

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S-SG 0046(3)	1	

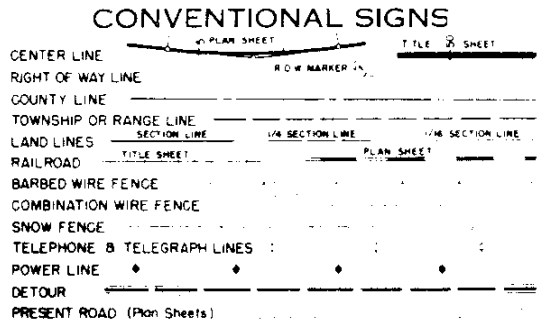
Rev. 3-11-64 R.S.M.

COLORADO DEPARTMENT OF HIGHWAYS

PLAN AND PROFILE OF PROPOSED FEDERAL AID PROJECT NO. S-SG 0046 (3) STATE HIGHWAY NO. 7 WELD & ADAMS COUNTIES

INDEX OF SHEETS

- SHEET NO. 1. SKETCH MAP TITLE PAGE AND TABULATION OF LENGTH AND DESIGN DATA
 2. TYPICAL SECTION AND GENERAL NOTES
 3. SUMMARY OF APPROXIMATE QUANTITIES
 4-5. STRUCTURE QUANTITIES
 6. SUBBASE PLAN, SURFACING PLAN, DELINEATORS, R.O.W. MARKERS, SNOW FENCE AND FENCING REQUIREMENTS.
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 85-88. CROSS SECTIONS FOR CROSS ROAD, STA. 137+

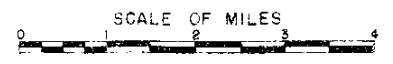
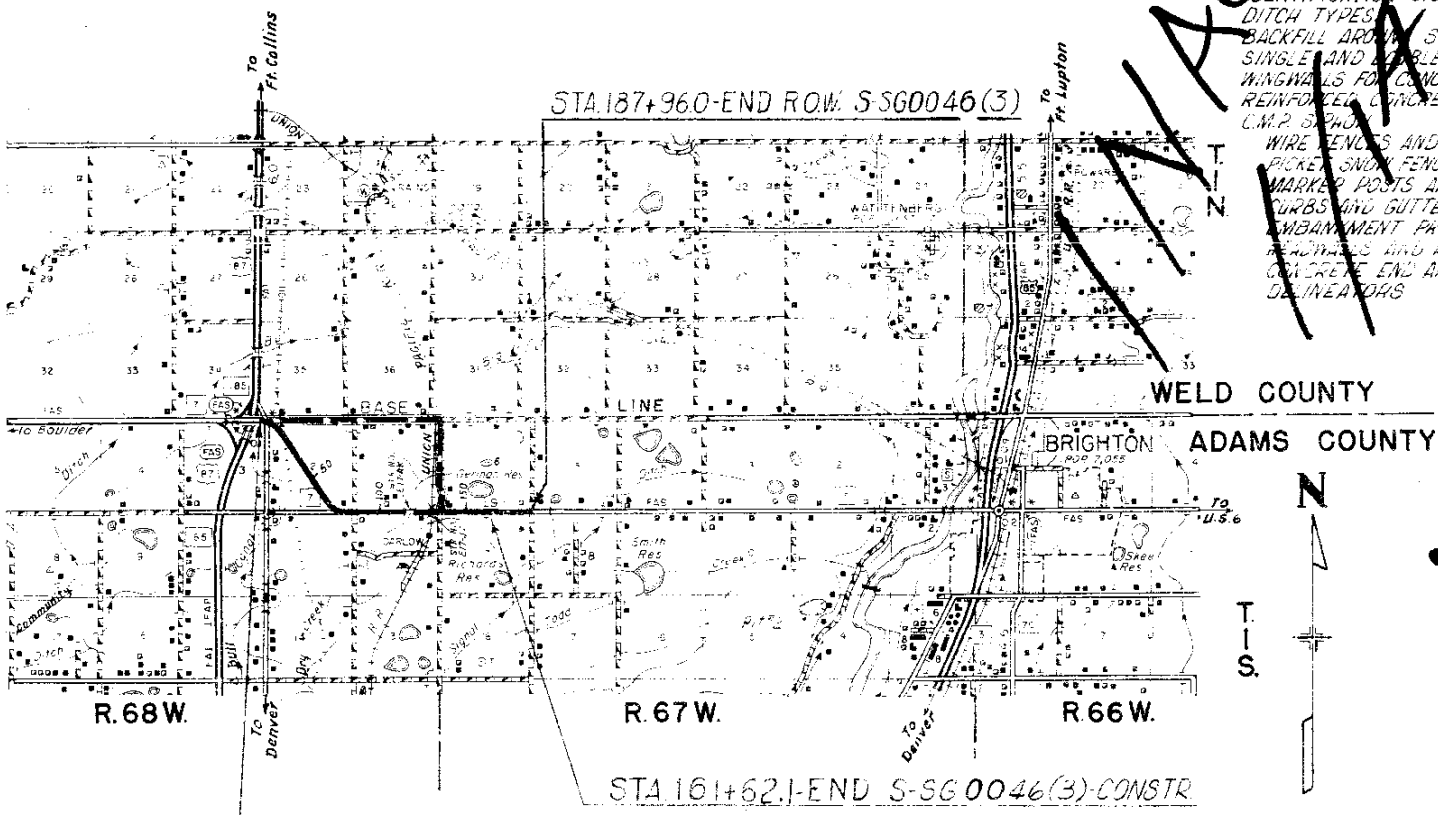


SCALES OF ORIGINAL DRAWINGS
 ON PLAN 1" = 100' HORIZONTAL
 ON PROFILE 1" = 10' VERTICAL
 GRADE LINE ON PROFILE IS SHOWN AS GRADE OF FINISHED ROAD
 GROSS LENGTH OF PROJECT } 15,723.5 FT = 2.973 Miles
 NET LENGTH OF PROJECT }

- "M.I.D." STANDARDS
 SUPERELEVATION AND WIDENING OF CURVES - CROWNED HIGHWAYS M-I-D Rev. 2-3-64
 APPROACH ROADS, FLARING, SLOPE TREATMENT, BRIDGES & CREST WIDENING M-2-A Rev. 2-3-64
 LETTERS AND FIGURES FOR STRUCTURE NUMBERS M-5-A Rev. 1-31-64
 CONSTRUCTION TRAFFIC SIGNS (2 SHEETS) M-6-B Rev. 1-31-64
 IDENTIFICATION SIGNS M-6-CA Jan. 31, 64
 DITCH TYPES M-13-A Rev. 2-3-64
 BACKFILL AND STRUCTURES M-16-A Rev. 1-31-64
 SINGLE AND DOUBLE CONCRETE BOX CULVERTS M-46-C Rev. 2-11-64
 MANHOLES FOR CONCRETE BOX CULVERTS M-46-E Rev. 2-11-64
 REINFORCED CONCRETE PIPE M-52-A Rev. 2-3-64
 C.M.P. S.P.H. M-55-A Rev. 2-14-64
 WIRE FENCES AND GATES (2 SHEETS) M-76-A Rev. 2-3-64
 PICKET SNOW FENCE M-77-A Rev. 2-14-64
 MARKER POSTS AND BENCH MARKS M-81-A Rev. 1-31-64
 CURBS AND GUTTERS M-84-A Rev. 2-3-64
 ALIGNMENT PROTECTORS M-93-A Rev. 2-14-64
 HEADWALLS AND APPROXS FOR C.M.P. CULVERTS M-95-A Rev. 2-3-64
 CONCRETE END AND ANGLE SECTIONS M-102-A Rev. 2-11-64
 DELINEATORS (2 Sheets) M-192-A Jan. 28-64

TABULATION OF LENGTH AND DESIGN DATA

STATION	ROADWAY	MAJOR STRUCT'S		R.O.W.
	LIN. FT.	LIN. FT.	LOADING	LIN. FT.
4+38.6-BEG S-SG 0046(3) = 16+06.6 END CROSS ROAD OF I-25-3(4) 4+52-BEG. R.O.W. S-SG 0046(3)	11,532.4			
113+71.0 Big Dry Creek - Str. No. E-17-AR 120+33.0		62.0	120-816	
135+79.8 UPRR. I. E. 7-1-52	4,129.1	*	CULVERTS E-1-5	
161+62.1-END S-SG 0046(3) CONSTRUCTION				
187+96.0-END R.O.W. S-SG 0046(3)				
TOTAL	15,661.5	62.0		18,357.4
SUMMARY		LIN. FT.	MILES	
ROADWAY		15,661.5	2.966	
MAJOR STRUCTURE		62.0	0.012	
S-SG 0046(3) (NET & GROSS)		15,723.5	2.978	
S-SG 0046(3) R.O.W.		18,357.4	3.477	
* No R.O.W. length (86' portion) DESIGN DATA				
Maximum Degree of Curve		4°00'		
Maximum Grade		2.5999%		
Minimum S.E.D.-Horizontal		900'		
Minimum S.E.D.-Vertical		580'		
Maximum Design Speed		65 MPH		



SEE SPECIAL PROVISIONS FOR NOTICE TO BIDDERS

COLORADO
DEPARTMENT OF HIGHWAYS

APPROVED: *[Signature]* 12-12-63
CHIEF ENGINEER DATE

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

APPROVED: _____ DATE _____
DIVISION ENGINEER

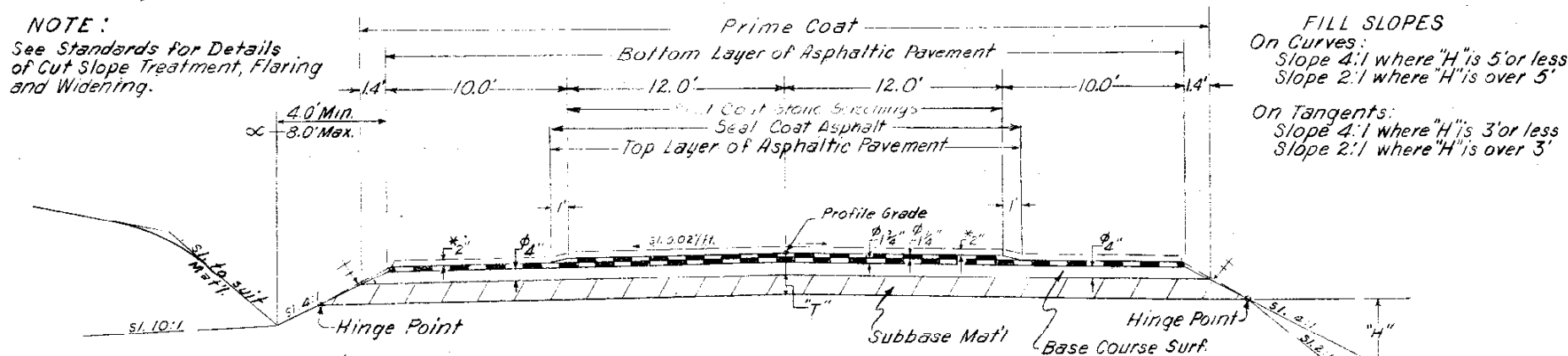
R. S. M.

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	S-5G 0046(3)	2

TYPICAL CROSS SECTION OF IMPROVEMENT

NOTE:

See Standards for Details of Cut Slope Treatment, Flaring and Widening.



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.

"T" - Design Thickness of Subbase Mat'l. Material above the subgrade is to be constructed of Subbase Material. Locations designated estimated quantities involved and thickness of material required, are tabulated in the Subbase material plan.

Surfacing Materials shall be placed in separate courses at the following rates per 100 lin. ft. of roadway:

Plant Mixed Asphaltic Surf. (Top Layer)	19 tons
" (Bottom Layer)	47 tons
Base Course Surfacing	101 tons

∅ - Approximate thickness.

* - Asphaltic Pavement - Future Construction.

X - Contractor will be required to blade Slope Material to this line after completion of Paving Operation.

∞ - Used for Preliminary Quantities

GENERAL NOTES

This project is to be constructed in conformity with the Standard Specifications of the Colorado Department of Highways, adopted January 1, 1958.

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

All poles and/or underground utilities encroaching on construction are to be moved by the owners.

Approximate location and quantities involved in construction of intercepting ditches, are tabulated on Summary of Earthwork Quantities sheet.

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 tonnage shown on plans.

During construction of this project, traffic will use the present traveled roadway and Detour as shown on Title Sheet, plus Temporary Detour Sta. 123+ (Sh. # 24)

The Force Account item Clearing of Building Sites, including Removal of Foundation and Appurtenances, 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. 82+ Lt., Sta. 107+ Lt., Sta. 119+ Rt., Sta. 138+ Lt.

It is estimated that old road is to be obliterated at the following locations: Sta. 8+ to Sta. 11+ Lt., Sta. 116+ to Sta. 123+ (Detour), Lt.

For preliminary plan quantities of Asphaltic Road Materials, the following rates of application were used:

PRIME COAT	MC	@ 0.40 Gals. per Sq. Yd.
PAVING ASPHALT		@ --- % by weight of Mix (Source of Plant Mix Undesignated)
SEAL COAT	RC	@ 0.28 Gals. per Sq. Yd.
STONE SCREENINGS		@ 2.5 Lbs. per Sq. Yd.

Rate of application and grade of Asphaltic Material shall be as determined by the Engineer at time of application.

Liquid Asphaltic Road Material application methods which result in discoloration of Concrete Structures, Pavement and Curbs & Gutters, will not be permitted.

All Side Approach Roads shall be primed and paved with 1 3/4" of Asphaltic Surfacing to a distance out from edge of Asphaltic Surfacing as follows:

Field Approaches	4 ft.
All other Approaches	50' or to the R.O.W. Line whichever is less.

A Tack coat as described in paragraph 32 - 4.4 may be required.

Present Guard Posts interfering with construction are to be removed by State Forces

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It is estimated that material for Subbase and/or Surfacing for the Project is available in the vicinity of the Pits indicated in the following tabulations. Estimated quantities involved in these operations are shown below.
Alteration of the Subbase and/or Surfacing Plans as here outlined will be allowed only on written permission from the Department.

SUBBASE PLAN

MATERIAL TO BE PLACED	SOURCE	AVAILABLE	THICKNESS APPROX INCHES	QUANTITY		OVERHAUL TON MILES
				CLASS 2	TONS	
4+386 ~ 119+71.0	Pit No. 2	60,000 CU Yds.	12	39,324	334,080	
119+71.0 ~ 120+33.0 (Bridge)	34,900 Ft. to Sta. 161+62.1					
120+33.0 ~ 161+62.1	"R" = 70+		12	14,085	98,609	
Estimated For:						
Approach to Proj. Sta. 161+					170	1,122
Intersection, Sta. 11±					760	7,206
Intersection, Sta. 73±					824	6,814
County Road, 137+20					4,407	31,924
TOTAL					59,570	479,761

⊕ Based on Design Curve "D"

SURFACING PLAN

MATERIAL TO BE PLACED	SOURCE	AVAIL.	QUANTITY		OVERHAUL	
			TONS USED		TON MILES	
			PLANT MIX	BASE COURSE	PLANT MIX	BASE COURSE
4+386 ~ 119+71.0	Plant Mix Undesignated Source		7,611	11,647		98,950
119+71.0 ~ 120+33.0 (Bridge)						
120+33.0 ~ 161+62.1	Base Course Pit No. 2		2,726	4,172		29,208
Estimated For:						
Approach to Proj. Sta. 4+				66	101	369
Approach to Proj. Sta. 161+				33	51	337
Intersection, Sta. 11±				145	251	2,380
Intersection, Sta. 73±				360	499	4,126
Intersection, Sta. 73±-Island				120		
County Road, 137+20				56	1,265	9,155
From Structure Quantities				115	570	4,599
Missing at Bridge Approaches, (7. p. Layer)				8		
TOTAL				11,180	18,559	143,134

DELINEATORS

STATION	SIDE	SPACING	TYPE NO.		
			I	II	III
7+33	Lt.	4 Curve	1		
7+33 ~ 14+50	Lt.	Intersection		18	1
7+33 ~ 24+77	Rt.	4 Curve	10		
15+05 ~ 24+77	Lt.	4 Curve	5		
25+77 ~ 56+77	Lt. & Rt.	800'	8		
57+85 ~ 67+52	Lt.	4 Curve	3		
60+85 ~ 72+62	Rt.	4 Curve	7		
69+00 ~ 72+00	Lt.	Rising Lanes		3	1
73+62 ~ 84+85	Lt.	4 Curve	6		
73+75 ~ 77+50	Rt.	Island		3	2
78+15 ~ 84+85	Rt.	4 Curve			
88+85 ~ 117+95	Lt. & Rt.	500'			
119+71 ~ 120+33	Lt. & Rt.	Bridge			2
124+33 ~ 160+33	Lt. & Rt.	800'	10		
135+80	Lt. & Rt.	Underpass			
TOTAL			61	24	8

R.O.W. MARKERS

STATION	SIDE	NO.
S.C. 7+38.6	Lt.	1
13+00	Lt.	1
S.T. 21+10.9	Lt. & Rt.	2
42+81	Lt. & Rt.	2
T.S. 64+51.5	Lt. & Rt.	2
S.T. 81+18.8	Lt. & Rt.	2
107+50	Lt. & Rt.	2
133+90	Lt. & Rt.	2
161+62.1	Lt. & Rt.	2
TOTAL		
		16

SNOW FENCING

STATION	SIDE	BUILD FENCE LIN. FT.
54+50 ~ 58+50	Lt.	410
132+60 ~ 135+40	Lt.	30
137+30 ~ 141+00	Lt.	370
44+50 ~ 48+50	Rt.	400
54+00 ~ 57+50	Rt.	350
132+00 ~ 135+10	Rt.	310
138+40 ~ 144+50	Rt.	610
TOTAL		
		2,720

FENCING REQUIREMENTS

STATION	SIDE	REMOVE FENCE LIN. FT.	BUILD FENCE		GATES	
			BARBED WIRE LIN. FT.	COMB. WIRE LIN. FT.	BARBED WIRE EA.	DRIVE-WAY EA.
6+10 ~ 7+00	Lt.	120				
7+10 ~ 13+00	X	760				
32+03	X	155				
34+56	X	175				
42+03	X	190				
46+85	X	260				
72+50 ~ 78+60	X	660				
79+90 ~ 81+60	Lt.	215				
76+30 ~ 82+85	Rt.	715				
83+50 ~ 109+70	Lt.	2,705				
110+00 ~ 136+70	Lt.	2,850				
83+50 ~ 120+35	Rt.	3,820				
120+50 ~ 136+50	Rt.	1,650				
137+30 ~ 161+62	Rt.	2,430				
148+50 ~ 161+62	Lt.	1,440				
County Rd. 137+20						
0+30 ~ 6+00 - South	East	585				
3+20 ~ 7+00 - North	East	405				
0+30 ~ 3+00 - South	West	600				
0+30 ~ 2+30 - North	West	330				
6+10 ~ 7+00	Lt.		100			
13+00 ~ 33+50	Lt.		2,130			
33+50 ~ 79+90	Lt.		4,815			
79+90 ~ 83+00	Lt.			300		
83+30 ~ 109+95	Lt.			2,705		
110+04 ~ 120+	Lt.			980		
120+ ~ 135+50	Lt.		1,560			
138+40 ~ 161+62	Lt.		2,325			
7+10 ~ 33+50	Rt.		2,410			
33+50 ~ 72+50	Rt.		4,040			
76+40 ~ 83+00	Rt.		665			
83+50 ~ 120+	Rt.		3,640			
120+ ~ 135+	Rt.		1,500			
138+40 ~ 161+62	Rt.		2,310			
Count. Rd. 137+20						
0+75 ~ 6+00 - South	East		545			
1+50 ~ 7+00 - North	East		630			
0+65 ~ 3+00 - South	West		440			
0+65 ~ 2+30 - North	West		260			
7+00	Lt.					1
32+10	Lt.					1
121+54	Lt.					1
131+39	Lt.					1
155+27	Lt.					1
157+12	Lt.					1
31+85	Rt.					1
44+	Rt.					1
109+94	Rt.					1
117+36	Rt.					1
122+47	Rt.					1
130+76	Rt.					1
156+30	Rt.					1
157+65	Rt.					1
TOTAL			20,065	27,370	3,985	

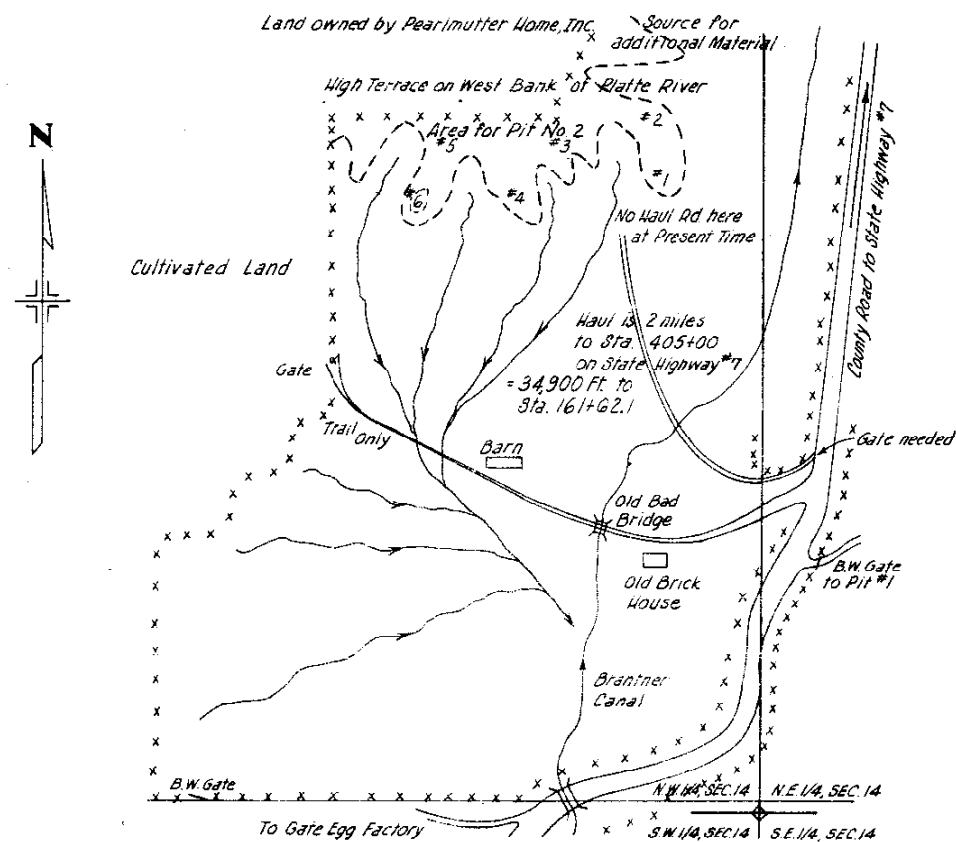
It is estimated that 58 Corner and/or Line Brace Posts and 33 End Posts will be required.

PIT NO. 2

PIT LOCATION

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	COLORADO	3-SG 0046(3)	7	

LOCATION: N 1/2 of NW 1/4, Sec. 14, T. 18, R. 67 W
 OWNER : R. C. Nauman & Dr. C. R. Greenhalgh,
 6020 So. Broadway, Littleton, Colorado.
 QUANTITY AVAILABLE: 60,000 Cu. Yds.
 HAUL DISTANCE: 34,900 Ft. to Sta. 161+62.1
 PROPOSED USE: Base Course & Subbase
 ESTIMATED FOR STRIPPING: 25,000 Cu. Yds.



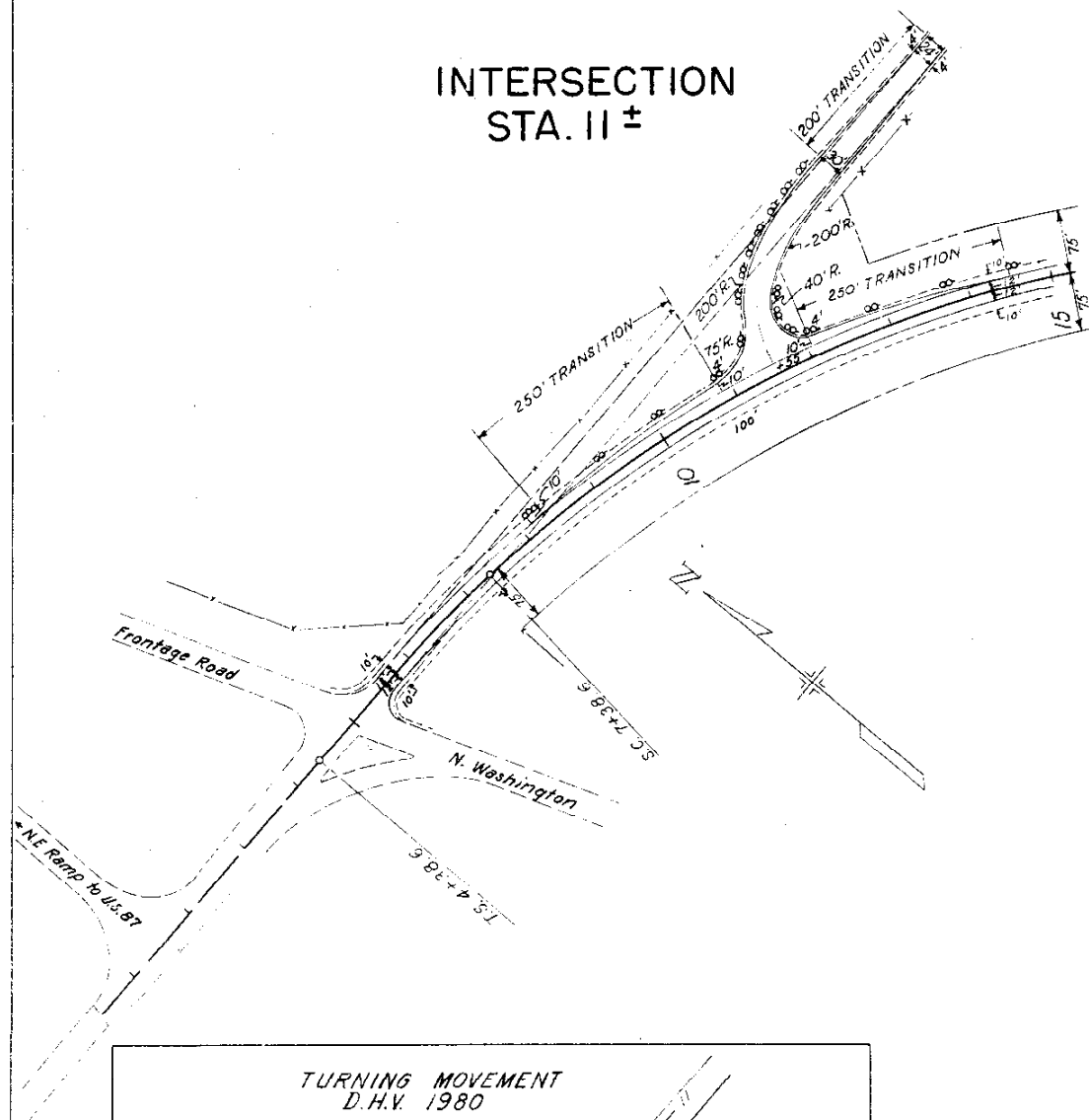
LOG OF PIT - SAMPLE NO. 2823

TEST NO.	DEPTH	DESCRIPTION
1	0 - 6.0'	Overburden Sim #2
1A	6.0' - 14.0'	Sand & Gravel Sim #2
1B	14.0' - 19.0'	Mixture of Sand & Clayey shale particles.
2	0' - 7.0'	Overburden-possible source of filler
2A	7.0' - 12.4'	Sample of S & G. Too coarse to drill deeper.
3	0' - 5.0'	Overburden Sim #2
3A	5.0' - 10.4'	S & G plus approx 20% OB due to auger action
4	0' - 4.0'	S & G mixed with a calcareous silt.
4A	4.0' - 8.4'	S & G plus approx 20% OB due to auger action
5	0' - 4.0'	Overburden
5A	4.0' - 12.4'	Clean sand but sample will contain approx 20% OB due to auger action.
6	0 - 6.4'	Clean S & G

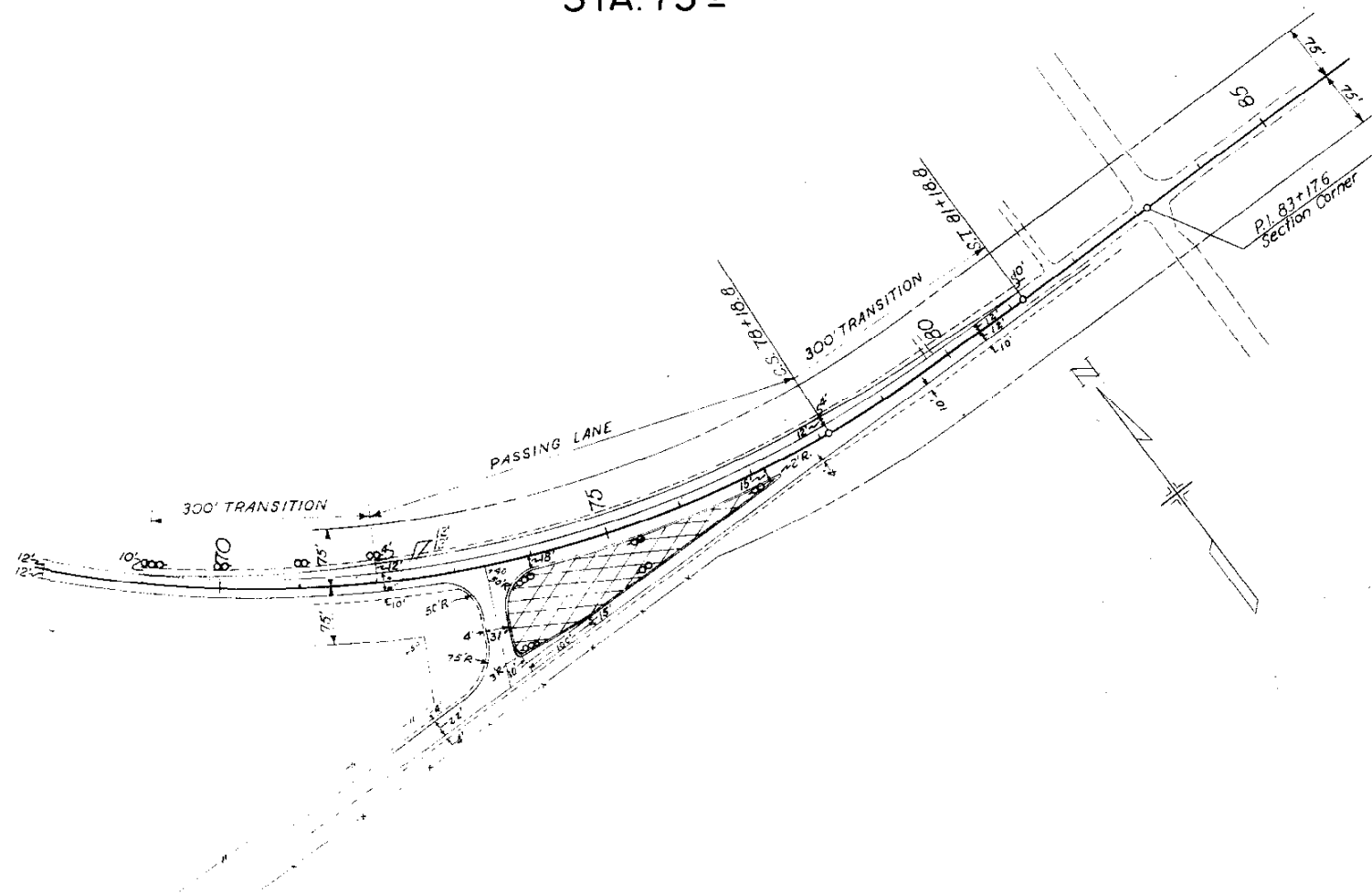
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S-56 0046(3)	8	

Rev. Turning Movement 5-11-64 R.S.M.

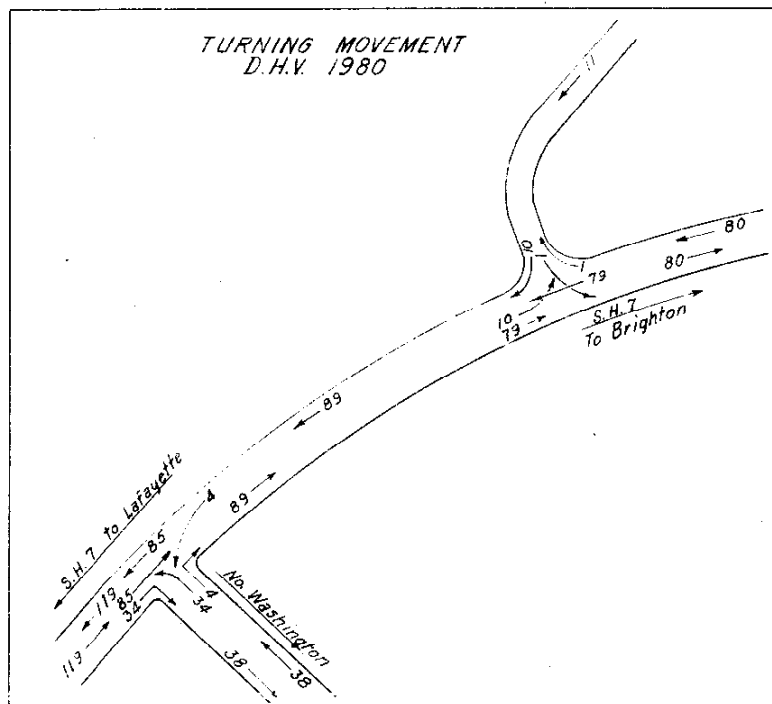
INTERSECTION STA. 11 ±



INTERSECTION STA. 73 ±



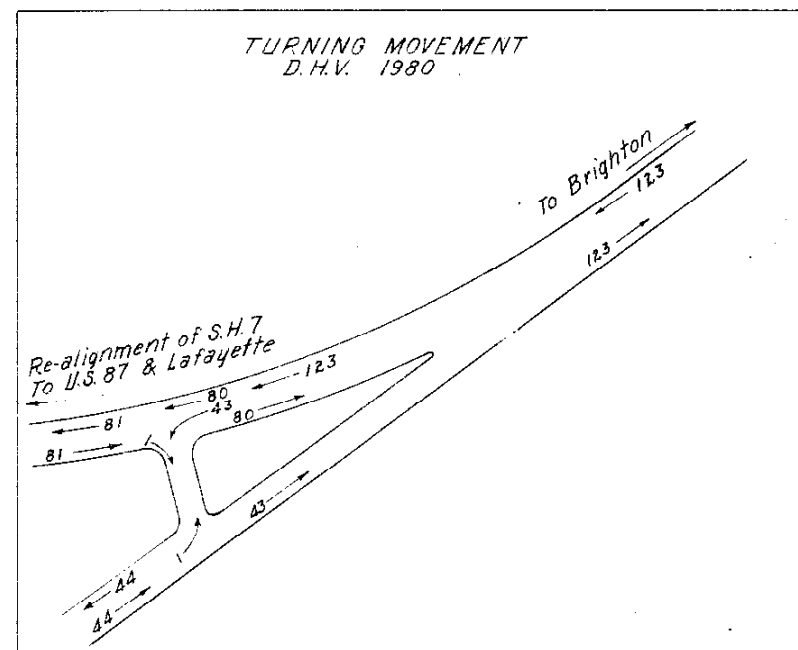
TURNING MOVEMENT
D.H.V. 1980



LEGEND

- Normal Edge of Pavement
- Shoulder Edge
- Right of Way
- Curbed Island
- Delimiters
- Dimensions at Curbed Island

TURNING MOVEMENT
D.H.V. 1980

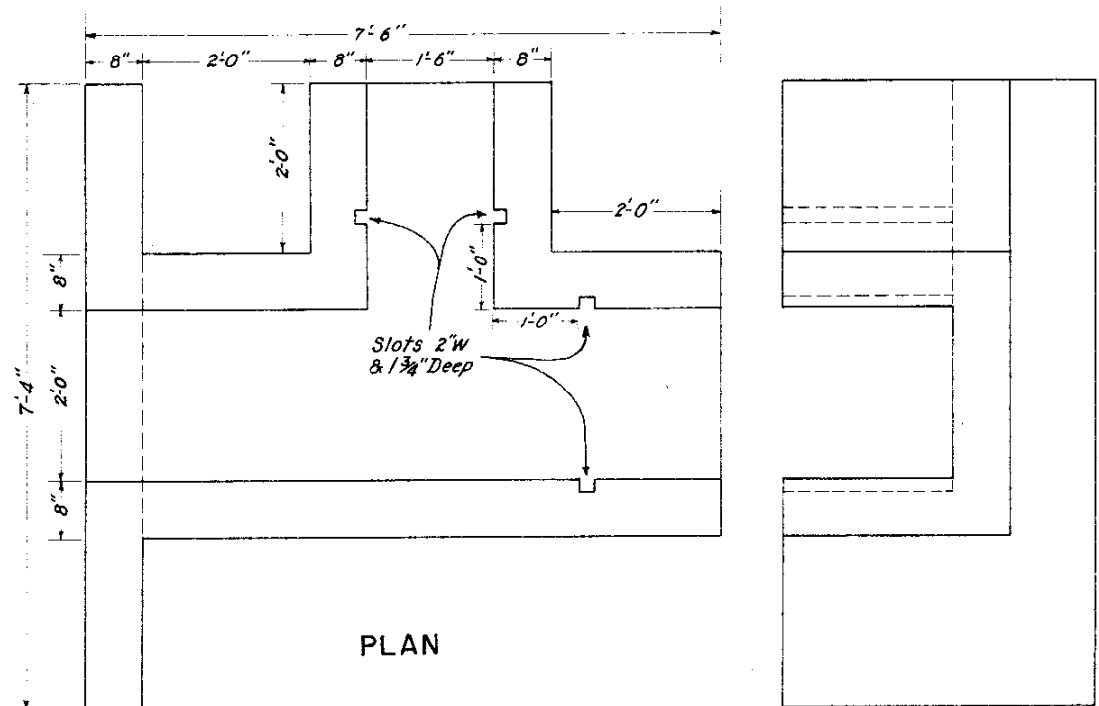


CONCRETE DIVISION BOX AND CONCRETE DROP BOXES

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S-SG 2046(3)	9	

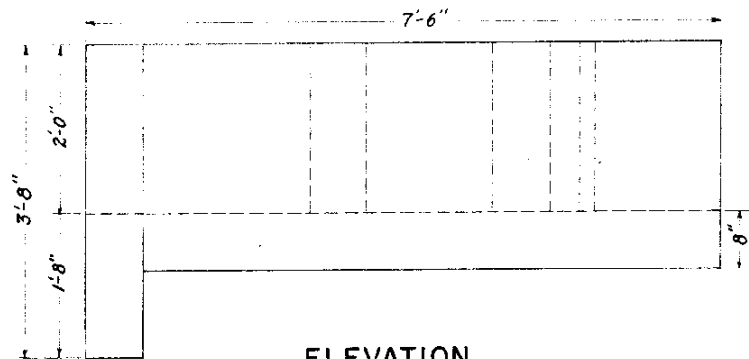
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DIVISION BOX
 STA. 41+, RT.
 STA. 83+, RT.



PLAN

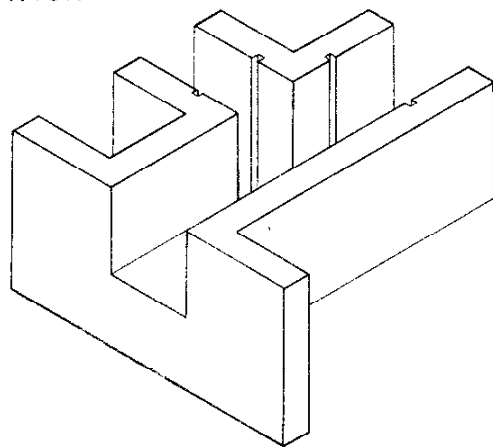
END ELEVATION



ELEVATION

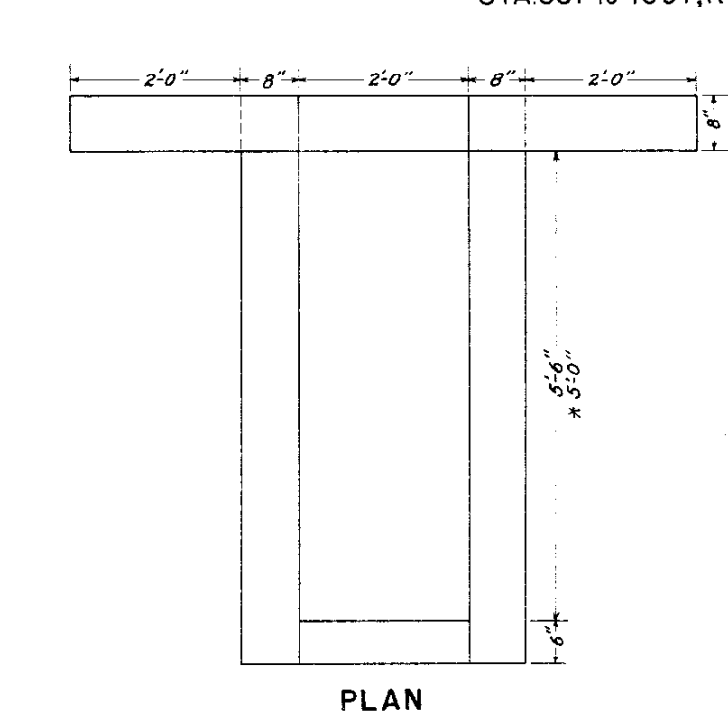
2.06 Cu. Yds. Concrete

NOTE:
 Division Outlet on Rt. Side
 of Box, Sta. 83+, Rt.

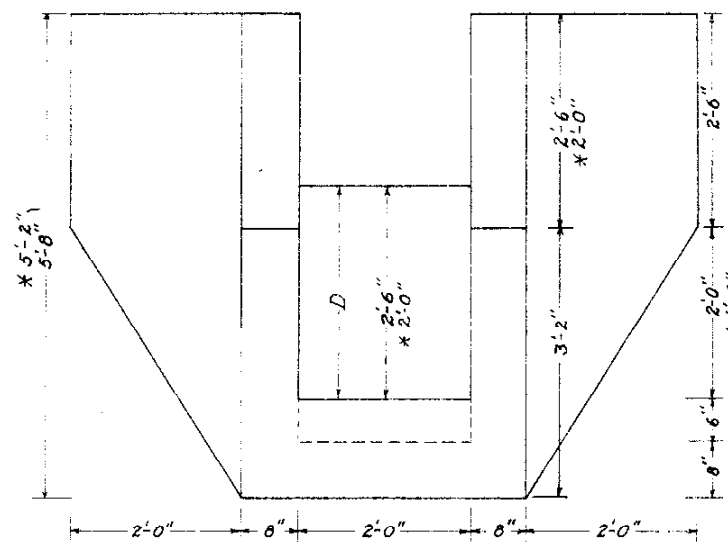


PICTORIAL VIEW

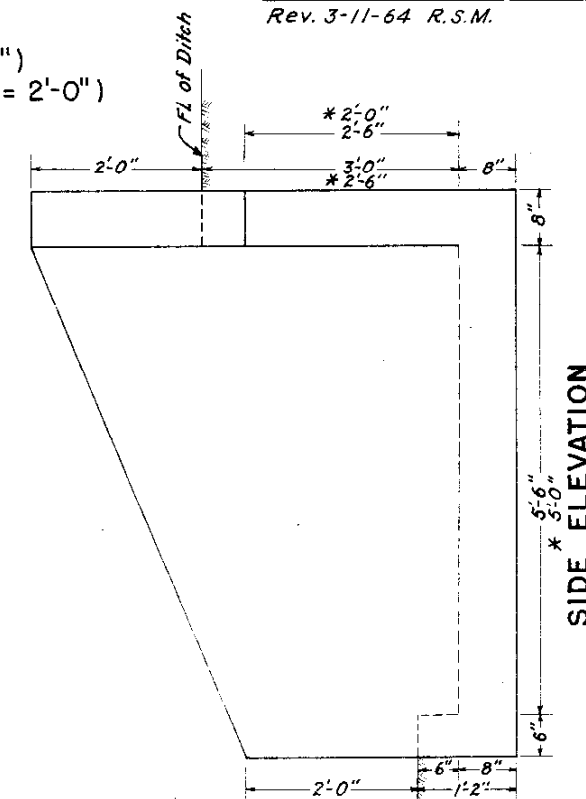
DROP BOXES
 STA. 42+, RT. (D= 2'-6")
 STA. 83+ to 109+, RT. (D= 2'-0")



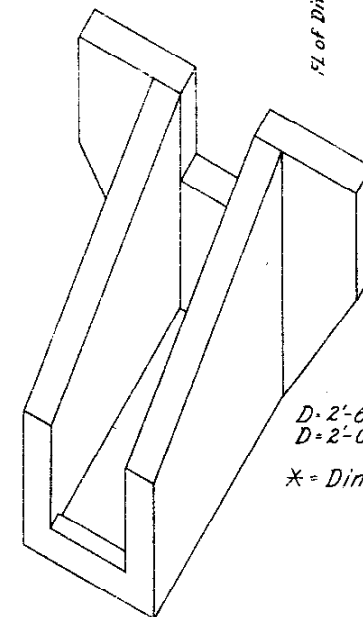
PLAN



ELEVATION



SIDE ELEVATION



PICTORIAL VIEW

D= 2'-6" - 2.39 Cu. Yds. Concrete
 D= 2'-0" - 2.14 " " "
 * = Dimensions for (D=2'-0")

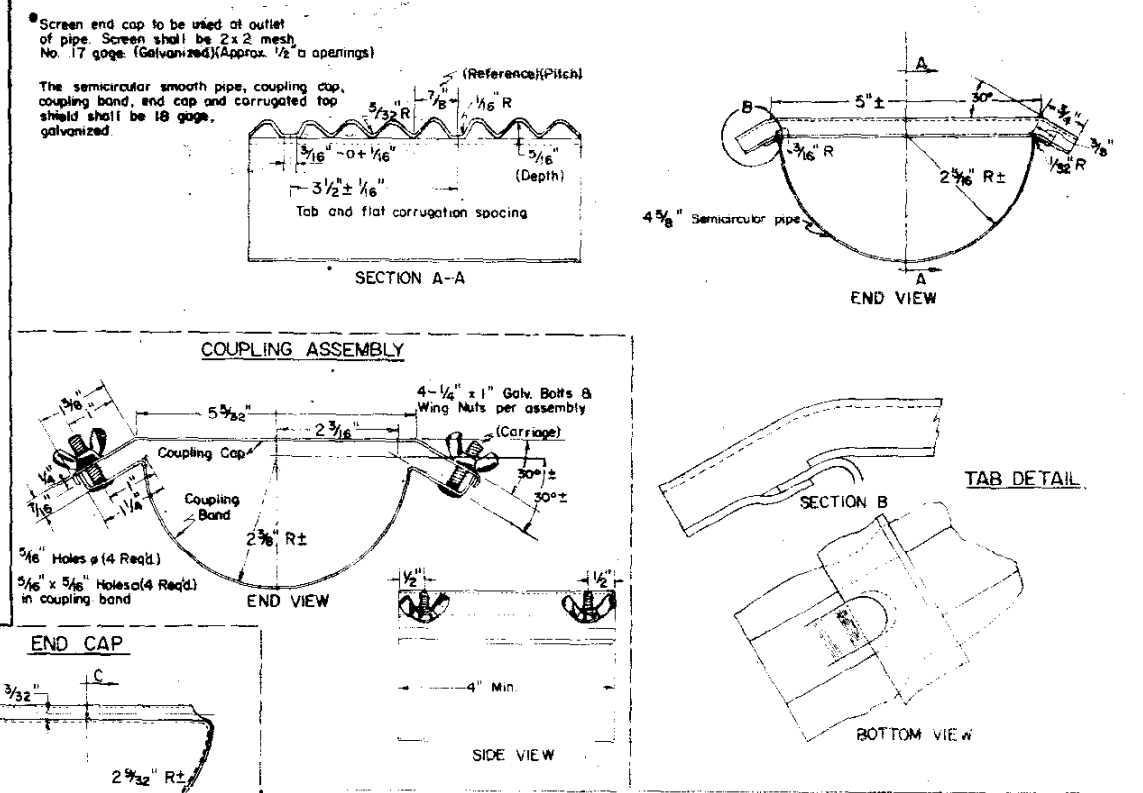
ASPHALTIC SHOULDER ROLL AND METAL EMBANKMENT PROTECTORS

FEDERAL ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S-560046(3)	10	

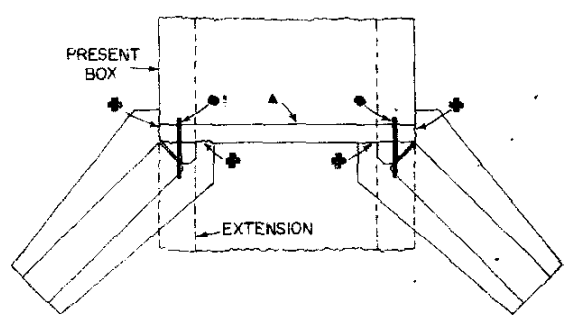
LOCATION	SIDE	UNCLASS. STRUCT. EXCAV.		CONCRETE CLASS A	CORR. METAL CULV. PIPE LIN. FT.	ASPHALTIC SHOULDER ROLL LIN. FT.	METAL EMBANKMENT PROTECTORS TYPE 3 EACH
		MISC.	CU. YDS.				
		CU. YDS.	CU. YDS.	12"	12"		
27+00	Lt.	1		0.40	10		1
27+00 ~ 31+60	Lt.					460	
32+20	Lt.	2		0.40	22		1
32+20 ~ 36+50	Lt.					430	
127+00	Lt.	1		0.40	10		1
127+00 ~ 131+20	Lt.					420	
27+50	Rt.	2		0.40	14		1
27+50 ~ 31+60	Rt.					410	
32+20	Rt.	2		0.40	22		1
32+20 ~ 35+00	Rt.					280	
127+00	Rt.	1		0.40	10		1
127+00 ~ 130+40	Rt.					340	
TOTALS			9	2.40	88	2340 Lin. Ft. = 36 Tons	6

Totals shown in Structure Quantities

ACCEPTABLE ALTERNATE PIPE FOR UNDERDRAIN

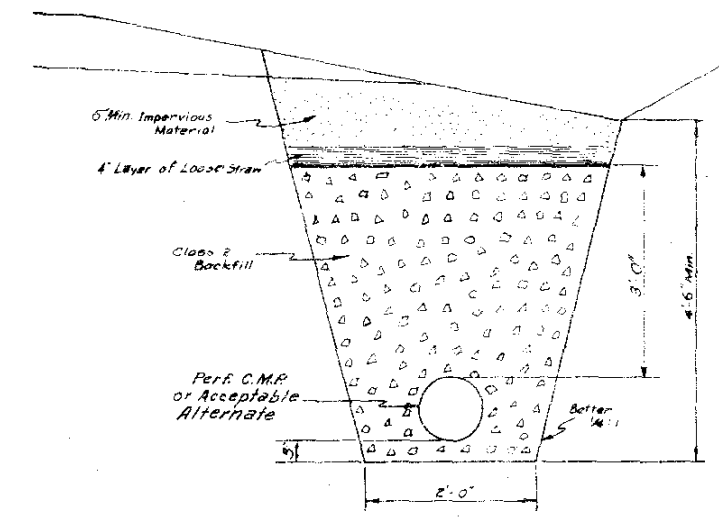


DETAIL FOR HEADWALL REMOVAL



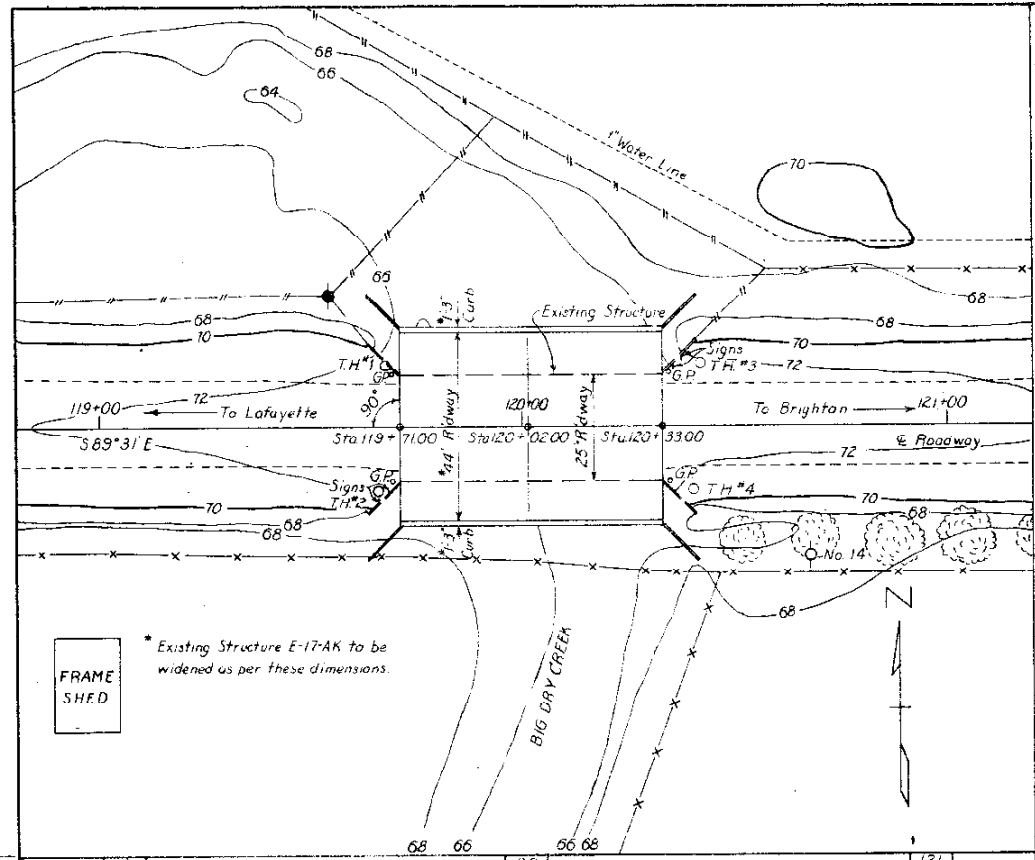
- REMOVE ALONG THESE LINES
 - ▲ HEADWALL IS TO BE REMOVED WHEN FILL OVER HEADWALL IS LESS THAN 1 FT.
 - 2 FT. REINFORCING BARS TO BE PLACED AT EVERY LONGITUDINAL BAR SHOWN ON THE STANDARD SIZE TO BE SAME AS LONGITUDINAL BARS
- THE BARS ARE TO BE GROUTED IN PLACE BY A CEMENT GROUT COMPOSED OF ONE PART CEMENT AND TWO PARTS CLEAN WELL GRADED SAND. THE COST OF DRILLING HOLES AND PLACING THE BARS IS TO BE INCLUDED IN PAYMENT FOR "REMOVAL OF HEADWALLS"

TYPICAL SECTION OF UNDERDRAIN

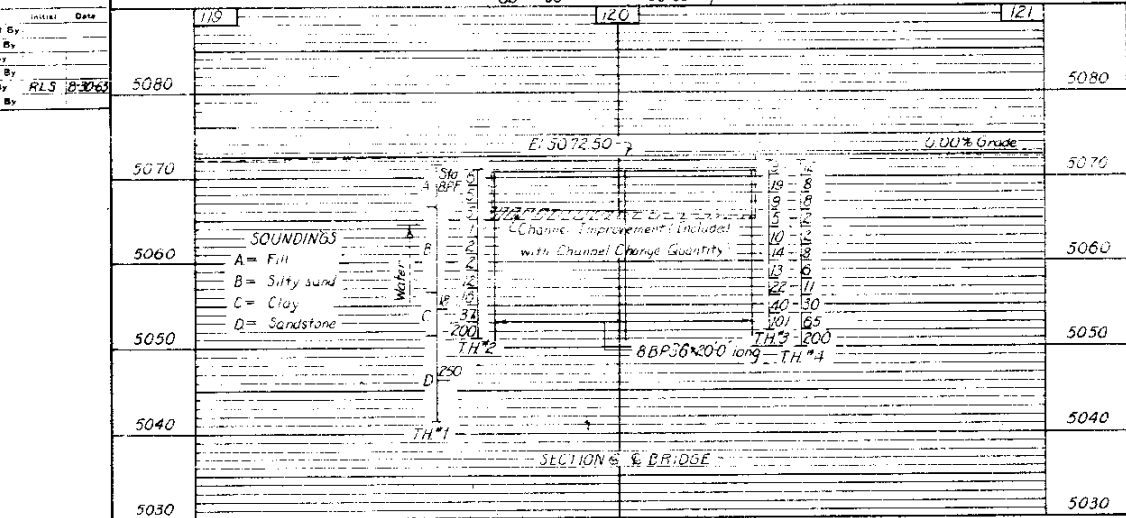


REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	SS600463	11	



Item	Description	Unit	Super-structure	Sub-structure	Total
11	Removal of Portions of Bridge	Each			1
11	Reset Handrail	Lin. Ft.	172		172
		Cu. Yd.			
14	Unclassified Structural Excavation-Bridges	Cu. Yd.		41	41
16	Structure Backfill (Class X)	Cu. Yd.		34	34
42	Treated Bridge Timber	M Ft. BM	304	1368	1672
48	Structural Steel (Incl. 1/2% for paint)	Lb.	35,355	2,785	38,140
48	Corrugated Metal Bridge Plank	Sq. Ft.	2,770		2,770
61	Steel Piling (8" BP @ 36")	Lin. Ft.		416	416



GENERAL NOTES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS APPLICABLE TO THE PROJECT.

ALL CONCRETE SHALL BE CLASS "A".

ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE STEEL OF A DEFORMED TYPE. EACH BAR SHALL BE TAGGED WITH THE BAR DESIGNATION AND STATION NUMBER OF THE PROJECT.

IF BY PERMISSION OF THE ENGINEER PRIMARY BARS ARE SPICED, THEY SHALL LAP A MINIMUM OF 38 DIAMETERS FOR BARS NEAR TOPS OF BEAMS HAVING MORE THAN 12 INCHES OF CONCRETE UNDER THE BARS AND 17 DIAMETERS FOR BARS NEAR BOTTOMS OF MEMBERS. SECONDARY BARS WHEN SPICED SHALL LAP 17 DIAMETERS OF THE BAR.

DIMENSIONS FOR REINFORCING STEEL NOT SHOWN AS CLEAR SHALL BE TO THE CENTERLINE OF THE BAR.

SOUNDINGS AND DEPTH OF FOOTINGS ARE IN ACCORDANCE WITH THE BEST AVAILABLE DATA, AND WHEN DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.

FOOTINGS IN ROCK SHALL BE POKED OUT TO ROCK AND NOT FORMED.

WHEN EXCAVATING FOR FOOTINGS THE FINAL ONE FOOT IN DEPTH SHALL BE DONE BY HAND-LABOR METHODS.

FOR DETAILS OF STRUCTURAL EXCAVATION AND STRUCTURE BACKFILL SEE STANDARD SPECIFICATIONS.

ALL CONCRETE SURFACES MARKED WITH THE STAMPS AS SHOWN ON SHEET NO. 11 SHALL RECEIVE CLASS "1" SURFACE FINISH.

ALL STRUCTURAL STEEL SHALL BE PAINTED WITH ONE SHOP COAT OF ZINC CHROMATE AND TWO FIELD COATS OF ALUMINUM PAINT UNLESS OTHERWISE NOTED.

ALL RIVETS SHALL BE 1/2 INCH DIAMETER UNLESS OTHERWISE NOTED.

HIGH TENSILE BOLTS MAY BE SUBSTITUTED FOR FIELD RIVETS AT THE CONTRACTOR'S OPTION. BOLTS SHALL BE FURNISHED IN THE AMOUNT OF FIVE PERCENT IN EXCESS OF THE NOMINAL NUMBER REQUIRED FOR EACH JOINT AND LENGTH.

WELDING SHALL CONFORM TO THE LATEST EDITION OF THE A.W.S. STANDARD SPECIFICATIONS FOR WELDING HIGHWAY BRIDGES.

FOR WELDED GIRDERS ALL SHOP BUTT WELDS IN FLANGES AND WEBS SHALL BE MADE BEFORE WELDING INTO GIRDER.

WHEN CALLED FOR IN THE SPECIAL PROVISIONS, SHOP WELDS SHALL BE INSPECTED RADIO GRAPHICALLY AND BY THE PENNBERG DYE METHOD.

WHEN TREATED TIMBER PILING IS SHOWN ON THE PLAN, THE PRESERVATIVE FOR TREATMENT SHALL BE CREOSOTE OIL.

ALL STRUCTURAL STEEL NOT OTHERWISE NOTED SHALL BE ASTM A36-62T.

LOADING DATA

LIVE LOAD - A. S. H. O. H20-S16

DEAD LOAD - ASSUMES 16 LBS. PER SQ. FT. ADDITIONAL WEARING SURFACE WHICH INCLUDES THE 1/4 INCH CONCRETE MONOLITHIC WEARING SURFACE SHOWN.

DESIGNING DATA

A. S. H. O. UNIT STRESSES:

f_c = 2,000 Lbs. per Sq. In.

f_s = 20,000 Lbs. per Sq. In. (Rein. (A30 Struct. Steel))

n = 10.

φ = 18,000 Lbs. per Sq. In. (A7 Street Steel)

COLORADO
DEPARTMENT OF HIGHWAYS

2 Spans @ 30' Widen to 44' Roadway
30° Skew

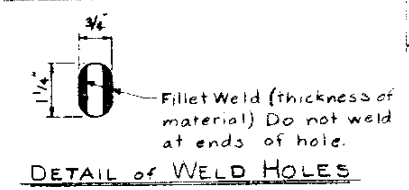
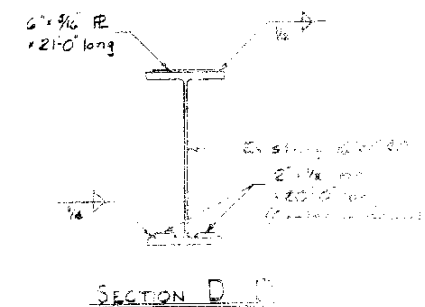
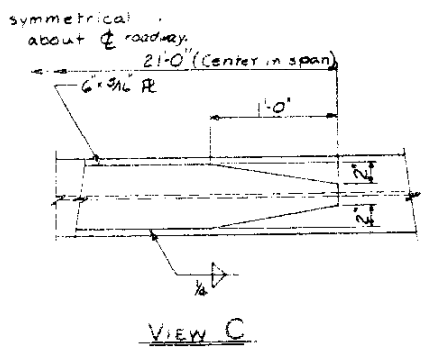
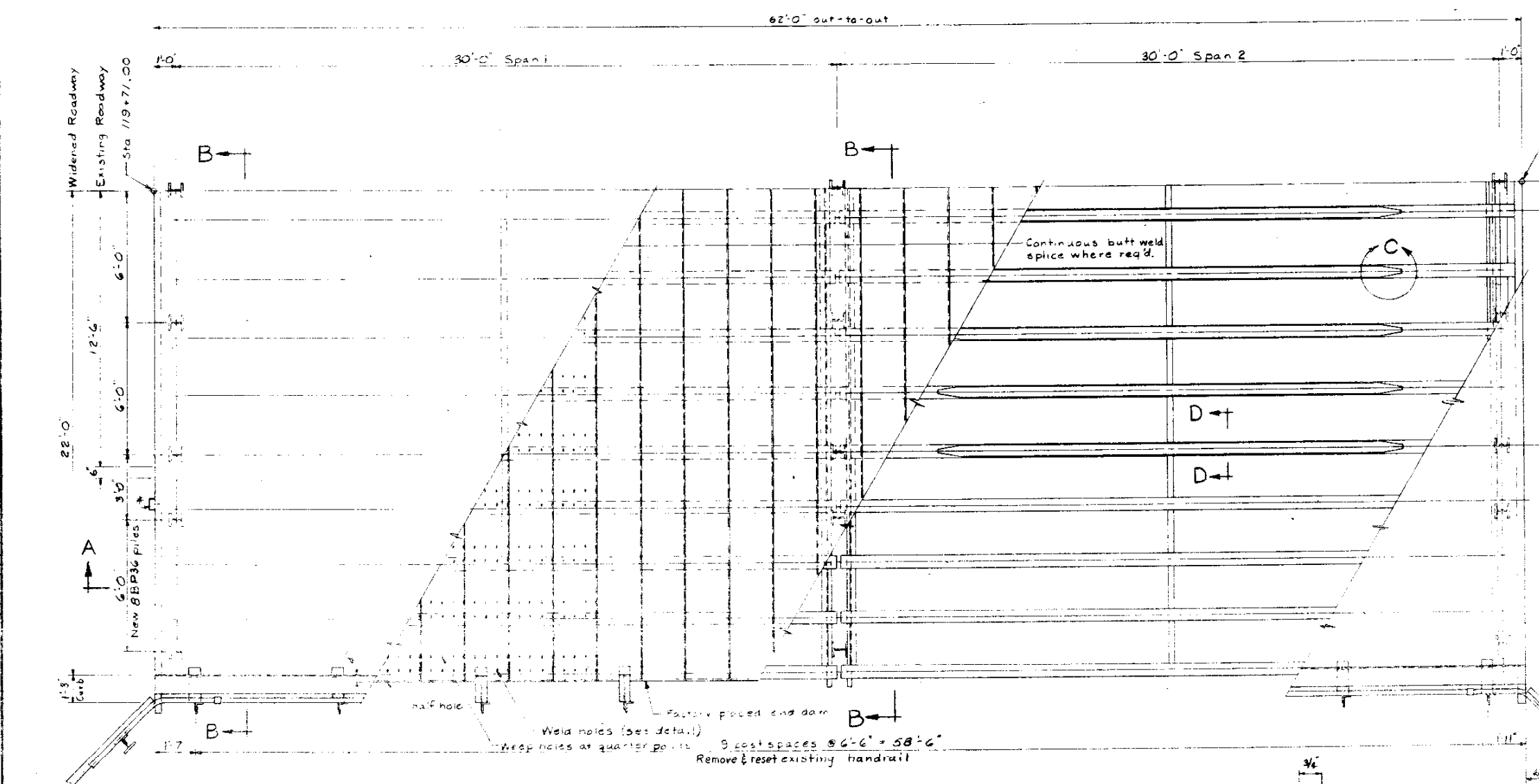
General Layout General Notes
Summary of Quantities

Access: BIG DRY CREEK
Sta. 120+00.00
Near BRIGHTON, See 1/2 T. 15. R. 68 W.

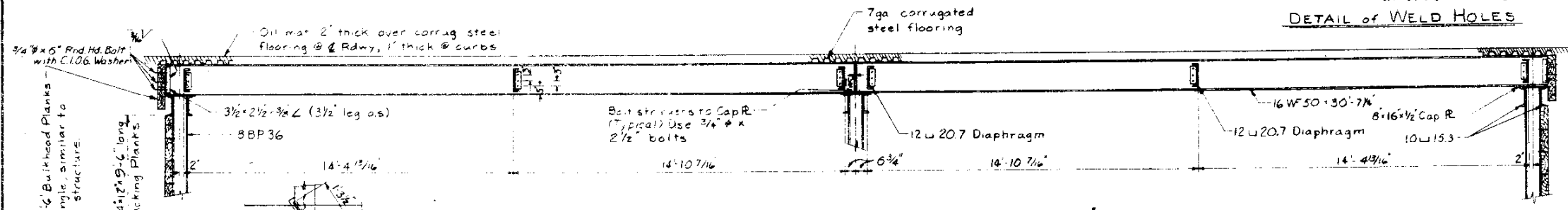
Designed by GHW Approved by *Robert Bell*
Made by DBS Bridge Engineer
Checked by Date: Sept. 26, 1963

STRUCTURE NO. E-17-AK

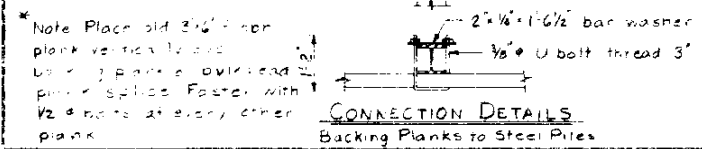
FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	3560046(3)	12	



Note: Cut off existing wing piles 3'-0" below grade.



SECTION A-A



CONNECTION DETAILS
Backing Planks to Steel Piles

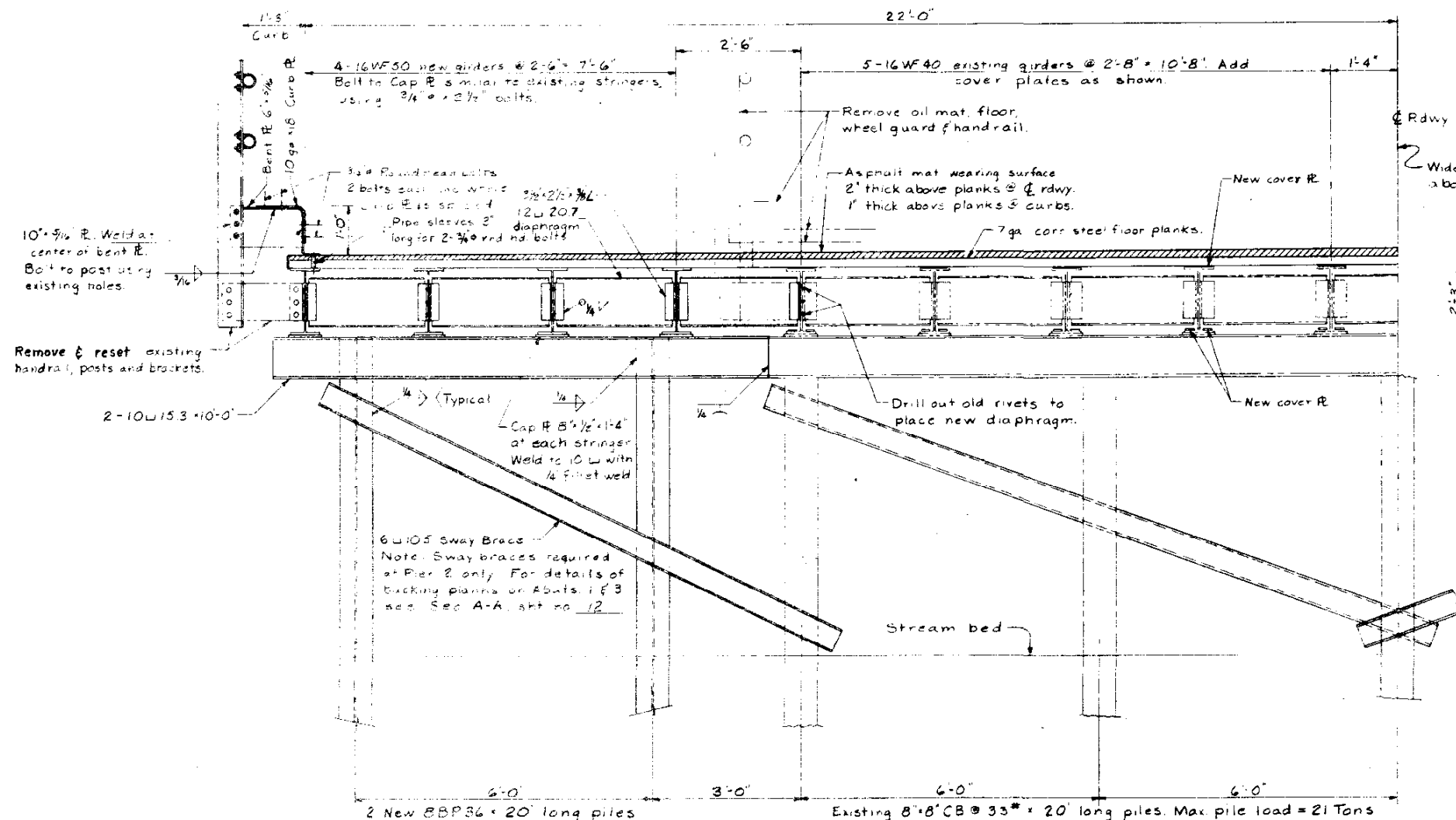
COLORADO
DEPARTMENT OF HIGHWAYS
SUPERSTRUCTURE
WIDENING & REFLOORING
DETAILS

Across Big Dry Creek
Sta 120+00 to 120+33.00
Near Brighton, Sec 1/2 T. 15. R. 65W

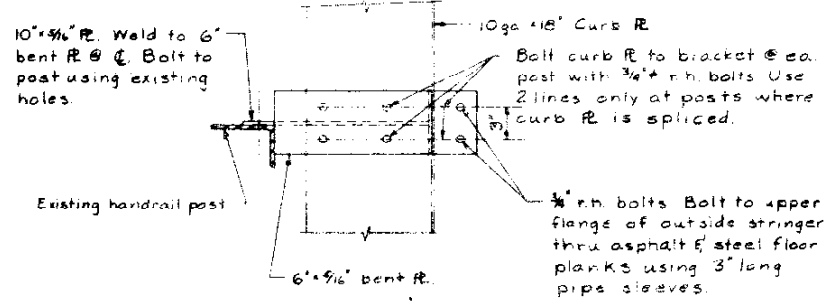
Designed by GHW Approved by [Signature]
Made by UDB
Checked by [Signature] Date 3/27/66 1963

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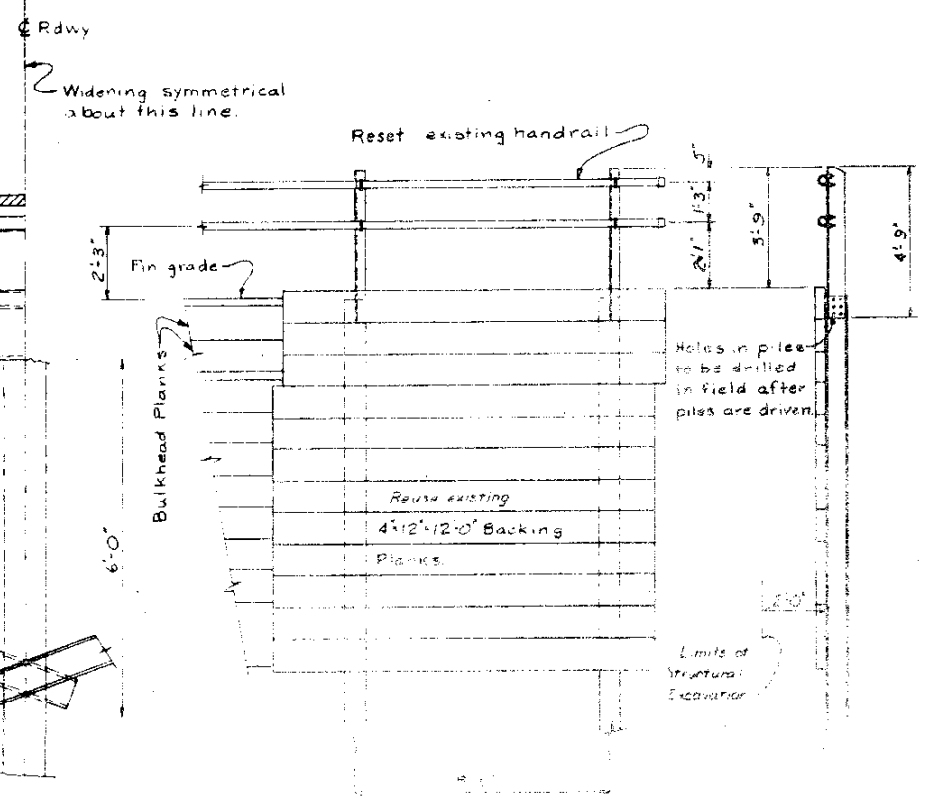
RD. ROAD SEG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	3560046(3)	13	



SECTION B-B



DETAIL PLAN OF HANDRAIL BRACKET



PIERWALL DETAILS

See BBP 36
x 22 long for details
of backing plank attach-
ment see Connection
Data sheet no. 12

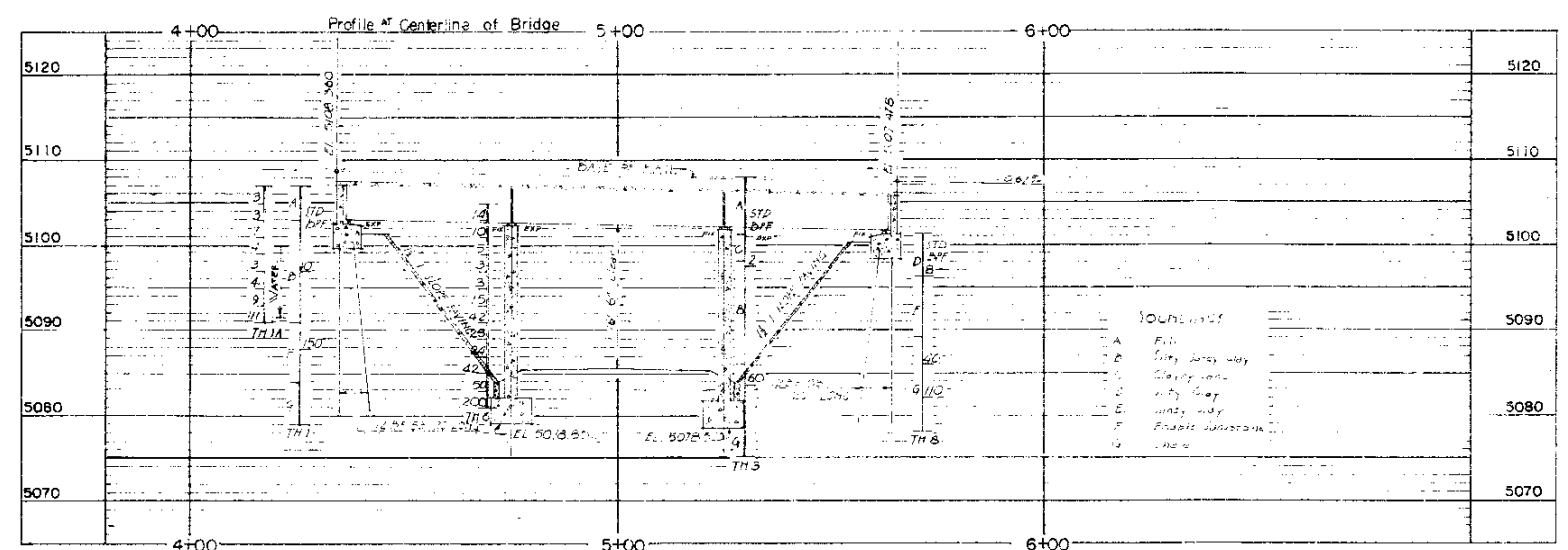
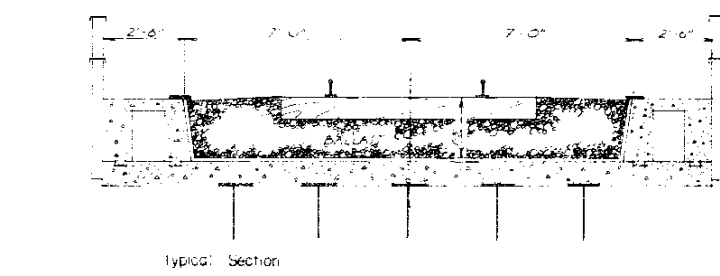
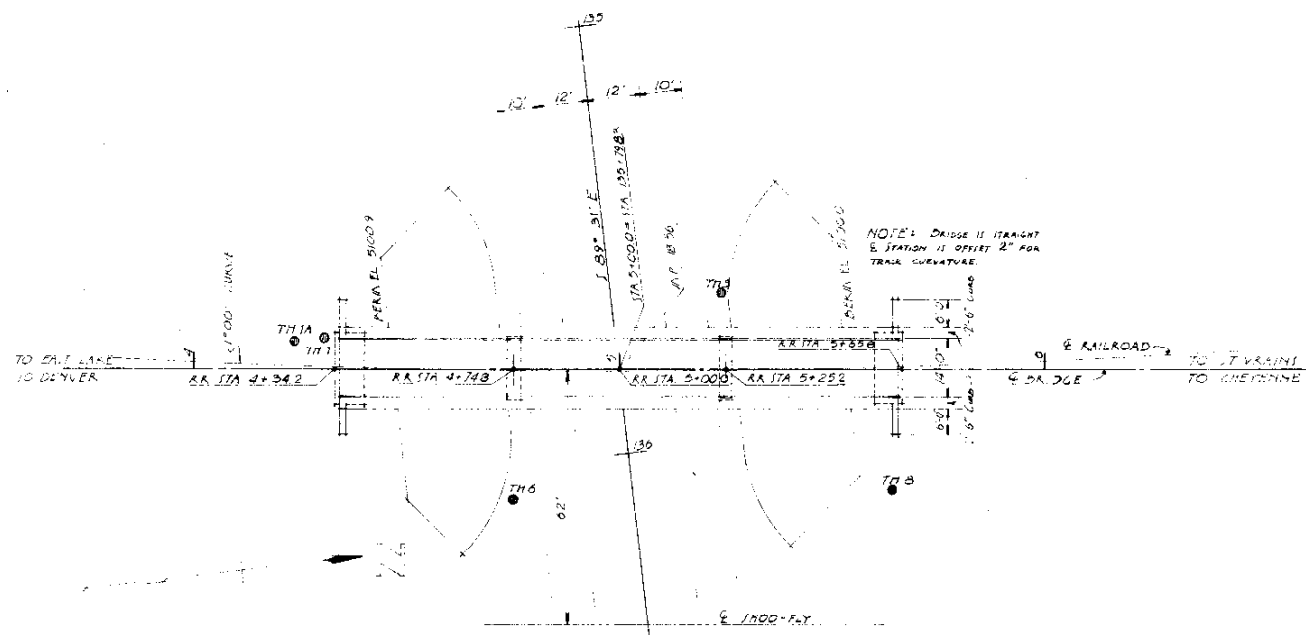
COLORADO
DEPARTMENT OF HIGHWAYS
WIDENING DETAILS -
ABUTMENTS & PIERS

Project: **BIG JAY CREEK**
No. **BRIGHTON** 10-11-7-13-800
Designed by **GHW** Approved by **W. H. ...**
Checked by **...**

REVISIONS

Rev 13-11-64 General Notes, Loading Data & Item 48 quantity. R.C.B.

FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	S-561046(3)	14	



SUMMARY OF QUANTITIES

ITEM	DESCRIPTION	UNIT	Span 1	Span 2	Span 3	Abut	Total
14	CONCRETE FOR STRUCTURAL EXCAVATION (BASED)	CU YD	80	44	46	85	255
15	STRUCTURAL BRICKWORK (BASED)	CU YD	15	15	15	15	60
16	CONCRETE FOR CURBS (BASED)	CU YD	15	15	15	15	60
17	REINFORCING STEEL (ALL IS FOR OVERLAP)	TON	12410	2305	3343	2305	21763
18	STRUCTURAL STEEL (GALVANIZED)	TON	123430	480	1085	1085	126580
19	STEEL PILING (2 OF 50)	LINEAL FT	160			160	320
20	CONCRETE UNDER PILING (BASED)	CU YD	34			34	68
21	WATERPROOFING (BASED)	SQ YD	244				244
22	BITUMEN (BASED)	LINEAL FT	80				80
23	10 # GALVANIZED STEEL PILING	LINEAL FT	30				30
24	20 # GALVANIZED STEEL PILING	LINEAL FT	20				20
25	30 # GALVANIZED STEEL PILING	LINEAL FT	24				24
26	40 # GALVANIZED STEEL PILING	LINEAL FT	5				5

- 1. Includes 204 sq yd of 8" x 12" concrete for 9' high waterstop to be included in bid item for item 14.
- 2. Expansion joints shall be in accordance with AASHTO specifications A-450 on all of the bridge spans & shall be installed in the field for item 14.
- 3. Does not include galvanizing the reinforcement steel. To allow for weight of bars under for splicing.

GENERAL NOTES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS APPLICABLE TO THE PROJECT.

ALL CONCRETE SHALL BE CLASS "A".

ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE STEEL OF A DEFORMED TYPE. EACH BAR SHALL BE TRACED WITH THE BAR DESIGNATION AND STATION NUMBER OF THE PROJECT.

IF BY PERMISSION OF THE ENGINEER PRIMARY BARS ARE SPICED, THEY SHALL LAP A MINIMUM OF 25 DIAMETERS FOR BARS NEAR TOPS OF BEAMS HAVING MORE THAN 12 INCHES OF CONCRETE UNDER THE BARS, AND 17 DIAMETERS FOR BARS NEAR BOTTOM OF MEMBERS. SECONDARY BARS WHEN SPICED SHALL LAP 17 DIAMETERS OF THE BAR.

DIMENSIONS FOR REINFORCING STEEL NOT SHOWN AS CLEAR SHALL BE TO THE CENTERLINE OF THE BAR.

FOUNDATIONS AND DEPTH OF FOOTINGS ARE IN ACCORDANCE WITH THE BEST AVAILABLE DATA AND WHEN DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.

FOOTINGS IN ROCK SHALL BE BOLTED OUT TO ROCK AND NOT FORMED.

WHEN EXCAVATING FOR FOOTINGS THE FINAL ONE FOOT IN DEPTH SHALL BE DONE BY HAND LABOR METHODS.

FOR DETAILS OF STRUCTURAL EXCAVATION AND STRUCTURE BACKFILL SEE STANDARD M-10-A ALL CONCRETE SURFACES MARKED WITH THE SYMBOL "A" AS SHOWN ON SHEET NO. 20 SHALL RECEIVE CLASS "B" SURFACE FINISH.

ALL STRUCTURAL STEEL SHALL BE PAINTED WITH ONE SHOP COAT OF ZINC CHROMATE AND TWO FIELD COATS OF ALUMINUM PAINT UNLESS OTHERWISE NOTED.

ALL PLATES SHALL BE 1/8 INCH DIAMETER UNLESS OTHERWISE NOTED.

WELDING SHALL CONFORM TO THE LATEST EDITION OF THE A.S.S. STANDARD SPECIFICATIONS FOR WELDING HIGHWAY BRIDGES.

FOR WELDED GIRDERS ALL SHOP BUTT WELDS IN FLANGES AND WEBS SHALL BE MADE BEFORE WELDING INTO GIRDER.

WHEN CALLED FOR IN THE SPECIAL PROVISIONS SHOP WELDS SHALL BE INSPECTED RADIOGRAPHICALLY AND BY THE PENETRANT DYE METHOD.

WELLS TREATED TIMBER PILING IS SHOWN ON THE PLANS. THE PRESERVATIVE FOR TREATMENT SHALL BE CHEQUONITE OR.

ALL STRUCTURAL STEEL NOT OTHERWISE NOTED SHALL BE ASTM A-36 - 60T.

LOADING DATA.
LIVE LOAD - COOPERS E-75

DESIGNING DATA.
fs = 1200 Lbs per Sq. In.
fc = 20,000 Lbs per Sq. In. (Reinforcing Steel)
n = 10.
fs = 18,000 Lbs per Sq. In. (Structural Steel)

COLORADO
DEPARTMENT OF HIGHWAYS
3 SPANS (38', 49', 38') CONCRETE
DECK WITH BALLAST ON STEEL GIRD'S

GENERAL LAYOUT, NOTES, & SUMMARY OF QUANTITIES

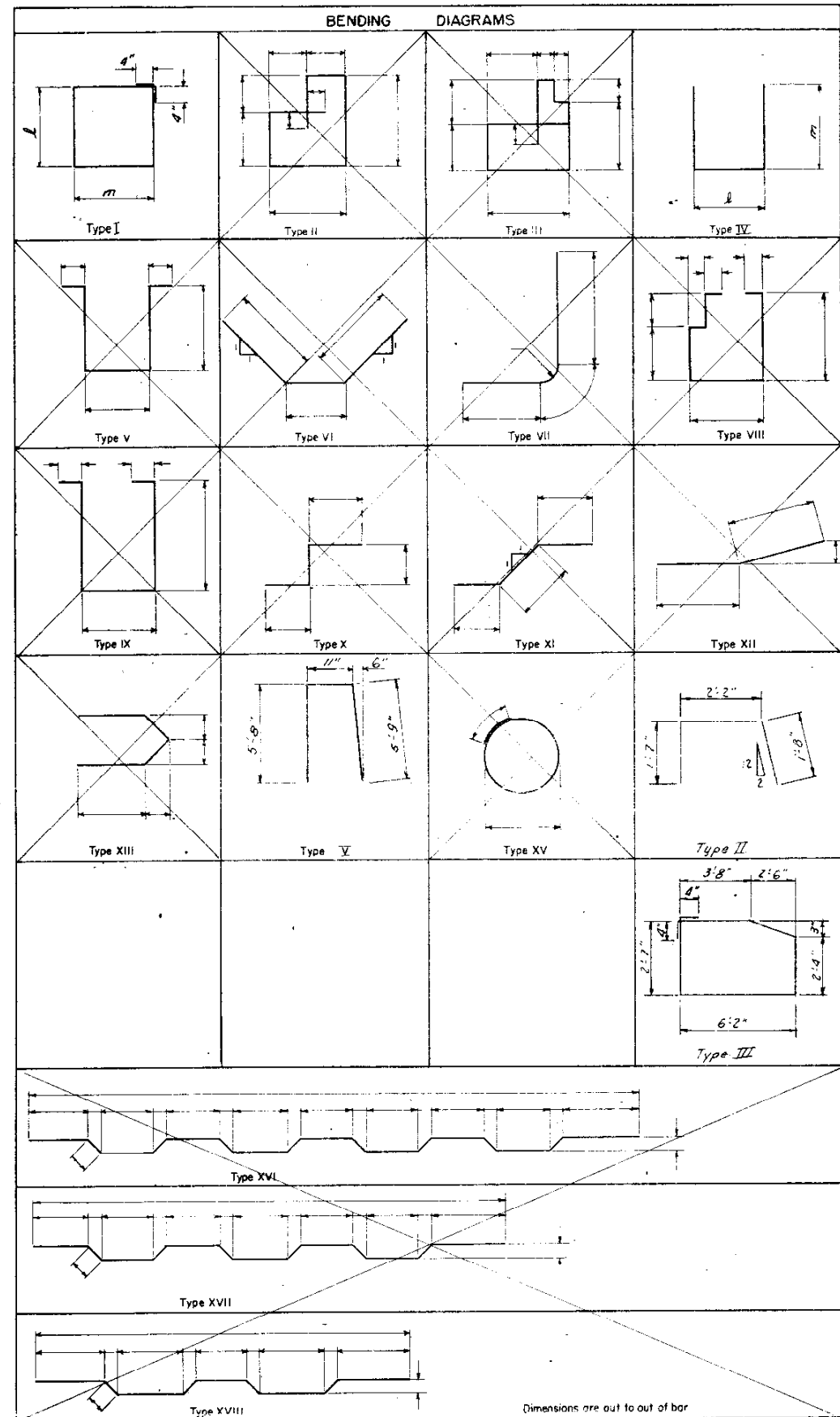
Under U.P.R.R.
Sta. 135+79.833
Near Brighton Sec. 18 1/2 T. 12 R. 68 W

Designed by GHW
Made by DJS
Checked by

Approved by [Signature]
Bridge Engineer
Date: Sept 26, 1963

STRUCTURE NO. E-17-JZ

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	950046(3)	15	



BAR LIST - SUPERSTRUCTURE

Mark	Size	No. Req'd	Length	Type	Dimensions	
					l	m
401	½"φ	56	40'-0"	Str.		
403	½"φ	526	18'-8"	Str.		
404	½"φ	264	5'-5"	II		
405	½"φ	88	5'-10"	I	1'-8"	11"
406	½"φ	56	25'-6"	Str.		

SUMMARY

15,430 Lin Ft ½"φ @ 0.668 lbs/lin ft = 10,307 Lbs
 Plus 1%± for Overrun = 103 Lbs
 Total = 10,410 Lbs

BAR LIST - PIER N^o 2
(Pier N^o 3 Similar)

Mark	Size	No. Req'd	Length	Type	Dimensions	
					l	m
603	¾"φ	17	5'-8"	II	2'-8"	1'-6"
604	¾"φ	34	19'-0"	Str.		
605	¾"φ	34	3'-0"	Str.		
606	¾"φ	15	19'-6"	Str.		
607	¾"φ	40	9'-8"	Str.		
608	¾"φ	48	13'-8"	Str.		

SUMMARY

2205 Lin Ft ¾"φ @ 1.502 lbs/lin ft = 3312 Lbs
 Plus 1%± for Overrun = 33 Lbs
 Total = 3345 Lbs

BAR LIST - ABUTMENT N^o 1
(Abutment N^o 4 Similar)

Mark	Size	No. Req'd	Length	Type	Dimensions	
					l	m
501	¾"φ	2	16'-2"	Str.		
503	¾"φ	8	8'-7"	Str.		
504	¾"φ	8	30'-8"	Str.		
505	¾"φ	4	1'-6"	Str.		
506	¾"φ	4	3'-6"	Str.		
507	¾"φ	19	12'-4"	Str.		
508	¾"φ	8	8'-10"	Str.		
509	¾"φ	6	6'-6"	Str.		
510	¾"φ	4EA	by 6" to	Str.		
513	¾"φ	8	8'-6"	Str.		

SUMMARY

821 Lin Ft ¾"φ @ 1.043 lbs/lin ft = 856 Lbs
 951 Lin Ft ¾"φ @ 1.502 lbs/lin ft = 1428 Lbs
 Plus 1%± for Overrun = 21 Lbs
 Total = 2305 Lbs

COLORADO
DEPARTMENT OF HIGHWAYS

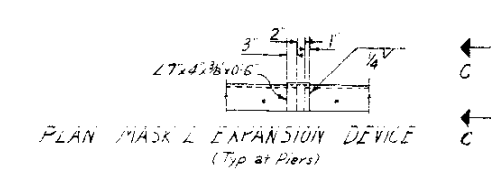
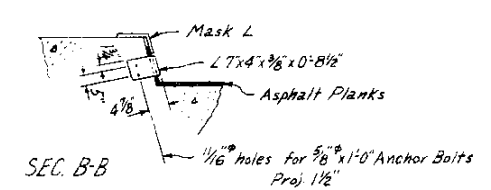
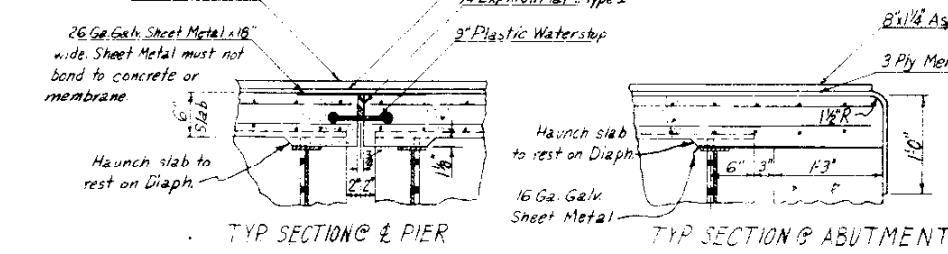
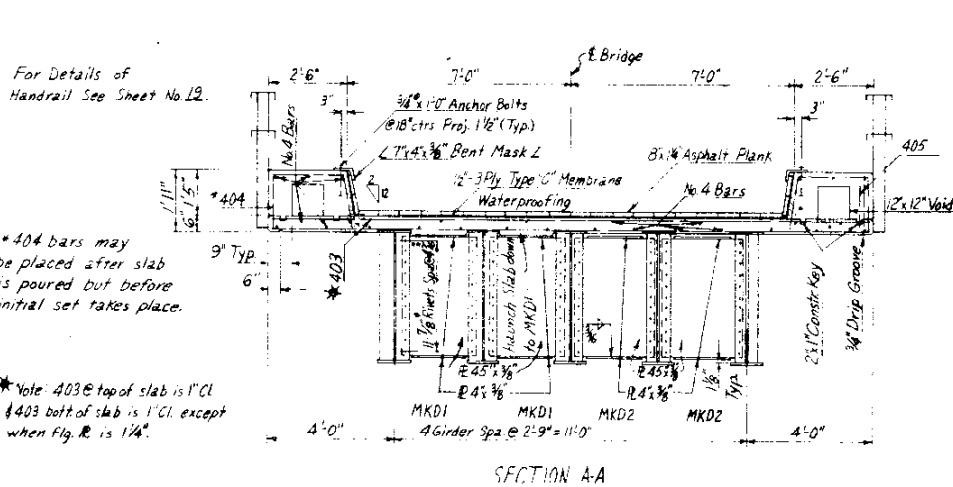
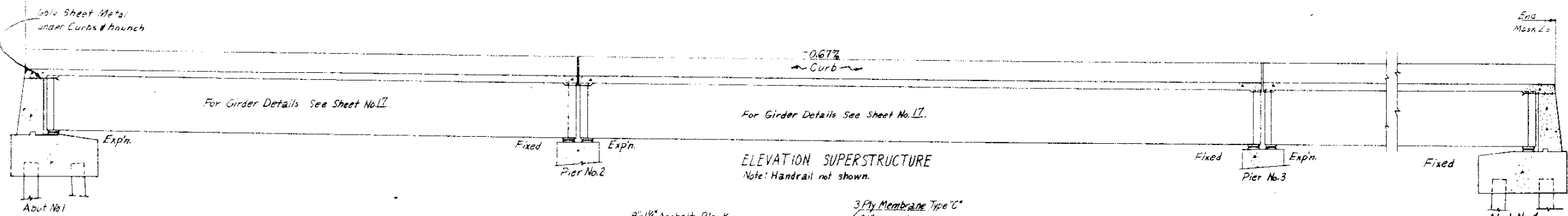
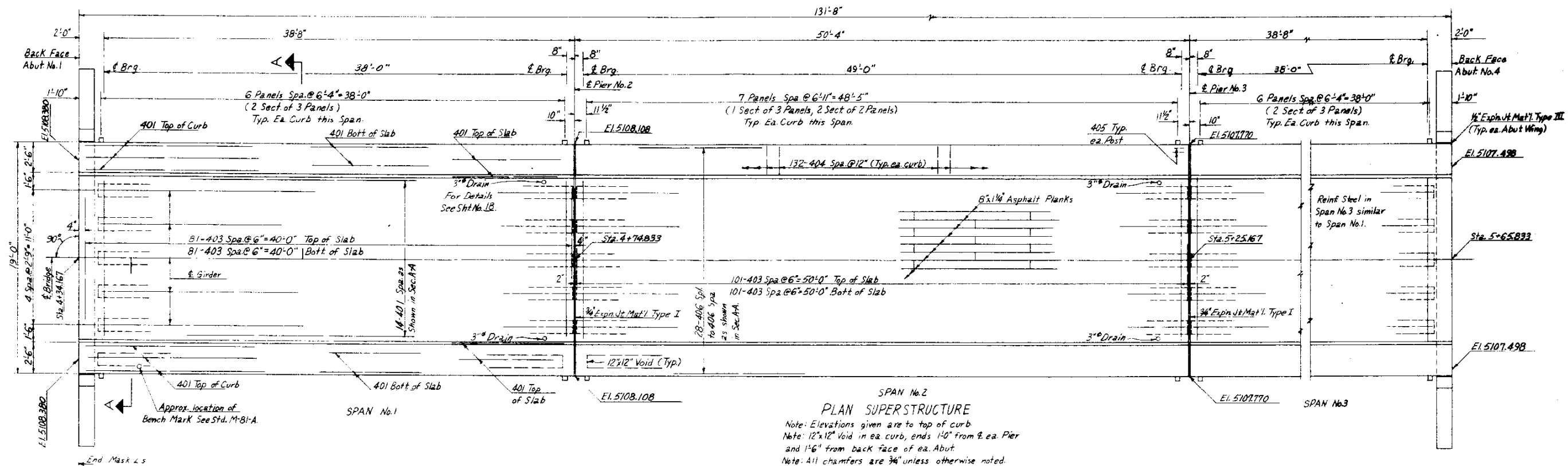
BENDING DIAGRAMS & BAR LIST

Across U.P.R.R.
 Sta. 135 79.833
 Near Brighton See 1/12 T. 1 S. R. 68 W.

Designed by GHW Approved by [Signature]
 Made by J.B. Bridge Engineer
 Checked by [Signature] Date: Sept 26, 1963

Rev. Added Details
D.J.S. 3-11-64

PER. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	S-560746(3)	16	



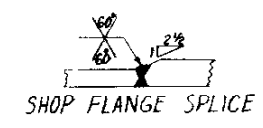
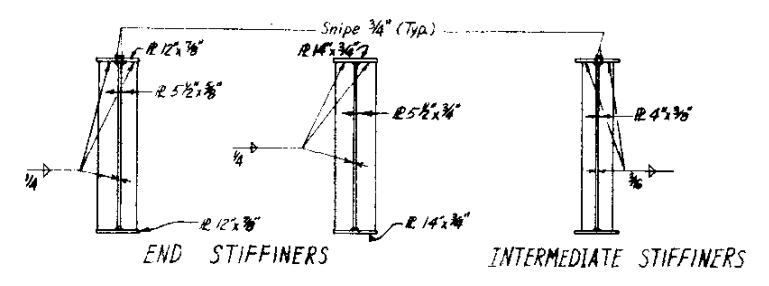
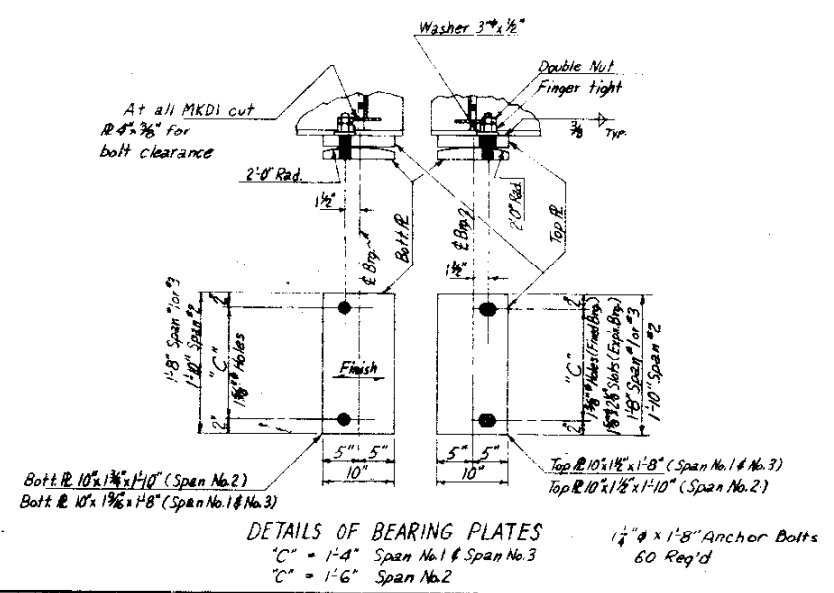
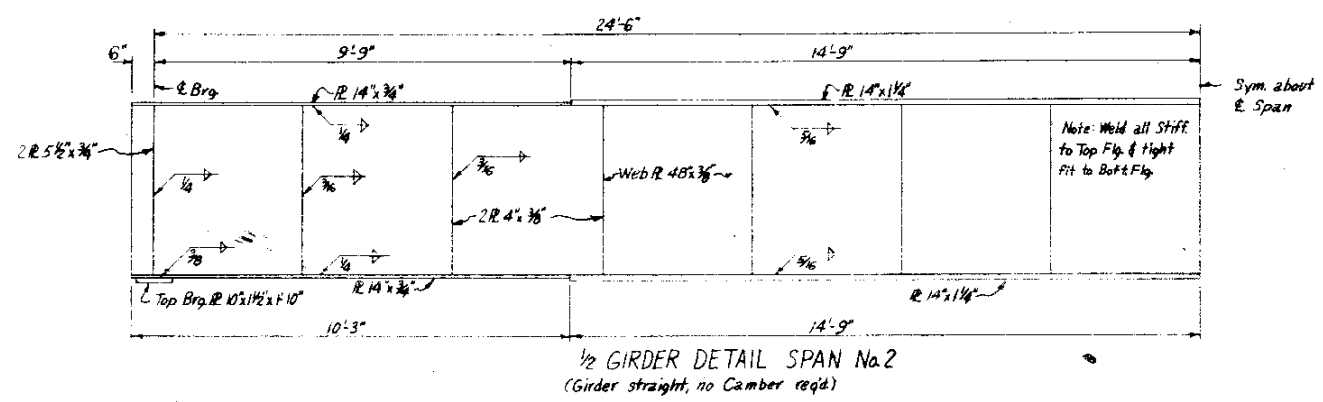
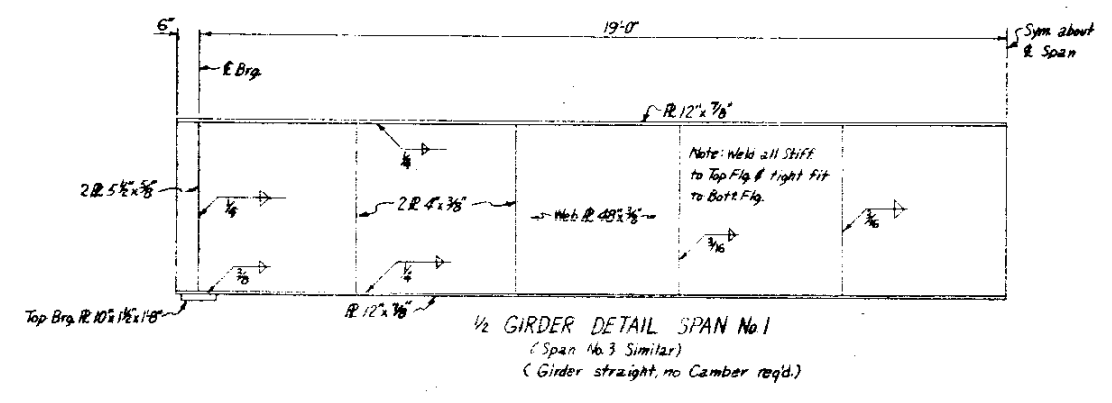
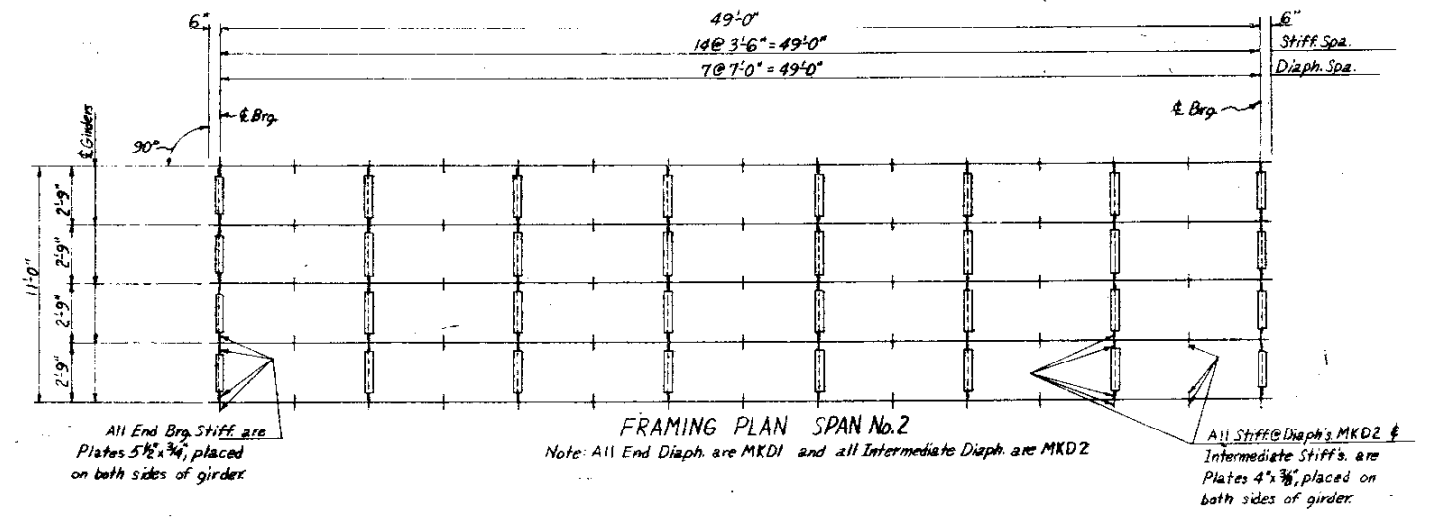
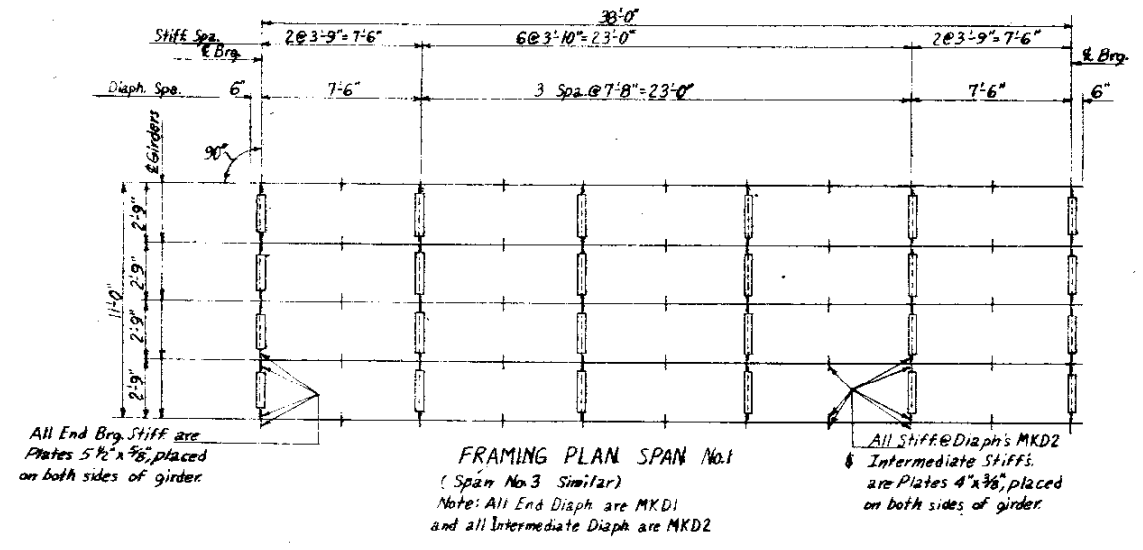
COLORADO DEPARTMENT OF HIGHWAYS
SUPERSTRUCTURE DETAILS

Under U.P.R.R.
 Sta. 135+79.833
 Near Brighton Sec. 12 T. 1S R. 68W
 Designed by G.H.W. Approved by [Signature]
 Made by D.J.S. Bridge Engineer
 Checked by [Signature] Date: Sept. 26, 1963

STRUCTURE NO. E-17-JZ

REVISIONS

FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLD.	S-560046(3)	17	



COLORADO
DEPARTMENT OF HIGHWAYS

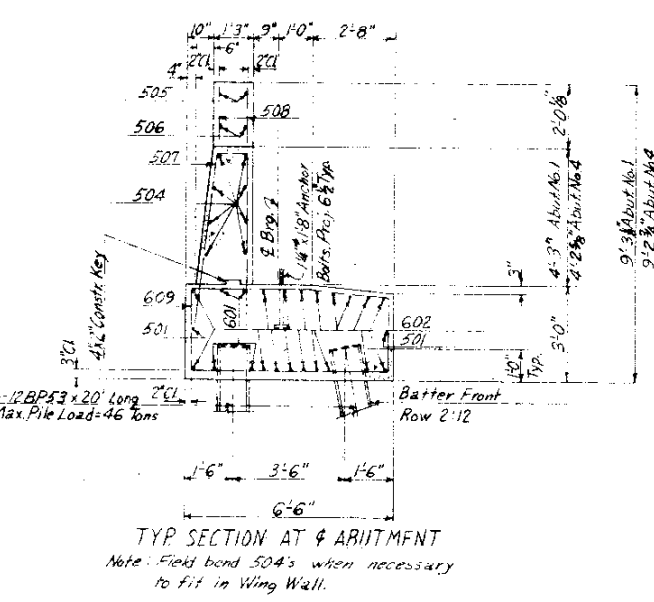
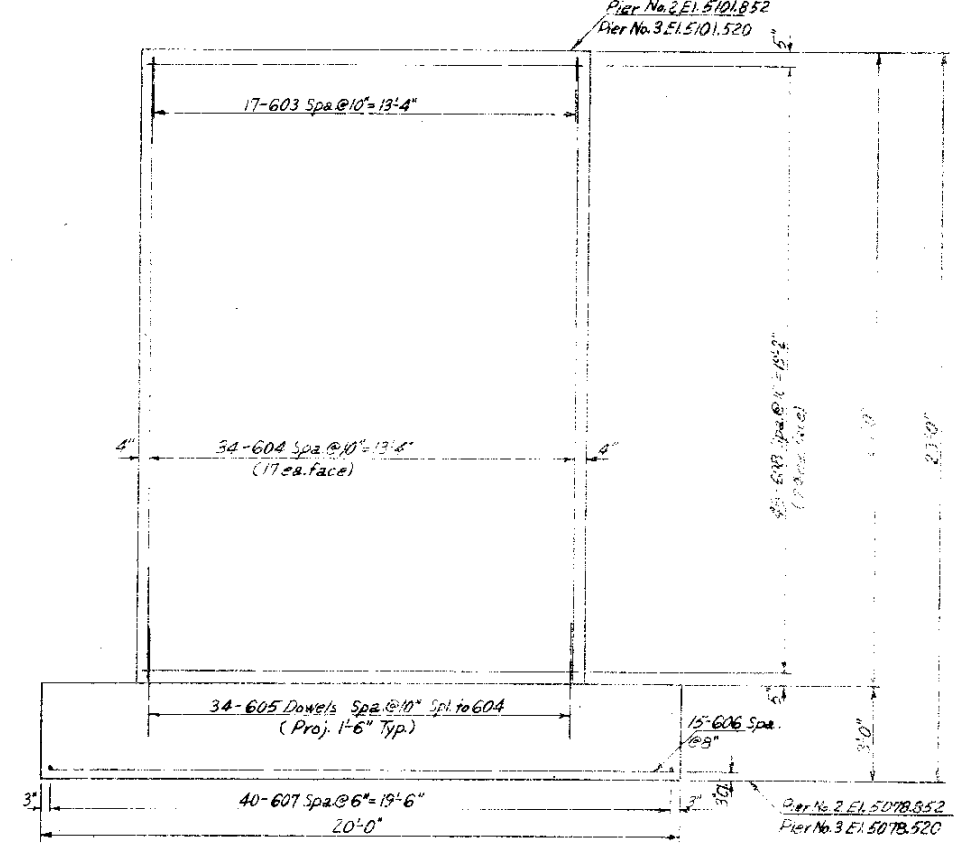
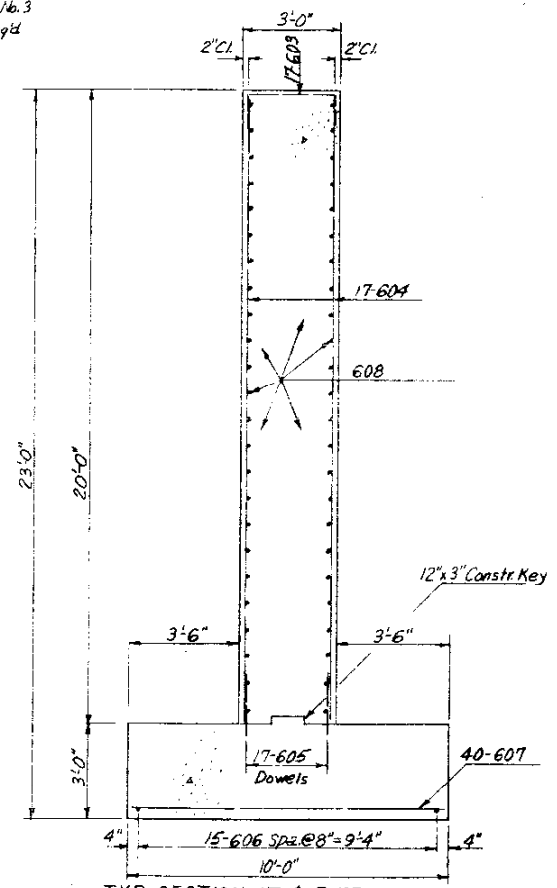
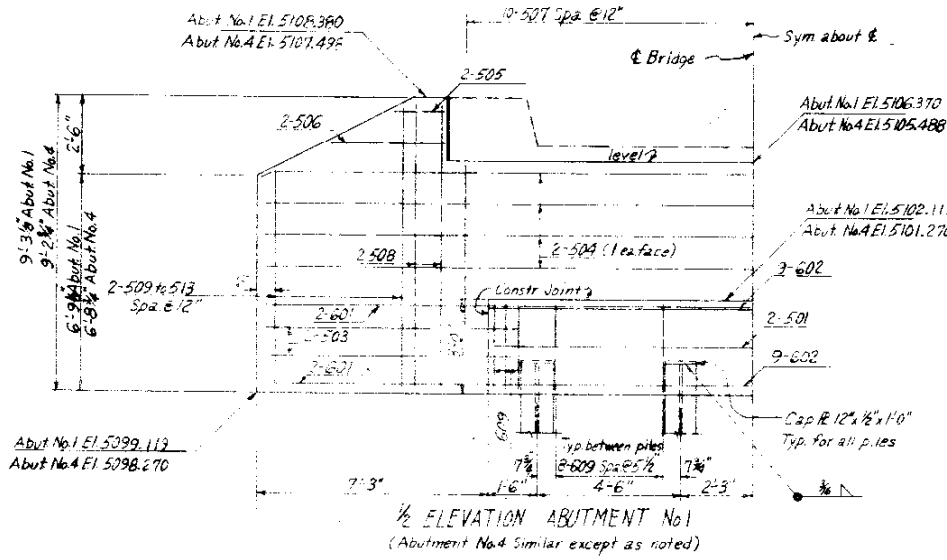
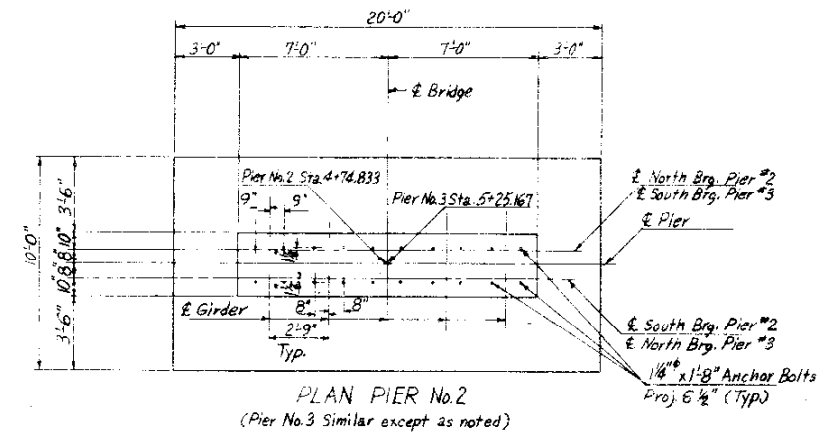
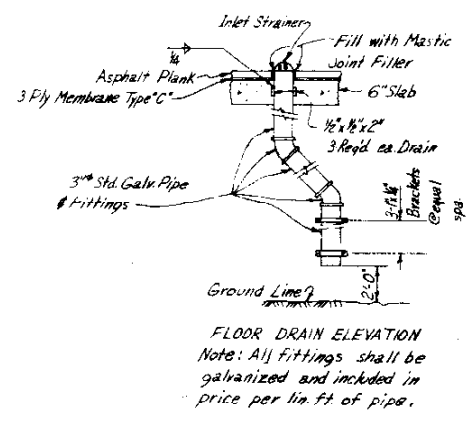
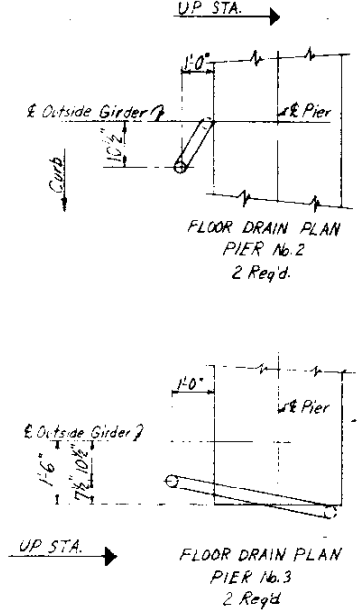
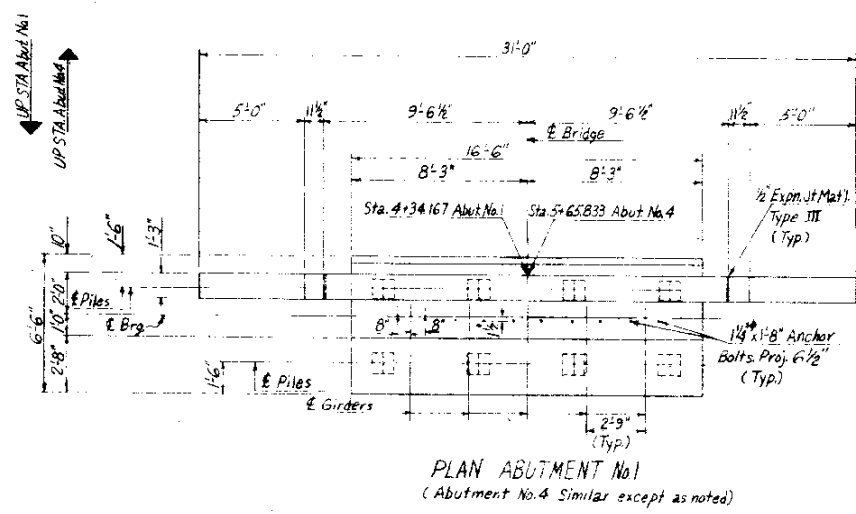
FRAMING PLAN
SUPERSTRUCTURE DETAILS

Under U.P.R.B.
S.M. 1957-78-033

Designed by *C. H. H. H.* Approved by *A. H. H. H.*
Made by D.U.S. Bridge Engineer
Checked by *S. O. P. 261963* Date: *SEP. 26 1963*

STRUCTURE NO. E-17-UZ

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	S-560046(3)	18	



COLORADO
DEPARTMENT OF HIGHWAYS

ABUTMENT No. 1 & No. 4 DETAILS
PIER No. 2 & No. 3 DETAILS

Under U.P.R.R.

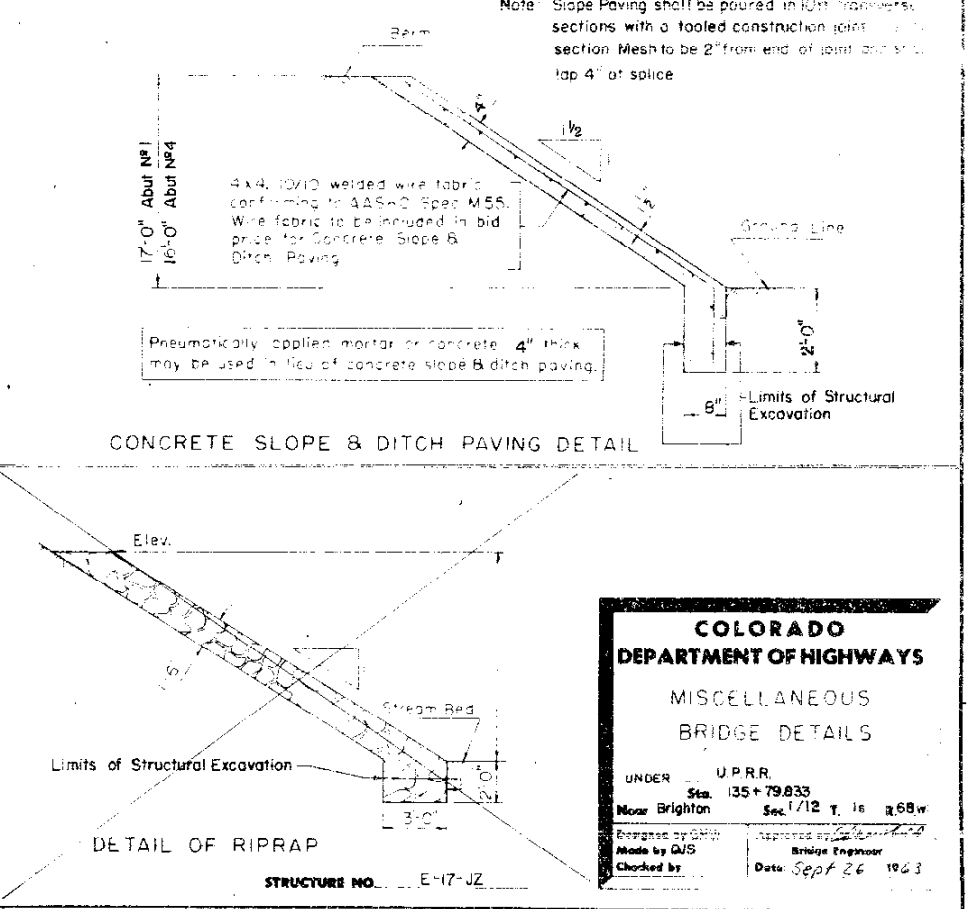
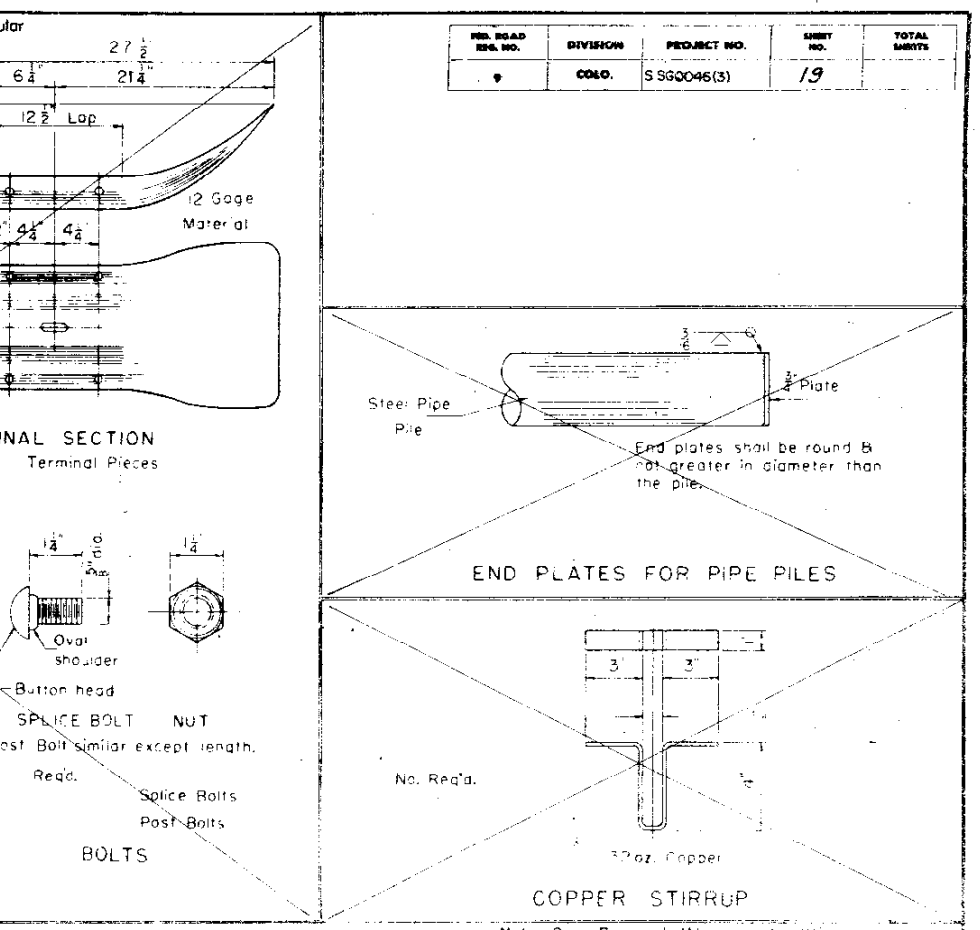
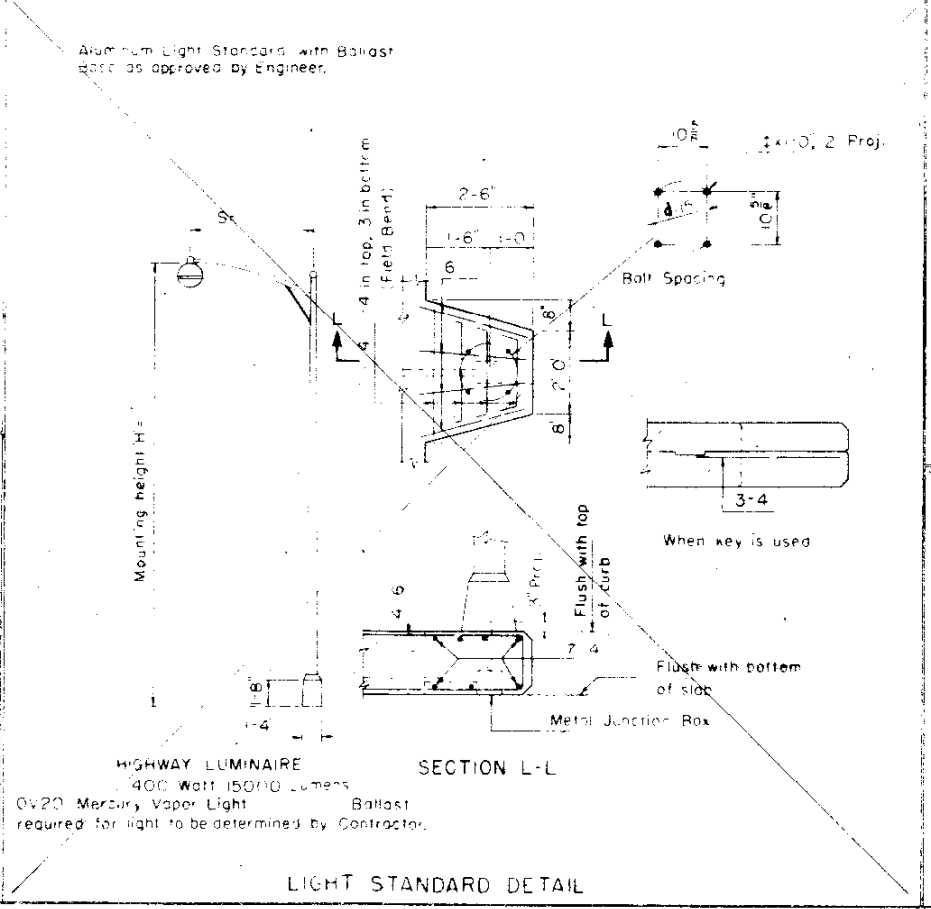
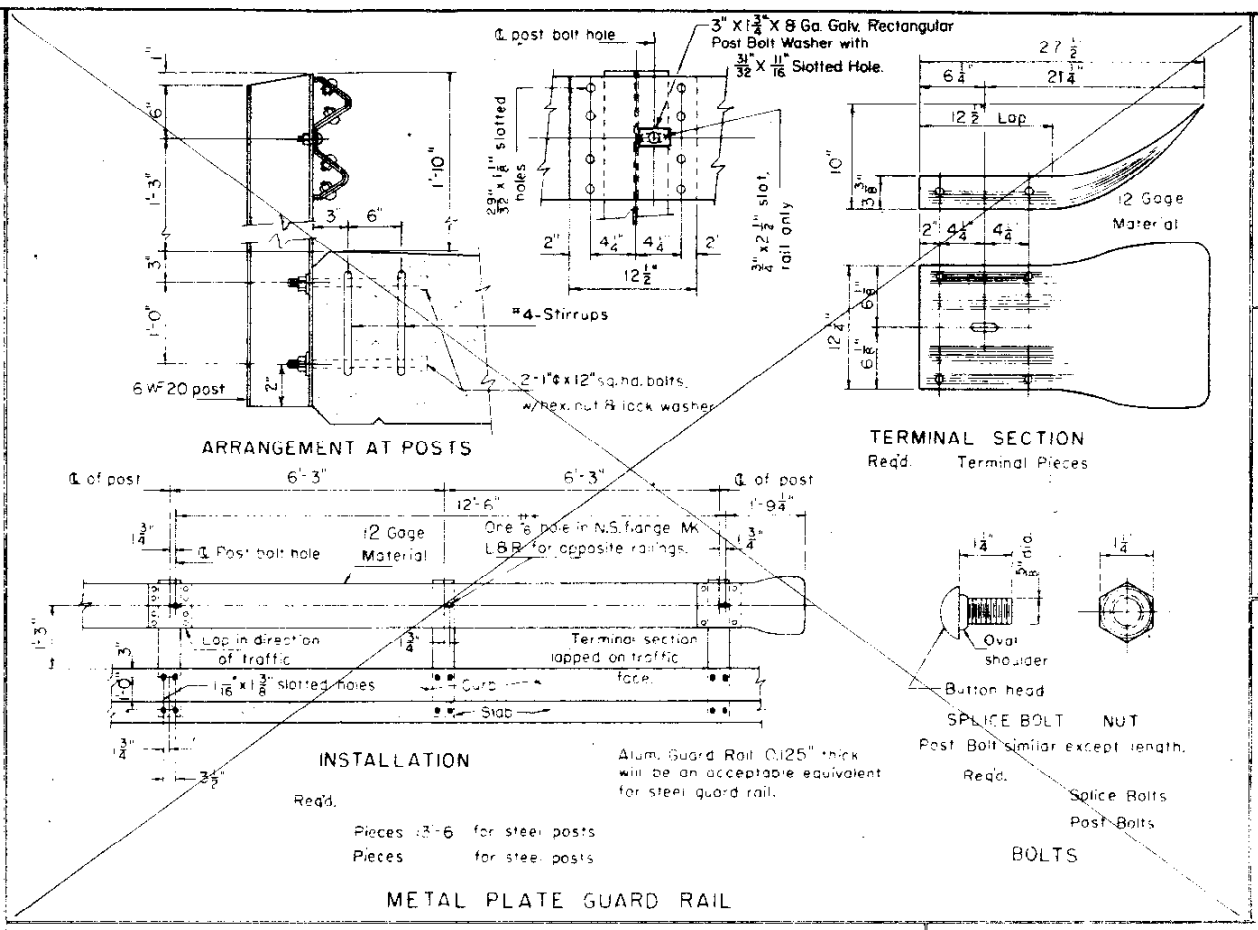
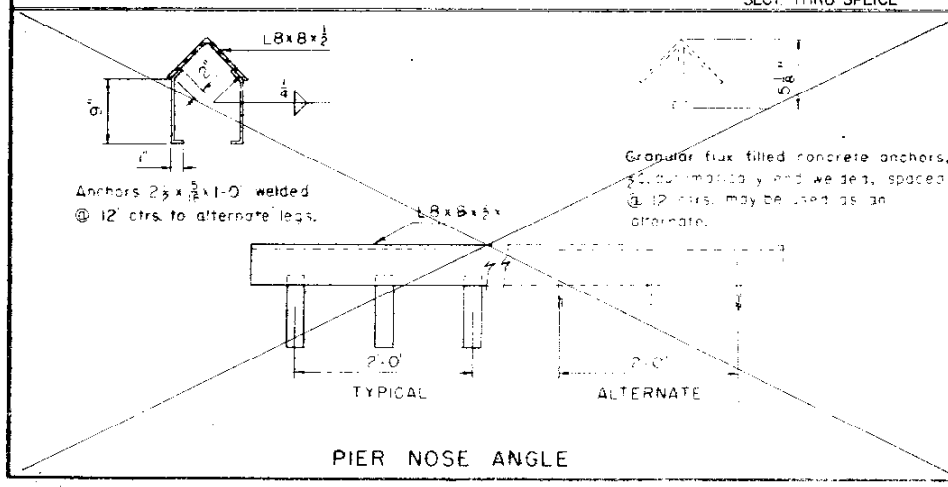
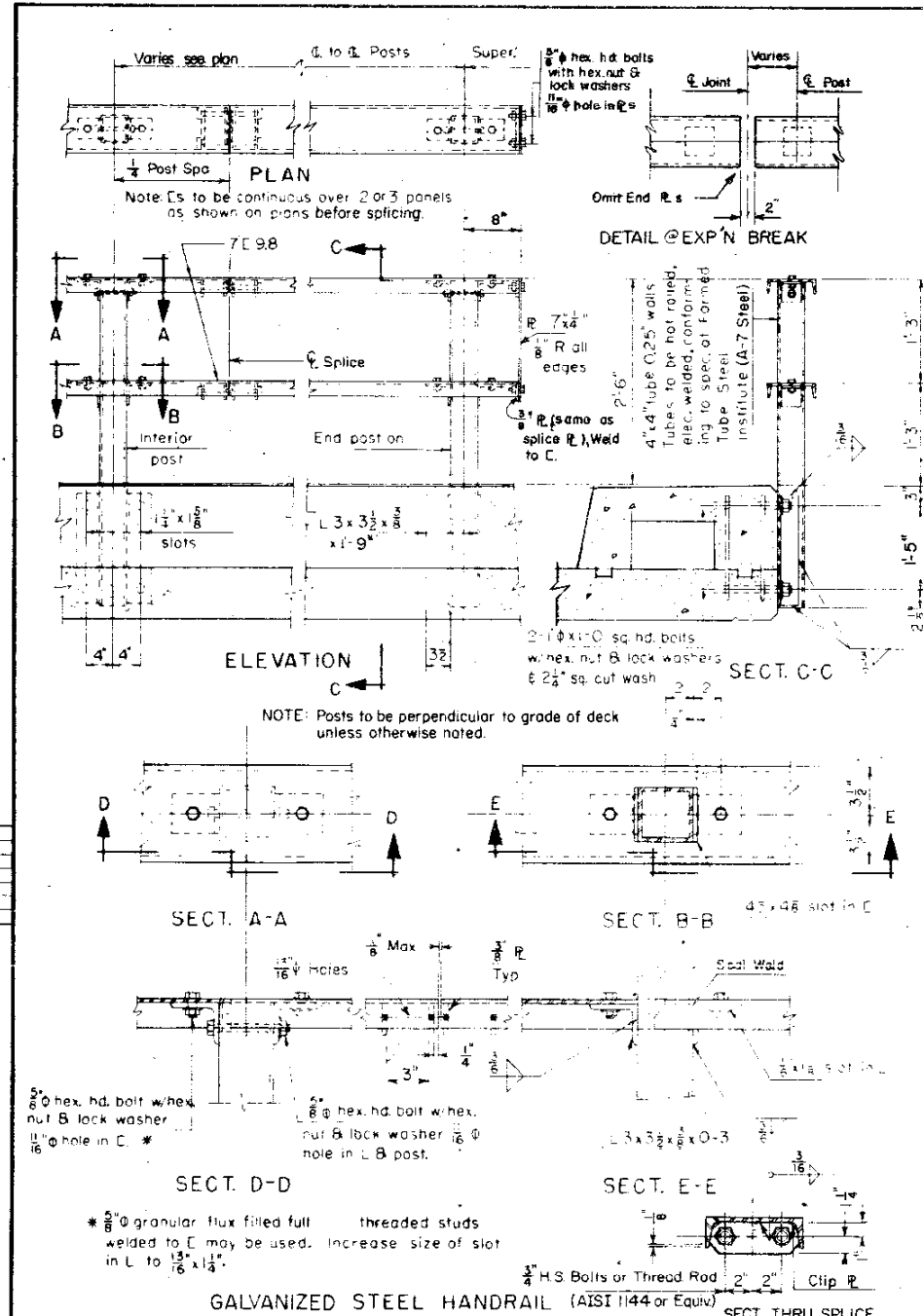
Sta. 133+75.853

Near Brighton Sec. 12, T. 15, R. 63W

Designed by: [Signature] Approved by: [Signature]

Made by: D.U.S. Bridge Engineer

Checked by: [Signature] Date: Sept. 26, 1963



RES. ROAD DES. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	SSG0046(3)	19	

COLORADO DEPARTMENT OF HIGHWAYS
MISCELLANEOUS BRIDGE DETAILS

UNDER U.P.R.R.
Sta. 135+79.833
Near Brighton
Sec. 1/12 T. 16 R. 68W

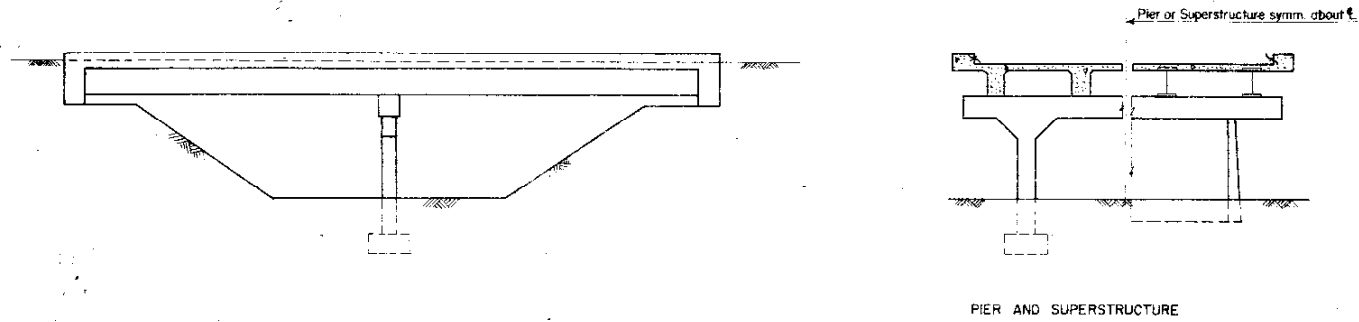
Designed by GWS
Made by GWS
Checked by

Approved by [Signature]
Bridge Engineer
Date: Sept 26 1963

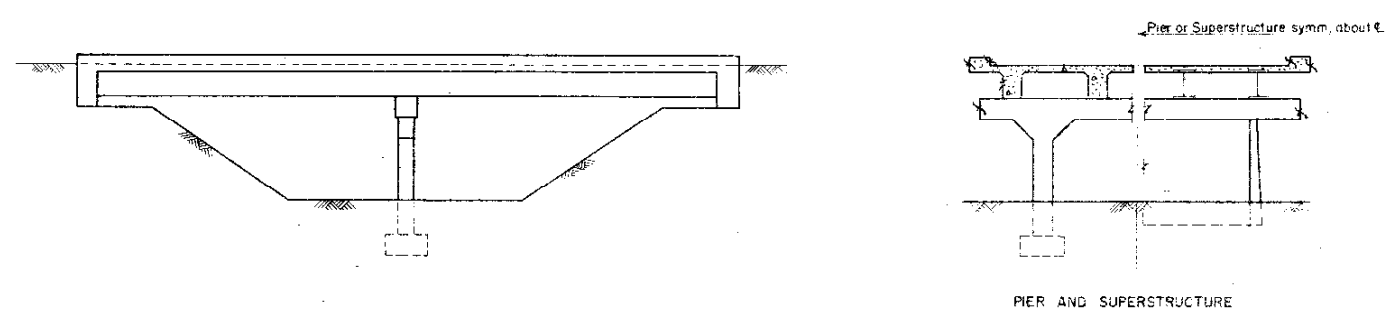
STRUCTURE NO. E-17-JZ

REVISIONS

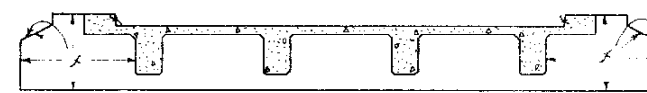
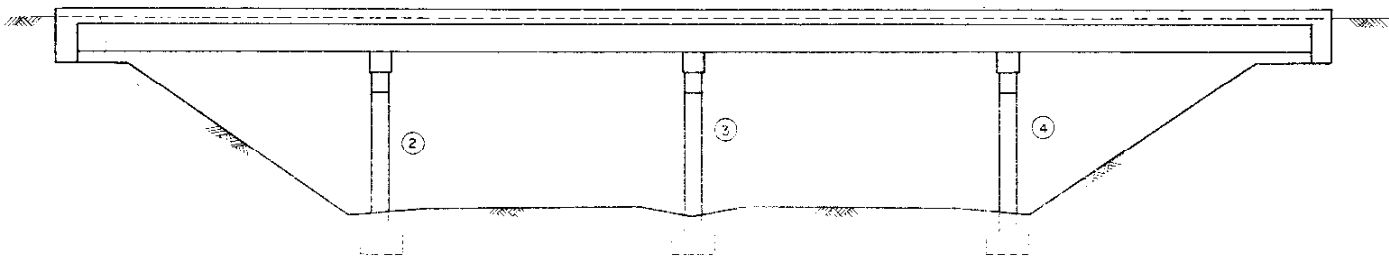
FED. ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	S-56 0046(3)	20	



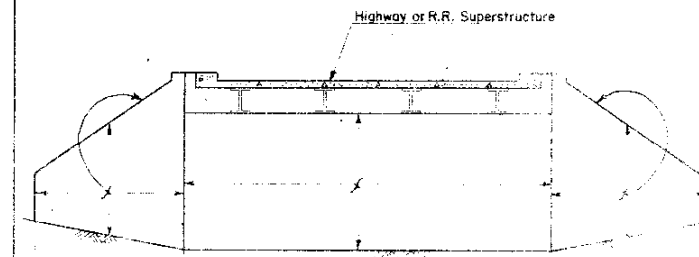
RURAL STREAM CROSSING



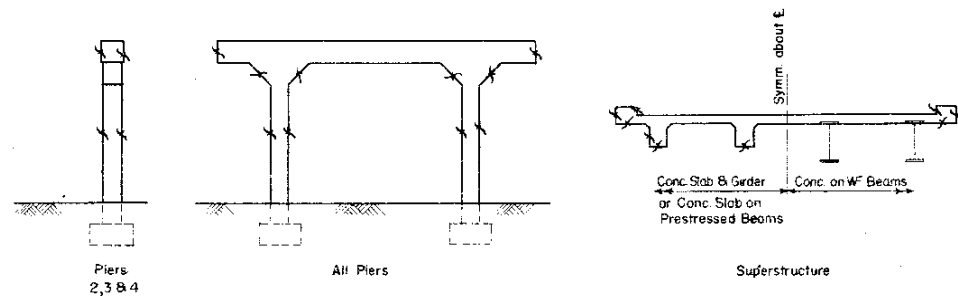
STREAM CROSSING IN OR NEAR URBAN AREA



STUB ABUTMENTS
(Underpass Only)



CANTILEVER ABUTMENTS
(Underpass Only)



In case of round columns the whole column shall receive Class "I" finish on all Piers.

UNDERPASS

COLORADO
DEPARTMENT OF HIGHWAYS

DETAILS SHOWING PORTIONS OF
STRUCTURE TO RECEIVE CLASS
"I" SURFACE FINISH.

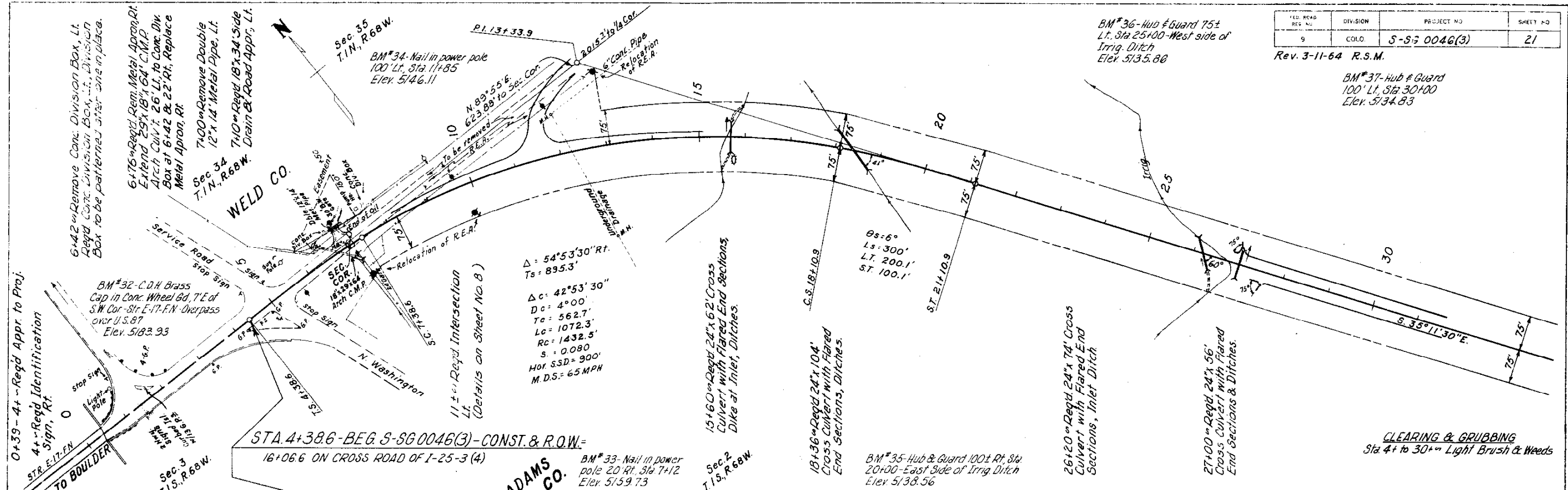
Under U. F. R. R.
Sta. 135+79.833
Near Brighton Sec. 12 T. 45 R. 69M
Designed by A.D.N. Approved by *[Signature]*
Made by R.R.A.-J.B. Bridge Engineer
Checked by *[Signature]* Date: Sep 26, 1963

STRUCTURE NO. E-17-02

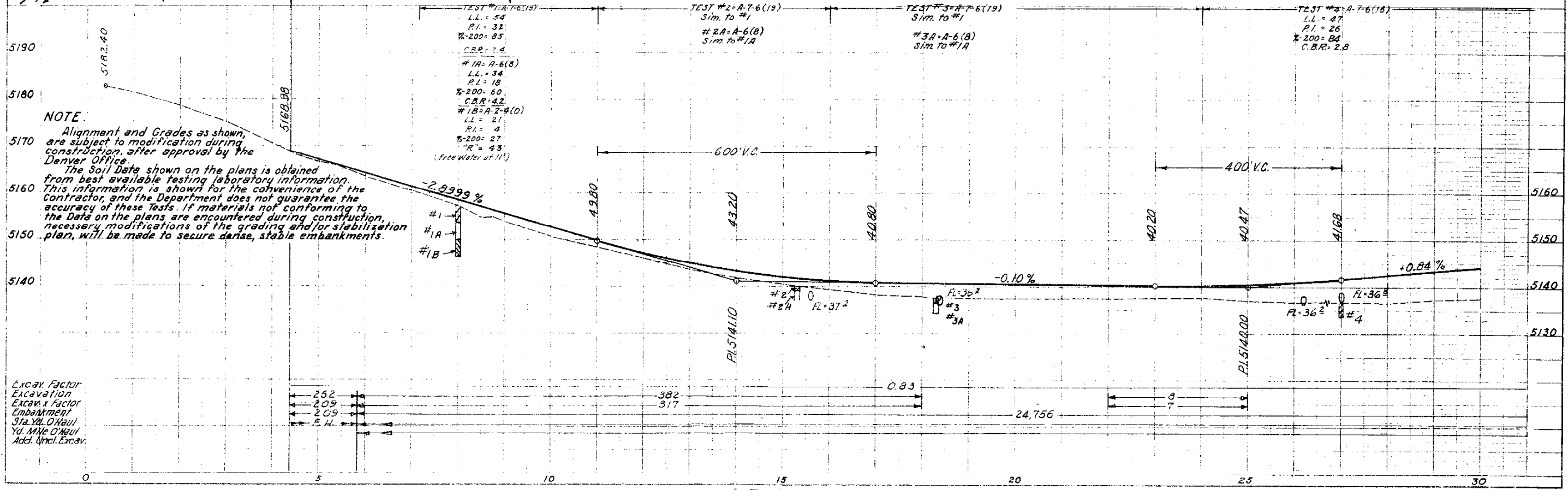
REG. ROAD RES. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.	S-53 0046(3)	21

Rev. 3-11-64 R.S.M.

BM*37-Hub & Guard
100' Lt. Sta. 30+00
Elev. 5134.83



STA. 4+38.6-BEG. S-SG 0046(3)-CONST. & R.O.W.
16+06.6 ON CROSS ROAD OF I-25-3 (4)



NOTE:
Alignment and Grades as shown, are subject to modification during construction, after approval by the Denver Office.
The Soil Data shown on the plans is obtained from best available testing laboratory information. This information is shown for the convenience of the Contractor, and the Department does not guarantee the accuracy of these Tests. If materials not conforming to the Data on the plans are encountered during construction, necessary modifications of the grading and/or stabilization plan, will be made to secure dense, stable embankments.

Excav. Factor
Excavation
Excav. Factor
Embankment
Sta. Yd. Orhaul
Yd. MHE Orhaul
Add. Uncl. Excav.

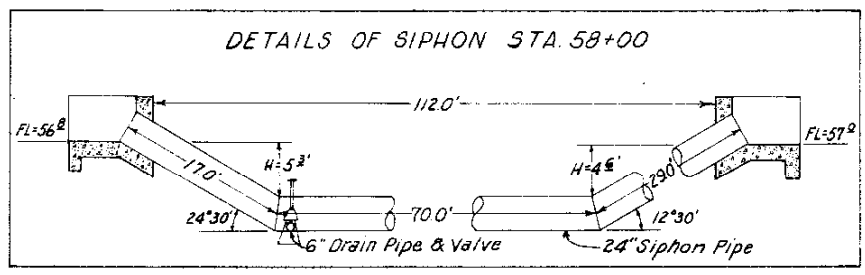
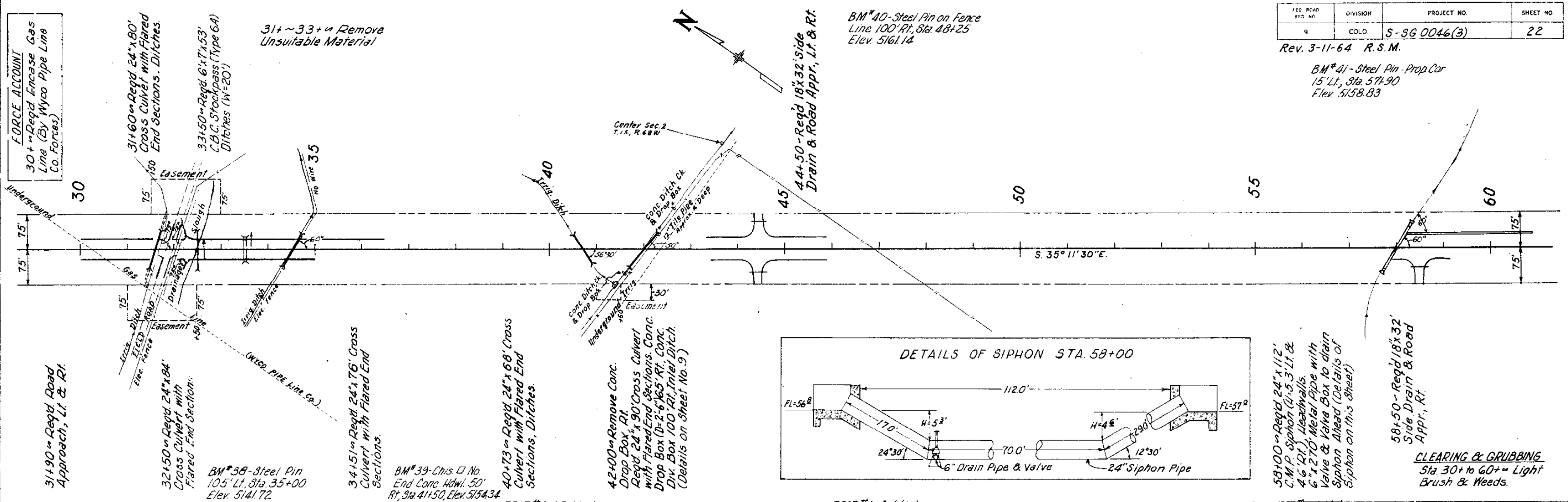
TEST #	LL	PI	%-200	C.B.R.
#1A-A-6(8)	54	32	85	2.4
#1B-A-2-9(0)	34	18	60	4.2
#2A-A-6(8)	54	32	85	2.4
#3A-A-6(8)	47	26	84	2.8

24487
24486
24485

FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.	S-96 0046(3)	22

Rev. 3-11-64 R.S.M.

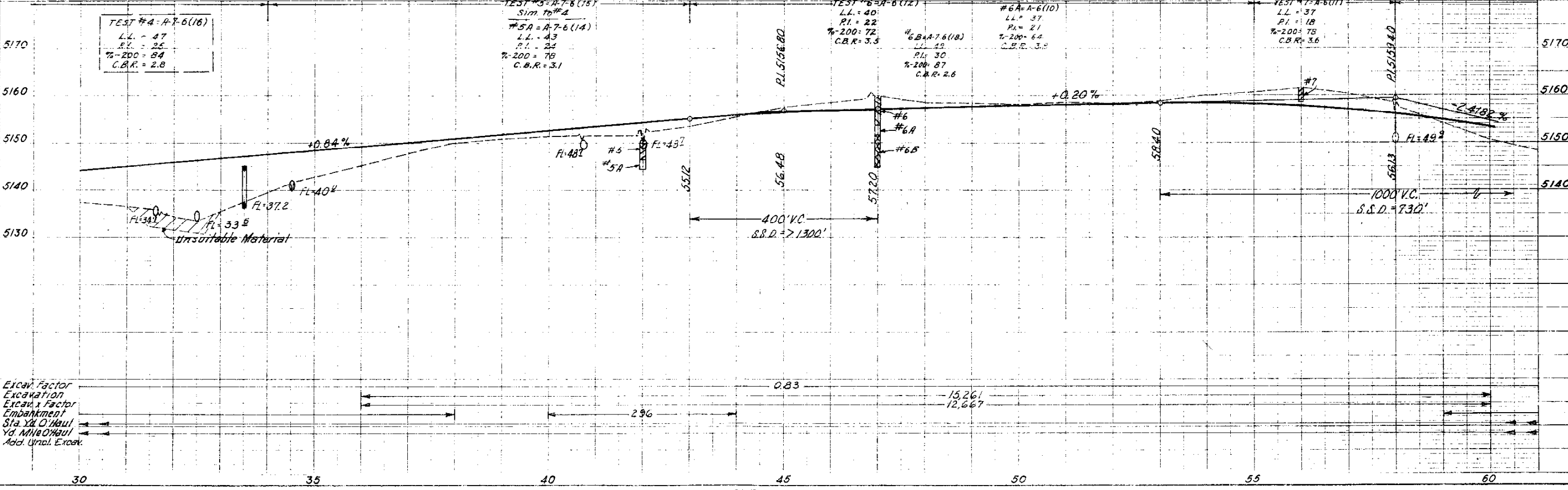
BM #41 - Steel Pin - Prop. Cor
15' Lt., Sta. 57+90
Elev. 5158.83



58x100 - Reg'd 24" x 112"
C.M.P. Siphon (11-5-3-11 &
4.6' D), Headwalls
6" x 270" Metal Pipe with
Valve & Valve Box to drain
Siphon Ahead (Details of
Siphon on this sheet)

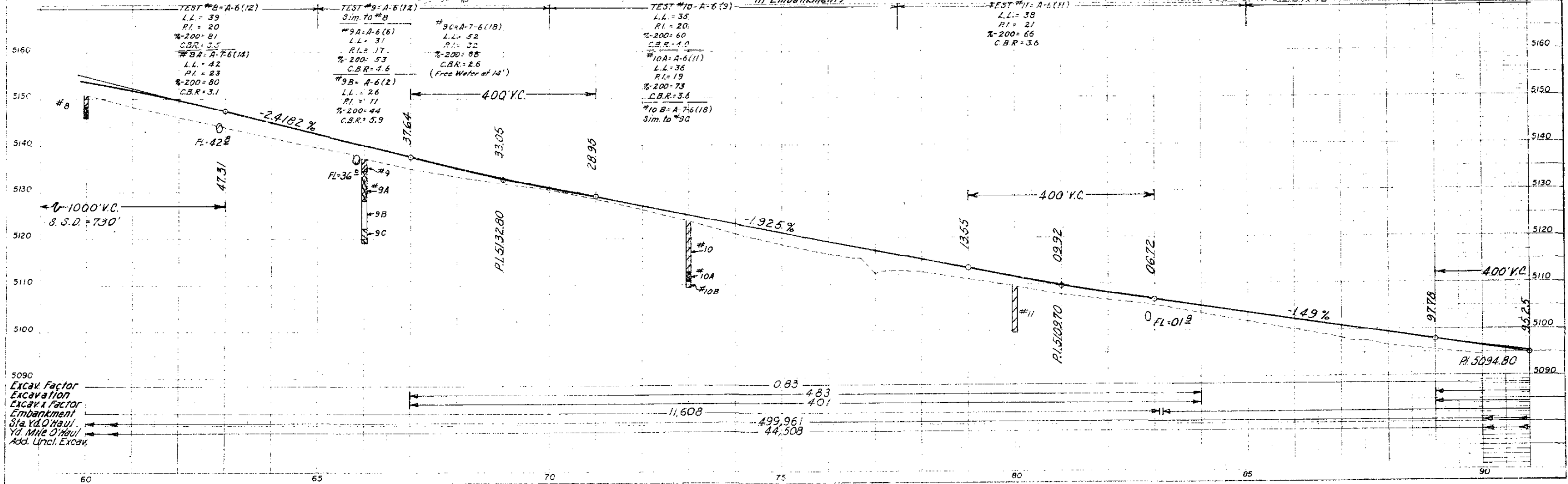
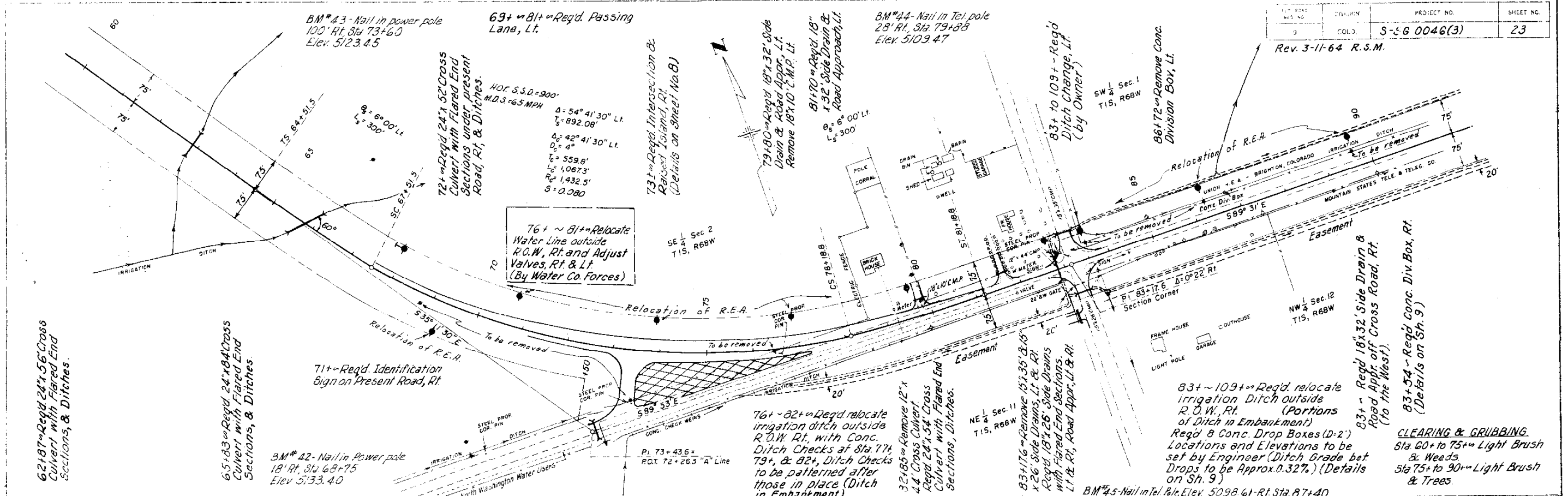
58x50 - Reg'd 18x32'
Side Drain & Road
Appr., Rt.

CLEARING & GRUBBING
Sta. 30+ to 60+ = Light
Brush & Weeds.



LET. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COL. 3.	S-5-6 0046(3)	23

Rev. 3-11-64 R.S.M.

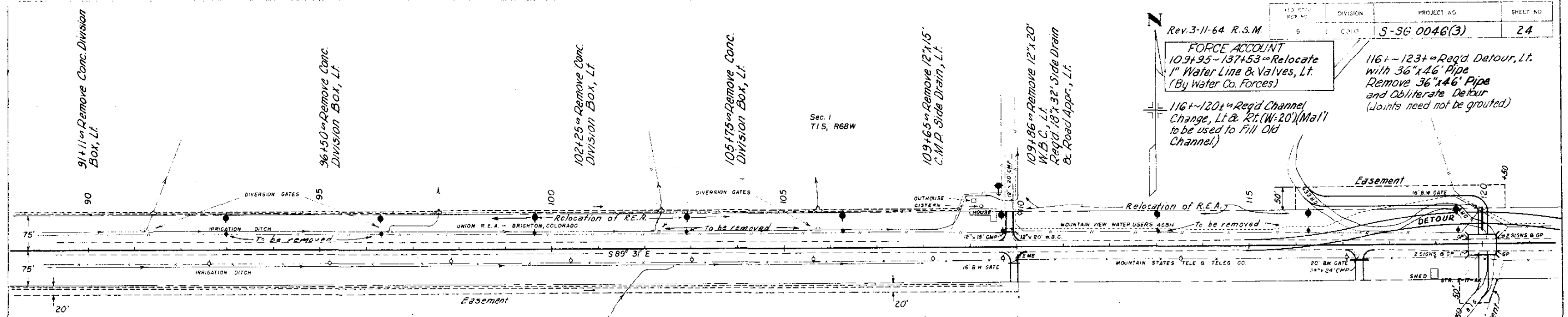


5090
Excav. Factor
Excavation
Excav. Factor
Embankment
Sta. Yd. Haul
Yd. Mile Haul
Add. Uncl. Excav.

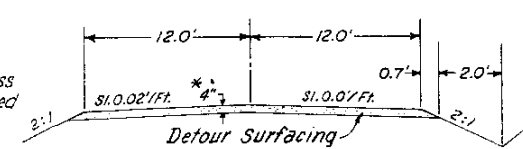
Rev. 3-11-64 R.S.M.
FORCE ACCOUNT
 109+95-137+53-Relocate
 1" Water Line & Valves, Lt.
 (By Water Co. Forces)

116+~123+ Reg'd Detour, Lt.
 with 36"x46" Pipe
 Remove 36"x46" Pipe
 and Obliterate Detour
 (Joints need not be grouted)

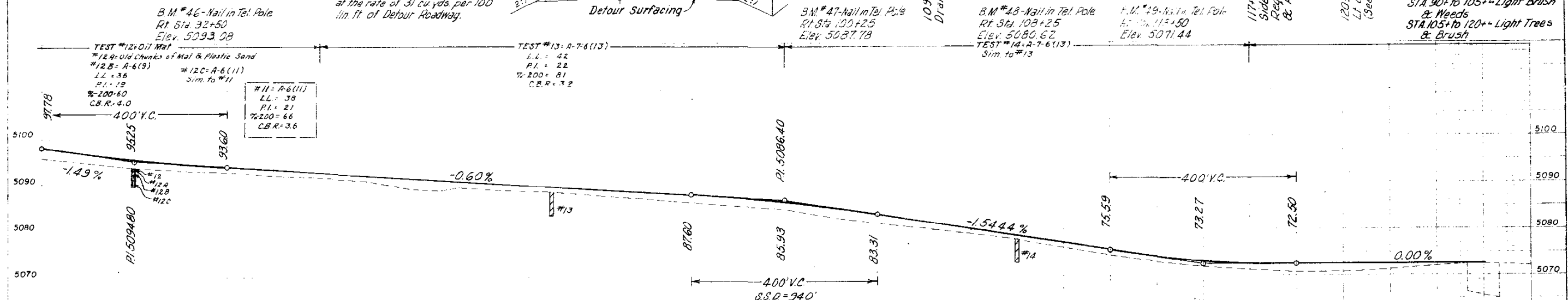
116+~120+ Reg'd Channel
 Change, Lt & Rt. (W-20) (Mat'l
 to be used to Fill Old
 Channel)



TYPICAL SECTION OF DETOUR
 STA. 116+~STA. 123+



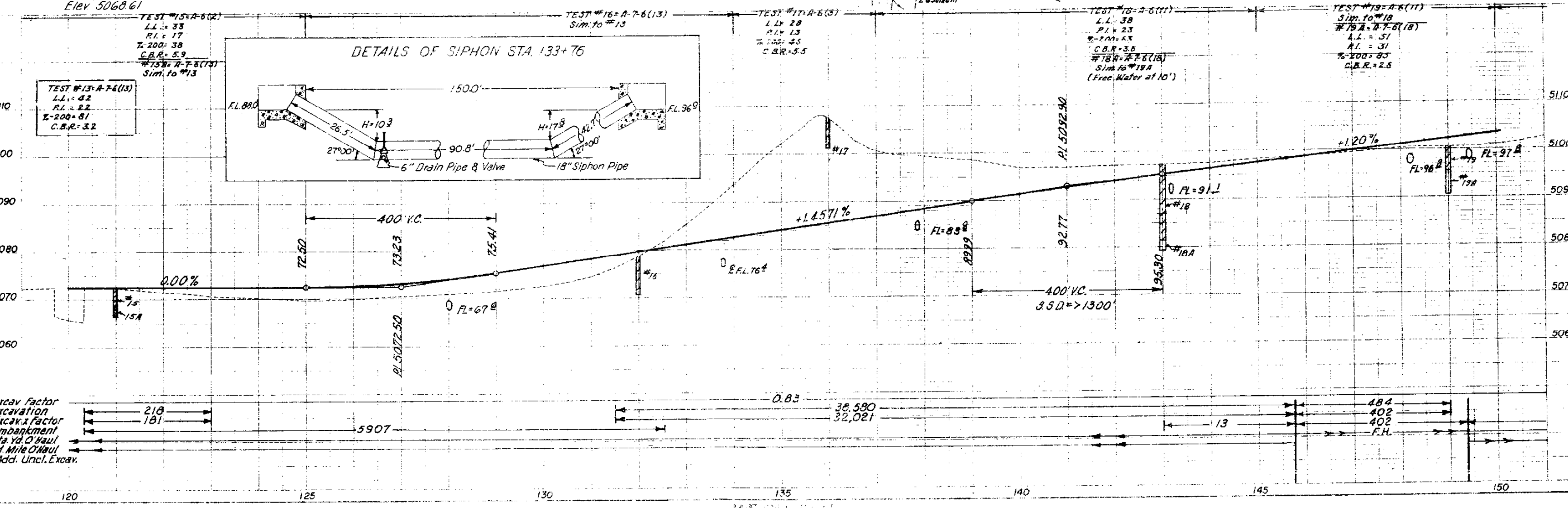
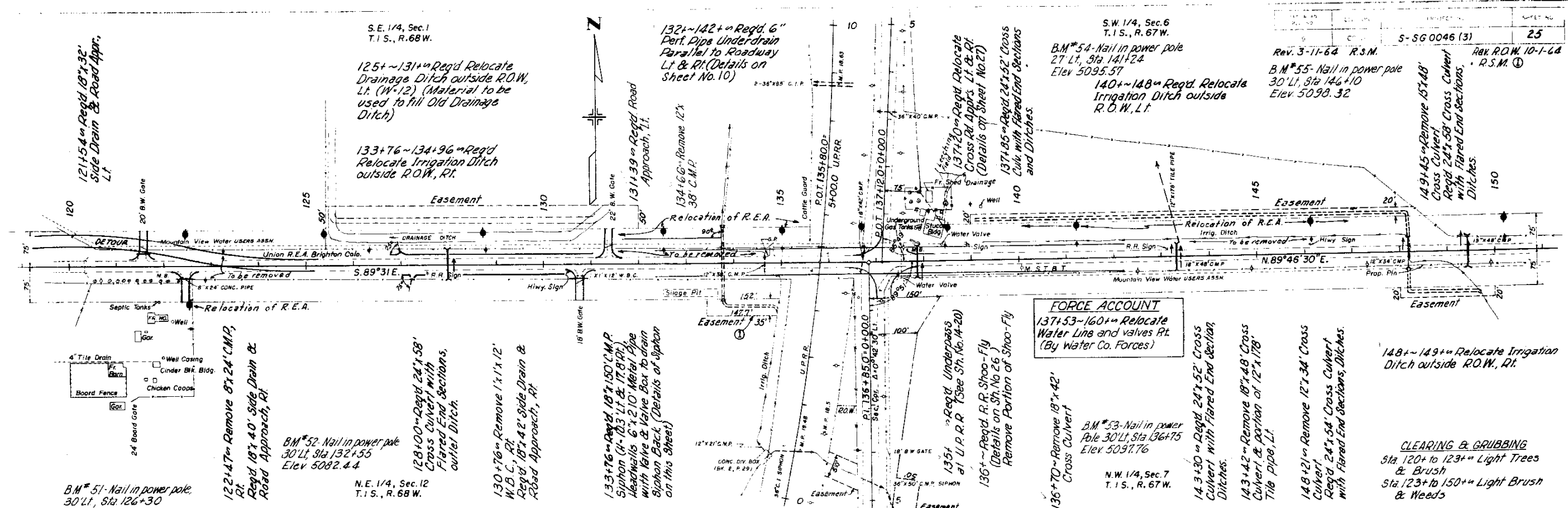
*Approximate 4" compacted thickness
 of Detour Surfacing shall be placed
 at the rate of 31 cu yds. per 100
 lin. ft. of Detour Roadway.



Excav. Factor	0.83	1,693	1,405	1,186
Excavation				
Excav. x factor				
Embarkment				
Sta. Yd. O'Haul	3,233			
Yd. Mile O'Haul				
Add. Uncl. Excav.				

24450

24451



FORCE ACCOUNT
 137+53-160+ Relocate
 Water Line and valves Rt.
 (By Water Co. Forces)

CLEARING & GRUBBING
 Sta 120+ to 123+ Light Trees
 & Brush
 Sta 123+ to 150+ Light Brush
 & Weeds

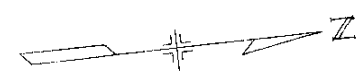
Excav Factor
 Excav x Factor
 Embankment
 Sta Yd C Haul
 Yd Mile C Haul
 Add. Uncl. Excav.

2445

2446

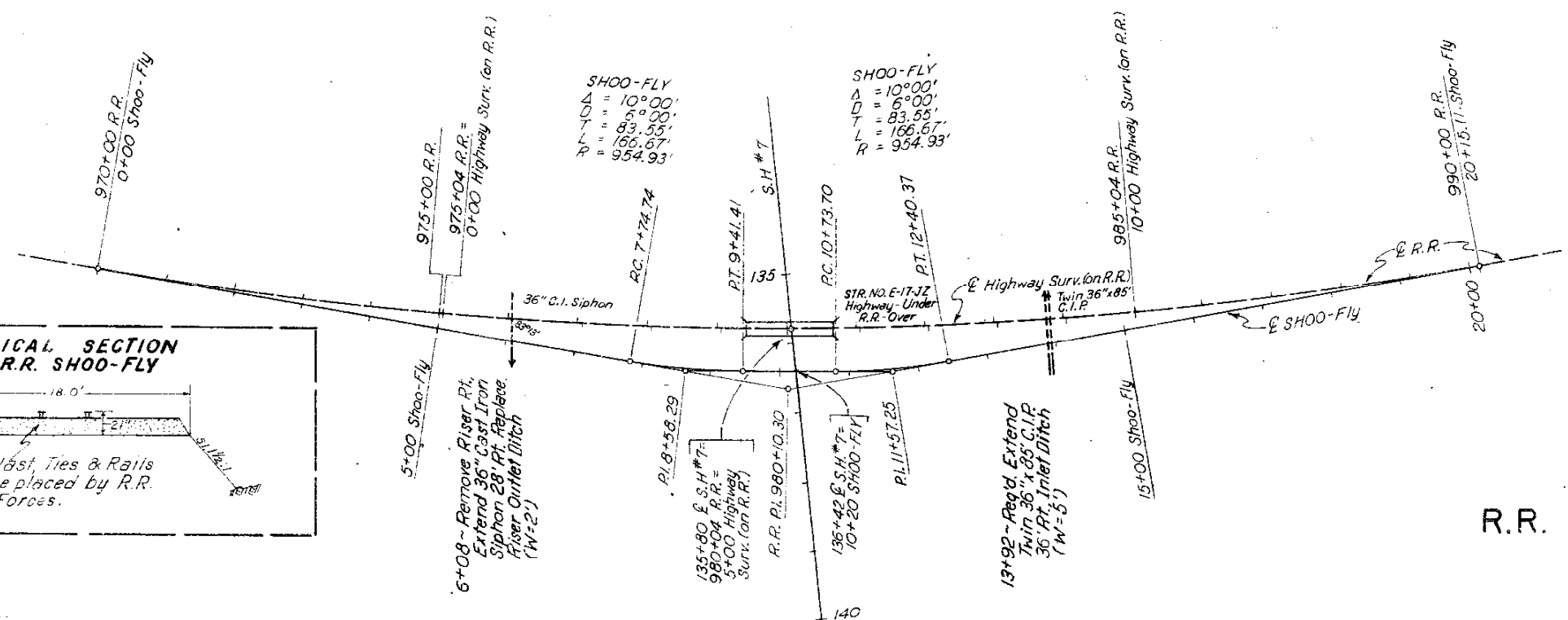
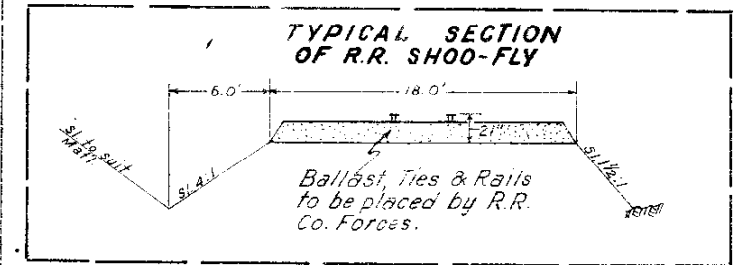
2447

R. R.
 $\Delta = 20^{\circ}00'$
 $D = 1500'$
 $T = 1010.30'$
 $L = 2000.0'$
 $R = 5729.58'$

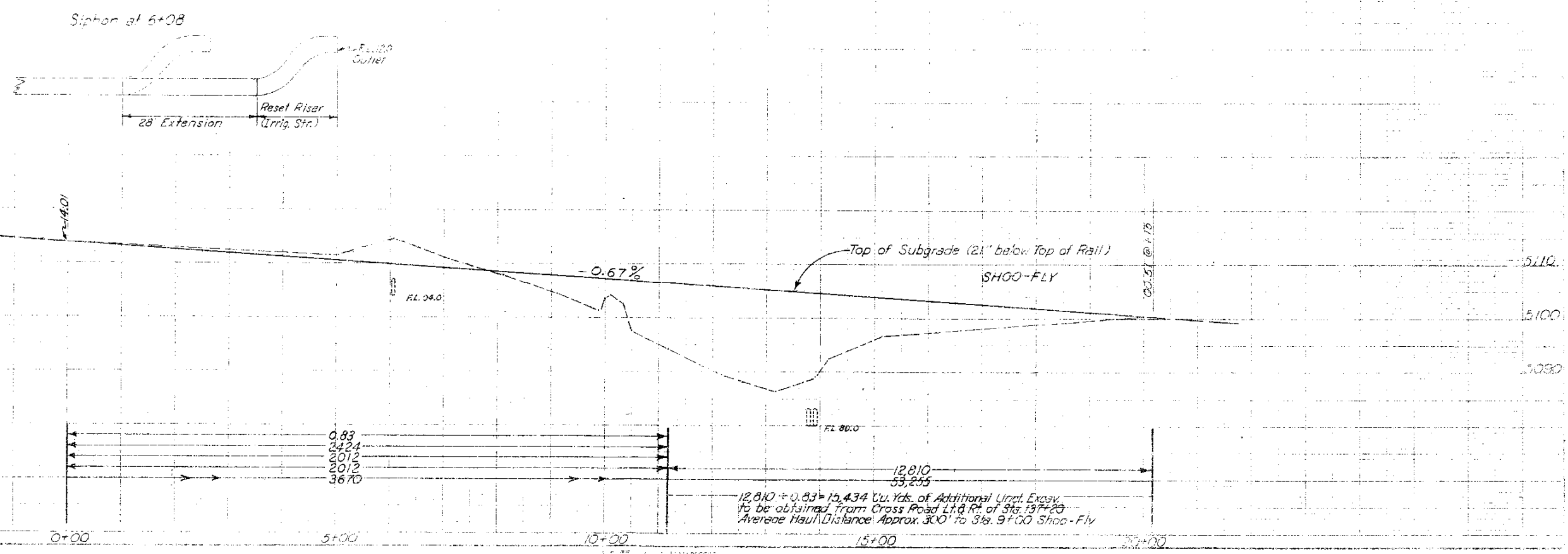


SHOO-FLY
 $\Delta = 10^{\circ}00'$
 $D = 600'$
 $T = 83.55'$
 $L = 166.67'$
 $R = 954.93'$

SHOO-FLY
 $\Delta = 10^{\circ}00'$
 $D = 600'$
 $T = 83.55'$
 $L = 166.67'$
 $R = 954.93'$



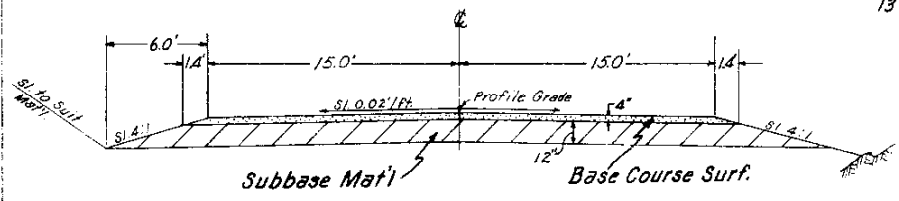
R.R. SHOO-FLY



Excav. Factor	0.83
Excavation	2424
Excavation x Factor	2013
Embarkment	2013
Sta. Yd. O.H.	3670
Additional Uncl. Excav.	
Source	

$12,810 \times 0.83 = 15,434$ Cu. Yds. of Additional Uncl. Excav.
 to be obtained from Cross Road Lt. & Rt. of Sta. 137+23
 Average Haul Distance Approx. 300' to Sta. 9+00 Shoo-Flv

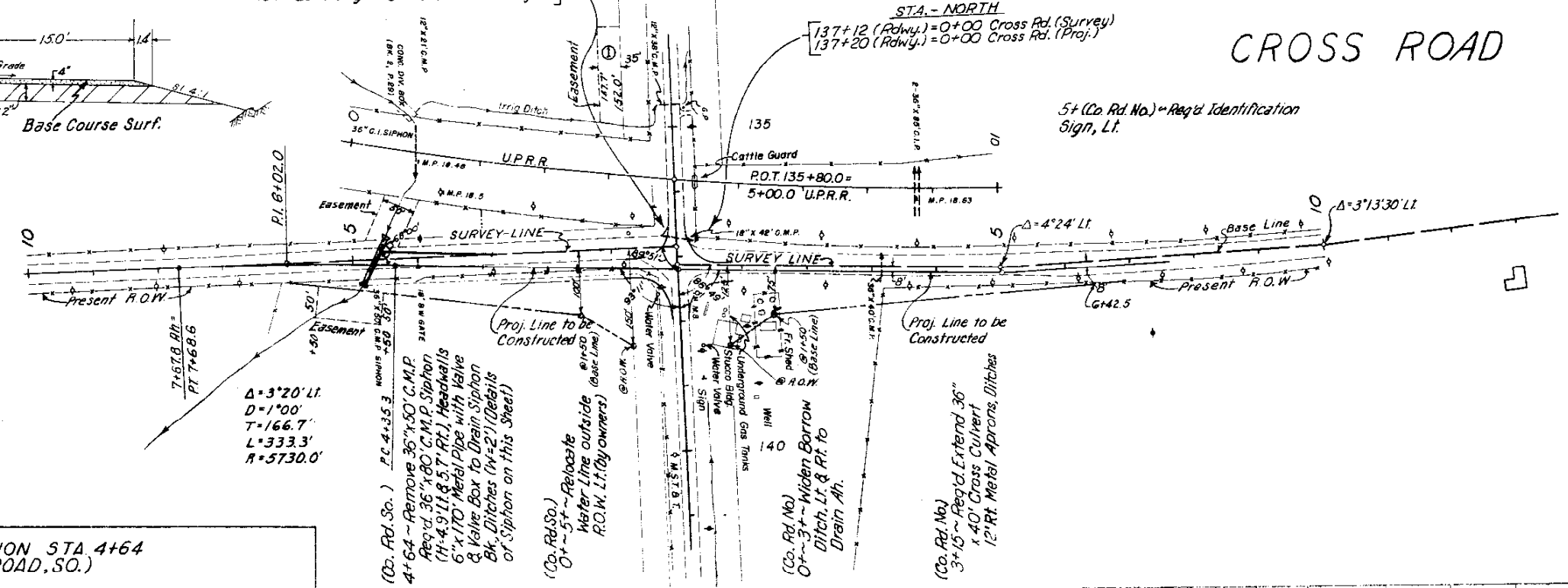
TYPICAL SECTION OF CROSS ROAD



STA. - SOUTH
 P.I. 136+85 (Rdwy.) = 0+00 Cross Rd. (Survey)
 137+20 (Rdwy.) = 0+00 Cross Rd. (Proj.)

STA. - NORTH
 137+12 (Rdwy.) = 0+00 Cross Rd. (Survey)
 137+20 (Rdwy.) = 0+00 Cross Rd. (Proj.)

CROSS ROAD



5+ (Co. Rd. No.) = Req'd Identification Sign, Lt.

$\Delta = 3^{\circ}20' \text{ Lt.}$
 $D = 1^{\circ}00'$
 $T = 166.7'$
 $L = 333.3'$
 $R = 5730.0'$

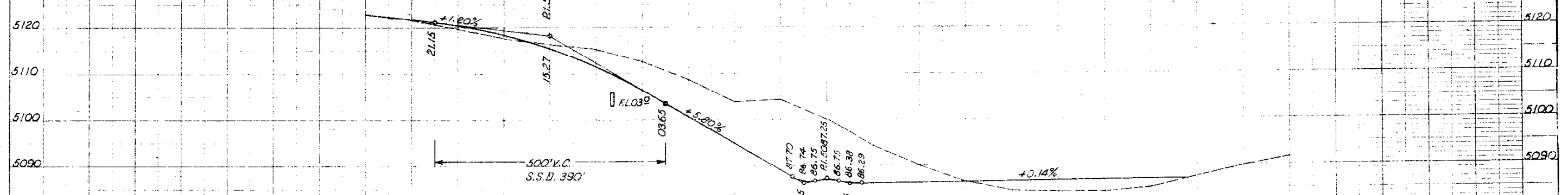
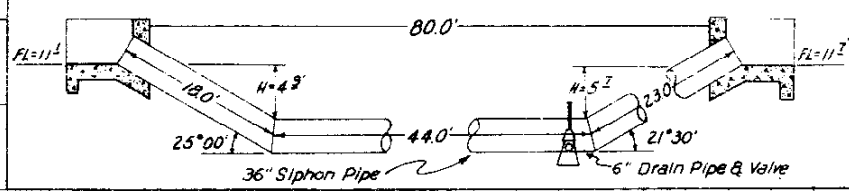
(Co. Rd. No.) P.C. 4+35.3 REMOVE 36" x 50' C.M.P. Siphon
 4+64 ~ Remove 36" x 50' C.M.P. Siphon
 Req'd. 36" x 50' C.M.P. Siphon
 (11'-4.9' Lt. & 5.7' Rt.) Headwalls
 & Valve Box to Drain Siphon
 Bk. Ditches (W=2') (Details or Siphon on this Sheet)

(Co. Rd. No.)
 0+ ~ 5+ ~ Relocate Water Line outside R.O.W. Lt. (By Owners)

(Co. Rd. No.)
 0+ ~ 3+ ~ Widen Bottom Ditch, Lt. & Rt. to Drain Aft.

(Co. Rd. No.)
 3+ ~ 5+ ~ Req'd. Extend 36" x 40' Cross Culvert 12' Rt. Metal Aprons, Ditches

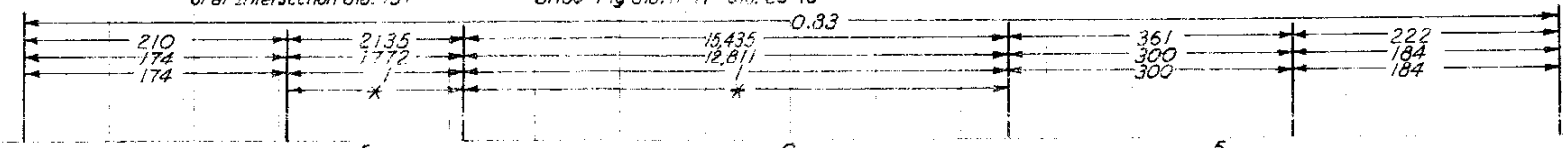
DETAILS OF SIPHON STA. 4+64 (COUNTY ROAD, S.O.)



* 1771 ÷ 0.83 = 2134 Cu. Yds. of Excess Excav. to be used in Replacing unsuitable material or at Intersection Sta. 73+

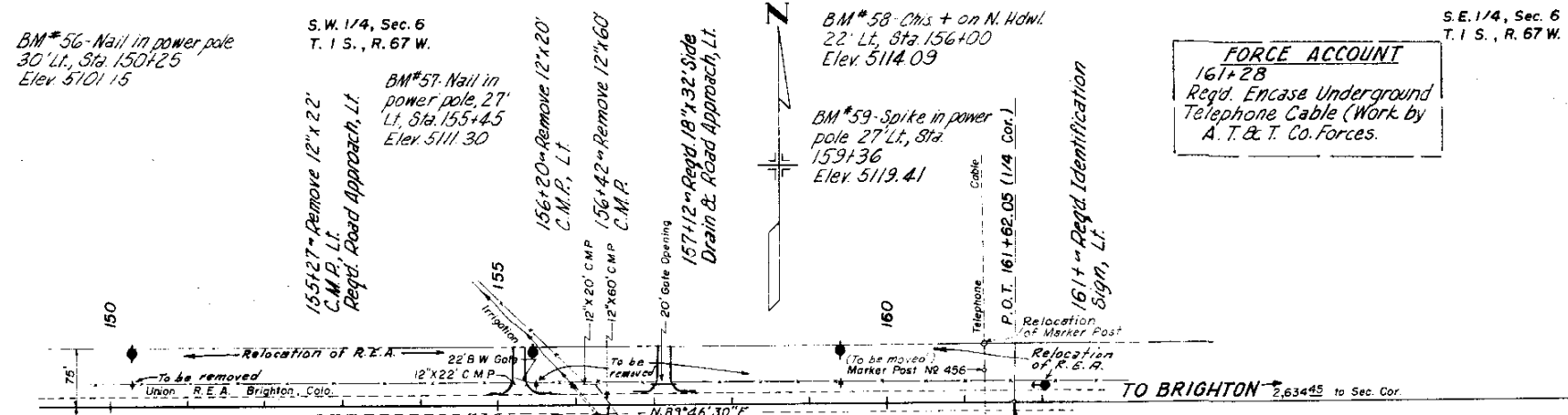
* 12,810 ÷ 0.83 = 15,434 Cu. Yds. of Excess Excav. to be placed on Shoo-Fly Sta. 11+17 ~ Sta. 20+15

Excav. Factor
 Excavation
 Excavation x Factor
 Embankment
 Excess Excav.



FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.	5-36 0046(3)	28

Rev. 3-11-64 R.S.M.

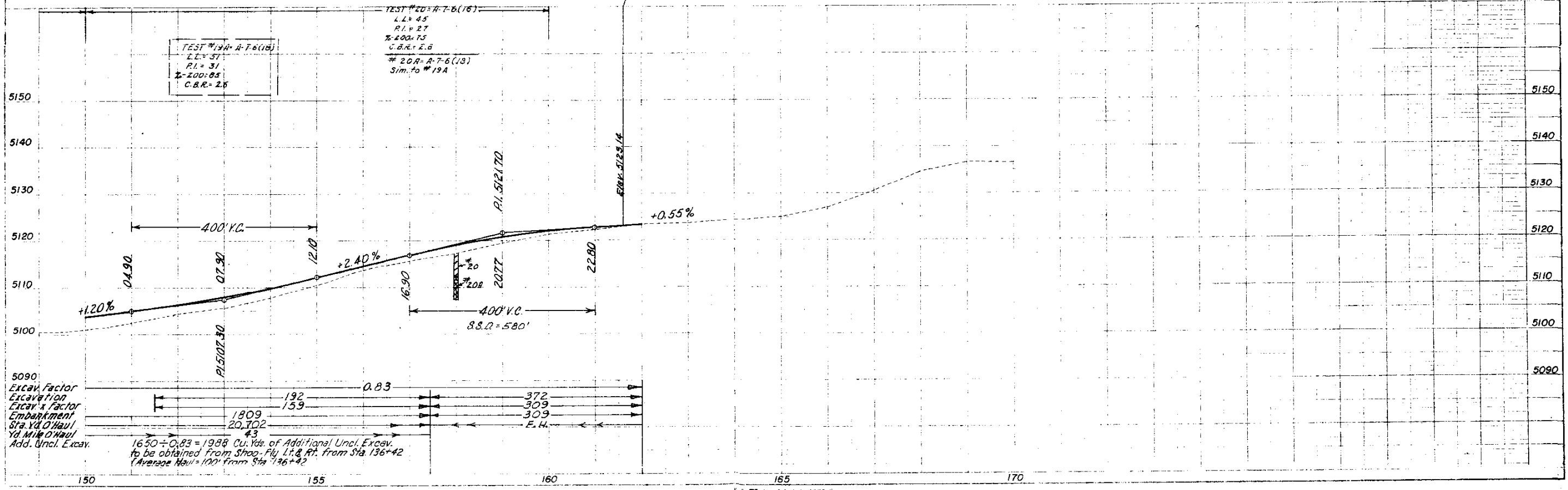


FORCE ACCOUNT
 161+28
 Reqd. Encase Underground Telephone Cable (Work by A. T. & T. Co. Forces.)

STA. 187+96.0 - END 5-SG 0046(3) R.O.W. →

STA. 161+62.1 - END 5-SG 0046(3) - CONSTRUCTION

CLEARING & GRUBBING
 Sta. 150+ to 161+ in Light Brush & Weeds.



Excavation
Cu. Yds. Area

Embankment
Area Cu. Yds.

Excavation
Cu. Yds. Area

Embankment
Area Cu. Yds.

FED. ROAD REGION	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	S-55 0046(3)	29	

Rev. 3-11-64 R.S.M.

SUMMARY OF EARTHWORK QUANTITIES

UNCLASSIFIED EXCAVATION

* MAIN ROADWAY (COMPUTER)	57,925
* ADDITIONAL UNCLASSIFIED EXCAVATION (REMOVE PORTION OF SHOOF-FLY)	1,988
* ESTIMATED FOR SUBSIDENCE	5,991
FROM STRUCTURE QUANTITIES AS EXCAVATION	4,382
* FROM STRUCTURE QUANTITIES AS EMBANKMENT	4,303
ESTIMATED FOR CUT SLOPE TREATMENT	852
‡ * INTERSECTION STA. 73+ (EMB.)	3,966
REMOVING UNSUITABLE MATERIAL	1,771
‡ REPLACING UNSUITABLE MATERIAL	— ‡
* R.R. SHOOF-FLY STA. 136+ (X-SECTIONS)	2,424
* CROSS ROAD STA. 137+ (X-SECTIONS)	18,363
TOTAL	101,965 CU. YDS.

COMPACTION

* AS EXCAVATION	24,550
ESTIMATED FOR BASE OF CUTS AND FILLS	41,723
TOTAL	136,639 CU. YDS.

EXCAVATION X FACTOR

FROM COMPUTER	48,078
R.R. SHOOF-FLY STA. 136+	2,012
CROSS ROAD STA. 137+	15,241
REMOVING PORTION OF SHOOF-FLY (FOR MAIN R'DWAY)	1,650
TOTAL	66,981 CU. YDS.

EMBANKMENT

FROM COMPUTER	43,728
R.R. SHOOF-FLY STA. 136+ (X-SECTIONS)	14,822
CROSS ROAD STA. 137+ (X-SECTIONS)	650
REPLACING UNSUITABLE MATERIAL	1,771
TOTAL	66,981 CU. YDS.

STATION YARD OVERHAUL

FROM MASS DIAGRAM	520,663
ESTIMATED FOR SUBSIDENCE	52,066
INTERSECTION STA. 73+	35,613
REPLACING UNSUITABLE MATERIAL	18,130
R.R. SHOOF-FLY STA. 136+	56,925
TOTAL	683,433 STA. YDS.

YARD MILE OVERHAUL

FROM MASS DIAGRAM	44,551
ESTIMATED FOR SUBSIDENCE	4,455
INTERSECTION STA. 73+	3,050
REPLACING UNSUITABLE MATERIAL	1,551
R.R. SHOOF-FLY STA. 136+	—
TOTAL	53,607 YD. MI.

‡ MATERIAL TO COME FROM EXCESS EXCAVATION (CROSS ROAD STA. 137+ and/or FROM ADDITIONAL REMOVAL OF SHOOF-FLY)

UNCLASSIFIED DITCH EXCAVATION

INTERCEPTING DITCHES

Δ STATION	SIDE	CU. YDS.
8+ ~ 18+	Rt.	150
21+ ~ 24+	Rt.	45
37+ ~ 55+	Rt.	270
FROM STRUCTURE QUANTITIES		1,139
TOTAL		1,604

Δ APPROXIMATE LOCATIONS MAY BE CHANGED DURING CONSTRUCTION

SHEET TOTALS	EXCAVATION	CU. YDS.
	EXCAVATION	CU. YDS.
	EMBANKMENT	CU. YDS.

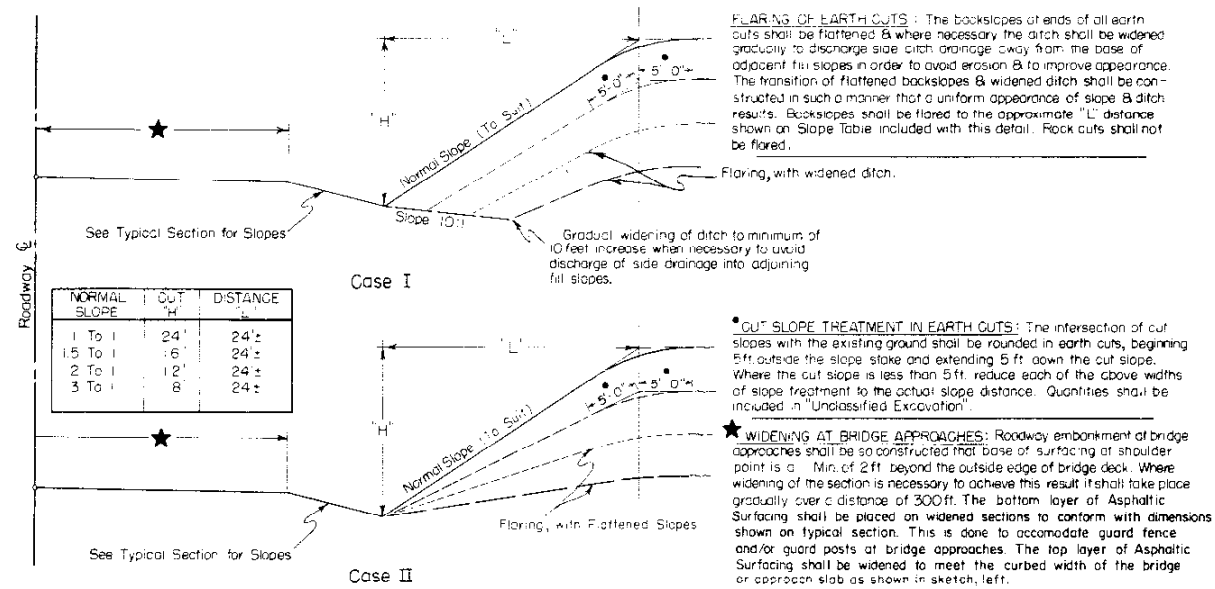
STANDARD SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT & WIDENING AT BRIDGES AND AT CREST OF GRADES

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

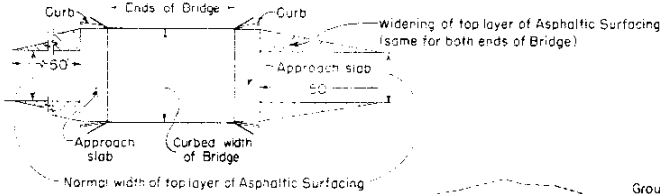
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

REVISIONS	
4-22-63 Rev. Bridge Approaches	L.E.O.
2-3-64 DEPT. NAME	M.R.H.

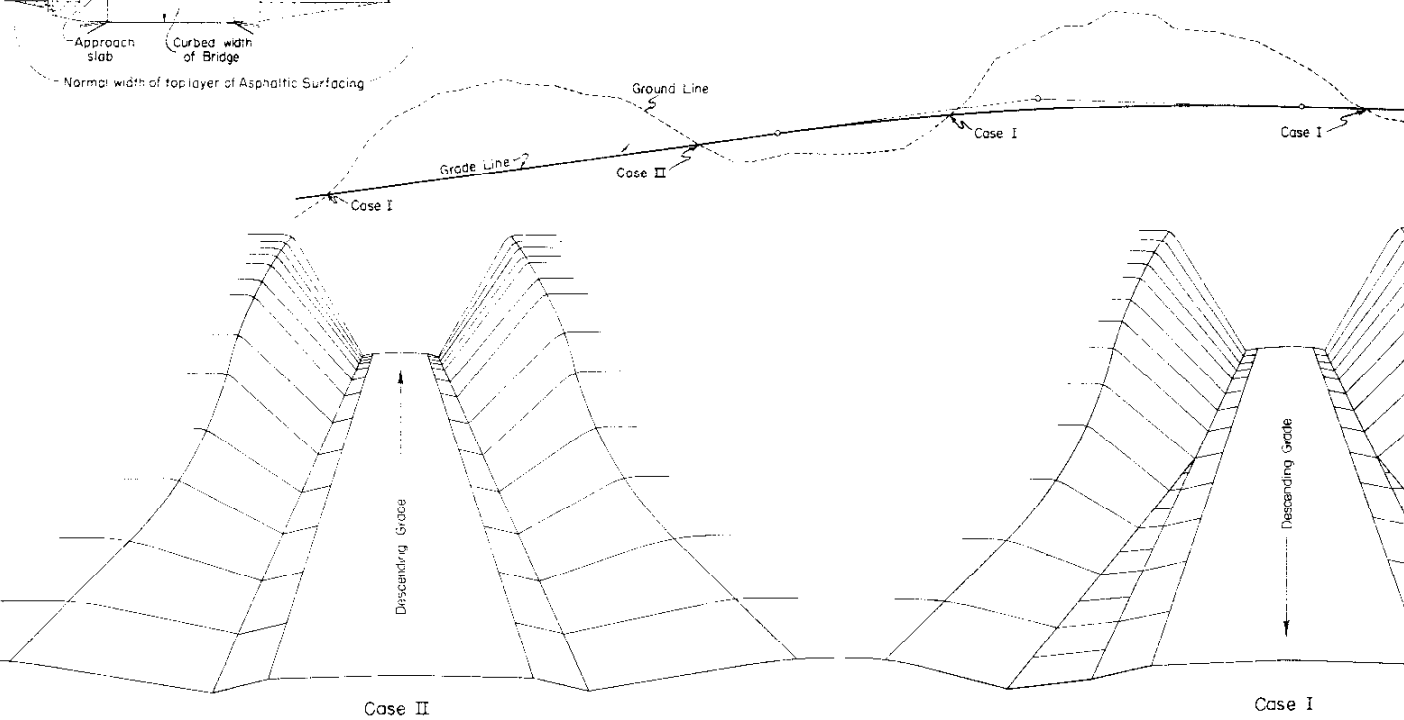
GENERAL DETAILS FOR FLARING OF EARTH CUTS, CUT SLOPE TREATMENT & WIDENING AT BRIDGES



PLAN OF WIDENING TOP LAYER OF ASPHALTIC SURFACING AT BRIDGE APPROACHES



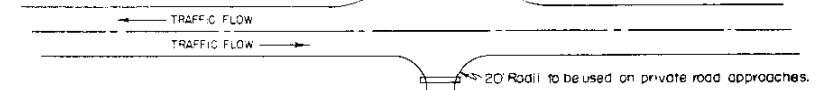
PLAN OF FLARING IN EARTH CUTS



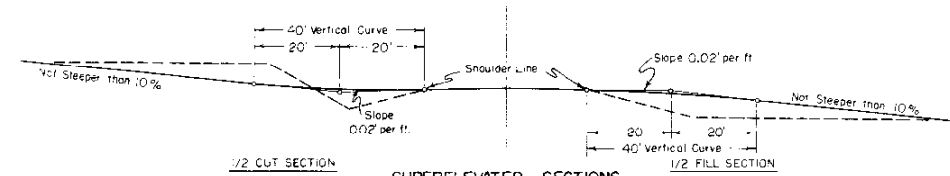
TYPICAL PLANS FOR SIDE APPROACH ROADS

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

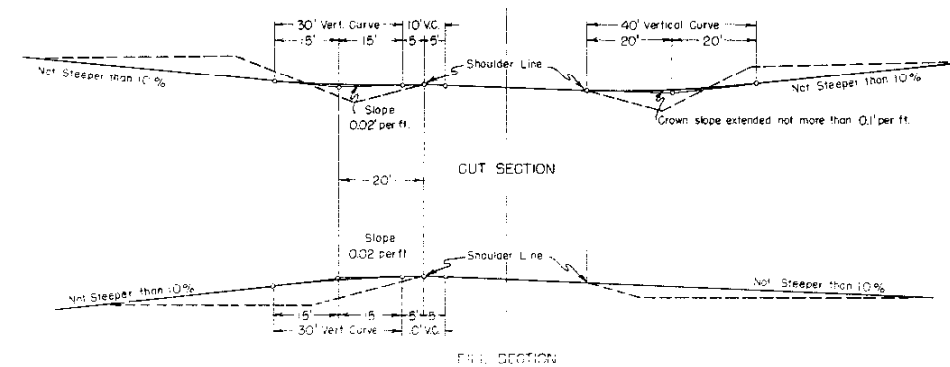
50' Radii to be used on all intersecting roads except private approaches. Radii may be varied to suit field conditions.



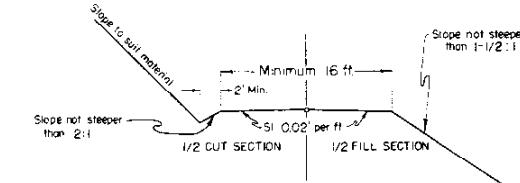
STANDARD CROWNED SECTION



SUPERELEVATED SECTIONS



TYPICAL SECTION FOR APPROACH

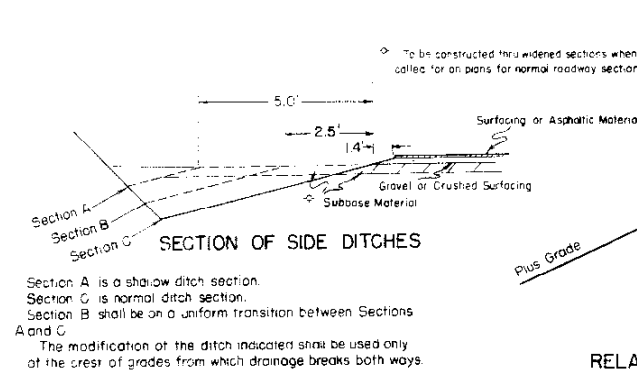


NOTE:

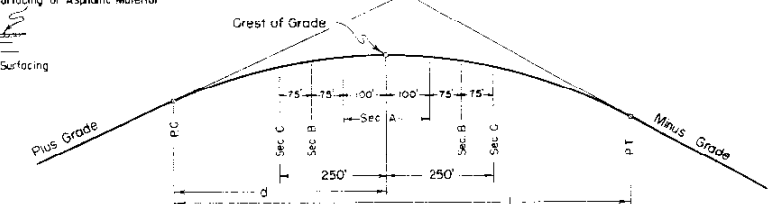
ROAD APPROACHES: To conform to the above details unless otherwise indicated on plans by Special Details. The width of the crowned section shall be not less than the width of the crowned section of the existing approach road and in no case shall the new construction be less than sixteen (16) feet in width.

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)



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.
 All side approach roads to the Project shall be Gravel Surfaced with a four (4) inch thickness of "Gravel or Crushed Rock Surfacing" extending approximately to the Right of Way Line. Estimated tonnage & type of material required for this operation are shown in the Surfacing Plan.
 The maximum grades shown are to be the limiting grades for all road approaches. Modifications of grades will be permitted where adherence to the grades as shown would cause damage to property or create other unsatisfactory conditions. Grades less than the maximum shown are to be used wherever feasible.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

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

Designed by P.Z. Approved by A. Zubian
 Made by SJM & ASH
 Checked by C.R.S. Date: November 1, 1953

STANDARD M-5-A

(MAY 1, 1962) REV. 1-31-64, DEPT. NAME, M.R.H.

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

1 2 3 4 5 6 7 8 9 0.

A B C D E F G H I J K L

M N O P Q R S T U V W

Scale in inches
3
2
1
0

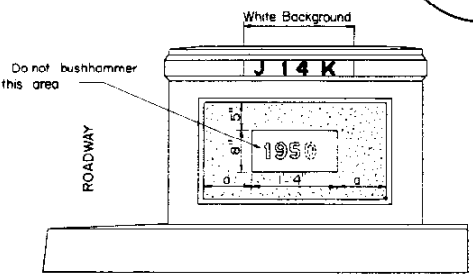
a f g l J 14 K 11 9 5 0

abcdefghijklmnopqrstuvwxyz

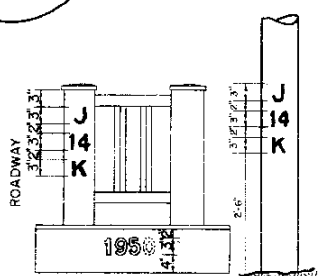
SAMPLE BRIDGE NUMBER

GENERAL NOTES

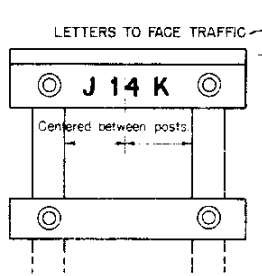
SAMPLE YEAR NUMBER



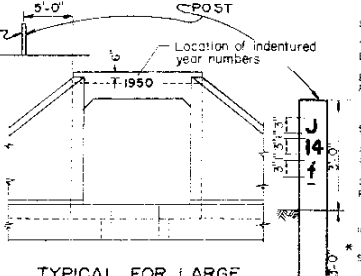
TYPICAL FOR CONCRETE ENDPOST



TYPICAL FOR STEEL HANDRAIL END POST



TYPICAL FOR TIMBER WING HANDRAIL



TYPICAL FOR LARGE BOX CULVERTS & STRUCTURES WITHOUT END POSTS

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS APPLICABLE TO THE PROJECT. THE SIZE SHAPE AND SPACING OF THE LETTERS AND FIGURES SHALL BE IN ACCORDANCE WITH THE FULL SIZE SHOWN ON THIS SHEET. ADDITIONAL COPIES OF THIS FULL SIZE SHEET CAN BE OBTAINED FROM THE DEPARTMENT WITHOUT CHARGE.

THE YEAR NUMBERS ARE RECESSED IN CONCRETE BY A MINIMUM AS SHOWN INTO THE FACE OF THE ENDPOST ON THE RIGHT HAND SIDE OF EACH BRIDGE END AND INTO THE FACE OF THE DOWNSTREAM HEADWALL OF CULVERTS AS SHOWN ON PLAN DETAILS. NUMBERS TO BE MADE OF WOOD, METAL OR OTHER SUITABLE MATERIAL AND ATTACHED TO THE FORMS BEFORE CONCRETE IS POURED. THE YEAR NUMBER OF EACH STRUCTURE SHALL CORRESPOND WITH THE YEAR IN WHICH THE CONCRETE IS POURED.

THE STRUCTURE NUMBER SHALL BE STENCILED ON THE RIGHT HAND SIDE OF EACH BRIDGE END AS SHOWN ON THIS STANDARD AND AS SPECIFIED WHERE THE STRUCTURE HAS NO END POSTS. THE NUMBER SHALL BE PLACED ON A POST ON THE RIGHT HAND SIDE OF THE ROAD AS SHOWN FOR SIGNS. THE NUMBER SHALL BE PLACED ON SIGN POSTS ON THE RIGHT HAND SIDE OF THE ROADWAY.

THE CORRECT NUMBER FOR EACH BRIDGE OR SIGN IS SHOWN ON THE PLANS.

THE NUMBERS FOR MAJOR STRUCTURES OF OVER 20 FEET CLEAR SPAN SHALL BE UPPER CASE LETTERS. THE NUMBERS FOR MINOR STRUCTURES OF 12 TO 20 FEET CLEAR SPAN SHALL BE LOWER CASE LETTERS. SIGN BRIDGES SHALL BE CONSIDERED AS MAJOR STRUCTURES.

A PROPER WHITE BACKGROUND RECTANGULAR IN SHAPE AND EXTENDING 4 INCHES BEFORE THE LIMITS OF THE NUMBER SHALL BE PAINTED WITH TWO COATS OF ACCEPTABLE WHITE PAINT. IF AN APPROVED WHITE CONCRETE PAINT IS USED BEFORE PAINTING THE SURFACE MUST BE THOROUGHLY DRIED, CLEANED AND PROPERLY SIZED ON TIMBER HANDRAILS THE WHITE PAINT USED ON THE BRIDGE WILL BE SATISFACTORY.

AFTER THE WHITE BACKGROUND HAS DRIED SUFFICIENTLY, THE CORRECT STRUCTURE NUMBER SHALL BE CAREFULLY STENCILED ON IT. WITH TWO COATS OF "SECOND FIELD COATS" DARK OR EXTENSION BLACK PAINT (AS SPECIFIED UNDER ITEM 30 PAINTS AND PAINTING) THE BRACES OF THE STENCILED LETTERS AND FIGURES SHALL BE CAREFULLY FILLED IN BY HAND TO MAKE SOLID FIGURES.

SUFFICIENT TIME BETWEEN SUCCESSIVE COATS SHALL BE ALLOWED TO PERMIT THORO DRYING.

THE COST OF PAINTING OF STRUCTURE NUMBERS AND FURNISHING AND PLACING POSTS FOR STRUCTURE NUMBERS SHALL BE CONSIDERED SUBSIDIARY WORK AND SHALL BE INCLUDED IN THE ORIGINAL CONTRACT ITEMS AND WILL NOT BE PAID FOR AS A SEPARATE ITEM.

* THE LENGTH OF SPAN OF STRUCTURE SHALL BE MEASURED ALONG CENTER LINE OF ROADWAY. IN CASE OF DOUBLE OR MULTIPLE BOX CULVERTS THE CENTER WALL OR WALLS SHALL BE DISREGARDED AND CLEAR SPAN MEASURED FROM INSIDE OF END WALLS.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

LETTERS AND FIGURES
FOR
STRUCTURE NUMBERS

Designed by _____
Made by _____
Checked by _____

Approved by *A. H. Newhall*
Bridge Engineer
Date: *Feb. 17, 1958*

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

STANDARD M-6-B

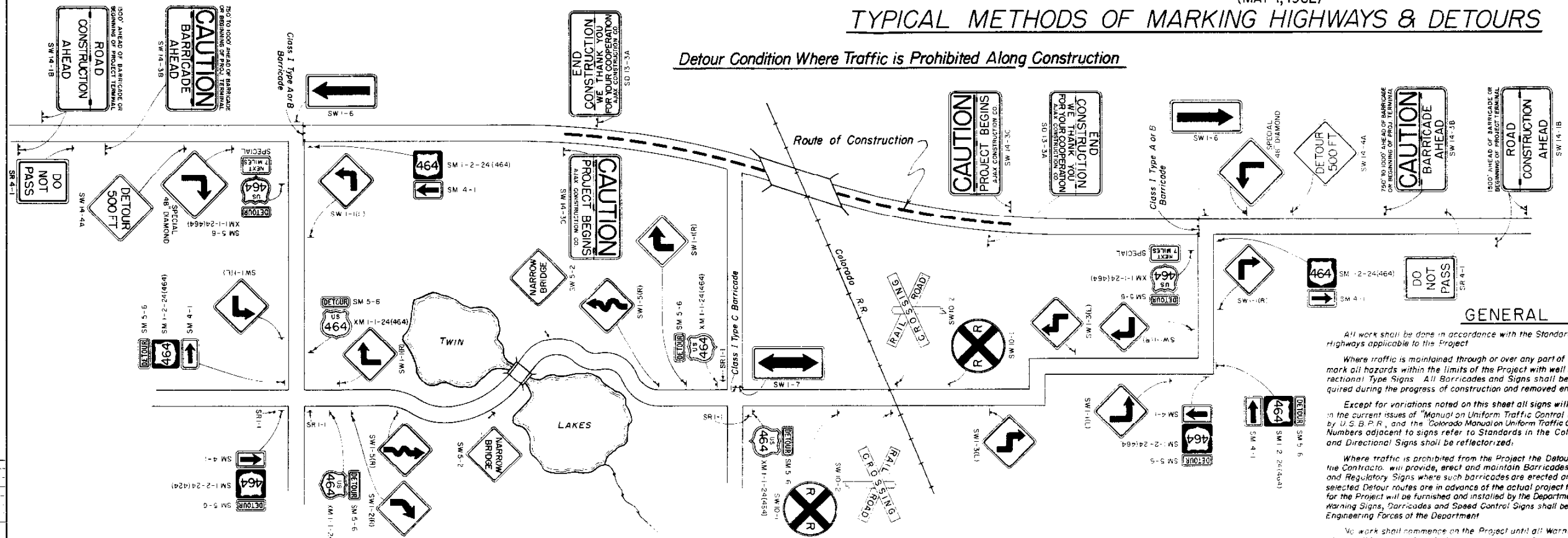
(SHEET 1 OF 2 SHEETS)
(MAY 1, 1962)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

TYPICAL METHODS OF MARKING HIGHWAYS & DETOURS

REVISIONS			
NO.	DATE	GENERAL REV.	BY
1-14-63			L.C.O.
1-31-64			M.R.H.

Detour Condition Where Traffic is Prohibited Along Construction



GENERAL NOTES

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

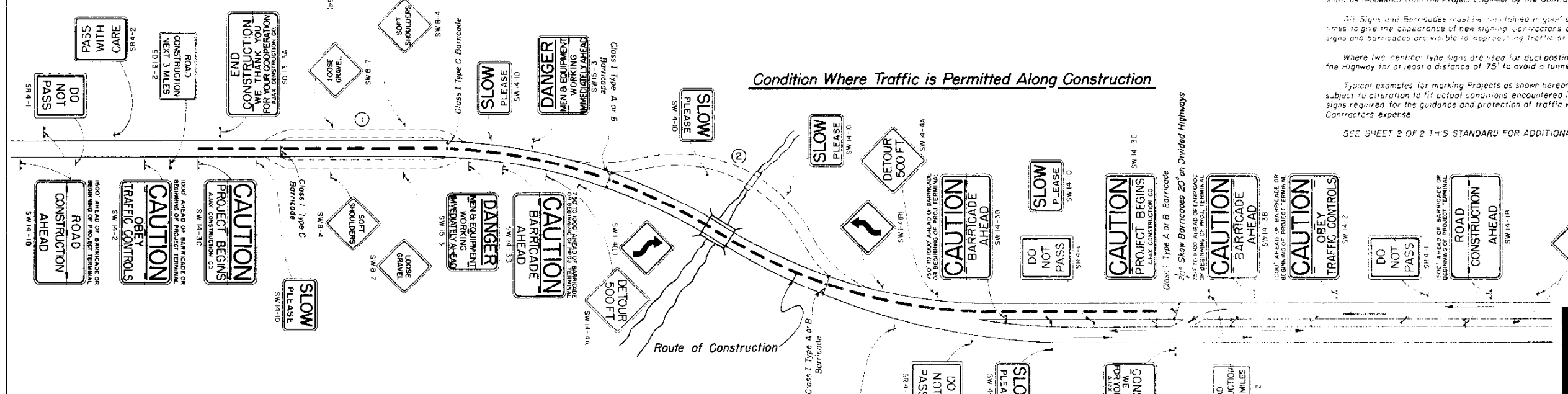
All Signs and Barricades must be maintained in good condition and kept clean and free of dirt at all times to give the appearance of new signs. Contractors and Engineers equipment must be parked so that signs and barricades are visible to approaching traffic at all times.

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.

Typical examples for marking Projects as shown hereon constitute a minimum of signs required and are 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.

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

Condition Where Traffic is Permitted Along Construction



- LEGEND**
- ① NEW GRADE, TRAFFIC USING SHOULDERS
 - ② TRAFFIC USING DETOUR AROUND STRUCTURE

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

Construction Traffic Signs

Designed by J.C.R. Approved by L. Julian
Made by J.C.R. Engineer, Survey & Plans
Checked by Date: July 22, 1955

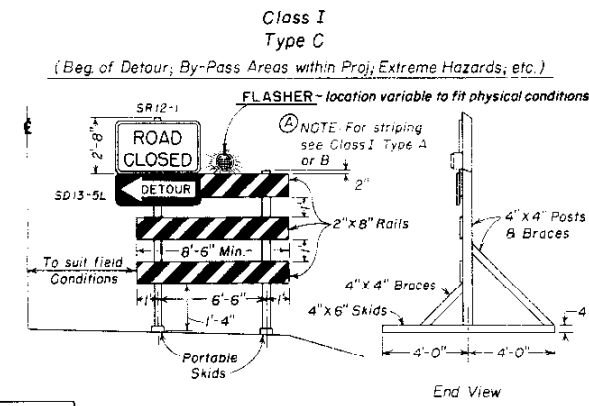
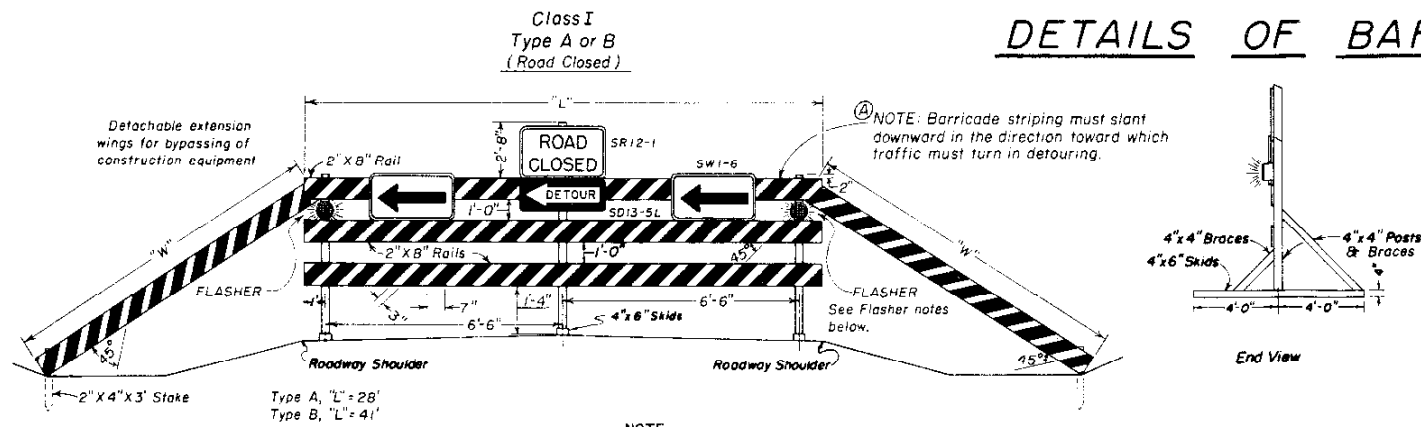
STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

STANDARD M-6-B
(SHEET 2 OF 2 SHEETS)
(MAY 1, 1962)

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS		
5-16-62	Rev. Margin & Border Color	L.E.O.
1-14-63	General Rev.	L.E.O.
1-31-64	DEPT. NAME	M.R.H.

DETAILS OF BARRICADES



SPECIFICATIONS

PAINT - All paint and methods of painting shall be in conformity with Item 38 of the Standard Specifications.

STRIPING - Planking and Wings on all Barricades shall be painted with Maintenance Flat Black on both sides before adding Reflective Strips. Reflective Strips shall be "Cutout Smooth Surface Yellow," of a type approved by the Department, 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 left hand side of the lower plank and progress up to the right with the stripes making an angle of 45 degrees with the horizontal axis of the board as shown in the detail. Traffic diversion to the right will be just the opposite.
- 2-Stripes on Barricades diverting traffic in both directions shall begin at the center of the lower plank and progress down in both directions.

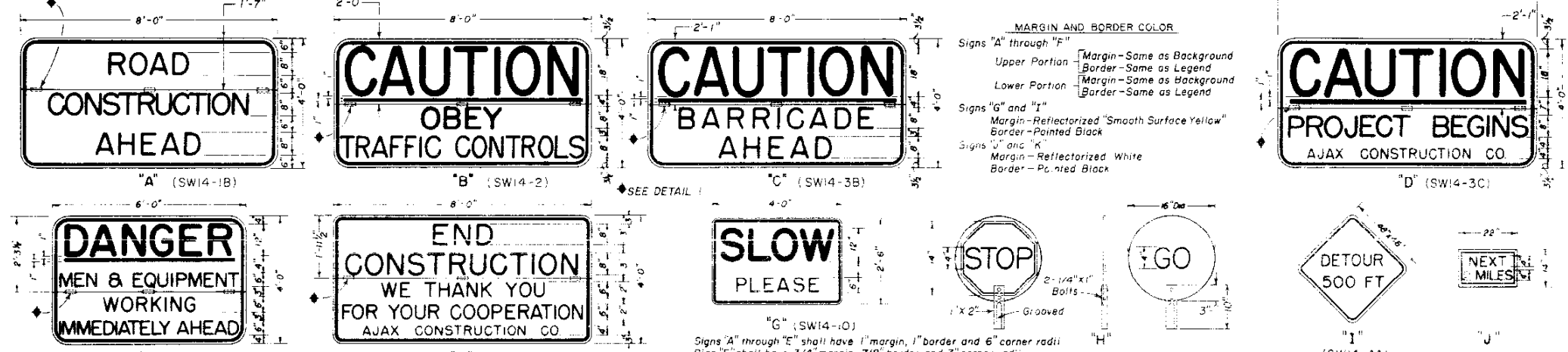
TIMBER - All Timber used shall conform to the Standard Specifications for Miscellaneous Untreated Timber.

Planking	2" x 8"	S 4 S
Posts (Barricades)	4" x 4"	S 4 S
Posts (Signs)	4" x 4" or 6" x 6"	S 4 S

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

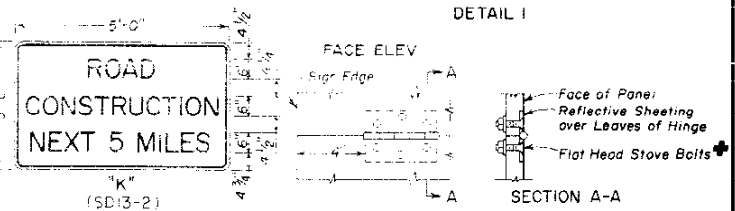
All skids, braces and posts to be painted yellow and nailed together with No. 20d nails. Bases to be weighted where necessary to provide stability.

DETAILS OF CONSTRUCTION SIGNS



NOTES

1. Signs "A" through "F" shall be of the hinge and fold type to facilitate the closing down of the sign when the need is not prevalent. These signs shall be hinged with 3-4" Butt Hinges (right pin) mortised into the face surface of the sign.
2. The reflective sheeting used on the sign background shall be placed over the leaves of the hinges.
3. Hinges shall be fastened to the sign with flat head stove bolts having a flat washer under the nut on back of sign.
4. All hinges, bolts, nuts and washers to be rust resistant.
5. Sign letters to be held in the open position with hooks and eyes or other approved fastening devices.
6. 5/8" Countersunk Steel or Aluminum Lock Bolt Fasteners with Collars suitable for use on wood may be used in lieu of stove bolts.



DETAILS OF SIGN AND BEACON FABRICATION AND USAGE

Construction Signs "A" through "K" shall be made of 5/8" 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 Yellow background with painted Black lettering.

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 Yellow 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 Yellow 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 painted 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" - This sign shall be made of 3/8" (Min) Plywood or other suitable material. Legend to be painted Black on a reflectORIZED White background. 3/4" x 9" metal slides to be placed between "NEXT 5 MILES", spaced so as to accommodate appropriate sized numerals. Numerals calculated to the nearest Mile.

Construction Sign "K" - ReflectORIZED White background with painted Black lettering.

Signs "A" through "E" and "G" shall be painted on the backside with one coat of white primer and one coat of yellow enamel.

Signs "F", "J" and "K" shall be given 2 coats of white paint on the backside.

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.

Sign "H" - This sign shall be placed at the limits of any project more than 2 miles in extent, where traffic is maintained through the job.

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

Flashers used on the Barricades shall be of the Battery or Electrical Type and shall have no less than a 4" diameter lens. The illuminating element in a flashing yellow beacon or signal shall be flashed continuously at a rate between 50 to 70 flashes per minute, with the "on" time being at least 25% of the cycle and 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.

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.

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:

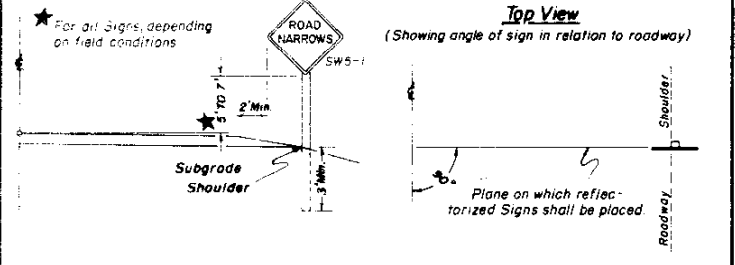
1. "ROAD CONSTRUCTION AHEAD"	Minimum 4
2. "CAUTION OBEY TRAFFIC CONTROLS"	Minimum 2
3. "CAUTION BARRICADE AHEAD"	As Required
4. Standard Warning, Guide & Directional Signs	As Required
5. "ROAD CONSTRUCTION NEXT 5 MILES"	As Required

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 Flashes as follows: Class I Type A or B Barricade	Minimum 3
Class I Type C Barricade	Minimum 1
9. Flashers - Class I Type A or B Barricade	2 Required
Class I Type C Barricade	As Required

All the request of the Contractor layouts of signs will be furnished 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 & Hazards



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

Construction Traffic Signs

Designed by J.G.R. Approved by J. Peterson
Made by J.G.R. Engineer, Surveys & Plans
Checked by Date: July 22, 1955

TYPICAL SIGNS STANDARD M-6-CA

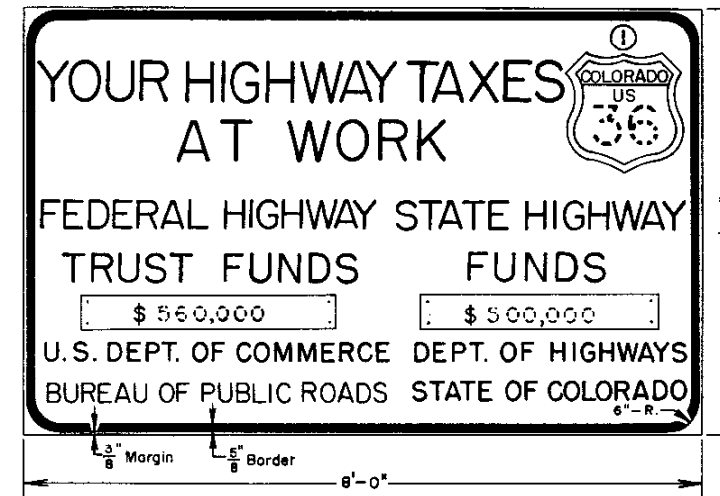
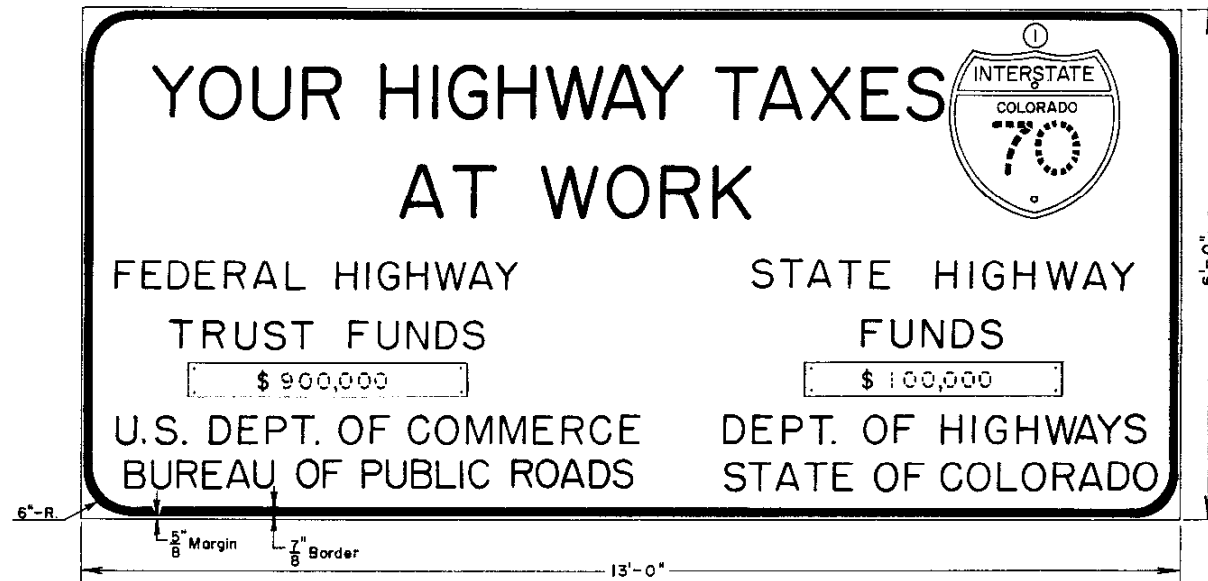
(JAN. 31, 1964)

INTERSTATE SYSTEM

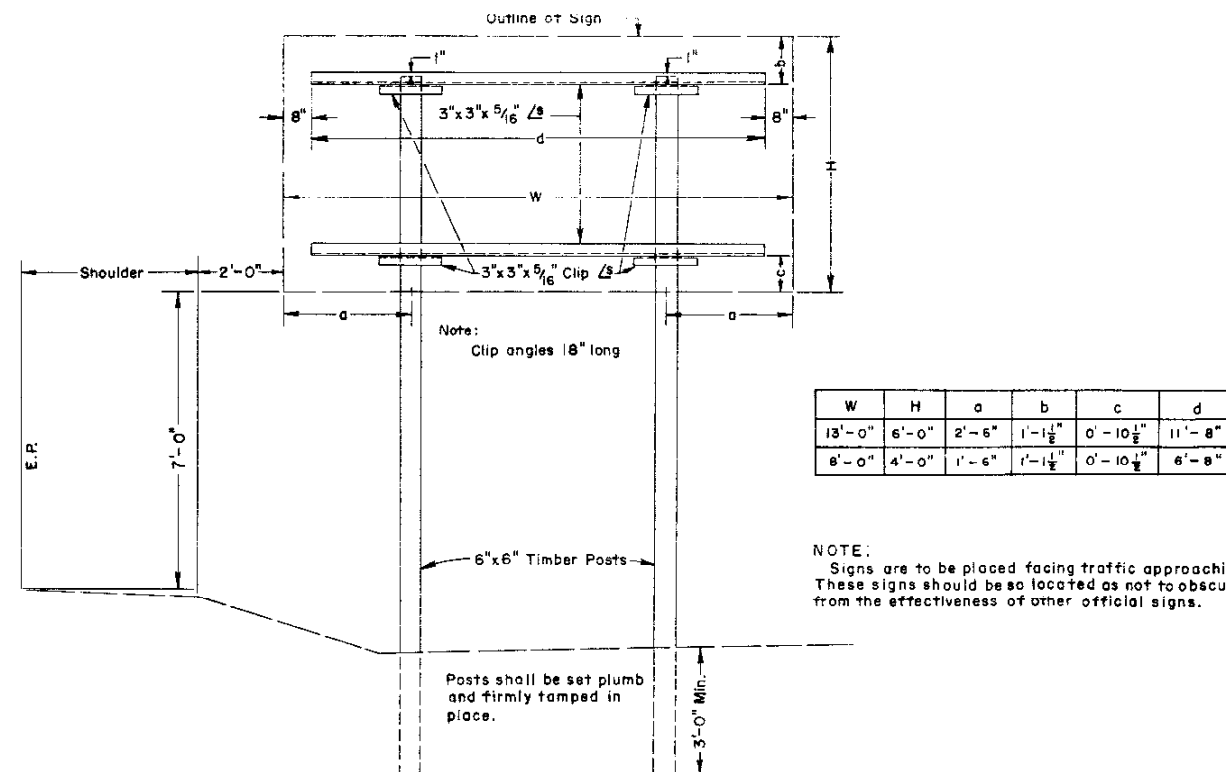
PRIMARY & SECONDARY SYSTEM

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS	



INSTALLATION DETAIL



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 3/4" Plywood or other material approved by the Department.
- Background to be painted plain white with stencil black letters, numerals and border.
- When a third governmental agency is participating its official name should be included centrally in lines 6 and 7.
- Posts shall be 6" X 6" S 4 S timber or other material approved by the Department and shall be painted white.
- Signs are to be non-reflectORIZED, black legend on plain white background. Route Marker plaques to be the appropriate standard colors, non-reflectORIZED.
- 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 amount of funds to be furnished contractor by Department.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

IDENTIFICATION
SIGNS

Designed by B.F.R. Approved by [Signature]
Made by D.J.B. Staff Design Engr.
Checked by M.R.H. Date: 2-5-64

① Applicable Interstate, U.S. Shield or State Route Shield.

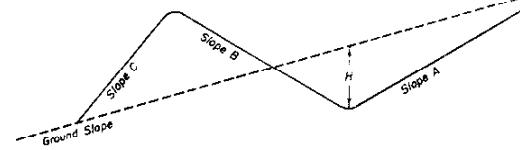
STANDARD TYPES OF DITCHES AND CONSTRUCTION METHODS

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

FED. ROAD RES. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

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 confronted 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

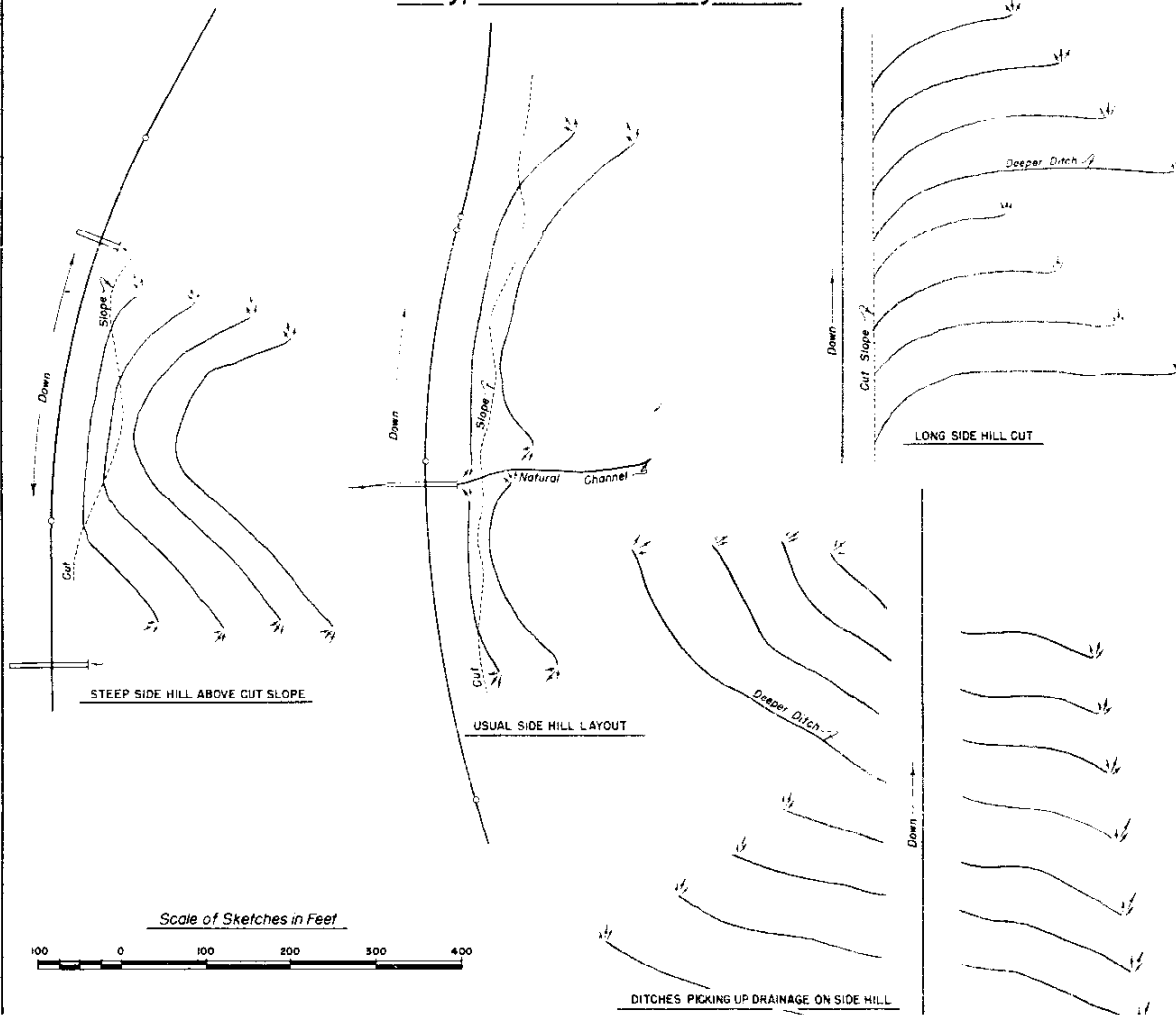
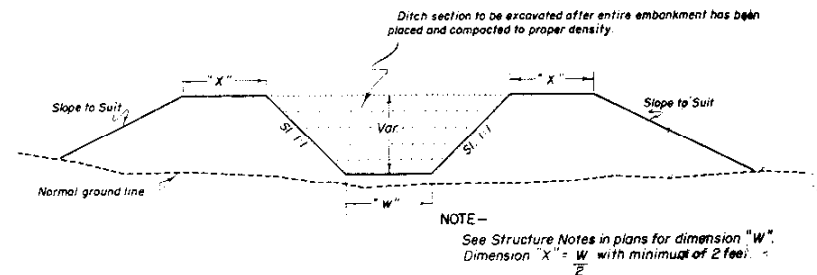


Table of Slopes and Yardages

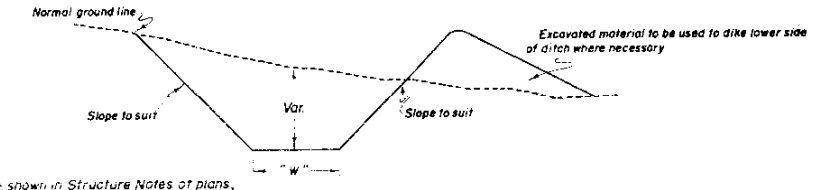
Ground	SLOPES			H	Cubic Yards per 100 lin. ft. of Ditch
	A	B	C		
5:1 Or Flatter	2:1	4:1	2:1	15"	16
				18"	23
				21"	32
	3:1	2:1	1-1/2:1	15"	15
				18"	22
				21"	30
				15"	14
				18"	20
				21"	27
	1-1/2:1	4:1	1-1/2:1	15"	13
				18"	19
				21"	25
15"				12	
18"				18	
21"				25	
4:1	2:1	4:1	2:1	15"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



For Embankment Sections
(Generally for use in Irrigation Ditches & Channel Changes)



For Cut Sections

NOTE - Unless otherwise shown in Structure Notes at plans, dimension "W" = 1 foot.

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.

REVISIONS	
2-3-64	DEPT. NAME M.R.H.

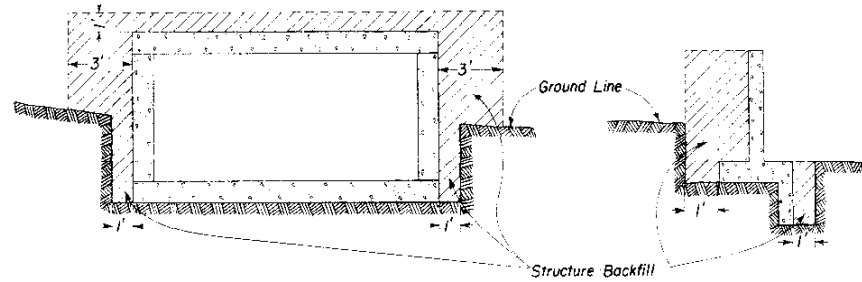
DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

DITCH TYPES

Designed by G.G.M.
Made by G.G.M.
Checked by

Approved by [Signature]
Engineer, Surveys & Plans
Date: Apr 13, 1962

CONCRETE BOX CULVERTS & WINGWALLS

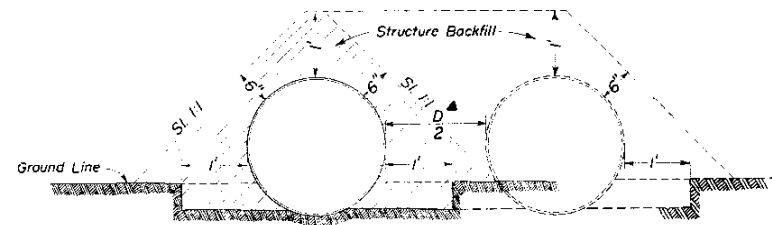


STANDARD M-16-A
(MAY 1, 1962)

FED. ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

REVISION	
5-2-63 Rev. Backfill	L.E.O.
1-31-64 DEPT. NAME	M.R.H.

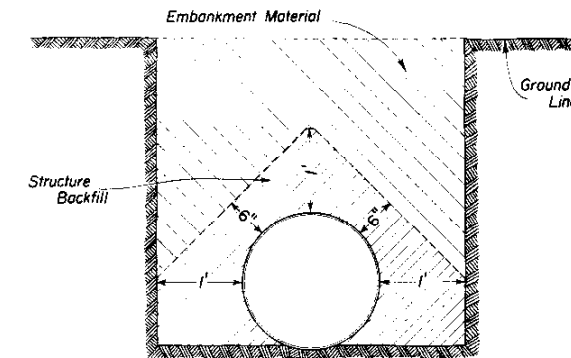
CIRCULAR CONDUIT



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

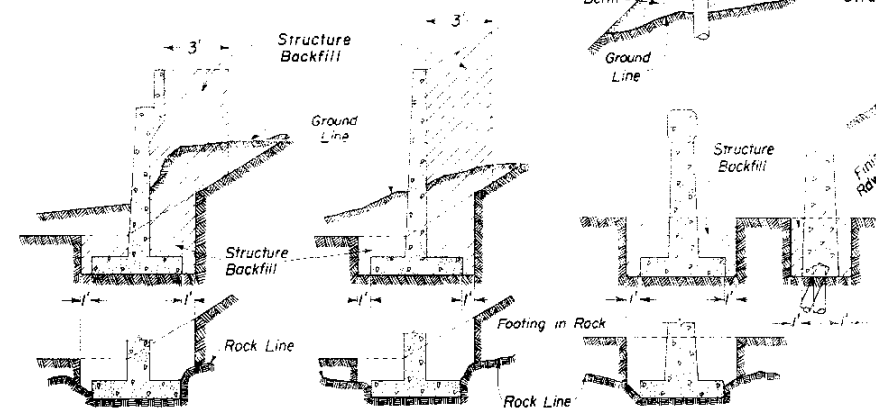
See Design Aid No. 16, 16a or 16b for computation of quantities.

SIPHONS OR CONDUIT IN TRENCH

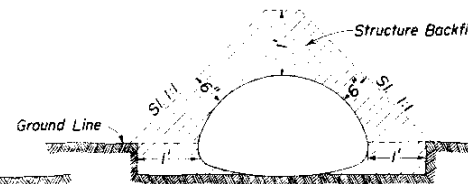


PIERS, ABUTMENTS, RETAINING WALLS ETC.

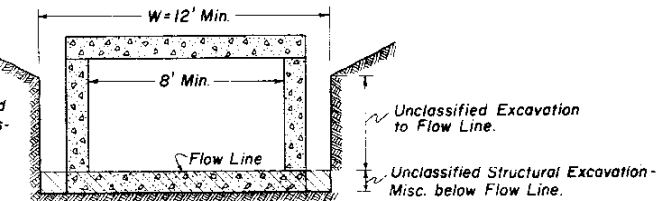
All material that is to be compacted shall be placed in horizontal layers not more than 6" inches in depth and compacted before the next layer is placed. For Arches, Rigid Frames and Box Culverts the fill shall be brought up uniformly on both sides of the center of structure to avoid stresses in the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



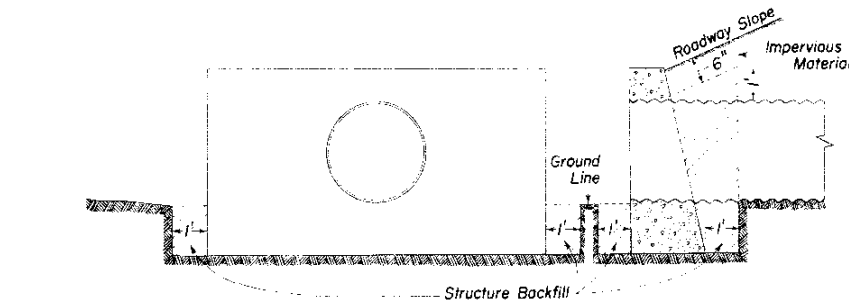
GENERAL NOTES

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

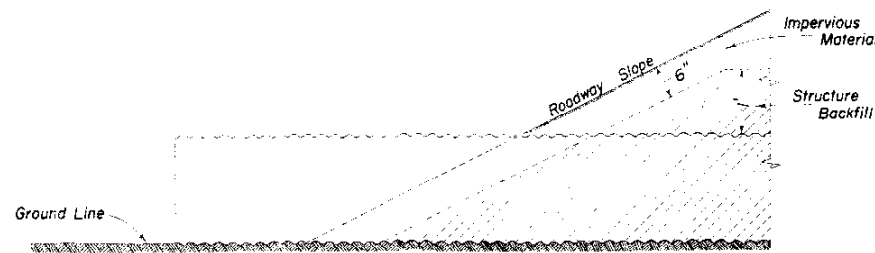
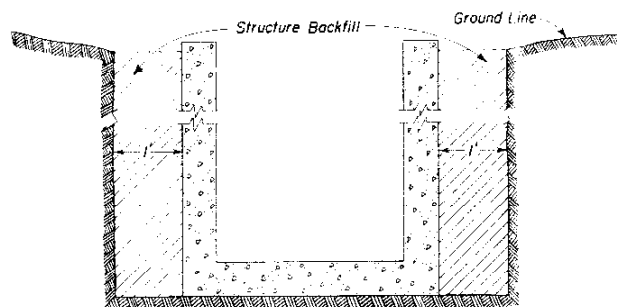
If, in the opinion of the Engineer, the material beneath the Structure is of such character as to cause unequal settlement along the length of the Structure, the material shall be removed to such a depth ordered, and backfilled with gravel or Structure Backfill and compacted in accordance with Item 16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

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.

HEADWALLS AND END OF CULVERTS



DROP INLETS, DIVISION BOXES, INTERCEPTING HEADWALLS ETC.



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

BACKFILL
AROUND STRUCTURES

Designed by H.E.P. Approved by L.E.O.
Made by D.M.E. Bridge Engineer
Checked by L.E.O. Date: May 2, 1958

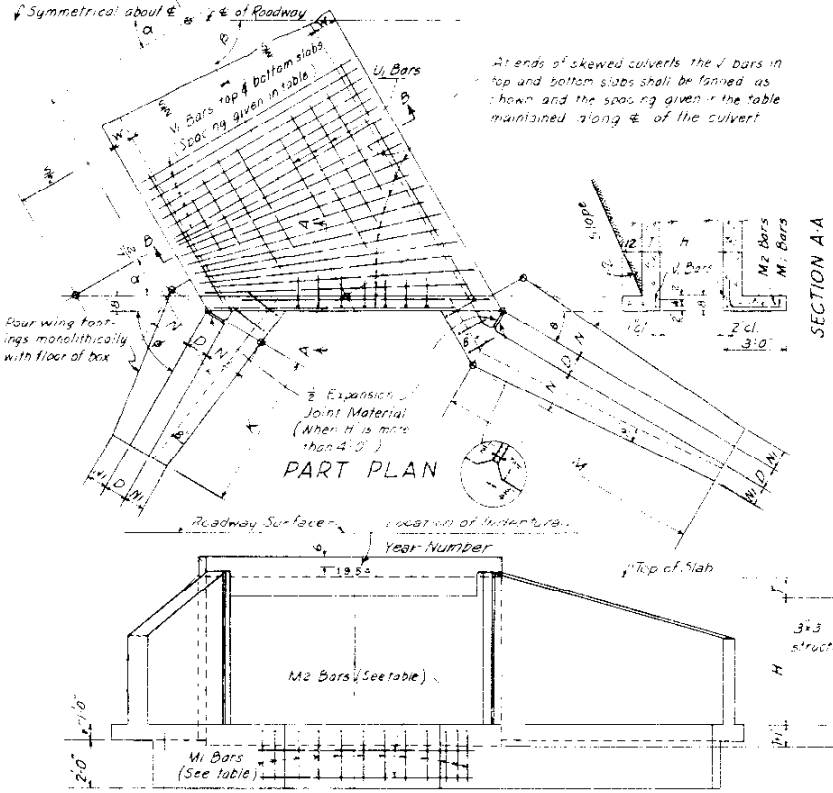
STANDARD M-46-C

FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

Dimensions & Quantities (see Wingwall Standard for Wings)

Height of Fill Allowed	Span S	Height H	Sub T	Wall W	Bar size & spacing		No. bars required	Quantities for one lin. ft. of box		Quantities for two headwalls	
					V	W		Concrete	Steel	Concrete	Steel
35' 0" 2A	2' 0"	2' 0"	6"	8"	3/4"	12"	4	0.216	17.5	1.30	8.1
30' 0" 3A	3' 0"	3' 0"	7"	8"	3/4"	12"	6	0.324	26.5	1.56	11.2
20' 0" 4A	4' 0"	4' 0"	7 1/2"	8"	3/4"	12"	10	0.365	31.6	1.75	15.0
16' 0" 5A	5' 0"	5' 0"	8"	8"	3/4"	12"	12	0.420	34.6	1.90	16.4
20' 0" 5B	5' 0"	4' 0"	8 1/2"	8"	3/4"	12"	16	0.500	45.5	2.20	15.3
14' 0" 6A	6' 0"	6' 0"	8 1/2"	8"	3/4"	12"	24	0.654	58	2.85	18.4
20' 0" 6B	6' 0"	5' 0"	10"	8"	3/4"	12"	24	0.771	61.4	3.10	23.6
12' 0" 7A	7' 0"	7' 0"	9"	9"	3/4"	12"	16	0.72	61.9	3.25	21.2
15' 0" 7B	7' 0"	6' 0"	10"	9"	3/4"	12"	24	0.883	90.0	4.45	26.6
20' 0" 7C	7' 0"	6' 0"	11"	9"	3/4"	12"	24	0.883	90.0	4.45	26.6
10' 0" 8A	8' 0"	8' 0"	9 1/2"	10"	3/4"	12"	30	1.027	86.8	4.10	24.7
16' 0" 8B	8' 0"	7' 0"	11 1/2"	10"	3/4"	12"	30	1.027	86.8	4.10	24.7
20' 0" 8C	8' 0"	6' 0"	12 1/2"	10"	3/4"	12"	30	1.027	86.8	4.10	24.7
7' 0" 9A	9' 0"	7' 0"	10"	11"	3/4"	12"	20	1.108	107.1	4.20	32.1
14' 0" 9B	9' 0"	7' 0"	12"	11"	3/4"	12"	20	1.108	107.1	4.20	32.1
20' 0" 9C	9' 0"	6' 0"	14"	11"	3/4"	12"	20	1.108	107.1	4.20	32.1
5' 0" 10A	10' 0"	5' 0"	12 1/2"	12"	3/4"	12"	44	1.244	114.4	4.30	36.3
10' 0" 10B	10' 0"	4' 0"	12 1/2"	12"	3/4"	12"	44	1.244	114.4	4.30	36.3
16' 0" 10C	10' 0"	3' 0"	14"	12"	3/4"	12"	44	1.244	114.4	4.30	36.3
5' 0" 11A	11' 0"	5' 0"	11"	12"	3/4"	12"	24	1.262	115.8	4.30	36.3
9' 0" 11B	11' 0"	4' 0"	12"	12"	3/4"	12"	24	1.262	115.8	4.30	36.3
13' 0" 11C	11' 0"	3' 0"	14"	12"	3/4"	12"	24	1.262	115.8	4.30	36.3
5' 0" 12A	12' 0"	5' 0"	12"	12"	3/4"	12"	26	1.273	117.2	4.30	36.3
10' 0" 12B	12' 0"	4' 0"	14"	12"	3/4"	12"	26	1.273	117.2	4.30	36.3
4' 0" 13A	13' 0"	4' 0"	12 1/2"	12"	3/4"	12"	26	1.273	117.2	4.30	36.3
8' 0" 13B	13' 0"	3' 0"	14"	12"	3/4"	12"	26	1.273	117.2	4.30	36.3
4' 0" 14A	14' 0"	4' 0"	13 1/2"	12"	3/4"	12"	30	1.273	117.2	4.30	36.3
8' 0" 14B	14' 0"	3' 0"	15"	12"	3/4"	12"	30	1.273	117.2	4.30	36.3

SINGLE CONCRETE BOX CULVERT

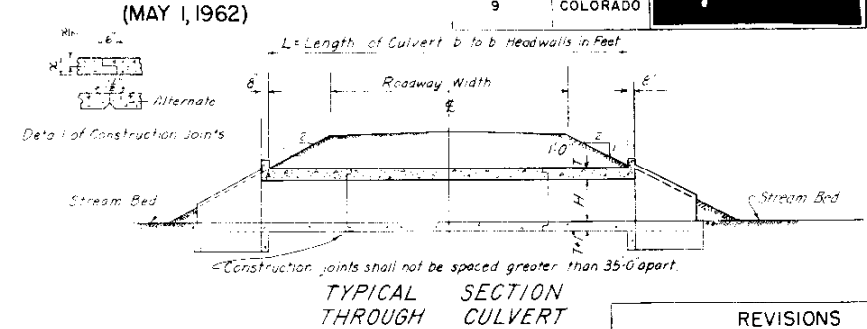


Bar List for Culvert & Headwalls (See Wingwall Standard for Wings)

Mark	Size	No. Req'd	Type	Length
V	See table	24/L	I	S+2W+6
W	See table	6	I	H+2T-5
U	3/4"	See table	I	L+1'0"
M1	3/4"	See table	II	3'6"
M2	3/4"	4	I	5+2W+6

Possible Combinations (Span & Height)

2 x 2	5 x 5	9 x 5	10 x 7	11 x 8	11 x 10
3 x 2	7 x 4	8 x 6	9 x 8	10 x 9	4 x 8
4 x 2	6 x 5	7 x 7	12 x 6	13 x 7	13 x 9
3 x 3	8 x 4	9 x 6	11 x 7	12 x 8	12 x 10
4 x 3	7 x 5	8 x 7	13 x 6	14 x 7	4 x 9
5 x 3	6 x 6	10 x 6	10 x 8	11 x 9	13 x 10
4 x 4	8 x 5	9 x 7	9 x 9	10 x 10	14 x 10
5 x 4	6 x 7	8 x 8	12 x 7	13 x 8	
6 x 4	7 x 6	1 x 6	14 x 6	2 x 9	



REVISIONS

2-11-64	DEPT NAME	M.R.H.

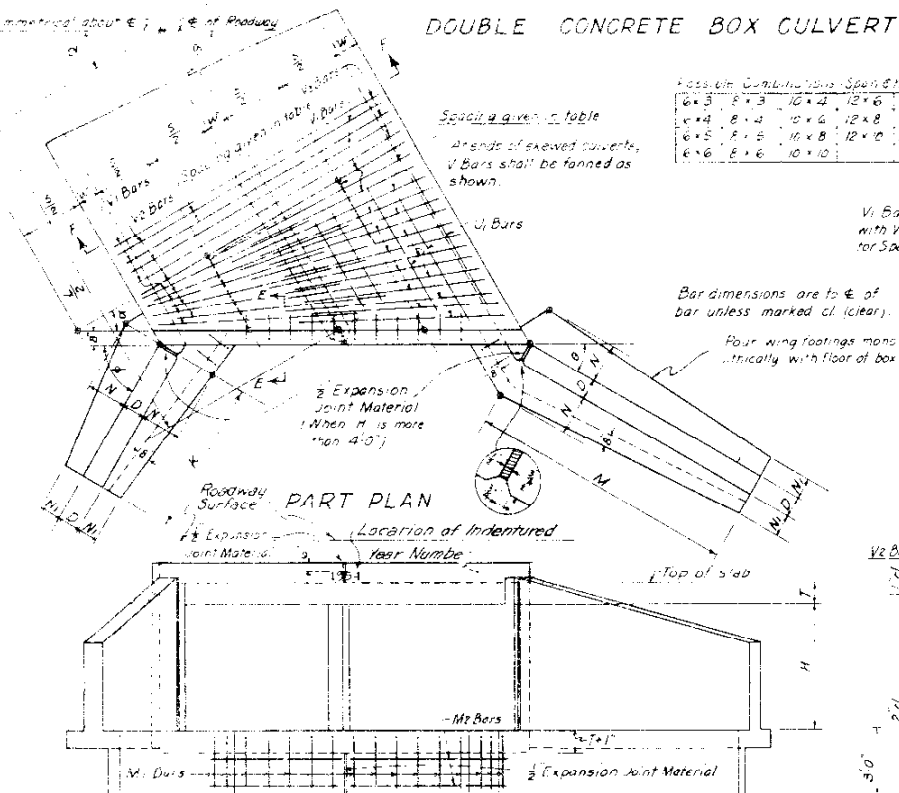
END ELEVATION

SECTION B-B

DOUBLE CONCRETE BOX CULVERT

Dimensions & Quantities (see Wingwall Standard for Wings)

Height of Fill Allowed	Span S	Height H	Wall W	Bar size & spacing		No. bars required	Quantities for one lin. ft. of box		Quantities for two headwalls		
				V	W		Concrete	Steel	Concrete	Steel	
10' 0" 6A	6' 0"	6' 0"	8"	3/4"	12"	4	0.216	17.5	1.30	8.1	
16' 0" 6B	6' 0"	5' 0"	10"	8"	3/4"	12"	12	0.420	34.6	1.90	16.4
20' 0" 6C	6' 0"	4' 0"	12"	8"	3/4"	12"	16	0.500	45.5	2.20	15.3
10' 0" 8A	8' 0"	8' 0"	9 1/2"	10"	3/4"	12"	30	1.027	86.8	4.10	24.7
15' 0" 8B	8' 0"	7' 0"	11"	10"	3/4"	12"	30	1.027	86.8	4.10	24.7
20' 0" 8C	8' 0"	6' 0"	12"	10"	3/4"	12"	30	1.027	86.8	4.10	24.7
5' 0" 10A	10' 0"	5' 0"	12 1/2"	12"	3/4"	12"	44	1.244	114.4	4.30	36.3
10' 0" 10B	10' 0"	4' 0"	12 1/2"	12"	3/4"	12"	44	1.244	114.4	4.30	36.3
15' 0" 10C	10' 0"	3' 0"	14"	12"	3/4"	12"	44	1.244	114.4	4.30	36.3
5' 0" 12A	12' 0"	5' 0"	12"	12"	3/4"	12"	26	1.273	117.2	4.30	36.3
10' 0" 12B	12' 0"	4' 0"	14"	12"	3/4"	12"	26	1.273	117.2	4.30	36.3
15' 0" 12C	12' 0"	3' 0"	16"	12"	3/4"	12"	26	1.273	117.2	4.30	36.3



Possible Combinations (Span & Height)

6 x 3	8 x 3	10 x 4	12 x 6	14 x 6
8 x 4	8 x 4	10 x 6	12 x 8	14 x 8
6 x 5	8 x 5	10 x 8	12 x 10	14 x 10
6 x 6	8 x 6	10 x 10		

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

Mark	Size	Number Required	Type	Total Length
V	See Table	24(L+2)	I	5+15W+4
W	See Table	Spacing	I	H+2T-4
U	3/4"	See Table	I	L+12
M1	3/4"	See Table	III	3'6"
M2	3/4"	8	I	5+2W+6

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
SINGLE AND DOUBLE
CONCRETE BOX CULVERTS
(FOR SIZES SEE TABLE OF POSSIBLE COMBINATIONS)

Designed by: WWD | Approved by: *210*
Made by: WWD | Bridge Engineer
Checked by: *100* | Date: *Aug. 20, 1964*

STANDARD M-46-E

(MAY 1, 1962)

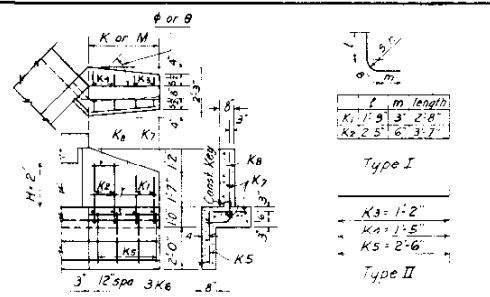
FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

2-11-64 Rev. Dept Name MRH

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

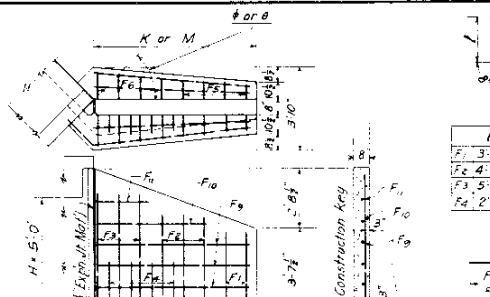
β	α	ϕ	θ	H=2'-0"	H=3'-0"	H=4'-0"	H=5'-0"	H=6'-0"	H=7'-0"	H=8'-0"	H=9'-0"	H=10'-0"
45°	45°	67°30'	22°30'	2.4	6.2	3.7	8.7	4.0	11.7	5.1	14.2	6.1
60°	30°	60°	30°	2.9	4.9	3.1	6.7	5.2	8.1	6.3	10.1	7.3
75°	15°	52°30'	37°30'	3.0	3.1	4.2	5.5	5.7	7.3	6.1	8.1	7.1
90°	0°	45°	45°	3.4	3.4	4.8	4.8	6.3	6.3	7.8	7.8	8.1
105°	15°	37°30'	52°30'	3.1	3.0	5.5	4.2	7.3	5.7	8.1	6.1	10.4
120°	30°	30°	60°	4.9	2.9	6.7	3.1	8.1	5.2	10.1	6.3	12.7
135°	45°	22°30'	67°30'	6.2	2.4	8.7	3.7	11.7	4.0	14.2	5.1	16.5

β EQUALS THE ANGLE BETWEEN ϕ OF CULVERT AND θ OF ROADWAY. α EQUALS THE ANGLE BETWEEN ϕ OF CULVERT AND A NORMAL TO θ 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 $\theta = 65^\circ$ WITH THE CENTER LINE OF ROADWAY, THEN, FROM THE TABLE, SELECT THE NEAREST ANGLE $\beta = 60^\circ$, THEN α , ϕ , AND θ BE EQUAL 30° , 60° AND 30° RESPECTIVELY. IF THE DESIRED HEIGHT "H" OF CULVERT IS 8'-0", THEN K AND M WILL BE 3.3 AND 10'-0" LOCATE THE WING DETAIL WHEN H=8'-0" ON THIS SHEET.



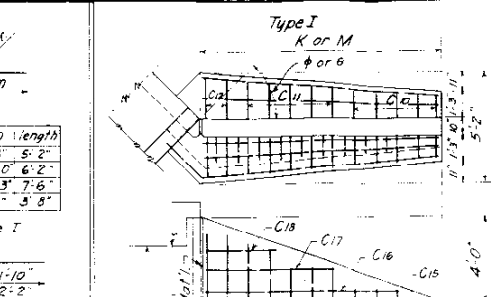
BAR LIST & QUANTITIES FOR ONE WING WHEN H=2'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	4	3	4
30°	3	2	2
37°30'	2	2	2
45°	2	2	2
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



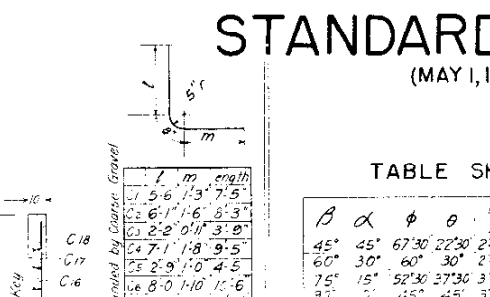
BAR LIST & QUANTITIES FOR ONE WING WHEN H=5'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	5	5	5
30°	4	4	4
37°30'	3	3	3
45°	3	3	3
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



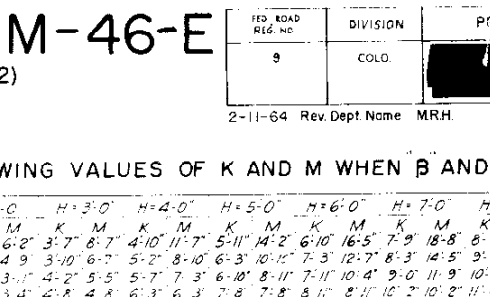
BAR LIST & QUANTITIES FOR ONE WING WHEN H=8'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	4	4	4
30°	3	3	3
37°30'	3	3	3
45°	2	2	2
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



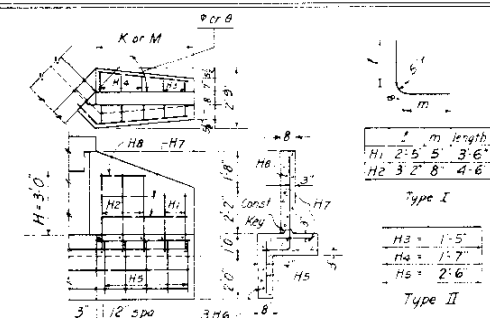
BAR LIST & QUANTITIES FOR ONE WING WHEN H=9'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	5	5	5
30°	4	4	4
37°30'	3	3	3
45°	3	3	3
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



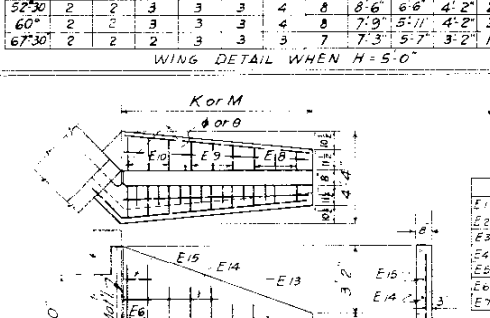
BAR LIST & QUANTITIES FOR ONE WING WHEN H=10'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	5	5	5
30°	4	4	4
37°30'	3	3	3
45°	3	3	3
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



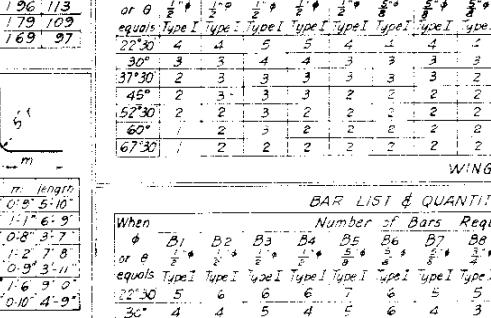
BAR LIST & QUANTITIES FOR ONE WING WHEN H=3'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	4	4	4
30°	3	3	3
37°30'	3	3	3
45°	2	2	2
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



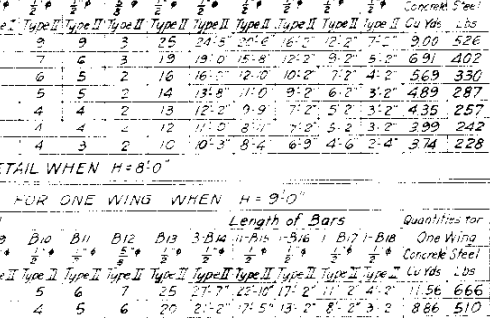
BAR LIST & QUANTITIES FOR ONE WING WHEN H=6'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	4	4	4
30°	3	3	3
37°30'	3	3	3
45°	2	2	2
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



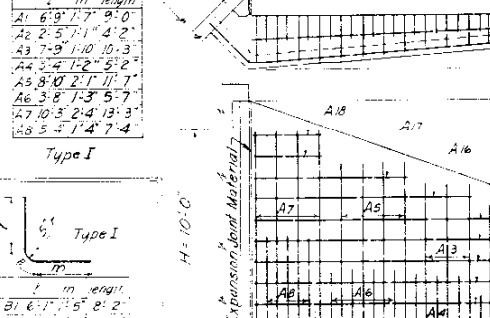
BAR LIST & QUANTITIES FOR ONE WING WHEN H=9'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	5	5	5
30°	4	4	4
37°30'	3	3	3
45°	3	3	3
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



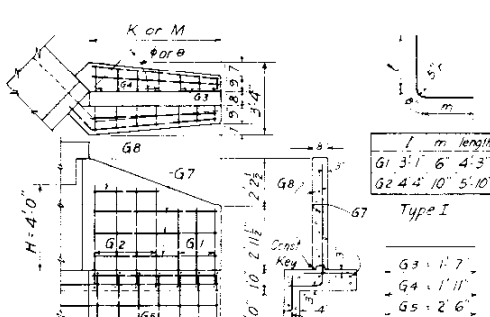
BAR LIST & QUANTITIES FOR ONE WING WHEN H=9'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	5	5	5
30°	4	4	4
37°30'	3	3	3
45°	3	3	3
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



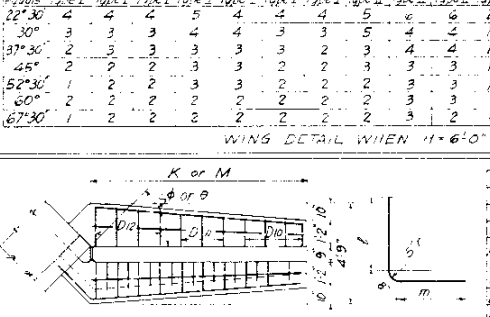
BAR LIST & QUANTITIES FOR ONE WING WHEN H=10'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	5	5	5
30°	4	4	4
37°30'	3	3	3
45°	3	3	3
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



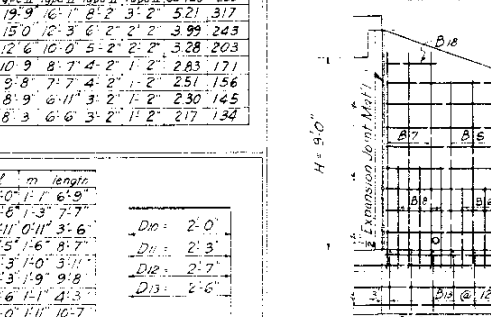
BAR LIST & QUANTITIES FOR ONE WING WHEN H=4'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	4	4	4
30°	3	3	3
37°30'	3	3	3
45°	2	2	2
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



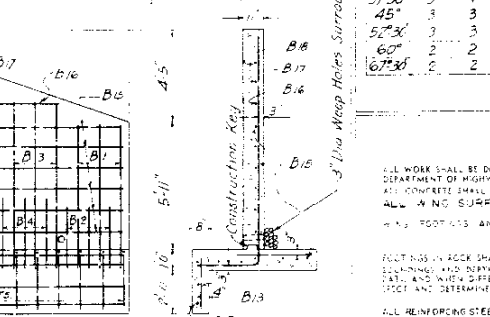
BAR LIST & QUANTITIES FOR ONE WING WHEN H=6'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	4	4	4
30°	3	3	3
37°30'	3	3	3
45°	2	2	2
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



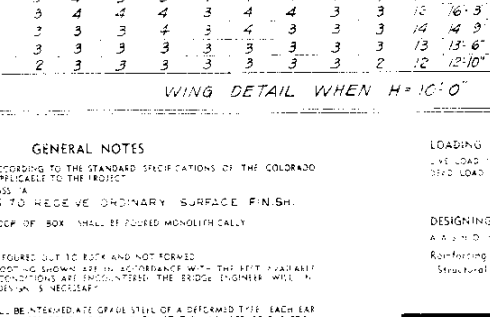
BAR LIST & QUANTITIES FOR ONE WING WHEN H=9'-0"

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	5	5	5
30°	4	4	4
37°30'	3	3	3
45°	3	3	3
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



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

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	5	5	5
30°	4	4	4
37°30'	3	3	3
45°	3	3	3
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2



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

When ϕ or θ	Number of Bars Required	Length of Bars	Quantities for One Wing
22°30'	5	5	5
30°	4	4	4
37°30'	3	3	3
45°	3	3	3
52°30'	2	2	2
60°	2	2	2
67°30'	2	2	2

LOADING DATA INTERSTATE ALTERNATE
 LIVE LOAD - AASHTO MC 15E-88
 DEAD LOAD COVERED 75 POUNDS PER CUBIC FOOT
 EARTH 84 POUNDS PER CUBIC FOOT

DESIGNING DATA
 ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE STEEL OF A SPECIFIED MINIMUM YIELD POINT
 REINFORCING STEEL IS 20000 PSI
 STRUCTURAL STEEL IS 18000 PSI
 ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN FEET AND INCHES EXCEPT AS NOTED
 REINFORCING STEEL IS 20000 PSI
 STRUCTURAL STEEL IS 18000 PSI
 ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN FEET AND INCHES EXCEPT AS NOTED

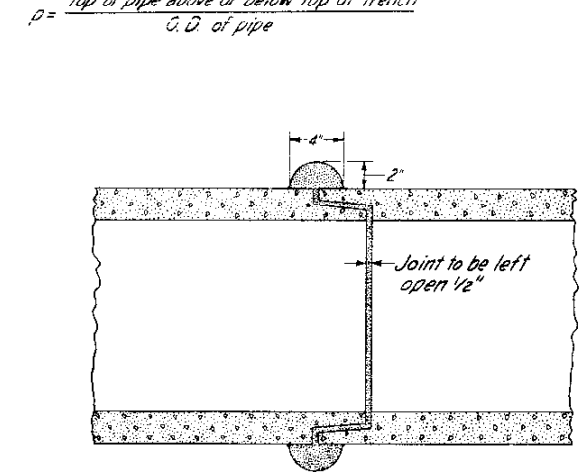
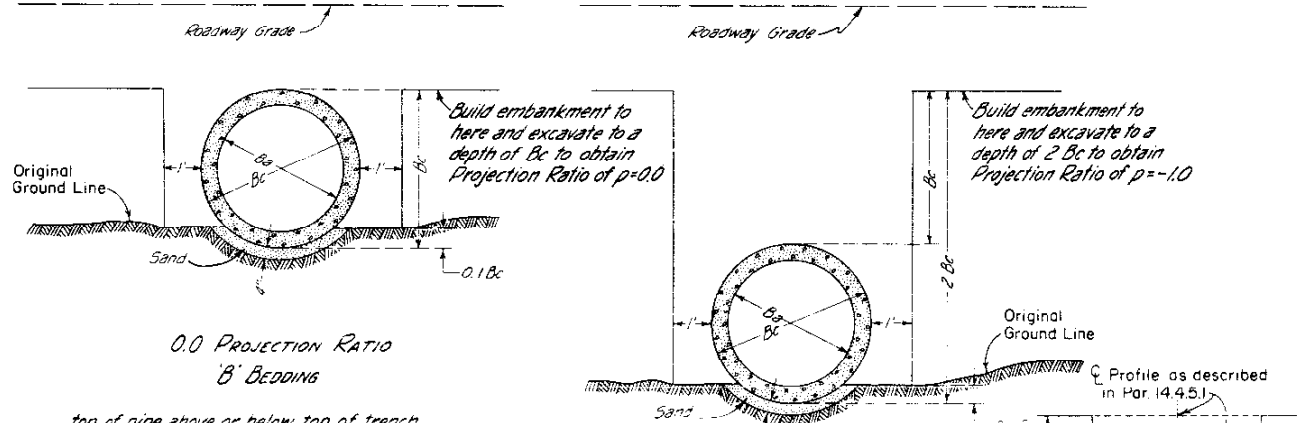
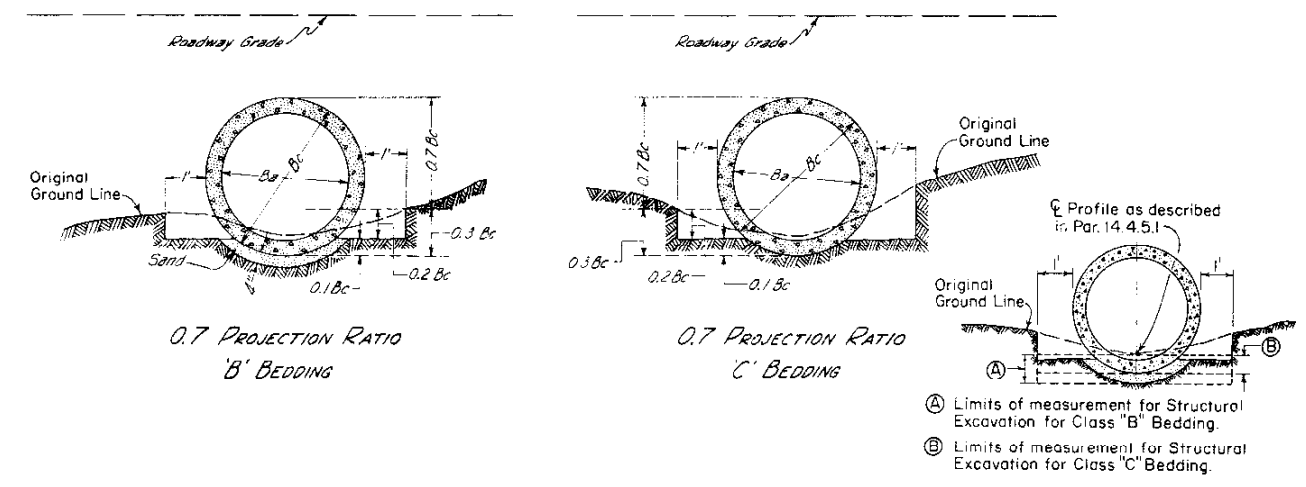
DEPARTMENT OF HIGHWAYS
 STATE OF COLORADO
 WINGWALLS FOR
 CONCRETE BOX CULVERTS

Designed by W.W.D. Approved by J.L. McQuinn
 Made by W.W.D. Bridge Engineer
 Checked by T.J.M. Date 11/30/1954

STANDARD M-52-A

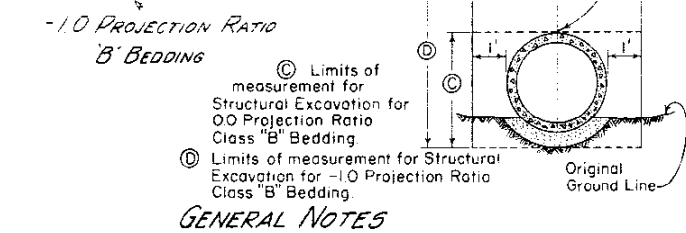
(MAY 1, 1962)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		



CONCRETE OR MORTAR PIPE JOINT

Where the flow line grade of the pipe is 10% or greater, all pipe shall be the Bell and Spigot type or shall be Tongue and Groove pipe with concrete collars as detailed above or a type approved in writing by the Engineer.



GENERAL NOTES

All work shall be done according to the Standard Specifications of the Colorado Department of Highways applicable to the Project.
 The Height of Fill for each culvert shall determine the bedding and class of concrete pipe to be used (See table herewith). Location, length and inside diameter of pipe, and class of pipe required shall be shown on plans.
 Type 'B' bedding is to be used in solid rock.
 Details for placement of structure backfill materials are shown elsewhere in plans.
 When projection ratios of 0.0 or -1.0 are used, backfilling above structure backfill material shall be made with materials excavated in order to produce the projection ratio. Cost of this backfilling is to be included in the contract unit price for Item 52. If material does not stand with a vertical face when attempting to produce 0.0 or -1.0 projection ratios, this standard is not applicable.

APPROVED COMBINATIONS OF HEIGHT OF FILL - PROJECTION RATIO - BEDDING - CLASS

Ba	HEIGHT OF FILL	PROJECTION RATIO	BEDDING	CLASS
12"	#-7'	0.7	C	II
	7'-10'	0.7	C	III
	10'-15'	0.7	C	IV
	15'-19'	0.7	B	IV
	19'-24'	0.0	B	IV
15"	#-8'	0.7	C	II
	8'-11'	0.7	C	III
	11'-16'	0.7	C	IV
	16'-20'	0.7	B	IV
	20'-30'	0.0	B	IV
18"	#-8'	0.7	C	II
	8'-11'	0.7	C	III
	11'-16'	0.7	C	IV
	16'-20'	0.7	B	IV
	20'-30'	0.0	B	IV
21"	#-8'	0.7	C	II
	8'-11'	0.7	C	III
	11'-17'	0.7	C	IV
	17'-21'	0.7	B	IV
	21'-31'	0.0	B	IV
24"	#-9'	0.7	C	II
	9'-12'	0.7	C	III
	12'-17'	0.7	C	IV
	17'-22'	0.7	B	IV
	22'-31'	0.0	B	IV
27"	#-9'	0.7	C	II
	9'-13'	0.7	C	III
	13'-18'	0.7	C	IV
	18'-22'	0.7	B	IV
	22'-32'	0.0	B	IV
30"	#-9'	0.7	C	II
	9'-12'	0.7	C	III
	12'-18'	0.7	C	IV
	18'-22'	0.7	B	IV
	22'-32'	0.0	B	IV
33"	#-9'	0.7	C	II
	9'-13'	0.7	C	III
	13'-18'	0.7	C	IV
	18'-23'	0.7	B	IV
	23'-33'	0.0	B	IV
36"	#-10'	0.7	C	II
	10'-13'	0.7	C	III
	13'-19'	0.7	C	IV
	19'-23'	0.7	B	IV
	23'-34'	0.0	B	IV
42"	#-10'	0.7	C	II
	10'-13'	0.7	C	III
	13'-18'	0.7	C	IV
	18'-22'	0.7	B	IV
	22'-34'	0.0	B	IV
48"	#-11'	0.7	C	II
	11'-14'	0.7	C	III
	14'-19'	0.7	C	IV
	19'-24'	0.7	B	IV
	24'-34'	0.0	B	IV

Ba	HEIGHT OF FILL	PROJECTION RATIO	BEDDING	CLASS
54"	#-10'	0.7	C	II
	10'-14'	0.7	C	III
	14'-19'	0.7	C	IV
	19'-23'	0.7	B	IV
	23'-34'	0.0	B	IV
60"	#-11'	0.7	C	II
	11'-14'	0.7	C	III
	14'-20'	0.7	C	IV
	20'-24'	0.7	B	IV
	24'-35'	0.0	B	IV
66"	#-11'	0.7	C	II
	11'-14'	0.7	C	III
	14'-20'	0.7	C	IV
	20'-24'	0.7	B	IV
	24'-34'	0.0	B	IV
72"	#-12'	0.7	C	II
	12'-15'	0.7	C	III
	15'-21'	0.7	C	IV
	21'-25'	0.7	B	IV
	25'-35'	0.0	B	IV
78"	#-11'	0.7	C	II
	11'-15'	0.7	C	III
	15'-20'	0.7	C	IV
	20'-25'	0.7	B	IV
	25'-34'	0.0	B	IV
84"	#-11'	0.7	C	II
	11'-15'	0.7	C	III
	15'-21'	0.7	C	IV
	21'-26'	0.7	B	IV
	26'-35'	0.0	B	IV
90"	#-12'	0.7	C	II
	12'-15'	0.7	C	III
	15'-18'	0.7	C	IV
	18'-22'	0.0	B	IV
	22'-25'	-1.0	B	IV
96"	#-12'	0.7	C	II
	12'-15'	0.7	C	III
	15'-19'	0.7	C	IV
	19'-23'	0.0	B	IV
	23'-25'	-1.0	B	IV
102"	#-12'	0.7	C	II
	12'-15'	0.7	C	III
	15'-18'	0.7	C	IV
	18'-23'	0.0	B	IV
	23'-25'	-1.0	B	IV
108"	#-13'	0.7	C	II
	13'-16'	0.7	C	III
	16'-19'	0.7	C	IV
	19'-23'	0.0	B	IV
	23'-25'	-1.0	B	IV

REVISIONS		
2-3-64	DEPT. NAME	M.R.H.

① Height above Top of Pipe
 * Minimum cover with concrete pavement shall be 1.25' and with asphalt or gravel 1.75'.
 Minimum cover on Side Drains shall be 1.0'

DEPARTMENT OF HIGHWAYS
 STATE OF COLORADO

REINFORCED CONCRETE
 PIPE

Designed by *[Signature]* Approved by *[Signature]*
 Made by *[Signature]* Bridge Engineer
 Checked by *[Signature]* Date: May 10, 1960

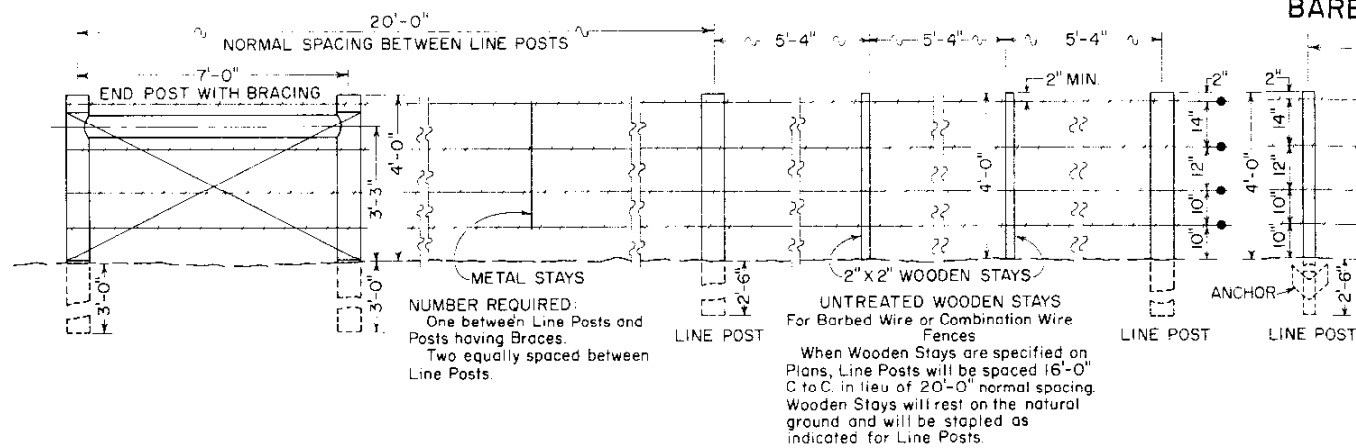
STANDARD M-76-A

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

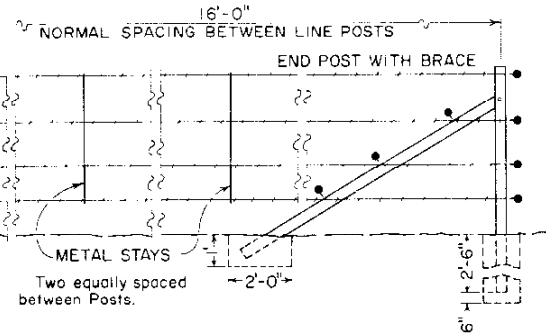
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS		
5-23-62	Rev. Line Brace Detail For Metal Post	L.E.O.
6-6-62	Rev. Fc. Int. for Wood Posts	L.E.O.
8-9-62	Rev. Line Brace Detail For Metal Post	J.C.R.
9-18-62	Add. Alternate Brace Attach. Detail	L.E.O.
2-11-63	Rev. Bot. Holes in Posts & Braces	L.E.O.
4-15-63	Rev. Note on Wire Splice	J.C.R.
7-25-63		L.E.O.
2-3-64	DEPT NAME	M.R.H.

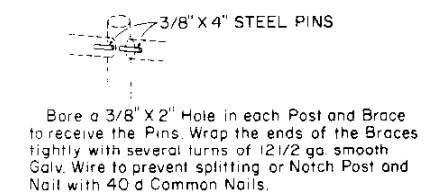
BARBED WIRE FENCE WITH WOODEN POSTS



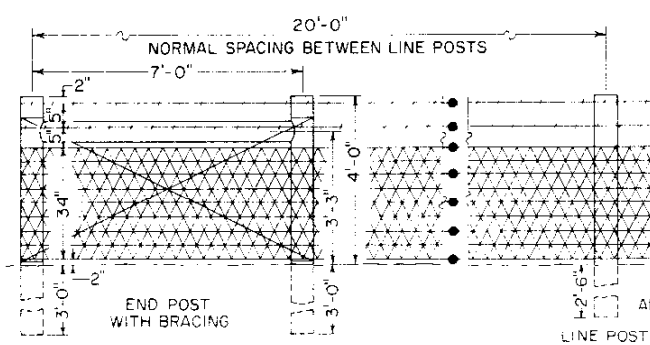
BARBED WIRE FENCE WITH METAL POSTS



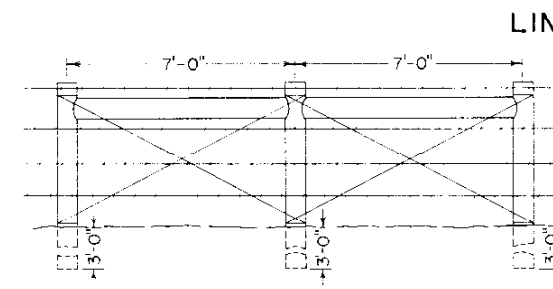
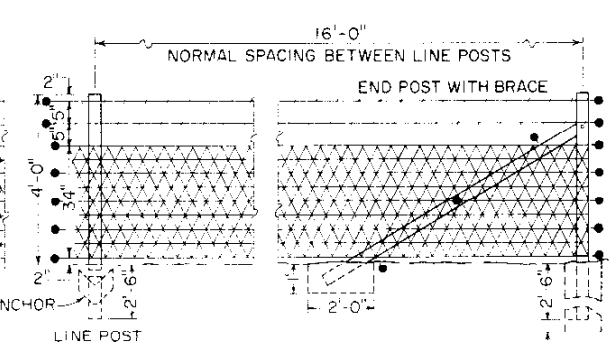
CROSS BRACE DOWELING DETAIL



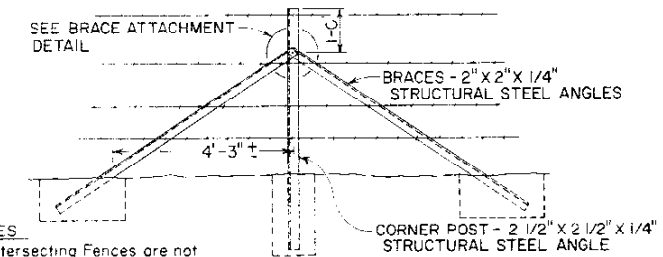
COMBINATION WIRE FENCE WITH WOODEN POSTS



COMBINATION WIRE FENCE WITH METAL POSTS

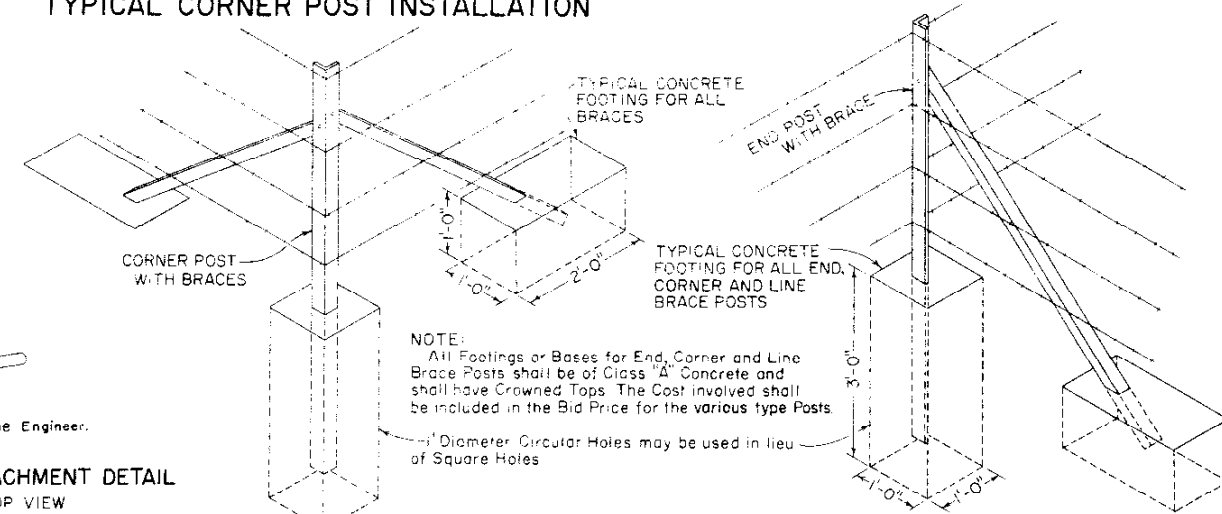


LINE BRACES

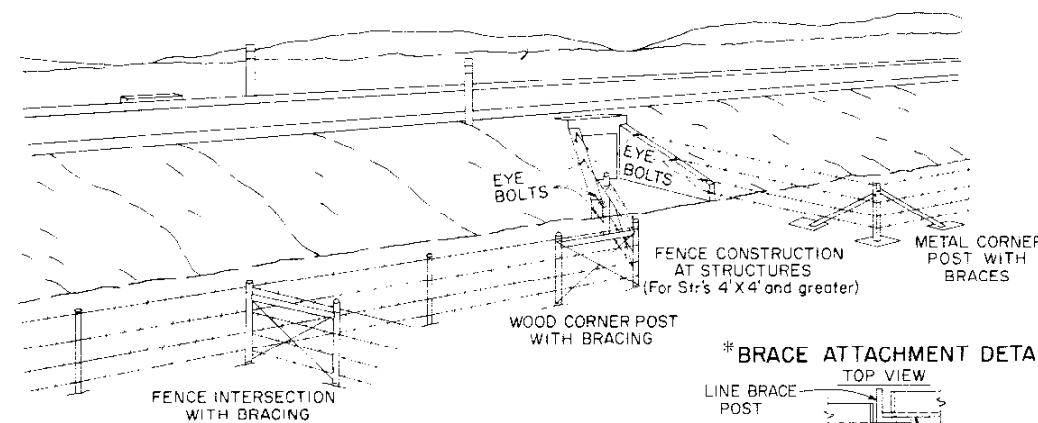


TYPICAL INSTALLATION AT FENCE INTERSECTIONS

TYPICAL CORNER POST INSTALLATION

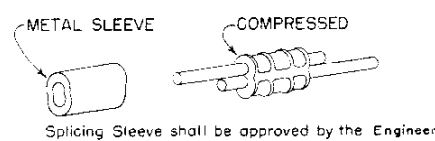


ILLUSTRATIVE SKETCH SHOWING TYPICAL EXAMPLES FOR CONSTRUCTING FENCES

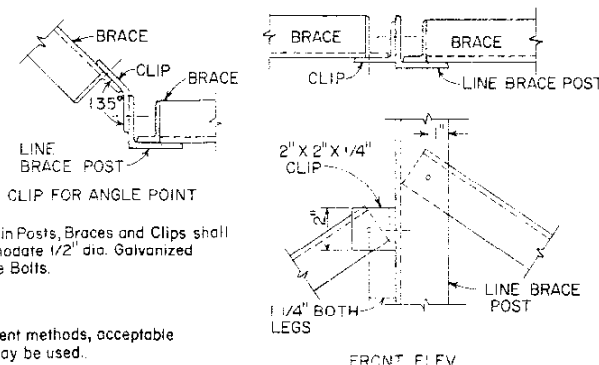


Fence wire will be stapled to wooden posts or tied to metal posts as shown marked ● on barbed wire or combination wire fence details.

ACCEPTABLE WIRE SPLICE



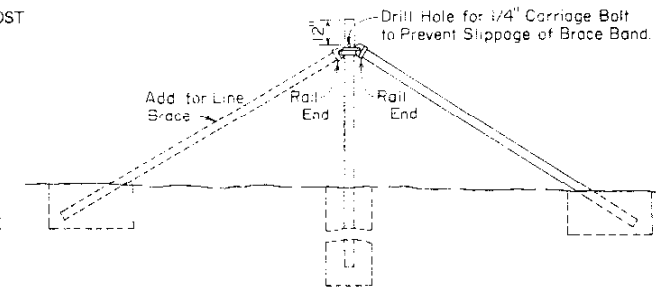
* ALTERNATE BRACE ATTACHMENT DETAIL



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

ALTERNATE POST

(FOR END, CORNER OR LINE BRACE POSTS)



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
WIRE FENCES
AND
GATES

Designed by L.E.O. Approved by J. F. Johnson
Made by T.E.F. Engr. Surveys & Plans
Checked by E.E.O. Date: 6-12-1961

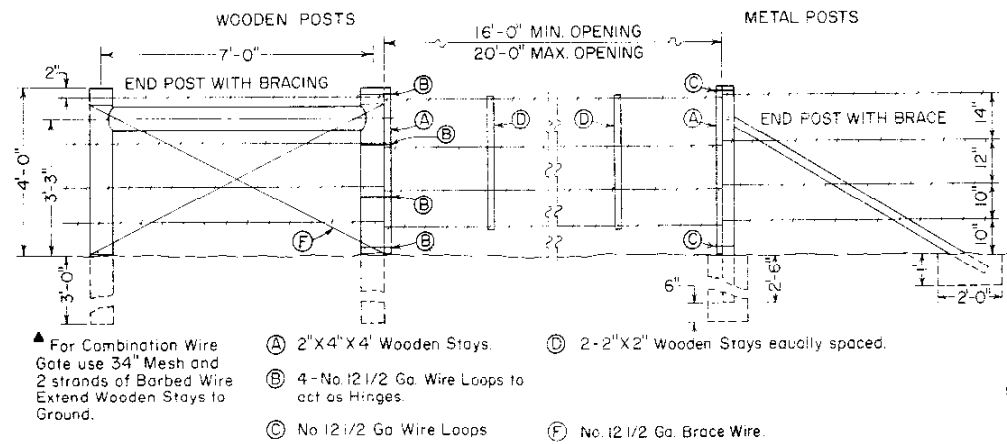
STANDARD M-76-A

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

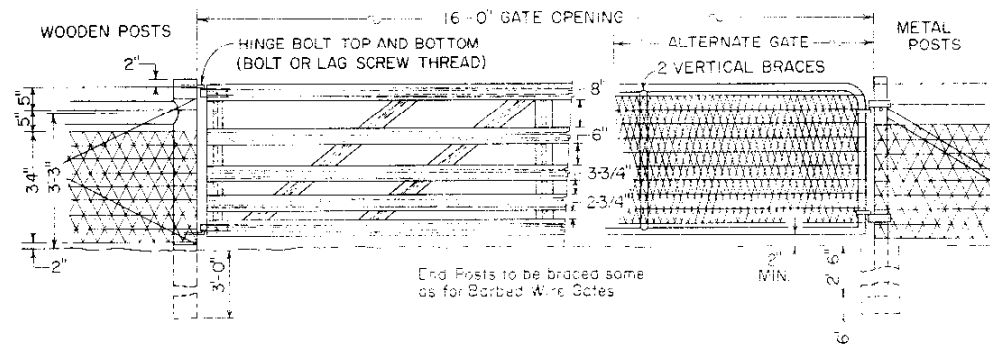
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

REVISIONS		
5-23-62	Tie For Angle Post	L.E.O.
8-9-62	Brace Bolt Size	J.C.R.
9-21-62	Rev. Angle Post & Ties	L.E.O.
2-11-63	Rev. Gates & Posts	L.E.O.
4-15-63		J.C.R.
7-25-63	Rev. Ref. to Commercial Std. 184-51	L.E.O.
2-3-64	DEPT. NAME	M.R.H.

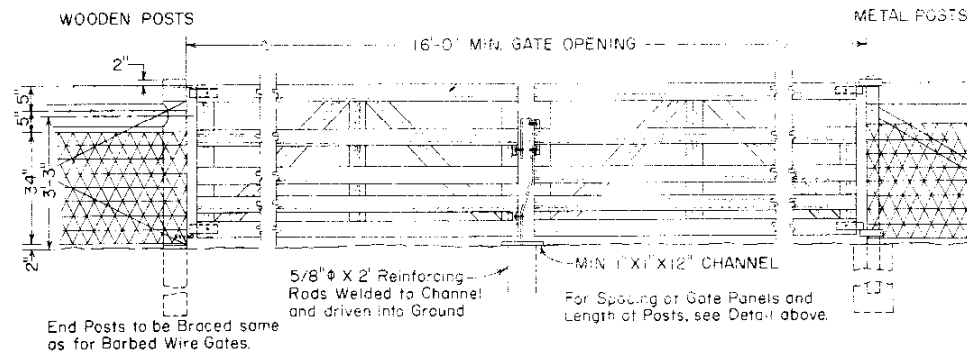
BARBED WIRE GATE



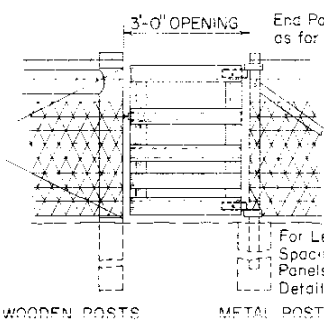
DRIVEWAY GATES



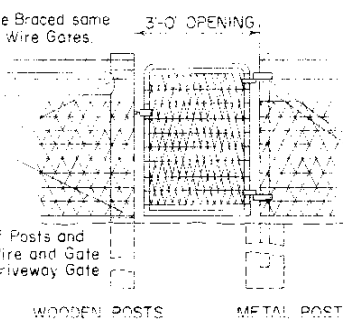
TWIN DRIVEWAY GATES



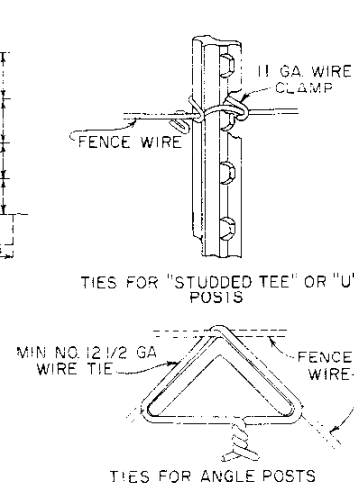
WALK GATE



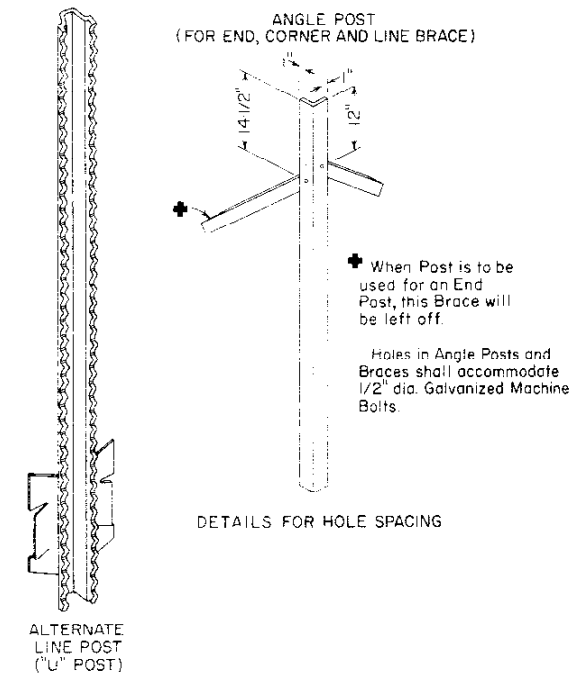
ALTERNATE WALK GATE



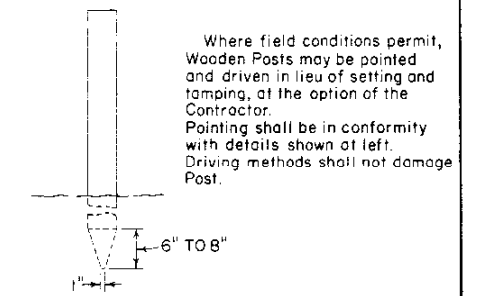
FENCE WIRE TIES



TYPICAL METAL POSTS



POST POINTING DETAILS



GENERAL NOTES

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 - 3/8" O.D. Tubular Steel with 2 1/2" Brace Band, Hinge Bolt and 1/3" I.D. Rod End; all Galvanized.
Weight - 1.6 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 I.

4" X 4" WIRE MESH:

Wire mesh used in combination wire fence as shown shall be galvanized and conform to the following:
Width - 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 I.

GATES:

DRIVEWAY GATES

Height - approximately 42" (15 panels) --- Width of gate opening - 16'-0"
Weight - Galvanized Steel, 90 lbs. Min. --- Tempered Aluminum, 45 lbs. Min.
Gates to be of Riveted construction as follows: Min. 4 No. 10 rivets at each right angle connection and where diagonal braces connect to horizontal panels; Min. 3 No. 10 rivets where diagonal braces connect to top and bottom panels.

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" X 4" wire mesh except it shall be 2" X 4" mesh 42" high.

WALK GATES:

Height - approx. 42" (15 panels)
Weight - Galvanized Steel, 18 lbs. Min.
Tempered Aluminum, 10 lbs. Min.
Width of gate opening - 3'-0"

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 local conditions, i.e. on curves the wire should be placed on the side of the post which would prevent tension on fence ties. This will also apply where wind drift, tumble weeds or other conditions would exert unusual pressure against the wire.

WOOD POSTS:

All line posts shall have a min. dia. of four (4) inches & 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 marked: ● on barbed wire or combination wire fence details.

METAL POSTS:

All posts and braces shall be of the types and weights shown or acceptable 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 - 3.81 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 - 0.57 lb. Min.

END POSTS:

Type - 2 1/2" X 2 1/2" X 1/4" Structural Steel Angles.
Weight - 3.81 lbs./lin. ft. Min.
Length - 6'-6" Min.
No. of Braces - 1

BRACES: (For Corner, End or Line Brace Posts)

Type - 2" X 3" X 1/4" Structural Steel Angles.
Weight - 3.09 lbs./lin. ft. Min.
Length - Same as corner and end posts used.

Posts shall meet requirements of Par 4.5 of U.S. Dept. of Commerce Commercial Standard 184-51. Acceptable materials include, but are not limited to:

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
WIRE FENCES
AND
GATES

Designed by L.E.O. Approved by J. J. Julian
Made by T.E.F. Engr. Surveys & Plans
Checked by E.E.O. Date: 6-12-1961

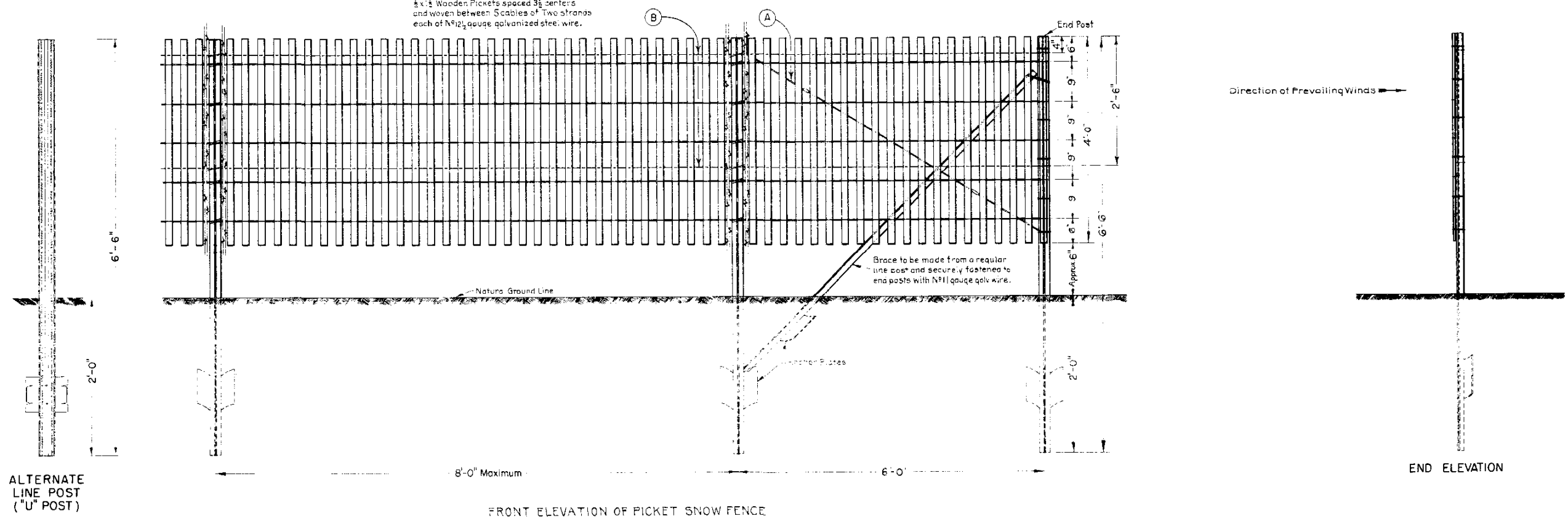
STANDARD M-77-A

(MAY 1, 1962)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		
REVISIONS			
2-21-63	Re-rolled Rails		L.E.O.
7-25-63	Rev. Bracing & Ref. to Comm. Std. 184-51		L.E.O.
2-14-64	DEPT. NAME		M.R.H.

Fence to be securely braced at each end panel with a regular line post and 1 diagonal cable consisting of 2 strands of twisted wire, each strand to consist of 2-12 gauge galvanized wires (A).
 Two horizontal wires (B) shall be placed for the full length of the fence. Each horizontal wire to consist of 2-12 gauge twisted galvanized wires. Each horizontal wire is to be fastened securely to fence post by means of 11 gauge wire clamps or No. 12 V2 gauge wire ties.

2" x 4" Wooden Pickets spaced 3 1/2" centers and woven between 5 cables of Two strands each of No. 12 1/2 gauge galvanized steel wire.



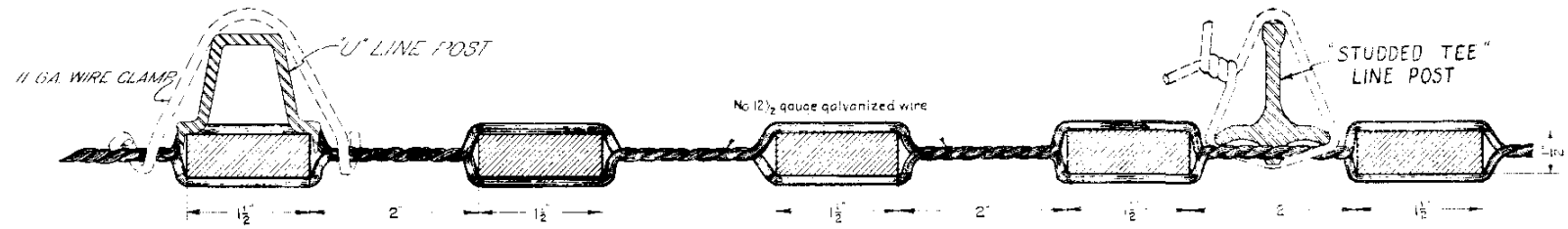
ALTERNATE LINE POST ("U" POST)

FRONT ELEVATION OF PICKET SNOW FENCE

END ELEVATION

GENERAL NOTES

- All work shall be done in accordance with the Standard Specifications of The Colorado Department of Highways applicable to the Project.
- Picket Fence is to be stretched tight and securely fastened to all posts with galvanized clips or No. 11 galvanized steel wire.
- All fence posts, complete with anchor plate, shall be hot dipped galvanized or painted with an approved asphalt or mineral paint and shall weigh not less than 1.28 lbs. per lin. ft. (without anchor). Suitable anchor plates shall be securely fastened to each line post and shall weigh a minimum of 0.57 lb.
- Posts shall meet requirements of Par. 4.5 of U.S. Dept. of Commerce Commercial Standard 184-51. Acceptable material includes re-rolled railroad rails.
- Snow fence may be placed immediately in front of the Right of Way fence when such location is suitable. This will avoid trapping of weeds and debris between the fences. In such installations the snow fence is not to be tied or fastened to the Right of Way fence.
- In general snow fence is to be placed 100 to 150 feet from C of Roadway. However specific location on each project is to be as staked by the engineer.



TYPICAL SECTIONS THROUGH SNOW FENCE POST AND PICKETS

Note: Other sections of steel posts having equal weight and equivalent strength may be used in lieu of this section.

**DEPARTMENT OF HIGHWAYS
STATE OF COLORADO**

PICKET SNOW FENCE

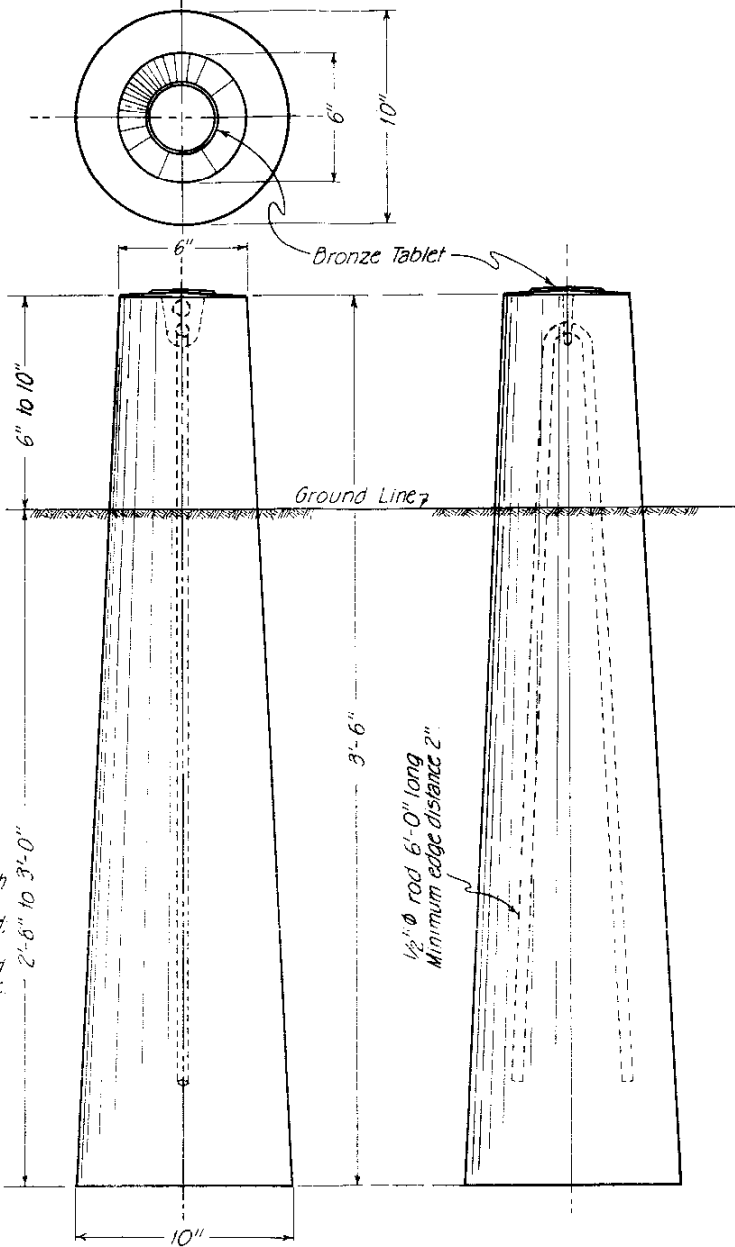
Designed by	Approved by
Made by	<i>C. Julian</i>
Checked by	Date: May 1, 1962

RIGHT OF WAY MARKER POST STANDARD M-81-A

(MAY 1, 1962)

FEDERAL ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

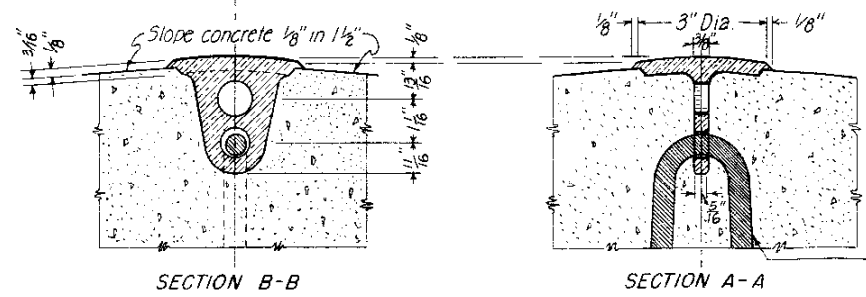
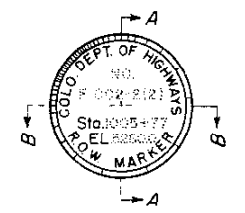
REVISIONS		
1-31-64	DEPT. NAME	M.R.H.



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 pin 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. & C for State Projects. see detail below.)



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

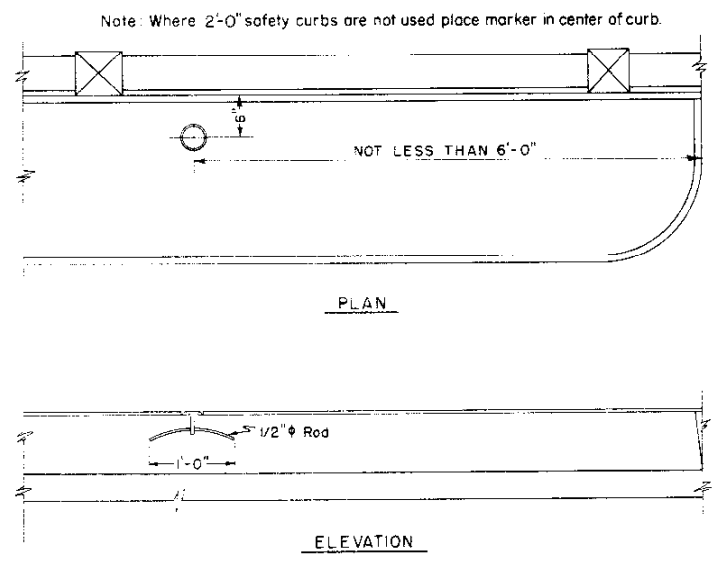
BENCH MARK

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 pin 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. & 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.



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

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

**MARKER POSTS
AND
BENCH MARKS**

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

STANDARD CURBS AND GUTTERS

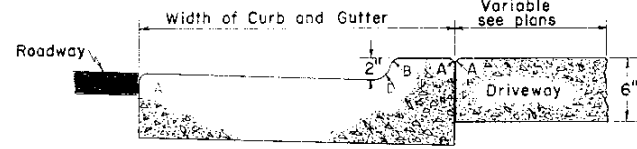
STANDARD M-84-A

(MAY 1, 1962)

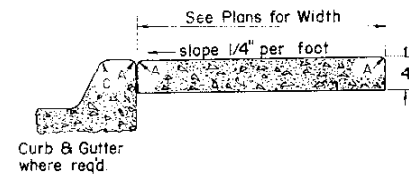
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLG		

REVISIONS		
3-25-63	Added Approach Slab Curbs	C.R.S.
2-3-64	DEPT NAME	M.R.H.

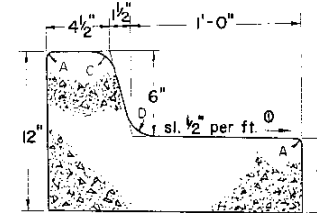
CONCRETE PAVEMENT (DRIVEWAYS)



CONCRETE SIDEWALKS



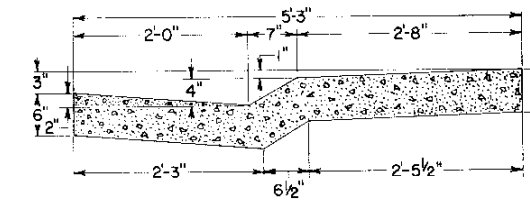
CONCRETE COMBINATION CURB AND GUTTER (6" Barrier-1' Gutter)(Type I)



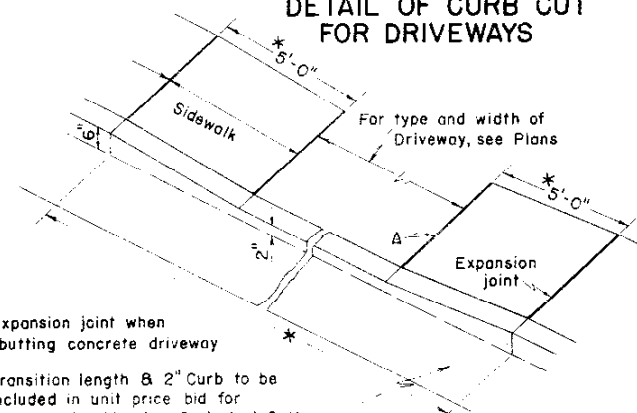
LEGEND FOR RADII

A	= 1/8"
B	= 1"
C	= 1 1/2"
D	= 1/2" to 2"

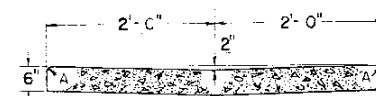
CONCRETE COMBINATION CURB, GUTTER AND SIDEWALK (TYPE II-M)



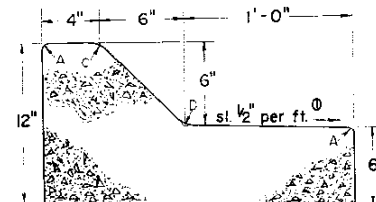
DETAIL OF CURB CUT FOR DRIVEWAYS



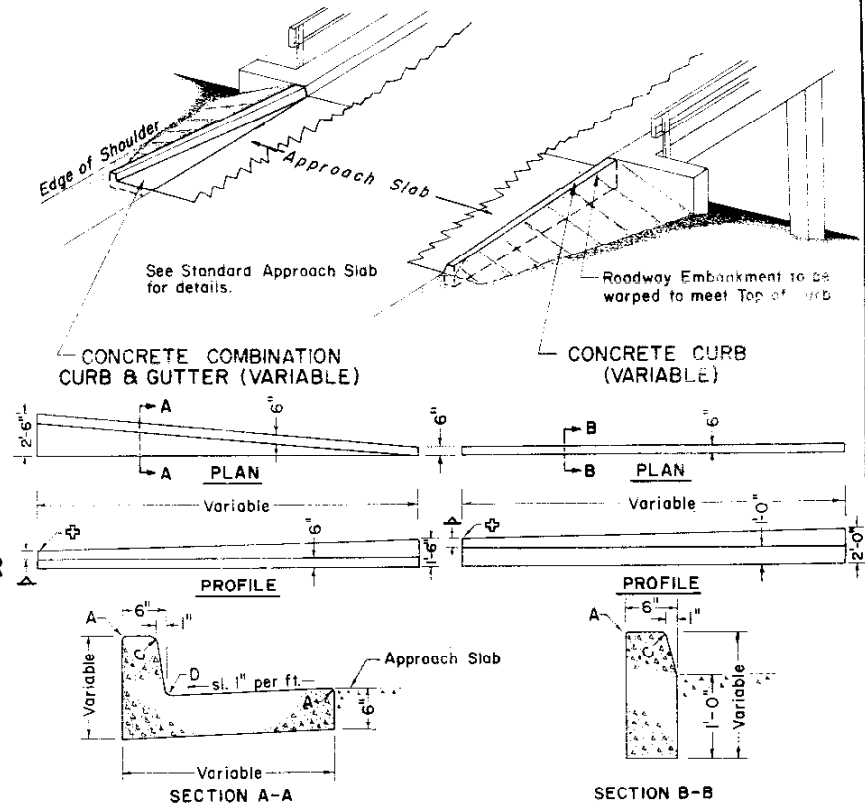
CONCRETE GUTTER



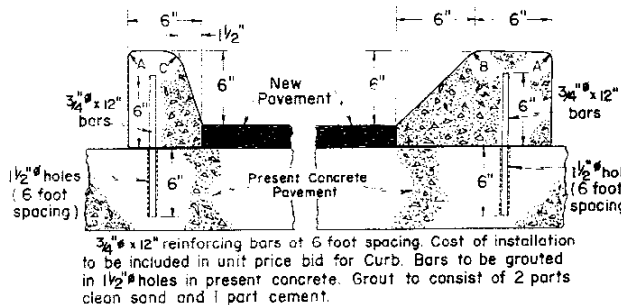
CONCRETE COMBINATION CURB AND GUTTER (6" Mountable-1' Gutter)(Type I-M)



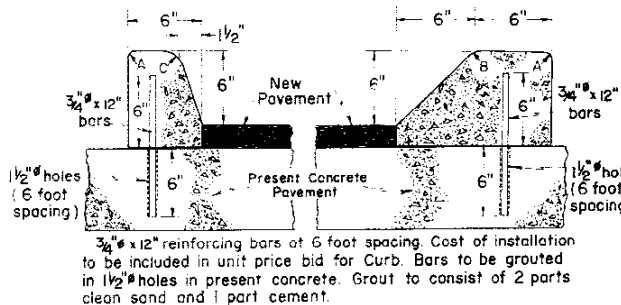
DETAILS OF CONCRETE COMBINATION CURB & GUTTER (VARIABLE) AND CONCRETE CURB (VARIABLE)



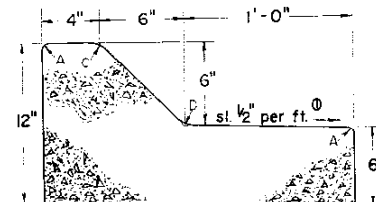
CONCRETE CURB (6" Barrier-Doweled)(Type I)



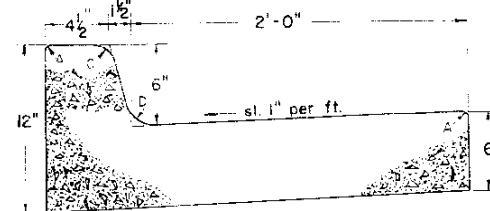
CONCRETE CURB (6" Mountable-Doweled)(Type I-M)



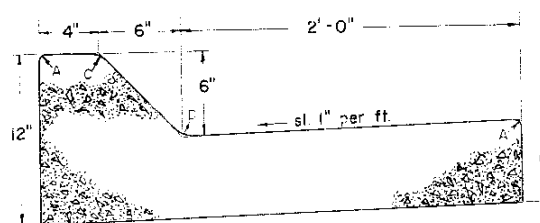
CONCRETE COMBINATION CURB AND GUTTER (6" Barrier-2' Gutter)(Type II)



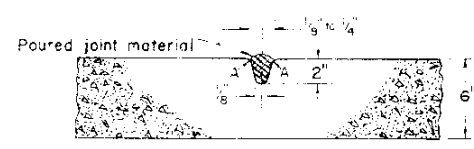
CONCRETE COMBINATION CURB AND GUTTER (6" Barrier-2' Gutter)(Type II)



CONCRETE COMBINATION CURB AND GUTTER (6" Mountable-2' Gutter)(Type II-M)

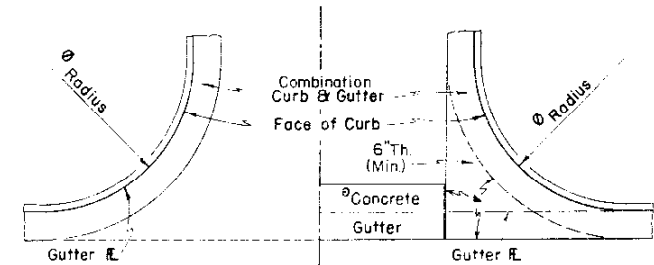


TRANSVERSE WEAKENED PLANE JOINT FOR CONCRETE PAVEMENT (DRIVEWAYS)



This joint required where length of slab exceeds 15 feet.

CONSTRUCTION OF CONCRETE GUTTERS AT INTERSECTIONS

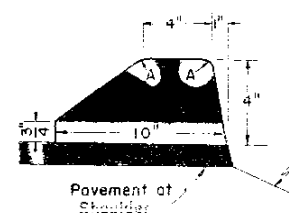


Length of Radius as shown elsewhere on Plans.

This section to be built when Concrete Gutter is not required.

This area shall be poured monolithically with curb and gutter and will be paid for as Concrete Pavement of specified thickness.

ASPHALTIC SHOULDER ROLL



NOTE: 0.647 x Specific Gravity of Asphalt = Tons per Station.

GENERAL NOTES

All work shall be done in accordance with the Specifications of the Colorado Department of Highways.
On Curves 3 degrees and sharper, Curbs and/or Gutters are to be placed on the Arc of the Curve unless otherwise noted on plans. A maximum chord length of 10 feet may be used when the degree of curve is less than 3 degrees.

4" (To meet Asphaltic Shoulder Roll)
6" (To meet Concrete Combination Curb & Gutter)
Use 1 1/2" R when no asphaltic or concrete curb is to be met. No radius required when meeting asphaltic or concrete curb.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

CURBS AND GUTTERS

Designed by *ed*
Made by *ed*
Checked by *CAS*
Approved by *ed*
Date: *5/29/62*

GENERAL NOTES

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

- * All exposed corners shall be beveled
 - * All construction joints shall be thoroughly cleaned before fresh concrete is poured
 - * All walls shall have forms on both sides.
- For size and location of protectors, see plans.
Structure backfill material is not to be used in connection with these structures. Embankment material shall be used for backfilling. This embankment, and compaction shall be included in price bid for these structures.

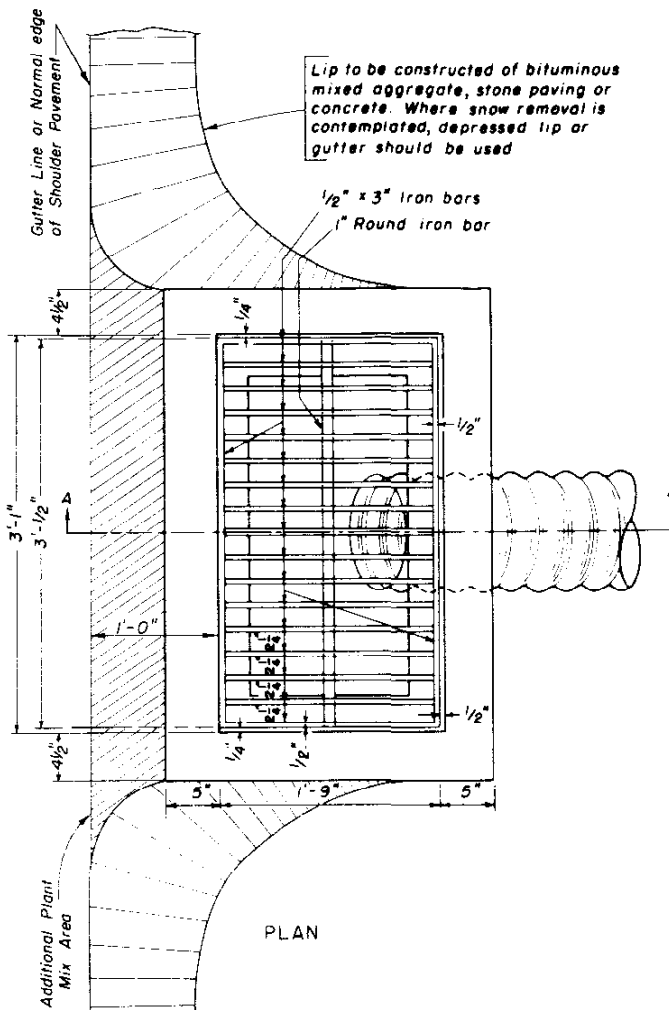
* Type 2 Embankment Protector only.

STANDARD M-93-A
(MAY 1, 1962)

FED. ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

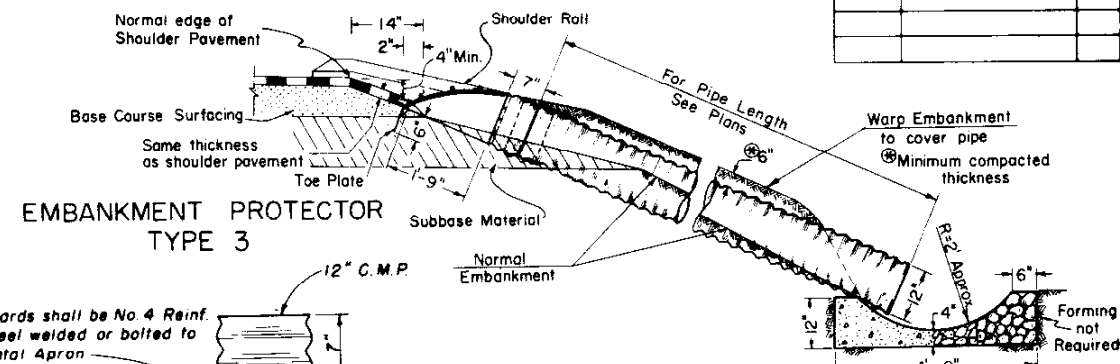
REVISIONS		
DATE	DEPT. NAME	M.R.M.
2-14-64		

TYPE 2



PLAN

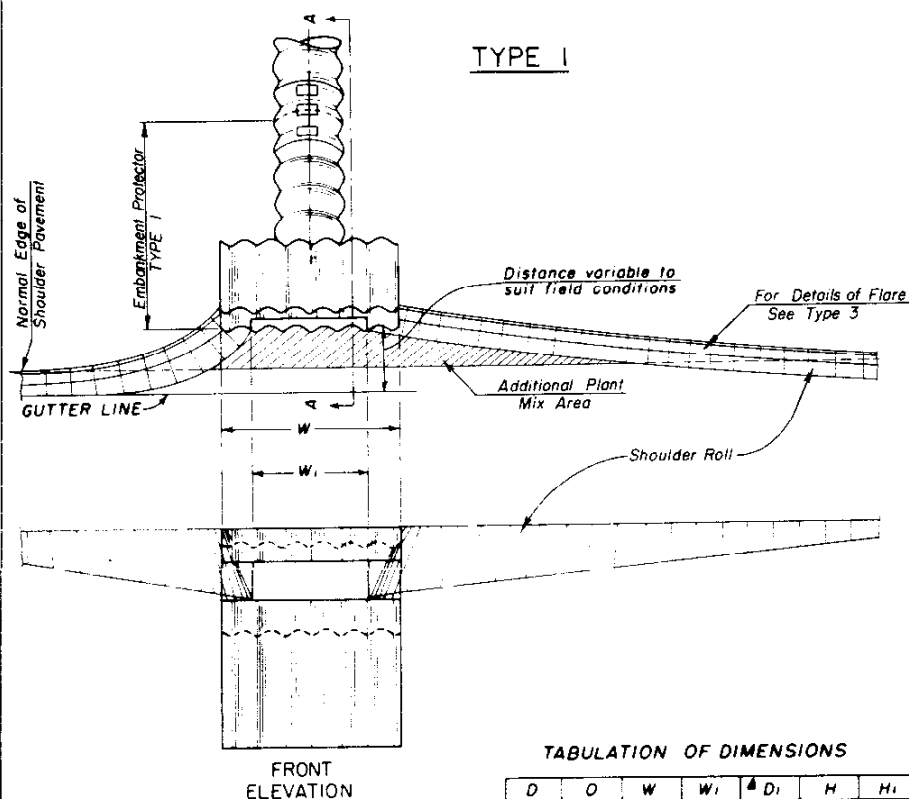
TYPE 3



EMBANKMENT PROTECTOR TYPE 3

SECTION "A-A"

4' x 4' Apron where required, see plans for type of material. Material to be placed to neat lines of trench. Quantities = 0.40 Cu. Yd. On concrete pavement projects, pavement concrete may be used.

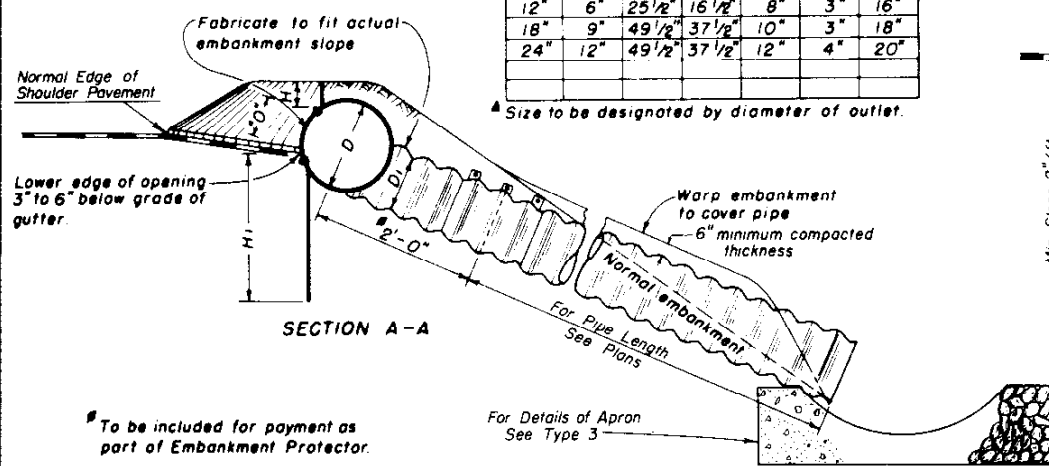


FRONT ELEVATION

TABULATION OF DIMENSIONS

D	O	W	W ₁	A	D ₁	H	H ₁
12"	6"	25 1/2"	16 1/2"	8"	3"	16"	
18"	9"	49 1/2"	37 1/2"	10"	3"	18"	
24"	12"	49 1/2"	37 1/2"	12"	4"	20"	

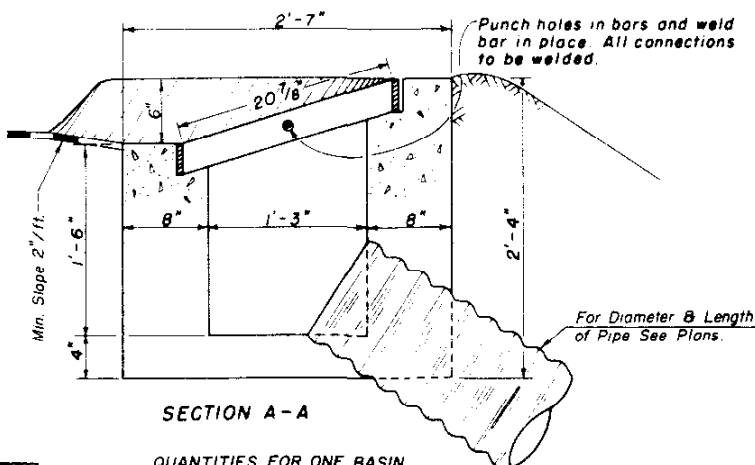
Size to be designated by diameter of outlet.



SECTION A-A

To be included for payment as part of Embankment Protector.

For Details of Apron See Type 3

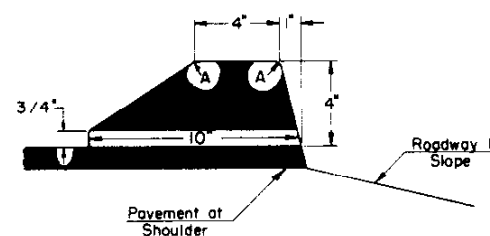


SECTION A-A

QUANTITIES FOR ONE BASIN
Class "A" Concrete = 0.54 Cu. Yds.
Inlet Grating = 1

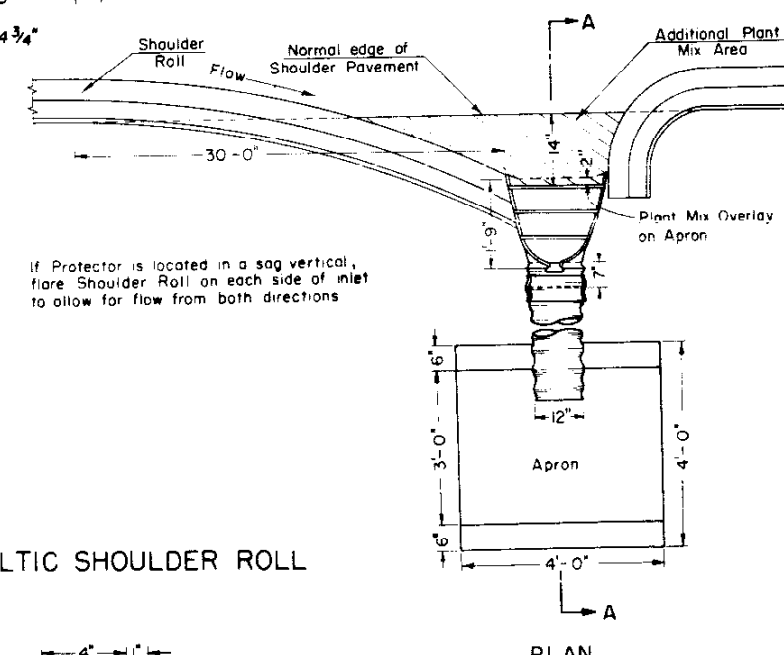
Volume occupied by pipe not to be deducted from Concrete Quantities.

ASPHALTIC SHOULDER ROLL



A = 1/8" Radius

NOTE: 0.647 X Specific Gravity of Briquette = Tons per Station



If Protector is located in a sag vertical, flare Shoulder Roll on each side of inlet to allow for flow from both directions

PLAN

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

EMBANKMENT PROTECTORS

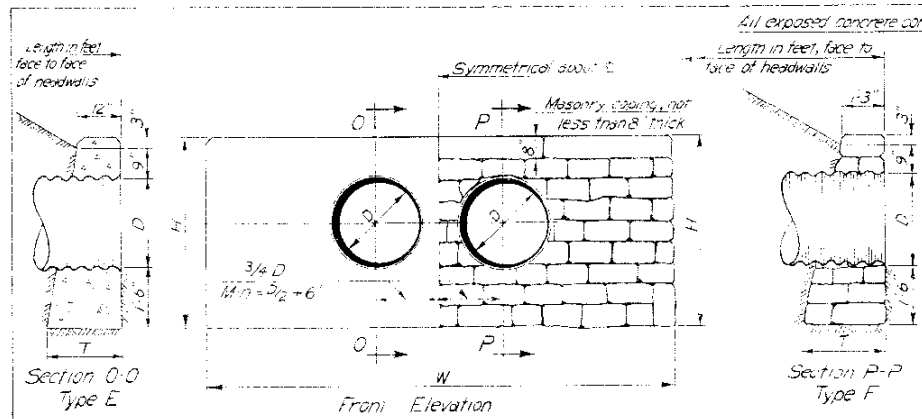
Designed by T.E.F.
Made by T.E.F.
Checked by E.E.O.
Approved by [Signature]
Date: November 1959

STANDARD M-95-A

(MAY 1, 1962)

FEDERAL ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

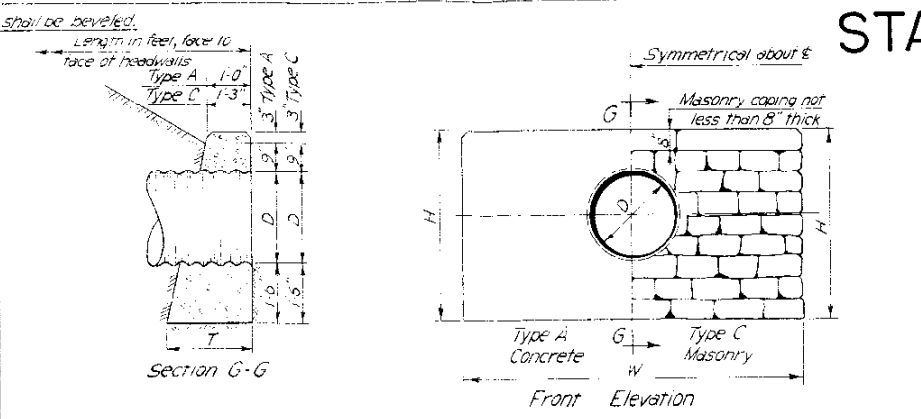
REVISIONS	
2-3-64	DEPT. NAME
	M.R.H.



STANDARD HEADWALLS FOR DOUBLE CORRUGATED METAL PIPE CULVERTS

Table of Dimensions and Quantities

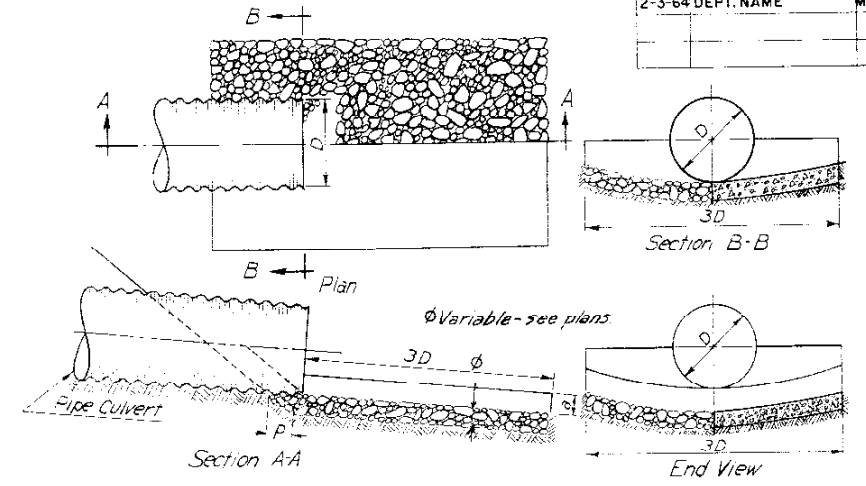
Type E		Both Types		Type F	
D	T	W	H	T	D
15	1-6	7-6	3-9	2-5	15
18	1-7	8-6	4-0	2-1	18
24	1-10	10-6	4-6	2-4	24
30	2-0	13-9	5-0	2-6	30
36	2-2	15-0	5-6	2-8	36
42	2-5	17-3	6-0	2-10	42
48	2-7	19-6	6-6	3-0	48



STANDARD HEADWALLS FOR SINGLE CORRUGATED METAL PIPE CULVERTS

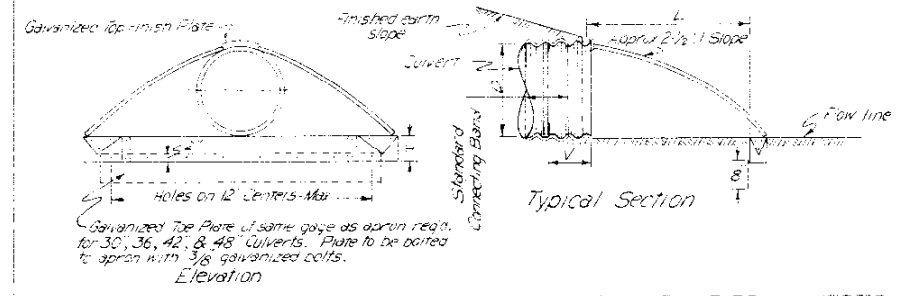
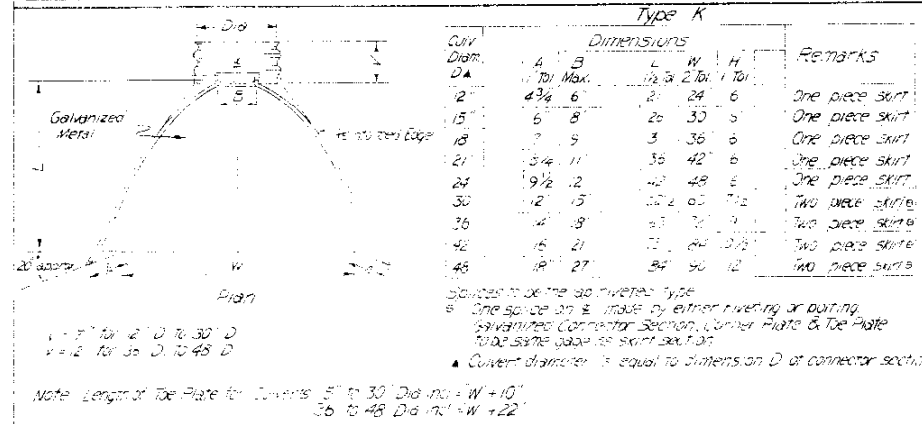
Table of Dimensions and Quantities

Type A		Both Types		Type C	
D	T	W	H	T	D
15	1-6	5-3	3-9	2-0	15
18	1-7	6-0	4-0	2-1	18
24	1-10	7-6	4-6	2-4	24
30	2-0	9-0	5-0	2-6	30
36	2-2	10-6	5-6	2-8	36
42	2-5	12-0	6-0	2-10	42
48	2-7	13-6	6-6	3-0	48

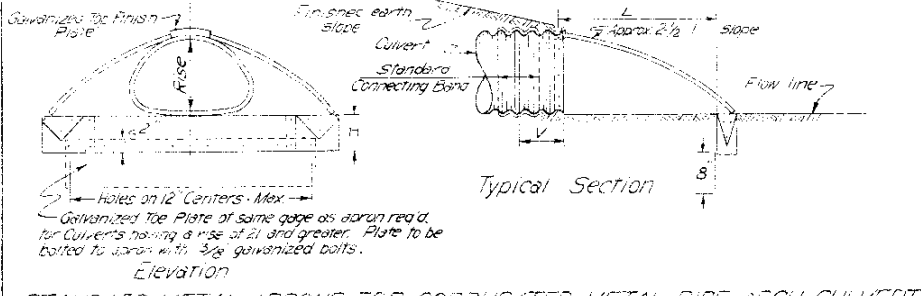
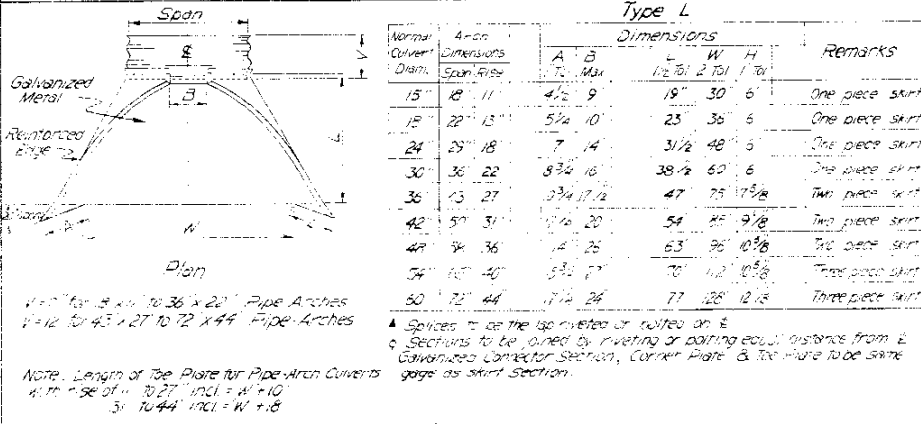


CONCRETE OR GROUTED RUBBLE APRON FOR PIPE CULVERT

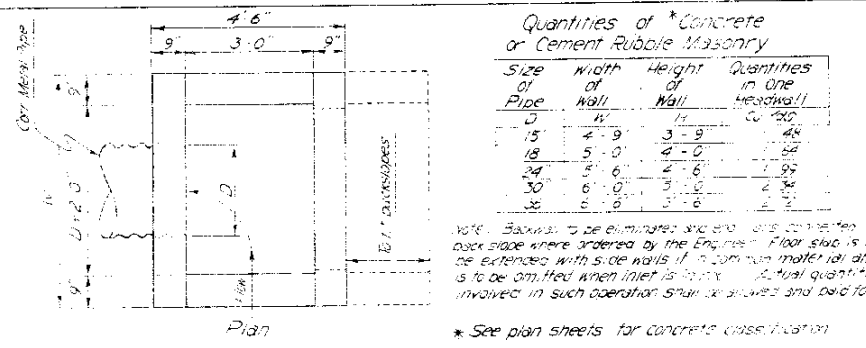
Fill slope	Square Yards of Slope and Ditch Paving															
	D	15	18	24	30	36	42	48	54	60	66	72	78	84		
1/2:1	2-0	3	4	6	9	12	17	21	27	33	39	46	54	62		
2:1	2-0	3	4	7	10	13	18	22	28	34	41	49	57	66		
3:1	3-0	3	4	7	11	15	20	25	31	38	45	54	63	72		
4:1	4-0	3	4	8	12	16	22	28	34	42	50	59	67	79		



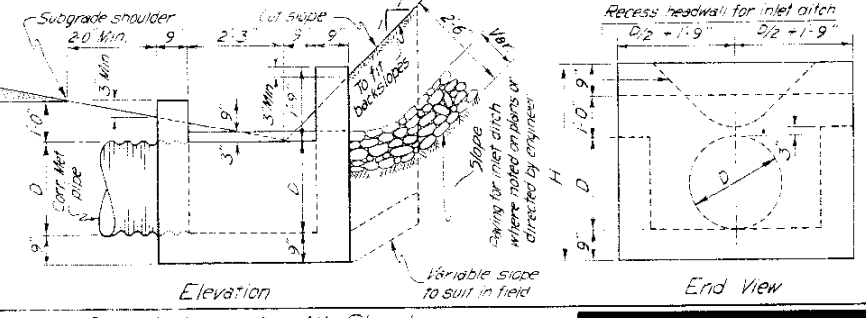
STANDARD METAL APRONS FOR CORRUGATED METAL PIPE CULVERTS TYPE K



STANDARD METAL APRONS FOR CORRUGATED METAL PIPE ARCH CULVERTS TYPE L



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 E of roadway.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

HEADWALLS AND APRONS FOR C.M.P. CULVERTS

Designed by R.E.S. Approved by R.E.S.
Made by J.E. Bridge Engineer
Checked by M.W.M. Date June 1, 1958

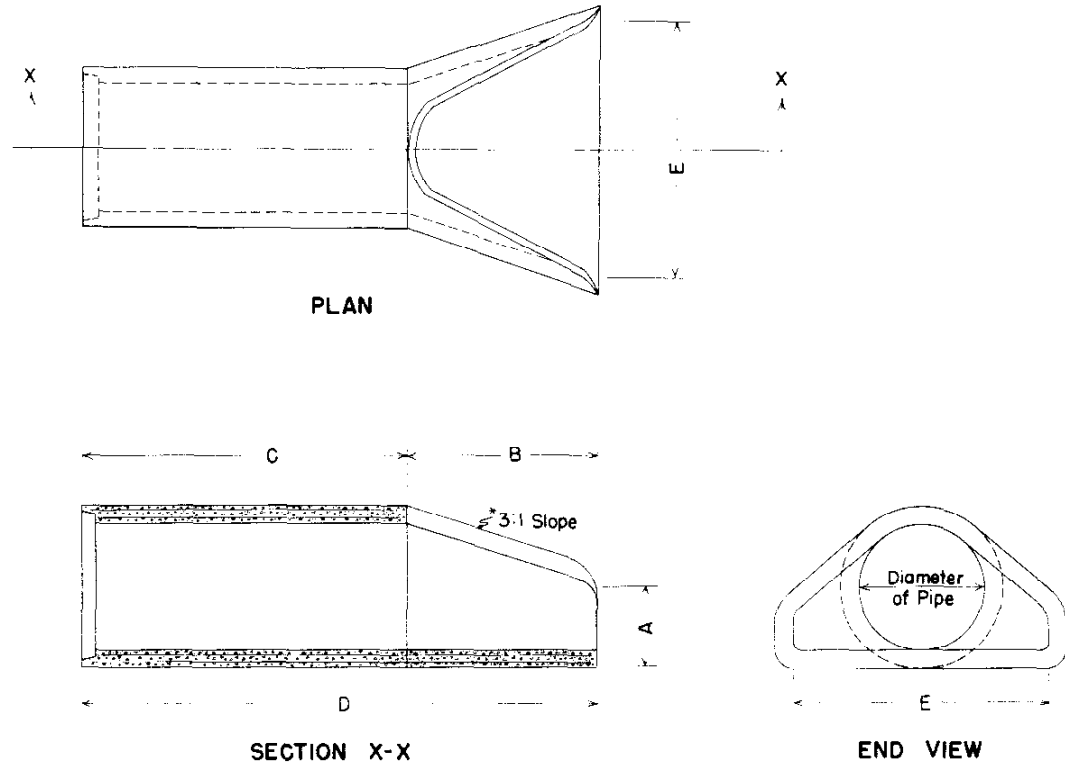
STANDARD M-152-A

(MAY 1, 1962)

FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

REVISIONS		
Rev.	Date	Name
2-11-64		M.R.H.

FLARED END SECTION FOR CONCRETE PIPE



DIMENSIONS FOR FLARED END SECTIONS

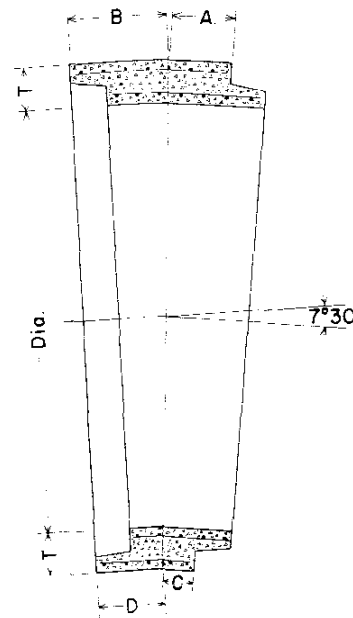
DIAMETER	A	B	C	D	E
12"	4"	2'-0"	4'-0 ⁷ / ₈ "	6'-0 ⁷ / ₈ "	2'-0"
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"
24"	9 ¹ / ₂ "	3'-7 ¹ / ₂ "	4'-6"	8'-1 ¹ / ₂ "	4'-0"
30"	1'-0"	4'-6"	3'-7 ³ / ₄ "	8'-1 ³ / ₄ "	5'-0"
36"	1'-3"	5'-3"	2'-10 ³ / ₄ "	8'-1 ³ / ₄ "	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-6"	6'-0"	2'-3"	8'-3"	7'-6"
*60"	2'-6"	5'-0"	3'-3"	8'-3"	8'-0"

*60" end section is based on a slope of 2:1

NOTE:

Alternate equivalent designs for flared end sections may be submitted to the Department for approval. Payment for "Flared End Sections" will be based on the lengths as shown in Column D. Any additional culvert pipe required to provide the lengths as shown in Column D will be included in the unit price bid for "Flared End Sections" of the several sizes.

7° 30' ANGLE SECTION FOR CONCRETE PIPE



DIMENSIONS FOR 7° 30' ANGLE SECTIONS

DIAMETER OF PIPE	LENGTH ON OUTSIDE OF PIPE				AVERAGE LAYING LENGTH ON C.
	A	B	C	D	
12"	4 ¹ / ₂ "	4 ¹ / ₂ "	3 ¹ / ₂ "	3 ¹ / ₂ "	8"
15"	5 ¹ / ₂ "	5 ¹ / ₈ "	4 ¹ / ₄ "	3 ⁷ / ₈ "	9 ³ / ₈ "
18"	3 ¹ / ₂ "	6 ¹ / ₂ "	2"	5"	8 ¹ / ₂ "
24"	4"	6 ¹ / ₂ "	2"	4 ⁹ / ₁₆ "	8 ¹ / ₂ "
30"	4 ¹ / ₂ "	7"	2"	4 ¹ / ₂ "	9"
36"	4 ⁷ / ₈ "	8 ⁷ / ₁₆ "	2"	5 ⁹ / ₁₆ "	10 ⁷ / ₁₆ "
42"	6"	9 ¹ / ₂ "	2 ⁵ / ₈ "	6 ¹ / ₈ "	12 ¹ / ₈ "
48"	7"	11"	3 ³ / ₁₆ "	7 ³ / ₁₆ "	14 ³ / ₁₆ "
54"	8 ¹ / ₈ "	12 ¹ / ₈ "	4"	8"	16 ¹ / ₈ "
60"	9 ¹ / ₈ "	14"	4 ³ / ₈ "	9 ¹ / ₄ "	18 ³ / ₈ "

A, B, C and D apply to Tongue and Groove type of Joint only and can be varied for other types of Joints.

GENERAL NOTES

Joints other than Tongue and Groove may be used for Flared End Sections, 7° 30' Angle but all joints for any one pipe structure must be uniform.

Concrete, wall thickness and reinforcing steel in Flared End Sections and 7° 30' Angle Sections must conform with the requirements of the pipe with which they are used.

Flared end sections are to be furnished with tongue or groove, and/or bell or spigot as required, in order that joints may be laid with the bell or groove end upstream.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

CONCRETE END
AND ANGLE
SECTIONS

Designed by R.S.M. Approved by J.M.K.
Made by J.M.K. *C. Sullivan*
Checked by R.S.M. Date: January 14, 1949

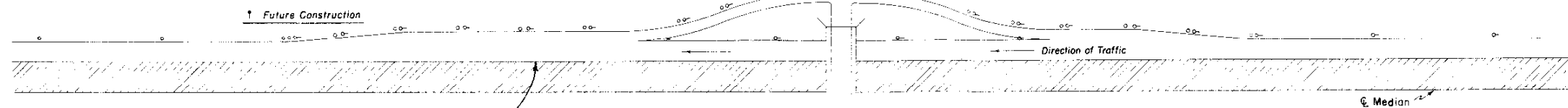
STANDARD M-192-AA

(SHEET 1 OF 2 SHEETS)
(JAN. 28, 1964)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS	

- Type I
- Type II
- Type III



EDGE OF PAVED SHOULDER
Typical Installation for Diamond Interchange.

GENERAL NOTES

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

See tabulation in plans for delineator post requirements.

Spacing between Posts on acceleration and deceleration lanes and on relatively straight portions of interchange ramps shall be ②. Spacing between Posts on the outside of interchange ramp curves shall be as indicated in table for the appropriate degree of curve with a 24' min. spacing. Post spacing in advance and beyond curve shall not apply to ramp curves.

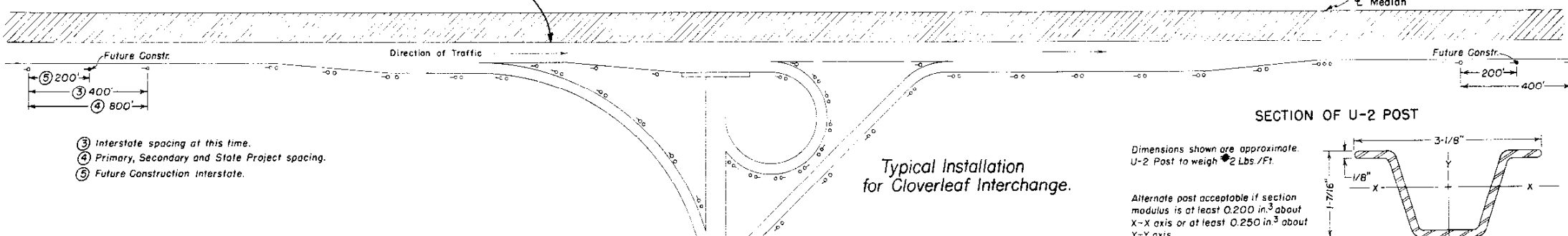
Posts shall meet requirements of Par. 4.5 of U.S. Dept. of Commerce Commercial Standard 184-51. Acceptable material includes re-rolled railroad rails.

When normal delineator spacing falls on a road approach or crossroad, move delineator either direction a distance not to exceed 1/4 normal spacing.

② 100' on Interstate and 200' on Primary and Secondary Projects.

Delineator Posts are not to be placed along Frontage Roads.

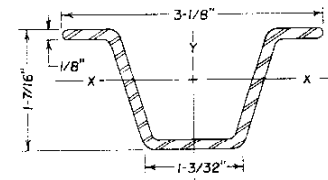
Color of Posts shall be Interstate Green.



- ③ Interstate spacing at this time.
- ④ Primary, Secondary and State Project spacing.
- ⑤ Future Construction interstate.

SECTION OF U-2 POST

Dimensions shown are approximate. U-2 Post to weigh 2 Lbs./Ft.



Alternate post acceptable if section modulus is at least 0.200 in.³ about X-X axis or at least 0.250 in.³ about Y-Y axis.

*A mill tolerance of minus 3-1/2% of the weight of any one post will be allowed.

SPACING FOR DELINEATOR POSTS ON HORIZONTAL CURVES

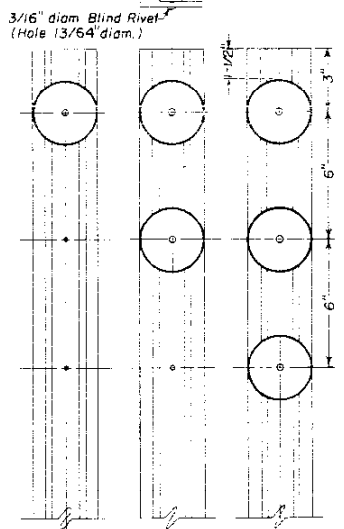
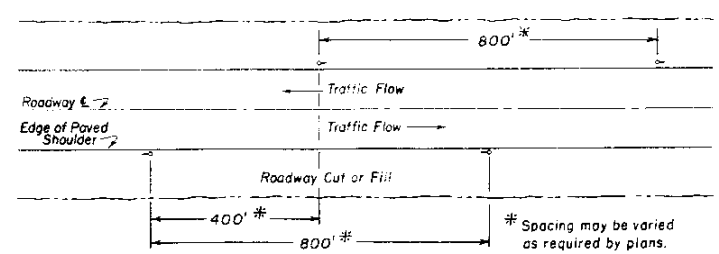
DEGREE OF CURVE	RADIUS	① SPACING ON CURVE			② SPACING IN ADVANCE OF AND BEYOND SIMPLE CURVE			DEGREE OF CURVE	RADIUS	③ SPACING ON CURVE			④ SPACING IN ADVANCE OF AND BEYOND SIMPLE CURVE		
		FEET	FEET	FEET	FIRST SPACE	SECOND SPACE	THIRD SPACE			FEET	FEET	FEET	FIRST SPACE	SECOND SPACE	THIRD SPACE
0°30'	11460.0'	200	200	200	200	200	200	8°00'	716.3'	52	94	156	200	200	200
1°00'	5730.0'	151	200	200	200	200	200	8°30'	674.1'	50	90	150	200	200	200
1°30'	3820.0'	123	200	200	200	200	200	9°00'	636.7'	48	86	144	200	200	200
2°00'	2865.0'	106	191	200	200	200	200	9°30'	603.2'	47	85	141	200	200	200
2°30'	2222.0'	95	171	200	200	200	200	10°00'	573.0'	46	83	138	200	200	200
3°00'	1910.0'	86	155	200	200	200	200	10°30'	545.7'	45	81	135	200	200	200
3°30'	1637.1'	80	144	200	200	200	200	11°00'	520.9'	43	77	129	200	200	200
4°00'	1432.5'	74	133	200	200	200	200	11°30'	498.3'	42	76	126	200	200	200
4°30'	1273.3'	70	126	200	200	200	200	12°00'	477.5'	41	74	123	200	200	200
5°00'	1146.0'	66	119	198	200	200	200	15°00'	382.0'	36	65	108	200	200	200
5°30'	1041.8'	63	113	189	200	200	200	18°00'	318.3'	33	59	99	198	200	200
6°00'	955.0'	60	108	180	200	200	200	21°00'	272.9'	30	54	90	180	200	200
6°30'	881.5'	58	104	174	200	200	200	25°00'	229.2'	27	49	81	162	200	200
7°00'	818.6'	55	99	165	200	200	200	30°00'	191.0'	24	43	72	144	200	200
7°30'	764.0'	53	95	159	200	200	200								

$S = 2 \sqrt{R-50}$ 1-ST. SPACE = 1.8S 2-ND. SPACE = 3S 3-RD. SPACE = 6S
NO SPACES TO EXCEED 200 FT.

① Omit third space on Secondary and Primary Routes and double the distance on the curve and in advance of and beyond curve.

Spacing for Delineator Posts on Tangents

(Two Lane - Two Way Traffic)



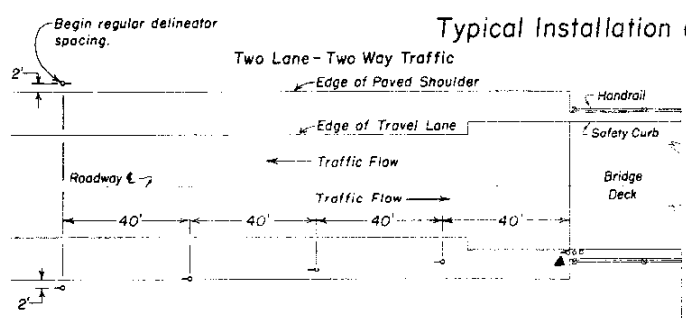
- TYPE I
1-3" diam. Crystal Reflector on U-2 Post
- TYPE II
2-3" diam. Yellow Reflectors on U-2 Post
- TYPE III
3-3" diam. Yellow Reflectors on U-2 Post

Min. 3 holes in all posts required as shown.

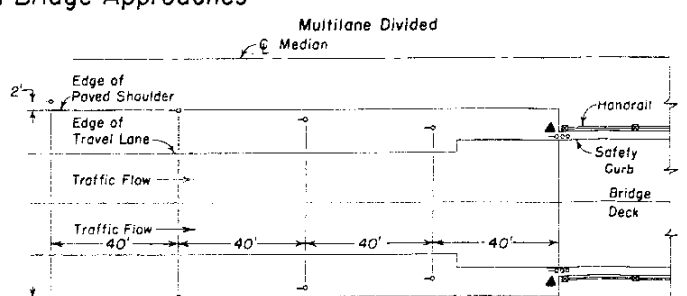
DEPARTMENT OF HIGHWAYS STATE OF COLORADO

DELINEATORS

D. signed by CKM
Made by WNC
Checked by LEO
Approved by [Signature]
Engineer, Surveys & Plans
Date: October 19, 1962



▲ Where curb to curb width of bridge is equal to or greater than roadway width plus usable shoulder width, use this delineator only and omit all others.
Note: Where guard rail is present, place delineators outside of guard rail and at height which will permit clear view of all three Delineator buttons.



When approach slab has curb, place Type III delineator immediately behind curb.

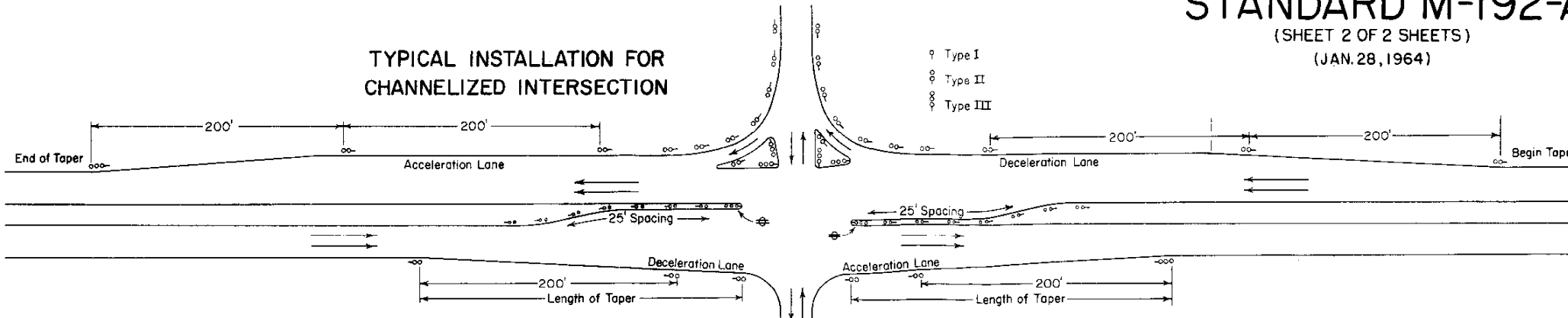
STANDARD M-192-AA

(SHEET 2 OF 2 SHEETS)
(JAN. 28, 1964)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS	

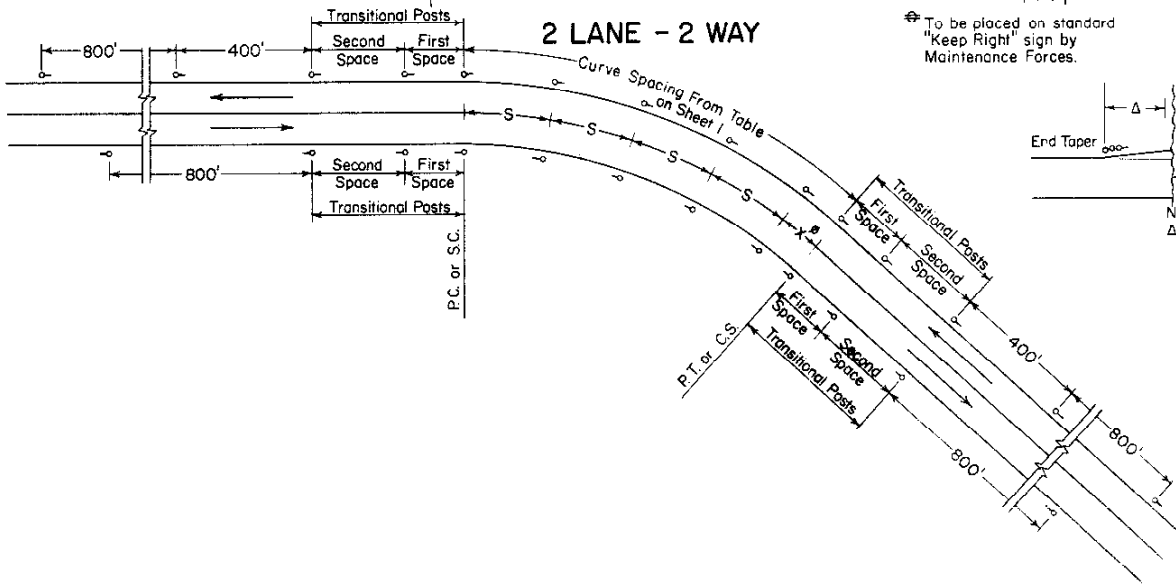
TYPICAL INSTALLATION FOR CHANNELIZED INTERSECTION



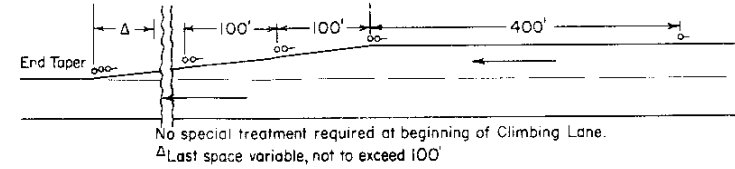
GENERAL NOTES

- For Radii greater than 200 Feet, use spacing from Table included on Sheet 1 of this Standard.
- For additional General Notes, see Sheet 1 of this Standard.
- Place face of button at 90° to \bar{C} of roadway.

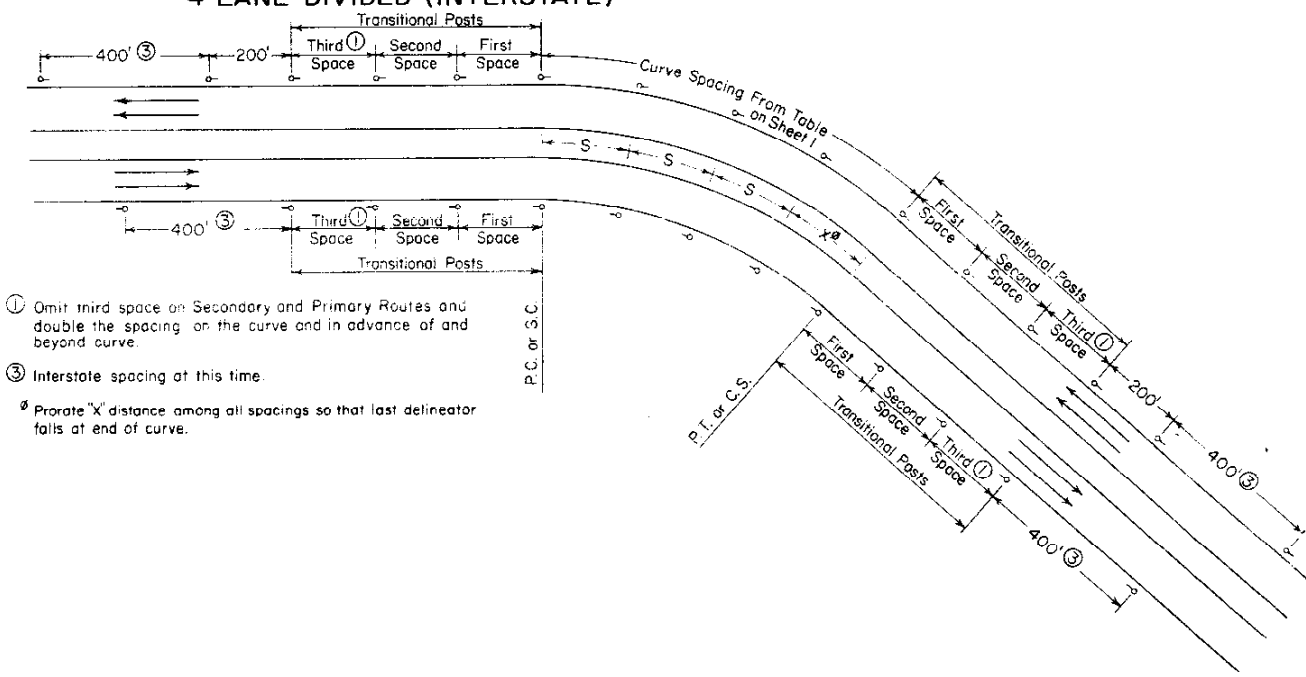
2 LANE - 2 WAY



TYPICAL INSTALLATION FOR CLIMBING LANE TRANSITION



4 LANE DIVIDED (INTERSTATE)



- ① Omit third space on Secondary and Primary Routes and double the spacing on the curve and in advance of and beyond curve.
- ③ Interstate spacing at this time.
- ④ Prorate "X" distance among all spacings so that last delineator falls at end of curve.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

DELINEATORS

Designed by C.K.M. Approved by S.C. LANN
Made by T.E.F. Engineer, Surveys & Plans
Checked by L.E.O. Date: 1964