FEDERAL ROAD REGION NO	DIVISION	PROJECT NO	SHEET NO
VIII	COLORADO	C16-0012-01	1

STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS—STATE OF COLORADO

AS CONSTRUCTED
REVISIONS DATE 10/29/73

PLAN AND PROFILE OF ~~PROPOSED~~

COLORADO PROJECT NO. C16-0012-01

STATE HIGHWAY NO. 12

HUERFANO COUNTY

INDEX OF SHEETS

SHEET NO

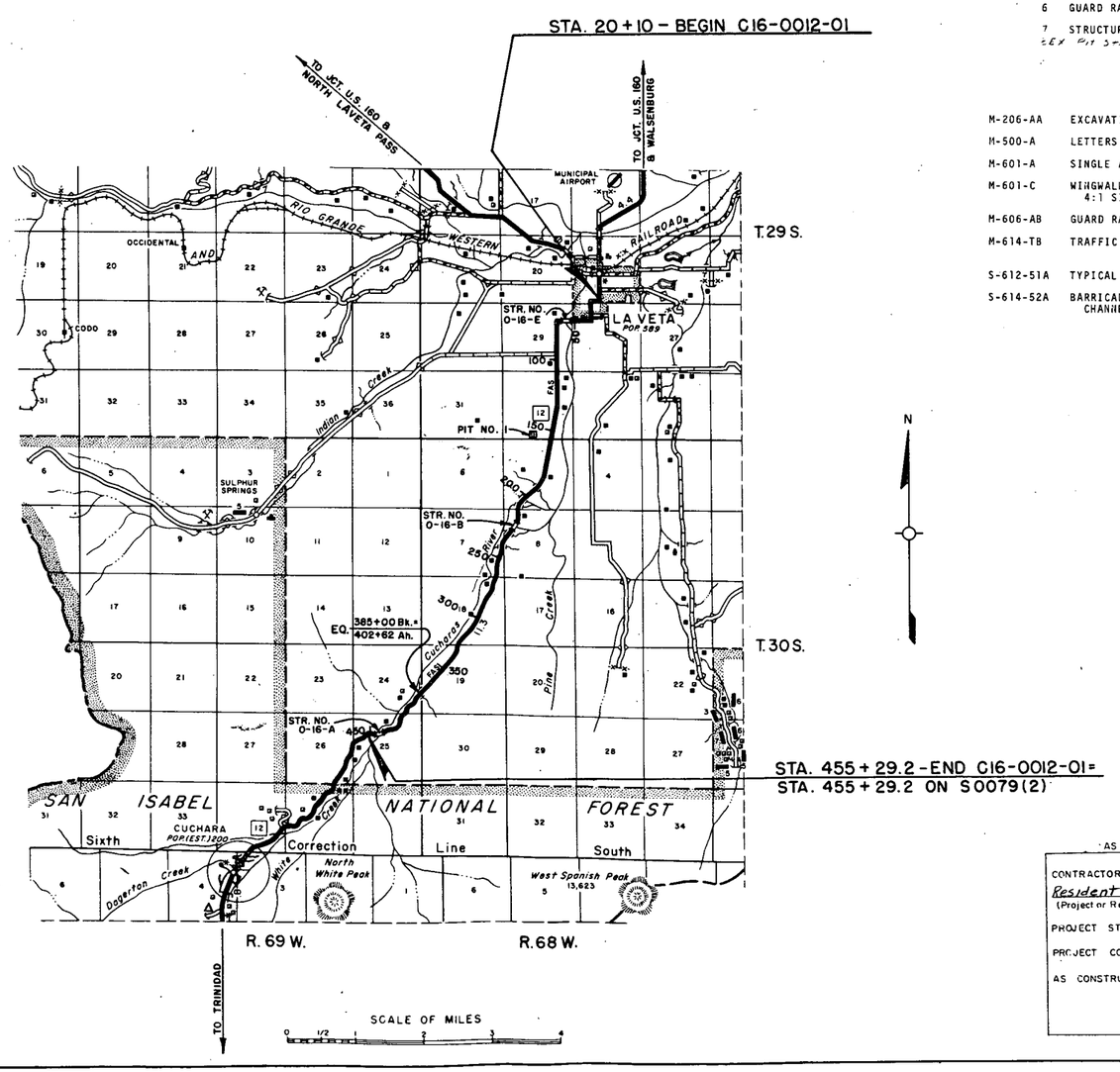
EX PIT SKETCH

M-206-AA	EXCAVATION AND BACKFILL FOR STRUCTURES	(2 SHEETS)	2-16-72
M-500-A	LETTERS AND FIGURES FOR STRUCTURE NUMBERS		7-1-65
M-601-A	SINGLE AND DOUBLE CONCRETE BOX CULVERTS		5-10-71
M-601-C	WINGWALLS FOR CONCRETE BOX CULVERTS - 4:1 SIDE SLOPES	(2 SHEETS)	10-25-68
M-606-AB	GUARD RAIL, TYPE 3	(3 SHEETS)	12-20-71
M-614-TB	TRAFFIC SIGNING FOR HIGHWAY CONSTRUCTION	(3 SHEETS)	11-22-71
S-612-51A	TYPICAL DELINEATOR INSTALLATIONS	(2 SHEETS)	10-26-72
S-614-52A	BARRICADES AND VERTICAL PANEL CHANNELIZING DEVICES		6-26-73

TABULATION OF LENGTH

STATION	ROADWAY LIN. FT.
20+10 - BEGIN C16-0012-01	
385+00 Bk. = 402+62.0 Ah. = BEGIN S 0079(2) EQ.	36,490.0
412+50.3 Bk. = 412+52.3 Ah. EQ.	988.3
427+85.5 Bk. = 427+77.1 Ah. EQ.	1,533.2
440+17.2 Bk. = 440+11.0 Ah. EQ.	1,240.1
449+96.4 Bk. = 449+96.2 Ah. EQ.	985.4
455+29.2 - END C16-0012-01 = 455+29.2 ON S0079(2)	533.0
TOTAL	41,770.0

SUMMARY	LIN. FT.	MILES
ROADWAY	41,770.0	7.911
TOTAL NET & GROSS LENGTH	41,770.0	7.911



DIVISION OF HIGHWAYS

APPROVED E.V. Hause 7/18/73
CHIEF ENGINEER DATE

AS CONSTRUCTED INFORMATION

CONTRACTOR I.W. Avery Const. Co.
Resident ENGINEER (Project or Resident) Bill B. Warren
PROJECT STARTED August 13, 1973
PROJECT COMPLETED October 24, 1973
AS CONSTRUCTED PLANS APPROVED C.T. Pim
Dist. Const. Engr. TITLE 1-7-74 DATE

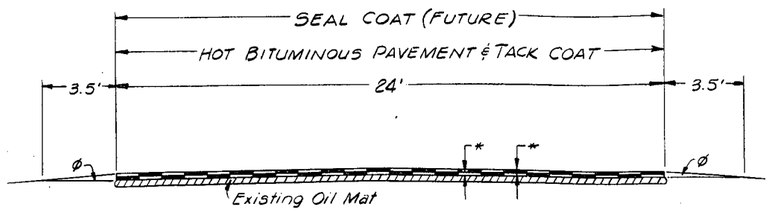
M.E.V.

VISION OF HIGHWAYS, STATE OF COLORADO
O. H FORM NO. 126
ev. October, 1972

AS CONSTRUCTED
REVISED DATE 10/24/73

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	C16-0012-01	2	

TYPICAL SECTION



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

STATION	REQUIREMENTS	TONS/STA. EA. LAYER
20+10 to 80+00	2 Layers @ 1½" thick	22
80+00 to 165+00	3 Layers @ 1½" thick	22
165+00 to 385+00	2 Layers @ 1½" thick	22
385+00 to 455+29.2	1 Layer @ 2" thick	29

Ø Shoulder Material ..... 6 Tons (A.B.C. Cl. 6)

STRUCTURE REQUIREMENTS

225+40 ~ Remove Headwalls, ~~Req'd Extend 6'x7' C.B.C. 5' Lt. & 3 Rt. with Wingwalls (4:1) Provide 9½ Floor Slab in Existing C.B.C. as directed~~

~~Struct. Exc. = 42 Cu. Yd.~~
Struct. Bkfl. = 113 Cu. Yd.
Conc. Cl. A (Box Culv.) = 34.4 Cu. Yd.
Rein. Steel = 2,514 Lbs.
~~Removal of Headwall - 2~~

Deleted by W.O. # 03333
Does not Delete Remove Headwalls

Req'd Delineators throughout Project as directed.

Delineator Type I - 94
Delineator Type III - 6

GENERAL NOTES

For Preliminary Plan quantities of Bituminous Materials the following rates of application were used:

Tack Coat (CSS-1H)..... ~~0.10~~ 0.02 Gal. per Sq. Yd.

Diluted Emulsified Asphalt for Tack Coat shall consist of 1 part Emulsified Asphalt and 1 part water.

Rates of application shall be as determined by the Engineer at the time of application.

Any layer of bituminous pavement that is to have a succeeding layer placed thereon shall be completed full width before succeeding layer is placed.

A Ski-type device at least 30 feet in length and short ski or short shoe shall be furnished with each bituminous paver.

Road Approaches which require bituminous pavement shall be tack coated and a 2" thickness of pavement placed as follows:

Public approaches and entrances to buildings or residences shall be paved 50 ft. out from edge of shoulder or to the Right-of-Way line whichever is less. Field entrances shall be paved 4 ft. out from edge of shoulder.

It is estimated that 600 Hours of Flagging for controlling traffic will be required for this project.

Delineators will be removed by State Forces.

It is estimated that 20 Hours of Blading will be required for this Project as directed by the Engineer.

SUMMARY OF APPROXIMATE QUANTITIES

AS CONSTRUCTED
REVISED DATE 10/24/73

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	C16-0012-01	3	

INDEX BOOK	INDEX PAGE	INDEX SHEET	CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	W. O. Numbers	PROJECT TOTALS Plan	PROJECT TOTALS FINAL	diff.	%
DOH 305	1		202	Removal of Headwall	Each		2	2	0	
Cross Sect.		BEX	203	Stripping	Cu. Yd.		3,200	2516	-684	-21
DOH 305	3		203	Blading	Hour		20	20	0	
		4	204	Haul	Ton Mi.		54,600	53,527	-1073	-2
			206	Structure Excavation	Cu. Yd.	03333	50	0	-50	-100
			206	Structure Backfill (Cl. 2)	Cu. Yd.	03333	120	0	-120	-100
		4	210	Reset Guard Rail Type 3	Lin. Ft.		63	50	-13	-21
		4	304	Aggregate Base Course (Cl. 6)	Ton		2,700	2861.55	+161.55	+6
		4	403	Hot Bituminous Pavement (Grading E) (Hydrated Lime)	Ton		22,500	21,645.70	-854.30	-4
DOH 305	10		411	Asphalt Cement (AC-5)	Ton		1,420	1449.28	+29.28	+2
DOH 305	11		411	Emulsified Asphalt (CSS-1H)	Gal.		11,600	1950	-9650	-83
			601	Concrete Class A (Box Culvert)	Cu. Yd.	03333	35	0	-35	-100
			602	Reinforcing Steel	Lb.	03333	2,514	0	-2514	-100
		4	606	Guard Rail Type 3 (6'-3" Spacing)	Lin. Ft.		1,475	1513 ~~1512~~	+38	+3
		4	606	End Anchor Type 3A	Each		12	18	+6	+50
DOH 305	16		612	Delineator Type I	Each		94	94	0	
DOH 305	17		612	Delineator Type III	Each		6	6	0	
DOH 305	18		614	Flagging	Hour		600	544	-56	-9
DOH 305	19		620	Field Laboratory	Each		1	1	0	
DOH 305	20		620	Sanitary Facility	Each		1	1	0	
			626	Mobilization	L.S.		•	•		
				FORCE ACCOUNT						
				Excavate Base Failures	L.S.	03332	•	•		
				Channel Change, Plug C.B.C., Install 60"x20' CSP	L.S.	03333		•		
				STATE FORCES						
				Striping	L.S.		•	•		

DIVISION OF HIGHWAYS, STATE OF COLORADO
D. O. H. FORM NO. 125
Rev. October, 1972

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	C16-0012-01	4	

.S CONSTRUCTED
REVISED DATE 10/24/73

FINAL SURFACING PLAN

Ref. Envelopes with White Scale tickets

STATION	SOURCE	TONS: AGGREGATE BASE COURSE CLASS G Plan	Final	HOT BITUMINOUS PAVEMENT-GRADING E: BOTTOM LAYER Plan	Final	MIDDLE LAYER Plan	Final	TOP LAYER Plan	Final	HAUL-TON MILE: AGGREGATE BASE COURSE CLASS G Plan	Final	HOT BITUMINOUS PAVEMENT-GRADING E: BOTTOM LAYER Plan	Final	MIDDLE LAYER Plan	Final	TOP LAYER Plan	Final
20+10 to 80+00	Goemmer Pit	~~360~~	426.10	~~1,318~~	1358.85			~~1,318~~	2111.85	~~803~~	950	~~2,939~~	3030			~~2,939~~	4708
80+00 to 157+20		~~464~~	611.15	~~1,699~~	2,037.70	~~1,699~~	1535.20	~~1,699~~	1639.25	~~432~~	569	~~1,582~~	1,897	~~1,582~~	1,429	~~1,582~~	1526
157+20 to 165+00		~~47~~	81.65	~~172~~	232.50	~~172~~	189.70	~~172~~	178.20	~~13~~	22	~~48~~	64	~~48~~	52	~~48~~	49
165+00 to 385+00		~~1,320~~	1,742.65	~~4,840~~	4833.00			~~4,840~~	5,182.00	~~3,209~~	4237	~~11,767~~	11,749			~~11,767~~	12,598
402+62 to 455+29.2		~~317~~	*					~~1,532~~	1,784.50	~~1,590~~	*					~~7,682~~	8946
Appr. to Proj.		~~50~~	*	~~527~~	562.95					~~102~~	*	~~1,072~~	1,701				
From Tab. of Rd. Appr.		~~122~~	*	~~473~~	*					~~248~~	*	~~962~~	*				
Leveling Course				~~903~~	*	~~187~~	*	~~945~~	*			~~1,837~~	*	~~381~~	*	~~1,923~~	*
Project Totals		~~2,680~~	2861.55	~~3,932~~	3025.00	~~2,058~~	1,724.90	~~10,506~~	10895.80	~~6,397~~	5,778	~~20,207~~	18,441	~~2,011~~	1481	~~25,941~~	27827

* Quantities included with Roadway Tabulation

FINAL GUARD RAIL TYPE 3

Ref. Book 1 Pg 10 & 11

STATION	SIDE	GUARD RAIL TYPE 3 Plan LIN. FT.	Final	RESET GUARD RAIL TYPE 3 Plan LIN. FT.	Final	END ANCHORAGE TYPE 3-A Plan EACH	Final
53+26 to 54+76Φ	Rt.	~~150~~	150			+	1
54+01 to 54+76Φ	Lt.	~~75~~	75			+	1
55+05.5Φ to 55+80.5	Rt.	~~75~~	50			+	1
55+05.5Φ to 56+55.5	Lt.	~~150~~	100			+	1
222+85.3 to 224+60.3Φ	Lt.	~~175~~	88			+	1
223+10.3 to 224+60.3Φ	Rt.	~~150~~	137			+	1
224+96.5Φ to 226+21.5	Rt.	~~125~~	125			+	3
224+96.5Φ to 226+21.5	Lt.	~~125~~	125			+	1
445+14.9 to 446+64.9*	Rt.	~~150~~	150			+	1
445+89.9 to 446+64.9*	Lt.	~~75~~	75			+	1
*446+64.9 to *446+96.3	Rt.			~~31.4~~	25		
*446+64.9 to *446+96.3	Lt.			~~31.4~~	25		
446+96.3* to 447+71.3	Rt.	~~75~~	63			+	1
446+96.3* to 448+46.3	Lt.	~~150~~	150			+	1
212+26 to 213+50	Rt.		125				2
212+50 to 213+50	Lt.		100				2
Project Total		~~1475~~	1513	~~62.8~~	50	~~12~~	18

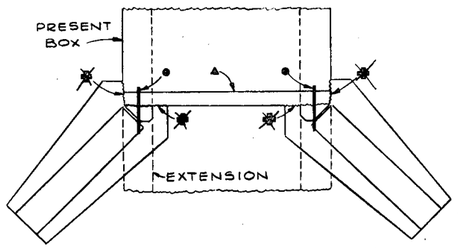
Φ Connect to Existing Bridge Rail (Detail on Sheet No. 6).

* Existing Bridge: Structure No. O-16-A.
Guard Rail on Existing Bridge shall be blocked out with 6"x8"x14" Timber Blocks (Estimated 10 Blocks Required) bolted to the Existing Posts (See Standard M-606-AB). Terminal Sections on Ends of Existing Bridge Rail shall be removed and new approach Guard Rail shall be connected to the Existing Bridge Rail.
Blocks, Bolts and all work necessary to accomplish the above shall be Included in the Bid Price for Item 210 "Reset Guard Rail, Type 3."

See Typical Guard Rail Flares and Table on Sheet No. 6.

Post Spacing for Guard Rail shall be 6'-3".

DETAIL OF HEADWALL REMOVAL



~~Remove Along These Lines.~~

▲ This Headwall To Be Removed.

~~●~~ 2 Ft. Reinforcing Bars To Be Placed At ~~Every~~ Longitudinal Bar Shown On The ~~Standard~~. Size To Be ~~Same~~ As Longitudinal Bars.

The Cost Of ~~Drilling~~ Holes ~~And~~ Placing Tie Bars ~~is To Be~~ Included in Payment ~~For~~ "~~Removal~~ Of Headwall".

TABULATION OF ROAD APPROACHES

STATION	SIDE	TONS: AGGREGATE BASE COURSE Plan CLASS G	Final	HOT BITUMINOUS PVMT. GRADING E Plan	Final
92+30	Rt			40	
93+10	Lt.			2	
100+43	Rt.			10	
105+74	Lt.			10	
115+50	Rt.			10	
115+95	Lt.			15	
118+90	Lt.			2	
103+60	Lt.			20	
132+05	Rt.			2	
133+60	Lt. & Rt.			6	
158+10	Rt.			4	
160+25	Lt.			2	
169+00	Lt.			2	
173+00	Lt.			5	
179+00	Rt.			20	
186+20	Rt.			2	
190+30	Lt.	25		25	
192+95	Rt.			2	
194+05	Lt.			4	
203+30	Lt.			2	
210+50	Rt.			4	
218+05	Lt.			2	
220+00	Lt.			30	
220+50	Lt.			2	
223+70	Lt.			20	
225+70	Lt.			2	
227+50	Rt.			2	
229+60	Lt.			2	
236+00	Lt.			2	
246+20	Rt.			2	
252+75	Lt.			2	
257+10	Rt.	40		40	
260+10	Rt.			4	
261+10	Lt.			40	
269+50	Rt.			40	
289+50	Lt.			2	
302+60	Lt.			10	
303+85	Rt.			5	
318+00	Lt.			2	
336+	Lt.	40		40	
348+10	Rt.			2	
351+80	Lt.			2	
368+60	Rt.			5	
369+95	Lt.			2	
370+95	Rt.			7	
378+00	Rt.			2	
385+	Lt. & Rt.			7	
431+15	Rt.	17		8	
Project Totals Φ		122		473	

Totals included in Surfacing Plan

Totals included in Surfacing Plan

Φ Quantities taken to Surfacing Plan.
Also includes Approaches between Sta. 20+10 ~ 92+30 and Sta. 431+15 ~ 455+29.2

DIVISION OF HIGHWAYS, STATE OF COLORADO
D. O. H. FORM NO. 126
Rev. October, 1972

PIT SKETCH

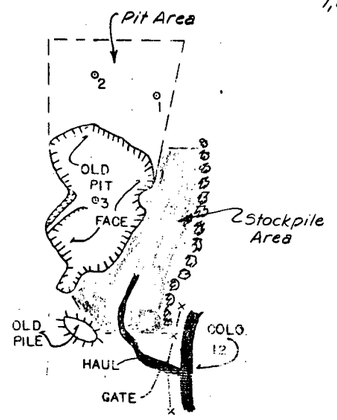
AS CONSTRUCTED
REVISED DATE 10/24/73

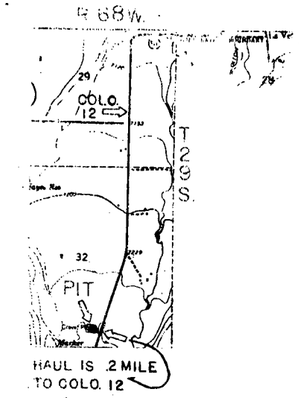
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	C16-0012-01	5	

PIT NO. 1

Owner: J. Curtis and L. Otto Goemmer
Box 212, La Veta, Colo. 81055

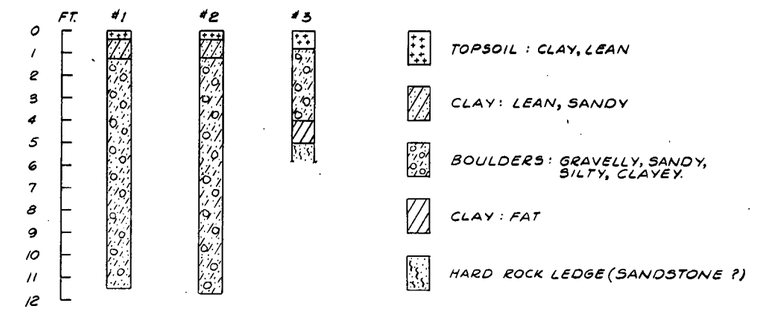
LOCATION: SW1/4 SE1/4 & SE1/4 SW1/4, Sec. 32, T.29S. R.68W.
USE: Base Coase and Bituminous Pavement
QUANTITY AVAILABLE: Ample
HAUL DISTANCE: 0.2 Mi. to Sta. 157+20 1,258
STRIPPING: Removing Overburden = ~~4,600~~ Cu.Yds.
Replacing Overburden = ~~4,600~~ 1,258 Cu.Yds.





LOG OF PIT

Sample No. 1763 (Proj. No. M02-0004-73)

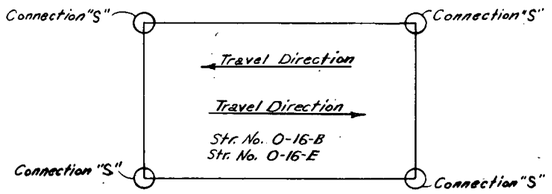


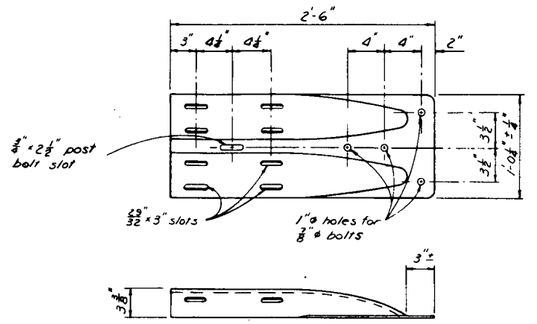
Depth of Water Table: 11.5'
Date of Test: May 8, 1973

AS CONSTRUCTED
NO REVISIONS DATE 10/24/73

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	C16-0012-01	6	

REVISIONS		



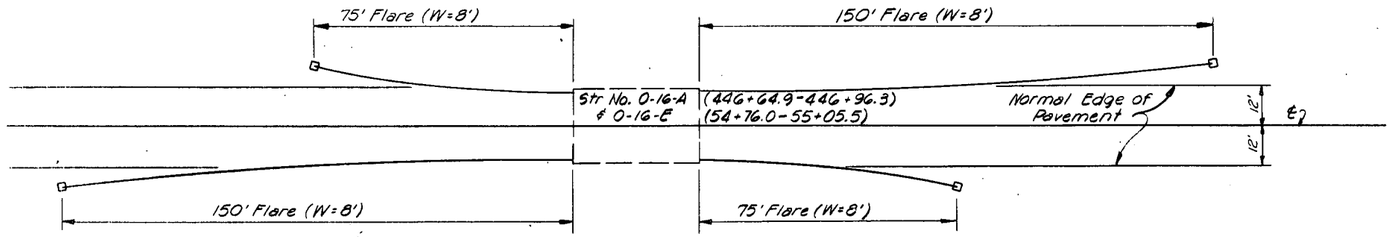


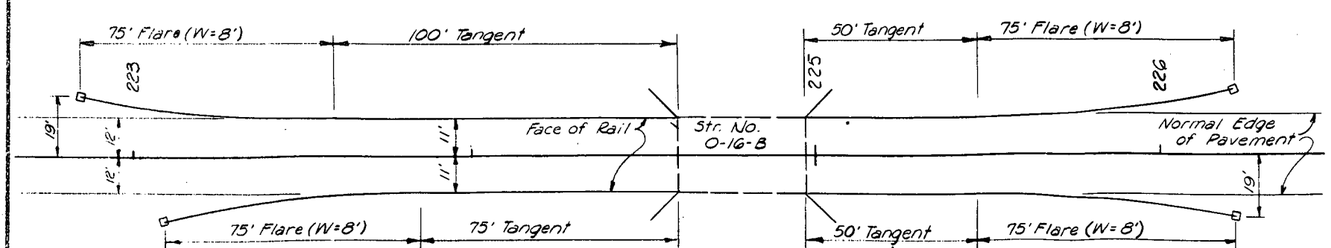
SPECIAL END SHOE
8-REQ'D.

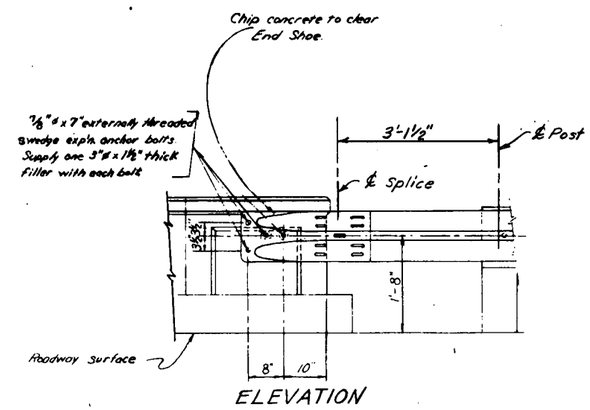
TABLE OF OFFSETS
FOR 75' & 150' PARABOLIC FLARES

X	Y For W=8'	
	L=75'	L=150'
12'-6"	0.22'	0.06'
25'-0"	0.89'	0.22'
37'-6"	2.00'	0.50'
50'-0"	3.56'	0.89'
62'-6"	5.56'	1.39'
75'-0"	8.00'	2.00'
87'-6"		2.72'
100'-0"		3.56'
112'-6"		4.50'
125'-0"		5.56'
137'-6"		6.73'
150'-0"		8.00'

TYPICAL GUARD RAIL FLARES







ELEVATION

GUARD RAIL CONNECTION "S"
Req'd. 8

Gen. Notes
For additional details of guard rail and its installation not shown on these sheets see Std. M-606-AB.
All work necessary to accomplish the above shall be included in the bid price for Item No. 606, Guard Rail Type 3.
The special end shoe shall be 10ga. steel and galvanized in accordance with ASTM Designation: A93 or A123 with coating class 2.50.

DIVISION OF HIGHWAYS

GUARD RAIL (TYPE 3)
CONNECTION TO
EXISTING STRUCTURE

Approved: Bridge Engineer Date:	Designed: D. Shosky Detailed: D. Shosky
	Structure Numbers: O-16-B, O-16-E
	DWG. No. 8 1 OF 1

DESIGNED BY	CHECKED BY
CHECKED BY	QUANTITIES BY
DETAILED BY	CHECKED BY
	DATE
	WITH

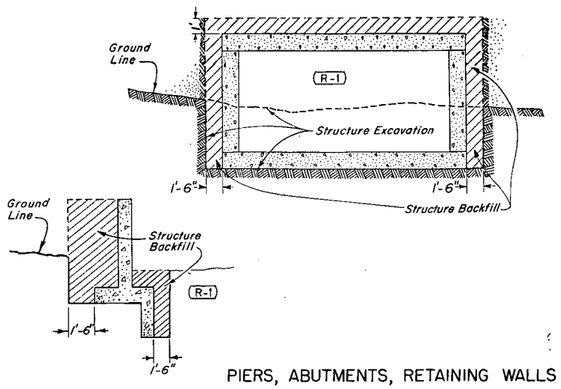
STANDARD M-206-AA

(MARCH 1, 1971)
(SHEET 1 OF 2)

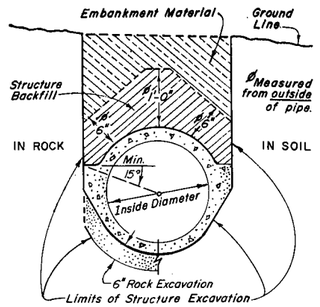
FED. ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
VIII	COLO.		

REVISION			
R-1	2-16-72	CBC, Abut., Walls.	M.R.H.

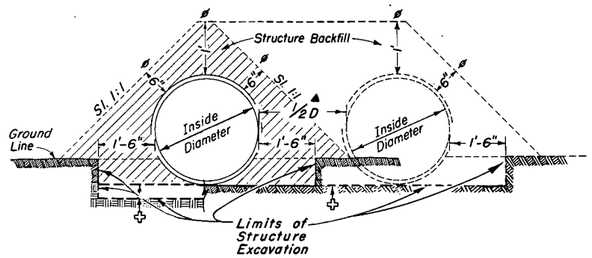
CONCRETE BOX CULVERTS & WINGWALLS



CAST IN PLACE CONDUIT

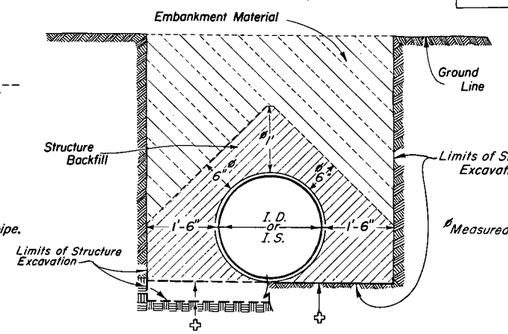


CIRCULAR CONDUIT



Ø Measured from outside of pipe.

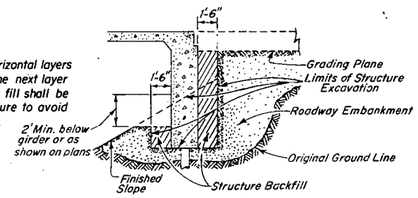
SIPHONS OR CONDUIT IN TRENCH



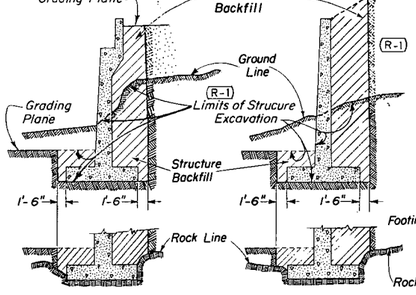
Ø Measured from outside of pipe.

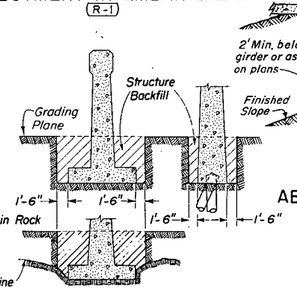
PIERS, ABUTMENTS, RETAINING WALLS ETC.

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.

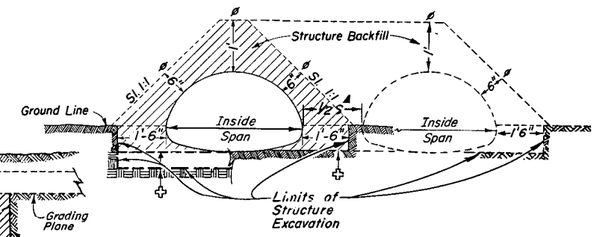


ABUTMENT IN EMBANKMENT

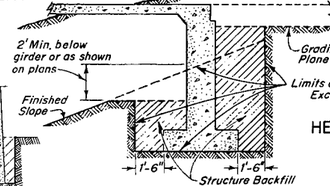




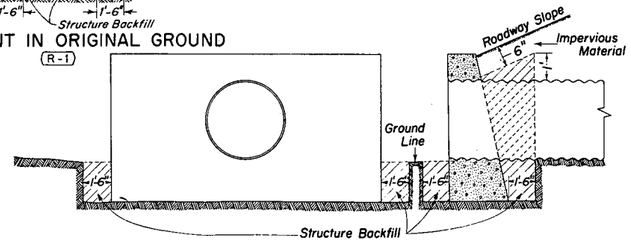
ELLIPTICAL OR ARCH CONDUIT



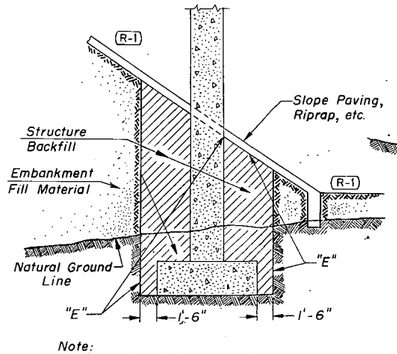
HEADWALLS AND END OF CULVERTS



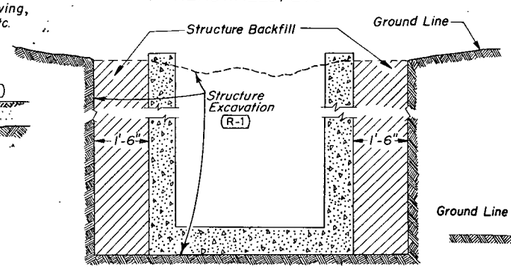
ABUTMENT IN ORIGINAL GROUND

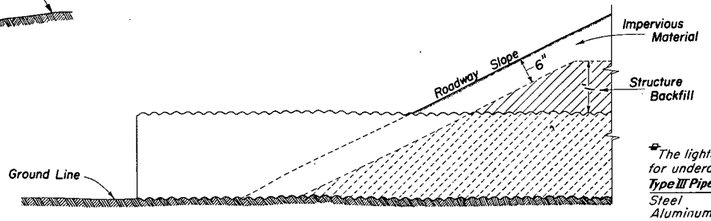


DROP INLETS, DIVISION BOXES, INTERCEPTING HEADWALLS, ETC.



Note:
"E" = Limits of Structure Excavation





NOTES:

▲ *When two or more conduits are laid side by side they shall be spaced so that the adjacent pipes will be ½I.D., ½I.S. or 3 feet apart (including wall thickness), whichever is less. Minimum spacing shall be not less than 1 foot between outside walls of pipe.*
For additional culvert installation details see M Standards for metal, concrete, or structural plate pipe culverts.

✣ *Bottom of trench as excavated. For applicable limits of Structure Excavation, see bedding details on standards for culverts.*

GENERAL NOTES

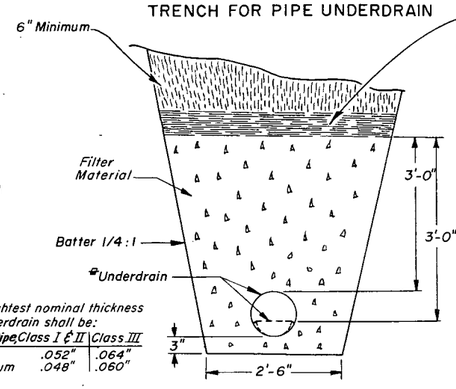
All work shall be done according to the Standard Specifications applicable to the Project.

Where the roadway cross section is in fill, excavation for concrete footings (except those in rock or those on piles) and for box culverts shall be done according to the following:
Embankment shall be built up and compacted to a point one foot above the bottom of the box or one foot above the bottom of the footing. The trench shall then be excavated to accommodate construction of the box or footing.

Excavation and backfill patterns different from those indicated on these sheets will be shown elsewhere on the plans.

Excavation for structure installation shall be classified as "Structure Excavation" unless otherwise shown on plans.

TRENCH FOR PIPE UNDERDRAIN



✣ *The lightest nominal thickness for underdrain shall be:*

Type III Pipe	*Class I & II*	*Class III*
Steel	.052"	.064"
Aluminum	.048"	.060"

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

EXCAVATION AND BACKFILL FOR STRUCTURES

Designed by H.E.P.	Approved by [signature]
Made by D.M.E.	Staff Design Engr.
Checked by L.E.O.	Date: March 1, 1971

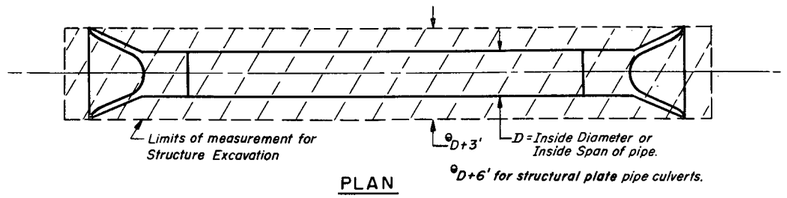
STANDARD M-206-AA

(MARCH 1, 1971)
(SHEET 2)

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO			

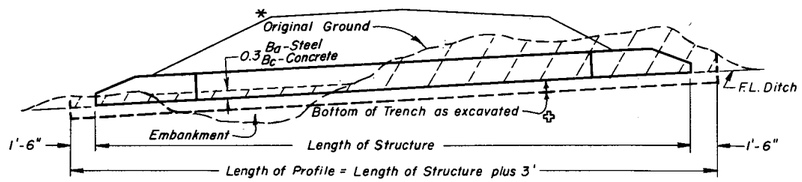
	REVISIONS:	
R-1	2-16-72	Revision date only. M.R.H.

STRUCTURE EXCAVATION MEASUREMENT FOR PIPE CULVERTS



PLAN

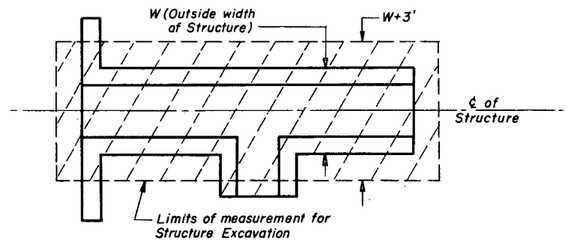
°D+6' for structural plate pipe culverts.



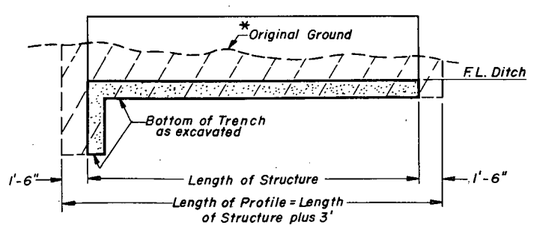
PROFILE

✠ For applicable limits of Structure Excavation, see bedding details on standards for metal, reinforced concrete and structural plate pipe culverts.

STRUCTURE EXCAVATION MEASUREMENT FOR DIVERSION OR DIVISION BOXES

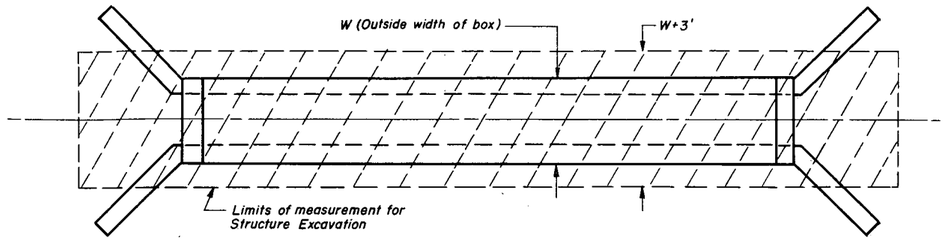


PLAN



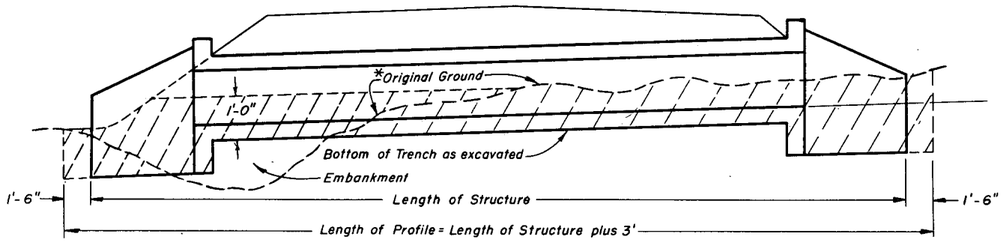
PROFILE

STRUCTURE EXCAVATION MEASUREMENT FOR CONCRETE BOX CULVERTS



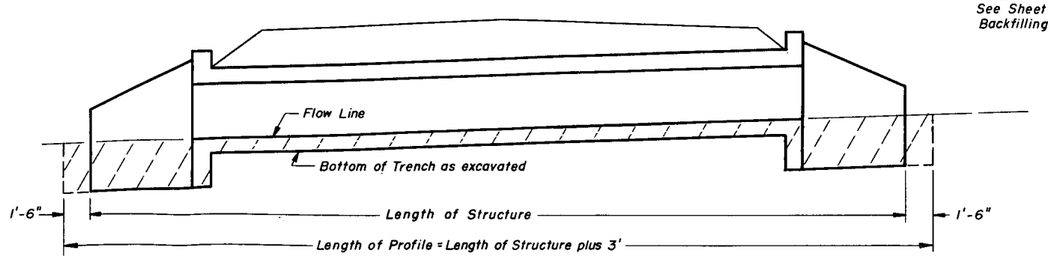
PLAN

Without Channel Change or Channel Improvement



PROFILE

With Channel Change or Channel Improvement



PROFILE

* Along ℄ of Structure

Areas to be used for Structure Excavation computations.

NOTE:
See Sheet 1 for General Notes and Backfilling Details.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

EXCAVATION AND BACKFILL FOR STRUCTURES

Designed by: M.R.H.	Approved by: C.E. Olson
Made by: H.P.B.	Staff Design Engr.
Checked by:	Date: March 1, 1971

STANDARD M-500-A

(JULY 1, 1965)

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

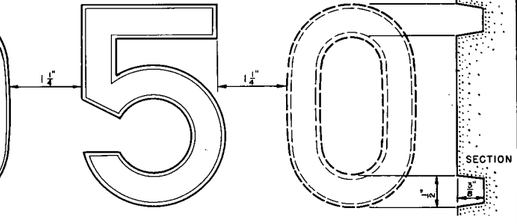
1 2 3 4 5 6 7 8 9 0 .

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

M N O P Q R S T U V W

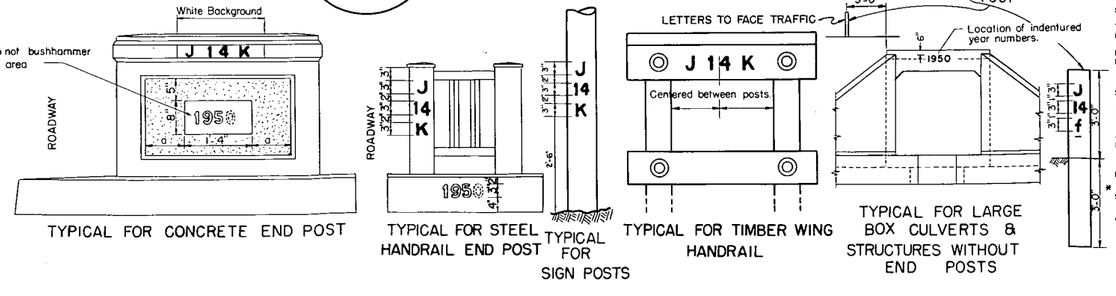
a f g l J 14 K 1 9 5 0

abcdefghijklmnopqrstuvwxyz



SAMPLE BRIDGE NUMBER

SAMPLE YEAR NUMBER



TYPICAL FOR CONCRETE END POST

TYPICAL FOR STEEL HANDRAIL END POST

TYPICAL FOR SIGN POSTS

TYPICAL FOR TIMBER WING HANDRAIL

TYPICAL FOR LARGE BOX CULVERTS & STRUCTURES WITHOUT END POSTS

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS 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 3/8" MINIMUM AS SHOWN INTO THE PANEL 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 THREE INCHES BEYOND THE LIMITS OF THE NUMBER SHALL BE PAINTED WITH TWO COATS OF ACCEPTABLE WHITE PAINT UNLESS AN APPROVED WHITE CONCRETE PAINT IS USED BEFORE PAINTING THE SURFACE MUST BE THOROLY 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 WITH "EXTERIOR BLACK PAINT" AS SPECIFIED IN SECTION 708 - PAINTS, OR AN ACCEPTABLE EQUIVALENT. 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 PAID FOR AS SEPARATE ITEMS.

* 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.

IN ADDITION TO THE REQUIREMENTS STATED ABOVE, STRUCTURE NUMBERS FOR HIGHWAYS PASSING UNDER GROSSROADS ARE TO BE PLACED AT THE FOLLOWING POINTS:

(A) FOR STRUCTURES OF 3 OR MORE SPANS, THE STRUCTURE NUMBER SHALL BE STENCILED, FACING TRAFFIC, ON THE OUTSIDE FACE OF THE END COLUMN OF THE RIGHT-HAND PIER.

(B) FOR 2-SPAN STRUCTURES, THE STRUCTURE NUMBER SHALL BE STENCILED, FACING TRAFFIC, ON THE OUTSIDE FACE OF EACH END COLUMN IN THE CENTER PIER.

STRUCTURE NO._____

REVISIONS		

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

LETTERS AND FIGURES FOR STRUCTURE NUMBERS

Designed by	Approved by L.D. Thornhill
Made by	Bridge Engineer
Checked by	Date: July 1, 1965

STANDARD M-601-A

(JULY 1, 1965)

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

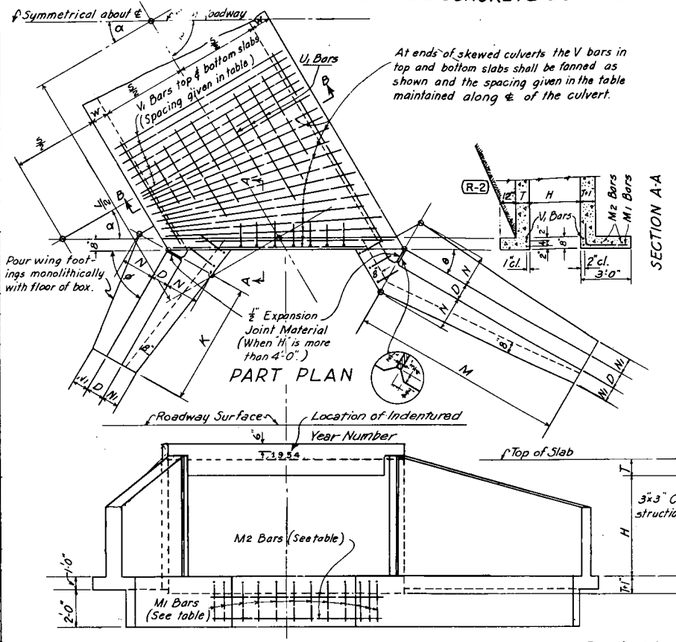
SINGLE CONCRETE BOX CULVERT

Dimensions & Quantities (see Wingwall Standard for Wings)

Height of Fill Allowed	Type	Span S	Height H	Slab T	Wall W	Bar size & spacing V_1 Size	V_1 Spa.	W_1 Size	W_1 Spa.	No. bars required U_1	M_1	Quantities For One Lin. Ft. of Box Concrete Cu. Yds.	Steel Lbs.	Quantities for Two Headwalls Concrete Cu. Yds.	Steel Lbs.
35'-0"	2A	2'-0"	2'-0"	6"	8"	3/4"	12"	1/2"	12"	8	8	0.232	17.5	1.30	81
30'-0"	3A	3'-0"	2'-0"	7"	8"	7/8"	12"	1/2"	12"	10	Cos α	0.299	26.3	1.50	119
			3'-0"							12		0.349	29.0	1.65	123
20'-0"	4A	4'-0"	2'-0"	7 1/2"	8"	7/8"	12"	1/2"	12"	12	10	0.362	31.8	1.75	150
			3'-0"							14	Cos α	0.412	34.6	1.90	154
			4'-0"							16		0.461	37.3	2.10	158
16'-0"	5A	5'-0"	3'-0"	8"	8"	3/4"	8"	1/2"	8"	16	12	0.481	45.1	2.20	183
			4'-0"							18		0.530	48.7	2.40	187
			5'-0"							20	Cos α	0.579	52.0	2.60	161
20'-0"	5B	5'-0"	3'-0"	8 1/2"	8"	3/4"	8"	1/2"	8"	16	12	0.500	45.5	2.30	153
			4'-0"							18		0.549	48.9	2.40	157
			5'-0"							20	Cos α	0.598	52.2	2.60	161
14'-0"	6A	6'-0"	3'-0"	8 1/2"	8"	7/8"	8"	1/2"	8"	20	20	0.605	54.7	2.65	180
			4'-0"							22	14	0.654	58.1	2.85	184
			5'-0"							24	Cos α	0.704	61.4	3.00	188
			6'-0"							26		0.753	64.9	3.30	192
20'-0"	6B	6'-0"	4'-0"	10"	8"	7/8"	8"	5/8"	8"	20		0.671	72.4	2.70	223
			5'-0"							22	14	0.720	76.9	2.90	228
			6'-0"							24	Cos α	0.771	81.4	3.10	234
			7'-0"							26		0.820	85.9	3.35	239
12'-0"	7A	7'-0"	4'-0"	9"	9"	3/4"	7"	1/2"	7"	22	16	0.720	68.2	3.05	208
			5'-0"							24		0.776	71.9	3.25	212
			6'-0"							26	Cos α	0.832	75.5	3.40	216
			7'-0"							28		0.887	79.2	3.70	220
15'-0"	7B	7'-0"	4'-0"	10"	9"	7/8"	8"	5/8"	8"	22	16	0.772	81.0	3.05	251
			5'-0"							24		0.827	85.5	3.25	262
			6'-0"							26	Cos α	0.883	90.0	3.45	268
			7'-0"							28		0.938	94.5	3.75	273
20'-0"	7C	7'-0"	4'-0"	11"	9"	7/8"	7"	5/8"	7"	22	16	0.826	91.1	3.10	257
			5'-0"							24		0.881	96.0	3.50	263
			6'-0"							26	Cos α	0.937	101.0	3.50	268
			7'-0"							28		0.992	106.0	3.75	274
10'-0"	8A	8'-0"	4'-0"	9 1/2"	10"	3/4"	7"	1/2"	7"	24		0.864	75.8	3.40	235
			5'-0"							26	18	0.905	79.5	3.60	239
			6'-0"							28	Cos α	0.966	83.2	3.80	243
			7'-0"							30		1.027	86.8	4.10	247
			8'-0"							32		1.089	90.5	4.40	251
16'-0"	8B	8'-0"	4'-0"	11 1/2"	10"	7/8"	7"	5/8"	7"	26		0.963	100.9	3.50	292
			5'-0"							26	18	1.025	105.9	3.70	297
			6'-0"							28	Cos α	1.086	110.8	3.90	303
			7'-0"							30		1.148	115.8	4.20	308
			8'-0"							32		1.210	120.8	4.45	314
20'-0"	8C	8'-0"	4'-0"	12 1/2"	10"	7/8"	6"	5/8"	6"	24		1.023	115.8	3.55	292
			5'-0"							26	18	1.084	121.4	3.75	298
			6'-0"							28	Cos α	1.146	126.2	3.95	304
			7'-0"							30		1.208	132.5	4.25	309
			8'-0"							32		1.270	138.1	4.50	315
7'-0"	9A	9'-0"	5'-0"	10"	11"	7/8"	8"	5/8"	8"	28		1.040	102.7	4.00	326
			6'-0"							30	20	1.108	107.1	4.20	331
			7'-0"							32	Cos α	1.176	111.6	4.50	337
			8'-0"							34		1.244	116.1	4.80	342
			9'-0"							36		1.311	120.7	5.15	348
14'-0"	9B	9'-0"	5'-0"	12"	11"	7/8"	6"	5/8"	6"	28		1.174	131.9	4.10	327
			6'-0"							30	20	1.242	137.5	4.30	333
			7'-0"							32	Cos α	1.310	143.1	4.60	338
			8'-0"							34		1.378	148.6	4.90	344
			9'-0"							36		1.445	154.2	5.25	349
20'-0"	9C	9'-0"	5'-0"	14"	11"	1"	7"	3/4"	7"	28		1.309	150.4	4.20	401
			6'-0"							30	20	1.377	156.9	4.40	408
			7'-0"							32	Cos α	1.444	163.4	4.70	416
			8'-0"							34		1.513	170.0	5.00	423
			9'-0"							36		1.581	176.6	5.35	430
5'-0"	10A	10'-0"	6'-0"	10 1/2"	12"	7/8"	8"	1/2"	8"	32		1.260	107.7	4.60	355
			7'-0"							34	22	1.334	111.0	4.90	358
			8'-0"							36	Cos α	1.408	114.4	5.20	363
			9'-0"							38		1.483	117.8	5.60	367
			10'-0"							40		1.558	121.1	5.95	371
10'-0"	10B	10'-0"	6'-0"	12"	12"	7/8"	7"	5/8"	7"	32		1.369	130.4	4.70	367
			7'-0"							34	22	1.443	135.4	5.00	372
			8'-0"							36	Cos α	1.517	140.4	5.30	378
			9'-0"							38		1.591	145.3	5.65	383
			10'-0"							40		1.665	150.3	6.05	388
16'-0"	10C	10'-0"	6'-0"	14"	12"	1"	8"	3/4"	8"	32		1.518	150.7	4.80	449
			7'-0"							34	22	1.593	156.6	5.10	456
			8'-0"							36	Cos α	1.666	162.5	5.40	464
			9'-0"							38		1.741	168.4	5.80	471
			10'-0"							40		1.815	174.3	6.15	478
5'-0"	11A	11'-0"	6'-0"	11"	12"	7/8"	7"	1/2"	7"	34		1.367	128.6	4.95	383
			7'-0"							36	24	1.441	132.2	5.25	387
			8'-0"							38	Cos α	1.515	135.9	5.55	391
			9'-0"							40		1.589	139.6	5.90	395
			10'-0"							42		1.664	143.1	6.25	399
9'-0"	11B	11'-0"	6'-0"	12 1/2"	12"	1"	8"	5/8"	8"	34		1.490	148.3	5.00	467
			7'-0"							36	24	1.564	152.8	5.30	472
			8'-0"							38	Cos α	1.638	157.3	5.65	478
			9'-0"							40		1.712	161.8	6.00	483
			10'-0"							42		1.783	166.4	6.35	489
13'-0"	11C	11'-0"	6'-0"	14"	12"	7/8"	6"	5/8"	6"	34		1.608	159.5	5.10	396
			7'-0"							36	24	1.682	165.1	5.40	401
			8'-0"							38	Cos α	1.756	170.7	5.70	407
			9'-0"							40		1.830	176.2	6.10	412
			10'-0"							42		1.904	181.8	6.45	418
5'-0"	12A	12'-0"	6'-0"	10"	12"	7/8"	7"	1/2"	7"	36		1.595	139.4	5.25	411
			7'-0"							38	26	1.595	141.0	5.60	415
			8'-0"							40	Cos α	1.673	144.7	5.90	419
			9'-0"							42		1.727	148.4	6.25	423
			10'-0"							44		1.520	152.0	6.60	427
10'-0"	12B	12'-0"	6'-0"	14"	12"	1"	7"	5/8"	7"	36		1.697	177.7	5.40	502
			7'-0"							38	26	1.772	182.7	5.70	508
			8'-0"							40	Cos α	1.846	187.7	6.00	513
			9'-0"							42		1.920	192.6	6.40	519
			10'-0"							44		1.994	197.6	6.70	524
4'-0"	13A	13'-0"	6'-0"	12 1/2"	12"	7/8"	8"	1/2"	7"	38		1.645	146.0	5.60	442
			7'-0"							40	28	1.720	149.7	5.90	446
			8'-0"							42	Cos α	1.794	153.3	6.20	450
			9'-0"							44		1.868	157.0	6.55	454
			10'-0"							46		1.942	160.7	6.95	458
8'-0"	13B	13'-0"	7'-0"	14"	12"	1"	7"	5/8"	7"	40	28	1.787	188.4	5.70	538
			8'-0"							42	Cos α	1.861	193.3	6.00	543
			9'-0"							44		1.935	198.3	6.30	549
			10'-0"							46		2.009	203.3	6.65	555
4'-0"	14A	14'-0"	6'-0"	13 1/2"	12"	1"	8"	5/8"	8"	46		2.083	208.2	7.05	560
			7'-0"							40		1.827	177.2	5.95	571
			8'-0"							42	30	1.901	181.7	6.25	577
			9'-0"							44	Cos α	1.975	186.2	6.55	582
			10'-0"							46		2.049	190.7	6.95	588
										48		2.123	195.2	7.30	593
8'-0"	14B	14'-0"	6'-0"	15"	12"	1 1/8"	7"	5/8"	7"	40		1.972	192.5	6.05	572
			7'-0"							42	30	2.049	204.5	6.40	578
			8'-0"							44	Cos α	2.123	2054	6.70	583
			9'-0"							46		2.196	214.4	7.05	589
			10'-0"							48		2.270	219.4	7.40	595

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

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



Bar dimensions are to ℄ of bar unless marked "cl" (clear).

R-3

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

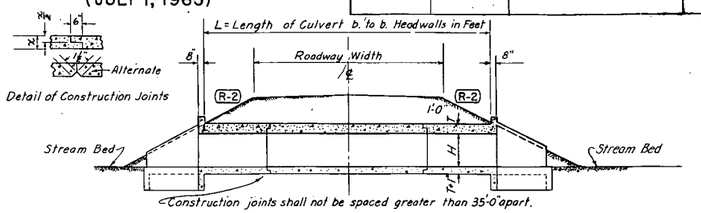
Mark	Size	No. Req'd.	Type	Length
V_1	See table	10+ 24L/Spa.	I	S+2W-6
W_1	See table	6+ 24L/Spa.	I	H+2T-5
U_1	½"@	See table	I	L+1'-0"
M_1	½"@	See table	II	3'-6"
M_2	½"@	4	I	(S+2W-6)/Cos α

Straight — Type I — Type II (2'-6", 1'-0")

(Bar dimensions are out to out of bar)

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'	14'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'	14'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'	11'x 6'	14'x 6'	12'x 9'	



TYPICAL THROUGH SECTION CULVERT

REVISIONS

R-1	7-23-68	Dept. Name	M.R.H.
R-2	10-25-68	Delete Slope	M.R.H.
R-3	5-10-71	Add General Notes	M.R.H.

R-3

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

All wing surfaces to receive Class I finish.

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

Secondary bars when spliced shall be given a lap of 24 bar diameters.

All reinforcing bars shall be tagged with the station number and bar designation.

All dimensions not shown as clear are to the ℄ of the bar.

All exposed corners on concrete shall be chamfered ¾".

All concrete shall be Class A.

Footings in rock shall be poured out to rock and not formed.

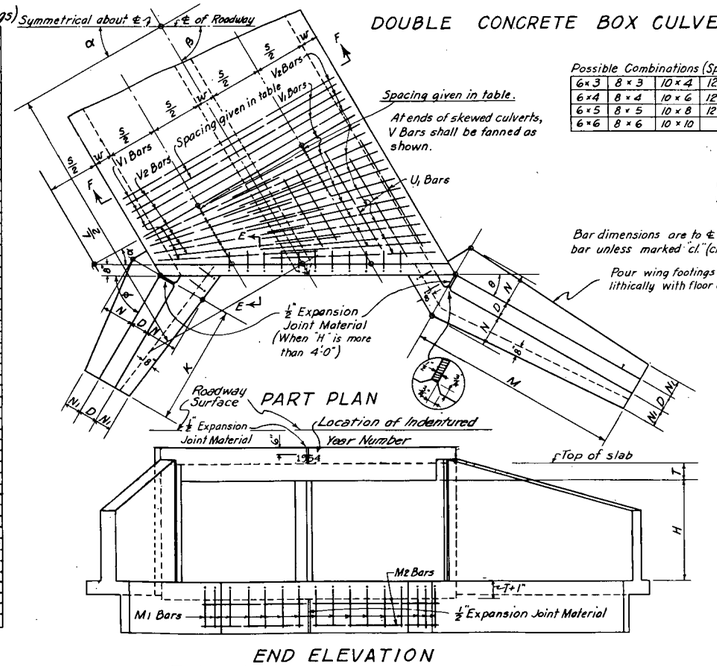
Note: K, M, N, N_1 and D are dimensioned on Wingwall Standard for the various heights of culverts.

DOUBLE CONCRETE BOX CULVERT

Dimensions & Quantities (see Wingwall Standard for Wings)

Height of Fill allowed	Type	Span S	Height H	Slab T	Wall W	Bar Size & Spacing V_1	V_2	Size	W_1 Spac.	No. Bars Required U_1	M_1	Quantities for One Lin. Ft. of Box Concrete Cu. Yds.	Steel Lbs.	Quantities for Two Headwalls Concrete Cu. Yds.	Steel Lbs.
10'-0"	6-6-A	6'-0"	3'-0"	8½"	8"	½"@ 5½ Spa.	½"@ 5 Spa.	½"	12"	48	32	1.000	123	3.85	327
			4'-0"						12"	52		1.073	117.1	4.60	335
			5'-0"						12"	56	Cos α	1.148	123.1	4.85	343
			6'-0"						12"	60		1.222	128.5	5.05	351
15'-0	6-6-B	6'-0"	3'-0"	9½"	8"	½"@ 5½ Spa.	½"@ 5 Spa.	½"	12"	48	32	1.087	120.3	4.45	329
			4'-0"						12"	52		1.171	125.7	4.65	337
			5'-0"						12"	56	Cos α	1.235	131.1	4.90	346
			6'-0"						8"	60		1.309	141.0	5.10	353
20'-0"	6-6-C	6'-0"	3'-0"	10½"	8"	½"@ 4½ Spa.	½"@ 5 Spa.	½"	12"	48	32	1.179	130.0	4.50	331
			4'-0"						12"	52		1.247	135.4	4.75	339
			5'-0"						10"	56	Cos α	1.321	142.5	4.95	347
			6'-0"						7"	60		1.395	152.4	5.15	355
10'-0"	8-8-A	8'-0"	3'-0"	8"	10"	⅝"@ 6 Spa.	¾"@ 5 Spa.	½"	12"	60		1.477	174.4	5.80	506
			4'-0"						12"	64	40	1.569	179.8	6.05	514
			5'-0"						12"	68	Cos α	1.662	185.2	6.30	522
			6'-0"						12"	72		1.755	190.6	6.55	531
15'-0"	8-8-B	8'-0"	3'-0"	11"	10"	⅝"@ 5½ Spa.	¾"@ 5 Spa.	½"	12"	60		1.592	188.6	5.90	508
			4'-0"						12"	64	40	1.684	192.0	6.15	516
			5'-0"						12"	68	Cos α	1.777	197.4	6.40	524
			6'-0"						8"	72		1.869	202.9	6.65	533
20'-0"	8-8-C	8'-0"	3'-0"	12½"	10"	⅝"@ 5 Spa.	¾"@ 5 Spa.	½"	12"	60		1.763	202.0	6.00	513
			4'-0"						12"	64	40	1.856	207.4	6.30	521
			5'-0"						10"	68	Cos α	1.948	214.6	6.55	529
			6'-0"						7"	72		2.041	225.7	6.75	537
5'-0"	10-10-A	10'-0"	2'-0"	10"	12"	⅝"@ 7" Spa.	¾"@ 6 Spa.	⅝"	15"	78	48	1.935	228.3	7.40	714
			4'-0"						15"	86		2.157	239.8	7.95	733
			6'-0"						12"	94	Cos α	2.380	255.2	8.70	752
			8'-0"						9"	102		2.602	275.5	9.55	771
			10'-0"						6"	110		2.824	311.0	10.65	721
10'-0"	10-10-B	10'-0"	2'-0"	10"	12"	⅝"@ 7" Spa.	¾"@ 6 Spa.	⅝"	15"	78	48	2.242	242.5	8.20	740
			4'-0"						15"	86		2.464	258.0	8.90	759
			6'-0"						12"	94	Cos α	2.686	282.6	9.75	778
			8'-0"						9"	102		2.908	307.2	10.60	797
			10'-0"						6"	110		3.130	343.0	11.80	816
15'-0"	10-10-C	10'-0"	2'-0"	14"	12"	⅝"@ 7" Spa.	¾"@ 6 Spa.	⅝"	15"	78	48	2.503	260.8	7.86	727
			4'-0"						15"	86		2.725	275.6	8.40	746
			6'-0"						12"	94	Cos α	2.947	295.0	9.15	765
			8'-0"						9"	102		3.170	325.5	10.00	784
			10'-0"						6"	110		3.392	361.3	11.20	803
5'-0"	12-12-A	12'-0"	2'-0"	12"	12"	⅝"@ 7" Spa.	¾"@ 6 Spa.	⅝"	15"	98	56	2.751	278.9	9.35	957
			4'-0"						12"	106		2.973	294.5	10.05	976
			6'-0"						9"	114	Cos α	3.195	315.0	10.90	995
			8'-0"						6"	122		3.417	350.8	12.10	1014
			10'-0"						6"	130		3.639	386.6	13.30	1033
10'-0"	12-12-B	12'-0"	2'-0"	14"	12"	⅝"@ 6" Spa.	¾"@ 6 Spa.	⅝"	15"	98	56	3.083	313.5	960	864
			4'-0"						12"	106		3.305	329.2	1030	883
			6'-0"						9"	114	Cos α	3.528	354.1	11.15	902
			8'-0"						6"	122		3.750	389.9	12.35	921
			10'-0"						6"	130		3.972	425.7	13.55	940
15'-0"	12-12-C	12'-0"	2'-0"	16"	12"	⅝"@ 5" Spa.	¾"@ 6 Spa.	⅝"	15"	98	56	3.416	365.1	985	870
			4'-0"						9"	106		3.638	384.7	10.55	889
			6'-0"						6"	114	Cos α	3.860	415.7	11.40	908
			8'-0"						6"	122		4.082	446.7	12.25	927
			10'-0"						6"	130		4.304	477.7	13.10	946
5'-0"	14-14-A	14'-0"	2'-0"	15"	12"	⅝"@ 5" Spa.	¾"@ 6 Spa.	⅝"	15"	110	64	3.623	326.2	10.95	984
			4'-0"						12"	118		3.845	372.0	11.80	1003
			6'-0"						9"	126	Cos α	4.077	392.9	12.50	1023
			8'-0"						6"	134		4.299	413.8	13.20	1042
			10'-0"						6"	142		4.521	434.7	13.90	1061
10'-0"	14-14-B	14'-0"	2'-0"	16"	12"	⅝"@ 5" Spa.	¾"@ 6 Spa.	⅝"	15"	110	64	3.824	409.4	11.05	988
			4'-0"						12"	118		4.046	425.2	11.75	1007
			6'-0"						9"	126	Cos α	4.269	450.5	1265	1026
			8'-0"						6"	134		4.491	475.8	13.55	1045
			10'-0"						6"	142		4.713	501.1	14.45	1064

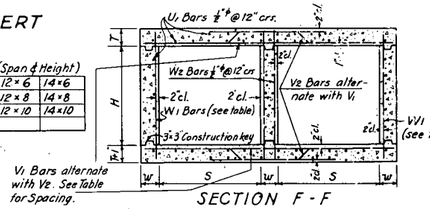
Quantities for one culvert shall be (quantity for one lin. ft. of box times L) plus (quantity for two head walls) plus (quantities for four wings).



R-3

Possible Combinations (Span & Height)

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



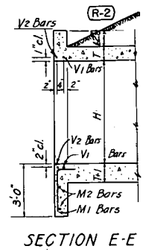
Bar List for Culvert and Two Headwalls (See Wingwall Std. for Wings)

Mark	Size	Number Required	Type	L	Total Length
V_1	See Table	24(L+2)/Spacing	I	S+15W+4"	L
V_2			II	0.785 S+4"	2Lt m
W_1			I	H+2T-4"	n·T·5 / m·14in
W_2		2(L+2)	I	H+2T-4"	L
U_1	½"@	See Table	I	L+12"	L
M_1	½"@	See Table	III	3'-6"	10
M_2	½"@	8	I	(S+15W)/Cos α	L

Type I — Type II — Type III

(Bar dimensions are out to out of bar.)

For General Notes, Loading and Design Data, see Wingwall Std.



R-1

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

SINGLE AND DOUBLE CONCRETE BOX CULVERTS

(FOR SIZES SEE TABLE OF POSSIBLE COMBINATIONS)

Designed by : W.W.D.	Approved by: Bridge Engineer
Made by : W.W.D.	
Checked by : T.J.M.	Date: July 15, 1965

STANDARD M-601-A

STANDARD M-601-C

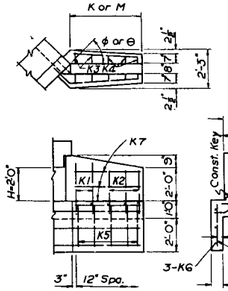
(SHEET 1 OF 2 SHEETS)
(JULY 1, 1965)

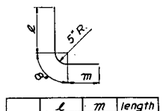
FED. ROAD REG. NO.	DIVISION	PROJECT. NO.	SHEET NO.
9	COLO.		

TABLE SHOWING VALUES OF K & M WHEN "B" & "H" ARE GIVEN

β	α	φ	θ	H= 2'-0"		H= 3'-0"		H= 4'-0"		H= 5'-0"		H= 6'-0"	
				K	M	K	M	K	M	K	M	K	M
45°	45°	67°30'	22°30'	3'-3"	8'-0"	4'-6"	11'-0"	6'-0"	14'-9"	7'-6"	18'-0"	8'-9"	21'-0"
60°	30°	60°	30°	3'-6"	6'-0"	5'-0"	8'-6"	6'-8"	11'-3"	8'-0"	14'-0"	9'-3"	16'-0"
75°	15°	52°30'	37°30'	3'-9"	5'-0"	5'-6"	7'-0"	7'-3"	9'-3"	8'-9"	11'-6"	10'-0"	13'-3"
90°	0°	45°	45°	4'-3"	4'-3"	6'-0"	6'-0"	8'-0"	8'-0"	10'-0"	10'-0"	11'-6"	11'-6"
105°	15°	37°30'	52°30'	5'-0"	3'-9"	7'-0"	5'-6"	9'-3"	7'-3"	11'-6"	8'-9"	13'-3"	10'-0"
120°	30°	30°	60°	6'-0"	3'-6"	8'-6"	5'-0"	11'-3"	6'-6"	14'-0"	8'-0"	16'-0"	9'-3"
135°	45°	22°30'	67°30'	8'-0"	3'-3"	11'-0"	4'-6"	14'-9"	6'-0"	18'-0"	7'-6"	21'-0"	8'-9"

β equals the angle between ℄ of culvert & ℄ of roadway. α equals the angle between ℄ of culvert and a line normal to ℄ of roadway. (R-3)
φ and θ are angles between the wingwall and a line parallel with the ℄ of roadway.
EXAMPLE FOR USING THE ABOVE TABLE. Suppose a stream makes an angle of β=65° with the ℄ of roadway, then, from the table, select the nearest angle, β = 60°, then α, φ, & θ equal 30°, 60° & 30° respectively. If the desired height "H" of culvert is 6'-0", then K & M will be 9'-3" and 16'-0". Locate the WING DETAIL WHEN H=6'-0" on this sheet.





	ℓ	m	length
K1	2'-7"	5"	3'-8"
K2	2'-2"	4"	3'-2"

TYPE I

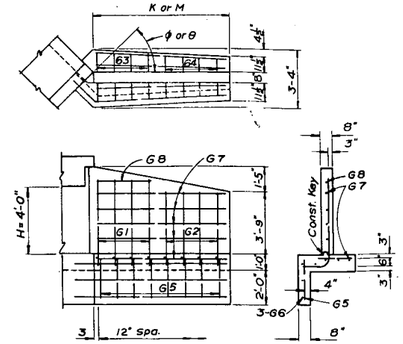
K3 = 1'-5"
K4 = 1'-4"
K5 = 2'-6"

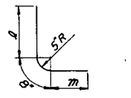
TYPE II

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

When φ or θ equals	Number of bars required: K1 ½" φ Type I	K2 ½" φ Type I	K3 ½" φ Type II	K4 ½" φ Type II	K5 ½" φ Type II	Length of bars: 3-K6 ½" φ Type II	4-K7 ½" φ Type II	Quantities for One Wing: Concrete Cu.Yd.	Steel Lb.
22°30'	4	4	4	4	8	9'-10"	7'-8"	1.47	80
30°	3	3	3	3	6	7'-4"	5'-8"	1.10	59
37°30'	3	2	3	2	5	6'-1"	4'-8"	0.92	50
45°	2	3	2	3	5	5'-2"	3'-11"	0.78	45
52°30'	2	2	2	2	4	5'-1"	3'-5"	0.69	39
60°	2	2	2	2	4	4'-6"	3'-2"	0.64	37
67°30'	2	2	2	2	4	4'-0"	2'-11"	0.60	36

WING DETAIL WHEN H= 2'-0"





	ℓ	m	length
G1	4'-9"	1'-0"	6'-5"
G2	3'-11"	9"	5'-4"

TYPE I

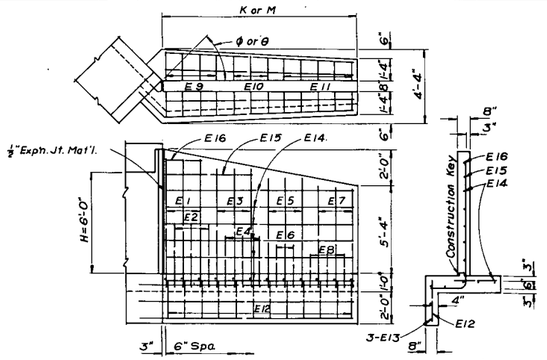
G3 = 2'-0"
G4 = 1'-10"
G5 = 2'-6"

TYPE II

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

When φ or θ equals	Number of bars required: G1 ½" φ Type I	G2 ½" φ Type I	G3 ½" φ Type II	G4 ½" φ Type II	G5 ½" φ Type II	Length of bars: 3-G6 ½" φ Type II	8-G7 ½" φ Type II	1-G8 ½" φ Type II	Quantities for One Wing: Concrete Cu.Yd.	Steel Lb.
22°30'	6	9	6	9	15	17'-4"	14'-5"	5'-2"	3.97	219
30°	5	7	5	7	12	13'-2"	10'-11"	4'-2"	3.03	170
37°30'	4	6	4	6	10	10'-10"	8'-11"	3'-2"	2.49	141
45°	4	4	4	4	8	9'-4"	7'-8"	3'-2"	2.15	118
52°30'	3	5	3	5	8	9'-0"	6'-11"	2'-2"	1.95	112
60°	3	4	3	4	7	7'-10"	6'-2"	2'-2"	1.75	99
67°30'	3	3	3	3	6	7'-0"	5'-8"	2'-2"	1.61	88

WING DETAIL WHEN H= 4'-0"



	ℓ	m	length
E1	7'-0"	1'-5"	9'-1"
E2	3'-4"	10"	4'-10"
E3	6'-6"	1'-4"	8'-6"
E4	2'-8"	9"	4'-1"
E5	6'-0"	1'-2"	7'-10"
E6	2'-2"	8"	3'-6"
E7	5'-6"	1'-1"	7'-3"
E8	1'-8"	7"	2'-11"

TYPE I

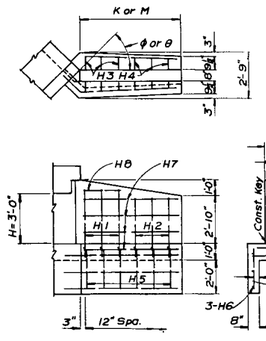
E9 = 2'-6"
E10 = 2'-4"
E11 = 2'-2"
E12 = 2'-6"

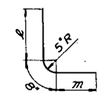
TYPE II

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

When φ or θ equals	Number of bars required: E1 ½" φ Type I	E2 ⅝" φ Type I	E3 ½" φ Type I	E4 ½" φ Type I	E5 ½" φ Type I	E6 ½" φ Type I	E7 ½" φ Type I	E8 ½" φ Type I	E9 ½" φ Type II	E10 ½" φ Type II	E11 ½" φ Type II	E12 ½" φ Type II	Length of bars: 3-E13 1" φ Type II	9-E14 1" φ Type II	1-E15 1" φ Type II	1-E16 1" φ Type II	Quantities for One Wing: Concrete Cu.Yd.	Steel Lb.
22°30'	6	5	5	5	5	5	5	5	6	7	8	21	24'-3"	20'-8"	10'-2"	5'-2"	7.30	430
30°	4	4	4	4	4	4	4	3	5	5	6	16	18'-5"	15'-8"	7'-2"	3'-2"	5.56	326
37°30'	4	3	3	3	3	3	4	4	4	5	5	14	15'-3"	12'-11"	6'-2"	3'-2"	4.60	278
45°	3	3	3	3	3	2	3	3	4	3	5	12	13'-2"	11'-2"	5'-2"	2'-2"	3.99	240
52°30'	3	2	2	3	3	2	2	2	3	4	3	10	12'-1"	9'-8"	4'-2"	2'-2"	3.47	202
60°	3	2	2	2	2	2	3	3	3	3	4	10	10'-10"	8'-11"	4'-2"	2'-2"	3.21	194
67°30'	3	2	2	2	2	2	2	2	3	3	3	9	9'-11"	8'-5"	4'-2"	2'-2"	3.04	180

WING DETAIL WHEN H= 6'-0"





	ℓ	m	length
H1	3'-6"	8"	4'-10"
H2	3'-0"	6"	4'-2"

TYPE I

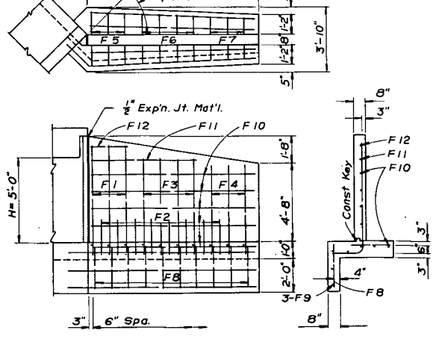
H3 = 1'-9"
H4 = 1'-7"
H5 = 2'-6"

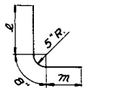
TYPE II

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

When φ or θ equals	Number of bars required: H1 ½" φ Type I	H2 ½" φ Type I	H3 ½" φ Type II	H4 ½" φ Type II	H5 ½" φ Type II	Length of bars: 3-H6 ½" φ Type II	5-H7 ½" φ Type II	1-H8 ½" φ Type II	Quantities for One Wing: Concrete Cu.Yd.	Steel Lb.
22°30'	6	5	6	5	11	13-2	10-8	5-2	2.47	131
30°	5	4	5	4	9	10-2	8-2	4-2	1.91	104
37°30'	4	3	4	3	7	8-4	6-8	3-2	1.57	82
45°	3	3	3	3	6	7-1	5-8	2-2	1.35	70
52°30'	3	3	3	3	6	7-0	5-2	2-2	1.23	68
60°	3	2	3	2	5	6-2	4-8	2-2	1.12	59
67°30'	3	2	3	2	5	5-4	4-2	2-2	1.01	56

WING DETAIL WHEN H= 3'-0"





	ℓ	m	length
F1	6'-0"	1'-2"	7'-10"
F2	2'-3"	11"	3'-10"
F3	5'-4"	1'-0"	7'-0"
F4	4'-10"	11"	6'-5"

TYPE I

F5 = 2'-3"
F6 = 2'-1"
F7 = 2'-0"
F8 = 2'-6"

TYPE II

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

When φ or θ equals	Number of bars required: F1 ½" φ Type I	F2 ½" φ Type I	F3 ½" φ Type I	F4 ½" φ Type I	F5 ½" φ Type II	F6 ½" φ Type II	F7 ½" φ Type II	F8 ½" φ Type II	Length of bars: 3-F9 ½" φ Type II	8-F10 ½" φ Type II	1-F11 ½" φ Type II	1-F12 ½" φ Type II	Quantities for One Wing: Concrete Cu.Yd.	Steel Lb.
22°30'	6	14	7	5	6	7	5	18	20'-11"	17'-8"	12'-2"	5'-2"	5.61	328
30°	5	11	5	4	5	5	4	14	16'-2"	13'-8"	9'-2"	4'-2"	4.36	254
37°30'	4	9	4	4	4	4	4	12	13'-3"	11'-2"	7'-2"	3'-2"	3.58	211
45°	3	8	4	3	3	4	3	10	11'-6"	9'-8"	6'-2"	2'-2"	3.11	180
52°30'	3	7	3	3	3	3	3	9	10'-8"	8'-5"	5'-2"	2'-2"	2.72	160
60°	3	6	2	3	3	2	3	8	9'-6"	7'-8"	4'-2"	2'-2"	2.49	143
67°30'	3	6	3	2	3	3	2	8	8'-7"	7'-2"	5'-2"	2'-2"	2.33	140

WING DETAIL WHEN H= 5'-0"

LOADING DATA INTERSTATE ALTERNATE
LIVE LOAD: A.A.S.H.O. (HS 20 – 44)
DEAD LOAD: CONCRETE 150 POUNDS PER CUBIC FOOT
EARTH 84 POUNDS PER CUBIC FOOT

(R-2) DESIGNING DATA
A.A.S.H.O. 1965 UNIT STRESS. EXCEPT AS NOTED
Reinforcing Steel fs 20000 lbs. per sq. in.
Structural Steel fs 18000 lbs. per sq. in.
fc 1200 lbs. per sq. in.
n 10

GENERAL NOTES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.

ALL CONCRETE SHALL BE CLASS "A".
ALL WING SURFACES TO RECEIVE CLASS 1 FINISH.
WING FOOTINGS & FLOOR OF BOX SHALL BE POURED MONOLITHICALLY.
FOOTINGS IN ROCK SHALL BE POURED OUT TO ROCK AND NOT FORMED.
SOUNDING AND DEPTH OF FOOTING SHOWN ARE IN ACCORDANCE WITH THE BEST AVAILABLE DATA AND WHEN DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF RE-DESIGN IS NECESSARY.
(R-3) EACH REINFORCING STEEL BAR SHALL BE TAGGED WITH THE NUMBER DESIGNATION AND THE STATION NUMBER OF THE PROJECT. SECONDARY BARS
(R-2) WHEN SPLICED SHALL LAP 24 DIAMETERS OF THE BAR. DIMENSIONS FOR REINFORCING STEEL NOT SHOWN AS CLEAR SHALL BE TO THE CENTER LINE OF THE BAR. OUT TO OUT DIMENSIONS SHALL BE USED ON BAR BENDING DETAILS.
SUPPORTING SOILS FOR ALL CULVERTS MUST BE COMPOSED OF FIRM AND UNIFORM MATERIAL THROUGHOUT.
HORIZONTAL CONSTRUCTION KEYS ARE NOT REQUIRED WHEN FOOTING AND WALL ARE POURED MONOLITHICALLY.
ALL COSTRUCTION KEYS SHOWN BETWEEN FOOTINGS AND WALLS ARE 3" X 3".

STEEL WEIGHTS INCLUDE 1% ± FOR OVERRUN.
EXPANSION JOINT MATERIAL IS TO BE INCLUDED IN THE PRICE OF CLASS "A" CONCRETE. AND SHALL
(R-2) CONFORM TO AASHO DESIGNATION M-213.
FOR CULVERTS REQUIRED AND GOVERNING DIMENSIONS SEE "LIST OF STRUCTURES".

(R-1) WHEN EXCAVATING FOR FOOTINGS THE FINAL SURFACE ELEVATION SHALL BE UNDISTURBED NATURAL OR COMPACTED SOIL.

STRUCTURE NO._____

REVISIONS		
(R-1) 7-17-67	General Note	M.R.H.
(R-2) 7-15-68	General Note & Dept. Name	M.R.H.
(R-3) 10-25-68	General Note & Table Note	M.R.H.

(R-2)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

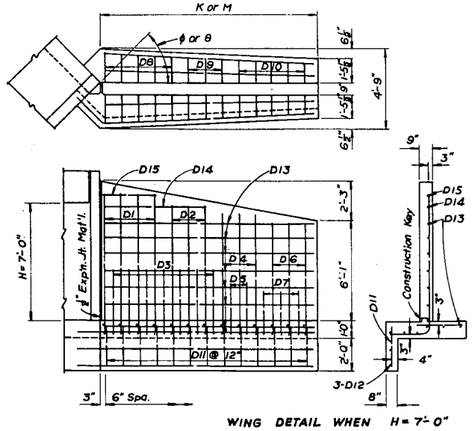
WINGWALLS FOR
CONCRETE BOX CULVERTS
4:1 SIDE SLOPES

Designed by L.D.P.
Made by J.M.M.E.R.L.S.
Checked by M.I.T.D.S.H.
Approved by _____ Bridge Engineer
Date: July 1, 1965

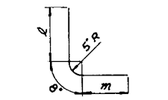
STANDARD M-601-C

(SHEET 2)
(JULY 1, 1965)

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



WING DETAIL WHEN H= 7'-0"



	ℓ	m	length
D1	7'-11"	1'-8"	10'-3"
D2	7'-4"	1'-6"	9'-6"
D3	3'-4"	1'-0"	5'-0"
D4	6'-9"	1'-5"	8'-10"
D5	2'-8"	10"	4'-2"
D6	6'-3"	1'-3"	8'-2"
D7	2'-2"	9"	3'-7"

TYPE I

D8= 2'-8"
D9= 2'-6"
D10= 2'-4"
D11= 2'-6"

TYPE II

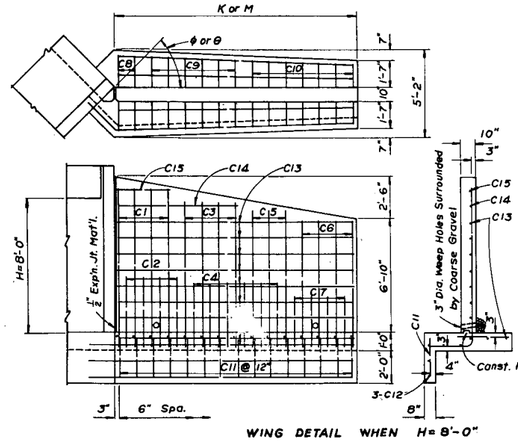
When ϕ or θ equals	Number of bars required											Length of bars				Quantities for One Wing	
	D1 ⅜" ϕ Type I	D2 ½" ϕ Type I	D3 ⅝" ϕ Type I	D4 ½" ϕ Type I	D5 ½" ϕ Type I	D6 ½" ϕ Type I	D7 ½" ϕ Type I	D8 ⅜" ϕ Type II	D9 ½" ϕ Type II	D10 ½" ϕ Type II	D11 ½" ϕ Type II	3-D12 ½" ϕ Type II	11-D13 ½" ϕ Type II	1-D14 ½" ϕ Type II	1-D15 ½" ϕ Type II	Concrete Cu.Yd.	Steel Lb.
22°30'	7	6	12	6	6	5	5	8	7	9	24	27'-4"	23'-5"	12'-2"	6'-2"	9.62	592
30°	5	5	9	5	5	4	4	6	6	7	19	20'-11"	17'-11"	9'-2"	4'-2"	7.39	457
37°30'	4	4	8	4	3	3	3	5	5	5	15	17'-2"	14'-8"	7'-2"	3'-2"	6.07	368
45°	4	3	7	3	2	3	3	5	5	5	13	14'-10"	12'-8"	6'-2"	3'-2"	5.26	321
52°30'	3	3	6	3	2	3	3	4	4	4	12	13'-10"	11'-2"	5'-2"	2'-2"	4.66	287
60°	3	3	5	3	3	2	2	4	3	4	11	12'-3"	10'-2"	5'-2"	2'-2"	4.25	262
67°30'	3	3	5	2	3	2	2	4	3	3	10	11'-4"	9'-8"	5'-2"	2'-2"	4.05	245

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

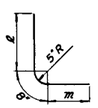
TABLE SHOWING VALUES OF K & M WHEN β & H ARE GIVEN

β	α	ϕ	θ	H= 7'-0" K	H= 7'-0" M	H= 8'-0" K	H= 8'-0" M	H= 9'-0" K	H= 9'-0" M	H= 10'-0" K	H= 10'-0" M
45°	45°	67°30'	22°30'	10'-0"	23'-9"	11'-0"	26'-9"	12'-3"	29'-6"	13'-6"	32'-3"
60°	30°	60°	30°	10'-6"	18'-3"	11'-9"	20'-6"	13'-0"	23'-9"	14'-3"	24'-9"
75°	15°	52°30'	37°30'	11'-6"	15'-0"	13'-0"	16'-9"	14'-3"	18'-6"	15'-9"	20'-3"
90°	0°	45°	45°	13'-0"	13'-0"	14'-6"	14'-6"	16'-0"	16'-0"	17'-6"	17'-6"
105°	15°	37°30'	52°30'	15'-0"	11'-6"	16'-9"	13'-0"	18'-6"	14'-3"	20'-3"	15'-9"
120°	30°	30°	60°	18'-3"	10'-6"	20'-6"	11'-9"	23'-9"	13'-0"	24'-9"	14'-3"
135°	45°	22°30'	67°30'	23'-9"	10'-0"	26'-9"	11'-0"	29'-6"	12'-3"	32'-3"	13'-6"

(R-3) β equals the angle between ℄ of culvert and ℄ of roadway. α equals the angle between ℄ of culvert and a line normal to ℄ of roadway. ϕ and θ are angles between the wingwall and a line parallel with the ℄ of roadway.
EXAMPLE FOR USING THE ABOVE TABLE. Suppose a stream makes an angle of β= 65° with ℄ of roadway, then, from the table, select the nearest angle β= 60°, then α, ϕ, & θ equal 30°, 60°, & 30° respectively. If the desired height "H" of culvert is 8'-0", then "K" & "M" will be 11'-9" & 20'-6". Locate the WING DETAIL WHEN H= 8'-0" on this sheet.



WING DETAIL WHEN H= 8'-0"



	ℓ	m	length
C1	6'-10"	1'-11"	11'-5"
C2	3'-8"	1'-2"	5'-6"
C3	6'-3"	1'-9"	10'-8"
C4	3'-4"	1'-1"	5'-1"
C5	7'-8"	1'-8"	10'-0"
C6	7'-0"	1'-6"	9'-2"
C7	2'-7"	11"	4'-2"

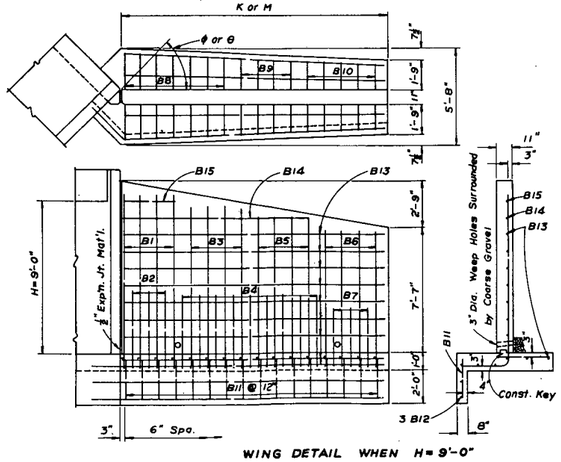
TYPE I.

C8= 3'-0"
C9= 2'-9"
C10= 2'-6"
C11= 2'-6"

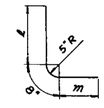
TYPE II

When ϕ or θ equals	Number of bars required											Length of bars				Quantities for One Wing	
	C1 ⅜" ϕ Type I	C2 ¾" ϕ Type I	C3 ⅜" ϕ Type I	C4 ½" ϕ Type I	C5 ½" ϕ Type I	C6 ½" ϕ Type I	C7 ½" ϕ Type I	C8 ⅜" ϕ Type II	C9 ½" ϕ Type II	C10 ½" ϕ Type II	C11 ½" ϕ Type II	3-C12 ½" ϕ Type II	12-C13 ½" ϕ Type II	1-C14 ½" ϕ Type II	1-C15 ½" ϕ Type II	Concrete Cu.Yd.	Steel Lb.
22°30'	8	7	6	12	6	7	7	5	10	12	27	30'-8"	26'-5"	13'-2"	7'-2"	12.53	779
30°	6	5	5	10	4	6	5	4	7	10	21	23'-5"	20'-2"	10'-2"	5'-2"	9.60	601
37°30'	5	4	4	8	4	4	4	3	6	8	17	19'-1"	16'-5"	8'-2"	4'-2"	7.84	487
45°	4	4	4	6	3	4	4	2	6	7	15	16'-6"	14'-2"	7'-2"	3'-2"	6.79	424
52°30'	4	3	3	6	3	3	3	2	5	6	13	15'-6"	12'-8"	6'-2"	3'-2"	6.08	374
60°	4	3	2	6	3	3	2	2	4	6	12	13'-8"	11'-5"	5'-2"	3'-2"	5.50	341
67°30'	3	3	3	5	2	3	2	2	4	5	11	12'-5"	10'-8"	5'-2"	2'-2"	5.15	315

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



WING DETAIL WHEN H= 9'-0"



	ℓ	m	length
B1	9'-11"	2'-3"	12'-10"
B2	4'-2"	1'-4"	6'-2"
B3	9'-2"	2'-1"	11'-11"
B4	3'-11"	1'-3"	5'-10"
B5	8'-5"	1'-10"	10'-11"
B6	7'-9"	1'-9"	10'-2"
B7	3'-1"	1'-1"	4'-10"

TYPE I

B8= 3'-3"
B9= 2'-9"
B10= 2'-7"
B11= 2'-6"

TYPE II

When ϕ or θ equals	Number of bars required											Length of bars				Quantities for One Wing	
	B1 ⅜" ϕ Type I	B2 ¾" ϕ Type I	B3 ⅜" ϕ Type I	B4 ½" ϕ Type I	B5 ½" ϕ Type I	B6 ½" ϕ Type I	B7 ½" ϕ Type I	B8 ⅜" ϕ Type II	B9 ½" ϕ Type II	B10 ½" ϕ Type II	B11 ½" ϕ Type II	3-B12 ½" ϕ Type II	12-B13 ½" ϕ Type II	1-B14 ½" ϕ Type II	1-B15 ½" ϕ Type II	Concrete Cu.Yd.	Steel Lb.
22°30'	7	6	8	16	8	7	7	13	8	9	30	33' 9"	29'-2"	22'-2"	6'-2"	15.93	930
30°	5	5	7	13	6	6	5	10	7	7	24	27'-0"	23'-5"	17'-2"	4'-2"	12.82	742
37°30'	4	4	5	10	5	5	4	8	5	6	19	21'-1"	18'-2"	13'-2"	3'-2"	9.98	580
45°	4	3	4	9	4	4	3	7	4	5	16	18'-2"	15'-8"	11'-2"	3'-2"	8.63	495
52°30'	3	3	4	8	4	4	3	6	4	5	15	17'-0"	13'-11"	10'-2"	2'-2"	7.69	453
60°	3	3	4	7	3	3	2	6	3	4	13	15'-1"	12'-8"	9'-2"	2'-2"	7.01	406
67°30'	3	2	3	7	4	3	3	5	3	5	13	13'-9"	11'-11"	9'-2"	2'-2"	6.61	385

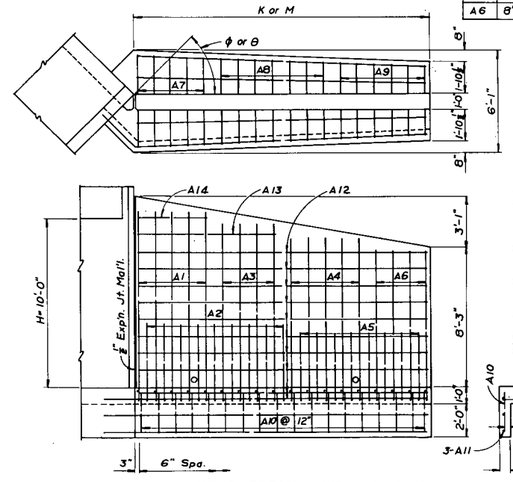
BAR LIST & QUANTITIES FOR ONE WING WHEN H= 9'-0"

A7= 3'-5"
A8= 3'-2"
A9= 2'-9"
A10= 2'-6"

TYPE II

	ℓ	m	length
A1	10'-8"	2'-5"	13'-9"
A2	4'-1"	1'-6"	6'-3"
A3	9'-11"	2'-3"	12'-10"
A4	9'-2"	2'-1"	11'-11"
A5	3'-7"	1'-4"	5'-7"
A6	8'-5"	1'-11"	11'-0"

TYPE I



WING DETAIL WHEN H= 10'-0"

When ϕ or θ equals	Number of bars required											Length of bars				Quantities for One Wing	
	A1 ⅜" ϕ Type I	A2 ¾" ϕ Type I	A3 ⅜" ϕ Type I	A4 ½" ϕ Type I	A5 ½" ϕ Type I	A6 ½" ϕ Type I	A7 ⅜" ϕ Type II	A8 ⅜" ϕ Type II	A9 ½" ϕ Type II	A10 ½" ϕ Type II	3-A11 ½" ϕ Type II	13-A12 ½" ϕ Type II	1-A13 ½" ϕ Type II	1-A14 ½" ϕ Type II	Concrete Cu.Yd.	Steel Lb.	
22°30'	9	16	8	8	16	8	10	12	11	33	36'-10"	31'-11"	16'-2"	8'-2"	19.74	1224	
30°	7	12	6	6	12	6	7	10	8	25	28'-2"	24'-5"	12'-2"	6'-2"	15.14	930	
37°30'	6	10	5	5	10	5	6	8	7	21	23'-1"	19'-11"	10'-2"	5'-2"	12.39	775	
45°	5	9	4	5	8	4	5	7	6	18	19'-9"	17'-2"	8'-2"	4'-2"	10.71	665	
52°30'	5	8	3	4	7	4	5	6	5	16	18'-9"	15'-5"	7'-2"	4'-2"	9.63	597	
60°	4	7	4	3	7	4	4	6	5	15	16'-6"	13'-11"	7'-2"	3'-2"	8.72	543	
67°30'	4	7	3	4	6	3	4	5	5	14	15'-2"	13'-2"	6'-2"	3'-2"	8.26	515	

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

REVISIONS		
(R-2) 7-15-68	Dept. Name	M.R.H.
(R-3) 10-25-68	Table Note	M.R.H.

(R-2)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

WINGWALLS FOR
CONCRETE BOX CULVERT
4:1 SIDE SLOPES

Designed by L.D.P.	Approved by
Made by J.W.M.F.R.L.S.	Bridge Engineer
Checked by A.T.J.J.S.M.	Date: July 1, 1965

STRUCTURE NO._____

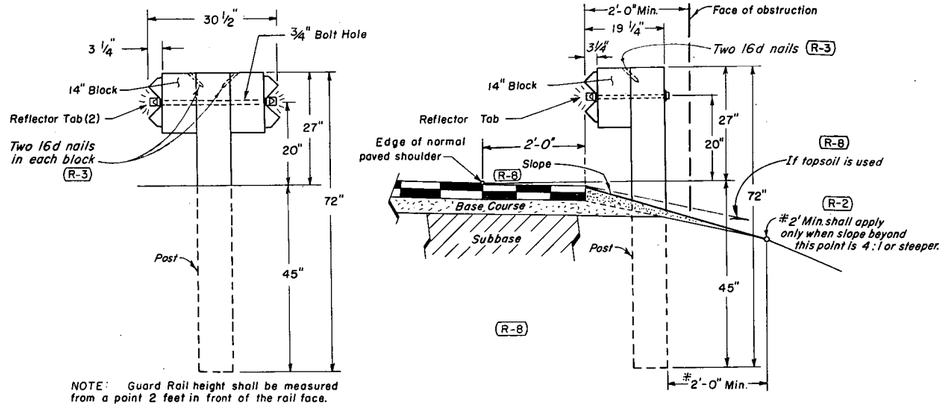
COLORADO DEPARTMENT OF HIGHWAYS
FORM C. D. H. 126
JANUARY 1960

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

STANDARD M-606-AB

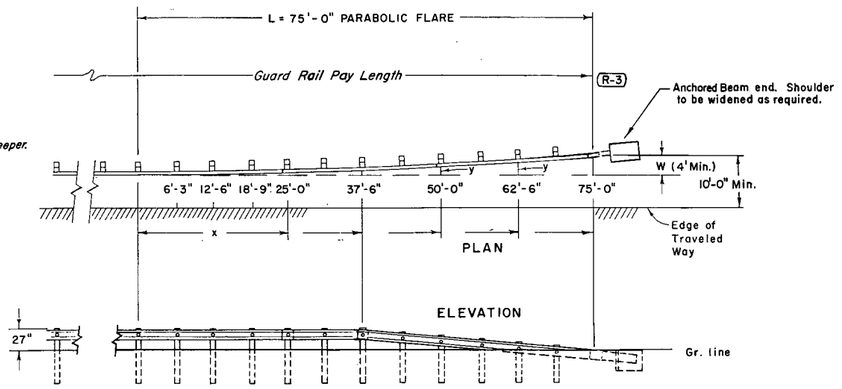
(MARCH 1, 1968)
(SHEET 1 OF 3)

REVISIONS		
(R-7)	10-21-71	Replace post spacing Gen. Note with table. M.R.H.
(R-8)	12-20-71	Shoulder treatment with and without curb. M.R.H.



TYPICAL POST INSTALLATIONS & SHOULDER TREATMENT WITHOUT CURB

(See Table for Post & Block Cross Section)



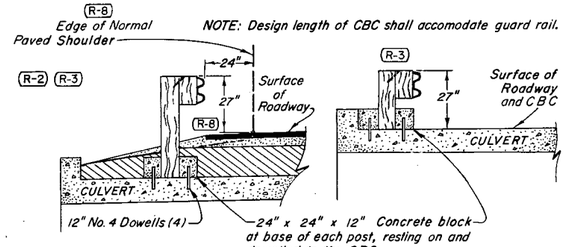
PARABOLIC TRANSITION & END TREATMENT

TABLE OF OFFSETS FOR 75' PARABOLIC FLARES

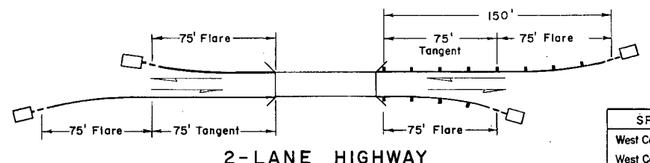
x	y W=4'	W=5'	W=10'	W=12'	W=14'	W=16'
12'-6"	0.11	0.14	0.28	0.33	0.39	0.44
25'-0"	0.44	0.55	1.11	1.33	1.56	1.78
37'-6"	1.00	1.25	2.50	3.00	3.50	4.00
50'-0"	1.78	2.22	4.44	5.33	6.23	7.11
62'-6"	2.78	3.48	6.95	8.34	9.73	11.11
75'-0"	4.00	5.00	10.00	12.00	14.00	16.00

LEGEND

W = Full parabolic offset.
L = Length of parabolic transition.
x = Longitudinal dist. from beginning of flare.
y = Offset = $W \cdot x^2/L^2$

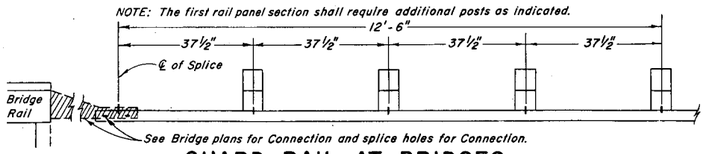


GUARD RAIL ACROSS CONCRETE BOX CULVERT

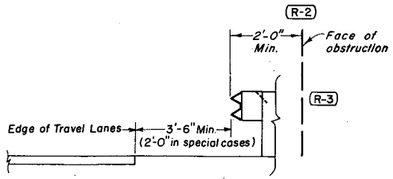


2-LANE HIGHWAY BRIDGE APPROACH GUARD RAIL

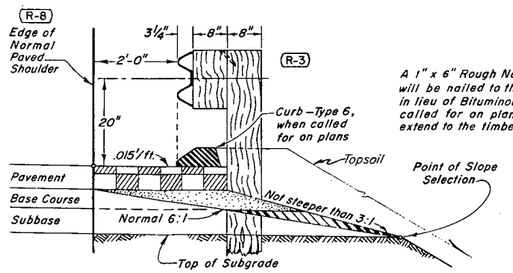
NOTE: For divided highways see Sheet No. 2.



GUARD RAIL AT BRIDGES

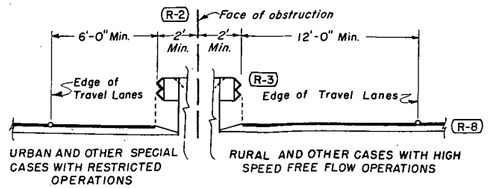


FOR NON-DEPRESSED MEDIAN AND CONTINUOUS GUARD RAIL



(R-7) A 1" x 6" Rough Native Timber Curb will be nailed to the Guard Rail posts in lieu of Bituminous Curb when called for on plans. Paving shall extend to the timber curb. (R-8)

GUARD RAIL SHOULDER TREATMENT WITH CURB (R-8)



URBAN AND OTHER SPECIAL CASES WITH RESTRICTED OPERATIONS

RURAL AND OTHER CASES WITH HIGH SPEED FREE FLOW OPERATIONS

(R-1) **GUARD RAIL FOR OBSTRUCTIONS IN MEDIAN**

(See Sheet No. 3)

(R-7)

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

All timber shall be close grained Douglas Fir of the Coast Region, Dense Longleaf or Shortleaf Southern Pine, Lodgepole Pine, Ponderosa Pine, Western Hemlock, or Larch, and shall conform to the following grading specifications and requirements:

SPECIES	SIZE	FOHC	GRADING RULES
West Coast Douglas Fir	6"x8"	Yes	WCLB #16 Par. 131 b
West Coast Hemlock	6"x8"	Yes	WCLB #16 Par. 131 a
Larch	6"x8"	Yes	WWP 1970 Par. 80.11
Southern Pine	6"x8"	No	SPIB 1970 Par. 285
Lodgepole Pine	8"x8"	No	WWP 1970 Par. 80.10
Ponderosa Pine	8"x8"	No	WWP 1970 Par. 80.10
West Coast Hemlock	8"x8"	Yes	WCLB #16 Par. 131 b

Post & block cross section

WCLB # 16 — "Standard Grading Rules #16 for West Coast Lumber" Published by the West Coast Lumber Inspection Bureau. Effective Sept. 1, 1970.

WWP 1970 — "1970 Standard Grading Rules for Southern Pine Lumber" Published by the Western Wood Products Association. Effective Sept. 1, 1970.

SPIB 1970 — "1970 Standard Grading Rules for Southern Pine Lumber" Published by the Southern Pine Inspection Bureau. Effective Sept. 1, 1970.

FOHC — Free of Heart Centers. See paragraph 714 c of WCLB.

NOTE — 6"x 8" Posts and Blocks shall be installed with the 6" dimension parallel to the roadway.

All timber shall be rough, free of wane, square cut and full sawn.

At the time the post or block is installed, any seasoning check which extends the full length of the piece shall not exceed one-quarter inch in width at its' maximum width.

Blocks shall be cut from timber of the same cross section, species and grade as the posts and recieve the same treatment.

Timber shall be incised and pressure treated in accordance with AASHO Designation M 133, except that blocks need not be incised. Post bolt holes are to be drilled before treatment is applied.

The preservative shall be either (a) Creosote or (b) Pentachlorophenol in a petroleum carrier (liquid or L.P. gas). Unless otherwise permitted by the Engineer, only one preservative shall be used on the project.

Where pedestrian hazard exists and sidewalk is constructed on the roadway shoulder, guard rail shall be placed between the sidewalk and the edge of traffic lane.

Guard rail plate shall not be lighter than No. 12 U.S. Standard Gage. 25' length of rail panels will be permitted.

Metal plate guard rail shall be painted in accordance with standard specifications or shall be galvanized in accordance with AASHO Designation M-111 or with ASTM Designation A 525, Coating Class 2.50.

Posts used for vertical transition shall be adjusted in length so that a minimum of 45" will be buried.

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

Concrete shall be Class **A**, **B** or **D**.

Blocks shall be toenailed to posts with two 16 penny galvanized nails in the top of each block.

If posts are cut in the field, cut ends shall receive 2 coats of hot creosote.

NORMAL CENTER-TO-CENTER POST SPACING (R-7)

LOCATION	DESIGN SPEED Less Than 50 mph and ADT < 750	DESIGN SPEED 50 mph and Over
Tangents	12'-6"	6'-3"
Curves with Radius Over 200'	12'-6"	6'-3"
Curves with Radius of 200' or Less	6'-3"	6'-3"
Flares and Obstructions	6'-3"	6'-3"

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

GUARD RAIL TYPE 3

Designed by M.R.H.
Made by R.R.B. by
Checked by R.S.M.
Approved by
Staff Design Engineer
Date: March 1, 1968

ORIGINAL

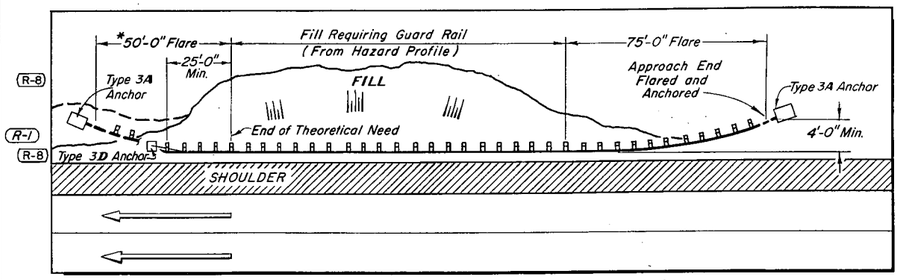
DEPARTMENT OF HIGHWAYS—STATE OF COLORADO
FORM D. O. H. 126
MARCH 1964

STANDARD M-606-AB

(MARCH 1, 1968)
(SHEET 2)

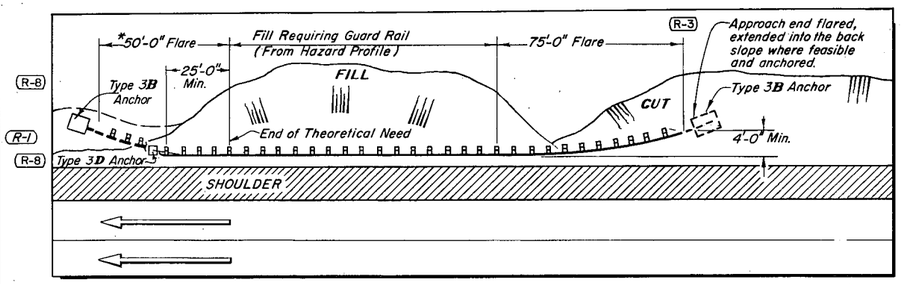
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS		
R-7	10-21-71	Revision date only.	M.R.H.
R-8	12-20-71	End anchorage type numbers.	M.R.H.

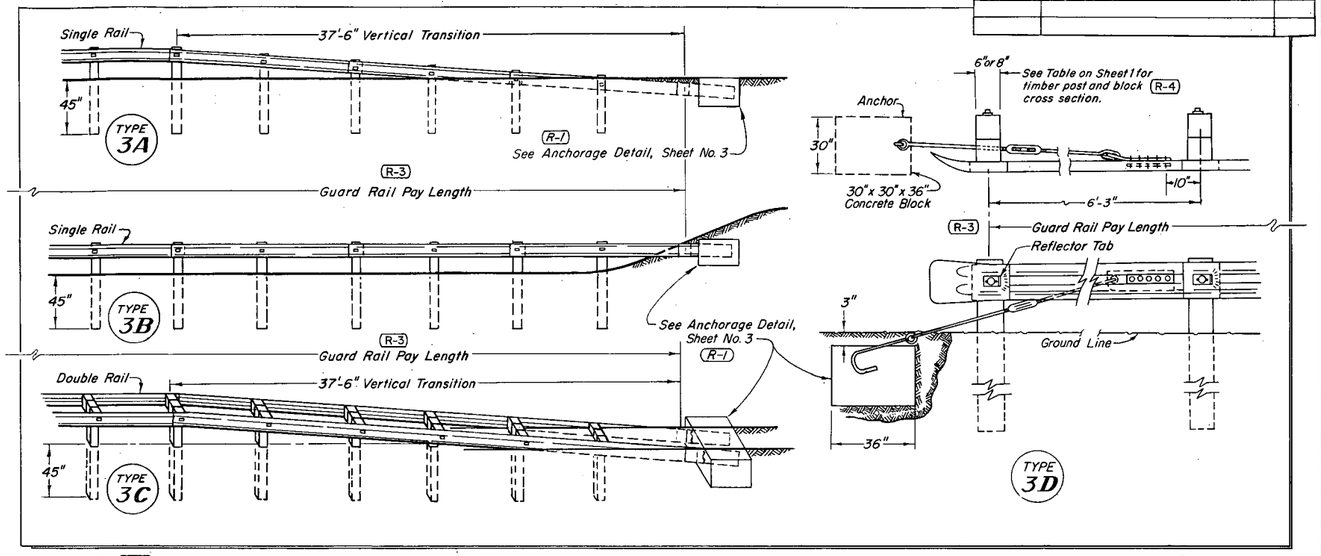


GUARD RAIL INSTALLATION — ROADSIDE FILL CONDITION

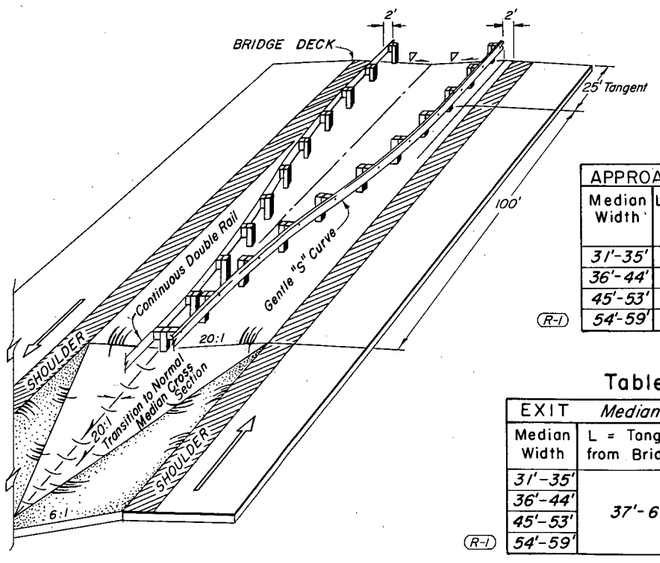
NOTES:
* 2-Lane Highways — The exit end of Guard Rail shall extend 50 feet past the end of theoretical need and shall be flared and anchored.



GUARD RAIL INSTALLATION — ROADSIDE CUT TO FILL CONDITION



R-8 TYPICAL END ANCHORAGE R-8



21' to 30' MEDIAN

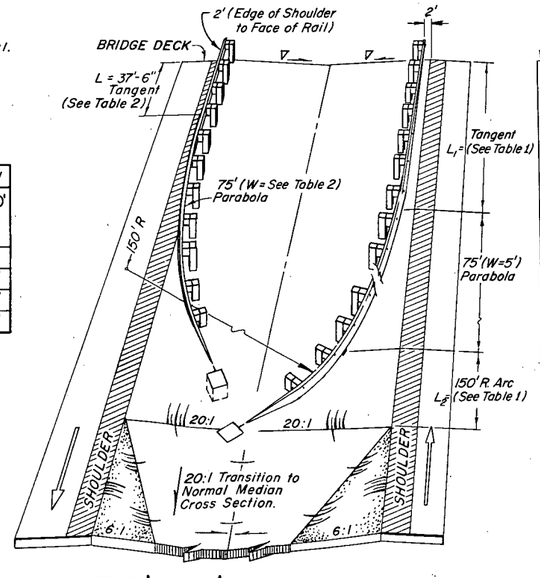
R-2
∇Not steeper than 20:1.

Table 1

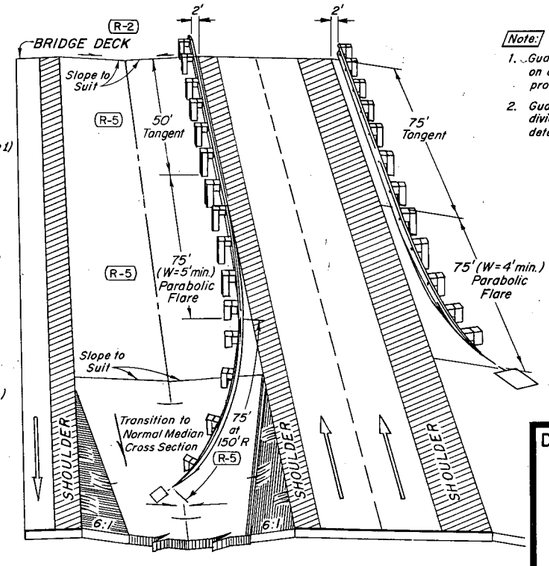
APPROACH Median Guard Rail			
Median Width	L_1=Tangent from Bridge	75' Parablic Flare	L_2 = 150' Radius Arc
	then		then
31'-35'	50'-0"	W = 5'	25'-0"
36'-44'	25'-0"		50'-0"
45'-53'	12'-6"		62'-6"
R-1 54'-59'	0'-0"		75'-0"

Table 2

EXIT Median Guard Rail		
Median Width	L = Tangent from Bridge	75' Parabolic Flare, W=
	then	then
31'-35'	37'-6"	10'
36'-44'		12'
45'-53'		14'
R-1 54'-59'		16'



R-1 31' to 59' MEDIAN



R-1 MEDIAN 60' AND OVER

R-2

Note: EXIT FROM BRIDGES:

1. Guard rail for OUTSIDE shoulders at exit end of bridges on divided highways to be determined from hazard profile.
2. Guard rail for INSIDE shoulders at exit end of bridges on divided highways with medians 60' and over to be determined from hazard profile.

GUARD RAIL AT BRIDGE APPROACH

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

GUARD RAIL
TYPE 3

Designed by	M.R.H.	Approved by	
Made by	J.R.B.	Staff Design Engineer	
Checked by	R.S.M.	Date:	March 1, 1968

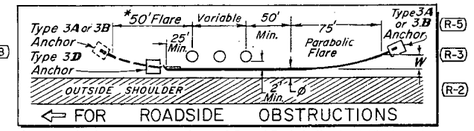
DEPARTMENT OF HIGHWAYS—STATE OF COLORADO
FORM D. O. H. 126
MARCH 1964

STANDARD M-606-AB

(MARCH 1, 1968)
(SHEET 3)

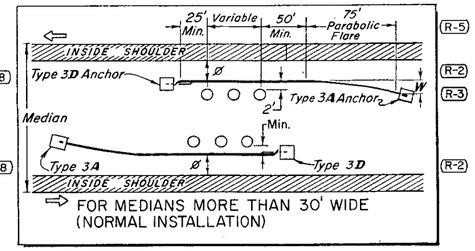
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS			
R-7	10-21-71	Revision date only.	M.R.H.
R-8	12-20-71	Anchorage type numbers & reflector tab.	M.R.H.

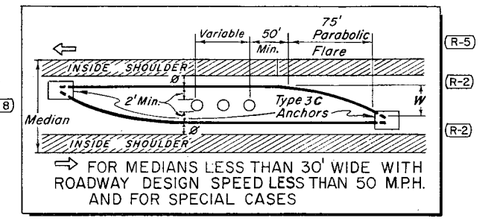


⇦ FOR ROADSIDE OBSTRUCTIONS

*2-Lane Highways — The exit end of Guard Rail shall extend 50 ft. past the end of theoretical need and shall be flared and anchored.

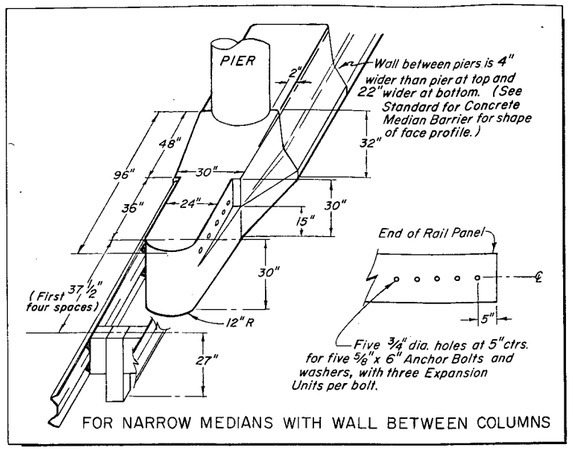


⇨ FOR MEDIANS MORE THAN 30' WIDE (NORMAL INSTALLATION)

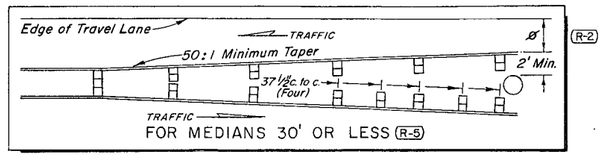


⇨ FOR MEDIANS LESS THAN 30' WIDE WITH ROADWAY DESIGN SPEED LESS THAN 50 M.P.H. AND FOR SPECIAL CASES

NON-CONTINUOUS RAIL



FOR NARROW MEDIANS WITH WALL BETWEEN COLUMNS

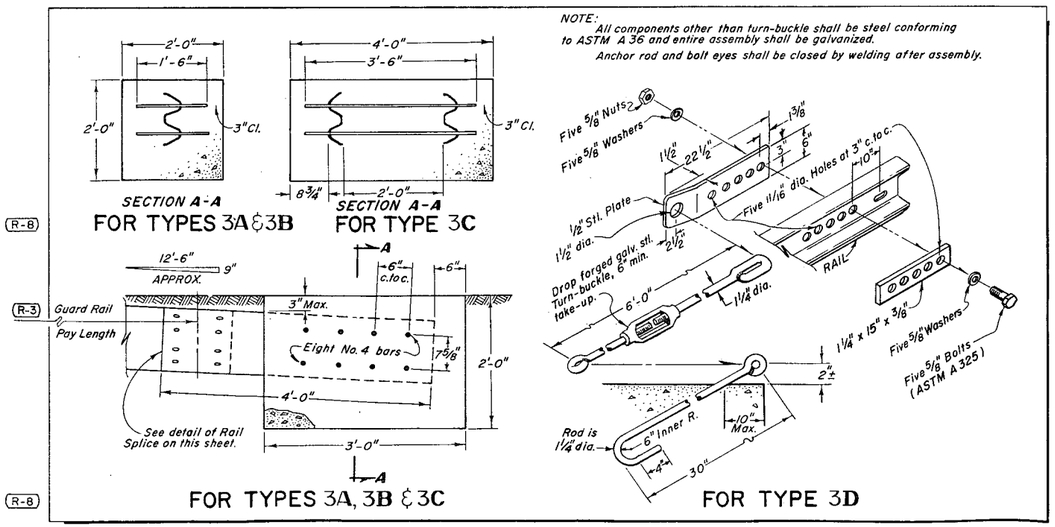


FOR MEDIANS 30' OR LESS (R-5)

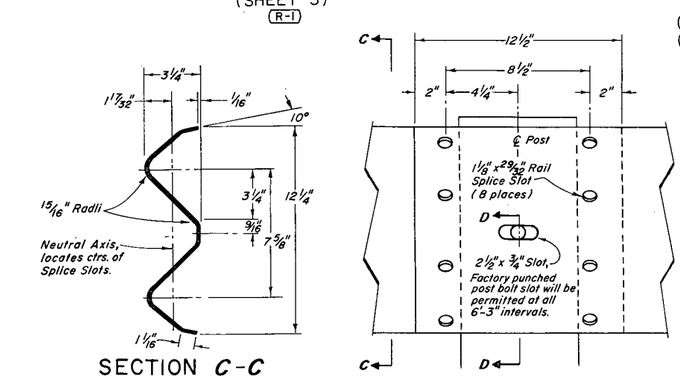
CONTINUOUS RAIL

Ø When slope is 6:1 or flatter and an obstruction is present, increase where possible, to allow more area for vehicle recovery. (R-2)

TYPICAL GUARD RAIL FOR OBSTRUCTIONS



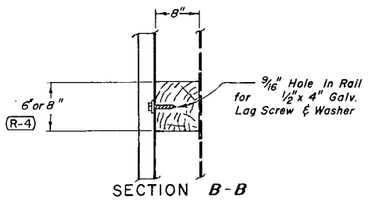
DETAILS FOR TYPICAL END ANCHORAGE



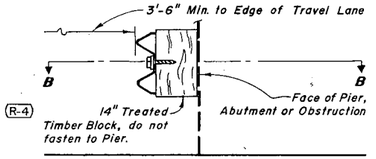
SECTION C-C

SECTION D-D

DETAIL OF RAIL AND SPLICE



SECTION B-B

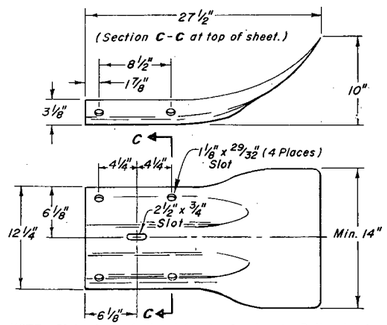


FOR NARROW MEDIANS

(To be used only when 2' min. clearance cannot be obtained.)

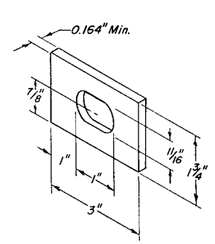
R-4 SEE TABLE ON SHEET 1 FOR TIMBER CROSS SECTION

R-5 NOTE: Four 37 1/2" post spaces shall be used at obstruction approach. Posts between piers shall be evenly spaced at 37 1/2" c. to c. or less. Timber blocks fastened to abutments or obstructions shall be spaced 37 1/2" c. to c. or less.

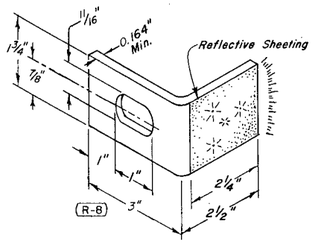


NOTE: Slots shown shall match outer 4 and center Rail-end slots.

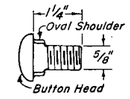
DETAIL OF TERMINAL SECTION



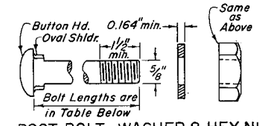
RECTANGULAR WASHER DETAIL



REFLECTOR TAB DETAIL



SPLICE BOLT & HEX NUT
(NEED 8 PER SPLICE, 4 PER TERMINAL)

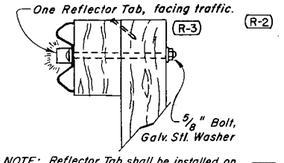


POST BOLT, WASHER & HEX NUT

TABLE OF POST BOLT SIZES

Block / Post	RAIL	BOLT SIZE
8"/8"/8"	Double	5/8" x 25 3/4"
8"/8"	Single	5/8" x 17 1/2"

R-4 NOTE: When 6" x 8" timber is used, the 8" dimension shall be perpendicular to the roadway.



NOTE: Reflector Tab shall be installed on alternate posts or at max. 12'-6" spacing, beginning at the 3rd post from the buried anchor. (R-2)

INSTALLATION DETAIL OF REFLECTOR TAB

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

GUARD RAIL
TYPE 3

Designed by M. R. H.	Approved by
Made by J. R. B.	Staff Design Engineer
Checked by R. S. M.	Date: March 1, 1968

STANDARD M-614-TB

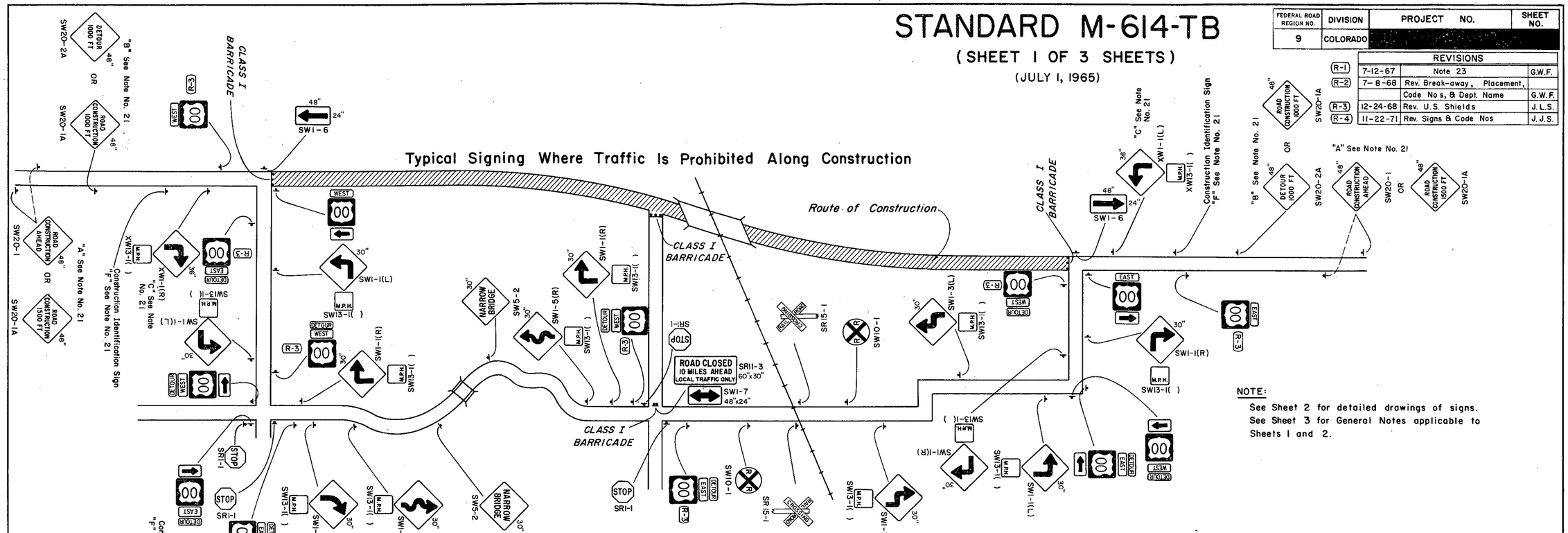
(SHEET 1 OF 3 SHEETS)

(JULY 1, 1965)

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	[redacted]	

REVISIONS			
R-1	7-12-67	Note 23	G.W.F.
R-2	7-8-68	Rev. Break-away, Placement, Code No s, & Dept. Name	G.W.F.
R-3	12-24-68	Rev. U.S. Shields	J.L.S.
R-4	11-22-71	Rev. Signs & Code Nos	J.J.S.

Typical Signing Where Traffic Is Prohibited Along Construction



Typical Signing Where Traffic Is Permitted Along Construction

NOTE:

See Sheet 2 for detailed drawings of signs.
See Sheet 3 for General Notes applicable to Sheets 1 and 2.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

TRAFFIC SIGNING FOR HIGHWAY CONSTRUCTION

Designed By: D.R.W.
Made By: J.L.S.
Checked By: J.B.

Approved By: [signature]
Traffic Engineer
Date: AUGUST 9, 1965

STANDARD M-614-TB

(SHEET 2 OF 3 SHEETS)

(JULY 1, 1965)

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	[redacted]	

REVISIONS			
R-1	7-12-67		M.R.H.
R-2	7-8-68	Rev. Code No. & Dept. Name	G.W.F.
R-3	12-24-68	Added Notes	J.L.S.
R-4	11-22-71	Rev. Signs & Code Nos.	J.J.S.

WARNING SIGNS
See Note No. 10

XW6-3

EXW6-3

Margin: $\frac{3}{8}$
Border: $\frac{3}{8}$
Corner Radius: $1\frac{1}{2}$

REGULATORY SIGNS
See Note No. 9

48"x30"
SR11-2

Margin: $\frac{1}{2}$
Border: $\frac{3}{4}$
Corner Radius: $1\frac{7}{8}$

60"x30"
SR11-3

WARNING SIGNS
See Note No. 10

48"x24"
SW1-6

Margin: $\frac{1}{2}$
Border: $\frac{3}{4}$
Corner Radius: $1\frac{7}{8}$

48"x24"
SW1-7

Margin: $\frac{3}{8}$
Border: A
Corner Radius: $1\frac{1}{2}$

	Panel	A	B	C	D	E	F	G	H	I	J
SW13-1	18"x18"	$\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{5}{16}$	$2\frac{1}{4}$	8-C	2	3-E	$2\frac{3}{4}$	$\frac{3}{4}$	$5\frac{3}{16}$
XW13-1	24"x24"	$\frac{5}{8}$	$6\frac{5}{8}$	$6\frac{9}{16}$	$3\frac{1}{4}$	10-C	$2\frac{3}{4}$	4-E	4	$\frac{15}{16}$	$6\frac{7}{8}$

WARNING SIGNS
See Note No. 10

	S	A	B	C	D	E	F	G	H	I	J
SW20-3	48	$11\frac{1}{4}$	$12\frac{1}{16}$	$6\frac{9}{16}$	$16\frac{3}{8}$	$14\frac{5}{8}$	$14\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{9}{16}$	$5\frac{3}{16}$	7-D
CW20-3	36	$8\frac{7}{16}$	$8\frac{9}{16}$	$11\frac{13}{16}$	$11\frac{7}{16}$	$10\frac{1}{2}$	$10\frac{1}{2}$	$3\frac{3}{8}$	$3\frac{1}{4}$	$3\frac{3}{16}$	5-D

	S	A	B	C	D	E	F	G
SW20-3A	48	12	$12\frac{1}{16}$	$13\frac{1}{8}$	$14\frac{1}{8}$	$13\frac{1}{4}$	$13\frac{5}{8}$	7-C
SW20-4A	36	$8\frac{5}{16}$	$8\frac{5}{8}$	$9\frac{3}{8}$	$10\frac{1}{8}$	$9\frac{1}{2}$	$9\frac{3}{4}$	5-C
CW20-3A								
CW20-4A								

	S	A	B	C	D	E	F	G	H	I	J
SW20-4	48	$18\frac{1}{2}$	$17\frac{7}{8}$	$9\frac{3}{16}$	$9\frac{5}{8}$	$11\frac{7}{8}$	$11\frac{7}{8}$	$3\frac{1}{8}$	$5\frac{1}{4}$	$3\frac{1}{2}$	7-C
CW20-4	36	$13\frac{3}{16}$	$12\frac{3}{4}$	$6\frac{9}{16}$	$6\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{3}{4}$	$2\frac{1}{2}$	5-C

WARNING SIGNS
See Note No. 10

	S	A	B	C	D	E	F	G
SW20-2	48	$18\frac{3}{16}$	$18\frac{3}{16}$	$16\frac{3}{4}$	$16\frac{3}{4}$	$1\frac{1}{4}$	$3\frac{1}{2}$	8-D
CW20-2	36	$13\frac{3}{4}$	$13\frac{3}{4}$	$12\frac{9}{16}$	$12\frac{9}{16}$	$\frac{15}{16}$	$2\frac{5}{8}$	6-D

	S	A	B	C	D	E	F	G
SW20-2A	48	13	$13\frac{3}{4}$	15	$16\frac{3}{16}$	$15\frac{1}{8}$	$15\frac{1}{8}$	8-C
CW20-2A	36	$10\frac{3}{8}$	$10\frac{5}{8}$	$11\frac{1}{4}$	$12\frac{1}{8}$	$11\frac{1}{8}$	$11\frac{1}{16}$	6-C

	S	A	B	C	D	E	F	G	H	I	J	K	L
SW20-6	36	$2\frac{1}{16}$	$3\frac{3}{64}$	$13\frac{17}{32}$	$13\frac{39}{64}$	$2\frac{31}{32}$	$2\frac{61}{64}$	$6\frac{11}{32}$	$6\frac{61}{64}$	3	2	1	5-C

SW8-1

WARNING SIGNS
See Note No. 10

	S	A	B	C	D	E	F	G	H	I	J
SW20-5(R)	48	$18\frac{3}{4}$	$18\frac{7}{16}$	$11\frac{1}{2}$	$11\frac{1}{2}$	$10\frac{1}{2}$	$10\frac{1}{2}$	$2\frac{7}{8}$	$\frac{7}{16}$	$3\frac{5}{16}$	6-C
CW20-5(R)	36	$15\frac{3}{16}$	$15\frac{3}{8}$	$9\frac{13}{16}$	$9\frac{13}{16}$	$8\frac{9}{16}$	$8\frac{9}{16}$	$2\frac{3}{8}$	$\frac{3}{8}$	$2\frac{3}{4}$	5-C

	S	A	B	C	D	E	F	G
SW20-5A(R)	48	$10\frac{5}{16}$	$10\frac{3}{8}$	$11\frac{1}{2}$	$12\frac{1}{8}$	$11\frac{3}{8}$	$11\frac{5}{16}$	6-C
SW20-5A(L)	48	$10\frac{5}{16}$	$10\frac{3}{8}$	$11\frac{1}{2}$	$12\frac{1}{8}$	$11\frac{3}{8}$	$11\frac{5}{16}$	6-C
CW20-5A(R)	36	$8\frac{7}{8}$	$8\frac{5}{8}$	$9\frac{3}{8}$	$10\frac{1}{8}$	$9\frac{1}{2}$	$9\frac{3}{4}$	5-C
CW20-5A(L)								

	S	A	B	C	D	E	F	G	H	I	J
SW20-5(L)	48	$17\frac{1}{8}$	$17\frac{1}{8}$	$11\frac{3}{4}$	$11\frac{3}{4}$	$10\frac{1}{4}$	$10\frac{1}{4}$	$2\frac{7}{8}$	$\frac{7}{16}$	$3\frac{5}{16}$	6-C
CW20-5(L)	36	$14\frac{1}{4}$	$14\frac{1}{2}$	$9\frac{13}{16}$	$9\frac{13}{16}$	$8\frac{9}{16}$	$8\frac{9}{16}$	$2\frac{3}{8}$	$\frac{3}{8}$	$2\frac{3}{4}$	5-C

WARNING SIGNS
See Note No. 10

	S	A	B	C	D	E	F	G
SW20-1A	48	12	$12\frac{1}{16}$	$13\frac{1}{8}$	$14\frac{1}{8}$	$13\frac{1}{4}$	$13\frac{5}{8}$	7-C
CW20-1A	36	$8\frac{5}{8}$	$8\frac{5}{8}$	$9\frac{3}{8}$	$10\frac{1}{8}$	$9\frac{1}{2}$	$9\frac{3}{4}$	5-C

	S	A	B	C	D	E	F	G	H	I	J
SW20-1	48	9	$9\frac{5}{8}$	26	$25\frac{5}{16}$	$11\frac{5}{8}$	$11\frac{5}{8}$	$4\frac{13}{16}$	$3\frac{1}{2}$	$4\frac{13}{16}$	7-C
CW20-1	36	$6\frac{3}{4}$	$6\frac{7}{8}$	19	$18\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{1}{2}$	$3\frac{3}{4}$	$2\frac{1}{2}$	$3\frac{3}{4}$	5-C

SW21-2

WARNING SIGNS
See Note No. 10

	S	A	B	C	D	E	F	G
SW20-7	48	18	18	$11\frac{7}{8}$	$11\frac{7}{8}$	$1\frac{1}{2}$	$4\frac{3}{4}$	7-C
CW20-7	36	$15\frac{7}{16}$	$15\frac{7}{16}$	$10\frac{3}{4}$	$10\frac{3}{16}$	$1\frac{5}{16}$	$4\frac{1}{16}$	6-C

	S	A	B	C	D	E	F	G
SW20-7A	48	12	$12\frac{1}{16}$	$13\frac{1}{8}$	$14\frac{1}{8}$	$13\frac{1}{4}$	$13\frac{5}{8}$	7-C
CW20-7A	36	$10\frac{5}{16}$	$10\frac{3}{8}$	$11\frac{1}{4}$	$12\frac{1}{8}$	$11\frac{3}{8}$	$11\frac{5}{16}$	6-C

SW21-1

SW21-3

SW21-3A

PLATE DETAILS

S	M	B	R
30	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{7}{8}$
36	$\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{4}$
48	$\frac{3}{4}$	$1\frac{1}{4}$	3

FLAGMAN SIGN
See Notes No. 20 and 22

Diamond:
Margin: $\frac{1}{4}$
Border: $\frac{1}{4}$
Corner Radius: 1

NOTES:

SEE SHEET 1 FOR TYPICAL SIGNING AND SIGN PLACEMENT. SEE SHEET 3 FOR GENERAL NOTES APPLICABLE TO SHEETS 1 AND 2.

ALL DIMENSIONS THAT ARE NOT LABELED ARE IN INCHES.

GUIDE SIGNS
See Note No. 11

24"x12"
SM4-8

Margin: $\frac{3}{8}$
Border: $\frac{3}{8}$
Corner Radius: $1\frac{1}{2}$

30"x24"
SM4-9(R)
SM4-9(L)

Margin: $\frac{3}{8}$
Border: $\frac{5}{8}$
Corner Radius: $1\frac{1}{2}$

60"x36"
SG20-1

Margin: $\frac{1}{2}$
Border: $\frac{3}{4}$
Corner Radius: $1\frac{7}{8}$

60"x24"
SG20-2

Margin: $\frac{3}{8}$
Border: $\frac{5}{8}$
Corner Radius: $1\frac{1}{2}$

42"x18"
SG20-3

Margin: $\frac{3}{8}$
Border: $\frac{5}{8}$
Corner Radius: $1\frac{1}{2}$

48"x18"
SM4-10R
SM4-10L

(R-3) Reverse Dimensions for Left Designation

36"x18"
SG20-4

Margin: $\frac{3}{8}$
Border: $\frac{5}{8}$
Corner Radius: $1\frac{1}{2}$

(R-2)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

TRAFFIC SIGNING FOR HIGHWAY CONSTRUCTION

Designed By: D.R.W.	Approved By: [signature]
Made By: H.B.D.	Traffic Engineer
Checked By: J.B.	Date: AUGUST 9, 1965

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

REVISIONS			
(R-1)	7-12-67	Added Note 23	G.W.F.
(R-2)	7-8-68	Rev. Note 23 & Dept. Name –	
		Deleted Note	G.W.F.
(R-3)	12-24-68	Rev. Note No. 18	J.L.S.
(R-4)	11-22-71	Rev. Notes	J.J.S.

STANDARD M-614-TB

(SHEET 3 OF 3 SHEETS)

(JULY 1, 1965)

GENERAL NOTES

(R-4) 1. All work shall be done in accordance with: (a) the Standard Specifications applicable to the Project, and (b) the "Manual on Uniform Traffic Control Devices for all Classes of Streets and Highways" published by the U.S. Department of Transportation, Federal Highway Administration, and the related Colorado Supplement.

2. 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 (including connecting roads) with well-maintained Barricades, Warning, and Guide Signs. All Barricades and Signs shall be moved, added to, changed or removed as required during the progress of construction and removed entirely when the Project is completed.

(R-4) 3. Where traffic is prohibited from the Project the Detour will be marked by the Division except that the Contractor shall provide, erect and maintain Barricades, complete, (when required) at the ends of the Project, ends of the Detour and connecting roads. All U.S. or State Route Markers required for the Project will be furnished and installed by the Division. The location and positioning of Warning Signs, Barricades, and Regulatory Signs shall be as recommended by the appropriate District Engineering Forces of the Division.

4. Work on the Project shall not be started until all required signs are in place and approved by the Engineer. Where speed control appears necessary such speed control shall be requested from the Engineer by the Contractor. Control of speed through a construction zone may be achieved by Advisory Speed plates in conjunction with Warning Signs (SW13-1 for use with 30" Warning Signs and XW13-1 for use with 36" and 48" Warning Signs). The Advisory Speed plate is to be posted only at those locations where the safe speed is lower than the imposed Regulatory speed limit.

5. All Signs and Barricades shall be placed for best visibility and legibility, maintained in good condition and kept clean and free of dirt at all times. Contractor's and Engineer's vehicles and equipment must be parked so that signs and barricades are visible to approaching traffic at all times.

6. Where two identical signs are used for dual posting they are to be staggered on the two sides of the roadway for a minimum distance of 75' to avoid a tunneling effect.

7. Examples for marking Projects, as shown on Sheet 1, are typical of signs required and are subject to alteration to fit actual conditions encountered in the field. Locations for control devices are to be staked by the Engineer. In all cases Warning signs are to be placed well in advance of the hazard, the distance depending on topography and existing approach speeds. 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.

(R-4) 8. Desirable sizes for signs are shown on Sheet 1 of this Standard. Larger or smaller signs shall be used where warranted. Detailed dimensions for signs normally used in connection with construction are shown on Sheet 2 of this Standard. For information on standard roadway signs not detailed on this Standard see the "Manual on Uniform Traffic Control Devices for all Classes of Streets and Highways" published by the U.S. Department of Transportation, Federal Highway Administration, and the related Colorado Supplement.

9. Signs with the prefix "R" in the sign code are Regulatory signs and as such impose legal compulsions or restrictions on drivers and should only be used as authorized by the Engineer.

10. Signs with the prefix "W" in the sign code are Warning signs and are used to alert traffic to existing or potentially hazardous conditions.

11. Signs with the prefix "D" or "M" in the sign code are Guide signs. Those with the prefix "D" convey general information and those with the prefix "M" are used for marking the traffic route.

(R-4) 12. All signs shall be reflectorized unless otherwise specified on plans. Regulatory signs (unless otherwise specified) shall have a screen processed black legend and border on a white flexible reflective sheeting, non-exposed lens background. The back side of Regulatory and Guide signs shall be painted with two coats of "Exterior Sign White Paint." Warning signs shall have a screen processed black legend and border on an orange flexible reflective sheeting, non-exposed lens background. The back side of Warning signs shall be painted with two coats of exterior sign white. Guide signs shall have a black message on an orange background.

13. Painting for wood surfaces shall conform with Section 508 of the Standard Specifications.

14. Posts for regulatory, warning, and guide signs will normally be 4" x 4" or 6" x 6" and shall conform to the Standard Specifications for Untreated Timber-S4S. Timber shall conform to Construction grade Paragraph 123B or 125B of Standard No. 15 Grading & Dressing Rules for West Coast Douglas Fir (1956) or Dense Structural 58 and LL Structural 58 Paragraph 284 or 285 of 1956 Grading Rules for Southern Pine. Posts shall be painted with one coat of "White Wood Primer" and one coat of "Outside White Paint."

15. Sign panels furnished by the Contractor for use only during construction may be fabricated from plywood, aluminum, steel or other suitable material but shall be stable and durable enough to meet other requirements of this Standard.

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

(R-4) 17. Alternate methods of processing signs or the substitution of symbols or other reflecting elements for painted symbols will be permitted only after approval by the Division.

(R-3) (R-4) 18. Lanterns and Torches – Lanterns, shall be used only in low speed urban areas. Open-flame torches shall not be used under any circumstances.

(R-4) 19. Barricades, Flashing Beacons and Flashers – Refer to appropriate Division Standard Drawings (Timber Barricades) for details.

20. Flagman Sign – This sign shall have a black painted background on both sides to form a contrast for the octagonal Stop sign and the diamond Warning sign. The "STOP" sign shall be fabricated by reverse screen process using transparent red paint on smooth surface silver reflective sheeting. The "SLOW" side of the Flagman Sign shall be black process paint on smooth surface orange reflective sheeting. Handle to be grooved on one side to indicate reading of sign to Flagman.

(R-4) 21. Sign "A": This is the first advance warning sign and shall be placed 1,500 feet ahead of Barricade or project terminal. Postings are required on both sides of the roadway on divided highways. Dual posting is required where warranted on two-lane, two-way highways.
Sign "B": This is the second advance warning sign and shall be placed 1,000 feet ahead of barricade or project terminal. Postings are required on both sides of the roadway on divided highways and singly on two-lane, two-way highways.
Sign "C": This is the third advance warning sign in cases where barricades are used and shall be placed 500 to 750 feet ahead of barricade or potentially hazardous condition. Postings are required on both sides of the roadway on divided highways and singly on two-lane, two-way highways.
Sign "D": SG20-1 This sign shall be placed to mark the beginning of a Project of more than 2 miles in extent, where traffic is maintained through the project. It shall be placed singly and near the beginning of construction.
Sign "E": SG20-2 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 "F": Construction identification signs shall be furnished and installed by the Division on all Federal-Aid and Forest Highway Projects where actual construction is in progress and visible to highway users. These signs should be located so as not to obscure or detract from the effectiveness of other official signs. Where two or more projects are contiguous the appropriate data may be included in one set of signs. Refer to appropriate Division Standard Drawings (Identification Signs) for sign details.
Signs A through F shall be furnished, installed and maintained by the Division.

22. When Flags are used in lieu of the Flagman Sign, they shall be a minimum of 18"x18", made of a good grade of bright red material, and fastened securely to a staff of approximately 3 foot length. The free edge should be weighted to insure that the flag will hang vertically, even in heavy winds.

(R-1) (R-2) 23. Each 6"x6" timber sign post shall be provided with two 2" diameter holes through the neutral axis normal to the roadway, one hole at 6" and one hole at 18" above the ground level. The 4"x4" timber posts shall not be provided with any type of break-away device. The inside portion of each 2" diameter hole shall be painted white. The underground portion of each timber post shall be treated with creosote.

(R-2)

(R-2)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

TRAFFIC SIGNING FOR HIGHWAY CONSTRUCTION

Designed By: D.R.W.	Approved By: Traffic Engineer
Made By: J.L.S.	
Checked By: J.B.	Date: AUGUST 9, 1965

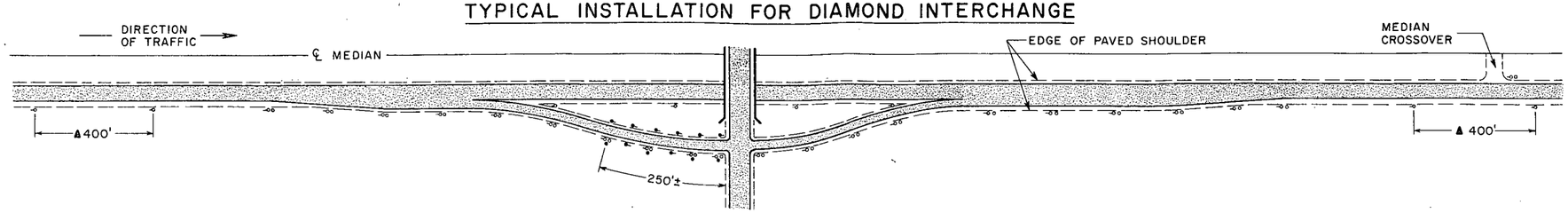
STANDARD S-612-51A (R-1)

(SHEET 1 OF 2 SHEETS)
SEPTEMBER 29, 1972

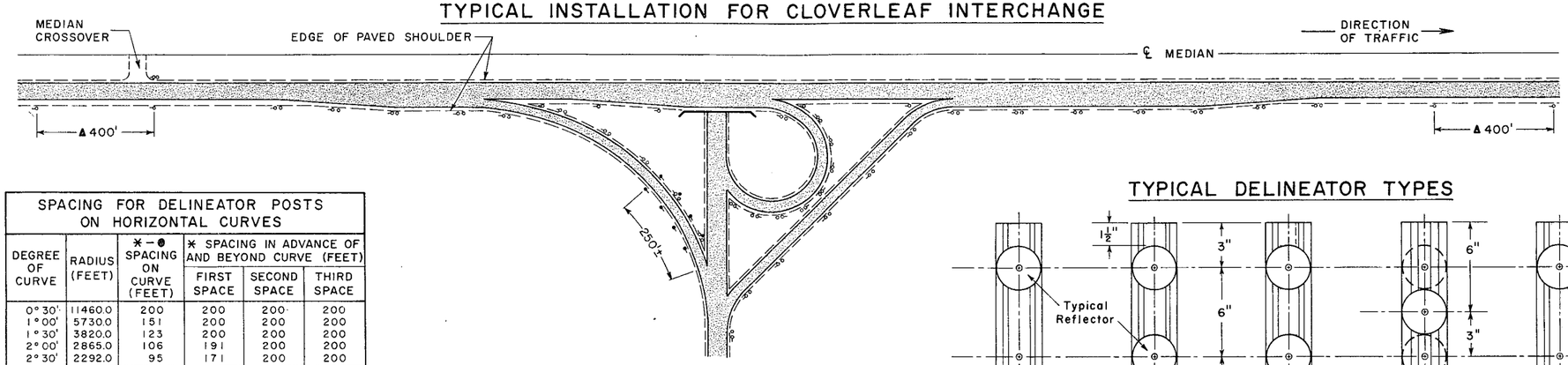
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO			

REVISIONS			
(R-1)	10-26-72	Rev. Std. No., Notes & Red Usage	J.D.S.

TYPICAL INSTALLATION FOR DIAMOND INTERCHANGE



TYPICAL INSTALLATION FOR CLOVERLEAF INTERCHANGE



PLAN LEGEND

- TYPE I DELINEATORS
- TYPE II DELINEATORS
- TYPE III DELINEATORS
- TYPE IV DELINEATORS
- TYPE V DELINEATORS

(R-1) ▲ EXPRESSWAY SPACING (Delineators will not be required on tangents of Conventional and Frontage roadways.)

SPACING FOR DELINEATOR POSTS ON HORIZONTAL CURVES

DEGREE OF CURVE	RADIUS (FEET)	✱–● SPACING ON CURVE (FEET)	✱ SPACING IN ADVANCE OF AND BEYOND CURVE (FEET)		
			FIRST SPACE	SECOND SPACE	THIRD SPACE
0°30'	11460.0	200	200	200	200
1°00'	5730.0	151	200	200	200
1°30'	3820.0	123	200	200	200
2°00'	2865.0	106	191	200	200
2°30'	2292.0	95	171	200	200
3°00'	1910.0	86	155	200	200
3°30'	1637.1	80	144	200	200
4°00'	1432.5	74	133	200	200
4°30'	1273.3	70	126	200	200
5°00'	1146.0	66	119	198	200
5°30'	1041.8	63	113	189	200
6°00'	955.0	60	108	180	200
6°30'	881.5	58	104	174	200
7°00'	818.6	55	99	165	200
7°30'	764.0	53	95	159	200
8°00'	716.3	52	94	156	200
8°30'	674.1	50	90	150	200
9°00'	636.7	48	86	144	200
9°30'	603.2	47	85	141	200
10°00'	573.0	46	83	138	200
10°30'	545.7	45	81	135	200
11°00'	520.9	43	77	129	200
11°30'	498.3	42	76	126	200
12°00'	477.5	41	74	123	200
15°00'	382.0	36	65	108	200
18°00'	318.3	33	59	99	198
21°00'	272.9	30	54	90	180
25°00'	229.2	27	49	81	162
30°00'	191.0	24	43	72	144

(R-1) ✱ OMIT THIRD SPACE ON PRIMARY AND SECONDARY ROUTES AND DOUBLE THE DISTANCE ON THE CURVE AND IN ADVANCE OF AND BEYOND THE CURVE. FOR CURVES LESS THAN 2 DEGREES ON EXPRESSWAY THROUGH ROADWAYS USE EXPRESSWAY TANGENT SPACING.

● $S = 2\sqrt{R-50}$ (NO SPACES TO EXCEED 200 FEET)

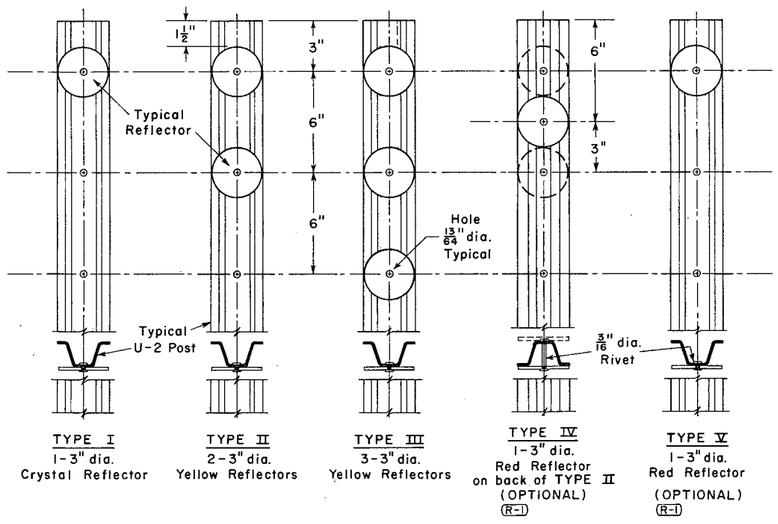
FIRST SPACE = 1.8 S
SECOND SPACE = 3 S
THIRD SPACE = 6 S

GENERAL NOTES

1. All work shall be done in accordance with the Standard Specifications applicable to the Project.
2. See the Tabulation in the Plans for delineator requirements.
3. Spacing between posts on acceleration and deceleration lanes and on relatively straight portions of interchange ramps shall be 100' on Interstate and 200' on Primary and Secondary projects. Spacing between posts on the outside of interchange ramp curves shall be as indicated in the table with a 24' minimum. Post spacing in advance of and beyond the curve shall not apply to ramp curves.
4. When guard rail is present, place delineators outside and at a height that permits an unobstructed view of all reflectors.
5. ■ Delineators are not to be placed beyond tangent points of reversing curves for median transitions. (See Sheet 2)
6. Delineators may be placed on the median side of a roadway when the Engineer determines that a location is hazardous and/or that each side can be treated as an independent roadway due to horizontal or vertical separation.
7. When normal delineator spacing falls on an intersecting roadway it may be moved either direction a distance not to exceed 1/4 of the normal space.
8. Type, location and spacing of delineators for tunnels and snow sheds shall be as directed by the Engineer.
9. Frontage road delineators are not to be installed where they might be misleading to mainline traffic.
10. Install face of delineator at 90 degrees to centerline of the roadway.
11. The color of delineator posts shall be Interstate Green.

(R-1) General Notes continued on Sheet 2.

TYPICAL DELINEATOR TYPES



TYPE I — 1-3" dia. Crystal Reflector

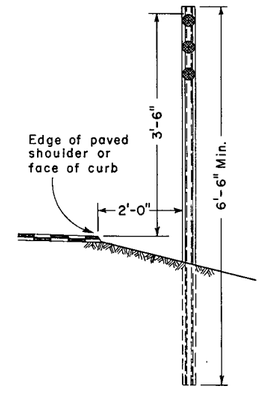
TYPE II — 2-3" dia. Yellow Reflectors

TYPE III — 3-3" dia. Yellow Reflectors

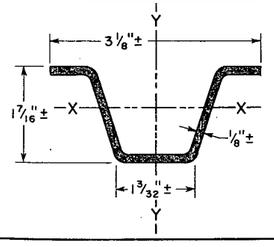
TYPE IV — 1-3" dia. Red Reflector on back of TYPE II (OPTIONAL) (R-1)

TYPE V — 1-3" dia. Red Reflector (OPTIONAL) (R-1)

TYPICAL DELINEATOR PLACEMENT



TYPICAL U-2 POST SECTION AND NOTES



Steel posts shall meet requirements of Paragraph 4.5 U.S. Dept. of Commerce Commercial Standard 184-51. Re-rolled rails are acceptable material.

Posts are to weigh 2 lbs./ft. with a mill tolerance of minus 3½% of the weight of any one post being allowed.

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

Posts shall be set in drilled or excavated holes, placed plumb and firmly tamped in place; or may be driven plumb.

A minimum of 3 holes for Types I, II, III and V and a minimum of 4 holes for Type IV delineator posts with 13/64" diameter are required (spacing as shown above).

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

TYPICAL DELINEATOR INSTALLATIONS

Designed By: G.W.F.	Approved By: [signature]
Made By: F.J.B.	Traffic Engineer
Checked By: J.D.S.	Date Sept. 29, 1972

STANDARD S-612-51A (R-1)

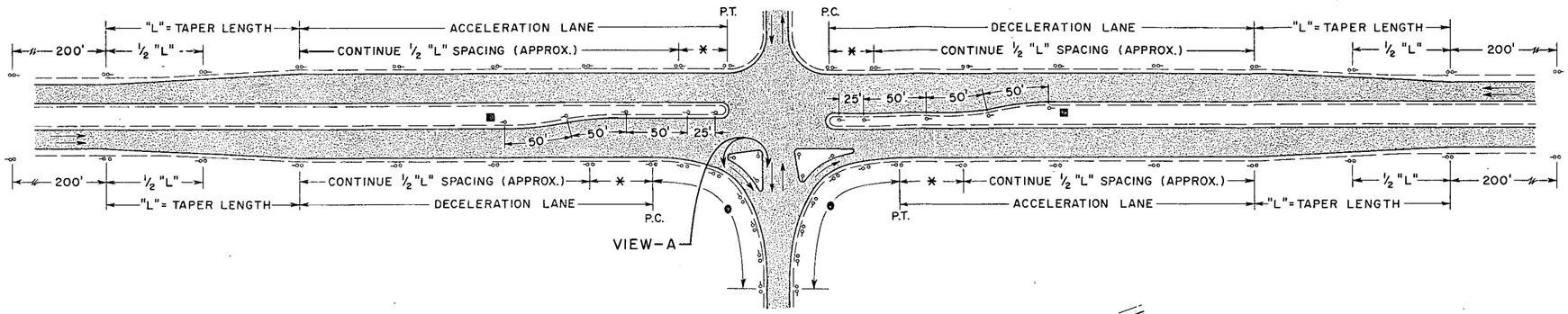
(SHEET 2 OF 2 SHEETS)

SEPTEMBER 29, 1972

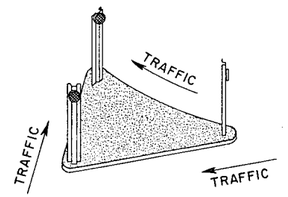
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO			

REVISIONS			
(R-1)	10-26-72	Rev. Std. No., Notes & Red Usage.	J.D.S.

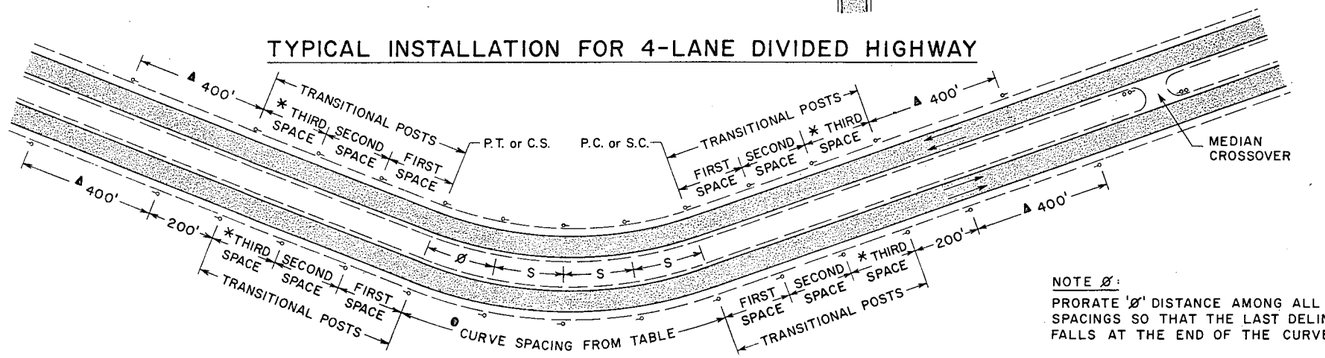
TYPICAL INSTALLATION FOR CHANNELIZED INTERSECTION



VIEW-A, TYPICAL ISLAND

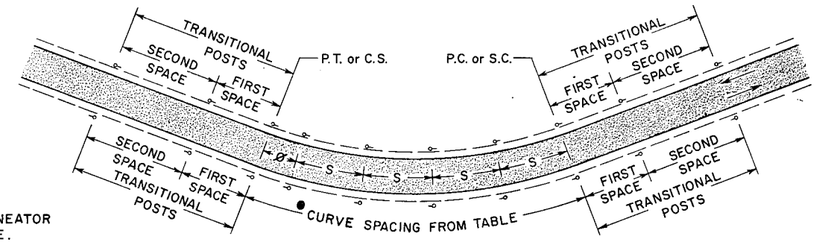


TYPICAL INSTALLATION FOR 4-LANE DIVIDED HIGHWAY

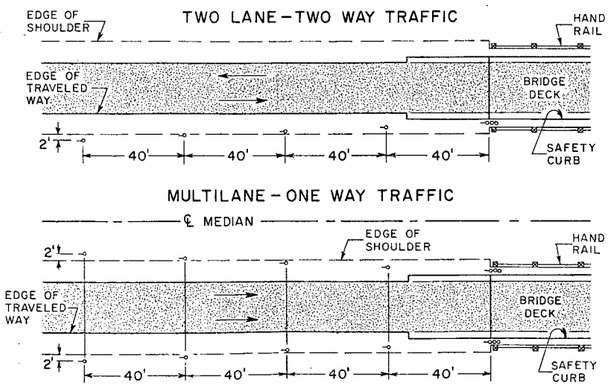


NOTE Ø:
PRORATE 'Ø' DISTANCE AMONG ALL SPACINGS SO THAT THE LAST DELINEATOR FALLS AT THE END OF THE CURVE.

TYPICAL INSTALLATION FOR 2-LANE, 2-WAY HIGHWAY



TYPICAL INSTALLATION FOR BRIDGE APPROACHES

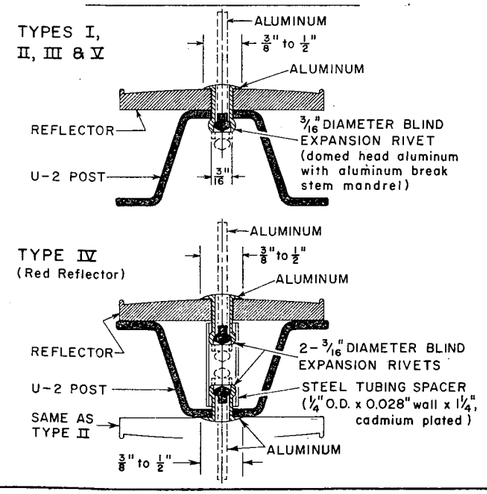


BRIDGE NOTES — WHERE CURB TO CURB WIDTH OF BRIDGE IS EQUAL TO OR GREATER THAN ROADWAY WIDTH PLUS USABLE SHOULDER WIDTH, USE THE TYPE III DELINEATORS ONLY AND OMIT ALL THE TYPE I DELINEATORS. WHEN APPROACH SLAB HAS CURB, PLACE THE TYPE III DELINEATOR IMMEDIATELY BEHIND THE CURB.

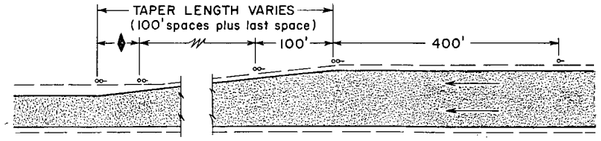
(R-1) GENERAL NOTES CONT'D.

12. Red delineators may be installed on existing roadways where investigation shows a need to guard against wrong-way movements.

TYPICAL DELINEATOR FABRICATION DETAILS



TYPICAL INSTALLATION FOR CLIMBING LANE TRANSITION



NO SPECIAL TREATMENT REQUIRED AT BEGINNING OF CLIMBING LANE.

PLAN LEGEND

- ♀ TYPE I DELINEATORS
- ♀ TYPE II DELINEATORS
- ♀ TYPE III DELINEATORS
- (R-1) ▲ EXPRESSWAY SPACING
- ■ SEE GENERAL NOTE 5
- ✱ SEE SPACING TABLE
- ● SEE SPACING TABLE
- ♦ LAST SPACE (Space is variable - not to exceed 100')

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

TYPICAL DELINEATOR INSTALLATIONS

Designed By: G.W.F.	Approved By: C.D. Stephens
Made By: F.J.B.	Traffic Engineer
Checked By: J.D.S.	Date Sept 29, 1972

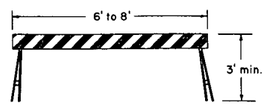
STANDARD S-614-52A

(MARCH 1, 1972)

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO			

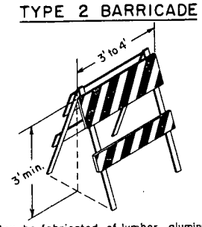
REVISIONS			
(R-1)	6-26-73	Notes	J.D.S.

TYPE 1 BARRICADE



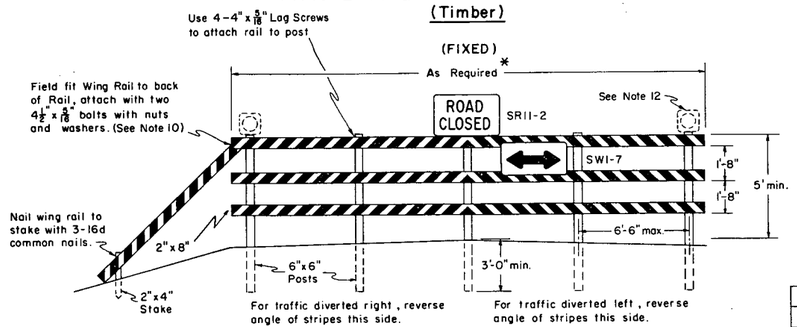
May be fabricated of lumber, aluminum or other suitable light weight materials of structural soundness.
Stands may be detachable for mobility.

TYPE 2 BARRICADE



May be fabricated of lumber, aluminum or other suitable light weight materials of structural soundness.

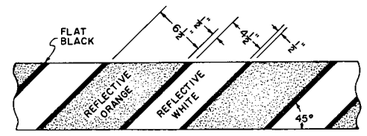
TYPICAL TYPE 3 BARRICADES (Timber)



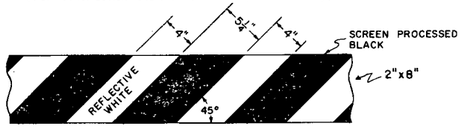
	BARRICADE DESIGNATIONS		
	TYPE 1	TYPE 2	TYPE 3
Rail Width	8" min. - 12" max.	Top-8" min. - 12" max. Mid-4" min. - 8" max.	8" min. - 12" max.
Rail Length	6' to 8'	3' to 4'	As Required, see Table *
Height	3' min.	3' min.	5' min
Stripes	See Detail of Barricade Striping		See Notes 4 & 7
Frame	Demountable or Heavy Duty "A" Frame	Light "A" Frame	Posts, Skids or "A" Frame
Flexibility	Movable	Portable	Fixed or movable
Use	Temporary	Temporary	Temporary or Permanent

RAIL LENGTH TABLE *		
TYPE 3 BARRICADE		LENGTH
FIXED	MOVABLE	
F - A	M - A	8' - 14'
F - B	M - B	15' - 24'
F - C	M - C	25' - 35'
F - D	M - D	> 35'

DETAIL OF BARRICADE RAIL STRIPING

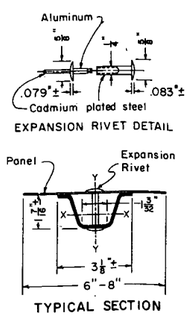


Temporary Barricades
(For construction and maintenance operations only)



Permanent Barricades

TYPICAL VERTICAL PANEL CHANNELIZING DEVICE



GENERAL NOTES

1. All work shall be done in accordance with the Standard Specifications applicable to the project.
2. All signs, sign materials, beacons, and barricade warning lights shall conform to the standards set forth in the "Manual on Uniform Traffic Control Devices for Streets and Highways" published by the Federal Highway Administration, of current issue, and the Colorado Supplement thereto, and this standard.
3. The various types and combinations of approved signs and beacons for barricades required for each project shall be governed by field conditions and subject to approval by the Engineer. Typical barricade applications are shown in Part 6 of the Manual on Uniform Traffic Control Devices for Streets and Highways.
4. Painting shall conform with Subsections 508.08 and 614.07 of the Standard Specifications. All skids, braces and posts shall be painted with 2 coats of "Exterior White Paint". Horizontal and wing rails on all temporary barricades shall have orange and white stripes with a narrow flat black stripe separating the orange and white stripes as shown in striping detail. The entire area of orange and white stripes shall be reflectorized. For striping of permanent barricades see Note 7.
5. Each barricade rail shall be striped on the face side only with stripes slanting downward at a 45° angle toward the side to which traffic is to turn or pass. The backsides of rails shall be painted with "Exterior White Paint".
6. When fixed barricades are designated on plans, the portion of the posts below ground line shall be dipped in hot creosote oil. The portion of the post above ground line shall be painted with 2 coats of "Exterior White Paint".
7. A Fixed Type 3 Barricade which is required as a permanent installation shall have rails striped with black and white in lieu of orange and white. The white stripes shall be 4" in width, the black stripes shall be 5¼" wide as shown in striping detail. The white stripes shall be reflectorized. The posts of a permanent installation shall be painted with 2 coats of "Exterior White Paint".
8. All skids, braces, rails and posts shall be nailed together with No. 20d nails. All screws, bolts, nuts and washers shall be galvanized or cadmium plated. Skids (bases) of movable barricades shall be weighted where necessary to provide stability.
9. (R-1) All timber shall be Grade No. 2 or better, S 4 S, Douglas fir or Larch, as described in the current Standard Grading Rules published by the Western Wood Products Association, and shall conform to applicable paragraphs for the rails and posts.
10. Detachable extension wing rails for bypassing of construction equipment are permitted when necessary. The length is variable and shall be adequate to provide closing of borrow pit and/or shoulder as required. May be used on Fixed or Movable Type 3 Barricades.
11. Alternate materials or other reflective elements on traffic signs or barricades will be permitted only after approval of such material by the Division in writing.
12. (R-1) Flashing Beacons or Barricade Warning Lights shall be used in connection with barricades when called for by the Engineer. When used, they shall be positioned above the top rail of the barricades to produce the most effective results. When used, Barricade Warning Lights shall be of the type specified by the Engineer.
13. (R-1) All reflective surfaces shall be reflective sheeting of the smooth surface type.
14. Barricades used as "Traffic Controls for Highway Construction" are not to be paid for separately.
15. Barricades will be paid for separately when designated on plans as bid items.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

BARRICADES AND VERTICAL PANEL CHANNELIZING DEVICES

Designed By: GWF Made By: JVN Checked By: GWF	Approved By: C. W. Hayden Traffic Engineer Date March 1, 1972