FED. ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	1	

COLORADO
STATE HIGHWAY DEPARTMENT

PLAN AND PROFILE OF PROPOSED
P.W.A. DOCKET - COLO. 804-D
PROJECT NO. 6009-C
STATE HIGHWAY NO. 91
CLEAR CREEK COUNTY

INDEX OF SHEETS

Sheet No. 1 Title sheet
" 2 Typical Cross Section and Summary
" 3 & 4 List of Structures, Fencing, R.O.W. markers, etc.
" 5 Concrete Box Culverts M-103-D
" 6 " " Culverts M-104-D
" 7 Standard Headwalls for C.M.P. culverts M-102-E
" 8 " Timber Guard Posts M-19-A
" 9 " Wire Cable Guard Fence M-20-B
" 10 " " Fences with Steel Posts & Marker Posts M-27-A
" 11 " Methods for Superelevation & Widening of Curves M-1-B
" 12 Typical Side Approach Roads and Traffic Signs-(P.W.A.) M-2-BX
" 13-21 Plan & Profile Sheets
" 22-195 Cross Section Sheets

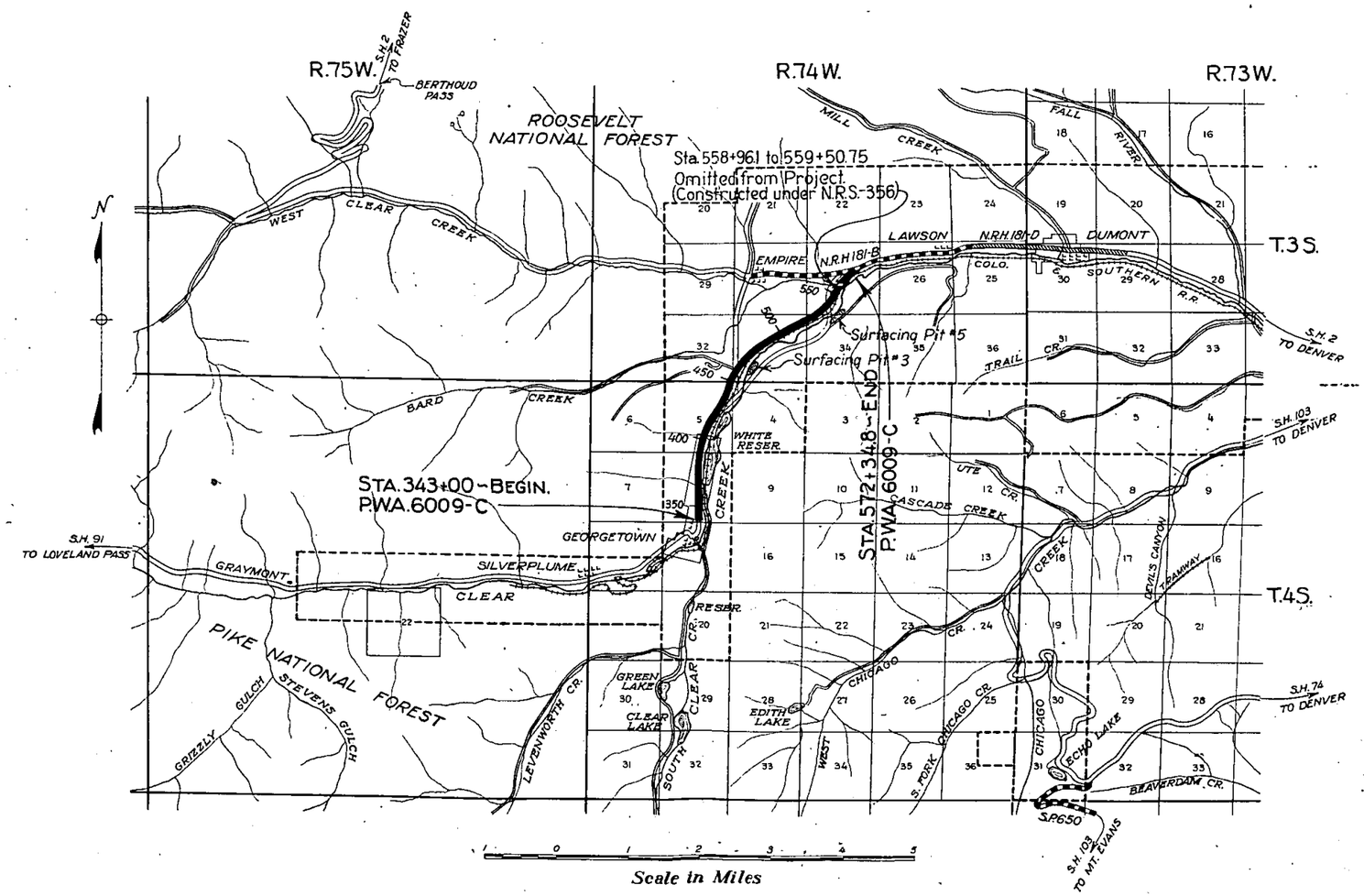
SCALES OF ORIGINAL TRACINGS

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 229348 FT. = 4.343 MILES
NET LENGTH OF PROJECT 228801 FT. = 4.333 MILES

CONVENTIONAL SIGNS

Center line of project
Right of way lines
Township or range lines
Section lines
Quarter section lines
Railroad center line
Barbed wire fence
Wire cable guard fence
Combination fence
Board and slab fence
Picket fence
Telephone lines
Power lines
Power lines (steel towers)



Note:
It is recommended that bidders on this project go over the plan details with one of the following field representatives of this department:
E.E. Montgomery, Division Engineer, Denver, Colo.
B.T. Miller, Resident Engineer, Denver, Colo.

RECOMMENDED FOR APPROVAL 9-8-37
J.E. Mahoney
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

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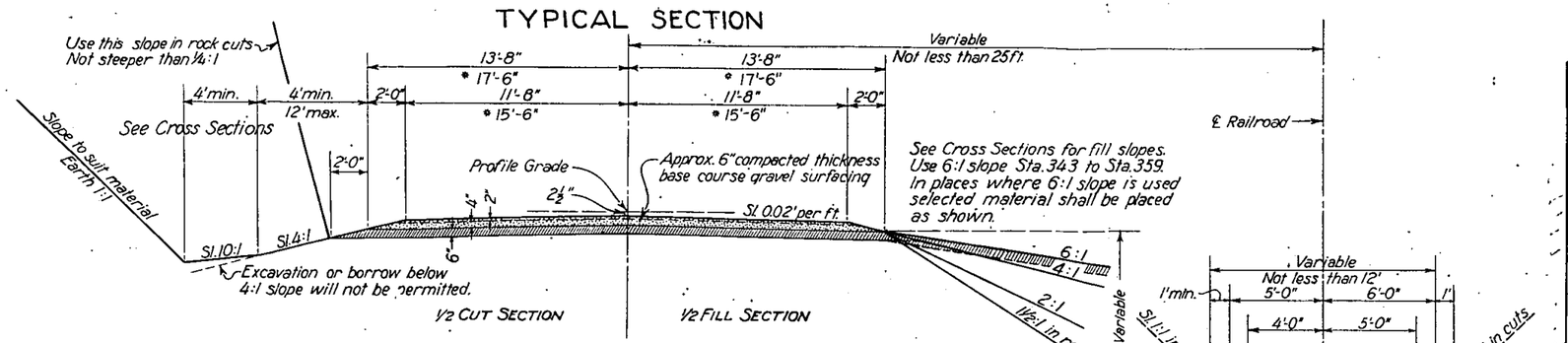
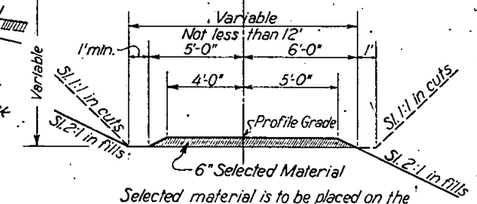
TYPICAL CROSS SECTION OF IMPROVEMENT AND SUMMARY OF QUANTITIES

TYPICAL SECTION



In places where excavation and embankment are in rock which would result in a roadway unsuitable for traffic the 6" underlying the subgrade as shown on the Typical Section is to be constructed of selected material, which is to be classified and paid for as "Unclassified Excavation".

Base course surfacing is to be placed in two courses. The bottom course of approximately 4" in thickness is to be placed at the rate of 53 tons per 100 ft. of roadway. The top course of approximately 2" in thickness is to be placed at the rate of 25 tons per 100 ft. of roadway.



Selected material is to be placed on the subgrade at the rate of 22 cu. yds. per 100 feet of railroad grade.

Railroad grade is to be constructed between the following stations:
434+30 - 481+00,
484+00 - 499+50,
502+50 - 508+50,
515+50 - 520+50,
525+50 - 528+50,
534+50 - 538+50.

GENERAL NOTES

This Project is to be constructed in conformity with the Standard Specifications of the Colorado State Highway Department, adopted June 1, 1937.

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

All roadway excavation required to construct the project shall be obtained as indicated on the plans. Quantities involved beyond the limits of ditches as shown on the Typical Section, either noted on the plans as "Borrow" or on the 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 ditch are subject to change by the Engineer to fit embankment requirements actually met during construction.

All curves are to be superelevated and widened in conformity with the "Standard Superelevation and Widening Sheet" included in the Plans.

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

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

Except as otherwise noted on the plans all overhaul will be paid for as measured along the center-line of the project.

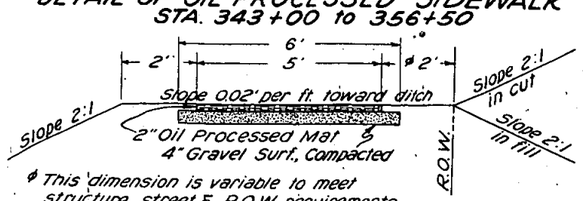
Clearing and Grubbing shall be of variable widths and be held to the minimum required for the construction of the road, borrow pits and channel changes and to accommodate visibility. Ordinarily the clearing shall not extend more than 8 feet beyond the toes of the fills and tops of the cut slopes, and the cost thereof included in the lump sum price for "Clearing and Grubbing the Entire Project".

At all places on this project where the new work lies along the present traveled road the contractor will be required to adequately provide for traffic at his own expense. Also, the contractor shall maintain in safe condition and at his own expense all temporary approaches to and crossings of intersecting roads.

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

* 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 feet. This is done to accommodate guard fence at bridge approaches.

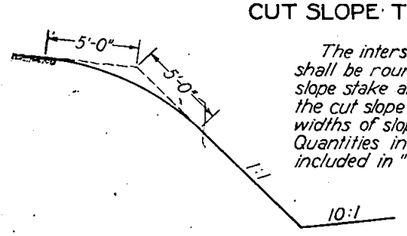
DETAIL OF OIL PROCESSED SIDEWALK
STA. 343+00 to 356+50



Base Course of Sidewalks shall be constructed of Gravel or Crushed Rock Surfacing placed at the rate of 12.5 tons per Station.

ø This dimension is variable to meet structure, street & R.O.W. requirements.

CUT SLOPE TREATMENT



The intersection of cut slopes with existing ground shall be round in earth cuts beginning 5 ft. outside the slope stake and extending 5 ft. down the cut slope. Where the cut slope is less than 5 ft. reduce each of the above widths of slope treatment to the actual slope distance. Quantities involved in cut slope treatment shall not be included in "Unclassified Excavation."

SURFACING PLAN

It is estimated that Gravel or Crushed Rock Surfacing for this project is available from vicinity of pits shown in the following table. If, for his own convenience, the contractor elects to use a plan other than shown below, overhaul in excess of that shown by the Department's plan will not be allowed.

Estimated quantities involved in this operation are as follows:

MATERIAL TO BE PLACED	SOURCE	QUANTITY AVAILABLE TONS	QUANTITY USED TONS	OVERHAUL TON MI.
343+00 to 403+85	Pit 300 ft. left of Sta. 463+00	(Pit No. 3)	4747	3576
Road Approaches 343+00 to 403+85	" " " " " "	"	130	98
403+85 to 413+20	Pit 300 ft. left of Sta. 463+00	"	729	65
413+20 to 503+00	" " " " " "	"	7004	Free
503+00 to 558+96.1	Pit 600 ft. right of Sta. 540+00	(Pit No. 5)	4400	"
559+50.8 to 572+34.8	" " " " " "	"	1037	"
Road Approaches 413+20 to 503+00	Pit 300 ft. left of Sta. 463+00	(Pit No. 3)	90	"
503+00 to 558+96.1	Pit 600 ft. right of Sta. 540+00	(Pit No. 5)	80	"
559+50.8 to 572+34.8	" " " " " "	"	20	"
Totals Sta. 343+00 to 403+85			4877	3674
Totals Sta. 403+85 to 572+34.8			13360	65
Grand Totals			18237	3739

SUMMARY OF APPROXIMATE QUANTITIES

NO.	ITEM	UNIT	343+00 TO 403+85	403+85 TO 572+34.8		TOTALS
10a&b	Clearing and Grubbing Entire Project	Lump Sum	(a)•	(b)•		(a&b)•
11b	Removal of 4 Structures-343+00 to 403+85	" "	•			•
11c	Removal of 2 Structures-403+85 to 572+34.8	" "		•		•
11d	Removing Signs	Each	1.			1
11e	Removing and Relaying 3" Pipe Line	Lin. Ft.		65		65
11f	Removing and Resetting R.O.W. Markers	Each		2		2
12a	Removing Fence	Lin. Ft.	500.	5,200		5,700
12b	Removing and Rebuilding Fence	" "	1,100			1,100
13c	Unclassified Excavation	Cu. Yd.	37,000	208,000		245,000
13d	Cut Slope Treatment	Mile	0.4	2.4		2.8
14a	Dry Rock Ecavation (Structural)	Cu. Yd.	30	480		510
14b	Dry Common Excavation (Structural)	" "	30	480		510
14c	Wet Rock Excavation (Structural)	" "	5	55		60
14d	Wet Common Excavation (Structural)	" "	5	55		60
18a	Station Yard Overhaul	Sta. Yd.	265,500	532,500		798,000
18b	Yard Mile Overhaul	Yd. Mi.	5,200	14,300		19,500
26a	Gravel or Crushed Rock Surfacing	Ton	4,880	13,360		18,240
26c	Overhaul of Surfacing	Ton Mi.	3700	100		3,800
46a	Class "A" Concrete	Cu. Yd.		273		273
46b	Class "B" Concrete	" "	8	68		76
47	Reinforcing Steel	Lb.		24,000		24,000
53x	12" Corrugated Metal Culvert Pipe	Lin. Ft.		56		56
53b	18" " " " "	" "	64	120		184
53c	24" " " " "	" "	58	686		744
53d	30" " " " "	" "	34	1214		1248
53e	36" " " " "	" "	212	300		512
53g	48" " " " "	" "		102		102
63a	Riprap	Cu. Yd.		230		230
74a	Wire Cable Guard Fence	Lin. Ft.		380		380
74x	Timber Guard Posts			171		171
76c	Barbed Wire Fence with Metal Posts	Lin. Ft.		6100		6100
76g	Barbed Wire Gates	Each		3		3
81a	Project Markers	"	1			1
81b	Right of Way Markers	"	10	46		56
87	Oil Processed Sidewalk	Sq. Yd.	750			750
	FORCE ACCOUNT ITEMS (WITH FEDERAL AID)					
	Removing Power Line from R.O.W., 400+80 to 403+85. (Work by Power Co. Forces)	Lump Sum	•			•
	Removing Power Line from R.O.W. 403+ to 452+; 500+ to 527+; 535+; 547+. (Work by Power Co. Forces)	" "		•		•
	Removing Telep. Line from R.O.W., 409+ to 436+. (Work by Telep. Co. Forces.)	" "		•		•
	Moving Railroad Track, 434+30 to 481+00; 484+00 to 499+50; 502+50 to 508+50; 515+50 to 520+50; 525+50 to 528+50; 534+50 to 538+50. (Work by Railroad Co. Forces.)	" "		•		•
	Construct Railroad Grade Crossings, 472+; 484+. (Work by Railroad Co. Forces.)	" "		•		•
	Removing and Resetting Foot Bridge, 517+	" "		•		•
	FORCE ACCOUNT ITEMS (WITHOUT FEDERAL AID)					
	Removing Buildings from R.O.W., 343+; 348+; 350+; 352+; 354+; 355+; 345+.	Lump Sum	•			•
	Removing Filling Station and 2 Gas Pumps from R.O.W., Sta. 344+	" "	•			•
	Remove and Reset Sprinkler Hydrant, 352	" "	•			•
	Removing Pump House from R.O.W., 412+	" "		•		•
	Removing Buildings from R.O.W., 484+; 485+; 486+; 564+; 473+.	" "		•		•
	Remove and Reset 2 Tram Cable Anchors off R.O.W., Sta. 486+	" "		•		•
	Remove Mine Cable from R.O.W., 543+.	" "		•		•

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SELECTED MATERIAL

Selected Material shall be placed and spread over the prepared subgrade and shoulder slopes as indicated on the Typical Section.

This material shall be classified and paid for as "Unclassified Excavation."

Estimated quantities involved in this operation and the source of Selected Material are shown in the tabulation below.

TO BE PLACED STA. TO STA.	QUANTITY CU. YD.	OVERHAUL STA. YD.	OVERHAUL YD. MI.	SOURCE
Roadway				
343+00 to 359+00	2187	24,057	2175	Pit 200' Lt 417+50
359+00 to 403+85	2781	30,588	1163	" " "
403+85 to 558+96.1	9641	94,463	9571	" " "
559+507 to 572+34.8	820	9,020	2088	" " "
Railroad				
434+30 - 481+00	1028	4,308	510	" " "
484+00 - 499+50	341	3,751	390	" " "
502+50 - 508+50	132	1,452	185	" " "
515+50 - 520+50	110	1,210	181	" " "
525+50 - 528+50	66	726	120	" " "
534+50 - 538+50	88	968	175	" " "
TOTAL 343+00-403+85	4968	54,645	3338	
TOTAL 403+85-572+34.8	12,226	122,898	13,220	
COMBINED TOTAL	17,194	177,543	16,558	

LIST OF STRUCTURES

Station	Description	Remove Struct. No.	Unclassified Excavation Cu. Yds. Excav.	Unclassified Excavation Cu. Yds. Embank.	Structural Excavation Cu. Yds. ※	Gravel or Cr. Rock Surfacing Ton	Concrete Cu. Yds. Class "A"	Concrete Cu. Yds. Class "B"	Reinf. Steel Lbs.	Corrugated Metal Culvert Pipe Lin. Ft. 12"	18"	24"	30"	36"	48"	Miscellaneous
343+00 - 356+50	Sidewalk on Lt.			1000												750 Sq. Yd. of Sidewalk
343+00	Project Marker															1 - Project Marker
343+16	Road Approach Lt. & Rt.			200		40										
343+70	Remove Building from R.O.W., Rt.				Force Account	(No Federal Aid)										
344+25	" 2 Gas Pumps & Gas Station from R.O.W.				Force Account	(No Federal Aid)										
345+10	" Building from R.O.W., Rt.				Force Account	(No Federal Aid)										
348+30	" Sign Lt.															
348+90	" Building from R.O.W.				Force Account	(No Federal Aid)										Remove Sign
350+00	" " " " "				Force Account	(No Federal Aid)										
351+50	C.M.P. Cross Culv. & Outlet		5		10			1.65				58				
352+75	Remove Building from R.O.W.				Force Account	(No Federal Aid)										
352+85	" & Reset Sprinkler Hydrant, Rt.				Force Account	(No Federal Aid)										
354+28	" Building from R.O.W.				Force Account	(No Federal Aid)										
355+30	" " " " "				Force Account	(No Federal Aid)										
357+05	Remove 28' Wood Box	1														
357+43	C.M.P. Cross Culv. (Skew 60° Rt.)				10			3.00					86			
358+79	Street Approach Lt.			75		20										
358+86	Remove 18"x20' C.M.P. Lt.	1														
359+00	C.M.P. Cross Culv. & Ditches		10		15			3.00					68			
363+00	C.M.P. Side Drain & Road Approach Lt.			90		10				32						
368+00	Road Approach Rt.			100		10										
368+50	C.M.P. Side Drain & Road Approach Lt.			65		10				32						
389+82	C.M.P. Cross Culv.				25			No Hdwl					58			
	Remove 18"x38' Iron Pipe.	1														
399+35	Road Approach Rt. & Lt.			500		20										
	C.M.P. Side Drain Lt.											34				
	Remove 24"x30' Iron Pipe Lt.	1														
400+80 to 403+85	Remove 330 Lin. Ft. Power Line with Steel Towers from R.O.W.				Force Account	(Work by Power Co. Forces)										
401+38	Road Approach Rt.			100		20										
403+85 to 452+40	Rem. 4890 Lin. Ft. Power Line (Steel Towers) from R.O.W.				Force Account	(Work by Power Co. Forces)										
408+50	C.M.P. Cross Culv.				20			3.00					54			
	Remove 18" C.M.P. Culv.	1														
409+80 to 436+80	" 2880 Lin. Ft. of Telephone Line from R.O.W.				Force Account	(Work by Telephone Co. Forces)										
412+55	Remove & Relay 3" Iron Water Pipe.															(Remove & Relay 65 Lin. Ft. of 3" Iron Water Pipe.
	C.M.P. Cross Culv.				5			No Hdwl		56						
	Remove Pump House from R.O.W., Lt.				Force Account	(No Federal Aid)										
414+50	C.M.P. Cross Culv. & Ditches		15		10			3.00					60			
417+80	" " " " " " "		50		50			3.00					54			
423+15	Road Approach Lt.			100		10										
423+50	C.M.P. Cross Culv. & Outlet		20		15			5.00						50		
431+50	6'x6'x36' Conc. Box Culv. & Inlet		50		175		62.9		4223							
431+90	Road Approach Rt.			1200		10										
432+00	" " Lt.			150		20										
434+30 to 481+00	Moving Railroad Track.				Force Account	(Work by R.R. Co. Forces)										
440+40	8'x8'x112' Conc. Box Culv. (Type 8 III) Skew 60° Rt.				100		209.4		19,634							
445+00	C.M.P. Cross Culv. & Ditches		5		15			1.65				114				
449+50	" " " " " " "		5		55			3.00					132			
450+45 to 451+90	Fill Pocket Lt.			50												
453+60	C.M.P. Cross Culv. & Inlet.		5		45			1.65				70				
458+40	" " " " " " "		5		10			2.25					108			
462+30	" " " " "				15			2.25					68			
467+15	" " " " & Inlet		5		15			2.25					78			
472+25	Road Approach Rt.			175		10										
	Railroad Grade Crossing Rt.				Force Account	(Work by R.R. Co. Forces)										
473+30	Remove Building from R.O.W., Rt.				Force Account	(No Federal Aid)										
474+50	C.M.P. Cross Culv.				25			2.25					68			
479+60	" " " " "				20			2.25					70			
480+05	Road Approach Lt.			70		10										
484+00	" " Rt.			75		10										
	Railroad Grade Crossing, Rt.				Force Account	(Work by R.R. Co. Forces)										
484+00 to 480+50	Moving Railroad Track, Rt.				Force Account	(Work by R.R. Co. Forces)										

(CONTINUED ON SHEET 4)

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FENCING & GATE REQUIREMENTS

Station	Side	Remove Fence	Remove and Rebuild Fence	Build Barbed Wire Fence	Build Barbed Wire Gates
		Lin. Ft.	Lin. Ft.	Lin. Ft.	No.
348+50-350+32	R	145	185		
351+85-358+90	R	275	710		
400+35-402+35	R	30	200		
450+45	X	190			
458+00-473+15	R&L	1525			
473+47-481+20	R	785			
484+10-485+70	R	180			
488+48-506+25	R&L	1825			
517+95-520+35	R	250			
524+85-528+70	R	410			
449+60-481+20	R			3240	
484+10-485+70	R			160	
472+25	R				1
485+90-506+25	R			2035	
496+60	R				1
504+20	R				1
517+95-520+35	R			240	
524+85-528+70	R			385	
TOTALS-STA. 343+00 TO 403+85		450	1095		
TOTALS-STA. 403+85 TO 573+		5165		6060	3
GRAND TOTALS		5615	1095	6060	3

TIMBER GUARD POSTS

Station	Side	Spacing	No. Posts
430+91.2-432+08.8	L&R	Minor Str.	8
433+40-435+40	R	50'	5
438+30-480+80	R	50'	86
439+50-442+00	L	50'	6
524+50-539+00	R	50'	30
541+10-546+60	R	50'	12
562+00-573+50	R	50'	24
TOTALS - STA. 343+00 TO 403+85			
TOTALS - STA. 403+85 TO 573+			171
GRAND TOTALS			171

R.O.W. MARKERS

Station	Side	No.	Station	Side	No.
343+00	L&R	2	489+58	R	1
361+96.3	L	2	490+30	L	1
364+00	L&R	2	495+00	L	2
367+00	L	2	510+00	L	2
400+00	L	2	515+92	R	1
			516+06	R	1
417+64	L	1	516+69	L	1
418+13	R	1	525+02.4	L	2
425+78.2	L	2	535+58	L	1
431+00	R	2	536+90	R	1
434+29.9	R	2	540+00	R	2
448+56	L	1	551+43.7	L	2
449+64	R	1	556+16.2	R	2
454+00	R	2	563+03	R	1
454+57	L	1	564+09	L	1
455+80	L	1	564+22	L	1
469+27.0	R	2	566+25	R	1
478+83.3	R	2	567+04	R	1
483+25	L	1	572+34.8	L	2
485+62	R	1			
TOTALS - STA. 343+00 TO 403+85					10
TOTALS - STA. 403+85 TO 573+					46
GRAND TOTALS					56

LIST OF STRUCTURES

(CONTINUED FROM SHEET 3)

Station	Description	Remove Struct. No.	Unclassified Excavation Cu. Yds. Excav.	Unclassified Excavation Cu. Yds. Embank.	Structural Excavation Cu. Yds. *	Gravel or Cr. Rock Surfacing Ton	Concrete Cu. Yds. Class "A"	Concrete Cu. Yds. Class "B"	Reinf. Steel Lbs.	Corrugated Metal Culvert Pipe Lin. Ft. 12"	18"	24"	30"	36"	48"	Wire Cable Guard Fence Lin. Ft.	Miscellaneous
484+90	Remove Building from R.O.W., Lt.				Force Account	(No Federal Aid)											
485+30	" " " " " ".				Force Account	(No Federal Aid)											
485+67	C.M.P. Side Drain & Road Approach Lt.			70		10					28						
485+90 to 488+00	Channel Change Rt.		600														230 cu. yds. Riprap 18" thick
485+90 to 488+00	Riprap in Channel, Rt.				90												
486+00	Remove & Reset off R.O.W. 2 Tram Cable Anchors, Lt.				Force Account	(No Federal Aid)											
486+37	C.M.P. Cross Culv. & Inlet.		5		10				No Bid			90					
	Remove "B" Tile Pipe	1															
486+70	Remove Building from R.O.W.				Force Account	(No Federal Aid)											
487+25	C.M.P. Cross Culv. & Inlet.		5		10				2.25				84				
487+40	Road Approach Lt.			70		10											
496+40	C.M.P. Cross Culv. & Inlet		5		5				1.65			72					
497+00 to 499+50	Channel Change, Rt.		500														
500+75 to 527+90	Remove Power Line with Steel Poles from R.O.W.				Force Account	(Work by Power Co. Forces)											
501+26	C.M.P. Cross Culv. & Ditches.		15		30				1.65			48					
502+50 to 508+50	Moving Railroad Track, Rt.				Force Account	(Work by R.R. Co. Forces)											
506+00	C.M.P. Cross Culv. & Ditches.		10		20				2.25				74				
506+50 to 510+00	Channel Change Rt.		1200														
510+55	C.M.P. Cross Culv. & Ditches.		5		90				2.25				42				
515+00 to 517+50	Intercepting Ditch Lt.		200														
515+50 to 520+50	Moving Railroad Track, Rt.				Force Account	(Work by R.R. Co. Forces)											
516+75 to 519+50	Channel Change, Rt.		1000														
517+30	Remove & Reset Foot Bridge Rt.				Force Account												
517+50	C.M.P. Cross Culv.				5				2.25				102				
518+00	Road Approach Lt.			120		10											
518+60	C.M.P. Cross Culv.				10				2.25				112				
518+60 to 526+60	Intercepting Ditch Lt.		480														
525+50 to 528+50	Moving Railroad Track, Rt.				Force Account	(Work by R.R. Co. Forces)											
526+60	C.M.P. Cross Culv.				25				2.25				112				
530+00	" " " " " & Inlet.		5		25				1.65			70					
532+70	" " " " " & Ditches.		20		65				1.65			102					
534+50 to 538+50	Moving Railroad Track, Rt.				Force Account	(Work by R.R. Co. Forces)											
534+70	Double C.M.P. Cross Culv. & Inlet.		300		60				3.05				52				
535+90	Remove Power Line with Wood Poles from R.O.W.				Force Account	(Work by Power Co. Forces)							52				
536+15	C.M.P. Cross Culv. & Ditches		10		65				2.25				124				
540+00	C.M.P. Side Drain & Road Approach Lt.		3500			10						30					
541+56	" " " " " " " " ".		200			10					26						
543+25 to 545+75	Surface Ditch Lt.		200														
543+50	Remove Old Steel Wire Mine Cable from R.O.W.				Force Account	(No Federal Aid)											
544+90	Road Approach Rt.			1200		20											
545+75	C.M.P. Cross Culv.				10				2.25				68				
547+53	Remove Power Line with Wood Poles from R.O.W.				Force Account	(Work by Power Co. Forces)											
549+55	C.M.P. Cross Culv. (Skew 45° Rt.)				5				1.65			68					
550+50	Road Approach Lt.		200			10											
554+00 to 555+50	Drainage Ditch Lt.		120														
555+90	C.M.P. Cross Culv. & Intcepting Ditch Lt.		50		10				5.00						52		
556+90	Road Approach Rt. & Lt.			50		20										95	
557+98.6 to 558+93.6	Wire Cable Guard Fence Rt. & Lt.															95	
559+53.3 to 560+48.3	" " " " " " ".															95	
561+00	Road Approach Rt.			240		10										95	
562+00	C.M.P. Side Drain & Road Approach Lt.			250		10					36						
564+50	Remove Building from R.O.W., Rt.				Force Account	(No Federal Aid)											
566+33	C.M.P. Cross Culv.				15				1.65			52					
566+85	Remove & Reset R.O.W. Marker Lt.																Remove & Reset R.O.W. Marker
573+	" " " " " " " Rt.																" " " " " "
TOTALS - STA. 343+00 TO STA. 403+85		4	15	2130	60	190		7.65			64	58	34	212			980
TOTALS - STA. 403+85 TO STA. 573+		2	8790	9820	1065	190	272.3	67.5	23,857	58	120	686	1214	300	102		980
GRAND TOTALS		6	8805	4950	1125	320	272.3	75.15	23,857	58	184	744	1248	512	102		980

* Structural Excavation is estimated to be 50% Common and 50% Rock, each of which is estimated to be 90% Dry and 10% Wet.

FED. ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	13	

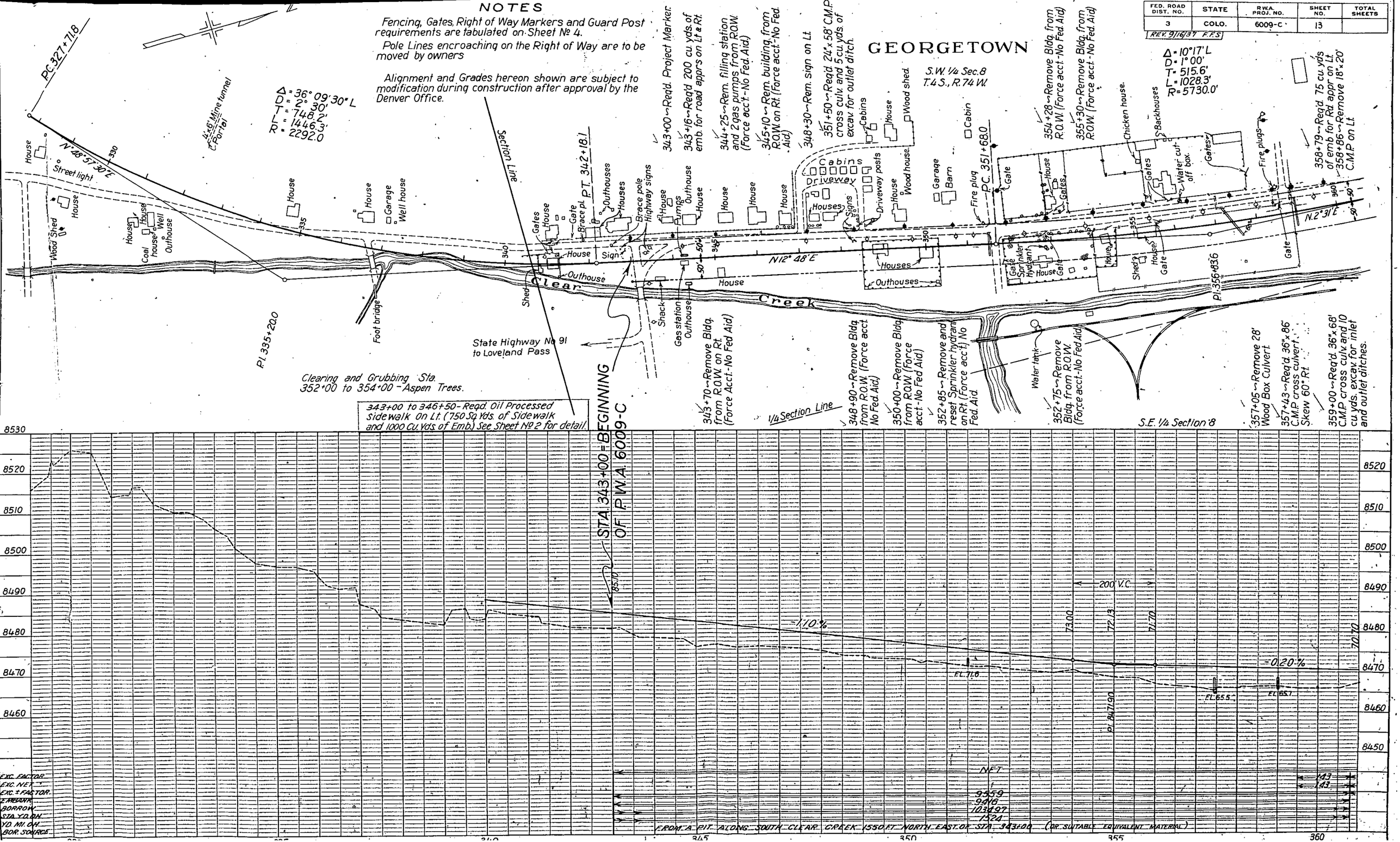
REV. 9/16/37 F.F.S.

NOTES

Fencing, Gates, Right of Way Markers and Guard Post requirements are tabulated on Sheet № 4.

Pole Lines encroaching on the Right of Way are to be moved by owners

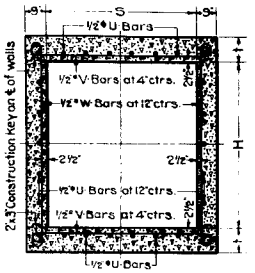
Alignment and Grades hereon shown are subject to modification during construction after approval by the Denver Office.



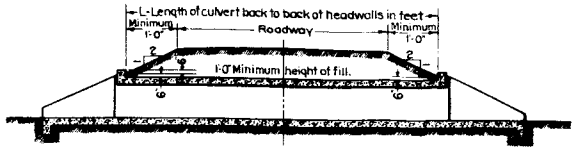
REVISIONS

FED. ROAD DIST. NO	STATE	P.W.A.	SHEET NO.	TOTAL SHEETS
3	COLO.	60090	5	

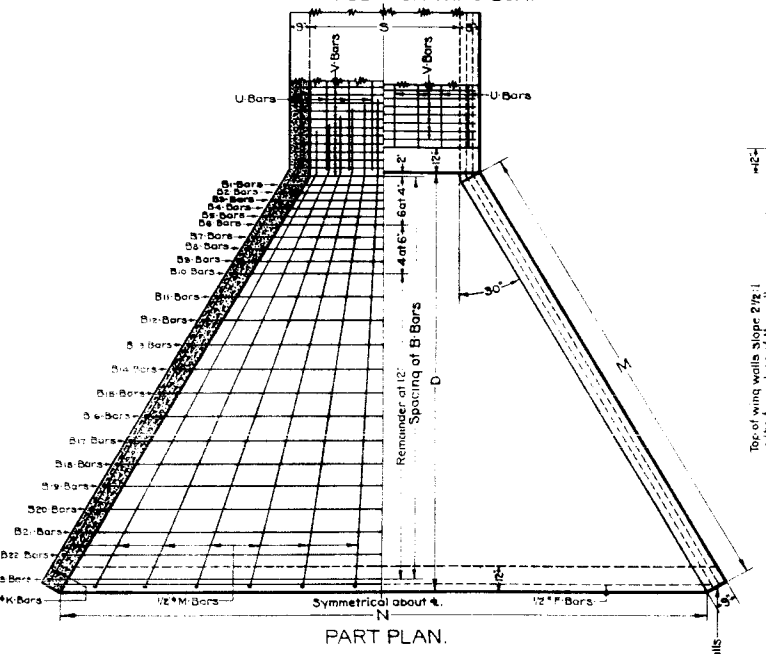
STANDARD M-103-D



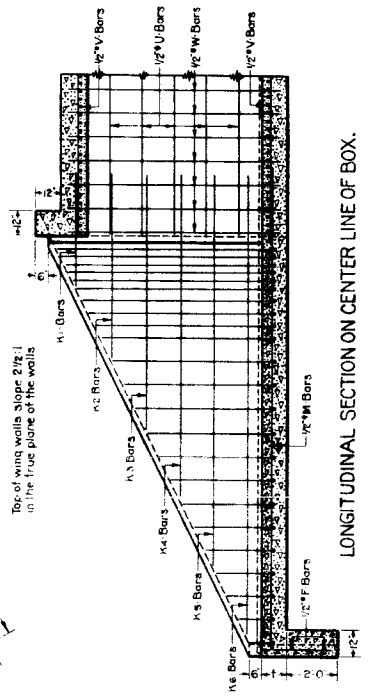
TYPICAL SECTION THRU BOX.



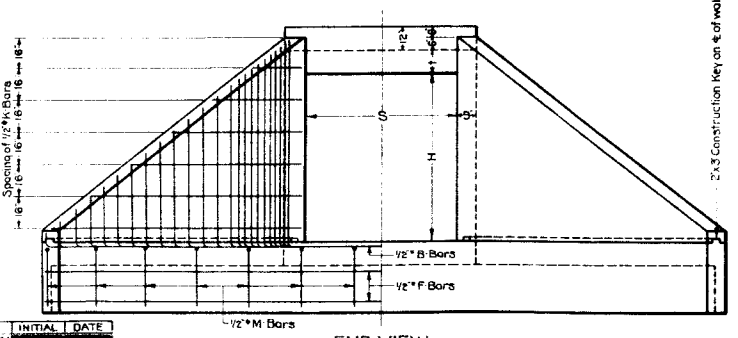
TYPICAL SECTION SHOWING RELATION OF CULVERT TO ROADWAY.



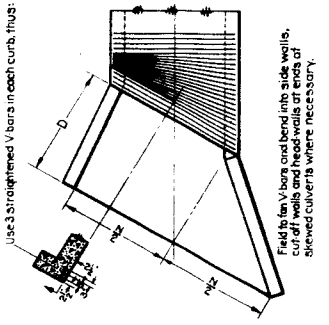
PART PLAN.



LONGITUDINAL SECTION ON CENTER LINE OF BOX.



END VIEW.



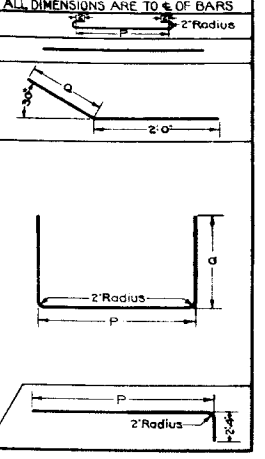
PART PLAN FOR SKEWED HEADWALLS.

REINFORCEMENT BAR LIST

W.W.B.

USE BARS FOR	MARK	SIZE	NUMBER	DIMENSION F	DIMENSION Q	TOTAL LENGTH
All Sizes	V	1½"φ	(S+L)+14	S+ 10"		S+ 2'-2"
" "	W	1½"φ	(2+L)+6	H+ 10"		H+ 2'-2"
" "	F	1½"φ	4			N+ 0'-3"
" "	U	1½"φ	★			L+ 1'-8"
" "	K 1	1½"φ	4		3'-4"	5'-4"
H=2'-0" or more	K 2	1½"φ	4		6'-8"	8'-8"
H=3'-0" " "	K 3	1½"φ	4		10'-0"	12'-0"
H=5'-0" " "	K 4	1½"φ	4		13'-4"	15'-4"
H=6'-0" " "	K 5	1½"φ	4		16'-8"	18'-8"
H=7'-0" " "	K 6	1½"φ	4		20'-0"	22'-0"
All Sizes	B 1	1½"φ	2	S+ 1'-6"	H+ 1'-3"	
" "	B 2	1½"φ	2	S+ 1'-11"	H+ 1'-11"	
" "	B 3	1½"φ	2	S+ 2'-3"	H+ 0'-11"	
" "	B 4	1½"φ	2	S+ 2'-8"	H+ 0'-9"	
" "	B 5	1½"φ	2	S+ 3'-0"	H+ 0'-8"	
" "	B 6	1½"φ	2	S+ 3'-5"	H+ 0'-6"	
" "	B 7	1½"φ	2	S+ 4'-0"	H+ 0'-3"	
" "	B 8	1½"φ	2	S+ 4'-7"	H+ 0'-0"	
" "	B 9	1½"φ	2	S+ 5'-2"	H- 0'-3"	
H=1'-6" or more	B 10	1½"φ	2	S+ 5'-9"	H- 0'-5"	
H=2'-0" " "	B 11	1½"φ	2	S+ 6'-11"	H- 0'-11"	
H=3'-0" " "	B 12	1½"φ	2	S+ 8'-1"	H- 1'-4"	P-(2×Q)-2"
H=3'-0" " "	B 13	1½"φ	2	S+ 9'-3"	H- 1'-10"	
H=3'-0" " "	B 14	1½"φ	2	S+ 10'-5"	H- 2'-3"	
H=4'-0" " "	B 15	1½"φ	2	S+ 11'-7"	H- 2'-9"	
H=4'-0" " "	B 16	1½"φ	2	S+ 12'-9"	H- 3'-3"	
H=5'-0" " "	B 17	1½"φ	2	S+ 13'-11"	H- 3'-8"	
H=5'-0" " "	B 18	1½"φ	2	S+ 15'-1"	H- 4'-2"	
H=6'-0" " "	B 19	1½"φ	2	S+ 16'-3"	H- 4'-7"	
H=6'-0" " "	B 20	1½"φ	2	S+ 17'-5"	H- 5'-1"	
H=6'-0" " "	B 21	1½"φ	2	S+ 18'-7"	H- 5'-6"	
H=7'-0" " "	B 22	1½"φ	2	S+ 19'-9"	H- 6'-0"	
H=7'-0" " "	B 23	1½"φ	2	S+ 20'-11"	H- 6'-5"	
All Sizes	M	1½"φ	(S+L)+4	D+ 3'-0"		D+ 5'-3"

BENDING DIAGRAM
ALL DIMENSIONS ARE TO ℄ OF BARS



★ See Table of Dimensions and Quantities.

TABLE OF DIMENSIONS AND QUANTITIES

W.W.B.

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

SPAN S	HEIGHT H	HEIGHT OF FILL ALLOWED	DIMENSION M	DIMENSION N	DIMENSION D	THICKNESS OF SLAB t	NUMBER OF U-BARS PER BOX	QUANTITIES FOR ONE LINEAL FT. OF BOX: CONCRETE CU. YDS.	QUANTITIES FOR ONE LINEAL FT. OF BOX: STEEL LBS.	QUANTITIES FOR TWO HEADWALLS: CONCRETE CU. YDS.	QUANTITIES FOR TWO HEADWALLS: STEEL LBS.	STRUCTURAL EXCAVATION: TWO HEADWALLS SQ. FT.	STRUCTURAL EXCAVATION: TWO CUT OFF WALLS CU. YDS.
1'-6"	1'-6"	25'-6"	5'-6¼"	7'-2⅝"	5'-1⅞"	8½"	8	0.241	30.6	4.5	820	116.31	4.40
2'-0"	2'-0"	22'-6"	6'-9¼"	8'-11⅝"	6'-2⅞"	8½"	8	0.298	34.0	6.1	430	139.44	5.18
2'-6"	1'-0"	15'-0"	[illegible]	7'-3⅝"	4'-4⅛"	10"	8	0.332	37.5	5.0	360	116.50	4.85
3'-0"	2'-0"	19'-0"	7'-1"	10'-3⅝"	6'-6⅛"	10"	10	0.388	40.5	7.7	495	178.11	5.78
3'-0"	3'-0"	19'-0"	9'-7"	12'-9⅝"	8'-8⅛"	10"	12	0.444	43.6	11.0	680	250.88	6.67
4'-0"	2'-0"	15'-0"	7'-1"	11'-3⅝"	6'-6⅛"	10"	12	0.450	47.0	8.5	565	195.13	6.13
4'-0"	3'-0"	15'-0"	9'-7"	13'-9⅝"	8'-8⅛"	10"	14	0.506	50.0	12.0	755	272.24	7.31
4'-0"	4'-0"	15'-0"	12'-1"	16'-3⅝"	10'-10⅛"	10"	16	0.562	53.1	16.0	910	353.71	8.42
5'-0"	3'-0"	11'-8"	9'-7"	14'-9⅝"	8'-8⅛"	10"	16	0.567	56.6	12.6	835	293.60	7.78
5'-0"	4'-0"	11'-6"	12'-1"	17'-3⅝"	10'-10⅛"	10"	18	0.623	59.6	17.1	955	365.43	8.87
5'-0"	5'-0"	11'-6"	14'-7"	19'-8⅝"	13'-0"	10"	20	0.679	62.7	21.9	1220	488.07	9.98
6'-0"	2'-0"	10'-0"	7'-4¾"	13'-7⅛"	6'-9⅝"	11½"	16	0.645	60.0	11.3	705	239.30	7.63
6'-0"	3'-0"	10'-0"	9'-10¾"	16'-1⅛"	8'-11¼"	11½"	18	0.699	63.0	15.3	920	325.95	8.34
6'-0"	4'-0"	10'-0"	12'-4¾"	18'-7⅛"	11'-1¼"	11½"	20	0.755	66.2	20.1	1090	423.57	9.45
6'-0"	5'-0"	10'-0"	14'-10¾"	21'-1⅛"	13'-3¼"	11½"	22	0.810	69.2	25.6	1320	532.02	10.56
6'-0"	6'-0"	10'-0"	17'-4¾"	23'-7⅛"	15'-5¼"	11½"	24	0.866	72.3	31.7	1620	651.46	11.67
6'-0"	7'-0"	10'-0"	19'-10¾"	26'-1⅛"	17'-7¼"	11½"	26	0.923	75.3	38.5	1900	781.58	12.79

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".

All exposed surfaces shall be rubbed free of form marks.

All walls shall have forms on both sides.

Minimum distance between center line of bar and edge of concrete to be 2½".

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.

For culverts required and governing dimensions see sheet № 2.

All reinforcing bars shall be deformed.

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 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.

This design not to be used when height of fill exceeds the allowable tabulated.

Supporting soils for all culverts must be composed of firm and uniform material throughout.

All backfilling in approaches, 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.

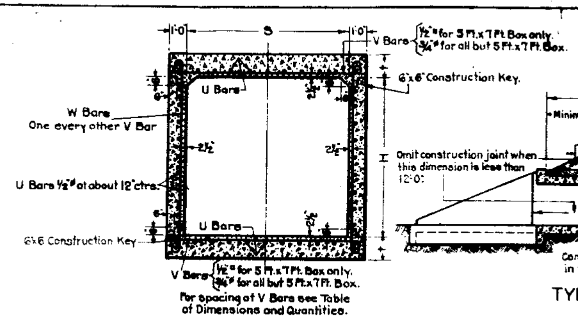
LOADING DATA
L.L.=A.A.S.H.O. 1935 Class "A" (H-15)

COLORADO
STATE HIGHWAY DEPARTMENT
CONCRETE BOX CULVERTS

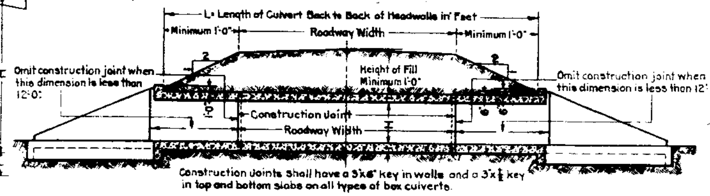
1½'×1½'	4'×2'	5'×4'	6'×4'
2'×2'	4'×3'	5'×5'	6'×5'
3'×1'	4'×4'	6'×2'	6'×6'
3'×2'	5'×3'	6'×3'	6'×7'
3'×3'	[redacted]	[redacted]	[redacted]

Designed by A.G.K.
Made by A.G.K.
Checked by
Approved by [signature]
Bridge Engineer
Date: May 10th, 1937.

INITIAL	DATE
[redacted]	

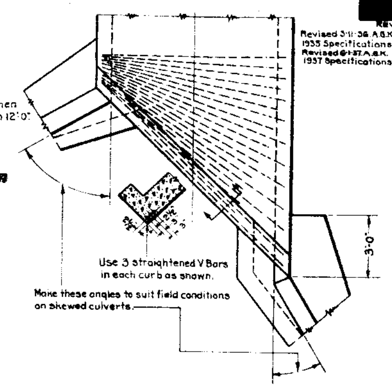


TYPICAL SECTION THRU BOX



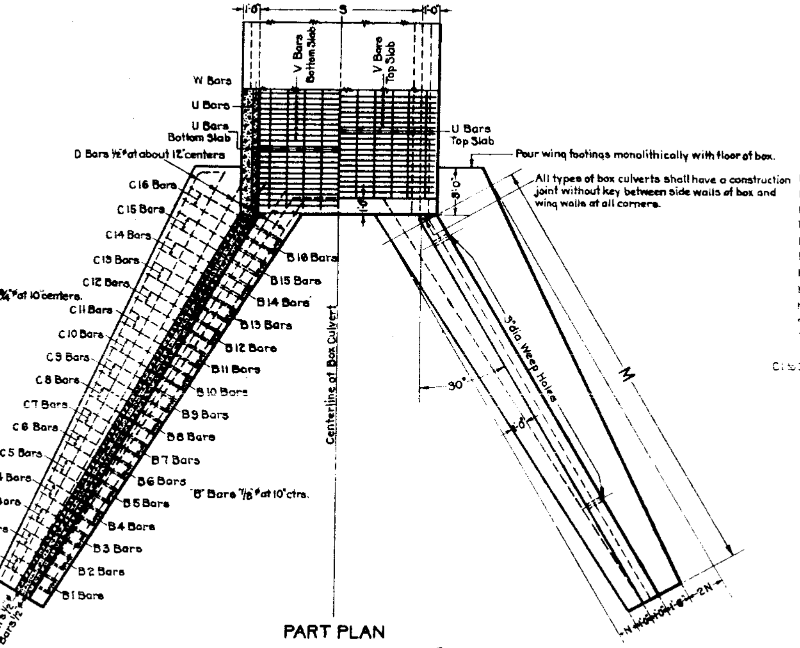
TYPICAL SECTION SHOWING RELATION OF CULVERT TO ROADWAY

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

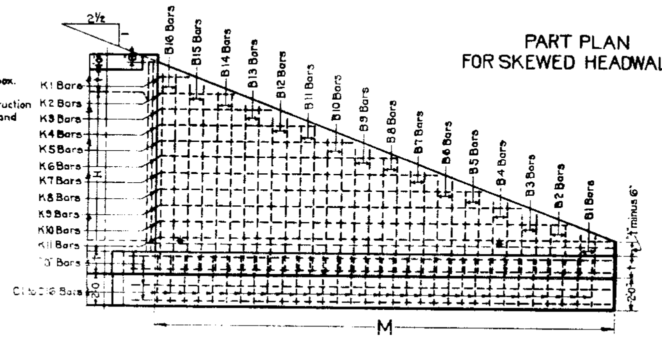


PART PLAN FOR SKEWED HEADWALLS

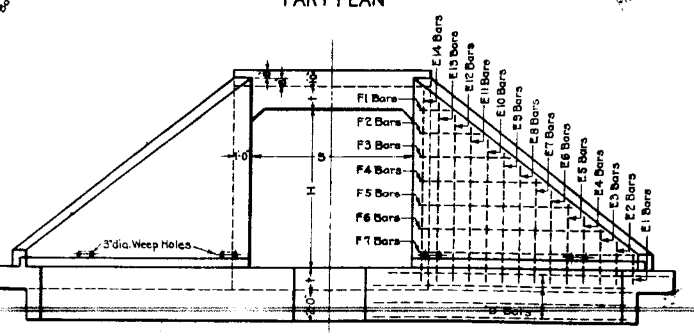
Revised 3-11-36 A.G.K. 1935 Specifications
Revised 6-1-37 A.G.K. 1937 Specifications



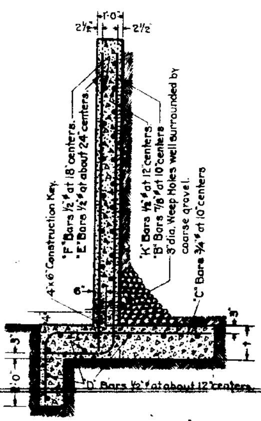
PART PLAN



TRUE SIDE ELEVATION OF WINGWALL



END VIEW



TYPICAL SECTION THRU WINGWALL

STANDARD M-104-D

[redacted]

REVISED 3-15-35 NWD DEFORMED BARS.

FED. ROAD DIST. No.	STATE	P.W.A. PROJ. No.	SHEET No.	TOTAL SHEETS
3	COLO.	6009C	6	

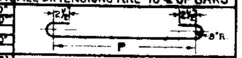
Revised 7-14-33 A.G.K. Changed Length of B and E Bars.

REINFORCEMENT BAR LIST

USE BARS FOR	MARK	SIZE	NUMBER	DIMENSION P		TOTAL LENGTH
All Boxes but 5'x7'	V	¾"#	24(L+2) divided by Spacing	S+14"		P+2'-0"
5'x7' Box Only	V	½"#		S+14"		P+2'-0"
All Sizes	W	★	½ No. of V Bars	H+10"		P+2'-0"
All Sizes	U	½"#	★			L+1'-8"
All Sizes	D	½"#	56			H+2'-0"
All Sizes	E1	½"#	4			8"
All Sizes	E2	½"#	4			1'-[illegible]"
All Sizes	E3	½"#	4			2'-4"
All Sizes	E4	½"#	4			[illegible]
All Sizes	E5	½"#	4			4'-0"
All Sizes	E6	½"#	4			4'-8"
All Sizes	E7	½"#	4			5'-[illegible]"
H=5 Ft. and over	E8	½"#	4			6'-4"
H=6 Ft. and over	E9	½"#	4			7'-2"
H=7 Ft. and over	E10	½"#	4			8'-0"
H=8 Ft. and over	E11	½"#	4			8'-9"
H=8 Ft. and over	E12	½"#	4			[illegible]
H=10 Ft.	E13	½"#	4			10'-5"
H=10 Ft.	E14	½"#	4			11'-2"
All Sizes	F1	½"#	4			4'-6"
All Sizes	F2	½"#	4			[illegible]
All Sizes	F3	½"#	4			[illegible]
H=5 Ft. and over	F4	½"#	4			12'-0"
H=6 Ft. & 7 Ft. and over	F5	½"#	4			[illegible]
H=8 Ft. and over	F6	½"#	4			[illegible]
H=10 Ft.	F7	½"#	4			[illegible]
All Sizes	K1	½"#	4			2'-0"
All Sizes	K2	½"#	4			4'-6"
All Sizes	K3	½"#	4			7'-0"
All Sizes	K4	½"#	4			[illegible]
All Sizes	K5	½"#	4			12'-0"
H=5 Ft. and over	K6	½"#	4			14'-6"
H=6 Ft. and over	K7	½"#	4			17'-0"
H=7 Ft. and over	K8	½"#	4			19'-6"
H=8 Ft. and over	K9	½"#	4			22'-0"
H=10 Ft.	K10	½"#	4			24'-6"
H=10 Ft.	K11	½"#	4			27'-0"
All Sizes	B1	⅞"#	8	P=1'-0"	Q=6"	2'-3"
All Sizes	B2	⅞"#	8	P=1'-0"	Q=1'-2"	2'-11"
All Sizes	B3	⅞"#	8	P=1'-1"	Q=1'-10"	3'-[illegible]"
All Sizes	B4	⅞"#	8	P=1'-2"	Q=2'-6"	4'-[illegible]"
All Sizes	B5	⅞"#	8	P=1'-3"	Q=3'-2"	[illegible]
All Sizes	B6	⅞"#	8	P=1'-4"	Q=3'-10"	5'-11"
All Sizes	B7	⅞"#	8	P=1'-5"	Q=4'-6"	6'-[illegible]"
H=5 Ft. and over	B8	⅞"#	8	P=1'-5"	Q=5'-2"	7'-4"
H=5 Ft. and over	B9	⅞"#	(5Ft.:4) 8	P=1'-6"	Q=5'-10"	8'-1"
H=6 Ft. and over	B10	⅞"#	8	P=1'-7"	Q=6'-6"	8'-10"
H=7 Ft. and over	B11	⅞"#	8	P=1'-8"	Q=7'-2"	9'-7"
H=7 Ft. and over	B12	⅞"#	(7Ft.:4) 8	P=1'-9"	Q=7'-10"	10'-4"
H=8 Ft. and over	B13	⅞"#	8	P=1'-10"	Q=8'-6"	11'-1"
H=10 Ft.	B14	⅞"#	8	P=1'-11"	Q=9'-2"	11'-10"
H=10 Ft.	B15	⅞"#	8	P=1'-11"	Q=9'-10"	12'-6"
H=10 Ft.	B16	⅞"#	8	P=2'-0"	Q=10'-6"	13'-3"
All Sizes	C1	¾"#	8	P=2'-5"	Q=1'-10"	5'-4"
All Sizes	C2	¾"#	8	P=2'-11"	Q=1'-10"	[illegible]
All Sizes	C3	¾"#	8	P=3'-1"	Q=1'-10"	5'-5"
All Sizes	C4	¾"#	8	P=3'-4"	Q=1'-10"	6'-0"
All Sizes	C5	¾"#	8	P=3'-7"	Q=1'-10"	6'-3"
All Sizes	C6	¾"#	8	[illegible]	Q=1'-10"	[illegible]
All Sizes	C7	¾"#	8	P=4'-0"	Q=1'-10"	6'-8"
H=5 Ft. and over	C8	¾"#	8	P=4'-3"	Q=1'-10"	6'-10"
H=5 Ft. and over	C9	¾"#	(5Ft.:4) 8	P=4'-5"	Q=1'-10"	7'-1"
H=6 Ft. and over	C10	¾"#	8	P=4'-8"	Q=1'-10"	7'-4"
H=7 Ft. and over	C11	¾"#	8	P=4'-10"	Q=1'-10"	7'-6"
H=7 Ft. and over	C12	¾"#	(7Ft.:4) 8	P=5'-1"	Q=1'-10"	7'-9"
H=8 Ft. and over	C13	¾"#	8	P=5'-4"	Q=1'-10"	8'-0"
H=8 Ft. and over	C14	¾"#	8	P=5'-6"	Q=1'-10"	8'-2"
H=10 Ft.	C15	¾"#	8	P=5'-9"	Q=1'-10"	8'-5"
H=10 Ft.	C16	¾"#	8	P=6'-0"	Q=1'-10"	8'-8"

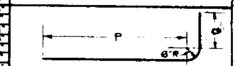
★ SEE TABLE OF DIMENSIONS AND QUANTITIES.

BENDING DIAGRAM — ALL DIMENSIONS ARE TO ℄ OF BARS



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"	



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"	

Where t=10" thick slabs use Q lengths & total lengths as shown

t=11½"	add 1½" to Q	
t=12½"	2"	
t=13"	3"	
t=13½"	3"	
t=14"	4"	
t=15½"	5"	
t=17"	7"	

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)

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	ONE LIN. FT. OF BOX CONCRETE CU. YDS.	ONE LIN. FT. OF BOX STEEL LBS.	TWO HEADWALLS CONCRETE CU. YDS.	TWO HEADWALLS STEEL LBS.
11'-6"		5'-0"	7'-0"	10"	4"	½"#	24	20'-0"	10"	0.960	79	35.5	3260
7'-0"	8 I	8'-0"	4'-0"	11½"	5½"	½"#	24	12'-6"	7"	1.016	100	22.5	1815
			5'-0"	11½"	5½"	½"#	26	15'-0"	8"	1.090	103	27.0	2300
			6'-0"	11½"	5½"	½"#	28	17'-6"	9"	1.164	106	33.0	2840
			8'-0"	11½"	5½"	½"#	32	22'-6"	1'-0"	1.318	118	45.0	4135
8'-6"	8 II	8'-0"	4'-0"	12½"	5"	½"#	24	12'-6"	7"	1.078	109	23.5	1850
			5'-0"	12½"	5"	½"#	26	15'-0"	8"	1.152	112	27.5	2340
			6'-0"	12½"	5"	½"#	28	17'-6"	9"	1.226	115	34.0	2890
			8'-0"	12½"	5"	½"#	32	22'-6"	1'-0"	1.374	126	47.0	4190
10'-6"	8 III	8'-0"	4'-0"	13½"	4½"	½"#	24	12'-6"	7"	1.140	120	24.0	1910
			5'-0"	13½"	4½"	½"#	26	15'-0"	8"	1.214	122	29.5	2415
			6'-0"	13½"	4½"	½"#	28	17'-6"	9"	1.288	126	35.5	2965
			8'-0"	13½"	4½"	½"#	32	22'-6"	1'-0"	1.436	137	48.5	4290
4'-0"	10 I	10'-0"	4'-0"	13"	5"	½"#	28	12'-6"	7"	1.269	126	24.0	1850
			6'-0"	13"	5"	½"#	32	17'-6"	9"	1.417	131	35.5	2935
			8'-0"	13"	5"	½"#	36	22'-6"	1'-0"	1.566	138	48.6	4250
			10'-0"	13"	5"	⅝"#	40	27'-6"	1'-2"	1.714	156	64.0	5530
6'-0"	10 II	10'-0"	4'-0"	14"	4½"	½"#	28	12'-6"	7"	1.343	138	25.0	1965
			6'-0"	14"	4½"	½"#	32	17'-6"	9"	1.491	144	37.5	3025
			8'-0"	14"	4½"	½"#	36	22'-6"	1'-0"	1.640	151	51.0	4350
			10'-0"	14"	4½"	⅝"#	40	27'-6"	1'-2"	1.788	170	66.0	5650
9'-0"	10 III	10'-0"	4'-0"	15½"	4"	½"#	28	12'-6"	7"	1.454	159	27.0	2055
			6'-0"	15½"	4"	½"#	32	17'-6"	9"	1.603	160	39.5	3125
			8'-0"	15½"	4"	½"#	36	22'-6"	1'-0"	1.751	166	54.0	4475
			10'-0"	15½"	4"	⅝"#	40	27'-6"	1'-2"	1.899	188	69.5	5795
12'-0"	10 IV	10'-0"	4'-0"	17"	3½"	½"#	28	12'-6"	7"	1.566	172	29.0	2145
			6'-0"	17"	3½"	½"#	32	17'-6"	9"	1.714	179	42.0	3240
			8'-0"	[illegible]	[illegible]	[illegible]	36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			10'-0"	17"	3½"	⅝"#	40	27'-6"	1'-2"	2.010	232	73.5	5955

[redacted]

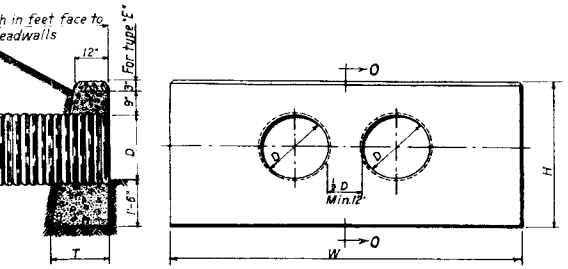
GENERAL NOTES

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.×4 FT. 5 FT.×7 FT. 10 FT.×6 FT.
8 FT.×5 FT. 8 FT.×8 FT. 10 FT.×8 FT.
[redacted]

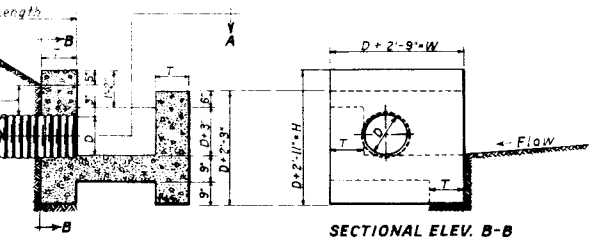
Designed by A.G.K.	Approved by [signature]
Made by A.G.K.	Bridge Engineer
Checked by A.L.C.	Date: 7-20, 1932



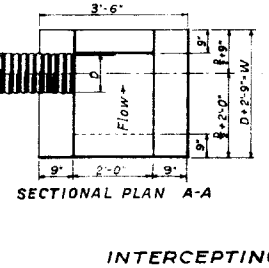
ONAL ELEV. 0-0 FRONT ELEVATION

OF DIMENSIONS & QUANTITIES FOR DOUBLE CORRUGATED METAL PIPE CULVERT & HEADWALLS							
W	H	T	CL."B" CONCRETE FOR 2 HDWALLS	CORRUGATED METAL PIPE			CEMENT RUBBLE MASONRY
7'-6"	3'-9"	1'-6"	2.4 CU. YDS.	16 GAGE	2 x L = LIN. FT.		
8'-9"	4'-0"	1'-7"	3.0 DO	16 DO	2 x L = DO		
10'-6"	4'-9"	1'-10"	4.4 DO	14 DO	2 x L = DO		
12'-9"	5'-0"	2'-0"	6.1 DO	14 DO	2 x L = DO		
15'-0"	5'-6"	2'-2"	8.1 DO	12 DO	2 x L = DO		
17'-9"	6'-0"	2'-5"	10.8 DO	10 DO	2 x L = DO		
19'-8"	6'-8"	2'-7"	13.6 DO	10 DO	2 x L = DO		

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



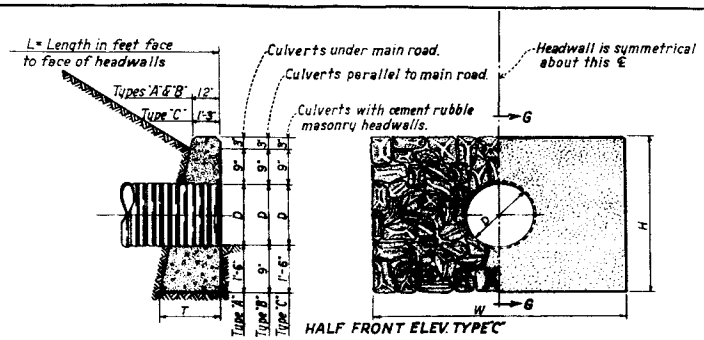
CTIONAL ELEV. C-C SECTIONAL ELEV. B-B



SECTIONAL PLAN A-A

SIZE OF PIPE	WIDTH OF WALL	HEIGHT OF WALL	THICKNESS OF WALL	CL."B" CONC. IN ONE HEADWALL
D	W	H	T	CU. YDS.
12"	3'-9"	3'-11"	9"	1.1
15"	4'-0"	4'-2"	9"	1.2
18"	4'-3"	4'-5"	9"	1.3
24"	4'-9"	4'-11"	9"	1.6
30"	5'-3"	5'-5"	9"	1.9
36"	5'-9"	5'-11"	9"	2.2

INTERCEPTING HEADWALLS



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"	2.3 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'-6"	1.5 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	5.8 DO
	36"	10'-6"	5'-6"	2'-8"		12 DO	L = DO	7.4 DO

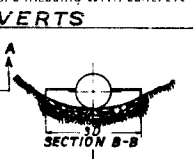
D	W	H	V	B	C	UNIT	CONCRETE CLASS "A"	CORRUGATED METAL PIPE		UNIT	REINFORCING STEEL	
54"	7'-6"	5'-6"	15'-6"	4'-0"	3'-6"	CU. YDS.	12.6 *	8 GAGE	L = LIN. FT.	LBS.	2146	▲
60"	8'-0"	6'-0"	16'-0"	4'-0"	4'-0"	DO	14.5 *	8 DO	L = DO	DO	2413	▲
66"	8'-6"	6'-6"	16'-6"	4'-0"	4'-6"	DO	14.4 *	8 DO	L = DO	DO	2408	▲
72"	9'-0"	7'-0"	17'-0"	4'-0"	5'-0"	DO	16.5 *	8 DO	L = DO	DO	2740	▲
78"	9'-6"	7'-6"	17'-6"	4'-0"	5'-6"	DO	16.5 *	8 DO	L = DO	DO	2740	▲
84"	10'-0"	8'-0"	18'-0"	4'-0"	6'-0"	DO	20.0 *	8 DO	L = DO	DO	3324	▲

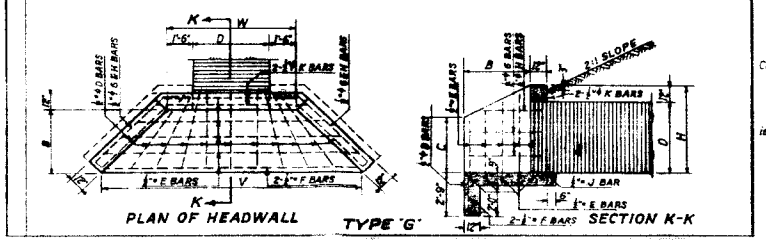
▲ REINFORCING STEEL QUANTITIES ARE FOR TWO HEADWALLS * CONCRETE QUANTITIES ARE FOR TWO HEADWALLS

BAR LIST FOR TYPE "G"

TYPE "G"	DIAMETER OF PIPE	54"	60"	66"	72"	78"	84"
D BARS ½"⌀	SPACING	18"	18"	18"	18"	18"	18"
	NUMBER	11	11	12	12	13	13
	LENGTH	7'-7"	7'-7"	7'-7"	8'-7"	8'-7"	8'-7"
E BARS ½"⌀	SPACING	12"	12"	12"	12"	12"	12"
	NUMBER	EACH	EACH	EACH	EACH	EACH	EACH
	LENGTH	24'-0" TO 20'-0"	25'-6" TO 21'-6"	27'-0" TO 23'-0"	28'-6" TO 24'-6"	30'-0" TO 26'-0"	31'-6" TO 27'-6"
	DECREASE	BY 1'-6"	BY 1'-6"	BY 1'-6"	BY 1'-6"	BY 1'-6"	BY 1'-6"
F BARS ½"⌀	SPACING	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"
	NUMBER	2	2	2	2	2	2
	LENGTH	15'-6"	16'-0"	16'-6"	17'-0"	17'-6"	18'-0"
G BARS ½"⌀	SPACING	18"	18"	18"	18"	18"	18"
	NUMBER	4	4	4	4	4	4
	LENGTH	7'-0"	7'-0"	7'-0"	6'-3"	6'-3"	6'-3"
H BARS ½"⌀	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	18"	12"	12"	12"	12"	12"
	NUMBER	2	2	2	2	2	2
	LENGTH	8'-6"	8'-0"	8'-6"	10'-0"	10'-6"	11'-0"
K BARS ½"⌀	SPACING	6"	6"	6"	6"	6"	6"
	NUMBER	2	2	2	2	2	2
	LENGTH	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"

BENDING DIAGRAM





PLAN OF HEADWALL TYPE "G" SECTION K-K

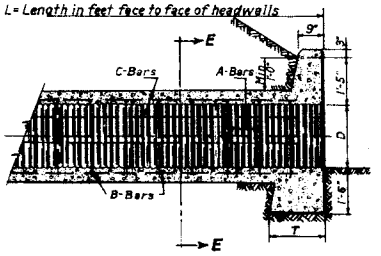
STD. HEADWALLS FOR CORRUGATED METAL PIPE CULVERTS

REVISIONS

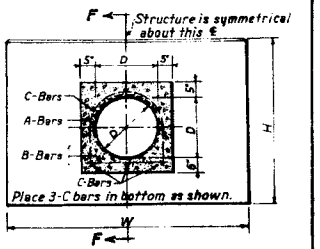
STANDARD M-102-E

FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	PW.A 60090	7	

Revised 6-1-57. A&R. Changed to 1957 Specifications.



LONGITUDINAL SECTION F-F



SECTIONAL ELEVATION E-E

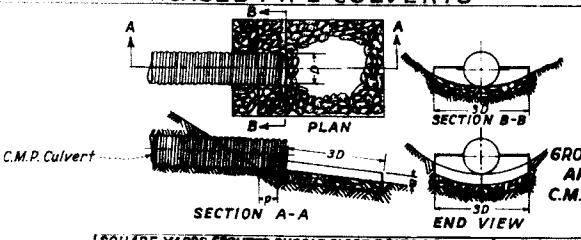
TABLE OF DIMENSIONS AND QUANTITIES FOR INCASED PIPE CULVERTS							
Diameter of pipe	D	12"	15"	18"	24"	30"	BENDING DIAGRAM
Width of headwall	W	4'-6"	5'-3"	6'-0"	7'-6"	9'-0"	
Height of headwall	H	4'-2"	4'-5"	4'-8"	5'-2"	5'-8"	
Width of headwall base	T	1'-7"	1'-8"	1'-9"	2'-0"	2'-3"	
A BARS	SPACING	12"	12"	12"	12"	12"	
	NUMBER	5-1	5-1	5-1	5-1	5-1	
	LENGTH	3'-8"	4'-3"	5'-0"	6'-4"	7'-7"	
B BARS	SPACING	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	
	NUMBER	0.5L	0.5L	0.5L	0.5L	0.5L	
	LENGTH	1'-7"	1'-10"	2'-1"	2'-7"	3'-1½"	
C BARS	SPACING						
	NUMBER	5	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+0.010 L	1.8+0.022 L	2.2+0.043 L	3.2+0.19 L	4.5+0.239 L
47	Reinforcing Steel	Lbs.	8.96 L-16.2●	11.19 L-17.2 ▼	16.53 L-17.8 ▼	41.79 L-18 ▼	49.09 L-18.4 ▼
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



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

SQUARE YARDS GROUTED RUBBLE SLOPE & DITCH PAVING (1 FOOT THICK)																
FILL	D	15"	18"	24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"
SLOPE	B	7'-6"	9"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"
1½:1	4'-0"	3	4	6	8	11	14	17	21	25	29	33	38	42
2:1	5'-0"	3	4	7	10	13	16	20	24	28	32	37	41	46
3:1	7'-0"	3	4	7	11	15	20	25	31	37	43	49	57	66
4:1	8'-0"	3	5	8	12	16	22	28	34	42	50	58	68	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

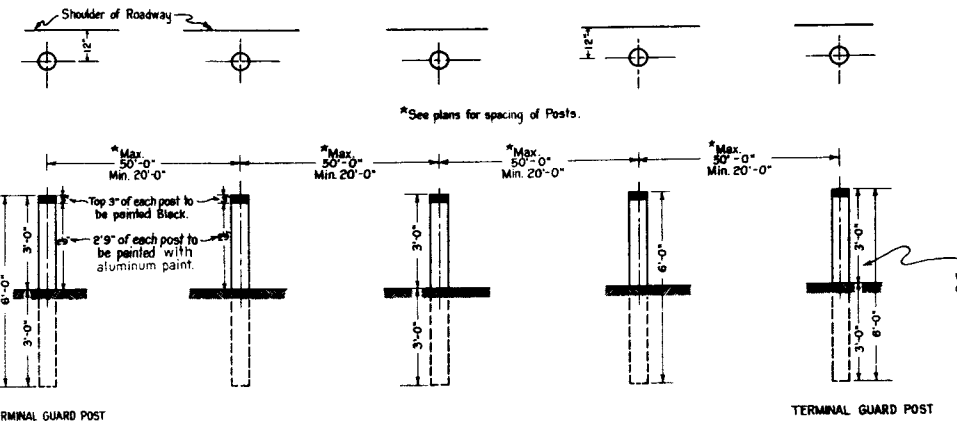
STANDARD HEADWALLS
INTERCEPTING HEADWALLS
INCASED METAL PIPE CULVERT
WITH HEADWALLS
FOR CORRUGATED
METAL PIPE CULVERTS

Designed R.E.B.-A.M.R. Approved by [signature]
Made by L.R.-A.M.R. Bridge Engineer
Checked R.A.B.-W.H.W. Date: April 27th 1937.

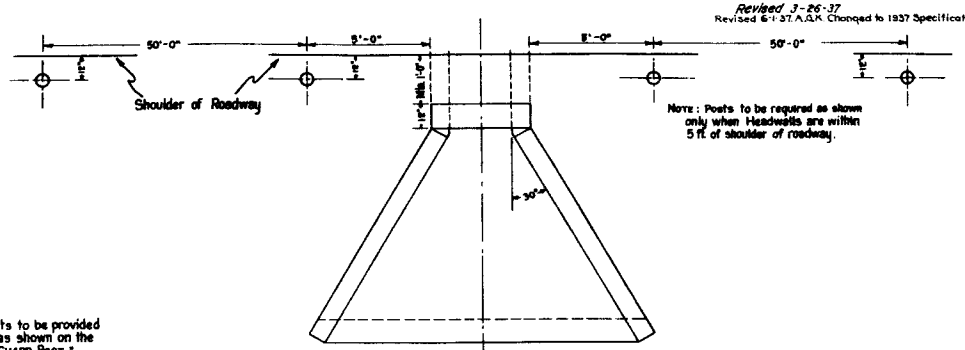
FED. ROAD DIST. NO.	STATE	P.W.A	SHEET NO.	TOTAL SHEETS
3	COLO.	6009C	8	

STANDARD M-19-A

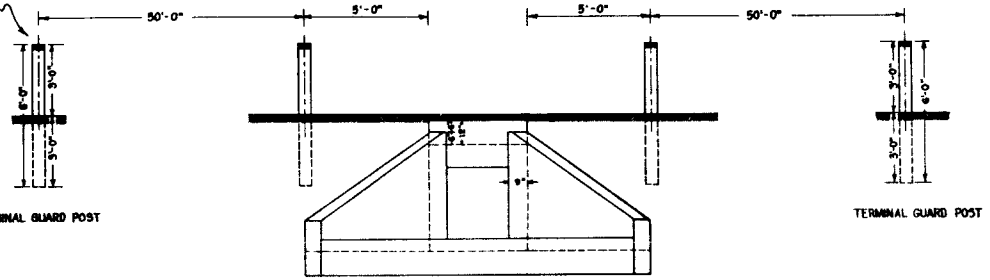
Revised 3-26-37
Revised 6-1-37 A.A.K. Changed to 1937 Specifications.

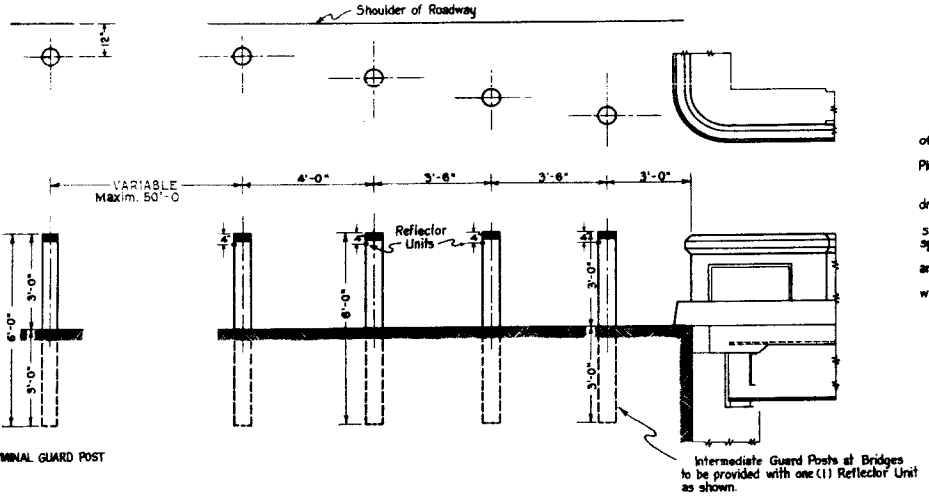


SHOWING PLACEMENT ON NORMAL ROADWAY FILLS



SHOWING PLACEMENT AT MINOR STRUCTURES





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.

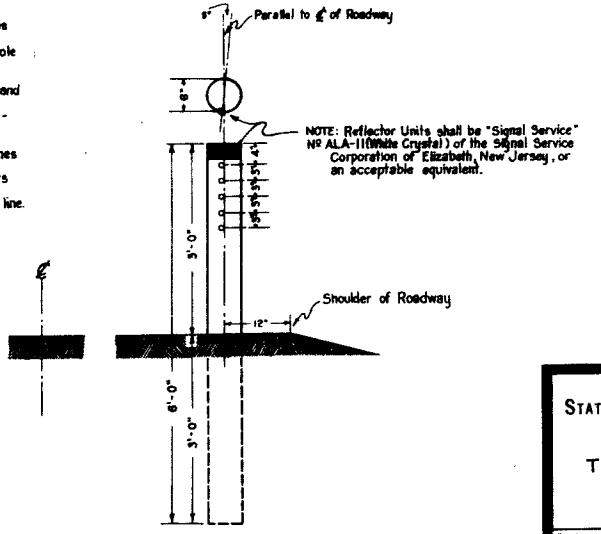
All wood posts shall be entirely peeled and shaved, thoroly seasoned and dry, with square tops.

All wood posts shall be pressure treated with a standard creosote treatment 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 as directed by the Engineer.

Posts with Reflector Units shall be rotated so that Reflector Units will function at a distance of 500 feet from posts.

On tangents the rotation shall be 5 degrees toward roadway center line.



COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
TIMBER GUARD POSTS

Designed by Made by P.B.B. Checked by	Approved by Bridge Engineer Date: 193

STRUCTURE NO.

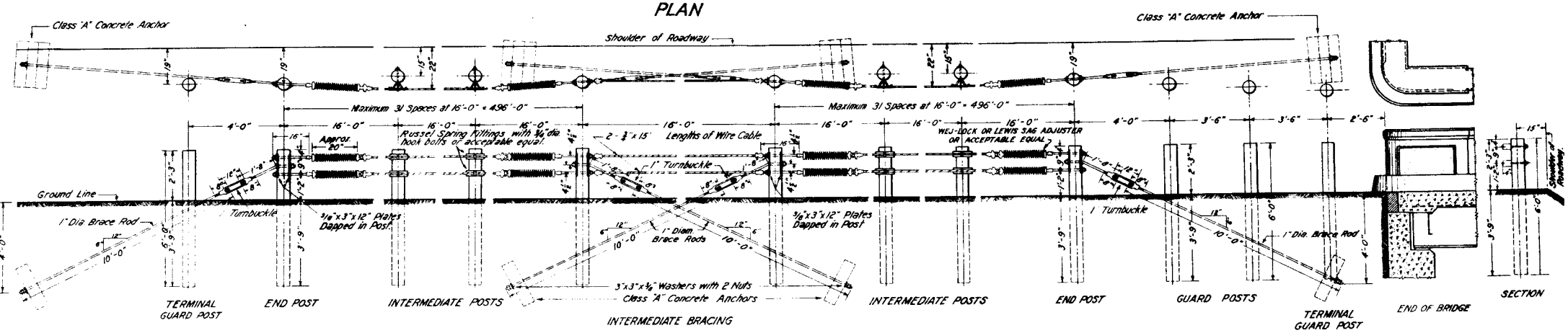
Revised 5-18-37 E.L.K. Notes re Bridge & Sidewalk
Rev 6-1-37 A.O.K. (1937 Specifications)

FED. ROAD DIST. NO.	STATE	P.W.A.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009	9	

STANDARD M-20-B

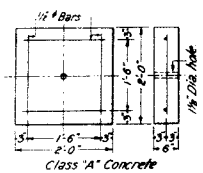
NOTE: The 3 guard posts between the End Post and the end of bridge railings shall be so placed that the faces of the posts are in a direct line between the face of the end post and the face of the handrailing on bridge.

PLAN

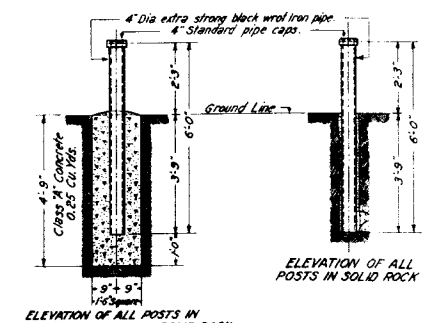


ELEVATION

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.



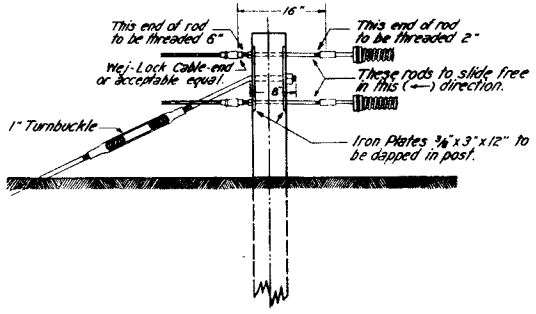
DETAIL OF ANCHORS



ELEVATION OF ALL POSTS IN MATERIAL OTHER THAN SOLID ROCK

ELEVATION OF ALL POSTS IN SOLID ROCK

DETAILS FOR WROT IRON PIPE



SIDE VIEW OF POST AT INTERMEDIATE BRACING

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 400 ft, Temp. 40°F; (4x6x1/32)+1 = 1 1/16".

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.

COLORADO STATE HIGHWAY DEPARTMENT
STANDARD WIRE CABLE GUARD FENCE

Designed by E.L.
Made by P.B.B.
Checked by

Approved by Chas. L. Merrill
Date May 5, 1937

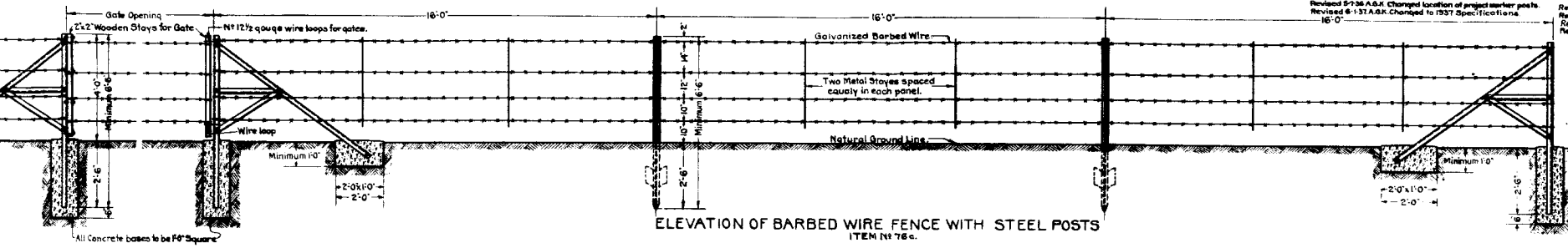
STANDARD NO. M-20-B

STANDARD M-27-A

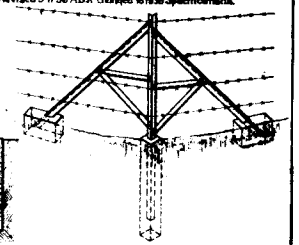
FED. ROAD DIST. Nº	STATE	P.W.A. PROJ. Nº	SHEET Nº	TOTAL SHEETS
3	COLO.	6009	10	

Revised 5-7-36 A.G.K. Changed location of project marker posts.
Revised 6-1-37 A.G.K. Changed to 1937 Specifications.

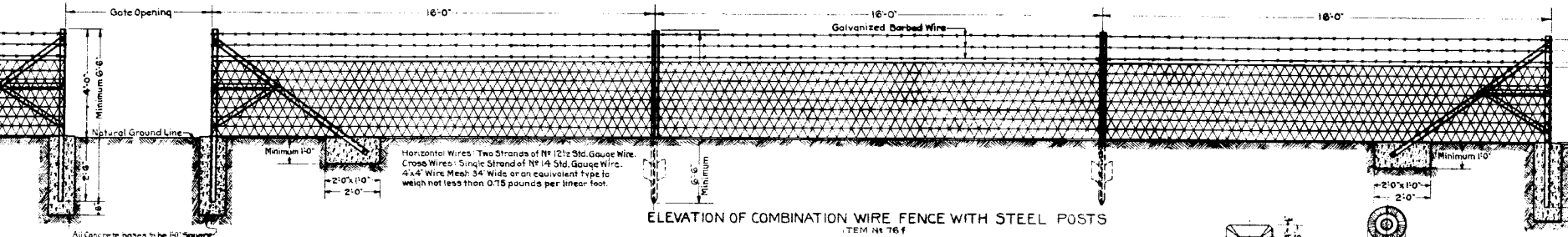
Revised 1-23-33 A.G.K. Changed Notes for gate and & corner Posts
Revised 7-24-33 R.E.L. New R.O.W. Markers.
Revised 7-20-36 E.M.D. Corner & End Posts at Streets.
Revised 3-11-36 A.G.K. Changed to 1936 Specifications.



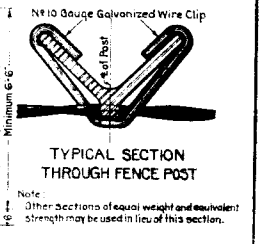
ELEVATION OF BARBED WIRE FENCE WITH STEEL POSTS
ITEM Nº 76e.



CORNER POST

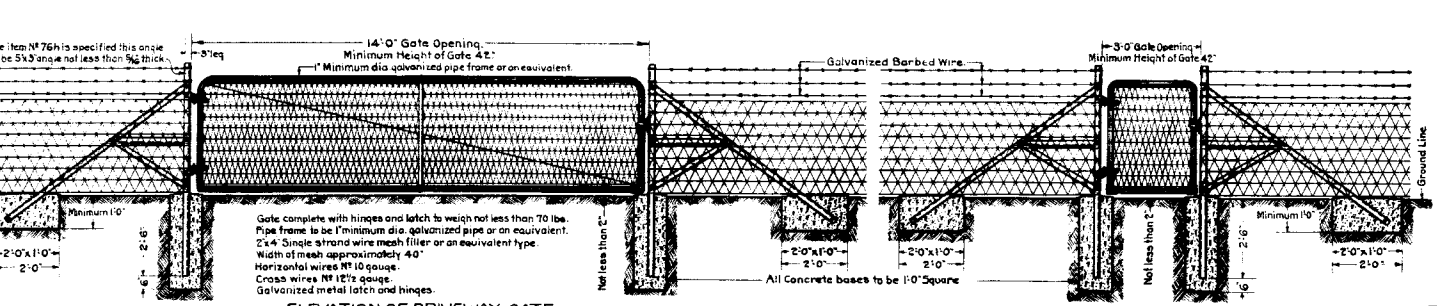


ELEVATION OF COMBINATION WIRE FENCE WITH STEEL POSTS
ITEM Nº 76f



TYPICAL SECTION THROUGH FENCE POST

Note:
Other Sections of equal weight and equivalent strength may be used in lieu of this section.



Gate complete with hinges and latch to weigh not less than 70 lbs.
Pipe frame to be 1" minimum dia. galvanized pipe or an equivalent.
2"x4" Single strand wire mesh filler or an equivalent type.
Width of mesh approximately 40".
Horizontal wires Nº 10 gauge.
Cross wires Nº 12½ gauge.
Galvanized metal latch and hinges.

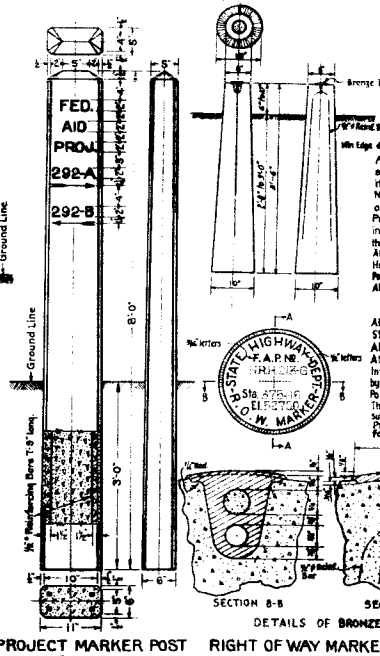
ELEVATION OF DRIVEWAY GATE
ITEM Nº 76h

Gate complete with hinges and latch to weigh not less than 19 lbs.
Pipe frame to be ¾" minimum dia. galvanized pipe or an equivalent
2"x4" Single strand wire mesh filler or an equivalent type.
Width of mesh approximately 40".
Horizontal wires Nº 10 gauge.
Cross wires Nº 12½ gauge.
Galvanized metal latch and hinges.

ELEVATION OF WALK GATE
ITEM Nº 76i.

GENERAL NOTES FOR WIRE FENCES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, Adopted June 1-1937.
Barbed wire shall be of standard make, not lighter than Nº 12½ gauge galvanized and with two point barbs spaced not more than 5" apart.
Wire mesh must be galvanized and not lighter than shown and noted on this plan.
Four Corner Posts and four Endposts shall be used at each Structure over 4'x4' in size and fence turned in and ended at Wings.
All line posts to be structural steel to weigh not less than 2.00 lbs. per lineal foot.
Suitable anchor plates shall be securely riveted or welded to each line post.
All line posts to be painted with an approved waterproof asphalt or mineral paint or hot dip galv.
All corner, end and gate posts including braces are to be structural steel 2"x2"x¼" angles to weigh not less than 3.15 lbs. per lineal foot, and to be painted with an approved waterproof asphalt or mineral paint or hot dip galvanized, except post supporting driving gate item Nº 76h.
At all places where intersecting fences are encountered an end post is to be placed with the angle arm at right angles to the line of fence.
All footings or bases shall be of class "A" concrete with crowned tops and shall be included in the price bid per lineal foot of fence with metal posts.
If knee braces are omitted from end, corner and gate posts the vertical post must be at least 2½"x2½"x¼".



DETAILS OF BRONZE TABLET.

PROJECT MARKER POST
ITEM Nº 61a.

RIGHT OF WAY MARKER POST
ITEM Nº 61b.

NOTES FOR PROJECT MARKER POSTS

All letters and numbers shall be 2" plain upright block, painted or stenciled on the concrete with a good quality of black paint. See item Nº 41 "Second Field Coat Dark".
Numbers and arrows shall show the proper numbers and directions of the projects each way from where the post is placed.
Post is to be set with sign facing the road of the end of the project, two feet inside the R.O.W. line or at a point amply protected from traffic in such a position that the sign will indicate properly the projects to which it refers.
All work shall be done in accordance with Standard Specifications of the Colorado State Highway Department, adopted June 1-1937.
Posts shall be made of Class "D" concrete (Sump 7 to 9") except use White Portland Cement.
All exposed surfaces shall be rubbed free of form marks.

NOTES FOR R.O.W. MARKER POSTS

All work shall be done in accordance with Standard Specifications of the Colorado State Highway Department, adopted June 1-1937.
All exposed surfaces of the Bronze Tablet are to be ground to a smooth surface.
All letters are to be depressed a minimum of 1/16 inch.
Information on the Bronze Tablet indicated by pen lines is to be stamped in the field by the engineering party after post is placed, 3/16" letters & figures to be used.
Posts shall be made of Class "A" Concrete.
The upper 12 inches of marker shall be rubbed free of form marks, and the top surface of marker must be constructed to drain thoroughly.
Project Designations on Tablets shall be properly shown: Thus "F.A.P. Nº" for Fed. Aid Proj; "S.P. Nº" for State Projs; "P.W.A. Nº" for P.W.A. Projs, etc.

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD WIRE FENCES WITH STEEL POSTS AND MARKER POSTS

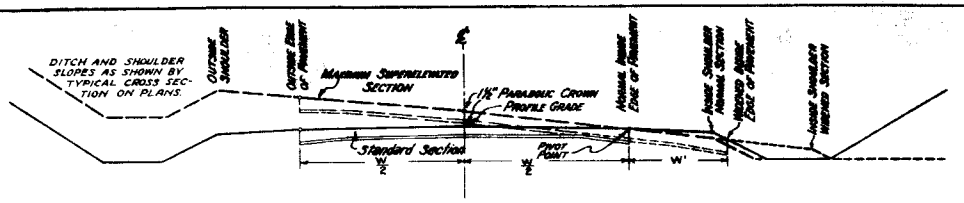
Designed by A.G.K.	Approved by Chas. Bailey
Made by A.G.K.	Bridge Engineer
Checked by	Date: Dec. 4th 1932.

STRUCTURE NO.

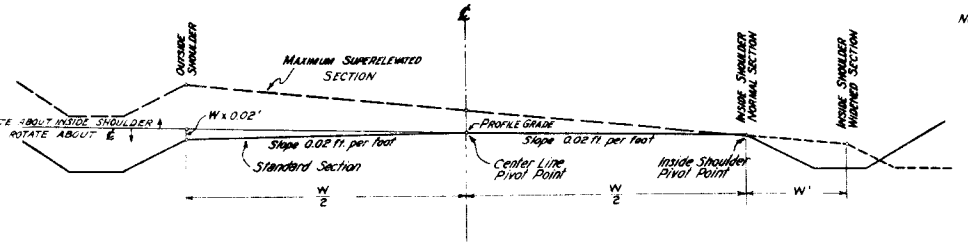
REVISIONS

STANDARD M-1-B

FED. ROAD DIST. NO.	STATE	PWA
3	COLO	6009



PAVEMENT SECTION

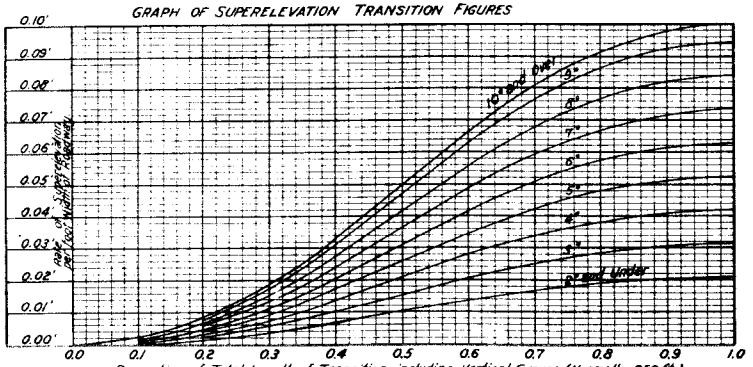


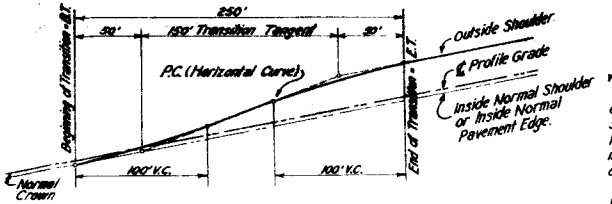
GRADED OR SURFACED SECTION

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

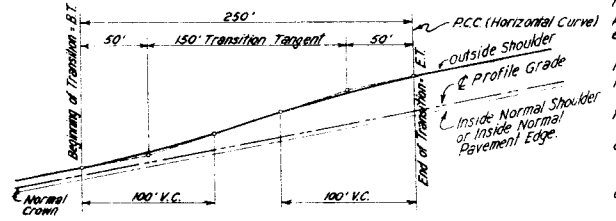




CASE I: SIMPLE CURVE WITH UNLIMITED TANGENT APPROACH

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.



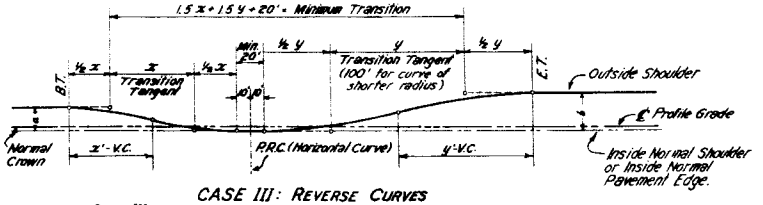
CASE II: COMPOUND CURVE

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.



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.

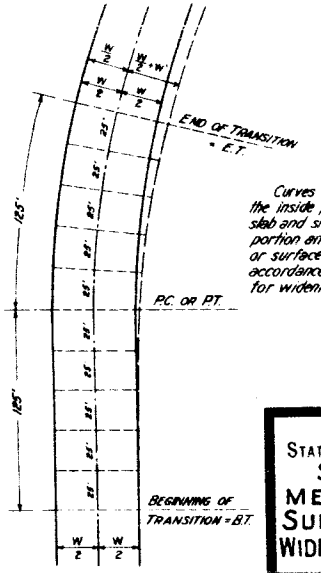
The rate of superelevation per foot width of roadway to be applied at the outside shoulder of the roadway is computed as follows:

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.



GENERAL PLAN OF WIDENING

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.

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

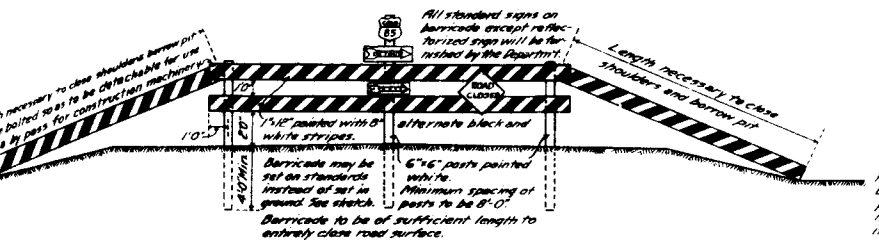
Designed by R.E.L. Approved by J. Marshall
Made by P.B.B.
Checked by F.T.S. & P.M. Date FEB 23RD 1937

STANDARD M-2-BX

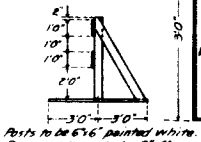
FED ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	6009C	12	

Rev. 5-3-37 - S.B.L.-W.P.A. Signs
Revised 6-1-37. A.G.R. Changed to 1937 Specifications.

Details of Permanent Barricade



End View of Portable Barricade



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.

P. W. A.

FEDERAL EMERGENCY ADMINISTRATION OF PUBLIC WORKS

(Description of Project)

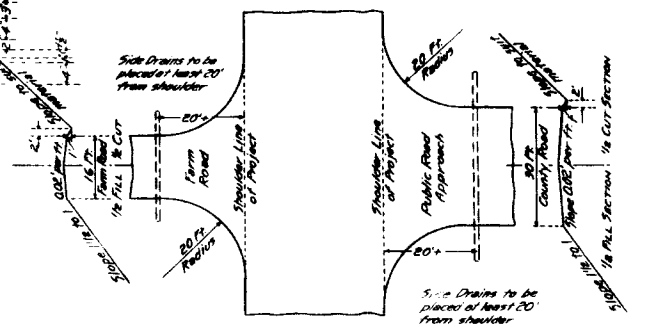
PROJECT NO.

5'-0"

Sign Required on All P.W.A. Projects

Sign to be made on 1" material with at least three cleats on back. Background to be white, letters to be black. Sign to be placed on two 4"x4"x10' posts set 4 ft. in the ground. One sign is required to be located at each end of each unit of construction.

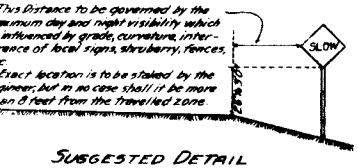
Typical Plan for Side Approach Roads



Position of Signs Relative Road Bed

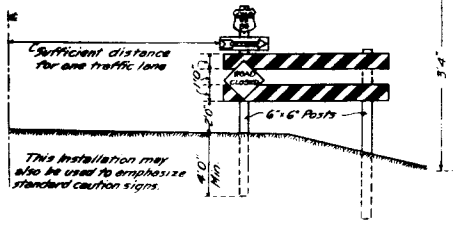
This Distance to be governed by the minimum day and night visibility which is influenced by grade, curvature, interference of local signs, shrubbery, fences, etc.

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



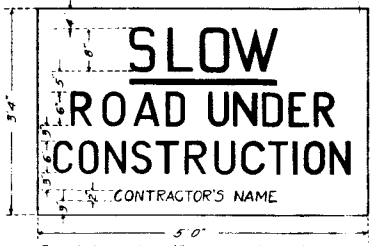
Barricades to be placed as construction conditions require.

Details of Partial Barricade



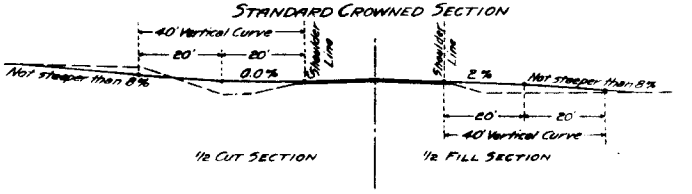
This installation may also be used to emphasize standard caution signs.

Details of Road Under Construction Sign

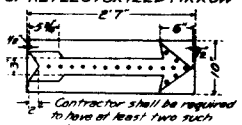


Sign to be made on 1" material with at least three cleats on the back. Background to be white, SLOW and underline to be red, and other lettering to be black. Sign to be set on 2 6"x6" posts 4 ft. in the ground.

Standard Crowned Section



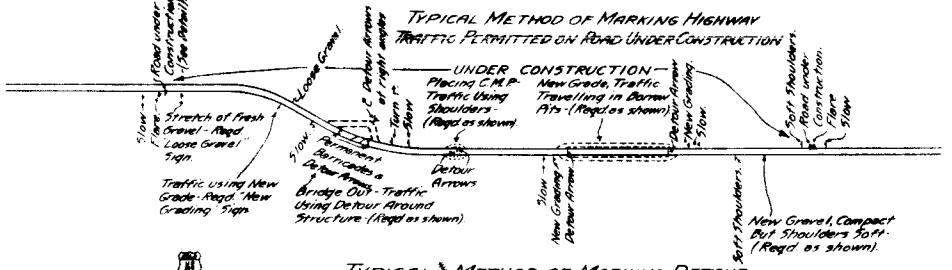
Suggested Detail of Reflectorized Arrow



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.

Typical Method of Marking Highway Traffic Permitted on Road Under Construction



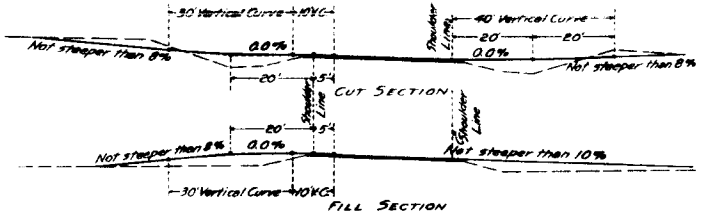
General Notes on Approaches

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

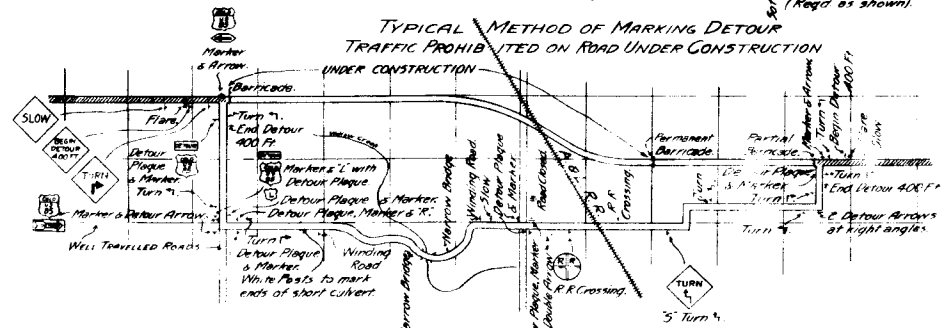
When the length of the approach as determined by the intersection of these grades with the natural ground is such as to damage the Property so served, or cause unreasonable conditions, the grades may be modified.

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

Superelevated Section



Typical Method of Marking Detour Traffic Prohibited on Road Under Construction



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 lighted during 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.
Made by S.B.L.
Check J.S.M.
Check K.A.K.
Approved by [signature]
Date Aug. 20, 1935

FED. ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	13	

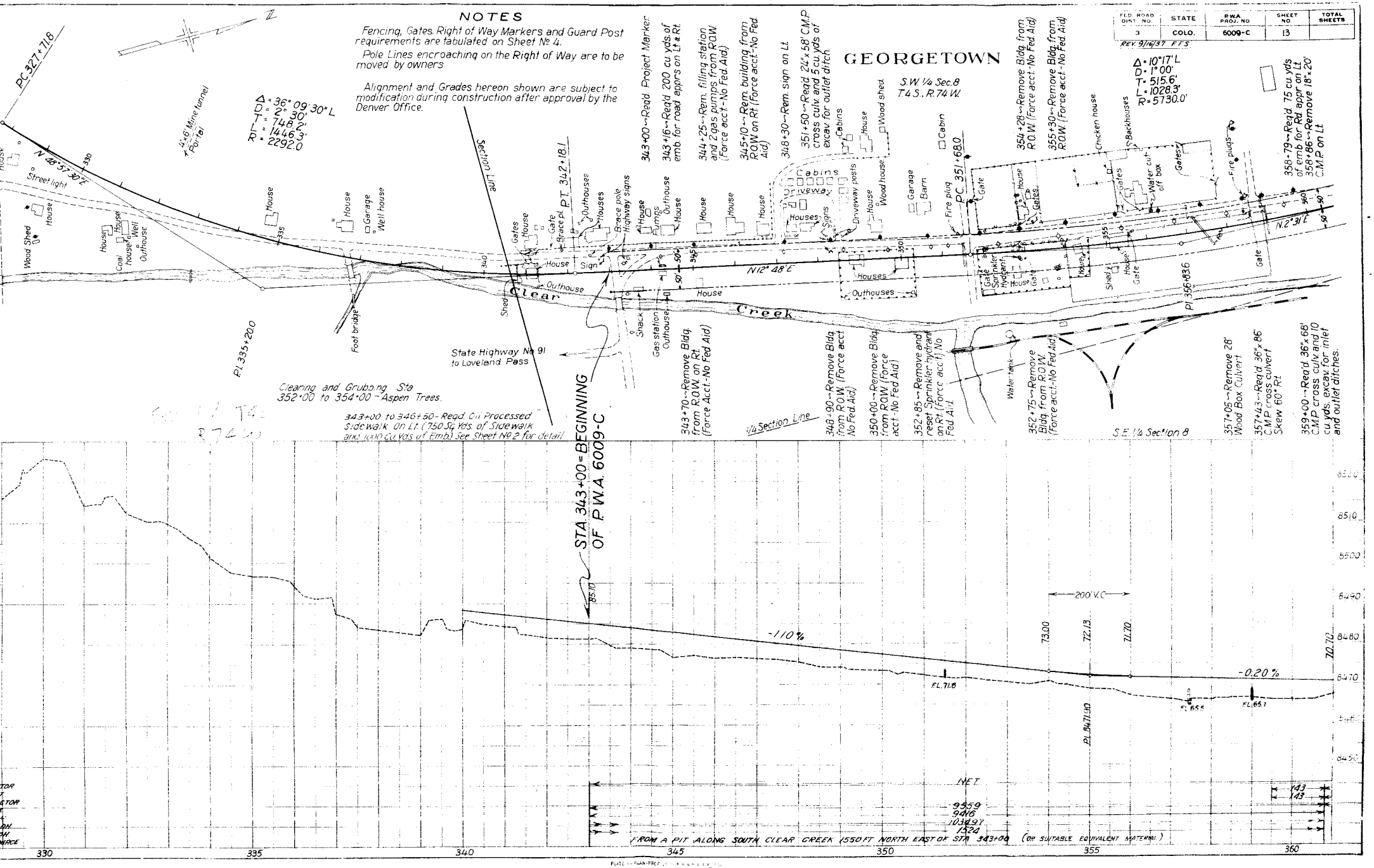
REV. 9/16/37 F.T.S.

NOTES

Fencing, Gates, Right of Way Markers and Guard Post requirements are tabulated on Sheet № 4.

Pole Lines encroaching on the Right of Way are to be moved by owners

Alignment and Grades hereon shown are subject to modification during construction after approval by the Denver Office.



FED. ROAD DIST. NO.	STATE	B.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	14	

R.4S., T.74W.
N.W. 1/4 Sec.8

Powder House

363+00 ~ Req'd. 90 cu. yds. emb. for road appr. on Lt.; also req'd. 18"x32' C.M.P. side drain.

368+50 ~ Req'd. 65 cu. yds. emb. for road appr. and 18"x32' C.M.P. side drain on Lt.

Aspen Trees
House
Shed
PT 361+96.3
Present Road
Shed
Shed
Mill
Tram Tower
3' concrete pipe
Clear Creek
1/4 Section Line
WHITE RESERVOIR
WHITE RESERVOIR
N 2°31'E
PI 389+51.2
389+82 ~ Remove 18"x38' Iron pipe. Req'd. 36"x58' C.M.P. cross culvert, no headwalls.
C. & S. R.R.
PC 385+55.3
368+00 ~ Req'd. 100 cu. yds. emb. for road appr. on right.
1/4 Section Line
N.E. 1/4 Sec.8
Section Line

Δ 11°50' R
D 1°30'
T 395.9
L 788.9
R 3820.0
E 20.5

B.M. Hub and Guard 80 ft left of Sta 360+00 Elev. 8470.65

B.M. Hub and Guard 170 ft left of Sta 375+00 Elev. 8455.04

B.M. Hub and Guard 45 ft left of Sta 389+50 Elev. 8449.12

8490
8480
8470
8460
8450
8440
8430

-0.20%
-2.10%
-0.10%
400' V.C.
400' V.C.
P.L. 69.70
70.10
68.75
65.50
59.20
56.00
54.80
53.20
PI 55.00
F.L. 46.0
N.E.I.
7855
7855
198
198
198
47
34597
29
4700
4100
51700
249
WIDEN CUTS ON LEFT 400-405

360
365
370
375
380
385
390

FED. ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	15	

S.W. 1/4 Section 5

T.4 S., R.74 W.

1/4 Section Line

399+35 ~ Remove 24" x 30' iron pipe on left. Req'd 500 cu yds. emb. for road apprs. on left and right and 30 x 34 C.M.P. side drain on left.

401+38 ~ Req'd 100 cu. yds. emb. for road appr. on Rt.

Sta. 403+85 (Scaled)

87°30' Scaled

408+50 ~ Remove 18" C.M.P. Culvert. Req'd 36" x 54" C.M.P. Cross culvert.

409+80 to 436+80 ~ Remove 2880 Lin. ft. of telephone line from R.O.W. (Force acct.) Work by Telephone Co. forces.

Pump house

4" pipe line

Old Pump House

412+55 ~ Remove and relay 65' feet of 3" iron water pipe. Req'd 12" x 56' C.M.P. cross culvert, to be used as conduit for 3" pipe line. No headwall.

412+55 ~ Remove pump house from R.O.W. on left. (Force acct.) No Fed. Aid.

1/4 Section Line

P.I. 420+21.7

P.I. 389+51.2

N 14° 21' E

Settling Pond

3" iron pipe line

GEORGETOWN CITY LIMITS

400+80 to 403+85 ~ Remove 330 lin. ft. of power line (steel towers) from R.O.W. (Force acct.) Work by Power Co. forces.

403+85 to 452+40 ~ Remove 4890 Lin. ft. of power line (steel towers) from R.O.W. (Force acct.) Work by Power Co. forces.

WHITE RESERVOIR

Δ 11° 50' R.
D 1° 30'
T. 395.9
L. 788.9
R. 3820.0
E. 20.5

Section Line

P.T. 393+44.2

P.C. 414+50.3

414+50 ~ Req'd 36" x 60' C.M.P. Cross Culvert and 15 cu yds. excav. for inlet and outlet ditches.

417+80 ~ Req'd 36" x 54' C.M.P. cross culvert and 50 cu. yds. excav. for inlet & outlet ditches.

Δ 22° 33' 30" R
D 2°
T. 57.14
L. 112.79
R. 2865.0
E. 5.64

S.E. 1/4 Section 5

B.M. Hub and Guard 12 ft right of Sta. 396+45. Elev. 8449.73

B.M. Hub and Guard 70 ft right of Sta. 405+00. Elev. 8462.00

B.M. Hub and Guard 120 ft right of Sta. 420+00. Elev. 8454.88

400' V.C.

52.80 53.65 56.60 P.I. 66.60 62.37 P.I. 52.60

-0.10% +2.00%

1000' V.C.

53.70 FL 52.4

-1.38%

400' V.C.

55.56 53.89 54.40 P.I. 52.80 FL 47.4 FL 45.9

+0.80%

FL 50.6

58.40

8490 8480 8470 8460 8450 8440 8430

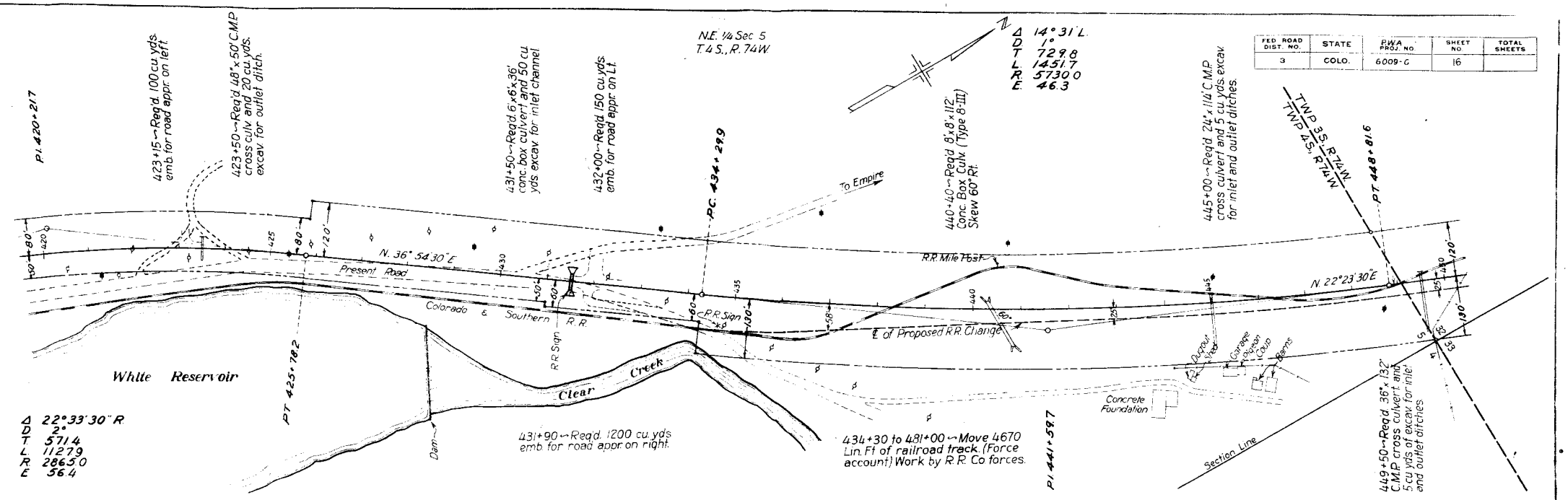
NET

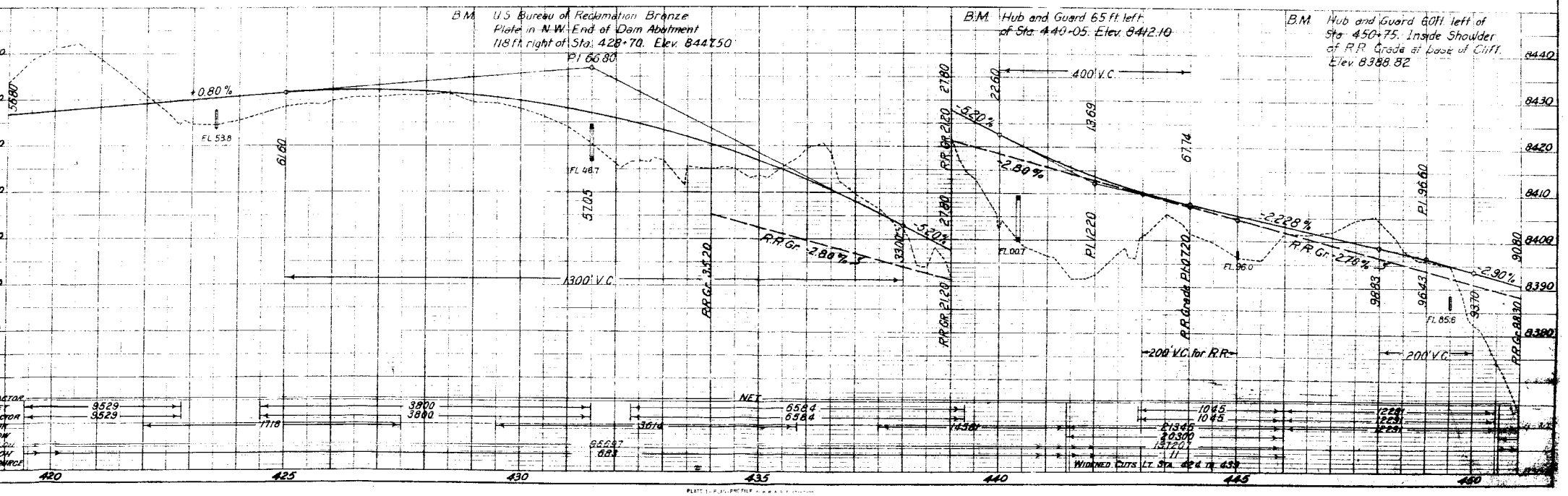
8769 8769 2441 2441 5197 5197

6210 20745 7586 5197 2763 2763 2763

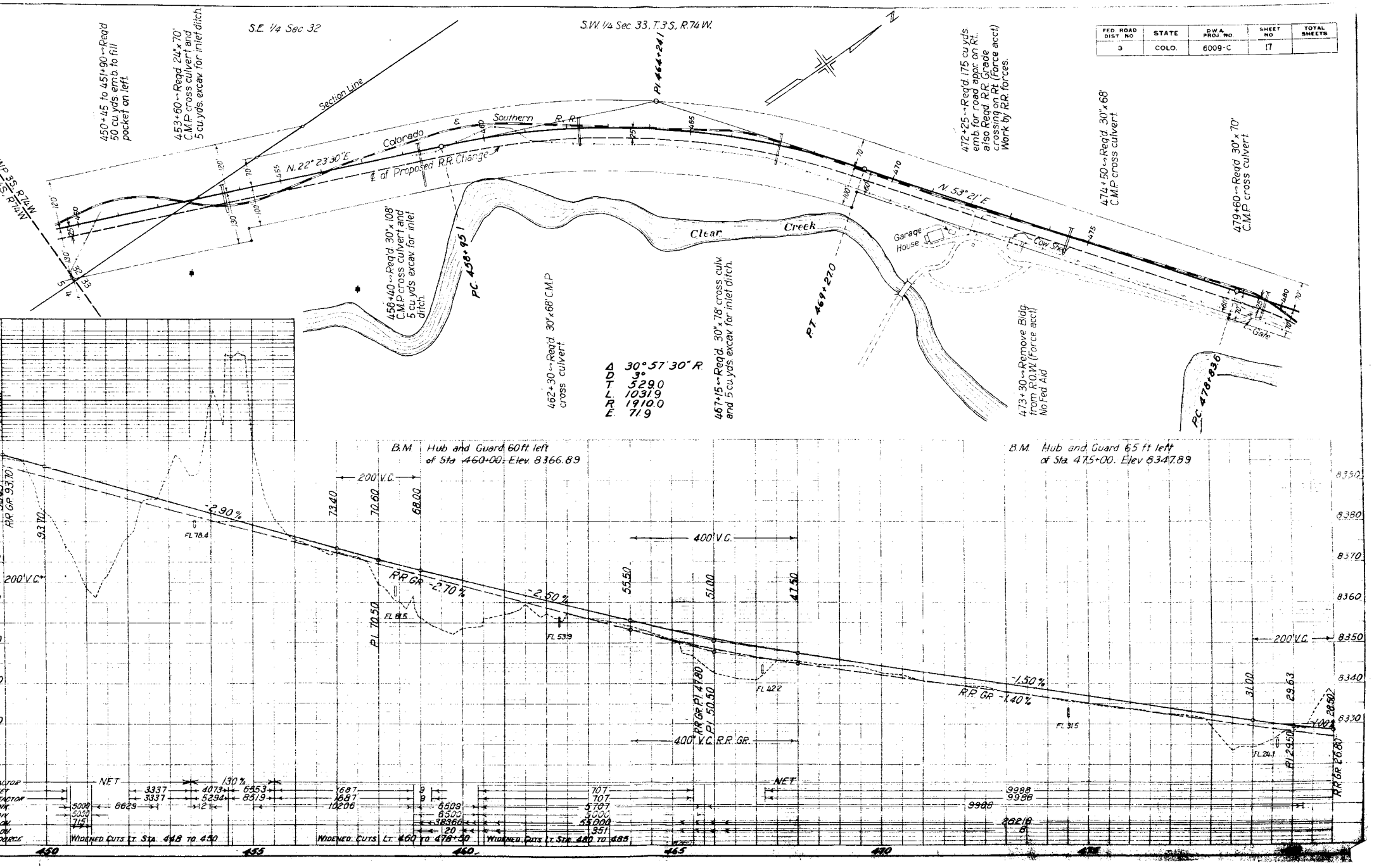
390 395 400 405 410 415 420

FED. ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-G	16	





FED. ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	17	



FED. ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	18	

Sec. 33, T 3 S, R 74 W.

480+05 ~ Req'd. 70 cu. yds. emb. for road appr. on left

484+00 ~ Req'd. 75 cu. yds. emb. for road appr. on right. Req'd. R.R. grade crossing on right (Force acct.) Work by R.R. Co. forces.

Pl. 483+534

484+90 ~ Remove building from R.O.W. on left. (Force acct.) No Fed. Aid

485+30 ~ Remove building from R.O.W. on left (Force acct.) No Fed. Aid

485+67 ~ Req'd. 70 cu. yds. emb. and 18" x 28' C.M.P. side drain for road appr. on left.

486+00 ~ Remove and reset 2 tram cable anchors. (Force acct.) No Fed. Aid.

486+37 ~ Remove 8" tile pipe. Req'd. 24" x 90' C.M.P. cross culvert (No headwalls) and 5 cu. yds. excav. for inlet ditch.

487+25 ~ Req'd. 30" x 84' C.M.P. cross culvert and 5 cu. yds. excav. for inlet ditch.

487+40 ~ Req'd. 70 cu. yds. emb. for road approach on left

496+40 ~ Req'd. 24" x 72' C.M.P. cross culv. and 5 cu. yds of excav. for inlet ditch.

500+75 to 527+90 ~ Remove 2740 lin. ft. Power line (steel towers) from R.O.W. (Force acct.) Work by Power Co. forces

501+26 ~ Req'd. 24" x 48' C.M.P. cross culvert and 15 cu. yds. excav. for inlet and outlet ditches.

506+00 ~ Req'd. 30" x 74' C.M.P. cross culvert and 10 cu. yds. excav. for inlet and outlet ditches.

Ore bin
Water tank
Mill
Sheds
Tram Cable Anchor
House
Power House
N. 53° 21' E
N 62° 43' 30" E
Colorado
Southern
R. R.
℄ of Proposed R.R. Change
Via Line
Clear
Creek
PC 478+836
PT 488+21

Δ 9° 22' 30" R
D 1°
T 469.8
L 937.5
R 5730.0
E 19.3

486+70 ~ Remove Bldg. from R.O.W. (Force acct.) No Fed. Aid

485+90 to 488+00 ~ Req'd. 600 cu. yds. of excav. for channel change on Rt. (Use material to fill old channel) Req'd. 230 cu. yds. of riprap to protect roadway on Rt.

484+00 to 499+50 ~ Move 1550 lin. ft. of R.R. track on Rt. (Force acct.) Work by R.R. Co. forces.

497+00 to 499+50 ~ Req'd. 500 cu. yds. of excav. for channel change on Rt. (Use Material to fill old channel)

502+50 to 508+50 ~ Move 600 lin. ft. of R.R. track. (Force acct.) Work by R.R. Co. forces.

506+50 to 510+00 ~ Req'd. 1200 cu. yds. excav. for channel change on Rt. (Use mat. to fill old channel)

200' V.C.
-1.50%
-1.40%
-1.40%
-1.00%
-1.00%
+0.10%
-0.60%
400' V.C.
200' V.C. R.R. GR.
Pl. 8329.50
R.R. GR. 28.80
R.R. Gr. 22.30
R.R. Gr. Pl. 8304.70
R.R. Gr. 04.70
R.R. Gr. 00.50
Pl. 8304.50
R.R. Gr. 06.50
FL. 15.8
FL. 14.2
FL. 04.3
FL. 03.8
FL. 9.5.5
8340
8330
8320
8310
8300
8290
8280
5085
5085
4299
4299
3874
3874
40
40
5193
5193
4160
4000
2430
4100
WIDEN CUTS LT. 488 TO 493
480
485
490
495
500
505
510

FED. ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	19	

T.3 S., R.74 W.

Sec. 27

Sec. 34

Section Line

N

Δ 60° 45' L.
D 2° 18'
T 1460.2
L 2641.3
R 2491.3
E 3964

510+55 ⟷ Req'd 30"x42' C.M.P. cross culvert and 5 cu. yds. excav. for inlet and outlet ditches.

515+50 to 520+50 ⟷ Move 500 lin ft of R.R. track on Rt. (Force acct) Work by R.R. Co. forces.

515+00 to 517+50 ⟷ Req'd 200 cu. yds. of excav. for intercepting ditch on left.

517+30 ⟷ Remove and reset foot bridge over new channel on Rt. (Force account)

517+50 ⟷ Req'd. 30"x102' C.M.P. cross culv.

Section Line

518+00 ⟷ Req'd 120 cu. yds. emb. for road approach on left.

518+60 ⟷ Req'd 30"x112' C.M.P. cross culvert

518+60 to 526+60 ⟷ Req'd 480 cu. yds. excav. for intercepting ditch on left.

516+75 to 519+50 ⟷ Req'd 1000 cu. yds. excav. for channel change on right. (Use material to fill old channel)

PC 525+02.4

526+60 ⟷ Req'd 30"x112' C.M.P. cross culvert.

530+00 ⟷ Req'd 24"x70' C.M.P. cross culvert, also 5 cu. yds. excav. for inlet ditch

532+70 ⟷ Req'd 24"x102' C.M.P. cross culvert and 20 cu. yds. excav. for inlet and outlet ditches.

534+70 ⟷ Req'd Double 30"x52' C.M.P. cross culvert and 300 cu. yds. excav. for inlet ditch.

535+90 ⟷ Remove 250 lin ft of Power Line (Force acct) Work by Power Co. forces.

536+15 ⟷ Req'd 30"x124' C.M.P. cross culvert and 10 cu. yds. excavation for inlet and outlet ditches.

540+00 ⟷ Req'd 3500 cu. yds. excav. and 18"x30' C.M.P. side drain for road appr. on left.

Mine shack

N 62° 43' 30" E

Colorado & Southern R.R.

Clear Creek

Foot Bridge

℄ of Proposed R.R. change

525+50 to 528+50 ⟷ Move 300 lin ft of R.R. track on Rt. (Force acct) Work by R.R. Co. forces.

534+50 to 538+50 ⟷ Move 400 lin. ft. of R.R. track on Rt. (Force acct) Work by R.R. Co. forces.

P.I. 539+62.6

389.8 ft to N. 1/4 Cor. of Sec. 34

N 1° 50' 30" E

92°

400' V.C.

05.80

06.30

07.40

+0.10%

+0.04%

+0.10%

+0.70%

-2.60%

-0.90%

000' V.C.

P.I. 06.00

P.I. 83.18.60

FL 00.4

FL 93.0

FL 92.6

FL 96.1

FL 05.5

FL 06.2

FL 11.0

FL 07.1

15.80

15.30

10.60

R.R. GR. 93.90

R.R. GR. 94.10

R.R. GR. 93.90

R.R. GR. 94.20

R.R. GR. 94.20

R.R. GR. 93.00

8350

8340

8330

8320

8310

8300

8290

NET

4.974
4.974
4.974
5.147
5.555
5.555
7.935
8.127
8.127
4.279
4.279
4.279
5
60
14.762
5

510

515

520

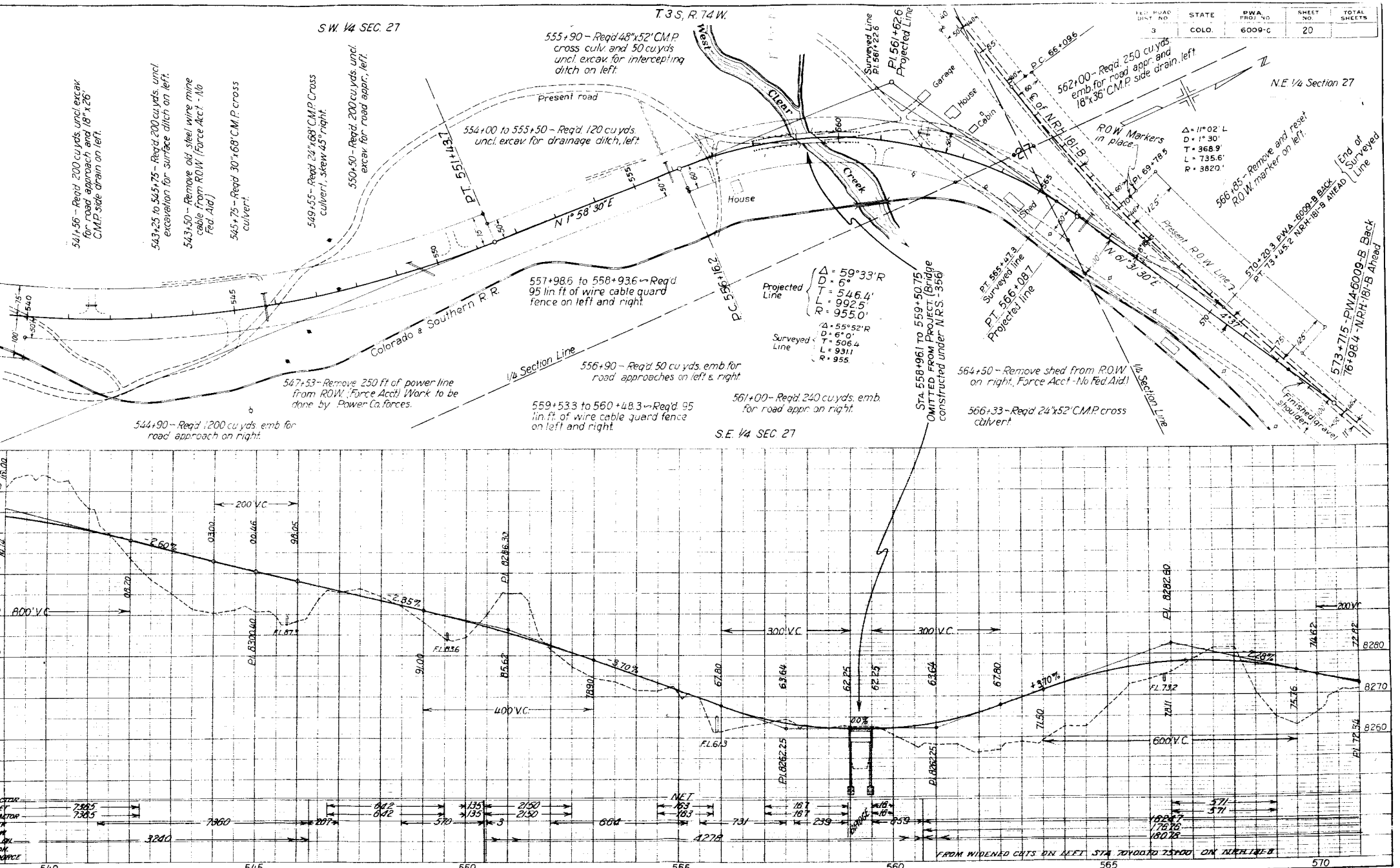
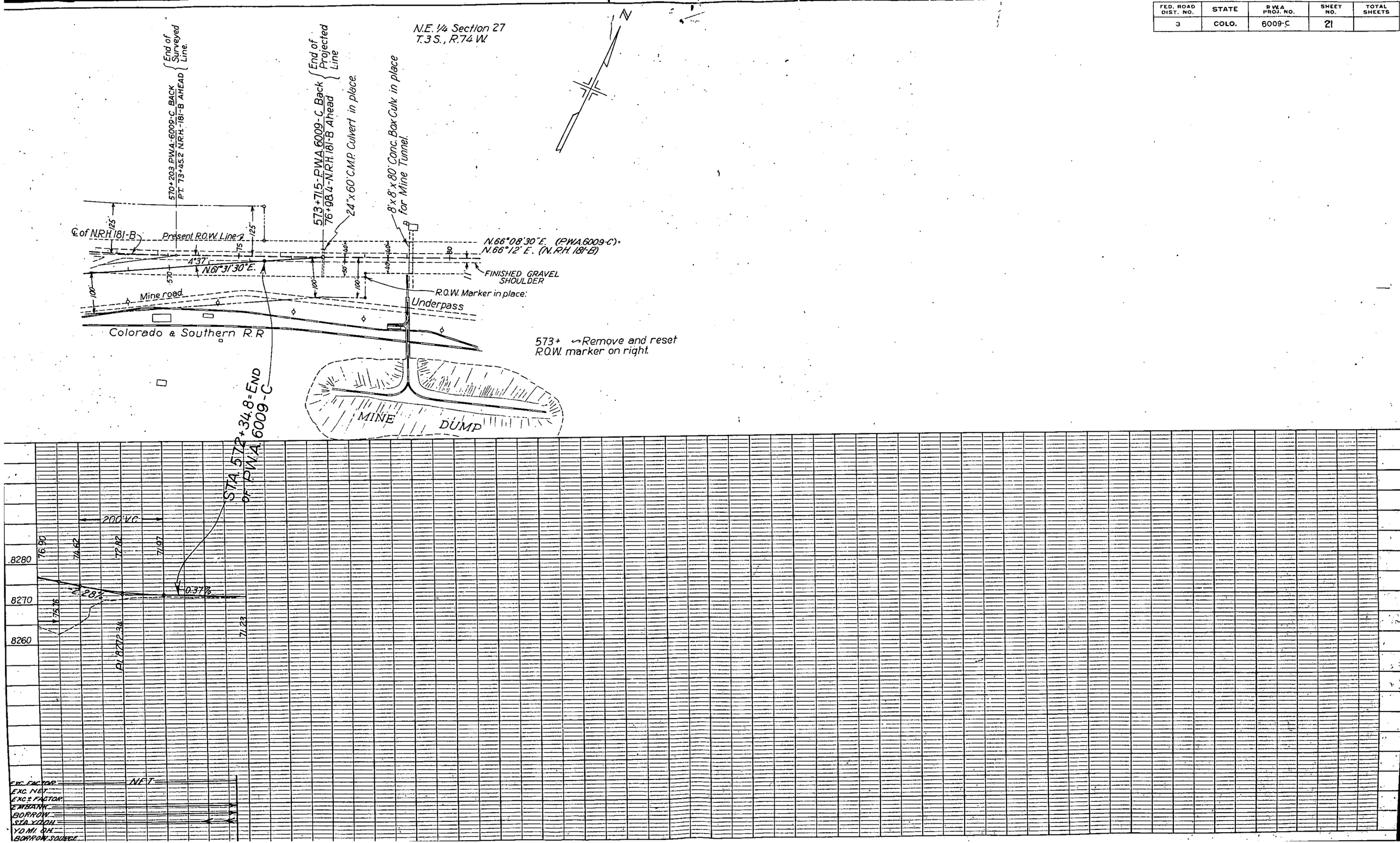
525

530

535

540

FED. ROAD DIST. NO.	STATE	PWA PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	20	



FED. ROAD DIST. NO.	STATE	P.W.A. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	6009-C	21