TITLE SHEET

STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS — STATE OF COLORADO

R.O.W. AND UTILITIES UNDER F032-1(9)

FEDERAL ROAD REGION NO	DIVISION	PROJECT NO	SHEET NO
9	COLORADO	F 058-1(2)	1

R-1 Rev. Index & Length. 12-29-70 W.E.M.
R-2 Rev. Title Block 6-7-71 W.E.M.

AS CONSTRUCTED
REVISED DATE DEC 2, 1972

PLAN AND PROFILE OF PROPOSED

FEDERAL AID PROJECT NO. F 058-1(2)

STATE HIGHWAY NO. 58

JEFFERSON COUNTY

SCALES OF ORIGINAL DRAWINGS

ON PLAN: 1 IN = 50 FT
ON PROFILE: 1 IN = 50 FT HORIZONTAL; 1 IN = 10 FT VERTICAL

GRADE LINE ON PROFILE IS SHOWN AS GRADE OF FINISHED ROAD

GROSS LENGTH OF PROJECT 16,723.51 FT = 3.167 MILES R-1
NET LENGTH OF PROJECT 16,339.68 FT = 3.095 MILES

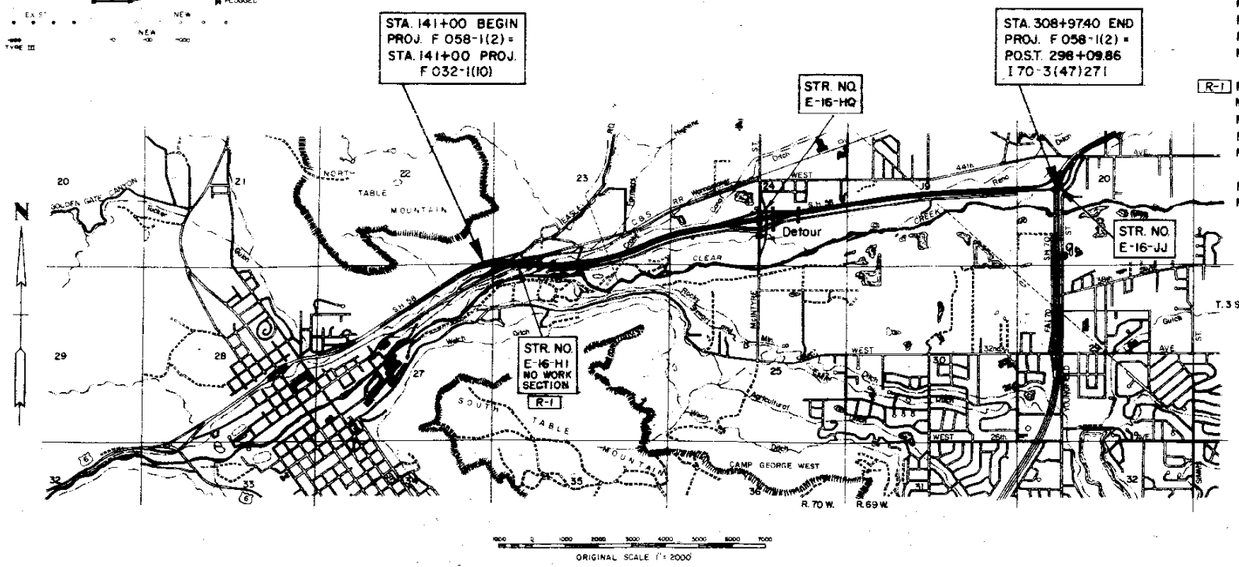
CONTRACTOR: L. H. Kilgroe Const. Co
RESIDENT ENGINEER: Frank Abel
DATE OF COMPLETION: December 2, 1972
APPROVED BY: R L Chrisman 6-20-73
District Construction Engineer

CONVENTIONAL SIGNS

CENTER LINE (PLAN SHEET / TITLE SHEET)
RIGHT OF WAY LINE (R.O.W. MARKER)
COUNTY LINE — CITY LIMITS
TOWNSHIP OR RANGE LINE
LAND LINES (SECTION LINE / 1/4 SECTION LINE / 1/16 SECTION LINE)
RAILROAD (PLAN SHEET / TITLE SHEET)
BARBED WIRE FENCE
CHAIN LINK FENCE — WOVEN WIRE FENCE
BEAM TYPE GUARD RAIL (NEW / EXIST)
TELEPHONE & TELEGRAPH POLES
POWER POLES
DETOUR
PRESENT ROAD (Plan Sheets)
CONTROL OF ACCESS LINE
ACCESS DENIED BY DEED — A — A (END OF ACCESS)
GAS LINE — G — G
WATER LINE — W — W
TELEPHONE CONDUIT — T — T

CURB AND GUTTER (TYPE 2 SEC. IB)
CURB AND GUTTER (TYPE 2 SEC. IIB)
CURB AND GUTTER (TYPE 2 SEC. IM)
CURB AND GUTTER (TYPE 2 SEC. IIM)
GUTTER TYPE 2 (4 FOOT)
CURB TYPE 6 (SECTION M)

EXISTING CURB AND GUTTER
EXISTING SANITARY SEWERS — MH — ADJUST MH
EXISTING STORM SEWERS — INLET
NEW STORM SEWER CONSTRUCTION — PLUGGED
TIMBER GUARD POSTS (EAST / NEW)
DELINEATORS (EXIST TYPE I / TYPE II / TYPE III / NEW)



INDEX OF SHEETS

"As Constructed" Revisions Sheets 8, 11, 12, 23-31 and 41

INACTIVE
JUL 31 1974

R. L. MAYER

W. E. MITCHELL

DIVISION OF HIGHWAYS
APPROVED: R L Chrisman 12-17-70
CHIEF ENGINEER — DATE

R-2
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED: ____ DATE ____
DIVISION ENGINEER

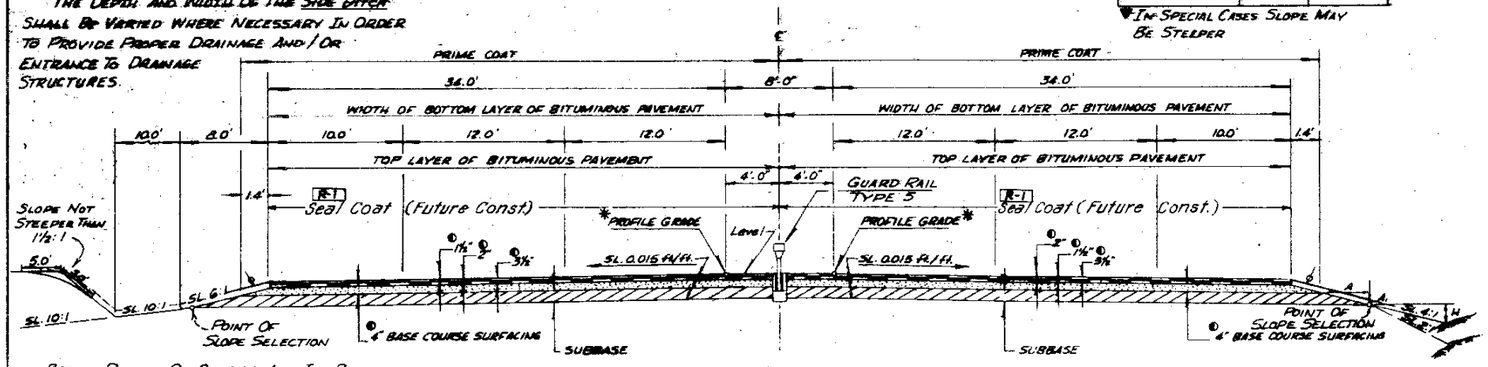
W.E.M.

NOTES:
SEE STANDARDS FOR DETAILS OF CUT SLOPE TREATMENT, FLARING & WIDENING.

TYPICAL SECTIONS

STA. 141 +00 to STA. 166+00

THE DEPTH AND WIDTH OF THE SIDE DITCH SHALL BE VARIED WHERE NECESSARY IN ORDER TO PROVIDE PROPER DRAINAGE AND/OR ENTRANCE TO DRAINAGE STRUCTURES.



BREAK POINTS ON SLOPES AND IN BOTTOMS OF DITCHES SHALL BE ROUNDED ON CONSTRUCTION FOR PLEASING APPEARANCE.

* CONTRACTOR WILL BE REQUIRED TO PLACE TOP SOIL TO THIS LINE AFTER COMPLETION OF PAVING OPERATIONS.

* PROFILE GRADE IS AT CENTERLINE FROM STATION 141 +00 to STATION 155+98 R-1

A. A. VARY TO MATCH FILL SLOPE THAT IS ACTUALLY CONSTRUCTED.

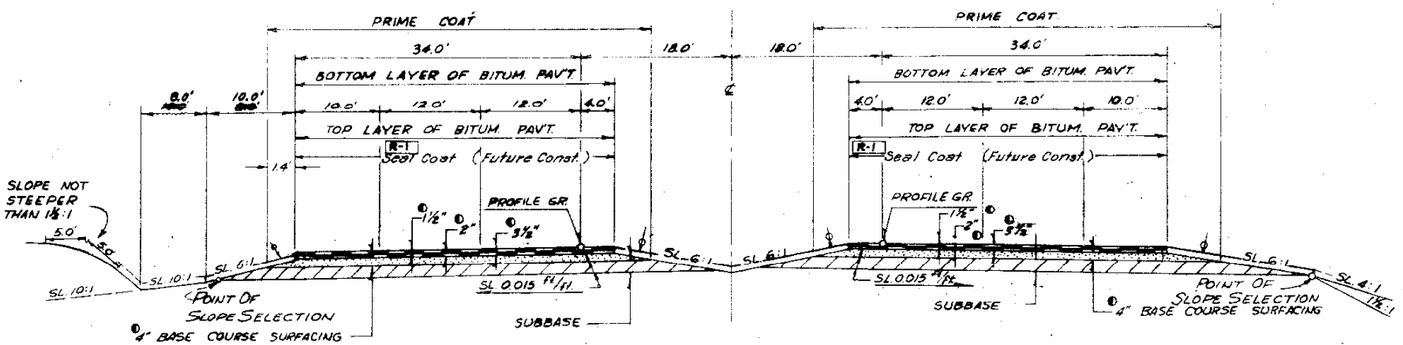
◐ APPROXIMATE THICKNESS

TRANSITION FROM NON-DEPRESSED TO DEPRESSED MEDIAN STA. 166+00 TO STA. 175+00

NOTE: TRENCH FOR PIPE UNDERDRAIN DETAIL SEE M 206-A

R-1 FUTURE CONSTRUCTION NOTE:
All construction above the Subgrade on the Main Line, Ramps & Service Road, will not be a part of this project. Main Line, Ramps & Service Road will be stabilized and paved as Future Construction.

STA. 175+00 to STA. 303+60



FILL SLOPES

"H"	CURVES	TANGENTS
4' OR LESS	6:1	6:1
4' to 10'	4:1	4:1
OVER 10'	▼3:1	▼3:1

▼ IN SPECIAL CASES SLOPE MAY BE STEEPER

AS CONSTRUCTED
REVISED
DATE DEC 2, 1972

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F058-1(2)	2	

R-1 REV. 12-29-70 W.E.M.

GENERAL NOTES

FOR PRELIMINARY PLAN QUANTITIES OF BITUMINOUS MATERIALS THE FOLLOWING RATES OF APPLICATION WERE USED:

PRIME COAT, (MC-70)	@	0.40	GALS. PER SQ. YD.
TACK COAT, EMUL. ASPH. (SS-1h)	@	0.10	GALS. PER SQ. YD.
BITUMINOUS PAVEMENT	@	110	LBS PER SQ. YD PER INCH

RATES OF APPLICATION SHALL BE AS DETERMINED BY THE ENGINEER AT TIME OF APPLICATION.

DEPTH OF MOISTURE-DENSITY CONTROL FOR THIS PROJECT SHALL BE AS FOLLOWS:
FULL DEPTH OF ALL EMBANKMENTS.
BASES OF CUTS 1 FOOT
BASES OF FILLS 1 FOOT
} EXCAVATION REQUIRED FOR COMPACTION OF BASES OF CUTS AND FILLS WILL BE CONSIDERED AS SUBSIDIARY TO THAT OPERATION AND WILL NOT BE PAID FOR SEPERATELY.

~~SEEDING AND MULCHING WILL BE REQUIRED WITHIN RIGHT OF WAY LIMITS ON ALL TEMPORARY AREAS FOR SEEDING. THE FOLLOWING SEEDS SHALL BE USED~~ R-1

COMMON NAME	BOTANICAL NAME	PERCENT PURITY	PERCENT GERMINATION	RATE PLS / ACRE	HAY MULCH
Smooth Brome	~~Bromus Inermis~~	~~85~~	~~90~~	~~6~~	~~1½ Tons per Acre~~
Russian Wildrye	Elymus Junceus	90	85	5	
Intermediate Wheatgrass	~~Agropyron Intermedium~~	~~90~~	~~85~~	~~5~~	
Crested Wheatgrass (Fairway Strain)	~~Agropyron Cristatum~~	~~90~~	~~85~~	~~4~~	
Blue Grama	Bouteloua Gracilis	35	60	1	

WHEN ORDERED BY THE ENGINEER, A TACK COAT (SS-1h) IS TO BE APPLIED BETWEEN PAVEMENT COURSES TO IMPROVE BOND.

R-1 Plain water shall be used as a dust palliative where required. Locations shall be as ordered.

EARTH SLOPES SHALL BE DISCED, OR ROUGHENED BY OTHER APPROVED METHODS FOR MULCHING OR EROSION PROTECTION.

ALL QUANTITIES ON PRELIMINARY PLANS ARE TO BE CONSIDERED APPROXIMATE ONLY.

WETTING (EMBANKMENT Std.) 40 GAL. PER CU YD.
WETTING (SUBBASE & BASE COURSE) 15 GAL. PER TON

ANY LAYER OF BITUMINOUS PAVEMENT THAT IS TO HAVE A SUCCEEDING LAYER PLACED THEREON SHALL BE COMPLETED FULL WIDTH BEFORE SUCCEEDING LAYER IS PLACED.

WATER LINES, SEWER LINES, GAS LINES, etc., as SHOWN ON PLAN AND PROFILE ARE PLOTTED FROM THE BEST AVAILABLE INFORMATION. THE CONTRACTOR'S ATTENTION IS DIRECTED TO PARAGRAPH 105.06 OF THE STANDARD SPECIFICATIONS CONCERNING UTILITIES.

MATERIAL ABOVE THE SUBGRADE IS TO BE CONSTRUCTED OF AGGREGATE MATERIAL AT LOCATIONS DESIGNATED IN THE SURFACING TABULATION. ESTIMATED QUANTITIES INVOLVED IN THIS OPERATION AND THICKNESS OF MATERIAL REQUIRED ARE TABULATED IN THE SURFACING MATERIAL PLAN.

TOPSOIL IS AVAILABLE WITHIN THE LIMITS OF CONSTRUCTION OF THIS PROJECT. CONTRACTOR SHALL STRIP, STOCKPILE AND PLACE ON SLOPES. NO SEPARATE PAYMENT WILL BE MADE FOR HAULING TOPSOIL. TOPSOIL WILL BE PLACED TO A MINIMUM THICKNESS OF 4 INCHES.

THE TYPE OF COMPACTION FOR STRUCTURE BACKFILL SHALL BE STANDARD.

R-1
Ski Type Device at least 30 Feet in length and Short Ski or Shoe shall be furnished with each bituminous paver equipped with an automatic control system.

R-1 Concrete pipe for this project shall be furnished with metal joint fasteners as shown on M Standard. Joint fasteners shall be installed on the last 3 connections at the outlet end of each culvert.

IT IS ESTIMATED THAT 1,000 HOURS OF FLAGGING FOR CONTROLLING TRAFFIC WILL BE REQUIRED FOR THIS PROJECT.

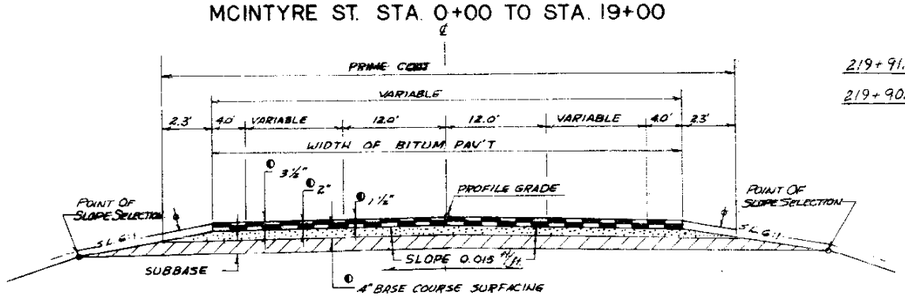
HENNINGSON, DURHAM & RICHARDSON
ENGINEERS PLANNERS CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

STATE OF COLORADO

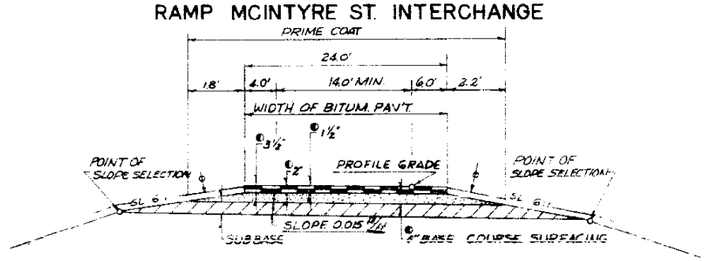
FEDERAL AID REGION NO	DISTRICT	PROJ NO	SHEET NO	TOTAL SHEETS
8	COLO.	F 058-1(21)	3	

AS CONSTRUCTED
REVISED DATE DEC 2, 1972 [R-1] Rev. 12-29-70 WEM

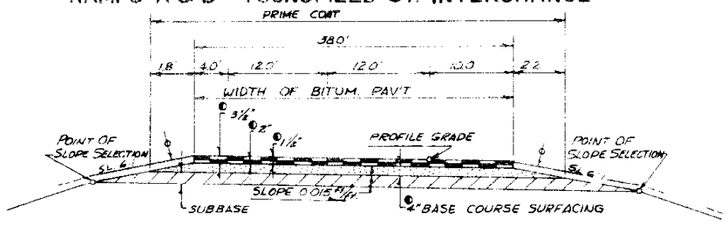
MCINTYRE ST. STA. 0+00 TO STA. 19+00



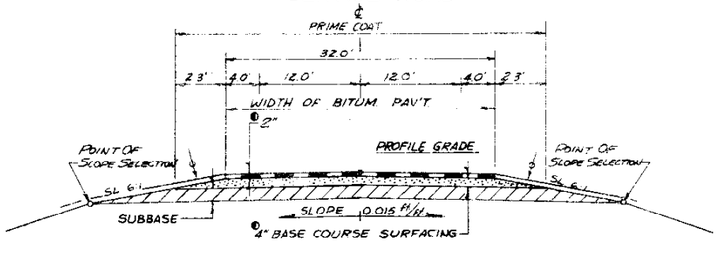
RAMP MCINTYRE ST. INTERCHANGE



RAMPS A & B YOUNGFIELD ST. INTERCHANGE



SERVICE ROAD



[R-1] TABULATION OF LENGTH AND DESIGN

219+91.84 BK
219+90.64 AH.

STATION	ROADWAY LIN. FT.	NO WORK SECTION LIN. FT.
141+00 BEG. F058-1(2)Ah=		
141+00 F032-1(10) Bk	431.59	
145+31.59		
149+15.42 } Str. No. E-16-HI		383.83
196+19.56 Bk. = } EQUA.	4,704.14	
197+00.35 Ah. } EQUA.	2,291.49	
~~218+76.3 Bk. =~~ } EQUA.	~~5,175.85~~	
218+70.6 Ah. } EQUA.	5,885.66	
308+97.40 END F058-1(2) =	3,026.80	
P.O.T. 298+09.86 I 70-3(47)271		
TOTALS	~~16,338.68~~ 16,339.68	383.83

SUMMARY

	LIN. FT.	MILES
ROADWAY LENGTH (NET)	~~16,338.68~~ 16,339.68	~~3.095~~ 3.096
NO WORK SECTION (STRUCTURE)	383.83	0.073
GROSS LENGTH PROJECT	~~16,722.51~~ 16,723.51	3.167

MAXIMUM DEGREE OF CURVE	3°00'
MINIMUM S.S.D. VERTICAL	>600'
MAXIMUM DESIGN SPEED	70 MPH
MAXIMUM GRADE	6.00%
MINIMUM S.S.D. HORIZONTAL	[R-1] 800'

1989 DESIGN TRAFFIC VOLUME { 11,480 ADT / 1,260 DHV

AS CONST. EARTHWORK QUANTITIES

EMBANKMENT MATERIAL (Haul & Compaction)	ROADWAY FED. AID C.Y. YD.	ROADWAY NON FED. AID C.Y. YD.	PROJECT TOTAL C.Y. YD.
Mainline 221+50 - 307+50	198,864		198,864
McIntyre St. 0+00 - 22+00	77,901	53,731	131,632
Channel Change 160+ - 162+	2,767		2,767
Pond Area Lt 161+	1,581		1,581
Grade Change NW Ramp	936		936
Staking Error NE Ramp	3,975		3,975
PROJECT TOTAL	286,024	53,731	339,755
Remove Muck (Haul)	40,405		
W.O. # 21470 Ramp To Revised Parcel 127		12,531	

NOTE: Quantities From Computer Output

SUMMARY OF EARTHWORK QUANTITIES

	ROADWAY FED. AID C.Y. YD.	ROADWAY NON FED. AID C.Y. YD.	PROJECT TOTAL C.Y. YD.
EMBANKMENT MATERIAL (Haul & Compaction)			
Replace Topsoil	22,300		22,300
From Cross Sections	387,825	51,171	~~438,996~~ 438,996
Ditch 160+ Estimated	500	—	500
Muck Removal	30,000	—	30,000
[R-1] PROJECT TOTAL	~~440,625~~ 440,625	51,171	~~491,796~~ 461,796
Remove Muck (Haul)	30,000		

Estimated 226,874 Cu. Yds. Excavation Available within Project Limits.

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS - PLANNERS - CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

SUMMARY OF APPROXIMATE QUANTITIES

AS CONSTRUCTED
REVISED DATE **DEC 2, 1972**

R-1 Rev. 12-29-70 W.E.M.
R-2 Rev. 1-7-71 W.E.M.

FEDERAL ROAD DESIGN NO	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
-	COLORADO	F 058-1(2)	4	

CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	ROADWAY	ROADWAY AS CONST.	ROADWAY (NON FED. AID)	ROADWAY AS CONST. (N.F.A.)	STR. NO. E-16-HQ	Str. *E-16-HQ AS CONST.	*COORS R-1 STR. (NON FED. AID)	COORS Str. AS CONST. (N.F.A.)	REFERENCE BOOK	REFERENCE PAGE	REFERENCE PLAN SHEET	PROJECT TOTALS	AS CONST.	+	−
201	Clearing and Grubbing	L.S.	•	•							1	7		•	•		
202	Removal of Structures and Obstructions	L.S.	•	•							1	9		•	•		
202	Removal of Fence	Lin. Ft.	9,100	8,850							1	11		9,100	8,850		250
203	Muck Excavation (Haul)	Cu. Yd.	30,000	40,405							1	15		30,000	40,405	10,405	
203	Embankment Material (Haul and Compaction)	Cu. Yd.	411,000	286,024	52,000	53,731					1	18		463,000	339,755		123,245
~~203~~	~~Embankment Material (Haul) and Compaction) W.O.# 21472~~	~~Cu.Yd.~~				12,531							N.F.A.		12,531	12,531	
206	Structure Excavation (Haul)	Cu. Yd.	4,500	3,501			210	210	1,530	1,524	1	22	23 N.F.A.	6,340	5,235		1,105
206	Structure Backfill (Class 2) (Haul) Deleted by W.O.# 05105	Cu. Yd.	350	0										350	0		350
206	Structure Backfill (~~Class 3~~) (Haul)	Cu. Yd.	670	1,242			40	40	1,170	1,162	1	28	29	1,880	2,444	564	
~~207~~	~~Topsoil (Haul) - Quantities From Connector Contract~~	~~Cu.Yd.~~	10,500	3,935	1,100	896					1	30	30 N.F.A.	~~14,600~~	~~4,831~~		~~6,765~~
~~208~~	~~Seeding~~ Deleted by W.O.# 21472	Acre	19	0	2	0								21	0		21
208	Mulching Deleted by W.O.# 21472	Acre	19	0	2	0								21	0		21
209	Wetting	M. Gal.	16,550	4,002	2,120	436					1	39	40	18,670	4,437		14,233
304	Aggregate Base Course (Class 1) (Haul)	Ton	7,000	6,705.26	3,700	3,452.81					1	41	42	10,700	10,158.06		541.94
304	Aggregate Base Course (Class 6) (Haul)	Ton	1,600	2,206.56	900	977.82					1	43	44	2,500	3,184.38	684.38	
403	Hot Bituminous Pavement (Grading E) (Haul and Asphalt)	Ton	1,600	1,249.20	800	811.74					1	45	46	2,400	2,060.94		339.06
411	Emulsified Asphalt (SS-1H)	Gal.	900	175	400	0					1	47		1,300	175		1,125
411	Liquid Asphaltic Material (MC-70)	Gal.	3,400	1,044	1,500	853					1	49		4,900	1,897		3,003
412	Concrete Pavement (10 Inch)	Sq.Yd	409	409	347	347					1	51	52	756	756		
503	Drilled Caissons (36 Inch) (~~440.4 Lin.Ft. @ Bid Price + 15%~~)	Lin. Ft.					746	**764.50	738	744.40	1	53	55	1,484	1,508.90	24.90	
507	Concrete Slope and Ditch Paving (Reinforced)	Cu Yd	0	24.7			227	~~135.35~~ 135.25	208	~~288.08~~ 283.34	1	56	60	435	~~423.34~~ 418.59	~~138.5~~ 134.24	
R-2 509	Structural Steel	Lb.							453,500	453,425	1	61		453,500	453,426		74
R-2 509	Structural Steel (Galvanized)	Lb.					6,300	15,630	18,900	18,883	1	62		25,200	34,513	3,313	
512	Bronze Bearing Plates	Lb.							846	846	1	63		846	846		
516	Dampproofing (Linseed Oil)	Sq. Yd.					2,450	2,442	2,720	2,712	1	64		5,170	5,154		16
518	Bridge Compression Joint Sealer (Type A)	Lin. Ft.							82	82	1	66		82	82		
R-1 601	Concrete Class A 102 Cu Yds Deleted by W.O.# 21456	Cu. Yd.	102	0			40	39.91	186	220.42	1	68	69	328	260.33		67.67
R-2 601	Concrete Class D	Cu. Yd.					1,203	1,202.83	762	726.12	1	71		1,965	1,928.95		36.05
602	Reinforcing Steel 8,855 Lbs Reinforcing Steel Deleted by W.O.# 21456	Lb	28,100	19,240	16,500	16,460	438,300	453,553	231,000	230,613	1	74	75	713,900	719,866	5,966	
603	12 Inch Vitrified Clay Pipe, Extra Strength	Lin.Ft.	20	30							2	7		20	30	10	
603	15 Inch Reinforced Concrete Pipe	Lin.Ft.	536	645							2	9		536	646	109	
R-1 603	18 Inch Reinforced Concrete Pipe	Lin.Ft.	1,902	2,870							2	13		1,902	2,870	968	
603	24 Inch Reinforced Concrete Pipe	Lin.Ft.	450	290							2	17		450	290		160
603	36 Inch Reinforced Concrete Pipe W.O.# 21456	Lin.Ft.	0	386							2	19		0	386	386	
603	15 Inch Reinforced Concrete End Section	Each	10	8							2	21		10	8		2
R-1 603	18 Inch Reinforced Concrete End Section	Each	10	24							2	23		10	24	14	
603	24 Inch Reinforced Concrete End Section	Each	3	1							2	25		3	1		2
604	Inlet Type C (5 Foot)	Each	10	19							2	27		10	19	9	
604	Inlet Type C (10 Foot)	Each	4	2							2	30		4	2	2	2
~~603~~	~~36 Inch Reinforced Concrete End Section - W.O.# 21456~~	~~Each~~	~~0~~	~~2~~							2	32		~~0~~	~~2~~	~~2~~	~~2~~
604	Inlet Type C (15 Foot)	Each	2	1							2	33		2	1		1
605	8 Inch Perforated Corrugated Steel Pipe Deleted by W.O.# 05105	Lin.Ft.	840	0										840	0		840

* THE DIVISION OF HIGHWAYS TO BE REIMBURSED BY COORS CO. FOR THIS WORK.

SUMMARY OF APPROXIMATE QUANTITIES

AS CONSTRUCTED
REVISED DATE DEC 2, 1972

R-1 Rev 12-29-70 W.E.M.
R-2 Rev 1-7-71 W.E.M.

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F 056-1(2)	5	

CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	ROADWAY	ROADWAY AS CONST.	ROADWAY (NON FED. AID)	ROADWAY AS CONST. (N.F.A.)	STR. NO. E-16-HQ	Str. "E-16-HQ AS CONST.	*COORS STR. (NON FED. AID)	COORS Str. AS CONST (N.F.A.)	REFERENCE BOOK	REFERENCE PAGE	REFERENCE PLAN SHEET	PROJECT TOTALS	AS CONST.	+	—
606	Guard Rail Type 3	Lin.Ft.	1,400	914	1,080	1,050					2	39		2,480	1,964		516
607	End Post (Chain Link)	Each	7	12							2	42		7	12	5	
607	Corner and Line Brace Post (Chain Link)	Each	68	98							2	43-46		68	98	30	
607	Fence Chain Link	Lin.Ft.	30,460	29,772							2	47-53		30,460	29,772		688
609	Curb and Gutter Type 2 (Section IIB)	Lin.Ft.	1,740	1,765							2	54		1,740	1,765	25	
612	Delineator (Type I)	Each	7	4	2	2					2	55 (N.F.A. 56)		9	6		3
612	Delineator (Type II)	Each	21	3							2	56		21	3		18
612	Delineator (Type III)	Each	2	2	2	2					2	58	58	4	4		
R-1 613	1-1/2 Inch Electrical Conduit	Lin.Ft.					420	500			2	60		420	500	80	
614	Flagging	Hour	1,000	1,764							2	62		1,000	1,764	764	
R-1 614	Barricade (Class I-Type M-1)	Each	4	2							2	64		4	2		2
R-1																	
R-1																	
R-1																	
R-2																	
R-2																	
R-2																	
621	Maintenance of Detour	L.S.	Prorated		Prorated						2	66 [illegible]		•			
626	Mobilization	L.S.	•								2	68		•			
	FORCE ACCOUNT																
R-1	On-The-Job-Training	L.S.	•											•			
	STATE FORCES																
	Furnishing and Installing Identification Sign	Each	4	4							2	69		4	4		
	NON FEDERAL AID																
R-2 613	4 Inch Electrical Conduit (To be Reimbursed by Mountain Bell)	Lin.Ft.					1,590	1,516	1,460	1,836	2	61		3,050	3,352	302	

* THE DIVISION OF HIGHWAYS TO BE REIMBURSED BY COORS CO. FOR THIS WORK.

STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS – STATE OF COLORADO
FORM D.O.H. 126
JULY 1966

AS CONSTRUCTED
REVISED DATE DEC 2, 1972

TABULATION OF DRAINAGE & LIST OF STRUCTURES

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F 058-1(2)	6	

R-1 Rev. 12-23-70 WEM

BOOK	PAGE	SHEET	LOCATION	TYPE	HEIGHT	ELEVATION RIM	ELEVATION INVERT	ITEM 605 PERFORATED CORRUGATED STEEL PIPE – SIZE & LENGTH (#)	ITEM 603 (R-1) CONC. CULV. PIPE SIZE & LENGTH 15"	18"	24"	36" (W.O. 21456)	~~CBC~~	V.C.P. 12"	HEIGHT	STR. EXC. CU. YDS.	STR. B'K'F'LL. CLASS 3 CU. YDS.	STR. B'K'F'LL. CLASS 2 CU. YDS.	RESET RIPRAP * CU. YDS.	REINF. STEEL LBS.	CLASS A CONC. CU. YDS.	FLOW LINE ELEVATIONS IN	FLOW LINE ELEVATIONS OUT	FITTINGS ANGLE BENDS	FITTINGS (R-1) CONC. END SECTION	LINE FROM	LINE TO	▲ % GRADE	MISCELLANEOUS
																													▲ Grades include End Sections
			175+00 ~~173+50 ℄~~	C ~~C~~	2.9 ~~3.0'~~	82.77 ~~83.00~~	80.42 ~~80.50~~		71.4 ~~66'~~						3.3 ~~6~~	40.8 ~~52~~	16.9 ~~9~~					80.42 ~~80.50~~	78.86 ~~80.30~~		1-15"	175 ~~173~~	End Sect.	2.00 ~~0.29~~	* To be included in Bid price for Culvert Pipe.
			183+00 ℄	C	2.3 ~~3.0'~~	71.06 ~~70.50~~	69.23 ~~63.00~~			169.2 ~~170'~~					5.0 ~~12~~	141.8 ~~218~~	42.2 ~~27~~		/			69.23 ~~63.00~~	58.10 ~~53.00~~			183	Creek	11.00 & 1.20 ~~5.88~~	
			191+00 ~~℄~~ Lt.-Rt.	C	3.6 ~~7.50'~~	57.12 ~~56.80~~	54.00 ~~42.30~~	~~840~~	~~36'~~	194.4 ~~190'~~					7.4 ~~16~~ ~~35~~	241.0 ~~315~~ ~~43~~ ~~23~~ ~~1,728~~	48.5 ~~27~~ ~~8~~	~~342~~	/			54.00 ~~42.30~~ ~~57.00~~	44.59 ~~40.50~~ 54.00		1-15"	191 End Sect.	Creek 191	1.00 & 6.00 ~~1.02~~ ~~5.17~~	Deleted W.O. #05105
																						~~SEE PLANS FOR LOCATION~~							
			198+12 Rt. 198+12 Med. ~~200+00 ℄~~	C C ~~C~~	8.5 11.2 ~~7.5'~~	47.60 50.71 ~~48.50~~	39.60 39.99 ~~41.50~~			178.7 ~~170'~~					~~8.5~~	320.8 ~~198~~	44.6 ~~27~~		/			39.99 ~~41.50~~	39.00 ~~40.00~~			198 ~~200~~	Creek	0.64 ~~0.88~~	
			208+00 Lt.-Rt. ~~210+50 ℄~~	C ~~C~~	7.5 ~~8.0'~~	40.83 ~~38.00~~	33.87 ~~30.50~~				92.1 ~~136'~~				8.2 ~~8~~	455.7 ~~163~~	98.0 ~~34~~					38.00 ~~33.00~~	33.87 ~~30.50~~		1-24"	End Sect.	208 ~~210~~	1.00 ~~1.92~~	
											192.9 ~~194'~~				~~9~~	~~257~~	~~41~~		/			33.87 ~~30.50~~	27.86 ~~28.00~~			208 ~~210~~	Creek	1.00 & 3.90 ~~1.44~~	
			218+93 Lt. ~~219+00 ℄~~	C ~~C~~	3.4 ~~10.50'~~	34.67 ~~35.00~~	31.81 ~~25.00~~		66.5 ~~68'~~						4.7 ~~10~~	48.9 ~~70~~	14.5 ~~9~~					31.81 ~~32.00~~	31.48 ~~25.00~~		~~1-15"~~	219 B ~~End Sect~~	219	0.50 ~~10.94~~	
			218+93 ℄	C	3.7	34.73	31.51			308.4 ~~300'~~					4.4 ~~8~~	592.1 ~~750~~	201.9 ~~96~~					31.51 ~~35.00~~	22.00 ~~23.80~~			218+93 ~~219~~	227+00 ~~225~~	1.28 & 0.90 ~~0.20~~	
			218+93 Rt.	C	3.4	34.67	31.81		67.8						4.7	49.0	14.6					31.81	31.48			219A	219	0.57	
			~~219+00 Rt~~	~~C~~	~~3.50~~	~~28.50~~	~~25.50~~		~~88'~~						~~11~~	~~779~~	~~72~~					~~25.50~~	~~25.00~~						
			~~225+00 ℄~~ 227+00 ℄	~~C~~ C	~~4.7'~~ 3.6	~~28.00~~ 28.12	~~23.80~~ 22.01			~~82'~~ 61.9 59.0 ~~86'~~					~~5~~ 3.0 3.0 ~~5.5~~	~~41~~ ~~22~~	~~70~~ ~~11~~					~~25.20~~ 24.26 22.01 ~~23.80~~	~~23.80~~ 22.01 20.70 ~~22.60~~		1-18"	End Sect. 227 ~~225~~	~~225~~ 227 227A ~~225A~~	~~3.08~~ 2.10 2.10 ~~7.97~~	
			227+00 Rt.	C	4.8	25.00	20.70			168.7						151.5	75.0					20.70	17.11		1-18"	227A	End Sec.	2.10	
			~~225+00 Rt~~	~~C~~	~~3.5~~	~~25.50~~	22.50			~~202'~~					~~17~~	~~151~~	~~33~~					~~22.50~~	~~18.30~~			~~225A~~	~~Creek~~	~~2.04~~	
			230+00 Lt. 236+45 Lt. & Rt. 235+52 Lt.	C C	2.5 ~~3.0'~~ 4.3	21.00 ~~21.00~~ 12.13	19.00 ~~18.50~~ 08.34		41.6 ~~42'~~	149.7				30 ~~20'~~	2.7 ~~2~~ 2.9	28.4 ~~75~~ 79.3	10.4 ~~5~~ 40.3					19.00 ~~18.50~~ 09.30	18.60 ~~18.00~~ 07.15		1-15" 2-18"	230B End Sect.	End Sect. End Sect.	1.04 1.29	
			~~240+00 ℄~~	~~C~~	~~4.00~~	~~08.00~~	~~04.50~~			~~86'~~					~~4~~	~~5~~	~~77~~					~~04.50~~	~~04.00~~		~~1-18"~~	~~240~~	~~End Sect~~	~~0.71~~	
			236+45 Rt. Ser. Rd.		CROSS	DRAIN				68.7					2.7	37.8	20.3					07.10	06.60		2-18"	End Sect.	End Sect.	0.68	
			245+05 Lt.-Rt.	C	2.90	03.45	01.07			132.8					5.4	132.4	36.0					01.50	00.50		2-18"	End Sect.	End Sect.	0.68	
			~~242+00 Lt-Rt~~		~~CROSS~~	~~DRAIN~~					~~140'~~				~~5~~	~~29~~	~~37~~					~~01.80~~	~~01.00~~		~~2-24"~~	~~End Sect~~	~~End Sect~~	~~0.49~~	
			245+05 Rt. Ser. Rd.		CROSS	DRAIN				68.3					3.6	30.7	20.2					00.50	99.60		2-18"	End Sect.	End Sect.	1.15	
			~~250+00 ℄~~	~~C~~	~~5.5~~	~~00.00~~	~~95.00~~			~~80'~~					~~6~~	~~23~~	~~73~~					~~95.00~~	~~94.50~~		~~1-18"~~	~~250~~	End Sect.	~~0.59~~	
			252+40 Lt.-Rt.	C	2.8	97.94	95.62			139.2					4.7	120.2	37.6					97.30	93.50		2-18"	End Sect.	End Sect.	2.467	
			252+40 Rt. Ser. Rd.		CROSS	DRAIN				68.5					3.6	50.3	20.2					93.50	93.00		2-18"			0.625	
			~~250+00 Rt~~		~~CROSS~~	~~DRAIN~~				~~70'~~					~~4~~	~~30~~	~~72~~					~~94.50~~	~~94.00~~		~~2-18"~~	End Sect.	~~End Sect~~	~~0.66~~	
			261+00 Lt.-Rt.	C	2.8	90.94	88.64			154.1					2.5	95.4	41.4					90.52	85.77		2-18"	End Sect.	End Sect.	3.19 & 2.54	
			~~260+00 ℄~~	~~C~~	~~5.0'~~	~~92.70~~	~~88.20~~			~~76'~~					~~6~~	~~6~~	~~12~~					~~88.20~~	~~85.50~~		~~1-18"~~	~~260~~	~~End Sect~~	~~3.56~~	
			261+00 Rt. Ser. Rd.		CROSS	DRAIN				68.6					2.5	34.9	20.2					85.70	84.60		2-18"	End Sect.	End Sect.	1.45	
			~~267+00 ℄ Rt~~	~~C~~	~~4.5~~	~~84.00~~	~~80.00~~			~~54'~~					~~4~~	~~93~~	~~70~~					~~82.50~~	~~80.00~~		~~1-18"~~	~~End Sect~~	~~267~~	~~4.00~~	
			268+50 Lt.-Rt.	C	2.8	81.70	79.45			137.2					3.7	93.4	37.1					82.60	78.45		2-18"	End Sect.	End Sect.	1.25 & 4.67	
										~~66'~~					~~5~~	~~44~~	~~11~~					~~80.00~~	~~79.00~~		~~1-18"~~	~~267~~	~~End Sect~~	~~1.98~~	
			~~267+00 Rt~~		~~CROSS~~	~~DRAIN~~				~~50'~~					~~3~~	~~20~~	~~9~~					~~79.00~~	~~78.00~~		~~2-18"~~	~~End Sect~~	~~End Sect~~	~~1.67~~	
			268+50 Rt. Ser. Rd.		CROSS	DRAIN				49.2					2.5	24.8	14.1					78.40	78.00		2-18"	End Sect.	End Sect.	0.74	
			273+31 Lt. & Rt.		40°	SKEW						386.0			Sheet #32AX	399.0	241.0					72.62	71.50		2-36"	End Sect.	End Sect.	0.28	W.O. 21456
			~~276+45 Lt-Rt~~		~~5'x4'~~	~~CONCRETE~~	~~BOX~~	~~CULVERT~~					~~106'~~			~~346~~	~~162~~			~~8,855~~	~~102~~	~~72.80~~	~~71.60~~					~~0.72~~	Deleted W.O. #31836
			~~274+00 ℄~~	~~C~~	~~2.5'~~	~~75.00~~	~~73.00~~		~~56'~~						~~3~~	~~9~~	~~9~~					~~73.00~~	~~72.50~~		~~1-15"~~	~~274~~	~~End Sect~~	~~0.94~~	
			276+00 Lt.-Rt.	C	2.6	72.40	70.90		127.0						3.0	66.7	30.4					70.90	70.10		2-15"	End Sect.	End Sect.	0.42 & 0.74	
			284+50 Rt.	C	2.5	61.00	59.00																						
			~~281+00 ℄~~	~~C~~	~~2.5'~~	~~66.00~~	~~64.00~~		~~60'~~						~~3~~	~~4~~	~~9~~					~~64.00~~	~~63.60~~		~~1-15"~~	~~281~~	~~End Sect~~	~~0.29~~	
			284+50 Lt. & Rt. 45° Skew	C	2.9	61.93	59.53			177.8					3.7	130.8	52.3					60.01	58.68		2-18"	End Sect.	End Sect.	0.65	
			292+00 Lt.-Rt.	C	2.3	56.12	54.12		132.9						2.6	60.2	31.7					54.30	53.93		2-15"	End Sect.	End Sect.	0.26	
			~~288+00 Lt~~		~~CROSS~~	~~DRAIN~~			~~50'~~						~~2.5~~	~~4~~	~~9~~					~~58.50~~	~~57.00~~		~~2-15"~~	~~End Sect~~	~~End Sect~~	~~2.29~~	
			~~97+75 Rt~~		~~CROSS~~	~~DRAIN~~			~~54'~~						~~3~~	~~4~~	~~9~~					~~50.00~~	~~49.00~~		~~2-15"~~	~~End Sect~~	~~End Sect~~	~~1.52~~	
			300+00 Rt.	C	2.5	51.46	49.46		66.2						2.8	32.3	15.8					49.46	48.38		1-15"	300	End Sect.	1.50	
			~~PROJECT TOTALS~~					~~840~~	~~356~~	~~1,902~~	~~450~~		~~106~~	~~20~~		~~4,698~~	~~663~~	~~342~~	~~4~~	~~8,855~~	~~102~~				[illegible]				
			As Constructed Totals						644.6	2869.5	290.0	386.0		30		3,501.3	1,242.1								(2-36" W.O. 21456)				

Note: Unclassified Excavation required to fill trench area to original ground or Subgrade line shall be included in contract unit bid price per lin. ft. of pipe. All connecting bands and connections shall be included in the cost of the pipe.

INLETS TYPE C
(5 Foot) 19
(10 Foot) 2
(15 Foot) 1

STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS — STATE OF COLORADO
FORM 0.D.H. 126
JULY 1968

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F058-1(2)	7	

(R-1) Deleted R.O.W. Markers 12-29-70 W.E.M.

AS CONSTRUCTED
REVISED DATE DEC 2, 1972

TABULATION OF SURFACING

STATION	STATION	LENGTH	AGGREGATE BASE COURSE **CLASS 1		AGGREGATE BASE COURSE *CLASS 6		HOT BITUMINOUS PAVEMENT *GRADING "E"		LIQUID ASPHALTIC MATERIAL (MC-70)		EMULSIFIED ASPHALT (SS-1h)	
			AS CONST.	TONS	AS CONST.	TONS	AS CONST.	TONS	AS CONST.	GALS.	AS CONST.	GALS.
McIntyre St. 0+00	7+79.50	779.50	3452.81 *	3,624 ***	977.82 **	865 ***	811.74 **	737 ***	853 **	1,415 ***	0	383 * *
7+79.50	21+27.97	1,348.47	6,349.50	6,554	1,560.16	1,343	1,249.20	1,597	1,044	3,372	175	829
Sta 142+	Approch	Slab 3	355.75	400	646.40	200						
TOTALS			10,158.06	10,578	3,184.38	2,408	2,060.94	2,334	1,897	4,787	175	1,212

* Subbase Estimated at 14 Inch Thickness
** Non-Federal Aid
* Includes Haul
* Includes Haul and Asphalt

TABULATION OF GUARD RAIL

STATION to STATION	~~SIDE~~ AS CONST.	TYPE 3	TYPE 5	RESET GUARD RAIL TYPE 3
		LIN. FT.	LIN. FT.	LIN. FT.
McIntyre Street NON FED. AID	914	1,400 *		
	1,050	*1,080 *		
PROJECT TOTALS		2,480		
* 12'-6" Spacing				
* Non-Federal Aid				
AS CONST. TOTALS		1,964		

TABULATION OF DELINEATORS

LOCATION	SIDE	TYPE I EACH	TYPE II EACH	TYPE III EACH
McIntyre Street		*6 ~~*9~~	3 ~~*4~~	*4
PROJECT TOTALS		~~*6~~	~~*7~~	~~*4~~
* 2-Type I, and 2-Type III Delineators Non-Federal Aid				
AS CONST. TOTALS		*6	3	*4

TABULATION OF FENCING

STATION to STATION	SIDE	REMOVE FENCE	BUILD CHAIN LINK FENCE	CORNER & LINE BRACE POST CHAIN LINK	END POSTS CHAIN LINK
		LIN. FT	LIN. FT.	EACH	EACH
146+60 to 155+00	Rt.		730	1	1
149+75 to 155+00	Lt.		520		1
155+00 to 170+00	Rt.		1,500	4	
155+00 to 170+00	Lt.		1,510	5	
170+00 to 185+00	Rt.		1,530	4	
170+00 to 185+00	Lt.		1,490	5	
185+00 to 200+00	Rt.		1,409	3	
185+00 to 200+00	Lt.		1,450	4	
200+00 to 210+50	Rt.		1,060	2	
200+00 to 210+50	Lt.		1,065	2	
210+50 to 230+00	Lt.		2,343	6	2
210+50 to 230+00	Rt.		1,050	1	1
~~230+00 to 238+83~~	~~Rt.~~	~~1,863~~			
230+00 to 245+00	Lt.		1,510	3	
230+00 to 245+00	Rt.		1,500	4	
232+50 to 238+83	Rt-Lt.	1,011			
245+00 to 260+00	Lt.		1,500	5	
245+00 to 260+00	Rt.		1,500	4	
243+98 to 271+00	Rt-Lt.	2,557			
260+00 to 275+00	Lt.		1,532	4	
260+00 to 275+00	Rt.		1,505	3	
271+00 to 290+	Rt-Lt.	3,581			
275+00 to 290+10	Lt.		1,510	4	
275+00 to 290+10	Rt.		1,510	3	
291+34.51 to 304+30	Lt.		1,360	2	1
89+24.52 to 102+80	Rt.		1,365	1	1
PROJECT TOTALS		9,012	30,451	68	7
AS CONST. TOTALS		8,850	29,772	98	12

TABULATION OF APPROACH SLABS

STRUCTURE NO.	NUMBER OF SLABS	WIDTH FT.	SKEW	10" CONCRETE PAVEMENT SQ. YDS.	REINFORCING STEEL LBS.
E-16-HQ	4	39	10°20'30"	408.4 ✓	19,240 ✓
McIntyre St.- Clear Creek	4	39	0°	346.8 * ✓	16,460 * ✓
AS CONST. PROJECT TOTALS				755.2	35,700
* Non-Federal Aid				~~346.8 *~~	~~16,460 *~~
AS CONST. TOTALS				~~409.0~~	19,240
PROJECT TOTALS				~~755.8~~	35,700

TABULATION OF RIGHT OF WAY MARKERS

(R-1)

STATION	SIDE	EACH
196+19.56 BL	Rt-Lt.	2
233+00	Rt-Lt.	2
257+23.07	Rt-Lt.	2
259+19.77	Rt-Lt.	2
290+10 BL	Rt-Lt.	2
297+49.8	Rt-Lt.	2
PROJECT TOTAL		12

△DETOUR QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	AMOUNT	AS CONST.
203	Embankment Material (Haul & Compaction)	Cu. Yd.	11,000	L.S.
209	Wetting	M.Gal.	480	L.S.
304	Aggregate Base Course (Class 6)(Haul)	Ton	2,168	L.S.
403	Hot Bituminous Pavement (Grading E)(Haul & Asph.)	Ton	684	L.S.
411	Liquid Asphaltic Material (MC-70)	Gal.	3,318	L.S.

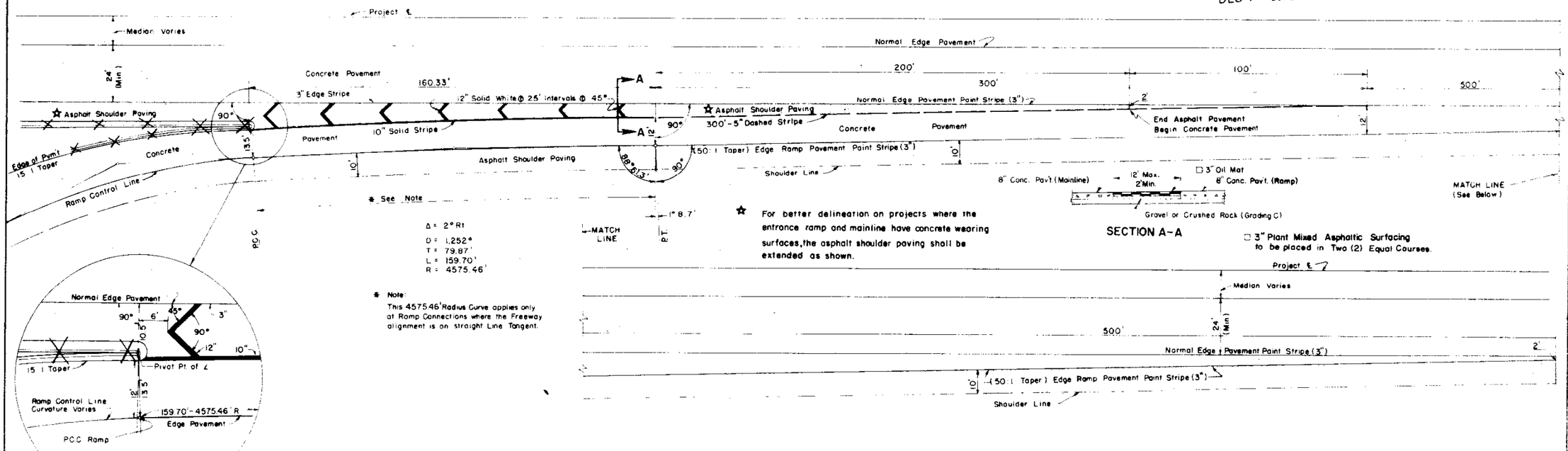
△ Detour Quantities to be Paid for under Pay Item 621 Maintenance of Detours (Lump Sum).

TYPICAL ENTRANCE RAMP MERGING DETAIL

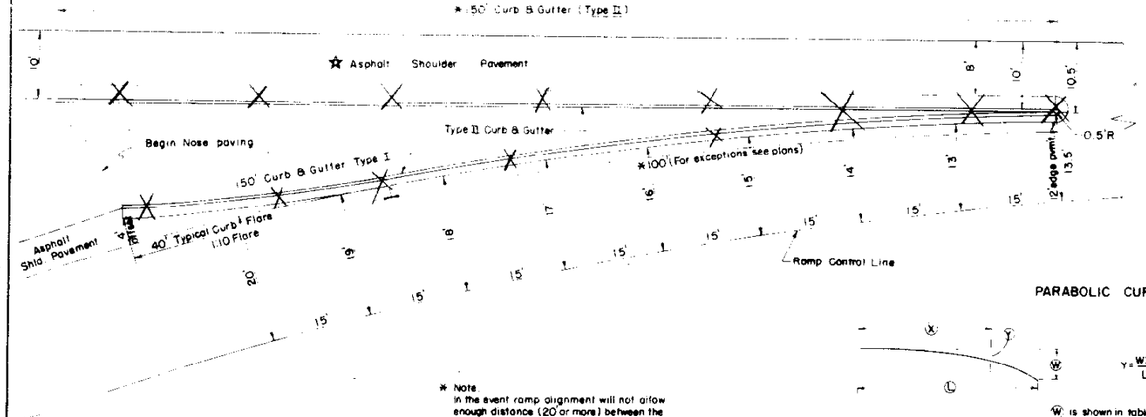
SCALE OF ORIGINAL DRAWING 1"=20'

AS CONSTRUCTED
NO REVISIONS DATE DEC 7 1972

FEDERAL ROAD REGION NO.	DISTRICT	PROJ NO	SHEET NO	TOTAL SHEETS
9	COLORADO	F 058-1 (2)	8	

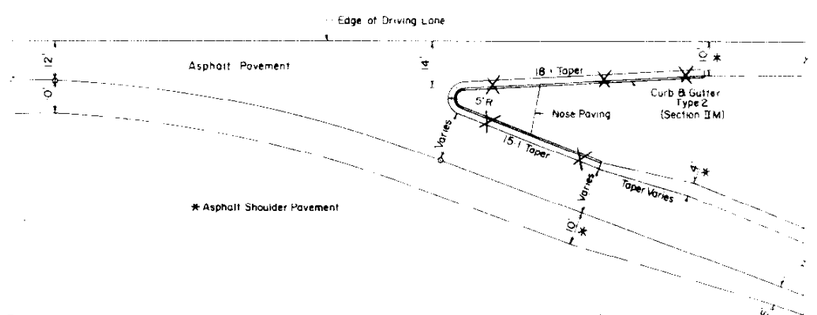


Typical One Lane Entrance Ramp to Freeway



* Note
In the event ramp alignment will not allow enough distance (20' or more) between the pavement edges of the main highway and the ramp to accomodate typical curbed flares, the curb and gutter will be lengthened along tangent to facilitate typical flared requirements as per table shown on this sheet

Typical One Lane Exit Ramp from Freeway



PARABOLIC CURB FLARES

$Y = \frac{Wx^2}{L^2}$

(L) = Length of flare in feet.
(W) = Maximum offset in feet
(X) = Distance along control line in feet.
(Y) = Offset from control line in feet.

(W) is shown in table thus 4.00

Length of Flare (L) \ Distance (X)	10	20	30	40	45	50	60	70	75	80	90	100	110	120	130	140	150
OFFSET IN FEET FOR GIVEN X DISTANCE																	
1.10 Flares																	
40	0.25	1.00	2.25	4.00													
60	0.17	0.67	1.47	2.67		4.17	6.00										
1.15 Flares																	
150	0.04	0.18	0.40	0.72		1.11	1.60	2.18		2.84	3.60	4.44	5.38	6.40	7.51	8.72	10.00

Use 1.10 Flare when approach speed is 60 mph or less
Use 1.15 Flare when approach speed is more than 50 mph

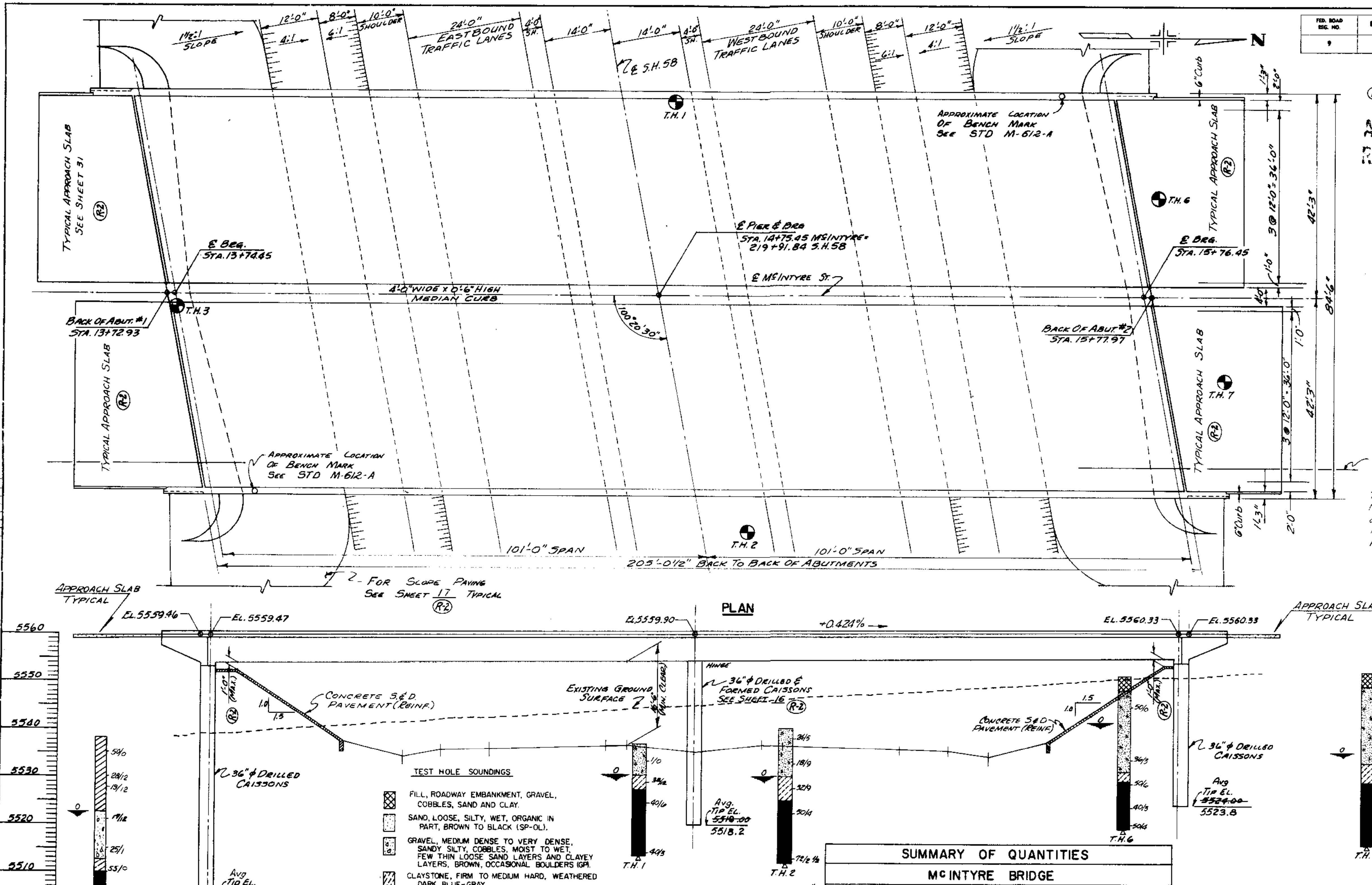
NOTE: All References to Concrete Pavement, Curb and Gutter do not apply to this Contract.

REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1 (2)	9	

(R-2) REVISED QUANTITIES TCF 1-7-71

AS CONSTRUCTED REVISED DATE 1972



TEST HOLE SOUNDINGS

- FILL, ROADWAY EMBANKMENT, GRAVEL, COBBLES, SAND AND CLAY.
- SAND, LOOSE, SILTY, WET, ORGANIC IN PART, BROWN TO BLACK (SP-OL).
- GRAVEL, MEDIUM DENSE TO VERY DENSE, SANDY SILTY, COBBLES, MOIST TO WET. FEW THIN LOOSE SAND LAYERS AND CLAYEY LAYERS, BROWN, OCCASIONAL BOULDERS (GP).
- CLAYSTONE, FIRM TO MEDIUM HARD, WEATHERED DARK BLUE-GRAY.
- CLAYSTONE, HARD TO VERY HARD DARK BLUE-GRAY.
- 50/0 INDICATES THAT 50 BLOWS OF A 140 POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2-INCH DIAMETER SAMPLER 0 INCHES.
- FREE WATER LEVEL & NUMBER OF HOURS AFTER DRILLING THAT MEASUREMENT WAS TAKEN.

NOTE: CAISSONS DESIGNED FOR 40,000 p.s.f. END BEARING AND 3000 p.s.f. SIDE SHEAR FOR THE PORTION OF THE CAISSON IN HARD TO VERY HARD DARK BLUE-GRAY CLAYSTONE.
DRILL CAISSONS MINIMUM OF 5'-0" INTO VERY HARD CLAYSTONE AT ABUTMENTS & 6'-0" INTO VERY HARD CLAYSTONE AT PIER.

① Non-Federal Aid: Mountain States Tel & Tel Company To Reimburse The Colorado Division of Highways For This Work. All work Necessary To Accomplish This Item Shall Be Incl. In The Bid Price for Item 613 4" Elec. Cond.

SUMMARY OF QUANTITIES

McINTYRE BRIDGE

Book #1	ITEM	DESCRIPTION	UNIT	Super Struct.	Abut. #1	Pier #1	Abut #2	Total
Page 22	206	Structure Excavation (Haul)	Cu Yd		105		105	210
28	206	Structure Backfill, Cl. 3 (Haul)	Cu Yd		20	144.42	20	40
53-54	503	Drilled Caissons (36" dia.)	Lin Ft	195.05	~~381.32~~	~~120.00~~	~~236.20~~	~~745.52~~ 764.5
59-60	507	Conc. Slope & Ditch Pave. (Reinf.)	Cu Yd	~~226.58~~				~~226.58~~ 135.05
62	509	Structural Steel (Galv.)	Lbs	~~6,285~~	15,630		15,630	~~6,285~~
64	516	Dampproofing (Linseed Oil)	Sq Yd	2442				2442
68	601	Concrete Class "A"	Cu Yd		415,016	39.91		39.91
Book #2 71	601	Concrete Class "D"	Cu Yd	1057.53	54.25	36.80	54.25	1202.83 (R-2)
74	602	Reinforcing Steel	Lbs	~~398,716~~	4,100	30,337	4,100	~~433,253~~ 453,553
Pg 60	613	1½" Electrical Conduit	Lin Ft	~~410~~	500		500	~~410~~
61 ①	613	4" Electrical Conduit	Lin Ft	~~1590~~	1516		1516	~~1590~~ (R-2)

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

STRUCTURE NO. E-16-HQ

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

GENERAL LAYOUT

UNDER McINTYRE ST.
Sta. 219 + 91.84
Near GOLDEN Sec. 24 T. 3 S. R. 70 W.

Designed by R.E.R. | Approved by
Made by A.T.
Checked by W.A.S. | Date: 19

REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1 (2)	10	

(R-2) Rev. Notes D.J.S. 1-7-71

GENERAL NOTES

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

Concrete shall be Class "A" or Class "D".

All reinforcing steel shall be intermediate grade steel of a deformed type. Each bar shall be tagged with the bar designation and station number of the project.

Dimensions for reinforcing steel not shown as clear shall be to the centerline of the bar.

Soundings and depth of footings are in accordance with the best available data and when different conditions are encountered the Bridge Engineer will inspect and determine if redesign is necessary.

For details of structural excavation and structure backfill, see Standard M-206-A

All concrete surfaces marked with the symbol S as shown on Sht No. 29 (R-2) shall receive class "2" surface finish.

If by permission of the Engineer primary bars are spliced, they shall lap a minimum of 40 diameters for bars near the top of beams having more than 12 inches of concrete under the bars, and 24 diameters for bars near the bottom of members. Secondary bars when spliced shall lap 24 diameters of the bar.

All concrete chamfers to be ¾" unless otherwise noted.

All structural steel not otherwise noted shall be AASHO M-183.

All welding shall conform to the latest edition of the AWS Standard Specifications for welding highway bridges as amended.

Bolts shall be furnished in the amount of two percent in excess of the nominal number required for each size and length.

Girder shoring shall remain in place until slab has been poured and concrete has reached a minimum compressive strength of 2400 psi or 14 days lapsed time. All shoring shall be collapsed prior to opening bridge to traffic.

Shoring diagrams shall be furnished to the Engineer.

LOADING DATA:
Live Load = A.A.S.H.O. H S-20-44
Dead Load = Assumes 15 lbs. per sq. ft. additional wearing surface which includes the ½" concrete monolithic wearing surface shown

DESIGNING DATA:
A.A.S.H.O. 1965 unit stresses
Conc. f_c = 1,200 lbs. per sq. in., n-10
Reinf. Steel f_s = 20,000 lbs per sq. in.

BAR LISTS

PIER NO. 1				
MARK	SIZE	SHAPE	NO. REQ'D.	LENGTH
H 1101	11	——	80	5'-0"
P 1101	11	——	208	18'-11"
P 1001	10	——	24	37'-0"
P 401	4	2:12	151	9'-5"
P 801	8	——	4	37'-0"
P 501	5	——	12	37'-0"
P 402	4	2:9	152	16'-6"
ABUTMENT NO. 1 & 2				
A 501	5	——	40	37'-0"
A 901	9	——	24	37'-0"
A 401	4	2:8½	152	18'-5"
A 402	4	——	40	4'-3"
A 403	4	——	32	5'-3"
A 502	5	——	8	2'-3"
A 503	5	——	8	2'-6"
A 504	5	——	8	3'-0"
A 505	5	——	8	3'-3"
A 506	5	——	8	3'-6"
A 507	5	——	8	4'-0"
A 508	5	——	8	4'-3"
A 509	5	——	8	4'-9"
A 510	5	——	8	5'-0"
A 511	5	——	8	5'-3"
A 512	5	——	8	5'-6"
A 513	5	——	8	6'-0"
A 514	5	——	8	6'-3"
A 515	5	——	8	6'-6"
A 516	5	——	8	6'-3"
A 517	5	2:9	4	4'-0"
A 518	5	4'-3"	4	5'-6"
A 519	5	5'-0"	4	6'-9"
A 520	5	6'-9"	4	8'-0"
A 521	5	8'-0"	4	9'-3"
A 522	5	9'-3"	4	10'-6"
A 523	5	10'-2"	16	11'-5"
A 524	5	7'-6"	4	2'-9"

ABUTMENT NO. 1 & 2 (Con't)				
MARK	SIZE	SHAPE	NO. REQ'D.	LENGTH
A 525	5	18" / 10"	60	2'-11"
A 526	5	2:9	4	4'-0"
A 527	5	4'-3"	4	5'-6"
A 528	5	5'-6"	4	6'-9"
A 529	5	6'-9"	4	8'-0"
A 530	5	8'-0"	4	9'-3"
A 531	5	9'-3"	4	10'-6"
A 532	5	10'-6"	16	11'-5"
A 533	5	7'-6"	4	2'-9"
A 534	5	10"	4	4'-8"

DECK SLAB				
MARK	SIZE	SHAPE	NO. REQ'D.	LENGTH
S 501	5	——	8	7'-3"
S 502	5	——	8	10'-6"
S 503	5	——	8	12'-9"
S 504	5	——	8	14'-9"
S 505	5	——	8	17'-6"
S 506	5	——	8	20'-9"
S 507	5	——	8	23'-6"
S 508	5	——	8	26'-0"
S 509	5	——	8	29'-0"
S 510	5	——	8	32'-0"
S 511	5	——	8	34'-6"
S 512	5	——	8	38'-0"
S 513	5	——	8	40'-0"
S 514	5	——	1636	40'-6"
S 515	5	——	8	4'-0"
S 516	5	——	8	8'-0"
S 517	5	——	8	12'-0"
S 518	5	——	8	16'-0"
S 519	5	——	8	21'-0"
S 520	5	——	8	24'-6"
S 521	5	——	8	29'-0"

DECK SLAB (Con't)				
MARK	SIZE	SHAPE	NO. REQ'D.	LENGTH
S 522	5	——	8	33'-0"
S 523	5	——	8	35'-0"
S 524	5	——	988	36'-6"
S 525	5	——	72	11'-0"
S 526	5	——	360	40'-0"
S 527	5	——	300	40'-0"
S 528	5	——	60	11'-0"
S 542	5	10"	52	4'-8"
CW 401	4	11" / 11"	206	8'-7"
CW 402	4	——	20	40'-0"
CW 403	4	——	4	10'-0"
C 401	4	3'-6" / 10"	103	4'-4"
C 402	4	——	15	40'-0"
C 403	4	——	3	10'-0"
C 601	6	3'-6" / 3'-6"	205	4'-0"
B 401	4	2'-0" / 2'-6"	988	4'-0"
B 402	4	2'-6"	744	4'-3"

BAR LISTS

GIRDERS				
MARK	SIZE	SHAPE	NO. REQ'D.	LENGTH
G 401	4	——	240	40'-0"
G 402	4	——	96	8'-3"
G 403	4	5½" / 5½"	2,904	11'-11"
G 404	4	5" / 5"	160	12'-6"
G 405	4	——	144	3'-6"
G 501	5	——	32	36'-6"
G 801	8	——	72	60'-0"
G 802	8	——	48	18'-6"
G 1105	11	——	48	60'-0"
G 1101	11	——	48	20'-0"
G 1102	11	——	32	28'-0"
G 1103	11	——	32	38'-0"
G 1104	11	——	32	50'-0"
G 1105	11	——	112	60'-0"
G 1106	11	——	64	7'-0"
G 1107	11	——	48	22'-0"
G 1108	11	——	32	17'-0"
G 1109	11	——	24	35'-6"
G 1110	11	——	8	43'-0"
G 1111	11	——	8	50'-6"
G 1112	11	——	32	38'-0"
G 1113	11	——	32	50'-0"
G 1114	11	——	32	59'-0"
G 1115	11	——	32	60'-0"
G 1116	11	——	32	60'-0"

Plan error

GIRDERS (Con't)				
MARK	SIZE	SHAPE	NO. REQ'D.	LENGTH
G 1117	11	——	64	60'-0"
G 1118	11	——	16	41'-0"
G 1119	11	——	16	57'-9"
G 1120	11	——	16	60'-0"
G 1121	11	——	32	60'-0"
G 1122	11	——	32	17'-0"
G 1123	11	——	64	18'-6"
G 1124	11	——	32	10'-0"
G 1125	11	——	16	13'-9"
S 529	5	——	144	60'-0"
S 530	5	——	16	37'-0"
S 531	5	——	8	28'-0"
S 532	5	——	16	16'-0"
S 533	5	——	16	28'-0"
S 534	5	——	16	37'-0"
S 535	5	——	24	13'-6"
S 536	5	——	24	27'-0"
S 537	5	——	24	36'-0"
S 538	5	——	80	17'-0"
S 539	5	——	40	9'-6"
S 540	5	——	136	60'-0"
S 541	5	——	4	56'-0"
DRILLED CAISSONS FOR INFORMATION ONLY				
ABUTMENT NO. 1				
A 902	9	——	192	26'-11"
A 404	4	2:9	380	9'-5"
ABUTMENT NO. 2				
A 903	9	——	96	31'-9"
A 404	4	2:9	235	9'-5"
PIER				
P 1102	11	——	208	18'-6"
P 401	4	2:9	128	9'-5"
P 1102	11	——	26	13'-0"

BAR SUMMARY

PIER NO. 1

3,930	L.F. #4 @ 0.668 #/FT. =	2,625.2	#'s
444	L.F. #5 @ 1.043 #/FT. =	463.1	lb.
148	L.F. #8 @ 2.670 #/FT. =	395.2	lb.
888	L.F. #10 @ 4.303 #/FT. =	3,821.1	lb.
4,335	L.F. #11 @ 5.313 #/FT. =	23,031.9	lb.
	TOTAL PIER #1 =	30,336.5	lb.

ABUTS. NO. 1 & 2

3,137	L.F. #4 @ 0.668 #/FT. =	2,095.5	lb.
2,959	L.F. #5 @ 1.043 #/FT. =	3,086.2	lb.
888	L.F. #9 @ 3.400 #/FT. =	3,019.2	lb.
	TOTAL ABUTS #1 & #2	8,200.9	lb.

DECK SLAB

9,562	L.F. #4 @ 0.668 #/FT. =	6,387.4	lb.
134,327	L.F. #5 @ 1.043 #/FT. =	140,103.1	lb.
820	L.F. #6 @ 1.502 #/FT. =	1,231.6	lb.
	TOTAL DECK SLAB	147,722.1	lb.

GIRDERS

47,502	L.F. #4 @ 0.668 #/FT. =	31,731.3	lb.
23,880	L.F. #5 @ 1.043 #/FT. =	24,906.8	lb.
5,208	L.F. #8 @ 2.670 #/FT. =	13,905.4	lb.
34,152	L.F. #11 @ 5.313 #/FT. =	181,449.6	lb.
37,032	TOTAL GIRDERS	251,093.1	lb.
		267,294	

(R-2) Note:
Drilled Caisson Steel Is Not Included In Bar Summary. Price Of Drilled Caisson Steel To Be Included In Price Of Item 503.

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
REINFORCING BAR LIST
SUMMARY OF QUANTITIES
AND GENERAL NOTES
UNDER McINTYRE ST.
Sta. 219+91.84
Near GOLDEN Sec. 24 T. 3S R. 70W

Designed by R.E.R.	Approved by
Made by D.A.S	
Checked by W.A.S	Date: 19

STRUCTURE NO. E-16-HQ

REVISIONS

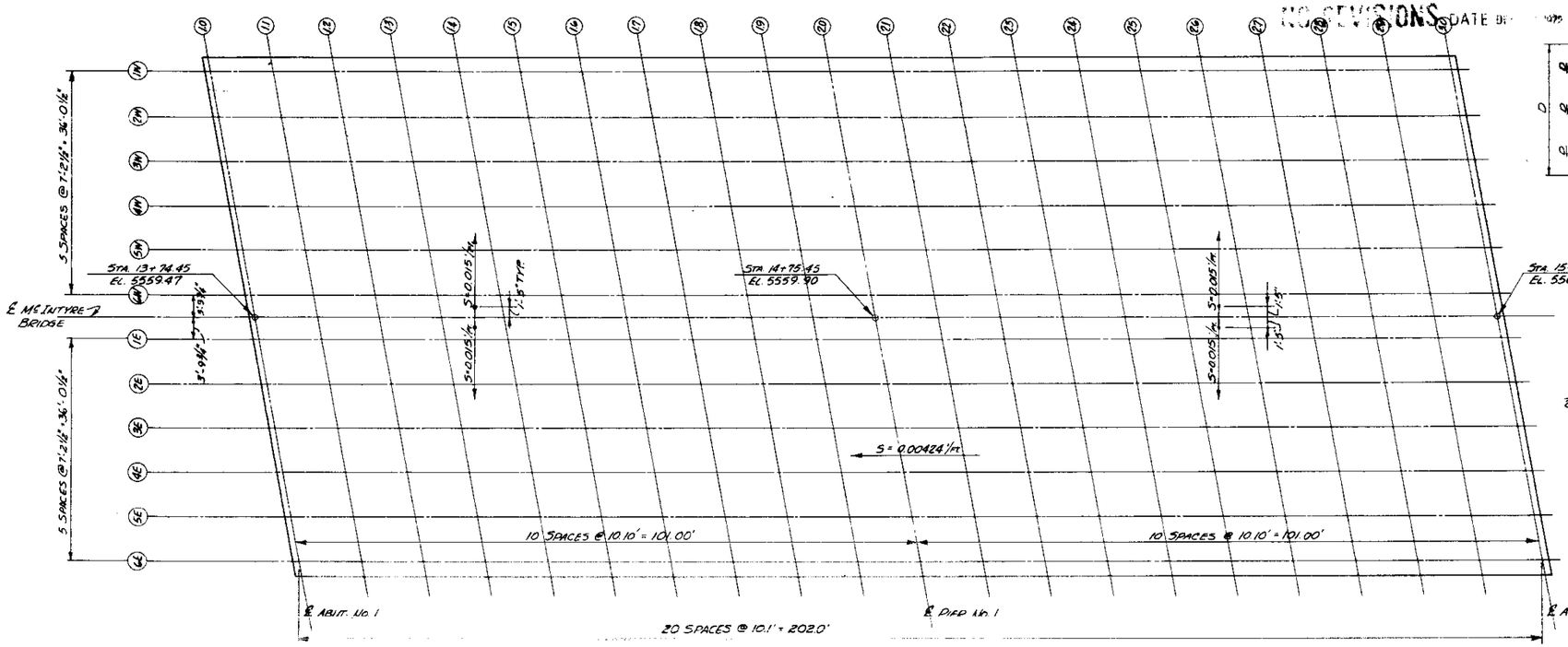
REVISIONS

HIGHWAYS

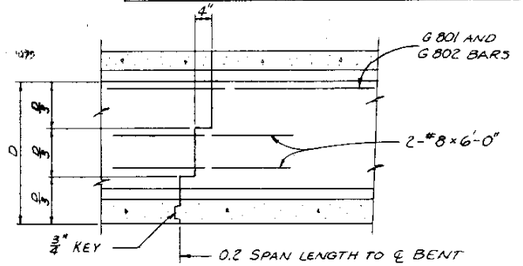
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1(2)	11	

(R-2) ADDED DETAILS TCF 1-7-71

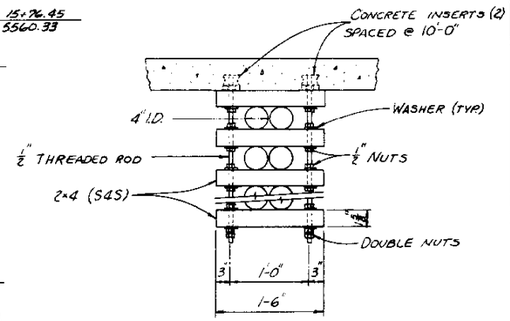
AS CONSTRUCTED
NO REVISIONS DATE BY



DECK PLAN



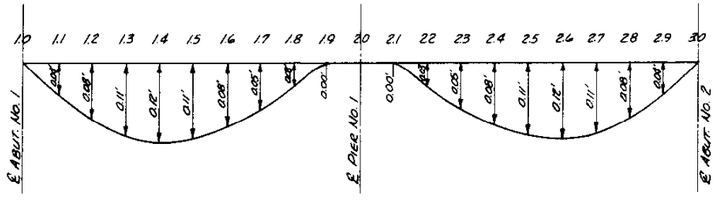
OPTIONAL GIRDER CONSTRUCTION JOINT (R-2)



SUSPENDED TELEPHONE CONDUIT DETAILS (R-2)

TOP OF DECK - ELEVATION 5500.00±																					
	SPAN NO. 1 = 101'-0"											SPAN NO. 2 = 101'-0"									
GIRDER NO.	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
1W	58.86	58.94	59.03	59.10	59.15	59.19	59.20	59.21	59.23	59.25	59.29	59.33	59.40	59.47	59.54	59.62	59.67	59.70	59.72	59.72	59.72
2W	58.97	59.05	59.14	59.21	59.26	59.30	59.31	59.32	59.34	59.36	59.40	59.44	59.51	59.58	59.65	59.73	59.78	59.81	59.83	59.83	59.83
3W	59.09	59.17	59.26	59.33	59.38	59.42	59.43	59.44	59.46	59.48	59.52	59.56	59.63	59.70	59.77	59.85	59.90	59.93	59.95	59.95	59.95
4W	59.21	59.29	59.38	59.45	59.50	59.54	59.55	59.56	59.58	59.60	59.64	59.68	59.75	59.82	59.89	59.97	60.02	60.05	60.07	60.07	60.07
5W	59.31	59.39	59.48	59.55	59.60	59.64	59.65	59.66	59.68	59.70	59.74	59.78	59.85	59.92	59.99	60.07	60.12	60.15	60.17	60.17	60.17
6W	59.43	59.51	59.60	59.67	59.72	59.76	59.77	59.78	59.80	59.82	59.86	59.90	59.97	60.04	60.11	60.19	60.24	60.27	60.29	60.29	60.29
1E	59.43	59.51	59.60	59.67	59.72	59.76	59.77	59.78	59.80	59.82	59.86	59.90	59.97	60.04	60.11	60.19	60.24	60.27	60.29	60.29	60.29
2E	59.33	59.41	59.50	59.57	59.62	59.66	59.67	59.68	59.70	59.72	59.76	59.80	59.87	59.94	60.01	60.09	60.14	60.17	60.19	60.19	60.19
3E	59.23	59.31	59.40	59.47	59.52	59.56	59.57	59.58	59.60	59.62	59.66	59.70	59.77	59.84	59.91	59.99	60.04	60.07	60.09	60.09	60.09
4E	59.13	59.21	59.30	59.37	59.42	59.46	59.47	59.48	59.50	59.52	59.56	59.60	59.67	59.74	59.81	59.89	59.94	59.97	59.99	59.99	59.99
5E	59.03	59.11	59.20	59.27	59.32	59.36	59.37	59.38	59.40	59.42	59.46	59.50	59.57	59.64	59.71	59.79	59.84	59.87	59.89	59.89	59.89
6E	58.92	59.00	59.09	59.16	59.21	59.25	59.26	59.27	59.29	59.31	59.35	59.39	59.46	59.53	59.60	59.68	59.73	59.76	59.78	59.78	59.78

NOTE: ALL ELEVATIONS INCLUDE DEAD LOAD DEFLECTIONS.



LOAD DEFLECTION DIAGRAM

(R-2) NOTE:
KEEP THE LEADING EDGE OF THE CONCRETE PARALLEL TO THE ABUTMENTS SO THAT THE GIRDERS WILL BE LOADED EVENLY DURING THE POURING AND SCREEDING OPERATIONS. AN APPROVED RETARDER SHALL BE USED WHEN NECESSARY IN ORDER TO RETAIN THE WORKABILITY OF THE CONCRETE.

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

STRUCTURE NO. E - 16 - HQ

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DECK ELEVATIONS AND LOAD DEFLECTION DIAGRAM
UNDER McINTYRE ST.
Sta. 219+91.84
Near GOLDEN Sec. 24 T. 3S R. 70W
Designed by R.E.R. | Approved by
Made by D.A.S.
Checked by W.A.S. | Date: 19

REVISIONS

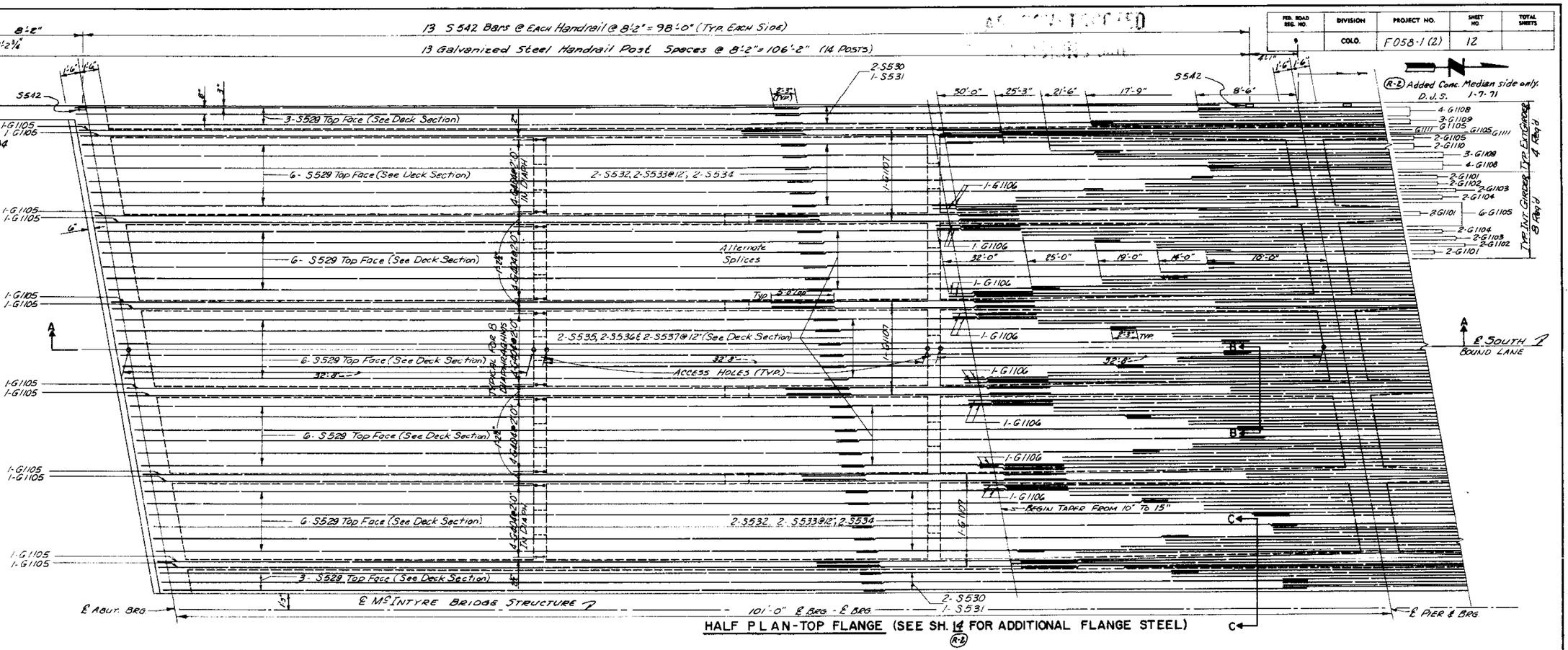
REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLO.	F058-1(2)	12	

13 S542 Bars @ Each Handrail @ 8'-2" = 98'-0" (Typ. Each Side)

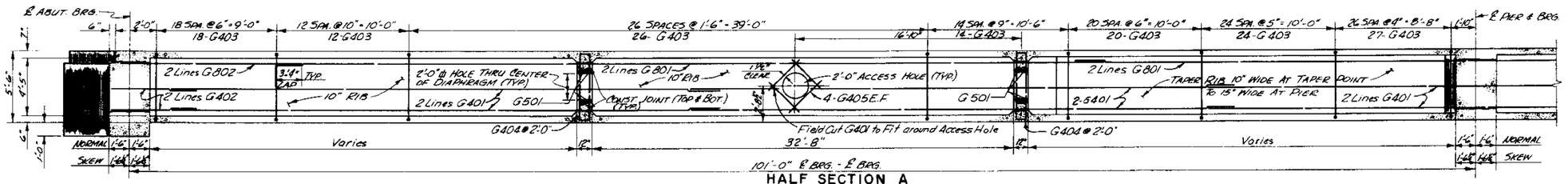
13 Galvanized Steel Handrail Post Spaces @ 8'-2" = 106'-2" (14 Posts)

(R-2) Added Conc. Median side only. D.U.S. 1-7-71

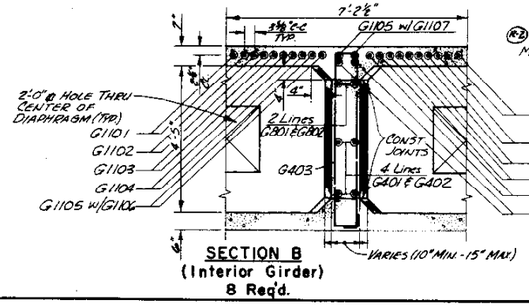


HALF PLAN-TOP FLANGE (SEE SH. 14 FOR ADDITIONAL FLANGE STEEL)

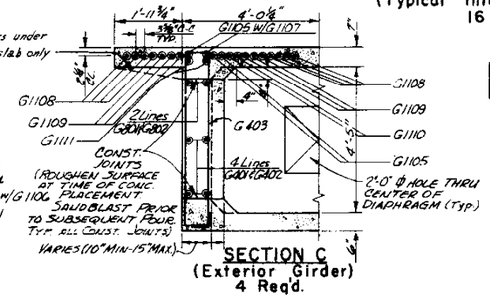
(R-2)



HALF SECTION A
(Typical Interior Girder)
16 Req'd.



SECTION B
(Interior Girder)
8 Req'd.



SECTION C
(Exterior Girder)
4 Req'd.

℄ ABUT. BRG.	1	2	3	4	5	6	7	8	9	℄ PIER
0	0.04	0.08	0.11	0.12	0.11	0.08	0.05	0.02	0	0

DEAD LOAD DEFLECTION (FT.)

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

STRUCTURE NO. E-16-HQ

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

GIRDER DETAILS
TOP FLANGE

UNDER Mc INTYRE ST.
Sta. 219+91.84
Near GOLDEN Sec. 24 T. 3 S. R. 70 W.

Designed by R.E.R	Approved by
Made by D.A.S.	
Checked by W.A.S.	Date: 19

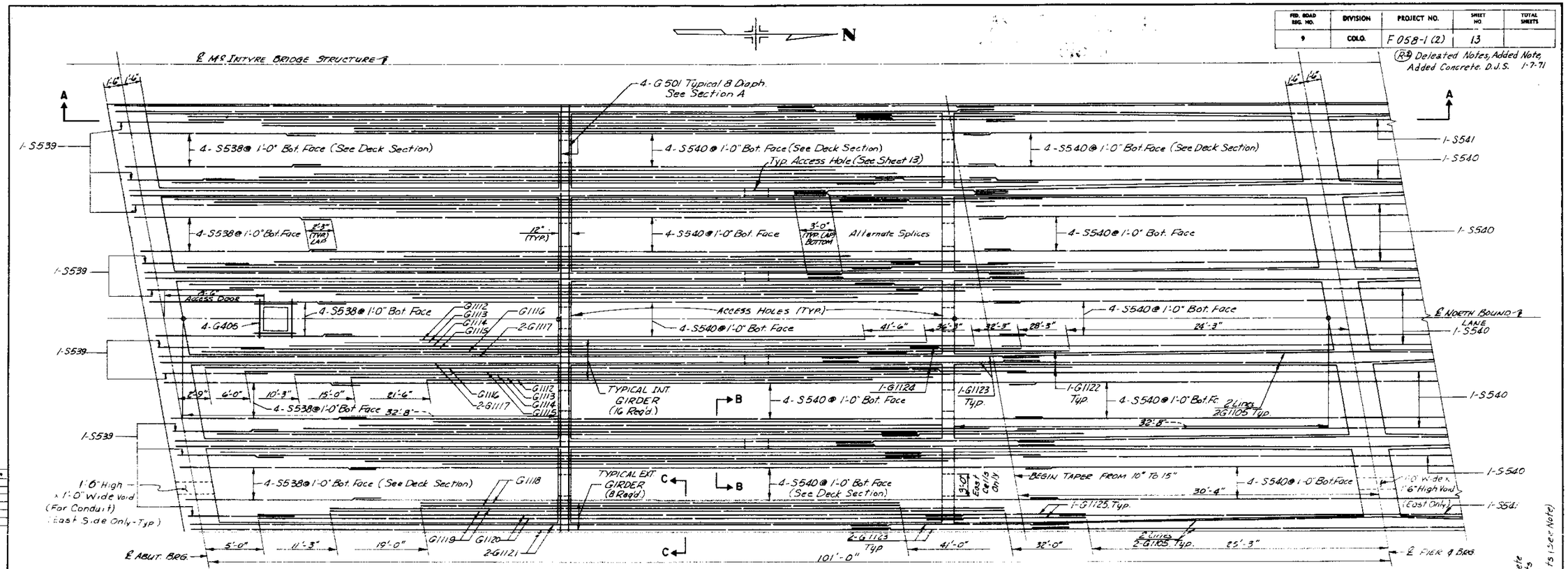
REVISIONS

REVISIONS

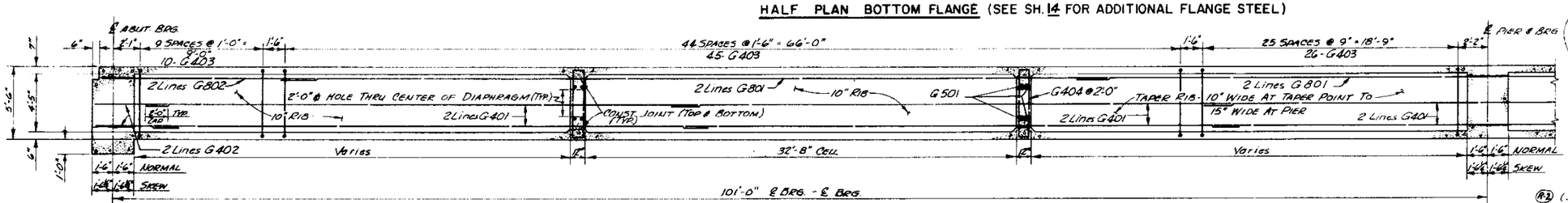
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1 (2)	13	

(R-1) Deleated Notes, Added Note, Added Concrete. D.U.S. 1-7-71

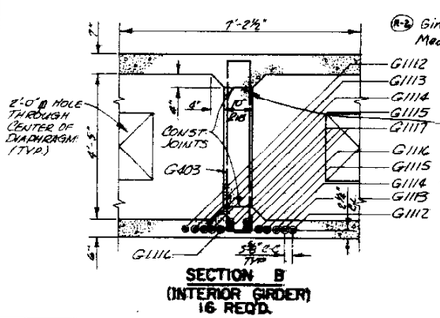
℄ MCINTYRE BRIDGE STRUCTURE

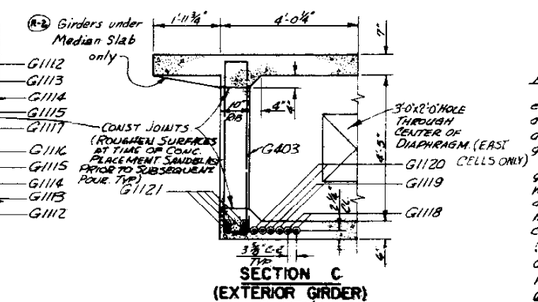


HALF PLAN BOTTOM FLANGE (SEE SH. 14 FOR ADDITIONAL FLANGE STEEL)

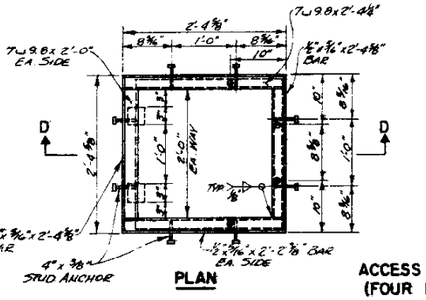


HALF SECTION A
(TYPICAL EXTERIOR GIRDER)
8 REQ'D.

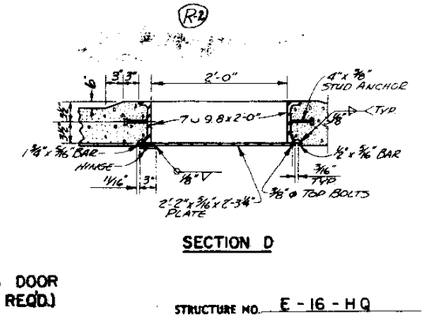




Access Door Notes:
Set hinge end nearest to and parallel to abutments. Door, frame and hardware to be galvanized.
Bottom slab and girder reinforcing which interferes with access doors or holes may be field bent or cut to clear.
(Price of Access Door and Framing included in Bid Price for Item 601, Concrete, Class D)



ACCESS DOOR
(FOUR REQ'D.)



STRUCTURE NO. E-16-HQ

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
GIRDER DETAILS
BOTTOM FLANGE

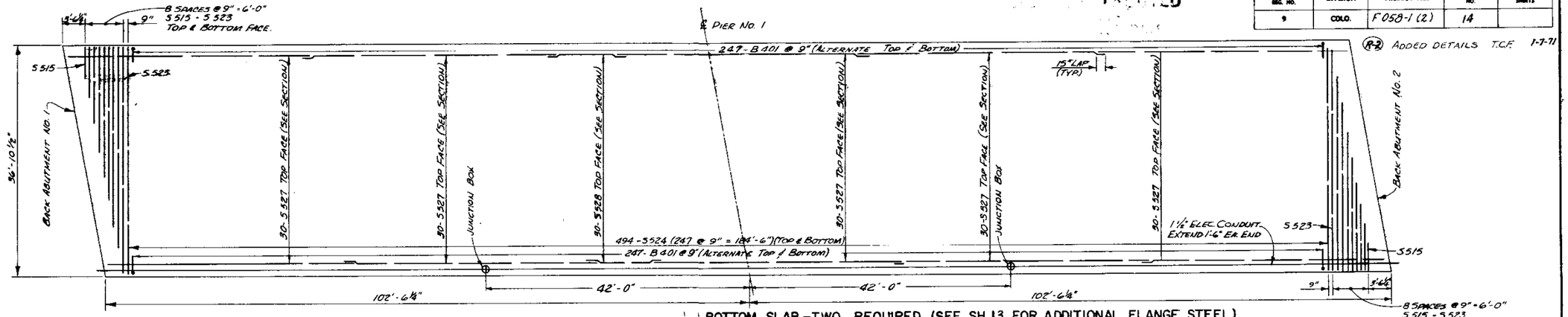
UNDER McINTYRE ST
Sta. 219+91.84
Near GOLDEN Sec. 24 T 3S R 70W

Designed by R.E.R.	Approved by
Made by D.A.S.	
Checked by W.A.S.	Date: 19

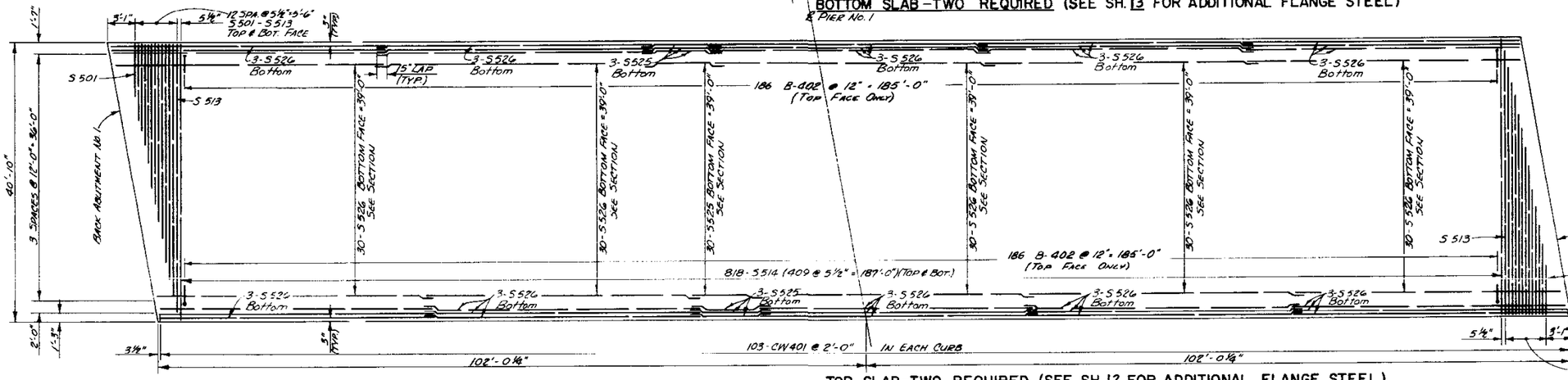
REVISIONS

FED. ROAD SEC. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1 (2)	14	

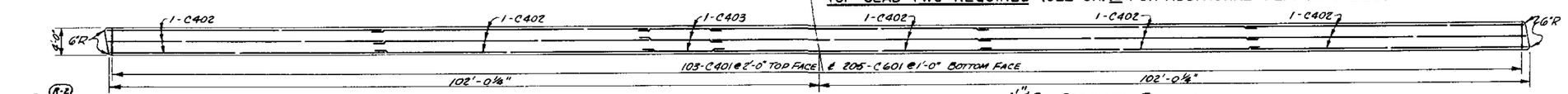
(R-2) ADDED DETAILS T.C.F. 1-7-71



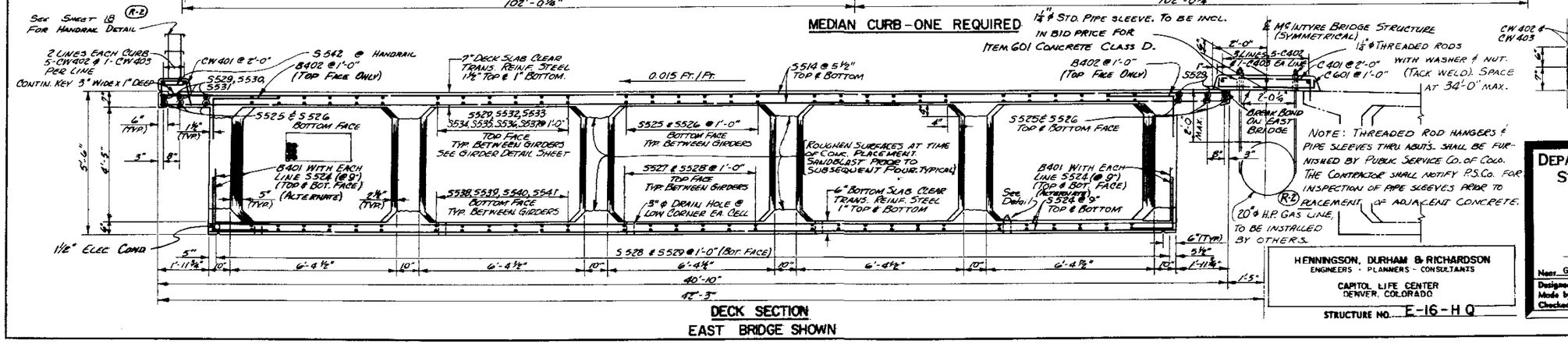
BOTTOM SLAB – TWO REQUIRED (SEE SH. 13 FOR ADDITIONAL FLANGE STEEL)



TOP SLAB – TWO REQUIRED (SEE SH. 12 FOR ADDITIONAL FLANGE STEEL)



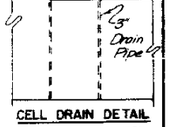
MEDIAN CURB – ONE REQUIRED



DECK SECTION
EAST BRIDGE SHOWN

CURB DETAIL

NOTE: Install Drains at Lowest Elevation in Each Cell



CELL DRAIN DETAIL

3 1/2" PRICE OF DRAINS INCLUDED IN BID PRICE ITEM 601 CONCRETE CLASS D)

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

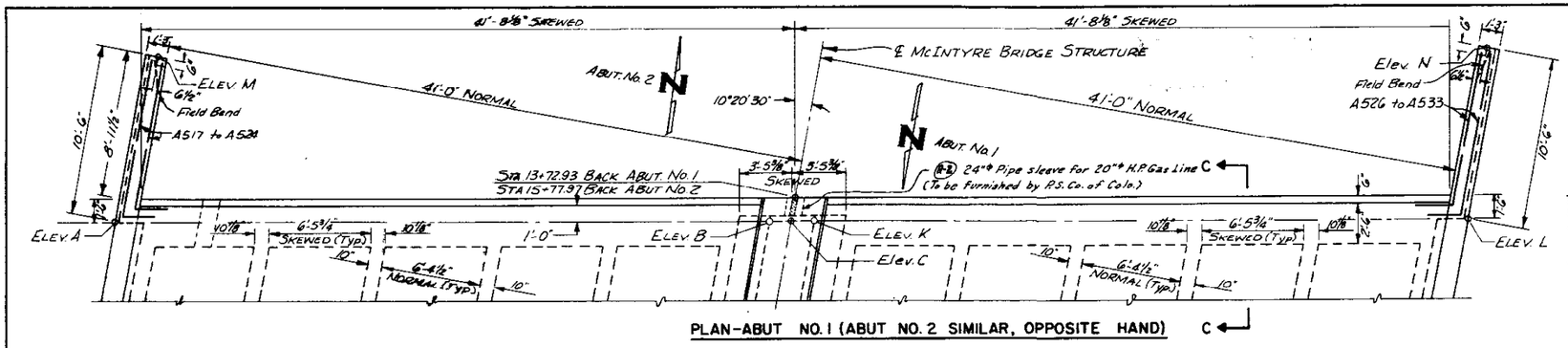
STRUCTURE NO. E-16-HQ

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DECK PLAN
& SECTION
UNDER McINTYRE ST.
Sec. 21S+9E 6th
Near GOLDEN Sec. 24 T. 3S R. 70W
Designed by R.E.R. | Approved by
Made by D.A.S.
Checked by W.A.S. | Date: 19

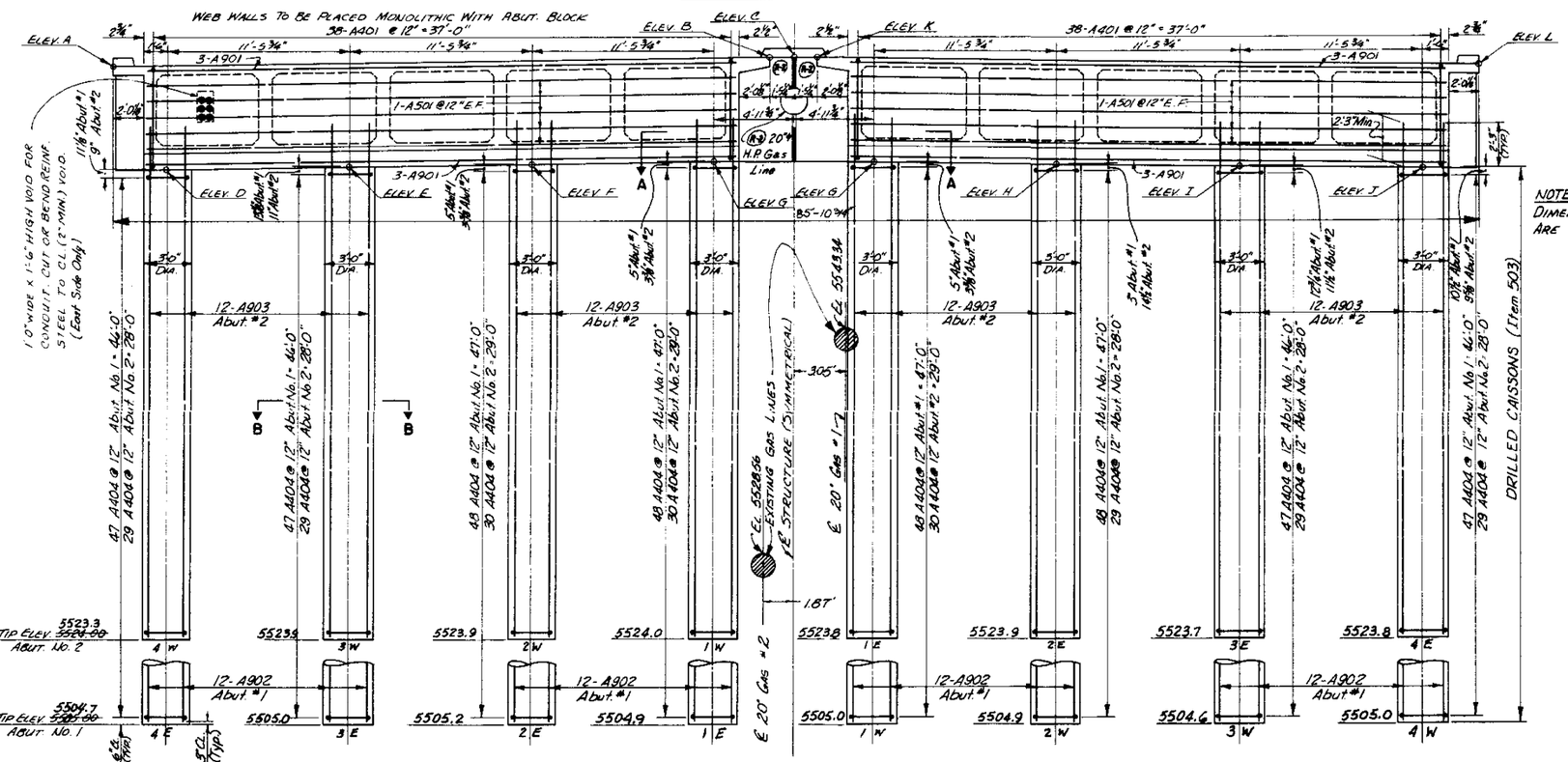
REVISIONS

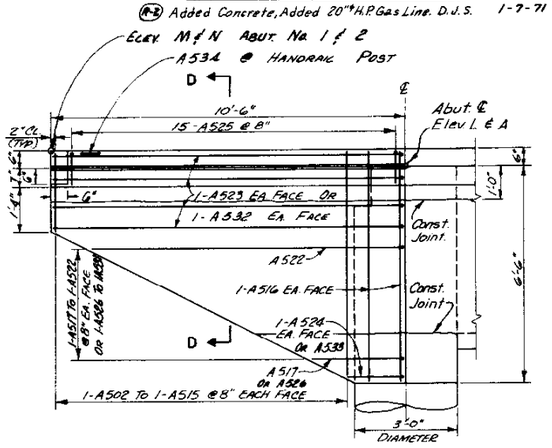
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F058-1(2)	15	

(R-2) Added Concrete, Added 20"ϕ H.P. Gas Line. D.J.S. 1-7-71



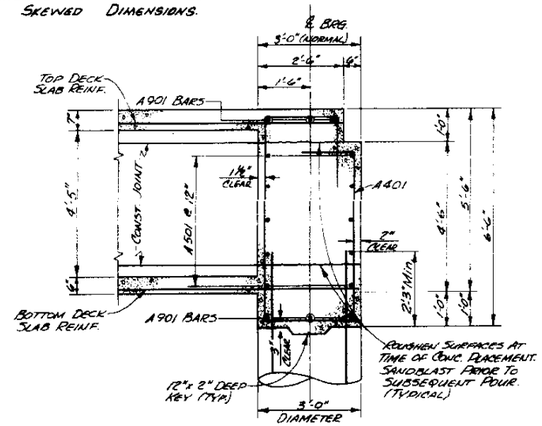
PLAN–ABUT NO. 1 (ABUT NO. 2 SIMILAR, OPPOSITE HAND)



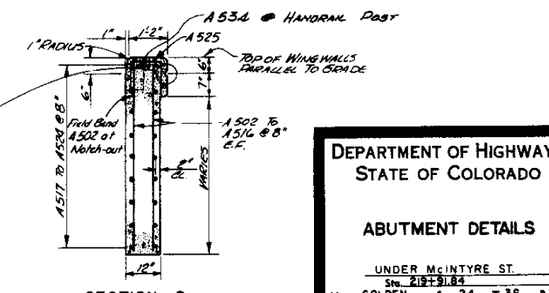


TYPICAL WINGWALL ELEVATION
2 REQ'D

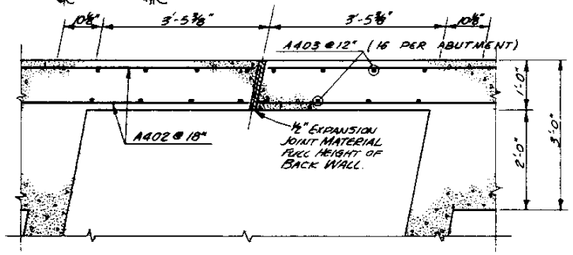
NOTE:
DIMENSIONS SHOWN ON ELEVATION ARE SKEWED DIMENSIONS.



SECTION C

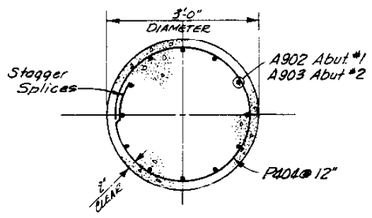


SECTION D



SECTION A

ELEVATION
AT SKEW ANGLE 10°20'30"



SECTION B

ELEVATIONS					
ELEV.	ABUT. NO. 1	ABUT. NO. 2	ELEV	ABUT. No. 1	ABUT. No. 2
A	5558.89	5559.69	K	5559.47	5560.33
B	59.47	60.33	L	60.83	59.73
C	59.49	60.35	M	59.35	60.83
D	52.44	53.24	N	5559.29	5560.29
E	52.60	53.42			
F	52.76	53.60			
G	52.92	53.78			
H	52.74	53.62			
I	52.50	53.46			
J	5552.38	5553.30			

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

STRUCTURE NO. E-16-HQ

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

ABUTMENT DETAILS

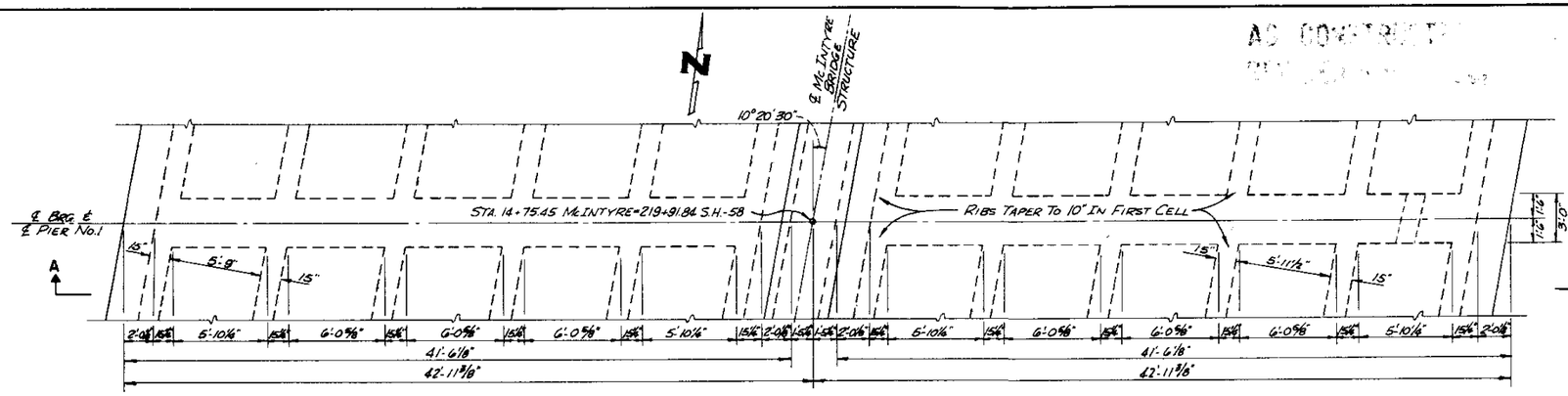
UNDER McINTYRE ST.
Sta. 219+91.84
Near GOLDEN Sec. 24 T. 3S R. 70W

Designed by R.E.R	Approved by
Made by D.A.S.	
Checked by W.A.S	Date: 19

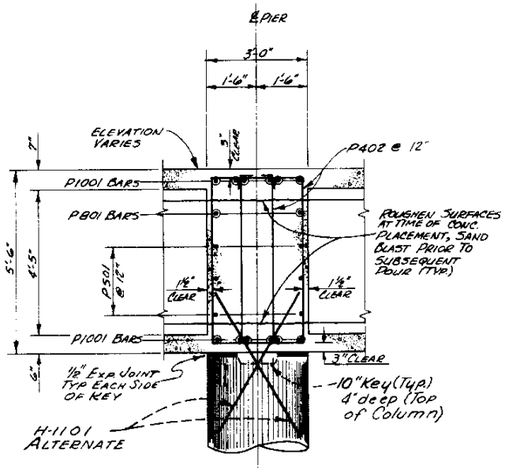
REVISIONS

FED. ROAD SEC. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1(2)	16	

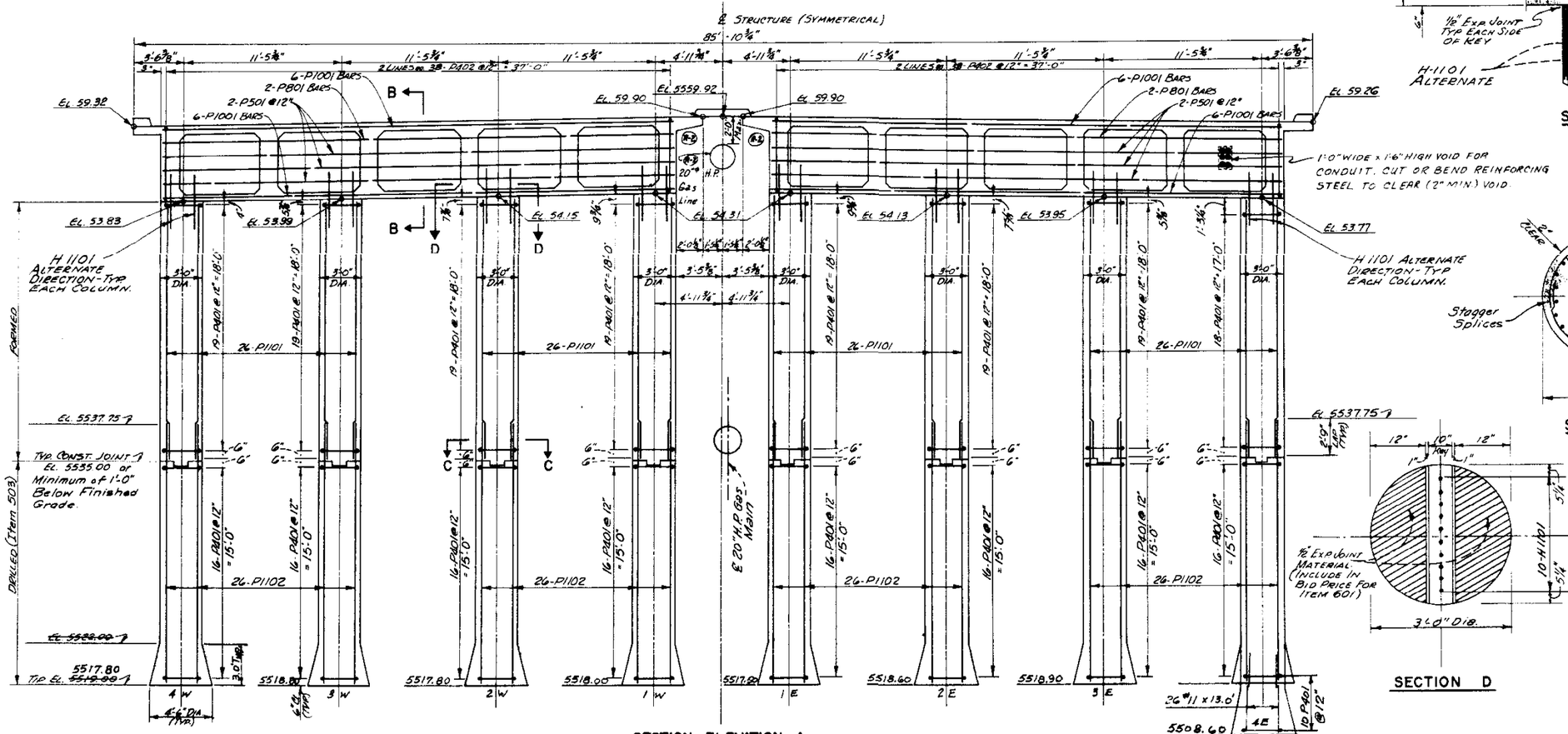
(R-1) Added Concrete, Added 20"ø H.P. Gas Line. D.J.S. 1-7-71



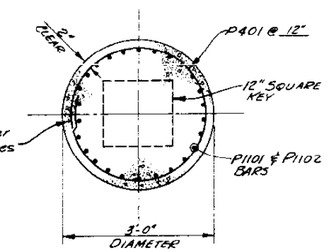
PLAN



SECTION B



SECTION ELEVATION A
AT SKEW ANGLE 10° 20' 30"



SECTION C

SECTION D

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

STRUCTURE NO. E-16-HQ

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

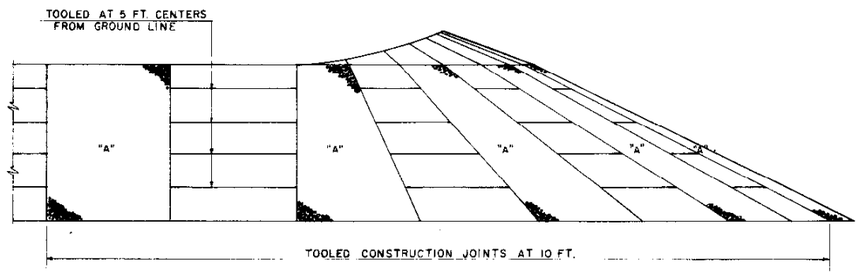
PIER DETAILS

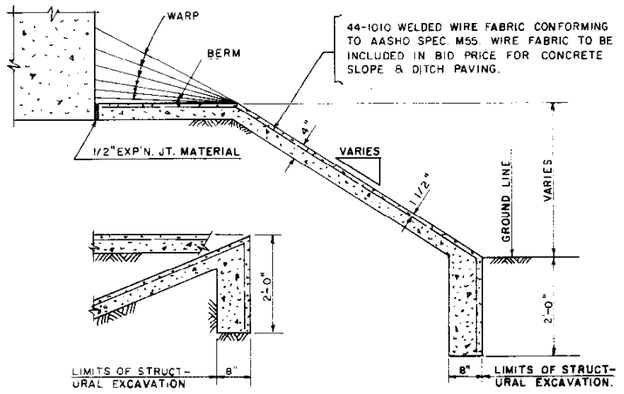
UNDER McINTYRE ST.
Sta. 219+91.84
Near GOLDEN Sec. 24 T. 3S R. 70W

Designed by R.E.R.	Approved by
Made by D.A.S.	
Checked by W.A.S.	Date: 19

REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1(12)	17	





DETAIL OF SLOPE PAVING

NOTE: SLOPE PAVING SHALL BE POURED IN 10 FT. TRANSVERSE SECTIONS WITH A TOOLED CONSTRUCTION JOINT AT EACH SECTION.

IN ALL CASES, THE EXPOSED AGGREGATE FINISH SHALL BE STARTED ON THE FIRST PANEL FACING ON-COMING TRAFFIC.

WIRE FABRIC SHALL BE 2" FROM THE END OF JOINTS AND SHALL LAP 4" AT SPLICES.

WHERE SLOPE OR BERM PAVING BUTTS AGAINST THE ABUTMENT OR WINGS, SEPARATE WITH 1/2" EXPANSION JOINT MATERIAL TYPE "II". (INCLUDE IN BID PRICE FOR ITEM 507).

TRANSITION ENDS OF SLOPE PAVING MAY BE MODIFIED BY THE ENGINEER TO FIT CONDITIONS ENCOUNTERED IN THE FIELD.

PANELS MARKED THUS "A" ARE TO RECEIVE AN EXPOSED AGGREGATE FINISH. THIS FINISH SHALL BE MADE BY ADDING AN APPROVED RETARDER TO THE CONCRETE MIX BEING USED IN THE EXPOSED AGGREGATE PANEL. AFTER THE CONCRETE IS STRUCK TO GRADE, THE SURFACE SHALL BE SPRAYED WITH AN APPROVED RETARDER IF DEEMED NECESSARY BY THE ENGINEER. THE AMOUNT OF RETARDER ADDED TO THE MIX AND THE AMOUNT OF RETARDER SPRAYED ON THE SURFACE SHALL BE AS RECOMMENDED BY THE MANUFACTURER.

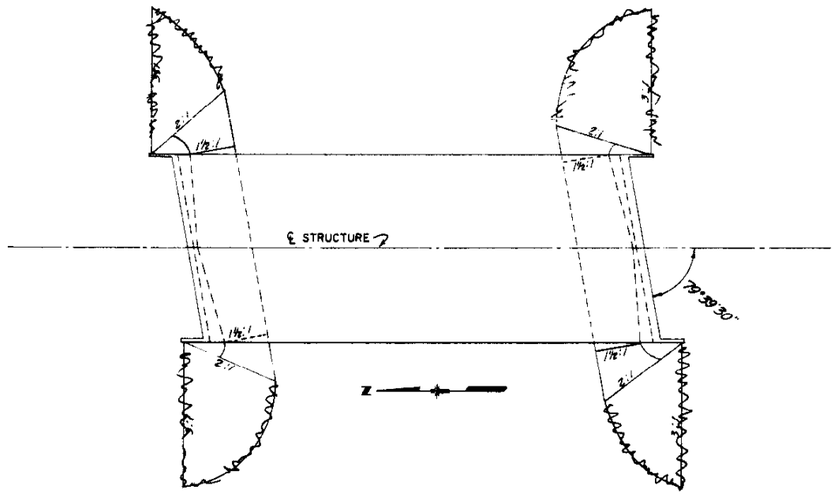
THE CONCRETE SHALL THEN BE ALLOWED TO SET. SETTING TIME SHALL BE DETERMINED BY THE ENGINEER. AFTER SETTING THE PRESCRIBED TIME, THE SURFACE SHALL BE BROOMED AND WASHED WITH WATER TO EXPOSE THE AGGREGATE.

THE EXPOSED AGGREGATE FINISH SHALL THEN BE SPRAYED WITH A CLEAR CURING COMPOUND.

ALL WORK NECESSARY BY THESE REQUIREMENTS SHALL BE INCLUDED IN THE BID PRICE FOR ITEM NUMBER 507.

CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 601. CONCRETE SHALL BE CLASS "D"

COARSE AGGREGATE USED IN EXPOSED AGGREGATE PANELS SHALL BE COMPOSED PREDOMINANTLY OF STONE CONTRASTING IN COLOR TO THAT OF NORMAL CONCRETE IN ADJACENT PANELS.



PLAN - SLOPE PAVING

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

178 (10-20-67)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

SLOPE PAVING DETAILS

UNDER McINTYRE ST.
Sta. 219+91.84
Near GOLDEN Sec. 24 T. 3S R. 70W

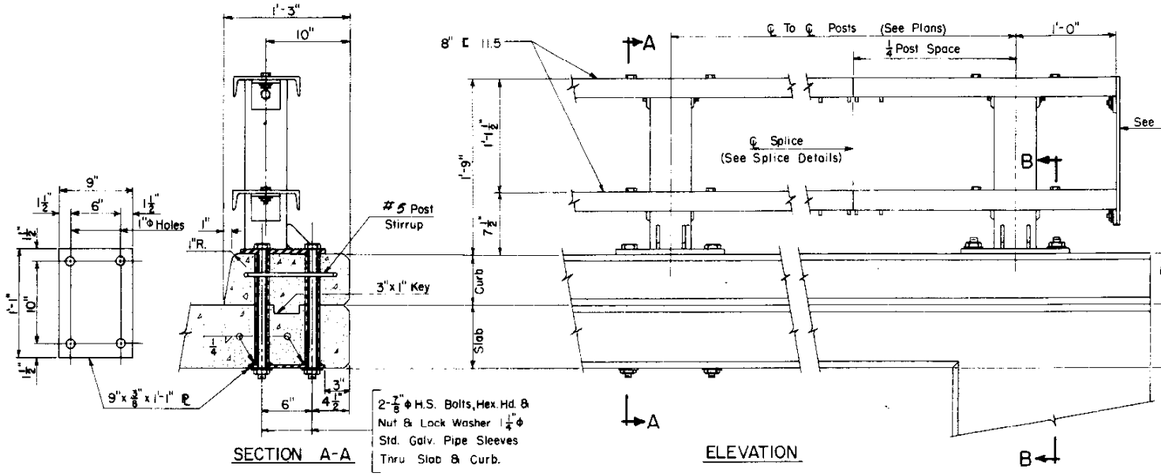
Designed by	Approved by
Made by	Bridge Engineer
Checked by	Date: 19

STRUCTURE NO. E-16-HQ

REVISIONS

AS CONSTRUCTED
NO REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F058-1(2)	18	



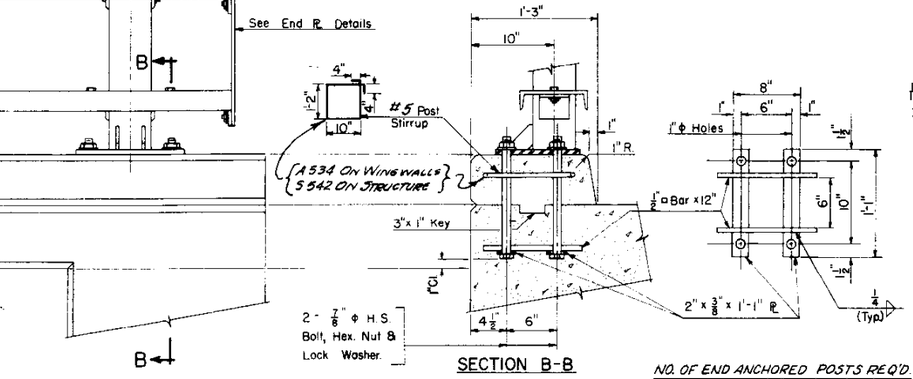
SECTION A-A

ELEVATION

THRU SLAB MOUNTED POST

NO. OF THRU SLAB MOUNTED POSTS REQ'D.

McIntyre St - SH-58	52
McIntyre St - Clear Creek	62
Total	114

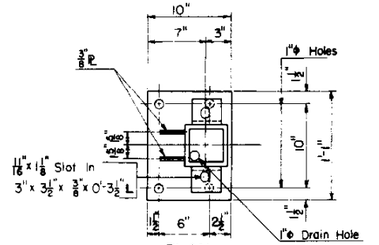


SECTION B-B

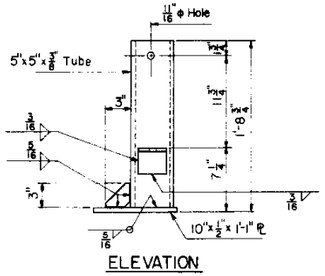
END ANCHORED POST

NO. OF END ANCHORED POSTS REQ'D.

McIntyre St - SH-58	8
McIntyre St - Clear Creek	8
Total	16

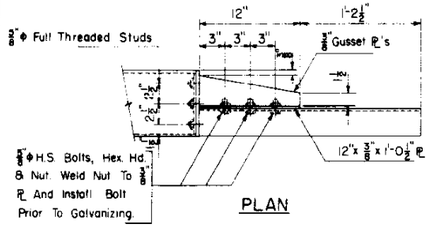


PLAN

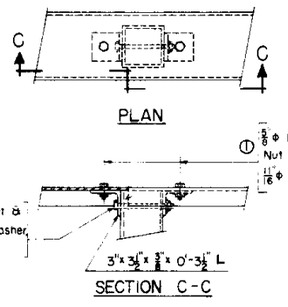


ELEVATION

POST DETAIL



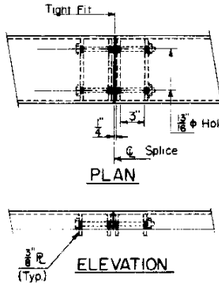
PLAN



PLAN

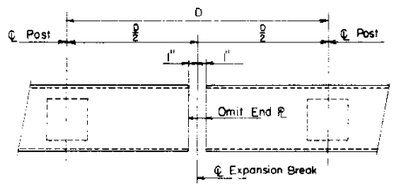
SECTION C-C

DETAIL AT TOP RAIL

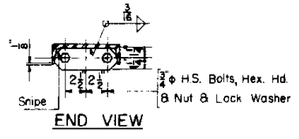


PLAN

ELEVATION



DETAIL AT EXPANSION BREAK



END VIEW

SPLICE DETAIL

NOTES:

Posts Shall Be Perpendicular To The Grade And Slope Of Deck.

All Rail Elements Shall Be Galvanized After Fabrication In Accordance With Specifications.

A.I.S.I. 1144 Steel Rods May Be Used In Lieu Of H.S. Bolts Shown. 10° Wedge Test Not Req. For Either Bolts Or Rods Used In Rail Assembly.

① ⅜"Φ Standard Full Threaded Studs Welded To The Channel May Be Used. Increase Size Of Slot In The Angle To 13/16" x 1¼".

Channels Shall Be Continuous Over 3 Or 4 Posts Before Splicing.

ELEVATION

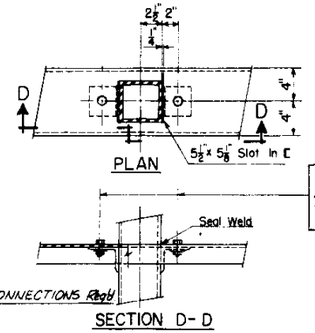
END VIEW

DETAIL OF END CONNECTION FOR FASTENING BRIDGE RAIL TO TRANSITION GUARD RAIL

Complete Unit Shall Be Galvanized After Fabrication

Detail Shown Is For Right Hand Rail.

Opposite Hand For Left Hand Rail.



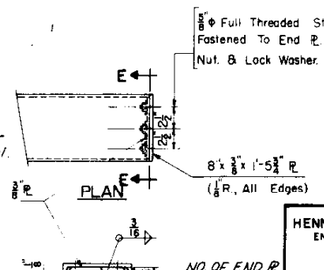
PLAN

SECTION D-D

DETAIL AT BOTTOM RAIL

NO. OF GUARD RAIL TRANSITION CONNECTIONS Req'd

McIntyre St - SH-58	4
McIntyre St - Clear Creek	4
Total	8



PLAN

SEC. E-E

NO. OF END PL REQ'D.

McIntyre St - SH-58	4
McIntyre St - Clear Creek	4
Total	8

END PLATE DETAIL

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

4 (5-14-68)

DEPARTMENT OF HIGHWAYS STATE OF COLORADO

GALVANIZED STEEL HANDRAIL

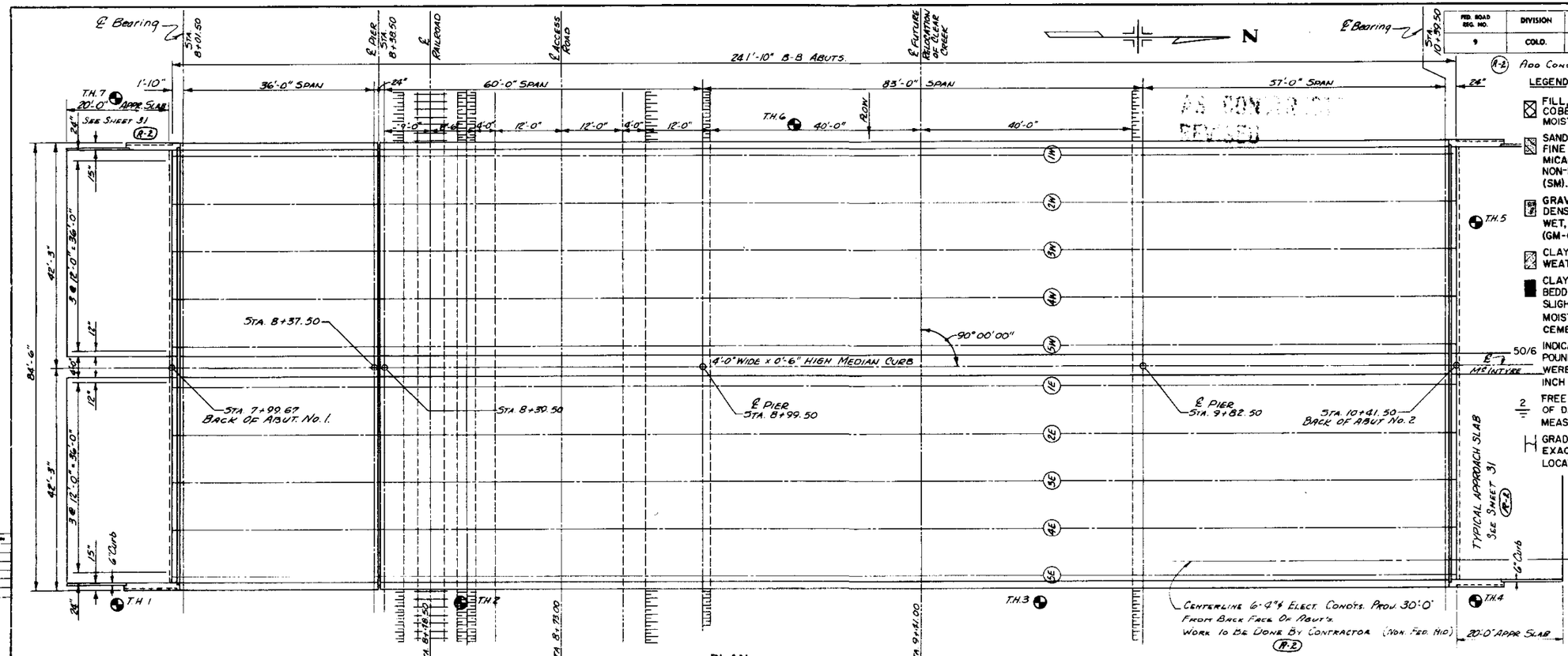
ACROSS CLEAR CREEK ON McINTYRE ST.
and
UNDER McINTYRE ST.
Sta. 219 + 91.84
Near GOLDEN Sec. 24 T. 3S R. 70W

Designed by	Approved by
Made by RMM	Bridge Engineer
Checked by	Date: 19

REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1 (2)	19	

(R-2) ADD CONDUIT & NOTE DGS 1-7-71

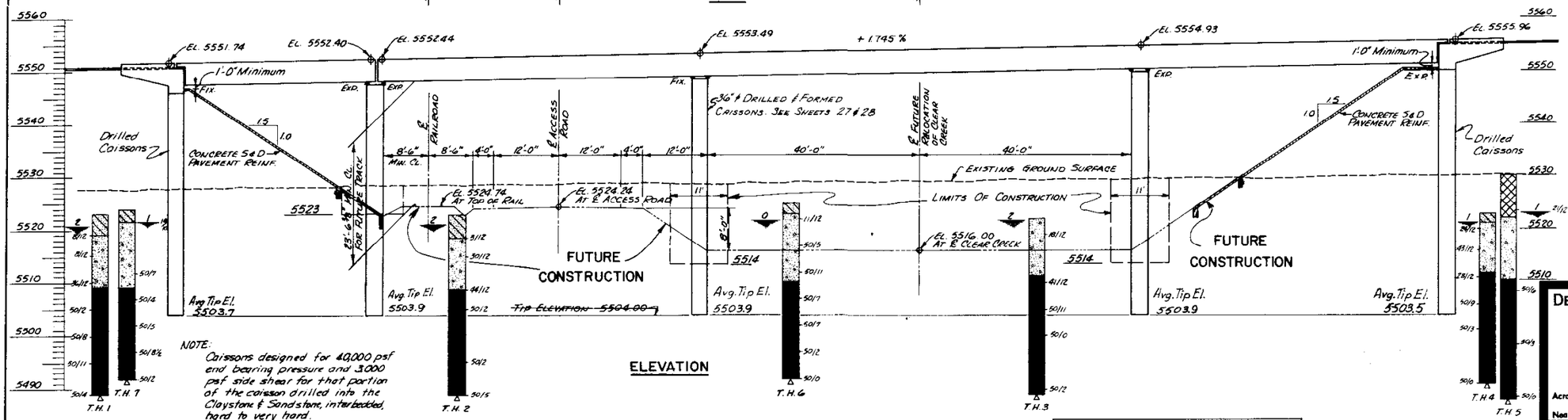


PLAN

LEGEND

- FILL, ROADWAY EMBANKMENT, COBBLES, GRAVEL, SAND AND CLAY, MOIST, TO VERY MOIST, BROWN.
- SAND, VERY LOOSE TO LOOSE, SILTY, FINE TO MEDIUM GRAINED, HIGHLY MICACEOUS, SLIGHTLY ORGANIC, NON-PLASTIC, MOIST TO WET, BROWN (SM).
- GRAVEL, MEDIUM DENSE TO VERY DENSE, SANDY, SILTY, COBBLES, WET, WITH OCCASIONAL BOULDERS (GM-GP).
- CLAYSTONE, MEDIUM HARD, MOIST, WEATHERED, OLIVE TO BLUE-GRAY.
- CLAYSTONE AND SANDSTONE, INTERBEDDED, HARD TO VERY HARD, SLIGHTLY MICACEOUS, SLIGHTLY MOIST TO MOIST, SANDSTONE WEAKLY CEMENTED, WEATHERED, BLUE-GRAY.
- 50/6 — INDICATES THAT 50 BLOWS OF A 140 POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2 INCH DIAMETER SAMPLER 6 INCHES.
- ▽ 2 — FREE WATER LEVEL AND NUMBER OF DAYS AFTER DRILLING THAT MEASUREMENT WAS TAKEN.
- GRADUAL CHANGE IN MATERIALS. EXACT STRATA CHANGE NOT LOCATED.

(R-2) SEE SHEET 20 FOR GENERAL NOTES AND SUMMARY OF QUANTITIES.



NOTE:
Caissons designed for 40,000 psf end bearing pressure and 3,000 psf side shear for that portion of the caisson drilled into the Claystone & Sandstone, interbedded, hard to very hard.

ELEVATION

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
LAYOUT

RELOCATED CLEAR CREEK,
Across COOK'S ACCESS ROAD & RAILROAD
Sta. 9+41.0 McINTYRE ST.
Near GOLDEN Sec. 24 T. 3S R. 70W

Designed by R.E.R.
Made by D.S.
Checked by W.A.S.
Approved by
Date: 19

REVISIONS

1-7-71 (R-2) Revised bar list & Summary of Quan. TDB

FED. ROAD ESC. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1 (2)	20	

SUMMARY OF QUANTITIES

	ITEM NO.	DESCRIPTION	UNIT	SUPER STRUCT.	ABUT NO.1	PIER NO. 1	PIER NO. 2	PIER NO. 3	ABUT NO. 2	TOTAL	
	206	STRUCTURE EXCAVATION (Haul)	CU. YDS.		176	174	489	489	196	1524	Book #1 Page 23
	206	STRUCTURE BACKFILL (CLASS 3)(Haul)	CU. YDS.		29	167	467	467	32	1162	29
(R-2)	503	DRILLED CAISSONS (36" ø)	LIN. FT.		~~240 FT~~	~~114.0~~	~~60.0~~	~~60.0~~	~~263.10~~	~~737.02~~	54-55
	507	CONCRETE SLOPE & DITCH PAVING (REINFORCED)	CU. YDS.		~~242.2~~ 95 152.97	114.2	60.8	60.4	226.4 43 135.11	744.3 ~~208~~ 288.08	56-57
(R-2)	509	STRUCTURAL STEEL	LBS.	453,425						453,425	61
	509	STRUCT. STEEL GALVANIZED	LBS.	18,883						18,883	62
	512	BRONZE BEARING PLATES	LBS.	846						846	63
	516 (1)	DAMPPROOFING (LINSEED OIL)	SQ. YDS.	2712						2712	64
	518	BRIDGE COMPRESSION JOINT SEALER (TYPE A)	LIN. FT.	81.67					35.3	81.67	66
	601	CONCRETE (CLASS "A")	CU. YDS.			33.49	74.71	76.91	17.33	~~185.44~~ 220.42	68
(R-2)	601	CONCRETE (CLASS "D")	CU. YDS.	528.10	50.91	48.88	40.65	40.45	~~52.24~~	~~726.43~~ 726.12	75
(R-2)	602	REINFORCING STEEL	LBS.	136,294	10,941.5	18,459.6	27,555.2	27,555.2	19,421.7	230,613	
	(2)	1/2" EXP. JT. MATERIAL (TYPE 3)	SQ. FT.	8						8	
(R-2) (3)	613	4" Electrical Conduit	Lin. Ft.	~~145~~ 1836						~~145~~ 1836	Book #2 Pg 61

QUANTITY FOOTNOTES

(R-2)
1. INCLUDES APPROACH SLAB
2. INCLUDED IN ITEM 601
3. Non Federal Aid: Mountain States Tel. & Tel. Co. to reimburse the Colorado Division of Highways for this work. All work necessary to accomplish this item shall be included in the bid price for item 613.

GENERAL NOTES

1. ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS APPLICABLE TO THE PROJECT.
2. ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE STEEL OF A DEFORMED TYPE. EACH BAR SHALL BE TAGGED WITH THE BAR DESIGNATION AND STATION NUMBER OF THE PROJECT.
3. IF, BY PERMISSION OF THE ENGINEER, PRIMARY BARS ARE SPLICED, THEY SHALL LAP 24 DIAMETERS EXCEPT BARS NEAR THE TOP OF BEAMS AND GIRDERS HAVING MORE THAN 12 INCHES OF CONCRETE UNDER THE BARS, IN WHICH CASE THE SPLICE SHALL BE 40 DIAMETERS.
4. DIMENSIONS FOR REINFORCING STEEL ARE SHOWN AS CLEAR DIMENSIONS.
5. SOUNDINGS & DEPTH OF FOOTINGS ARE IN ACCORDANCE WITH THE BEST AVAILABLE DATA, AND WHEN DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.
6. FOR DETAILS OF STRUCTURAL EXCAVATION AND STRUCTURE BACKFILL SEE STANDARD M-296-A.
7. ALL CONCRETE SURFACES MARKED WITH THE SYMBOL f AS SHOWN ON SHEET NO. 29 SHALL RECEIVE CLASS "2" SURFACE FINISH.
8. ALL STRUCTURAL STEEL SHALL BE PAINTED IN ACCORDANCE WITH SECTION 509 FOR GREEN PAINT.
9. BOLTS SHALL BE FURNISHED IN THE AMOUNT OF TWO PERCENT IN EXCESS OF THE NOMINAL NUMBER REQUIRED FOR EACH SIZE AND LENGTH.
10. WELDING SHALL CONFORM TO THE LATEST EDITION OF THE A.W.S. STANDARD SPECIFICATIONS FOR WELDING HIGHWAY BRIDGES.
11. ALL STRUCTURAL STEEL SHALL BE A.S.T.M. A36-62T.
12. ALL CONCRETE CHAMFERS TO BE 3/4" UNLESS OTHERWISE NOTED.

STRUCTURAL STEEL NOTES

1. ENDS OF GIRDERS & ALL END BEARING PLATES SHALL BE VERTICAL.
2. EXCEPT AS NOTED ALL SHOP FILLET WELDS FOR DIAPHRAGMS AND CLIP PLATES SHALL BE 1/4".
3. ALL FIELD CONNECTIONS SHALL BE 7/8" HIGH STRENGH BOLTS EXCEPT AS SHOWN.
4. SUB PUNCH HOLES TO 13/16" ø & REAM TO 15/16" ø WITH PARTS ASSEMBLED IN CORRECT POSITION EXCEPT AS SHOWN.

DESIGN SPECIFICATION

1. 1965 A.A.S.H.O. AND SUBSEQUENT REVISIONS.
2. LIVE LOAD HS20-44
3. DEAD LOAD. CONCRETE = 150 P.C.F.
4. WEIGHT OF EARTH 120 P.C.F.
5. EQUIVALENT FLUID PRESSURE 30 P.C.F.
6. CONCRETE:
   f'c = 3,000 p.s.i. fc = 1,200 p
   fs (REINF.) = 20,000 p.s.i.
7. STRUCTURAL STEEL
   fs (A36) = 20,000 p.s.i.

BAR SUMMARY

ABUTMENT NO. 1 & 2

10,629 L.F. #5 @ 1.043#/ft. =	11,086 LBS.	(R-2)
2,848 L.F. #9 @ 3.400#/ft. =	9,683 LBS.	
Total Abut. #1 & #2	20,769 LBS.	(R-2)

PIER NO. 1, 2 & 3

9,759 L.F. #4 @ 0.668#/ft. =	6,519 LBS.
8,197 L.F. #5 @ 1.043#/ft. =	8,549 LBS.
3,696 L.F. #10 @ 4.303#/ft. =	15,904 LBS.
8,014 L.F. #11 @ 5.313#/ft. =	42,578 LBS.
Total Pier #1, #2 & #3	73,550 LBS.

DECK

52,506 L.F. #4 @ 0.668#/ft. =	34,940 LBS.	(R-2)
289 L.F. #5 @ 1.043#/ft. =	302 LBS.	(R-2)
67,278 L.F. #6 @ 1.502#/ft. =	101,052 LBS.	(R-2)
Total Deck	136,294 LBS.	(R-2)
TOTAL REINFORCING STEEL	230,613 LBS.	(R-2)

BAR LIST - ABUT. NO. 1 & NO. 2

MARK	SIZE	SHAPE	No. REQ'D No. 1	No. REQ'D No. 2	LENGTH
A501	5	2'-9" 1'-2"	168	168	13'-8"
A502	5	—	32	32	40'-0"
A503	5	—	16	16	6'-3"
A504	5	—	166		4'-6"
A505	5	1'-3" 2'-8"	83	83	3'-4"
A506	5	—		166	5'-0"
A507	5	1'-10" 1'-10"	20	20	3'-7"
A508	5	—	4	4	3'-9"
A509	5	—	12	12	2'-9"
A510	5	—	4	4	9'-0"
A511	5	—	8	8	9'-8"
A512	5	—	8	8	5'-0"
A513	5	—	4	4	3'-3"
A514	5	—	4	4	7'-9"
A515	5	—	8	8	11'-9"
A516	5	—	4	4	3'-7"
A517	5	—	4	4	3'-5"
A518	5	—	4	4	3'-4"
A519	5	—	4	4	3'-3"
A520	5	—	4	4	3'-3"
A521	5	—	4	4	3'-2"
A522	5	—	4	4	3'-1"
A523	5	—	4	4	2'-10"
A524	5	—	4	4	2'-9"
A525	5	—	4	4	2'-7"
A526	5	—	4	4	2'-5"
A527	5	—	4	4	2'-3"
(R-2) A534	5	1'-10" 1'-10"	4	4	4'-8"
A901	9	—	32	32	40'-0"
A902	9	—	16	16	9'-0"

DRILLED CAISSON BARS*

(R-2) A401	4	2'-8"	504	9'-5"	
A1101	11	—	156	23'-8"	
A1102	11	—	156	25'-6"	

BAR LIST - PIER NO. 1

MARK	SIZE	SHAPE	NO. REQ'D	LENGTH
P401	4	—	8	34'-6"
P402	4	—	4	15'-5"
P403	4	1'-3" 2'-8" 1'-2"	100	13'-4"
P404	4	2'-8"	126	9'-5"
P501	5	—	6	34'-6"
P502	5	—	3	15'-11"
P503	5	1'-0" 3'-0"	110	7'-8"
P1001	10	—	28	38'-0"
P1002	10	—	14	12'-0"
P1101	11	—	78	24'-4"

DRILLED CAISSON BARS*

(R-2) P405	4	2'-8"	114	9'-5"	
P1102	11	—	78	23'-4"	

* NOTE:
Drilled Caisson Bars Are Shown For Information Only. To Be Paid For Under Item 503 Drilled Caissons.

BAR LIST - PIER NO. 2 & NO. 3

MARK	SIZE	SHAPE	No. REQ'D No. 2	No. REQ'D No. 3	LENGTH
P401	4	—	8	8	34'-6"
P402	4	—	4	4	15'-5"
P403	4	1'-3" 2'-8" 1'-2"	100	100	13'-4"
P404	4	2'-8"	180	180	9'-5"
P501	5	—	131	131	10'-3"
P502	5	—	88	88	15'-0"
P503	5	—	44	44	5'-0"
P504	5	1'-0"	11	11	3'-0"
P505	5	—	44	44	7'-0"
P506	5	—	22	22	14'-8"
P1001	10	—	28	28	38'-0"
P1002	10	—	14	14	12'-0"
P1101	11	—	39	39	22'-9"
P1102	11	—	39	39	24'-6"
P1103	11	—	78	78	15'-7"

DRILLED CAISSON BARS*

(R-2) P405	4	2'-8"	120	9'-5"	
P1104	11	—	156	14'-10"	

BAR LIST - DECK

MARK	SIZE	SHAPE	NO. REQ'D	LENGTH
C401	4	1'-7"	480	2'-7"
C402	4	—	24	40'-0"
C403	4	—	6	40'-0"
C404	4	—	6	37'-0"
(R-2) C405	4	5'-5" 0'-10"	240	5'-4"
C406	4	—	6	6'-6"
(R-2) S542	5	1'-0" 1'-0"	62	4'-8"
(R-2) C601	6	0'-5" 3'-3"	240	4'-3"
S401	4	—	910	40'-0"
S402	4	—	166	6'-6"
S403	4	—	166	37'-0"
S404	4	—	168	28'-0"
S601	6	—	1636	40'-6"

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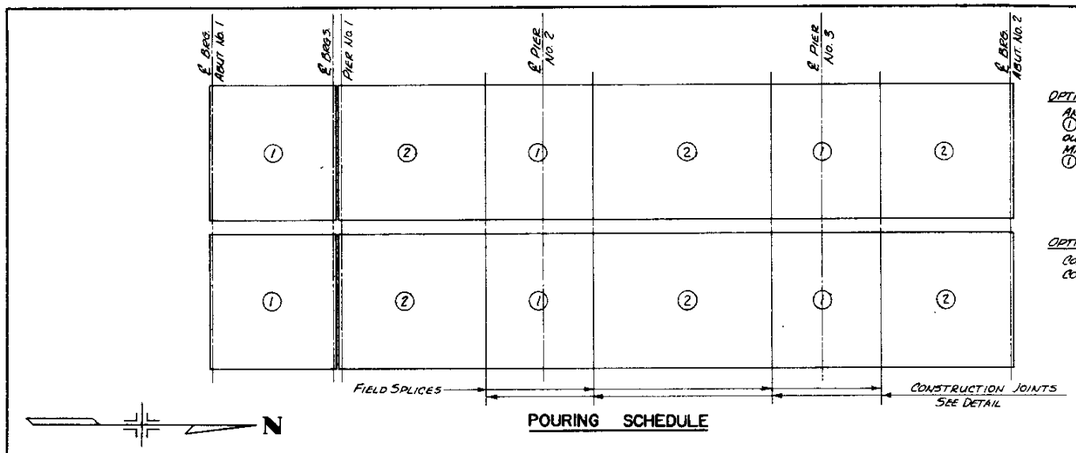
DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
GENERAL NOTES
SUMMARY OF QUANTITIES & REINFORCING BAR LIST
RELOCATED CLEAR CREEK,
Across COOR'S ACCESS ROAD & RAILROAD
Sta. 9+41.0 McINTYRE ST.
Near GOLDEN Sec. 24 T. 3S R. 70W.
Designed by R F R | Approved by
Made by D S
Checked by W A S | Date: 19

REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1(2)	21	

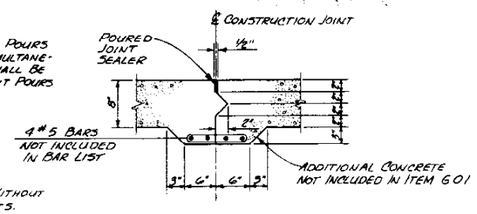
(R-2) ADDED DETAIL TCF 1-7-71



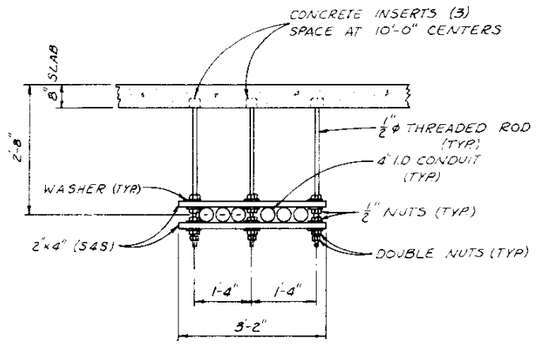
POURING SCHEDULE

OPTION "A"
ANY COMBINATION OF POURS ① CAN BE MADE SIMULTANEOUSLY. POURS ② SHALL BE MADE AFTER ADJACENT POURS ① ARE COMPLETED.

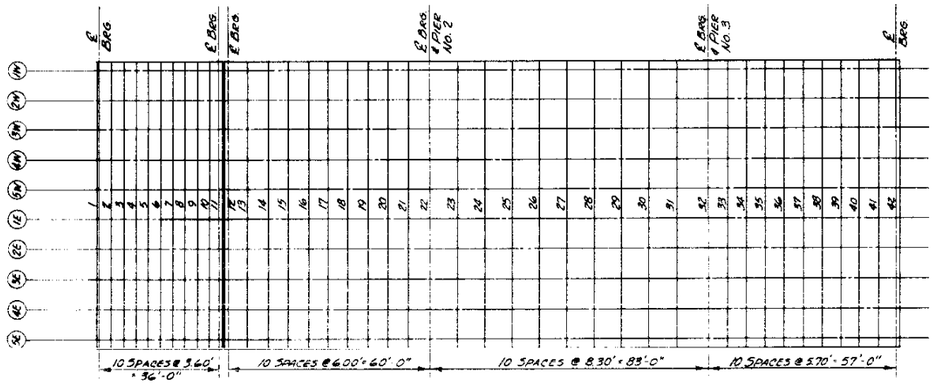
OPTION "B"
CONTINUOUS POUR WITHOUT CONSTRUCTION JOINTS.



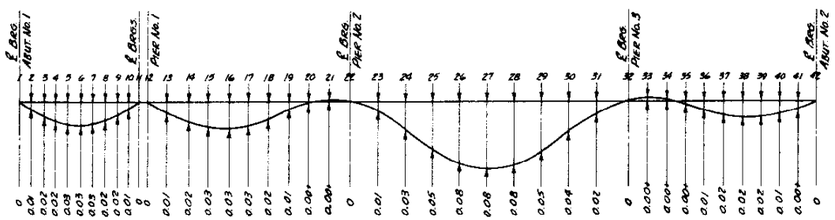
DETAIL OF SLAB CONSTRUCTION JOINT



SUSPENDED TELEPHONE CONDUIT DETAILS (R-2)



DECK PLAN



DEAD LOAD DEFLECTION DIAGRAM

TOP OF DECK - ELEVATION 5500.00 +

GIRDER NO.	SPAN NO. 1 = 36'-0"											SPAN NO. 2 = 60'-0"											SPAN NO. 3 = 83'-0"											SPAN NO. 4 = 57'-0"										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
1W	51.21	51.28	51.36	51.42	51.49	51.55	51.62	51.67	51.73	51.78	51.84	51.87	51.93	52.10	52.22	52.32	52.42	52.52	52.61	52.71	52.81	52.92	53.07	53.24	53.40	53.58	53.72	53.87	53.98	54.12	54.24	54.37	54.47	54.57	54.67	54.77	54.88	54.98	55.08	55.17	55.26	55.36
2W	51.34	51.42	51.49	51.55	51.63	51.69	51.75	51.80	51.87	51.92	51.97	52.01	52.12	52.24	52.35	52.46	52.56	52.66	52.75	52.85	52.95	53.05	53.21	53.37	53.54	53.71	53.86	54.00	54.12	54.25	54.38	54.50	54.60	54.70	54.80	54.91	55.02	55.12	55.22	55.31	55.40	55.50
3W	51.48	51.55	51.62	51.69	51.76	51.82	51.89	51.94	52.00	52.05	52.11	52.14	52.25	52.37	52.49	52.59	52.69	52.79	52.88	52.98	53.08	53.19	53.34	53.51	53.67	53.85	53.99	54.14	54.25	54.39	54.51	54.64	54.74	54.84	54.94	55.04	55.15	55.25	55.35	55.44	55.53	55.63
4W	51.61	51.69	51.76	51.82	51.90	51.96	52.02	52.07	52.14	52.19	52.24	52.28	52.39	52.51	52.62	52.73	52.83	52.93	53.02	53.12	53.22	53.32	53.48	53.64	53.81	53.98	54.13	54.27	54.39	54.52	54.65	54.77	54.87	54.97	55.07	55.18	55.29	55.39	55.49	55.58	55.67	55.77
5W	51.75	51.82	51.90	51.96	52.03	52.09	52.14	52.21	52.27	52.32	52.38	52.41	52.53	52.64	52.76	52.86	52.96	53.06	53.15	53.25	53.35	53.46	53.61	53.78	53.94	54.12	54.26	54.41	54.52	54.66	54.78	54.91	55.01	55.11	55.21	55.31	55.42	55.52	55.62	55.71	55.80	55.90
1E	51.75	51.82	51.90	51.96	52.03	52.09	52.14	52.21	52.27	52.32	52.38	52.41	52.53	52.64	52.76	52.86	52.96	53.06	53.15	53.25	53.35	53.46	53.61	53.78	53.94	54.12	54.26	54.41	54.52	54.66	54.78	54.91	55.01	55.11	55.21	55.31	55.42	55.52	55.62	55.71	55.80	55.90
2E	51.61	51.69	51.76	51.82	51.90	51.96	52.02	52.07	52.14	52.19	52.24	52.28	52.39	52.51	52.62	52.73	52.83	52.93	53.02	53.12	53.22	53.32	53.48	53.64	53.81	53.98	54.13	54.27	54.39	54.52	54.65	54.77	54.87	54.97	55.07	55.18	55.29	55.39	55.49	55.58	55.67	55.77
3E	51.48	51.55	51.62	51.69	51.76	51.82	51.89	51.94	52.00	52.05	52.11	52.14	52.25	52.37	52.49	52.59	52.69	52.79	52.88	52.98	53.08	53.19	53.34	53.51	53.67	53.85	53.99	54.14	54.25	54.39	54.51	54.64	54.74	54.84	54.94	55.04	55.15	55.25	55.35	55.44	55.53	55.63
4E	51.34	51.42	51.49	51.55	51.63	51.69	51.75	51.80	51.87	51.92	51.97	52.01	52.12	52.24	52.35	52.46	52.56	52.66	52.75	52.85	52.95	53.05	53.21	53.37	53.54	53.71	53.86	54.00	54.12	54.25	54.38	54.50	54.60	54.70	54.80	54.91	55.02	55.12	55.22	55.31	55.40	55.50
5E	51.21	51.28	51.36	51.42	51.49	51.55	51.62	51.67	51.73	51.78	51.84	51.87	51.99	52.10	52.22	52.32	52.42	52.52	52.61	52.71	52.81	52.92	53.07	53.24	53.40	53.58	53.72	53.87	53.98	54.12	54.24	54.37	54.47	54.57	54.67	54.77	54.88	54.98	55.08	55.17	55.26	55.36

NOTE: ALL ELEVATIONS INCLUDE DEAD LOAD DEFLECTION

FINISH DECK ELEVATIONS AT ℄ OF GIRDERS

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DENVER, COLORADO

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

MISCELLANEOUS DETAILS

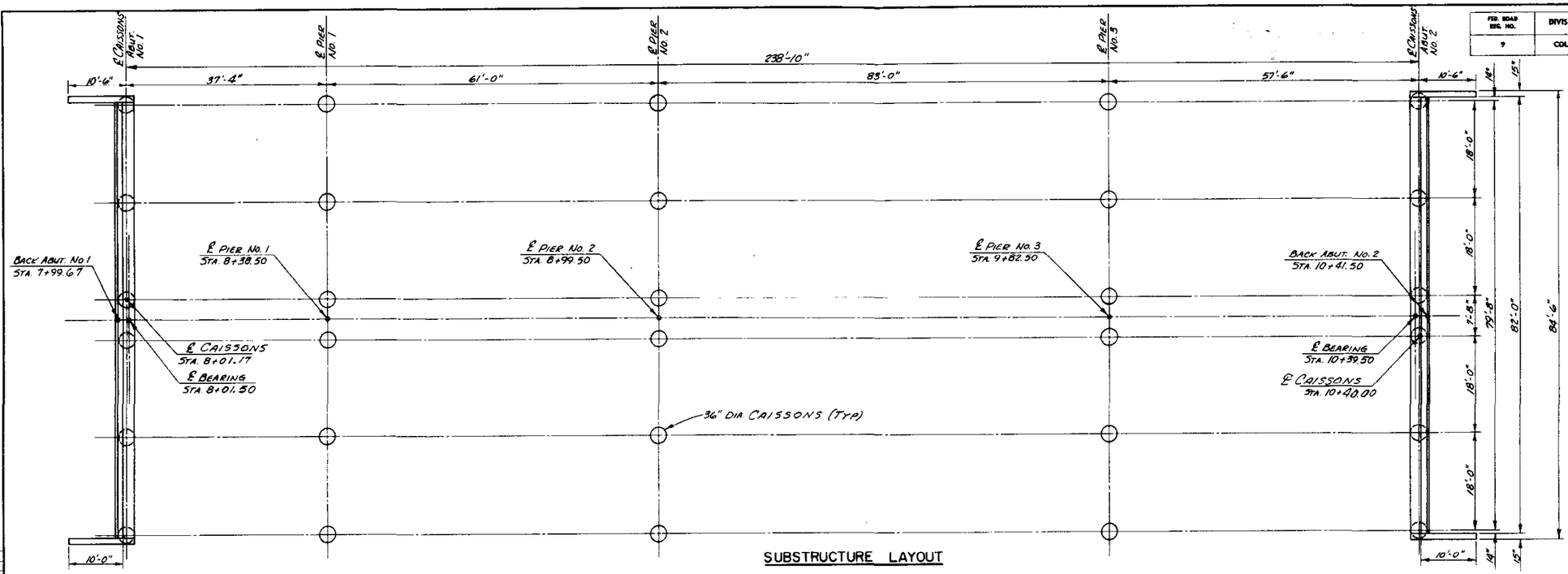
RELOCATED CLEAR CREEK,
Across COOR'S ACCESS ROAD & RAILROAD
Sta. 9+41.0 McINTIRE ST.
Near GOLDEN Sec. 24 T. 3S R. 70W

Designed by R.E.R. | Approved by
Made by D.S.
Checked by W.H.S. | Date: 19

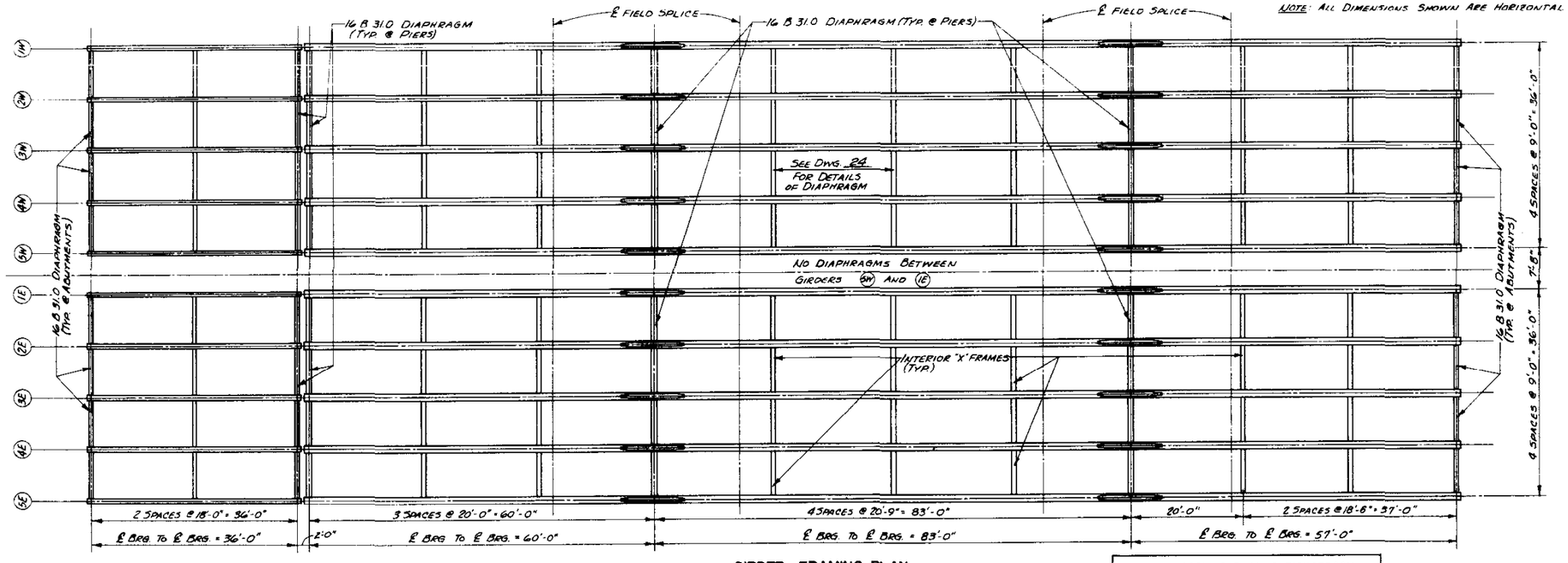
REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1(2)	22	

AS CONSTRUCTED
REVISIONS DATE



SUBSTRUCTURE LAYOUT



NOTE: ALL DIMENSIONS SHOWN ARE HORIZONTAL

N

GIRDER FRAMING PLAN

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DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
SUBSTRUCTURE LAYOUT
&
GIRDER FRAMING PLAN
RELOCATED CLEAR CREEK,
Across COOR'S ACCESS ROAD & RAILROAD
Sta. 9+41.0 McINTYRE ST.
Near GOLDEN Sec. 24 T. 3S. R. 70 W

Designed by R.E.R.	Approved by
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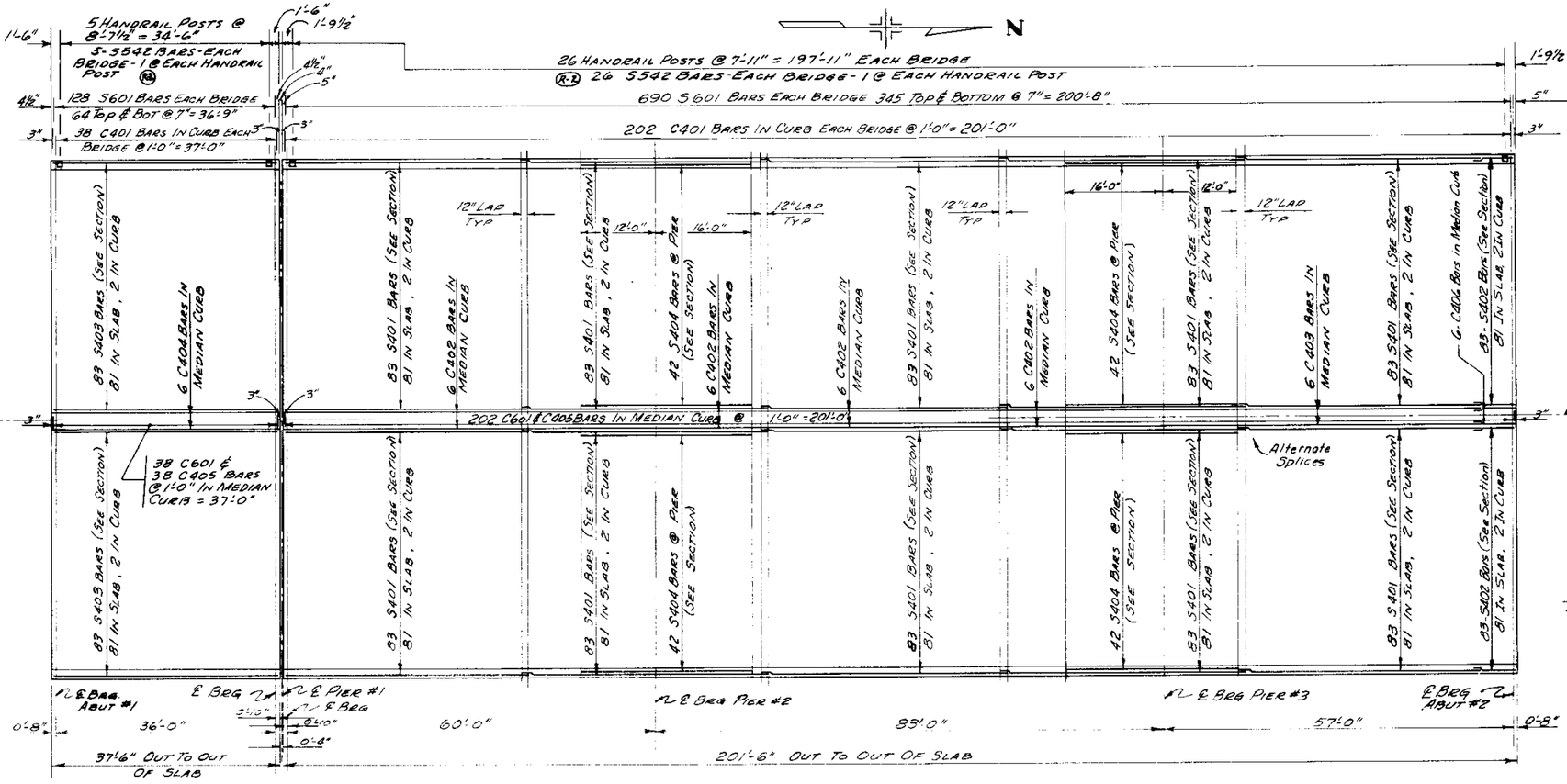
REVISIONS

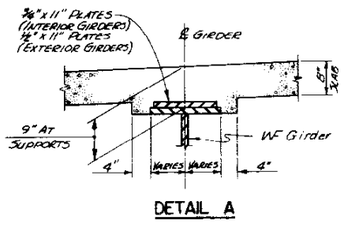
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO	TOTAL SHEETS
9	COLO.	F 058-1 (2)	23	

(R-2) ADD GAS LINE TELE CONDUIT & NOTE DGS 1-7-71

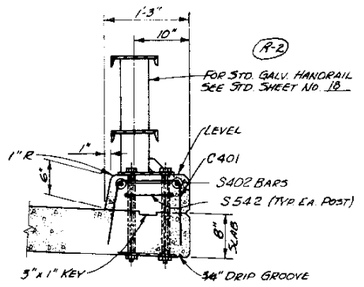
AS CONSTRUCTED



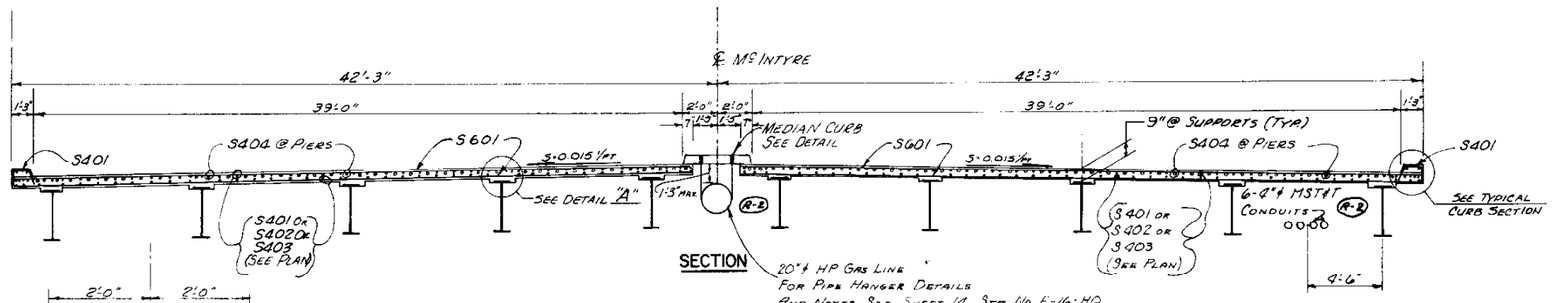
PLAN



DETAIL A



TYPICAL CURB SECTION



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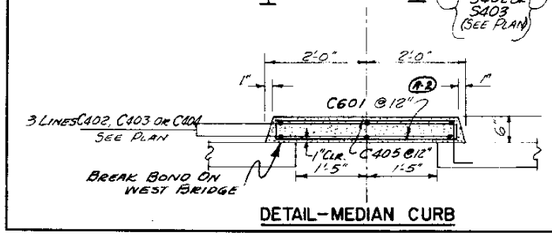

DETAIL-MEDIAN CURB

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DENVER, COLORADO

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DECK
PLAN & SECTION

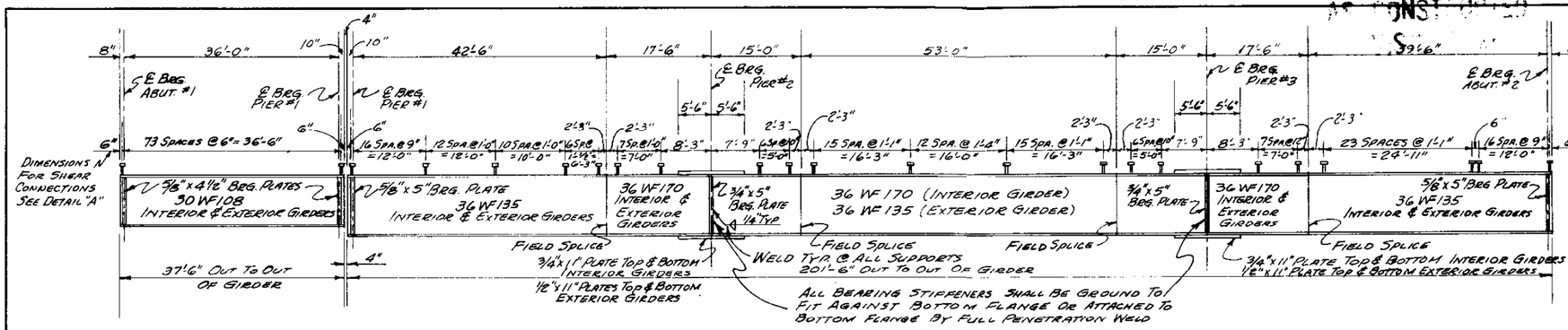
RELOCATED CLEAR CREEK,
Across COOR'S ACCESS ROAD & RAILROAD
Sta. 9+41.0 Mc INTYRE ST.
Near GOLDEN Sec. 24 T. 3S. R. 70W.

Designed by R.E.R	Approved by
Made by A.T.	
Checked by W.A.S.	Date: 19

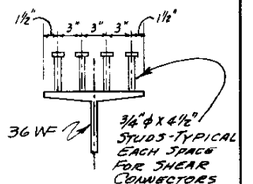
REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F058-1 (2)	24	

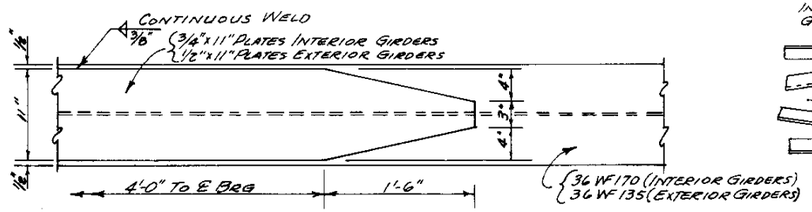
(R-2) 1-7-71 Shear Conn. Spacing, Conduits, and note CUC



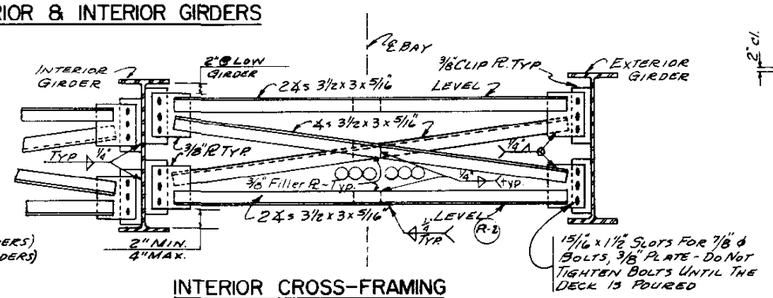
DETAIL EXTERIOR & INTERIOR GIRDERS



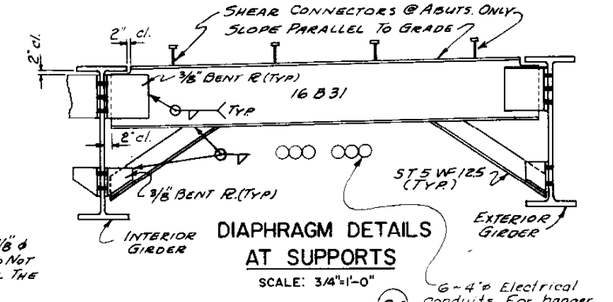
DETAIL "A"
SCALE: 1½"=1'-0"



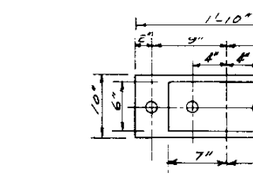
COVER PLATE DETAILS
SCALE: 1½"=1'-0"



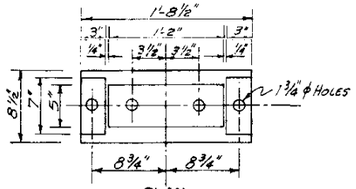
INTERIOR CROSS-FRAMING
SCALE: 3/4"=1'-0"



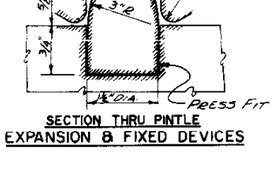
DIAPHRAGM DETAILS AT SUPPORTS
SCALE: 3/4"=1'-0"



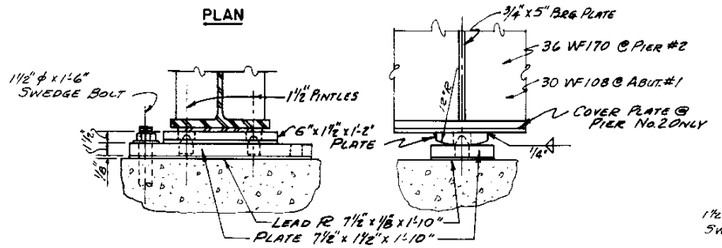
PLAN



PLAN

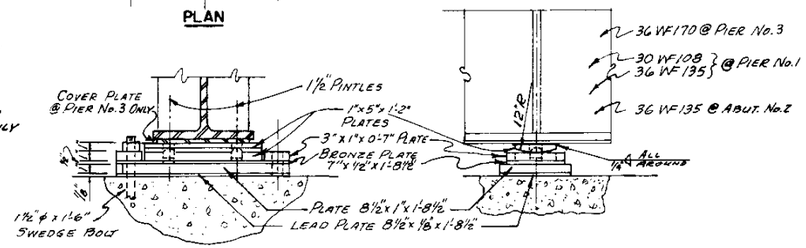


SECTION THRU PINTLE EXPANSION & FIXED DEVICES



ELEVATION END VIEW

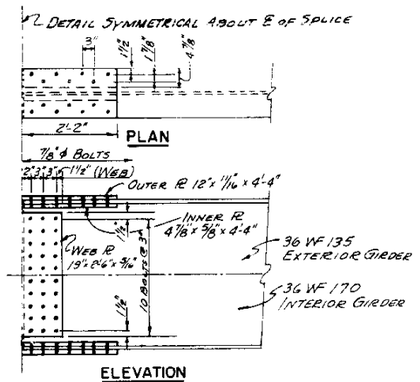
FIXED BEARING DEVICE AT PIER NO. 2 & ABUT. NO. 1
SCALE: 1½"=1'-0"



ELEVATION END VIEW

EXPANSION BEARING DEVICE AT PIERS NO. 1 & NO. 3 & ABUT. NO. 2

Note: All anchor bolts shall be snugged and jammed. (R-2)



FIELD SPLICE DETAIL
SCALE: 3/4"=1'-0"

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CAPITOL LIFE CENTER
DENVER, COLORADO

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

GIRDER DETAILS

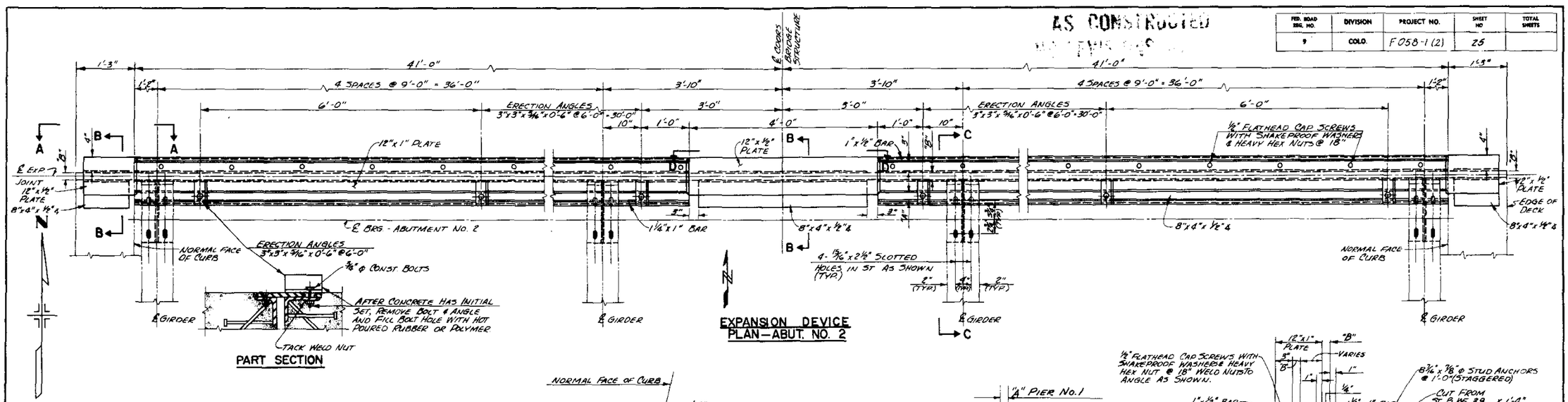
RELOCATED CLEAR CREEK, Across COOR'S ACCESS ROAD & RAILROAD
Sta. 9 + 41.0 McINTYRE ST.
Near GOLDEN Sec. 24 T. 3 S R. 70 W

Designed by R.E.R.	Approved by
Made by A.T.	
Checked by W.A.S.	Date: 19

REVISIONS

AS CONSTRUCTED

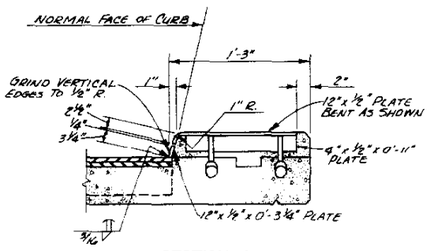
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO	TOTAL SHEETS
9	COLO.	F 058-1(2)	25	



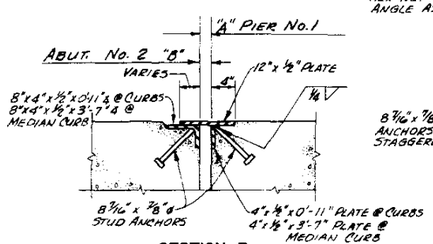
PART SECTION

EXPANSION DEVICE PLAN—ABUT. NO. 2

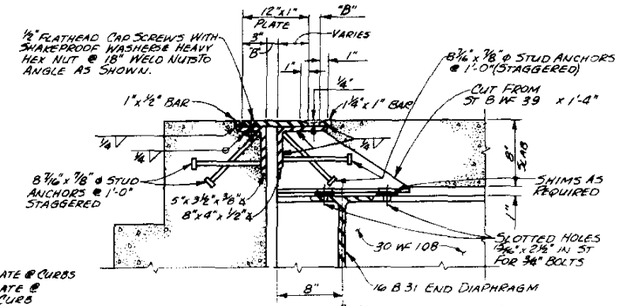
TEMPERATURE VARIATION TABLE ABUTMENT NO. 2 & PIER #1		
TEMPERATURE °F	DIMENSION "A" PIER NO. 1	DIMENSION "B" ABUT. NO. 2
40°	4 1/8"	4 7/32"
60°	4"	4"
80°	3 7/8"	3 29/32"
100°	3 11/16"	3 9/16"



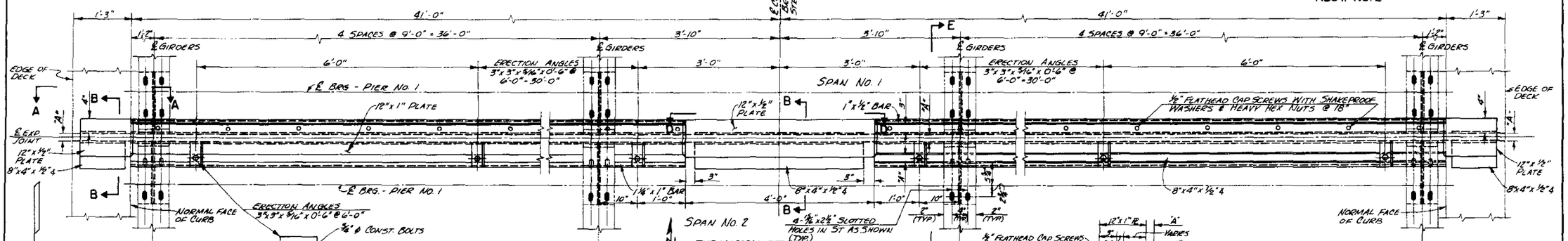
SECTION A
ABUT. NO. 2
PIER NO. 1



SECTION B
ABUT. NO. 2
PIER NO. 1

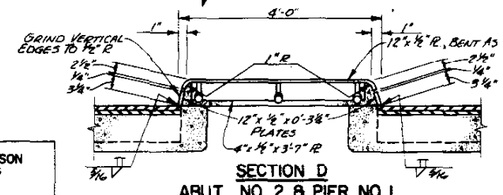


SECTION C
ABUT. NO. 2

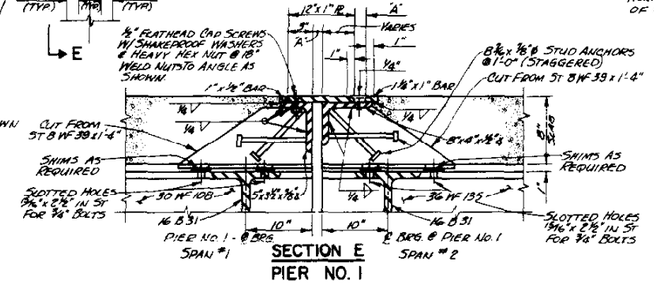


PART SECTION

EXPANSION DEVICE PLAN—PIER NO. 1



SECTION D
ABUT. NO. 2 & PIER NO. 1



SECTION E
PIER NO. 1

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DENVER, COLORADO

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DECK EXPANSION DEVICES AND DETAILS

RELOCATED CLEAR CREEK, COORS ACCESS ROAD & RAILROAD
Across Sta. 9+41.0 McINTYRE ST.
Near GOLDEN Sec. 24 T. 3S R. 70W.

Designed by H.E.R.	Approved by
Made by D.C.	
Checked by W.A.S.	Date: 19

REVISIONS

1-7-71	Gas line	RJS
1-7-71	Reinforcing Steel	RJS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1 (2)	26	

ELEV.	ABUT. No. 1	ABUT. No. 2
A	5547.71	5551.35
B	5547.84	5551.49
C	5547.98	5551.62
D	5548.11	5551.76
E	5548.25	5551.89
F	5551.19	5555.34
G	5551.78	5555.93
H	5544.12	5547.85

ABUT. No. 2 N

ABUT. No. 1 N

E MCINTYRE

NOTCH FOR COMPRESSIBLE FILLER - ABUT. No. 1. FOR GROOVE DIMENSIONS SEE MANUFACTURER'S RECOMMENDATIONS. 83 A505 BARS @ 12" = 82'-0" ABUT. #1 & ABUT. #2.

2" R-2

NOTE: JOINT SEALER IN UNCOMPRESSED POSITION

TYPE "A" JOINT DETAIL - ABUT. NO. 1

FOR GROOVE DIMENSIONS SEE MANUFACTURER'S RECOMMENDATIONS

TOOLED CORNERS

JOINT SEALER

AS CONSTRUCTED

REVISED

2 Handrail Posts at Each Wing

6" 12" deep

6½"

APPROACH SLAB NOTCH BACK WALL

24" Pipe sleeve for 20" H.P. Gas line (To be furnished by Public Service Company of Colorado) R-2

8¾" ABUT No. 2 (TYP.)

9" ABUT. No. 1 (TYP.)

SLOPE

LEVEL

℄ E BEARING

1½" ϕ x 1'-6" LONG ANCHOR BOLTS

ABUT. No. 2

ABUT. No. 1

42'-3"

PLAN ABUT. NO. 1 & ABUT. NO. 2

EL. "H" LEVEL

EL. A

EL. B

EL. C

EL. D

EL. E

EL. F

EL. G

SLOPE .015 FT/FT

2-A502 E.F.

8 A901 ABUT #1 & ABUT #2

2 A502 ABUT #1 & ABUT #2

2 A503 ABUT #1 & ABUT #2

8 A902 ABUT #1 & ABUT #2

166 A504 @ 12" (2 EACH SPACE) ABUT #1 = 82'-0"

166 A506 @ 12" (2 EACH SPACE) ABUT #2 = 82'-0"

Typ. Lap 1'-3"

2'-6" Lap

R-2 Note: Cut or bend A 503 bars to clear opening

168-A501 BARS @ 12" (2 EACH SPACE) = 83'-0" ABUT. #1 & ABUT. #2.

SEE TYPE "A" JOINT DETAIL ABUT. No1 THIS SHEET R-2

SEE EXPANSION DEVICE DETAIL ABUT. No. 2 (Sheet 25) R-2

A 505 ABUT. #1 & ABUT. #2

A 504 ABUT. #1

A 506 ABUT. #2

ABUT. No. 1

ABUT. No. 2

2"x6" CONT. KEY

A 502 & A 503

A 501

A 901 BARS & A 902 BARS

A 502 BARS & A 503 BARS

EL. "H"

VARIES

SECTION THRU ABUT.

ELEVATION ABUT. NO. 1 & ABUT. NO. 2

10 A507 @ 12" = 9'-0"

1-A534 (Typ.) @ Each Handrail Post

1-A534

1-A511 Eq. Face

EL. "F"

½" Exp. Jt. Filler Type 3

1-A508 E.F.

3-A509 E.F.

1-A513 E.F.

A527

A516

1-A514 EA. FA.

1-A510 EA. FA.

1-A515 Eq. Face

A513 to A515 @ 12" Eq. Face

1-A516 to A527 @ 9" Eq. Face

CONSTRUCTION JOINT OPTIONAL

4-A512 @ 9" (Near Face)

TYPICAL ELEVATION OF WINGWALL

A-507

TOP OF WINGWALLS PARALLEL TO GRADE

A511 E.F.

A515 E.F.

A534 @ Handrail Post

A508 & A509 Bars E.F.

A-516 to A527 @ 9"

TYPICAL SECTION THRU WINGWALL

WINGWALL DETAILS TYPICAL AT ABUT. NO. 1 & ABUT. NO. 2

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DENVER, COLORADO

℄ COLUMN

12" SQUARE KEY (TYP.) @ EL. H

13-#11 BARS EXTEND 2'-9" ABOVE TOP OF COLUMN.

ABUT #1 40-A401 @ 12" = 39'-0"

ABUT #2 44-A401 @ 12" = 45'-0"

3'-0" DIAMETER

44-A 401 @ 12" Abut. #2

40-A401 @ 12" Abut. #1

stagger splices

12" SQUARE x 4" Deep KEY TOP OF COLUMN

2" CLEAR

13 A1101 BARS ABUT #1
13 A1102 BARS ABUT #2

SECTION - ABUT. CAISSONS

Caisson No	Abut. 1 Bott. Elev's	Abut. 2 Bott. Elev's
3W	5503.10	5503.10
2W	5504.00	5503.95
1W	5503.80	5502.90
1E	5503.80	5503.90
2E	5504.70	5503.80
3E	5503.90	5502.95

Elev. 5504.00

TYPICAL ABUT. CAISSON 12 REQ'D.

DEPARTMENT OF HIGHWAYS STATE OF COLORADO

ABUTMENT DETAILS

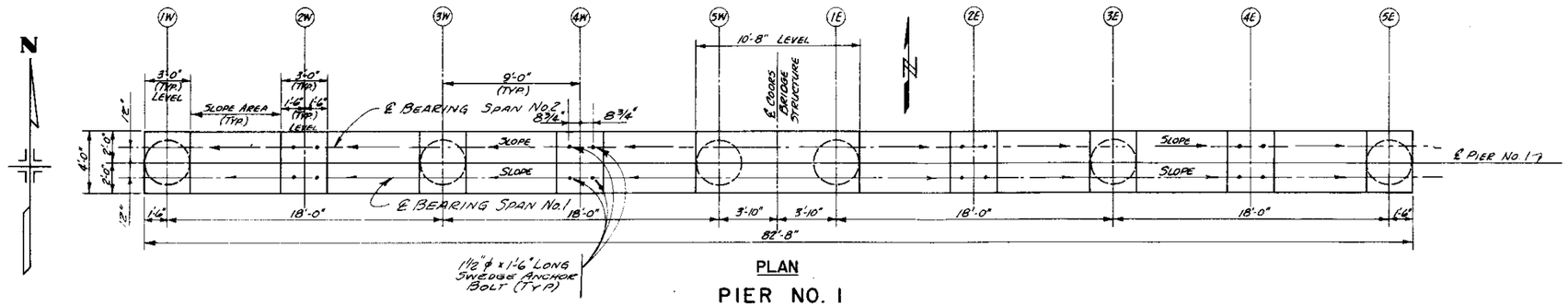
RELOCATED CLEAR CREEK,
Across COORS ACCESS ROAD & RAILROAD
Sta. 9+41.0 Mc INTYRE ST.
Near GOLDEN Sec. 24 T. 3S R. 70W

Designed by R.E.R.
Made by A.T.
Checked by W.A.S.
Approved by
Date: 19

REVISIONS

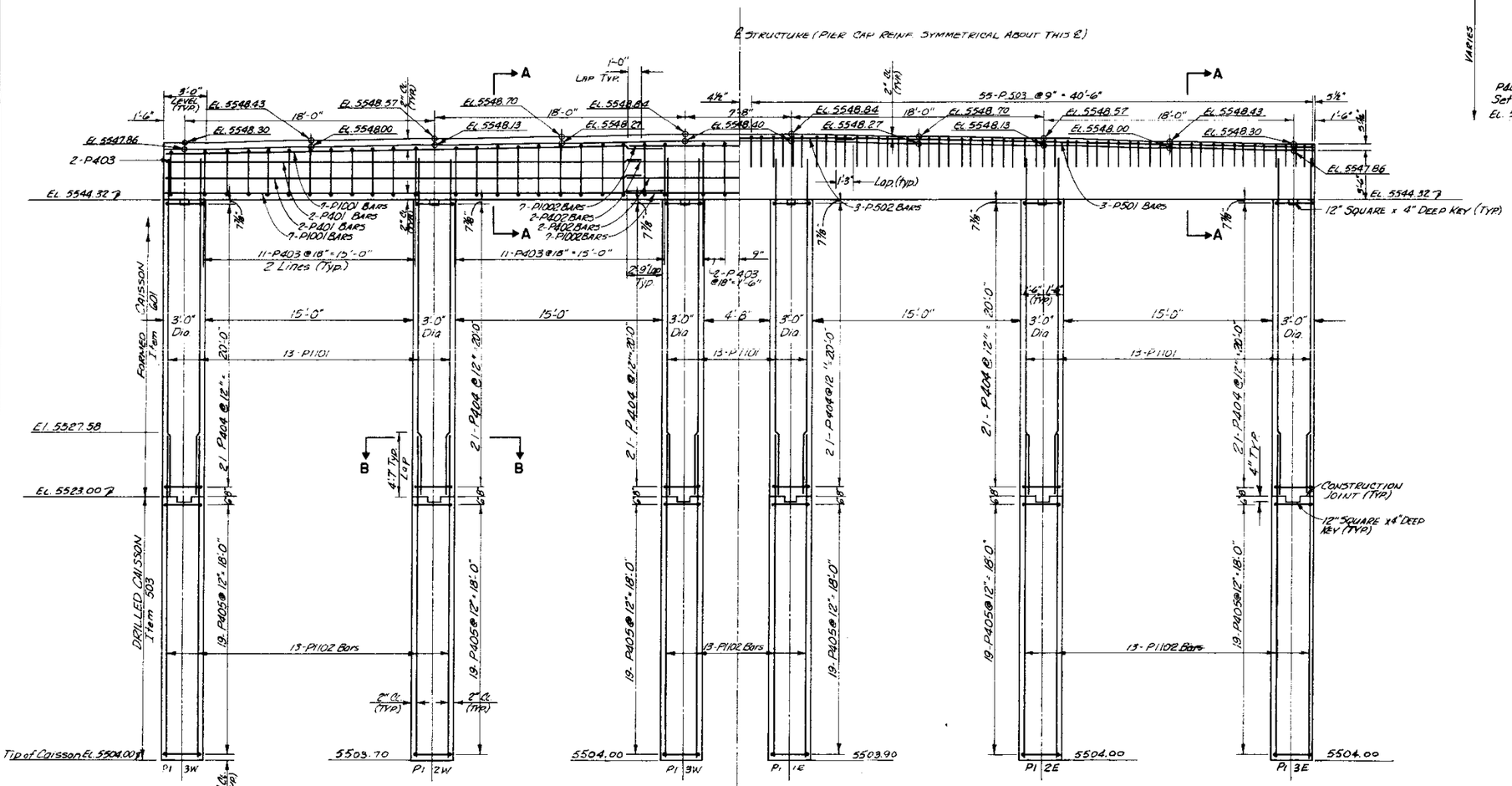
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1 (2)	27	

AS CONSTRUCTED



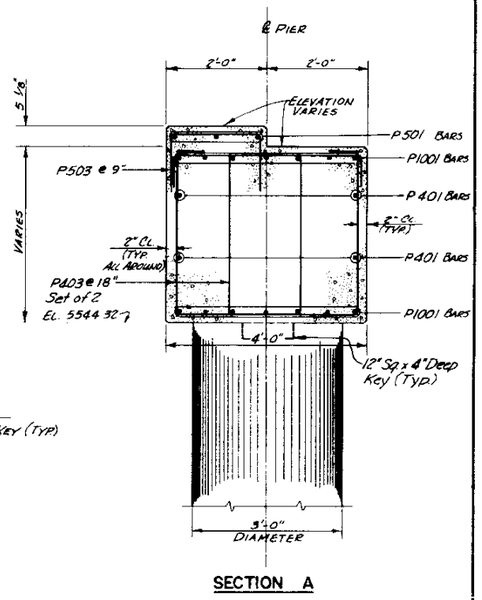
PLAN

PIER NO. 1

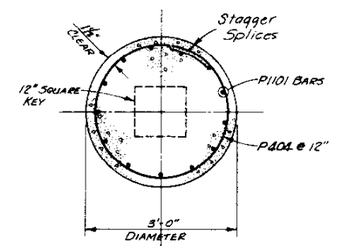


ELEVATION

PIER NO. 1



SECTION A



SECTION B

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

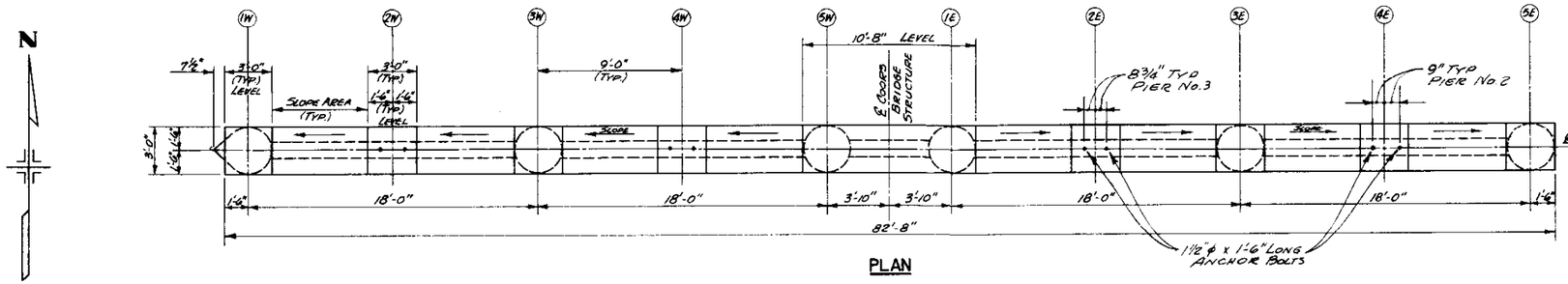
PIER NO. 1
DETAILS

RELOCATED CLEAR CREEK,
Across COORS ACCESS ROAD & RAILROAD
Sta. 9+41.0 McINTYRE ST.
Near GOLDEN Sec. 24 T. 3S R. 70W

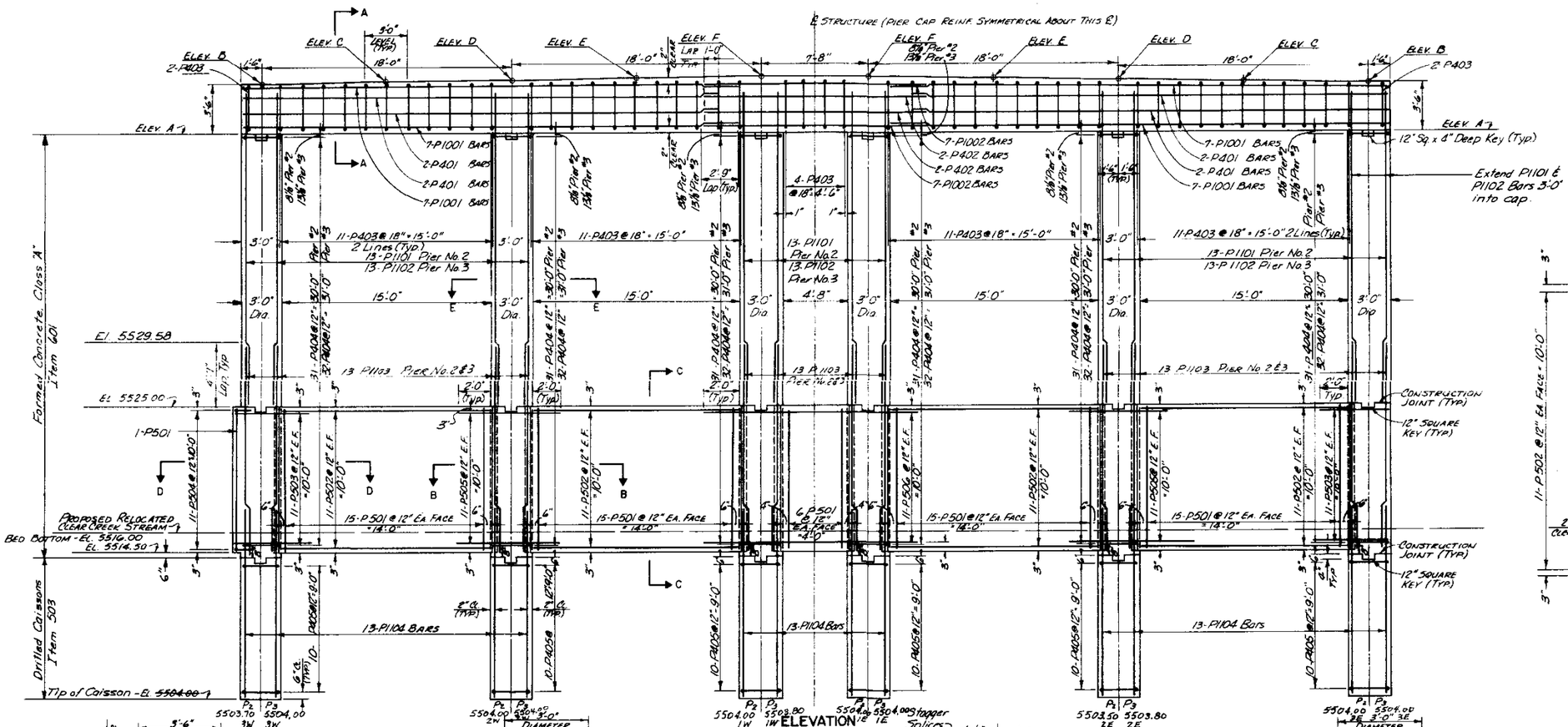
Designed by P.E.R.	Approved by
Made by D.S.	
Checked by W.A.S.	Date: 19

REVISIONS

REG. ROAD DESC. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1(2)	28	



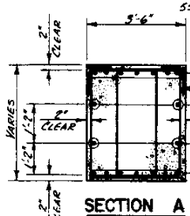
PLAN



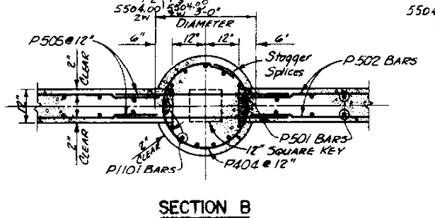
ELEVATION

Pier Cap Elevations

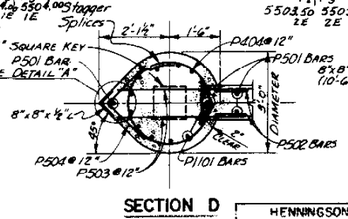
Elev.	Pier No.2	Pier No.3
A	5545.36	5546.76
B	5548.85	5550.26
C	5548.96	5550.37
D	5549.10	5550.31
E	5549.23	5550.68
F	5549.37	5550.78



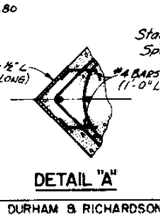
SECTION A



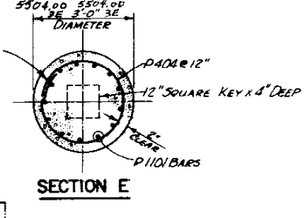
SECTION B



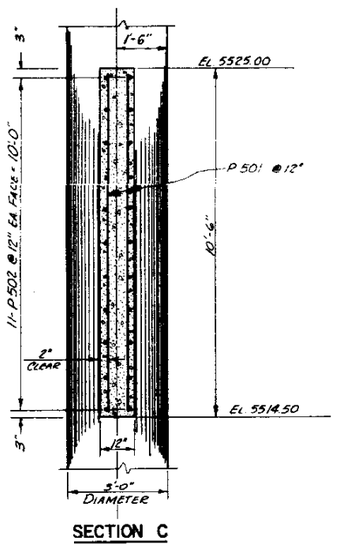
SECTION D



DETAIL "A"



SECTION E



SECTION C

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS - PLANNERS CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

DEPARTMENT OF HIGHWAYS STATE OF COLORADO

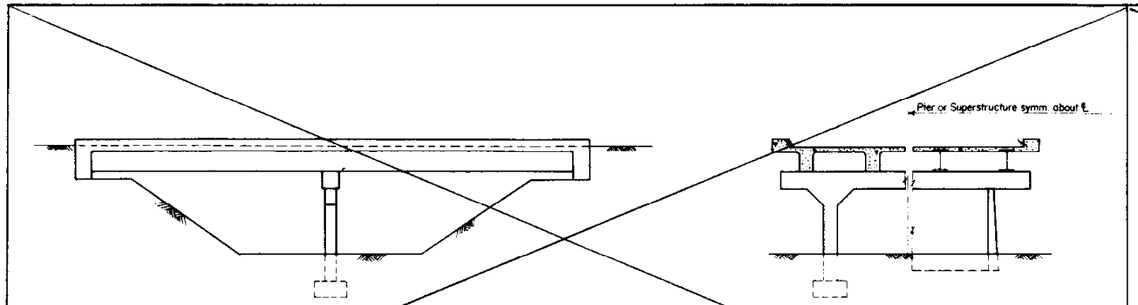
PIER NO. 2 & 3 DETAILS

RELOCATED CLEAR CREEK
Across COOR'S ACCESS ROAD & RAILROAD
Sta. 9+41.0 Mc INTYRE ST
Near GOLDEN Sec. 24 T. 3S R. 70W

Designed by R.E.R.	Approved by
Made by D.S.	
Checked by W.A.S.	Date: 19

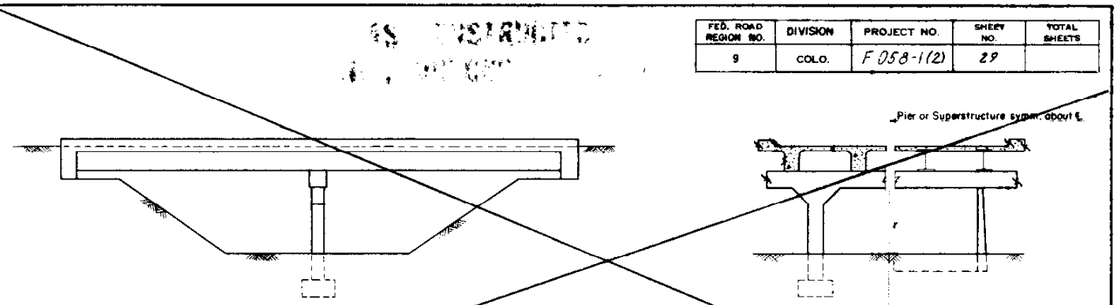
REVISIONS

FED. ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1(12)	29	



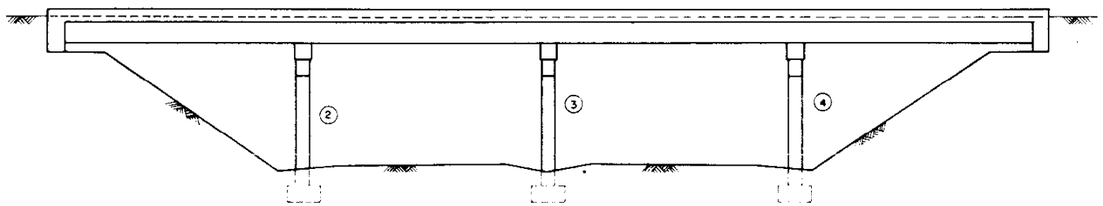
PIER AND SUPERSTRUCTURE

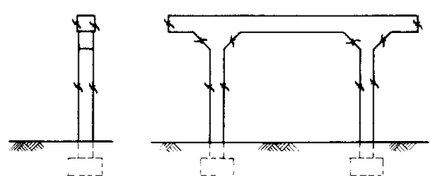
RURAL STREAM CROSSING



PIER AND SUPERSTRUCTURE

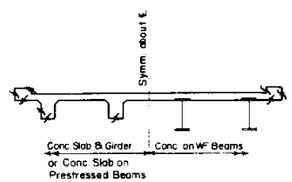
STREAM CROSSING IN OR NEAR URBAN AREA





Piers 2,3 & 4

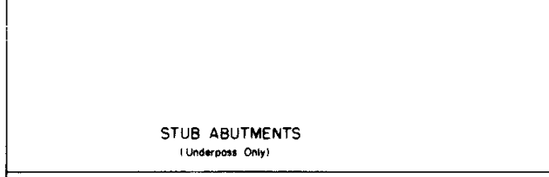
All Piers



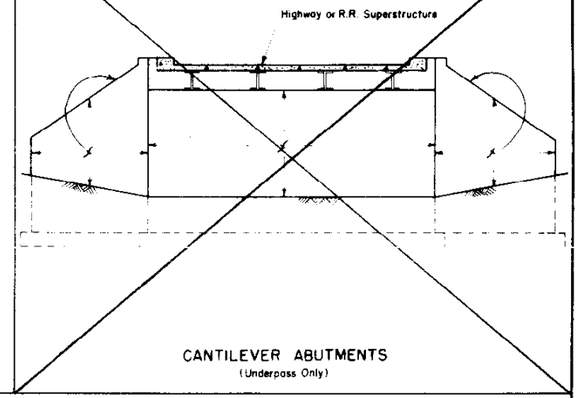
Superstructure

In case of round columns the whole column shall receive Class 2 finish on all Piers

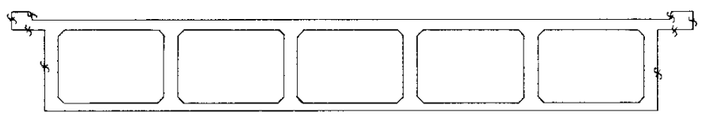
UNDERPASS



STUB ABUTMENTS
(Underpass Only)



CANTILEVER ABUTMENTS
(Underpass Only)



SUPERSTRUCTURE - BOX GIRDER

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

16 (10-20-67)

COLORADO
DEPARTMENT OF HIGHWAYS

DETAILS SHOWING PORTIONS OF STRUCTURE TO RECEIVE CLASS 2 SURFACE FINISH.
Across CLEAR CREEK ON McINTYRE ST.
and
UNDER McINTYRE ST.
Sta. 219 + 91.84
Near GOLDEN Sec. 24 T. 3S R. 70W

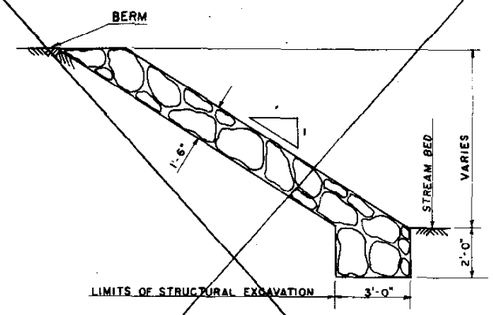
Designed by A.D.N.	Approved by
Made by R.R.A.-J.B.	Bridge Engineer
Checked by W.A.S.	Date: 19

UNDER McINTYRE ST. BRIDGE STRUCTURE NO. Coors St. & E-16-HQ

REVISIONS

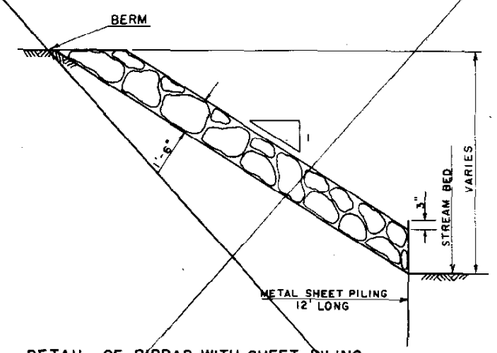
FED. ROAD DIV. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 058-1(2)	30	

AS CONSTRUCTED
NO REVISION



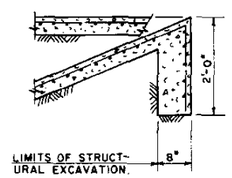
DETAIL OF RIPRAP WITH TOE

NOTES:
TRANSITION ENDS OF RIPRAP MAY BE MODIFIED BY THE ENGINEER TO FIT CONDITIONS ENCOUNTERED IN THE FIELD.

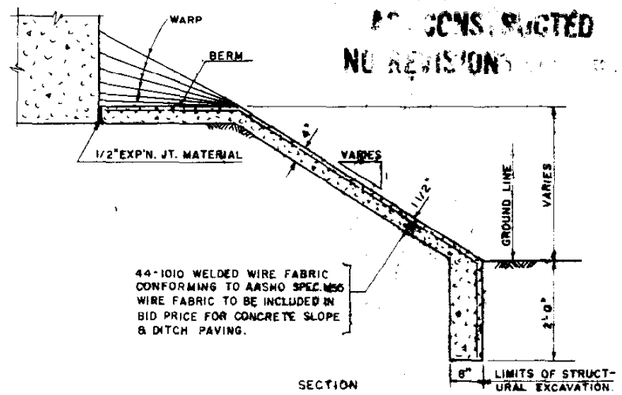


DETAIL OF RIPRAP WITH SHEET PILING

NOTES:
TRANSITION ENDS OF RIPRAP MAY BE MODIFIED BY THE ENGINEER TO FIT CONDITIONS ENCOUNTERED IN THE FIELD.



SECTION THRU CUTOFF WALL.

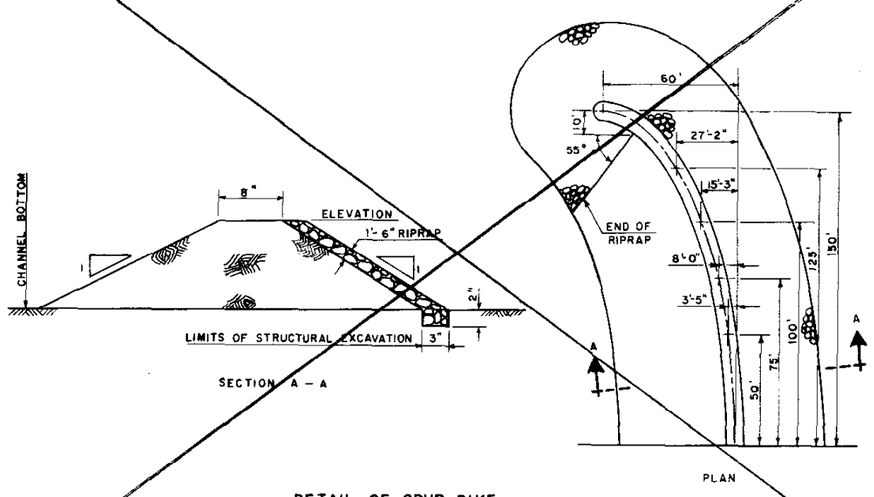


SECTION

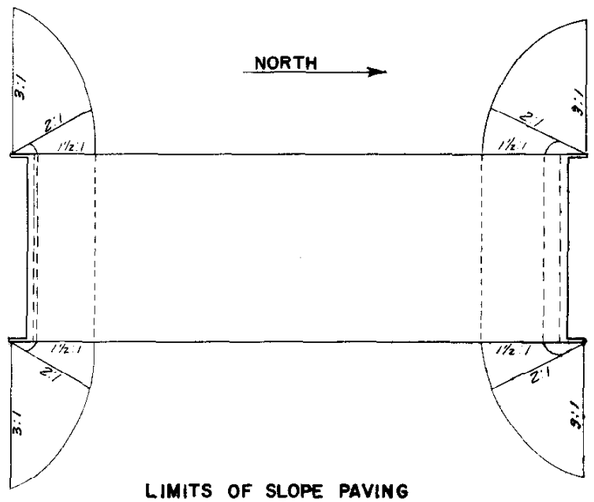
DETAIL OF SLOPE PAVING

NOTES:
WIRE FABRIC SHALL BE 2" FROM THE END OF JOINTS AND SHALL LAP 4" AT SPLICES.
SLOPE PAVING SHALL BE POURED IN 10 FT. TRANSVERSE SECTIONS WITH A TOOLED CONSTRUCTION JOINT AT EACH SECTION.
WHERE SLOPE OR BERM PAVING BUTTS AGAINST THE ABUTMENT OR WINGS, SEPARATE WITH 1/2" EXP'N. JT. MAT'L. TYPE II. (INCLUDE IN BID PRICE FOR ITEM 507).
TRANSITION ENDS OF SLOPE PAVING MAY BE MODIFIED BY THE ENGINEER TO FIT CONDITIONS ENCOUNTERED IN THE FIELD.
ALL WORK NECESSARY BY THESE REQUIREMENTS SHALL BE INCLUDED IN THE BID PRICE FOR ITEM NUMBER 507.
CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 601. CONCRETE SHALL BE CLASS "D".

Initial	Date
DSN	10 '67



DETAIL OF SPUR DIKE



LIMITS OF SLOPE PAVING
SCALE: 1" = 30'

17.A (10-20-67)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

SLOPE PAVING DETAILS

RELOCATED CLEAR CREEK
Across COORS ACCESS ROAD & RAILROAD
Sta. 92+10 BRINTNIRE ST.
Near GOLDEN Sec. R4 T. 3S R. 70W

Designed by R.E.W.	Approved by
Made by D.S.	Bridge Engineer
Checked by W.A.S.	Date: 19

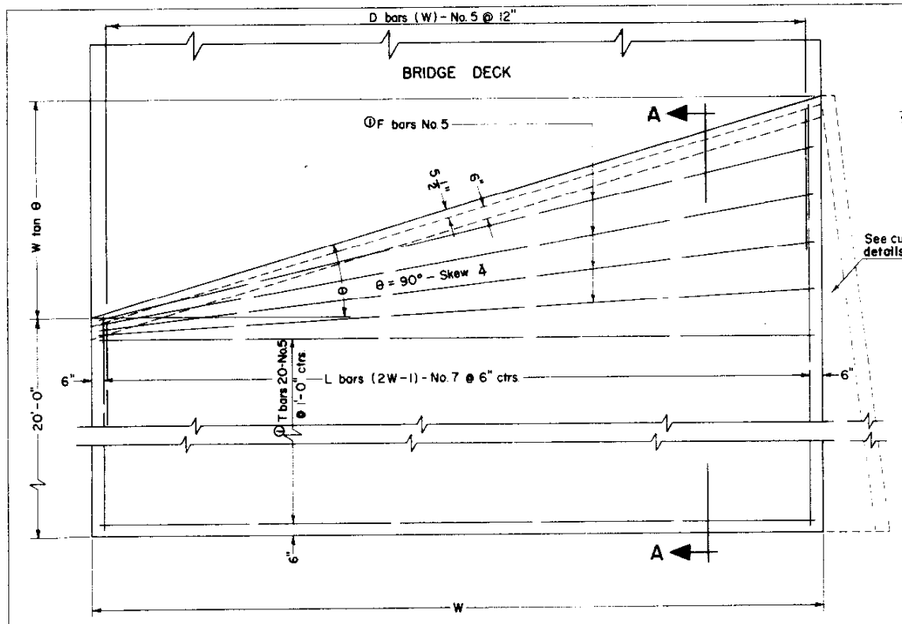
DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

STANDARD M-412-B

(JULY 1, 1965)

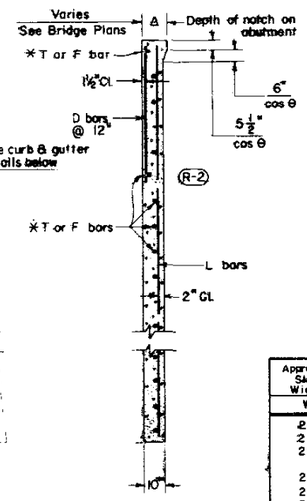
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F058-1(2)	31	

REVISIONS			
R-1	11-16-65	Curb subtitles	M.R.H.
R-2	4-6-66	T & F Bars and * Note	M.R.H.
R-3	12-8-66	Exp. Joint Mat'l. - Detail "K"	M.R.H.
R-4	1-24-67	Exp. Joint Mat'l. - Ø Note	M.R.H.
		Continued Below	



① Note: One T or F bar to be placed near top of slab at each end of D bars.

APPROACH SLAB - PLAN



SECTION A-A

(R-2) * Includes 2 T or F bars placed at top of slab as shown.

DETAIL AT BRIDGE ABUTMENT

(R-2)

Bar List and Quantities required for one Approach Slab

Approach Slab Width	T = No. 5; Str.		D = No. 5; Str.		L = No. 7; Str.		F = No. 5; Str.		Reinforcing Steel (Lbs.)			Additional Steel for Skew (Lbs.)		Concrete Pavement
W	* No.	Length	No.	Length	No.	Length	* No.	Length	T Bar	D Bar	L Bar	F Bar	L Bar	(Sq. Yds.)
20	20	19'-6"	20	5'-0"	39	19½"-6" by (6" tan θ) to (19'-6" + [(W-1) tan θ])	10 tan θ	19'-6"	411	105	1570	205 tan θ	765 tan θ	44.4 + 22.2 tan θ
22		21'-6"	22		43		11 tan θ	21'-6"	452	116	1731	249 tan θ	932 tan θ	48.9 + 26.9 tan θ
24		23'-6"	24		47		12 tan θ	23'-6"	494	126	1892	297 tan θ	1116 tan θ	53.3 + 32.0 tan θ
26		25'-6"	26		51		13 tan θ	25'-6"	537	137	2053	349 tan θ	1316 tan θ	57.8 + 37.6 tan θ
28		27'-6"	28		55		14 tan θ	27'-6"	580	147	2214	406 tan θ	1533 tan θ	62.2 + 43.6 tan θ
30		29'-6"	30		59		15 tan θ	29'-6"	621	158	2375	466 tan θ	1766 tan θ	66.7 + 50.0 tan θ
32		31'-6"	32		63		16 tan θ	31'-6"	663	169	2536	531 tan θ	2016 tan θ	71.1 + 56.9 tan θ
34		33'-6"	34		67		17 tan θ	33'-6"	706	179	2697	600 tan θ	2282 tan θ	75.6 + 64.2 tan θ
36		35'-6"	36		71		18 tan θ	35'-6"	748	190	2858	673 tan θ	2565 tan θ	80.0 + 72.0 tan θ
38		37'-6"	38		75		19 tan θ	37'-6"	790	200	3019	751 tan θ	2864 tan θ	84.4 + 80.2 tan θ
40		39'-6"	40		79		20 tan θ	39'-6"	832	211	3180	832 tan θ	3180 tan θ	88.9 + 88.9 tan θ
42		41'-6"	42		83		21 tan θ	41'-6"	874	221	3341	918 tan θ	3513 tan θ	93.3 + 98.0 tan θ
44		43'-6"	44		87		22 tan θ	43'-6"	916	232	3502	1008 tan θ	3862 tan θ	97.8 + 107.6 tan θ
46		45'-6"	46		91		23 tan θ	45'-6"	958	242	3663	1102 tan θ	4227 tan θ	102.2 + 117.6 tan θ
48		47'-6"	48		95		24 tan θ	47'-6	1001	253	3824	1201 tan θ	4609 tan θ	106.7 + 128.0 tan θ
50		49'-6"	50		99		25 tan θ	49'-6"	1043	263	3986	1304 tan θ	5007 tan θ	111.1 + 138.9 tan θ
52		51'-6"	52		103		26 tan θ	51'-6"	1084	274	4146	1411 tan θ	5422 tan θ	115.6 + 150.2 tan θ
54	20	53'-6"	54	5'-0"	107		27 tan θ	53'-6"	1127	284	4307	1522 tan θ	5854 tan θ	120.0 + 162.0 tan θ

(R-4) *Lengths shown include 1 percent for overrun.*

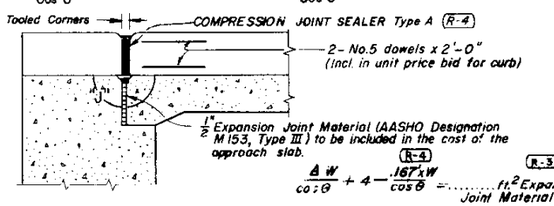
Quantity of Compression Joint Sealer Material for one Approach Slab

SAFETY CURB

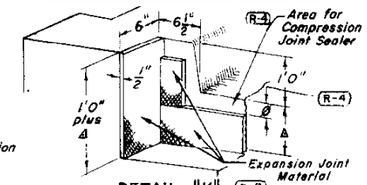
$\frac{W+1}{\cos\theta} + 2' =$ ___ LINEAR FEET

BRUSH CURB

$\frac{W}{\cos\theta} + 1' =$ ___ LINEAR FEET



$\frac{\Delta W}{\cos\theta} + 4 - \frac{.167 \times W}{\cos\theta} = \ldots\ldots ft^2$ Expansion Joint Material (R-4) (R-3)



DETAIL "K" (R-3)

EXPANSION JOINT MATERIAL

GENERAL NOTES

Concrete for Approach slabs shall be Class "P". (R-1)

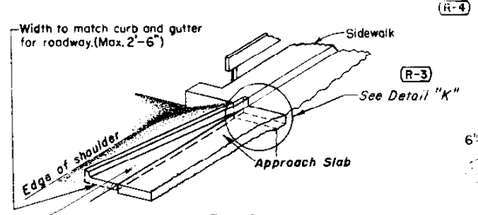
Approach slab shall be paid for under Section 412 as "Concrete Pavement" of the specified thickness.

Reinforcing Steel required in Approach Slab will be paid for under Section 602.

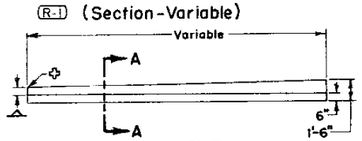
Class "A" concrete aggregate may be used in the pavement.

(R-1)
- 6" min. curb height when no curb is used on abutting roadway.
- Δ 4" where Bituminous Curbing is used. (Shape bituminous curb to meet concrete curb.)
- 6" To meet concrete Curb or Curb and Gutter. (R-1)

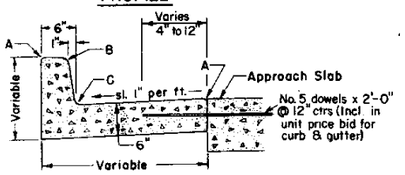
✣ Use 1½" R. when no bituminous or concrete curb is to be met. No radius required when meeting bituminous or concrete curb.



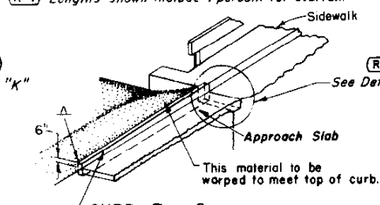
CURB & GUTTER Type 2 (R-1) (Section - Variable)



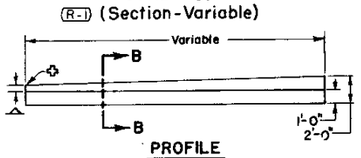
PROFILE



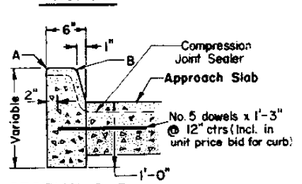
SECTION A-A



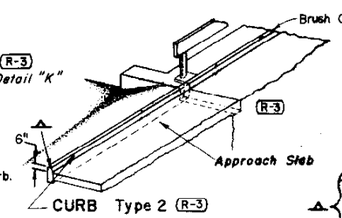
CURB Type 2 (R-1) (Section - Variable)



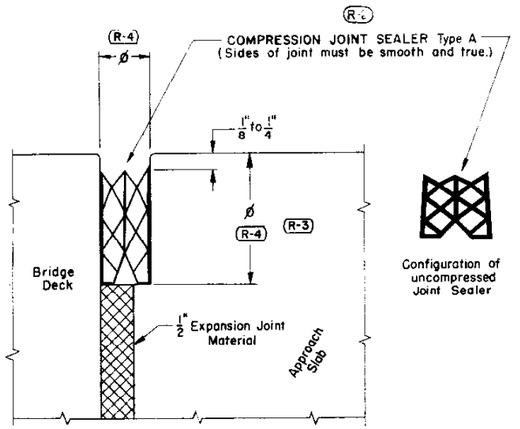
PROFILE



SECTION B-B



CURB Type 2 (R-3) (R-1) (Section - Variable)



(R-4) Ø *Dimension of groove to be proportionate with compression joint sealer supplied.*

DETAIL "J"

LEGEND FOR RADII
A = ⅛"
B = 1"
C = 1½"

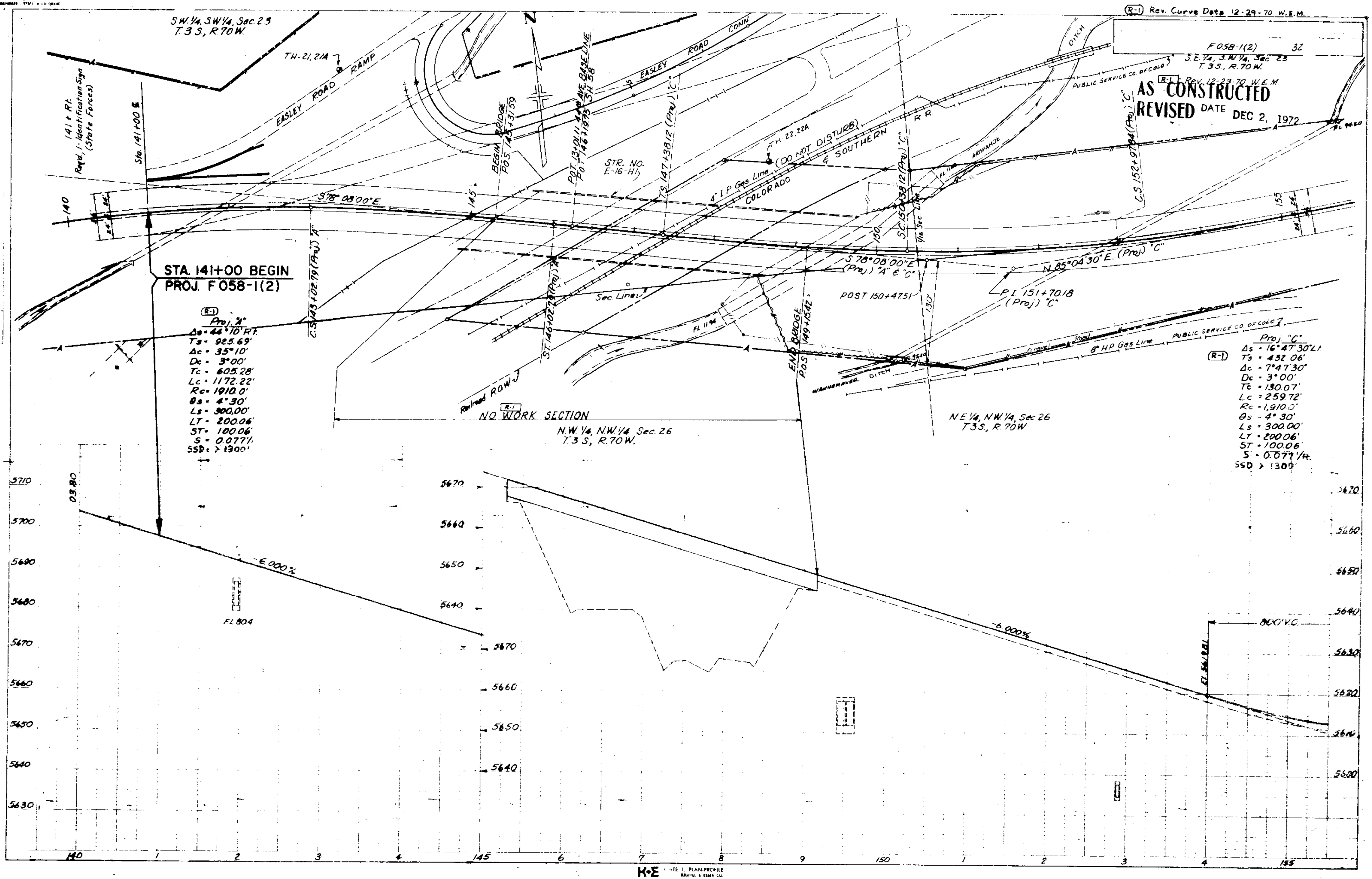
REVISIONS			
(R-5)	5-7-68	Delete Detail	M.R.H.
(R-6)	7-23-68	Dept. Name	M.R.H.

(R-6)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

CONCRETE PAVEMENT
BRIDGE APPROACH
SLAB

Designed by C.O.O.	Approved by [illegible]
Made by T.F.	Bridge Engineer
Checked by R.C.	Date: July 1, 1965



Rev. Curve Data 12-29-70 W.E.M.
F058-1(2) 32
S.E.1/4, S.W.1/4, Sec. 23 T.3S., R.70W.
AS CONSTRUCTED
REVISED DATE DEC 2, 1972
S.W.1/4, S.W.1/4, Sec.23 T.3S, R.70W.
TH-21, 21A
EASLEY ROAD RAMP
EASLEY ROAD CONN
141+ Rt. Req'd. I-Identification Sign (State Forces)
Sta. 141+00
BEGIN BRIDGE POS 145+31.59
POT 146+19.15
STR. NO. E-16-HI
TS 147+38.12 (Proj) "C"
TH. 22, 22A
(DO NOT DISTURB)
4" I.P. Gas Line
COLORADO & SOUTHERN R.R.
SC 150+38.12 (Proj) "C"
CS 152+97.84 (Proj) "C"
PUBLIC SERVICE CO. OF COLO.
DITCH
ARAPAHOE
S78°08'00"E
N.85°04'30"E. (Proj) "C"
S.78°08'00"E (Proj) "A" & "C"
STA. 141+00 BEGIN
PROJ. F058-1(2)
CS 143+02.79 (Proj) "A"
ST 146+02.79 (Proj) "A"
Sec Line
POST 150+47.51
P.I. 151+70.18 (Proj) "C"
END BRIDGE POS 149+15.42
Railroad ROW
8" HP Gas Line
Gravel Road
WANAMAKER DITCH
NO WORK SECTION
N.W.1/4, N.W.1/4 Sec. 26 T.3S, R.70W.
N.E.1/4, N.W.1/4, Sec 26 T.3S, R.70W
Proj. "A"
Δs = 44°10' Rt.
Ts = 925.69'
Δc = 35°10'
Dc = 3°00'
Tc = 605.28'
Lc = 1172.22'
Rc = 1910.0'
θs = 4°30'
Ls = 300.00'
LT = 200.06'
ST = 100.06'
S = 0.077%
SSD = >1300'
Proj. "C"
Δs = 16°47'30" Lt
Ts = 432.06'
Δc = 7°47'30"
Dc = 3°00'
Tc = 130.07'
Lc = 259.72'
Rc = 1,910.0'
θs = 4°30'
Ls = 300.00'
LT = 200.06'
ST = 100.06'
S = 0.077%/ft.
SSD > 1300'
PLAN
PROFILE
-6.000%
FL 80.4
-6.000%
800' V.C.
5710
5700
5690
5680
5670
5660
5650
5640
5630
140
145
150
155
K+E PLAN-PROFILE

F058-1(2) 33

AS CONSTRUCTED
REVISED DATE DEC 2, 1972A

Colo. & Southern R.R.
R.R. ROW. Line
Wannemaker Ditch
CONC. FLUME
SHEDS
N.O.
1/4 Sec. Line
T.S. 166+28.27 (Proj) "C"
166+00 Begin Median Transition
S.C. 169+28.27 (Proj) "C"
S.T. 155+97.84 (Proj) "C"
N.85°04' 30" E. (Proj. C)
T.H. 23
T.H. 24
24A
N. 1/4 Cor. Sec. 26 T3S R70W
Sec. Line
PUBLIC SERVICE CO OF COLO.
CONC. WELL
CONC. WELL
Croke Canal
Diversion Dam
Clear Creek

B.M. No. 26 Elev. 5599.56 Spike in tree 70' Rt. of 155+30 (Surv.)

B.M. No. 27 Elev. 5588.46 Spike in power pole 90' Rt. 162+00 (Surv.)

T.H. 23 A-7-6(10) Similar to No. 22

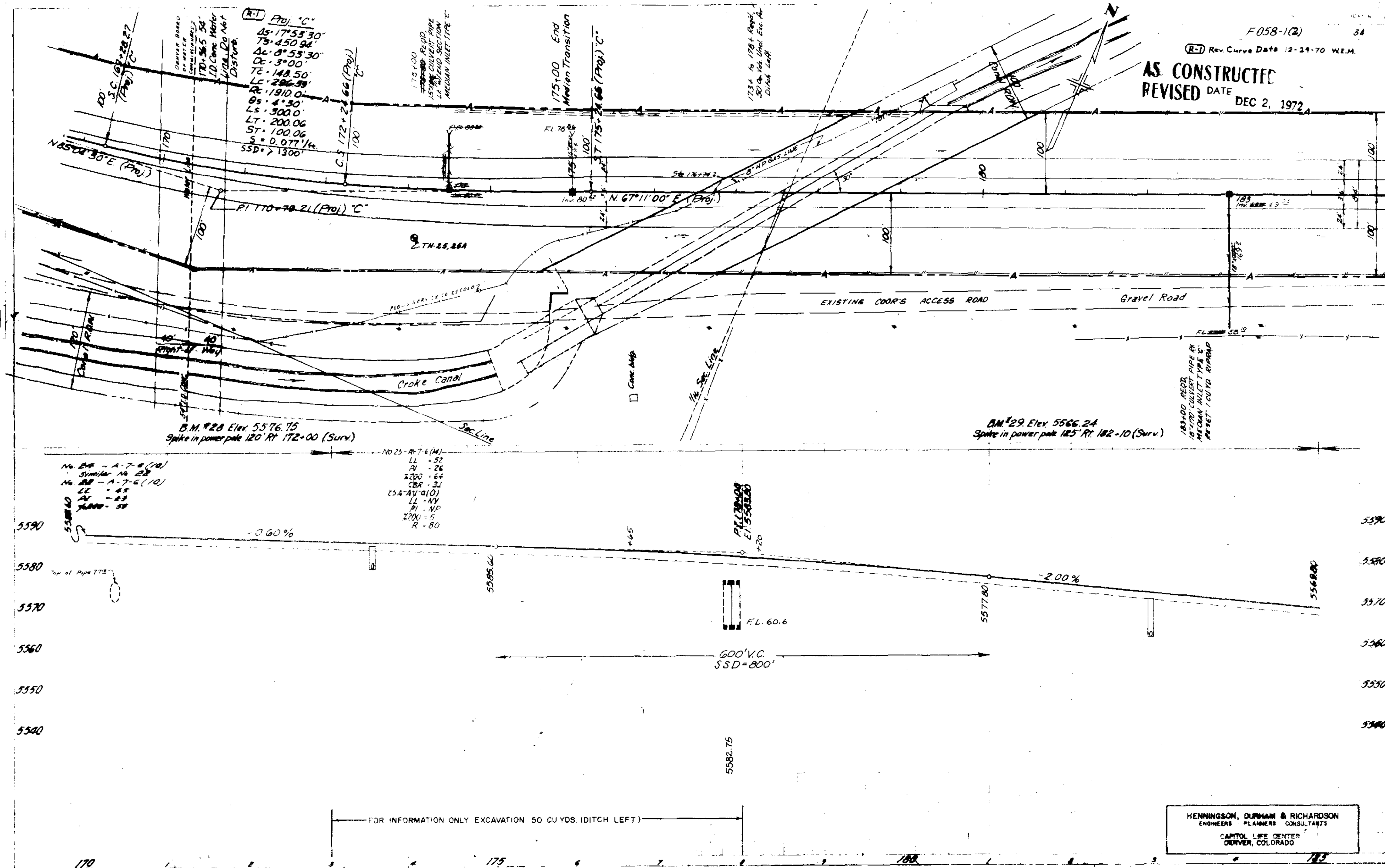
T.H. 24 A-7-6(10) Similar to No. 22 (Silt)

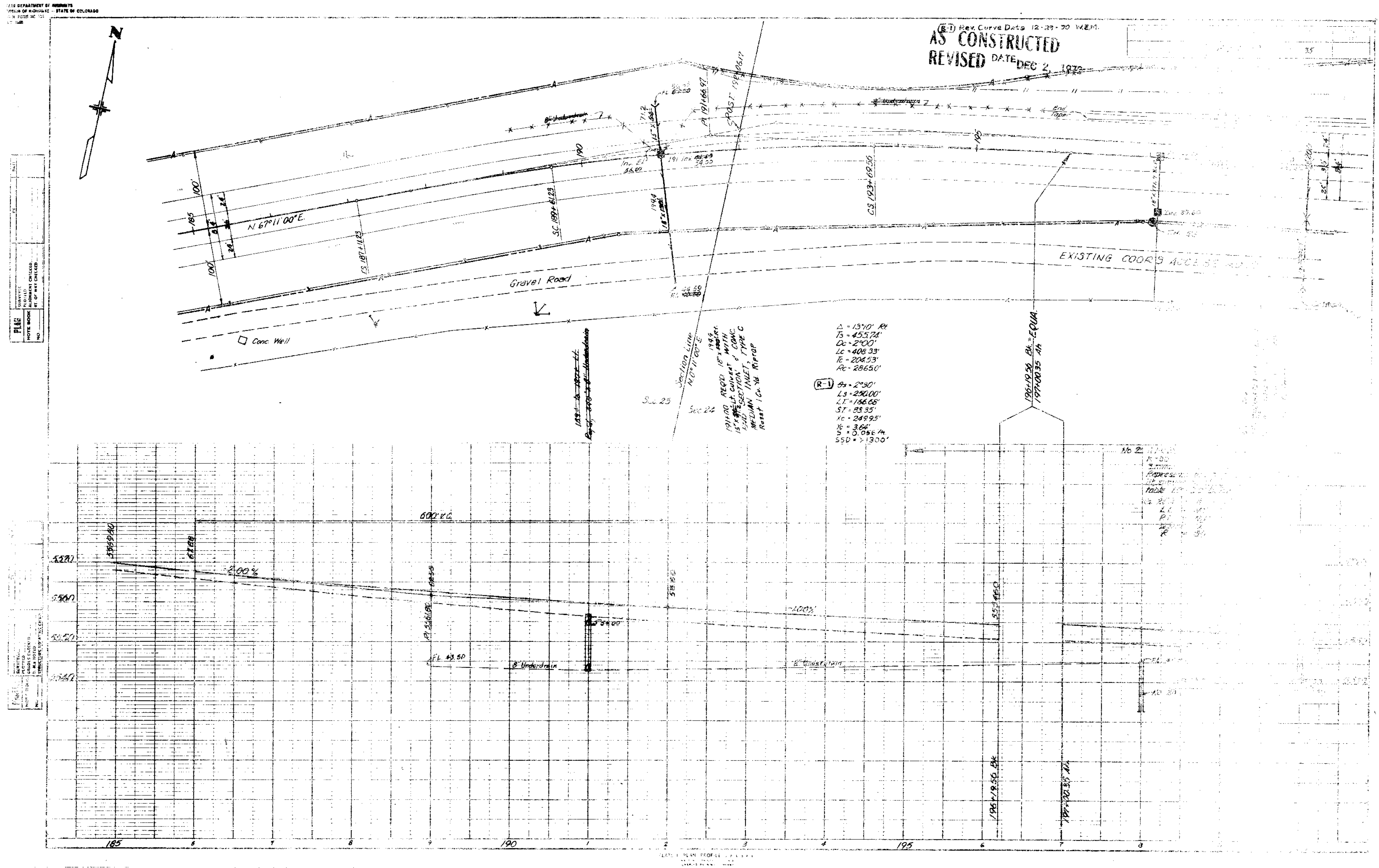
T.H. 22 A-7-6(10)
L.L. = 45
P.I. = 23
%200=55

24A Coarse gravel - too rocky to drill deeper

-6.00%
-0.60%
T.H. 23 (38' Lt.)
T.H. 24
T.H. 24A (51' Rt.)
El. 5593.40
P.I. 158+00
El. 5595.80
800' V.C.
Emb. 500 Cu. Yds.

5600
90
80
70
10
20
155
160
165
170


F058-1(2)
34
R-1 Rev. Curve Data 12-29-70 W.E.M.
AS CONSTRUCTED
REVISED DATE DEC 2, 1972
R-1 Proj. "C"
Δs = 17°53'30"
Ts = 450.94'
Δc = 8°53'30"
Dc = 3°00'
Tc = 148.50'
Rc = 1910.0'
θs = 4°30'
Ls = 300.0'
LT = 200.06
ST = 100.06
S = 0.077'/ft.
SSD = > 1300'
S.C. 169+28.27 (Proj.) "C"
C.S. 172+28.66 (Proj.) "C"
175+00 End Median Transition
S.T. 175+28.66 (Proj.) "C"
N 85°04'30" E (Proj.)
PI 170+78.21 (Proj.) "C"
N 67°11'00" E (Proj.)
TH-25, 26A
EXISTING COOR'S ACCESS ROAD
Gravel Road
Croke Canal
Sec. Line
1/4 Sec. Line
Right-of-Way
B.M. #28 Elev. 5576.75 Spike in power pole 120' Rt. 172+00 (Surv.)
B.M. #29 Elev. 5566.24 Spike in power pole 125' Rt. 182+10 (Surv.)
-0.60 %
-2.00 %
600' V.C.
SSD = 800'
5585.00
5577.80
5582.75
F.L. 60.6
5590
5580
5570
5560
5550
5540
FOR INFORMATION ONLY EXCAVATION 50 CU. YDS. (DITCH LEFT)
170
175
180
185
HENNINGSON, DURHAM & RICHARDSON
ENGINEERS PLANNERS CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO


AS CONSTRUCTED
REVISED DATE DEC 2, 1972
R-1 Rev. Curve Data 12-29-70 W.E.M.
35
N
N 67°11'00"E.
Gravel Road
Conc. Well
EXISTING COOR'S ACCESS ROAD
Section Line N.0°11'00"E.
Sec 23
Sec 24
CS 187+11.23
SC 189+61.23
CS 193+69.50
PI 191+66.97
196+19.56 Bk.=EQUA.
197+00.35 Ah.
Δ = 13°10' Rt
Ts = 455.74'
Dc = 2°00'
Lc = 408.33'
Tc = 204.53'
Rc = 2865.0'
R-1 θs = 2°30'
Ls = 250.00'
L.T. = 166.68'
S.T. = 83.35'
Xc = 249.95'
Yc = 3.64'
S = 0.056 Ft
SSD = >1300'
Gravel Road
End Taper
8" Underdrain
600' V.C.
-2.00%
-1.00%
FL 43.50
8" Underdrain
185
190
195
196+19.50 Bk
197+20.35 Ah
PLAN
NOTE BOOK
NO.

STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS — STATE OF COLORADO

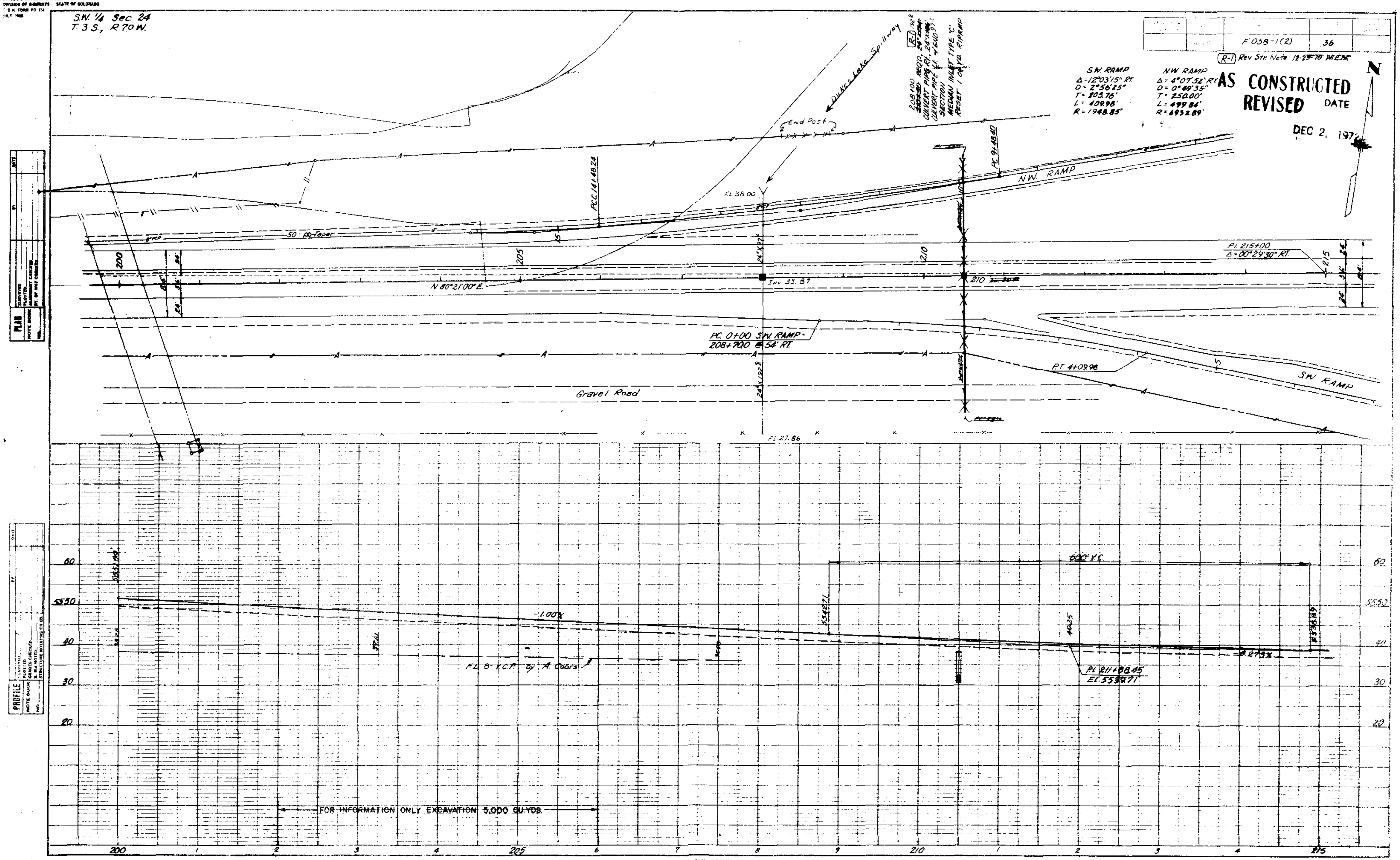
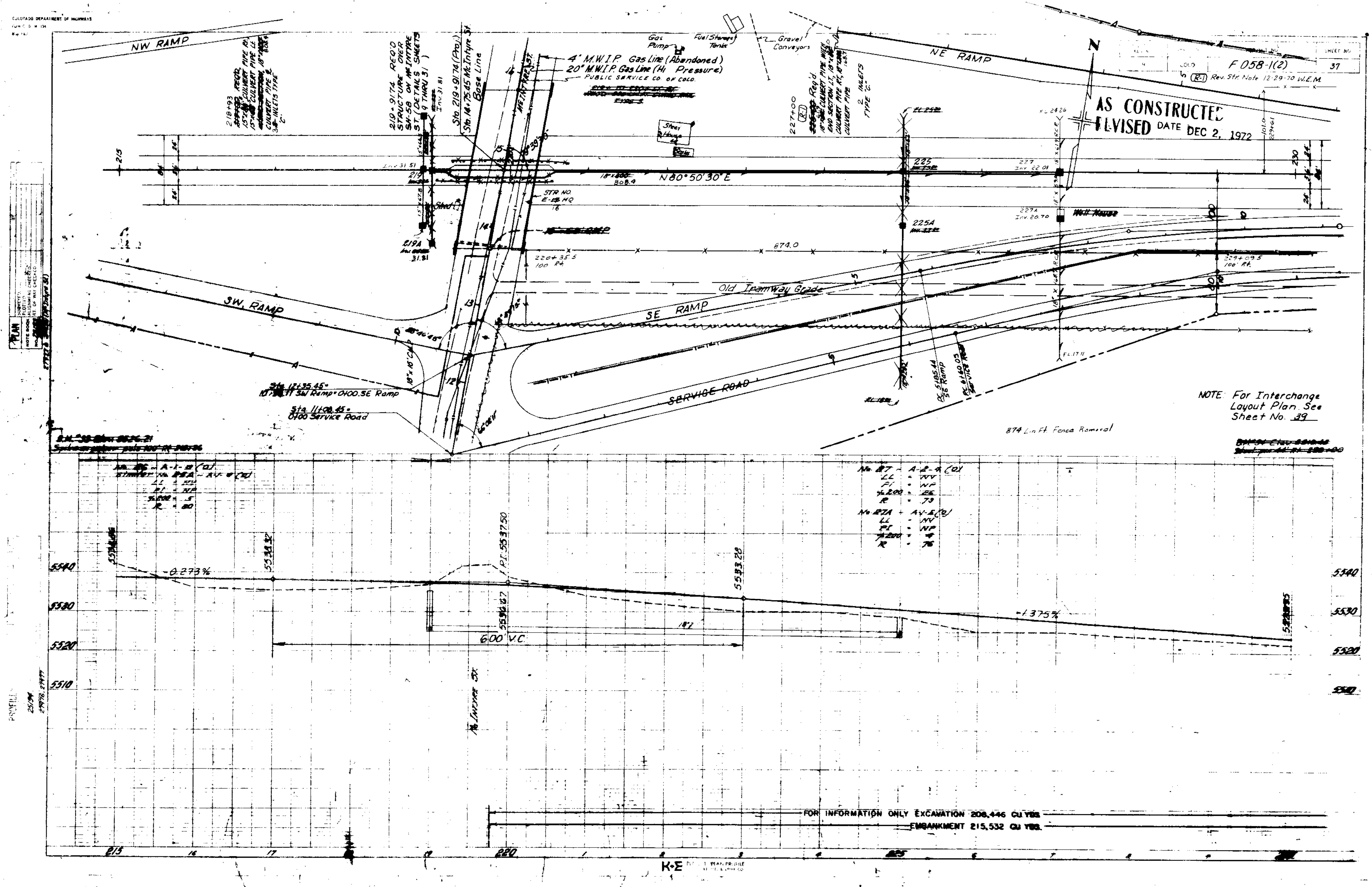


PLATE 1 – PLAN–PROFILE
CHARLES BRUNING COMPANY



COLORADO DEPARTMENT OF HIGHWAYS
NW RAMP
NE RAMP
F 058-1(2)
37
Rev. Str. Note 12-29-70 W.E.M.
AS CONSTRUCTED
REVISED DATE DEC 2, 1972
N
4" M.W.I.P. Gas Line (Abandoned)
20" M.W.I.P. Gas Line (Hi Pressure)
PUBLIC SERVICE CO. OF COLO.
Gas Pump
Fuel Storage Tanks
Gravel Conveyors
Sta. 219+91.74 (Proj.) Sta. 14+75.65 McIntyre St. Base Line
219+91.74 REQ'D STRUCTURE OVER McINTYRE ST. (DETAILS SHEETS 9 THRU 31)
Inv. 31.81
N 80°50'30" E
808.4
225
227
Inv. 22.01
227A
Inv. 20.70
Well House
225A
STR. NO. E-16-HQ
220+35.5 100' Rt.
229+09.5 100' Rt.
874.0
Old Tramway Grade
SW RAMP
SE RAMP
SERVICE ROAD
Sta. 12+35.45 = 10+71.77 SW Ramp = 0+00 SE Ramp
Sta. 11+08.45 = 0+00 Service Road
NOTE: For Interchange Layout Plan See Sheet No. 39
874 Lin Ft. Fence Removal
PLAN
PROFILE
No. 27 - A-2-4 (0)
LL - NV
PI - NP
% 200 - 26
R - 73
No. 27A - A-1-b (0)
LL - NV
PI - NP
% 200 - 4
R - 76
-0.273%
-1.375%
P.I. 5537.50
600' V.C.
5540
5530
5520
5510
McIntyre St.
FOR INFORMATION ONLY EXCAVATION 208,446 CU YDS.
EMBANKMENT 215,532 CU YDS.
215
16
17
19
220
225
K+E

COLORADO DEPARTMENT OF HIGHWAYS

PROJECT NO. F 058-1(2) | SHEET NO. 38

R-1 Rev. Sta Notes 12-29-72 W.L.M.

AS CONSTRUCTED
REVISED DATE DEC 2, 1972

PLAN

236+45 18"X149.7 Rt Elt (Conc Culv Pipe)
236+45 18"X68.7 Sew Rd Rt (Conc Culv Pipe)
1-Type C Inlet

20' Sanitary Sewer Easement

WESTBOUND

EASTBOUND

SE RAMP

SERVICE ROAD

Old Tramway Grade

Manhole

N 30° 50' 30" E

20' Sanitary Sewer Easement

DENVER WATER SAN 2

TH-27 27A

1256' Fen. Rem.

245+05 Conc Cul. Pipe
18"X132.8 Rt Elt
18"X68.3 Rt Sew Rd.
W/14 End Sections
1-Type C Inlet

B.M. 35 Elev. 5506.51
Spike in base of tree 105' Rt. 236+10

See Sheet 8 for Typical Entrance Ramp Merging Detail

No. 27-A-2-4(0)
LL - NV
PI - NP
%200 - 26
R - 73
27A-A-1-b(0)
LL - NV
PI - NP
%200 - 4
R - 76
Marshy channel sand, similar to No 27A Rt & Lt of old tram road bed. Water at 5'.

PROFILE

-1.375%
-0.947%
0.750%

600' V.C.

SERVICE ROAD GRADE

No. 27-27A (40' Lt)

SER. RD. 13+00 BK = SER. RD. 238+00 AH

NOTE: FOR SERVICE ROAD PROFILE (STA 0+00 TO 13+00) SEE SHEET 42

FOR INFORMATION ONLY EXCAVATION 208,446 CU. YDS.
EMBANKMENT 215,932 CU. YDS.

ARTMENT OF HIGHWAYS—STATE OF COLORADO
M.D.C. H-126
RCH 1964

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F 058-1(2)	39	

(R-1) Rev. Str. No. 12-28-70 W.E.M.

AS CONSTRUCTED
REVISED DATE
DEC 2, 1972

LEGEND

- CENTERLINE OF MEDIAN
- EDGE OF ROADWAY
- EDGE OF SHOULDER
- ACCESS DENIED BY DEED — A — A — 24'00
- DELINEATORS
- GUARD RAIL

CURVE DATA

CURVE	Δ	D	T	L	R
①	13°37'19"	2°00'	342.19'	681.10'	2865'
②	8°50'15"	1°38'47"	269.25'	536.95'	3,480.96'
③	8°43'22"	3°24'17"	128.35'	256.20'	1,682.88'
④	4°07'52"	0°49'35"	250.00'	499.84'	6,932.89'
⑤	12°03'15"	2°56'25"	205.76'	409.98'	1,948.85'
⑥	25°01'	8°17'	150.00'	302.70'	693.29'
⑦	25°01'	6°13'	200.00'	403.61'	924.39'
⑧	28°59'	9°52'	150.00'	293.57'	580.35'
⑨	28°11'	14°22'	100.00'	196.20'	398.36'

220+
McIntyre Interchange Lt.-Rt.
Req'd. 2-Identification Signs
(State Forces)

~~Sta 194+11.04~~
McIntyre St.
Req'd. 2 timber Barricades
(Class 1) (Typ M-1)

Sta 10+ Lt. of
McIntyre St.
Req'd. 2 timber Barricade
(Class 1) (Type M-1)

2336.5 Fence Removal

TRAFFIC LEGEND
637 = 1984 DHV

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS • PLANNERS • CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

GRAPHIC SCALE
0 25 50 100 200

INTERCHANGE LAYOUT

AS CONSTRUCTED
REVISED DATE DEC 2, 1972

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F 058-1(2)	40	

NORTHWEST RAMP

SOUTHWEST RAMP

NORTHEAST RAMP

SOUTHEAST RAMP

MCINTYRE STREET

FOR INFORMATION ONLY
EXCAVATION 2,000 CU. YDS.
EMBANKMENT 86,963 CU YDS

FOR INFORMATION ONLY
EXCAVATION 2,298 CU. YDS.
EMBANKMENT 21,716 CU YDS

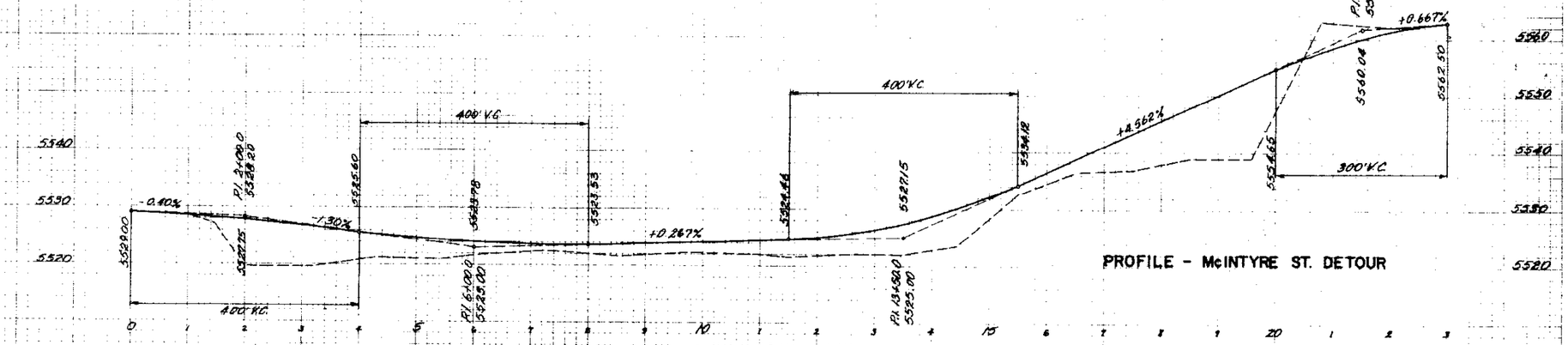
EMBANKMENT 51,171 CU YDS (Non-Fed. Aid)

FINAL SURVEY — SURVEYED, PLOTTED, TEMPLATE, AREAS, AREAS CHECKED, NOTE BOOK, NO., DATE

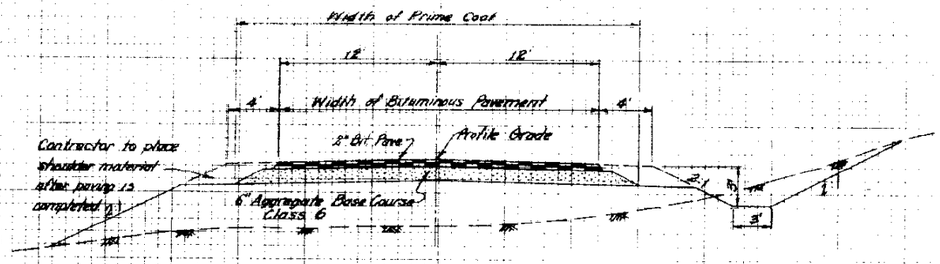
ORIGINAL SURVEY — SURVEYED, PLOTTED, TEMPLATE, AREAS, AREAS CHECKED, NOTE BOOK, NO., DATE

FEDERAL ROAD REGION NO.	DISTRICT	PROJ NO	SHEET NO	TOTAL SHEETS
9	COLORADO	F058-1(2)	41	

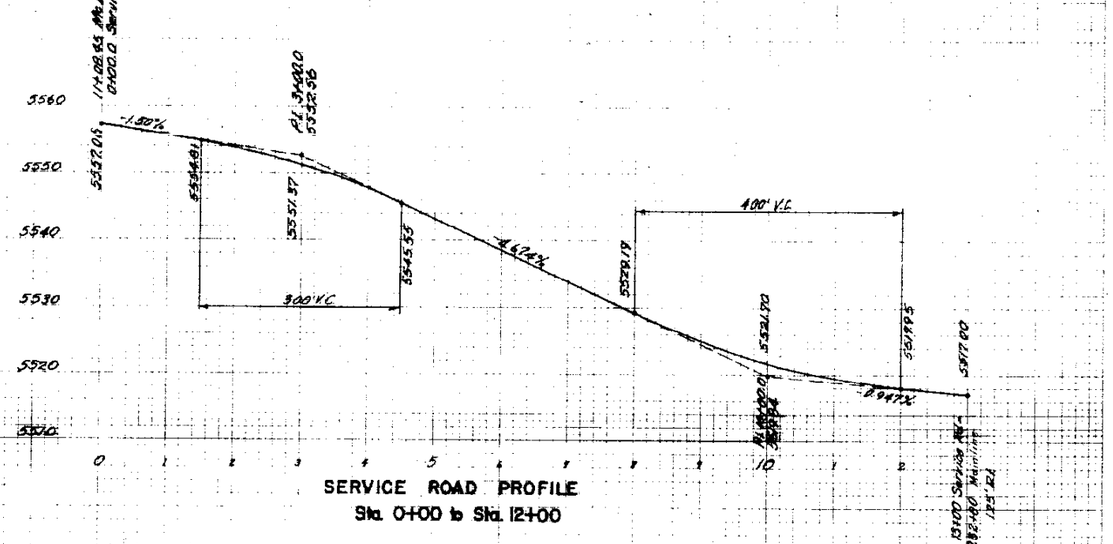
AS CONSTRUCTED
NO REVISIONS DATE **DEC 2, 1972**



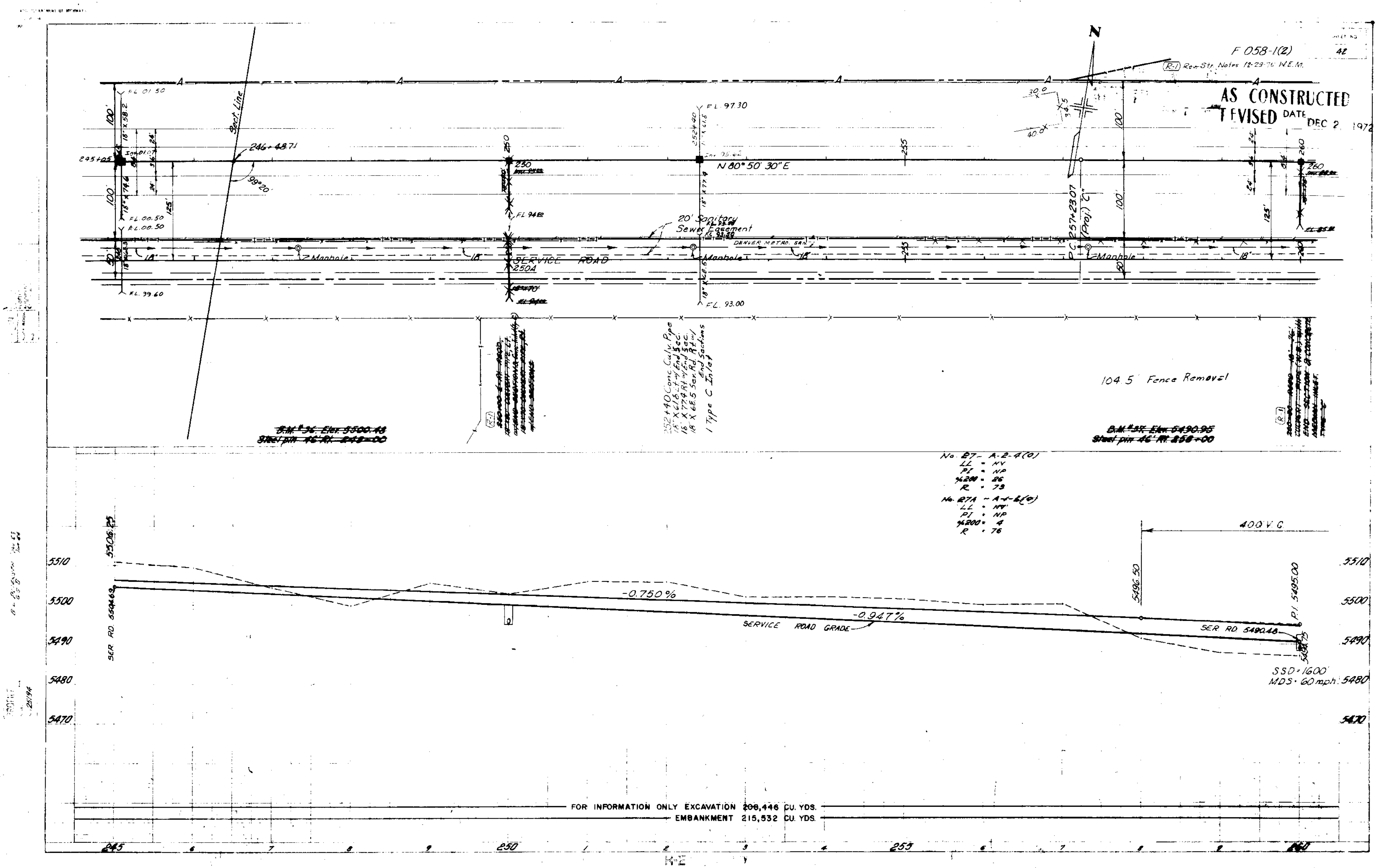
PROFILE - McINTYRE ST. DETOUR



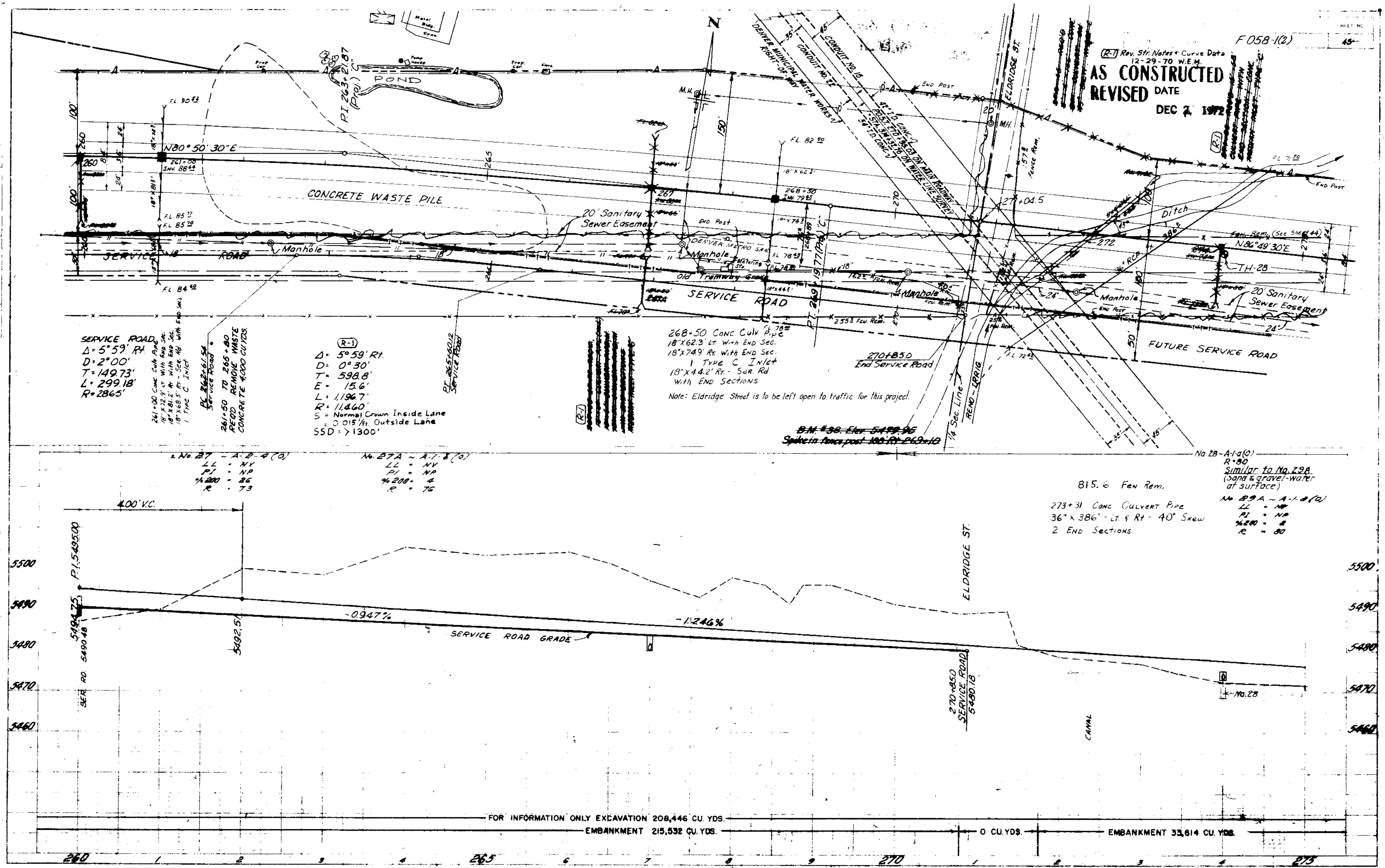
TYPICAL SECTION - DETOUR
STA 0+00 to STA 23+00



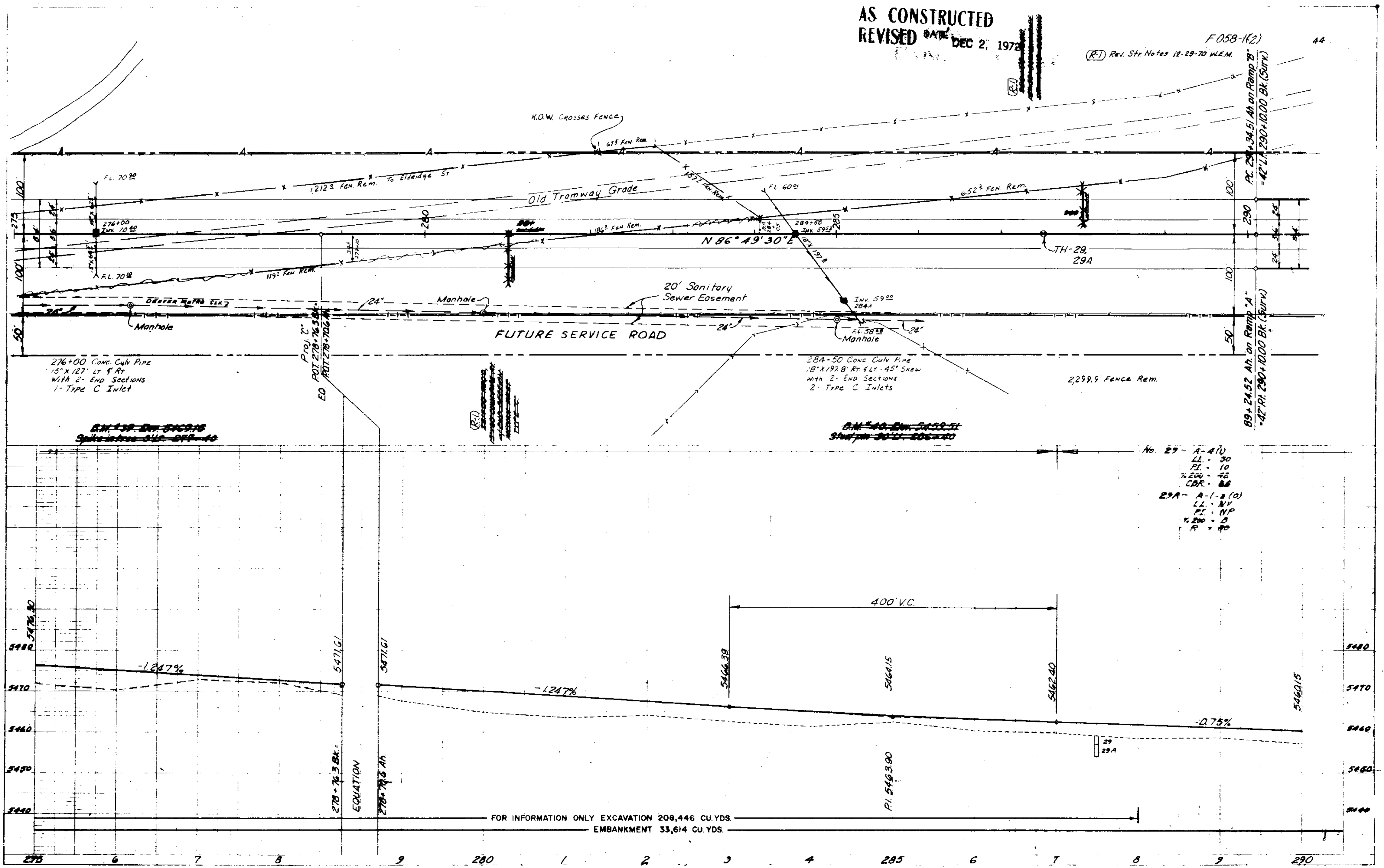
SERVICE ROAD PROFILE
Sta. 0+00 to Sta. 12+00



F 058-1(2)
42
R-1 Rev. Str. Notes 12-29-76 W.E.M.
AS CONSTRUCTED
REVISED DATE DEC 2, 1972
N
Sect. Line
246+48.71
N 80° 50' 30" E
20' Sanitary Sewer Easement
DENVER METRO. SAN.
SERVICE ROAD
Manhole
P.C. 257+23.07 (Proj. C)
252+40 Conc. Culv. Pipe 18" X 41.8 1-F.E. Sec. 18" X 77.4 Rt. w/ End Sec. 18" X 68.5 Ser. Rd. Rt. w/ End Sections 1 Type C Inlet
104.5' Fence Removal
B.M. #36 Elev. 5500.43 Steel pin 46' Rt. 248+00
B.M. #37 Elev. 5490.95 Steel pin 46' Rt. 258+00
No. 27 - A-2-4(0) LL = NV PI = NP %200 = 26 R = 73
No. 27A - A-4-2(0) LL = NV PI = NP %200 = 4 R = 76
400 V.C.
-0.750%
-0.947%
SERVICE ROAD GRADE
SER. RD. 5490.48
P.I. 5495.00
5496.50
SSD = 1600'
MDS = 60 mph
5510
5500
5490
5480
5470
FOR INFORMATION ONLY EXCAVATION 208,446 CU. YDS.
EMBANKMENT 215,532 CU. YDS.
245
250
255
260



F 058-1(2)
AS CONSTRUCTED
REVISED DATE
DEC 2, 1972
(R-1) Rev. Str. Notes + Curve Data 12-29-70 W.E.M.
N
POND
P.I. 263+21.87 (Proj.) "C"
CONCRETE WASTE PILE
N80°50'30"E
261+00 Inv. 88.44
FL. 90.82
FL. 85.77
FL. 85.20
FL. 84.40
SERVICE ROAD
Manhole
20' Sanitary Sewer Easement
DENVER MUNICIPAL WATER WORKS RIGHT-OF-WAY
CONDUIT NO. 16
CONDUIT NO. 22
ELDRIDGE ST.
M.H.
End Post
268+50 Inv. 79.45
FL. 82.50
FL. 78.45
Old Tramway Grade
SERVICE ROAD
P.T. 269+19.77 (Proj.) "C"
271+04.5
272
Ditch
N86°49'30"E
TH-28
20' Sanitary Sewer Easement
FUTURE SERVICE ROAD
270+850 End Service Road
1/4 Sec. Line
RENO-LERIG
B.M. #38. Elev. 5479.96
Spike in fence post 100' Rt. 269+10
SERVICE ROAD
Δ = 5°59' Rt.
D = 2°00'
T = 149.73'
L = 299.18'
R = 2865'
261+00 Conc. Culv. Pipe 18"x72.9' Lt. with End Sec. 18"x81.2' Rt. with End Sec. 18"x68.5' Rt. - Ser. Rd. with End Sec. 1 Type C Inlet
P.C. 262+61.54 Service Road
261+50 to 265+80 Req'd Remove Waste Concrete 4,000 Cu. Yds.
(R-1)
Δ = 5°59' Rt.
D = 0°30'
T = 598.8'
E = 15.6'
L = 1,196.7'
R = 11,460'
S = Normal Crown Inside Lane
= 0.015'/Ft. Outside Lane
SSD = >1300'
P.T. 265+60.12 Service Road
268+50 Conc. Culv. Pipe
18"x62.3' Lt. With End Sec.
18"x74.9' Rt. With End Sec.
1 Type C Inlet
18"x44.2' Rt. - Ser. Rd. With End Sections
Note: Eldridge Street is to be left open to traffic for this project.
No. 27 ~ A-2-4(0)
LL = NV
PI = NP
% 200 = 26
R = 73
No. 27A ~ A-1-b(0)
LL = NV
PI = NP
% 200 = 4
R = 76
No. 28 ~ A-1-a(0)
R = 80
Similar to No. 29A
(Sand & gravel - water at surface)
No. 29A ~ A-1-a(0)
LL = NV
PI = NP
% 200 = 8
R = 80
815.6 Fen Rem.
273+31 Conc. Culvert Pipe
36" x 386' - Lt. & Rt. - 40° Skew
2 End Sections
400' V.C.
P.I. 5495.00
5494.75
SER. RD. 5490.48
5492.5
-0.947%
-1.246%
SERVICE ROAD GRADE
ELDRIDGE ST.
270+850 SERVICE ROAD 5480.18
CANAL
No. 28
5500
5490
5480
5470
5460
FOR INFORMATION ONLY EXCAVATION 208,446 CU. YDS.
EMBANKMENT 215,532 CU. YDS.
0 CU. YDS.
EMBANKMENT 33,614 CU. YDS.
260
265
270
275



AS CONSTRUCTED
REVISED DATE DEC 2, 1972
F 058-1(2)
44
(R-1) Rev. Str. Notes 12-29-70 W.E.M.
R.O.W. Crosses Fence
1,212± Fen. Rem. To Eldridge St
Old Tramway Grade
652± Fen. Rem.
F.L. 70.90
276+00 Inv. 70.40
F.L. 70.12
119± Fen. Rem.
186± Fen. Rem.
F.L. 60.21
284+50 Inv. 59.93
N 86° 49' 30" E
TH-29, 29A
20' Sanitary Sewer Easement
Manhole
Inv. 59.00 284A
F.L. 58.68
FUTURE SERVICE ROAD
276+00 Conc. Culv. Pipe 15" X 127' Lt. & Rt. With 2- End Sections 1- Type C Inlet
Proj. "C" POT 278+76.3 Bk. POT 278+70.6 Ah. EQ
284+50 Conc. Culv. Pipe 18" X 197.8' Rt. & Lt. - 45° Skew With 2- End Sections 2- Type C Inlets
2,299.9 Fence Rem.
P.C. 290+34.51 Ah. on Ramp "B" = 42' Lt. 290+10.00 Bk. (Surv.)
89+24.52 Ah. on Ramp "A" = 42' Rt. 290+10.00 Bk. (Surv.)
No. 29 - A-4(1) LL. - 30 PI. - 10 % 200 - 72 CBR. - 86
29A - A-1-b(0) LL. - NV PI. - NP % 200 - 8 R - 80
400' V.C.
5476.90
5471.61
5471.61
5466.39
5464.15
5462.40
5460.15
-1.247%
-1.247%
-0.75%
P.I. 5463.90
278+76.3 Bk.
EQUATION
278+70.6 Ah.
FOR INFORMATION ONLY EXCAVATION 208,446 CU. YDS.
EMBANKMENT 33,614 CU. YDS.
5480
5470
5460
5450
5440
275
6
7
8
9
280
1
2
3
4
285
6
7
8
9
290

STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS STATE OF COLORADO

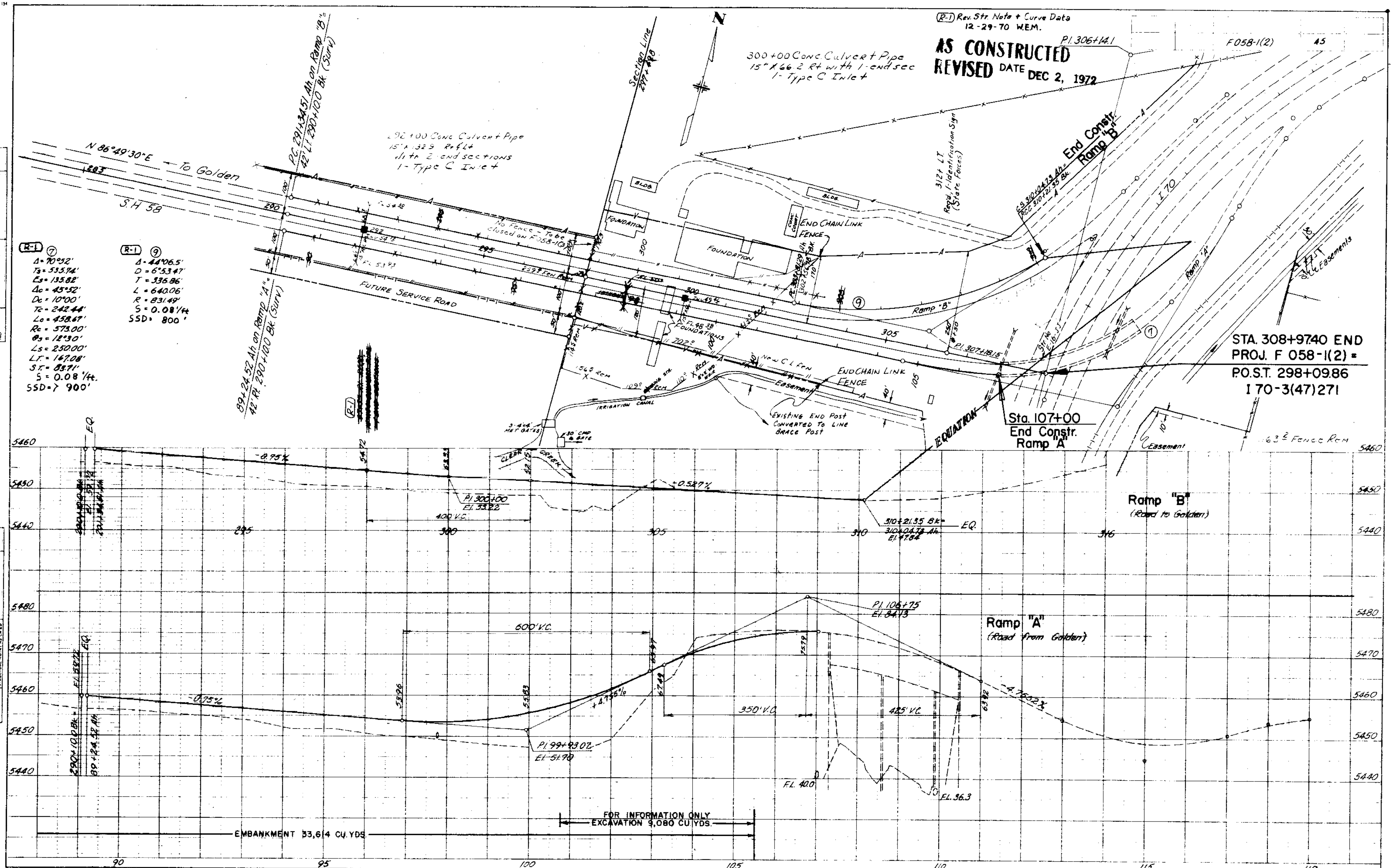
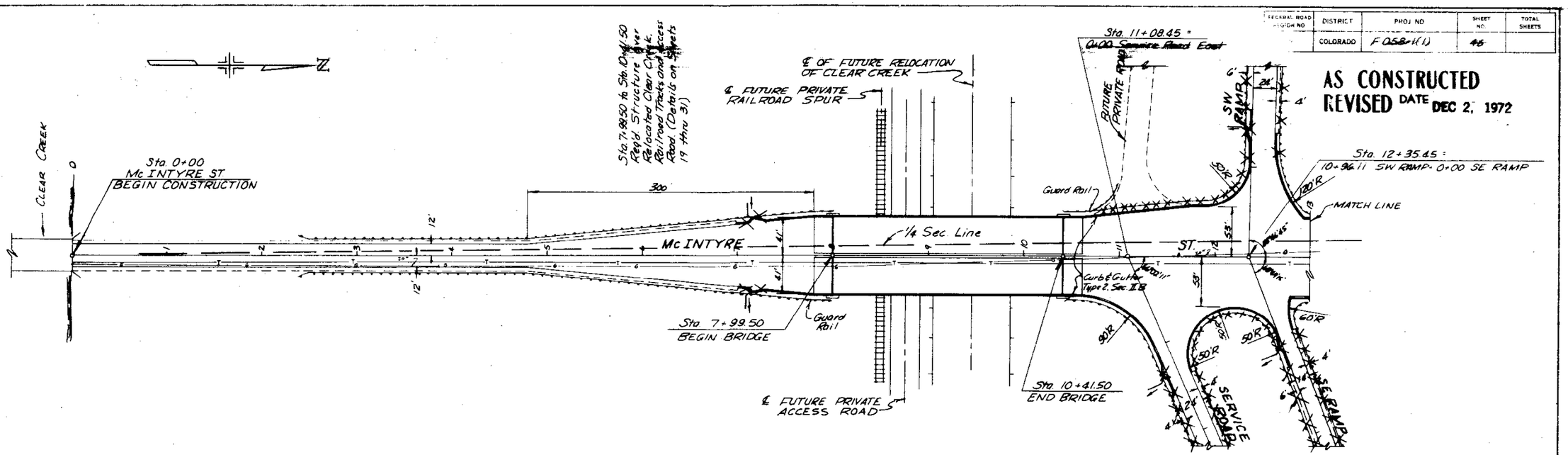
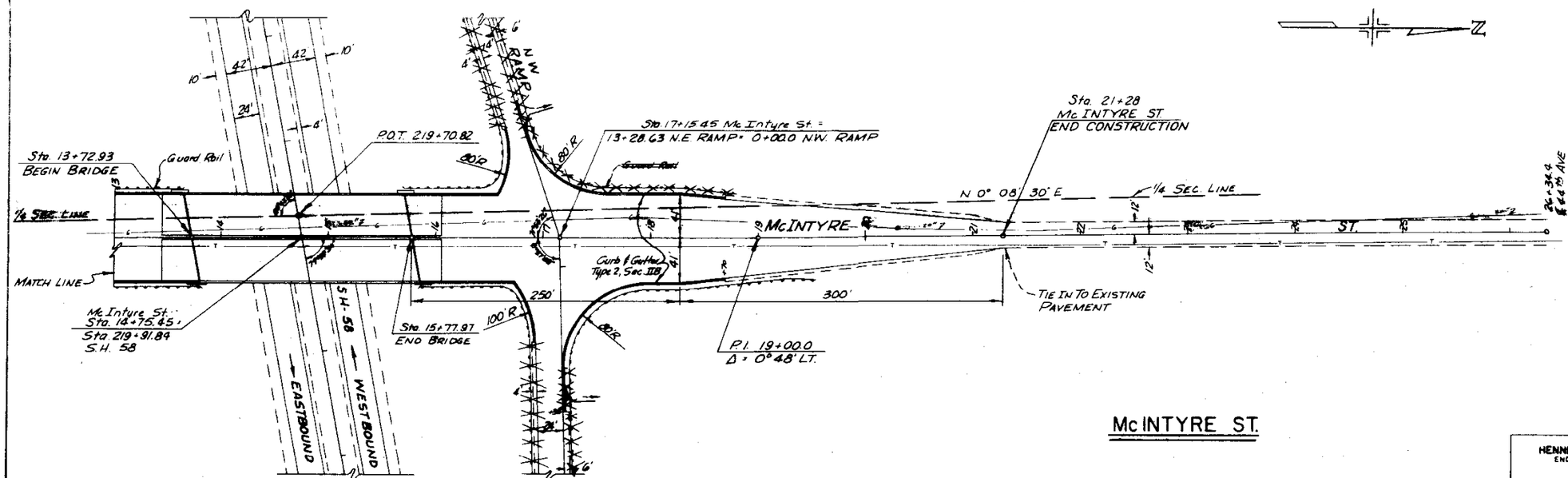


PLATE PLAN PROFILE

FEDERAL ROAD REGION NO.	DISTRICT	PROJ NO	SHEET NO.	TOTAL SHEETS
	COLORADO	F 058-1(1)	46	

AS CONSTRUCTED
REVISED DATE DEC 2, 1972





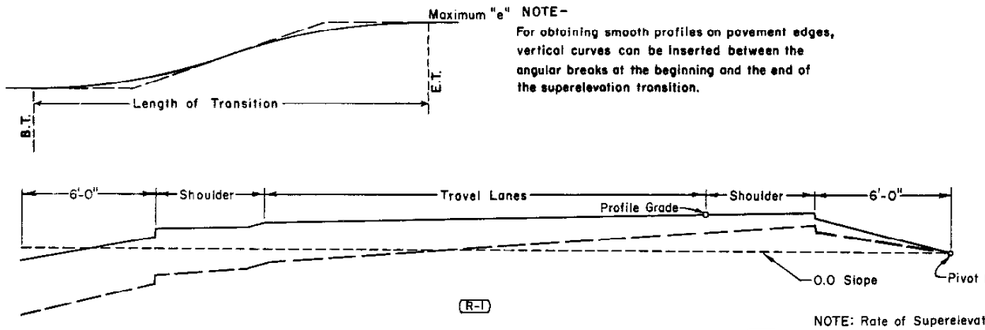
Mc INTYRE ST.

HENNINGSON, DURHAM & RICHARDSON
ENGINEERS · PLANNERS · CONSULTANTS
CAPITOL LIFE CENTER
DENVER, COLORADO

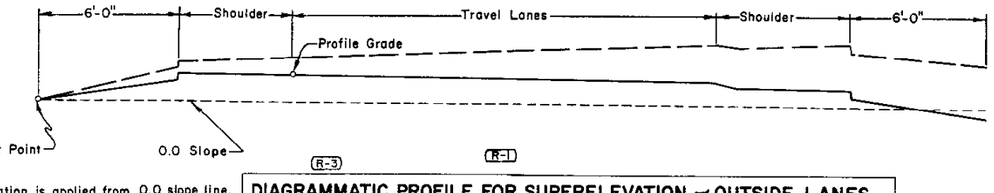
STANDARD M-203-A-1

(JULY 1, 1965)

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

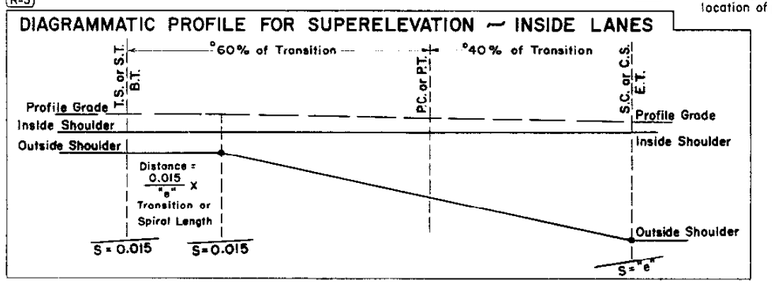


NOTE- For obtaining smooth profiles on pavement edges, vertical curves can be inserted between the angular breaks at the beginning and the end of the superelevation transition.

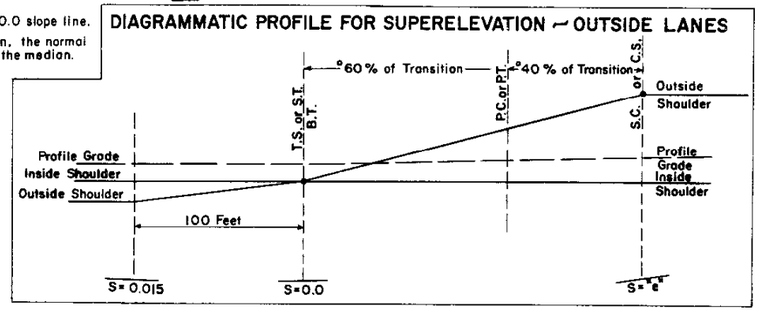


NOTE: Rate of Superelevation is applied from 0.0 slope line. In case of narrow (non-depressed) median, the normal location of pivot point will be at the centerline of the median.

(R-3) (R-2)



(R-3) (R-1)



° When Curve is Not Spiralled

(R-3) e = Maximum rate of superelevation for the given degree of curve and design speed.

REVISIONS			
(R-1)	5-26-67	Supered Template	M.R.H.
(R-2)	7-26-67	Median note	R.S.M.
(R-3)	7-30-68	Dpt. Name, Tables, Note	M.R.H.

(R-3)

TABLE 1

SUPERELEVATION RATES FOR FOUR LANE DIVIDED HIGHWAYS

Degree of Curve	Maximum Superelevation = 0.08			Maximum Superelevation = 0.10		
	Super. Rate Ft./Ft.	Maximum Design Speed M.P.H.	Minimum Transition or Spiral Length	Super. Rate Ft./Ft.	Maximum Design Speed M.P.H.	Minimum Transition or Spiral Length
0° 15'	►.015	70	200'	►.015	70	200'
0° 30'	►.015	70	200'	►.015	70	200'
0° 45'	.021	70	200'	.020	70	200'
1° 00'	.028	70	200'	.028	70	200'
1° 30'	.042	70	200'	.042	70	200'
2° 00'	.056	70	250'	.055	70	250'
2° 30'	.069	70	250'	.069	70	250'
3° 00'	.077	70	250'	.083	70	300'
3° 30'	.080	70	300'	.096	70	350'
4°	.080	65	300'	.100	70	350'
5°	.080	60	300'	.100	65	350'
6°	.080	55	250'	.100	55	300'
7°	.080	50	250'	.100	55	300'
8°	.080	50	250'	.100	50	300'
9°	.080	45	250'	.100	45	300'
10°	.080	45	250'	.100	45	300'
11°	.080	40	200'	.100	40	250'
12°	.080	40	200'	.100	40	250'
13°	.080	35	200'	.100	40	250'
14°	.080	35	200'	.100	35	200'
15°	.080	35	150'	.100	35	200'
16°	.080	35	150'	.100	35	200'
17°	.080	30	150'	.100	35	200'
18°	.080	30	150'	.100	35	200'
19°	.080	30	150'	.100	30	200'
20°	.080	30	150'	.100	30	200'
21°	.080	30	150'	.100	30	200'
22°	.080	30	150'	.100	30	200'
23°	.080	30	150'	.100	30	200'
24°				.100	30	200'
25°				.100	30	200'

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

(R-3)

TABLE 2 ~ SUPERELEVATION RATES FOR SPECIAL CASES ◪

Degree of Curve	25 M.P.H.			30 M.P.H.			35 M.P.H.			40 M.P.H.			45 M.P.H.			50 M.P.H.			55 M.P.H.			60 M.P.H.			Degree of Curve
	Required Super. Rate Ft./Ft.		Minimum Length of Transition	Required Super. Rate Ft./Ft.		Minimum Length of Transition	Required Super. Rate Ft./Ft.		Minimum Length of Transition	Required Super. Rate Ft./Ft.		Minimum Length of Transition	Required Super. Rate Ft./Ft.		Minimum Length of Transition	Required Super. Rate Ft./Ft.		Minimum Length of Transition	Required Super. Rate Ft./Ft.		Minimum Length of Transition	Required Super. Rate Ft./Ft.		Minimum Length of Transition	
	0.08	0.10	or Spiral	0.08	0.10	or Spiral	0.08	0.10	or Spiral	0.08	0.10	or Spiral	0.08	0.10	or Spiral	0.08	0.10	or Spiral	0.08	0.10	or Spiral	0.08	0.10	or Spiral	
0° 15'	N S	N S	0	N S	N S	0	N S	N S	0	N S	N S	0	N S	N S	0	N S	N S	0	N S	N S	0	N S	N S	0	0° 15'
0° 30'	N S	N S	0	N S	N S	0	N S	N S	0	N S	N S	0	N S	N S	0	►.015	►.015	200'	►.015	►.015	200'	.015	►.015	200'	0° 30'
0° 45'	N S	N S	0	N S	N S	0	N S	N S	0	►.015	►.015	150'	►.015	►.015	150'	►.015	►.015	150'	.016	.016	200'	.018	.018	200'	0° 45'
1° 00'	N S	N S	0	N S	N S	0	►.015	►.015	150'	►.015	►.015	150'	.016	.016	150'	.018	.018	150'	.021	.021	200'	.022	.022	200'	1° 00'
1° 30'	N S	N S	0	►.015	►.015	100'	►.015	.016	150'	.019	.020	150'	.023	.024	150'	.027	.027	150'	.031	.031	200'	.035	.034	200'	1° 30'
2° 00'	►.015	►.015	100'	.016	.016	100'	.020	.021	150'	.025	.027	150'	.030	.032	150'	.035	.036	150'	.041	.042	200'	.047	.046	200'	2° 00'
2° 30'	►.015	►.015	100'	.020	.020	100'	.025	.026	150'	.030	.033	150'	.036	.039	150'	.043	.045	150'	.050	.052	200'	.057	.059	200'	2° 30'
3° 00'	.016	.017	100'	.023	.024	100'	.029	.031	150'	.035	.038	150'	.042	.046	150'	.050	.054	150'	.057	.062	200'	.066	.070	250'	3° 00'
3° 30'	.019	.019	100'	.026	.027	100'	.033	.035	150'	.040	.045	150'	.048	.053	150'	.056	.063	200'	.064	.072	250'	.072	.081	300'	3° 30'
4°	.021	.021	100'	.029	.030	100'	.037	.040	150'	.044	.050	150'	.053	.060	150'	.062	.070	200'	.069	.079	250'	.076	.090	300'	4°
5°	.026	.026	100'	.035	.038	100'	.044	.048	150'	.053	.060	150'	.062	.071	200'	.070	.083	250'	.077	.091	300'	.080	.099	350'	5°
6°	.031	.031	100'	.041	.044	100'	.050	.056	150'	.060	.068	150'	.069	.080	200'	.076	.093	250'	.080	.098	300'		.100	350'	6°
7°	.035	.035	100'	.045	.050	100'	.056	.063	150'	.066	.076	200'	.074	.088	250'	.079	.097	300'							7°
8°	.039	.040	100'	.050	.055	100'	.061	.069	150'	.071	.084	200'	.078	.094	250'	.080	.100	300'							8°
9°	.043	.044	100'	.054	.061	100'	.065	.075	150'	.074	.089	200'	.080	.097	300'										9°
10°	.046	.048	100'	.058	.065	150'	.069	.081	150'	.077	.093	200'		.100	300'										10°
11°	.049	.052	100'	.061	.070	150'	.072	.085	200'	.079	.096	250'													11°
12°	.052	.056	100'	.065	.074	150'	.075	.089	200'	.080	.098	250'													12°
13°	.054	.060	100'	.067	.078	150'	.077	.092	200'		.100	250'													13°
14°	.057	.063	100'	.070	.082	150'	.078	.095	200'																14°
15°	.059	.067	100'	.072	.085	150'	.079	.097	200'																
16°	.061	.070	100'	.074	.087	150'	.080	.099	200'																
17°	.063	.073	100'	.076	.090	150'		.100	200'																
18°	.065	.076	100'	.077	.093	200'																			
19°	.067	.078	100'	.078	.095	200'																			
20°	.069	.081	100'	.079	.096	200'																			
21°	.070	.083	100'	.080	.098	200'																			
22°	.072	.086	100'	.080	.099	200'																			
23°	.073	.088	100'		.099	200'																			
24°	.075	.090	100'		.100	200'																			
25°	.076	.091	100'																						
26°	.077	.093	150'																						
27°	.078	.094	150'																						
28°	.079	.096	150'																						
29°	.079	.097	150'																						
30°	.080	.098	150'																						
32°	.080	.099	150'																						
35°		.100	150'																						

◪ Table 2 data may be used for City Streets & Interchanges.
NS = Normal Slope section.
► Do nothing to inside lanes. Superelevate outside lanes at rate shown in tables.

NOTES – Transition or Spiral Lengths are shown in the tables for 4 Lane Divided Highways.
For 6 Lane Divided Highways use 1.2 times the lengths shown, rounded to the nearest 50 feet.

(R-3)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

SUPERELEVATION OF CURVES DIVIDED HIGHWAYS

Designed by S.B.L.	Approved by [signature]
Made by S.B.L.	Staff Design Engr.
Checked by L.E.O.	Date July 1, 1965

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

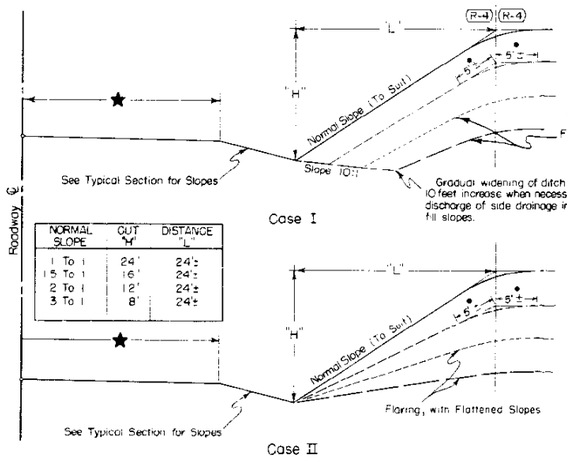
STANDARD M-203-B

(JULY 1, 1965)

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

REVISIONS			
(R-1)	2-6-68	Median Cross Over	MRH
(R-2)	7-30-68	Dept. Name	MRH
(R-3)	4-1-69	Widening for Guard Rail	MRH
(R-4)	4-27-70	Cut Slope and Note	MRH

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



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

(R-4) (R-4)

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

Flaring, with widened ditch.

* CUT SLOPE TREATMENT IN EARTH CUTS: The intersection of cut slopes with the existing ground shall be rounded in earth cuts, beginning outside the slope stake and extending down the cut slope. The exact dimension will be determined by the Engineer based on the type of material encountered.

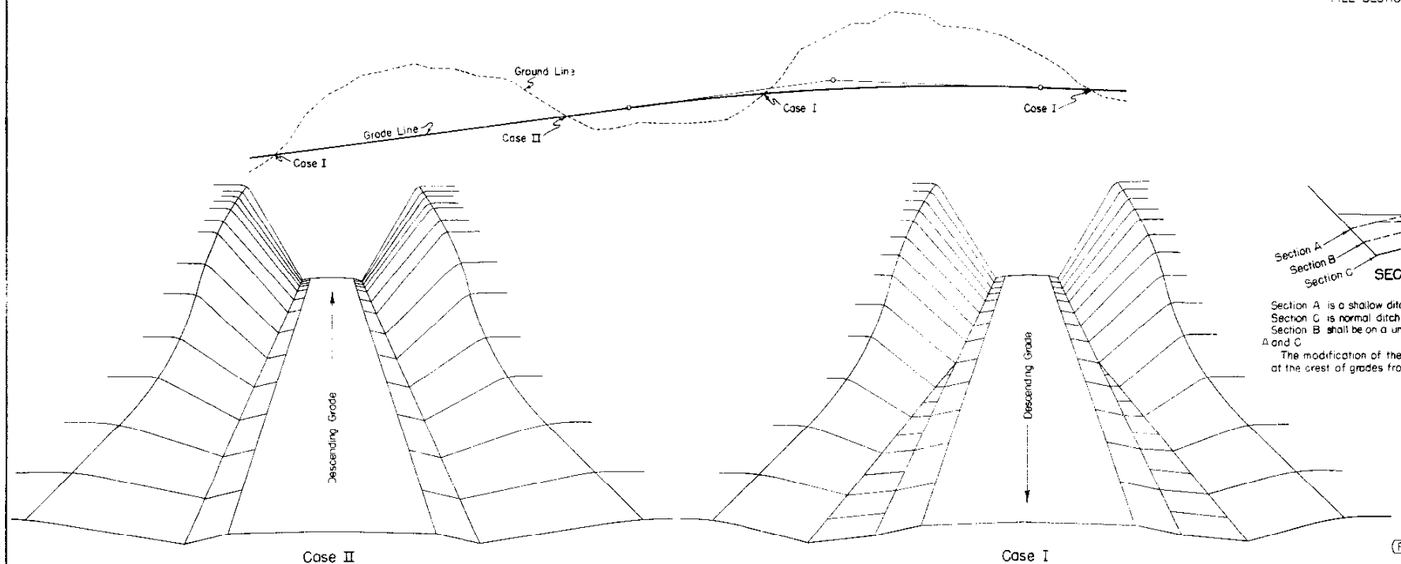
Quantities shall be included in "Unclassified Excavation".

* WIDENING AT BRIDGE APPROACHES: Roadway embankment at bridge approaches shall be so constructed that base of surfacing at shoulder point is a minimum of 2 Ft. beyond the edge of bridge deck. Where widening is necessary to achieve this result it shall take place gradually over a distance of 300 ft.

WIDENING FOR BITUMINOUS CURB (Only where Guard Rail is required); See appropriate M-Standard for Guard Rail. (R-3)

PLAN OF FLARING IN EARTH CUTS

(R-4)

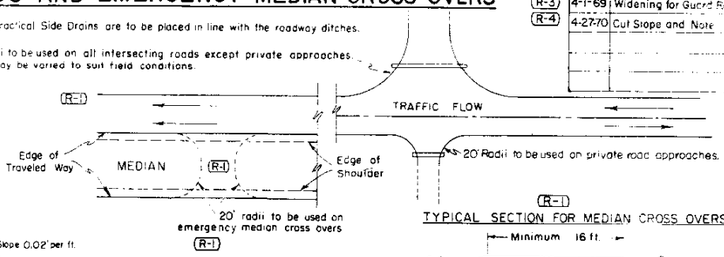


TYPICAL PLANS FOR SIDE APPROACH ROADS AND EMERGENCY MEDIAN CROSS OVERS

(R-1)

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

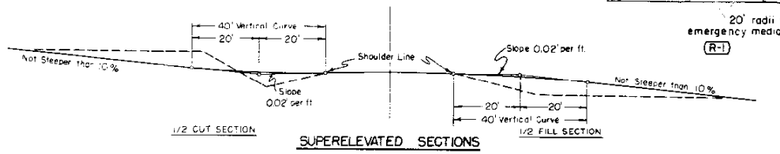
50' Radii to be used on all intersecting roads except private approaches. Radii may be varied to suit field conditions.



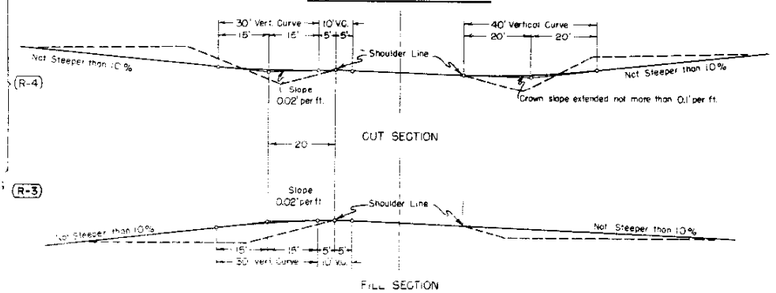
(R-1)

TYPICAL SECTION FOR MEDIAN CROSS OVERS

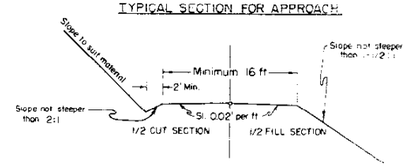
STANDARD CROWNED SECTION



SUPERELEVATED SECTIONS



TYPICAL SECTION FOR APPROACH

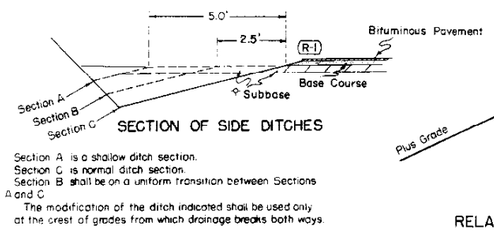


NOTE

Road Approaches shall conform to the above details unless otherwise indicated on plans. The width of the crowned section shall not be less than the width of the crowned section of the existing approach road and the new construction shall not be less than 16 feet in width.

DETAILS FOR DITCH & WIDENED SHOULDERS AT CREST OF GRADES

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



SECTION OF SIDE DITCHES

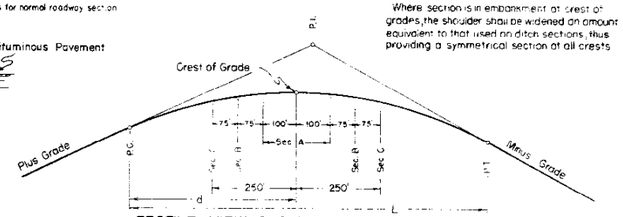
Section A is a shallow ditch section.
Section C is normal ditch section.
Section B shall be on a uniform transition between Sections A and C.
The modification of the ditch indicated shall be used only at the crest of grades from which drainage breaks both ways.

Formula for finding the Crest of Grade

$d = \frac{\text{Plus Grade}}{\text{Algebraic Diff.}} \times L$

NOTE

Where section is in embankment at crest of grades, the shoulder shall be widened an amount equivalent to that used on ditch sections, thus providing a symmetrical section at all crests.



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

GENERAL NOTES

(R-2)

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

All side approach roads to the Project shall be Graded, Surfaced with a 4 inch thickness of Aggregate Base Course extending approximately to the Right of Way Line. Estimated tonnage and class of material required for this operation are shown in the Aggregate Base Course Plan.

The maximum grades shown are to be the limiting grades for all road approaches. Modifications of grades will be permitted where adherence to the grades as shown would cause damage to property or create other unsatisfactory conditions. Grades flatter than the maximum shown are to be used wherever feasible.

(R-4)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

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

Designed by A.Z.	Approved by [signature]
Made by Sam Gash	Staff Design Engr.
Checked by C.R.S.	Date: July 1, 1965.

STANDARD M-206-A

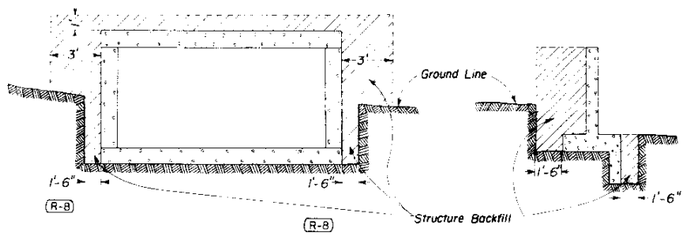
(JULY 1, 1965)

(SHEET 1 OF 2 SHEETS)

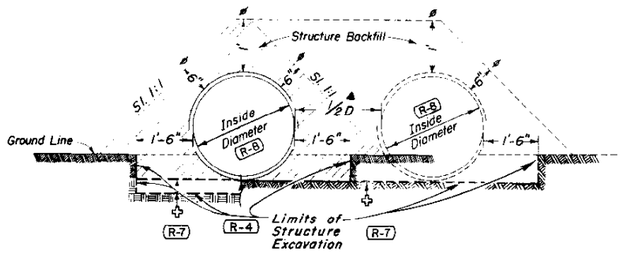
FED. ROAD REGION NO.	DIVISION	PROJECT NO.	SHT. NO.
9	COLO.		

REVISION			
R-1	10-20-65	ADDED PIER VIEW	M.R.H.
R-2	12-7-65	STR. EXCV.	M.R.H.
R-3	4-25-66	Class 2 Backfill(Trench)	M.R.H.
R-4	3-17-67	Conduit, Underdrn, Box	M.R.H.
R-5	4-26-68	Limit Str. Excavation	M.R.H.
R-6	7-23-68	Dept. Name, Gen. Note	M.R.H.
R-7	11-1-68	Limit Str. Excavation	M.R.H.
R-8	9-23-70	Dimensions & Pipe Gage	M.R.H.

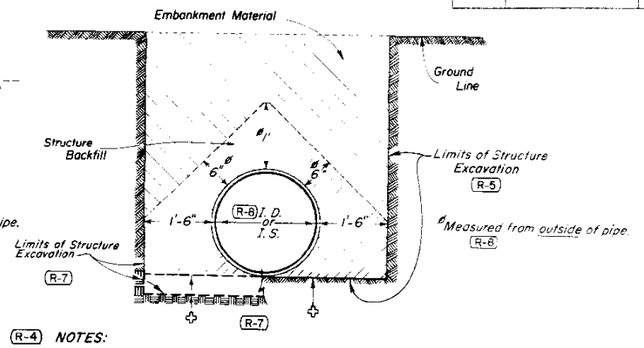
CONCRETE BOX CULVERTS & WINGWALLS



CIRCULAR CONDUIT



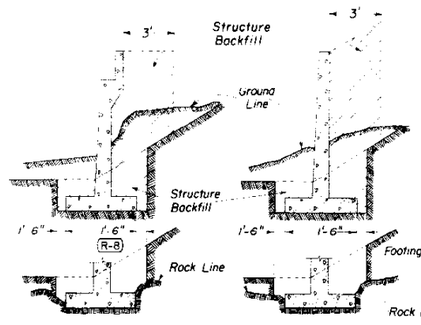
SIPHONS OR CONDUIT IN TRENCH

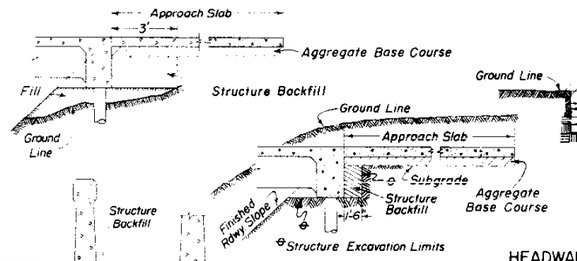


R-8 Measured from outside of pipe.

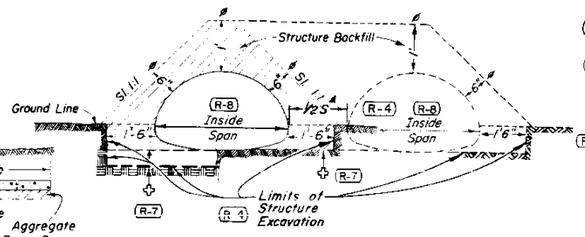
PIERS, ABUTMENTS, RETAINING WALLS ETC.

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.

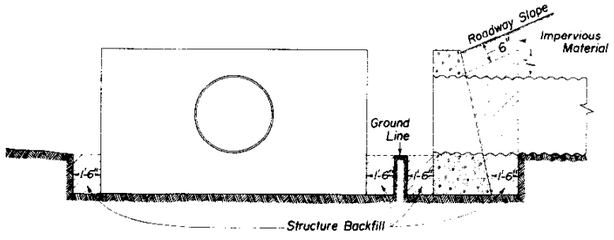




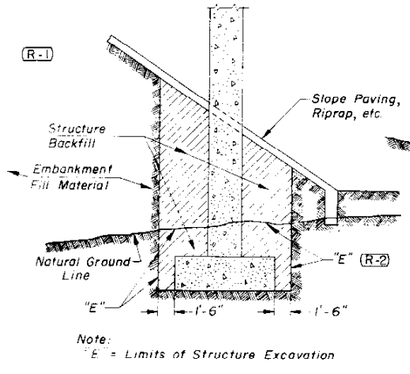
ELLIPTICAL OR ARCH CONDUIT



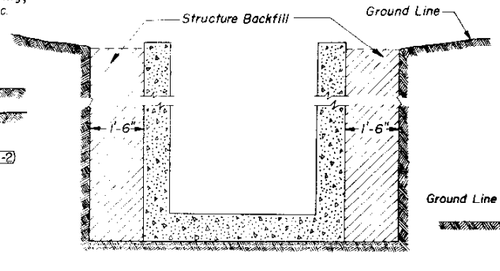
HEADWALLS AND END OF CULVERTS

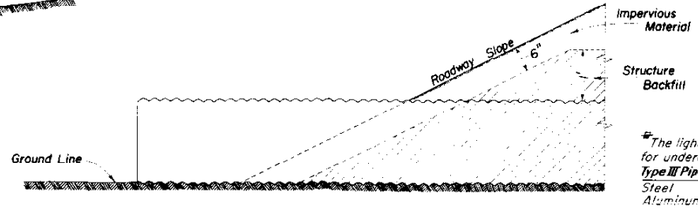


DROP INLETS, DIVISION BOXES, INTERCEPTING HEADWALLS, ETC.



Note: "E" = Limits of Structure Excavation

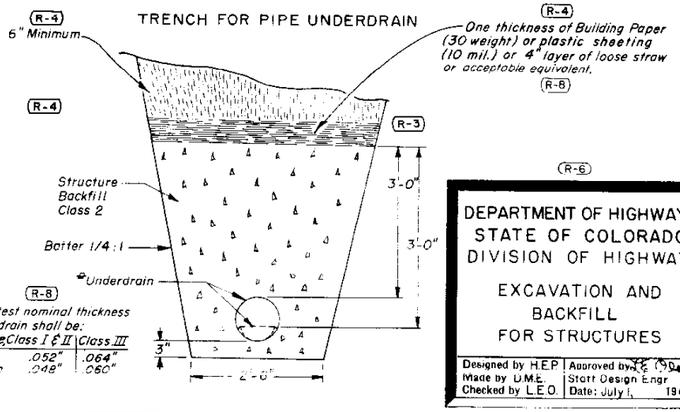




R-8 *The lightest nominal thickness for underdrain shall be:*

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

TRENCH FOR PIPE UNDERDRAIN



R-4 **NOTES:**

R-8 *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.* R-4

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 metal, reinforced concrete, and structural plate pipe 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.

R-6 *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.

R-4 ***Excavation** for structure installation shall be classified as "**Structure Excavation**" **unless otherwise** shown on plans.*

R-6

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

EXCAVATION AND BACKFILL FOR STRUCTURES

Designed by H.E.P.	Approved by [illegible]
Made by U.M.E.	Staff Design Engr.
Checked by L.E.O.	Date: July 1, 1965

STANDARD M-206-A

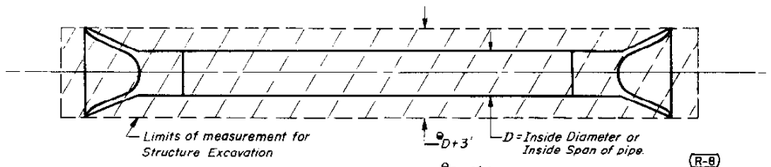
(SHEET 2)

(JULY 1, 1965)

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

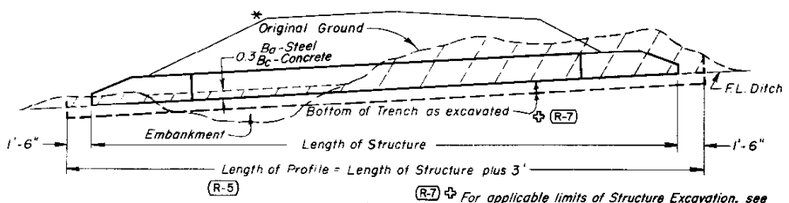
	REVISIONS:		
R-1	3-17-67	I. D. on Pipe Culvert Span or D.	M.R.H.
R-5	4-26-68	Structure Excavation in Fill	M.R.H.
R-6	7-23-68	Dept. Name & Detail	M.R.H.
R-7	11-1-68	Limit Str. Excavation	M.R.H.
R-8	9-23-70	Re-define "D" for Pipe culvert	M.R.H.

STRUCTURE EXCAVATION MEASUREMENT FOR PIPE CULVERTS



PLAN

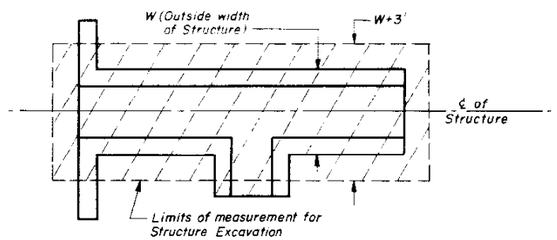
*D+6' for structural plate pipe culverts. (R-8)



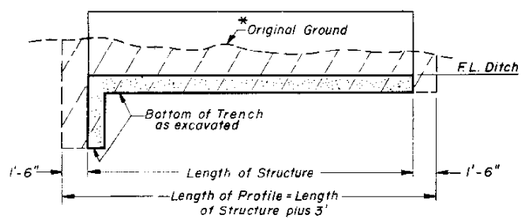
PROFILE

(R-7) ✣ 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

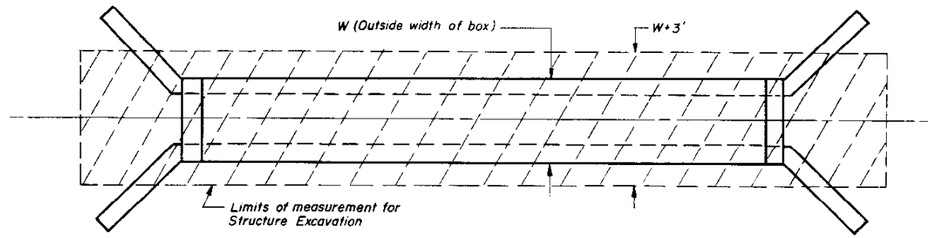


PLAN



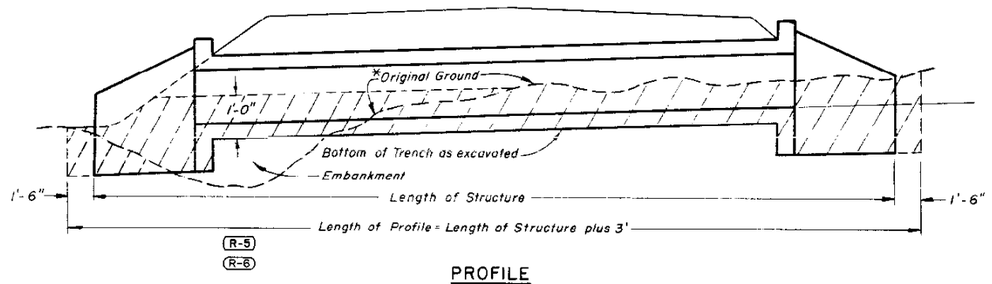
PROFILE

STRUCTURE EXCAVATION MEASUREMENT FOR CONCRETE BOX CULVERTS



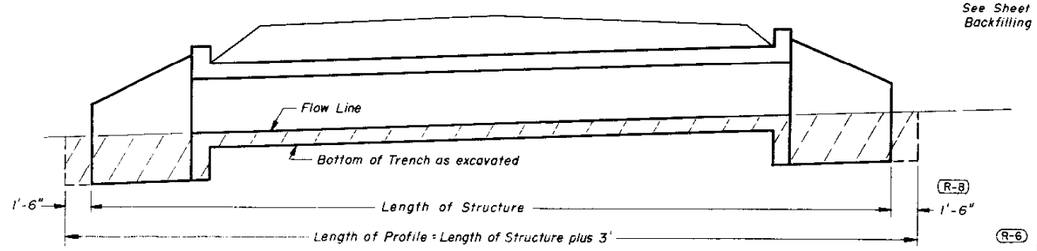
PLAN

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: L.C. Olson
Made by: H.P.B.	Staff Design Engr.
Checked by:	Date: July 1, 1965

STANDARD M-500-A

(JULY 1, 1965)

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

1 2 3 4 5 6 7 8 9 0 .

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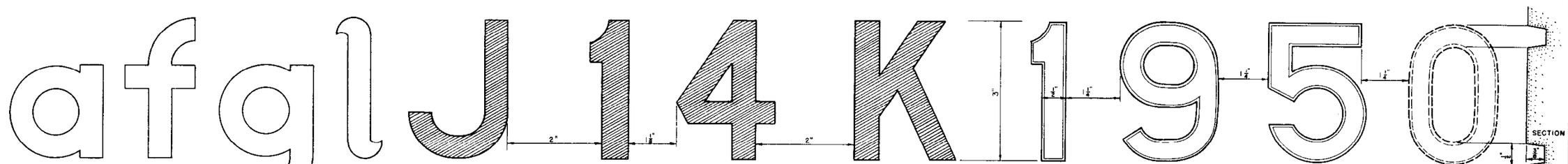
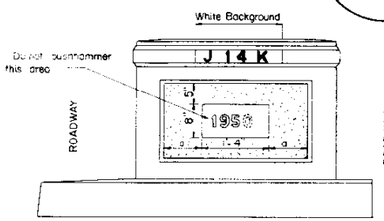
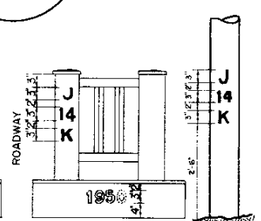


SAMPLE BRIDGE NUMBER

SAMPLE YEAR NUMBER

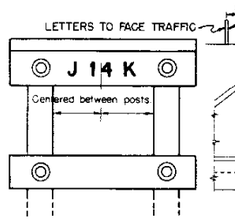


TYPICAL FOR CONCRETE END POST

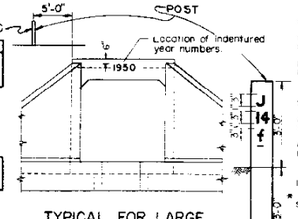


TYPICAL FOR STEEL HANDRAIL END POST

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 CROSSROADS 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. Threlkeld
Made by	Bridge Engineer
Checked by	Date: July 1, 1965

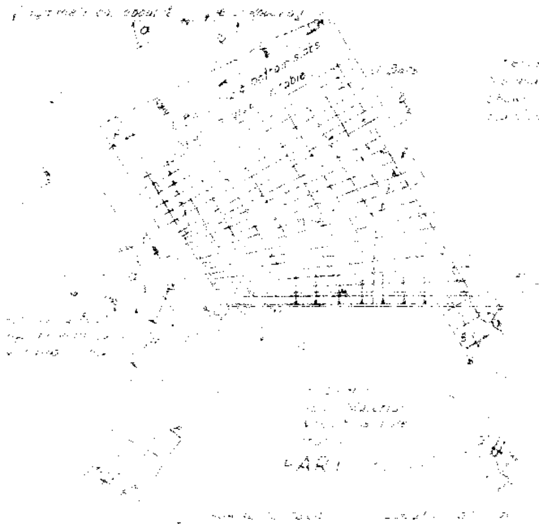
STANDARD M-601-A

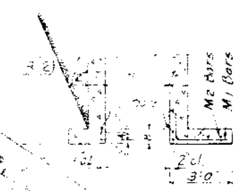
(JULY 1, 1965)

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

SINGLE CONCRETE BOX CULVERT

Dimensions & Quantities (See ...)





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

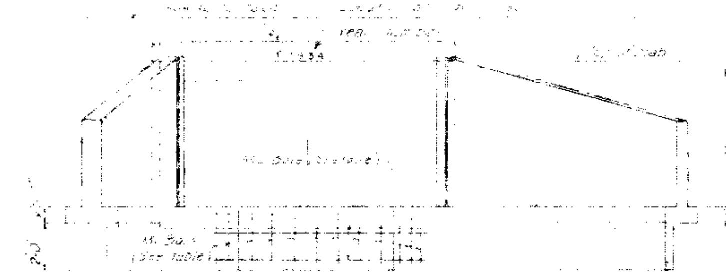
Mark	Size	No Req'd.	Type	Length
V_1	See table	$10+\frac{24L}{Spa}$	I	S+2w-6"
W_1	See table	$6+\frac{24L}{Spa.}$	I	H+2T-5"
U_1	½" ϕ	See table	I	L+1'-0"
M_1	½" ϕ	See table	II	3'-6"
M_2	½" ϕ	4	I	$\frac{S+2w-6"}{Cos\ \alpha}$

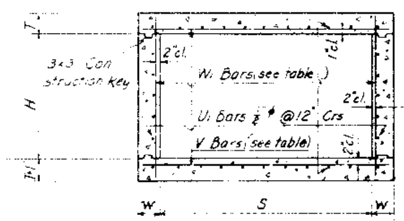
Straight — Type I; 2'-6" — Type II

(Bar dimensions are out to out of bar.)

Possible Combinations (Span & Height)

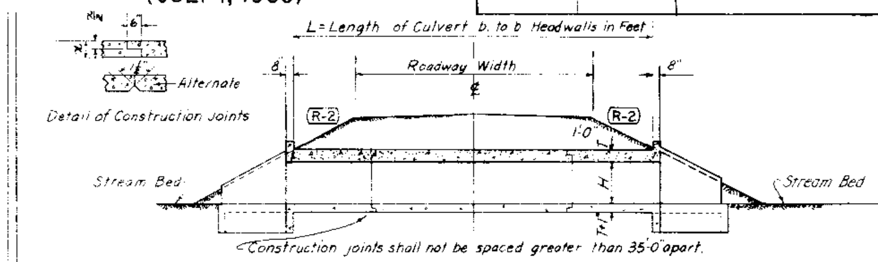
2'×2'	5'×5	9×5'	10'×7'	11'×8'	11'×10'
3'×2	7×4'	8'×6	9'×8'	10'×9	14'×8'
4'×2	6'×5	7×7	12'×6'	13'×7'	13'×9'
3'×3	8'×4	9'×6'	11'×7'	12'×8'	12'×10'
4'×3	7'×5	8'×7'	13'×6	14'×7'	14'×9'
5'×3	6'×6	10'×6	10'×8'	11'×9'	13'×10'
4'×4	8'×5	9'×7	9'×9'	10'×10'	14'×10'
5'×4	6'×7	8'×8	12'×7	13'×8'	
6'×4	7×6	11×6	14'×6	12'×9'	





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

SECTION B-B



TYPICAL SECTION THROUGH CULVERT

REVISIONS			
R-1	7-23-68	Dept. Name	M.R.H.
R-2	10-25-68	Delete Slope	M.R.H.

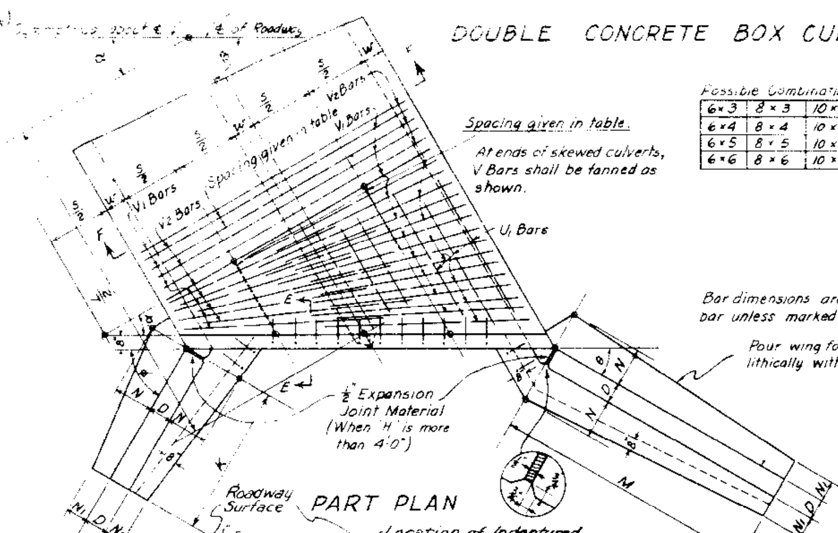
Note: K, M, N, N1 and D are dimensioned on Wingwall Standard for the various heights of culverts.

Quantities for one culvert shall be (quantity for ... two head walls) plus (quantities for four wings)

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

Note: This ... height of fill exceeds the allowed amount tabulated.

DOUBLE CONCRETE BOX CULVERT

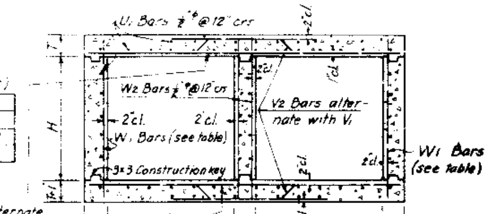


PART PLAN

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

Possible Combinations (Span & Height)

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



SECTION F-F

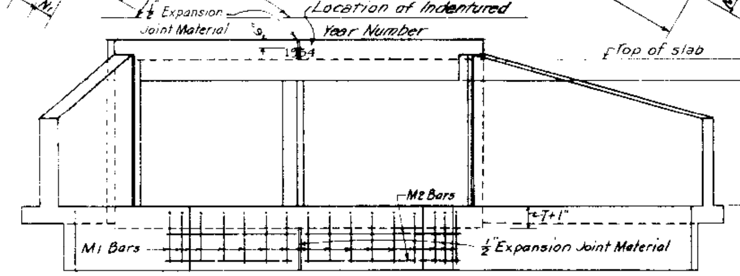
Bar List for Culvert and Two Headwalls (See Wingwall Std. for Wings)

Mark	Size	Number Required	Type	ℓ	Total Length
V_1	See Table	24(L+2) / Spacing	I	S+1.5w+4"	ℓ
V_2	See Table	24(L+2) / Spacing	II	0.75S+4"	2ℓ+m
W_1	See Table	24(L+2) / Spacing	I	H+2T-4"	ℓ
W_2	½" ϕ	2(L+2)	I	H+2T-4"	ℓ
U_1	½" ϕ	See Table	I	L+12"	ℓ
M_1	½" ϕ	See Table	III		3'-6"
M_2	½" ϕ	8	I	$\frac{S+1.5w}{Cos\ \alpha}$	ℓ

Type I; Type II (n = T-5", m = 1.41n); Type III (2'-6", 1'-0")

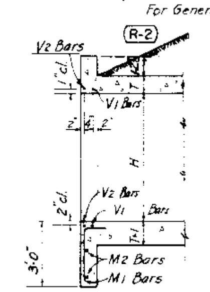
(Bar dimensions are out to out of bar.)

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



END ELEVATION

Note: All wing faces to receive Class I finish.



SECTION E-E

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: WWD	Approved by:
Made by: WWD	Bridge Engineer
Checked by: TJM	Date: July 1, 1965

STANDARD M-601-C

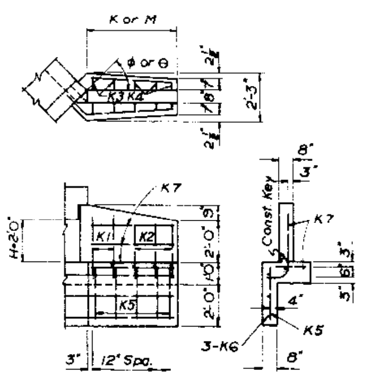
(SHEET 1 OF 2 SHEETS)
(JULY 1, 1965)

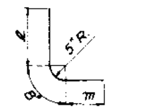
FED. ROAD REG. NO.	DIVISION	PROJECT. NO.	SHEET NO.
9	COLO.		

TABLE SHOWING VALUES OF K & M WHEN "β" & "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'-6"	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

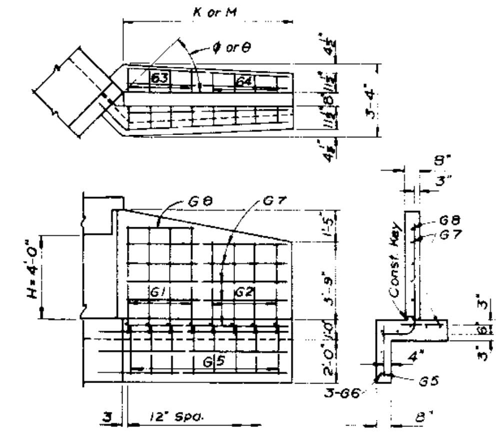
K3 = 1'-5"
K4 = 1'-4"
K5 = 2'-6"

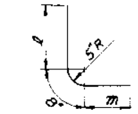
TYPE II

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

When φ or θ equals	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	3-K6 ½" φ Type II	4-K7 ½" φ Type II	Concrete Cu.Yd.	Steel Lb.
	Number of bars required					Length of bars		Quantities for One Wing	
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

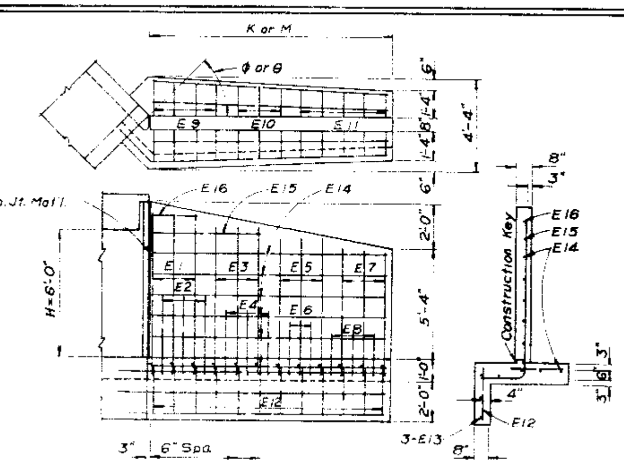
G3 = 2'-0"
G4 = 1'-10"
G5 = 2'-6"

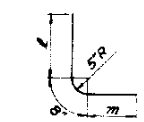
TYPE II

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

When φ or θ equals	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	3-G6 ½" φ Type II	8-G7 ½" φ Type II	1-G8 ½" φ Type II	Concrete Cu.Yd.	Steel Lb.
	Number of bars required					Length of bars			Quantities for One Wing	
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

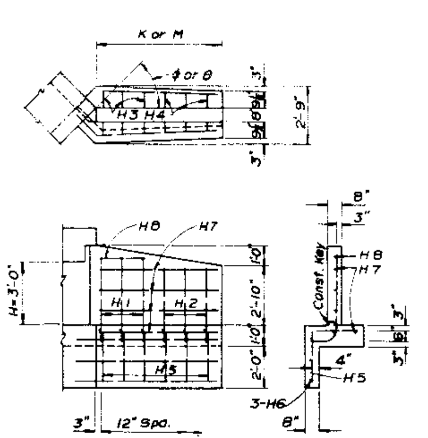
E9 = 2'-6"
E10 = 2'-4"
E11 = 2'-2"
E12 = 2'-6"

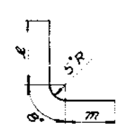
TYPE II

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

When φ or θ equals	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	3-E13 ½" φ Type II	9-E14 ½" φ Type II	1-E15 ½" φ Type II	1-E16 ½" φ Type II	Concrete Cu.Yd.	Steel Lb.
	Number of bars required												Length of bars				Quantities for One Wing	
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

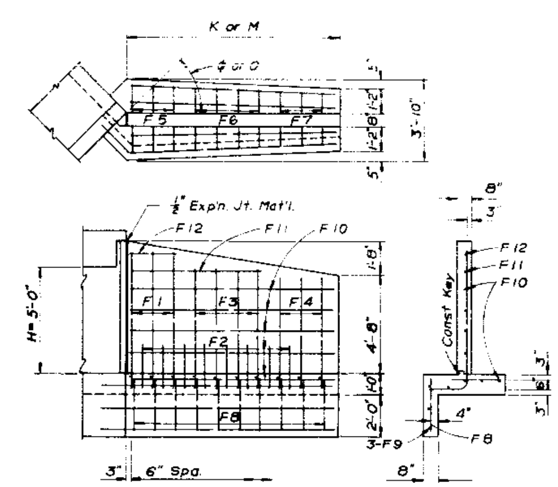
H3 = 1'-9"
H4 = 1'-7"
H5 = 2'-6"

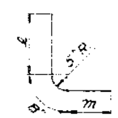
TYPE II

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

When φ or θ equals	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	3-H6 ½" φ Type II	5-H7 ½" φ Type II	1-H8 ½" φ Type II	Concrete Cu.Yd.	Steel Lb.
	Number of bars required					Length of bars			Quantities for One Wing	
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	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	3-F9 ½" φ Type II	8-F10 ½" φ Type II	1-F11 ½" φ Type II	1-F12 ½" φ Type II	Concrete Cu.Yd.	Steel Lb.
	Number of bars required								Length of bars				Quantities for One Wing	
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 I 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 A A S H O 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

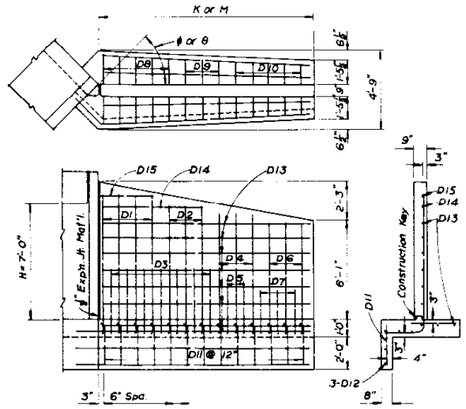
Designed by L.D.P.	Approved by [signature]
Made by JWM & RLS	Bridge Engineer
Checked by A.I.I. & D.S.M.	Date: July 1, 1965

STANDARD M-601-C

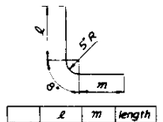
(SHEET 2)

(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

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

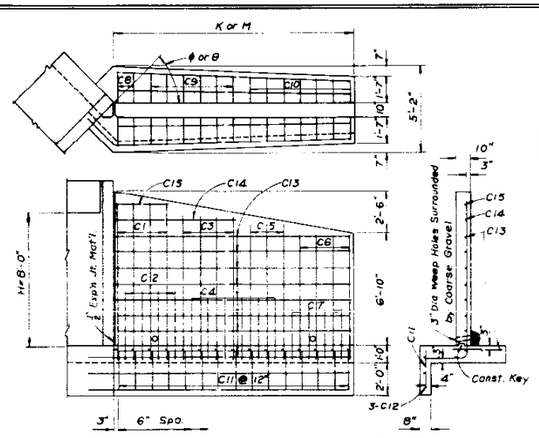
When ϕ or θ equals	Number of bars required: D1 ½ϕ Type I	D2 ½ϕ Type I	D3 ½ϕ Type I	D4 ½ϕ Type I	D5 ½ϕ Type I	D6 ½ϕ Type I	D7 ½ϕ Type I	D8 ½ϕ Type II	D9 ½ϕ Type II	D10 ½ϕ Type II	D11 ½ϕ Type II	Length of bars: 3-D12 ½ϕ Type II	1-D13 ½ϕ Type II	1-D14 ½ϕ Type II	1-D15 ½ϕ Type II	Quantities for One Wing: 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	3	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

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

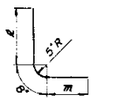
β	α	ϕ	θ	H= 7'-0" K	H= 7'-0" M	H= 8'-0" K	H= 8'-0" M	H= 9'-0" K	H= 9'-0" M	H=10'-0" K	H=10'-0" M
45°	45°	67°30'	22°30'	10'-0"	23'-9"	11'-0"	26'-9"	12'-3"	29'-6"	13'-6"	32'-3"
60°	30°	60°	30°	10'-6"	18'-3"	11'-9"	20'-6"	13'-0"	23'-9"	14'-3"	24'-9"
75°	15°	52°30'	37°30'	11'-6"	15'-0"	13'-0"	16'-9"	14'-3"	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=45° 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	8'-10"	1'-11"	11'-5"
C2	3'-8"	1'-2"	5'-6"
C3	8'-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"	1"	4'-2"

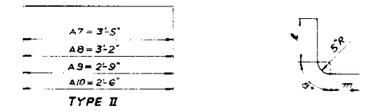
TYPE I

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

TYPE II

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

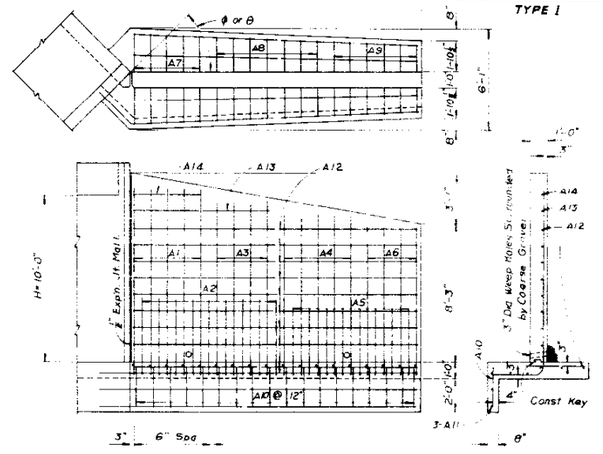
When ϕ or θ equals	Number of bars required: A1 ½ϕ Type I	A2 ½ϕ Type I	A3 ½ϕ Type I	A4 ½ϕ Type I	A5 ½ϕ Type I	A6 ½ϕ Type I	A7 ½ϕ Type I	A8 ½ϕ Type II	A9 ½ϕ Type II	A10 ½ϕ Type II	Length of bars: 3-A11 ½ϕ Type II	1-A12 ½ϕ Type II	1-A13 ½ϕ Type II	1-A14 ½ϕ Type II	Quantities for One Wing: Concrete Cu Yd	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"	9.83	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



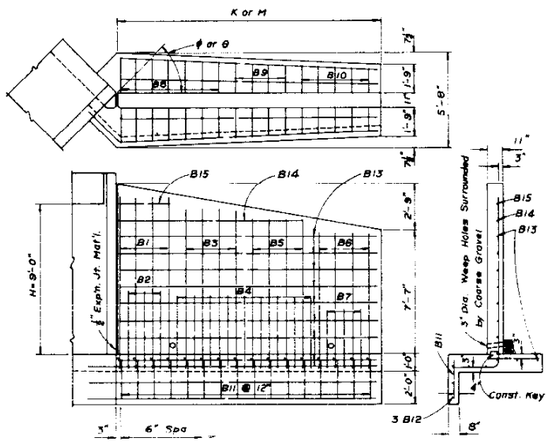
TYPE II

	ℓ	m	length
A1	10'-8"	2'-5"	13'-9"
A2	4'-1"	1'-6"	6'-3"
A3	9'-1"	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"

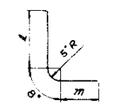
TYPE I



WING DETAIL WHEN H=10'-0"



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

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

When ϕ or θ equals	Number of bars required: B1 ½ϕ Type I	B2 ½ϕ Type I	B3 ½ϕ Type I	B4 ½ϕ Type I	B5 ½ϕ Type I	B6 ½ϕ Type I	B7 ½ϕ Type I	B8 ½ϕ Type II	B9 ½ϕ Type II	B10 ½ϕ Type II	B11 ½ϕ Type II	Length of bars: 3-B12 ½ϕ Type II	2-B13 ½ϕ Type II	1-B14 ½ϕ Type II	1-B15 ½ϕ Type II	Quantities for One Wing: 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

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.G.P.	Approved by [signature]
Made by J.W.M.E.R.S.	Bridge Engineer
Checked by [illegible] Date July, 1965	

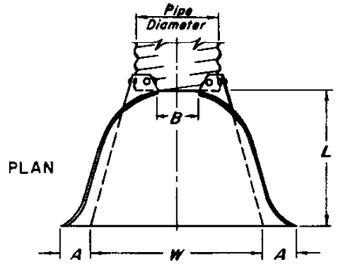
STRUCTURE NO. .....

STANDARD M-603-CA

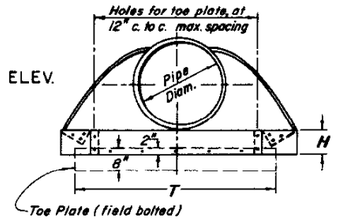
(NOVEMBER 10, 1967)

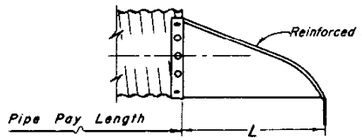
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TL SHEETS
9	COLORADO			

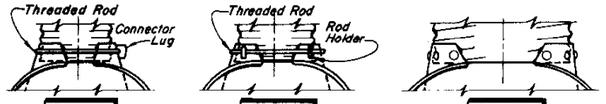
REVISIONS			
R-1	4-19-68	Welding - Conc. Arch, Elliptical - Gen. Notes	M.R.H.
R-2	7-23-68	Dept. Name	M.R.H.



PIPE DIAM. In.	GAGE	DIMENSIONS A (1"±) In.	B (Max.) In.	H (1"±) In.	L (1½"±) In.	W (2"±) In.	T In.
12	16	6	6	6	21	24	34
15	16	7	8	6	26	30	40
18	16	8	10	6	31	36	46
21	16	9	12	6	36	42	52
24	16	10	13	6	41	48	58
30	14	12	16	8	51	60	70
36	14	14	19	9	60	72	94
42	12	16	22	11	69	84	106
48	12	18	27	12	78	90	112
54	12	18	30	12	84	102	124
60	12	18	33	12	87	114	136
66	12	18	36	12	87	120	142
72	12	18	39	12	87	126	148
78	12	18	42	12	87	132	154
84	12	18	45	12	87	138	160







For 12" thru 24" pipe with Annular corrugations. Not to be used on helically formed pipe.

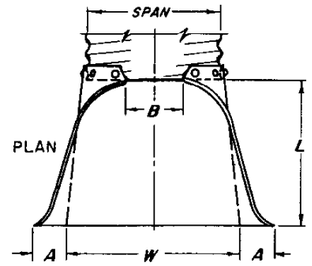
For 30" thru 36" pipe with Annular corrugations. Not to be used on helically formed pipe.

For 42" thru 84" pipe with Annular corrugations, and all sizes of pipe with Helical corrugations.

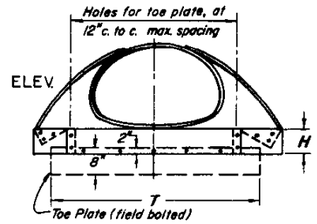
NOTE: Type 3 connections shall consist of an end section shop attached to a minimum 2 ft. of pipe with galvanized rivets or bolts, or by welding. (R-1)

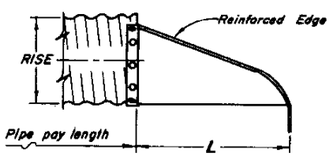
TYPICAL CONNECTIONS

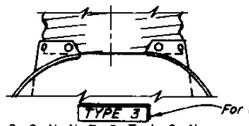
END SECTION AND CONNECTION DETAILS FOR ROUND CORRUGATED STEEL PIPE CULVERTS



PIPE ARCH SPAN • RISE In. In.	GAGE	DIMENSIONS A (1"±) In.	B (Max.) In.	H (1"±) In.	L (1½"±) In.	W (2"±) In.	T In.
18 x 11	16	7	9	6	19	30	40
22 x 13	16	7	10	6	23	36	46
25 x 16	16	8	12	6	28	42	52
29 x 18	16	9	14	6	32	48	58
36 x 22	14	10	16	6	39	60	70
43 x 27	14	12	18	8	46	75	88
50 x 31	12	13	21	9	53	85	103
58 x 36	12	18	26	12	63	90	108
65 x 40	12	18	30	12	70	102	120
72 x 44	12	18	33	12	77	114	132







For all sizes of pipe with Annular or Helical corrugations.

NOTE: End sections for pipe arches shall be shop attached to a minimum 2 ft. of pipe with galvanized rivets or bolts, or by welding. (R-1)

CONNECTION

END SECTION AND CONNECTION DETAIL FOR CORRUGATED STEEL PIPE ARCH CULVERT

GENERAL NOTES

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

Concrete End Sections are to be furnished with tongue or groove as req'd.

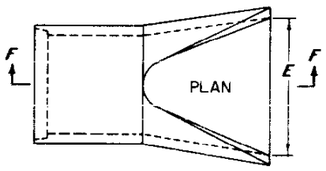
Alternate equivalent designs for Concrete End Sections may be submitted to the Department for approval. Design length of culvert is based on length of End Section shown in table. Additional pipe required to provide the design length of the culvert shall be furnished by and at the expense of the Contractor.

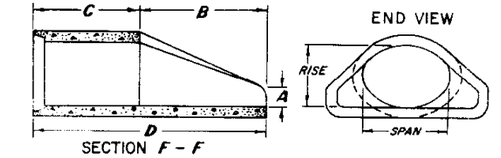
Other sizes of concrete pipe and end sections may be available upon request; however, the designer should contact supplier prior to calling for sizes other than those shown on this standard.

Inside configuration and joint of concrete end section and pipe shall match.

Galvanized Toe Plate as shown will be required on End Sections for corrugated steel pipe and shall be the same gage as the End Sections. Toe Plate shall be field bolted to End Section with 3/8" galvanized bolts, nuts and washers.

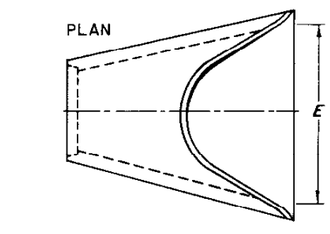
Designs for Aluminum End Sections for use on aluminum culverts shall be submitted to the Department for approval prior to use.





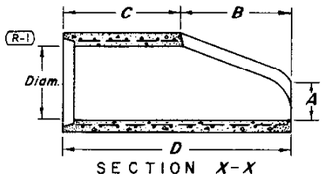
EQUIVALENT CIRCULAR DIAM. (Inches)	NOMINAL (In.) SPAN	RISE	DIMENSIONS (Inches) A	B	C	D	E
24	30	19	8 1/2	39	33	72	48
30	38	24	9 1/2	54	18	72	60
36	45	29	11 1/8	60	24	84	72
42	53	34	15 3/16	60	36	96	78
48	60	38	21	60	36	96	84
54	68	43	25 1/2	60	36	96	90
60	76	48	30	60	36	96	96

END SECTION FOR REINFORCED CONCRETE ELLIPTICAL PIPE (R-1)

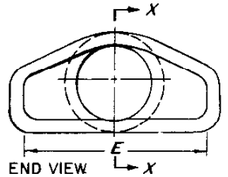


PIPE I. D. In.	DIMENSIONS A In.	B In.	C In.	D In.	E In.	
12	5½	23	49	72	24	
15	7	26	47	73	29	
18	11½	26	48	74	36	
24	12	43	54	97	48	
30	17	53	43	96	60	
36	18	60	37	97	71	
42	24	61	36	97	78	
48	28	70	28	98	84	
54	27	65	35	100	90	
60	36	58	40	98	96	
72	34½	75	21	96	108	

(R-1)

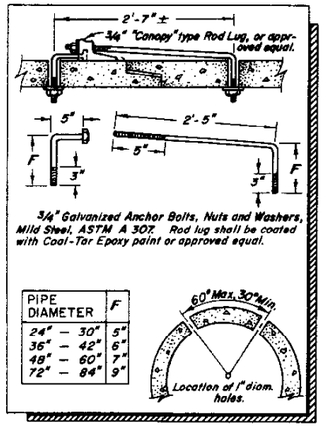


(R-1)



(R-1)

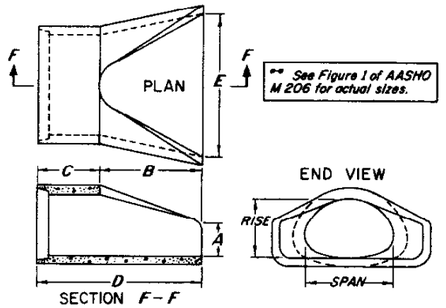
END SECTION FOR REINFORCED CONCRETE CIRCULAR PIPE



PIPE DIAMETER	F
24" – 30"	5"
36" – 42"	6"
48" – 60"	7"
72" – 84"	9"

CONCRETE JOINT FASTENER

NOTE: This assembly, or approved equal, shall be used for joining sections where shown on plans.



EQUIVALENT CIRCULAR DIAM. (Inches)	NOMINAL (In.) SPAN	RISE	DIMENSIONS (Inches) A	B	C	D	E
24	29	18	8 1/2	39	33	72	48
30	36	22	9 1/2	50	46	96	60
36	43	27	11 1/8	60	36	96	72
42	50	31	15 3/16	60	36	96	78
48	58	36	21	60	36	96	84
54	65	40	25 1/2	60	36	96	90
60	72	44	31	60	36	96	96
72	88	54	31	60	39	99	120

END SECTION FOR REINFORCED CONCRETE ARCH PIPE (R-1)

(R-2)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

CONCRETE AND METAL END SECTIONS

Designed by	M.R.H.	Approved by	
Made by	W.R.B.	Staff Design Engineer	
Checked by	R.S.M.	Date:	November 10, 1967

STANDARD M-603-M
(MARCH 20, 1967)

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

REVISIONS			
R-1	4-5-68	Added notes.	M.R.H.
R-2	7-23-68	Dept. Name. & Ø Note	M.R.H.

FILL HEIGHT AND GAGE TABLES FOR METAL CULVERT PIPE (RIVETED, WELDED OR HELICAL FABRICATION)

TABLE I
CORRUGATED STEEL PIPE
(2" x 1/2") OR (2·2/3" x 1/2") CORRUGATIONS

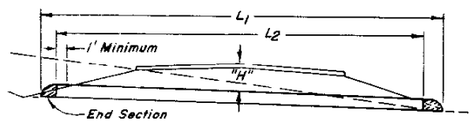
PIPE SIZE (B_d) Inches	AREA (Sq Ft)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET: 1 to 10	10+ to 15	15+ to 20	20+ to 25	25+ to 30	30+ to 35	35+ to 40	40+ to 45	45+ to 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80	80+ to 90	90+ to 100
		GAGE														
12	0.8	16	16	16	16	16	16	16	16	16	16	16	16	14	12	
15	1.2	16	16	16	16	16	16	16	16	16	16	16	14	12	12	10
18	1.8	16	16	16	16	16	16	16	16	14	14	12	12	10	8	
24	3.1	16	16	16	16	16	14	12	10	10	8					
30	4.9	16	16	16	16	14	14	12	12	10	8					
36	7.1	16	16	16	16	14	12	10	8							
42	9.6	16	16	16	16	16	14	14	12	8						
48	12.6	16	16	16	14	14	12	12	12							
54	15.9	14	14	14	14	14	12	12								
60	19.6	12	12	12	12	12	12	10								
66	23.8	12	12	12	12	10	10	8								
72	28.3	10	10	10	10	8										
78	33.0	8	8	8	8											
84	38.0	8	8	8												

---- See General Note.

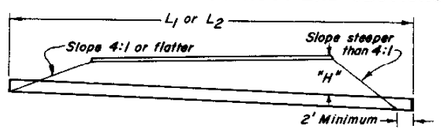
TABLE II
CORRUGATED STEEL PIPE ARCH
(2" x 1/2") OR (2·2/3" x 1/2") CORRUGATIONS

PIPE SIZE Span-Rise (Inches)	AREA (Sq.Ft.)	CORNER RADIUS (Inches)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET: 1.5 to 7	7+ to 8	8+ to 9	9+ to 10	10+ to 12	12+ to 13
			GAGE					
18 x 11	1.1	3 1/2	16	16	16	16	16	16
22 x 13	1.6	4	16	16	16	16	16	
25 x 16	2.2	4	16	16	16	16		
29 x 18	2.8	4 1/2	16	16	16			
36 x 22	4.4	5	16	16	16			
43 x 27	6.4	5 1/2	16					
50 x 31	8.7	6	14					
58 x 36	11.4	7	12					
65 x 40	14.3	8	12					
72 x 44	17.6	9	10					

METAL CULVERT WITH END SECTIONS



METAL CULVERT WITHOUT END SECTIONS



"H" = Maximum height of fill over top of Culvert, including pavement.

L_1 = Length of Culvert to be measured when placed in accordance with Section 617.

L_2 = Length of pipe to be measured when placed in accordance with Section 603.

(R-1) *Length of extension, when placed in accordance with Section 617, shall be the actual number of feet of new culvert required.*

TABLE III
CORRUGATED STEEL PIPE
3" x 1" CORRUGATIONS
RIVETED OR HELICAL FABRICATION

PIPE SIZE (B_d) Inches	AREA (Sq.Ft.)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET: 1 to 10	10+ to 15	15+ to 20	20+ to 25	25+ to 30	30+ to 35	35+ to 40	40+ to 45	45+ to 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80
		GAGE												
36	7.1	16	16	16	16	16	14	14	12	12	12	12	10	8
42	9.6	15	16	16	16	14	14	14	12	12	12	12	8	
48	12.6	16	16	16	14	14	14	12	12	12	10	8		
54	15.9	16	16	16	14	14	12	12	10	8				
60	19.6	15	16	16	14	12	12	12	10					
66	23.8	15	16	14	14	12	12	10						
72	28.3	15	15	14	12	12	12	10						
78	33.0	16	16	14	12	10	8							
84	38.0	14	14	14	12	12								
90	44.0	14	14	12	12	12								
96	50.3	12	12	12	12	10								
102	57.0	12	12	12	12									
108	64.0	12	12	12	10									
114	70.9	10	10	10	8									
120	78.6	10	10	10	8									

---- See General Note

5/16" rivets or helical fabrication shall be used on pipes with gages to the left of or above the heavy solid line.

3/8" rivets or helical fabrication shall be used on pipes with gages to the right of or below the heavy solid line.

TABLE IV
CORRUGATED STEEL PIPE
3" x 1" CORRUGATIONS
* SPOT WELDED OR BOLTED (1/2" ASTM A 325 BOLTS) FABRICATION

PIPE SIZE (B_d) Inches	AREA (Sq.Ft.)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET: 1 to 10	10+ to 15	15+ to 20	20+ to 25	25+ to 30	30+ to 35	35+ to 40	40+ to 45	45+ to 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80	80+ to 90	90+ to 100
		GAGE														
36	7.1	16	16	16	16	16	16	16	14	14	14	12	12	12	12	10
42	9.6	16	16	16	16	16	16	16	14	14	12	12	12	10	8	
48	12.6	16	16	16	16	16	14	14	14	12	12	12	10	8		
54	15.9	16	16	16	16	16	14	14	12	12	10	10				
60	19.6	16	16	16	16	14	14	12	12	10	8					
66	23.8	16	16	16	14	14	12	12	10	8						
72	28.3	16	16	16	14	14	12	12	10							
78	33.0	16	16	16	14	12	12	10	8							
84	38.0	14	14	14	14	12	12	10								
90	44.0	14	14	14	14	12	12	10								
96	50.3	12	12	12	12	12	10	8								
102	57.0	12	12	12	12	10	8									
108	64.0	12	12	12	10	8										
114	70.9	10	10	10	10	10	10	8								
120	78.6	10	10	10	10	10										

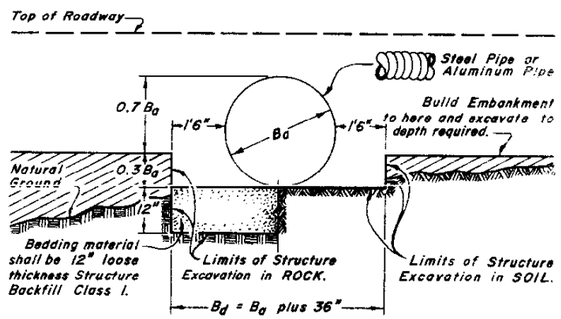
---- See General Note.

** 3/8" rivets may be used on pipes with gages to the left of or above the heavy solid line.*
7/16" rivets may be used on pipes with gages to the right of or below the heavy solid line.

TABLE V
CORRUGATED STEEL PIPE ARCH
3" x 1" CORRUGATIONS
(R-2)

PIPE SIZE Span-Rise (Inches)	AREA (Sq.Ft.)	CORNER RADIUS (Inches)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET: 1.5 to 10	10+ to 11	11+ to 12	12+ to 14	14+ to 15
			GAGE				
43 x 27	6.4	7 3/4	16	16	16		
50 x 31	8.7	9	16	16	16		
58 x 36	11.4	10 1/2	16	16	16		
65 x 40	14.3	12	16	16	16		
72 x 44	17.6	13 1/4	16	16	16		
73 x 55	22.0	18	16	16	16	16	16
81 x 59	26.0	18	14	14	14	14	14
Ø 87 x 63	31.0	18	14	14	14	14	
Ø 95 x 67	35.0	18	12	12	12		
Ø 103 x 71	41.0	18	12	12			

INSTALLATION OF METAL CULVERT PIPE



NOTE: Spacing for multiple pipe installations shall conform to the details shown on M Standard for Excavation and Backfill for Structures.

TABLE VI
CORRUGATED ALUMINUM PIPE
2·2/3" x 1/2" CORRUGATIONS

PIPE SIZE (B_d) Inches	AREA (Sq.Ft.)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET: 1 to 10	10+ to 15	15+ to 20	20+ to 25	25+ to 30	30+ to 35	35+ to 40	40+ to 45	45+ to 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80
		GAGE												
12	0.8	16	16	16	16	16	16	16	14	12	12	12	12	
18	1.8	16	16	16	16	14	12	10	8	8				
24	3.1	16	16	16	14	10								
30	4.9	16	16	16	12	12	8							
36	7.1	16	16	14	12	8								
42	9.6	14	14	12	14	12	12	8						
48	12.6	12	12	12	12	10	8	8						
54	15.9	12	12	10	8	8								
60	19.6	10	10	8										
66	23.8	10	8											
72	28.3	8												

---- See General Note.

TABLE VII
CORRUGATED ALUMINUM PIPE ARCH
2·2/3" x 1/2" CORRUGATIONS

PIPE SIZE Span-Rise (Inches)	AREA (Sq.Ft.)	CORNER RADIUS (Inches)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET: 1.5 to 7	7+ to 9	9+ to 11	11+ to 13	13+ to 14	14+ to 15
			GAGE					
18 x 11	1.1	4 3/4	16	16	16	16	16	16
22 x 13	1.6	4 3/4	16	16	16	16	16	
25 x 16	2.2	4 1/2	16	16	16	16		
29 x 18	2.8	4 1/2	16	16	16			
36 x 22	4.4	5	16	16				
43 x 27	6.4	5 1/2	14					
50 x 31	8.7	6	12					
58 x 36	11.4	7	10					
65 x 40	14.3	8	10					
72 x 44	17.6	9	8					

GENERAL NOTES

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

The tables on this sheet show minimum gages for structural requirements only. They are intended for use only where corrosive and/or abrasive conditions are negligible. Heavier gages and/or protective coatings shall be used where site investigations indicate corrosive and/or abrasive conditions.

Gages shown are U.S. Standard and are minimum requirements for use with adequate bedding and backfill, in accordance with the Standard Specifications.

Gages shown are for finished construction. During construction, adequate cover shall be provided to protect the structure from damage.

The minimum depth of fill excluding pavement over corrugated metal pipe culverts shall be as staked by the Engineer but in no case shall it be less than shown in the following tabulation:

Diameter of Culvert (B_d)	Minimum Allowable Cover
96" and smaller	1 foot
102" and larger	2 feet
Pipe Arch	1.5 feet

Structural plate pipes of equal or larger diameter, conforming to Section 510 of the Standard Specifications, may be substituted for the pipes shown on this sheet at no additional cost to the State.

NOTES FOR TABLES

Pipes with gages to the right of or below the heavy dashed line shown in the tables on this sheet, shall be elongated 5 percent on the vertical axis as installed. (Tables I, III, IV and VI)

Maximum fill heights shown are for bearing pressures of 2 tons per square foot. (Tables II, V and VII)

Fill heights greater than 90' shall be used only after thorough investigation of foundation material. (Tables I and IV)

Variations from corner radii shown will be acceptable provided the pipe is of sufficient strength to support it's designated fill height. (Tables II, V, and VII)

(R-1)
GENERAL NOTES (Continued)

When a culvert is to be extended with pipe of different material, the connection shall conform to the detail on plans or be approved.

Ø May not be available. The designer should (R-2) *contact supplier before calling for the sizes denoted by this symbol.*

(R-2)
DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

METAL CULVERT PIPE
H-20 LOADING

Designed by M.R.H.	Approved by P.E.O.
Made by J.R.B.	Staff Design Engineer
Checked by R.S.M.	Date: March 20, 1967

STANDARD M-603-RC

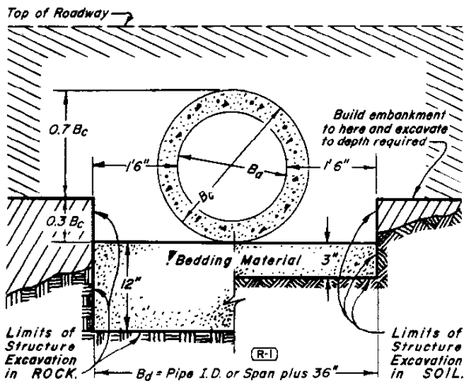
(MARCH 20, 1967)

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

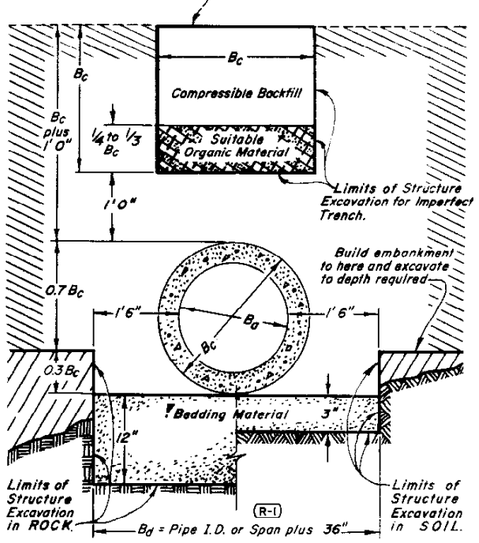
REVISIONS			
R-1	4-19-68	Added Arch and Elliptical Pipe. Gen. Notes.	M.R.H.
R-2	7-23-68	Dept. Name.	M.R.H.

(R-1) NOTE: B_c Is the outside dimension for diameter, span or rise.

PIPE INSTALLATION
(WITH 0.7 PROJECTION RATIO)



IMPERFECT TRENCH PIPE INSTALLATION
(WITH 0.7 PROJECTION RATIO)



Bedding Material for SOIL shall be 3" loose thickness Structure Backfill Class 3.
Bedding Material for ROCK shall be 12" loose thickness Structure Backfill Class 1.

(R-1)

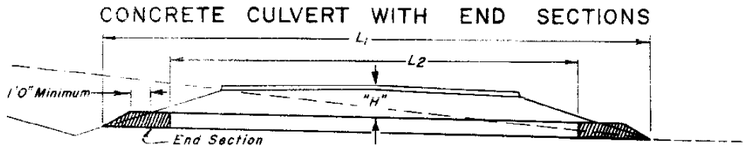
DIMENSIONS FOR REINFORCED CONCRETE PIPE
(For Information Only)

CIRCULAR			ARCH				(VE) VERTICAL ELLIPTICAL				(HE) HORIZONTAL ELLIPTICAL			
▲ PIPE SIZE: B_0 (In. I.D.)	Wall Thickness (Inches)	0.3 B_c (Outside Dia.) (Feet)	⌀ Span (Inches)	⌀ Rise (Inches)	Wall Thickness (Inches)	0.3 Outside Rise (Feet)	Span (Inches)	Rise (Inches)	Wall Thickness (Inches)	0.3 Outside Rise (Feet)	Span (Inches)	Rise (Inches)	Wall Thickness (Inches)	0.3 Outside Rise (Feet)
12	2	0.40												
15	2-1/4	0.49	18	11	2-1/4	0.39								
18	2-1/2	0.58	22	13	2-1/2	0.45					23	14	2-3/4	0.49
21	2-3/4	0.66	25	16	2-3/4	0.54								
24	3	0.75	29	18	3	0.60					30	19	3-1/4	0.66
27	3-1/4	0.84									34	22	3-1/2	0.73
30	3-1/2	0.92	36	22	3-1/2	0.73					38	24	3-3/4	0.79
33	3-3/4	1.01									42	27	3-3/4	0.86
36	4	1.10	43	27	4	0.88	29	45	4-1/2	1.35	45	29	4-1/2	0.95
39							32	49	4-3/4	1.46	49	32	4-3/4	1.04
42	4-1/2	1.28	50	31	4-1/2	1.00	34	53	5	1.58	53	34	5	1.10
48	5	1.45	58	36	5	1.15	38	60	5-1/2	1.78	60	38	5-1/2	1.23
54	5-1/2	1.62	65	40	5-1/2	1.28	43	68	6	2.00	68	43	6	1.38
60	6	1.80	72	44	6	1.40	48	76	6-1/2	2.23	76	48	6-1/2	1.53
66	6-1/2	1.97					53	83	7	2.43	83	53	7	1.68
72	7	2.15	88	54	7	1.70	58	91	7-1/2	2.65	91	58	7-1/2	1.83
78	7-1/2	2.32					63	98	8	2.85	98	63	8	1.98
84	8	2.50	102	62	8	1.95	68	106	8-1/2	3.08	106	68	8-1/2	2.13
90	8-1/2	2.68	115	72	8-1/2	2.23	72	113	9	3.28	113	72	9	2.25
96	9	2.85	122	77	9	2.38	77	121	9-1/2	3.50	121	77	9-1/2	2.40
102	9-1/2	3.02					82	128	9-3/4	3.69	128	82	9-3/4	2.54
108	10	3.20	138	87	10	2.68	87	136	10	3.90	136	87	10	2.68

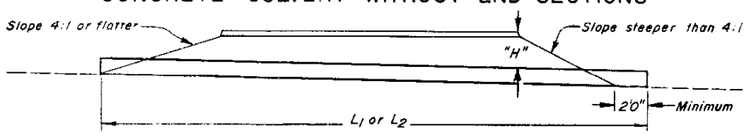
▲ Also equivalent round dimension for Arch and Elliptical pipe.

⌀ Sizes shown are for identification purposes only. Actual sizes shall conform to those listed in Fig. 1 of ASTM Spec. C 506.

CONCRETE CULVERT WITH END SECTIONS



CONCRETE CULVERT WITHOUT END SECTIONS



"H" = Maximum height of fill over top of Culvert, including pavement.

L_1 = Length of Culvert to be measured when placed in accordance with Section 617.

L_2 = Length of Pipe to be measured when placed in accordance with Section 603.

(R-1) Length of extension, when placed in accordance with Section 617, shall be the actual number of feet of new culvert required.

(R-1)

HEIGHTS OF FILL OVER REINFORCED CONCRETE PIPE
— ALL SIZES —

TYPE OF PIPE	HEIGHT OF FILL OVER TOP OF PIPE IN FEET — CLASS OF PIPE (0.01" Crack D-Load)				
	Class II / Class VE II / Class HE II	Class III / Class VE III / Class HE III	Class IV / Class VE IV / Class HE IV	Class V / Class VE V	Class VE VI
	1000 D	1350 D	2000 D	3000 D	4000 D
PIPE INSTALLATION WITH 0.7 PROJECTION RATIO					
CIRCULAR	Min. to 18	Min. to 25	25+ to 37	37+ to 45	
ARCH	Min. to 18	Min. to 25	25+ to 37		
VERTICAL ELLIPTICAL	Min. to 18	Min. to 25	25+ to 37	37+ to 45	45+ to 5[illegible]
HORIZONTAL ELLIPTICAL	Min. to 18	Min. to 25	25+ to 37		
PIPE INSTALLATION WITH IMPERFECT TRENCH					
ALL TYPES	up to 35	up to 48	48+ to 75	75+ to 96	

(R-1)

GENERAL NOTES

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

Minimum cover excluding pavement shall be 1 foot.

Fill heights greater than maximum allowed in the Heights of Fill Table on this sheet will require special design of structure.

Pipe design is based on safety factor of 1.33 on ultimate strength.

The heights of fill over top of pipe are based on unit weight of soil at 120 lbs. per cubic foot.

Pipe Class is determined from .01 inch crack D-load.

Class II pipe shall not be used on main roadway but is permissible in medians, road approaches and other areas not subject to heavy traffic loads.

Changes in design factors will require compensating change in pipe design.

Minimum wall thicknesses or designations are based on AASHO Designation M 170 (Wall B) for Circular Pipe, AASHO Designation M 206 for Arch Pipe and AASHO Designation M 207 for Elliptical Pipe.

Spacing for multiple pipe installations shall conform to the details shown on M Standard for Excavation and Backfill for Structures.

When a culvert is [illegible] with pipe of different material, the connection shall conform to the detail on plans or as [illegible].

(R-2)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

REINFORCED CONCRETE PIPE

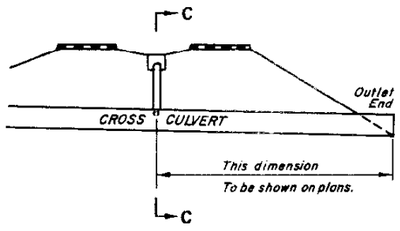
Designed by M. R. H.	Approved by [illegible]
Made by J. R. B.	Staff Design Engr.
Checked by R. S. M.	Date: 4-19-68

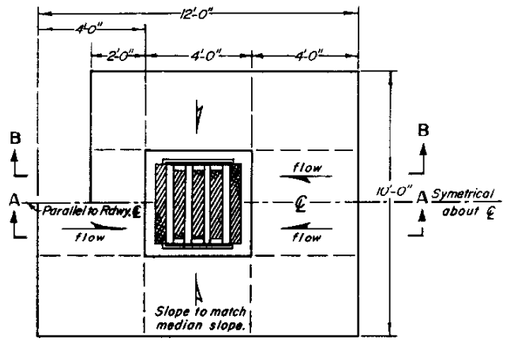
STANDARD M-604-BA

(JUNE 1, 1967)

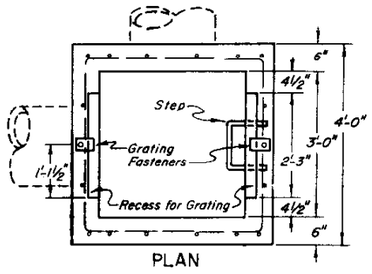
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	
9	COLORADO			

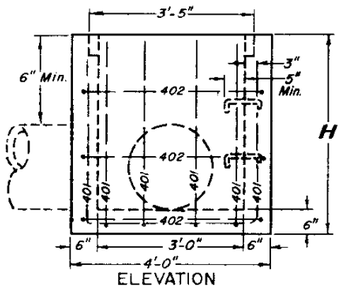
REVISIONS			
R-1	9-13-67	Grate Detail & Quants.	M.R.H.
R-2	12-18-67	Connect to skewed culvert, Gen... Note	M.R.H.
R-3	7-19-68	Note & Dept. Name	M.R.H.



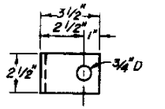


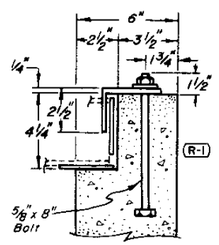
LAYOUT OF INLET IN MEDIAN DITCH





CONCRETE INLET





SECTION D-D (R-1)

DETAIL OF RECESS AND GRATING FASTENER
(2 REQUIRED)

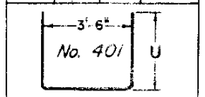
QUANTITIES FOR ONE INLET

H	CLASS "A" CONCRETE *(CU. YDS.)	REINF. STEEL (LBS.)	NO. STEPS REQ'D.
3'-0"	1.0	83	0
3'-6"	1.1	89	0
4'-0"	1.2	105	0
4'-6"	1.4	111	1
5'-0"	1.5	127	2
5'-6"	1.6	134	2
6'-0"	1.7	150	2
6'-6"	1.9	157	3
7'-0"	2.0	172	3
7'-6"	2.1	178	3
8'-0"	2.3	194	4
8'-6"	2.4	201	4
9'-0"	2.5	217	4
9'-6"	2.7	223	5
10'-0"	2.8	239	5
11'-0"	3.0	261	6
12'-0"	3.3	283	6

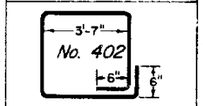
* Note: Includes Volume occupied by pipes. (R-3)

BAR LIST FOR H=3' AND BENDING DIAGRAM

MARK	NO. REQ'D	HGT. "U"	LENGTH
401	9	2'-7"	8'-8"
402	3		15'-4"

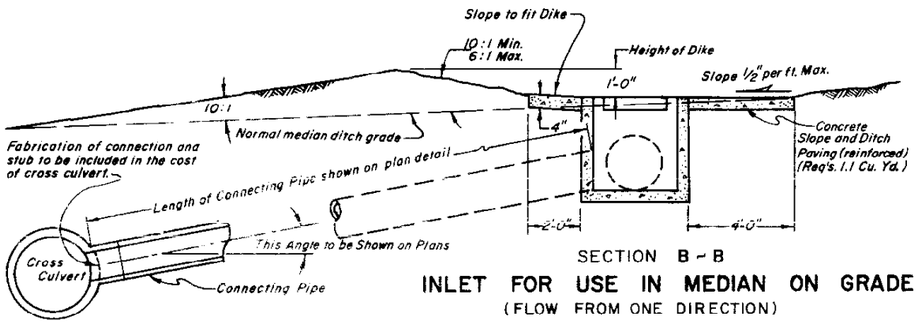


Increase dimension "U" 6" for each 6" increase of H above 3'-0".



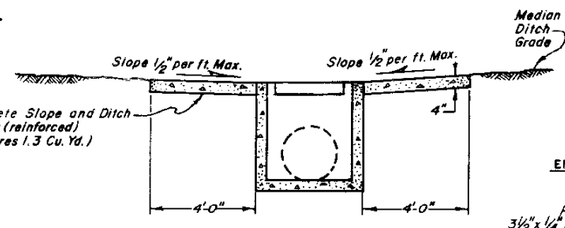
Add one bar for each foot increase of H above 3'-0".

All bars to be ½" Dia.—Cut or bend around pipes as required.



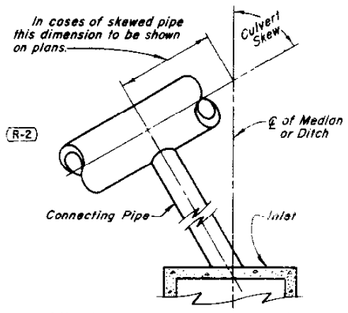
SECTION C-C

DETAIL SHOWING MEDIAN INLET CONNECTED TO A CROSS CULVERT

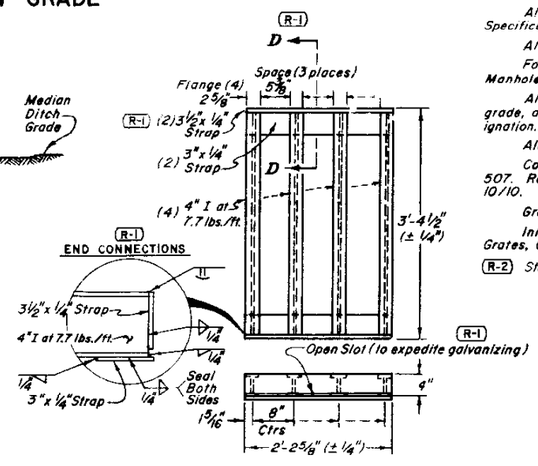


SECTION A-A

INLET FOR USE IN MEDIAN AT BOTTOM OF VERTICAL CURVE



DETAIL SHOWING MEDIAN INLET CONNECTED TO A SKEWED CROSS CULVERT



DETAIL OF GRATING

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project. (R-1)

All concrete shall be Class "A" or Class "D".

For detail of Inlet Step, see M-Standard "Steps for Manholes and Inlets".

All reinforcing bars shall be deformed, of intermediate grade, and shall be tagged with the station number and bardesignation.

All edge distances not marked "clear" are to ℄ of bar.

Concrete slope and ditch paving shall conform to Section 507. Reinforcement for concrete slope paving shall be 4 x 4, 10/10.

Grating shall conform to Section 604.

Inlet grating shall be galvanized as described for Frames, Grates, Covers and Steps in Section 712.

(R-2) Steps or ladder will be required when inlet depth exceeds 3'-6"

MATERIAL LIST FOR GRATING, FASTENERS

PART	NO. REQ'D.	SIZE	LBS. PER UNIT	WEIGHT — LBS.
Strap Iron	2	3½" x ¼" x 2'-2⅝"	2.58/ft.	13.2
Strap Iron	2	3" x ¼" x 2'-2⅝"	2.6/ft.	11.5
Beam	4	4I 7.7 x 3'-4"	7.7/ft.	102.7
Fastener	2	6" x ¼" x 2 ½"	1.0 ea.	2.0
Bolt	2	5/8" x 8"	0.8 ea.	1.6
Washer	2		0.1 ea.	0.2
		TOTAL WEIGHT		131.2

(R-1)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

(R-3)

INLET, TYPE C

Designed by	D. B. R.	Approved by	J. E. Olson
Made by	J. R. B.	Staff Design Engineer	
Checked by	R. S. M.	Date:	JUNE 1, 1967

DEPARTMENT OF HIGHWAYS—STATE OF COLORADO
FORM D. O. H. 136
MARCH 1964

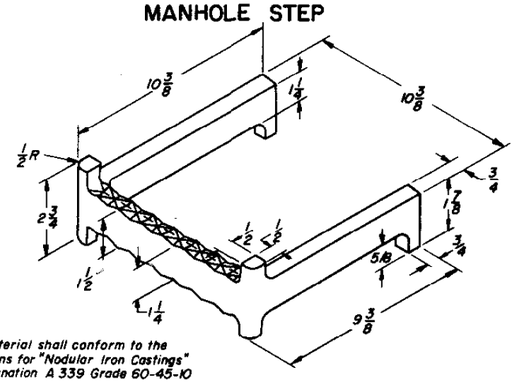
STANDARD M-604-D

(JULY 1, 1965)

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

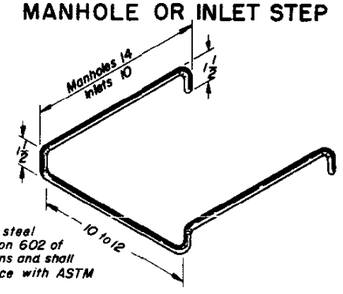
REVISIONS			
R-1	7-23-68	Dept. Name.	M.R.H.

CAST IRON MANHOLE STEP



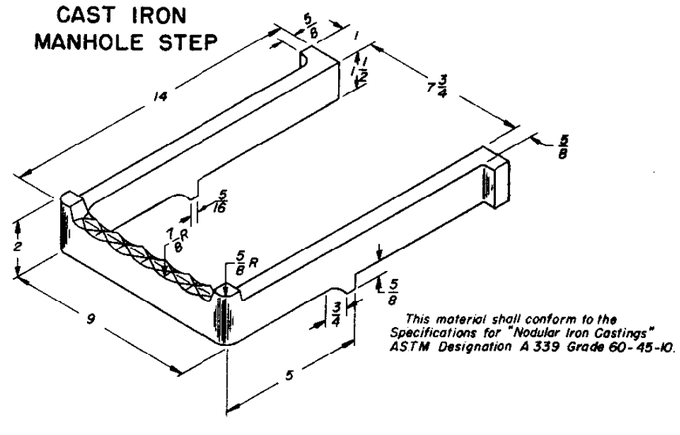
This material shall conform to the Specifications for "Nodular Iron Castings" ASTM Designation A 339 Grade 60-45-10

MILD STEEL MANHOLE OR INLET STEP



Step shall be 3/4 Dia. steel bars conforming to Section 602 of the Standard Specifications and shall be galvanized in accordance with ASTM Designation A 123.

CAST IRON MANHOLE STEP



This material shall conform to the Specifications for "Nodular Iron Castings" ASTM Designation A 339 Grade 60-45-10.

GENERAL NOTES

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

Steps shall be included in the cost of "Manholes" or "Inlets".

All dimensions shown in inches.

(R-1)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

STEPS FOR MANHOLES AND INLETS

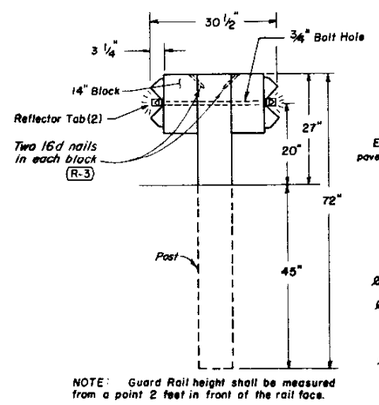
Designed by: M.R.H.	Approved by:
Made by: H.P.B.	Staff Design Engr.
Checked by:	Date: July 1, 1965

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

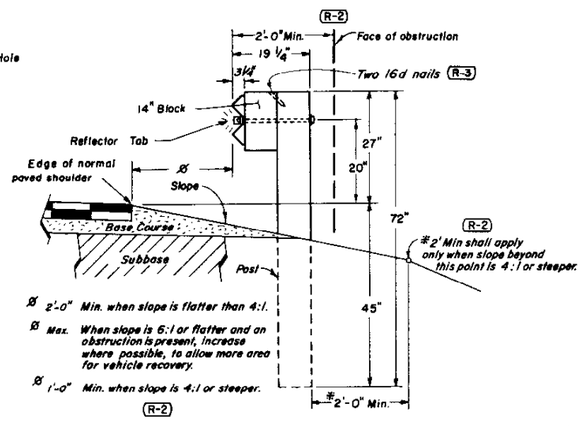
STANDARD M-606-AB

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

REVISIONS			
R-1	7-10-68	Add typical post & obstr.	M.R.H.
R-2	4-1-69	Widening. Bevel. Gen. notes.	M.R.H.
R-3	2-18-70	Pay length. Blocks. Gen. Notes.	M.R.H.
R-4	11-25-70	Timber, Hole and Gen. Notes.	M.R.H.

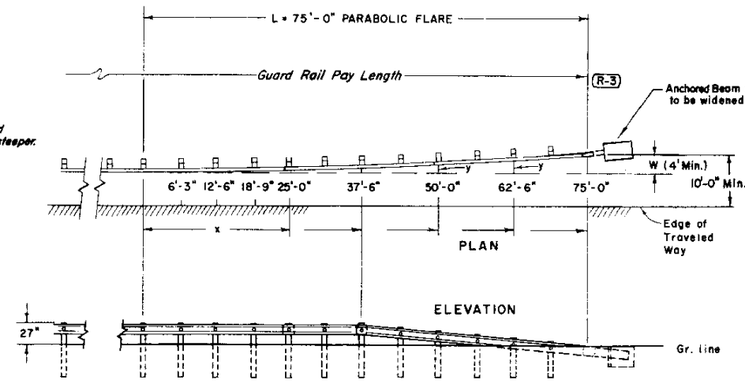


NOTE: Guard Rail height shall be measured from a point 2 feet in front of the rail face.



TYPICAL POST INSTALLATIONS

(See Table for Post & Block Cross Section) R-4



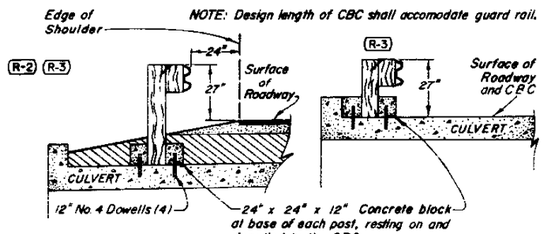
PARABOLIC TRANSITION & END TREATMENT

TABLE OF OFFSETS FOR 75' PARABOLIC FLARES

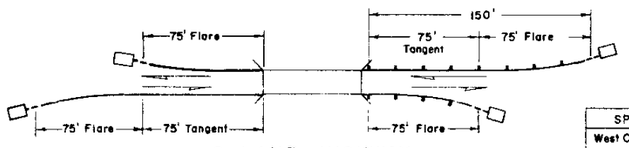
x	y W=4'	W=5'	W=10'	W=12'	W=14'	W=16'
12'-6"	0.11	0.14	0.28	0.33	0.39	0.44
25'-0"	0.44	0.55	1.11	1.33	1.56	1.78
37'-6"	1.00	1.25	2.50	3.00	3.50	4.00
50'-0"	1.78	2.22	4.44	5.33	6.23	7.11
62'-6"	2.78	3.48	6.95	8.34	9.73	11.11
75'-0"	4.00	5.00	10.00	12.00	14.00	16.00

LEGEND

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

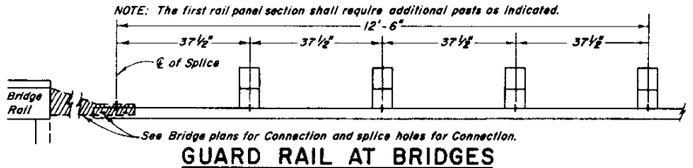


GUARD RAIL ACROSS CONCRETE BOX CULVERT

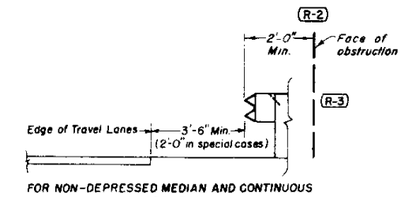


2-LANE HIGHWAY
BRIDGE APPROACH GUARD RAIL

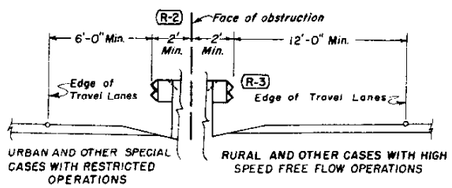
NOTE: For divided highways see Sheet No. 2.



GUARD RAIL AT BRIDGES

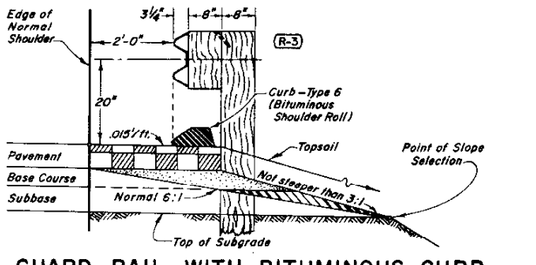


FOR NON-DEPRESSED MEDIAN AND CONTINUOUS GUARD RAIL



R-1 GUARD RAIL FOR OBSTRUCTIONS IN MEDIAN

(See Sheet No. 3)



GUARD RAIL WITH BITUMINOUS CURB
(Showing Typical Shoulder Widening) R-2

R-4

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, Ladgepole Pine, Ponderosa Pine, Western Hemlock, or Larch, and shall conform to the following grading specifications and requirements:

SPECIES	POST & BLOCK CROSS SECTION	FOHC	GRADING RULES
West Coast D. F.	6" x 8"	Yes	WCLA Par. 125 b
West Coast Hemlock	6" x 8"	Yes	WCLA Par. 225 b
Larch	6" x 8"	Yes	WWPA Par. 80.11
Southern Pine	6" x 8"	No	SPA Par. 253
Lodgepole Pine	8" x 8"	No	WWPA Par. 80.11
Ponderosa Pine	8" x 8"	No	WWPA Par. 80.11

WCLA — Standard Grading Rule 15, Grading and Dressing Rules of West Coast Douglas Fir, Issued by the West Coast Lumber Inspection Bureau.

WWPA — Standard Grading Rules, Published by Western Wood Products Association.

SPA — Standard Grading Rules for Southern Pine Lumber, issued by the Southern Pine Inspection Bureau.

FOHC — Free of Heart Centers. See paragraph 612 b of WCLA.

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

All timber shall be rough, 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 and species as the posts.

Timber shall be incised and pressure treated in accordance with AASHO Designation M133, 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).

Posts shall be spaced at 6'-3" center-to-center except when otherwise designated on this Standard or in the guardrail tabulation on the plans.

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" or Class "B".

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.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

GUARD RAIL TYPE 3

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

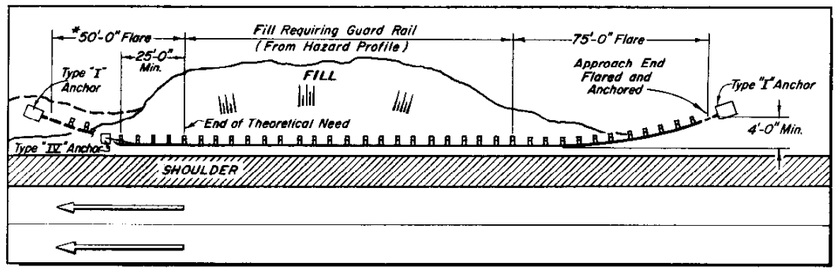
STANDARD M-606-AB

(MARCH 1, 1968)

(SHEET 2)

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

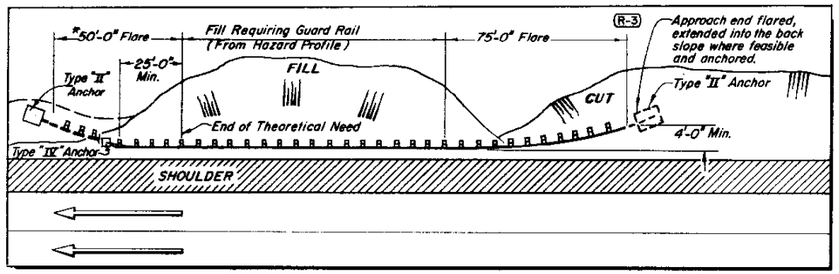
REVISIONS			
R-1	7-10-68	Add end anchorage	M.R.H.
R-2	4-1-69	Bridge exit guard rail note	M.R.H.
R-3	2-18-70	Pay length	M.R.H.
R-4	11-25-70	Timber dimension.	M.R.H.



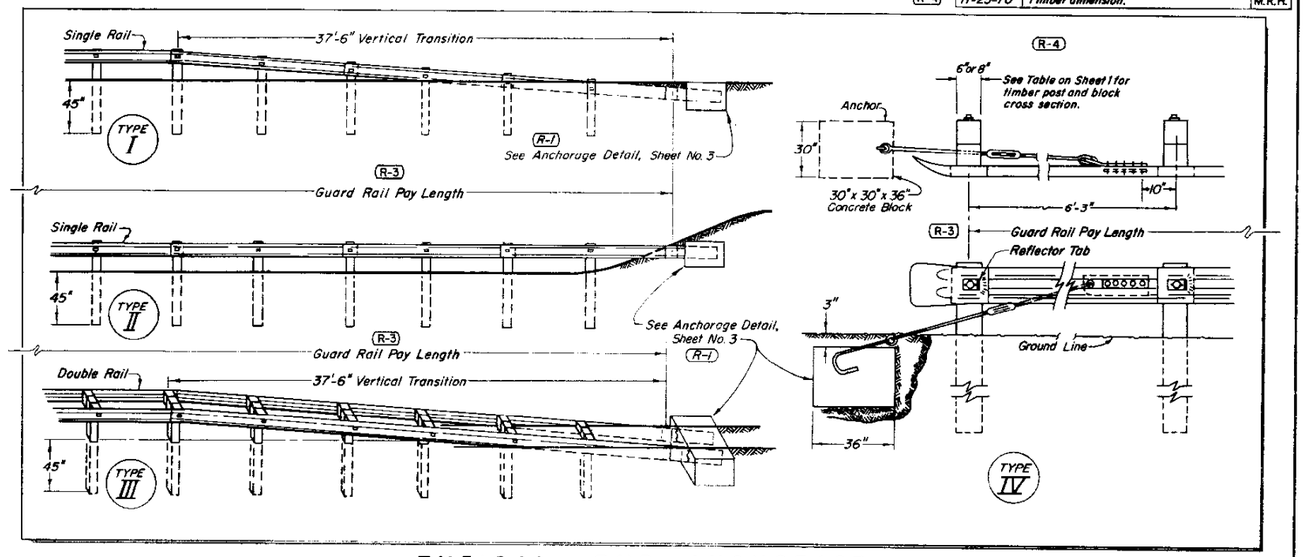
GUARD RAIL INSTALLATION ⟶ ROADSIDE FILL CONDITION

NOTES:

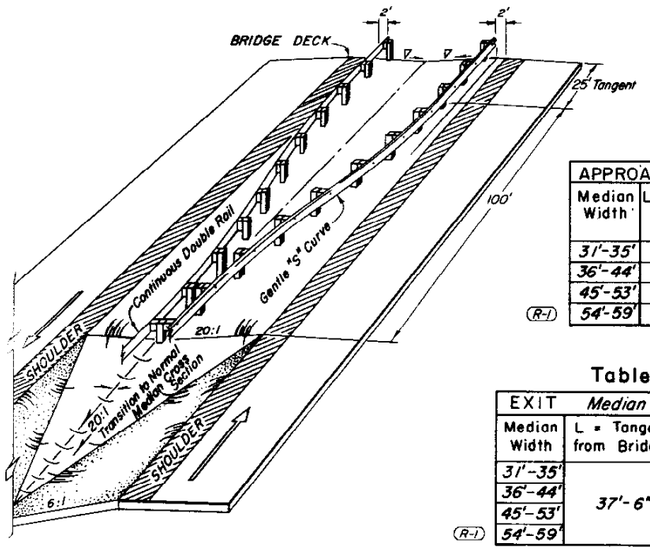
* 2-Lane Highways — The exit end of Guard Rail shall extend 50 feet past the end of theoretical need and shall be flared and anchored.



GUARD RAIL INSTALLATION ⟶ ROADSIDE CUT TO FILL CONDITION



TYPICAL END ANCHORAGE



21' to 30' MEDIAN

Table 1

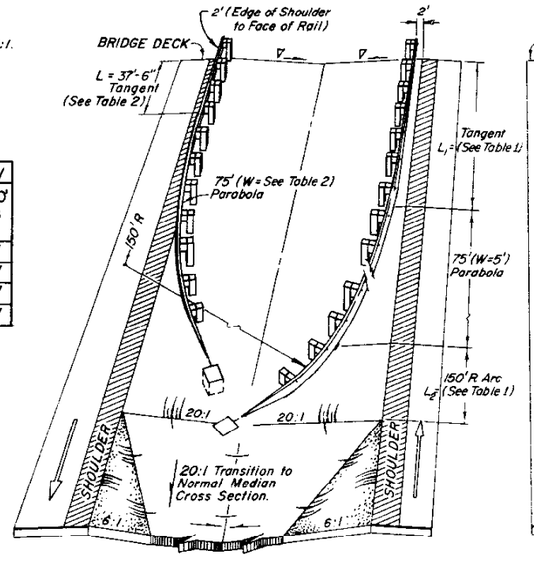
APPROACH Median Guard Rail			
Median Width	L_1=Tangent from Bridge	75' Parablic Flare	L_2 = 150' Radius Arc
31'-35'	50'-0"	then W = 5' then	25'-0"
36'-44'	25'-0"		50'-0"
45'-53'	12'-6"		62'-6"
54'-59'	0'-0"		75'-0"

R-1

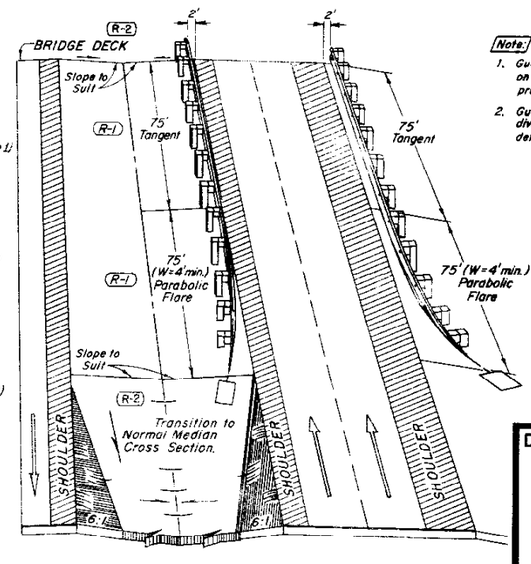
Table 2

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

R-1



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

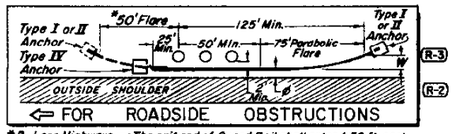
Designed by	M.R.H.	Approved by	
Made by	J.R.B.	Staff Design Engineer	
Checked by	R.S.M.	Date:	March 1, 1968

STANDARD M-606-AB

(MARCH 1, 1968)
(SHEET 3)

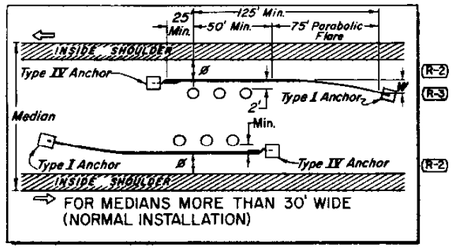
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS			
R-1	7-10-68	Entire sheet redone.	M.R.H.
R-2	4-1-69	Recovery area. Delete timber bevel. Refl. tab.	M.R.H.
R-3	2-18-70	Pay Length.	M.R.H.
R-4	11-25-70	Block at pier.	M.R.H.

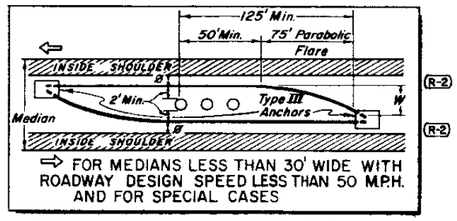


(R-3) (R-2)

*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.

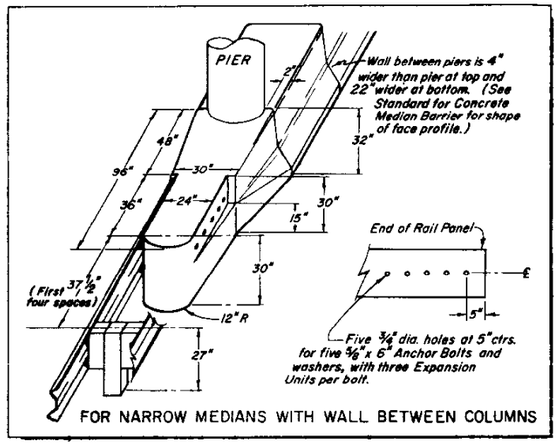


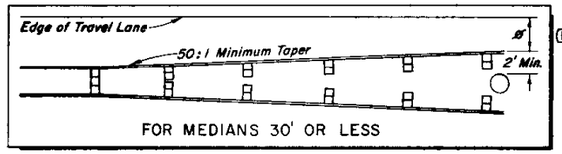
(R-2) (R-3) (R-2)



(R-2) (R-2)

NON-CONTINUOUS RAIL



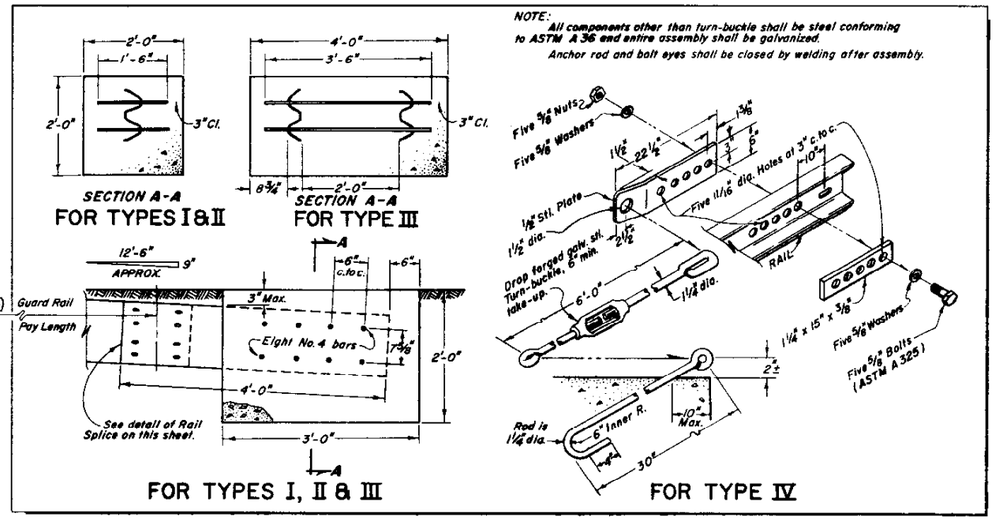


(R-2)

CONTINUOUS RAIL

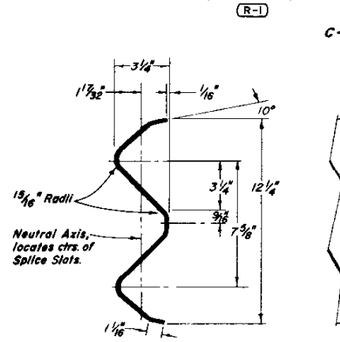
Ø When slope is 6:1 or flatter and an obstruction is present, increase where possible, to allow more area for vehicle recovery. (R-2)

TYPICAL GUARD RAIL FOR OBSTRUCTIONS

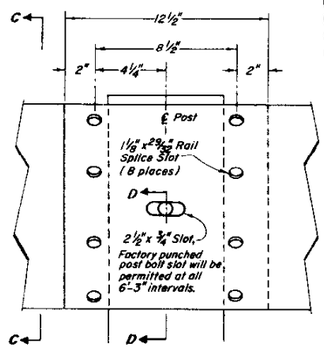


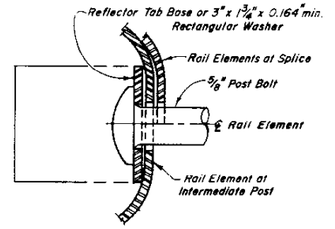
(R-3)

DETAILS FOR TYPICAL END ANCHORAGE



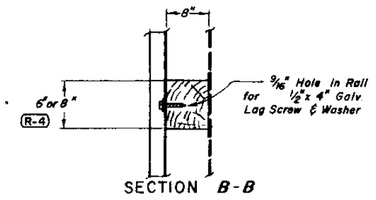
SECTION C-C





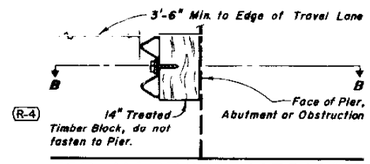
SECTION D-D

DETAIL OF RAIL AND SPLICE



(R-4)

SECTION B-B

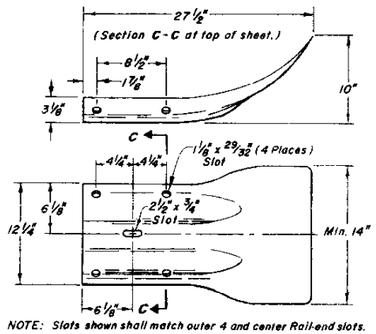


(R-4)

FOR NARROW MEDIANS

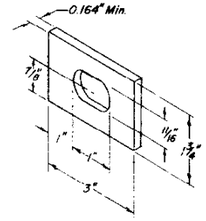
(To be used only when 2' min. clearance cannot be obtained.)

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

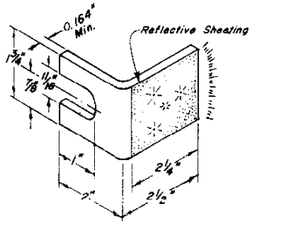


NOTE: Slots shown shall match outer 4 and center Rail-end slots.

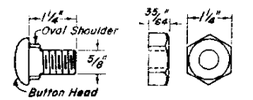
DETAIL OF TERMINAL SECTION



RECTANGULAR WASHER DETAIL

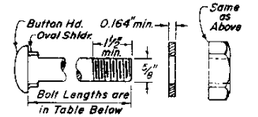


REFLECTOR TAB DETAIL



SPLICE BOLT & HEX NUT

(NEED 8 PER SPLICE, 4 PER TERMINAL)

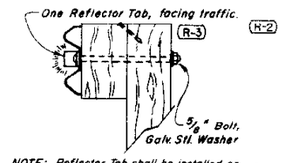


POST BOLT, WASHER & HEX NUT

TABLE OF POST BOLT SIZES

Block / Post	RAIL	BOLT SIZE
8"6"8"	Double	⅝" x 25¾"
8"8"	Single	⅝" x 17½"

(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

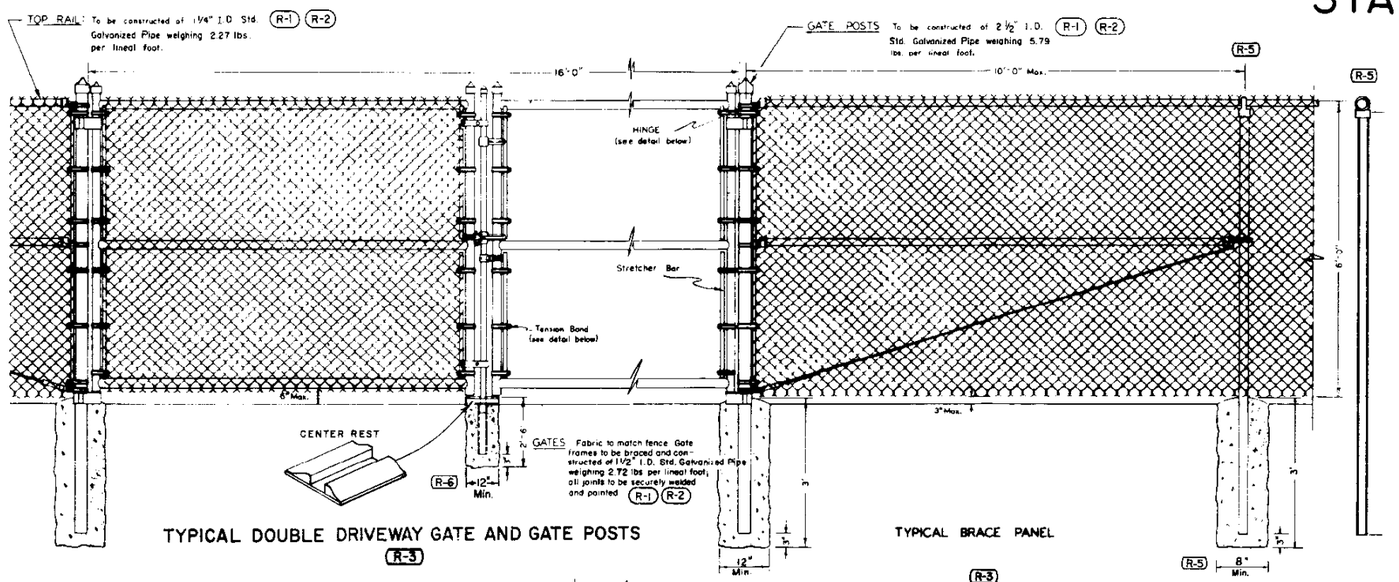
GUARD RAIL
TYPE 3

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-607-B

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

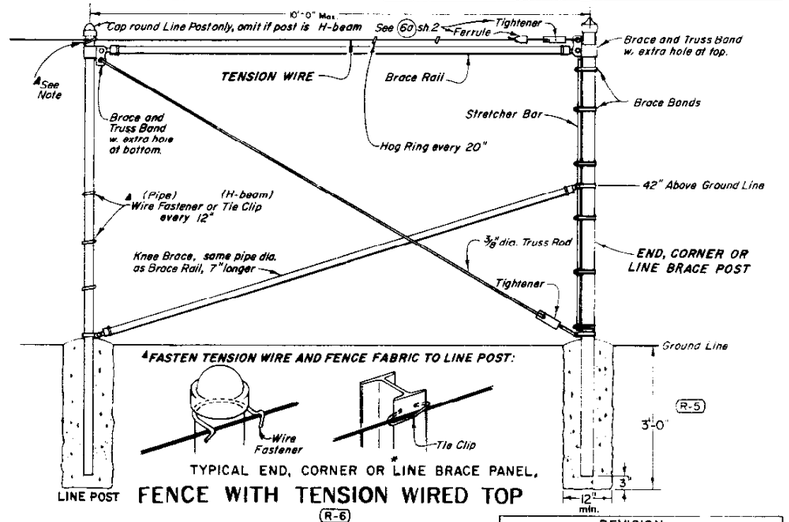
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SH. NO.
9	COLORADO		



TYPICAL DOUBLE DRIVEWAY GATE AND GATE POSTS
(R-3)

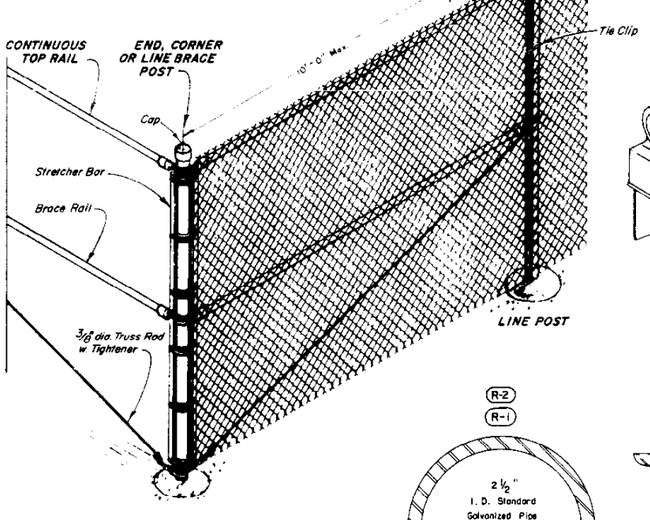
TYPICAL BRACE PANEL
(R-3)

TYPICAL LINE POST
(R-5)

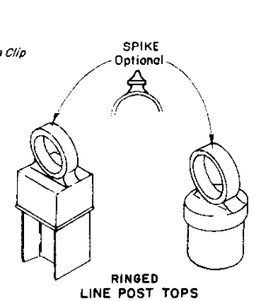


TYPICAL END, CORNER OR LINE BRACE PANEL,
FENCE WITH TENSION WIRED TOP
(R-6)

	REVISION		
(R-1)	3-28-66	Pipe, Fence height & Gen'l. Notes	M.R.H.
(R-2)	4-7-66	Pipe diameters clarified	M.R.H.
(R-3)	2-6-67	Delete spec. No's.; add Gen. Notes	M.R.H.
(R-4)	7-24-68	Dept. Name	M.R.H.
(R-5)	7-13-70	Post titles & tops. Line brace. Gnotes	M.R.H.
(R-6)	12-11-70	Add details for tension wire	M.R.H.

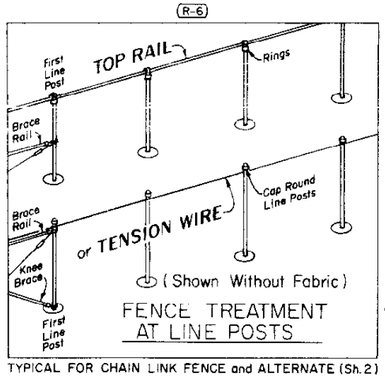


TYPICAL END, CORNER OR LINE BRACE PANEL
for
FENCE WITH RAILED TOP
(R-6)



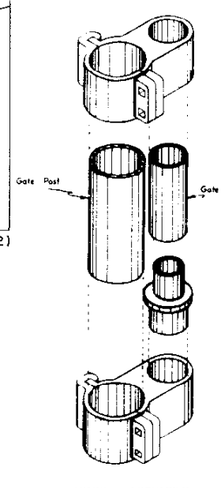
RINGED
LINE POST TOPS

(R-6)

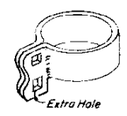


TYPICAL FOR CHAIN LINK FENCE and ALTERNATE (Sh. 2)

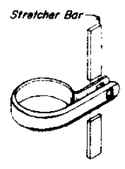
*Note: Line Brace Panel shall be used in fence at intervals of not more than 400 feet. (R-6)



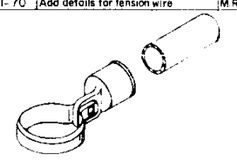
HINGE ASSEMBLY



BRACE & TRUSS BAND
(R-6)



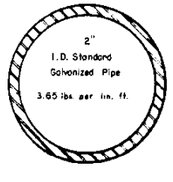
TENSION BAND



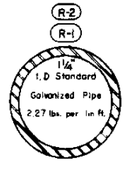
BRACE BAND & RAIL END

END, CORNER AND LINE BRACE POSTS
(R-5)

ALTERNATE LINE POST
(R-5)



LINE POST
(R-5)



BRACE RAIL
&
TOP RAIL

(R-6) GENERAL NOTES

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

Weights of pipe as shown are nominal for the diameter designated. Pipe for posts shall conform to ASTM Designation A 120, Series 40.

Alternate equivalent standard fittings, gates, posts, and rails other than as shown may be used subject to approval by the Engineer.

Chain Link Fabric shall be No. 9 gage wire securely fastened to all Line Posts, Rails and Braces with No. 7 (B&S) gage aluminum wire and/or No. 12 1/2 (W&M) gage galvanized steel wire spaced at a minimum of 6 per 10 feet horizontally and one per foot vertically. Suitable attachment bands shall be used on all gate posts, End Posts, Braces, and stretcher bars.

Chain Link Fabric for use on rock slopes or in conjunction with rock bolts shall be No. 6 gage wire.

Maximum Line Post spacing shall be 10' (c to c).

Concrete shall be Class "A" or "B".

Lightweight aggregate conforming to ASTM C 330 will be allowed in concrete.

Concrete footings shall have crowned tops.

Toprail or tension wire shall be used as shown on the plans.

Tension wire shall be continuous between end or corner post and line brace post. A turnbuckle or other approved tightening device shall be used for each continuous span of tension wire. (R-4)

Tension wire shall be 7 gage galvanized coil spring steel, or approved equal.

Termination of fence at bridges or other structures shall be as shown on the plans.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

CHAIN LINK FENCE

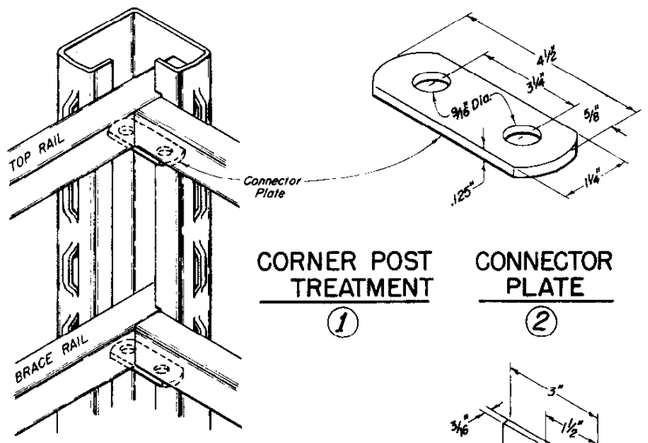
Designed by: V.L.A.	Approved by: L.C. Olson
Made by: E.L.H.	Staff Design Engr.
Checked by:	Date: July 1, 1965

STANDARD M-607-B

(SHEET 2)
(JULY 13, 1970)

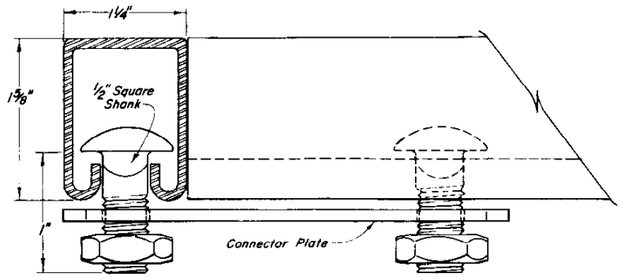
FEDERAL ROAD REGION NO.	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
9	COLORADO			

REVISIONS			
R-5	7-13-70	Entire sheet.	M.R.H.
R-6	12-11-70	Add details 6a and 13.	M.R.H.



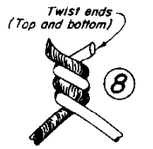
CORNER POST TREATMENT (1)

CONNECTOR PLATE (2)



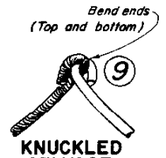
RAIL (Showing Corner Assembly) (3)

14 GAGE ROLL FORMED STEEL, 20' LENGTHS, 1.35 LB. PER LIN. FT.



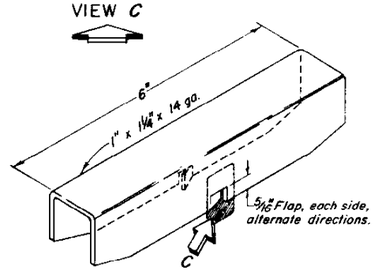
BARBED SELVAGE

VIEW C



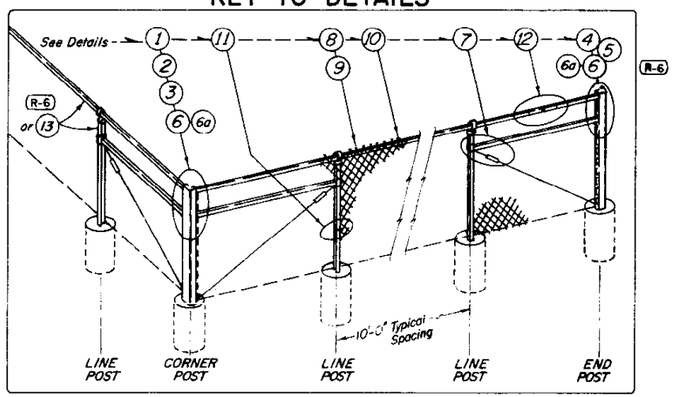
KNUCKLED SELVAGE

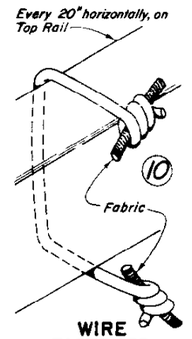
Alternate, use only when called for on plans.



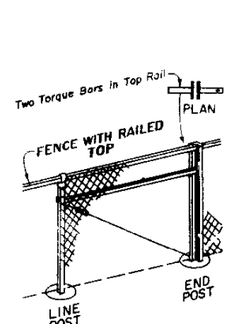
RAIL SPLICE INSERT (12)

KEY TO DETAILS





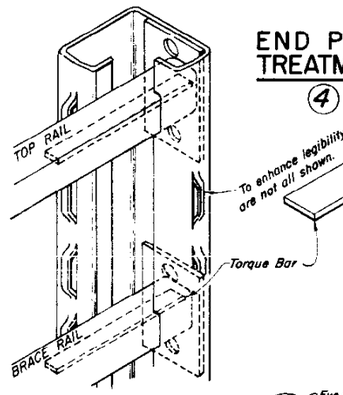
WIRE FASTENER



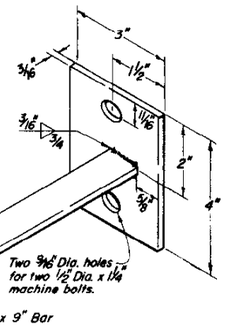
LINE BRACE

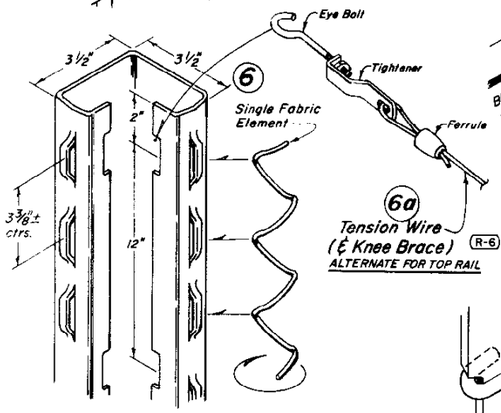
400 FT. INTERVALS

R-6



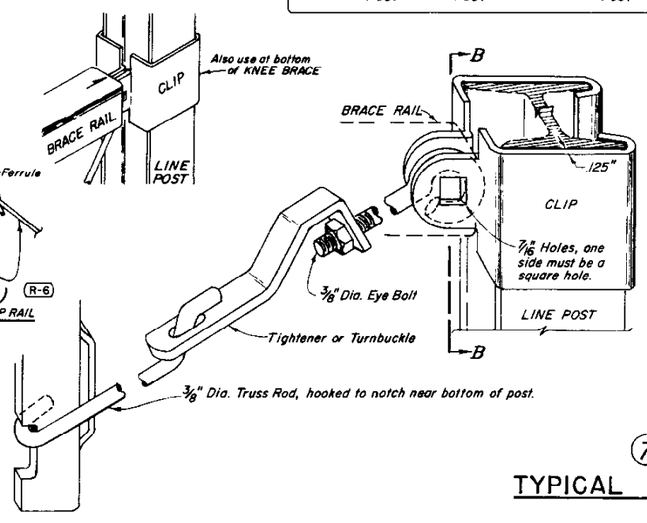
TORQUE BAR (5)



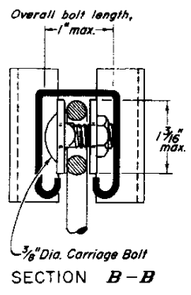


END POST OR CORNER POST

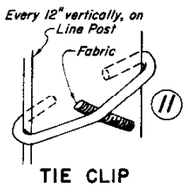
10 GAGE ROLL FORMED STEEL, 5.14 LB. PER LINEAR FOOT



TYPICAL BRACING (7)



SECTION B–B



TIE CLIP

WIRE WORK

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

CHAIN LINK FENCE

(ALTERNATE)

Designed by	M.R.H.	Approved by	
Made by	J.R.B.	Staff Design Engineer	
Checked by	R.S.M.	Date:	July 13, 1970

STANDARD CURBS AND GUTTERS

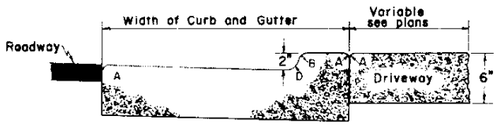
STANDARD M-609-A

(JULY 1, 1965)

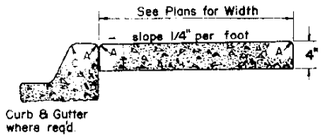
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

REVISIONS			
R-1	11-16-65	Subtitles.	M.R.H.
R-2	2-14-66	General Notes.	M.R.H.
R-3	7-19-68	Dept. Name and Rev. Gen'l. Notes.	M.R.H.
R-4	5-21-69	Provide variable width on conc. gtr.	M.R.H.

CONCRETE PAVEMENT (DRIVEWAYS)

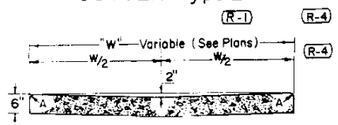


CONCRETE SIDEWALK

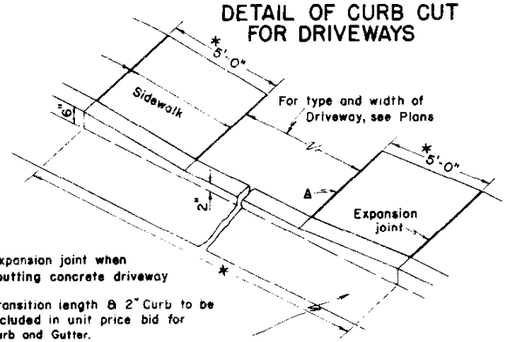


GUTTER Type 2

(R-1) (R-4)



DETAIL OF CURB CUT FOR DRIVEWAYS

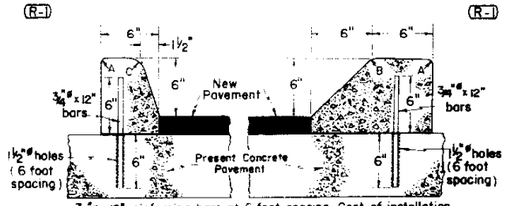


Δ Expansion joint when abutting concrete driveway

* Transition length & 2" Curb to be included in unit price bid for Curb and Gutter.

CURB Type 4 (6" Barrier) (Section B)

(R-1)

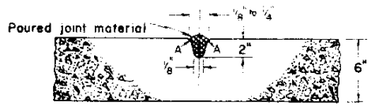


¾"ø x 12" reinforcing bars at 6 foot spacing. Cost of installation to be included in unit price bid for Curb. Bars to be grouted in 1½"ø holes in present concrete. Grout to consist of 2 parts clean sand and 1 part cement.

CURB Type 4 (6" Mountable) (Section M)

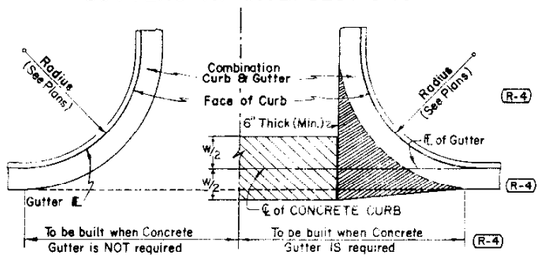
(R-1)

TRANSVERSE CONTRACTION JOINT FOR CONCRETE PAVEMENT (DRIVEWAYS)



This joint required where length of slab exceeds 15 feet.

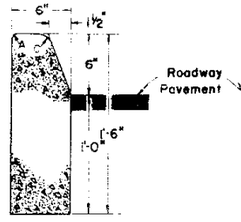
CONSTRUCTION OF CONCRETE GUTTERS AT INTERSECTIONS



▨ This area shall be poured monolithically with curb and gutter and paid for as Concrete Pavement of specified thickness. (R-4)

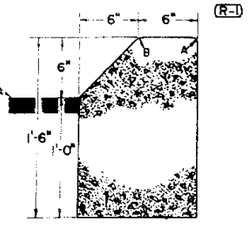
CURB Type 2 (6" Barrier) (Section B)

(R-1)



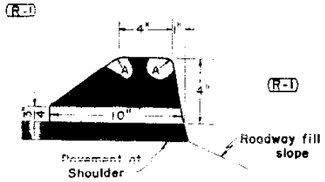
CURB Type 2 (6" Mountable) (Section M)

(R-1)



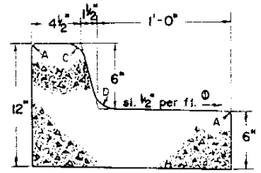
CURB Type 6 (4" Mountable) (Section M)

(R-1)



(R-1)

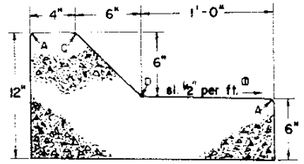
CURB AND GUTTER Type 2 (6" Barrier - 1' Gutter) (Section IB)



LEGEND FOR RADII	
A	= ⅛"
B	= 1"
C	= 1½"
D	= 1½" to 2"

CURB AND GUTTER Type 2 (6" Mountable - 1' Gutter) (Section IM)

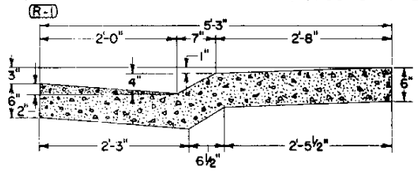
(R-1)



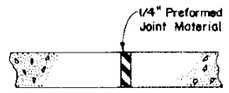
① Slope in opposite direction when required to fit field conditions.

CURB AND GUTTER (Type 2) (4" Mountable with Sidewalk) (Section MS)

(R-1)

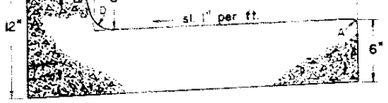


SIDEWALK EXPANSION JOINT



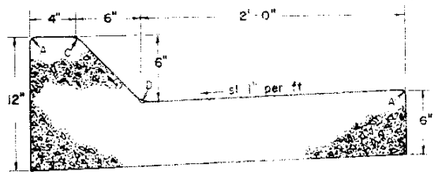
(R-1)

CURB AND GUTTER Type 2 (6" Barrier - 2' Gutter) (Section IIB)



(R-1)

CURB AND GUTTER Type 2 (6" Mountable - 2' Gutter) (Section IIM)



GENERAL NOTES

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

On Curves 3 degrees and sharper, Curbs and/or Gutters are to be placed on the Arc of the Curve unless otherwise noted on plans. A maximum chord length of 10 feet may be used when the degree of curve is less than 3 degrees.

(R-3) Expansion joints shall be installed between concrete curb and any fixed structure, sidewalk or bridge. Expansion joint material shall be ½" thick and shall extend the full depth of contact surface.

(R-2) Concrete shall be Class "A" or Class "D"

(R-3)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

CURBS AND GUTTERS

Designed by WD	Approved by H. G. Olson
Made by WD	Staff Design Engr.
Checked by RPS	Date: July 1, 1965

RIGHT OF WAY MARKER POST STANDARD M-612-A

(JULY 1, 1965)

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

REVISIONS			
R-1	5-2-66	R.O.W. Marker Note	M.R.H.
R-2	7-24-68	Dept. Name	M.R.H.

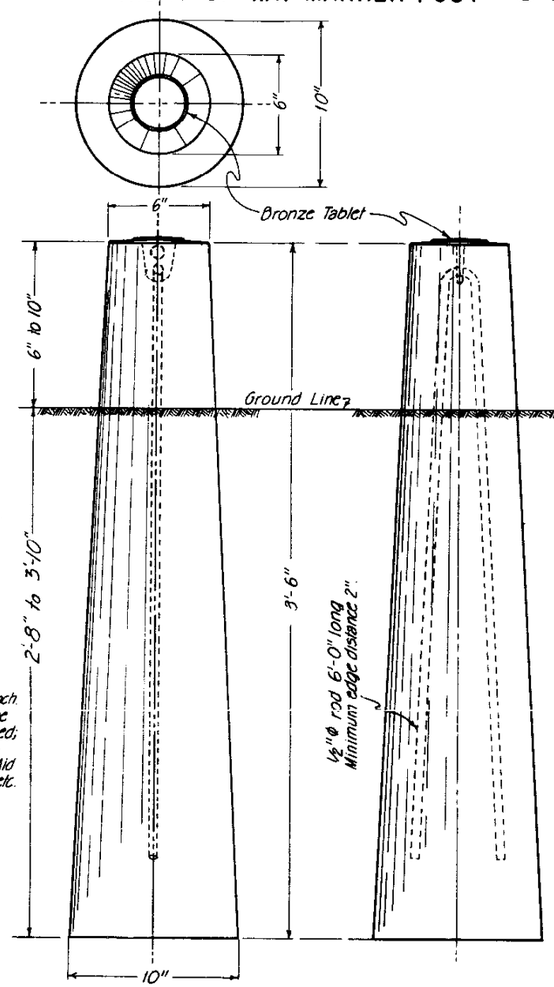
NOTES FOR R.O.W. MARKER POSTS

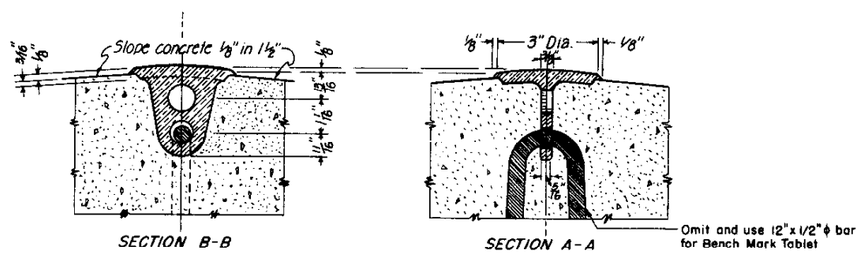
All work shall be done in accordance with the Standard Specifications applicable to the project.

Posts shall be made of class 'A' Concrete. The upper 12 inches of marker posts shall be rubbed free of form marks, and the top surface of the post must be constructed to drain thoroughly.

R-1 Light weight aggregate conforming to ASTM Designation C-330 will be allowed.

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





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

BENCH MARK

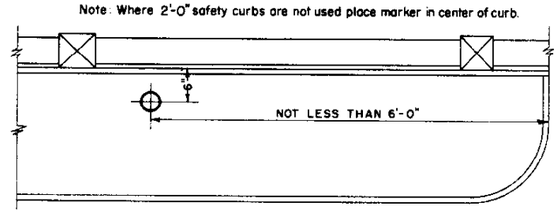
All work shall be done in accordance with Standard Specifications applicable to the project.

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

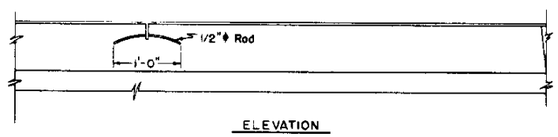
Bronze Bench Mark Tablets will be furnished by the Department at no expense to the Contractor.

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

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



PLAN



ELEVATION

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

R-2 DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

MARKER POSTS AND BENCH MARKS

Designed by R.E.L.	Approved by C. C. Olson
Made by C.E.C.	Staff Design Engr.
Checked by R.E.L.	Date: July 1, 1965

STANDARD M-612-C

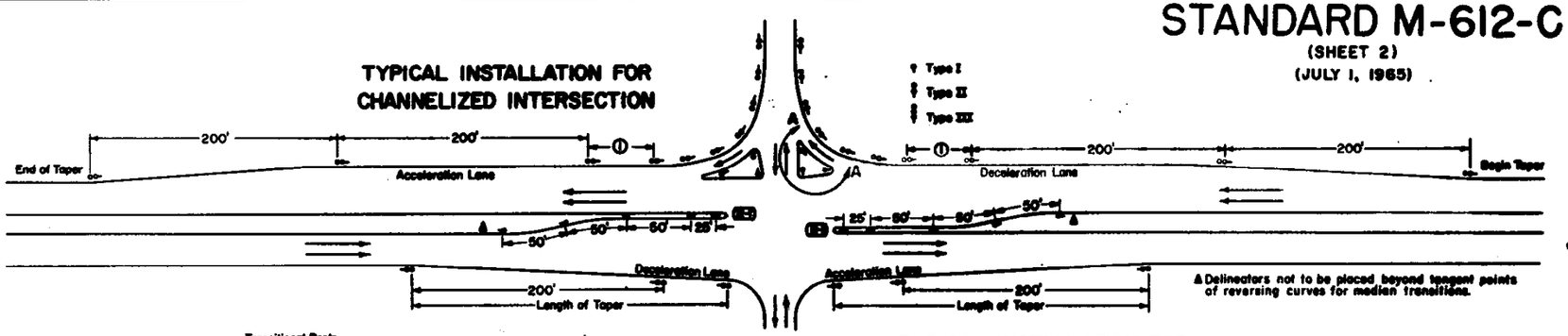
(SHEET 2)

(JULY 1, 1965)

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

REVISIONS			
R-1	5-4-67	Median and Island Delineators	M.R.H.
R-2	1-9-68	Median Crossover	M.R.H.
R-3	7-11-68	Division Name	M.R.H.

TYPICAL INSTALLATION FOR CHANNELIZED INTERSECTION



Δ Delineators not to be placed beyond tangent points of reversing curves for median transitions.

GENERAL NOTES

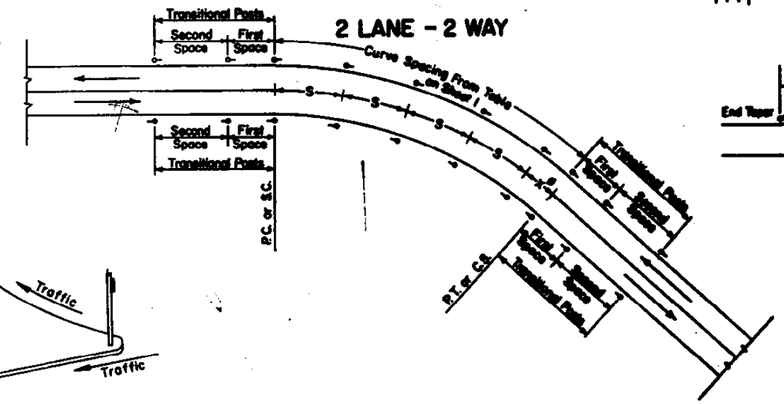
For Radii greater than 200 Feet, use spacing from Table included on Sheet 1 of this Standard.

For additional General Notes, see Sheet 1 of this Standard.

Place face of button at 90° to ℄ of roadway.

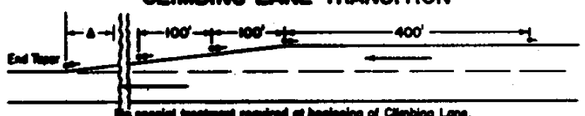
Lengths of speed change lanes including tapers shall be as shown on plans.

2 LANE - 2 WAY



(R-1)
VIEW A-A

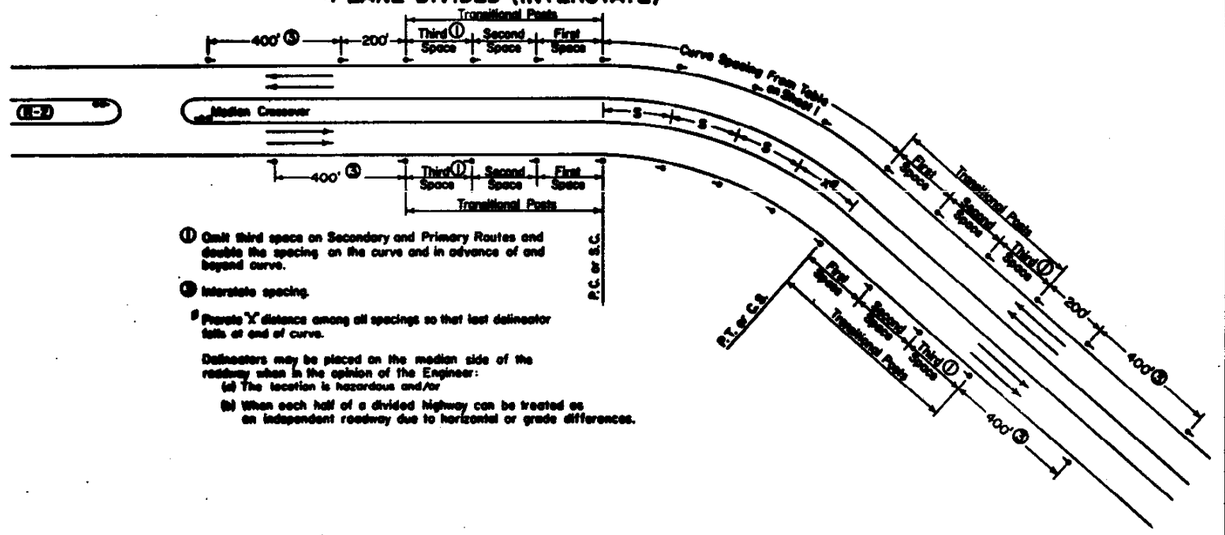
TYPICAL INSTALLATION FOR CLIMBING LANE TRANSITION



No special treatment required at beginning of Climbing Lane.

Δ Last space variable, not to exceed 100'

4 LANE DIVIDED (INTERSTATE)



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

S Interstate spacing.

$ Prorate "X" distance among all spacings so that last delineator falls at end of curve.

Delineators may be placed on the median side of the roadway when in the opinion of the Engineer:
(a) The location is hazardous and/or
(b) When each half of a divided highway can be treated as an independent roadway due to horizontal or grade differences.

(R-2)

(R-3)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

DELINEATORS

Designed by C.K.M.	Approved by [illegible]
Made by T.E.F.	Staff Design Engr.
Checked by L.E.Q.	Date: July 1, 1965

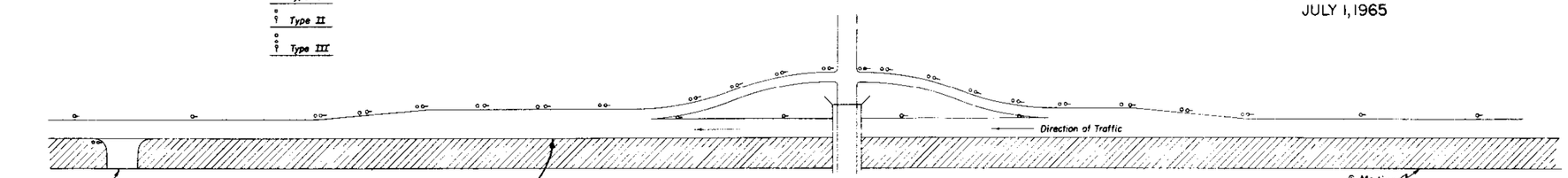
STANDARD M-612-C

(SHEET 1 OF 2 SHEETS)
JULY 1, 1965

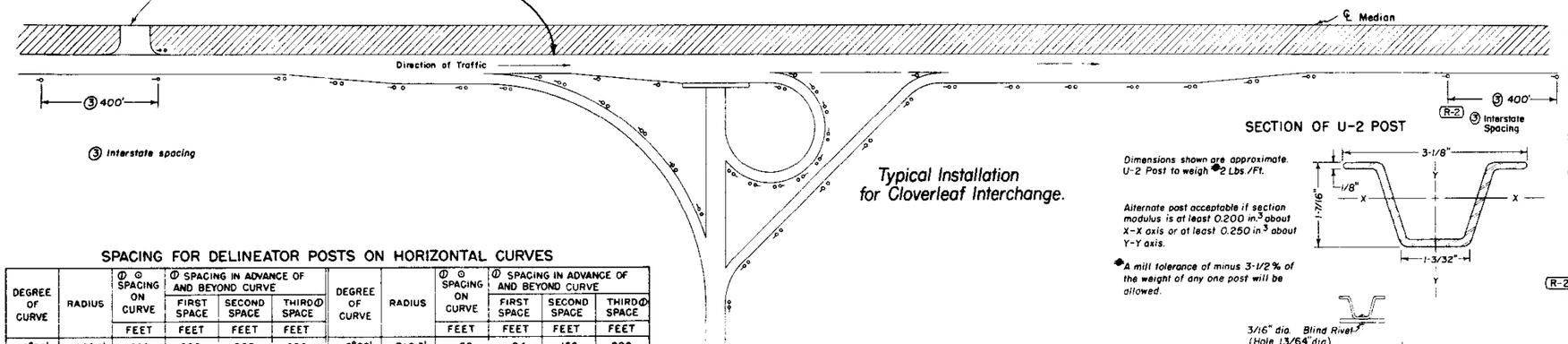
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS			
R-2	1-9-68	Median Crossover, Gen'l. Note	M.R.H.
R-3	7-11-66	Division Name	M.R.H.

Type I
Type II
Type III



Typical Installation for Diamond Interchange.



Typical Installation for Cloverleaf Interchange.

GENERAL NOTES

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

See tabulation in plans for delineator post requirements.

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

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

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

Type, location and spacing of delineators for tunnels and snow sheds shall be as directed by the Engineer.

Delineator Posts are not to be placed along Frontage Roads.

Color of Posts shall be Interstate Green.

(R-2) Delineators will not be required on tangents for Primary and Secondary roadways.

SPACING FOR DELINEATOR POSTS ON HORIZONTAL CURVES

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

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

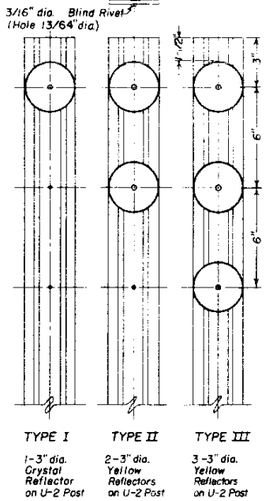
ⓓ Omit third space on Secondary and Primary Routes and double the distance on the curve and in advance of and beyond curve. For curves less than 2 degrees on Interstate through roadways use Interstate tangent spacing.

SECTION OF U-2 POST

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

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

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

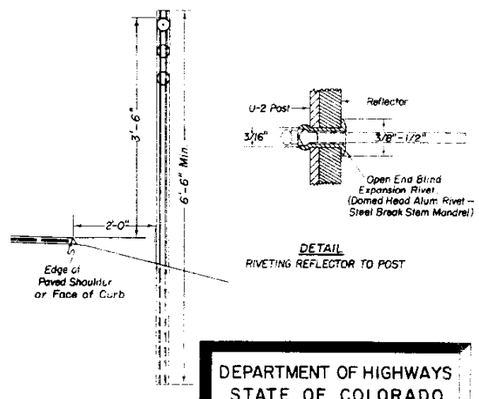


TYPE I
1-3" dia. Crystal Reflector on U-2 Post

TYPE II
2-3" dia. Yellow Reflectors on U-2 Post

TYPE III
3-3" dia. Yellow Reflectors on U-2 Post

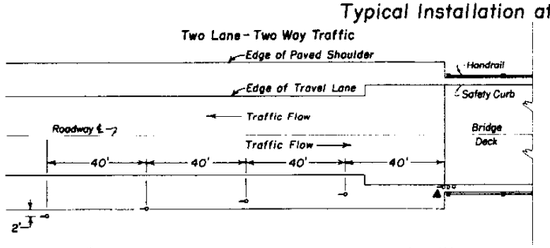
Min. 3 holes in all posts required as shown.



DETAIL
RIVETING REFLECTOR TO POST

Typical Installation at Bridge Approaches

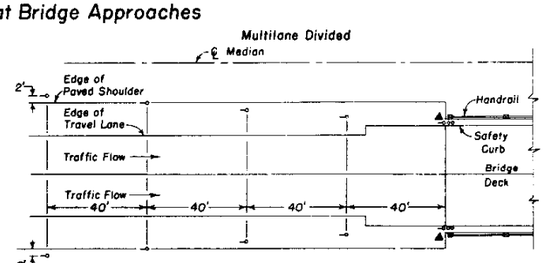
Two Lane - Two Way Traffic



♣Where curb to curb width of bridge is equal to or greater than roadway width plus usable shoulder width, use this delineator only and omit all others.

Note: Where guard rail is present, place delineators outside of guard rail and at height which will permit clear view of all three Delineator buttons.

Multilane Divided



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

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

DELINEATORS

Designed by CKM	Approved by T E Olson
Made by WNC	Staff Design Engr.
Checked by LEO	Date July 1, 1965

STANDARD M-614-A

(JULY 1, 1965)

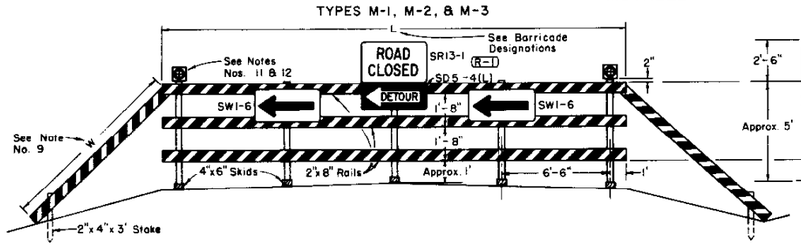
FEDERAL ROAD REGION NO.	DISTRICT	PROJECT NO.	SHEET NO.
9	COLORADO	[redacted]	

REVISIONS			
(R-1)	11-15-68	Rev. Dept. Name & Code Nos.	JLS
(R-2)	4-23-69	Rev. Code No. & Notes	JLS

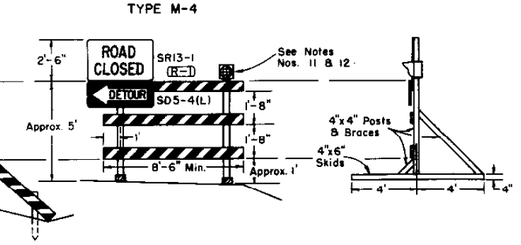
CLASS I BARRICADES
(3 RAILS)

MOVABLE

TYPES M-1, M-2, & M-3

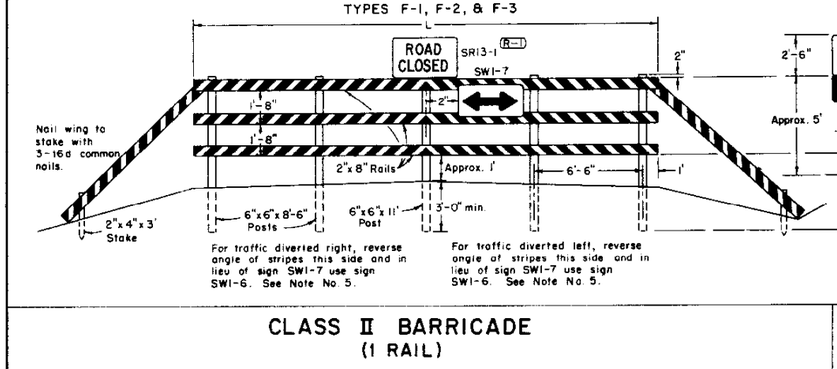


TYPE M-4



FIXED

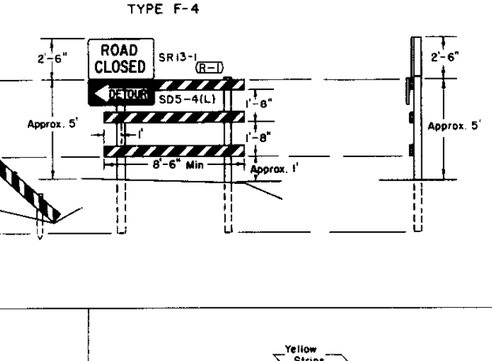
TYPES F-1, F-2, & F-3



For traffic diverted right, reverse angle of stripes this side and in lieu of sign SW1-7 use sign SW1-6. See Note No. 5.

For traffic diverted left, reverse angle of stripes this side and in lieu of sign SW1-7 use sign SW1-6. See Note No. 5.

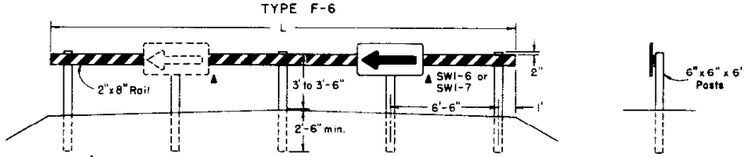
TYPE F-4



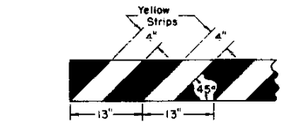
CLASS II BARRICADE
(1 RAIL)

FIXED

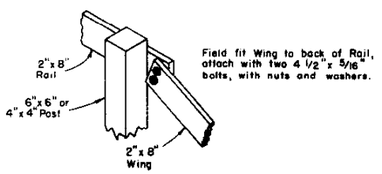
TYPE F-6



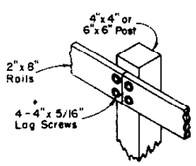
▲ When facing a one-way street or roadway a second SW1-6 or SW1-7 may be required. See Note No. 3.



DETAIL OF RAIL AND WING STRIPING

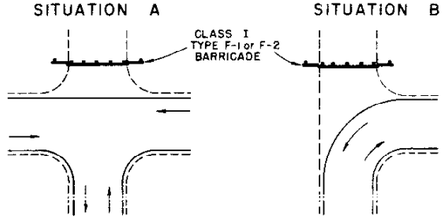


REAR VIEW OF BARRICADE SHOWING WING ATTACHED
(See Note No. 9)

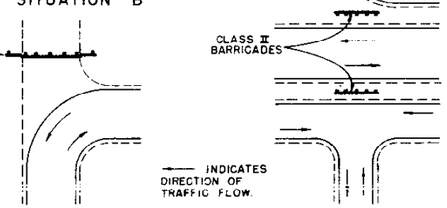


METHOD OF ATTACHING PLANKING TO POSTS AT JOINTS

SITUATION A



SITUATION B



SITUATION C

← INDICATES DIRECTION OF TRAFFIC FLOW.

GENERAL NOTES

1. All work shall be done in accordance with the Standard Specifications applicable to the Project.
(R-2) 2. All signs and sign materials shall conform to the standards set forth in the "Manual on Uniform Traffic Control Devices for All Classes of Streets and Highways" published by the Division of Highways 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. All traffic controls shall be placed for best visibility and legibility and maintained in good condition at all times. Oversigning is to be avoided.
(R-2) 4. Painting shall conform with Subsection 508.08 of the Standard Specifications. All skids, braces, and posts shall be painted with 2 coats of "Exterior Black Paint." Planking and wings on all barricades shall be painted with 2 coats of "Exterior Black Paint" on all sides before adding reflective strips. Reflective strips shall be "cut from smooth surface yellow reflective sheeting" of a type approved by the Division.
5. Each barricade rail shall be striped on the face side only with reflective yellow strips slanting downward at a 45° angle toward the side to which traffic is to turn or pass. See "DETAIL OF RAIL AND WING STRIPING."
6. When barricades are designated on plans the portion of the posts below ground line shall either be dipped in or painted with hot creosote oil. The portion of the post above ground line shall be painted with 2 coats of "Exterior Black Paint."
7. All skids, braces, 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.
(R-2) 8. All timber shall be Standard Grade or better, S4S, Douglas Fir or Larch, as described in the 1965 Standard Grading Rules published by the Western Wood Products Association, and shall conform to paragraph 123c for the rails and paragraphs 122c and 125c for the posts.
9. Detachable extension wings for bypassing of construction equipment are permitted. "W" is variable, length shall be adequate to provide closing of borrow pit and/or shoulder as required.
(R-2) 10. 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.
11. A Flashing Beacon for use on Barricades is a section of a standard traffic signal head or a similar-type device having a yellow lens in the face, which is illuminated by intermittent flashes. Where commercial power is not available, the beacon may be adapted to operate from storage batteries. Each signal unit lens shall have a visible diameter of not less than 8 inches. Each unit complete shall be of such design as to render the lens when illuminated clearly visible to traffic facing the signal at all distances up to 1000 feet under all atmospheric conditions except dense fog. The color of the yellow lens for caution shall be in accordance with Technical Report No. 1 of the Institute of Traffic Engineers. All beacon flashers shall be equipped with filters for suppression of radio interference. The illuminating element in a flashing yellow beacon shall be flashed at a rate of not less than 50 times nor more than 60 times per minute. The illuminated period of each flash shall be not less than half and not more than two-thirds of the total cycle. The use of Flashing Beacons will be governed by field conditions. Flashing Beacons when warranted generally should be operated continuously throughout the 24 hours of the day. Warrant for Flashing Beacons may be found in Sec. 3G of the "Manual on Uniform Traffic Control Devices for Streets and Highways" published by the U.S. Department of Commerce, Bureau of Public Roads June, 1961 (or latest revision).
12. Flashers are portable, power-operated, lens-directed, enclosed lights, illuminated by rapid intermittent flashes of short duration. Flashers may be used in connection with barricades when approved by the Engineer. An array of random flashers which tends to obscure rather than delineate the traveled way will not be permitted. The use of flashers on a job will be governed by Sec. 5D of the "Manual on Uniform Traffic Control Devices for Streets and Highways" published by the U.S. Department of Commerce, Bureau of Public Roads, June, 1961 (or latest revision). The color of the light emitted by a flasher shall be yellow.
13. Flashing Beacons and Flashers, when used, shall be positioned above the top rail of the barricades to produce the most effective results.
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.
16. For additional general information on control of traffic through work areas refer to the "Manual on Uniform Traffic Control Devices for Streets and Highway", Part VI, published by the U.S. Department of Commerce, Bureau of Public Roads, June, 1961 (or latest revision).

BARRICADE DESIGNATIONS

	Class	Type Movable	Type Fixed	Roadway Width	L	Description
(R-1)	I	M-1	F-1	26'-34'	28'	Barricade complete with SR13-1 sign and SW1-6 or SW1-7 signs as required.
(R-2)	I	M-2	F-2	35'-44'	41'	Barricade complete with SR13-1 sign and SW1-6 or SW1-7 signs as required.
(R-1)	I	M-3	F-3	Variable	28'	Barricade (without extension wings) complete with SR13-1 sign and SW1-6 or SW1-7 signs as required.
	I	M-4	F-4	Variable	Variable 8'-6" min.	Wing Barricade (signs only as appropriate).
	II	—	F-6	Variable	28'	Barricade complete with appropriate signs.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

(R-1)

TIMBER BARRICADES

Designed By: D.R.W
Made By: JLS
Checked By: J.B

Approved By: [signature]
Date: JULY 1, 1965

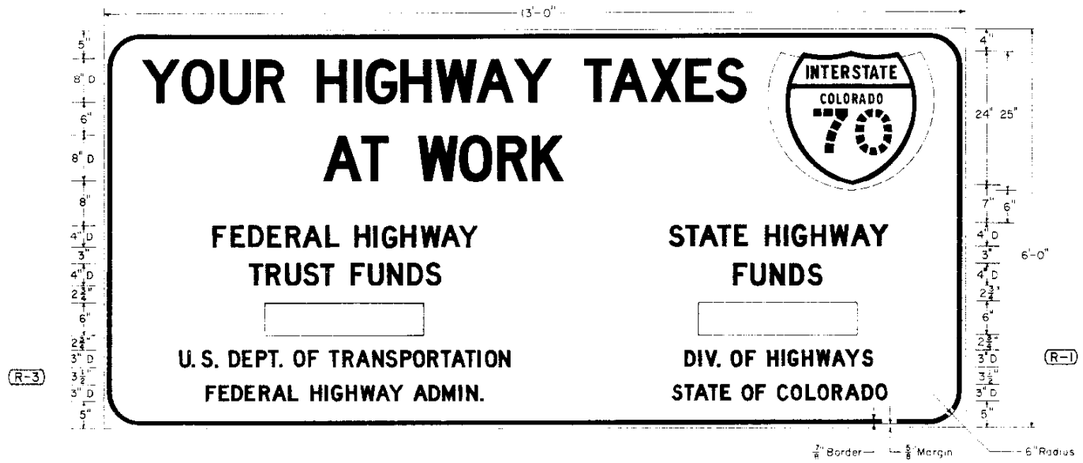
STANDARD M-614-IC

JULY 5, 1968

(SHEET 1 OF 2 SHEETS)

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	NO. SHEETS
8	COLORADO	[redacted]		

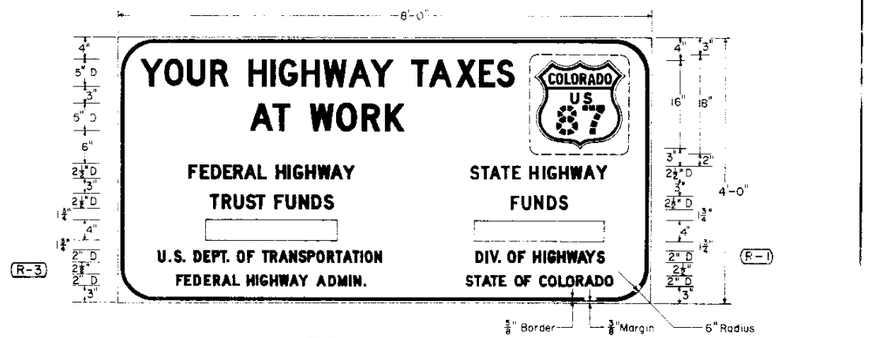
REVISIONS			
R-1	7-26-68	Rev. Legend and Notes	G.W.F.
R-2	5-20-69	Rev. Lateral Placement	J. J. B.
R-3	9-25-70	Rev. Legend	J. J. B.



ALTERNATE LEGEND

4" D FEDERAL

4" D FUNDS

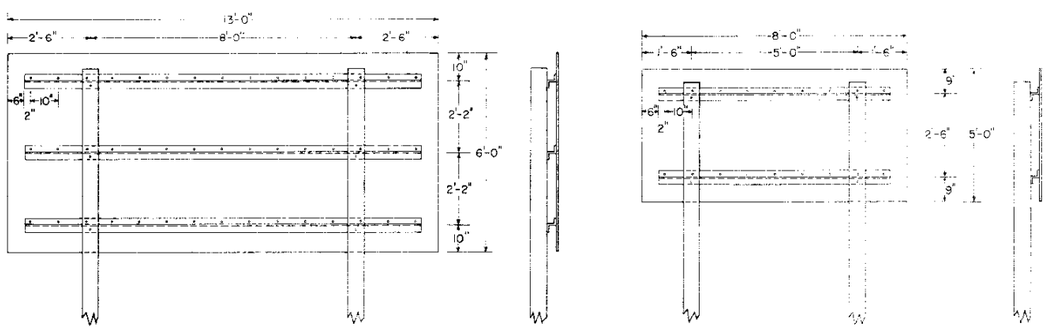


ALTERNATE LEGEND

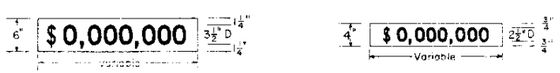
2½" D FEDERAL

2½" D FUNDS

FABRICATION DETAILS



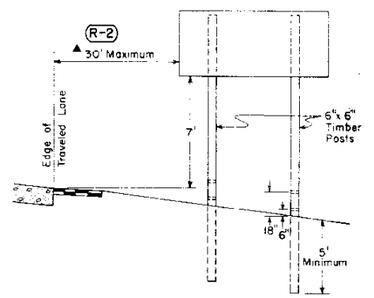
"AMOUNT OF FUNDS" PLAQUE DETAILS



GENERAL NOTES

1. These signs shall be furnished and installed by state forces.
2. All work shall be done in accordance with Standard Specifications applicable to the Project.
3. Signs are to be placed facing traffic approaching the Project. They shall be installed at a location where they will not obscure or detract from the effectiveness of other official signs.
4. ▲ The lateral placement may be reduced to a minimum of 2 ft. outside of the shoulder edge where necessary to fit field conditions.
5. When these signs are used on Beautification Projects, the words "HIGHWAY" and "TRUST" in lines 3 and 4 shall be deleted and the words "FEDERAL" and "FUNDS" shall be used in accordance with the spacing as shown under "Alternate Legend".
6. Sign panel shall be fabricated with ¾" plywood.
7. Route Marker plaques and "Amount of Funds" plaques shall be sheet aluminum 0.080" min. thickness.
8. Signs shall have a screen processed black legend and border on a plain white background. "Amount of Funds" plaques shall have a screen processed black legend on a plain white background.
9. Route Marker plaques shall be plain as indicated on the applicable standards.
10. Backing zees shall be 3" x 2¾" x ¼". Steel zees shall weigh 6.7 lbs. per ft. and aluminum zees shall be of 6061-T6 alloy weighing 2.33 lbs. per ft.
11. Posts shall be 6"x 6", S4S timber, painted white.
12. Each timber post shall be provided with two 2" diameter holes through the neutral axis, one at 6" and one at 18" above the ground level. The inside portion of each 2" diameter hole shall be painted white.
13. Panels shall be fastened to backing zees with ¼" thrust head lockbolt fasteners.
14. Backing zees shall be fastened to posts with ⅜" machine bolts.
15. Route Marker plaques and "Amount of Funds" plaques shall be fastened to the sign panels with ⅜" # 9 round head wood screws.
16. Exposed lockbolt fastener heads and wood screw heads on the face of the sign shall be dipped or painted to match the surrounding color.
17. The underground portion of each timber post shall be treated with creosote.
18. Where a third governmental agency is shown as participating, its official name should be included centrally in lines 6, 7, and 8.
19. (R-1) It will not be necessary to change DEPT to DIV. on any existing signs.

INSTALLATION DETAIL



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

STANDARD CONSTRUCTION IDENTIFICATION SIGNS

Designed By: L. L. S. Approved By: [signature]
Made By: F. J. B. Traffic Engineer
Checked By: G. W. F. Date: [illegible]

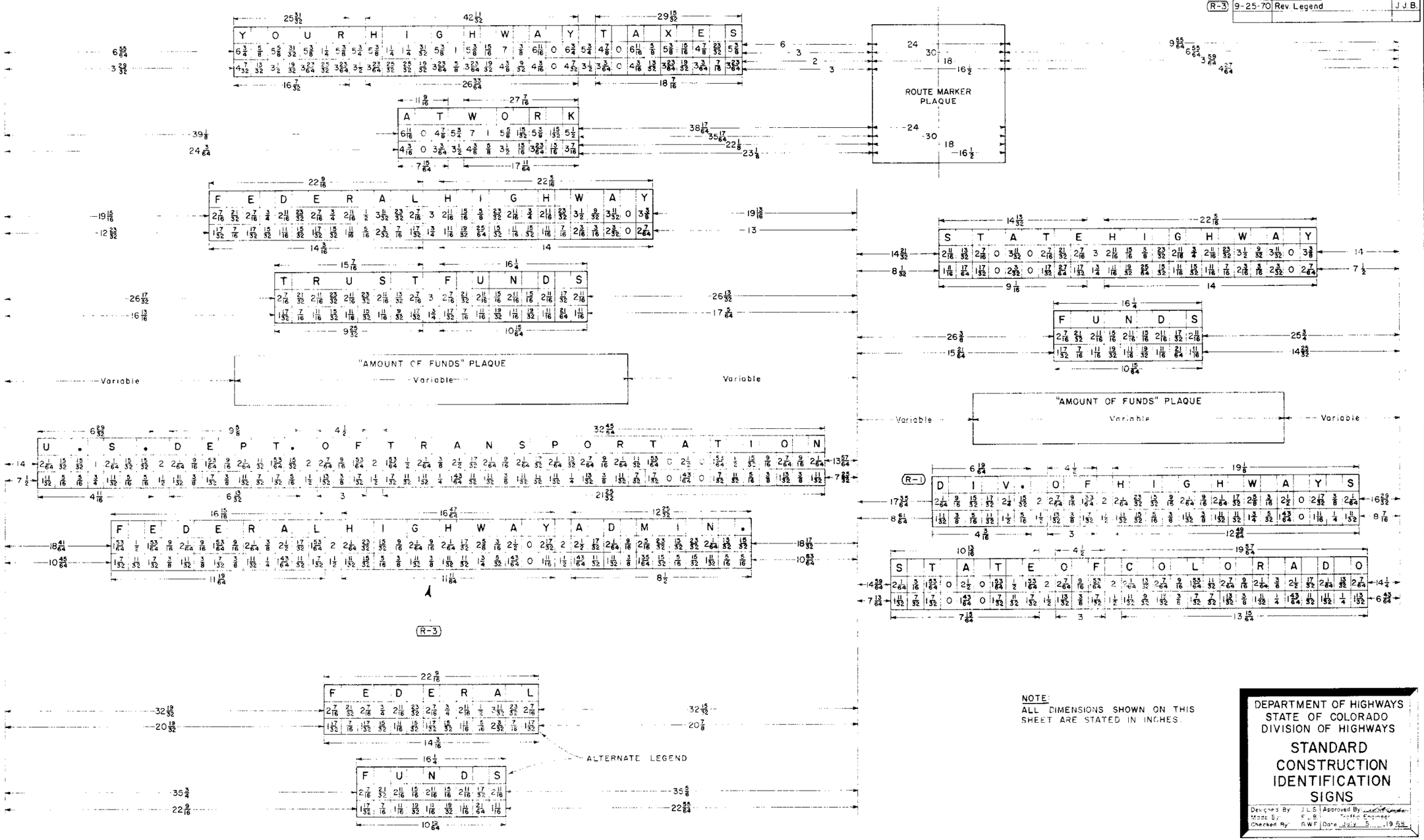
STANDARD M-614-IC

JULY 5, 1968

(SHEET 2 OF 2 SHEETS)

FEDERAL-AID PROJECT NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	[redacted]		

REVISIONS			
R-1	7-26-68	Rev. Legend	G.W.F.
R-2	5-20-69	Rev. Lateral Placement	J.J.B.
R-3	9-25-70	Rev. Legend	J.J.B.



NOTE:
ALL DIMENSIONS SHOWN ON THIS SHEET ARE STATED IN INCHES.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

STANDARD CONSTRUCTION IDENTIFICATION SIGNS

Designed By	J.L.S.	Approved By	[signature] Traffic Engineer
Made By	F.J.B.		
Checked By	G.W.F.	Date	July 5, 1968

STANDARD M-614-TB

(SHEET 2 OF 3 SHEETS)

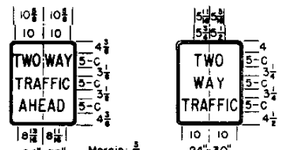
(JULY 1, 1965)

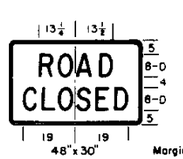
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	[redacted]	

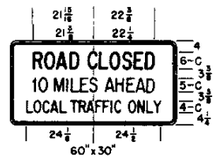
REVISIONS			
R-1	7-12-67		M.R.H.
R-2	7-8-68	Rev. Code No. & Dept. Name	G.W.F.
R-3	12-24-68	Added Notes	J.L.S.

REGULATORY SIGNS

See Note No. 9

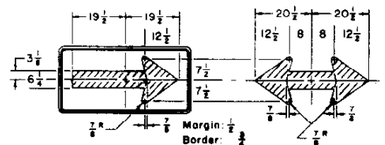


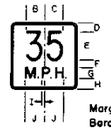




WARNING SIGNS

See Note No. 10

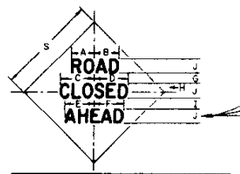




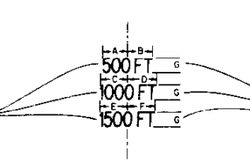
	Panel	A	B	C	D	E	F	G	H	I	J
SW13-1	18"x18"	3/8	5 1/2	5 5/16	2 1/2	8-C	2	3-E	2 3/4	3/4	5 3/16
XW13-1	24"x24"	5/8	6 5/8	6 5/16	3 1/4	10-C	2 3/4	4-E	4	15/16	6 7/8

WARNING SIGNS

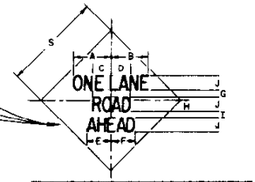
See Note No. 10



	S	A	B	C	D	E	F	G	H	I	J
SW14-3	48	11 1/4	12	6 3/4	16 3/4	14 1/2	4 1/2	4 1/2	5 3/4	7-D	
CW14-3	36	8 1/8	8 1/2	11 1/8	11 1/4	10 1/2	3 1/2	3 1/2	3 1/2	5-D	



	S	A	B	C	D	E	F	G
SW14-3A	48	12	12 1/4	3 1/4	14	13 1/2	13 1/2	7-C
SW14-4A	48	12	12 1/4	3 1/4	14	13 1/2	13 1/2	7-C
CW14-3A	36	8 1/8	8 1/2	9	10	9 1/2	9 1/2	5-C
CW14-4A								



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SW14-4	48	10 1/2	17 3/8	9 3/8	11 7/8	11 1/2	3 1/2	5 1/4	3 1/2	7-C	
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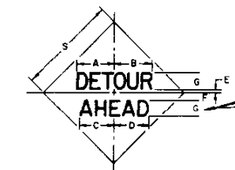
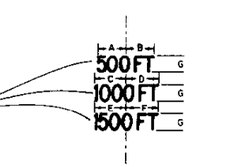
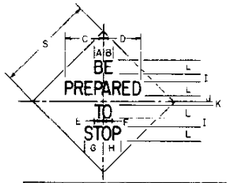


	S	A	B	C	D	E	F	G
SW14-2	48	10 3/8	16 1/2	16 1/2	1 1/2	3 1/4	8-D	
CW14-2	36	13 1/8	12 3/4	12 3/4	1 1/2	2 1/2	6-D	



	S	A	B	C	D	E	F	G
SW14-2A	48	13 1/2	3 1/2	15	16 3/8	5 1/2	15 3/8	8-C
CW14-2A	36	10 3/8	10 3/8	11 1/2	12 1/8	11 1/8	11 1/16	6-C



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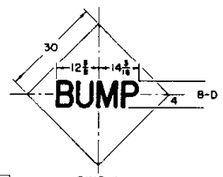
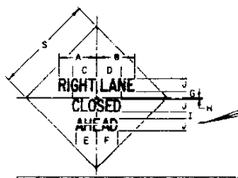
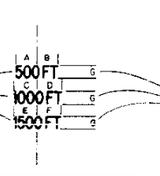
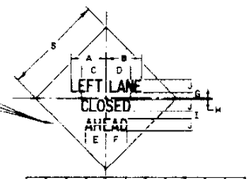




	S	A	B	C	D	E	F	G	H	I	J
SW14-6(R)	48	18 3/8	18 3/8	11 1/2	11 1/2	10 1/2	10 1/2	2 7/8	11	3 3/16	6-C
CW14-6(R)	36	15 3/8	15 3/8	9 1/8	9 1/8	8 3/8	8 1/2	2 3/8	3	2 3/8	5-C



	S	A	B	C	D	E	F	G
SW14-6A(R)	48	10 3/8	10 3/8	11 1/4	11 1/8	11 1/8	11 1/8	6-C
SW14-6A(L)	48	10 3/8	10 3/8	11 1/4	11 1/8	11 1/8	11 1/8	6-C
CW14-6A(R)	36	8 1/8	8 3/8	9 1/8	10 1/8	9 1/2	9 1/2	5-C
CW14-6A(L)								



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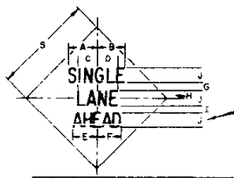
SW14-6(L)	48	17 1/2	17 1/2	11 1/2	10 1/2	10 1/2	2 7/8	11	3 3/16	6-C	
CW14-6(L)	36	14 1/4	14 1/2	9 1/8	8 3/8	8 3/8	2 3/8	3	2 1/2	5-C	



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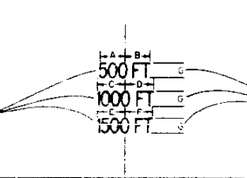
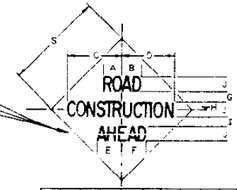
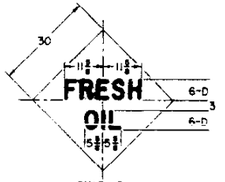
SW14-5	48	13 3/8	13 3/8	9 3/8	10 3/8	11 7/8	11 1/2	3 1/4	3 1/2	7-C	
CW14-5	36	11	10 3/8	8	8 1/2	10 7/8	10 1/2	2 3/8	2 1/2	2 1/2	5-D

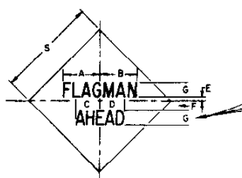


	S	A	B	C	D	E	F	G
SW14-1A	48	12	12 1/4	13 1/2	14 1/2	13 1/2	13 1/2	7-C
SW14-5A								
CW14-1A	36	8 3/8	8 3/8	9 1/8	10 1/8	9 1/2	9 1/2	5-C
CW14-5A								

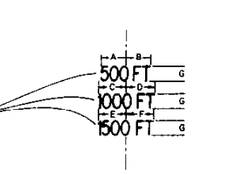


	S	A	B	C	D	E	F	G	H	I	J
SW14-1	48	9	9 3/8	26	25 3/4	11 1/2	11 1/2	4 1/2	3 1/2	4 11/16	7-C
CW14-1	36	6 3/4	6 3/4	19	18 1/2	8 1/8	8 1/2	3 1/2	2 1/2	3 1/2	5-C

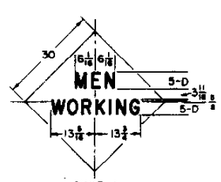


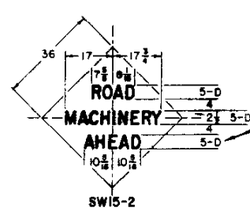


	S	A	B	C	D	E	F	G
SW14-7	48	18	18	11 7/8	11 7/8	1 1/2	4 3/8	7-C
CW14-7	36	15 7/16	15 7/16	10 3/8	10 3/8	1 5/16	4 1/16	6-C



	S	A	B	C	D	E	F	G
SW14-7A	48	12	12 1/4	13 1/4	14 1/2	13 1/4	13 1/2	7-C
CW14-7A	36	10 3/8	10 3/8	11 1/4	12 1/8	11 1/8	11 1/16	6-C





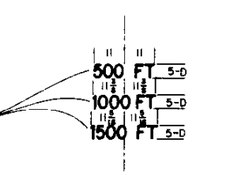
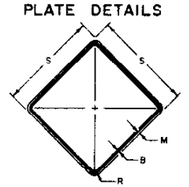
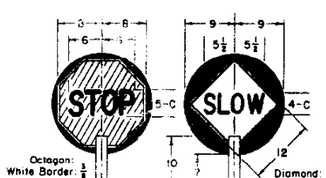


PLATE DETAILS



S	M	B	R
30	1/2	3/8	1 1/8
36	3/8	1/4	2 1/4
48	3/4	1 1/4	3



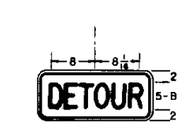
NOTES:

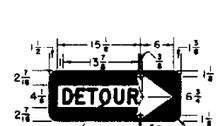
SEE SHEET 1 FOR TYPICAL SIGNING AND SIGN PLACEMENT. SEE SHEET 3 FOR GENERAL NOTES APPLICABLE TO SHEETS 1 AND 2.

ALL DIMENSIONS THAT ARE NOT LABELED ARE IN INCHES.

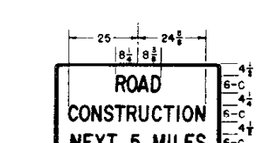
GUIDE SIGNS

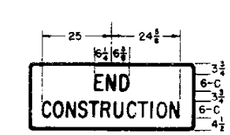
See Note No 11

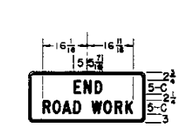


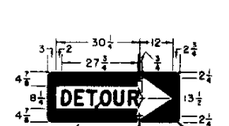


(R-3) Reverse Dimensions for Left Designation

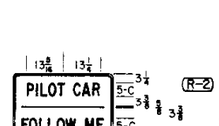








(R-3) Reverse Dimensions for Left Designation



(R-2)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

TRAFFIC SIGNING FOR HIGHWAY CONSTRUCTION

Designed By: D.R.W.	Approved By: [signature] Traffic Engineer
Made By: H.R.D.	
Checked By: J.B.	Date: AUGUST 2, 1965

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 Nos, & Dept. Name	G.W.F.
R-3	12-24-68	Rev. U.S. Shields	J.L.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.

TOP VIEW

Sign Placement

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 2, 1968

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

	REVISIONS	
(R-1)	7-12-67	Added Note 23
(R-2)	7-8-68	Rev. Note 23 & Dept. Name -
		Deleted Note
(R-3)	12-24-68	Rev. Note No. 18

STANDARD M-614-TB

(SHEET 3 OF 3 SHEETS)

(JULY 1, 1965)

GENERAL NOTES

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 Department of Highways.

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.

3. Where traffic is prohibited from the Project the Detour will be marked by the Department 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 Department. The location and positioning of Warning Signs, Barricades, and Regulatory Signs shall be as recommended by the appropriate District Engineering Forces of the Department.

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.

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 Department of Highways.

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.

12. All signs shall be reflectorized unless otherwise specified on plans. Regulatory and Guide 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 a highway yellow flexible reflective sheeting, non-exposed lens background. The back side of Warning signs shall be painted with two coats of "Federal Yellow Synthetic Sign Enamel."

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 1238 or 1258 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 fro plywood, aluminum, steel or other suitable material but shall be stable and durable enough to other requirements of this Standard.

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

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

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

19. Barricades, Flashing Beacons and Flashers - Refer to appropriate "M" Standard (Timber Barric 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 sh fabricated by reverse screen process using transparent red paint on smooth surface silver r sheeting. The "SLOW" side of the Flagman Sign shall be black process paint on smooth surface yellow reflective sheeting. Handle to be grooved on one side to indicate reading sign to Flagman.

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 di 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 barricade or project terminal. Postings are required on both sides of the roadway on d
Sign "C": This is the third advance warning sign in cases where barricades are used shall be placed 500 to 750 feet ahead of barricade or potentially hazardous condition. Postin required on both sides of the roadway on divided highways and singly on two-lane, two- highways.
Sign "D": SD5-2 - This sign shall be placed to mark the beginning of a Project of more 2 miles in extent, where traffic is maintained through the project. It shall be placed sin and near the beginning of construction.
Sign "E": SD5-3 - This sign shall be placed to mark the end of the Project. It shall placed singly and may be placed opposite barricade if desirable.
Sign "F": Construction identification signs shall be furnished and installed by the Depa on all Federal-Aid and Forest Highway Projects where actual construction is in progre visible to highway users. These signs should be located so as not to obscure or detrac 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 "M" Standar (Identification Signs) for sign details.
Signs A through F shall be furnished, installed and maintained by the Department.

22. When Flags are used in lieu of the Flagman Sign, they shall be a minimum of 18"x18", of a good grade of bright red material, and fastened securely to a staff of approxi 3 foot length. The free edge should be weighted to insure that the flag will hang vert 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 axi normal to the roadway, one hole at 6" and one hole at 18" above the ground level. The 4"x4" tim 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 treate with creosote.

(R-2)

(R-2)

DEPARTMENT OF HIGHW
STATE OF COLORAD
DIVISION OF HIGHW

TRAFFIC SIGNII
FOR HIGHWAY
CONSTRUCTION

Designed By D.R.W.	Approved By
Made By J.L.S.	Traffic Engine
Checked By J.B.	Date AUGUST 9