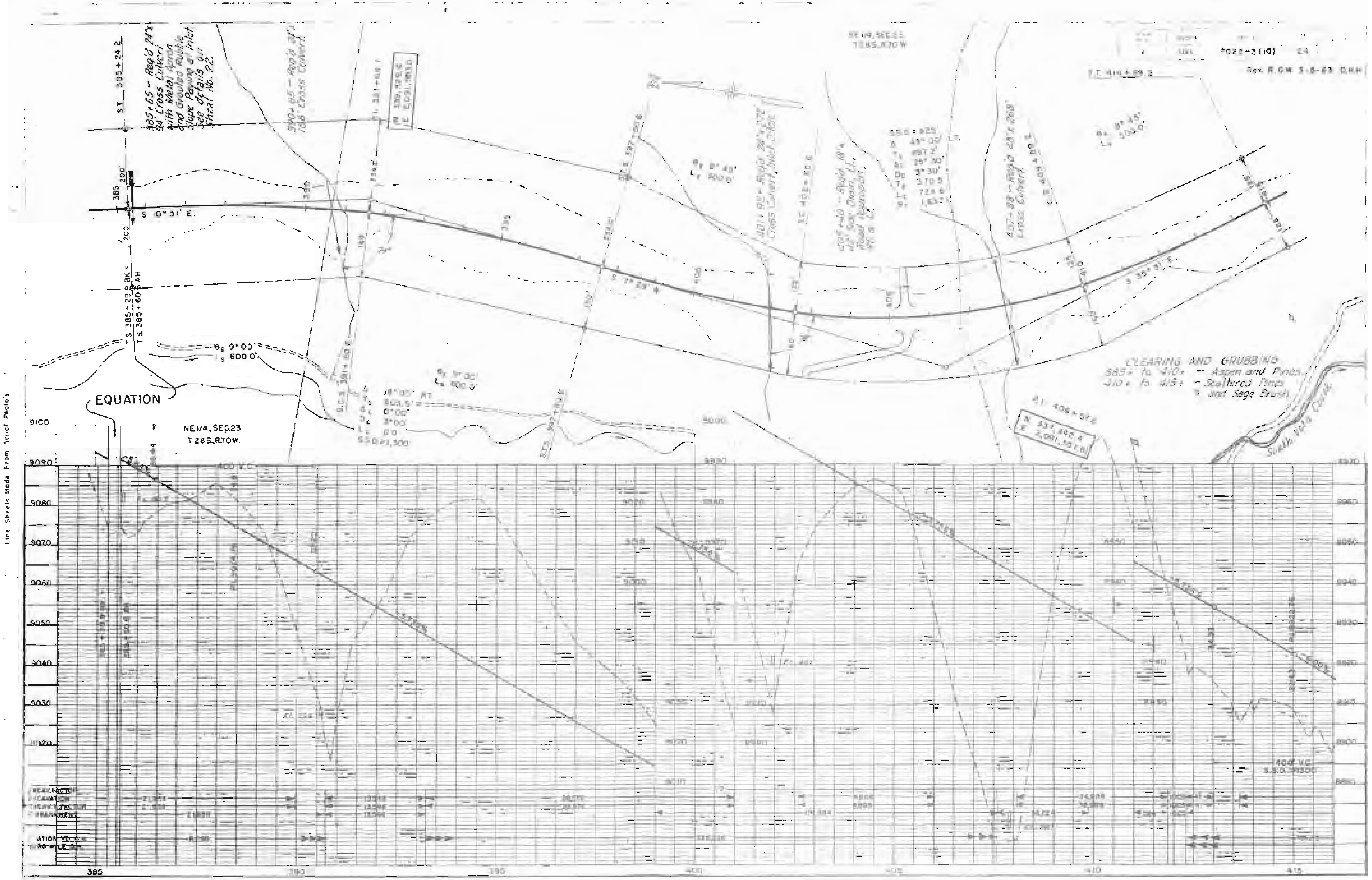
Designed by PSB-BRD | Approved: Bridge Engineer
Made by | Checked by | Date

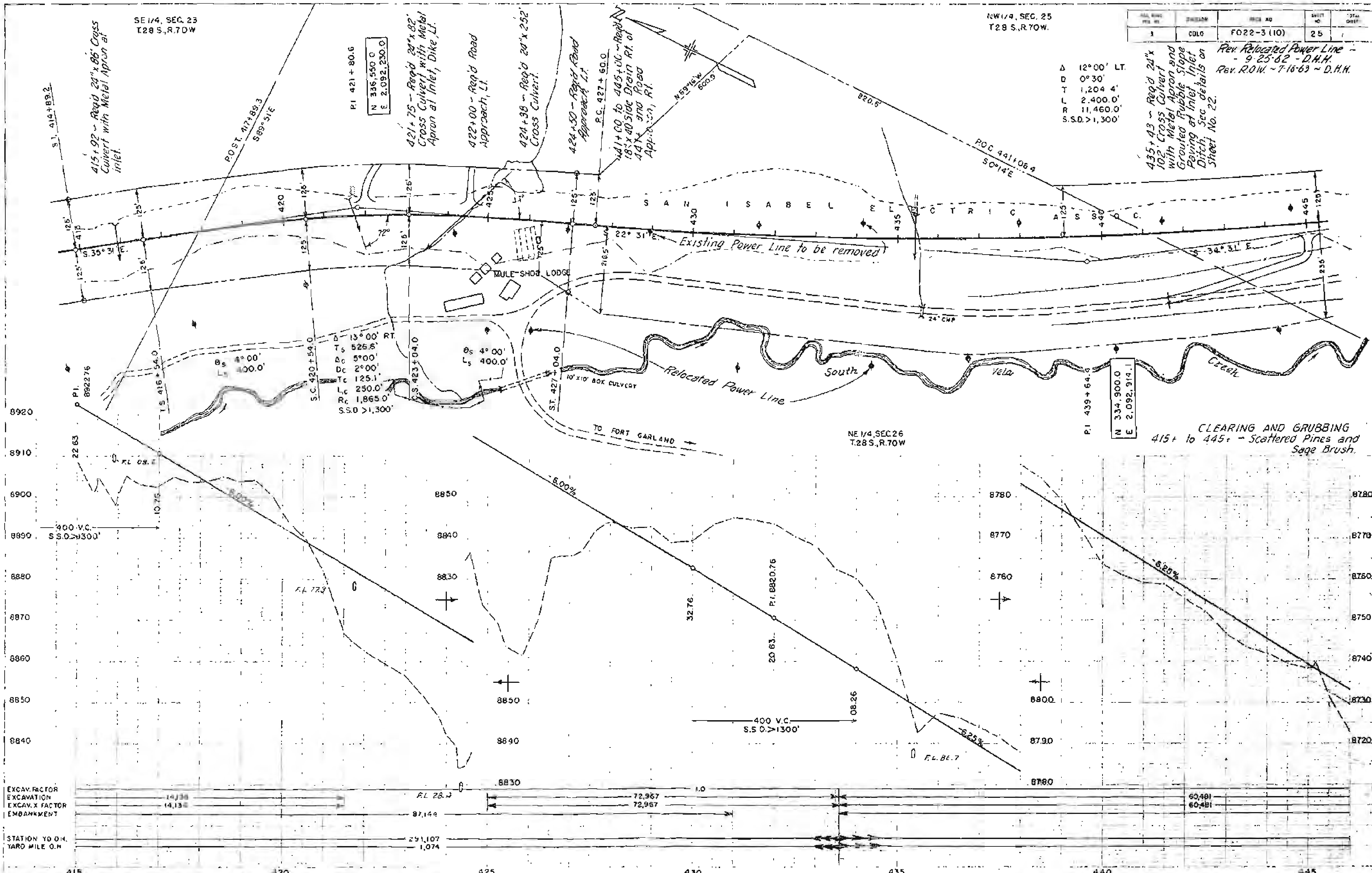
6	COLO.	F 022-3 (10)	22



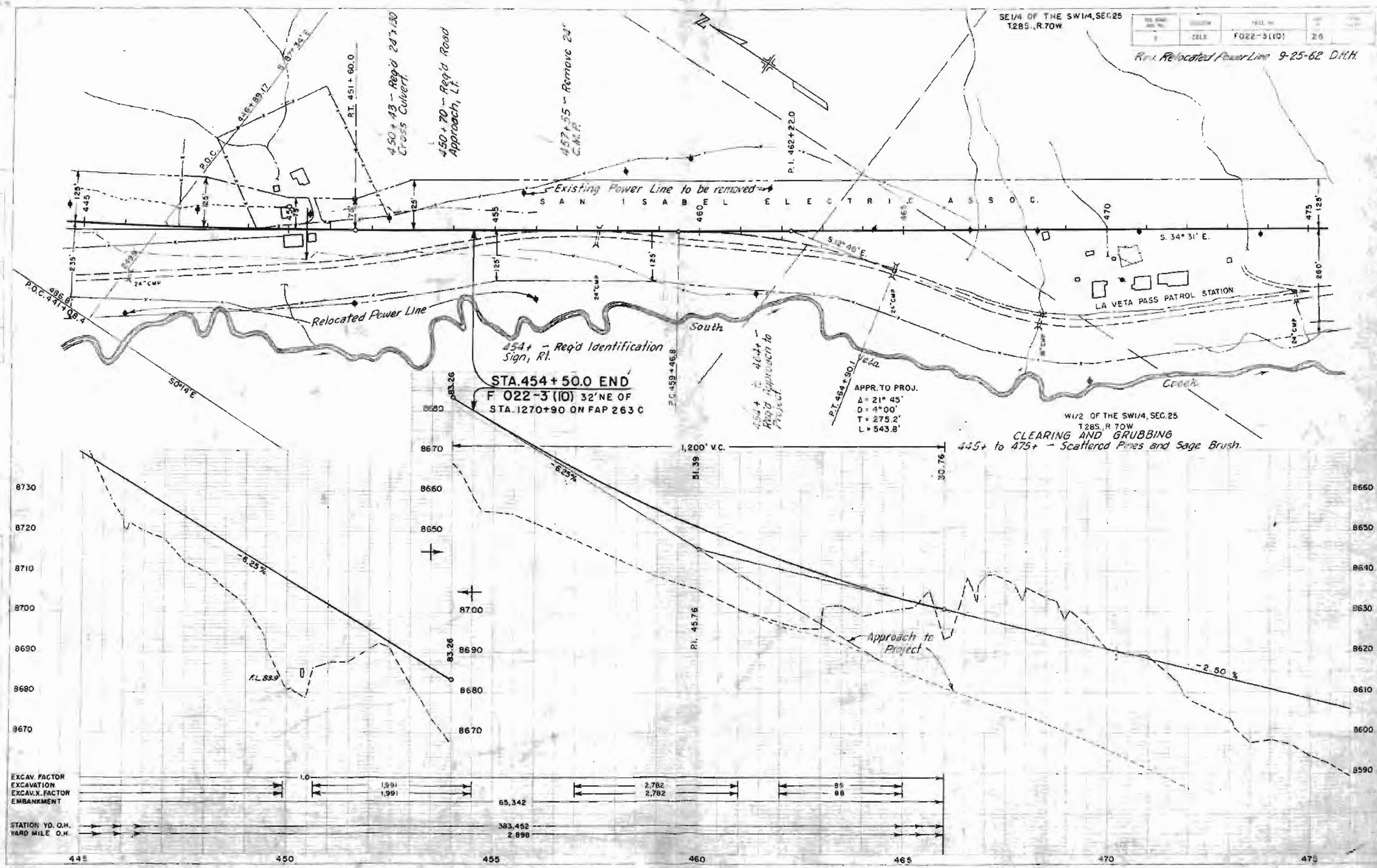


F022-3(10)
23
Rev. R.O.W. 3-5-63 D.H.H.
Rev. R.O.W. 3-18-63 D.H.H.
NE 1/4 SEC.23
T.28S,R70W
SE1/4,SEC.14
T.28S,R70W
S.T. 385+24.2
P.I. 357+35.0
N 343,055.0
E 2,096,772.8
P.I. 377+80.1
N 340,739.8
E 2,091,241.2
Easement
S. 33°20' W.
S. 10°51' E.
θs 9°00'
Ls 450.0'
θs 9°09'
Ls 450.0'
θs 10°30'
Ls 600.0
C.S. 363+62.8
S.T. 369+62.8
T.S. 369+74.2
S.C. 374+24.2
C.S. 380+74.2
376+00 - Read 24" x 118' Cross Culvert, Inlet Ditch
374+50 - Read 18" x 44' Side Drain 3rd Road Approach Lt.
372+75 - Read 24" x 112' Cross Culvert with Note: Apron at Inlet
363+00 - Read 24" x 132' Cross Culvert
362+75 - Read Road Approach Rt.
CLEARING AND GRUBBING
355± to 385± - Aspen and Pines.
EQUATION
T.S. 385+60.6 AH.
9280
9270
9260
9240
9220
9210
9200
9180
9170
9160
9150
9140
9130
9120
9110
9100
9090
9080
9070
600' V.C.
EXCAV. FACTOR
EXCAVATION
EMBANKMENT
STATION YD. P.S.
355
360
365
370
375
380
385


F022-3(10)
24
Rev. R.O.W. 3-8-63 D.R.H.
S.T. 385+24.2
385+65 – Req'd 24"x 94' Cross Culvert with Metal Apron and Grouted Rubble Slope Paving at Inlet. See details on Sheet No. 22.
390+65 – Req'd 24"x 138' Cross Culvert
S 10°31' E.
T.S. 385+29.8 BK = T.S. 385+60.6 AH
EQUATION
θ_s 9°00'
L_s 600.0'
NE 1/4, SEC.23
T 28S, R70W.
SE 1/4, SEC.23
T 28S, R70W.
S 7°29' E
S 35°31' E.
S.S.D. = 825'
T.T. 414+89.2
CLEARING AND GRUBBING
385+ to 410+ – Aspen and Pines
410+ to 415+ – Scattered Pines and Sage Brush
South Veta Creek
400' V.C.
400' V.C.
S.S.D. 39500
9100
9090
9080
9070
9060
9050
9040
9030
9020
385
390
395
400
405
410
415
Line Sheets Made From Aerial Photo's



COLO
F022-3 (10)
25
Rev. Relocated Power Line - 9-25-62 - D.H.H.
Rev. R.O.W. ~ 7-16-63 ~ D.H.H.
SE 1/4, SEC. 23 T.28 S., R.70 W
NW 1/4, SEC. 25 T.28 S., R.70W.
NE 1/4, SEC.26 T.28 S., R.70W
S.T. 414+89.2
415+92 ~ Req'd 24"x 86' Cross Culvert with Metal Apron at Inlet.
P.O.S.T. 417+89.3
S89°51'E
P.I. 421+80.6
N 336,550.0
E 2,092,230.0
421+75 ~ Req'd 24"x 82' Cross Culvert with Metal Apron at Inlet, Dike, Lt.
422+00 ~ Req'd Road Approach, Lt.
424+38 ~ Req'd 24"x 252' Cross Culvert.
424+50 ~ Req'd Road Approach, Lt.
P.C. 427+60.0
N59°16'W 600.9
820.6'
P.O.C. 441+06.4
S0°14'E
Δ 12°00' LT.
D 0°30'
T 1,204.4'
L 2,400.0'
R 11,460.0'
S.S.D. > 1,300'
435+43 ~ Req'd 24"x 102' Cross Culvert with Metal Apron and Grouted Rubble Slope Paving at Inlet. Inlet Ditch, Sec. details on Sheet No. 22.
S.35°31'E.
S. 34°31' E.
22° 31' E.
SAN ISABEL ELECTRIC ASSOC.
Existing Power Line to be removed
MULE SHOE LODGE
24" CMP
Δ 13°00' RT.
T_s 526.6'
Δ_c 5°00'
D_c 2°00'
T_c 125.1'
L_c 250.0'
R_c 1,865.0'
S.S.D. >1,300'
θ_s 4°00'
L_s 400.0'
T.S. 416+54.0
S.C. 420+54.0
C.S. 423+04.0
S.T. 427+04.0
10'X10' BOX CULVERT
Relocated Power Line
South Vela Creek
TO FORT GARLAND
P.I. 439+64.
N 334,900.0
E 2,092,919.1
CLEARING AND GRUBBING
415± to 445± ~ Scattered Pines and Sage Brush.
P.I. 8922.76
400 V.C.
S.S.D.>1300'
-6.00%
P.I. 8820.76
-6.25%
F.L. 17.3
F.L. 26.4
F.L. 86.7
Line Sheets Made From Aerial Photo's
EXCAV. FACTOR
EXCAVATION
EXCAV. X FACTOR
EMBANKMENT
STATION YD. O.H.
YARD MILE O.H.
1.0
14,136
72,967
60,481
87,144
291,107
1,074
415
420
425
430
435
440
445



SE1/4 OF THE SW1/4, SEC.25
T.28S., R.70W
F022-3(10)
26
Rev. Relocated Power Line 9-25-62 D.H.H.
446+89.17
P.O.C.
P.T. 451+60.0
450+43 – Req'd 24"x130 Cross Culvert.
450+70 – Req'd Road Approach, Lt.
457+55 – Remove 24" C.M.P.
P.I. 462+22.0
Existing Power Line to be removed
SAN ISABEL ELECTRIC ASSOC.
S. 34° 31' E.
LA VETA PASS PATROL STATION
24" CMP
P.O.C. 441+08.4
Relocated Power Line
50°14'E
454+ – Req'd Identification Sign, Rt.
South
Veta
Creek
STA. 454+50.0 END
F 022-3 (10) 32' NE OF
STA. 1270+90 ON FAP 263 C
P.C. 459+46.8
454+ & 464+ – Req'd Approach to Project.
P.T. 464+90.1
APPR. TO PROJ.
Δ = 21° 45'
D = 4° 00'
T = 275.2'
L = 543.8'
W1/2 OF THE SW1/4, SEC.25
T.28S., R.70W
CLEARING AND GRUBBING
445+ to 475+ – Scattered Pines and Sage Brush.
1,200' V.C.
-6.25%
-2.50 %
P.I. 45.76
51.39
30.76
83.26
F.L. 83.9
Approach to Project
EXCAV. FACTOR
EXCAVATION
EXCAV. X. FACTOR
EMBANKMENT
STATION YD. O.H.
YARD MILE O.H.
1.0
1,991
2,782
89
88
65,342
383,452
2,898
445
450
455
460
465
470
475
Line Sheets Made From Aerial Photo's