FED. ROAD DIST. NO.	STATE	F. A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#1&2	1	

259.080/02

COLORADO
STATE HIGHWAY DEPARTMENT

PLAN AND PROFILE OF PROPOSED
F. A. P. 259 H(1) CONST. DIV. NO. 1 & 2
STATE HIGHWAY NO. 6

CHAFFEE COUNTY

INDEX OF SHEETS

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3&4 LIST OF STRUCTURES
5&6 DETAILS AND LAYOUT FOR 120" MULTIPLE PLATE CULVERT, STA. 90+32.
7 DETAILS OF PERFORATED C.M.P UNDERDRAIN STA. 110+
8 STANDARD HEADWALLS FOR C.M.P. CULVERTS. M102E
9 STANDARD CONCRETE BOX CULVERT M104D
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CONST. DIVISION № 2

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7a DETAILS OF SIDE BRIDGE, STA. 280+
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12a & 13a " " PERFORATED C.M.P. UNDERDRAINS
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CONVENTIONAL SIGNS

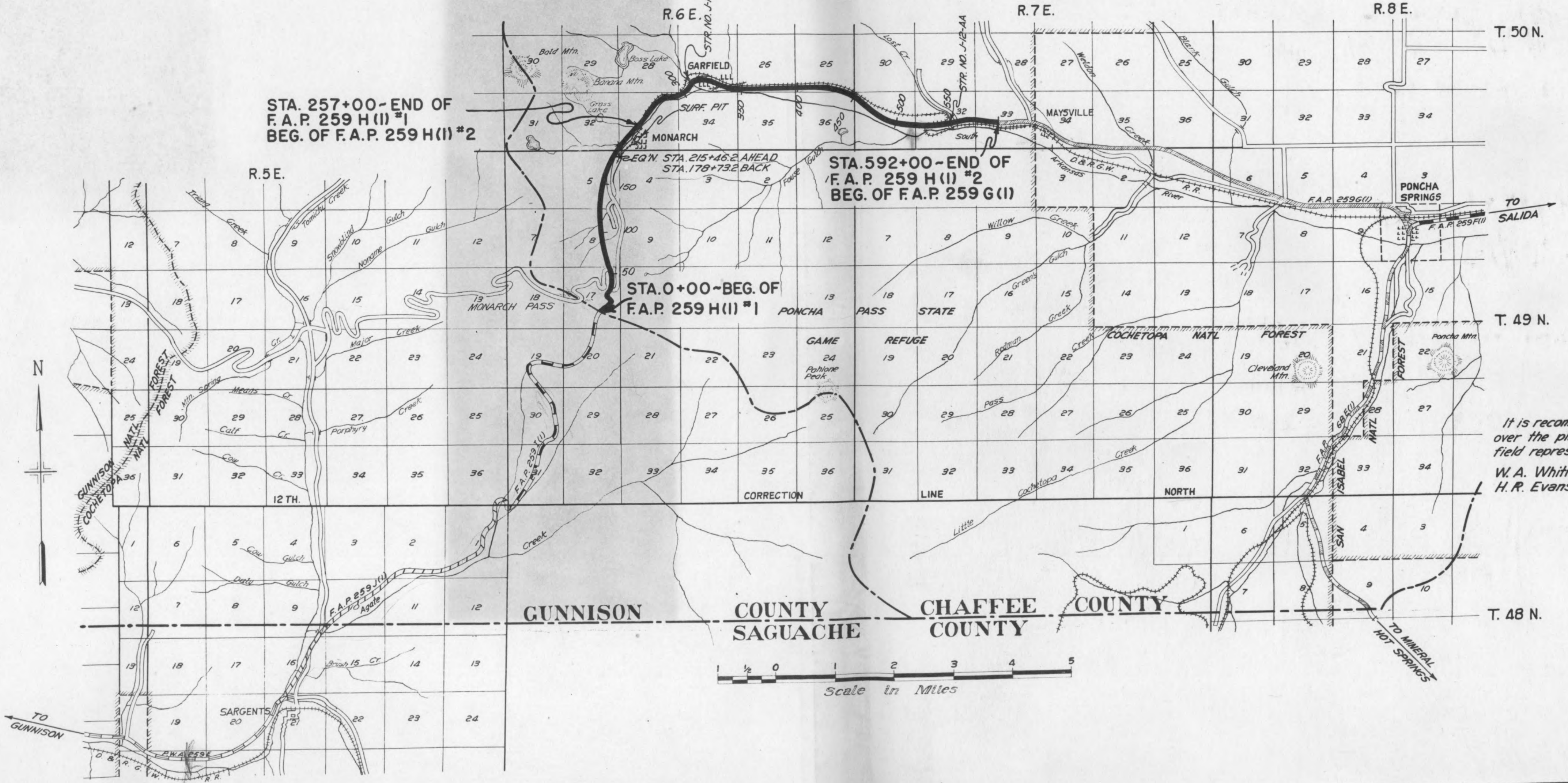
- CENTER LINE OF SURVEY
- RIGHT OF WAY LINES
- TOWNSHIP OR RANGE LINES
- SECTION LINES
- ONE QUARTER SECTION LINES
- ONE SIXTEENTH SECTION LINES
- BARBED WIRE FENCE
- COMBINATION WIRE FENCE
- GUARD FENCE
- TIMBER GUARD POSTS
- TELEPHONE LINES
- POWER LINES

400

SCALES OF ORIGINAL TRACINGS
ON PLAN, 1 IN. - 100 FT.
ON PROFILE { 1 IN. - 100 FT. HORIZONTAL
1 IN. - 10 FT. VERTICAL }

GRADE LINE ON PROFILE IS SHOWN AS GRADE OF FINISHED ROAD

GROSS LENGTH OF PROJECT
NET LENGTH OF PROJECT } CONST. DIV. NO. 1 22,199.5 FEET = 4.204 MILES CONST. DIV. NO. 2 33,478.0 FEET = 6.340 MILES TOTAL 55,677.5 FEET = 10.544 MILES


R.5E.
R.6E.
R.7E.
R.8E.
T. 50 N.
T. 49 N.
T. 48 N.
STR. NO. J-11-F
STR. NO. J-12-AA
GARFIELD
MONARCH
SURF. PIT
MAYSVILLE
PONCHA SPRINGS
TO SALIDA
STA. 257+00 - END OF F.A.P. 259 H(1)#1 BEG. OF F.A.P. 259 H(1)#2
EQ'N. STA. 215+46.2 AHEAD STA. 178+73.2 BACK
STA. 592+00 - END OF F.A.P. 259 H(1)#2 BEG. OF F.A.P. 259 G(1)
STA. 0+00 - BEG. OF F.A.P. 259 H(1)#1
MONARCH PASS
PONCHA PASS STATE GAME REFUGE
COCHETOPA NATL FOREST
GUNNISON NATL FOREST
SAN ISABEL NATL FOREST
F.A.P. 259 G(1)
F.A.P. 259 F(1)
F.A.P. 259-I(1)
F.A.P. 68 E(1)
D.&R.G.W. R.R.
Arkansas River
12TH. CORRECTION LINE NORTH
GUNNISON COUNTY
SAGUACHE COUNTY
CHAFFEE COUNTY
SARGENTS
TO GUNNISON
TO MINERAL HOT SPRINGS
N
Scale in Miles
1/2 0 1 2 3 4 5

NOTE

It is recommended that bidders on this Project go over the plan details with one of the following field representatives of this department:

W. A. Whitney	Division Engineer	Salida
H. R. Evans	Resident "	"

RECOMMENDED FOR APPROVAL
D. H. Young. O.E.
ASSISTANT ENGINEER

APPROVED
Chas D. Vail
STATE HIGHWAY ENGINEER

RECOMMENDED FOR APPROVAL
DIST. ENG. BUREAU PUBLIC ROADS

RECOMMENDED FOR APPROVAL
CHIEF ENG. BUREAU PUBLIC ROADS

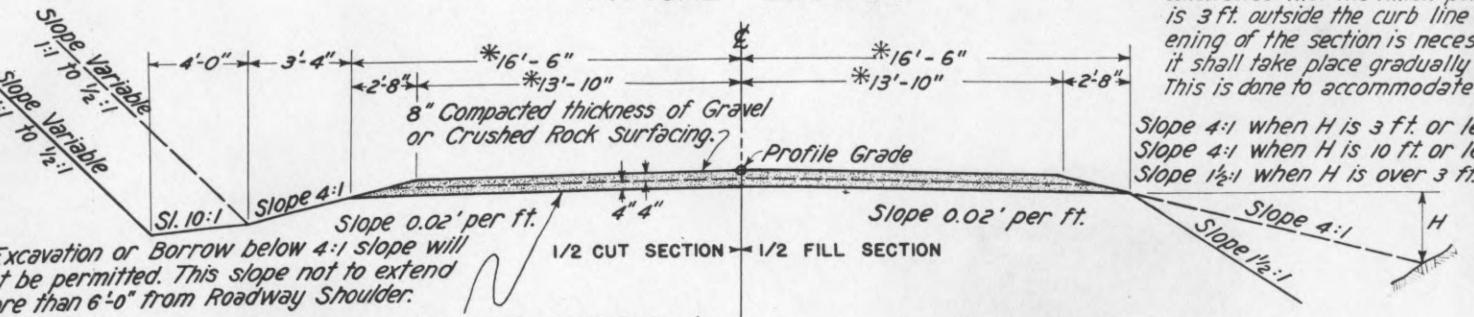
APPROVED
DIRECTOR BUREAU PUBLIC ROADS

INACTIVE

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#2	2a	

TYPICAL CROSS SECTION OF IMPROVEMENT

TYPICAL SECTION



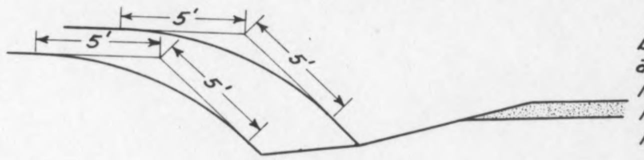
*Roadway embankment at bridge approaches shall be so constructed that the finish point of the gravel shoulder is 3 ft. outside the curb line of the bridge. Where widening of the section is necessary to achieve this result, it shall take place gradually over a distance of 300 ft. This is done to accommodate guard fence and/or guard posts.

Slope 4:1 when H is 3 ft. or less on tangents.
Slope 4:1 when H is 10 ft. or less on curves.
Slope 1½:1 when H is over 3 ft. on tangents.

Excavation or Borrow below 4:1 slope will
t be permitted. This slope not to extend
re than 6'-0" from Roadway Shoulder.

8" Compacted thickness of Gravel or Crushed Rock Surfacing to
e placed in two courses.
Approx. 4" Base Course to be placed at the rate of 65 tons
er 100 lin. ft. of roadway.
Approx. 4" Top Course to be placed at the rate of 59 tons
er 100 lin. ft. of roadway.

CUT SLOPE TREATMENT IN EARTH CUTS



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

SURFACING PLAN

It is estimated that material for gravel or crushed rock surfacing for the Project is available in the vicinity of the pit indicated in the following tabulation. Estimated quantities involved in the operation are shown below.

Alteration of the surfacing plan as here outlined will not be allowed without written permission from the Department.

MATERIAL TO BE PLACED	SOURCE	QUANTITY AVAIL.	QUANTITY USED	OVERHAUL
		TONS	TONS	Ton Mile
257+00 - 278+26	Pit 0.55 Mi. from Sta. 254+50		2636	
278+26 - 554+37.5	" " " " " "		34,211	89,394
554+71 - 592+00	" " " " " "		4624	25,793
Approaches	" " " " " "		220	612
Transitions	" " " " " "		166	462
TOTALS			41,857	116,261

GENERAL NOTES

This Project is to be constructed in conformity with the Standard Specifications of the Colorado State Highway Dep't., adopted June 1, 1937.

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

All roadway excavation required to construct this Project is to be obtained as indicated on the plans. Quantities involved beyond the limits of the ditch as shown on the Typical Section, either noted on the Profile as "Borrow," or on List of Structures as "Embankment," are to be classified and paid for as "Unclassified Excavation." These quantities are to be staked as part of the Original Excavation at locations indicated on the Plans. Slope stakes beyond the limits of the Typical Section are subject to change by the Engineer to fit embankment requirements actually encountered during construction.

All curves are to be superelevated as provided for by the Standard Superelevation Sheet included with plans.

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

All corrugated metal pipe cross culverts are to be provided with one headwall on the inlet end, unless otherwise noted on plans.

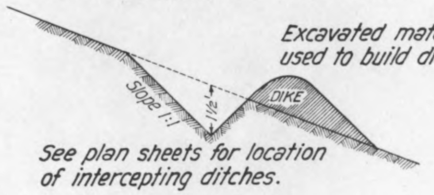
All side approach roads to the Project shall be gravel surfaced with a 4 inch thickness of "Gravel or Crushed Rock Surfacing" extending approximately 30 ft. from edge of roadbed. Estimated tonnage of surfacing material required in this operation is shown in "List of Structures."

Overhaul will be paid for as measured along center line of Project, unless otherwise noted on the plans.

At all places on the Project where the new work lies along the present traveled road, the Contractor shall, at his own expense, prosecute construction in such a manner that traffic may readily pass over the road. Also the Contractor shall maintain in safe condition and at his own expense, all temporary approaches to and crossings of intersecting roads.

The entire Project is to be cleared for variable widths which shall be held to the minimum required for the construction of the road, borrow pits, channel changes and widths required to accommodate visibility. Ordinarily the clearing shall not extend more than eight (8) feet beyond the toes of fills or tops of cut banks. All fallen timber, debris, logs, etc., are to be removed from the Right of Way. The cost of the above items shall be included in the lump sum price bid for "Clearing and Grubbing the Entire Project."

TYPICAL INTERCEPTING DITCH



Excavated material to be used to build dike.

See plan sheets for location of intercepting ditches.

WIRE CABLE GUARD FENCE

STATION	SIDE	LIN. FT.
261+25 - 264+53	R	328
301+75 - 307+11	R	536
310+40 - 315+28	L	488
TOTAL		1352

FENCING REQUIREMENTS AND LIST OF GATES

STATION	SIDE	REMOVE FENCE	REMOVE & REBUILD FENCE	*BUILD BARBED WIRE	*BUILD COMBINATION	BUILD GATES *BARBED WIRE	BUILD GATES *DRIVEWAY	
		LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	NO.	NO.	
330+08 - 332+20	R&L	530						
526+80 - 529+15	R	380						
535+60 - 540+80	R	520						
542+75 - 552+80	R	1015						
330+08 - 332+30	L				225			
334+00 - 336+00	R		200					
397+70 - 399+85	R		215					
407+25 - 411+85	R		480					
521+00 - 557+00	R			3655				
331+15	L						1	
334+90	R						1	
408+00	R						1	
522+75	R						1	
542+65	R					1		
554+00	R					1		
TOTAL		2445	895	3655	225	2	4	

* NO FEDERAL AID

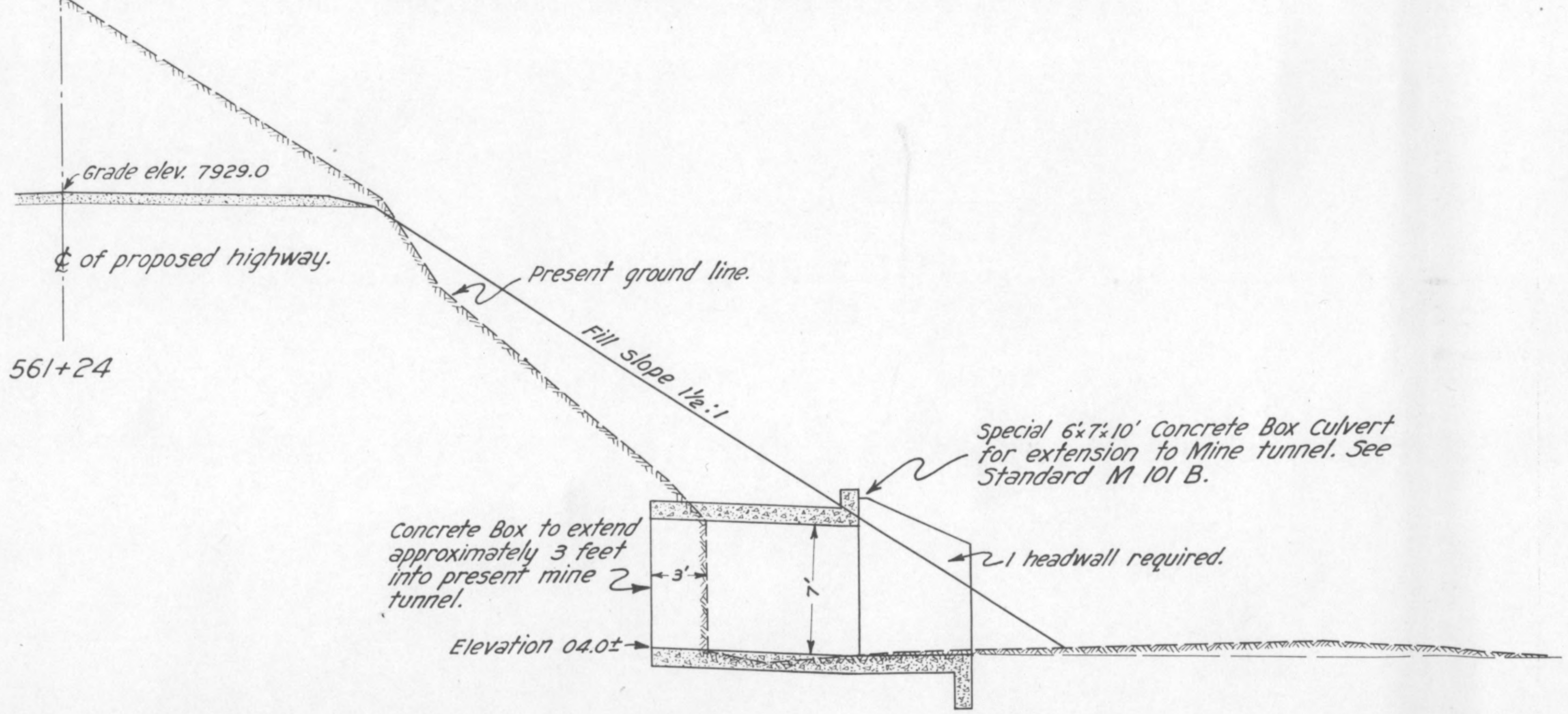
TIMBER GUARD POSTS

STATION	SIDE	SPACING	NO. OF POSTS
266+50 - 280+50	R	50'	29
287+50 - 293+50	R	50'	13
298+50 - 301+53	R	50'	7
310+50 - 315+50	R	50'	11
323+50 - 331+50	R	50'	17
343+00 - 353+61	R	50'	22
356+50 - 366+50	R	50'	21
369+50 - 375+00	R	50'	12
370+50 - 374+50	L	50'	9
378+00 - 384+00	R	50'	13
386+50 - 389+50	R	50'	7
393+50 - 401+50	R	50'	17
398+50 - 401+50	L	50'	7
408+50 - 412+50	R&L	50'	18
420+50 - 425+54	R	50'	11
492+50 - 494+00	R	50'	4
510+50 - 524+50	R	50'	29
527+50 - 541+52	R	50'	29
546+23 - 554+34	R	50'& BR.	20
553+73 - 554+34	L	Bridge	5
554+74 - 555+35	L	"	5
554+74 - 584+85	R	50'& Br.	64
579+25 - 579+75	L	50'	2
TOTAL			372

FED. ROAD DIST. NO.	STATE	F. A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1) *2	3a	

Rev. 12-7-38 MTG
Rev. 12-14-38 P.A.F.
Rev. 2-27-39 A.Z.

DETAIL OF 6'x7'x10' CONCRETE BOX CULVERT FOR EXTENSION TO MINE TUNNEL RT. OF STA. 561+24


Grade elev. 7929.0
℄ of proposed highway.
561+24
Present ground line.
Fill slope 1½:1
Special 6'x7'x10' Concrete Box Culvert for extension to Mine tunnel. See Standard M 101 B.
1 headwall required.
Concrete Box to extend approximately 3 feet into present mine tunnel.
3'
7'
Elevation 04.0±

SUMMARY OF APPROXIMATE QUANTITIES

No.	Item	Unit	Roadway	Bridge STA. 554+	Non Federal Aid			Totals
10a	CLEARING & GRUBBING ENTIRE PROJECT	LUMP SUM	●					●
11a	REMOVAL OF BRIDGES, STA. 280+, 311+, 362+.	" "	●					●
11b	REMOVAL OF 27 STRUCTURES	" "	●					●
11c	REMOVING BUILDINGS, STA. 323+, 324+, 331+, 334+, 335+, & 525+.	" "	●					●
11e	REMOVING CAVES, STA. 523+ & 524+	LUMP SUM	●					●
11f	" WATER PIPES	LIN. FT.	120					120
11g	" RAILROAD SPUR, STA. 321+	LUMP SUM	●					●
11h	" & RESETTING MAIL BOXES	" "	●					●
12a	" FENCE	LIN. FT.	2500					2500
12b	" & REBUILDING FENCE	" "	900					900
13c	UNCLASSIFIED EXCAVATION	CU. YD.	360800	200				361000
14a	DRY ROCK EXCAVATION (STRUCTURAL)	" "	1235	5				1240
14b	" COMMON " "	" "	1240	20				1260
14c	WET ROCK " "	" "	420	40				460
14d	" COMMON " "	" "	420	320				740
15x	ROCK FILL	" "	200					200
18a	STATION YARD OVERHAUL	STA. YD.	797000					797000
18b	YARD MILE OVERHAUL	YD. MI.	4200					4200
26a	GRAVEL OR CRUSHED ROCK SURFACING	TON	41900					41900
26c	OVERHAUL OF SURFACING	TON MI.	116300					116300
42a	UNTREATED BRIDGE TIMBER	M FT. BM	0.7	0.4				1.1
42b	TREATED BRIDGE TIMBER	" "	4.4					4.4
42x	UNTREATED BRIDGE TIMBER (NATIVE LOGS 12"ϕ)	LIN. FT.	2750					2750
46a	CLASS "A" CONCRETE	CU. YD.	867	191				1058
46r	" "A" " (HANDRAILS)	CU. YD.		4				4
47	REINFORCING STEEL	LB.	77900	18300				96200
48	STRUCTURAL "	"		16300				16300
49	CEMENT RUBBLE MASONRY	CU. YD.	133					133
53x	8" CORRUGATED METAL CULVERT PIPE	LIN. FT.	66					66
53b	18" " " " "	" "	40					40
53c	24" " " " "	" "	2586					2586
53d	30" " " " "	" "	466					466
53e	36" " " " "	" "	460					460
64	GROUTED RUBBLE SLOPE & DITCH PAVING (1 FT. THICK)	SQ. YD.	135					135
72x	8" PERFORATED CORRUGATED METAL PIPE UNDERDRAIN	LIN. FT.	762					762
74	WIRE CABLE GUARD FENCE	" "	1352					1352
74x	TIMBER GUARD POSTS	EACH	372					372
76c	BARBED WIRE FENCE WITH METAL POSTS	LIN. FT.			3700			3700
76f	COMBINATION WIRE FENCE WITH METAL POSTS	" "			300			300
76g	BARBED WIRE GATES	EACH			2			2
76h	DRIVEWAY GATES	"			4			4
81a	PROJECT MARKERS	"	1					1
81b	RIGHT OF WAY MARKERS	"	97					97
89a	DRAIN PIPE (CONCRETE FLOOR) 3"ϕX3'-0" LONG	"		2				2
110	CEMENT RUBBLE MASONRY MANHOLES	"	2					2
WORK	TO BE DONE BY FORCE ACCOUNT (FEDERAL AID)							
	OBLITERATING OLD ROAD	LUMP SUM	●					●
	RAILROAD GRADE CROSSINGS, STA. 257+, 343+, & 530+ AND MOVING RAILROAD, STA. 357+ (WORK TO BE DONE BY RAILROAD CO. FORCES)	" "	●					●
	REMOVE & REBUILD TELEPHONE LINES, STA. 512+ TO 557+ (WORK TO BE DONE BY TELEPHONE CO. FORCES)	" "	●					●
WORK	TO BE DONE BY FORCE ACCOUNT (NO FEDERAL AID)							
	REMOVAL OF BUILDINGS, STA. 321+, 322+, 328+, 329+, 332+, 334+, & 525+	LUMP SUM			●			●
	MOVE GRAVE, STA. 347+ (WORK TO BE DONE BY STATE FORCES)	" "			●			●
	REMOVE AND REBUILD POWER LINES, STA. 267+, 291+ 310+, 342+, 438+, 475±, 504±, 519±, 526±. (WORK TO BE DONE BY POWER CO. FORCES).	" "			●			●

R.O.W. MARKERS

STATION	SIDE	NO.	STATION	SIDE	NO.
257+00	R&L	2	441+24	R	1
262+20	R	1	444+30	L	1
264+18	L	1	445+66	L	1
266+00	L	1	452+34	L	1
267+00	L	1	452+76	L	1
272+00	L	1	454+08	R	1
274+00	R	1	460+00	L	1
275+00	R	1	461+00	L	1
277+00	R	1	479+00	R	1
278+00	R	1	480+00	R	1
278+35	L	1	487+00	R	1
287+00	R	1	487+64	L	1
288+50	R	1	488+00	R	1
292+22	R	1	512+00	R	1
294+47	L	1	513+00	R	1
298+11	L	1	514+00	L	1
301+35	R	1	515+00	L	1
303+00	L	1	517+06	L	1
304+00	L	1	517+64	R	1
316+00	R	1	522+00	R	1
317+50	R	1	523+00	R	1
321+00	L	1	525+86	R	1
322+00	L	1	527+00	R	1
323+30	R	1	528+00	L	1
324+00	L	1	529+00	L	1
325+00	L	1	535+20	L	1
330+00	L	1	540+00	R	1
331+00	L	1	540+32	L	1
332+00	L	1	541+00	R	1
333+50	L	1	542+92	R	1
342+00	R	1	543+37	L	1
343+00	L	1	545+00	R	1
344+00	R&L	2	546+00	R	1
345+50	L	1	558+50	L	1
347+50	R	1	560+00	L	1
349+00	R	1	565+00	L	1
360+57	L	1	565+10	R	1
370+83	L	1	566+00	L	1
373+70	L	1	573+16	R	1
373+94	R	1	573+22	L	1
380+67	L	1	576+68	R	1
392+00	R	1	582+00	R&L	2
393+00	R	1	583+00	R&L	2
398+14	R	1			
398+75	L	1			
411+00	R	1			
412+00	R	1			
420+63	L	1			
425+13	L	1			
425+33	R	1	TOTAL		97

LIST OF STRUCTURES

FED. ROAD DIST. NO.	STATE	F. A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H (1) #2	4 a	

Rev. 12-14-38 M.T.G.

STATION	DESCRIPTION	REMOVE STRUCT.	UNCLASSIFIED EXCAVATION		STRUCTURAL EXCAVATION				GRAVEL OR CR. ROCK SURFACING	CONCRETE		REINF. STEEL	CEMENT RUBBLE MASONRY	* CORRUGATED METAL CULVERT PIPE								CEMENT RUB'L MASONRY MANHOLE	GROUTED RUBBLE SL. PAV.		* PERFORATED C.M.P. UNDERDRAIN		MISCELLANEOUS
			CU. YDS.		CU. YDS.					CU. YDS.				LIN. FT.									SQ. YDS.		LIN. FT.		
		NO.	EXCAV.	EMBANK	*				TONS	CLASS "A"		LBS.	CU. YDS.	8"	18"	24"	30"	36"				EACH	12"		8"		
257+00	Project Marker																										1- Project Marker
267+00 to 273+00	Remove & Rebuild Power Line					FORCE ACCOUNT -WORK TO BE DONE BY POWER CO. FORCES ~ NO F.A.																					
257+95.2	Railroad Grade Crossing					FORCE ACCOUNT-WORK TO BE DONE BY R.R. CO. FORCES																					
257+68	C.M.P. Cr. Culv. (Sk. 63° Lt.) Interc'pt. h'dwall				15								2.3			72											
	& Ditches		25																								
263+00	C.M.P. Cr. Culv. (Interc'pt. h'dwall)				30								2.3			54											
268+50	C.M.P. Cr. Culv. & Dike Lt.			15	20								2.8				108										
	Remove 18"x 24' C.M.P.	1																									
269+40 to 271+25	Perf. C.M.P. Underdrain & Manhole Lt.				100																	1			186 38 26		
	Remove 15"x 24' C.M.P.	1																									
272+80 to 273+60	Perf. C.M.P. Underdrain & Manhole Lt.				65																	1			80 38 28		
276+35	Remove 24"x 24' C.M.P.	1																									
280+90	Bridge, Rd. Appr. & Chan. Change Rt. Rem. Bridge		550	600	272				50																		170 cu.yds. Rock Fill 2750 lin.ft. Untr. Br. Timb. (Nat. Logs) 644 Bd. ft. Untr. Br. Timb. 4325 Bd. ft. Tr. Timb. Remove Bridge
281+40	C.M.P. Cr. Culv. (Interc'pt. h'dwall) & Outlet		10		15								2.3			58											
289+00	" " " " "				20								2.3			64											
289+50 to 300+00	Channel Change Rt.		•																								
291+	Remove & Rebuild Power Line					FORCE ACCOUNT-WORK TO BE DONE BY POWER CO. FORCES ~ NO F.A.																					
296+40	C.M.P. Cr. Culv. (Interc'pt. h'dwall)				20								2.3			72											
301+13	" " " " " & Inlet		10		15								2.3			54											
303+00 to 305+50	Channel Change Rt.		•																								
310+	Remove & Rebuild Power Line					FORCE ACCOUNT-WORK TO BE DONE BY POWER CO. FORCES ~ NO F.A.																					
312+46	Concrete Arch Culv. & Channel Change		500		820					606		55000															
314+42	Road Appr. Lt.			200					10																		
319+50	Road Appr. Rt.			400					10																		
321+08	C.M.P. Cr. Culv. (Sk. 70° Rt.), Interc'pt. h'dwall				30								2.3			54											
	& Ditches		35																								
	Remove 2'x 2'x 22' W.B.C. Lt.	1																									
321+10 to 321+75	Remove Buildings (Including Gas Pump)					FORCE ACCOUNT - NO FEDERAL AID																					
321+90 to 322+20	Remove Abandoned Railroad Spur																										Remove R.R. Spur
322+06	Remove Shed & Outhouse Rt.					FORCE ACCOUNT - NO FEDERAL AID																					
322+50	Remove Log Walls	1																									
	Backfill Cave			20																							
322+90	C.M.P. Side Dr. & Road Appr. Lt.		100						10						40												
	Road Appr. Rt.			150					10																		
323+50	Remove Shed Lt.																										Remove Bldg.
323+73	C.M.P. Cr. Culv., Inlet & Dike Lt.		15		15								2.05			52											
324+15	Remove Garage Rt.																										Remove Bldg.
324+00	Road Appr. Lt.		60						10																		
328+00	Remove Outhouse Rt.					FORCE ACCOUNT-NO FEDERAL AID																					
329+40	Remove House, Shed & Wood Steps Lt.					FORCE ACCOUNT - NO FEDERAL AID																					
329+83	Remove 12"x 20' C.M.P.	1																									
329+83 to 331+05	Ditch Change Lt.		25																								
331+05	C.M.P. Cr. Culv. & Ditches		25		10								2.05			78											
	Remove 12"x 22' C.M.P. Lt.	1																									
331+15	Road Appr. Lt.			160					10																		
331+30	Remove Shed Lt.																										Remove Bldg.
331+40	" " Rt.																										Remove Bldg.
332+12	" Outhouse Lt.					FORCE ACCOUNT -NO FEDERAL AID																					
332+20	" Garage Lt.					FORCE ACCOUNT - NO FEDERAL AID																					
332+50	Road Appr. Rt.			20					10																		
334+00	Remove Chicken House Rt.																										Remove Bldg.
334+90	Road Appr. Rt.		30						10																		
	Remove House Rt.					FORCE ACCOUNT - NO FEDERAL AID																					
335+20	" Garage Lt.																										Remove Bldg.
335+60	C.M.P. Cr. Culv. (Interc'pt h'dwall), Ditches		25		100								2.3			80											
	& Slope Paving																						32				
	Remove 18"x 32' C.M.P.	1																									
338+87	C.M.P. Cr. Culv. (Sk. 61° Rt), Intercept. h'dwall,				50								2.3			70											
	Inlet & Slope Paving		5																				20				
342+ to 366+	Remove & Rebuild Power Line					FORCE ACCOUNT-WORK TO BE DONE BY POWER CO. FORCES ~ NO F.A.																					
343+09	C.M.P. Cr. Culv. (Interc'pt. h'dwall)				30								2.3			50											
343+10	R.R. Grade Crossing					FORCE ACCOUNT - WORK TO BE DONE BY R.R. CO. FORCES																					

(CONTINUED ON SHEET NO. 5a)

FED. ROAD DIST. NO.	STATE	F. A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1) #2	5a	

Rev. 12-14-38 M.T.G.

LIST OF STRUCTURES

(CONTINUED FROM SHEET NO. 4a)

STATION	DESCRIPTION	REMOVE STRUCT. NO.	UNCLASSIFIED EXCAVATION CU. YDS. EXCAV.	UNCLASSIFIED EXCAVATION CU. YDS. EMBANK.	STRUCTURAL EXCAVATION CU. YDS. *	GRAVEL OR CR. ROCK SURFACING TONS	CONCRETE CU. YDS. CLASS "A"	REINF. STEEL LBS.	CEMENT RUBBLE MASONRY CU. YDS.	* CORRUGATED METAL CULVERT PIPE LIN. FT. 8"	18"	24"	30"	36"	CEMENT RUB'L. MASONRY MANHOLE EACH	GROUTED RUBBLE SL. PAV. SQ. YDS. 12"	* PERFORATED C.M.P. UNDERDRAIN LIN. FT. 8"	MISCELLANEOUS
347+90	Move Grave Rt.				FORCE ACCOUNT - WORK TO BE DONE BY STATE FORCES - NO FEDERAL AID													
349+22	Remove 15"x26' C.M.P. Lt.	1																
350+81	C.M.P. Cr. Culv. (Intercpt. h'dwall) & Inlet		10		25				2.3			60						
353+28	Remove 15"x 24' C.M.P.	1																
357+00 to 363+00	Move Railroad Lt.				FORCE ACCOUNT - WORK TO BE DONE BY RAILROAD CO. FORCES													
358+50	C.M.P. Cr. Culv. (Intercpt. h'dwall)				40				2.3			58						
362+20	Special 6'x7'x40' Conc. Box Culv.				35		52.5	4450										
	Remove 15'x15' Timber Bridge																	Remove Bridge
362+30 to 365+00	Intercepting Ditch Lt.		30															
364+00	Road Appr. Lt.		30			10												
369+00	C.M.P. Cr. Culv. (Intercpt. h'dwall) & Outlet		10		30				2.3			46						
370+60	Remove 15"x 22' C.M.P.	1																
372+00 to 375+00	Intercepting Ditch Lt.		30															
374+55	Remove 15"x 20' C.M.P.	1																
375+00	C.M.P. Cr. Culv. & Dyke Lt.			5	15				2.05			58						
378+91	" " " (Intercpt. h'dwall) & Inlet		10		20				2.3			60						
381+71	" " " " " " "		25		30				2.3			52						
382+07	Remove 18"x 22' C.M.P.	1																
387+00 to 389+00	Intercepting Ditch Lt.		20															
389+00	C.M.P. Cr. Culv. (Intercpt. h'dwall) & Inlet		10		35				2.3			60						
394+00	" " " " "				35				2.3			52						
399+58	" " " " " " "		50		25				2.3			126						
	Remove 12"x 24' C.M.P. Lt.	1																
401+33	C.M.P. Cr. Culv. (Sk. 63° Lt.), Ditches & Dyke Lt.		10		10				2.8				82					
401+50 to 403+00	Intercepting Ditch Lt.		20															
403+00	Remove 18"x 30' C.M.P. Rt.	1																
403+00 to 410+00	Intercepting Ditch Lt.		70															
408+00	Road Appr. Rt.			300		10												
410+00	C.M.P. Cr. Culv.				10				2.8				88					
410+00 to 421+15	Intercepting Ditch Lt.		120															
420+00	Road Appr. Rt.			30		10												
421+15	C.M.P. Cr. Culv. (Sk. 63° Rt.), Intercpt. h'dwall				20				2.7				70					
	Inlet		10															
421+15 to 422+00	Intercepting Ditch Lt.		15															
424+00 to 429+00	" " "		50															
429+00	C.M.P. Cr. Culv. & Inlet		15		10				2.05			50						
429+00 to 436+58	Intercepting Ditch Lt.		80															
436+58	C.M.P. Cr. Culv. & Inlet & Dyke Lt.		10		15				2.05			70						
439+85	Remove 24"x 22' C.M.P.	1																
438+ to 445+	Remove & Rebuild Power Line				FORCE ACCOUNT - WORK TO BE DONE BY POWER CO. FORCES. ~ NO FEDERAL AID													
443+77	C.M.P. Cr. Culv., Inlet & Dyke Lt.		10		25				2.05			52						
	Remove 15"x 26' C.M.P.	1																
448+62	C.M.P. Cr. Culv., Inlet & Dyke Lt.		30		15				2.8				56					
449+50	Remove 15"x 30' C.M.P.	1																
456+07	C.M.P. Cr. Culv., Inlet & Dyke Lt.		25		10				2.8				62					
	Remove 24"x 28' C.M.P.	1																
464+66	C.M.P. Cr. Culv., Inlet & Dyke Lt.		60		20				3.7					52				
	Remove 36"x 32' C.M.P.	1																
471+45	C.M.P. Cr. Culv. & Dyke Lt.			40	5				2.05			50						
476+84	C.M.P. Cr. Culv. (Intercpt. h'dwall) & Inlet		10		15				2.3			58						
483+83	" " ", Inlet & Dyke Lt.		25		10				2.05			66						
489+85	" " ", (Intercept. h'dwall)				20				2.3			50						
497+54	" " " Inlet & Dyke Lt.		20		10				2.05			58						
504+24	" " " (Intercept. h'dwall) & Inlet		10		15				2.3			54						
511+00	" " " " "				25				2.3			60						
512+50 to 557+00	Remove & Rebuild Telephone Line				FORCE ACCOUNT - WORK TO BE DONE BY TELEPHONE CO. FORCES													
504±, 519± & 526±	Remove & Rebuild Power Line				FORCE ACCOUNT - WORK TO BE DONE BY POWER CO. FORCES ~ NO FEDERAL AID													
517+00	C.M.P. Cr. Culv. (Intercept. h'dwall)				80				2.3			78						
522+75	Road Appr. Rt.			1500		10												
523+79	Remove Cave Rt.																	Remove Cave
	Backfill Cave Rt.			25														
524+38	Remove Aerial Pole Rt.	1																
524+65	Remove 120 lin. ft. Abandoned Water Line																	Rem. 120 lin. ft. 1" Water Line
524+68	C.M.P. Cr. Culv. (Sk. 82° Lt.) Intercpt. h'dwall,				60				2.3			58						
	Inlet & Slope Paving		5													45		

(CONTINUED ON SHEET NO. 6a)

Rev. 2-27-39 A.Z.

FED. ROAD DIST. NO.	STATE	F. A. PROJ. NO.	SHEET NO	TOTAL SHEETS
3	COLO.	259 H (1) #2	6 a	

Rev. 12-7-38. R.R.A. Rev. 12-14-38 M.T.G.

LIST OF STRUCTURES

(CONTINUED FROM SHEET NO. 5a)

STATION	DESCRIPTION	REMOVE STRUCT.	UNCLASSIFIED EXCAVATION CU. YDS.		STRUCTURAL EXCAVATION CU. YDS.				GRAVEL OR CR. ROCK SURFACING	CONCRETE CU. YDS.		REINF. STEEL	CEMENT RUBBLE MASONRY	* CORRUGATED METAL CULVERT PIPE LIN. FT.								CEMENT RUB'L MASONRY MANHOLE	GROUTED RUBBLE SL. PAV. SQ. YDS.		* PERFORATED C.M.P. UNDERDRAIN LIN. FT.		MISCELLANEOUS
		NO.	EXCAV.	EMBANK.	❋				TONS	CLASS "A"		LBS.	CU. YDS.	8"	18"	24"	30"	36"				EACH	12"		8"		
524+82	Remove Cave Rt.																										Remove Cave
	Backfill Cave			25																							
525+40	Remove Log Chicken House Rt.																										Remove Bldg.
525+54	Remove Outhouse Rt.					FORCE ACCOUNT - NO FEDERAL AID																					
531+52	8'x6'x40' Conc. Box Culv. (Sk. 83° Rt.)				150					79.6		7080															
	(Type 8-I) & Channel Change		600																								
	Remove 24"x14' C.M.P. 100' Rt.	1																									
530+04.8	Railroad Grade Crossing					FORCE ACCOUNT - WORK TO BE DONE BY R.R. CO. FORCES																					
534+80 to 538+40	Perf. C.M.P. Underdrain & Outlet Pipe				120									66											120 230 16		
537+00 to 538+90	Channel Change Rt.		175																								
538+00	C.M.P. Cr. Culv. (Interc'pt. h'dwall)				20								2.3			94											
538+33	Remove C.M.P. Rt.	1																									
542+65	Road Appr. Rt.			35					10																		
544+81	Remove 12"x22' C.M.P.	1																									
547+92	C.M.P. Cr. Culv., Outlet & Dyke Lt.		5		20								2.05			120											
549+26	Remove 15"x22' C.M.P.	1																									
549+90 to 551+20	Rebuild Road Outside Right-of-Way Rt.		300						20																		
554+00	Road Appr. Rt.			700					10																		
554+95	" " Lt.		580						10																		
554+37.5 to 554+71	Bridge & Channel Improvement		ϕ500			(Quantities in Summary)																					
555+19	Remove 36"x26' C.M.P.	1																									
559+76	C.M.P. Cr. Culv. (Interc'pt. h'dwall)				25								2.3			48											
566+15	" " ", Int. h'dwall (Sk. 73° Rt.) & Ditches		25		65								2.3			70											
	C.M.P. Culv. under R.R.				25											38											
569+49	C.M.P. Cr. Culv. (Interc'pt. h'dwall), Ditches		10		125								3.1					52 20 44					38				
	& Slope Paving																										
573+96	C.M.P. Cr. Culv. (Sk. 77° Rt.) & Ditches		20		40								2.05			90 28											
579+44	8'x8'x50' Conc. Box Culv. (Type 8-I) & Ditches		230		175					110.9		9935															
583+45	C.M.P. Cr. Culv.				20								3.7					72									
	C.M.P. Culv. Under R.R. & Ditches		35		20								3.7					26									
583+45 to 585+00	Intercepting Ditch		20																								
585+00	C.M.P. Cr. Culv. & Inlet		40		30								3.7					66									
	C.M.P. Culv. Under R.R. & Ditches		200		45								3.7					36									
585+00 to 591+00	Intercepting Ditch Lt.		70																								
591+00	C.M.P. Cr. Culv. & Ditches		40		35								3.7					56									
	C.M.P. Culv. Under R.R. & Ditches		10		35								3.7					36									
275+00	C.M.P. Cr. Culv. (Interc'pt. h'dwall)				25								2.3			64											
275+00 to 277+00	Channel Change Rt.		●																								
311+50	Remove Bridge 300' Lt.																										Remove Bridge
475±	Remove & Rebuild Power Line					FORCE ACCOUNT - WORK TO BE DONE BY POWER CO. FORCES ~ NO FEDERAL AID																					
561+24	Special 6'x7'x10' Conc. Box Culv. & Outlet		10		25					17.3		1395															
	Remove timber cribbing at mine entrance.	1																									
TOTALS		27	4605	4225	3292				220	866.3		77,860	132.65	66	40	2586	466	460				2	135		762		

❋ Structural Excavation is estimated to be 50% Common and 50% Rock, each of which is estimated to be 75% Dry and 25% Wet.

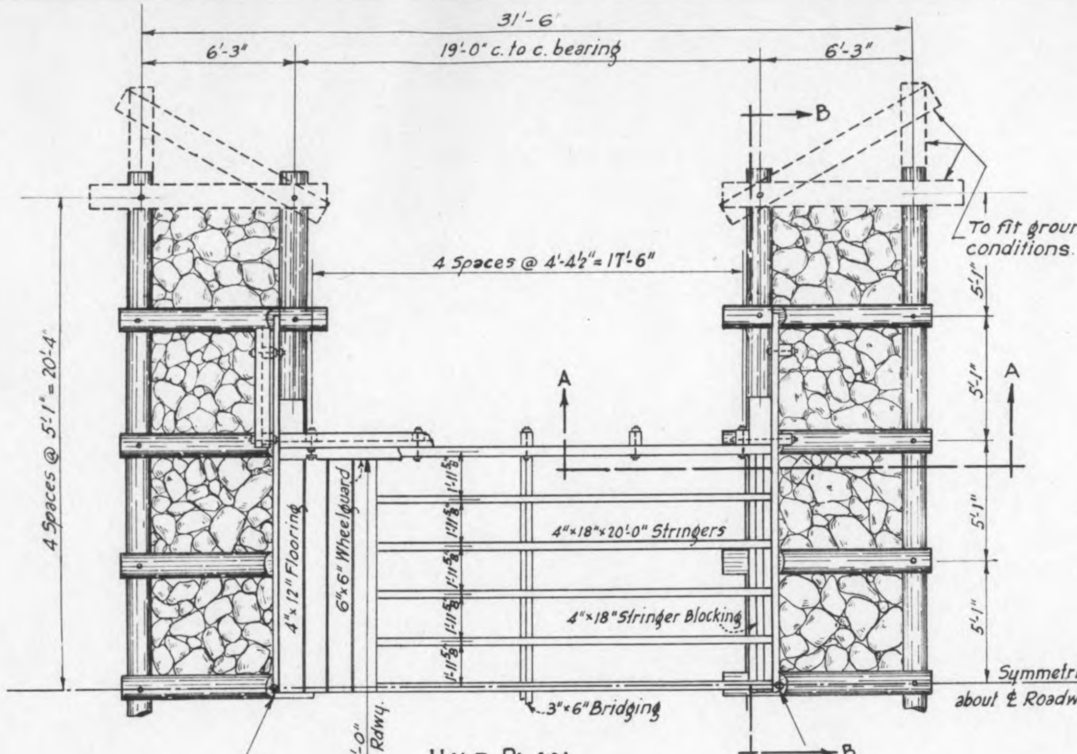
● Included in Profile Quantities for Payment.

ϕ Included in Major Structure Quantities for Payment.

* Price bid per linear foot for the various sizes of Corrugated Metal Pipe to include all necessary elbows and fittings.

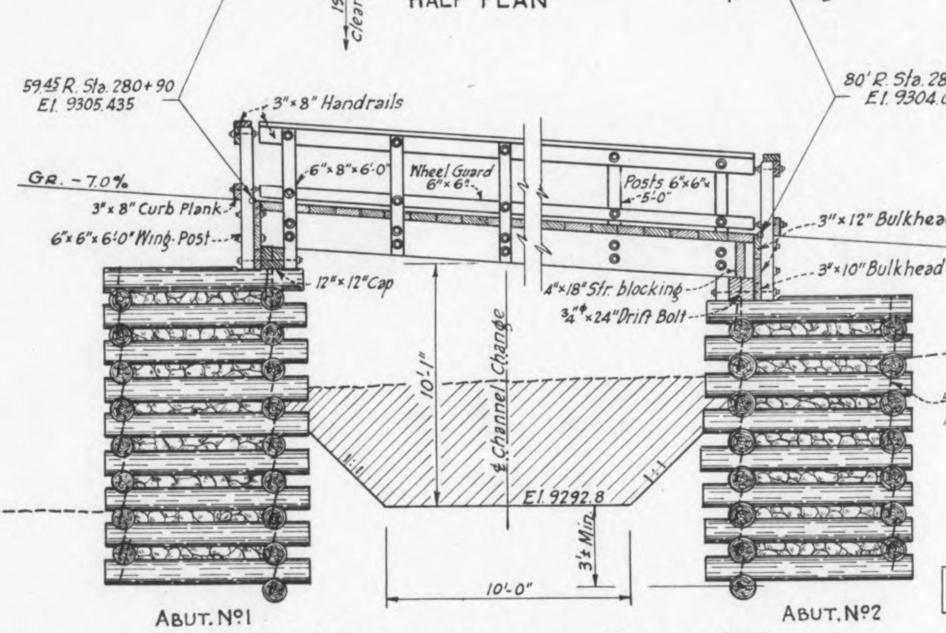
REVISIONS

FED. ROAD DIST. NO.	STATE	F.A.P	SHEET NO.	TOTAL SHEETS
3	COLO.	259-H(1)#2	7a	



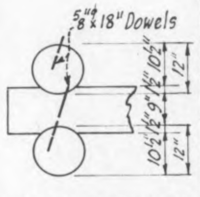
31'-6"
6'-3"
19'-0" c. to c. bearing
6'-3"
B
To fit ground conditions.
4 Spaces @ 4'-4½" = 17'-6"
4 Spaces @ 5'-1" = 20'-4"
5'-1"
A
A
4"×12" Flooring
6"×6" Wheelguard
4"×18"×20'-0" Stringers
4"×18" Stringer Blocking
3"×6" Bridging
Symmetrical about ℄ Roadway
19'-0" Clear Rdwy.

HALF PLAN



59.45 R. Sta. 280+90
El. 9305.435
80' R. Sta. 280+90
El. 9304.00
3"×8" Handrails
Gr. -7.0%
3"×8" Curb Plank
6"×6"×6'-0" Wing Post
6"×8"×6'-0"
Wheel Guard 6"×6"
Posts 6"×6"×5'-0"
3"×12" Bulkhead Plank
3"×10" Bulkhead Plank
12"×12" Cap
4"×18" Str blocking
¾"×24" Drift Bolt
10'-1"
℄ Channel Change
El. 9292.8
3½' Min.
10'-0"
⅝"ϕ Dowel Pins in Cribbing
ABUT. No1
ABUT. No2

SIDE ELEVATION SECTION "AA"



⅝"ϕ×18" Dowels
12"
10½"
9"
1½"

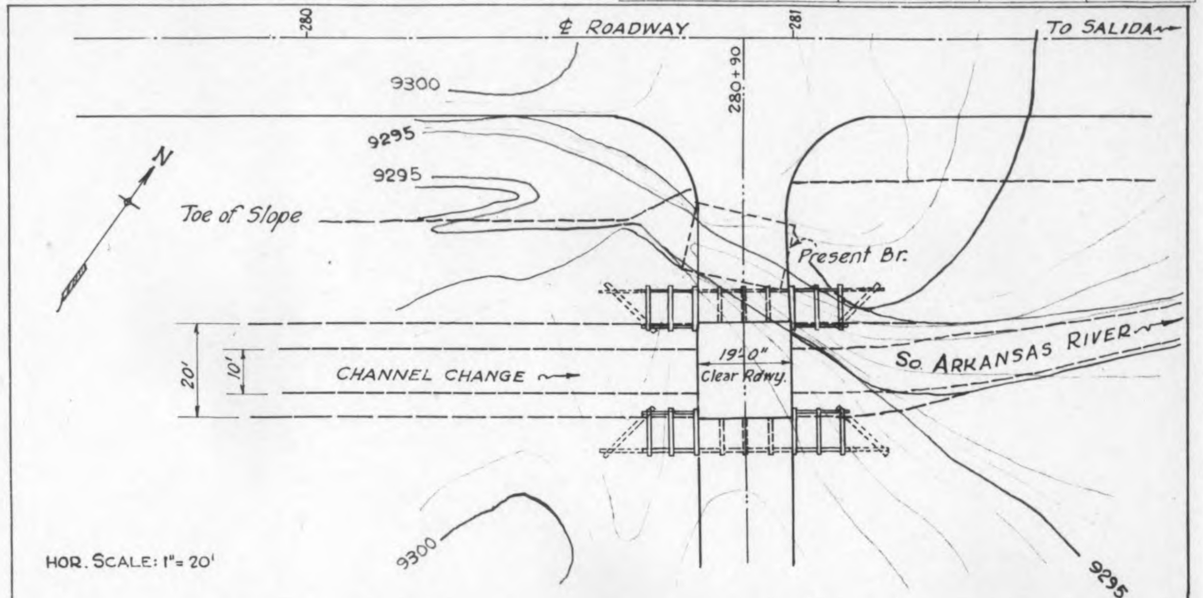
DETAIL OF DAPPING LOGS

Bolts and Washers						
LOCATION	ITEM	SIZE	NO. REQD.	LENGTH	WT. EACH	TOTAL WT.
SPAN POSTS TO RAILS	BOLTS	⅝"ϕ	10	10"	1.08	10.8
WING POSTS TO RAILS	"	⅝"ϕ	8	11"	1.16	9.2
POSTS TO WHEELGUARDS	"	⅝"ϕ	10	14"	1.41	14.1
POSTS TO STRINGERS	"	⅝"ϕ	20	14"	1.41	28.2
WING POSTS TO CURB PLANK	"	⅝"ϕ	8	11"	1.16	9.3
WHEELGUARD TO STRINGERS	"	⅝"ϕ	10	32"	2.90	29.0
POSTS TO BULKHEAD TO CAP TO POST	"	⅝"ϕ	4	29"	2.65	10.6
WING POSTS TO BULKHEAD	"	⅝"ϕ	20	11"	1.16	23.2
CAPS TO CRIBBING	DRIFT BOLTS	¾"ϕ	10	24	3.00	30.0
WASHERS, STANDARD C.I.O.G.	WASHERS	⅝"ϕ	180		0.75	135.6
TOTAL WEIGHT						300.0 LB.

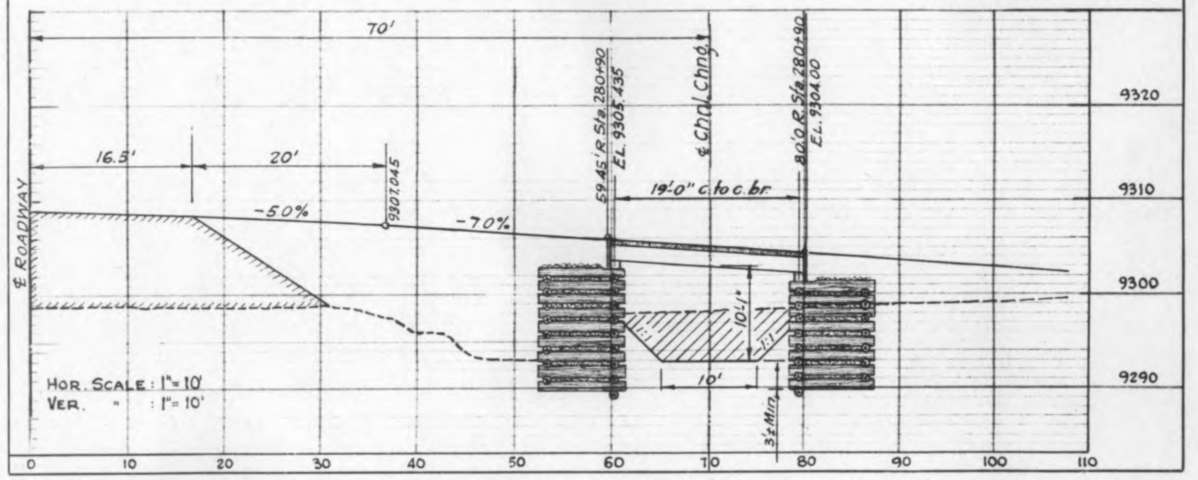
Nails		
LOCATION	ITEM	WEIGHT
RAILS TO POSTS	40 D COMMON	2.2 LBS.
WING RAILS TO POSTS	"	1.8 "
STRINGER BLOCKING	"	4.4 "
STRINGER BRIDGING	"	4.4 "
STRINGER TO CAPS	"	2.4 "
BULKHEAD TO CAPS TO STRINGERS	7" WIRE SPIKES	19.0 "
FLOOR PLANK TO STRINGERS	"	36.0 "
WHEELGUARD BLOCKING	20 D COMMON	0.6 "
BULKHEAD PLANK TO WING POSTS	40 D COMMON	2.2 "
TOTAL WEIGHT		73.0 LBS.

Untreated Timber				
DESCRIPTION	No.	SIZE	LENGTH	BD. FT.
HANDRAILS S-4-S	4	3"×8"	20'-0"	160
HANDRAIL POSTS S-4-S	6	6"×8"	5'-0"	120
" " S-4-S	4	6"×8"	6'-0"	96
WING HANDRAILS S-4-S	8	3"×8"	5'-0"	80
WING HANDRAIL POSTS S-4-S	8	6"×6"	6'-0"	144
WING CURB PLANK S-4-S	4	3"×8"	5'-6"	44
TOTAL UNTREATED TIMBER				644 BFt.

Treated Timber				
DESCRIPTION	No.	SIZE	LENGTH	BD. FT.
FLOORING	19	4"×12"	20'-0"	1520
BRIDGING	2	3"×6"	24'-0"	72
WHEELGUARDS	2	6"×6"	20'-0"	120
STRINGERS	11	4"×18"	20'-0"	1320
CAPS	2	12"×12"	24'-0"	576
BULKHEAD PLANKS	2	3"×10"	31'-0"	155
" "	4	3"×12"	30'-0"	360
STRINGER BLOCKING	2	4"×18"	16'-0"	192
WHEELGUARD BLOCKING	10	2"×6"	1'-0"	10
TOTAL TREATED TIMBER				4325 BFt.



280
281
℄ ROADWAY
280+90
TO SALIDA
9300
9295
9295
N
Toe of Slope
Present Br.
20'
10'
CHANNEL CHANGE
19'-0" Clear Rdwy.
So ARKANSAS RIVER
HOR. SCALE: 1" = 20'
9300
9295

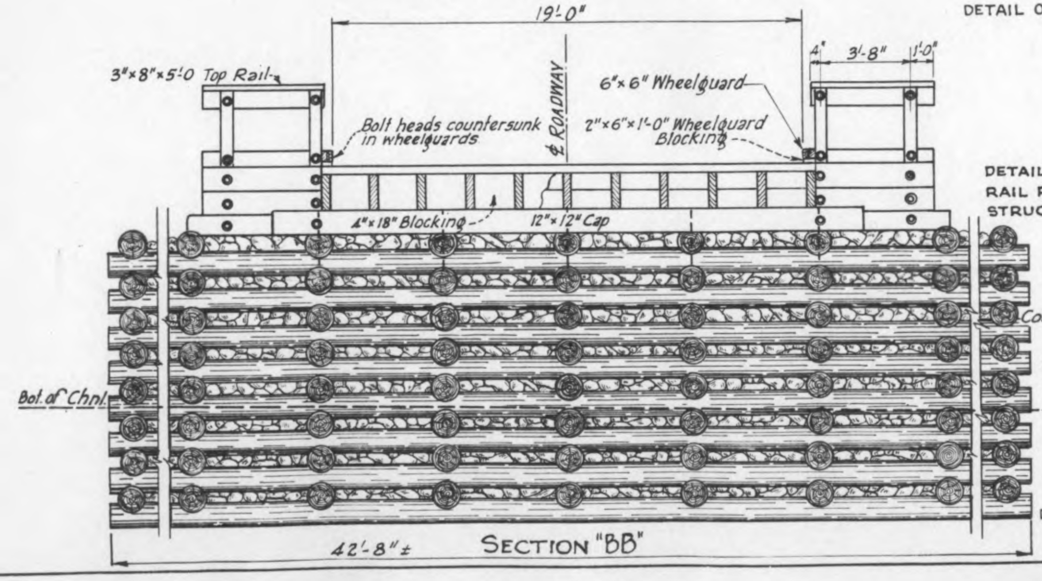


70'
16.5'
20'
-5.0%
-7.0%
9301.045
59.45' R. Sta. 280+90 El. 9305.435
℄ Chnl. Chng.
80.0' R. Sta. 280+90 El. 9304.00
19'-0" c. to c. br.
℄ ROADWAY
10'-1"
10'
3½' Min.
9320
9310
9300
9290
HOR. SCALE: 1" = 10'
VER. " : 1" = 10'
0
10
20
30
40
50
60
70
80
90
100
110

SITUATION PLAN AND PROFILE

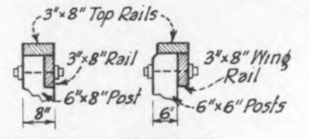
Summary of Quantities						
ITEM	DESCRIPTION	UNIT	SUPER-STR.	ABUT. #1	ABUT. #2	TOTALS
11a	Removal of Present Bridge.	Lump Sum				•
14	Excavation (Structural)	Cu. Yds.		113	159	272
*42x	Untreated Bridge Timber (Native Logs 12"ϕ)	Lin. Ft.		1455	1295	2750
42a	Untreated Bridge Timber.	M.Ft. BM.	.280	.182	.182	.644
42b	Treated Bridge Timber.	M.Ft. BM.	3.042	.6415	.6415	4.325
15x	Rock Fill	Cu. Yds.		90	80	170

* ⅝"ϕ × 18" *Dowels to be included in unit bid price for logs.*



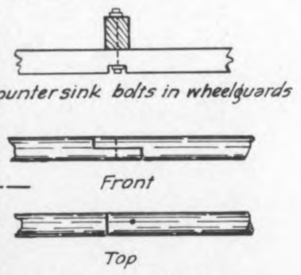
19'-0"
4"
3'-8"
1'-0"
3"×8"×5'-0" Top Rail
℄ ROADWAY
6"×6" Wheelguard
Bolt heads countersunk in wheelguards
2"×6"×1'-0" Wheelguard Blocking
4"×18" Blocking
12"×12" Cap
Bot. of Chnl.
42'-8" ±

SECTION "BB"



3"×8" Top Rails
3"×8" Rail
6"×8" Post
8"
3"×8" Wing Rail
6"×6" Posts
6"

DETAIL OF HAND-RAIL POSTS-SUPER-STRUCTURE. DETAIL OF WING POSTS.



Countersink bolts in wheelguards
Front
Top

DETAIL OF LOG SPLICES

NAILING DIRECTIONS

Posts to Rails.- 2-40d nails per rail per post.

Wing Rails to Posts.- 2-40d nails per rail per post.

Wheelguard Blocking.- 2-20d nails per block.

Stringer Blocking.- 4-40d nails per block.

Stringer Bridging.- 4-40d nails per piece of bridging.

Stringer to Caps.- 2-40d nails per stringer per cap.

Bulkhead Planks to Caps and Stringers.- 2-7" wire spikes per bulkhead or cap per stringer.

Floor Planks to Stringers.- 2-7" wire spikes in each end and one in each intermediate stringer.

GENERAL NOTES (CONT.)

All logs shall be peeled native Red Spruce and shall be 10" in their least dimension after peeling.

Rocks filling the log cribs shall be no larger than one man can handle and no smaller than six inches least diameter. Volume of rock placed in the abutments will be paid for as "Rock Fill."

GENERAL NOTES

All work shall be done according to the standard specifications of the Colorado State Highway Department, adopted June 1, 1937.

All timber to be treated or untreated as shown in bills of material.

All timber shall be dense southern yellow pine or west coast douglas fir except logs.

All cut surfaces or bored holes in treated timber shall be thoroly saturated with hot creosote oil.

Joints in top handrail must be staggered with joints in side rail.

All handrailing and posts above wheelguards shall be painted white and all handrail posts below the top of wheelguards shall be painted black as specified.

All bolts over 12 inches long must be threaded not less than 4 inches.

Bolts in finished structure shall not project more than ½" beyond the nut.

All bolts must have Standard C.I.O.G. or malleable cast washers under each head & nut.

Bolt lengths are calculated assuming Standard C.I.O.G. washers will be used.

The contractor is cautioned to check bolt lengths before ordering because of variations in thickness of lumber.

The entire exposed surface of all untreated timber shall be painted one coat as specified immediately after the material is delivered to the project.

Before placing handrailing the contact surfacing shall receive the second coat of paint.

All hardware to be galvanized. Weights of hardware as shown are for ungalvanized material.

LOADING DATA.
LIVE LOAD = A. A. S. H. O. 1935 CLASS A. (H-12½)

DESIGNING DATA.
A.A.S.H.O. 1935 EXCEPT CONCRETE UNIT STRESSES PER A.A.S.H.O. AUG. 1928.

COLORADO
STATE HIGHWAY DEPARTMENT
DETAILS OF
1-19' SPAN TIMBER BRIDGE
ROCK-FILLED CRIB ABUTMENTS

Across So. Arkansas River
Sta. 70' R. Sta. 280+90
Near GARFIELD Sec. 33 T. 50N R. 6E

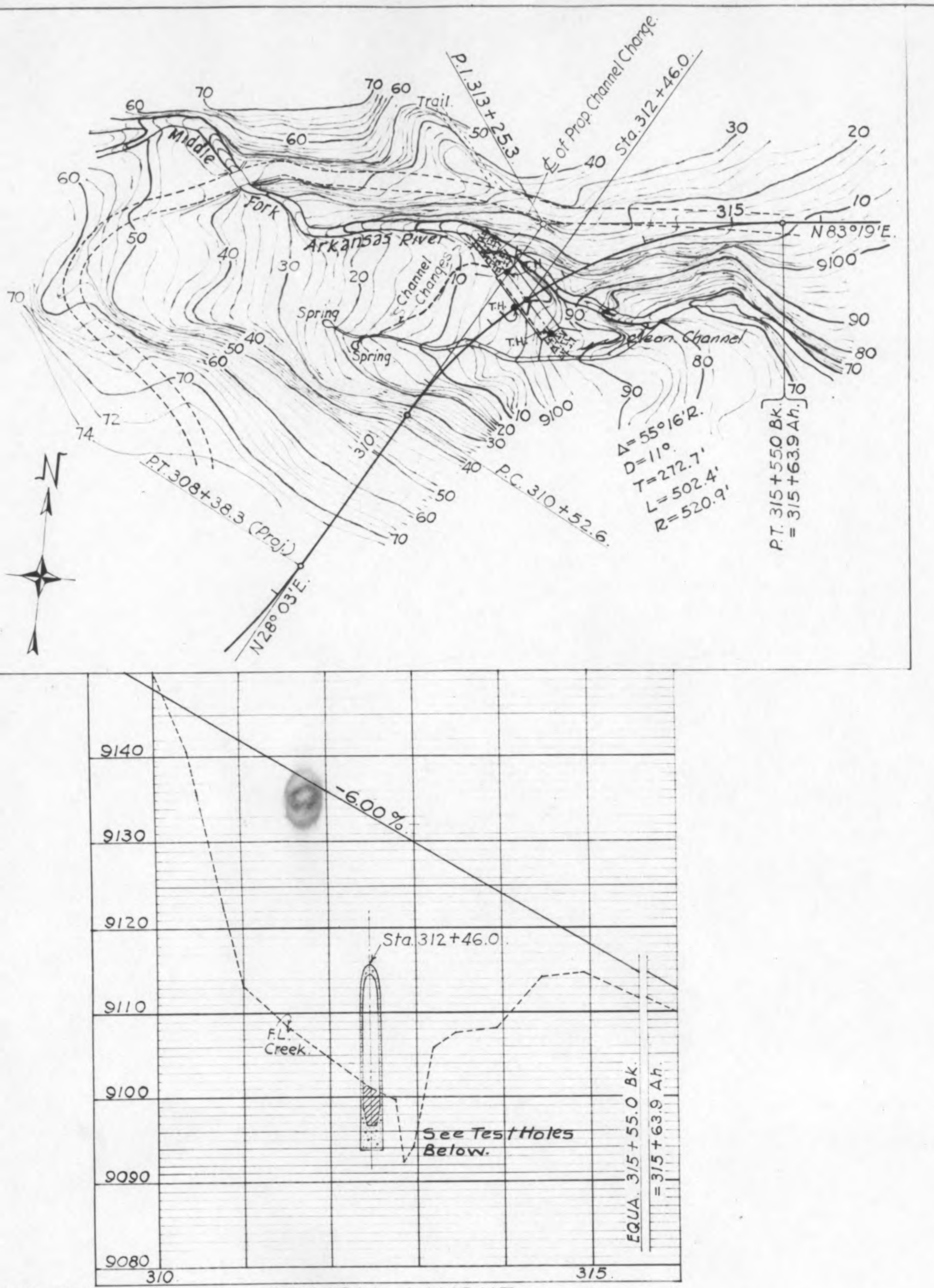
Designed by W-G-S
Made by W-G-S
Checked by A-D-N

Approved by C. S. Bailey
Bridge Engineer
Date: Nov. 10th, 1938.

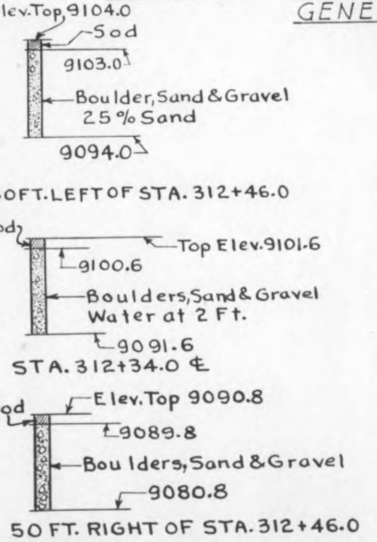
STRUCTURE NO. J-11-G

Rev. 11-30-38 M.F.M. Channel change shown.
Rev. 12-13-38. H.A.L.F. Put Soundings on General Layout.

FED. ROAD DIST. NO.	STATE	F.A.P.	SHEET NO.	TOTAL SHEETS
3	COLO.	259H(1)#2	8a	


Middle
Fork
Arkansas River
Trail.
P.I. 313+25.3
℄ of Prop. Channel Change.
Sta. 312+46.0.
315
N 83°19'E.
9100
Channel Changes
Spring
Spring
T.H.
T.H.
Clean Channel
Δ=55°16'R.
D=11°
T=272.7'
L=502.4'
R=520.9'
P.T. 315+55.0 Bk.
= 315+63.9 Ah.
P.T. 308+38.3 (Proj.)
P.C. 310+52.6.
N28°03'E.
310
N
70
60
50
40
30
20
10
90
80
72
74
9140
9130
9120
9110
9100
9090
9080
310
315
-6.00%
Sta. 312+46.0.
F.L. Creek
See Test Holes Below.
EQUA. 315+55.0 Bk.
= 315+63.9 Ah.

GENERAL LAYOUT.


lev.Top 9104.0
Sod
9103.0
Boulder, Sand & Gravel
25% Sand
9094.0
OFT. LEFT OF STA. 312+46.0
od
Top Elev. 9101.6
9100.6
Boulders, Sand & Gravel
Water at 2 Ft.
9091.6
STA. 312+34.0 ℄
od
Elev. Top 9090.8
9089.8
Boulders, Sand & Gravel
9080.8
50 FT. RIGHT OF STA. 312+46.0

TEST HOLES

SUMMARY OF QUANTITIES ✓C.B.M.

ITEM Nº	DESCRIPTION	UNIT	TOTAL
11a	Removal of Bridge 300' Left Sta. 311+50	Lump Sum	●
13c	Unclassified Excavation	Cu. Yd.	500
14	Structural Excavation	Cu. Yd.	820
46a	Class "A" Concrete	Cu. Yd.	606
47	Reinforcing Steel	Lb.	55000
*	1/4" Expansion Joint Material	Sq. Ft.	120
*	1/2" Expansion Joint Material	Sq. Ft.	142

* To Be Included In Unit Bid Price For Class "A" Conc.

BAR LIST FOR ARCH CULVERT. ✓J.J.M.

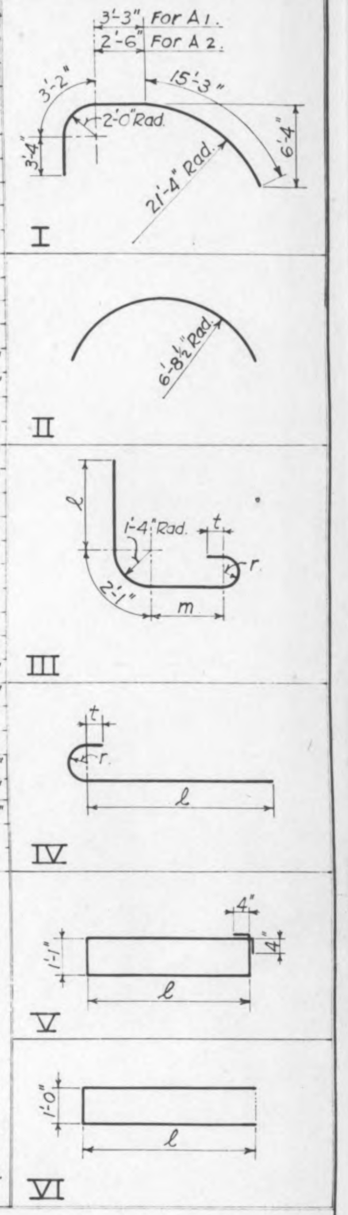
MARK	SIZE	NO. REQ.	LENGTH	TYPE	ℓ	m	r	t
A 1	1" ϕ	220	25'-0"	I				
A 2	7/8" ϕ	148	24'-3"	I				
A 3	5/8" ϕ	123	18'-2"	II				
A 4	1/2" ϕ	228	24'-3"	—				
B 1	5/8" ϕ	8	23'-6"	—				
B 2	7/8" ϕ	16	12'-0"	—				
B 3	1/2" ϕ	4	9'-9"	—				
B 4	1/2" ϕ	4	8'-5"	—				
B 5	1/2" ϕ	4	7'-6"	—				
B 6	1/2" ϕ	4	6'-10"	—				
B 7	1/2" ϕ	4	6'-3"	—				
B 8	1/2" ϕ	4	5'-10"	—				
B 9	1/2" ϕ	4	5'-4"	—				
B 10	1/2" ϕ	4	4'-11"	—				
B 11	1/2" ϕ	4	4'-5"	—				
B 12	1/2" ϕ	4	4'-1"	—				
B 13	1/2" ϕ	4	3'-9"	—				
B 14	1/2" ϕ	4	3'-4"	—				
B 15	1/2" ϕ	4	3'-0"	—				
B 16	1/2" ϕ	4	2'-8"	—				
B 17	1/2" ϕ	4	2'-5"	—				
B 18	1/2" ϕ	4	2'-2"	—				
B 19	1/2" ϕ	4	11'-6"	—				
B 20	1/2" ϕ	4	8'-5"	—				
B 21	1/2" ϕ	2	6'-2"	—				
B 22	1/2" ϕ	2	4'-4"	—				
B 23	1/2" ϕ	2	2'-11"	—				
B 24	1/2" ϕ	2	2'-0"	—				
B 25	1/2" ϕ	2	1'-6"	—				
B 26	1/2" ϕ	2	1'-3"	—				
B 27	1/2" ϕ	2	1'-4"	—				
B 28	1/2" ϕ	2	1'-8"	—				
B 29	1/2" ϕ	2	2'-5"	—				
B 30	1/2" ϕ	2	3'-8"	—				
B 31	1/2" ϕ	2	5'-4"	—				
B 32	1/2" ϕ	4	7'-5"	—				
B 33	1/2" ϕ	4	10'-4"	—				
B 34	1/2" ϕ	32	3'-6"	IV	2'-10"		2"	2"
C 1	1" ϕ	8	20'-0"	IV	18'-8"		4"	3 1/2"
C 2 to C 7	1/2" ■	4 Each	5'-10" by 1'-6" to 13'-4"	V	1'-6" by 9" to 5'-3"			
C 8	1/2" ■	4	19'-0"	VI	9'-0"			
C 9	1/2" ■	4	25'-0"	VI	12'-0"			
C 10	1/2" ■	4	31'-0"	VI	15'-0"			
D 1 to D 14	1/2" ϕ	1 Each	2'-4" by 1'-8" to 24'-0"	—				
D 15	1/2" ϕ	18	26'-0"	—				
D 16 to D 26	1/2" ϕ	1 Each	3'-2" by 2'-0" to 23'-2"	—				
D 27 to D 38	1/2" ϕ	1 Each	3'-0" by 2'-0" to 25'-0"	—				
D 39	1/2" ϕ	7	32'-0"	—				
D 40 to D 51	1/2" ϕ	1 Each	4'-6" by 2'-4" to 30'-2"	—				
E 1	1" ■	4	13'-3"	III	6'-6"	3'-4"	4"	3 1/2"
E 2	1" ϕ	4	12'-9"	III	6'-6"	2'-10"	4"	3 1/2"
E 3	7/8" ϕ	3	12'-3"	III	6'-6"	2'-6"	3 1/2"	3"
E 4	3/4" ϕ	4	10'-9"	III	5'-7"	2'-1"	3"	2 1/2"
E 5	5/8" ϕ	4	9'-0"	III	4'-6"	1'-7"	2 1/2"	2"
E 6	5/8" ϕ	1	7'-6"	III	3'-4"	1'-3"	2 1/2"	2"
E 7	5/8" ϕ	2	10'-0"	III	6'-7"	0'-6"	2 1/2"	2"
E 8	5/8" ϕ	2	11'-3"	III	7'-7"	0'-9"	2 1/2"	2"
E 9	5/8" ϕ	2	12'-6"	III	8'-7"	1'-0"	2 1/2"	2"
E 10	5/8" ϕ	2	13'-8"	III	9'-6"	1'-3"	2 1/2"	2"
E 11	5/8" ϕ	2	13'-5"	III	10'-6"	0'-0"	2 1/2"	2"
E 12	5/8" ϕ	2	14'-5"	III	11'-6"	0'-0"	2 1/2"	2"
E 13	5/8" ϕ	2	15'-4"	III	12'-5"	0'-0"	2 1/2"	2"
E 14	3/4" ϕ	2	16'-7"	III	13'-5"	0'-1"	3"	2 1/2"
E 15	3/4" ϕ	2	17'-8"	III	14'-4"	0'-3"	3"	2 1/2"
E 16	7/8" ϕ	2	18'-11"	III	15'-4"	0'-4"	3 1/2"	3"
E 17	7/8" ϕ	2	20'-1"	III	16'-4"	0'-6"	3 1/2"	3"
E 18	7/8" ϕ	2	21'-3"	III	17'-4"	0'-8"	3 1/2"	3"
E 19	1" ϕ	3	22'-6"	III	18'-3"	0'-10"	4"	3 1/2"
F 1	1 1/4" ■	108	18'-0"	—				
F 2	1 1/8" ■	26	18'-0"	—				
F 3	1" ■	20	18'-0"	—				
F 4	1" ϕ	30	18'-0"	—				
F 5	5/8" ϕ	10	7'-0"	IV	6'-2"		2 1/2"	2"
F 6	5/8" ϕ	93	6'-3"	IV	5'-5"		2 1/2"	2"
F 7	5/8" ϕ	41	5'-3"	IV	4'-5"		2 1/2"	2"
F 8	5/8" ϕ	10	3'-0"	IV	2'-2"		2 1/2"	2"
F 9	3/4" ϕ	75	7'-9	IV	6'-9"		3"	2 1/2"
F 10	5/8" ϕ	9	4'-0"	IV	3'-2"		2 1/2"	2"
F 11	5/8" ϕ	14	7'-3"	IV	6'-5"		2 1/2"	2"
F 12	7/8" ϕ	24	8'-6"	IV	7'-4"		3 1/2"	3"
F 13	5/8" ϕ	17	4'-6"	IV	3'-8"		2 1/2"	2"
F 14	1/2" ϕ	36	20'-0"	—				
F 15	1/2" ϕ	18	10'-6"	—				
F 16	1/2" ϕ	6	16'-6"	—				
N 1	1" ■	3	13'-6"	III	6'-9"	3'-4"	4"	3 1/2"
N 2	1" ϕ	3	13'-0"	III	6'-9"	2'-10"	4"	3 1/2"
N 3	7/8" ϕ	3	12'-6"	III	6'-9"	2'-6"	3 1/2"	3"
N 4	3/4" ϕ	3	11'-0"	III	5'-10"	2'-1"	3"	2 1/2"
N 5	5/8" ϕ	3	9'-3"	III	4'-8"	1'-8"	2 1/2"	2"
N 6	5/8" ϕ	1	7'-3"	III	3'-0"	1'-4"	2 1/2"	2"
N 7	5/8" ϕ	2	7'-3"	III	4'-4"	0'-0"	2 1/2"	2"
N 8	5/8" ϕ	2	8'-6"	III	5'-4"	0'-3"	2 1/2"	2"
N 9	5/8" ϕ	2	9'-11"	III	6'-6"	0'-6"	2 1/2"	2"
N 10	5/8" ϕ	2	11'-5"	III	7'-9"	0'-9"	2 1/2"	2"
N 11	5/8" ϕ	2	12'-9"	III	8'-10"	1'-0"	2 1/2"	2"
N 12	5/8" ϕ	2	14'-3"	III	10'-0"	1'-4"	2 1/2"	2"
N 13	5/8" ϕ	2	14'-0"	III	11'-1"	0'-0"	2 1/2"	2"
N 14	5/8" ϕ	2	15'-2"	III	12'-3"	0'-0"	2 1/2"	2"
N 15	3/4" ϕ	2	16'-7"	III	13'-4"	0'-2"	3"	2 1/2"
N 16	3/4" ϕ	2	17'-11"	III	14'-6"	0'-4"	3"	2 1/2"
N 17	7/8" ϕ	2	19'-5"	III	15'-8"	0'-6"	3 1/2"	3"
N 18	7/8" ϕ	2	20'-8"	III	16'-9"	0'-8"	3 1/2"	3"
N 19	1" ϕ	3	22'-3"	III	18'-0"	0'-10"	4"	3 1/2"
W 1	1" ■	6	14'-3"	III	7'-2"	3'-8"	4"	3 1/2"
W 2	1" ■	7	13'-3"	III	6'-6"	3'-4"	4"	3 1/2"
W 3	1" ϕ	7	12'-9"	III	6'-4"	3'-0"	4"	3 1/2"
W 4	7/8" ϕ	6	12'-3"	III	6'-4"	2'-8"	3 1/2"	3"
W 5	3/4" ϕ	7	10'-9"	III	5'-4"	2'-4"	3"	2 1/2"
W 6	5/8" ϕ	7	9'-3"	III	4'-4"	2'-0"	2 1/2"	2"
W 7	5/8" ϕ	7	7'-6"	III	3'-1"	1'-6"	2 1/2"	2"
W 8	5/8" ϕ	4	11'-1"	III	7'-2"	1'-0"	2 1/2"	2"
W 9	5/8" ϕ	4	12'-4"	III	8'-2"	1'-3"	2 1/2"	2"
W 10	5/8" ϕ	2	13'-9	III	9'-4"	1'-6"	2 1/2"	2"
W 11	5/8" ϕ	2	13'-3"	III	10'-4"	0'-0"	2 1/2"	2"
W 12	5/8" ϕ	2	14'-3"	III	11'-4"	0'-0"	2 1/2"	2"
W 13	5/8" ϕ	2	15'-6"	III	12'-5"	0'-2"	2 1/2"	2"
W 14	5/8" ϕ	2	16'-9"	III	13'-7"	0'-3"	2 1/2"	2"
W 15	3/4" ϕ	2	18'-0"	III	14'-7"	0'-4"	3"	2 1/2"
W 16	3/4" ϕ	2	19'-1"	III	15'-6"	0'-6"	3"	2 1/2"
W 17	7/8" ϕ	2	20'-6"	III	16'-8"	0'-7"	3 1/2"	3"
W 18	1" ϕ	2	21'-9"	III	17'-8"	0'-8"	4"	3 1/2"
W 19	1" ϕ	2	23'-0"	III	18'-9"	0'-10"	4"	3 1/2"
W 20	1" ■	3	24'-3"	III	19'-10"	1'-0"	4"	3 1/2"
W 21	5/8" ϕ	2	12'-11"	III	8'-9"	1'-3"	2 1/2"	2"
W 22	5/8" ϕ	2	14'-0"	III	9'-7"	1'-6"	2 1/2"	2"
W 23	5/8" ϕ	2	13'-4"	III	10'-5"	0'-0"	2 1/2"	2"
W 24	5/8" ϕ	2	14'-2"	III	11'-3"	0'-0"	2 1/2"	2"
W 25	5/8" ϕ	2	15'-1"	III	12'-1"	0'-1"	2 1/2"	2"
W 26	5/8" ϕ	2	16'-0"	III	12'-11"	0'-2"	2 1/2"	2"
W 27	5/8" ϕ	2	17'-0"	III	13'-9"	0'-4"	2 1/2"	2"
W 28	3/4" ϕ	2	18'-1"	III	14'-7"	0'-5"	3"	2 1/2"
W 29	3/4" ϕ	2	19'-0"	III	15'-5"	0'-6"	3"	2 1/2"
W 30	7/8" ϕ	2	20'-3"	III	16'-4"	0'-8"	3 1/2"	3"
W 31	7/8" ϕ	2	21'-4"	III	17'-2"	0'-9"	3 1/2"	3"
W 32	1" ϕ	2	22'-3"	III	18'-0"	0'-10"	4"	3 1/2"
W 33	1" ϕ	2	23'-2"	III	18'-10"	0'-11"	4"	3 1/2"
W 34	1" ■	3	24'-2"	III	19'-9"	1'-0"	4"	3 1/2"

BAR SUMMARY ✓J.J.M.

Lin. Ft.	Size	Lbs. Per Ft.	Lbs.
1944	1 1/4" ■	5.313	10328
468	1 1/8" ■	4.303	2014
777	1" ■	3.400	2642
6695	1" ϕ	2.670	17876
4460	7/8" ϕ	2.044	9116
1020	3/4" ϕ	1.502	1532
4544	5/8" ϕ	1.043	4739
530	1/2" ■	0.850	451
8585	1/2" ϕ	0.668	5735

Plus 1% ± For Overrun = 567 ".
TOTAL = 55000 LBS.

BENDING DIAGRAMS


3'-3" For A 1.
2'-6" For A 2.
15'-3"
3'-2"
2'-0" Rad.
3'-4"
6'-4"
21'-4" Rad.
I
6'-8 1/2" Rad.
II
ℓ
1'-4" Rad.
t
r
2'-1"
m
III
t
r
ℓ
IV
4"
4"
1'-1"
ℓ
V
1'-0"
ℓ
VI

REFERENCE DRAWING —
Sheet No. 9a. Details of Culvert.

GENERAL NOTES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT ADOPTED JUNE 1, 1937.

ALL CONCRETE SHALL BE CLASS "A."

FORMS FOR CONCRETE SURFACES EXPOSED IN THE FINISHED WORK SHALL BE CONSTRUCTED OF SHIPLAP OR TONGUE AND GROOVE LUMBER S3S UNLESS FACED WITH PANEL BOARD.

ALL EXPOSED SURFACES SHALL BE RUBBED FREE OF FORM MARKS.

FOOTINGS IN ROCK SHALL BE POURED OUT TO THE ROCK AND NOT FORMED.

ALL REINFORCING BARS SHALL BE DEFORMED AND TAGGED WITH THE STATION NUMBER AND LETTER DESIGNATION. MAIN BARS SHALL NOT BE SPLICED.

SOUNDINGS AND DEPTH OF FOOTINGS SHOWN ARE ACCORDING TO THE BEST AVAILABLE DATA. IF ESSENTIALLY DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.

ALL EXPOSED CORNERS SHALL BE BEVELED TO A 2 IN. FACE.

ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.

SUPPORTING SOILS FOR CULVERTS MUST BE COMPOSED OF FIRM AND UNIFORM MATERIAL THROUGHOUT.

THE FILL SHALL BE MADE IN LIFTS OF NOT TO EXCEED SIX (6) INCHES, LOOSE MEASUREMENT, UNTIL THE FILL OVER THE CENTER OF THE ARCH SHALL HAVE ATTAINED A MINIMUM HEIGHT OF FOUR (4) FEET. THE FILL SHALL BE PLACED SYMMETRICALLY ON BOTH SIDES OF THE ARCH AND AT NO TIME SHALL THE FILL ON ONE SIDE EXCEED THAT ON THE OTHER BY MORE THAN SIX (6) INCHES. AFTER THE FILL MATERIAL IS PLACED, EACH 6 INCH LIFT SHALL BE THOROUGHLY COMPACTED BY MEANS OF HAND TAMPERS, PREVIOUS TO PLACING THE SUCCEEDING LIFT. ALL FILL MATERIAL SHALL BE OF SUCH SIZE THAT ALL WILL PASS A THREE (3) INCH RING.

STRUCTURE NO. J-11-F

LOADING DATA.
LIVE LOAD A. A. S. H. O. 1935 CLASS A. (H-15)
DEAD LOAD = ASSUMES 15 LBS. PER SQ. FT. ADDITIONAL WEARING SURFACE WHICH INCLUDES THE 3/4 INCH CONCRETE MONOLITHIC WEARING SURFACE SHOWN.

DESIGNING DATA.
A.A.S.H.O. 1935 EXCEPT CONCRETE UNIT STRESSES PER A.A.S.H.O. AUG. 1928

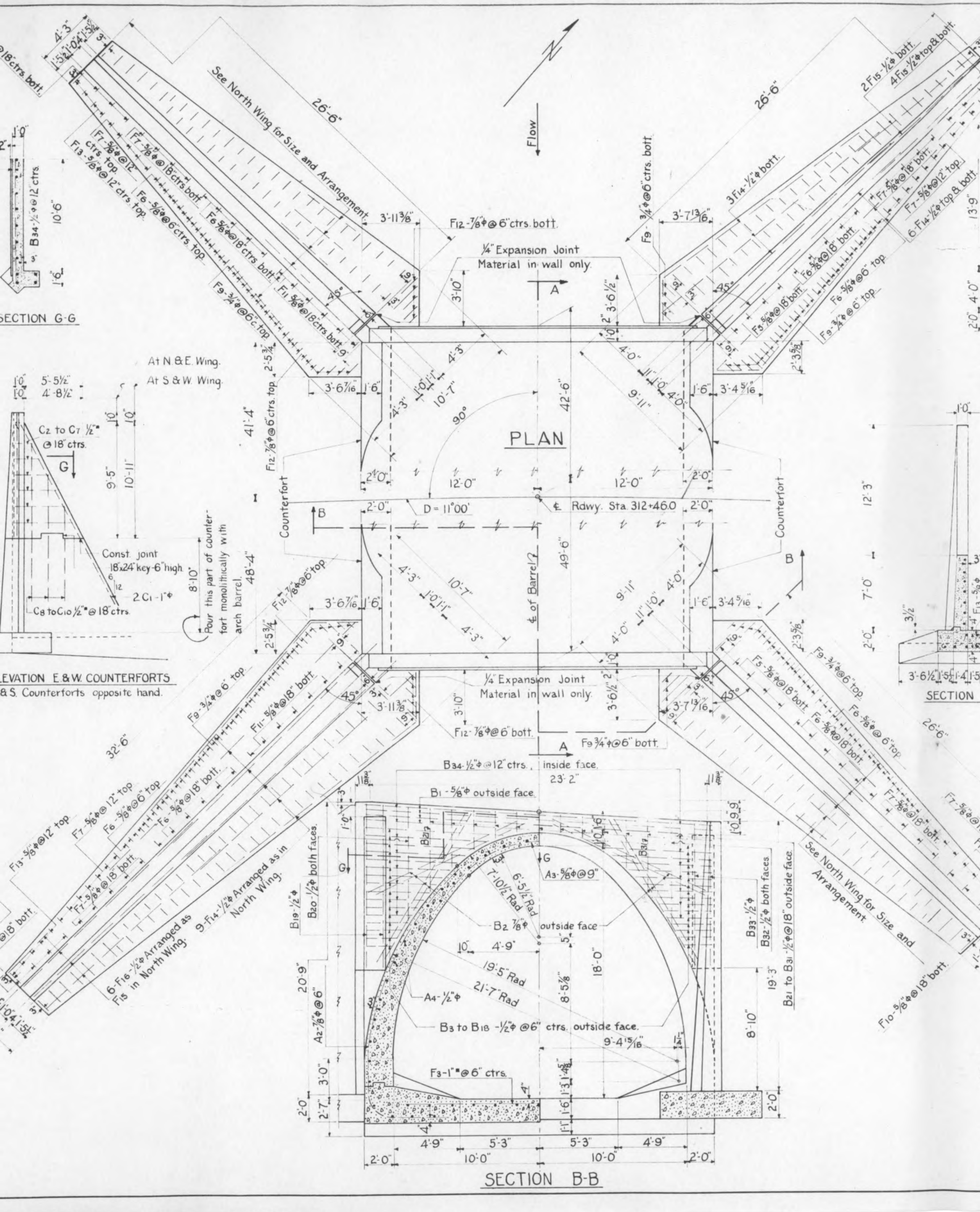
COLORADO
STATE HIGHWAY DEPARTMENT
20' SPAN ARCH CULVERT
GENERAL LAYOUT, BAR LIST, & SUMMARY OF QUANTITIES.

Across Middle Fork S. Arkansas River.
Sta. 312 + 46.0.
Near Garfield Sec. 27 T. 50N R. 6E

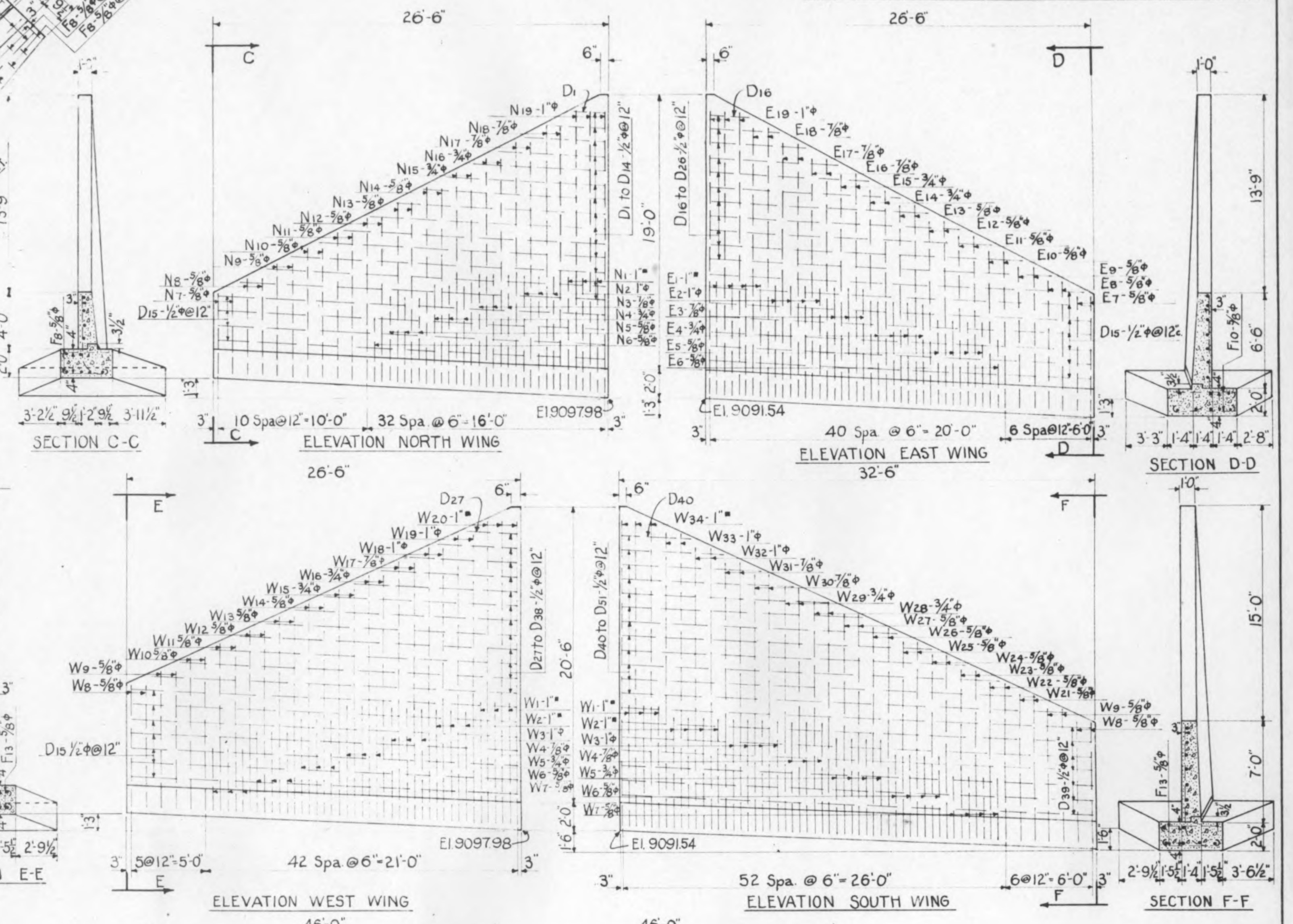
Designed by M.G.D.	Approved by C. L. Bailey.
Made by J.A.V.	Bridge Engineer
Checked by J.D.B.	Date: Nov. 10th, 1938.

REVISIONS

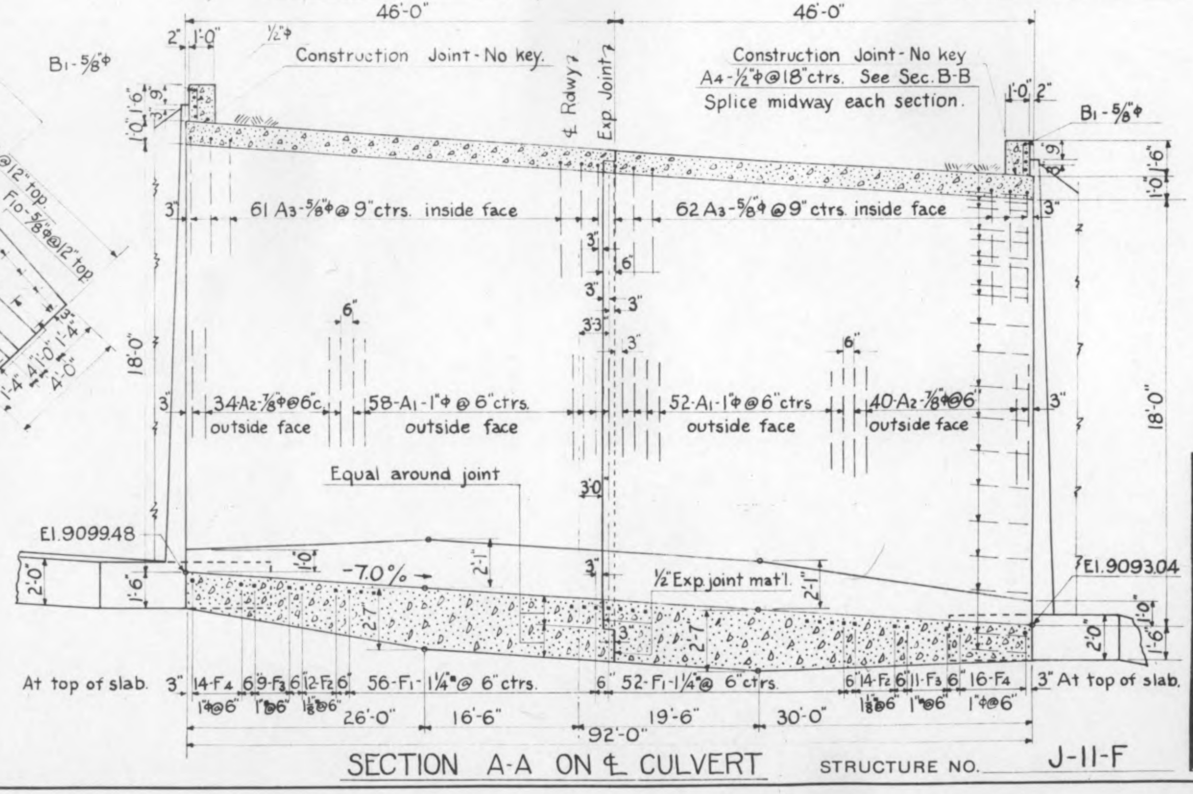
FED. ROAD DIST. NO.	STATE	F.A.P.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#2	9a	



SECTION G-G
ELEVATION E&W COUNTERFORTS
N.&S. Counterforts opposite hand.
PLAN
SECTION B-B
Flow
See North Wing for Size and Arrangement
¼" Expansion Joint Material in wall only.
Counterfort
℄ Rdwy. Sta 312+46.0
D = 11°00'
℄ of Barrel
Pour this part of counterfort monolithically with arch barrel.
Const. joint 18x24" key-6" high
At N & E Wing.
At S & W Wing.
B34-½"φ@12" ctrs. inside face.
B1-⅝"φ outside face.
B3 to B18 -½"φ @6" ctrs. outside face.
F3-1"φ@6" ctrs.
6-F16-½"φ Arranged as F15 in North Wing.
9-F14-½"φ Arranged as in North Wing.
26'-6"
32'-6"
42'-6"
49'-6"
23'-2"



SECTION C-C
ELEVATION NORTH WING
ELEVATION EAST WING
SECTION D-D
SECTION E-E
ELEVATION WEST WING
ELEVATION SOUTH WING
SECTION F-F
El. 9097.98
El. 9091.54
10 Spa@12"=10'-0"
32 Spa @ 6"=16'-0"
40 Spa @ 6"= 20'-0"
6 Spa@12"-6'0"
5@12"=5'-0"
42 Spa @6"=21'-0"
52 Spa. @ 6"= 26'-0"
6@12"= 6'-0"



Construction Joint - No key.
Construction Joint - No key
A4-½"φ@18" ctrs. See Sec. B-B
Splice midway each section.
℄ Rdwy.
Exp. Joint
61 A3-⅝"φ @ 9" ctrs. inside face
62 A3-⅝"φ @ 9" ctrs. inside face
34 A2-⅞"φ @6" c. outside face
58-A1-1"φ @ 6" ctrs. outside face
52-A1-1"φ @6" ctrs outside face
40-A2-⅞"φ@6" outside face
Equal around joint
El. 9099.48
El. 9093.04
-7.0%
½ Exp. joint mat'l.
At top of slab.
92'-0"
46'-0"

SECTION A-A ON ℄ CULVERT

STRUCTURE NO. J-11-F

REFERENCE DRAWING.

Sheet No. 8a General Layout, Bar List, and Summary of Quantities.

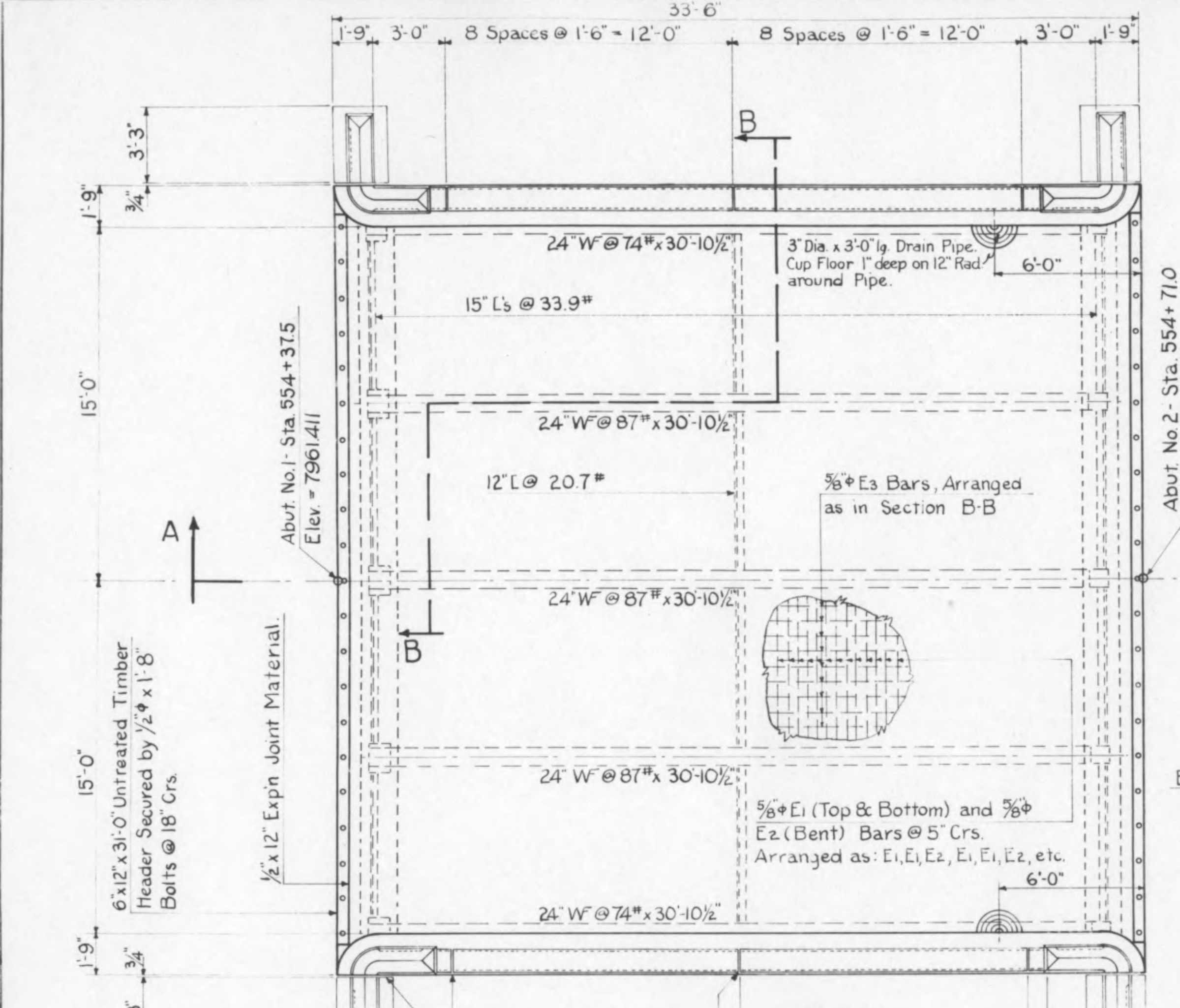
COLORADO
STATE HIGHWAY DEPARTMENT
20'-0" SPAN ARCH CULVERT

DETAILS OF CULVERT

Across Middle Fork South Arkansas River.
Sta. 312+46.0
Near Garfield Sec. 27 T. 50N R. 6E

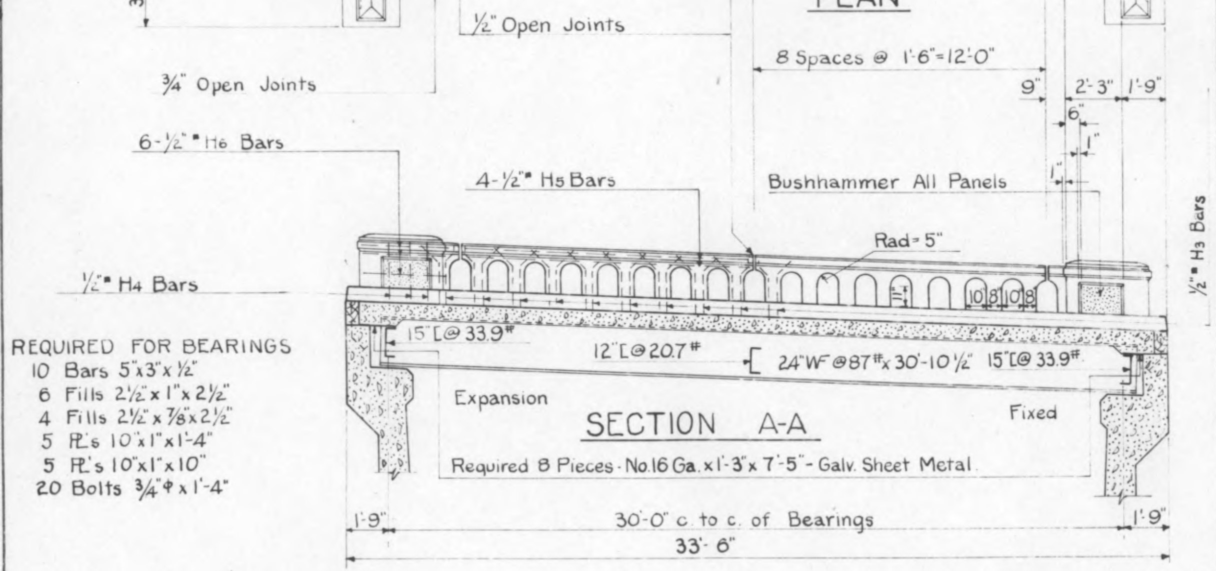
Designed by M.G.D. Made by R.A.D. Checked by	Approved by C. L. Bailey Bridge Engineer Date: Nov. 10th, 1936.

FED. ROAD DIST. NO.	STATE	F.A.P.	SHEET NO.	TOTAL SHEETS
3	COLO.	259-H(1)#2	10a	



33'-6"
1'-9" 3'-0" 8 Spaces @ 1'-6" = 12'-0" 8 Spaces @ 1'-6" = 12'-0" 3'-0" 1'-9"
3'-3"
1'-9"
3/4"
15'-0"
15'-0"
B
24" WF @ 74# x 30'-10½"
3" Dia x 3'-0" lg. Drain Pipe. Cup Floor 1" deep on 12" Rad. around Pipe.
6'-0"
15" Ls @ 33.9#
24" WF @ 87# x 30'-10½"
12" L @ 20.7#
5/8"φ E3 Bars, Arranged as in Section B-B
Abut. No. 1 - Sta. 554+37.5 Elev. = 7961.411
Abut. No. 2 - Sta. 554+71.0 Elev. = 7959.827
A
A
24" WF @ 87# x 30'-10½"
½" x 12" Expn Joint Material.
6"x12"x31'-0" Untreated Timber Header Secured by ½"φ x 1'-8" Bolts @ 18" Crs.
24" WF @ 87# x 30'-10½"
5/8"φ E1 (Top & Bottom) and 5/8"φ E2 (Bent) Bars @ 5" Crs. Arranged as: E1, E1, E2, E1, E1, E2, etc.
6'-0"
24" WF @ 74# x 30'-10½"
1'-9"
3'-3"

PLAN

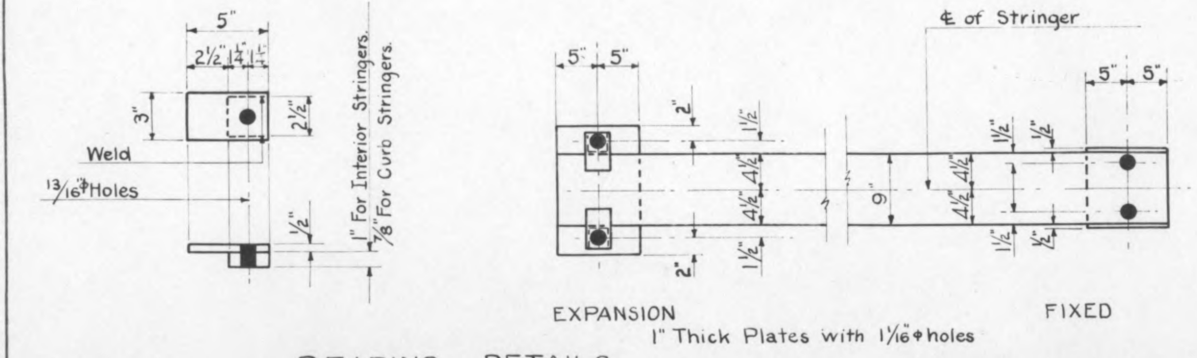


½" Open Joints
¾" Open Joints
8 Spaces @ 1'-6" = 12'-0"
9" 2'-3" 1'-9"
6-½" ■ H6 Bars
4-½" ■ H5 Bars
Bushhammer All Panels
Rad = 5"
½" ■ H4 Bars
½" ■ H5 Bars
15" L @ 33.9#
12" L @ 20.7#
24" WF @ 87# x 30'-10½"
15" L @ 33.9#
Expansion
Fixed
1'-9"
30'-0" c. to c. of Bearings
1'-9"
33'-6"

SECTION A-A

Required 8 Pieces - No. 16 Ga. x 1'-3" x 7'-5" - Galv. Sheet Metal

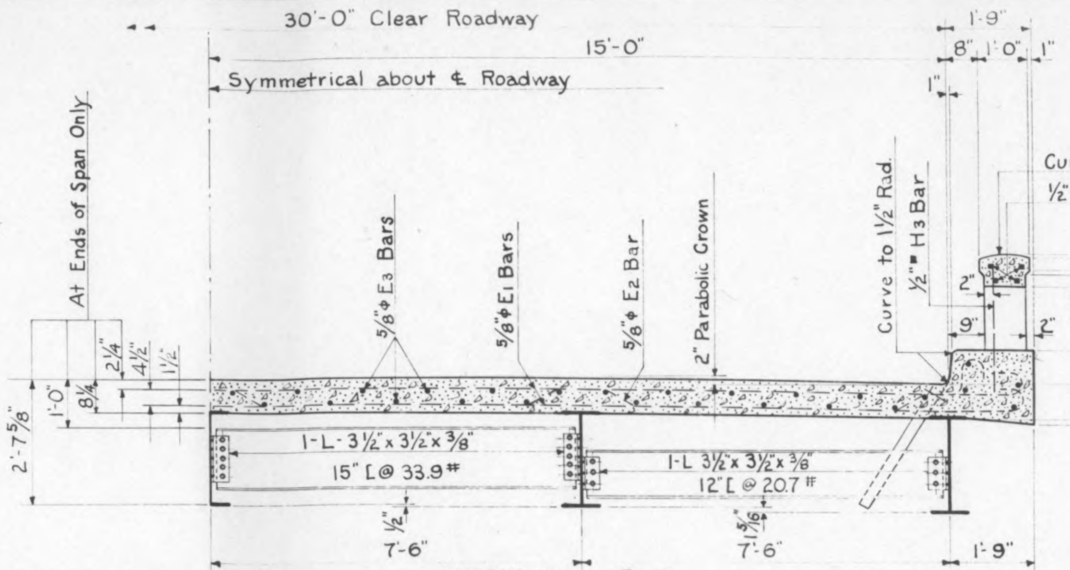
REQUIRED FOR BEARINGS
10 Bars 5"x3"x½"
6 Fills 2½" x 1" x 2½"
4 Fills 2½" x 7/8" x 2½"
5 Pℓ's 10"x1"x1'-4"
5 Pℓ's 10"x1"x10"
20 Bolts ¾"φ x 1'-4"



5"
2½" 1¼" 1¼"
3"
2½"
Weld
13/16" Holes
½"
1" For Interior Stringers.
7/8" For Curb Stringers.
5" 5"
2" 1½" 4½" 4½" 1½" 2"
9"
℄ of Stringer
1½" 1½" 4½" 4½" 1½" 1½"
5" 5"
EXPANSION
FIXED

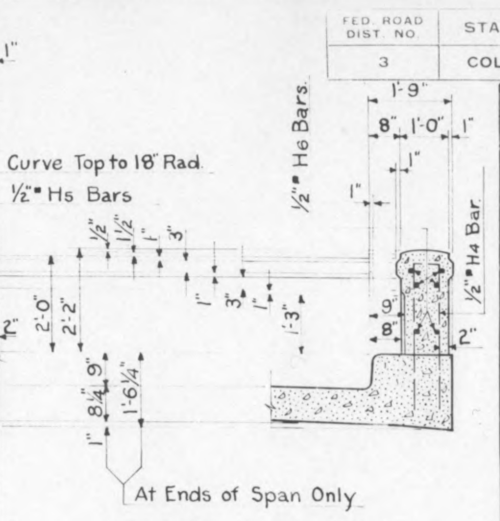
1" Thick Plates with 1 1/16"φ holes

BEARING DETAILS



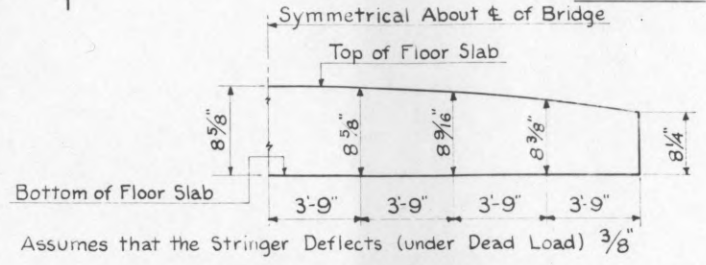
30'-0" Clear Roadway
15'-0"
Symmetrical about ℄ Roadway
At Ends of Span Only
5/8"φ E3 Bars
5/8"φ E1 Bars
5/8"φ E2 Bar
2" Parabolic Crown
Curve to 1½" Rad.
½" ■ H3 Bar
1'-0"
8¼"
2¼"
4½"
1½"
2'-7 5/8"
1-L - 3½" x 3½" x 3/8"
15" L @ 33.9#
1-L 3½" x 3½" x 3/8"
12" L @ 20.7#
7'-6"
7'-6"
1'-9"

SECTION B-B



1'-9"
8" 1'-0" 1"
1'-9"
8" 1'-0" 1"
Curve Top to 18" Rad.
½" ■ H5 Bars
½" ■ H6 Bars
½" ■ H4 Bar
2'-0"
2'-2"
8¼"
9"
1'-6¼"
At Ends of Span Only

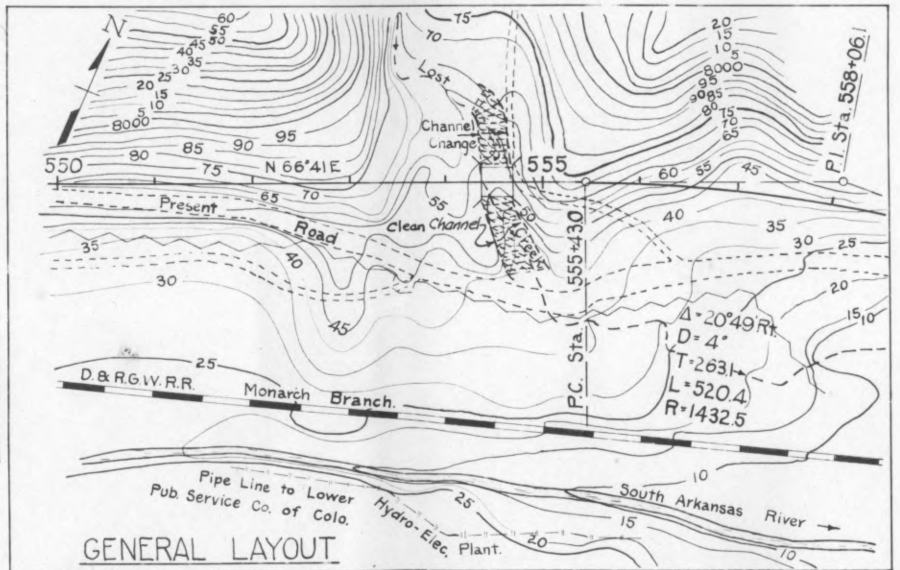
SECTION THRU. POST.



Symmetrical About ℄ of Bridge
Top of Floor Slab
8 5/8"
8 5/8"
8 9/16"
8 3/8"
8¼"
Bottom of Floor Slab
3'-9" 3'-9" 3'-9" 3'-9"

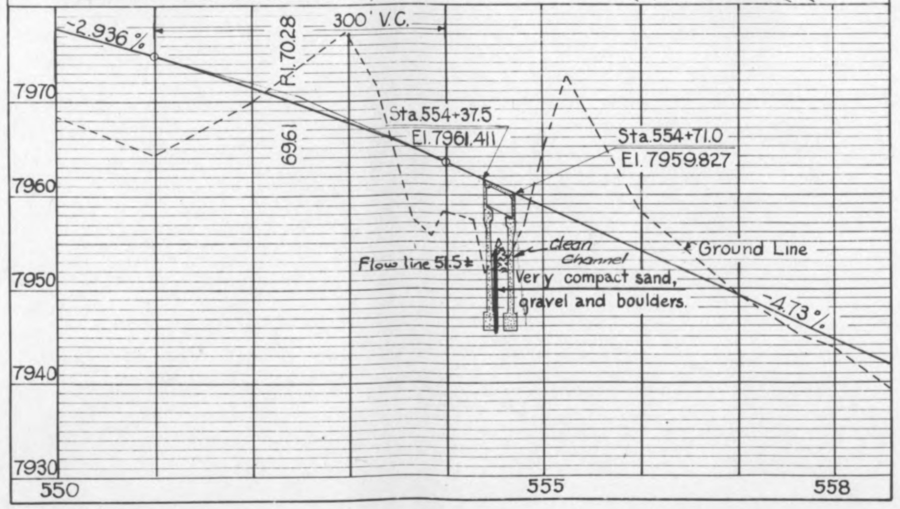
Assumes that the Stringer Deflects (under Dead Load) 3/8"

CAMBER DIAGRAM



N
550
N 66°41'E
555
P.I. Sta. 558+06.1
Present Road
Lost Creek
Channel Change
Clean Channel
Sta. 555+43.0
P.C. Sta.
Δ = 20°49' Rt.
D = 4°
T = 263.1
L = 520.4
R = 1432.5
D. & R.G.W. R.R. Monarch Branch
Pipe Line to Lower Hydro-Elec. Plant.
Pub. Service Co. of Colo.
South Arkansas River

GENERAL LAYOUT

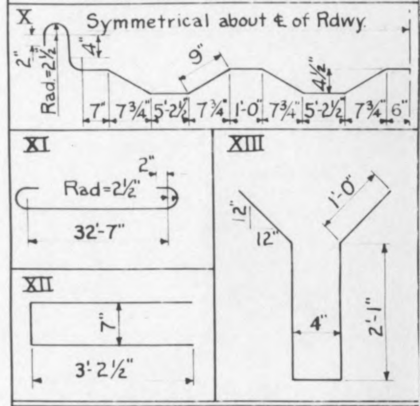


BAR LIST

✓L.J.S.

MARK	SIZE	TYPE	NUMBER	LENGTH
E1	5/8"φ	XI	104	34'-3"
E2	5/8"φ	X	26	34'-0"
E3	5/8"φ	Str.	52	32'-0"
H3	½" ■	XIII	36	6'-6"
H4	½" ■	XII	12	7'-0"
H5	½" ■	Str.	16	11'-7"
H6	½" ■	Str.	24	2'-9"

BENDING DIAGRAMS



X
Symmetrical about ℄ of Rdwy.
Rad. = 2½"
2"
4"
9"
4½"
7" 7¾" 5'-2½" 7¾" 1'-0" 7¾" 5'-2½" 7¾" 6"
XI
2"
Rad = 2½"
32'-7"
XIII
12"
12"
1'-0"
4"
2'-1"
XII
7"
3'-2½"

6110 lin. ft. 5/8"φ bars @ 1.043 lb./ft. = 6373 lb.
569 lin. ft. ½" ■ bars @ 0.850 lb/ft. = 484
Plus 1% ± for overrun = 73
TOTAL = 6930 lb.

SUMMARY OF QUANTITIES

✓T.G.

ITEM No.	DESCRIPTION	UNIT	SUPER STR.	ABUT. No. 1	ABUT. No. 2	TOTAL
13c	Unclassified Excavation	Cu. Yd.				200
14a	Dry Rock Structural Excavation	Cu. Yd.			5	5
14b	Dry Common Structural Excavation	Cu. Yd.		10	10	20
14c	Wet Rock Structural Excavation	Cu. Yd.		20	20	40
14d	Wet Common Structural Excavation	Cu. Yd.		170	150	320
42a	Untreated Bridge Timber	M.ft.bm.		0.19	0.19	0.38
46a	Class "A" Concrete	Cu. Yd.	33	86	72	191
46r	Class "A" Concrete (Handrail)	Cu. Yd.	3.0	0.5	0.5	4
47	Reinforcing Steel	Lb.	6930	6030	5300	18260
48	Structural Steel	Lb.	16170	25	25	16220
89a	Drain Pipe (Concrete Floor) 3"φ x 3'-0" lg.	Each	2			2
*	16 Gage Galv. Sheet Metal	Lb.	200			200
*	½" Expansion Joint Material	Sq. Ft.	32			32
*	¼" Expansion Joint Material	Sq. Ft.		31	26	57

* To be included in unit bid price of Class "A" Concrete.

REFERENCE DRAWINGS

Sheet No. 11a Details of Abuts. No. 1 & No. 2

GENERAL NOTES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT.

ALL CONCRETE SHALL BE CLASS "A."

FORMS FOR CONCRETE SURFACES EXPOSED IN THE FINISHED WORK SHALL BE CONSTRUCTED OF SHIPLAP OR TONGUE AND GROOVE LUMBER S3S UNLESS FACED WITH PANEL BOARD.

CONCRETE GIRDERS, FLOOR SLABS AND CURB SHALL BE POURED MONOLITHICALLY.

FOOTINGS IN ROCK SHALL BE POURED OUT TO THE ROCK AND NOT FORMED.

ALL REINFORCING BARS SHALL BE DEFORMED AND TAGGED WITH THE STATION NUMBER AND LETTER DESIGNATION. MAIN BARS SHALL NOT BE SPLICED.

SOUNDINGS AND DEPTH OF FOOTINGS SHOWN ARE ACCORDING TO THE BEST AVAILABLE DATA. IF ESSENTIALLY DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.

ALL RIVETS TO BE ¾" DIA. ALL RIVETS TO BE POWER DRIVEN.

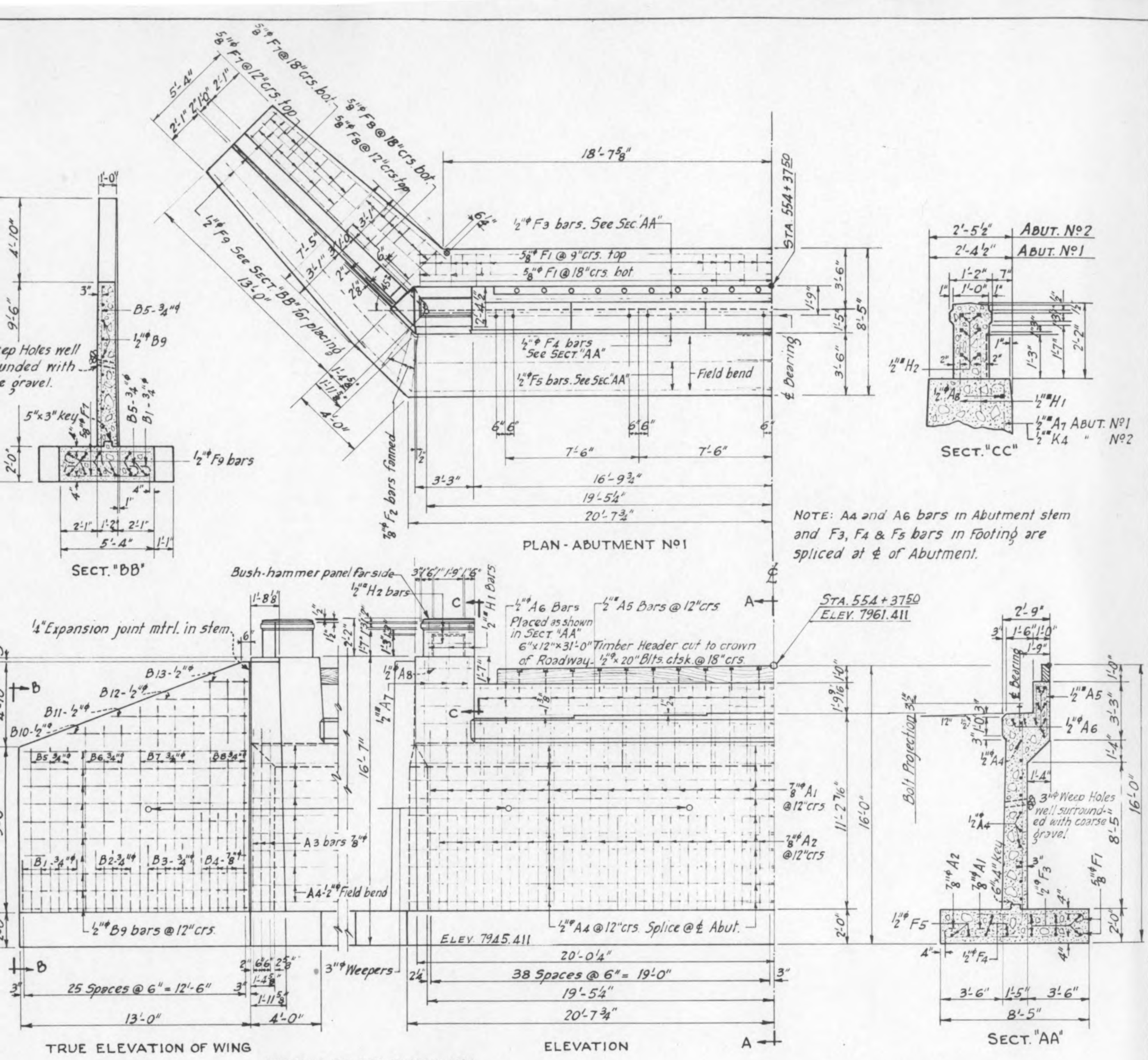
HANDRAIL TO BE BUILT ACCURATELY TO LINE AND GRADE.

LOADING DATA.
LIVE LOAD A. A. S. H. O. 1935 CLASS A. (H-15)
DEAD LOAD ASSUMES 15 LBS. PER SQ. FT. ADDITIONAL WEARING SURFACE WHICH INCLUDES THE ¾ INC CONCRETE MONOLITHIC WEARING SURFACE SHOWN

DESIGNING DATA.
A.A.S.H.O. 1935 EXCEPT CONCRETE UNIT STRESSE PER A.A.S.H.O. AUG. 1928

STRUCTURE NO. J-12-AA

COLORADO
STATE HIGHWAY DEPARTMENT
1-30'-0" CONC. & I-BEAM SPAN
DETAILS OF SUPERSTRUCTURE
GEN. LAYOUT & SUM. OF QUANT.
Across Lost Creek
Sta. 554+37.5 to 554+71.0
Near Maysville Sec. 32 T. 50N R. 7E
Designed by M.E.M. & P.D.W.
Made by R.A.D.
Checked by L.J.S.
Approved by P. J. Bailey
Bridge Engineer
Date: Nov. 10th, 1938.


PLAN - ABUTMENT Nº1
SECT. "BB"
SECT. "CC"
SECT. "AA"
TRUE ELEVATION OF WING
ELEVATION
STA. 554+37.50
ELEV. 7961.411
ELEV. 7945.411
ABUT. Nº2
ABUT. Nº1
Bush-hammer panel far side
¼" Expansion joint mtrl. in stem
6"×12"×31'-0" Timber Header cut to crown of Roadway - ½"φ×20" Blts. ctsk. @ 18" crs
3"φ Weep Holes well surrounded with coarse gravel
25 Spaces @ 6" = 12'-6"
38 Spaces @ 6" = 19'-0"
20'-7¾"

NOTE: A4 and A6 bars in Abutment stem and F3, F4 & F5 bars in Footing are spliced at ℄ of Abutment.

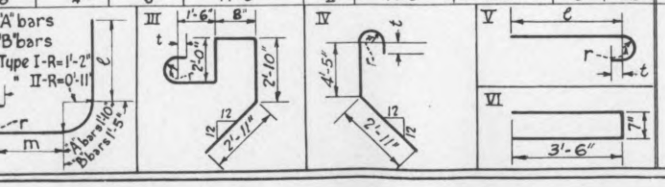
DETAILS OF ABUTMENT Nº1

Symmetrical about ℄ of Roadway

√P.D.W

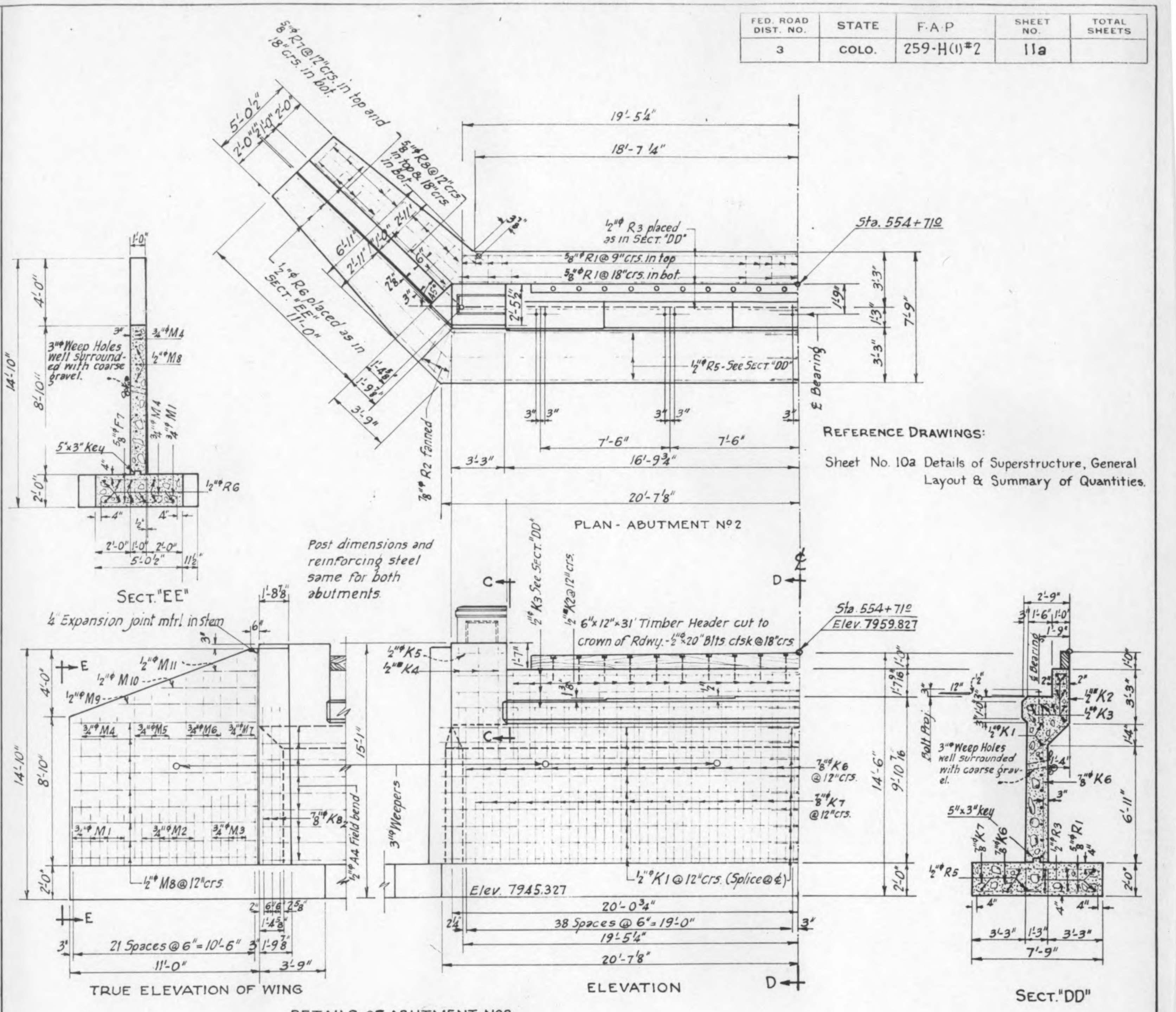
BAR LIST ABUTMENT Nº1

rk	Size	Nº Reqd	Length	Type	ℓ	m	r	t	Mark	Size	Nº Reqd	Length	Type	ℓ	m	r	t
1	7/8"φ	39	15'-9"	I	11'-3"	1'-6"	3½"	3"	B9	1/2"φ	20	12'-6"	-	-	-	-	-
2	7/8"φ	39	12'-0"	I	6'-0"	3'-0"	3½"	3"	B10	1/2"φ	2	10'-3"	-	-	-	-	-
3	7/8"φ	6	16'-5"	I	11'-1"	2'-4"	3½"	3"	B11	1/2"φ	2	7'-9"	-	-	-	-	-
4	1/2"φ	20	22'-6"	-	Field bend	-	-	-	B12	1/2"φ	2	5'-3"	-	-	-	-	-
5	1/2"■	34	10'-7"	III	-	-	2"	2"	B13	1/2"φ	2	2'-5"	-	-	-	-	-
6	1/2"φ	18	20'-10"	-	-	-	-	-	F1	5/8"φ	80	6'-4"	V	5'-6"	-	2½"	2"
7	1/2"■	6	8'-0"	IV	-	-	2"	2"	F2	7/8"φ	6	7'-8"	V	6'-6"	-	3½"	3"
8	1/2"φ	2	2'-9"	-	-	-	-	-	F3	1/2"φ	12	21'-5"	-	-	-	-	-
1	3/4"φ	8	7'-10"	II	3'-11"	1'-6"	3"	2½"	F4	1/2"φ	6	24'-0"	-	Field bend	-	-	-
2	3/4"φ	6	8'-6"	II	4'-3"	1'-10"	3"	2½"	F5	1/2"φ	4	25'-3"	-	Field bend	-	-	-
3	3/4"φ	6	9'-2"	II	4'-8"	2'-1"	3"	2½"	F7	5/8"φ	24	5'-5"	V	4'-7"	-	2½"	2"
4	7/8"φ	6	11'-3"	II	6'-5"	2'-3"	3½"	3"	F8	5/8"φ	20	5'-11"	V	5'-1"	-	2½"	2"
5	3/4"φ	6	13'-8"	II	10'-3"	1'-0"	3"	2½"	F9	1/2"φ	20	13'-0"	-	-	-	-	-
6	3/4"φ	6	15'-0"	II	11'-7"	1'-0"	3"	2½"	H1	1/2"■	6	7'-7"	VI	-	-	-	-
7	3/4"φ	8	16'-1"	II	12'-8"	1'-0"	3"	2½"	H2	1/2"■	12	2'-7"	-	-	-	-	-
8	3/4"φ	6	17'-8"	II	14'-3"	1'-0"	3"	2½"									


"A" bars
"B" bars
Type I-R=1'-2"
" II-R=0'-11"
ℓ
m
III
1'-6"
8"
t
2'-0"
2'-10"
12
2'-11"
IV
4'-5"
12
2'-11"
V
ℓ
r
t
VI
3'-6"
7"

Summary:

1294 Lin. Ft. 7/8"φ @ 2.044 Lbs. per lin. ft. = 2645 Lbs.
575 " " 3/4"φ @ 1.502 " " " " = 864 "
755 " " 5/8"φ @ 1.043 " " " " = 787 "
1894 " " 1/2"φ @ 0.668 " " " " = 1265 "
485 " " 1/2"■ @ 0.850 " " " " = 412 "
Plus 1% overrun = 57 "
Total 6030 Lbs.


PLAN - ABUTMENT Nº2
SECT. "EE"
SECT. "DD"
TRUE ELEVATION OF WING
ELEVATION
Sta. 554+71.0
Elev. 7959.827
Elev. 7945.327
¼" Expansion joint mtrl. in stem
6"×12"×31' Timber Header cut to crown of Rdwy. - ½"φ×20" Blts ctsk @ 18" crs
3"φ Weep Holes well surrounded with coarse gravel
21 Spaces @ 6" = 10'-6"
38 Spaces @ 6" = 19'-0"
20'-7⅞"

Post dimensions and reinforcing steel same for both abutments.

REFERENCE DRAWINGS:

Sheet No. 10a Details of Superstructure, General Layout & Summary of Quantities.

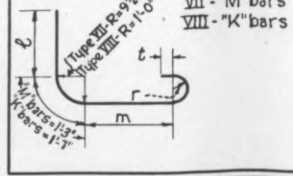
DETAILS OF ABUTMENT Nº2

Symmetrical about ℄ of Roadway

√P.D.W

BAR LIST ABUTMENT Nº2

Mark	Size	Nº Reqd	Length	Type	ℓ	m	r	t	Mark	Size	Nº Reqd	Length	Type	ℓ	m	r	t
K1	1/2"φ	18	22'-6"	-	Field bend	-	-	-	M8	1/2"φ	18	10'-6"	-	-	-	-	-
K2	1/2"■	34	10'-7"	III	- -	-	2"	2"	M9	1/2"φ	2	8'-0"	-	-	-	-	-
K3	1/2"φ	18	20'-10"	-	-	-	-	-	M10	1/2"φ	2	5'-3"	-	-	-	-	-
K4	1/2"■	6	8'-0"	IV	-	-	2"	2"	M11	1/2"φ	2	3'-0"	-	-	-	-	-
K5	1/2"φ	2	2'-9"	-	-	-	-	-	R1	5/8"φ	80	6'-1"	V	5'-3"	-	2½"	2"
K6	7/8"φ	39	14'-1"	VIII	10'-0"	1'-4"	3½"	3"	R2	7/8"φ	6	7'-5"	V	6'-3"	-	3½"	3"
K7	7/8"φ	39	10'-6"	VIII	5'-1"	2'-8"	3½"	3"	R3	1/2"φ	12	21'-6"	-	-	-	-	-
K8	7/8"φ	6	15'-0"	VIII	10'-1"	2'-2"	3½"	3"	R5	1/2"φ	8	26'-5"	-	-	-	-	-
M1	3/4"φ	8	7'-9"	VII	4'-1"	1'-5"	3"	2½"	R6	1/2"φ	20	11'-0"	-	-	-	-	-
M2	3/4"φ	8	8'-2"	VII	4'-1"	1'-10"	3"	2½"	R7	5/8"φ	20	5'-4"	V	4'-6"	-	2½"	2"
M3	3/4"φ	6	9'-7"	VII	5'-2"	2'-2"	3"	2½"	R8	5/8"φ	18	5'-9"	V	4'-11"	-	2½"	2"
M4	3/4"φ	6	12'-8"	VII	9'-9"	0'-8"	3"	2½"	H1	1/2"■	6	7'-7"	VI	-	-	-	-
M5	3/4"φ	6	13'-10"	VII	10'-11"	0'-8"	3"	2½"	H2	1/2"■	12	2'-7"	-	-	-	-	-
M6	3/4"φ	6	14'-11"	VII	12'-0"	0'-8"	3"	2½"									
M7	3/4"φ	4	16'-1"	VII	13'-2"	0'-8"	3"	2½"									


Type VII-R=9½"
Type VIII-R=1'-0"
ℓ
t
r
m
"M" bars
"K" bars

VII - "M" bars
VIII - "K" bars

Summary:

1093 Lin. Ft. 7/8"φ @ 2.044 Lbs. per lin. ft. = 2234 Lbs.
498 " " 3/4"φ @ 1.502 " " " " = 748 "
697 " " 5/8"φ @ 1.043 " " " " = 727 "
1696 " " 1/2"φ @ 0.668 " " " " = 1133 "
484 " " 1/2"■ @ 0.850 " " " " = 411 "
Plus 1% overrun 47 "
Total 5300 Lbs.

Max. Soil Pressure - 3000#/□'

LOADING DATA.
LIVE LOAD - A. A. S. H. O. 1935 CLASS A. (H-15)
DEAD LOAD - ASSUMES 15 LBS. PER SQ. FT. ADDITIONAL WEARING SURFACE WHICH INCLUDES THE ¾ INCH CONCRETE MONOLITHIC WEARING SURFACE SHOWN.

DESIGNING DATA.
A.A.S.H.O. 1935 EXCEPT CONCRETE UNIT STRESSES PER A.A.S.H.O. AUG. 1928.

COLORADO
STATE HIGHWAY DEPARTMENT
1-30'-0" CONC. & I-BEAM SPAN
DETAILS OF ABUTMENTS
No. 1 AND No. 2

Across LOST CREEK
Sta. 554+37.50 to 554+71.0
Near MAYSVILLE Sec. 32 T. 50N R. 7E

Designed by M·F·M
Made by M·F·M
Checked by W·G·S

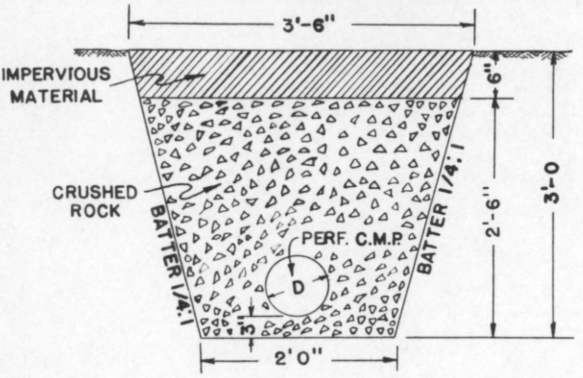
Approved by C.d. Bailey
Bridge Engineer
Date: Nov 10th, 1938.

STRUCTURE NO. J-12-AA

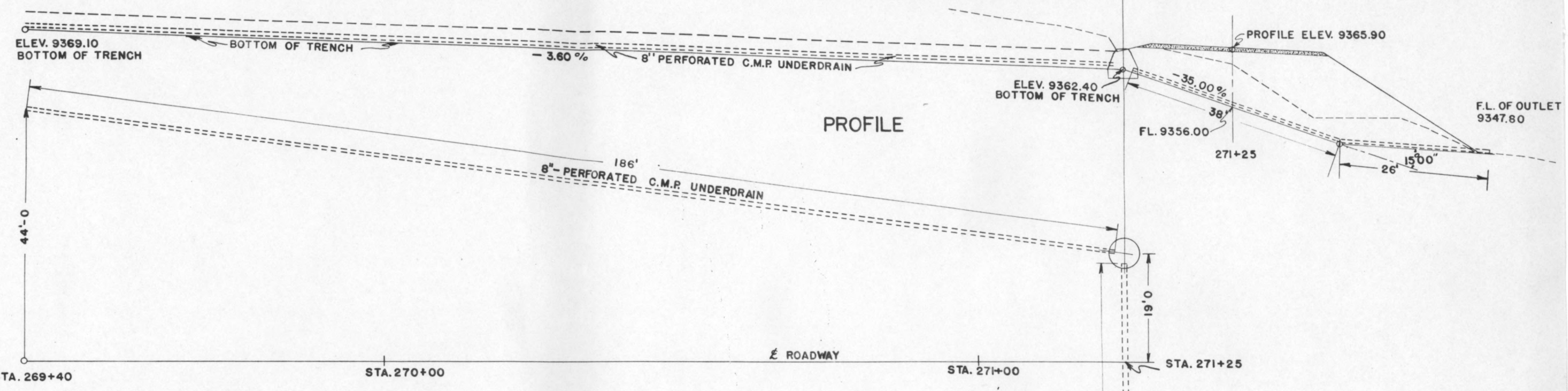
DETAILS OF 8" PERFORATED C.M.P. UNDERDRAINS

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1) #2	12a	

ETAIL OF TRENCH FOR PERFORATED C.M.P. UNDERDRAIN

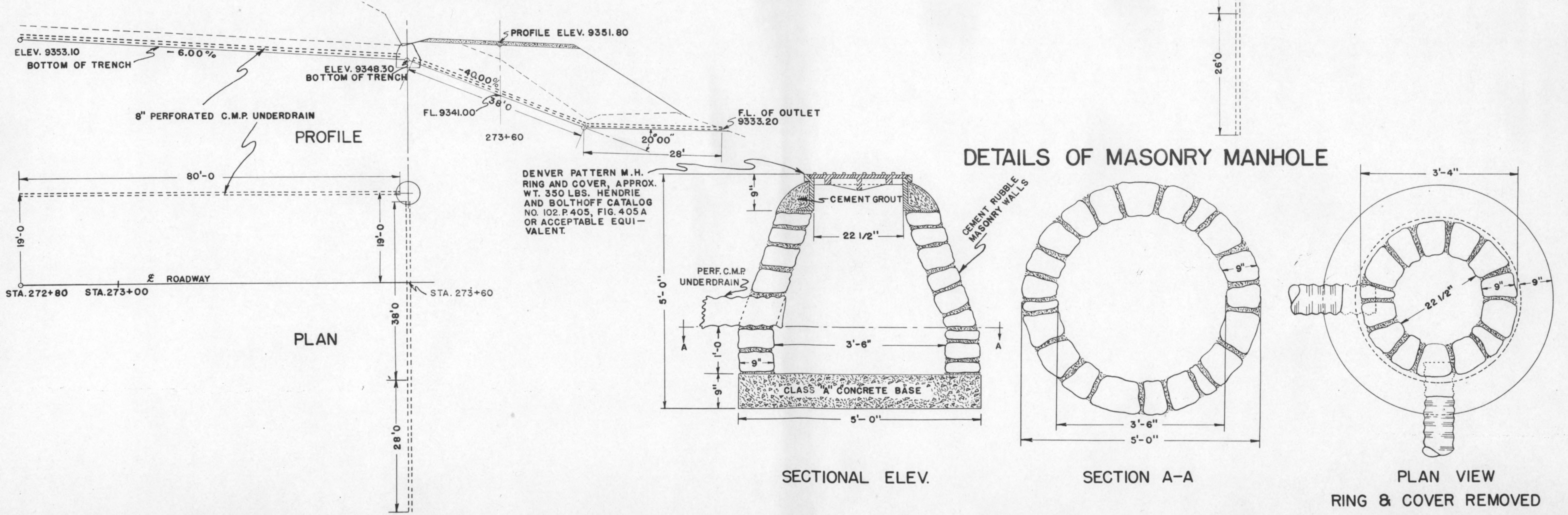

3'-6"
IMPERVIOUS MATERIAL
6"
CRUSHED ROCK
BATTER 1/4:1
BATTER 1/4:1
PERF. C.M.P.
D
3"
2'-6"
3'-0
2'0"

STA. 269+40 TO 271+25


ELEV. 9369.10
BOTTOM OF TRENCH
BOTTOM OF TRENCH
- 3.60 %
8" PERFORATED C.M.P. UNDERDRAIN
PROFILE ELEV. 9365.90
ELEV. 9362.40
BOTTOM OF TRENCH
35.00 %
38'
F.L. OF OUTLET
9347.60
FL. 9356.00
271+25
PROFILE
26'
15'00"
186'
8"- PERFORATED C.M.P. UNDERDRAIN
44'-0
19'-0
℄ ROADWAY
STA. 269+40
STA. 270+00
STA. 271+00
STA. 271+25
PLAN
38'0
26'0

STA. 272+80 TO 273+60

DETAILS OF MASONRY MANHOLE


ELEV. 9353.10
BOTTOM OF TRENCH
- 6.00 %
PROFILE ELEV. 9351.80
ELEV. 9348.30
BOTTOM OF TRENCH
-40.00%
38'0
FL. 9341.00
273+60
F.L. OF OUTLET
9333.20
20'00"
28'
8" PERFORATED C.M.P. UNDERDRAIN
PROFILE
80'-0
19'-0
19'-0
℄ ROADWAY
STA. 272+80
STA. 273+00
STA. 273+60
PLAN
38'0
28'0
DENVER PATTERN M.H. RING AND COVER, APPROX. WT. 350 LBS. HENDRIE AND BOLTHOFF CATALOG NO. 102, P. 405, FIG. 405 A OR ACCEPTABLE EQUIVALENT.
9"
CEMENT GROUT
22 1/2"
CEMENT RUBBLE MASONRY WALLS
PERF. C.M.P. UNDERDRAIN
5'-0"
A
A
1'-0
9"
3'-6"
9"
CLASS "A" CONCRETE BASE
5'-0"
9"
3'-6"
5'-0"
3'-4"
22 1/2"
9"
9"

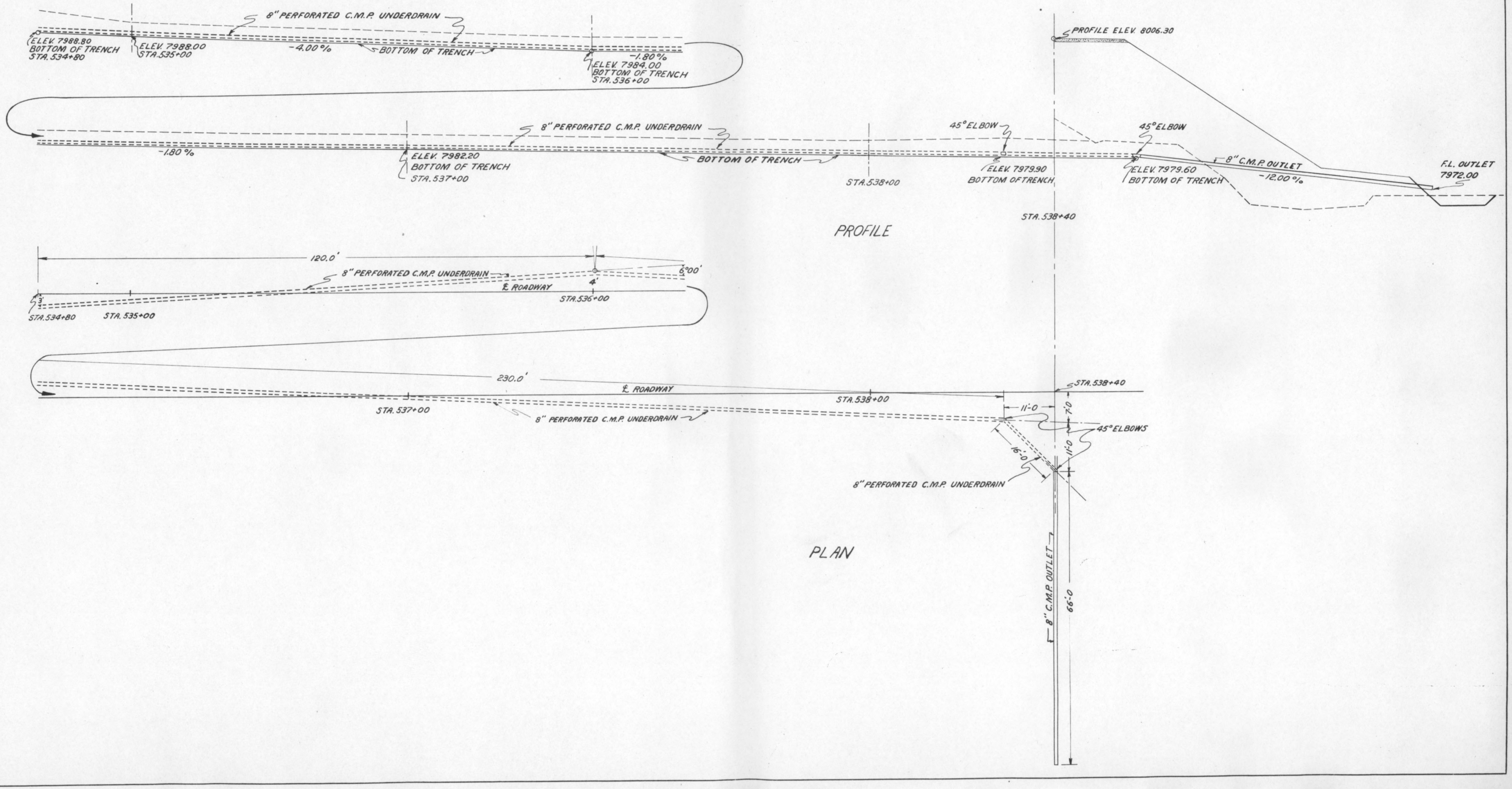
SECTIONAL ELEV.

SECTION A-A

PLAN VIEW
RING & COVER REMOVED

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259H(1)#2	13a	

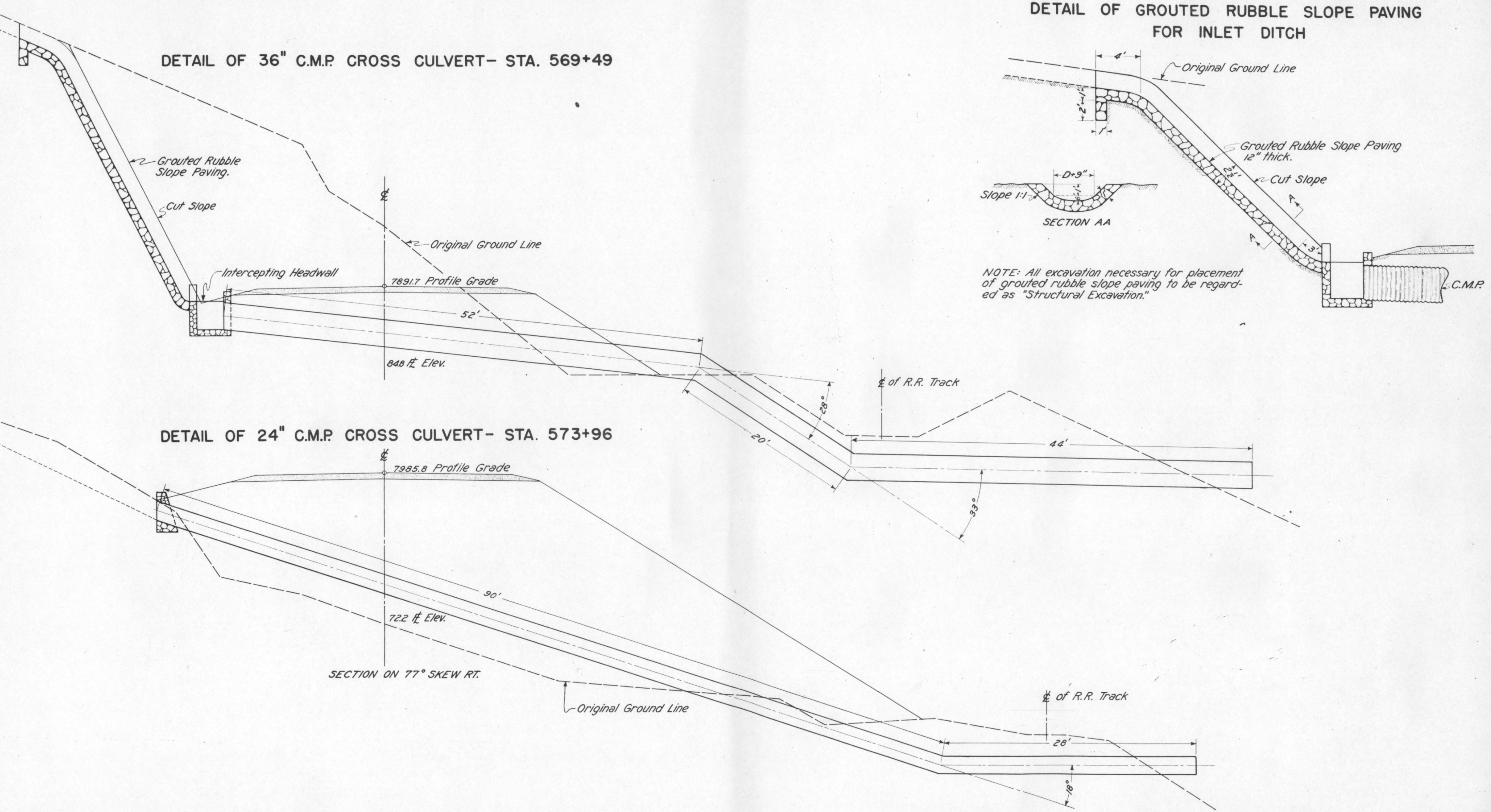
DETAIL OF 8" PERFORATED C.M.P. UNDERDRAIN
STA. 534+80 TO 538+40


8" PERFORATED C.M.P. UNDERDRAIN
ELEV. 7988.80
BOTTOM OF TRENCH
STA. 534+80
ELEV. 7988.00
STA. 535+00
-4.00 %
BOTTOM OF TRENCH
-1.80 %
ELEV. 7984.00
BOTTOM OF TRENCH
STA. 536+00
8" PERFORATED C.M.P. UNDERDRAIN
-1.80 %
ELEV. 7982.20
BOTTOM OF TRENCH
STA. 537+00
BOTTOM OF TRENCH
STA. 538+00
45° ELBOW
ELEV. 7979.90
BOTTOM OF TRENCH
PROFILE ELEV. 8006.30
45° ELBOW
ELEV. 7979.60
BOTTOM OF TRENCH
8" C.M.P. OUTLET
-12.00 %
F.L. OUTLET
7972.00
STA. 538+40
PROFILE
120.0'
8" PERFORATED C.M.P. UNDERDRAIN
℄ ROADWAY
3'
4'
6'00'
STA. 534+80
STA. 535+00
STA. 536+00
230.0'
℄ ROADWAY
STA. 537+00
STA. 538+00
STA. 538+40
8" PERFORATED C.M.P. UNDERDRAIN
11'-0
7'-0
45° ELBOWS
11'-0
16'-0
8" PERFORATED C.M.P. UNDERDRAIN
8" C.M.P. OUTLET
66'-0
PLAN

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#2	14a	

DETAIL OF 36" C.M.P. CROSS CULVERT– STA. 569+49

DETAIL OF 24" C.M.P. CROSS CULVERT– STA. 573+96


Grouted Rubble Slope Paving.
Cut Slope
Original Ground Line
Intercepting Headwall
℄
7891.7 Profile Grade
52'
848 ℄ Elev.
28°
20'
℄ of R.R. Track
44'
33°
℄
7985.8 Profile Grade
90'
72.2 ℄ Elev.
Original Ground Line
℄ of R.R. Track
28'
18°

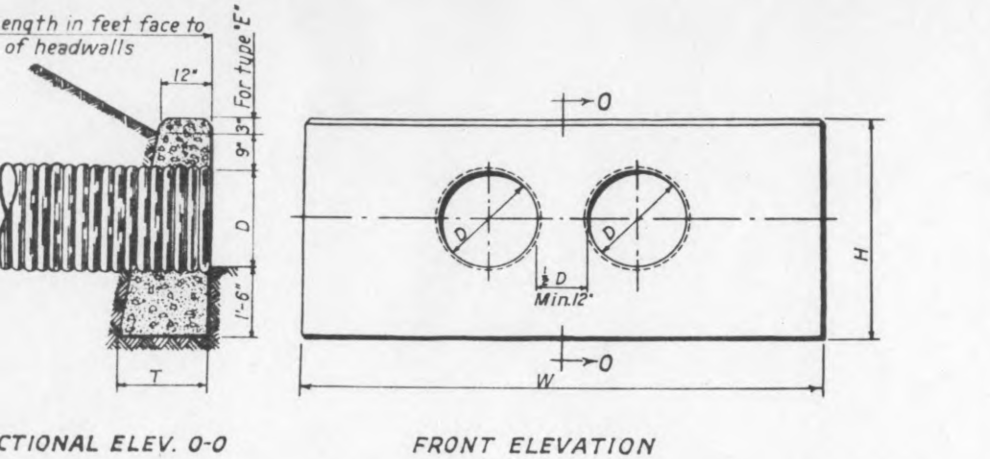
SECTION ON 77° SKEW RT.

DETAIL OF GROUTED RUBBLE SLOPE PAVING FOR INLET DITCH

4'
Original Ground Line
1'
2'
1'
Grouted Rubble Slope Paving 12" thick.
2½'
Cut Slope
A
A
3'
C.M.P.
D+9"
Slope 1:1
6"
1'

SECTION AA

NOTE: All excavation necessary for placement of grouted rubble slope paving to be regarded as "Structural Excavation."


ength in feet face to
of headwalls
12"
For type "E"
9"
3"
D
1'-6"
T
O
D
Min.12"
H
W
O

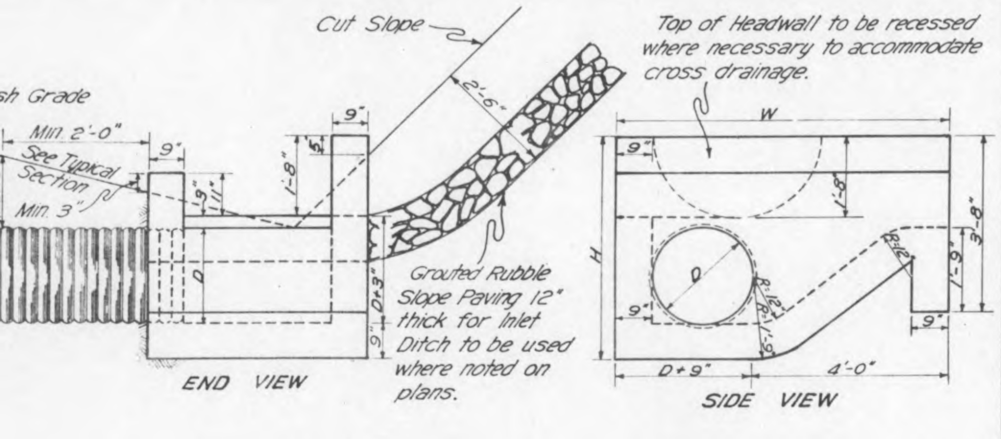
CTIONAL ELEV. O-O

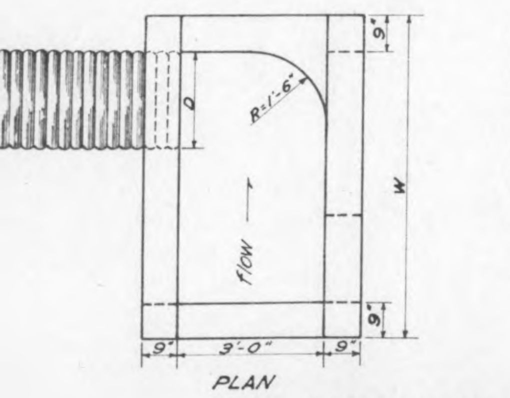
FRONT ELEVATION

LE OF DIMENSIONS & QUANTITIES FOR DOUBLE CORRUGATED METAL PIPE CULVERT & HEADWALLS

D	W	H	T	CL."B" CONCRETE FOR 2 HDWALLS	CORRUGATED METAL PIPE		CEMENT RUBBLE MASONRY
15"	7'-6"	3'-9"	1'-6"	2.4 CU. YDS.	16 GAGE	2×L = LIN. FT.	
18"	8'-6"	4'-0"	1'-7"	3.0 DO.	16 DO	2×L = DO	
24"	10'-6"	4'-6"	1'-10"	4.4 DO	14 DO	2×L = DO	
30"	12'-9"	5'-0"	2'-0"	6.1 DO.	14 DO	2×L = DO	
36"	15'-0"	5'-6"	2'-2"	8.1 DO	12 DO	2×L = DO	
42"	17'-3"	6'-0"	2'-5"	10.8 DO	10 DO	2×L = DO	
48"	19'-6"	6'-6"	2'-7"	13.6 DO	10 DO	2×L = DO	

TD. HEADWALLS FOR DOUBLE CORR. METAL PIPE CULV'S.

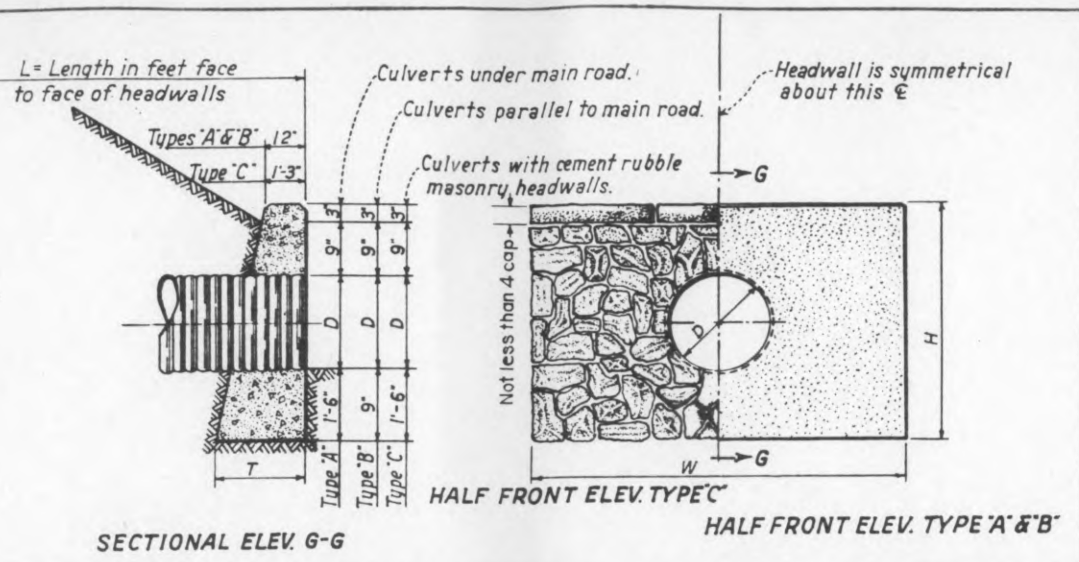

Cut Slope
Top of Headwall to be recessed where necessary to accommodate cross drainage.
sh Grade
Min. 2'-0"
See Typical Section
Min. 3"
9"
1'-8"
11"
5"
2'-6"
D
D+9"
9"
Grouted Rubble Slope Paving 12" thick for Inlet Ditch to be used where noted on plans.
W
H
D
1'-8"
3'-8"
1'-9"
9"
D+9"
4'-0"
END VIEW
SIDE VIEW


D
R=1'-6"
W
flow
9"
9"
3'-0"
9"
PLAN

QUANTITIES OF CLASS "B" CONCRETE
OR CEMENT RUBBLE MASONRY

SIZE OF PIPE	WIDTH OF WALL	HEIGHT OF WALL	QUANTITY IN ONE HEADWALL
D	W	H	CU. YDS.
12"	5'-9"	3'-8"	1.7
15"	6'-0"	3'-11"	1.8
18"	6'-3"	4'-2"	2.0
24"	6'-9"	4'-8"	2.3
30"	7'-3"	5'-2"	2.7
36"	7'-9"	5'-8"	3.1

INTERCEPTING HEADWALLS


L= Length in feet face to face of headwalls
Types "A" & "B" 12"
Type "C" 1'-3"
Culverts under main road.
Culverts parallel to main road.
Culverts with cement rubble masonry headwalls.
Headwall is symmetrical about this ℄
G
G
Not less than 4 cap
3"
9"
D
1'-6"
T
Type "A"
Type "B"
Type "C"
W
H
D

HALF FRONT ELEV. TYPE "C"

SECTIONAL ELEV. G-G

HALF FRONT ELEV. TYPE "A" & "B"

TABLE OF DIMENSIONS & QUANTITIES FOR CORRUGATED METAL PIPE CULVERTS & HEADWALLS

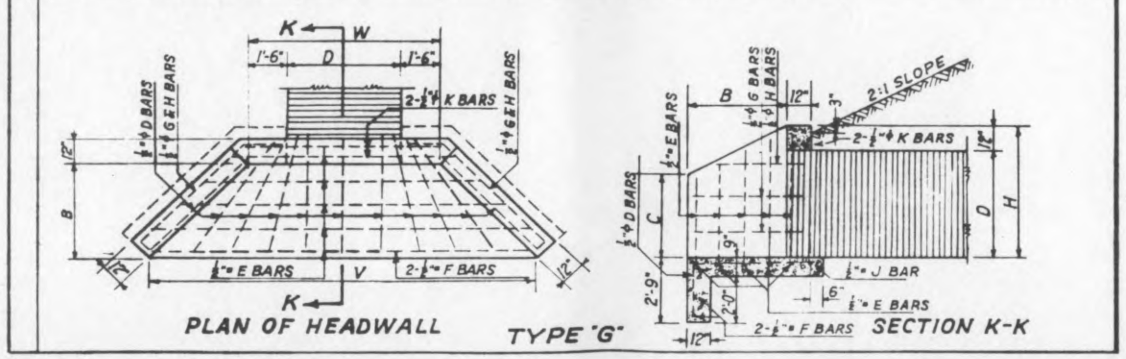
	D	W	H	T	CL."B" CONCRETE FOR 2 HEADWALLS	CORRUGATED METAL PIPE		CEMENT RUBBLE MASONRY
TYPE "A"	12"	4'-6"	3'-6"	1'-5"	1.4 CU. YDS.	16 GAGE	L = LIN. FT.	
	15"	5'-3"	3'-9"	1'-6"	1.8 DO	16 DO	L = DO	
	18"	6'-0"	4'-0"	1'-7"	2.2 DO	16 DO	L = DO	
	24"	7'-6"	4'-6"	1'-10"	3.3 DO	14 DO	L = DO	
	30"	9'-0"	5'-0"	2'-0"	4.5 DO	14 DO	L = DO	
	36"	10'-6"	5'-6"	2'-2"	6.0 DO	12 DO	L = DO	
	42"	12'-0"	6'-0"	2'-5"	8.0 DO	10 DO	L = DO	
	48"	13'-6"	6'-6"	2'-7"	10.0 DO	10 DO	L = DO	
TYPE "B"	12"	4'-0"	2'-9"	1'-0"	0.8 CU. YDS.	16 GAGE	L = LIN. FT.	
	15"	4'-3"	3'-0"	1'-2"	0.9 DO	16 DO	L = DO	
	18"	4'-6"	3'-3"	1'-3"	1.1 DO	16 DO	L = DO	
	24"	5'-0"	3'-9"	1'-5"	1.2 DO	14 DO	L = DO	
	30"	5'-6"	4'-3"	1'-7"	1.8 DO	14 DO	L = DO	
TYPE "C"	12"	4'-6"	3'-6"	2'-0"		16 GAGE	L = LIN. FT.	1.8 CU. YDS.
	15"	5'-3"	3'-9"	2'-0"		16 DO	L = DO	2.2 DO
	18"	6'-0"	4'-0"	2'-1"		16 DO	L = DO	2.8 DO
	24"	7'-6"	4'-6"	2'-4"		14 DO	L = DO	4.1 DO
	30"	9'-0"	5'-0"	2'-6"		14 DO	L = DO	5.6 DO
	36"	10'-6"	5'-6"	2'-8"		12 DO	L = DO	7.4 DO
	42"	12'-0"	6'-0"	2'-10"		10 DO	L = DO	9.2 DO
	48"	13'-6"	6'-6"	3'-0"		10 DO	L = DO	11.5 DO

D	W	H	V	B	C	UNIT	CONCRETE CLASS "A"	CORRUGATED METAL PIPE		UNIT	REINFORCING STEEL
54"	7'-6"	5'-6"	15'-6"	4'-0"	3'-6"	CU. YDS.	12.6 *	8 GAGE	L = LIN. FT.	LBS.	446 ▲
60"	8'-0"	6'-0"	16'-0"	4'-0"	4'-0"	DO	13.5 *	8 DO	L = DO	DO	482 ▲
66"	8'-6"	6'-6"	16'-6"	4'-0"	4'-6"	DO	14.4 *	8 DO	L = DO	DO	498 ▲
72"	9'-0"	7'-0"	19'-0"	5'-0"	4'-6"	DO	17.9 *	8 DO	L = DO	DO	610 ▲
78"	9'-6"	7'-6"	19'-6"	5'-0"	5'-0"	DO	18.9 *	8 DO	L = DO	DO	630 ▲
84"	10'-0"	8'-0"	20'-0"	5'-0"	5'-6"	DO	20.0 *	8 DO	L = DO	DO	684 ▲

▲ REINFORCING STEEL QUANTITIES ARE FOR TWO HEADWALLS * CONCRETE QUANTITIES ARE FOR TWO HEADWALLS

BAR LIST FOR TYPE "G"

DIAMETER OF PIPE		54"	60"	66"	72"	78"	84"	BENDING DIAGRAM
D BARS ½"-φ	SPACING	18"	18"	18"	18"	18"	18"	2'-5" B + 1'-2"
	NUMBER	11	11	11	12	12	13	
	LENGTH	7'-7"	7'-7"	7'-7"	8'-7"	8'-7"	8'-7"	
E BARS ½"-▪	SPACING	12"	12"	12"	12"	12"	12"	C TO H BY 6" INCREASE V+1'-6" TO W+1'-6" BY 2'-0" DECREASE
	NUMBER	1 EACH	1 EACH	1 EACH	1 EACH	1 EACH	1 EACH	
	LENGTH	24'-0" TO 20'-0"	25'-6" TO 21'-6"	27'-0" TO 23'-0"	29'-6" TO 24'-6"	31'-0" TO 26'-0"	32'-6" TO 27'-6"	
	DECREASE	BY 12"	BY 12"	BY 12"	BY 12"	BY 12"	BY 12"	
F BARS ½"-▪	SPACING	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	V
	NUMBER	2	2	2	2	2	2	
	LENGTH	15'-6"	16'-0"	16'-6"	19'-0"	19'-6"	20'-0"	
G BARS ½"-φ	SPACING	18"	18"	18"	18"	18"	18"	X = 5'-7" FOR 54", 60" & 66" DIAMETER X = 7'-0" FOR 72", 78" & 84" DIA. X FOR G BARS Y FOR H BARS 1'-5" 12 12
	NUMBER	4	6	6	6	6	8	
	LENGTH	7'-0"	7'-0"	7'-0"	8'-5"	8'-5"	8'-5"	
H BARS ½"-φ	SPACING	18"	18"	18"	18"	18"	18"	
	NUMBER	2	2	2	2	2	2	
	LENGTH	5'-11"	5'-11"	5'-11"	5'-11"	5'-11"	5'-11"	
J BARS ½"-▪	SPACING	12"	12"	12"	12"	12"	12"	Y = 4'-6" FOR H BARS
	NUMBER	1	1	1	1	1	1	
	LENGTH	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	
K BARS ½"-φ	SPACING	8"	8"	8"	8"	8"	8"	W + 1'-0"
	NUMBER	2	2	2	2	2	2	
	LENGTH	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	


K
W
1'-6"
D
1'-6"
½"-φ D BARS
½"-φ G & H BARS
2-1¼" K BARS
½"-φ G & H BARS
12"
B
½" E BARS
V
2-½" F BARS
K
B
½"-φ G BARS
½"-φ H BARS
12"
3"
2:1 SLOPE
2-½"-φ K BARS
½" E BARS
½"-φ D BARS
C
D
H
½" J BAR
½" E BARS
2-½" F BARS
2'-9"
2'-0"
12"
6"

PLAN OF HEADWALL

TYPE "G"

SECTION K-K

STD. HEADWALLS FOR CORRUGATED METAL PIPE CULVERTS

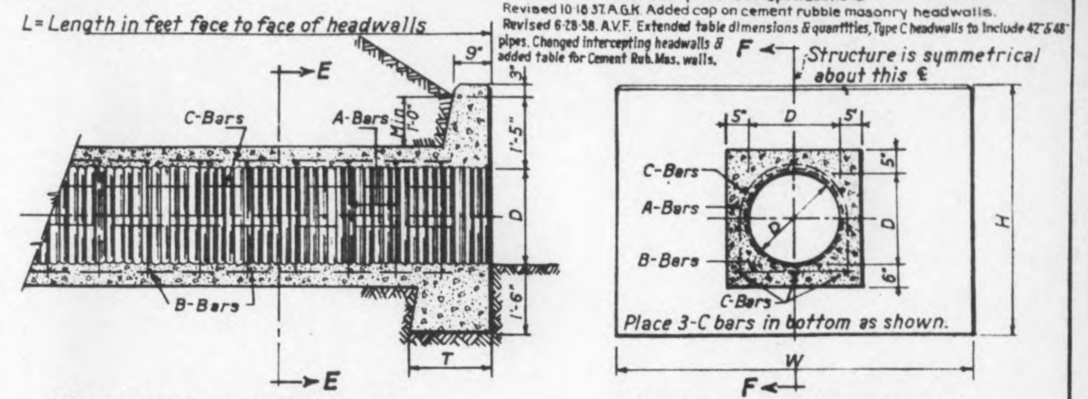
REVISIONS

STANDARD M-102-E

Revised 10-14-38. P.A.F. - New Intercepting Headwall and Quantities.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259-H(1) #2	15a	

Revised 6-1-37. A.G.K. Changed to 1937 Specifications.
Revised 10-18-37. A.G.K. Added cap on cement rubble masonry headwalls.
Revised 6-28-38. A.V.F. Extended table dimensions & quantities, Type C headwalls to include 42" & 48" pipes. Changed intercepting headwalls & added table for Cement Rub. Mas. walls.


L= Length in feet face to face of headwalls
9"
E
C-Bars
A-Bars
Min. 1'-0"
3"
1'-5"
D
1'-6"
B-Bars
T
E
F
Structure is symmetrical about this ℄
5"
D
5"
C-Bars
A-Bars
B-Bars
C-Bars
5"
D
6"
H
Place 3-C bars in bottom as shown.
W
F

LONGITUDINAL SECTION F-F

SECTIONAL ELEVATION E-E

TABLE OF DIMENSIONS AND QUANTITIES FOR INCASED PIPE CULVERTS

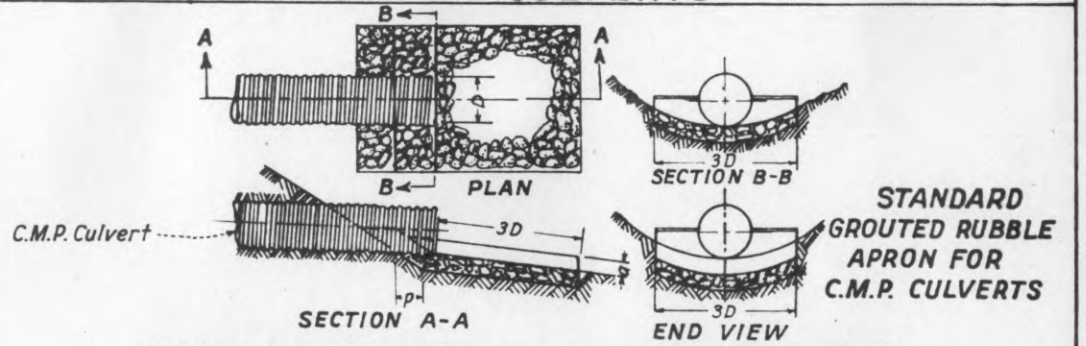
Diameter of pipe		D	12"	15"	18"	24"	30"		BENDING DIAGRAM
Width of headwall		W	4'-6"	5'-3"	6'-0"	7'-6"	9'-0"		
Height of headwall		H	4'-2"	4'-5"	4'-8"	5'-2"	5'-8"		
Width of headwall base		T	1'-7"	1'-8"	1'-9"	2'-0"	2'-3"		
A BARS		SPACING	12"	12"	12"	12"	12"		D/2+2" D+4"
		NUMBER	L-1	L-1	L-1	L-1	L-1		
		LENGTH	3'-9"	4'-5"	5'-0"	6'-4"	7'-7"		
B BARS		SPACING	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"		D+7"
		NUMBER	0.5L	0.5L	0.5L	0.5L	0.5L		
		LENGTH	1'-7"	1'-10"	2'-1"	2'-7"	3'-1"		
C BARS		SPACING							L-(2'-0")
		NUMBER	6	8	8	8	8		
		LENGTH	L-(2'-0")	L-(2'-0")	L-(2'-0")	L-(2'-0")	L-(2'-0")		
ITEM NO.	DESCRIPTION	UNIT							
46a	Concrete Class "A" *	Cu. Yds.	1.4+0.101L	1.6+0.122L	2.2+0.143L	3.2+0.19L	4.5+0.239L		
47	Reinforcing Steel	Lbs.	8.96L-16.2●	11.191L-17.2▼	11.863L-17.8▼	13.139L-18.8▼	14.909L-19.4▼		
53	Galv. Corr. Metal Pipe	Lin. Ft.	L	L	L	L	L		

* Concrete quantities shown above include two headwalls.
● When L= 40 feet or more add 10.6 Lbs. for lap in C-bars.
▼ When L= 40 feet or more add 14.17 Lbs. for lap in C-bars.

SPECIAL NOTES

All reinforcing bars shall be ½"▪.
Minimum distance ℄ of bar to surface of concrete shall be 2".
Pipe shall be thoroughly cleaned before incasing with concrete.

INCASED PIPE CULVERTS


B
A
A
D
B
PLAN
3D
SECTION B-B
C.M.P. Culvert
3D
p
t
SECTION A-A
3D
END VIEW

STANDARD GROUTED RUBBLE APRON FOR C.M.P. CULVERTS

SQUARE YARDS GROUTED RUBBLE SLOPE & DITCH PAVING "1 FOOT THICK"														
FILL SLOPE	D	15"	18"	24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"
	p \ g	7½"	9"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"
1½:1	2'-0"	3	4	6	9	12	17	21	27	33	39	46	54	62
2:1	2'-0"	3	4	7	10	13	18	22	28	34	41	49	57	66
3:1	3'-0"	3	4	7	11	15	20	25	31	38	45	54	63	72
4:1	4'-0"	3	5	8	12	16	22	28	34	42	50	59	69	79

GENERAL NOTES FOR ALL STRUCTURES

All work shall be done according to the standard specifications of the Colorado State Highway Department, adopted June 1-1937.
All concrete shall be class "A" except types A & B, which shall be class "B".
All exposed surfaces shall be rubbed free of form marks.
All exposed corners shall be beveled to a 2" face.
All construction joints shall be thoroughly cleaned before fresh concrete is poured.
All walls shall have forms on both sides.
All reinforcing bars shall be deformed.
All reinforcing bars shall tagged with the station number & letter designation.
Secondary bars when spliced shall be given a lap of 50 diameters.
Main bars shall not be spliced.
Minimum fill over top of culverts shall be 1'-0"
When culvert is skewed, headwalls shall be placed parallel to ℄ of roadway
Minimum grade of pipe shall be 1%
For size and location of culverts see sheet No. 2
Footings in rock shall be poured out to the rock and not formed.

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD HEADWALLS
INTERCEPTING HEADWALLS
INCASED METAL PIPE CULVERT
WITH HEADWALLS
FOR CORRUGATED
METAL PIPE CULVERTS

Designed P.S.B.-G.H.D. Made by L.S.-A.V.F. Checked G.H.D.-W.M.N.	Approved by C. S. Bailey Bridge Engineer Date: April 27th 1937.

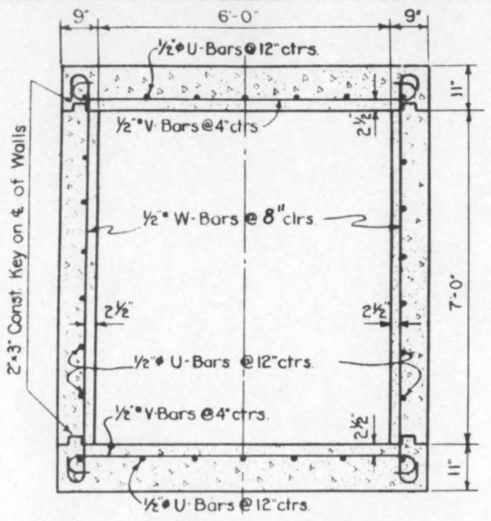
-E

REVISED

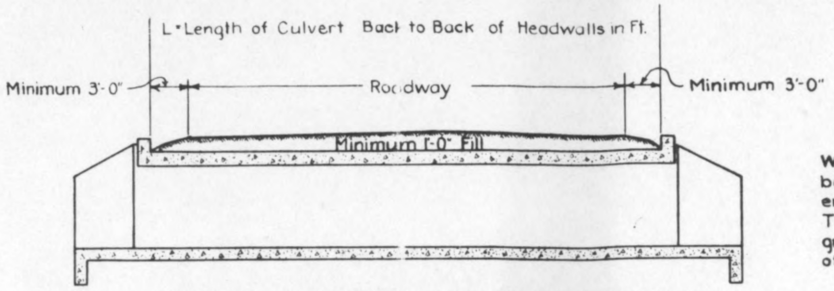
8-5-38 - T.G. Changed spacing of 'W' bars from 12" to 8"; Decreased max. allowable fill from 8'-0" to 7'-0", changed bar List.

FED ROAD DIST No	STATE	F.A.P.	SHEET No	TOTAL SHEETS
3	COLO	259-H(1)2	16a	

STANDARD M-101-B.

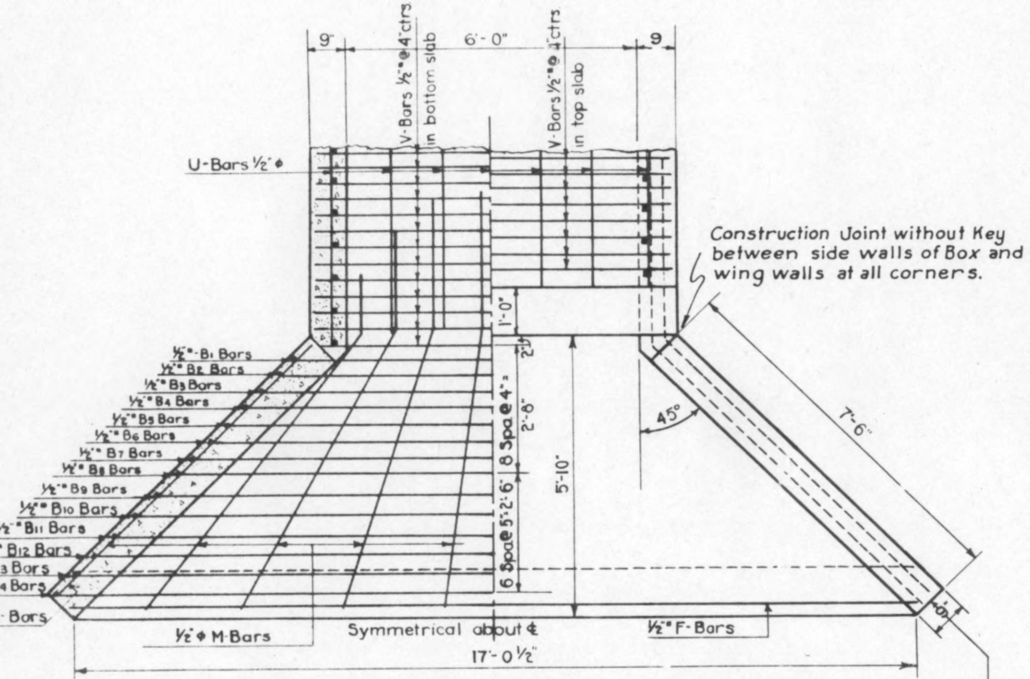

9"
6'-0"
9"
½"ϕ U-Bars @ 12" ctrs.
½" V-Bars @ 4" ctrs
2½"
½" W-Bars @ 8" ctrs
2½"
2½"
½"ϕ U-Bars @ 12" ctrs.
½" V-Bars @ 4" ctrs.
2½"
½"ϕ U-Bars @ 12" ctrs.
2"x3" Const. Key on ℄ of Walls
11"
7'-0"
11"

TYPICAL SECTION THRU BOX

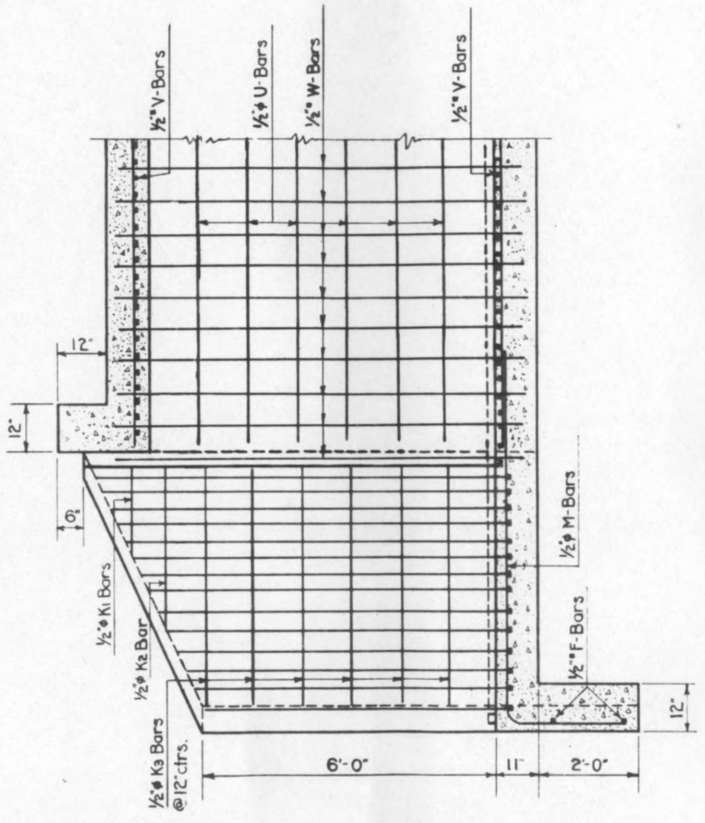

L = Length of Culvert Back to Back of Headwalls in Ft.
Minimum 3'-0"
Roadway
Minimum 3'-0"
Minimum 1'-0" Fill

TYPICAL SECTION SHOWING RELATION OF CULVERT TO ROADWAY

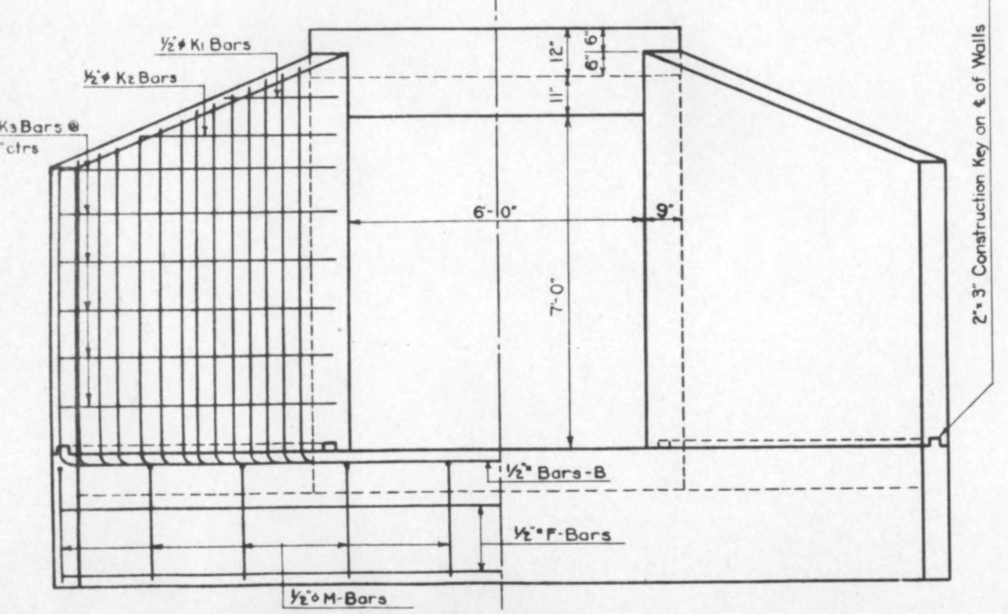
Where conditions require, slope paving should be placed on earth slopes to prevent spill encroaching on waterway of culvert. This condition occurs, in general, when natural ground line is 3 ft. or less above flow line of culvert.


9"
6'-0"
9"
V-Bars ½"@4" ctrs in bottom slab
V-Bars ½"@4" ctrs in top slab
U-Bars ½"ϕ
Construction Joint without Key between side walls of Box and wing walls at all corners.
½"- B1 Bars
½"- B2 Bars
½"- B3 Bars
½"- B4 Bars
½"- B5 Bars
½"- B6 Bars
½"- B7 Bars
½"- B8 Bars
½"- B9 Bars
½"- B10 Bars
½"- B11 Bars
½"- B12 Bars
B13 Bars
B14 Bars
Bars
1'-0"
2'-6"
8 Spa @ 4"=
6 Spa @ 5"=2'-6"
5'-10"
45°
7'-6"
6"
½"ϕ M-Bars
Symmetrical about ℄
½" F-Bars
17'-0½"

PART PLAN


½" V-Bars
½"ϕ U-Bars
½" W-Bars
½" V-Bars
12"
12"
6"
½"ϕ K1 Bars
½"ϕ K2 Bar
½"ϕ K3 Bars @ 12" ctrs.
½"ϕ M-Bars
½" F-Bars
12"
6'-0"
11"
2'-0"

LONGITUDINAL SECTION ON ℄ OF BOX


½"ϕ K1 Bars
½"ϕ K2 Bars
K3 Bars @
" ctrs
12"
6"
11"
6'-10"
9"
7'-0"
2"x3" Construction Key on ℄ of Walls
½" Bars-B
½" F-Bars
½"ϕ M-Bars

END VIEW

BAR LIST

G.A.M.
E.W.T.

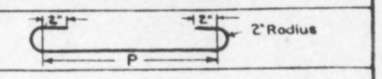
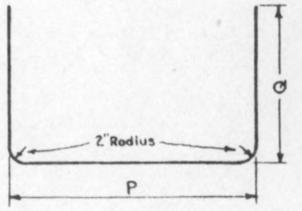
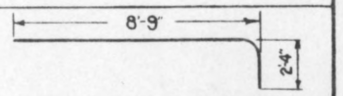
MARK	SIZE	NUMBER	DIMENSION P	DIMENSION Q	TOTAL LENGTH	BENDING DIAGRAM
V	½"■	(6×L)+14	S+10"		S+2'-2"	 2" 2" 2" Radius P
W	½"■	(3×L)+8	H+10"		H+2'-2"	
F	½"■	4			17'-3"	
U	½"ϕ	26			L+2'-4"	
K1	½"ϕ	4			2'-6"	
K2	½"ϕ	4			4'-8"	
K3	½"ϕ	24			7'-2"	
B1	½"■	2	7'-11"	8'-1"	23'-1"	
B2	½"■	2	8'-7"	7'-11"	24'-3"	
B3	½"■	2	9'-3"	7'-10"	24'-9"	
B4	½"■	2	9'-11"	7'-8	25'-1"	
B5	½"■	2	10'-7"	7'-6"	25'-5"	
B6	½"■	2	11'-3"	7'-5"	25'-11"	
B7	½"■	2	11'-11"	7'-3	26'-3"	
B8	½"■	2	12'-7"	7'-1"	26'-7"	
B9	½"■	2	13'-5"	6'-11"	27'-1"	
B10	½"■	2	14'-3"	6'-9"	27'-7"	
B11	½"■	2	15'-1"	6'-7"	28'-1"	
B12	½"■	2	15'-11"	6'-4"	28'-5"	
B13	½"■	2	16'-9"	6'-2"	28'-11"	
B14	½"■	2	17'-7"	6'-0"	29'-5"	
M	½"ϕ	20			11'-0"	

TABLE OF QUANTITIES

G.A.M.
E.W.T.

SPAN S	HEIGHT H	QUANTITIES FOR ONE LINEAL FT OF BOX: CLASS "A" CONCRETE CU. YDS.	QUANTITIES FOR ONE LINEAL FT OF BOX: STEEL LBS.	QUANTITIES FOR TWO HEADWALLS: CLASS "A" CONCRETE CU. YDS.	QUANTITIES FOR TWO HEADWALLS: STEEL LBS.	
6'-0"	7'-0"	0.898	83.0	16.5	1130	

GENERAL NOTES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT. ADOPTED JUNE 1 1937

ALL CONCRETE SHALL BE CLASS "A."

FORMS FOR CONCRETE SURFACES EXPOSED IN THE FINISHED WORK SHALL BE CONSTRUCTED OF SHIPLAP OR TONGUE AND GROOVE LUMBER S3S.

ALL EXPOSED SURFACES SHALL BE RUBBED FREE OF FORM MARKS.

ALL WALLS TO HAVE FORMS ON BOTH SIDES.

ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.

FOOTINGS IN ROCK SHALL BE POURED OUT TO THE ROCK AND NOT FORMED.

ALL REINFORCING BARS SHALL BE DEFORMED AND ROUND OR SQUARE AS SHOWN AND NOTED.

ALL REINFORCING BARS SHALL BE TAGGED WITH THE STATION NUMBER AND LETTER DESIGNATION.

SECONDARY BARS WHEN SPLICED SHALL BE GIVEN A LAP OF 50 DIAMETERS.

MAIN BARS SHALL NOT BE SPLICED.

SOUNDINGS AND DEPTH OF FOOTINGS SHOWN ARE ACCORDING TO THE BEST AVAILABLE DATA. IF ESSENTIALLY DIFFERENT CONDITIONS ARE ENCOUNTERED, THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.

POUR WING FOOTINGS MONOLITHICALLY WITH FLOOR OF BOX.

THE USE OF ADDITIONAL CONSTRUCTION JOINTS UNDESIRABLE. SHOULD FIELD CONDITIONS REQUIRE, CONSTRUCTION JOINTS MAY BE MADE ON A VERTICAL PLANE PERPENDICULAR TO CENTERLINE OF CULVERT AND SHALL HAVE A 2"x3" KEY.

SUPPORTING SOILS FOR ALL CULVERTS MUST BE COMPOSED OF FIRM AND UNIFORM MATERIAL THROUGHT

ALL BACKFILLING IN APPROACHES, TO AND OVER CULVERTS, SHALL BE LAID IN LAYERS NOT EXCEEDING 6" IN DEPTH AND EACH LAYER SHALL BE ROLLED OR HAND TAMPED WHERE INACCESSIBLE TO ROLLER. ALSO MOISTEN WHEN NECESSARY.

STRUCTURE NO.________

LOADING DATA.
LIVE LOAD = A. A. S. H. O. AUG 1928 CLASS A. H-15
DEAD LOAD = MAXIMUM 7'-0" FILL

COLORADO
STATE HIGHWAY DEPARTMENT
SPECIAL 6FT. x 7FT
CONCRETE BOX CULVERT

Across
Sta.
Near
Sec. T. R.

Designed by G.A.M. Made by E.W.T. Checked by G.A.M.	Approved by C. S. Bailey Bridge Engineer Date: May 27th, 1935

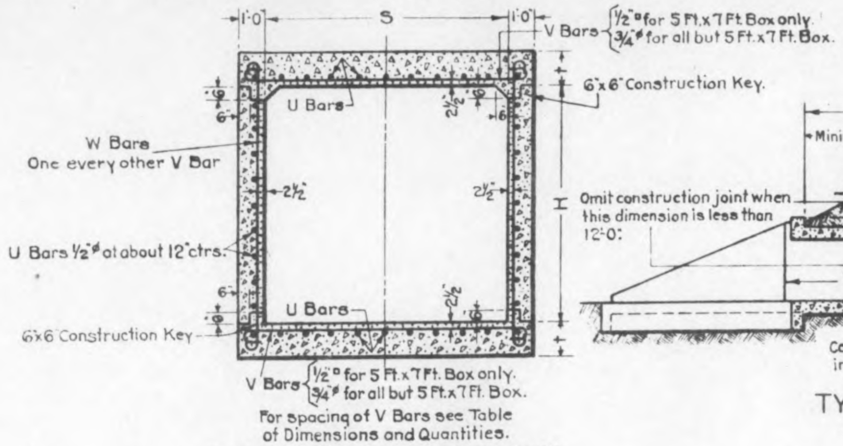
STANDARD M-104-D

FED. ROAD DIST. No.	STATE	F.A.P. PROJ. No.	SHEET No.	TOTAL SHEETS
3	COLO.	259-HU) #2	17a	

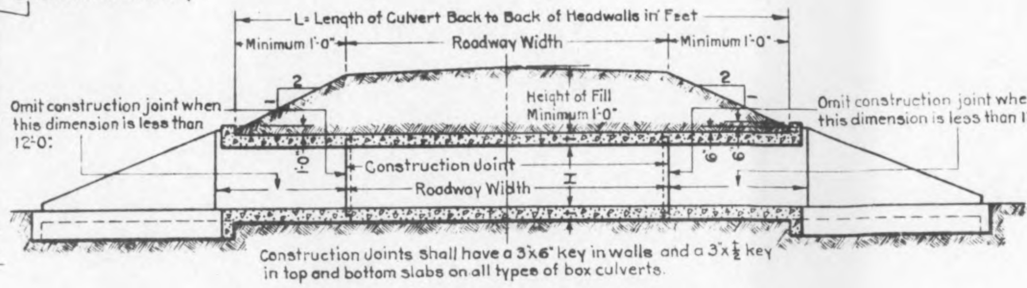
REVISED 3-15-35 WWD DEFORMED BARS.

Revised 7-14-33 A.G.K. Changed Length of B and E Bars.

Revised 3-11-36 A.G.K. 1935 Specifications
Revised 6-1-37 A.G.K. 1937 Specifications

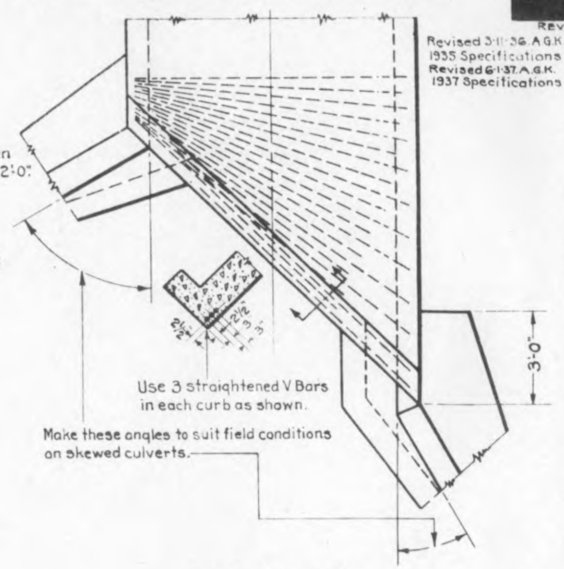

1'-0"
S
1'-0"
V Bars {1/2"ϕ for 5 Ft. x 7 Ft. Box only. 3/4"ϕ for all but 5 Ft. x 7 Ft. Box.
6"x6" Construction Key.
U Bars
W Bars One every other V Bar
2½"
U Bars 1/2"ϕ at about 12" ctrs.
U Bars
6"x6" Construction Key
H
V Bars {1/2"ϕ for 5 Ft. x 7 Ft. Box only. 3/4"ϕ for all but 5 Ft. x 7 Ft. Box.
For spacing of V Bars see Table of Dimensions and Quantities.

TYPICAL SECTION THRU BOX

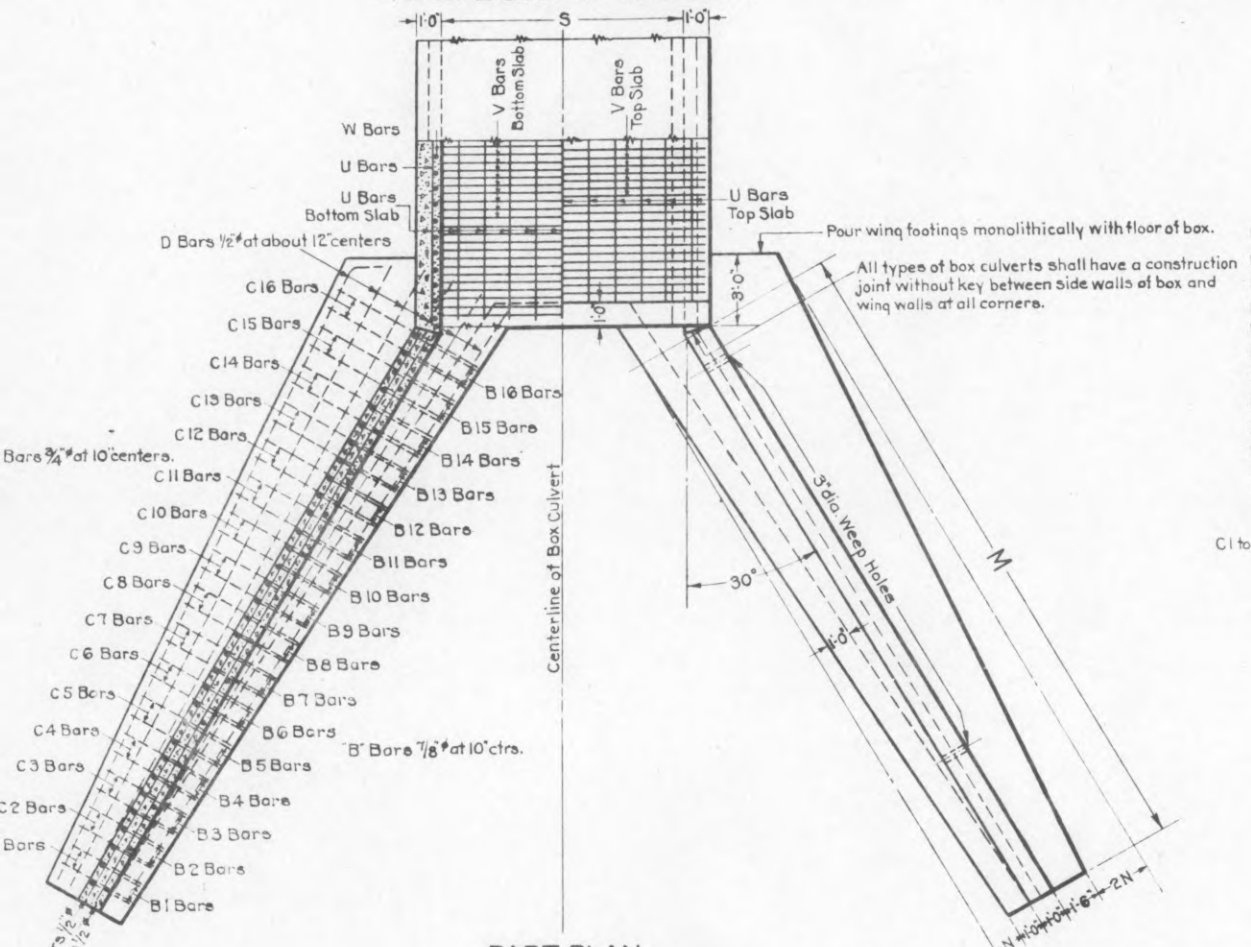

L = Length of Culvert Back to Back of Headwalls in Feet
Minimum 1'-0"
Roadway Width
Minimum 1'-0"
2
Height of Fill Minimum 1'-0"
Omit construction joint when this dimension is less than 12'-0".
Omit construction joint when this dimension is less than 12'-0".
Construction Joint
Roadway Width
H
1'-0"
6"
Construction Joints shall have a 3"x6" key in walls and a 3"x½" key in top and bottom slabs on all types of box culverts.

TYPICAL SECTION SHOWING RELATION OF CULVERT TO ROADWAY

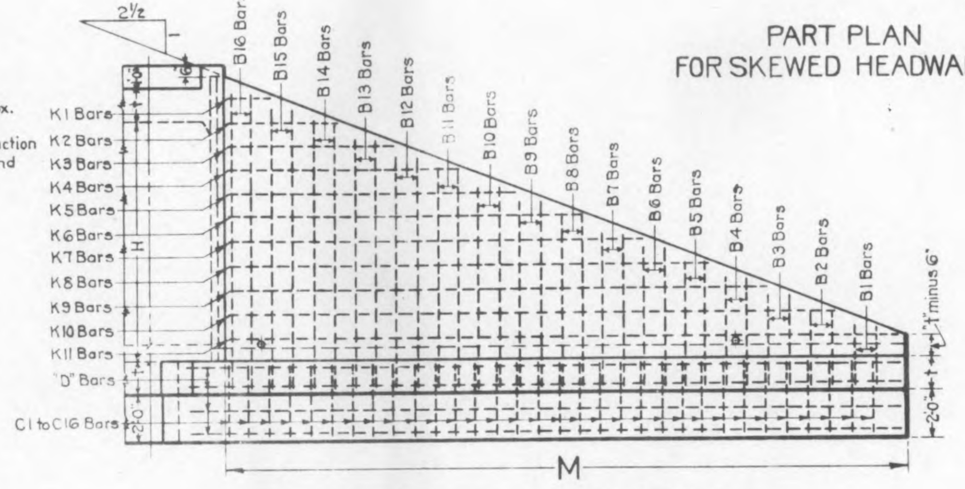
Field to fan V Bars as shown, placing alternate bars to bearing on outside walls at ends of skewed boxes.


2½"
3"
3'-0"
Use 3 straightened V Bars in each curb as shown.
Make these angles to suit field conditions on skewed culverts.

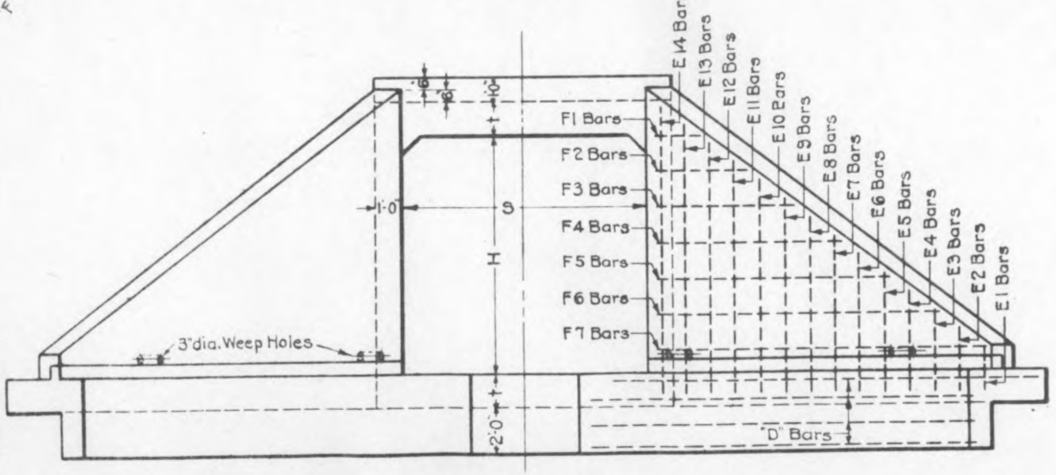
PART PLAN FOR SKEWED HEADWALLS


1'-0"
S
1'-0"
V Bars Bottom Slab
V Bars Top Slab
W Bars
U Bars
U Bars Bottom Slab
U Bars Top Slab
D Bars 1/2"ϕ at about 12" centers
Pour wing footings monolithically with floor of box.
All types of box culverts shall have a construction joint without key between side walls of box and wing walls at all corners.
3'-0"
1'-0"
C16 Bars
C15 Bars
C14 Bars
C13 Bars
C12 Bars
Bars 3/4"ϕ at 10" centers.
C11 Bars
C10 Bars
C9 Bars
C8 Bars
C7 Bars
C6 Bars
C5 Bars
C4 Bars
C3 Bars
C2 Bars
Bars
B16 Bars
B15 Bars
B14 Bars
B13 Bars
B12 Bars
B11 Bars
B10 Bars
B9 Bars
B8 Bars
B7 Bars
B6 Bars
B5 Bars
B4 Bars
B3 Bars
B2 Bars
B1 Bars
"B" Bars 7/8"ϕ at 10" ctrs.
Centerline of Box Culvert
30°
3" dia. Weep Holes
M
1'-0"
N
"K" Bars 1/2"
"F" Bars 1/2"

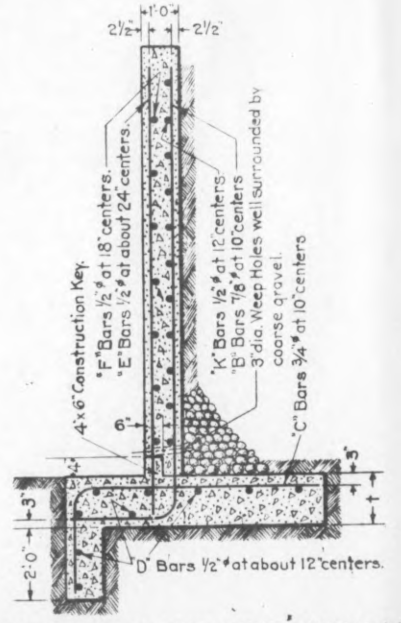
PART PLAN


2½"
B16 Bars
B15 Bars
B14 Bars
B13 Bars
B12 Bars
B11 Bars
B10 Bars
B9 Bars
B8 Bars
B7 Bars
B6 Bars
B5 Bars
B4 Bars
B3 Bars
B2 Bars
B1 Bars
K1 Bars
K2 Bars
K3 Bars
K4 Bars
K5 Bars
K6 Bars
K7 Bars
K8 Bars
K9 Bars
K10 Bars
K11 Bars
"D" Bars
C1 to C16 Bars
H
"t" minus 6"
2'-0"
M

TRUE SIDE ELEVATION OF WINGWALL


6"
1'-0"
F1 Bars
F2 Bars
F3 Bars
F4 Bars
F5 Bars
F6 Bars
F7 Bars
E14 Bars
E13 Bars
E12 Bars
E11 Bars
E10 Bars
E9 Bars
E8 Bars
E7 Bars
E6 Bars
E5 Bars
E4 Bars
E3 Bars
E2 Bars
E1 Bars
1'-0"
S
H
3" dia. Weep Holes
"D" Bars
2'-0"

END VIEW


1'-0"
2½"
2½"
4"x6" Construction Key.
"F" Bars 1/2"ϕ at 18" centers.
"E" Bars 1/2"ϕ at about 24" centers.
"K" Bars 1/2"ϕ at 12" centers.
"B" Bars 7/8"ϕ at 10" centers
3" dia. Weep Holes well surrounded by coarse gravel.
"C" Bars 3/4"ϕ at 10" centers
6"
4"
3"
3"
t
2'-0"
"D" Bars 1/2"ϕ at about 12" centers.

TYPICAL SECTION THRU WINGWALL

REINFORCEMENT BAR LIST

USE BARS FOR	MARK	SIZE	NUMBER	DIMENSION P	TOTAL LENGTH	BENDING DIAGRAM ALL DIMENSIONS ARE TO ℄ OF BARS
All Boxes but 5'x7'	V	3/4"ϕ	24(L+2) divided by Spacing	S+14"	P+2'-0"	2½" 2½" 3"R. P
5'x7' Box Only	V	1/2"ϕ		S+14"	P+2'-0"	
All Sizes	W	★	1/2 No. of V Bars	H+10"	P+2'-0"	
All Sizes	U	1/2"ϕ	★		L+1'-8"	
All Sizes	D	1/2"ϕ	36		M+2'-0"	
All Sizes	E1	1/2"ϕ	4		9"	NOTE FOR "E" BARS ONLY. Where t=10" thick slabs use lengths as shown. " t=11½" " " add 3" to " " " " t=12½" " " " 5" " " " " t=13" " " " 6" " " " " t=13½" " " " 7" " " " " t=14" " " " 8½" " " " " t=15½" " " " 11" " " " " t=17" " " " 14" " " "
All Sizes	E2	1/2"ϕ	4		1'-7"	
All Sizes	E3	1/2"ϕ	4		2'-4"	
All Sizes	E4	1/2"ϕ	4		3'-2"	
All Sizes	E5	1/2"ϕ	4		4'-0"	
All Sizes	E6	1/2"ϕ	4		4'-9"	
All Sizes	E7	1/2"ϕ	4		5'-7"	
H=5 Ft. and over	E8	1/2"ϕ	4		6'-4"	
H=6 Ft. and over	E9	1/2"ϕ	4		7'-2"	
H=7 Ft. and over	E10	1/2"ϕ	4		8'-0"	
H=8 Ft. and over	E11	1/2"ϕ	4		8'-9"	
H=8 Ft. and over	E12	1/2"ϕ	4		9'-7"	
H=10 Ft.	E13	1/2"ϕ	4		10'-5"	
H=10 Ft.	E14	1/2"ϕ	4		11'-2"	
All Sizes	F1	1/2"ϕ	4		4'-6"	
All Sizes	F2	1/2"ϕ	4		8'-3"	
All Sizes	F3	1/2"ϕ	4		12'-0"	
H=5 Ft. and over	F4	1/2"ϕ	4		15'-9"	
H=6 Ft. & 7 Ft. and over	F5	1/2"ϕ	4		19'-6"	
H=8 Ft. and over	F6	1/2"ϕ	4		23'-3"	
H=10 Ft.	F7	1/2"ϕ	4		27'-0"	
All Sizes	K1	1/2"ϕ	4		2'-0"	
All Sizes	K2	1/2"ϕ	4		4'-6"	
All Sizes	K3	1/2"ϕ	4		7'-0"	
All Sizes	K4	1/2"ϕ	4		9'-6"	
All Sizes	K5	1/2"ϕ	4		12'-0"	
H=5 Ft. and over	K6	1/2"ϕ	4		14'-6"	
H=6 Ft. and over	K7	1/2"ϕ	4		17'-0"	
H=7 Ft. and over	K8	1/2"ϕ	4		19'-6"	
H=8 Ft. and over	K9	1/2"ϕ	4		22'-0"	
H=10 Ft.	K10	1/2"ϕ	4		24'-6"	
H=10 Ft.	K11	1/2"ϕ	4		27'-0"	
All Sizes	B1	7/8"ϕ	8	P=1'-0" Q=6"	2'-3"	P Q 6"R Where t=10" thick slabs use Q lengths & total lengths as shown " t=11½" " " add 3" to Q " " " " " " t=12½" " " " 5" " " " " " " t=13" " " " 6" " " " " " " t=13½" " " " 7" " " " " " " t=14" " " " 8" " " " " " " t=15½" " " " 11" " " " " " " t=17" " " " 14" " " " " "
All Sizes	B2	7/8"ϕ	8	P=1'-0" Q=1'-2"	2'-11"	
All Sizes	B3	7/8"ϕ	8	P=1'-1" Q=1'-10"	3'-8"	
All Sizes	B4	7/8"ϕ	8	P=1'-2" Q=2'-6"	4'-5"	
All Sizes	B5	7/8"ϕ	8	P=1'-3" Q=3'-2"	5'-2"	
All Sizes	B6	7/8"ϕ	8	P=1'-4" Q=3'-10"	5'-11"	
All Sizes	B7	7/8"ϕ	8	P=1'-5" Q=4'-6"	6'-8"	
H=5 Ft. and over	B8	7/8"ϕ	8	P=1'-5" Q=5'-2"	7'-4"	
H=5 Ft. and over	B9	7/8"ϕ	(5Ft.=4) 8	P=1'-6" Q=5'-10"	8'-1"	
H=6 Ft. and over	B10	7/8"ϕ	8	P=1'-7" Q=6'-6"	8'-10"	
H=7 Ft. and over	B11	7/8"ϕ	8	P=1'-8" Q=7'-2"	9'-7"	
H=7 Ft. and over	B12	7/8"ϕ	(7Ft.=4) 8	P=1'-9" Q=7'-10"	10'-4"	
H=8 Ft. and over	B13	7/8"ϕ	8	P=1'-10" Q=8'-6"	11'-1"	
H=10 Ft.	B14	7/8"ϕ	8	P=1'-11" Q=9'-2"	11'-10"	
H=10 Ft.	B15	7/8"ϕ	8	P=1'-11" Q=9'-10"	12'-6"	
H=10 Ft.	B16	7/8"ϕ	8	P=2'-0" Q=10'-6"	13'-3"	
All Sizes	C1	3/4"ϕ	8	P=2'-8" Q=1'-10"	5'-4"	6"R Q P Where t=10" thick slabs use Q lengths & total lengths as shown " t=11½" " " add 1" to Q " " " " " " t=12½" " " " 2" " " " " " " t=13" " " " 3" " " " " " " t=13½" " " " 3" " " " " " " t=14" " " " 4" " " " " " " t=15½" " " " 5" " " " " " " t=17" " " " 7" " " " " "
All Sizes	C2	3/4"ϕ	8	P=2'-11" Q=1'-10"	5'-7"	
All Sizes	C3	3/4"ϕ	8	P=3'-1" Q=1'-10"	5'-9"	
All Sizes	C4	3/4"ϕ	8	P=3'-4" Q=1'-10"	6'-0"	
All Sizes	C5	3/4"ϕ	8	P=3'-7" Q=1'-10"	6'-3"	
All Sizes	C6	3/4"ϕ	8	P=3'-9" Q=1'-10"	6'-5"	
All Sizes	C7	3/4"ϕ	8	P=4'-0" Q=1'-10"	6'-8"	
H=5 Ft. and over	C8	3/4"ϕ	8	P=4'-2" Q=1'-10"	6'-10"	
H=5 Ft. and over	C9	3/4"ϕ	(5Ft.=4) 8	P=4'-5" Q=1'-10"	7'-1"	
H=6 Ft. and over	C10	3/4"ϕ	8	P=4'-8" Q=1'-10"	7'-4"	
H=7 Ft. and over	C11	3/4"ϕ	8	P=4'-10" Q=1'-10"	7'-6"	
H=7 Ft. and over	C12	3/4"ϕ	(7Ft.=4) 8	P=5'-1" Q=1'-10"	7'-9"	
H=8 Ft. and over	C13	3/4"ϕ	8	P=5'-4" Q=1'-10"	8'-0"	
H=8 Ft. and over	C14	3/4"ϕ	8	P=5'-6" Q=1'-10"	8'-2"	
H=10 Ft.	C15	3/4"ϕ	8	P=5'-9" Q=1'-10"	8'-5"	
H=10 Ft.	C16	3/4"ϕ	8	P=6'-0" Q=1'-10"	8'-8"	

★ SEE TABLE OF DIMENSIONS AND QUANTITIES.

TABLE OF DIMENSIONS AND QUANTITIES

STEEL QUANTITIES GIVEN BELOW INCLUDE ALLOWANCE OF 1%± FOR OVERRUN.
TOTAL QUANTITIES FOR ONE BOX EQUALS THE QUANTITY FOR TWO HEADWALLS PLUS (L×QUANTITY FOR ONE LIN. FT. BOX)

A.L.C.

HEIGHT OF FILL ALLOWED	TYPE	SPAN S	HEIGHT H	THICKNESS OF SLAB t	SPACING OF BARS V	SIZE OF BARS W	NUMBER OF U BARS PER BOX	LENGTH OF WINGWALL M	DIMENSION N	QUANTITES FOR ONE LIN. FT. OF BOX		QUANTITIES FOR TWO HEADWALLS	
										CONCRETE CU. YDS.	STEEL LBS.	CONCRETE CU. YDS.	STEEL LBS.
11'-6"		5'-0"	7'-0"	10"	4"	1/2"ϕ	24	20'-0"	10"	0.960	79	35.5	3260
7'-0"	8 I	8'-0"	4'-0"	11½"	5½"	1/2"ϕ	24	12'-6"	7"	1.016	100	22.5	1815
			5'-0"	11½"	5½"	1/2"ϕ	26	15'-0"	8"	1.090	103	27.0	2300
			6'-0"	11½"	5½"	1/2"ϕ	28	17'-6"	9"	1.164	106	33.0	2840
			8'-0"	11½"	5½"	1/2"ϕ	32	22'-6"	1'-0"	1.318	116	45.0	4135
8'-6"	8 II	8'-0"	4'-0"	12½"	5"	1/2"ϕ	24	12'-6"	7"	1.078	109	23.5	1850
			5'-0"	12½"	5"	1/2"ϕ	26	15'-0"	8"	1.152	112	27.5	2340
			6'-0"	12½"	5"	1/2"ϕ	28	17'-6"	9"	1.226	115	34.0	2880
			8'-0"	12½"	5"	1/2"ϕ	32	22'-6"	1'-0"	1.374	126	47.0	4190
10'-6"	8 III	8'-0"	4'-0"	13½"	4½"	1/2"ϕ	24	12'-6"	7"	1.140	120	24.0	1910
			5'-0"	13½"	4½"	1/2"ϕ	26	15'-0"	8"	1.214	122	29.5	2415
			6'-0"	13½"	4½"	1/2"ϕ	28	17'-6"	9"	1.288	126	35.5	2965
			8'-0"	13½"	4½"	1/2"ϕ	32	22'-6"	1'-0"	1.436	137	48.5	4290
4'-0"	10 I	10'-0"	4'-0"	13"	5"	1/2"ϕ	28	12'-6"	7"	1.269	126	24.0	1890
			6'-0"	13"	5"	1/2"ϕ	32	17'-6"	9"	1.417	131	35.5	2935
			8'-0"	13"	5"	1/2"ϕ	36	22'-6"	1'-0"	1.566	138	48.5	4250
			10'-0"	13"	5"	5/8"ϕ	40	27'-6"	1'-2"	1.714	156	64.0	5530
6'-0"	10 II	10'-0"	4'-0"	14"	4½"	1/2"ϕ	28	12'-6"	7"	1.343	138	25.0	1965
			6'-0"	14"	4½"	1/2"ϕ	32	17'-6"	9"	1.491	144	37.5	3025
			8'-0"	14"	4½"	1/2"ϕ	36	22'-6"	1'-0"	1.640	151	51.0	4350
			10'-0"	14"	4½"	5/8"ϕ	40	27'-6"	1'-2"	1.788	170	66.0	5650
9'-0"	10 III	10'-0"	4'-0"	15½"	4"	1/2"ϕ	28	12'-6"	7"	1.454	153	27.0	2055
			6'-0"	15½"	4"	1/2"ϕ	32	17'-6"	9"	1.603	160	39.5	3125
			8'-0"	15½"	4"	1/2"ϕ	36	22'-6"	1'-0"	1.751	166	54.0	4475
			10'-0"	15½"	4"	5/8"ϕ	40	27'-6"	1'-2"	1.899	188	69.5	5795
12'-0"	10 IV	10'-0"	4'-0"	17"	3½"	1/2"ϕ	28	12'-6"	7"	1.566	172	29.0	2145
			6'-0"	17"	3½"	1/2"ϕ	32	17'-6"	9"	1.714	179	42.0	3240
			8'-0"	17"	3½"	1/2"ϕ	36	22'-6"	1'-0"	1.862	194	57.0	4610
			10'-0"	17"	3½"	3/4"ϕ	40	27'-6"	1'-2"	2.010	232	73.5	5955

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT, ADOPTED JUNE 1-1937

ALL CONCRETE SHALL BE CLASS "A".

ALL WALLS SHALL HAVE FORMS ON BOTH SIDES.

ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.

ALL BARS SHALL BE DEFORMED.

MINIMUM DISTANCE FROM CENTERLINE OF BARS TO EDGE OF CONCRETE TO BE 2½".

LONG BARS WHEN SPLICED SHALL BE LAPPED TWO FEET.

FOR CULVERTS REQUIRED AND GOVERNING DIMENSIONS SEE SHEET No. 2.

ALL REINFORCING BARS SHALL BE TAGGED WITH THE STATION NUMBER AND LETTER DESIGNATION.

THIS DESIGN NOT TO BE USED WHEN HEIGHT OF FILL OVER BOX EXCEEDS THAT TABULATED AS ALLOWABLE.

POUR WING FOOTINGS MONOLITHICALLY WITH FLOOR OF BOX.

POUR WINGS INDEPENDENT OF SIDES OF BOX.

THE USE OF ADDITIONAL CONSTRUCTION JOINTS UNDESIRABLE, SHOULD FIELD CONDITIONS REQUIRE, CONSTRUCTION JOINTS MAY BE MADE ON A VERTICAL PLANE PERPENDICULAR TO CENTERLINE OF CULVERT, AND SHALL HAVE KEYS AS SHOWN.

SUPPORTING SOILS FOR ALL CULVERTS MUST BE COMPOSED OF FIRM AND UNIFORM MATERIAL THROUGHOUT.

ALL BACKFILLING TO AND OVER CULVERTS SHALL BE LAID IN LAYERS NOT EXCEEDING SIX INCHES IN DEPTH AND EACH LAYER SHALL BE ROLLED OR HAND TAMPED WHERE INACCESSIBLE TO ROLLER. ALSO MOISTENED WHEN NECESSARY.

LOADING DATA
L.L.=A.A.S.H.O. 1935 CLASS "A" (H-15)

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
CONCRETE BOX CULVERT
8 FT. x 4 FT. 5 FT. x 7 FT. 10 FT. x 6 FT.
8 FT. x 5 FT. 8 FT. x 8 FT. 10 FT. x 8 FT.
8 FT. x 6 FT. 10 FT. x 4 FT. 10 FT. x 10 FT.

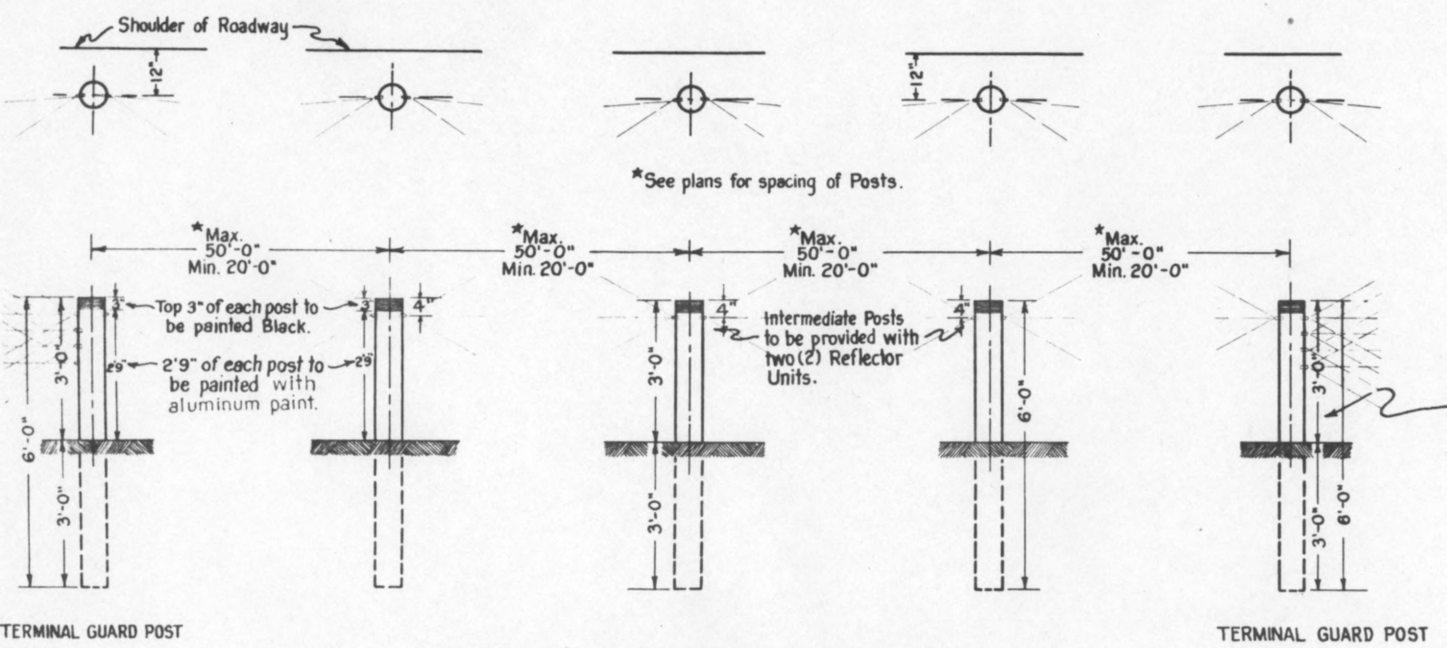
Designed by A.G.K. Made by A.G.K. Checked by A.L.C.	Approved by P. S. Bailey Bridge Engineer Date: 7-20, 1932

REVISIONS

STANDARD M-19-A

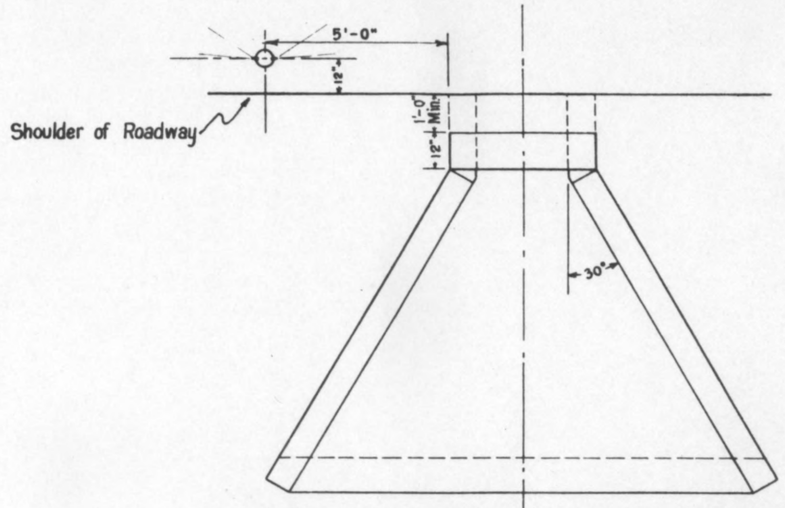
FED. ROAD DIST. NO.	STATE	F.A.P.	SHEET NO.	TOTAL SHEETS
3	COLO.	259-H(1) $\frac{R}{2}$	18a	

Revised 3-26-37
Revised 6-1-37 A.G.K. Changed to 1937 Specifications.
Revised 12-16-37 P.B.B.
Revised 1-10-38 P.B.B.
Revised 7-7-38 P.B.B.
Revised 10-14-38 P.B.B.


Shoulder of Roadway
12"
12"
*See plans for spacing of Posts.
*Max. 50'-0" Min. 20'-0"
*Max. 50'-0" Min. 20'-0"
*Max. 50'-0" Min. 20'-0"
*Max. 50'-0" Min. 20'-0"
Top 3" of each post to be painted Black.
2'9" of each post to be painted with aluminum paint.
3"
2'9"
4"
Intermediate Posts to be provided with two (2) Reflector Units.
3'-0"
6'-0"
TERMINAL GUARD POST
TERMINAL GUARD POST

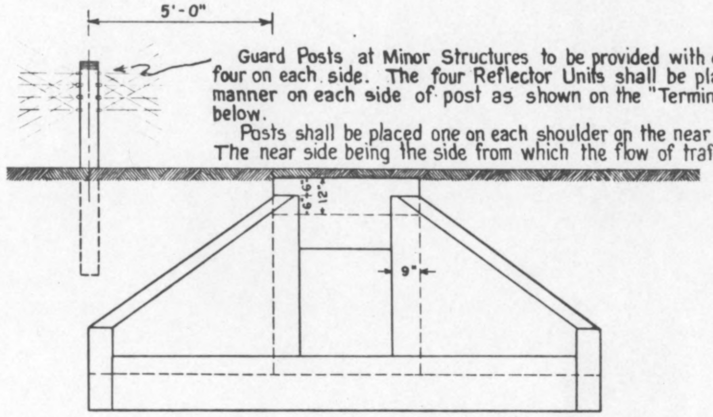
Terminal Guard Posts to be provided with Reflector Units as shown on the detail for "TERMINAL GUARD POST."

SHOWING PLACEMENT ON NORMAL ROADWAY FILLS


5'-0"
12"
Shoulder of Roadway
1'-0" Min.
12"
30°

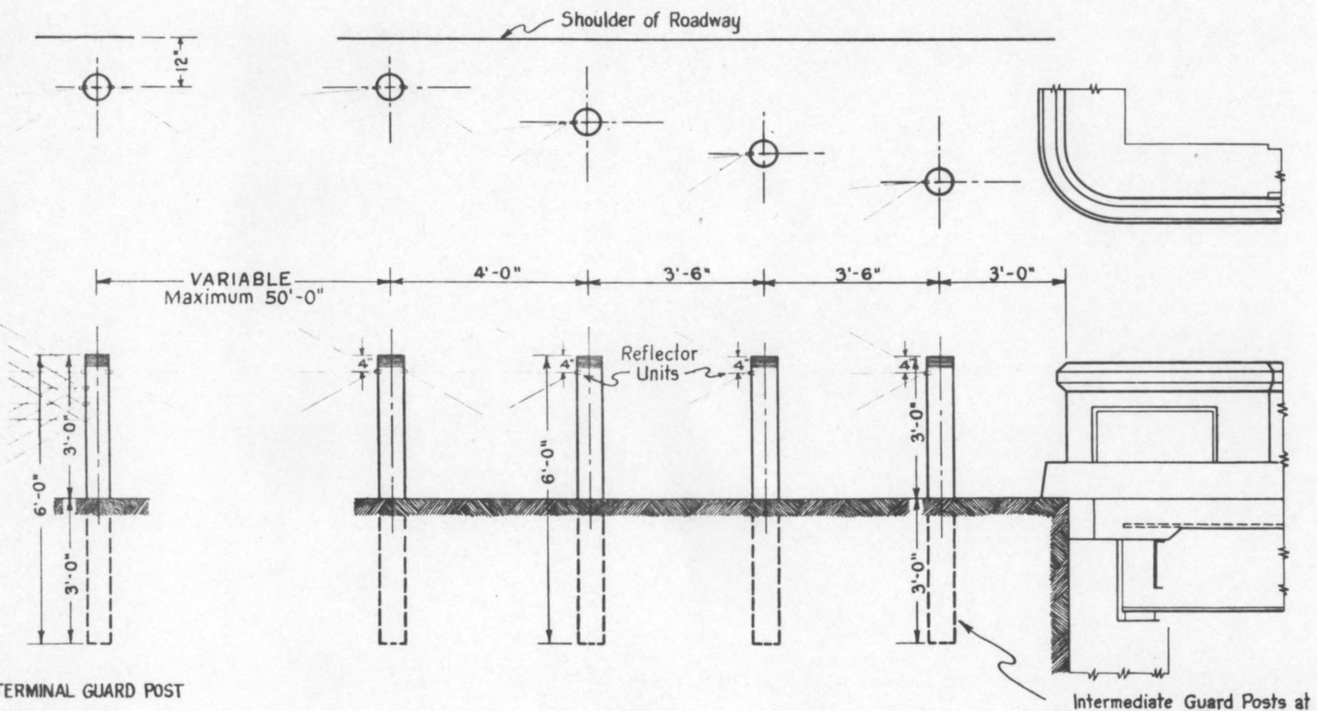
NOTE: Posts to be required as shown only when Headwalls are within 5 ft. of shoulder of roadway.

SHOWING PLACEMENT AT MINOR STRUCTURES



Guard Posts at Minor Structures to be provided with eight Reflector Units, four on each side. The four Reflector Units shall be placed in the same manner on each side of post as shown on the "Terminal Guard Post" detail below.

Posts shall be placed one on each shoulder on the near side of the structure. The near side being the side from which the flow of traffic approaches.


Shoulder of Roadway
12"
VARIABLE Maximum 50'-0"
4'-0"
3'-6"
3'-6"
3'-0"
Reflector Units
4"
3'-0"
6'-0"
TERMINAL GUARD POST

Intermediate Guard Posts at Bridges to be provided with Reflector Units as shown; that is, one Unit each on the three Posts nearest the bridge-end and two Units on the fourth Post.

SHOWING PLACEMENT AT BRIDGE APPROACHES

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, adopted on June 1-1937.

All wood posts shall be made from seasoned, straight, sound, Lodge Pole Pine, Southern Yellow Pine, or West Coast Douglas Fir.

No section of wood posts shall be less than 6" in diameter.

All wood posts shall be entirely peeled and shaved, thoroly seasoned and dry, with square tops. Posts shall not be treated.

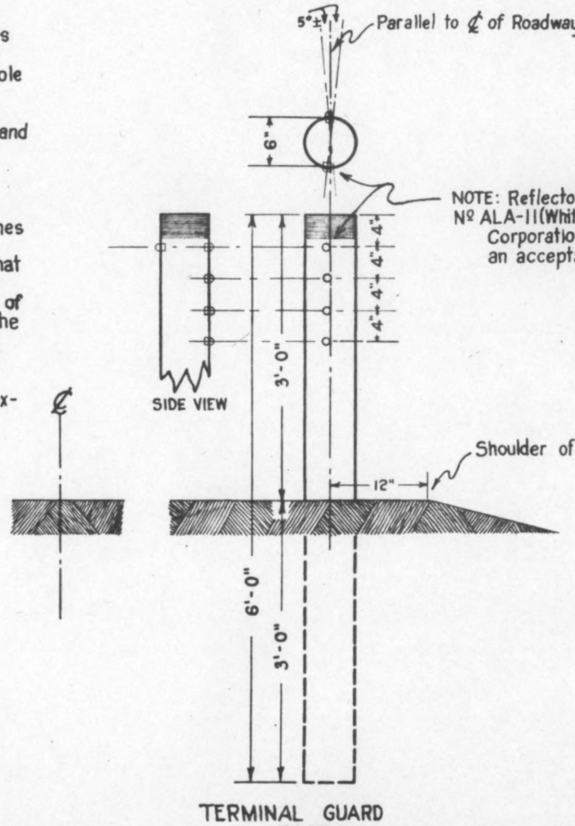
All wood posts shall be set and tamped in plumb and firm, to the lines and grades as directed by the Engineer.

Reflector Units in all posts shall be placed in such position that the units will function at a distance of 500 feet.

On tangents the Reflector Units shall be placed at an angle of approximately five degrees to a line parallel to the center line of the highway.

In all instances a test shall be made to assure the position of the Reflector Units to be the most effective possible.

The diameter of holes drilled in the posts shall be drilled approximately one-sixteenth (1/16) inch less than the diameter of the signal button base. In all instances the hole shall be enough undersize that the button when driven into the post shall have complete bond with the post, and be securely locked in correct position.


5°±
Parallel to ℄ of Roadway
6"
4"
4"
4"
4"
SIDE VIEW
℄
3'-0"
6'-0"
3'-0"
12"
Shoulder of Roadway

NOTE: Reflector Units shall be "Signal Service" Nº ALA-11 (White Crystal) of the Signal Service Corporation of Elizabeth, New Jersey, or an acceptable equivalent.

TERMINAL GUARD POST

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
TIMBER GUARD
POSTS

Designed
Made by P.B.B.
Checked by J.M.

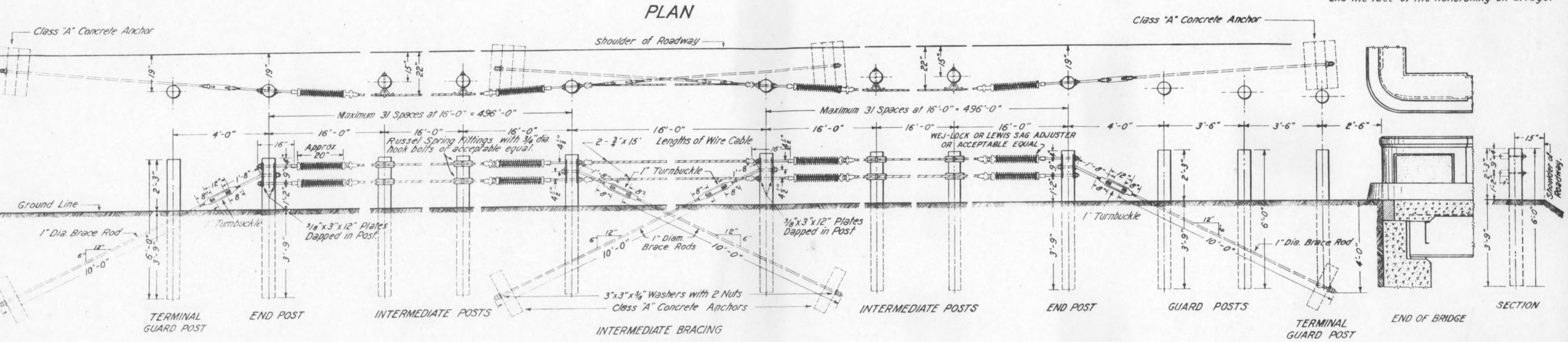
Approved by
J. H. Marshall
Date: 12 193

REVISIONS
REV. 5-18-37 - E.L.K. NOTES RE. BRIDGE & SIDEWALK
Rev. 6-1-37. A.O.K. (1937 Specifications)
Rev. 3-25-38. A.G.K. Added paint note for W.I. posts.

STANDARD M-20-B

FED. ROAD DIST. NO.	STATE	F.A.P.	SHEET NO.	TOTAL SHEETS
3	COLO.	259-HW 2	19a	

NOTE: The 3 guard posts between the End Post and the end of bridge railings shall be so placed that the faces of the posts are in a direct line between the face of the end post and the face of the handrailing on bridge.


PLAN
Class "A" Concrete Anchor
Shoulder of Roadway
19"
19"
15"
22"
22"
15"
19"
Class "A" Concrete Anchor
Maximum 31 Spaces at 16'-0" = 496'-0"
Maximum 31 Spaces at 16'-0" = 496'-0"
4'-0"
16'-0"
16'-0"
16'-0"
16'-0"
16'-0"
16'-0"
16'-0"
4'-0"
3'-6"
3'-6"
2'-6"
15"
16"
Approx. 20"
Russel Spring Fittings with 3/4" dia. hook bolts or acceptable equal.
2 - 3/4" x 15' Lengths of Wire Cable
WEJ-LOCK OR LEWIS SAG ADJUSTER OR ACCEPTABLE EQUAL
1" Turnbuckle
4 1/2"
9"
1'-8"
12"
8"
2'-3"
1'-2"
Ground Line
1" Turnbuckle
1" Dia. Brace Rod
3/8"x3"x12" Plates Dapped in Post
3/8"x3"x12" Plates Dapped in Post
1" Diam. Brace Rods
10'-0"
6"
6'-0"
3'-9"
3'-9"
1" Dia. Brace Rod
3"x3"x3/8" Washers with 2 Nuts
Class "A" Concrete Anchors
Shoulder of Roadway
TERMINAL GUARD POST
END POST
INTERMEDIATE POSTS
INTERMEDIATE BRACING
INTERMEDIATE POSTS
END POST
GUARD POSTS
TERMINAL GUARD POST
END OF BRIDGE
SECTION

ELEVATION
ITEM Nº74.

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, adopted June 1-1937.

The length of guard fence to be paid for and designated on plans shall be measured from terminal guard post to terminal guard post.

When continuous wire cable fence is more than 500 Ft. in length it shall have intermediate bracing complete with turnbuckles.

All wood posts shall be made from seasoned, straight, sound Lodge Pole Pine, Southern Yellow Pine, or West Coast Douglas Fir.

No section of wood posts shall be less than 6" diameter.

All wood posts shall be entirely peeled and shaved, thoroly seasoned and dry, with square tops and all holes to be drilled 1/32" larger than diameter of bolt or rod before treatment is applied.

All wood posts shall be pressure treated with creosote for the full length of posts, as provided for in the Specifications.

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

Standard galvanized cast iron O.G. or galvanized malleable cast washers shall be used under all bolt heads and nuts coming in contact with wood posts.

Only one style of eyebolts, turnbuckles, and other fittings may be used on a project.

Turnbuckles on all brace rods shall be so placed that the entire turnbuckle clears the ground line.

All sag adjusters shall be compressed a minimum of 1" @ 100°F to allow for initial tension in the cable. The adjusted amount of compression of springs due to temperature shall be figured in the following manner. For every 10° of temperature below 100°F an additional 1/32" of compression per 100 ft. of cable shall be used. Illustration: Length between end posts- 400ft, Temp. 40°F; $(4 \times 6 \times 1/32)+1 = 1\tfrac{3}{4}$".

Sag adjusters and appurtenances shall be either hot dip galvanized or painted with 2 coats of approved aluminum paint. Paint and painting shall conform to requirements of Item 41 of the Standard Specifications.

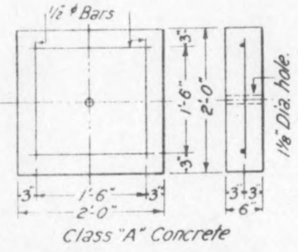
Where sidewalks are constructed adjacent to the lane for traffic, Guard Fence shall be placed in such manner that the cable lies on the line between the sidewalk area and the normal roadway shoulder.

Where Guard Fences are constructed on the approaches to bridges with sidewalks, the cable at bridge shall be placed in line with the face of the curbing on the bridge.

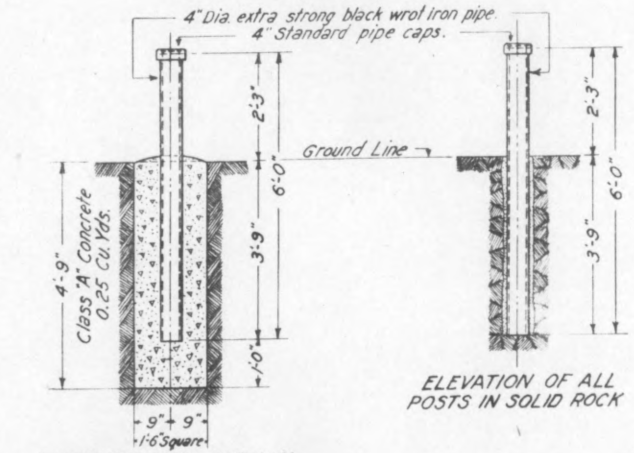
Note!
All wrot iron posts shall have one shop coat, red lead, and two coats aluminum as specified under item Nº 41.

NOTE: Holes in rock shall be constructed as near as possible to diameter of pipe, the remaining space between pipe and wall of hole to be filled with cement grout.

Holes necessary for type of fence used shall be drilled in pipe posts.


1/2" ⌀ Bars
3"
1'-6"
2'-0"
3"
1'-6"
3"
2'-0"
3"
3
6"
1 1/8" Dia. hole

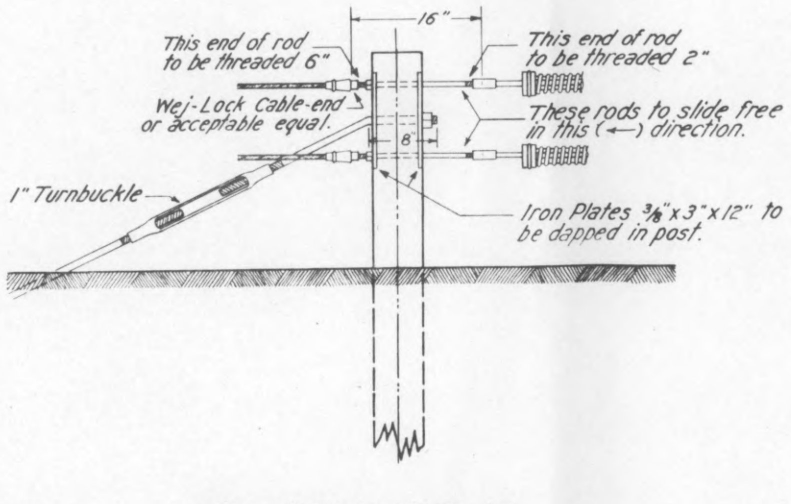
Class "A" Concrete
DETAIL OF ANCHORS


4" Dia. extra strong black wrot iron pipe.
4" Standard pipe caps.
2'-3"
6'-0"
3'-9"
1'-0"
4'-9"
Class "A" Concrete 0.25 Cu. Yds.
9"
9"
1'-6" square
Ground Line
2'-3"
6'-0"
3'-9"

ELEVATION OF ALL POSTS IN MATERIAL OTHER THAN SOLID ROCK

ELEVATION OF ALL POSTS IN SOLID ROCK

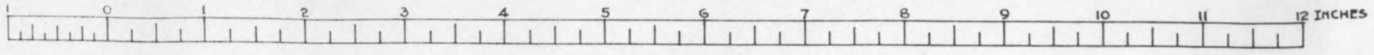
DETAILS FOR WROT IRON PIPE
ITEM Nº74b.


16"
This end of rod to be threaded 6"
This end of rod to be threaded 2"
Wej-Lock Cable-end or acceptable equal.
These rods to slide free in this (←) direction.
8"
1" Turnbuckle
Iron Plates 3/8"x3"x12" to be dapped in post.

SIDE VIEW OF POST AT INTERMEDIATE BRACING

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
WIRE CABLE GUARD
FENCE

Designed by R.E.L.
Made by P.B.B.
Checked by
Approved by John L Marshall
Date. May 5, 1937



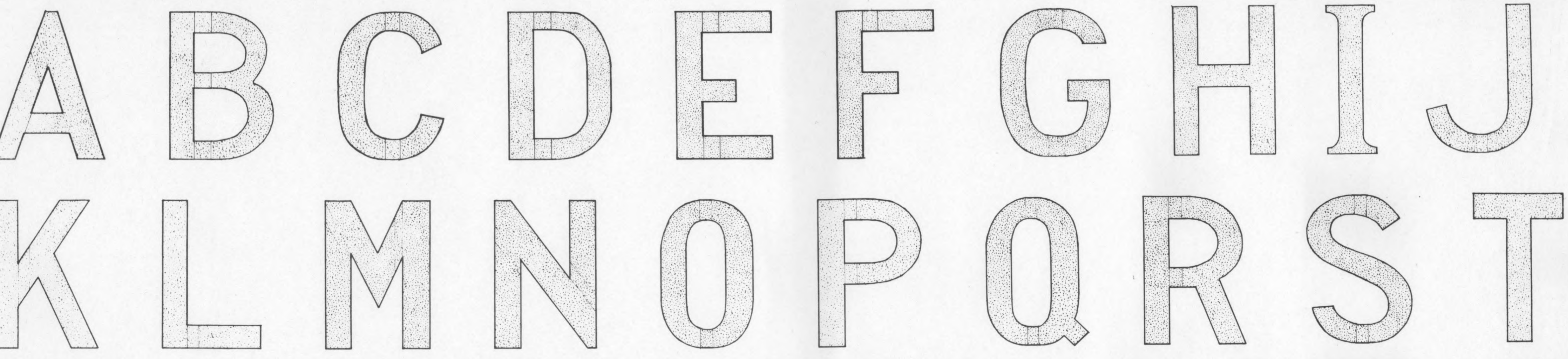
SCALE OF LETTERING

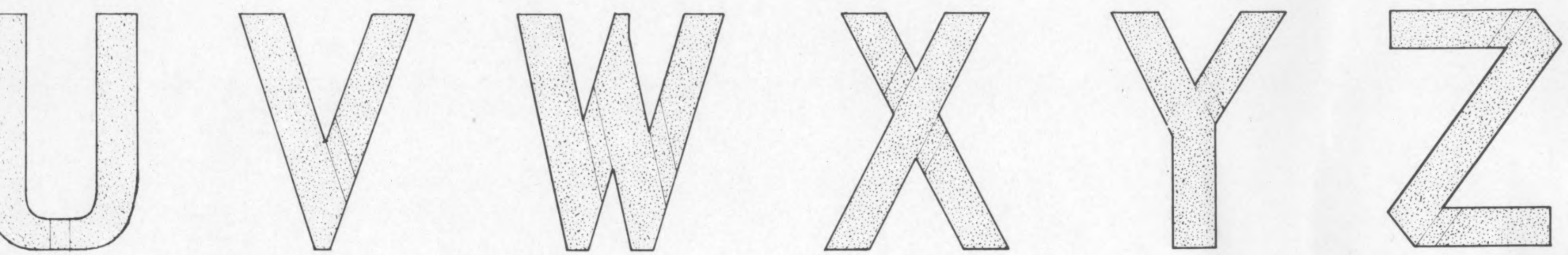
STANDARD M-10-A

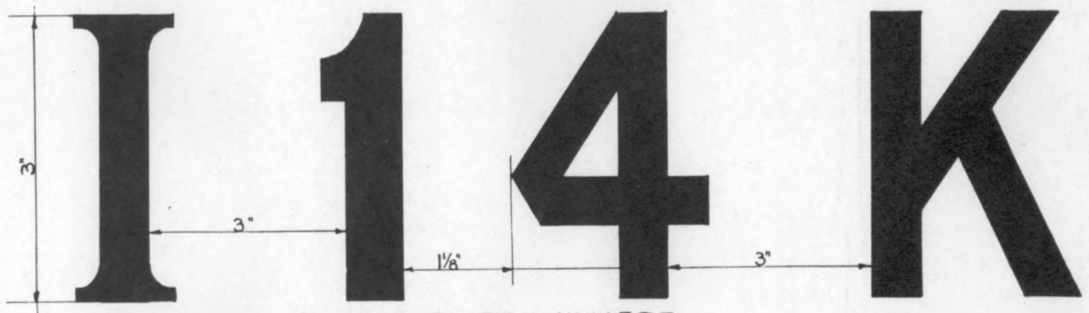
[redacted]

FED. ROAD DIST. NO.	STATE	F.A.P. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259-H(1)#2	21a	[redacted]

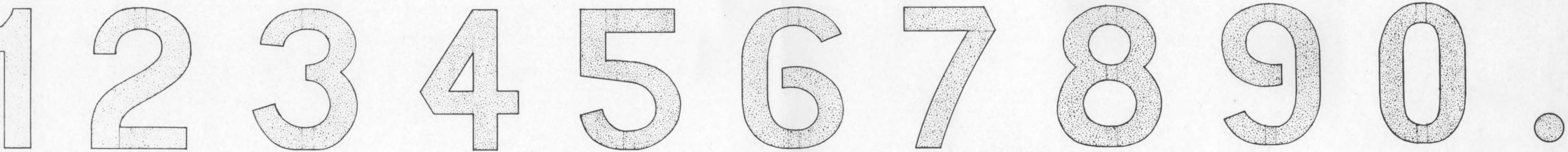
Revised 3-11-1936 A.G.K. Changed to 1935 Specifications.
Revised 6-1-37. A.G.K. Changed to 1937 Specifications.

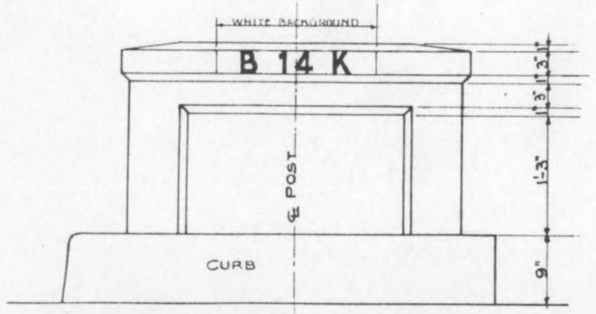




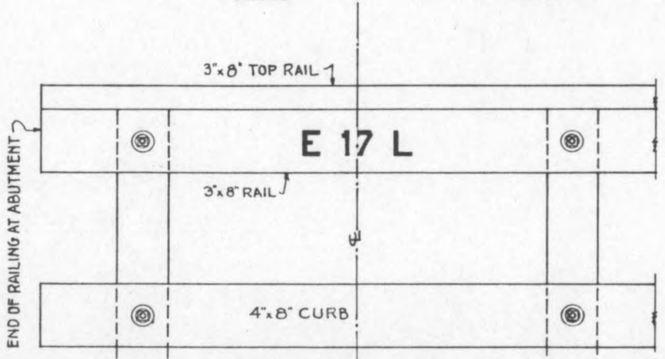


SAMPLE BRIDGE NUMBER





TYPICAL CONCRETE ENDPOST.



· TYPICAL TIMBER WING ·

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT. ADOPTED JUNE 1-1937.

THE STRUCTURE NUMBER SHALL BE STENCILED ON THE RIGHT HAND SIDE OF EACH BRIDGE END AS SHOWN ON THIS STANDARD AND AS SPECIFIED.

THE CORRECT NUMBER FOR EACH BRIDGE IS SHOWN IN THE LOWER RIGHT HAND CORNER OF THE DETAIL SHEETS FOR THAT PARTICULAR BRIDGE.

THE SIZE, SHAPE AND SPACING OF THE LETTERS AND FIGURES SHALL BE IDENTICAL WITH THE FULL SIZE SHOWN ON THIS SHEET. ADDITIONAL COPIES OF THIS FULL SIZE SHEET CAN BE OBTAINED FROM THE DEPARTMENT WITHOUT CHARGE.

BEFORE STENCILING THE NUMBER ON THE BRIDGE, THE SURFACE MUST BE THOROLY CLEANED. A PROPER WHITE BACKGROUND SHALL BE PAINTED ON CONCRETE SURFACES. ON TIMBER HANDRAILS THE WHITE PAINT USED ON THE BRIDGE WILL BE SATISFACTORY. ON CONCRETE ENDPOSTS THE DRY CONCRETE SURFACE SHALL BE PROPERLY SIZED BEFORE PLACING THE WHITE RECTANGLE, UNLESS AN APPROVED WHITE CONCRETE PAINT IS USED.

TWO COATS OF ACCEPTABLE WHITE PAINT SHALL BE APPLIED TO THE CONCRETE IN A NEAT RECTANGULAR SHAPE AND EXTEND THREE INCHES BEYOND THE LIMITS OF THE STRUCTURE NUMBER.

AFTER THIS WHITE BACKGROUND HAS DRIED SUFFICIENTLY, THE CORRECT STRUCTURE NUMBER SHALL BE CAREFULLY STENCILED ON IT WITH TWO COATS OF STANDARD "C-SECOND FIELD COAT DARK" AS SPECIFIED UNDER ITEM 41 "STEEL BRIDGES. 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 THE PRECEDING COAT TO DRY.

THIS WORK WILL NOT BE PAID FOR AS A SEPERATE ITEM. COMPENSATION SHALL BE INCLUDED IN THE ORIGINAL CONTRACT ITEMS.

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD STRUCTURE
NUMBER LETTERING.
Across
Sta.
Near Sec. T. R.

Designed by G.H.D. Made by G.H.D. Check Design Check Detail	Approved by P. S. Bailey Bridge Engineer Date: Feb. 6th 1935.

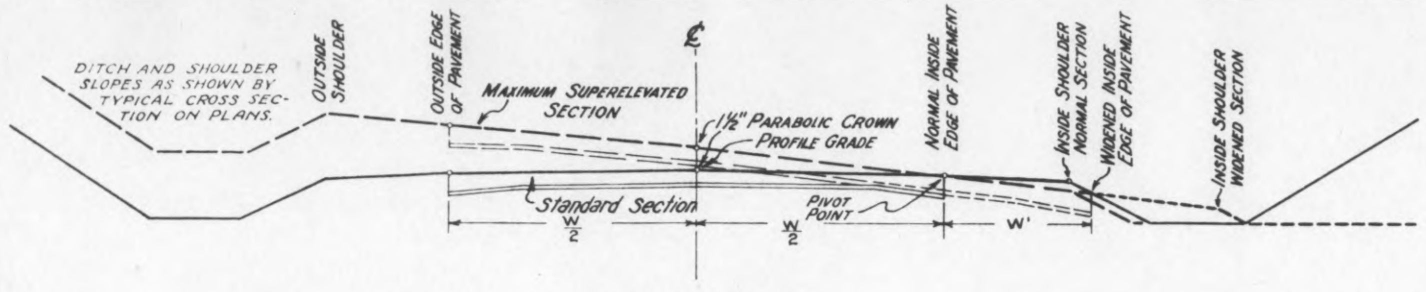
STRUCTURE NO.________

REVISIONS

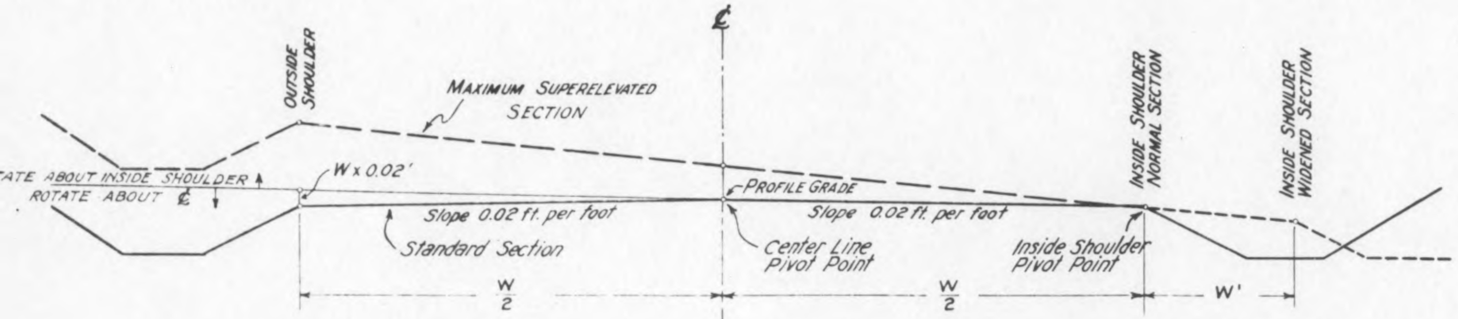
STANDARD M-I-B

FED. ROAD DIST. NO.	STATE	F.A.P.	SHEET NO.	TOTAL SHEETS
3	COLO	259-H(1)^2	22a	

Rev. 11-2-38 P.B.B. Widening Trans'n.


DITCH AND SHOULDER SLOPES AS SHOWN BY TYPICAL CROSS SECTION ON PLANS.
OUTSIDE SHOULDER
OUTSIDE EDGE OF PAVEMENT
MAXIMUM SUPERELEVATED SECTION
℄
1½" PARABOLIC CROWN
PROFILE GRADE
NORMAL INSIDE EDGE OF PAVEMENT
INSIDE SHOULDER NORMAL SECTION
WIDENED INSIDE EDGE OF PAVEMENT
INSIDE SHOULDER WIDENED SECTION
Standard Section
PIVOT POINT
W/2
W/2
W'

PAVEMENT SECTION

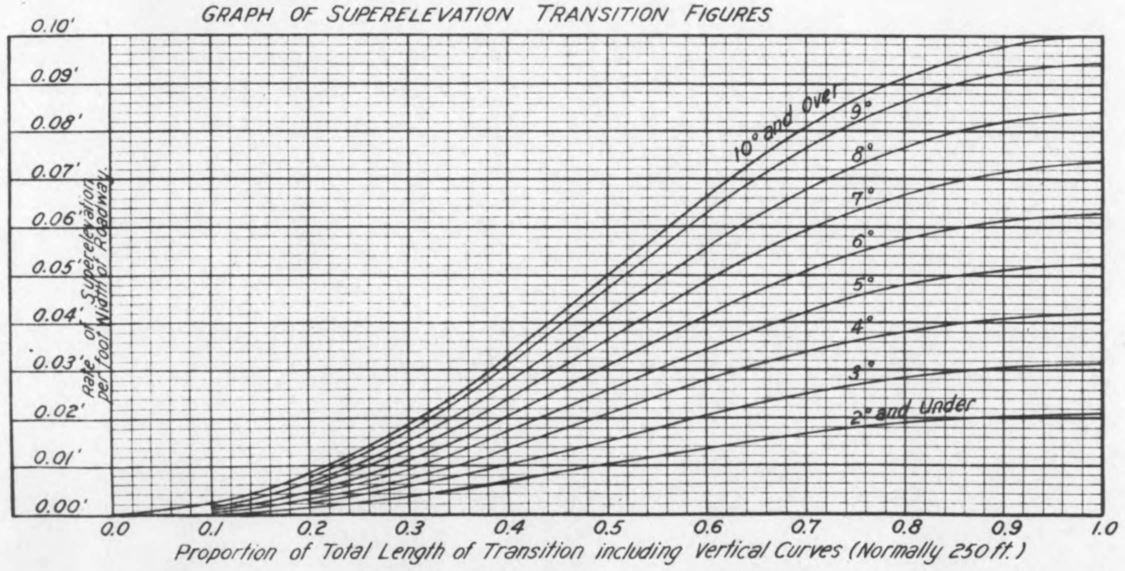

OUTSIDE SHOULDER
MAXIMUM SUPERELEVATED SECTION
℄
INSIDE SHOULDER NORMAL SECTION
INSIDE SHOULDER WIDENED SECTION
ROTATE ABOUT INSIDE SHOULDER
ROTATE ABOUT ℄
W x 0.02'
PROFILE GRADE
Slope 0.02 ft. per foot
Slope 0.02 ft. per foot
Standard Section
Center Line Pivot Point
Inside Shoulder Pivot Point
W/2
W/2
W'

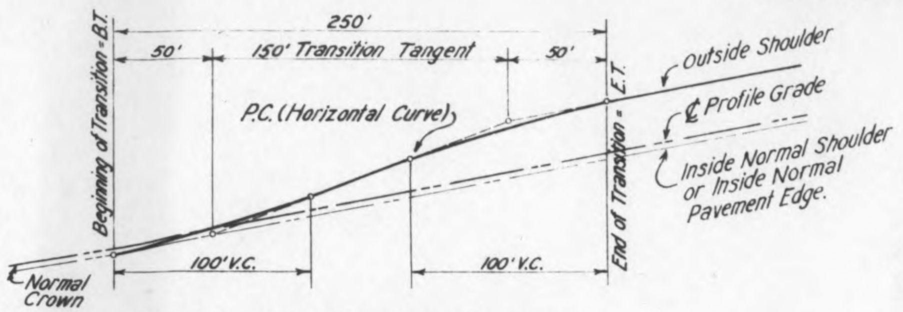
GRADED OR SURFACED SECTION

SUPERELEVATION AND WIDENING TABLES

DISTANCE FROM B.T. (PROPORTION)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Max. 1.0
Degree of Curvature	RATE OF SUPERELEVATION (IN FEET) PER FOOT WIDTH OF ROADWAY									
2° and Under	0.00044	0.00175	0.00394	0.00700	0.01050	0.01400	0.01706	0.01925	0.02056	0.02100
3°	0.00066	0.00263	0.00591	0.01050	0.01575	0.02100	0.02559	0.02888	0.03084	0.03150
4°	0.00088	0.00350	0.00788	0.01400	0.02100	0.02800	0.03413	0.03850	0.04113	0.04200
5°	0.00109	0.00438	0.00984	0.01750	0.02625	0.03500	0.04266	0.04813	0.05141	0.05250
6°	0.00131	0.00525	0.01181	0.02100	0.03150	0.04200	0.05119	0.05775	0.06169	0.06300
7°	0.00153	0.00613	0.01378	0.02450	0.03675	0.04900	0.05972	0.06738	0.07197	0.07350
8°	0.00175	0.00700	0.01575	0.02800	0.04200	0.05600	0.06825	0.07700	0.08225	0.08400
9°	0.00197	0.00788	0.01772	0.03150	0.04725	0.06300	0.07678	0.08663	0.09253	0.09450
10° and Over	0.00208	0.00833	0.01875	0.03333	0.05000	0.06667	0.08125	0.09166	0.09792	0.10000
	OFFSETS FOR WIDENING - W' - (IN FEET)									
Over 10° - Under 12°	0.03	0.12	0.27	0.48	0.75	1.08	1.47	1.92	2.43	3.00
" 12° - " 15°	0.04	0.16	0.36	0.64	1.00	1.44	1.96	2.56	3.24	4.00
" 15° - " 20°	0.05	0.20	0.45	0.80	1.25	1.80	2.45	3.20	4.05	5.00
" 20°	0.06	0.24	0.54	0.96	1.50	2.16	2.94	3.84	4.86	6.00

GRAPH OF SUPERELEVATION TRANSITION FIGURES

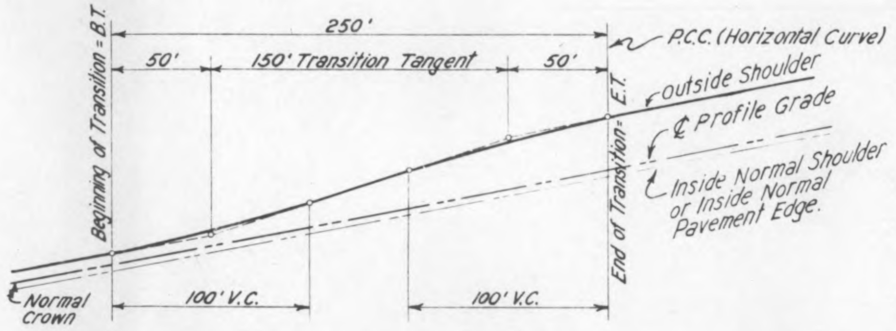



Beginning of Transition = B.T.
250'
50'
150' Transition Tangent
50'
E.T.
End of Transition = E.T.
Outside Shoulder
℄ Profile Grade
Inside Normal Shoulder or Inside Normal Pavement Edge.
P.C. (Horizontal Curve)
100' V.C.
100' V.C.
Normal Crown

CASE I: SIMPLE CURVE WITH UNLIMITED TANGENT APPROACH

NOTE: CASE I

The transition in this case, from crowned section to superelevated section, shall proceed uniformly by raising the outside shoulder, over a distance of 250 ft. as shown, beginning at a point on the tangent 150 ft. from the end of the curve and acquiring full superelevation at a point 100 ft. inside the curve.


Beginning of Transition = B.T.
250'
50'
150' Transition Tangent
50'
P.C.C. (Horizontal Curve)
E.T.
End of Transition = E.T.
Outside Shoulder
℄ Profile Grade
Inside Normal Shoulder or Inside Normal Pavement Edge.
100' V.C.
100' V.C.
Normal Crown

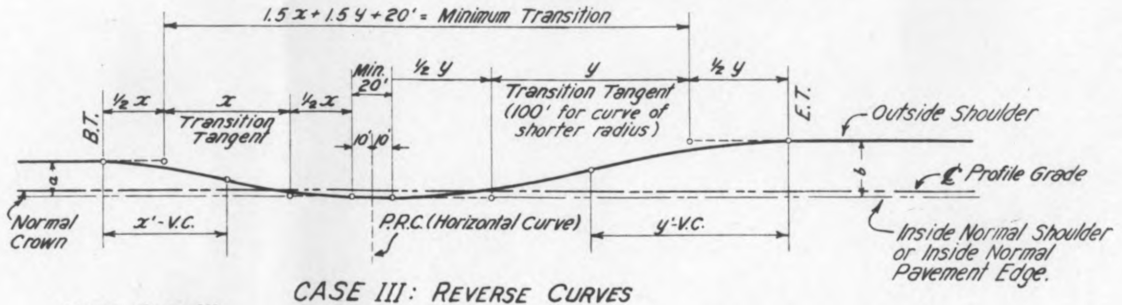
CASE II: COMPOUND CURVE

NOTE: CASE II

Superelevation transitions at the outside ends of compound curves shall be constructed in accordance with rules given under CASE I.

Superelevation transition between the arcs of different radii shall be made as in CASE I, except that the entire transition shall lie within the limits of the curve of the longer radius.

In cases where curves in the same direction have a tangent distance of less than 300 ft. between points of curve, the intervening tangent shall be superelevated an amount equal to that of the curve of greater radius and the transition shall be made as in the case of a true compound curve.


1.5 x + 1.5 y + 20' = Minimum Transition
B.T.
½ x
x
Transition Tangent
½ x
Min. 20'
10' 10'
½ y
y
Transition Tangent (100' for curve of shorter radius)
½ y
E.T.
Outside Shoulder
℄ Profile Grade
a
b
Normal Crown
x' - V.C.
P.R.C. (Horizontal Curve)
y' - V.C.
Inside Normal Shoulder or Inside Normal Pavement Edge.

CASE III: REVERSE CURVES

NOTE: CASE III

Transitions between true reverse curves shall be accomplished as shown on the above diagram.

Transition tangents shall be directly proportional to the amount of superelevation of the respective curves.

EXAMPLE: Let a represent the amount of superelevation on 1st curve;
" b " " " " " " 2nd " ;
" x " " " " transition tangent on 1st " ;
" y " " " " " " " 2nd " ;
then, $a:b = x:y$.

The transition tangent of the curve having the shorter radius shall be set at 100 ft.

A normal crowned section 20 ft. long, 10 ft. on each side of the P.R.C. shall be used.

In cases where curves in opposite directions are in such proximity that a standard transition can not be had, the practice outlined for true reversing curves shall be used.

The total distance between the P.T. of the first curve and the P.C. of the succeeding curve shall be prorated into the transition distance of the respective curves until a maximum of 150 ft. of transition tangent for each curve is achieved.

GENERAL NOTES

Curves on projects using the Sections shown are to be superelevated and widened as indicated in the accompanying drawings and tables.

The normal inside edge of the Pavement slab is to remain at the standard elevation of 0.125 ft. below the profile grade, and the outside edge of the slab is to be superelevated at the rate per foot width of roadway given in the table. The Section is to be rotated about the normal inside edge of the Pavement, with a 1½" parabolic crown for curves of 10° and under, and a flat crown for widened Sections.

The normal inside edge of the Graded or Surfaced Section is to remain at the standard elevation of 0.02 ft. per foot width of roadway below the profile grade, or as shown on the Typical Section for the Project. Also, the center-line pivot point is to be used until the superelevation equals 0.02 ft. per foot width of roadway, but when this elevation is exceeded the normal inside shoulder pivot point is to be used.

When the degree of curvature exceeds 10°, the inside edge of the Pavement slab or the inside shoulder of the Graded or Surfaced Section is to be widened from the normal inside edge or shoulder, respectively, as shown by the table and plan or by cross-sections. Curves of 10° or less are not to be widened.

The slope of the shoulders and widened sections shall conform to the rate per foot width of roadway required, except that the inside shoulder of paved sections shall maintain the Typical Section slope until this slope is exceeded by the required superelevation slope.

The outside ditch on superelevated Sections is to be modified, where necessary to provide drainage. Otherwise, this ditch shall conform to normal ditch section shown for Project.

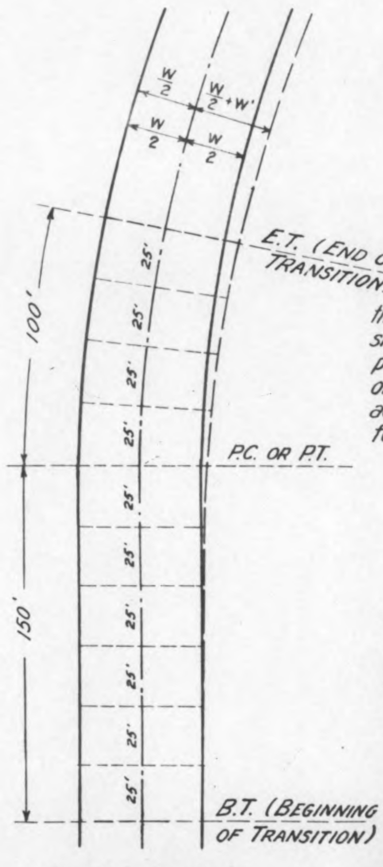
The rate of superelevation per foot width of roadway to be applied at the outside shoulder of the roadway is computed as follows:

The full superelevation per foot width of roadway rate for a given degree of curvature is

0.0105 ft. x Degree of Curvature.

The maximum superelevation of 0.10 ft. per foot width, applying to curves of 10° and over, is not to be exceeded.

Special transition problems not covered by this standard sheet shall be covered by appropriate notes included with curve data on plans.


W/2
W/2 + W'
W/2
W/2
E.T. (END OF TRANSITION)
100'
25'
25'
25'
25'
P.C. OR P.T.
150'
25'
25'
25'
25'
25'
25'
B.T. (BEGINNING OF TRANSITION)

Curves of over 10° are to have the inside portion of the pavement slab and shoulder, or the inside portion and shoulder in a graded or surfaced section, widened in accordance with the plan, offsets for widening, and cross sections.

GENERAL PLAN OF WIDENING

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
METHODS FOR
SUPERELEVATION &
WIDENING OF CURVES

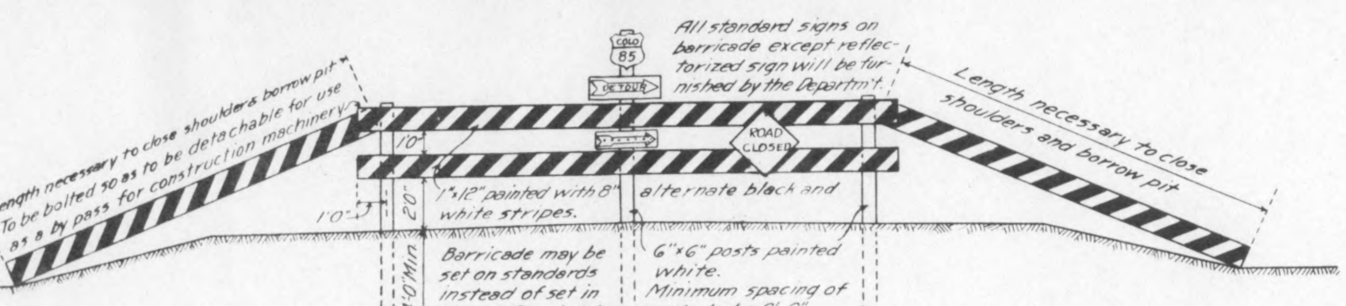
Designed by R.E.L. Made by P.B.B. Checked by F.F.S. & P.B.B.	Approved by J.S. Marshall Date FEB. 23RD 1937

STANDARD
M-2-B

FED. ROAD DIST. NO.	STATE	F.A.P. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259-H(1)#2	23a	

Revised 6-1-37. A.B.K. Changed to 1937 Specifications.

DETAILS OF PERMANENT BARRICADE



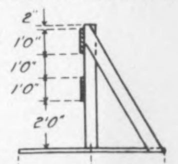
Length necessary to close shoulders borrow pit
To be bolted so as to be detachable for use as a by pass for construction machinery
COLO 85
DETOUR
ROAD CLOSED
1'0"
2'0"
1'0"
4'0" Min.
1"x12" painted with 8" alternate black and white stripes.
6"x6" posts painted white.
Minimum spacing of posts to be 8'-0".
Barricade may be set on standards instead of set in ground. See sketch.
Length necessary to close shoulders and borrow pit

All standard signs on barricade except reflectorized sign will be furnished by the Departm't.

Barricade to be of sufficient length to entirely close road surface.

Barricades to be placed as construction conditions require.

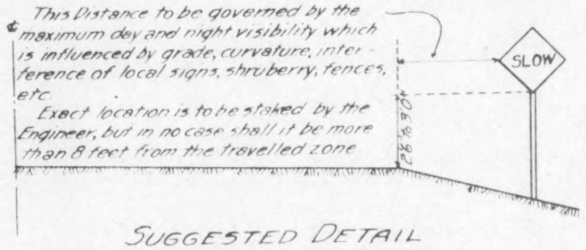
END VIEW OF PORTABLE BARRICADE



2"
1'0"
1'0"
1'0"
2'0"
3'0"
3'0"

Posts to be 6"x6" painted white. Base and brace to be 2"x6", painted white, and nailed with 12d nails. Base to be weighted if necessary for stability.

POSITION OF SIGNS RELATIVE ROAD BED

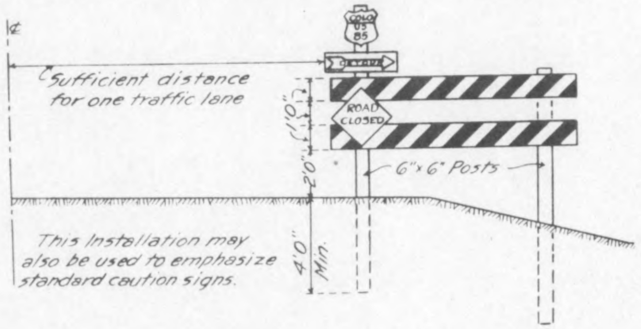


℄
SLOW
2'6" to 3'0"

This Distance to be governed by the maximum day and night visibility which is influenced by grade, curvature, interference of local signs, shruberry, fences, etc.

Exact location is to be staked by the Engineer, but in no case shall it be more than 8 feet from the travelled zone.

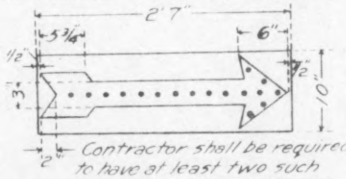
DETAILS OF PARTIAL BARRICADE



℄
Sufficient distance for one traffic lane
COLO US 85
DETOUR
ROAD CLOSED
(1'0")
2'0"
6"x6" Posts
4'0" Min.

This Installation may also be used to emphasize standard caution signs.

SUGGESTED DETAIL OF REFLECTORIZED ARROW

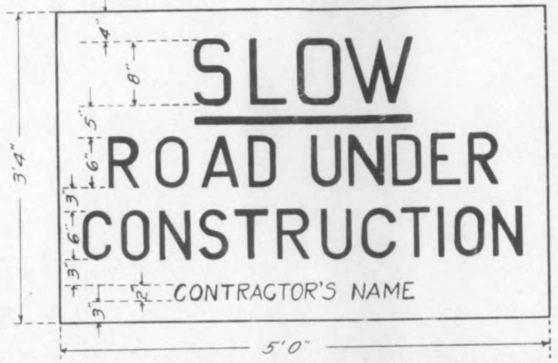


2'7"
5 3/16"
6"
1/2"
3"
1/2"
10"
2"

Contractor shall be required to have at least two such arrows for use on barricades at the ends of each project.

Reflector Buttons shall be of a type and size, and the sign shall be subject to Department approval.

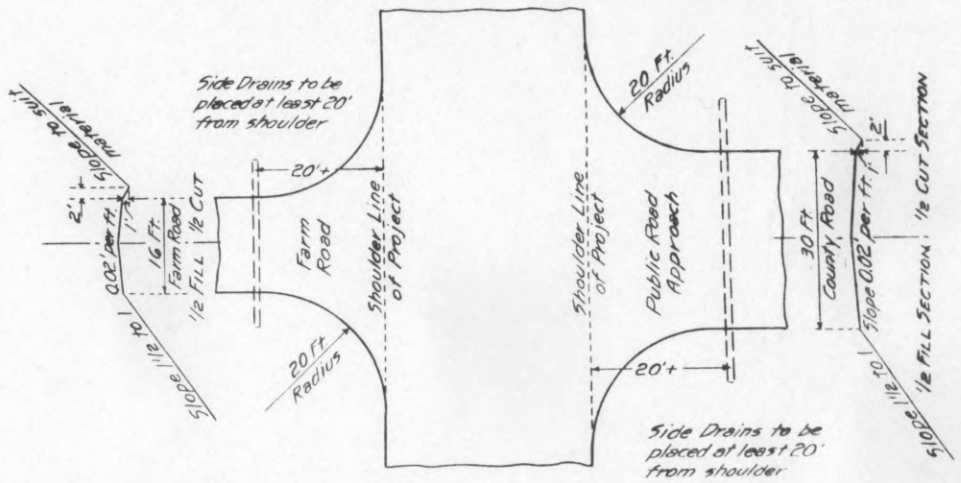
DETAILS OF ROAD UNDER CONSTRUCTION SIGN



SLOW
ROAD UNDER
CONSTRUCTION
CONTRACTOR'S NAME
4"
8"
5"
6"
3"
6"
3"
2"
3"
3'4"
5'0"

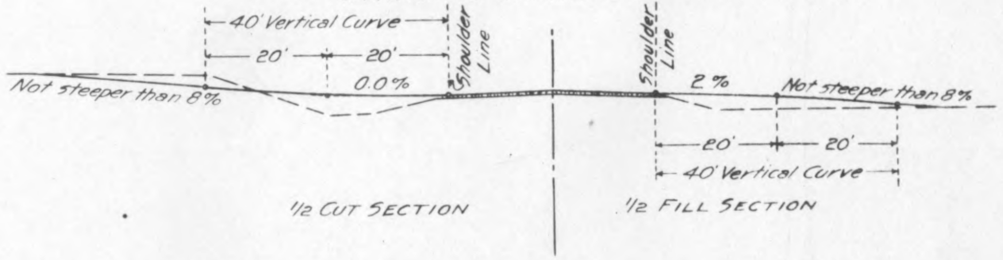
Sign to be made on 1" material with at least three cleats on the back. Background to be white, SLOW and underline to be red, and other lettering to be black. Sign to be set on 2-6"x6" posts 4 ft. in the ground.

TYPICAL PLAN FOR SIDE APPROACH ROADS



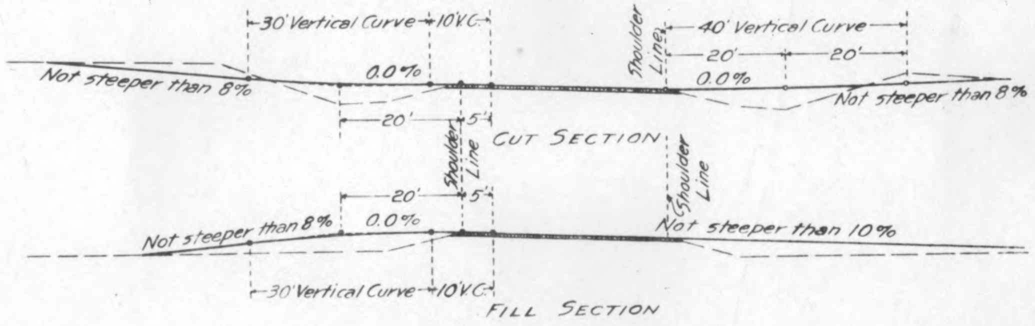
Side Drains to be placed at least 20' from shoulder
Slope to suit material
2'
1'
0.02' per Ft.
16 Ft. Farm Road
1/2 CUT
1/2 FILL
Slope 1 1/2 to 1
20'+
Farm Road
Shoulder Line of Project
20 Ft. Radius
20 Ft. Radius
Shoulder Line of Project
Public Road Approach
20'+
30 Ft. County Road
Slope 0.02' per Ft.
2'
1'
1/2 CUT SECTION
1/2 FILL SECTION
Slope to suit material
Slope 1 1/2 to 1
Side Drains to be placed at least 20' from shoulder

STANDARD CROWNED SECTION



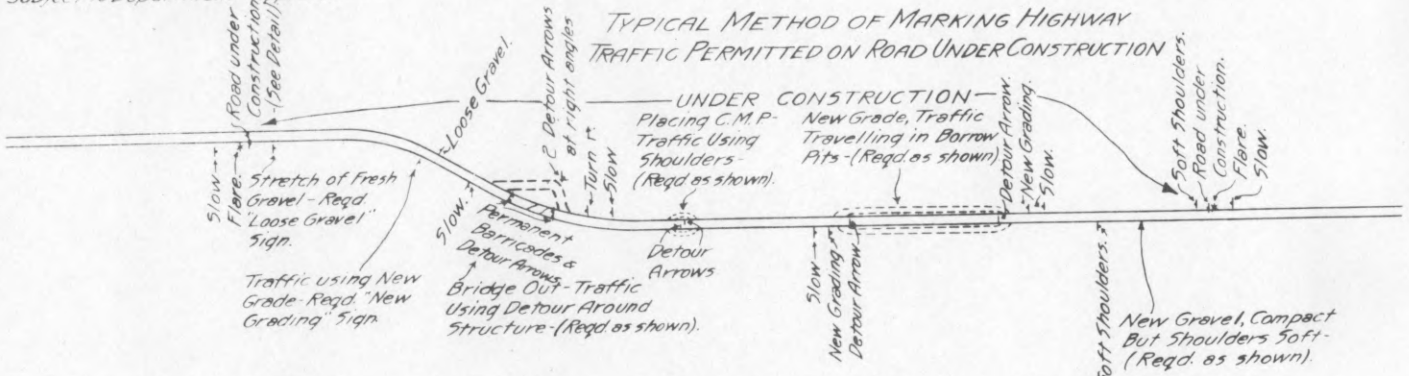
40' Vertical Curve
20'
20'
Shoulder Line
Shoulder Line
Not steeper than 8%
0.0%
2%
Not steeper than 8%
20'
20'
40' Vertical Curve
1/2 CUT SECTION
1/2 FILL SECTION

SUPERELEVATED SECTION



30' Vertical Curve
10' V.C.
Shoulder Line
40' Vertical Curve
20'
20'
Not steeper than 8%
0.0%
0.0%
Not steeper than 8%
20'
5'
CUT SECTION
Shoulder Line
Shoulder Line
20'
5'
Not steeper than 8%
0.0%
Not steeper than 10%
30' Vertical Curve
10' V.C.
FILL SECTION

TYPICAL METHOD OF MARKING HIGHWAY TRAFFIC PERMITTED ON ROAD UNDER CONSTRUCTION



Road under Construction (See Detail)
Loose Gravel.
2 Detour Arrows at right angles
Turn
Slow
UNDER CONSTRUCTION
Placing C.M.P. - Traffic Using Shoulders - (Reqd as shown).
New Grade, Traffic Travelling in Borrow Pits - (Reqd. as shown)
Detour Arrow.
New Grading.
Slow.
Soft Shoulders.
Road under Construction.
Flare.
Slow.
Slow
Flare.
Stretch of Fresh Gravel - Reqd. "Loose Gravel" Sign.
Slow.
Permanent Barricades & Detour Arrows.
Detour Arrows
Traffic using New Grade - Reqd. "New Grading" Sign.
Bridge Out - Traffic Using Detour Around Structure - (Reqd. as shown).
Slow
New Grading
Detour Arrow
Soft Shoulders.
New Gravel, Compact But Shoulders Soft - (Reqd. as shown).

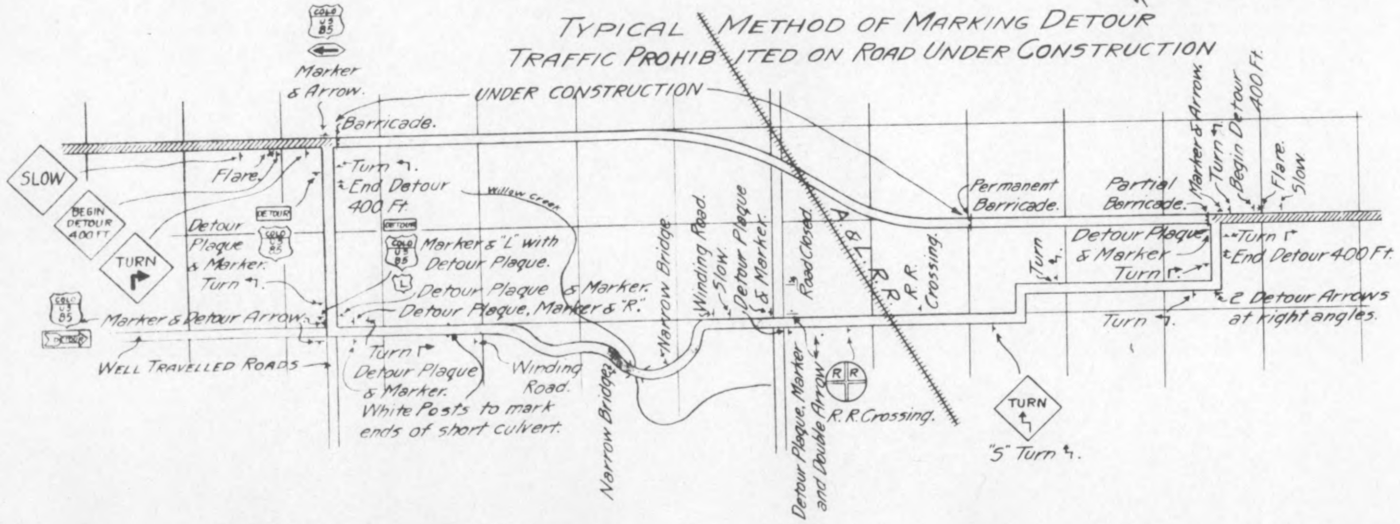
GENERAL NOTES ON APPROACHES

The maximum grades shown are to be the limiting grades for all except extreme cases.

When the length of the approach as determined by the intersection of these grades with the natural ground is such as to damage the Property so served, or cause unreasonable conditions, the grades may be modified.

In such cases, methods used, and maximum grades, shall be as indicated on the plans, or provided by work order.

TYPICAL METHOD OF MARKING DETOUR TRAFFIC PROHIBITED ON ROAD UNDER CONSTRUCTION



COLO US 85
Marker & Arrow.
UNDER CONSTRUCTION
Barricade.
SLOW
BEGIN DETOUR 400 FT.
TURN
Flare.
Turn.
End Detour 400 Ft.
Willow Creek
Detour Plaque & Marker.
Turn.
DETOUR
COLO US 85
Marker & "L" with Detour Plaque.
Detour Plaque & Marker.
Detour Plaque, Marker & "R".
Marker & Detour Arrow.
WELL TRAVELLED ROADS
Turn
Detour Plaque & Marker.
White Posts to mark ends of short culvert.
Winding Road.
Narrow Bridge.
Narrow Bridge
Winding Road.
Slow.
Detour Plaque & Marker.
Road Closed.
Detour Plaque, Marker and Double Arrow.
A. & L. R.R.
R.R. Crossing.
R R
R.R. Crossing.
Permanent Barricade.
Turn.
TURN
"S" Turn.
Partial Barricade.
Marker & Arrow.
Turn.
Begin Detour 400 Ft.
Flare.
Slow.
Detour Plaque & Marker.
Turn.
Turn
End Detour 400 Ft.
2 Detour Arrows at right angles.
Turn.

GENERAL NOTES FOR ROADWAY CONSTRUCTION TRAFFIC SIGNS

All Work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department adopted June 1-1937.

Whenever traffic is permitted on a road while under construction, the Contractor shall at all times adequately and appropriately mark any and all hazards on the Project with well painted, well maintained barricades, and standard caution and warning signs. The Contractor shall also mark with standard directional signs any places where the direction of the flow of traffic is not plain.

Whenever traffic is prohibited from a Project under construction, the Detour will be marked by the Department and the barricades at either end of the Project shall be erected and maintained by the Contractor.

All signs and barricades shall be immediately moved, added to, removed, or changed to appropriately mark hazards, or conditions altered, corrected, or changed by construction progress.

The Contractor shall furnish:

(1.) All barricade material. It shall always be well painted, as per sketch, and well maintained.
(2.) A reflectorized arrow of an approved type for each barricade at the ends of the Project, and at other barricades required where traffic is permitted on road under construction.
(3.) "SLOW-ROAD UNDER CONSTRUCTION" signs as required.
(4.) Any special signs the Department may deem necessary for the protection of traffic over the Project.
(5.) At least three (3) flares or torches for each barricade, and other flares to illuminate such signs as are called for on these plans, or as the Department may direct.

Flares or torches shall be placed between 3 and 5 feet ahead of the sign or object to be illuminated, and shall be kept burning from sunset to sunrise.

Costs of all of the foregoing materials and work by the Contractor shall be included in the original contract prices for the Project.

The Highway Department will furnish all standard signs not required to be furnished by the Contractor.

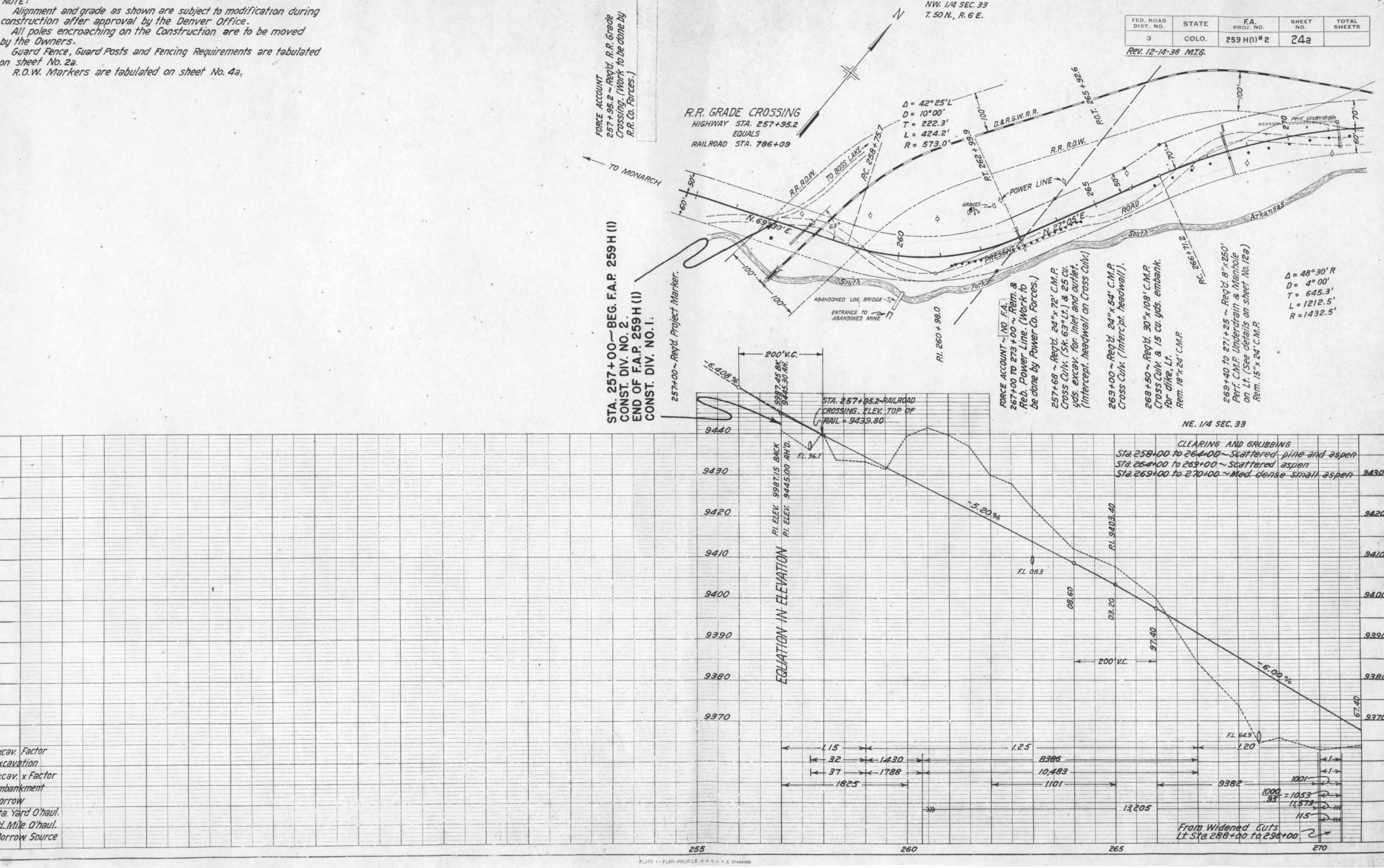
COLORADO
STATE HIGHWAY DEPARTMENT
TYPICAL
SIDE APPROACH ROADS
ROADWAY CONSTRUCTION
TRAFFIC SIGNS

Designed by J.S.M. K.A.K.	Approved by
Made by S.B.L.	J.S. Marshall
Check J.S.M.	Date: Aug. 20, 1935
Check K.A.K.	

NOTE:
Alignment and grade as shown are subject to modification during construction after approval by the Denver Office.
All poles encroaching on the Construction are to be moved by the Owners.
Guard Fence, Guard Posts and Fencing Requirements are tabulated on sheet No. 2a.
R.O.W. Markers are tabulated on sheet No. 4a.

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1) # 2	24a	

Rev. 12-14-38 M.T.G.


NW. 1/4 SEC. 33
T. 50 N., R. 6 E.
N
R.R. GRADE CROSSING
HIGHWAY STA. 257+95.2
EQUALS
RAILROAD STA. 786+09
TO MONARCH
Δ = 42°25' L
D = 10°00'
T = 222.3'
L = 424.2'
R = 573.0'
D.&R.G.W.R.R.
R.R. R.O.W.
TO BOSS LAKE
P.C. 258+75.7
P.T. 262+99.9
P.O.T. 265+92.6
POWER LINE
GRAVES
ROAD
PRESENT
N. 69°30' E.
N. 27°05' E.
63°
60'
50'
100'
70'
South
Fork
Arkansas
ABANDONED LOG BRIDGE
ENTRANCE TO ABANDONED MINE
Perf. Underdrain
P.I. 260+98.0
P.C. 266+71.2
260
265
270
Δ = 48°30' R
D = 4°00'
T = 645.3'
L = 1212.5'
R = 1432.5'
NE. 1/4 SEC. 33
200' V.C.
-6.408%
9987.45 BK.
9445.30 AH.
P.I. ELEV. 9987.15 BACK
P.I. ELEV. 9445.00 AH'D.
EQUATION IN ELEVATION
F.L. 36.1
-5.20%
F.L. 08.3
08.60
P.I. 9403.40
03.20
97.40
200' V.C.
-6.00%
F.L. 64.9
67.40
9440
9430
9420
9410
9400
9390
9380
9370
1.15
1.25
1.20
32
1430
8386
37
1788
10,483
1825
1101
9382
1
1
1001
1000/.95 = 1053
11,579
115
13,205
xcav. Factor
xcavation
xcav. x Factor
mbankment
orrow
ta. Yard O'haul.
d. Mile O'haul.
Borrow Source
255
260
265
270

FORCE ACCOUNT
257+95.2 ~ Reqd. R.R. Grade Crossing. (Work to be done by R.R. Co. Forces.)

STA. 257+00—BEG. F.A.P. 259 H (1)
CONST. DIV. NO. 2.
END OF F.A.P. 259 H (1)
CONST. DIV. NO. 1.

257+00 ~ Reqd. Project Marker.

STA. 257+95.2-RAILROAD CROSSING. ELEV. TOP OF RAIL = 9439.80

FORCE ACCOUNT ~ NO F.A.
267+00 TO 273+00 ~ Rem. & Reb. Power Line. (Work to be done by Power Co. Forces.)

257+68 ~ Reqd. 24"x 72' C.M.P. Cross Culv. (Sk. 63° Lt.) & 25 cu. yds. excav. for Inlet and outlet. (Intercept. headwall on Cross Culv.)

263+00 ~ Reqd. 24"x 54' C.M.P. Cross Culv. (Intercpt. headwall).

268+50 ~ Reqd. 30"x 108' C.M.P. Cross Culv. & 15 cu. yds. embank. for dike, Lt.
Rem. 18"x 24' C.M.P.

269+40 to 271+25 ~ Reqd. 8"x 250' Perf. C.M.P. Underdrain & Manhole on Lt. (See details on sheet No. 12a)
Rem. 15"x 24' C.M.P.

CLEARING AND GRUBBING
Sta. 258+00 to 264+00 ~ Scattered pine and aspen
Sta. 264+00 to 269+00 ~ Scattered aspen
Sta. 269+00 to 270+00 ~ Med. dense small aspen

From Widened Cuts
Lt. Sta. 288+00 to 296+00

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#2	25a	

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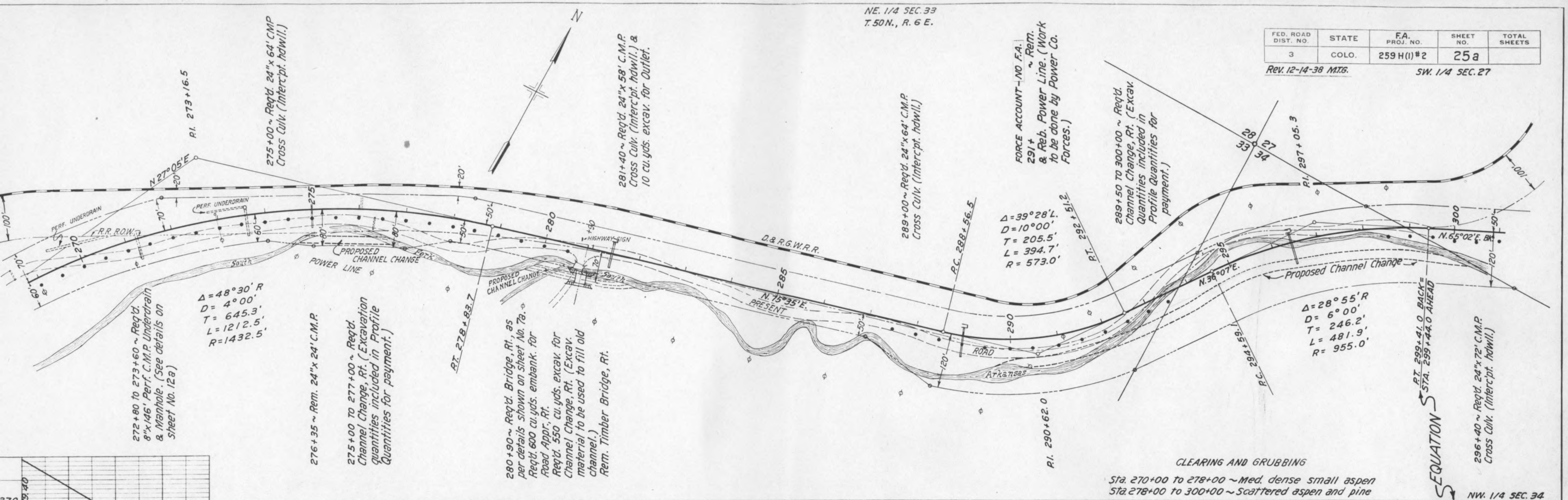
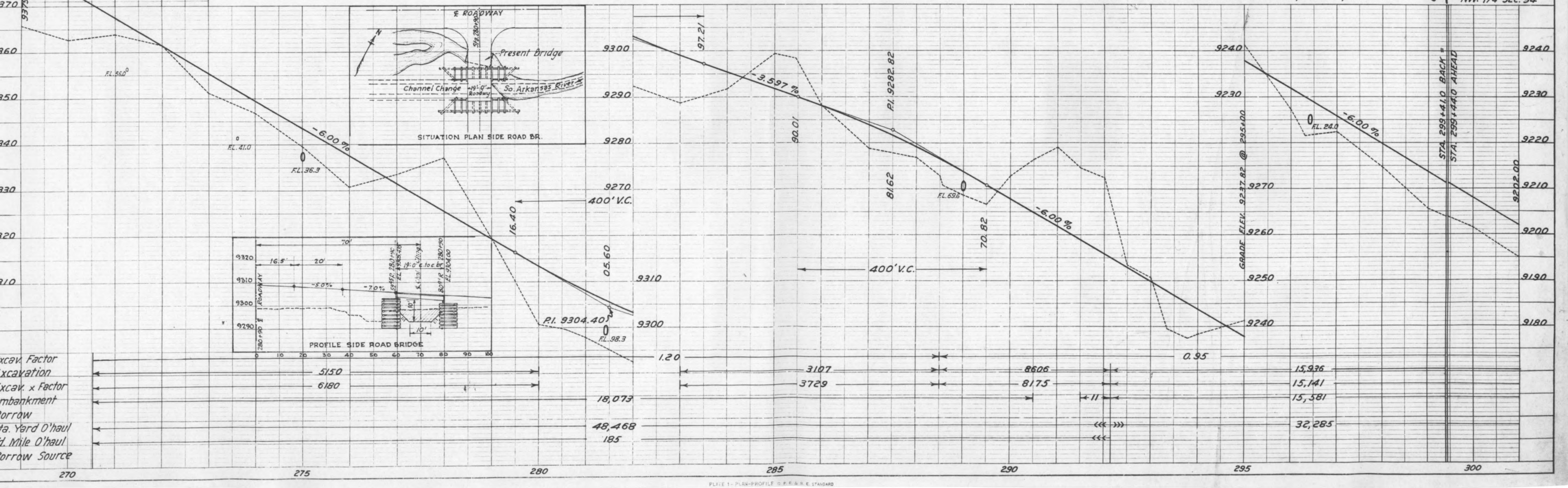


NE. 1/4 SEC. 33
T. 50 N., R. 6 E.
SW. 1/4 SEC. 27
N
P.I. 273+16.5
N.27°05'E.
275+00 ~ Req'd. 24"x 64' CMP Cross Culv. (Intercpt. hdwll.)
281+40 ~ Req'd. 24"x 58' C.M.P. Cross Culv. (Intercpt. hdwll.) & 10 cu. yds. excav. for Outlet.
289+00 ~ Req'd. 24"x 64' C.M.P. Cross Culv. (Intercpt. hdwll.)
FORCE ACCOUNT–NO F.A. 291+ ~ Rem. & Reb. Power Line. (Work to be done by Power Co. Forces.)
289+50 to 300+00 ~ Req'd. Channel Change, Rt. (Excav. Quantities included in Profile Quantities for payment.)
P.I. 297+05.3
28 27 33 34
PERF. UNDERDRAIN
R.R. ROW
270
275
280
285
290
295
300
POWER LINE
PROPOSED CHANNEL CHANGE
South Fork
HIGHWAY SIGN
D.&R.G.W.R.R.
N.75°35'E.
PRESENT ROAD
Arkansas
N.36°07'E.
Proposed Channel Change
N.65°02'E. BK.
P.C. 288+56.5
P.T. 292+51.2
Δ=39°28'L.
D=10°00'
T= 205.5'
L= 394.7'
R= 573.0'
Δ=48°30' R
D= 4°00'
T= 645.3'
L=1212.5'
R=1432.5'
Δ=28°55' R
D= 6°00'
T= 246.2'
L= 481.9'
R= 955.0'
P.C. 294+59.
P.T. 278+83.7
P.I. 290+62.0
P.T. 299+41.0 BACK= STA. 299+44.0 AHEAD
EQUATION
272+80 to 273+60 ~ Req'd. 8"x 146' Perf. C.M.P. Underdrain & Manhole. (See details on sheet No. 12a)
276+35 ~ Rem. 24"x 24' C.M.P.
275+00 to 277+00 ~ Req'd. Channel Change, Rt. (Excavation quantities included in Profile Quantities for payment.)
280+90 ~ Req'd. Bridge, Rt., as per details shown on Sheet No. 7a. Req'd. 600 cu. yds. embank. for Road Appr., Rt. Req'd. 550 cu. yds. excav. for Channel Change, Rt. (Excav. material to be used to fill old channel.) Rem. Timber Bridge, Rt.
296+40 ~ Req'd. 24"x 72' C.M.P. Cross Culv. (Intercpt. hdwll.)
100'
70'
60'
20'
50'
80'
120'

CLEARING AND GRUBBING

Sta. 270+00 to 278+00 ~ Med. dense small aspen
Sta. 278+00 to 300+00 ~ Scattered aspen and pine

NW. 1/4 SEC. 34



9379.40
9370
9360
9350
9340
9330
9320
9310
F.L. 56.0
F.L. 41.0
F.L. 36.3
-6.00 %
16.40
05.60
P.I. 9304.40
F.L. 98.3
400' V.C.
SITUATION PLAN SIDE ROAD BR.
℄ ROADWAY
Sta. 280+90
Present Bridge
Channel Change
19'-0" Roadway
So. Arkansas River
N
PROFILE SIDE ROAD BRIDGE
9320
9310
9300
9290
280+90 ℄ ROADWAY
16.5'
20'
70'
-5.0%
-7.0%
19'-0" c. to c.
10'
0 10 20 30 40 50 60 70 80 90 100
9300
9290
9280
9270
9310
9300
97.21
-3.597 %
90.01
P.I. 9282.82
81.62
F.L. 69.8
70.82
-6.00 %
400' V.C.
9240
9230
9220
9210
9200
9190
9180
GRADE ELEV. 9237.82 @ 295+00
F.L. 24.0
-6.00 %
9202.00
STA. 299+41.0 BACK = STA. 299+44.0 AHEAD
9270
9260
9250
9240
0.95
xcav. Factor
xcavation
xcav. x Factor
mbankment
orrow
a. Yard O'haul
. Mile O'haul
orrow Source
1.20
5150
6180
18,073
48,468
185
3107
3729
8606
8175
11
15,936
15,141
15,581
32,285
270
275
280
285
290
295
300

PLATE 1 - PLAN-PROFILE C. P. R. & R. E. STANDARD

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#2	26a	

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SE. 1/4 SEC. 27

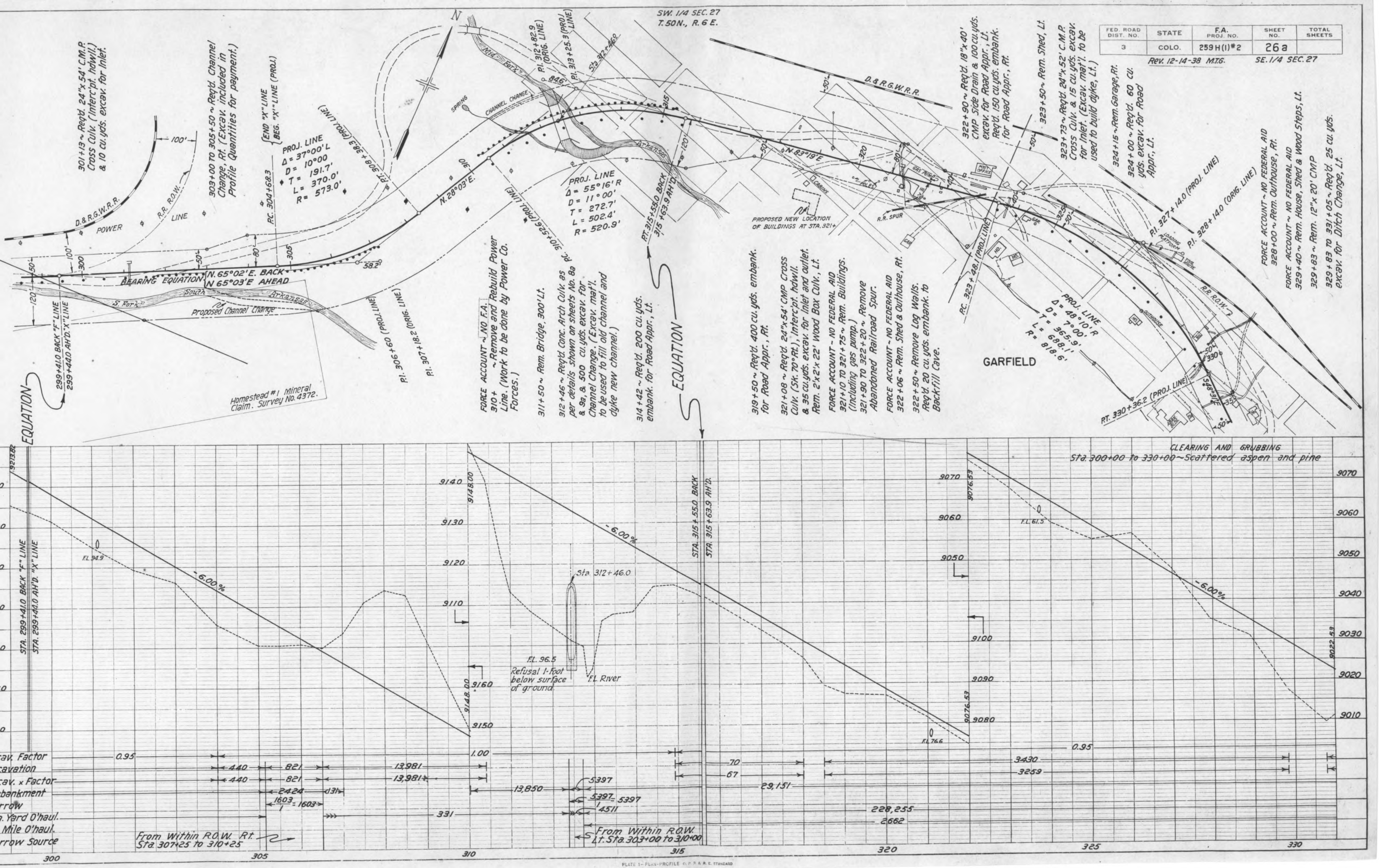
SW. 1/4 SEC. 27
T. 50 N., R. 6 E.
N
301+13 ~ Reqd. 24"x54' C.M.P. Cross Culv. (Intercpt. hdwll.) & 10 cu. yds. excav. for Inlet.
303+00 TO 305+50 ~ Reqd. Channel Change, Rt. (Excav. included in Profile Quantities for payment.)
END "X" LINE
BEG. "X'" LINE (PROJ.)
PROJ. LINE
Δ = 37°00' L
D = 10°00
T = 191.7'
L = 370.0'
R = 573.0'
P.C. 304+68.3
P.T. 308+38.3 (PROJ. LINE)
D.&R.G.W.R.R.
POWER
LINE
R.R. R.O.W.
100'
80
50'
120'
300
305
310
58.2
BEARING EQUATION
N. 65°02' E. BACK
N 65°03' E AHEAD
S. Fork
South Arkansas
Proposed Channel Change
299+41.0 BACK "F" LINE
299+44.0 AH'D. "X" LINE
EQUATION
Homestead #1 Mineral Claim. Survey No. 4372.
P.I. 306+60 (PROJ. LINE)
P.I. 307+18.2 (ORIG. LINE)
N. 28°03' E.
P.C. 310+52.6 (PROJ. LINE)
SPRING
CHANNEL CHANGE
Mid Fork
Arkansas
846
P.I. 312+82.9 (ORIG. LINE)
P.I. 313+25.3 (PROJ. LINE)
Sta. 312+46.0
315
PROJ. LINE
Δ = 55°16' R
D = 11°00'
T = 272.7'
L = 502.4'
R = 520.9'
P.T. 315+55.0 BACK
315+63.9 AH'D.
FORCE ACCOUNT ~ NO F.A.
310+ ~ Remove and Rebuild Power Line. (Work to be done by Power Co. Forces.)
311+50 ~ Rem. Bridge, 300' Lt.
312+46 ~ Reqd. Conc. Arch Culv. as per details shown on sheets No. 8a & 9a. & 500 cu. yds. excav. for Channel Change. (Excav. mat'l. to be used to fill old channel and dyke new channel.)
314+42 ~ Reqd. 200 cu. yds. embank. for Road Appr., Lt.
EQUATION
D.&R.G.W.R.R.
N 83°19' E
320
PROPOSED NEW LOCATION OF BUILDINGS AT STA. 321+
CABINS
R.R. SPUR
GAS PUMP
POLES
POST OFFICE
319+50 ~ Reqd. 400 cu. yds. embank. for Road Appr., Rt.
321+08 ~ Reqd. 24"x54' CMP Cross Culv. (Sk. 70° Rt.), Intercpt. hdwll. & 35 cu. yds. excav. for Inlet and outlet. Rem. 2'x2'x22' Wood Box Culv., Lt.
FORCE ACCOUNT ~ NO FEDERAL AID
321+10 TO 321+75 ~ Rem. Buildings. (Including gas pump.)
321+90 TO 322+20 ~ Remove Abandoned Railroad Spur.
FORCE ACCOUNT ~ NO FEDERAL AID
322+06 ~ Rem. Shed & Outhouse, Rt.
322+50 ~ Remove Log Walls. Reqd. 20 cu. yds. embank. to Backfill Cave.
322+90 ~ Reqd. 18"x40' CMP Side Drain & 100 cu. yds. excav. for Road Appr., Lt. Reqd. 150 cu. yds. embank. for Road Appr., Rt.
323+50 ~ Rem. Shed, Lt.
323+73 ~ Reqd. 24"x52' C.M.P. Cross Culv. & 15 cu. yds. excav. for Inlet. (Excav. mat'l. to be used to build dyke, Lt.)
324+15 ~ Rem. Garage, Rt.
324+00 ~ Reqd. 60 cu. yds. excav. for Road Appr., Lt.
P.C. 323+48.1 (PROJ. LINE)
325
PROJ. LINE
Δ = 48°10' R
D = 7°00'
T = 365.9'
L = 688.1'
R = 818.6'
GARFIELD
P.I. 327+14.0 (PROJ. LINE)
P.I. 328+14.0 (ORIG. LINE)
LOADING PLATFORM
TOOL SHOP
OUTHOUSE
R.R. R.O.W.
330
PT. 330+36.2 (PROJ. LINE)
FORCE ACCOUNT ~ NO FEDERAL AID
328+00 ~ Rem. Outhouse, Rt.
FORCE ACCOUNT ~ NO FEDERAL AID
329+40 ~ Rem. House, Shed & Wood Steps, Lt.
329+83 TO 331+05 ~ Reqd. 25 cu. yds. excav. for Ditch Change, Lt.
CLEARING AND GRUBBING
Sta. 300+00 to 330+00 ~ Scattered aspen and pine
STA. 299+41.0 BACK "F" LINE
STA. 299+44.0 AH'D. "X" LINE
9213.82
F.L. 94.9
-6.00%
9140
9130
9120
9110
9160
9150
9148.00
Sta. 312+46.0
F.L. 96.5
Refusal 1-foot below surface of ground
F.L. River
-6.00%
STA. 315+55.0 BACK
STA. 315+63.9 AH'D.
9100
9090
9080
9070
9060
9050
9076.53
F.L. 61.5
F.L. 76.6
-6.00%
9070
9060
9050
9040
9030
9020
9010
9022.53
Excav. Factor
Excavation
Excav. x Factor
Embankment
Borrow
Sta. Yard O'haul.
Mile O'haul.
Borrow Source
0.95
440
821
13,981
440
821
13,981
2424
131
1603/1 = 1603
331
1.00
13,850
5397
5397/1 = 5397
4511
70
67
29,151
228,255
2662
0.95
3430
3259
From Within R.O.W. Rt. Sta. 307+25 to 310+25
From Within R.O.W. Lt. Sta. 303+00 to 310+00
300
305
310
315
320
325
330

PLATE 1 - PLAN-PROFILE C. P. & S. E. STANDARD

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1) # 2	27a	

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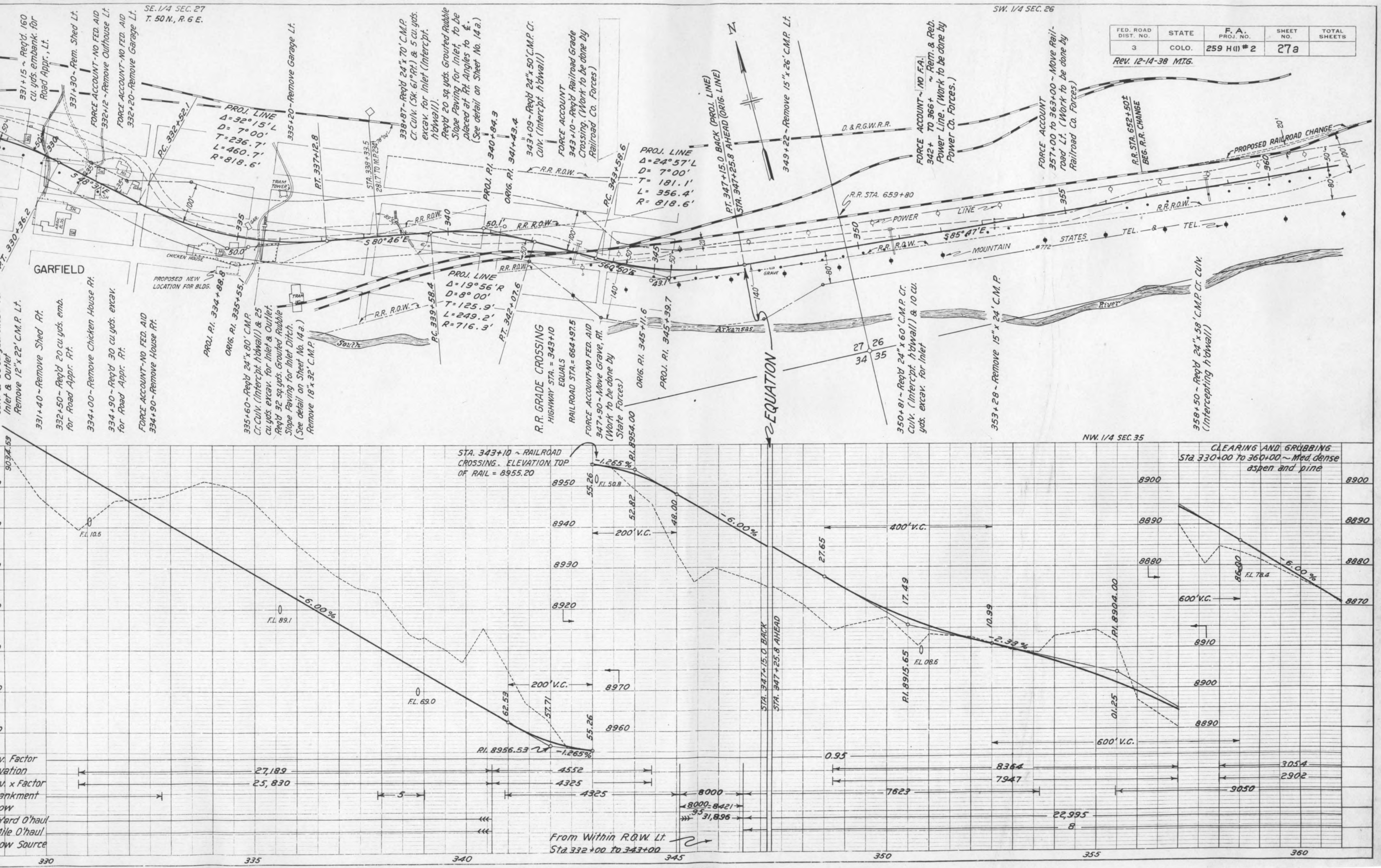
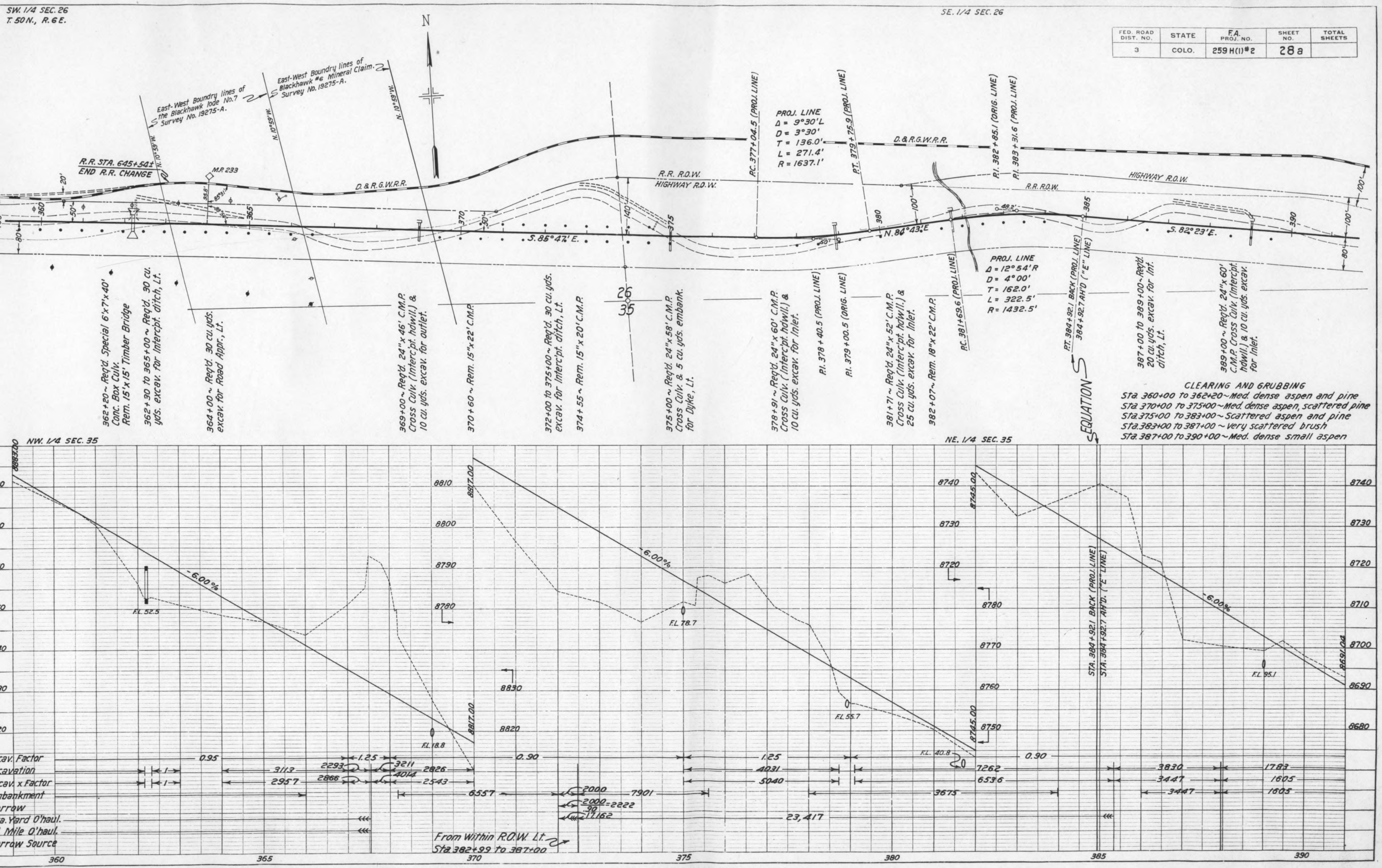


SE. 1/4 SEC. 27
T. 50 N., R. 6 E.
SW. 1/4 SEC. 26
NW. 1/4 SEC. 35
331+15 ~ Req'd. 160 cu. yds. embank. for Road Appr., Lt.
331+30 ~ Rem. Shed Lt.
FORCE ACCOUNT - NO FED. AID
332+12 ~ Remove Outhouse Lt.
FORCE ACCOUNT - NO FED. AID
332+20 - Remove Garage Lt.
335+20 - Remove Garage Lt.
338+87 - Req'd 24" x 70' C.M.P. Cr. Culv. (Sk. 61° Rt.) & 5 cu. yds. excav. for Inlet (Intercp't. h'dwall).
Req'd 20 sq. yds. Grouted Rubble Slope Paving for Inlet, to be placed at Rt. Angles to ℄. (See detail on Sheet No. 14a.)
343+09 ~ Req'd 24" x 50' C.M.P. Cr. Culv. (Intercp't. h'dwall)
FORCE ACCOUNT
343+10 ~ Req'd Railroad Grade Crossing. (Work to be done by Railroad Co. Forces)
349+22 ~ Remove 15" x 26' C.M.P. Lt.
FORCE ACCOUNT ~ NO F.A.
342+ TO 366+ ~ Rem. & Reb. Power Line. (Work to be done by Power Co. Forces.)
FORCE ACCOUNT
357+00 to 363+00 ~ Move Railroad Lt. (Work to be done by Railroad Co. Forces)
R.R. STA. 652+50±
BEG. R.R. CHANGE
PROPOSED RAILROAD CHANGE
D. & R.G.W. R.R.
PROJ. LINE
Δ = 32°15' L
D = 7°00'
T = 236.7'
L = 460.7'
R = 818.6'
P.C. 332+52.1
P.T. 330+36.2
P.T. 337+12.8
STA. 338+33.5
281.7' TO M.P. 234
78°04'
89°52'
61°
PROJ. P.I. 340+84.3
ORIG. P.I. 341+43.4
P.C. 343+58.6
PROJ. LINE
Δ = 24°57' L
D = 7°00'
T = 181.1'
L = 356.4'
R = 818.6'
P.T. 347+15.0 BACK (PROJ. LINE)
STA. 347+25.8 AHEAD (ORIG. LINE)
N
S 48°31' E
S 80°46' E
S 60°50' E
S 85°47' E
50.0'
50.1'
43.1
100'
140'
80'
50'
20'
330
335
340
345
350
355
360
HO.
SH.
GAR.
ABAN. BLDG.
TRAM TOWER
TRAM HO.
CHICKEN HOUSE
GARFIELD
PROPOSED NEW LOCATION FOR BLDG.
R.R. R.O.W.
R.R. STA. 659+80
POWER
LINE
MOUNTAIN
STATES
TEL.
&
TEL.
#772
GRAVE
South
Arkansas
River
27
26
34
35
Inlet & Outlet
Remove 12" x 22' C.M.P. Lt.
331+40 ~ Remove Shed Rt.
332+50 ~ Req'd 20 cu. yds. emb. for Road Appr. Rt.
334+00 ~ Remove Chicken House Rt.
334+90 ~ Req'd 30 cu. yds. excav. for Road Appr. Rt.
FORCE ACCOUNT - NO FED. AID
334+90 ~ Remove House Rt.
PROJ. P.I. 334+88.8
ORIG. P.I. 335+55.1
335+60 ~ Req'd 24" x 80' C.M.P. Cr. Culv. (Intercp't. h'dwall) & 25 cu. yds. excav. for Inlet & Outlet.
Req'd 32 sq. yds. Grouted Rubble Slope Paving for Inlet Ditch. (See detail on Sheet No. 14a.)
Remove 18" x 32' C.M.P.
P.C. 339+58.4
PROJ. LINE
Δ = 19°56' R
D = 8°00'
T = 125.9'
L = 249.2'
R = 716.3'
P.T. 342+07.6
R.R. GRADE CROSSING
HIGHWAY STA. = 343+10
EQUALS
RAILROAD STA. = 664+97.5
FORCE ACCOUNT - NO FED. AID
347+90 ~ Move Grave, Rt. (Work to be done by State Forces)
ORIG. P.I. 345+11.6
PROJ. P.I. 345+39.7
EQUATION
350+81 ~ Req'd 24" x 60' C.M.P. Cr. Culv. (Intercp't. h'dwall) & 10 cu. yds. excav. for Inlet
353+28 ~ Remove 15" x 24' C.M.P.
358+50 ~ Req'd 24" x 58' C.M.P. Cr. Culv. (Intercepting h'dwall)
STA. 343+10 ~ RAILROAD CROSSING. ELEVATION TOP OF RAIL = 8955.20
CLEARING AND GRUBBING
Sta. 330+00 to 360+00 ~ Med. dense aspen and pine
9034.53
F.L. 10.5
-6.00%
F.L. 89.1
F.L. 69.0
200' V.C.
62.53
57.71
55.26
P.I. 8956.53
-1.265%
8970
8960
-1.265%
P.I. 8954.00
55.26
F.L. 50.8
52.82
48.00
200' V.C.
-6.00%
400' V.C.
8950
8940
8930
8920
27.65
17.49
F.L. 08.6
P.I. 8915.65
10.99
-2.39%
P.I. 8904.00
01.25
600' V.C.
8910
8900
8890
8880
STA. 347+15.0 BACK
STA. 347+25.8 AHEAD
86.00
F.L. 78.4
-6.00%
600' V.C.
8900
8890
8880
8870
v. Factor
vation
v. x Factor
ankment
ow
Yard O'haul
Mile O'haul
ow Source
27,189
25,830
5
4552
4325
4325
8000
8000/.95 = 8421
31,896
0.95
8364
7947
7623
22,995
8
3054
2902
9050
From Within R.O.W. Lt.
Sta. 332+00 to 343+00
330
335
340
345
350
355
360

PLATE 1 - PLAN-PROFILE O. P. R. & R. E. STANDARD

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#2	28a	


SW. 1/4 SEC. 26
T. 50N., R. 6E.
SE. 1/4 SEC. 26
N
East-West Boundry lines of the Blackhawk lode No. 7 Survey No. 19275-A.
East-West Boundry lines of Blackhawk #6 Mineral Claim. Survey No. 19275-A.
N. 10°59' W.
N. 10°59' W.
N. 10°59' W.
R.R. STA. 645+54±
END R.R. CHANGE
M.P. 233
D. & R.G.W. R.R.
D. & R.G.W. R.R.
R.R. R.O.W.
HIGHWAY R.O.W.
R.R. R.O.W.
HIGHWAY R.O.W.
PC. 377+04.5 (PROJ. LINE)
PROJ. LINE
Δ = 9°30' L
D = 3°30'
T = 136.0'
L = 271.4'
R = 1637.1'
PT. 379+75.9 (PROJ. LINE)
P.I. 382+85.1 (ORIG. LINE)
P.I. 383+31.6 (PROJ. LINE)
S. 85°47' E.
N. 84°43' E
S. 82°23' E.
20'
50'
80'
100'
100'
100'
80'
140
50'
48.2'
360
365
370
375
380
385
390
26
35
PROJ. LINE
Δ = 12°54' R
D = 4°00'
T = 162.0'
L = 322.5'
R = 1432.5'
P.I. 378+40.5 (PROJ. LINE)
P.I. 379+00.5 (ORIG. LINE)
P.C. 381+69.6 (PROJ. LINE)
P.T. 384+92.1 BACK (PROJ. LINE)
384+92.7 AH'D ("E" LINE)
EQUATION
NW. 1/4 SEC. 35
NE. 1/4 SEC. 35
8817.00
8810
8800
8790
8780
8830
8820
8817.00
-6.00%
-6.00%
-6.00%
F.L. 52.5
F.L. 18.8
F.L. 78.7
F.L. 55.7
F.L. 40.8
F.L. 95.1
8745.00
8740
8730
8720
8780
8770
8760
8750
8745.00
8740
8730
8720
8710
8700
8690
8680
8691.04
STA. 384+92.1 BACK (PROJ. LINE)
STA. 384+92.7 AH'D. ("E" LINE)
cav. Factor
cavation
cav. x Factor
bankment
rrow
a. Yard O'haul.
Mile O'haul.
rrow Source
0.95
1.25
0.90
1.25
0.90
1
1
3113
2957
2293
2866
3211
4014
2826
2543
6557
2000
7901
2000/.90 = 2222
17,162
4031
5040
3675
23,417
7262
6536
3830
3447
3447
1783
1605
1605
From Within R.O.W. Lt. Sta. 382+99 to 387+00
360
365
370
375
380
385
390

362+20 ~ Req'd. Special 6'x7'x40' Conc. Box Culv. Rem. 15'x15' Timber Bridge

362+30 to 365+00 ~ Req'd. 30 cu. yds. excav. for Intercp't. ditch, Lt.

364+00 ~ Req'd. 30 cu. yds. excav. for Road Appr., Lt.

369+00 ~ Req'd. 24"x46' C.M.P. Cross Culv. (Interc'pt. hdwll.) & 10 cu. yds. excav. for outlet.

370+60 ~ Rem. 15"x22' C.M.P.

372+00 to 375+00 ~ Req'd. 30 cu. yds. excav. for Intercp't. ditch, Lt.

374+55 ~ Rem. 15"x20' C.M.P.

375+00 ~ Req'd. 24"x58' C.M.P. Cross Culv. & 5 cu. yds. embank. for Dyke, Lt.

378+91 ~ Req'd. 24"x60' C.M.P. Cross Culv. (Interc'pt. hdwll.) & 10 cu. yds. excav. for Inlet.

381+71 ~ Req'd. 24"x52' C.M.P. Cross Culv. (Interc'pt. hdwll.) & 25 cu. yds. excav. for Inlet.

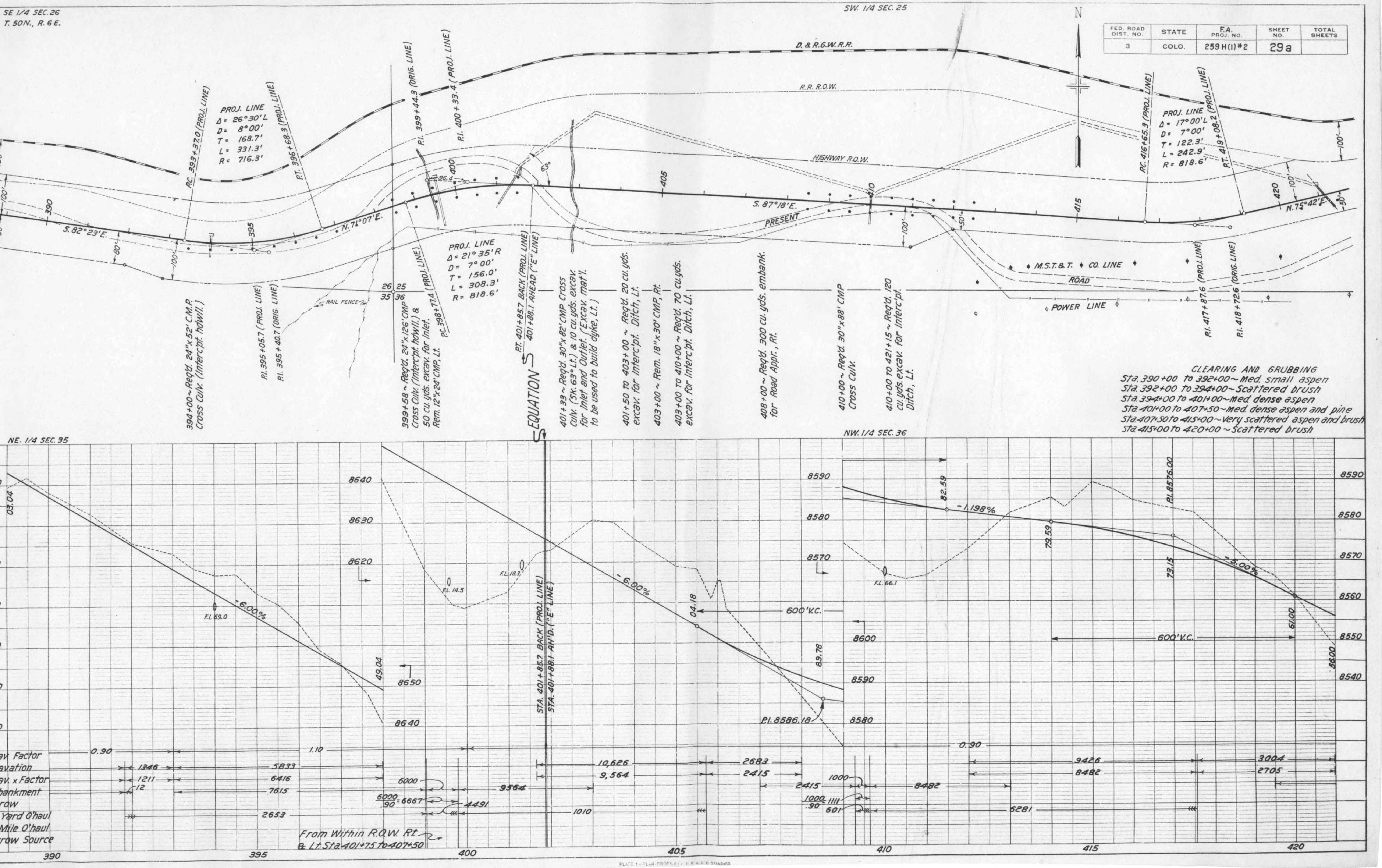
382+07 ~ Rem. 18"x22' C.M.P.

387+00 to 389+00 ~ Req'd. 20 cu. yds. excav. for Int. ditch, Lt.

389+00 ~ Req'd. 24"x60' C.M.P. Cross Culv. (Intercp't. hdwll.) & 10 cu. yds. excav. for Inlet.

CLEARING AND GRUBBING
Sta. 360+00 to 362+20 ~ Med. dense aspen and pine
Sta. 370+00 to 375+00 ~ Med. dense aspen, scattered pine
Sta. 375+00 to 383+00 ~ Scattered aspen and pine
Sta. 383+00 to 387+00 ~ Very scattered brush
Sta. 387+00 to 390+00 ~ Med. dense small aspen

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#2	29a	



SE 1/4 SEC. 26
T. 50N., R. 6E.
SW. 1/4 SEC. 25
N
D. & R.G.W. R.R.
R.R. R.O.W.
HIGHWAY R.O.W.
PROJ. LINE
Δ= 26°30'L
D= 8°00'
T= 168.7'
L= 331.3'
R= 716.3'
P.C. 393+37.0 (PROJ. LINE)
P.T. 396+68.3 (PROJ. LINE)
P.I. 399+44.3 (ORIG. LINE)
P.I. 400+33.4 (PROJ. LINE)
PROJ. LINE
Δ= 17°00'L
D= 7°00'
T= 122.3'
L= 242.9'
R= 818.6'
P.C. 416+65.3 (PROJ. LINE)
P.T. 419+08.2 (PROJ. LINE)
S. 82°23'E.
N. 71°07'E.
S. 87°18'E.
N. 75°42'E.
PRESENT
63°
96.4
100'
80'
50'
390
395
400
405
410
415
420
PROJ. LINE
Δ= 21°35'R
D= 7°00'
T= 156.0'
L= 308.3'
R= 818.6'
M.S.T.&T. CO. LINE
ROAD
POWER LINE
RAIL FENCE
26 25
35 36
394+00 ~ Req'd. 24"x52' C.M.P. Cross Culv. (Intercp't. hdwll.)
P.I. 395+05.7 (PROJ. LINE)
P.I. 395+40.7 (ORIG. LINE)
399+58 ~ Req'd. 24"x126' CMP Cross Culv. (Intercp't. hdwll.) & 50 cu. yds. excav. for Inlet. Rem. 12"x24' CMP, Lt.
P.C. 398+77.4 (PROJ. LINE)
P.T. 401+85.7 BACK (PROJ. LINE)
401+88.1 AHEAD ("E" LINE)
EQUATION
401+33 ~ Req'd. 30"x82' CMP Cross Culv. (Sk. 63° Lt.) & 10 cu. yds. excav. for Inlet and Outlet. (Excav. mat'l. to be used to build dyke, Lt.)
401+50 TO 403+00 ~ Req'd. 20 cu. yds. excav. for Intercp't. Ditch, Lt.
403+00 ~ Rem. 18"x30' CMP, Rt.
403+00 TO 410+00 ~ Req'd. 70 cu. yds. excav. for Intercp't. Ditch, Lt.
408+00 ~ Req'd. 300 cu. yds. embank. for Road Appr., Rt.
410+00 ~ Req'd. 30"x88' CMP Cross Culv.
410+00 TO 421+15 ~ Req'd. 120 cu. yds. excav. for Intercp't. Ditch, Lt.
P.I. 417+87.6 (PROJ. LINE)
P.I. 418+72.6 (ORIG. LINE)
NE. 1/4 SEC. 35
NW. 1/4 SEC. 36
03.04
F.L. 69.0
-6.00%
49.04
8650
8640
8630
8620
8640
F.L. 14.5
F.L. 18.3
STA. 401+85.7 BACK (PROJ. LINE)
STA. 401+88.1 AH'D. ("E" LINE)
-6.00%
04.18
600' V.C.
89.78
P.I. 8586.18
8590
8580
8570
8600
8590
8580
F.L. 66.1
82.59
-1.198%
79.59
P.I. 8576.00
73.15
-5.00%
61.00
56.00
600' V.C.
8590
8580
8570
8560
8550
8540
...av. Factor
...avation
...av. x Factor
...bankment
...row
...Yard O'haul
...Mile O'haul
...rrow Source
0.90
1.10
0.90
1346
5833
1211
6416
12
7615
2653
6000
6000/.90 = 6667
4491
9564
1010
10,626
9,564
2683
2415
2415
1000
1000/.90 = 1111
601
8482
6281
9426
8482
3004
2705
From Within R.O.W. Rt. & Lt. Sta. 401+75 to 407+50
390
395
400
405
410
415
420

CLEARING AND GRUBBING
Sta. 390+00 to 392+00 ~ Med. small aspen
Sta. 392+00 to 394+00 ~ Scattered brush
Sta. 394+00 to 401+00 ~ Med. dense aspen
Sta. 401+00 to 407+50 ~ Med. dense aspen and pine
Sta. 407+50 to 415+00 ~ Very scattered aspen and brush
Sta. 415+00 to 420+00 ~ Scattered brush

PLATE 1 - PLAN-PROFILE - F.R.A.S.E. STANDARD

FED. ROAD DIST. NO.	STATE	F. A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#2	30 a	

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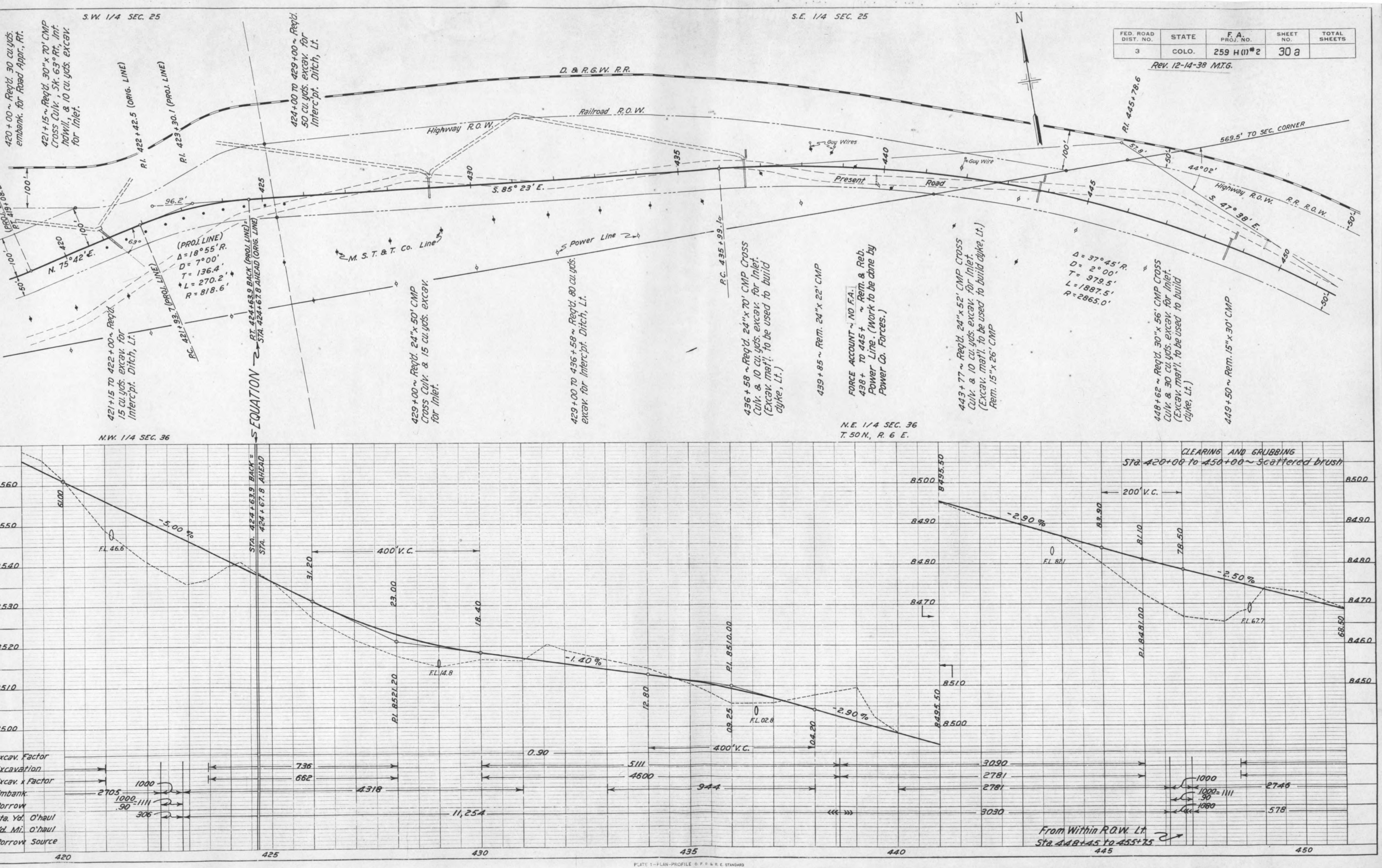

S.W. 1/4 SEC. 25
S.E. 1/4 SEC. 25
N.W. 1/4 SEC. 36
N.E. 1/4 SEC. 36
T. 50 N., R. 6 E.
N
D. & R.G.W. R.R.
Railroad R.O.W.
Highway R.O.W.
Present Road
569.5' TO SEC. CORNER
R.R. R.O.W.
Guy Wires
Guy Wire
M. S. T. & T. Co. Line
Power Line
N. 75° 42' E.
S. 85° 23' E.
S. 47° 38' E.
44° 02'
57.8'
96.2'
63°
100'
50'
420
425
430
435
440
445
450
(PROJ. LINE)
Δ = 18° 55' R.
D = 7° 00'
T = 136.4'
L = 270.2'
R = 818.6'
Δ = 37° 45' R.
D = 2° 00'
T = 979.5'
L = 1887.5'
R = 2865.0'
P.I. 419+08 (PROJ.)
P.I. 422+42.5 (ORIG. LINE)
P.I. 423+30.1 (PROJ. LINE)
P.C. 421+93.7 (PROJ. LINE)
P.T. 424+63.9 BACK (PROJ. LINE)
STA. 424+67.8 AHEAD (ORIG. LINE)
EQUATION
P.C. 435+99.1
P.I. 445+78.6
420+00 ~ Req'd. 30 cu. yds. embank. for Road Appr., Rt.
421+15 ~ Req'd. 30"x 70' CMP Cross Culv., Sk. 63° Rt., Int. hdwll., & 10 cu. yds. excav. for Inlet.
424+00 TO 429+00 ~ Req'd. 50 cu. yds. excav. for Intercp't. Ditch, Lt.
421+15 TO 422+00 ~ Req'd. 15 cu. yds. excav. for Intercp't. Ditch, Lt.
429+00 ~ Req'd. 24"x 50' CMP Cross Culv. & 15 cu. yds. excav. for Inlet.
429+00 TO 436+58 ~ Req'd. 80 cu. yds. excav. for Intercp't. Ditch, Lt.
436+58 ~ Req'd. 24"x 70' CMP Cross Culv. & 10 cu. yds. excav. for Inlet. (Excav. mat'l. to be used to build dyke, Lt.)
439+85 ~ Rem. 24"x 22' CMP
FORCE ACCOUNT ~ NO F.A. 438+ TO 445+ ~ Rem. & Reb. Power Line. (Work to be done by Power Co. Forces.)
443+77 ~ Req'd. 24"x 52' CMP Cross Culv. & 10 cu. yds. excav. for Inlet. (Excav. mat'l. to be used to build dyke, Lt.) Rem. 15"x 26' CMP
448+62 ~ Req'd. 30"x 56' CMP Cross Culv. & 30 cu. yds. excav. for Inlet. (Excav. mat'l. to be used to build dyke, Lt.)
449+50 ~ Rem. 15"x 30' CMP
CLEARING AND GRUBBING
Sta. 420+00 to 450+00 ~ Scattered brush
STA. 424+63.9 BACK = STA. 424+67.8 AHEAD
-5.00 %
400' V.C.
-1.40 %
400' V.C.
-2.90 %
200' V.C.
-2.90 %
-2.50 %
61.00
31.20
23.00
18.40
12.80
09.25
04.20
P.I. 8521.20
P.I. 8510.00
8495.50
8495.50
83.90
81.10
78.50
P.I. 8481.00
68.50
F.L. 46.6
F.L. 14.8
F.L. 02.8
F.L. 82.1
F.L. 67.7
560
550
540
530
520
510
500
8500
8490
8480
8470
8510
8500
8500
8490
8480
8470
8460
8450
Excav. Factor
Excavation
Excav. x Factor
Embank.
Borrow
Sta. Yd. O'haul
Yd. Mi. O'haul
Borrow Source
2705
1000
1000 .90 = 1111
306
736
662
4318
11,254
0.90
5111
4600
944
3090
2781
2781
3030
1000
1000 .90 = 1111
1080
2746
578
From Within R.O.W. Lt.
Sta. 448+45 to 455+75
420
425
430
435
440
445
450
PLATE 1—PLAN-PROFILE D. F. R. & R. E. STANDARD

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259H(1)#2	31a	

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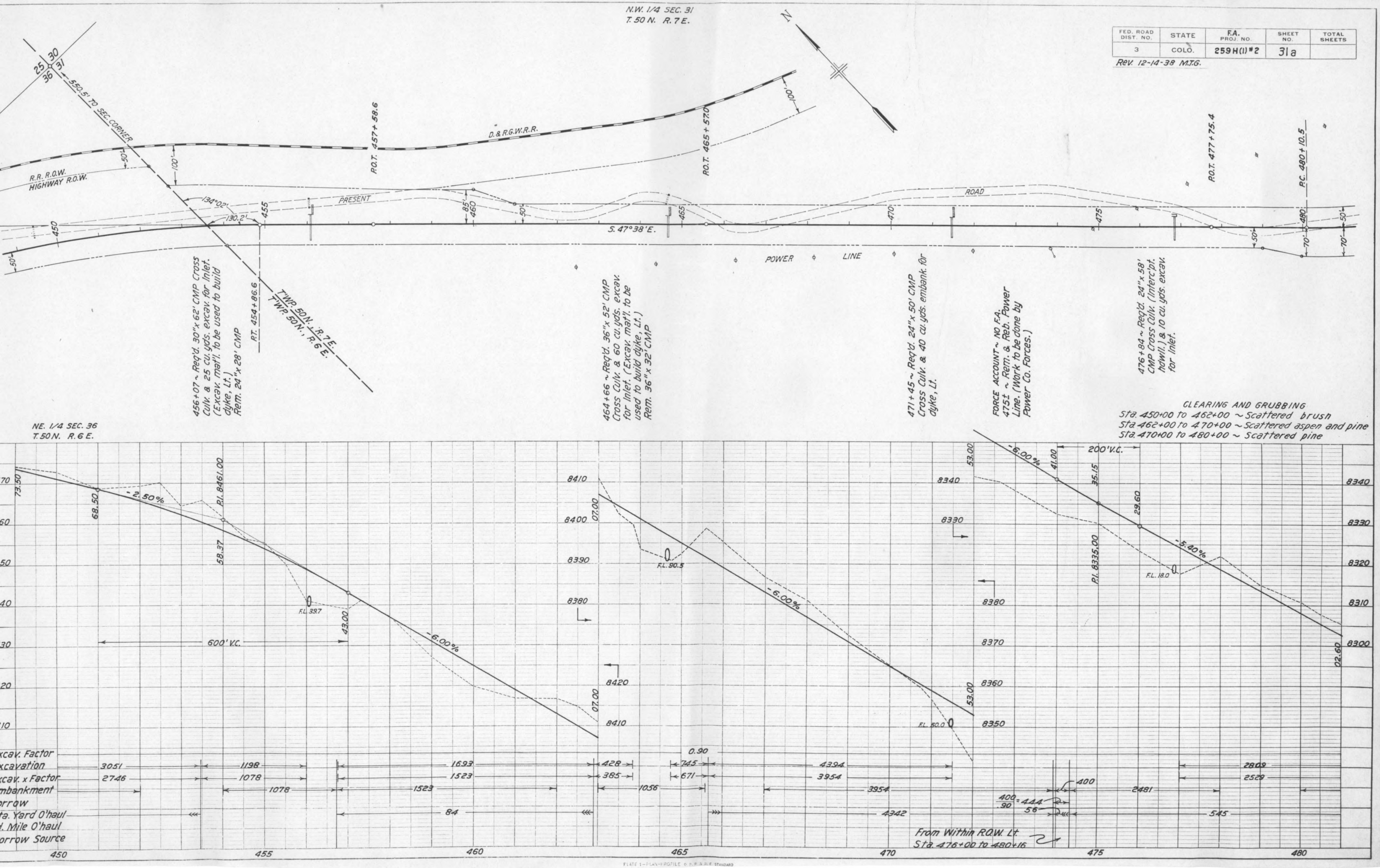

N.W. 1/4 SEC. 31
T. 50 N. R. 7 E.
N
25 30
36 31
550.5' TO SEC. CORNER
D.&R.G.W.R.R.
100'
P.O.T. 457+58.6
P.O.T. 465+57.0
P.O.T. 477+75.4
P.C. 480+10.5
R.R. R.O.W.
HIGHWAY R.O.W.
50'
134°02'
130.2'
PRESENT
ROAD
85'
450
455
460
465
470
475
480
S. 47°38'E.
POWER LINE
70'
P.T. 454+86.6
T'WP. 50 N., R. 7 E.
T'WP. 50 N., R. 6 E.
NE. 1/4 SEC. 36
T. 50 N. R. 6 E.
73.50
68.50
-2.50%
P.I. 8461.00
58.37
F.L. 39.7
43.00
600' V.C.
-6.00%
8410
8400
8390
8380
8370
8360
8350
8340
8330
8320
8310
8300
8420
07.00
F.L. 90.5
F.L. 50.0
53.00
41.00
200' V.C.
35.15
29.60
P.I. 8335.00
-5.40%
F.L. 18.0
02.60
70
60
50
40
30
20
10
Excav. Factor
Excavation
Excav. x Factor
Embankment
Borrow
Sta. Yard O'haul
Yd. Mile O'haul
Borrow Source
3051
2746
1198
1078
1078
1693
1523
1523
84
428
385
1056
0.90
745
671
4394
3954
3954
4342
400
400/90 = 4.44
56
2481
2809
2529
545
From Within R.O.W. Lt.
Sta. 476+00 to 480+16

456+07 ~ Req'd. 30"x 62' CMP Cross Culv. & 25 cu. yds. excav. for Inlet. (Excav. mat'l. to be used to build dyke, Lt.)
Rem. 24"x 28' CMP

464+66 ~ Req'd. 36"x 52' CMP Cross Culv. & 60 cu. yds. excav. for Inlet. (Excav. mat'l. to be used to build dyke, Lt.)
Rem. 36"x 32' CMP

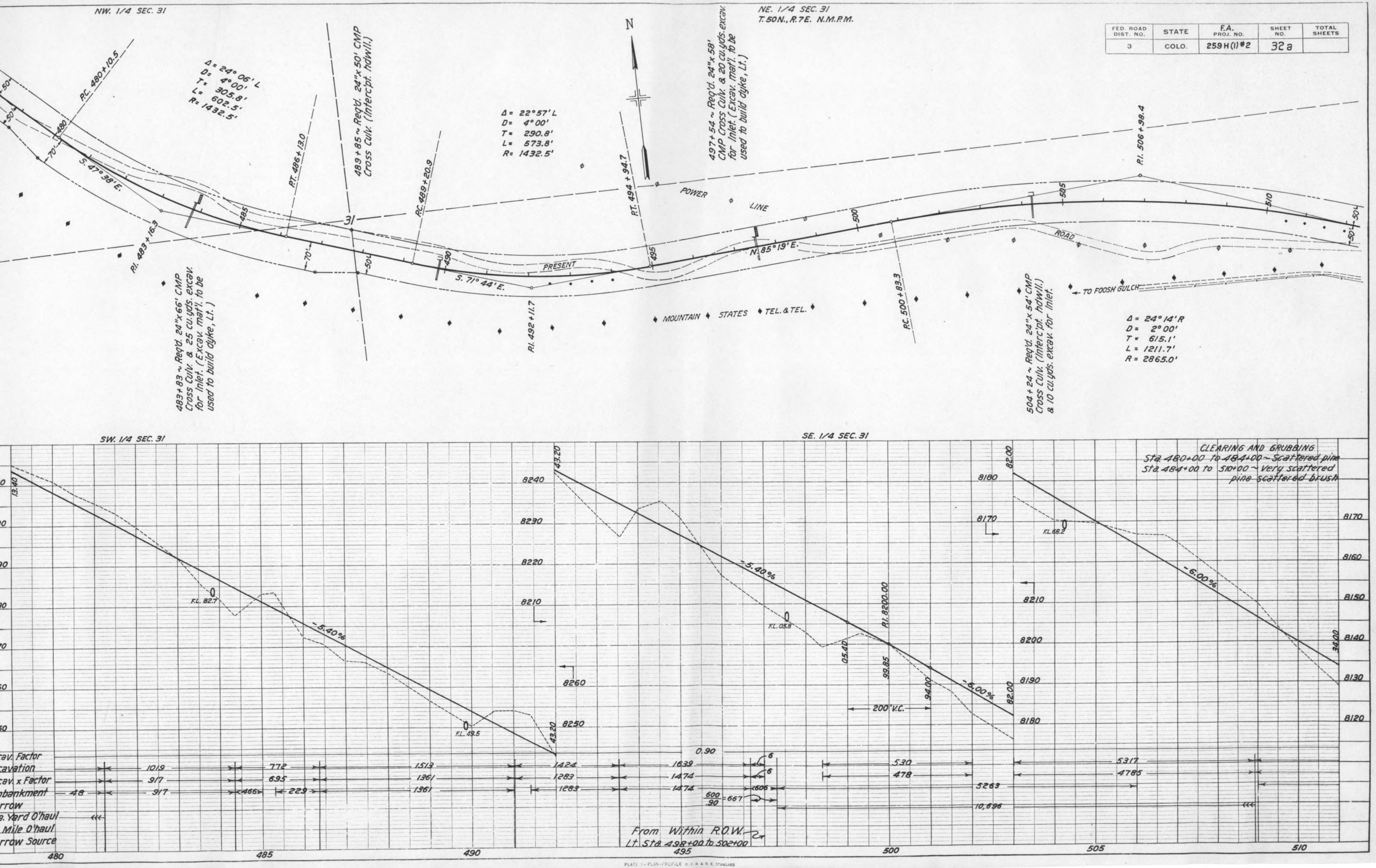
471+45 ~ Req'd. 24"x 50' CMP Cross Culv. & 40 cu. yds. embank. for dyke, Lt.

FORCE ACCOUNT ~ NO F.A.
475± ~ Rem. & Reb. Power Line. (Work to be done by Power Co. Forces.)

476+84 ~ Req'd. 24"x 58' CMP Cross Culv. (Interc'pt. hdwll.) & 10 cu. yds. excav. for Inlet.

CLEARING AND GRUBBING
Sta. 450+00 to 462+00 ~ Scattered brush
Sta. 462+00 to 470+00 ~ Scattered aspen and pine
Sta. 470+00 to 480+00 ~ Scattered pine

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1) #2	32 a	



NW. 1/4 SEC. 31
NE. 1/4 SEC. 31
T. 50 N., R. 7 E. N.M.P.M.
N
Δ = 24° 06' L
D = 4° 00'
T = 305.8'
L = 602.5'
R = 1432.5'
P.C. 480 + 10.5
480
50'
50'
70'
S. 47° 38' E.
P.I. 483 + 16.3
485
P.T. 486 + 13.0
489 + 85 ~ Req'd. 24" x 50' CMP Cross Culv. (Intercpt. hdwll.)
31
70'
50'
P.C. 489 + 20.9
490
S. 71° 44' E.
Δ = 22° 57' L
D = 4° 00'
T = 290.8'
L = 573.8'
R = 1432.5'
PRESENT
P.I. 492 + 11.7
P.T. 494 + 94.7
495
POWER
LINE
497 + 54 ~ Req'd. 24" x 58' CMP Cross Culv. & 20 cu. yds. excav. for Inlet. (Excav. mat'l. to be used to build dyke, Lt.)
N. 85° 19' E.
500
P.C. 500 + 83.3
MOUNTAIN STATES TEL. & TEL.
505
P.I. 506 + 98.4
ROAD
TO FOOSH GULCH
510
50'
50'
483 + 83 ~ Req'd. 24" x 66' CMP Cross Culv. & 25 cu. yds. excav. for Inlet. (Excav. mat'l. to be used to build dyke, Lt.)
504 + 24 ~ Req'd. 24" x 54' CMP Cross Culv. (Intercpt. hdwll.) & 10 cu. yds. excav. for Inlet.
Δ = 24° 14' R
D = 2° 00'
T = 615.1'
L = 1211.7'
R = 2865.0'
SW. 1/4 SEC. 31
SE. 1/4 SEC. 31
13.40
F.L. 82.7
-5.40%
F.L. 49.5
43.20
43.20
8240
8230
8220
8210
8260
8250
-5.40%
F.L. 05.8
05.40
P.I. 8200.00
99.85
94.00
-6.00%
82.00
200' V.C.
82.00
8180
8170
8210
8200
8190
8180
F.L. 68.2
-6.00%
34.00
8170
8160
8150
8140
8130
8120
rav. Factor
cavation
cav. x Factor
nbankment
rrow
. Yard O'haul
Mile O'haul
rrow Source
0.90
1019
772
1513
1424
1639
6
530
5317
917
695
1361
1283
1474
6
478
4785
48
917
466
229
1361
1283
1474
606
5263
600/.90 = 667
10,696
From Within R.O.W. Lt. Sta. 498+00 to 502+00
480
485
490
495
500
505
510
PLATE 1 – PLAN-PROFILE C. P. R. & R. E. STANDARD

CLEARING AND GRUBBING
Sta. 480+00 to 484+00 ~ Scattered pine
Sta. 484+00 to 510+00 ~ Very scattered pine scattered brush

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1) #2	33 a	

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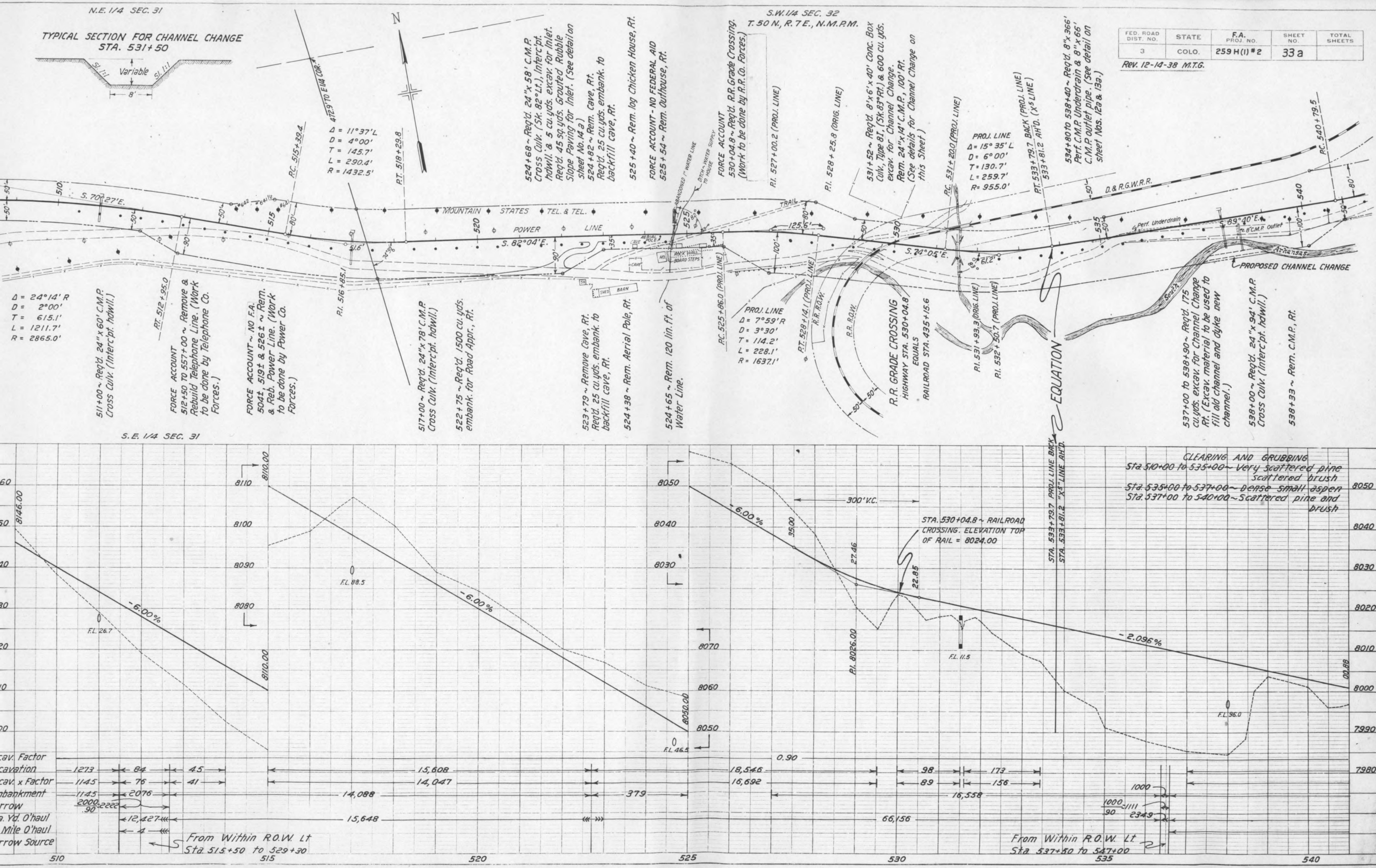


TYPICAL SECTION FOR CHANNEL CHANGE
STA. 531+50

N.E. 1/4 SEC. 31

S.E. 1/4 SEC. 31

S.W. 1/4 SEC. 32
T. 50 N., R. 7 E., N.M.P.M.

Δ = 24°14' R
D = 2°00'
T = 615.1'
L = 1211.7'
R = 2865.0'

Δ = 11°37'L
D = 4°00'
T = 145.7'
L = 290.4'
R = 1432.5'

PROJ. LINE
Δ = 7°59'R
D = 3°30'
T = 114.2'
L = 228.1'
R = 1637.1'

PROJ. LINE
Δ = 15° 35' L
D = 6°00'
T = 130.7'
L = 259.7'
R = 955.0'

511+00 ~ Req'd. 24"x 60' C.M.P. Cross Culv. (Interc'pt. hdwll.)

FORCE ACCOUNT
512+50 TO 557+00 ~ Remove & Rebuild Telephone Line. (Work to be done by Telephone Co. Forces.)

FORCE ACCOUNT ~ NO F.A.
504±, 519± & 526± ~ Rem. & Reb. Power Line. (Work to be done by Power Co. Forces.)

517+00 ~ Req'd. 24"x 78' C.M.P. Cross Culv. (Interc'pt. hdwll.)

522+75 ~ Req'd. 1500 cu. yds. embank. for Road Appr., Rt.

523+79 ~ Remove Cave, Rt. Req'd. 25 cu. yds. embank. to backfill cave, Rt.

524+38 ~ Rem. Aerial Pole, Rt.

524+65 ~ Rem. 120 lin. ft. of Water Line.

524+68 ~ Req'd. 24"x 58' C.M.P. Cross Culv. (Sk. 82° Lt.), Interc'pt. hdwll.' & 5 cu. yds. excav. for Inlet. Req'd. 45 sq. yds. Grouted Rubble Slope Paving for Inlet. (See detail on sheet No. 14 a)
524+82 ~ Rem. Cave, Rt. Req'd. 25 cu. yds. embank. to backfill cave, Rt.

525+40 ~ Rem. log Chicken House, Rt.

FORCE ACCOUNT - NO FEDERAL AID
525+54 ~ Rem. Outhouse, Rt.

FORCE ACCOUNT
530+04.8 ~ Req'd. R.R. Grade Crossing. (Work to be done by R.R. Co. Forces.)

531+52 ~ Req'd. 8'x 6'x 40' Conc. Box Culv., Type 8I, (Sk. 83° Rt.) & 600 cu. yds. excav. for Channel Change. Rem. 24"x 14' C.M.P., 100' Rt. (See details for Channel Change on this Sheet)

R.R. GRADE CROSSING
HIGHWAY STA. 530+04.8
EQUALS
RAILROAD STA. 435+15.6

EQUATION

534+80 to 538+40 ~ Req'd. 8"x 366' Perf. C.M.P. Underdrain & 8"x 66' C.M.P. outlet pipe. (See detail on sheet Nos. 12a & 13a.)

537+00 to 538+90 ~ Req'd. 175 cu. yds. excav. for Channel Change Rt. (Excav. material to be used to fill old channel and dyke new channel.)

538+00 ~ Req'd. 24"x 94' C.M.P. Cross Culv. (Interc'pt. hdwll.)

538+33 ~ Rem. C.M.P., Rt.

STA. 530+04.8 ~ RAILROAD CROSSING. ELEVATION TOP OF RAIL = 8024.00

CLEARING AND GRUBBING
Sta. 510+00 to 535+00 ~ Very scattered pine scattered brush
Sta. 535+00 to 537+00 ~ Dense small aspen
Sta. 537+00 to 540+00 ~ Scattered pine and brush

From Within R.O.W. Lt
Sta. 515+50 to 529+30

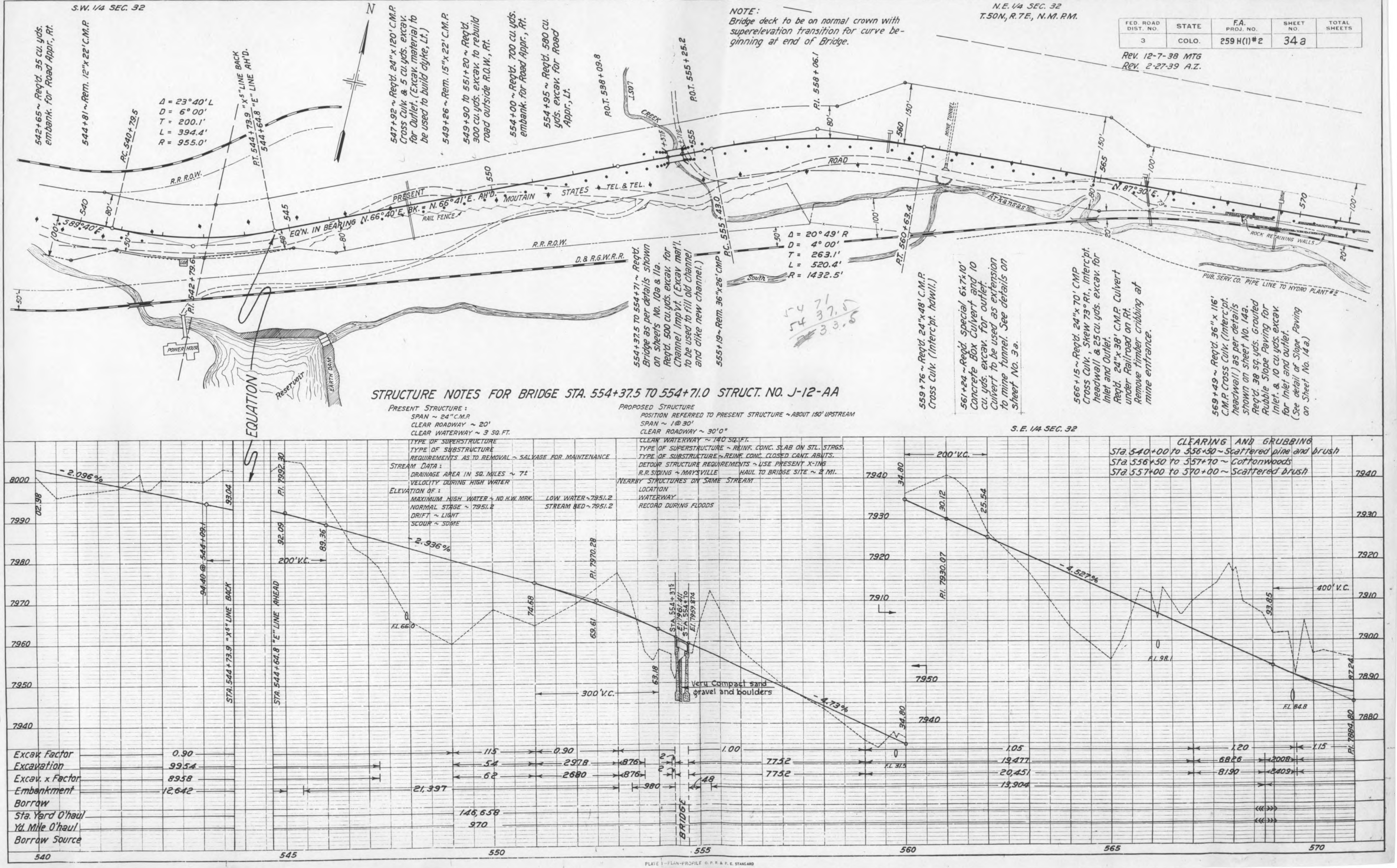
From Within R.O.W. Lt
Sta. 537+50 to 547+00

Variable
Sl. 1:1
Sl. 1:1
8'
N
472.9' TO E 1/4 COR.
P.C. 515+39.4
P.T. 518+29.8
P.T. 512+95.0
P.I. 516+85.1
S. 70°27'E.
S. 82°04'E.
S. 74°05'E.
S. 89°40'E.
510
515
520
525
530
535
540
#642
#641½
#641
51.6'
24°30'
MOUNTAIN STATES TEL. & TEL.
POWER LINE
AERIAL POLE
CAVE
HO.
ROCK WALL
BOARD STEPS
SH
SHED
BARN
ABANDONED 1" WATER LINE
DITCH ~ WATER SUPPLY TO HOUSE
82°
TRAIL
125.6'
100'
80'
90'
50'
35'
P.C. 525+86.0 (PROJ. LINE)
P.I. 527+00.2 (PROJ. LINE)
P.T. 528+14.1 (PROJ. LINE)
P.I. 528+25.8 (ORIG. LINE)
R.R. R.O.W.
R.R. R.O.W.
P.C. 531+20.0 (PROJ. LINE)
P.I. 531+93.3 (ORIG. LINE)
P.I. 532+50.7 (PROJ. LINE)
61.2'
83°
P.T. 533+79.7 BACK (PROJ. LINE)
533+81.2 AH'D. (X5 LINE)
D. & R.G.W.R.R.
Perf. Underdrain
8" C.M.P. Outlet
Arkansas
South
PROPOSED CHANNEL CHANGE
P.C. 540+79.5
8146.00
8110.00
8110.00
8050.00
8110
8100
8090
8080
8070
8060
8050
8050
8040
8030
8050
8040
8030
8020
8010
8000
7990
7980
-6.00%
-6.00%
-6.00%
-2.096%
300' V.C.
35.00
27.46
22.85
P.I. 8026.00
8000.88
F.L. 26.7
F.L. 88.5
F.L. 46.5
F.L. 11.5
F.L. 96.0
STA. 533+79.7 PROJ. LINE BACK
STA. 533+81.2 "X5" LINE AH'D.
cav. Factor
cavation
cav. x Factor
nbankment
rrow
a. Yd. O'haul
Mile O'haul
rrow Source
0.90
1273
84
45
15,608
18,546
98
173
1145
76
41
14,047
16,692
89
156
1145
2076
14,088
379
16,558
1000
2000/.90 = 2222
1000/.90 = 1111
12,427
15,648
66,156
2349
4
510
515
520
525
530
535
540

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H(1)#2	34a	

Rev. 12-7-38 MTG
Rev. 2-27-39 A.Z.

NOTE:
Bridge deck to be on normal crown with superelevation transition for curve beginning at end of Bridge.


S.W. 1/4 SEC. 32
N.E. 1/4 SEC. 32
T.50N., R.7E., N.M.P.M.
S.E. 1/4 SEC. 32
N
542+65 ~ Req'd. 35 cu. yds. embank. for Road Appr., Rt.
544+81 ~ Rem. 12"x22' C.M.P.
Δ = 23°40' L
D = 6° 00'
T = 200.1'
L = 394.4'
R = 955.0'
P.C. 540+79.5
P.T. 544+73.9 "X5" LINE BACK
544+64.8 "E" LINE AH'D.
547+92 ~ Req'd. 24"x120' C.M.P. Cross Culv. & 5 cu. yds. excav. for Outlet. (Excav. material to be used to build dyke, Lt.)
549+26 ~ Rem. 15"x22' C.M.P.
549+90 to 551+20 ~ Req'd. 300 cu. yds. excav. to rebuild road outside R.O.W., Rt.
554+00 ~ Req'd. 700 cu. yds. embank. for Road Appr., Rt.
554+95 ~ Req'd. 580 cu. yds. excav. for Road Appr., Lt.
P.O.T. 538+09.8
P.O.T. 555+25.2
P.I. 558+06.1
Creek
Mine Tunnel
Road
R.R. R.O.W.
S 89°40' E
EQ'N. IN BEARING N.66°40' E. BK. = N.66°41' E. AH'D.
Present Moutain States Tel. & Tel.
Rail Fence
D. & R.G.W.R.R.
P.I. 542+79.6
Power House
Reservoir
Earth Dam
EQUATION
554+37.5 TO 554+71 ~ Req'd. Bridge as per details shown on sheets No. 10a & 11a. Req'd. 500 cu. yds. excav. for Channel Imp'vt. (Excav mat'l. to be used to fill old channel and dike new channel.)
555+19 ~ Rem. 36"x26' CMP
P.C. 555+43.0
Δ = 20°49' R
D = 4° 00'
T = 263.1'
L = 520.4'
R = 1432.5'
South
Arkansas
N. 87°30' E.
P.T. 560+63.4
54 71
54 37.5
33.5
559+76 ~ Req'd. 24"x48' C.M.P. Cross Culv. (Interc'pt. hdwll.)
561+24 ~ Req'd. special 6'x7'x10' Concrete Box Culvert and 10 cu. yds. excav. for outlet. Culvert to be used as extension to mine tunnel. See details on sheet No. 3a.
566+15 ~ Req'd. 24"x70' CMP Cross Culv., Skew 73° Rt., Interc'pt. headwall & 25 cu. yds. excav. for Inlet and Outlet. Req'd. 24"x38' C.M.P. Culvert under Railroad on Rt. Remove timber cribbing at mine entrance.
569+49 ~ Req'd. 36"x116' C.M.P. Cross Culv. (Interc'pt. headwall) as per details shown on sheet No. 14a. Req'd. 38 sq. yds. Grouted Rubble Slope Paving for Inlet. & 10 cu. yds. excav. for Inlet and outlet. (See detail of Slope Paving on Sheet No. 14a.)
Rock Retaining Walls
Pub. Serv. Co. Pipe Line to Hydro Plant #2
-2.096%
-2.936%
-4.73%
-4.527%
200' V.C.
300' V.C.
400' V.C.
P.I. 7992.30
P.I. 7970.28
P.I. 7930.07
P.I. 7884.80
94.40 @ 544+99.1
STA. 544+73.9 "X5" LINE BACK
STA. 544+64.8 "E" LINE AHEAD
STA. 554+37.5 El. 7961.41
STA. 554+71.0 El. 7959.874
Very Compact sand gravel and boulders
F.L. 66.0
F.L. 31.5
F.L. 98.1
F.L. 84.8
8000
7990
7980
7970
7960
7950
7940
7930
7920
7910
7900
7890
7880
BRIDGE
540
545
550
555
560
565
570

Excav. Factor	0.90	1.15	0.90			1.00	1.05	1.20		1.15	
Excavation	9954	54	2978	876	2	7752	19,477	6826	2008		
Excav. x Factor	8958	62	2680	876	2	7752	20,451	8190	2409		
Embankment	12,642	21,397	980	48	13,904						
Borrow											
Sta. Yard O'haul	146,658										
Yd. Mile O'haul	970										
Borrow Source											

STRUCTURE NOTES FOR BRIDGE STA. 554+37.5 TO 554+71.0 STRUCT. NO. J-12-AA

PRESENT STRUCTURE:
SPAN ~ 24" C.M.P.
CLEAR ROADWAY ~ 20'
CLEAR WATERWAY ~ 3 SQ. FT.
TYPE OF SUPERSTRUCTURE
TYPE OF SUBSTRUCTURE
REQUIREMENTS AS TO REMOVAL ~ SALVAGE FOR MAINTENANCE

STREAM DATA:
DRAINAGE AREA IN SQ. MILES ~ 7±
VELOCITY DURING HIGH WATER

ELEVATION OF:
MAXIMUM HIGH WATER ~ NO H.W. MRK. LOW WATER ~ 7951.2
NORMAL STAGE ~ 7951.2 STREAM BED ~ 7951.2
DRIFT ~ LIGHT
SCOUR ~ SOME

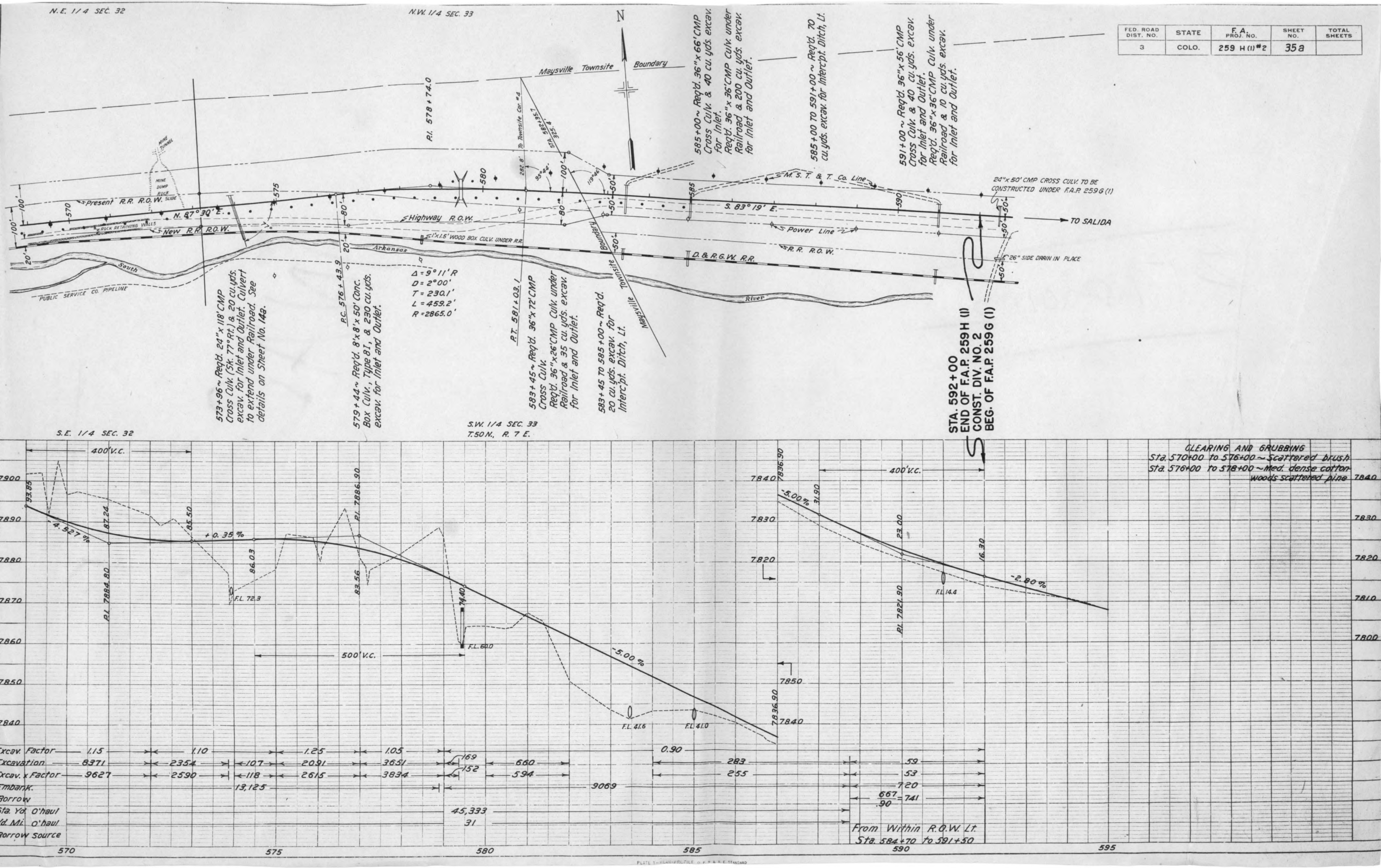
PROPOSED STRUCTURE
POSITION REFERRED TO PRESENT STRUCTURE ~ ABOUT 150' UPSTREAM
SPAN ~ 1@30'
CLEAR ROADWAY ~ 30'0"
CLEAR WATERWAY ~ 140 SQ. FT.
TYPE OF SUPERSTRUCTURE ~ REINF. CONC. SLAB ON STL. STRGS.
TYPE OF SUBSTRUCTURE ~ REINF. CONC. CLOSED CANT. ABUTS.
DETOUR STRUCTURE REQUIREMENTS ~ USE PRESENT X-ING
R.R. SIDING ~ MAYSVILLE HAUL TO BRIDGE SITE ~ 2 MI.

NEARBY STRUCTURES ON SAME STREAM
LOCATION
WATERWAY
RECORD DURING FLOODS

CLEARING AND GRUBBING
Sta. 540+00 to 556+50 ~ Scattered pine and brush
Sta. 556+50 to 557+70 ~ Cottonwoods
Sta. 557+00 to 570+00 ~ Scattered brush

PLATE 1 — PLAN-PROFILE G. P. R. & P. E. STANDARD
KEUFFEL & ESSER CO. NEW YORK

FED. ROAD DIST. NO.	STATE	F. A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	259 H (1) #2	35a	



573+96 ~ Req'd. 24"x 118' CMP Cross Culv. (Sk. 77° Rt.) & 20 cu. yds. excav. for Inlet and Outlet. Culvert to extend under Railroad. See details on Sheet No. 14a.

579+44 ~ Req'd. 8'x 8'x 50' Conc. Box Culv., Type 81, & 230 cu. yds. excav. for Inlet and Outlet.

583+45 ~ Req'd. 36"x 72' CMP Cross Culv.
Req'd. 36"x 26' CMP Culv. under Railroad & 35 cu. yds. excav. for Inlet and Outlet.

583+45 TO 585+00 ~ Req'd. 20 cu. yds. excav. for Interc'pt. Ditch, Lt.

585+00 ~ Req'd. 36"x 66' CMP Cross Culv. & 40 cu. yds. excav. for Inlet.
Req'd. 36"x 36' CMP Culv. under Railroad & 200 cu. yds. excav. for Inlet and Outlet.

585+00 TO 591+00 ~ Req'd. 70 cu. yds. excav. for Interc'pt. Ditch, Lt.

591+00 ~ Req'd. 36"x 56' CMP Cross Culv. & 40 cu. yds. excav. for Inlet and Outlet.
Req'd. 36"x 36' CMP Culv. under Railroad & 10 cu. yds. excav. for Inlet and Outlet.

STA. 592+00
END OF F.A.P. 259H (1)
CONST. DIV. NO. 2
BEG. OF F.A.P. 259G (1)

CLEARING AND GRUBBING
Sta. 570+00 to 576+00 ~ Scattered brush
Sta. 576+00 to 578+00 ~ Med. dense cotton woods scattered pine

From Within R.O.W. Lt.
Sta. 584+70 to 591+50

N.E. 1/4 SEC. 32
N.W. 1/4 SEC. 33
N
Maysville Townsite Boundary
MINE TUNNEL
MINE DUMP ROCK SLIDE
P.I. 578+74.0
282.8' To Townsite Cor. #4
STA. 582+35.7
35°44'
119°46'
100'
80'
50'
20'
Present R.R. R.O.W.
N. 87° 30' E.
ROCK RETAINING WALLS
New R.R. R.O.W.
77°
Highway R.O.W.
S. 83° 19' E.
M. S. T. & T. Co. Line
Power Line
R.R. R.O.W.
D. & R.G.W. R.R.
1'x1.5' WOOD BOX CULV. UNDER R.R.
South
Arkansas
River
PUBLIC SERVICE CO. PIPELINE
Maysville Townsite Boundary
24"x 50' CMP CROSS CULV. TO BE CONSTRUCTED UNDER F.A.P. 259G (1)
26" SIDE DRAIN IN PLACE
TO SALIDA
570
575
580
585
590
P.C. 576+43.9
P.T. 581+03.1
Δ = 9° 11' R
D = 2° 00'
T = 230.1'
L = 459.2'
R = 2865.0'
S.E. 1/4 SEC. 32
S.W. 1/4 SEC. 33
T. 50 N., R. 7 E.
400' V.C.
500' V.C.
400' V.C.
93.85
87.24
85.50
86.03
83.56
P.I. 7884.80
P.I. 7886.90
74.40
F.L. 72.3
F.L. 60.0
F.L. 41.6
F.L. 41.0
-4.527 %
+0.35 %
-5.00 %
7836.90
7836.90
31.90
-5.00 %
23.00
16.30
P.I. 7821.90
F.L. 14.4
-2.80 %
7900
7890
7880
7870
7860
7850
7840
7850
7840
7840
7830
7820
7840
7830
7820
7810
7800
Excav. Factor — 1.15 — 1.10 — 1.25 — 1.05 — 0.90
Excavation — 8371 — 2354 — 107 — 2091 — 3651 — 169 — 660 — 283 — 59
Excav. x Factor — 9627 — 2590 — 118 — 2615 — 3834 — 152 — 594 — 255 — 53
Embank. — 13,125 — 9069 — 720
Borrow — 667/.90 = 741
Sta. Yd. O'haul — 45,333
Yd. Mi. O'haul — 31
Borrow Source
570
575
580
585
590
595