

STATE	PROJ NO	SHEET NO	TOTAL SHEETS
COLO	T-170-1 (2)	1	245

COLORADO STATE HIGHWAY DEPARTMENT

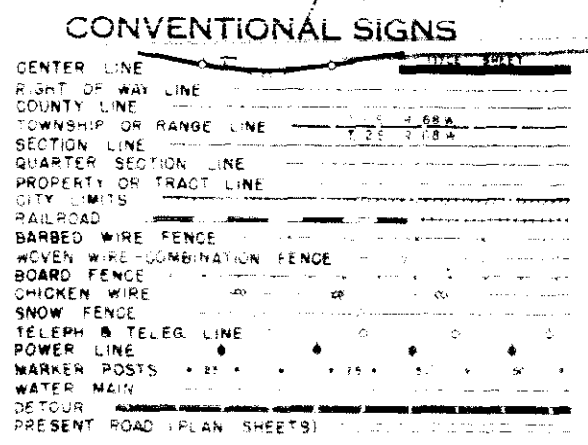
PLAN AND PROFILE OF PROPOSED DENVER - BOULDER TURNPIKE

PROJECT NO. T-170-1 (2) JEFFERSON AND ADAMS COUNTIES

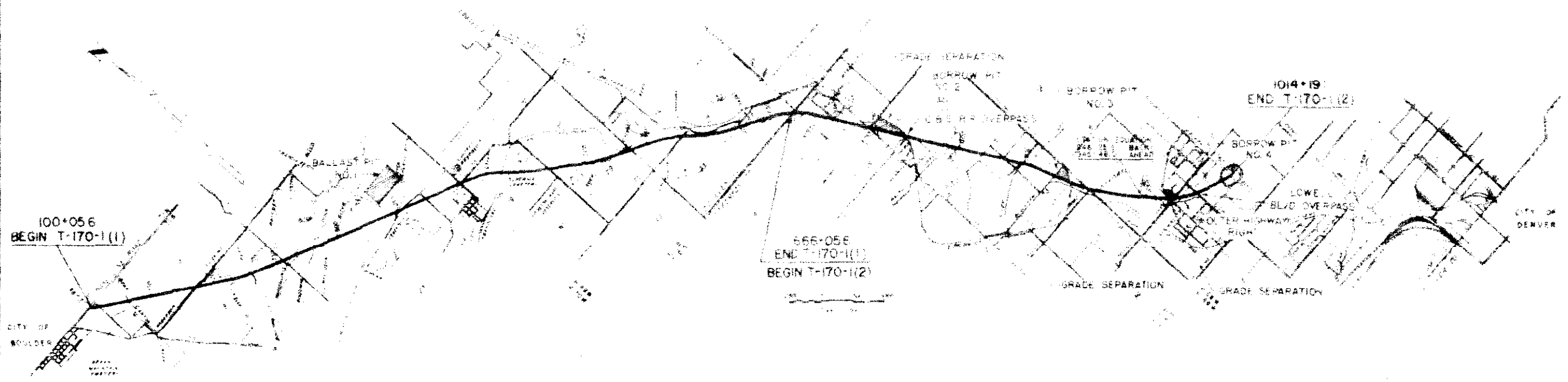
INDEX OF SHEETS

SHEET NO	SHEET NO
1	29
2	30
3	31
4	32
5-9	33
10	34
11-17	35
18	36
19-20	37-48
21	49-55
22	56-155
23	156-215
24	216-244
25	245
26	
27	
28	

SCALES ON ORIGINAL DRAWINGS
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: 34,890.6 FEET = 6.528 MILES
NET LENGTH OF PROJECT



GRADING AND DRAINAGE SOUTH SECTION OF TURNPIKE



NOTE: It is recommended that orders for all materials be placed with the following:

B. W. W. & S. Co., Inc., Denver, Colorado

RECOMMENDED FOR APPROVAL

JAS. D. BELL
CHIEF ENGINEER

APPROVED

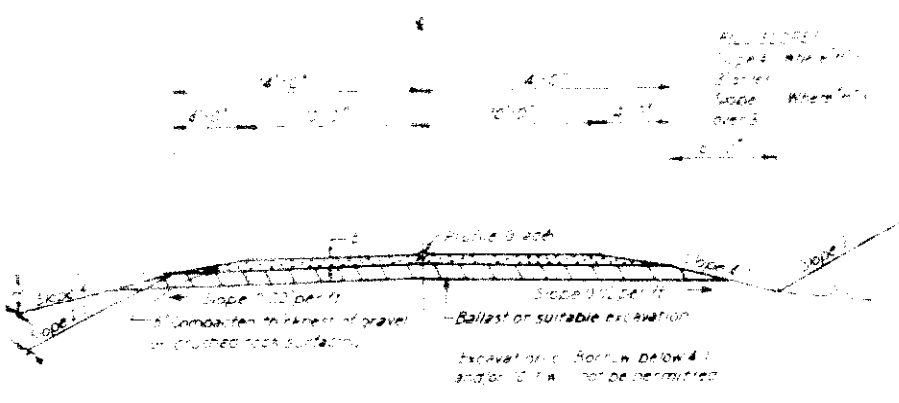
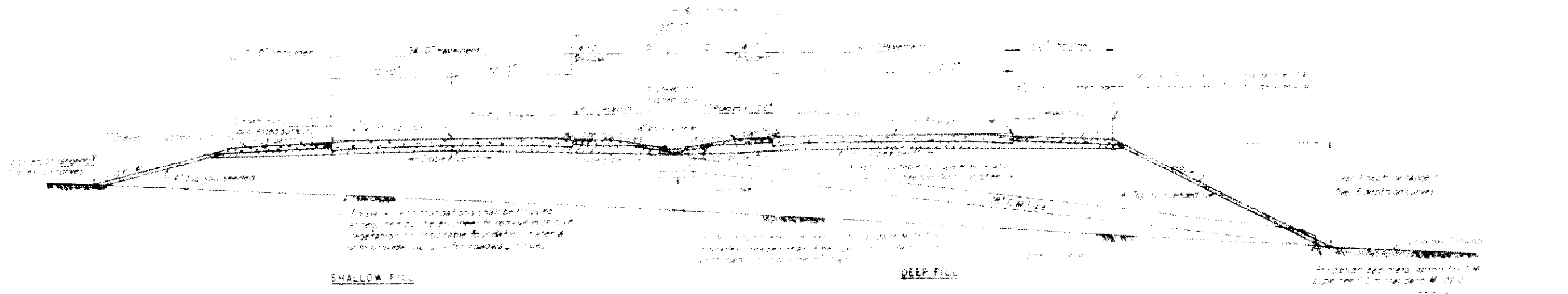
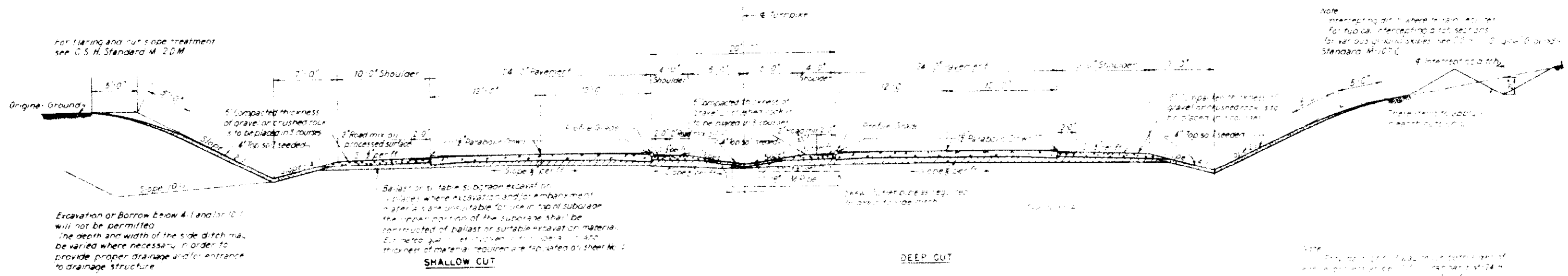
WALTER WATROUS
STATE HIGHWAY AND TRAIL ENGINEER



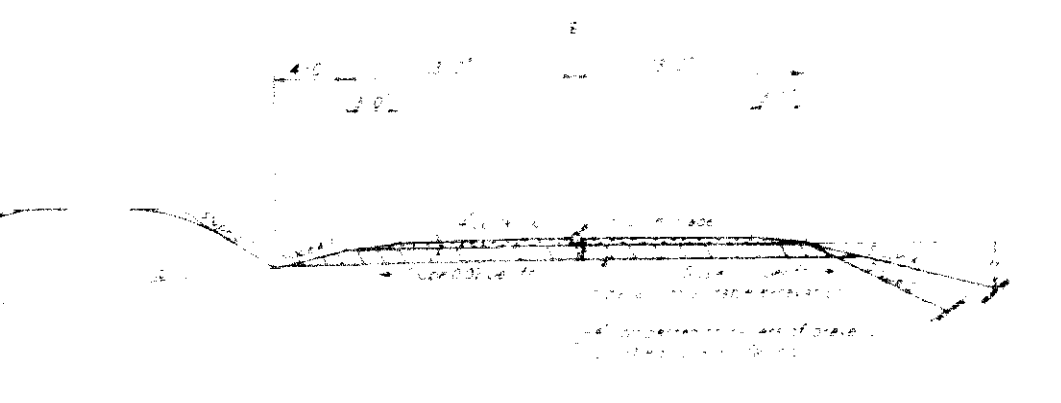
PREPARED AND RECOMMENDED BY
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
KANSAS CITY NEW YORK

Howard Needles Tammen & Bergendoff

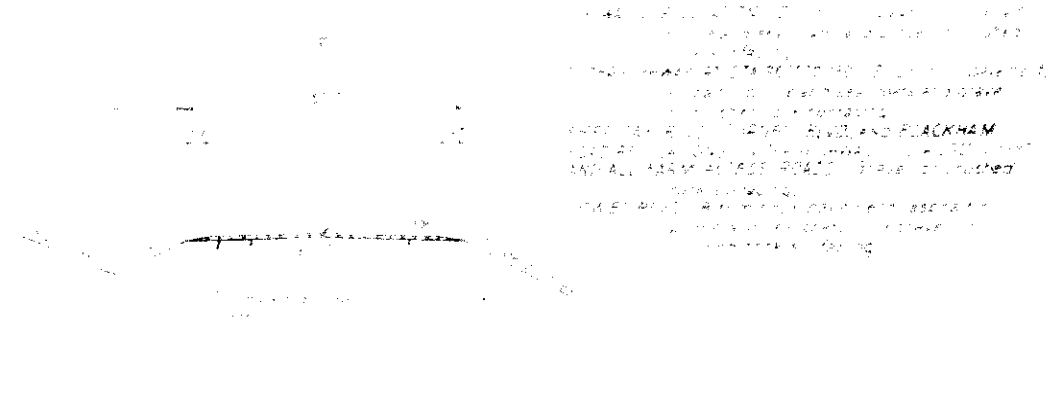
TYPICAL CROSS SECTIONS OF TURNPIKE



TYPICAL CROSS-SECTION FOR SHERIDAN BLVD RELOCATION

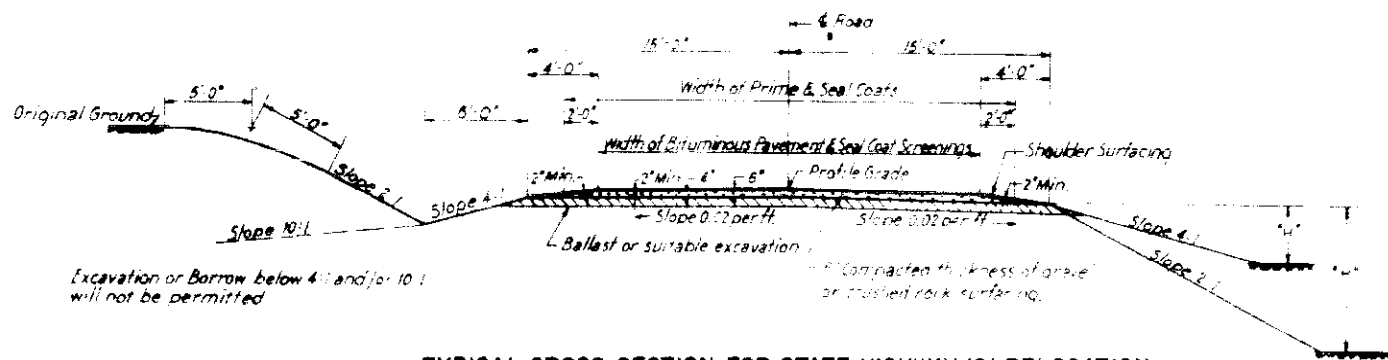


TYPICAL CROSS-SECTION FOR OUTER HIGHWAY LEFT-STA 692 TO 698* CORNELL BLVD AND BLACKHAM ROAD RELOCATIONS

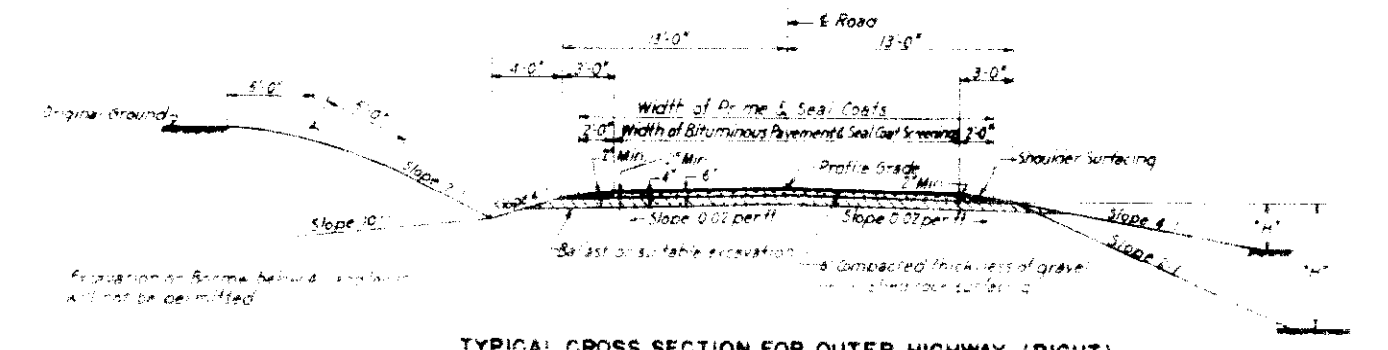


TYPICAL CROSS-SECTION FOR FARM ACCESS ROADS

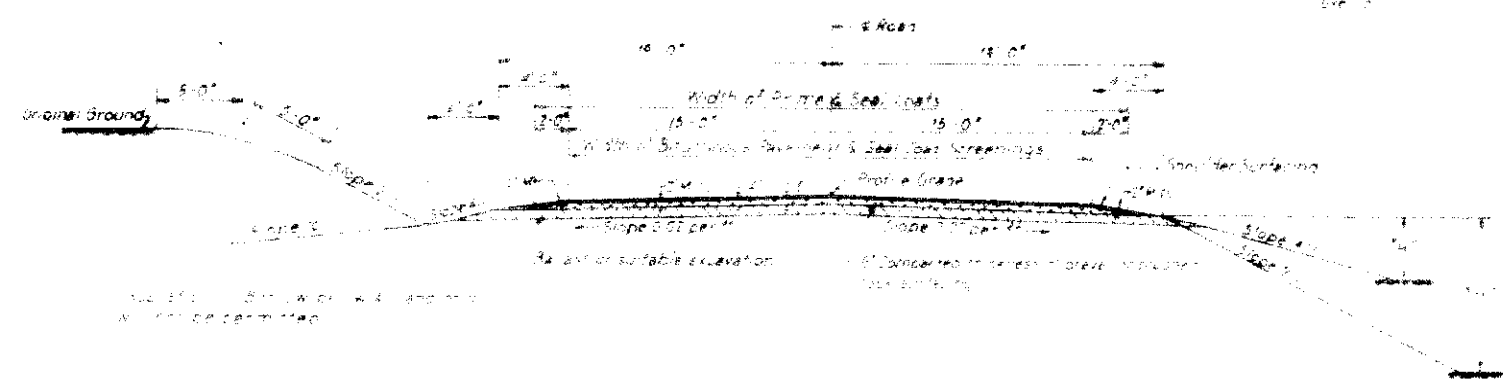
NOTE A
 This section of road will be built on top of old road surface. The depth and width of the side ditch may be varied where necessary in order to provide proper drainage and for entrance to drainage structure.



TYPICAL CROSS SECTION FOR STATE HIGHWAY 121 RELOCATION
 See Note A



TYPICAL CROSS SECTION FOR OUTER HIGHWAY (RIGHT)
 STA. 967+ TO STA. 988+
 See Note A



TYPICAL CROSS SECTION FOR LOWELL BLVD.
 See Note A

GENERAL NOTES

This Project is to be constructed in conformity with the Standard Specifications of the Colorado State Highway Department adopted January 1, 1948 supplemented by Special Provisions.

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

All quantities noted on requirements throughout this Project is to be obtained and used as indicated on the plans. Quantities involved beyond the limit of the former shown on the Typical Cross Section, either noted as "Borrow" on the Plans or as "Embankments" in the List of Structures, are to be mass filled and paid for as "Mass Fill Excavation". These quantities are to be staked as part of the original excavation at locations indicated on the Plans. Any slope stakes beyond the limit of the Typical Section as shown, are subject to change by the Engineer in field conditions actually met in construction.

Location Metal pipe to have galvanized Metal Approx. 1/4 inch ends in accordance with Standard Specification unless otherwise noted on plans.

Concrete pipe to have flared End on both ends in accordance with Standard Specification unless otherwise noted on plans.

All concrete used on this project shall be "Air Entrained Concrete" Cement shall be Type II or II-A unless otherwise noted.

Gravel for bedding for pipe elements shall be covered with approximately 6" of embankment material in such a manner that a minimum 12" depth shall be supplied for the bedding work. This shall be accomplished by working embankment slopes around and adjacent to the culvert.

Right of Way fence on the right shall be constructed approximately six (6) feet from the boundary of the Turnpike Right of Way unless otherwise noted on plans.

Quantity of earthwork quantities involved in construction of intercepting ditches are tabulated on summary of earthwork quantities sheet.

All curves are to be super-elevated as shown on plans. For additional details see Standard M-1-B.

Sufficient topsoil for seeding slopes and median shall be taken from areas on the tops of roadway cuts within slope stake areas and from areas under roadway embankments, keeping at least 2 feet within slope stake or from other areas approved by the Engineer, and stockpiled at an end of cut or at intervals of approximately 1000 feet for use in covering the constructed cut and fill slopes and median with four (4) inch thickness of topsoil.

The base account item, "Clearing of Building Sites including Removal of Foundation and Structures" shall include removal of all foundations, walls, porches and other structures, and removed boulders and any necessary backfilling of cellars, cesspools, wells, etc. to provide near normal ground conditions if a contractor's bid applies at the following stations: 658+00, 664+00, 670+00, 677+00, 683+00, and to 689+00.

Contractor shall maintain a construction and at his own expense all temporary crossings of the intercepting roads at the following approximate stations: 665+00, 671+00, 677+00, 683+00, 689+00, 695+00, 701+00, 707+00, 713+00, 719+00, 725+00, 731+00, 737+00, 743+00, 749+00, 755+00, and 761+00.

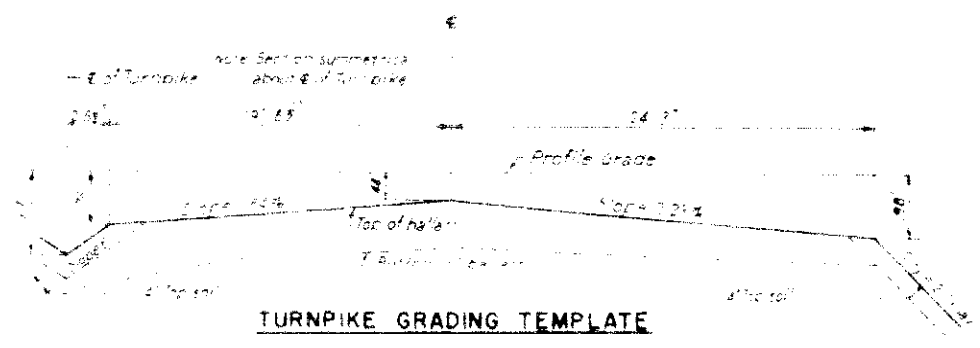
TABULATION OF LENGTH

STATION	ROADWAY	BRIDGES
658+00-664+00	1.100	
664+00-670+00	1.100	
670+00-677+00	1.100	
677+00-683+00	1.100	
683+00-689+00	1.100	
689+00-695+00	1.100	
695+00-701+00	1.100	
701+00-707+00	1.100	
707+00-713+00	1.100	
713+00-719+00	1.100	
719+00-725+00	1.100	
725+00-731+00	1.100	
731+00-737+00	1.100	
737+00-743+00	1.100	
743+00-749+00	1.100	
749+00-755+00	1.100	
755+00-761+00	1.100	
TOTALS	14.500	3.850
SUMMARY	14.500	3.850
1.000 Miles Roadway	14.500	3.850
1.000 Miles Separate Contract	3.880	0.074
TOTALS	18.380	3.924

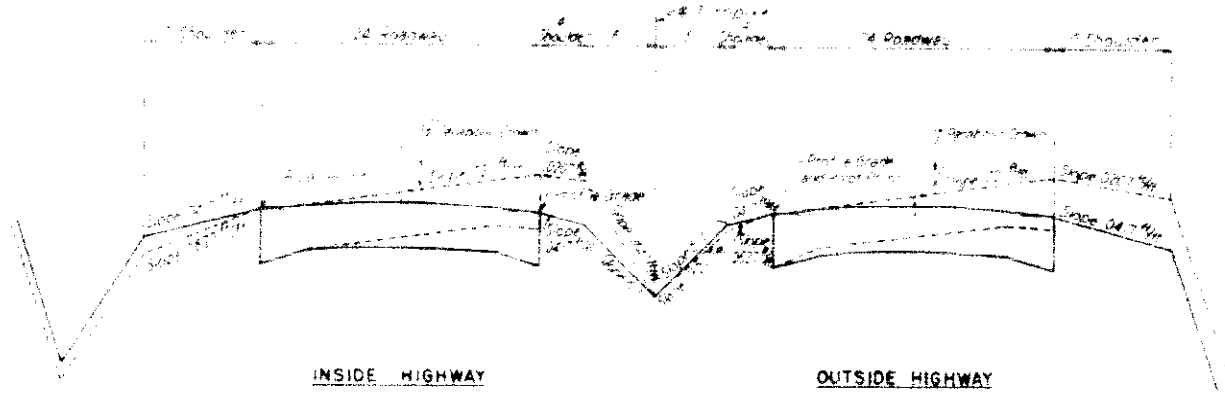
DESIGN DATA

TURNPIKE	
Maximum Degree of Curve	1%
Maximum Grade	4%
Minimum Right-of-Way	600'
Minimum Right-of-Way	500'
Maximum Design Speed	50 M.P.H.

INTERSECTING ROADS					
Road	Station	Shoulder	Blacktop	Width	Grade
State Route 101	73+00	6.00	8.00	14.00	1.00%
Station	73+00	6.00	8.00	14.00	1.00%
Maximum Degree of Curve	5%	1.00%	1.00%	1.00%	1.00%
Maximum Grade	4%	1.00%	1.00%	1.00%	1.00%
Minimum Right-of-Way	400'	300'	200'	100'	100'
Minimum Right-of-Way	400'	300'	200'	100'	100'
Maximum Design Speed	30 M.P.H.	20 M.P.H.	20 M.P.H.	20 M.P.H.	20 M.P.H.



TURNPIKE GRADING TEMPLATE



SUPERELEVATION DETAIL

Note: Section symmetrical about E of Turnpike.

Note: Superelevated section is derived by raising the normal section from its base level...
 Note: Section symmetrical about E of Turnpike.

SUMMARY OF APPROXIMATE QUANTITIES

SUMMARY OF APPROXIMATE QUANTITIES

ITEM NO.	ITEM	UNIT	TOTAL
10a	Clearing and Grubbing - Entire Project	Lump Sum	*
11a	Removal of 25 Structures	Lump Sum	*
11b	Remove and Reset Headgate and Frame	Each	1
11c	Removing 6" Water Pipe	Lump Sum	3100
11d	Remove 7x14x37 Wood Bridge Sta. 7032	Lump Sum	*
12a	Remove Fence	Lump Sum	33,600
13c	Unclassified Excavation	Cu Yd	1,132,000
13d	Unclassified Ditch Excavation	Cu Yd	6,700
14a	Dry Rock Excavation (Structures)	Cu Yd	430
14b	Dry Common Excavation (Structures)	Cu Yd	3,830
14c	Wet Rock Excavation (Structures)	Cu Yd	150
14d	Wet Common Excavation (Structures)	Cu Yd	1,280
16a	Structure Backfill (Class 1)	Cu Yd	1,240
16b	Mechanical Tamping	hour	730
17a	Rolling with Tamping Roller (2 Unit)	hour	2200
17b	Rolling with Tamping Roller (4 Unit)	hour	1100
17c	Rolling with Flat Wheeled Roller	hour	360
17d	Furnishing Tamping Roller (2 Unit)	Each	4
17e	Furnishing Tamping Roller (4 Unit)	Each	2
17f	Furnishing Flat Wheeled Roller	Each	2
17g	Wetting	M Gal	21,100
18a	Station Yard Overhaul	Sq Yd	6,839,000
18b	Yard Mile Overhaul	Yd Mi	299,100
18c	Ton Mile Overhaul	Ton Mi	742,100
19a	Masking Topsoil	Sq Yd	25,100
20a	Centering Old Road	Yd	3
23a	Barrel (Class 1)	Yd	72,100
46a	Class 1 Concrete	Cu Yd	2025
47	Reinforcing steel handling and placing	Lb	225,300
51a	Relaying 4" Pipe	Lump Sum	100
51b	Relaying 6" Pipe	Lump Sum	925
51c	Relaying 8" Pipe	Lump Sum	5456
52a	24" Reinforced Concrete Culvert Pipe	Lump Sum	116
52b	24" Reinforced Concrete Culvert Pipe - Extra Strength	Lump Sum	32
52c	30" Reinforced Concrete Culvert Pipe	Lump Sum	216
52d	48" Reinforced Concrete Culvert Pipe	Lump Sum	116
53a	18" Corrugated Metal Culvert Pipe	Lump Sum	1464
53b	24" Corrugated Metal Culvert Pipe	Lump Sum	1412
53c	42" Corrugated Metal Culvert Pipe	Lump Sum	128
55c	24" Corrugated Metal Siphon Pipe	Lump Sum	784
58f	40' Abrasion Resistant Corrugated Metal Siphon Pipe	Lump Sum	104
64	2 1/2" Rubber Sill and Ditch Paving 12' Thick	Sq Yd	105
67a	Rip out	Cu Yd	160
68a	Combination Wire Fence with Treated Wood Posts	Lump Sum	85,600
76f	Driveway Gates	Each	23
85c	Trash Buntline Station	Each	12
95a	Metal Appurtenances for 18" M.P. Culverts	Each	33
95f	Metal Appurtenances for 24" M.P. Culverts	Each	57
96f	Metal Appurtenances for 42" M.P. Culvert	Each	2
95f	Metal Appurtenances for 18" M.P. Culverts - Bituminous coated	Each	2
95k	Metal Appurtenances for 24" M.P. Culverts (Flap Spheres)	Each	10
110a	Cast Iron Valve and Valve Box	Each	5
110b	Metal Drain Pipe	Lump Sum	915
110c	Metal Drain Pipe	Lump Sum	300
121a	1 1/2" Cast Iron Water Pipe	Lump Sum	97
121b	1 1/2" Cast Iron Water Pipe	Lump Sum	1452
121c	1 1/2" Cast Iron Water Pipe	Lump Sum	3100
131	Manholes	Each	3

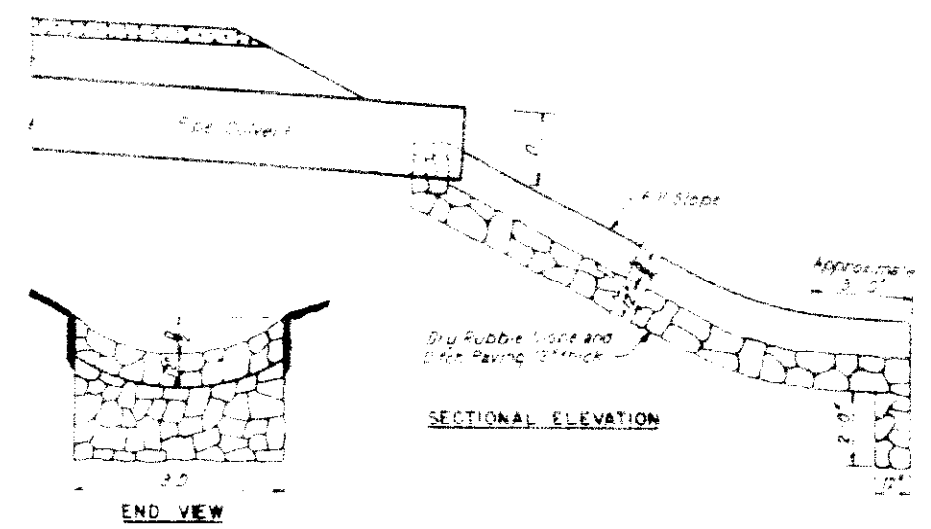
ITEM NO.	ITEM	UNIT	TOTAL
121a	1 1/2" Cast Iron Pipe Sewer	Lump Sum	960
121b	1 1/2" Cast Iron Pipe Sewer	Lump Sum	500
122a	Flared End Sections for 24" Reinforced Concrete Pipe	Each	100
122b	Flared End Sections for 30" Reinforced Concrete Pipe	Each	4
122f	Flared End Sections for 42" Reinforced Concrete Pipe	Each	2
81a	State Fences	Each	2
	Project Markers	Each	2
	Fence Removal	Lump Sum	*
	Clearing of Building Sites, etc.	Lump Sum	*
	Remove and Relocate High Tension Lines and Towers Sta. 680+50 to 688+50 (Work done by P.E.A. forces)	Lump Sum	*
	Remove and Relocate Power Lines, Sta. 756+50 and 760+00 to 766+00 (Work to be done by P.E.A. forces)	Lump Sum	*
	Remove and Relocate Telephone Poles Sta. 757+35 to 757+50 (Work to be done by P.E.A. forces)	Lump Sum	*
	Remove and Relocate Power Lines and Poles Sta. 935+30 (Work to be done by P.E.A. forces)	Lump Sum	*
	Remove and Relocate Telephone Lines and Poles Sta. 933+00 (Work to be done by P.E.A. forces)	Lump Sum	*
	Remove and Relocate Power Lines and Poles Sta. 933+00 (Work to be done by P.E.A. forces)	Lump Sum	*
	Equipment Power Generator	Lump Sum	*
	Approach Ways - Entire Project	Lump Sum	*

BALLAST MATERIAL TABULATION

MATERIAL TO BE PLACED	SOURCE	QUANTITY		OVERHAUL TON MILES	
		AVAILABLE	THICKNESS INCHES		
			TONS USED		
Sta. 654+00 to 680+00	Ballast P. No. 1 1800' ft. of Sta. 344+00 on Chausseant Property	Ample	5"	30,351	247,470
Sta. 840+00 to 1014+13.1	Same	Ample	5"	30,909	368,958
State Highway Route 121 Relocation	Same	Ample	5"	3,143	25,042
Sheldon Blvd Relocation	Same	Ample	5"	3,250	37,490
Cornell Ave Relocation	Same	Ample	5"	2,475	32,200
Lowell Blvd	Same	Ample	5"	948	12,580
Outer Highway Right Sta. 967 to 988	Same	Ample	5"	1,215	16,000
26' Access Road Sta. 992 to 694	Same	Ample	5"	33	360
Total				72,428	742,100



TYPICAL SECTION OF DITCHES & CHANNEL CHANGES



DETAIL OF DRY RUBBLE SLOPE & DITCH PAVING FOR OUTLET DITCHES

LIST OF STRUCTURES

STATION	DESCRIPTION	REMOVE STRUCTURE NO	EXCAVATION			STRUCTURAL EXCAVATION		STRUCTURE BACKFILL		MECH TAMPING HR	GRAVEL OR CR. ROCK SURF. TON	CONCRETE		REINF STEEL LBS	CORRUGATED METAL SIPHON PIPE			CORRUGATED METAL CULVERT PIPE			METAL APRON FOR CORRUGATED METAL PIPES			REINFORCED CONC. CULVERT PIPE				CONC FLARED END SECTION				GRATING AND FRAME FOR NO 13 INLETS	MISCELLANEOUS		
			CUBIC YARDS			CUBIC YARDS		CUBIC YARDS				CUBIC YARDS			CLASS		LIN. FT.			LIN. FT.			EACH			LIN. FT.				EACH					
			UNCL	EMBANK	UNCL DITCH										A		24"	30"	42"	18"	24"	42"	18"	24"	42"	24"	30"	36"	42"	24"	30"			36"	42"
666+066	Project Marker																														1 Project Marker (State Forces)				
672+50	Cross Culvert Ditches (W=2)				5	16		53																											
674+20	Cross Culvert (Access Road) Ditches (W=2)				6	10		53																											
674+75	Cross Culvert (Access Road) Ditches				8	10		44																											
675+50	Median Drain Ditch #13 Conc Inlet (W=3)				5	27		15		2		0.83	84				45																		
677+50	Siphon (W=6) #12 (84") Ditches (W=2)				5	138		56		7		0.41		57																		1. Trash Guards 24" x 36" Metal Drain Pipe 12" x 12" valve and valve box for 24" siphon			
678+20	Siphon (W=6) #12 (84") Ditches (W=2)				11	156		58		3		0.41																				2. Trash Guards 4" x 30" Metal Drain Pipe 12" x 12" valve and valve box for 24" siphon			
678+40	Cross Culvert (Access Road) Ditches (W=2)				5	1		12																											
678+50	Siphon (W=6) #12 (84") Ditches (W=2)				7	148		7		7		0.41																					3. Trash Guards 6" x 30" Metal Drain Pipe 12" x 12" valve and valve box for 24" siphon		
679+00	Cross Culvert (Access Road) Ditches (W=2)				10	10		10																											
683+00	Cross Culvert Ditches (W=2)				12	50		60																											
	Cross Culvert (Access Road) Ditches (W=2)				15	5		18																											
690+00	Cross Culvert Ditches (W=2)				7	8		50																											
	#13 Conc Inlet (W=3)				18	7		7																											
697+50	Cross Culvert (Access Road) Ditches (W=2)				17	10		22																											
	Cross Culvert Ditch (W=2)				17	10		22																											
702+00	#13 Conc Inlet (W=3)				18	213		15				0.83	84																						
704+00	Median Drain #13 Conc Inlet (W=3)				5	5		5		3		0.83	84																						
710+00	Cross Culvert Ditches (W=2)				11	27		15				1.52	113																						
	#13 Conc Inlet (W=3)				30	14		47				0.83	84																						
722+00	Cross Culvert Ditches (W=2)				10	18		27				0.83	84																						
	#13 Conc Inlet (W=3)				10	18		27				0.83	84																						
726+00	Cross Culvert				10	18		27				0.83	84																						
727+50	Cross Culvert				10	18		27				0.83	84																						
729+00	Cross Culvert (W=2)				11	14		41				0.83	84																						
736+00	Median Drain #13 Conc Inlet (W=3)				11	14		41				0.83	84																						
741+00	Median Drain #13 Conc Inlet (W=3)				5	5		17		2		0.83	84																						
745+00	Median Drain #13 Conc Inlet (W=3)				5	5		17		2		0.83	84																						
750+00	Median Drain #13 Conc Inlet (W=3)				5	5		17		3		0.83	84																					1. Trash Guards 24" x 36" Metal Drain Pipe 12" x 12" valve and valve box for 24" siphon	

1. All aprons for C.M.F. culverts (for siphons)
 2. Asbestos reinforced pipe - Fiberglass coated apron

LIST OF STRUCTURES

STATION	DESCRIPTION	REMOVE STRUCTURE NO	EXCAVATION			STRUCTURAL EXCAVATION		STRUCTURE BACKFILL		MECH TAMPING HR	GRAVEL OR CRUSHED STONE TON	CONCRETE		REINF. STEEL LBS	CORRUGATED METAL SIPHON PIPE			CORRUGATED METAL CULVERT PIPE			METAL APRON FOR CORRUGATED METAL PIPES			REINFORCED CONC. CULVERT PIPE				CONC. FLARED END SECTION				GRATING AND FRAME FOR NO. 13 INLETS	MISCELLANEOUS									
			CUBIC YARDS			CUBIC YARDS		CUBIC YARDS				CLASS			LIN. FT.			LIN. FT.			EACH			LIN. FT.				EACH														
			UNCL.	EMBANK	UNCL. DITCH	●							A			24"	30"	42"	18"	24"	42"	18"	24"	42"	24"	30"	36"	42"	24"	30"	36"			42"								
755+15 761+65	Cross Culvert Ditch (W=2) Cross Culvert Ditch (W=2)				5 17	35 23		14 26		11 8														216*																		
763+00	Median Drain Dry Rubble Apron #13 Conc Inlet (H=3)				5			19		2		0.83	84						58																					196 Sq yds (12" thick) Dry Rubble Slope and ditch paving		
767+50 770+00	Cross Culvert Ditches (W=2) Median Drain Dry Rubble Apron				6 5	19 5		62 15		6 2														140																14 Sq yds (12" thick) Dry Rubble Slope and ditch paving		
771+25 777+00	#13 Conc Inlet (H=3) Cross Culvert Ditch Median Drain #13 Conc Inlet (H=3)				6 5	15 5		53 17		5 2		0.83 0.83	64 84											116																		
779+00 to 780+25 780+00 785+00	Ditch Cross Culvert Ditches (W=2) Cross Culvert Ditch (W=2) #13A Conc Inlet (H=4)				5 10 2			43 42		4 4														92 54																		
791+50	Median Drain Dry Rubble Apron #13 Conc Inlet (H=4)							6		2		0.1	8																											45 Sq yds (12" thick) Dry Rubble Slope and ditch paving		
792+10 796+00 796+95	Cross Culvert Ditch (W=2) Ditch (75" L) (W=2) Median Drain Dry Rubble Apron #13 Conc Inlet (H=3)		1800		10 5	10 5		120 17		5 2		0.83 0.83	20 84											36*																	516 Cu yds Rip Rap 45 Sq yds (12" thick) Dry Rubble Slope and ditch paving	
803+50 809+80	Median Drain #13 Conc Inlet (H=3) Cross Culvert Ditches (W=2) #13A Conc Inlet (H=9)					33 41		18 30		2 5		0.83 0.83	84 392																													
802+20 to 811+00	Ditch (75" L) (W=2)				30																																					
813+00 817+60	Cross Culvert Ditch (W=2) Cross Culvert Ditch (W=3) #13A Conc Inlet (H=3)				25 66	19 18		42 40		4 4														36 35																		
821+15 829+90 to 831+90 830+00	Cross Culvert Ditch #13A Conc Inlet (H=7) Ditch (160" L) (W=2) Conc. Division Box				15 39	7 5		24 2		4 2		0.1 0.83	210 129											96																		
830+25 to 831+50 831+50 to 833+20 831+50	Ditch (75" L) (W=2) Ditch (105" L) (W=2) Cross Culvert Ditch (W=2) #13A Conc Inlet (H=6)				7 3 5			10 43		1 4														36 36																		
	Cross Culvert Access Road Ditches (W=2)				15	6																																				
837+50 837+00	Conc. Division Box Conc. Division Box				4 5			3 3		1 1		1.00 1.0	16 28																													
837+90 832+10 840+00	Remove 12" x 12" C.M.P.L. Remove Conc. Division Box Median Drain #13 Conc Inlet (H=5)					7		22		2			156																													
843+00 to 846+50 846+00 846+75	Ditch 160 LF Remove and Relay 8x25 VEP and move headgate Cross Culvert #13A Conc Inlet (H=4)				33 3 13			10 42		1 4		1.00 1.00	16 84																													Relay 8" x 25" VEP and move headgate
847+00 847+00 849+75 849+40 849+87	Relocate Reservoir Lt Cross Culvert Cross Culvert Cross Culvert C.B.C. (4'x4'x23)		1000			13 6 13 15		42 19 46 46		4 2 3 3																																

* Extra Strength

165

SW 1/4 SEC. 1 T2S R69W

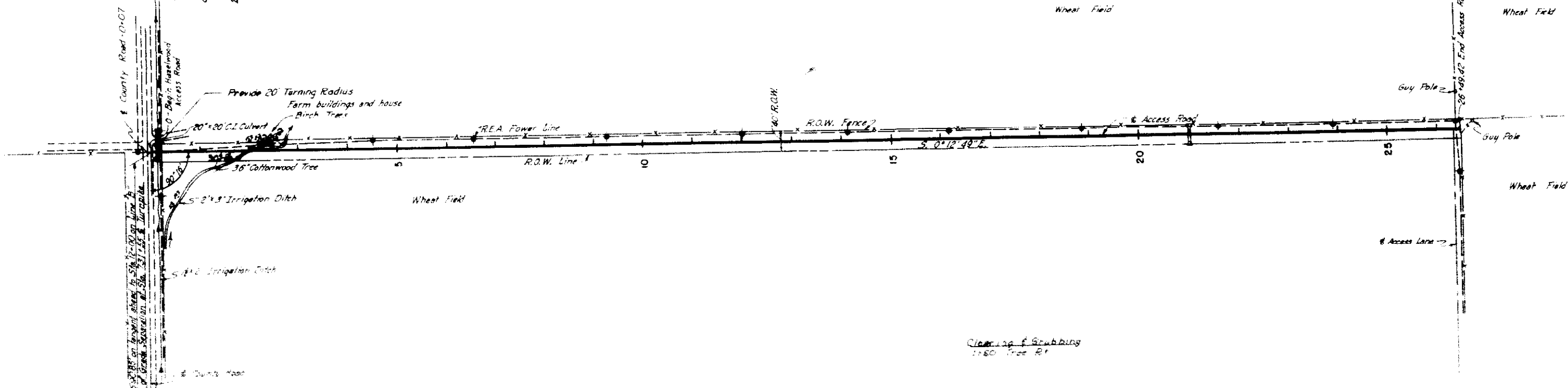
R69W

COLORADO STATE HIGHWAY DISTRICT
T 170.1 (2)
DENVER - BOULDER TURN
HOWARD, NEEDLES, TAMMEN & BERGEN
CONSULTING ENGINEERS
KANSAS CITY NEW YORK S.W.



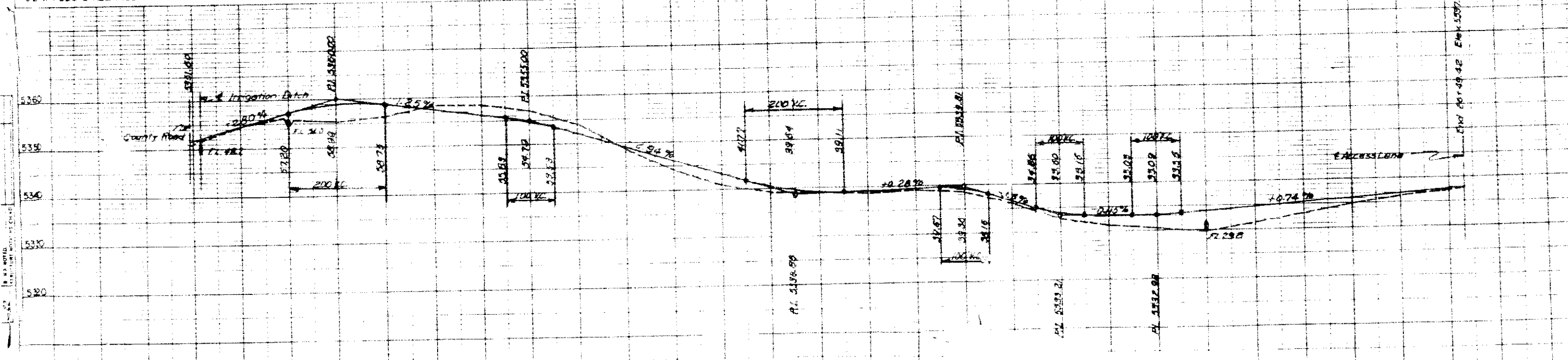
0-15 Remote
20"x20" C.I. Culvert
0-15 Reg'd 24"x22"
Cross Culvert
Ditches (4x2)
2x00 Reg'd 18"x24"
Cross Culvert
Ditch Lt. (4x2')

2100 Reg'd
18"x24" Cross
Culvert

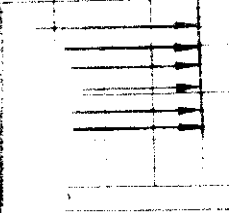


SE 1/4 SEC. 2 T2S R69W

NE 1/4 SEC. 11 T2S R69W



ADJUST FACTOR	1.15	1.15	1.15
ADJUSTMENT	525	525	1116
ADJUST FACTOR	504	504	1204
ADJUSTMENT	504	504	1294
ADJUST FACTOR	0	0	0
ADJUSTMENT	0	0	5436



FENCING REQUIREMENTS

STATION	SIDE	REMOVE FENCE	REMOVE & REBUILD FENCE	BUILD COMBINATION FENCE		BUILD B/W FENCE	GATES
		LN. FT.	LN. FT.	LN. FT.	BARRIER		
666+70 667+60 668+50 671+60	Rt & Lt	430 190 370 235					
678+00 666+70 to 690+00 665+60 to 690+00 665+10 to 690+00	Rt & Lt Lt Rt Rt	260		2330 2440	2490		
678+00 668+00 685+00 693+85	Rt & Lt Rt Rt Rt & Lt	420					3 1
698+30 697+00 697+70 707+90	Rt & Lt Rt & Lt Rt & Lt Rt & Lt	430 290 230 255					
708+10 719+80 690+00 to 692+50 692+70 to 697+80	Rt & Lt Rt & Lt Lt Lt	285 225		250 510			
698+25 to 720+00 692+80 to 698+10 690+00 to 695+60 697+20 to 720+00	Lt Lt Rt Rt			570 560 2280	530		
690+00 to 696+70 704+25 722+00 723+30	Rt Rt & Lt Rt & Lt Rt & Lt	420 420			220		
726+90 727+55 727+70 736+35 to 750+00	Rt & Lt Rt & Lt Rt Lt	290 300 300					
720+00 to 724+00 728+00 to 750+00 720+20 to 728+20 730+00 to 736+35	Rt Rt Lt Lt			420 225 800 750			
726+00 to 725+20 726+50 733+20 to 738+00	Rt Rt Rt			120 60 480			
Line 6 Highway 12 2+30 21+00 21+60 33+50	Rt & Lt Rt & Lt Rt & Lt Rt & Lt	320 530 200 350					
1+00 to 14+75 4+00 to 21+00 27+50 to 30+50 30+50 to 36+00	Lt Rt Lt Lt			1420 780 500	780 300		
756+50 758+80 762+70 763+80	Rt & Lt Rt & Lt Rt & Lt Lt	340 360 520 240					
764+10 765+00 765+70 771+70	Rt & Lt Rt & Lt Rt & Lt Rt & Lt	200 300 400 230					
775+55 778+30	Rt & Lt Rt & Lt	240 175					

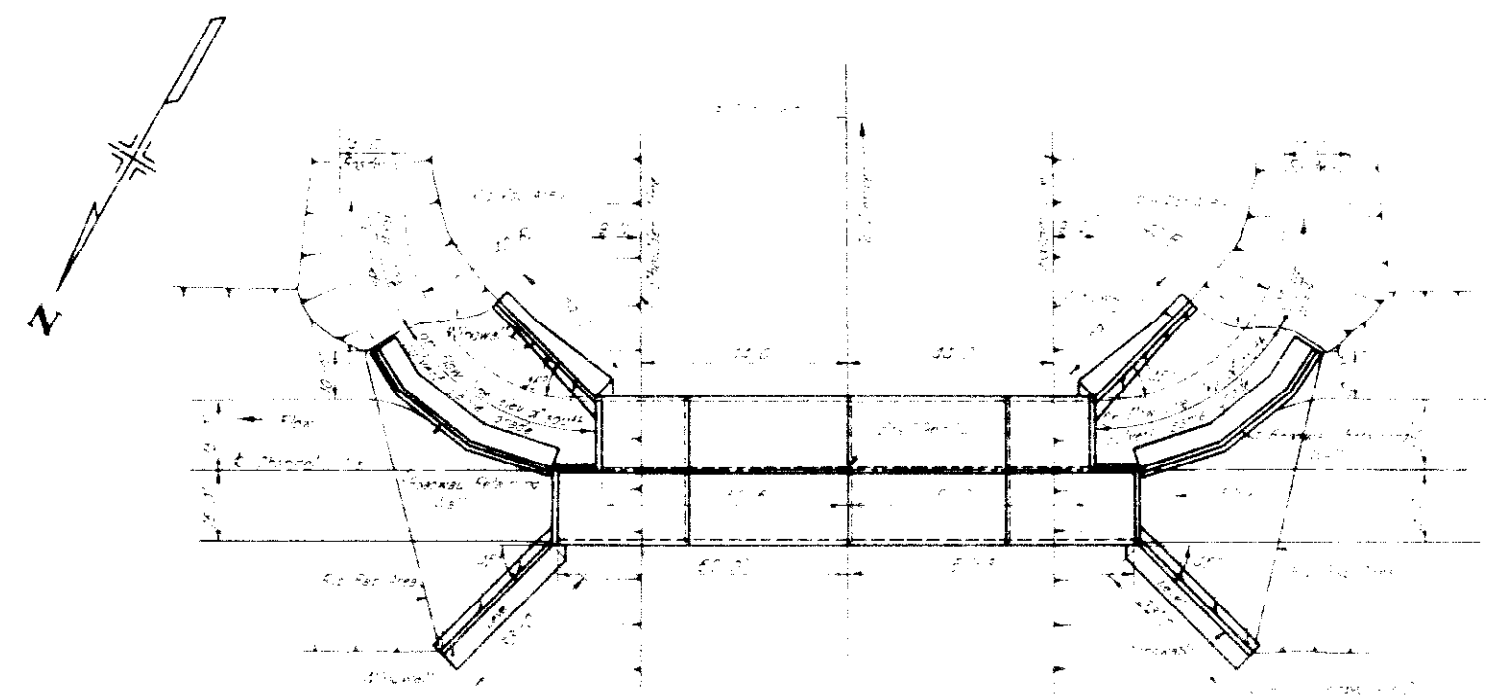
FENCING REQUIREMENTS

STATION	SIDE	REMOVE FENCE	REMOVE & REBUILD FENCE	BUILD COMBINATION FENCE		BUILD B/W FENCE	GATES
		LN. FT.	LN. FT.	LN. FT.	BARRIER		
779+33 750+00 to 780+00 750+00 to 780+00 786+31	Rt & Lt Lt Rt Rt & Lt	520		3010 305			
800+35 806+00 780+00 to 810+00 780+00 to 781+00	Rt & Lt Rt & Lt Lt Rt	405 780			3200 100		
785+70 to 810+00 817+06 831+70 832+55	Rt Rt & Lt Rt & Lt Rt & Lt	230 510 800			2510		
810+00 to 830+00 830+00 to 840+00 840+00 to 840+00 830+00 to 840+00	Lt Lt Rt Lt				2000 1000 3000	1000	
846+10 846+80 847+20 851+40	Rt & Lt Rt & Lt Rt & Lt Rt & Lt	420 275 220 350					
861+55 864+21 840+00 to 841+50 847+60 to 870+00	Rt & Lt Rt & Lt Lt Lt	240 540			750 2280		
840+00 to 870+00 840+00 to 841+50 875+20 875+75	Rt Lt Rt & Lt Rt & Lt				1070 740		
870+00 to 875+50 870+00 to 876+70	Lt Rt				550 870		
Line 6 Interchange 12+75 12+60 13+30 31+50 1+30 to 1+41	Rt & Lt Rt & Lt Rt & Lt Rt & Lt Rt	230 475 470 800					
Line 8 Interchange 74+00 to 75+00	Rt				12.5		
901+60 902+95 927+35 903+82	Rt & Lt Rt & Lt Rt & Lt Rt & Lt	400 740 320 140					
901+00 to 930+100 901+00 to 930+20 929+58 935+67	Lt Rt Rt & Lt Rt & Lt				2300 2360		
938+90 948+15 951+70 930+00 to 959+55	Rt & Lt Rt & Lt Rt & Lt Lt	270 350 370			2395		
930+00 to 959+50 978+00 to 940+00 951+50 985+45	Rt Lt Rt & Lt Rt & Lt				2870 400		2
961+98 969+10	Rt & Lt Rt & Lt	1845 800					

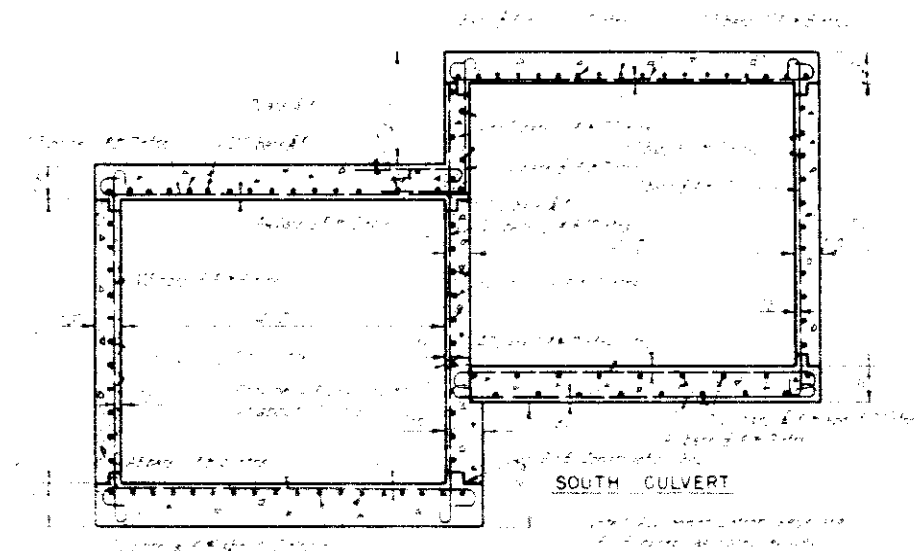
FENCE REQUIREMENTS

STATION	SIDE	REMOVE FENCE	REMOVE & REBUILD FENCE	BUILD COMBINATION FENCE		BUILD B/W FENCE	GATES
		LN. FT.	LN. FT.	LN. FT.	BARRIER		
974+00 978+88 946+10 971+00 to 964+00	Rt & Lt Rt & Lt Rt & Lt Lt	400 320 315				310	1
984+00 to 990+00 967+20 to 967+50 960+00 to 961+40 961+30 to 982+20	Lt Rt Lt Rt				550 2080	40 1870	3
Line 4 and 6 Interchange Line 4 Line 6	Lt Rt Rt					470 320	
990+40 990+50 990+50 997+00	Rt & Lt Rt & Lt Rt Rt & Lt	460 470 290 480					
997+50 1000+20 1007+20 990+17	Lt Rt & Lt Rt & Lt Rt & Lt	140 600 450 570					
1000+50 to 1012+70 1012+70 1000+00 to 1041+22 990+00 to 1011+22 1011+22 to 1012+70	Lt Rt & Lt Lt Rt Lt				1340 850	2490 2670	470
Hand/Wood Access Rd 0+25 to 26+25					2600		1
TOTALS		33640			7715	12207	15

Note: Access gates specified shall conform to 110 Min. for driveway gates. Provide 1/2" x 1/2" Towne padlock #861 with bronze shackles and 2-3' length of 1/2" stock steel chain per gate.

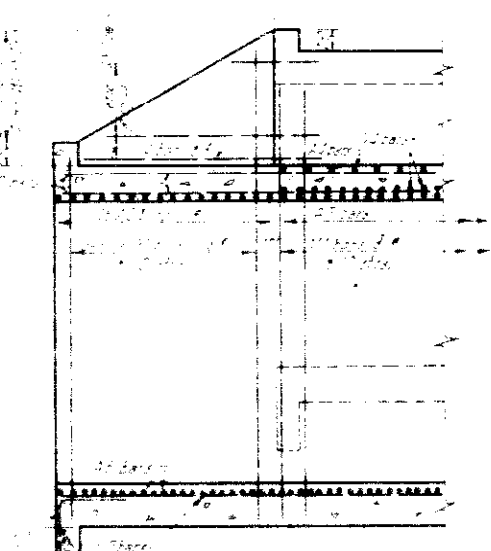


PLAN

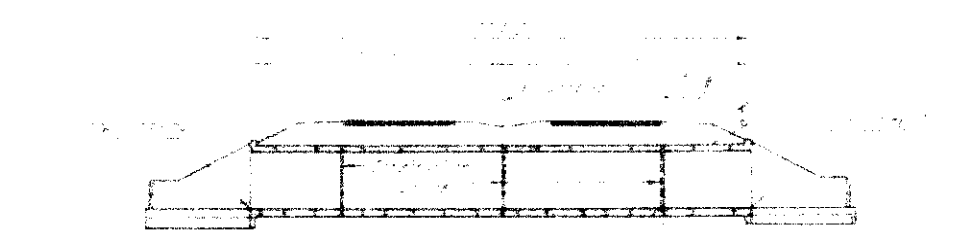


NORTH CULVERT

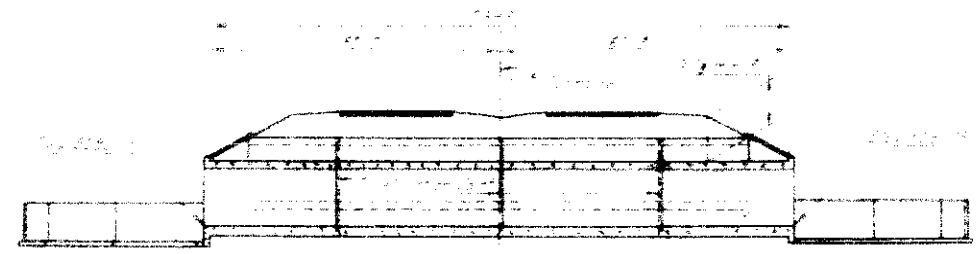
TYPICAL SECTION THRU BOX



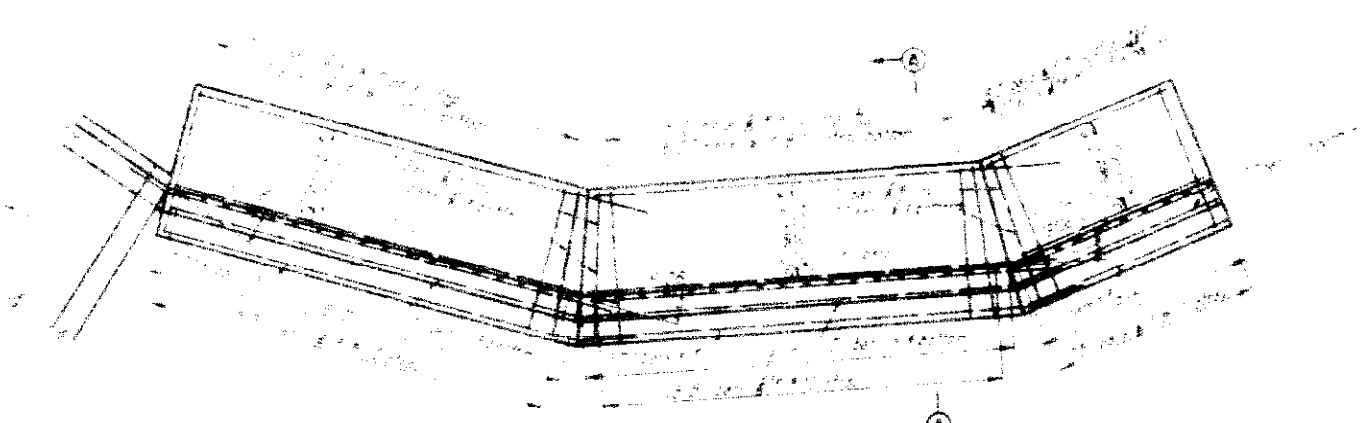
TYPICAL DETAIL AT END OF BOX



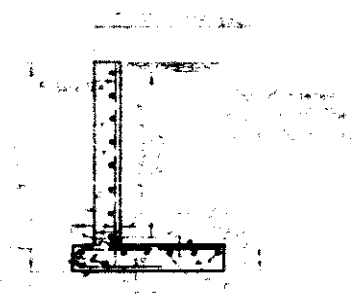
SECTION ON S. SOUTH CULVERT



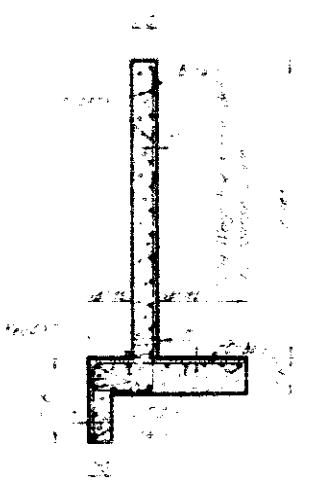
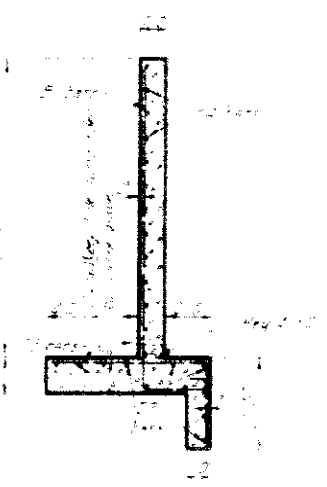
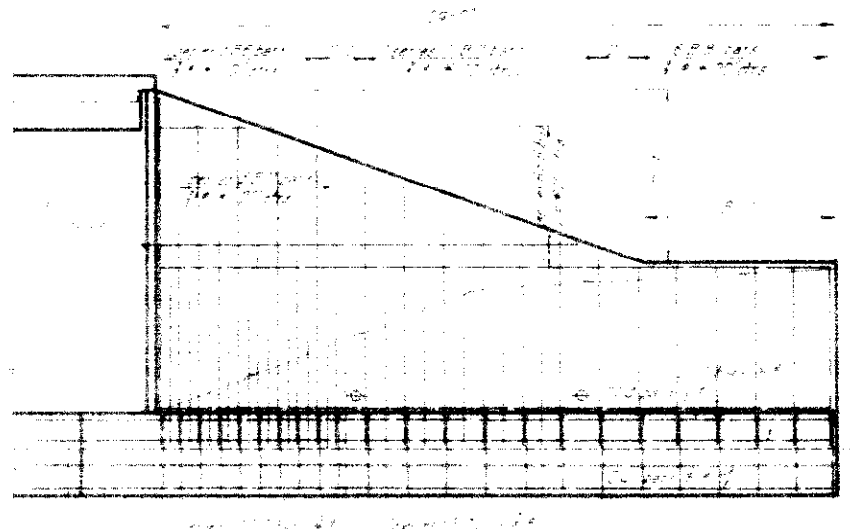
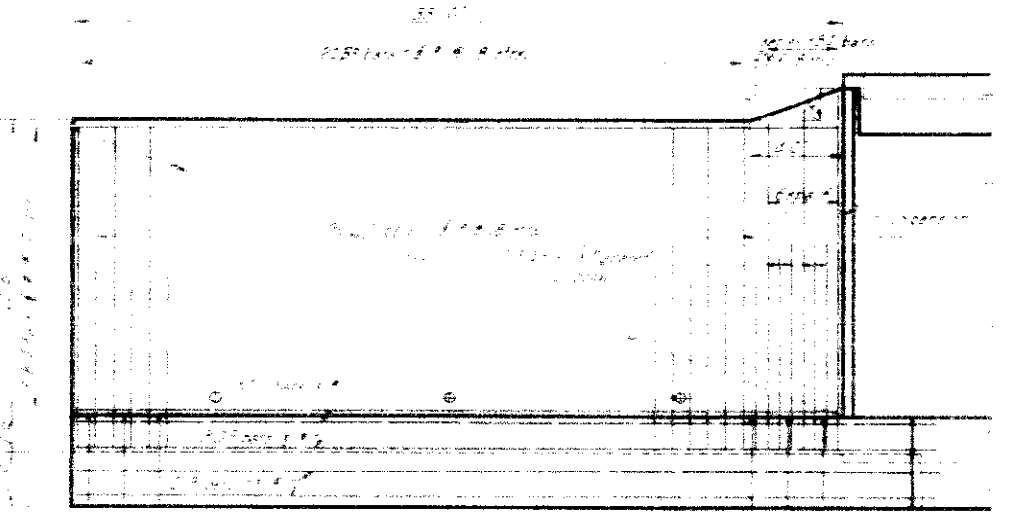
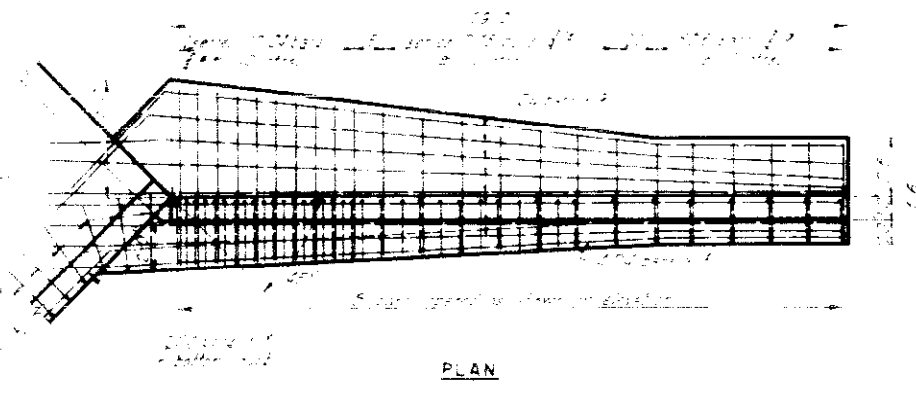
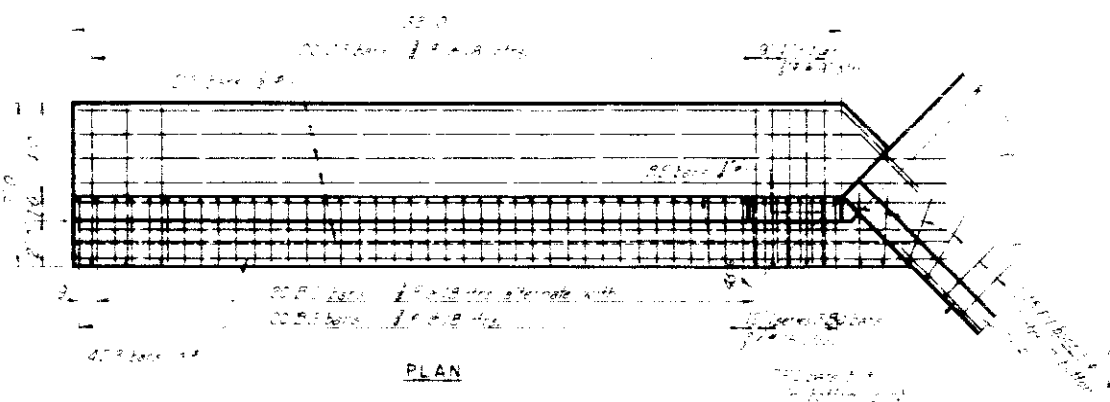
SECTION ON N. NORTH CULVERT



PLAN OF ROADWAY RETAINING WALL

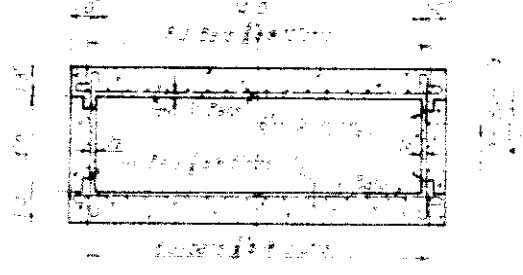
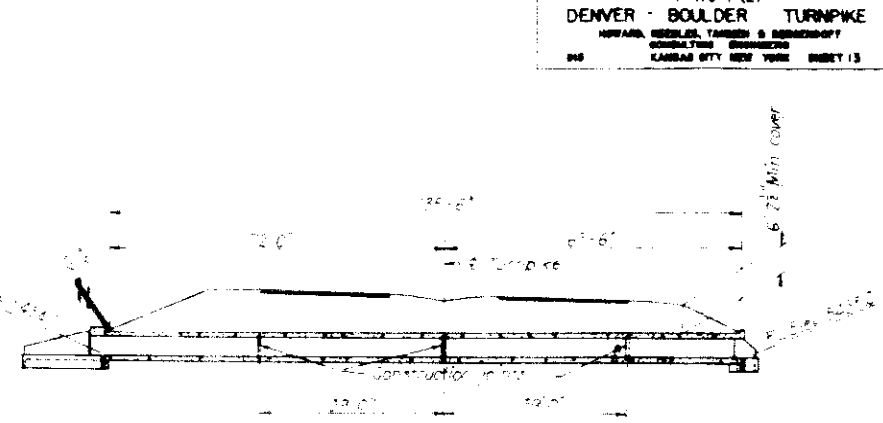
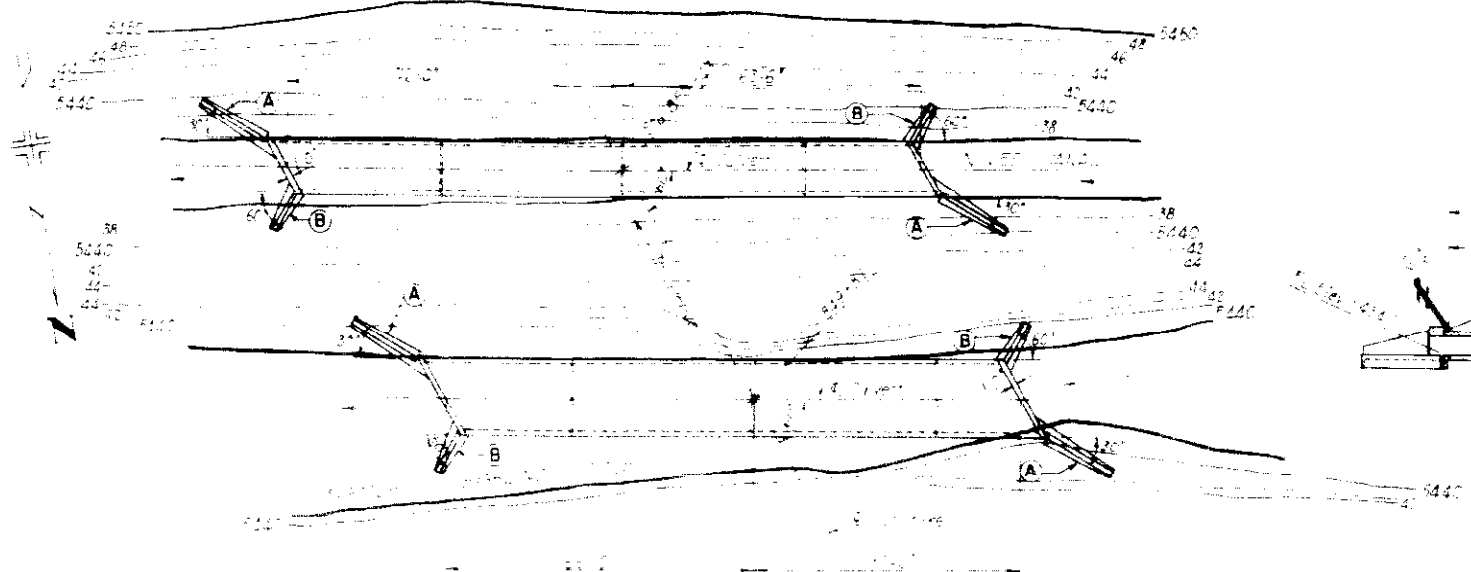
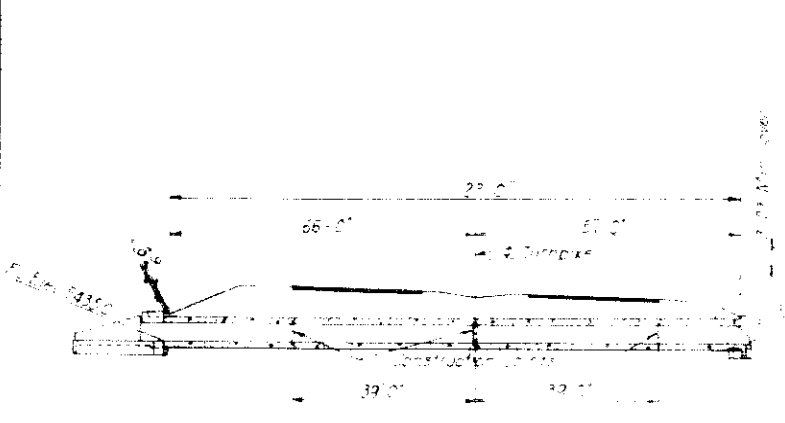


SECTION A-A



QUANTITIES	
Concrete	1000.00
Reinforcement	1000.00
Formwork	1000.00
Other	1000.00

REINFORCEMENT BAR LIST		BENDING DIAGRAMS	
Bar No.	Description	Diagram 1	Diagram 2
1	...	[Diagram]	[Diagram]
2	...	[Diagram]	[Diagram]
3	...	[Diagram]	[Diagram]
4	...	[Diagram]	[Diagram]
5	...	[Diagram]	[Diagram]
6	...	[Diagram]	[Diagram]
7	...	[Diagram]	[Diagram]
8	...	[Diagram]	[Diagram]
9	...	[Diagram]	[Diagram]
10	...	[Diagram]	[Diagram]
11	...	[Diagram]	[Diagram]
12	...	[Diagram]	[Diagram]
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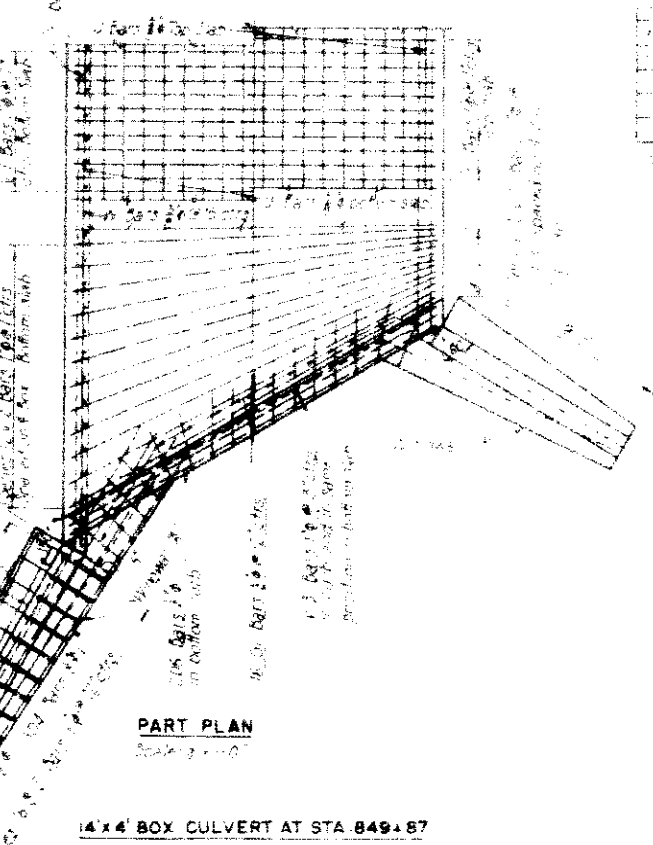
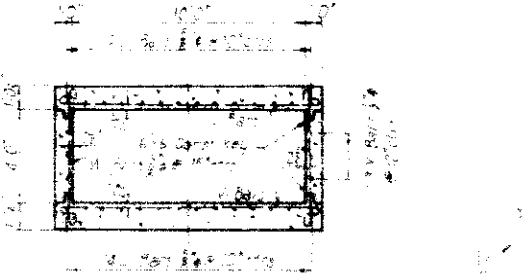


REINFORCEMENT BAR LIST

NO.	DESCRIPTION	QTY	UNIT
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REINFORCEMENT BAR LIST

NO.	DESCRIPTION	QTY	UNIT
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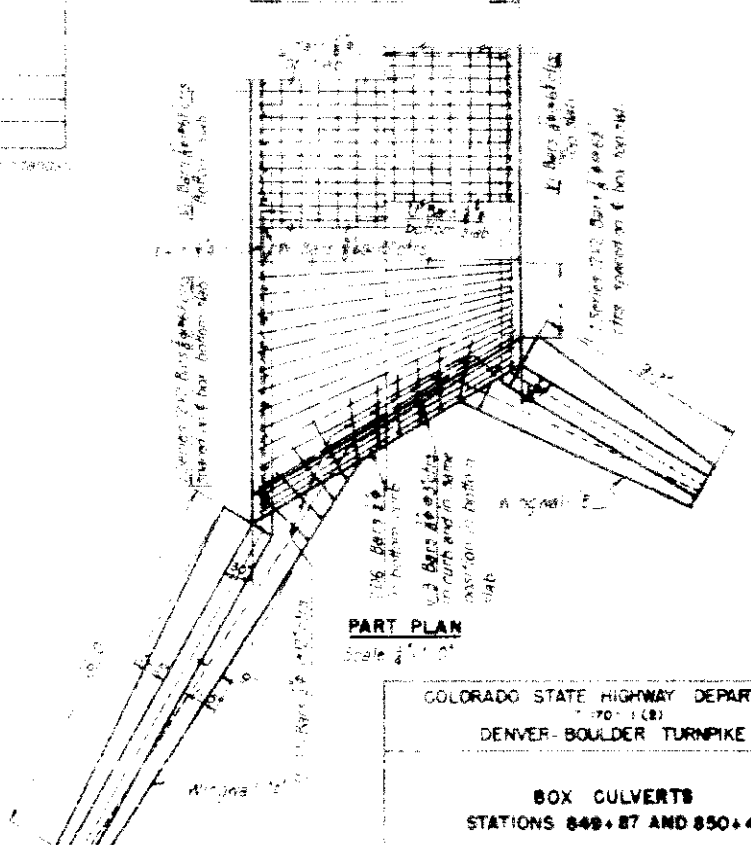
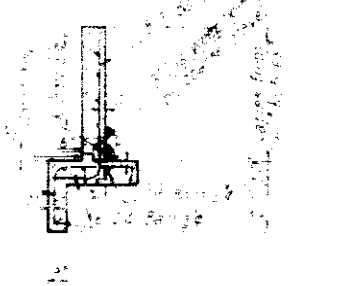
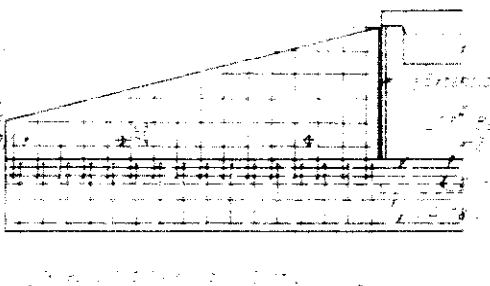


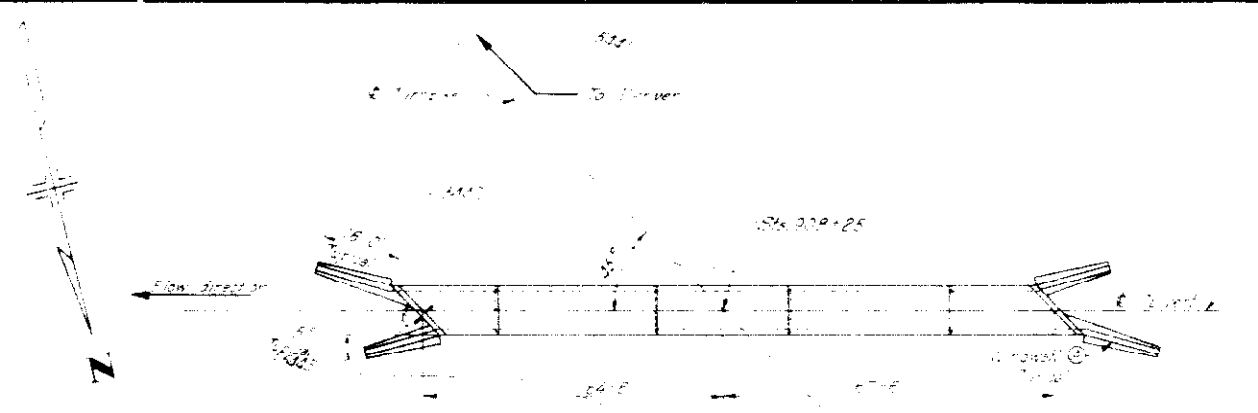
QUANTITIES

NO.	DESCRIPTION	QTY	UNIT
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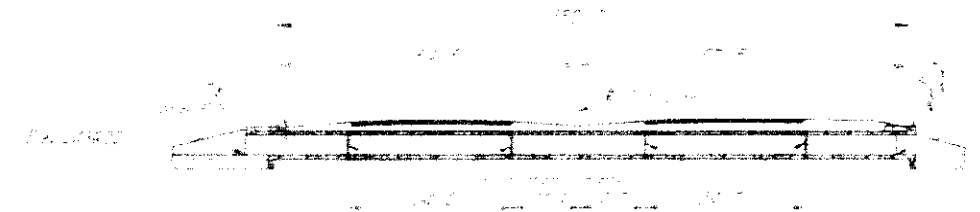
QUANTITIES

NO.	DESCRIPTION	QTY	UNIT
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PLAN
Scale 1"=40'



SECTION ON & CULVERT
Scale 1"=10'

QUANTITIES			
Concrete	1,200	1,200	1,200
Steel	1,200	1,200	1,200
Structural	1,200	1,200	1,200
Other	1,200	1,200	1,200
Total	4,800	4,800	4,800

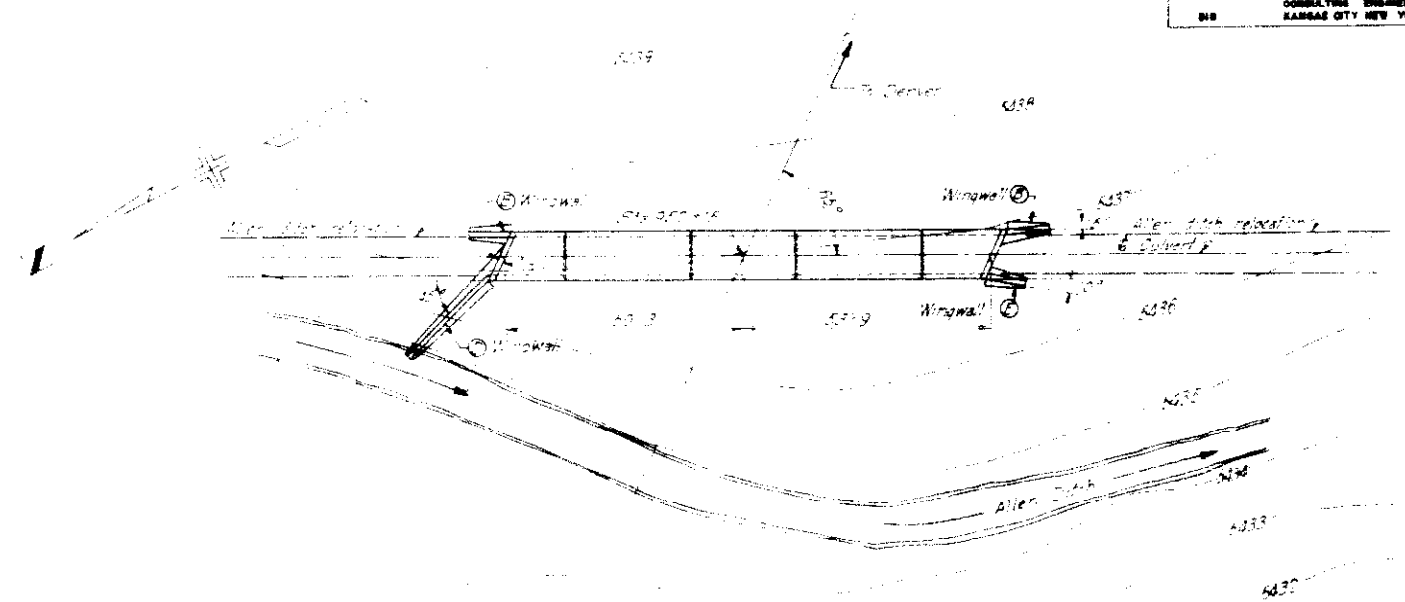
REINFORCEMENT BAR LIST WINGWALL (A)			
Bar	Size	Qty	Notes
1	#4	10	Top longitudinal
2	#4	10	Bottom longitudinal
3	#4	10	Vertical
4	#4	10	Diagonal

REINFORCEMENT BAR LIST WINGWALL (B)			
Bar	Size	Qty	Notes
1	#4	10	Top longitudinal
2	#4	10	Bottom longitudinal
3	#4	10	Vertical
4	#4	10	Diagonal

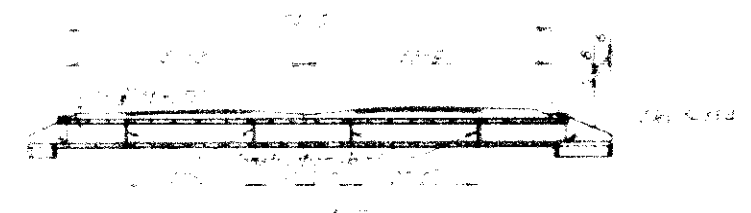
QUANTITIES			
Concrete	1,200	1,200	1,200
Steel	1,200	1,200	1,200
Structural	1,200	1,200	1,200
Other	1,200	1,200	1,200
Total	4,800	4,800	4,800

REINFORCEMENT BAR LIST WINGWALL (C)			
Bar	Size	Qty	Notes
1	#4	10	Top longitudinal
2	#4	10	Bottom longitudinal
3	#4	10	Vertical
4	#4	10	Diagonal

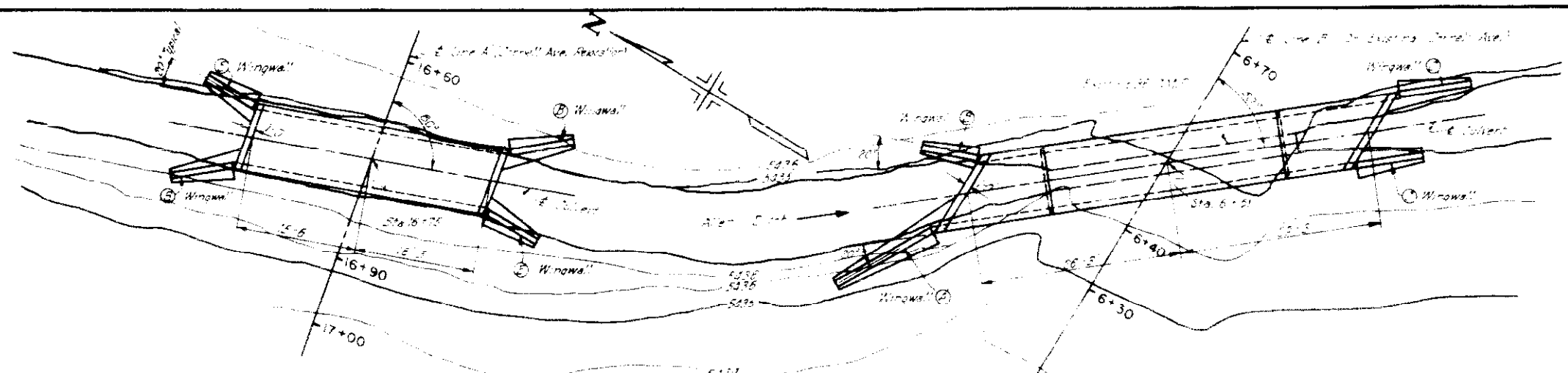
Reinforcement shown is for one wingwall only.



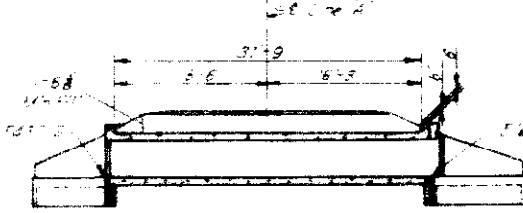
PLAN
Scale 1"=40'



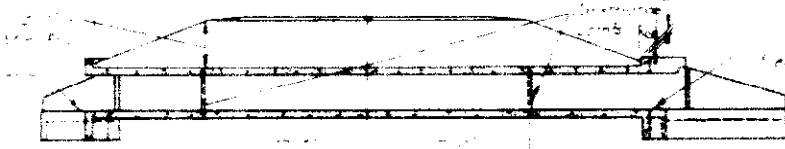
SECTION ON & CULVERT
Scale 1"=10'



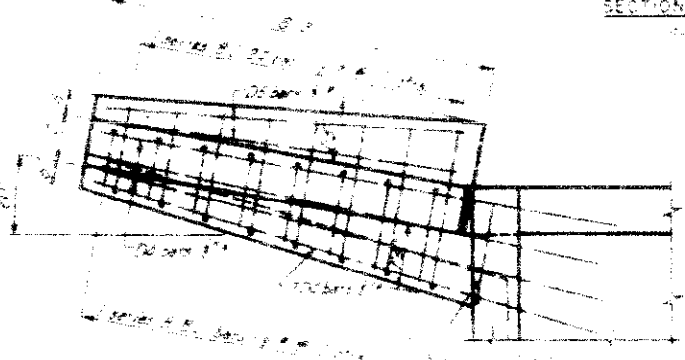
PLAN
 Scale 1" = 10'



SECTION ON S. CULVERT



SECTION ON E. CULVERT



PLAN WINGWALL "E"

REINFORCEMENT BAR LIST WINGWALL "E"

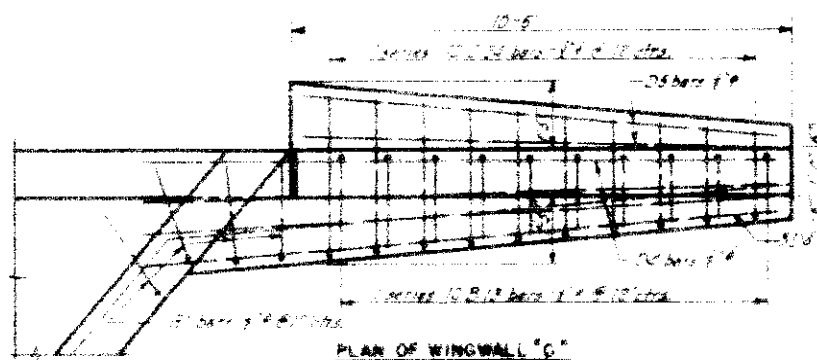
Item	Quantity	Size	Length	Notes
1	1	10	10.00	Top
2	1	10	10.00	Bottom
3	1	10	10.00	Left
4	1	10	10.00	Right
5	1	10	10.00	Diagonal
6	1	10	10.00	Diagonal
7	1	10	10.00	Diagonal
8	1	10	10.00	Diagonal
9	1	10	10.00	Diagonal
10	1	10	10.00	Diagonal
11	1	10	10.00	Diagonal
12	1	10	10.00	Diagonal
13	1	10	10.00	Diagonal
14	1	10	10.00	Diagonal
15	1	10	10.00	Diagonal
16	1	10	10.00	Diagonal
17	1	10	10.00	Diagonal
18	1	10	10.00	Diagonal
19	1	10	10.00	Diagonal
20	1	10	10.00	Diagonal

REINFORCEMENT BAR LIST WINGWALL "C"

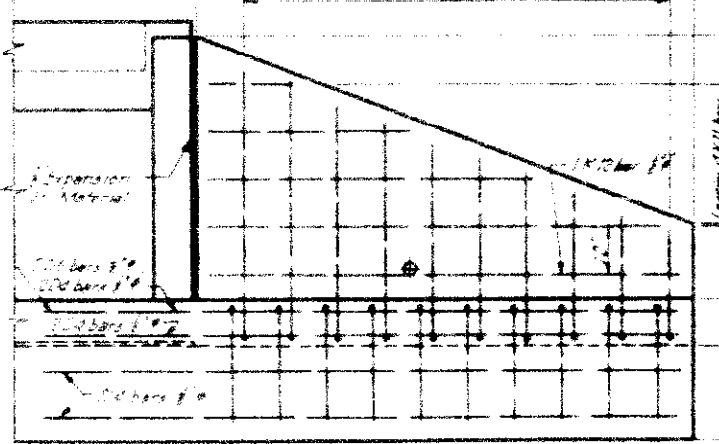
Item	Quantity	Size	Length	Notes
1	1	10	10.00	Top
2	1	10	10.00	Bottom
3	1	10	10.00	Left
4	1	10	10.00	Right
5	1	10	10.00	Diagonal
6	1	10	10.00	Diagonal
7	1	10	10.00	Diagonal
8	1	10	10.00	Diagonal
9	1	10	10.00	Diagonal
10	1	10	10.00	Diagonal
11	1	10	10.00	Diagonal
12	1	10	10.00	Diagonal
13	1	10	10.00	Diagonal
14	1	10	10.00	Diagonal
15	1	10	10.00	Diagonal
16	1	10	10.00	Diagonal
17	1	10	10.00	Diagonal
18	1	10	10.00	Diagonal
19	1	10	10.00	Diagonal
20	1	10	10.00	Diagonal

REINFORCEMENT BAR LIST WINGWALL "A"

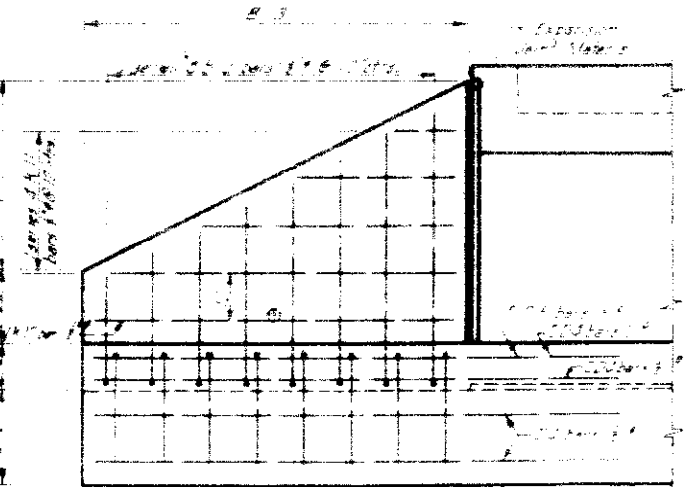
Item	Quantity	Size	Length	Notes
1	1	10	10.00	Top
2	1	10	10.00	Bottom
3	1	10	10.00	Left
4	1	10	10.00	Right
5	1	10	10.00	Diagonal
6	1	10	10.00	Diagonal
7	1	10	10.00	Diagonal
8	1	10	10.00	Diagonal
9	1	10	10.00	Diagonal
10	1	10	10.00	Diagonal
11	1	10	10.00	Diagonal
12	1	10	10.00	Diagonal
13	1	10	10.00	Diagonal
14	1	10	10.00	Diagonal
15	1	10	10.00	Diagonal
16	1	10	10.00	Diagonal
17	1	10	10.00	Diagonal
18	1	10	10.00	Diagonal
19	1	10	10.00	Diagonal
20	1	10	10.00	Diagonal



PLAN OF WINGWALL "C"



TRUE ELEVATION WINGWALL "C"



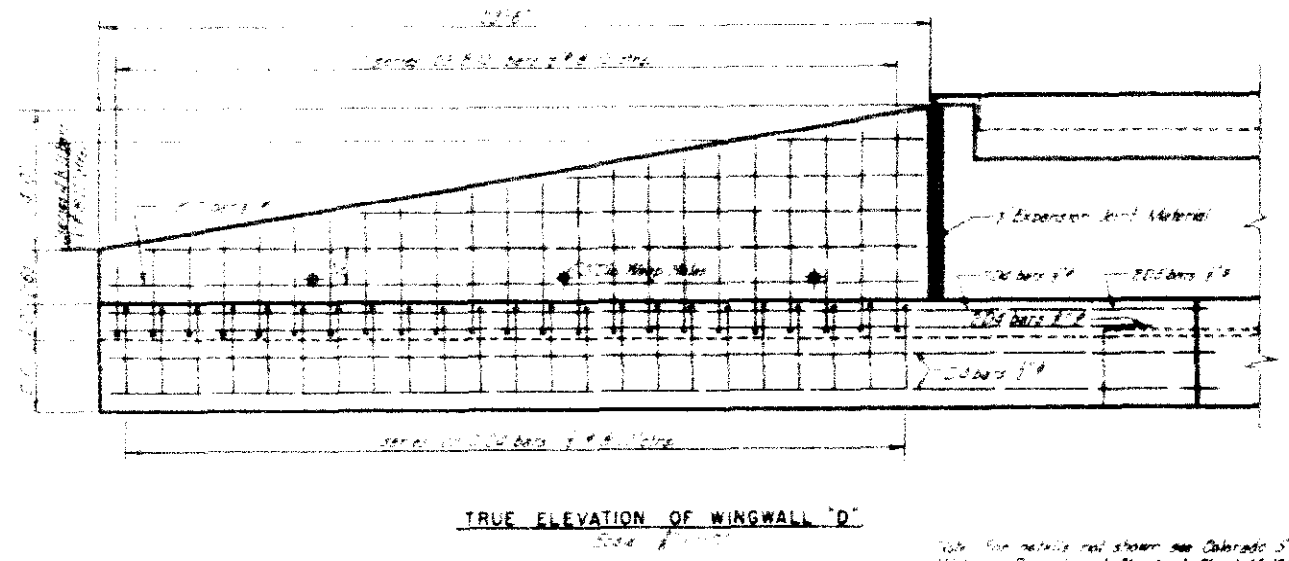
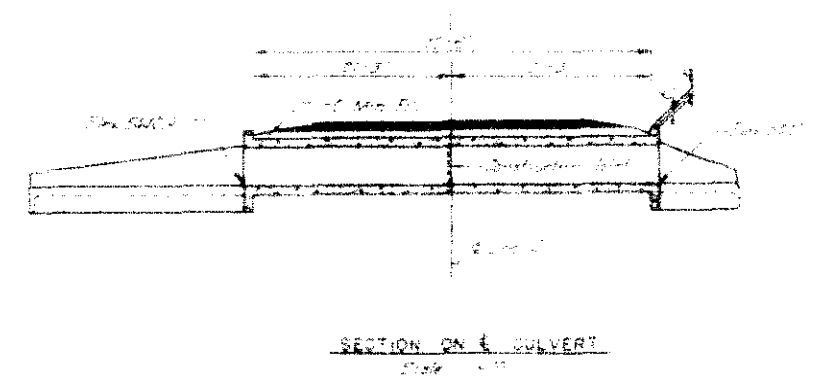
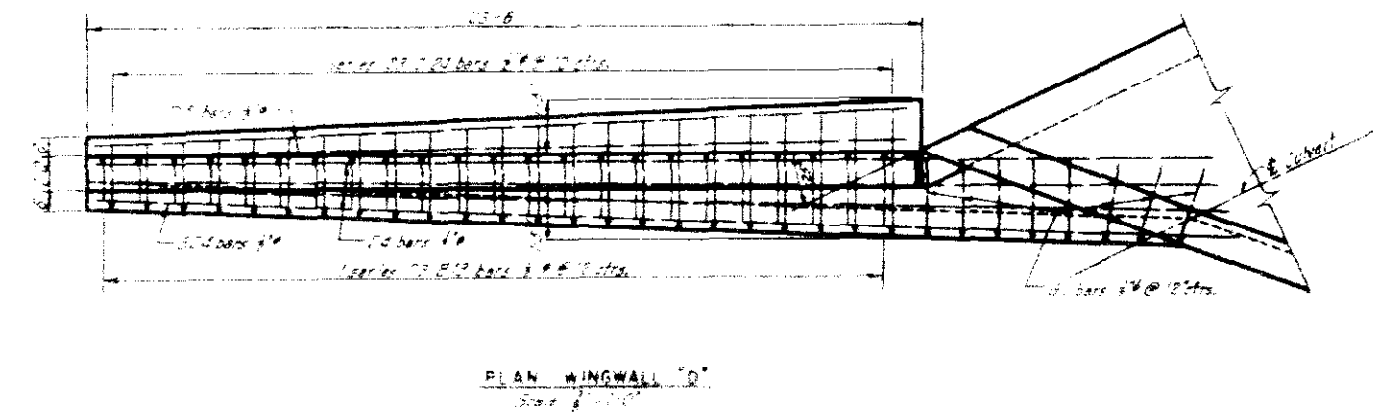
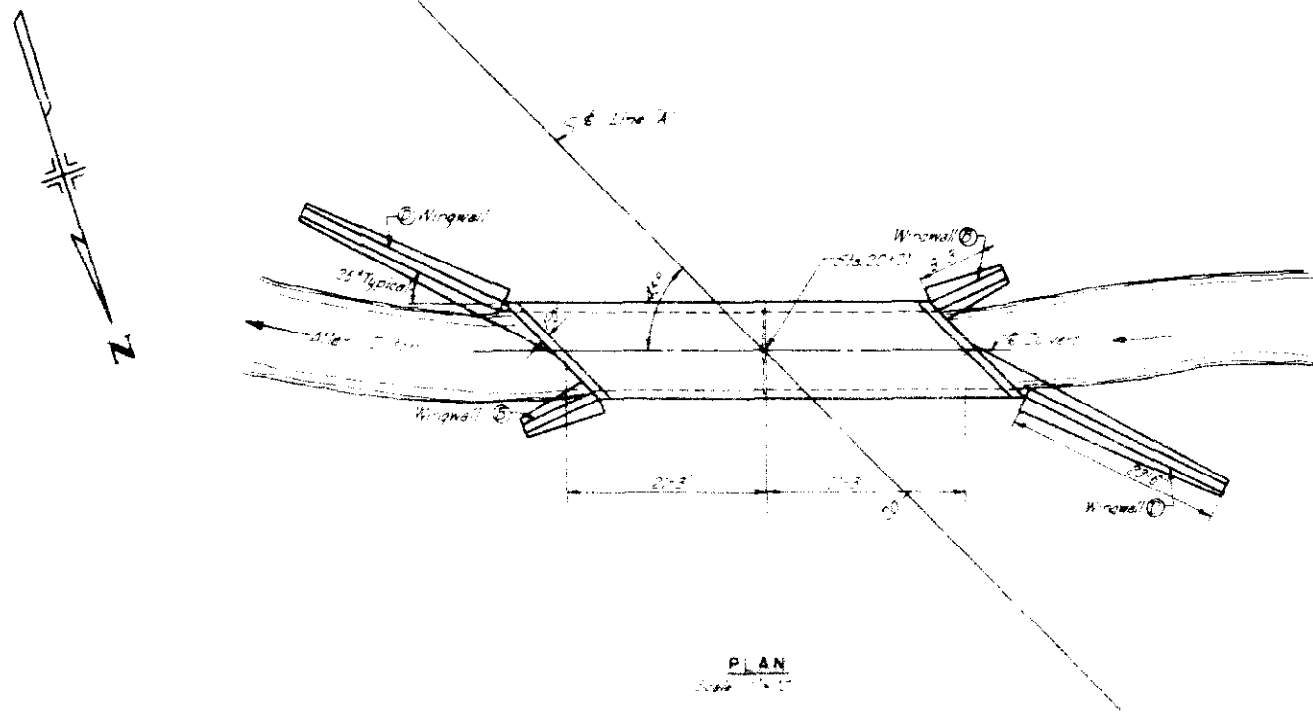
TRUE ELEVATION WINGWALL "E"

QUANTITIES

Item	Quantity	Size	Notes
1	1	10	Top
2	1	10	Bottom
3	1	10	Left
4	1	10	Right
5	1	10	Diagonal
6	1	10	Diagonal
7	1	10	Diagonal
8	1	10	Diagonal
9	1	10	Diagonal
10	1	10	Diagonal
11	1	10	Diagonal
12	1	10	Diagonal
13	1	10	Diagonal
14	1	10	Diagonal
15	1	10	Diagonal
16	1	10	Diagonal
17	1	10	Diagonal
18	1	10	Diagonal
19	1	10	Diagonal
20	1	10	Diagonal

QUANTITIES

Item	Quantity	Size	Notes
1	1	10	Top
2	1	10	Bottom
3	1	10	Left
4	1	10	Right
5	1	10	Diagonal
6	1	10	Diagonal
7	1	10	Diagonal
8	1	10	Diagonal
9	1	10	Diagonal
10	1	10	Diagonal
11	1	10	Diagonal
12	1	10	Diagonal
13	1	10	Diagonal
14	1	10	Diagonal
15	1	10	Diagonal
16	1	10	Diagonal
17	1	10	Diagonal
18	1	10	Diagonal
19	1	10	Diagonal
20	1	10	Diagonal



REINFORCEMENT BAR LIST WINGWALL "D"						
Mark	Size	No. Reqd.	1'	2'	Total Length	Type
B-1	1/2"	2	2.0	2.0	4.0	II
B-2	3/8"	2	2.0	2.0	4.0	II
B-3	3/8"	2	2.0	2.0	4.0	II
B-4	3/8"	2	2.0	2.0	4.0	II
B-5	3/8"	2	2.0	2.0	4.0	II
B-6	3/8"	2	2.0	2.0	4.0	II
B-7	3/8"	2	2.0	2.0	4.0	II
B-8	3/8"	2	2.0	2.0	4.0	II
B-9	3/8"	2	2.0	2.0	4.0	II
B-10	3/8"	2	2.0	2.0	4.0	II
B-11	3/8"	2	2.0	2.0	4.0	II
B-12	3/8"	2	2.0	2.0	4.0	II
B-13	3/8"	2	2.0	2.0	4.0	II
B-14	3/8"	2	2.0	2.0	4.0	II
B-15	3/8"	2	2.0	2.0	4.0	II
B-16	3/8"	2	2.0	2.0	4.0	II
B-17	3/8"	2	2.0	2.0	4.0	II
B-18	3/8"	2	2.0	2.0	4.0	II
B-19	3/8"	2	2.0	2.0	4.0	II
B-20	3/8"	2	2.0	2.0	4.0	II
B-21	3/8"	2	2.0	2.0	4.0	II
B-22	3/8"	2	2.0	2.0	4.0	II
B-23	3/8"	2	2.0	2.0	4.0	II
B-24	3/8"	2	2.0	2.0	4.0	II
B-25	3/8"	2	2.0	2.0	4.0	II
B-26	3/8"	2	2.0	2.0	4.0	II
B-27	3/8"	2	2.0	2.0	4.0	II
B-28	3/8"	2	2.0	2.0	4.0	II
B-29	3/8"	2	2.0	2.0	4.0	II
B-30	3/8"	2	2.0	2.0	4.0	II
B-31	3/8"	2	2.0	2.0	4.0	II
B-32	3/8"	2	2.0	2.0	4.0	II
B-33	3/8"	2	2.0	2.0	4.0	II
B-34	3/8"	2	2.0	2.0	4.0	II
B-35	3/8"	2	2.0	2.0	4.0	II
B-36	3/8"	2	2.0	2.0	4.0	II
B-37	3/8"	2	2.0	2.0	4.0	II
B-38	3/8"	2	2.0	2.0	4.0	II
B-39	3/8"	2	2.0	2.0	4.0	II
B-40	3/8"	2	2.0	2.0	4.0	II
B-41	3/8"	2	2.0	2.0	4.0	II
B-42	3/8"	2	2.0	2.0	4.0	II
B-43	3/8"	2	2.0	2.0	4.0	II
B-44	3/8"	2	2.0	2.0	4.0	II
B-45	3/8"	2	2.0	2.0	4.0	II
B-46	3/8"	2	2.0	2.0	4.0	II
B-47	3/8"	2	2.0	2.0	4.0	II
B-48	3/8"	2	2.0	2.0	4.0	II
B-49	3/8"	2	2.0	2.0	4.0	II
B-50	3/8"	2	2.0	2.0	4.0	II
B-51	3/8"	2	2.0	2.0	4.0	II
B-52	3/8"	2	2.0	2.0	4.0	II
B-53	3/8"	2	2.0	2.0	4.0	II
B-54	3/8"	2	2.0	2.0	4.0	II
B-55	3/8"	2	2.0	2.0	4.0	II
B-56	3/8"	2	2.0	2.0	4.0	II
B-57	3/8"	2	2.0	2.0	4.0	II
B-58	3/8"	2	2.0	2.0	4.0	II
B-59	3/8"	2	2.0	2.0	4.0	II
B-60	3/8"	2	2.0	2.0	4.0	II
B-61	3/8"	2	2.0	2.0	4.0	II
B-62	3/8"	2	2.0	2.0	4.0	II
B-63	3/8"	2	2.0	2.0	4.0	II
B-64	3/8"	2	2.0	2.0	4.0	II
B-65	3/8"	2	2.0	2.0	4.0	II
B-66	3/8"	2	2.0	2.0	4.0	II
B-67	3/8"	2	2.0	2.0	4.0	II
B-68	3/8"	2	2.0	2.0	4.0	II
B-69	3/8"	2	2.0	2.0	4.0	II
B-70	3/8"	2	2.0	2.0	4.0	II
B-71	3/8"	2	2.0	2.0	4.0	II
B-72	3/8"	2	2.0	2.0	4.0	II
B-73	3/8"	2	2.0	2.0	4.0	II
B-74	3/8"	2	2.0	2.0	4.0	II
B-75	3/8"	2	2.0	2.0	4.0	II
B-76	3/8"	2	2.0	2.0	4.0	II
B-77	3/8"	2	2.0	2.0	4.0	II
B-78	3/8"	2	2.0	2.0	4.0	II
B-79	3/8"	2	2.0	2.0	4.0	II
B-80	3/8"	2	2.0	2.0	4.0	II
B-81	3/8"	2	2.0	2.0	4.0	II
B-82	3/8"	2	2.0	2.0	4.0	II
B-83	3/8"	2	2.0	2.0	4.0	II
B-84	3/8"	2	2.0	2.0	4.0	II
B-85	3/8"	2	2.0	2.0	4.0	II
B-86	3/8"	2	2.0	2.0	4.0	II
B-87	3/8"	2	2.0	2.0	4.0	II
B-88	3/8"	2	2.0	2.0	4.0	II
B-89	3/8"	2	2.0	2.0	4.0	II
B-90	3/8"	2	2.0	2.0	4.0	II
B-91	3/8"	2	2.0	2.0	4.0	II
B-92	3/8"	2	2.0	2.0	4.0	II
B-93	3/8"	2	2.0	2.0	4.0	II
B-94	3/8"	2	2.0	2.0	4.0	II
B-95	3/8"	2	2.0	2.0	4.0	II
B-96	3/8"	2	2.0	2.0	4.0	II
B-97	3/8"	2	2.0	2.0	4.0	II
B-98	3/8"	2	2.0	2.0	4.0	II
B-99	3/8"	2	2.0	2.0	4.0	II
B-100	3/8"	2	2.0	2.0	4.0	II

QUANTITIES			
Item	Concrete	Vol.	Structure
	cu. yd.	cu. ft.	sq. ft.
Wingwall	14.7	14.7	21.9
Totals	14.7	14.7	21.9

See note shown in bars in wingwall
 See Colorado Standard M-1001 for bar bending diagrams and bar
 cut for box and wingwall
 See plans for location of bars 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Note: For details see Colorado State Highway Department Standard Sheet M-1001 for
 box and wingwall and M of fill = 10'-0".

8 X 4 BOX CULVERT STA. 20+21 LINE "A" SHERIDAN ROAD RELOCATION

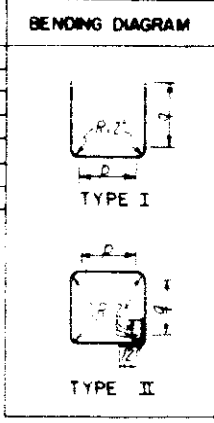
COLORADO STATE HIGHWAY DEPARTMENT
 T 170-1 (2)
 DENVER - BOULDER TURNPIKE

BOX CULVERT
 STA. 20+21 LINE "A"
 SHERIDAN ROAD RELOCATION

HOWARD, NEEDLES TAMMEN & BERENDHOFF
 CONSULTING ENGINEERS
 KANSAS CITY NEW YORK
 SHEET 17

BAR LIST FOR H=3'-6"

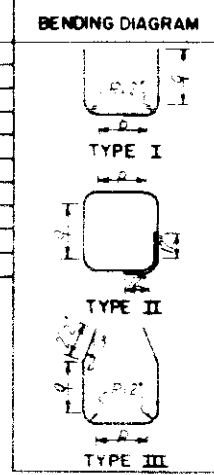
MARK	SIZE	NO. RECD	LENGTH	TYPE	DIMENSIONS	
					F	G
K	1/2"	Note	2.6'	I	0.8'	0.8'
L	1/2"	5	7.0'	II	4.1'	2.9'
M	1/2"	3	8.0'	I	2.8'	2.5'
N	1/2"	6	9.4'	I	4.0'	2.5'



* Use K bars when H=4' 0" or less.
 * These dimensions to be increased in increments of 6" for H above 3' 6".
 Add 1/2" per bar for each additional height above 3' 6".
 * K bars required as follows:
 H=4' 6" to 6' 6" bars - 1/2" x 6' 6" bars
 H=6' 0" to 7' 0" bars - 1/2" x 6' 0" to 6' 6" bars
 L or bend bars around pipes as required.

BAR LIST FOR H=4'-6"

MARK	SIZE	NO. RECD	LENGTH	TYPE	DIMENSIONS	
					F	G
U	1/2"	3	20.4'	I	4.1'	4.6'
V	1/2"	6	14.7'	I	4.0'	3.5'
W	1/2"	3	10.0'	I	4.0'	2.9'
X	1/2"	1	8.0'	I	4.0'	2.5'
Y	1/2"	1	10.0'	II	4.1'	2.9'
Z	1/2"	1	9.9'	II	4.1'	2.9'
AA	1/2"	Note	2.4'	I	3.8'	2.4'



* Use K bars when H=4' 0" or less.
 * These dimensions to be increased in increments of 6" for H above 3' 6".
 Add 1/2" per bar for each additional height above 3' 6".
 * K bars required as follows:
 H=4' 6" to 6' 6" bars - 1/2" x 6' 6" bars
 H=6' 0" to 7' 0" bars - 1/2" x 6' 0" to 6' 6" bars
 L or bend bars around pipes as required.

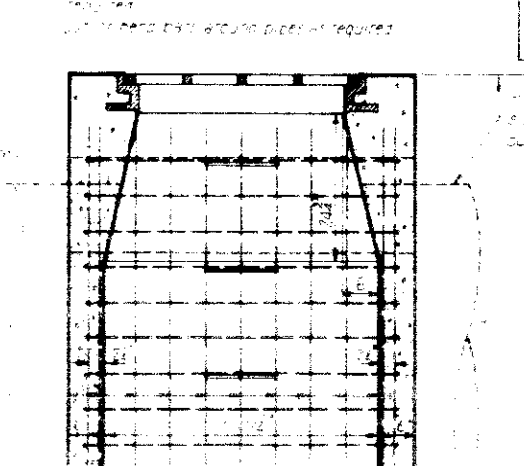
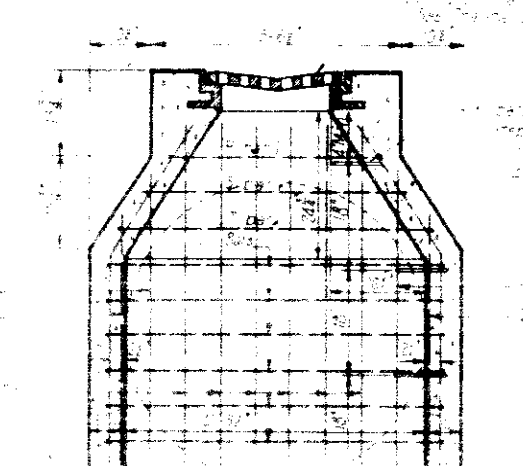
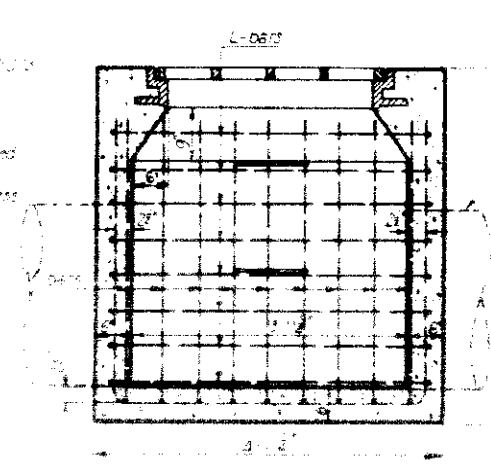
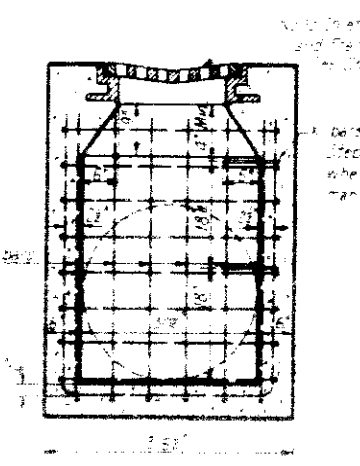
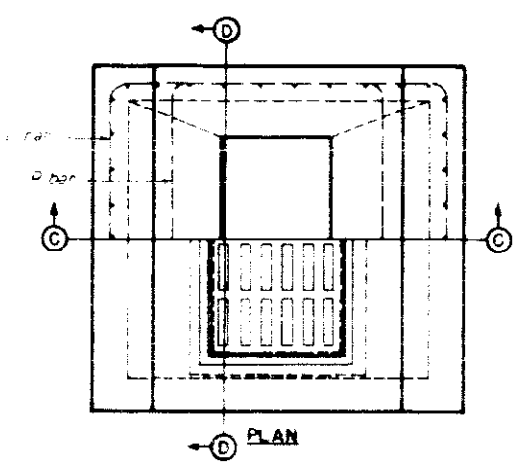
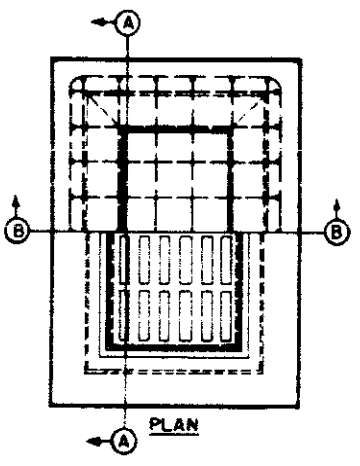


TABLE OF QUANTITIES

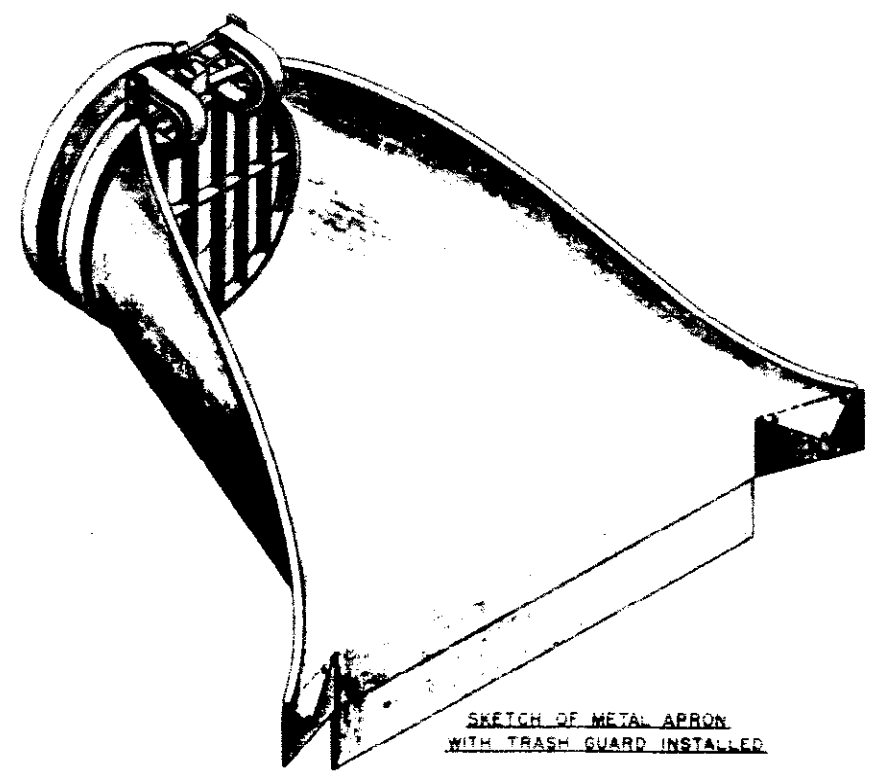
H	A		B	
	Concrete	Reinforcing Steel	Concrete	Reinforcing Steel
3' 0"	115	12	148	69
3' 6"	125	15	158	96
4' 0"	135	18	168	122
4' 6"	145	21	178	148
5' 0"	155	24	188	174
5' 6"	165	27	198	200
6' 0"	175	30	208	226
6' 6"	185	33	218	252
7' 0"	195	36	228	278
7' 6"	205	39	238	304
8' 0"	215	42	248	330
8' 6"	225	45	258	356
9' 0"	235	48	268	382
9' 6"	245	51	278	408
10' 0"	255	54	288	434
10' 6"	265	57	298	460
11' 0"	275	60	308	486
11' 6"	285	63	318	512
12' 0"	295	66	328	538

NO. 10-A CONCRETE INLET FOR MEDIAN DITCH

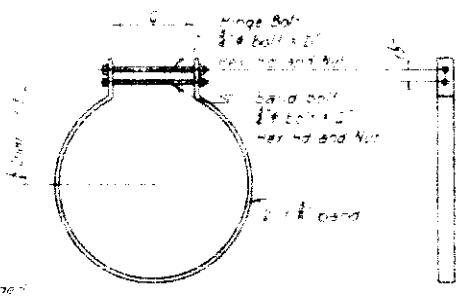
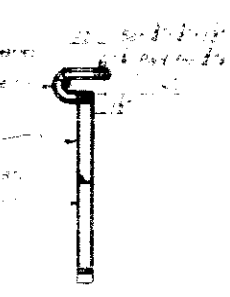
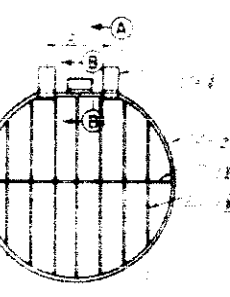
NO. 10-B CONCRETE INLET FOR MEDIAN DITCH

TABLE OF DIMENSIONS

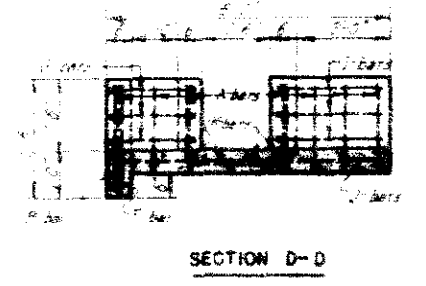
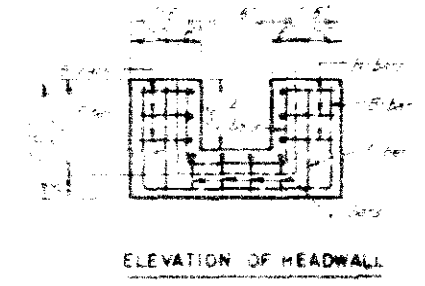
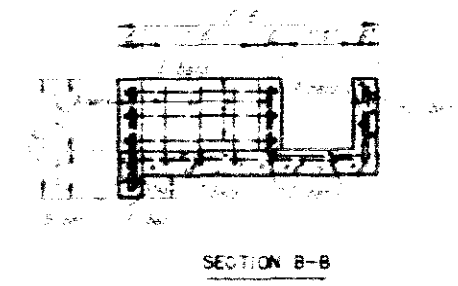
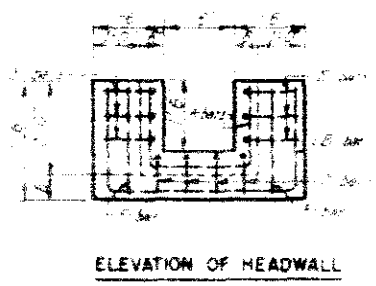
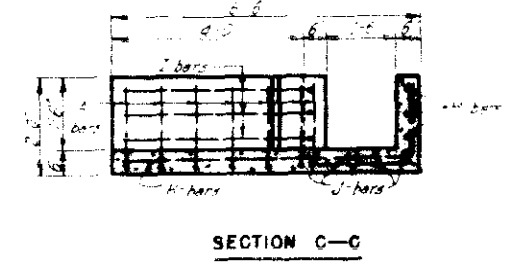
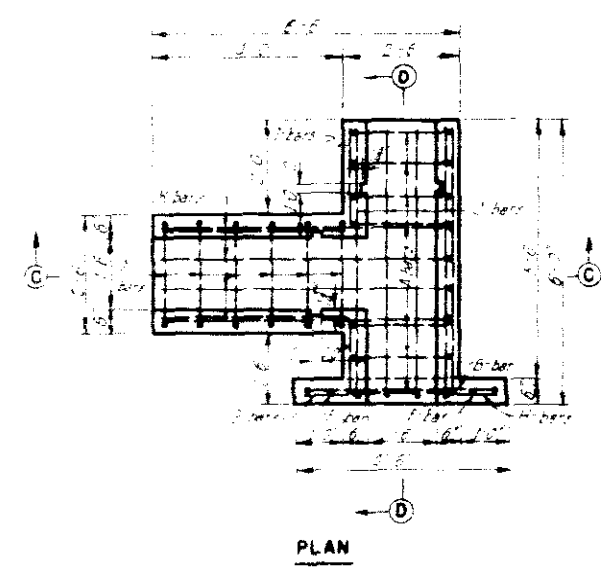
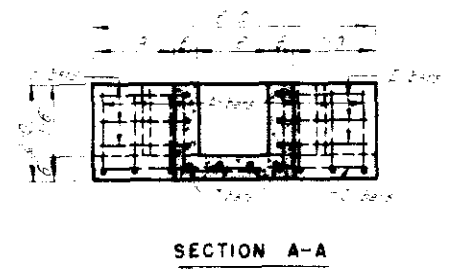
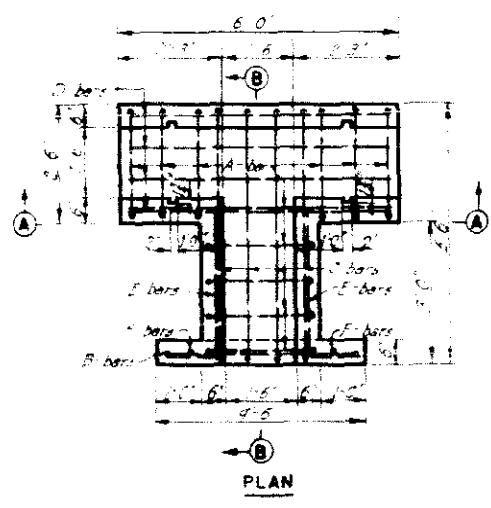
Height	Width	Depth	Length	Weight
3'	3'	18"	10'	22'
4'	3'	18"	11'	32'
5'	3'	18"	12'	42'
6'	3'	18"	13'	52'



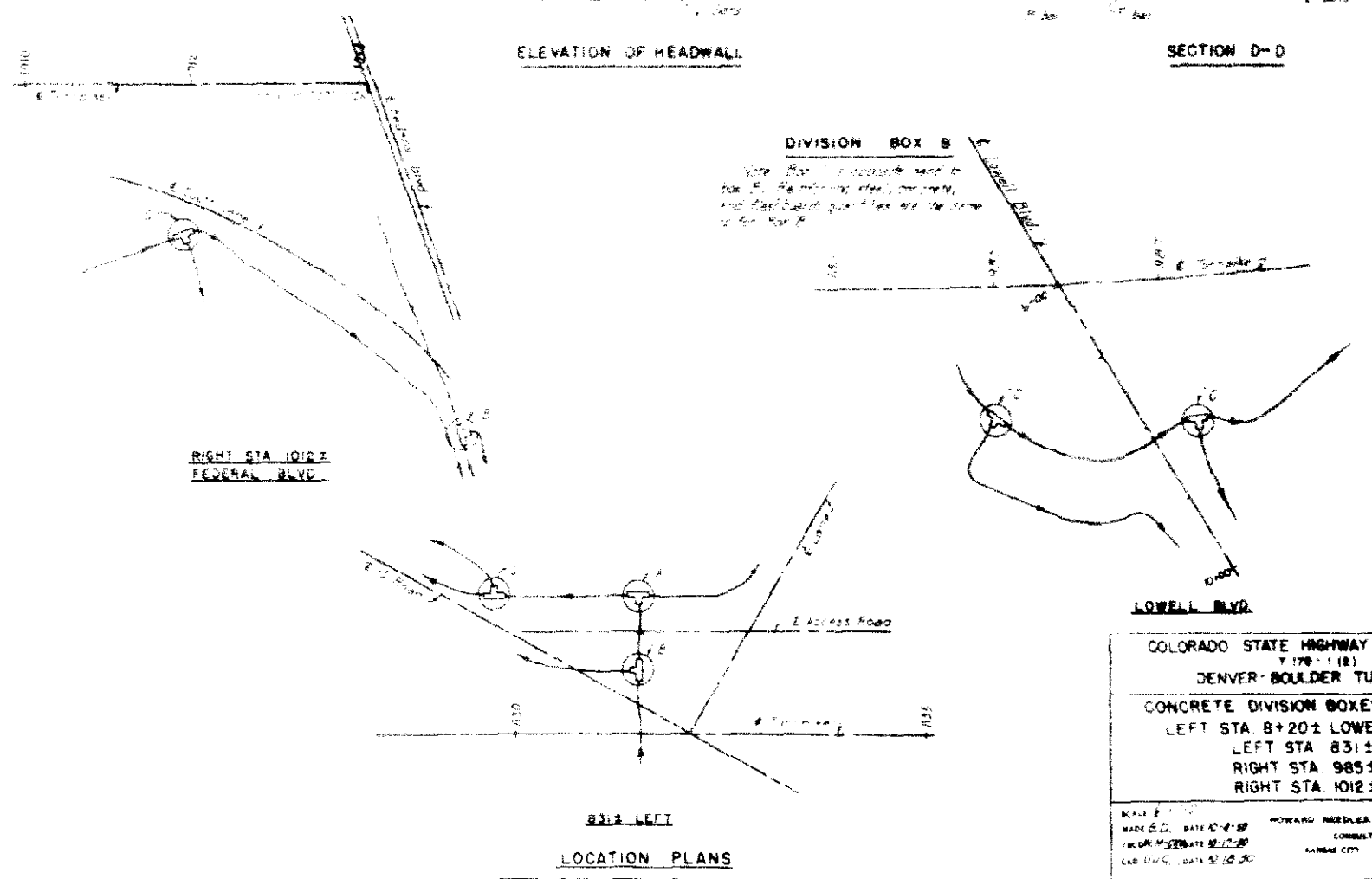
METAL APRON END SECTION



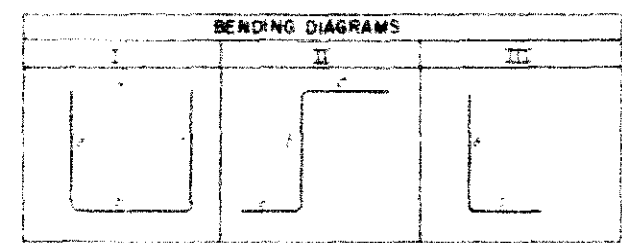
DETAIL OF TRASH GUARD



DIVISION BOX B



DIVISION BOX B
 Note: Bar is accurate here in box B. Reinforcing steel, concrete, and flash board quantities are the same as for Box B.

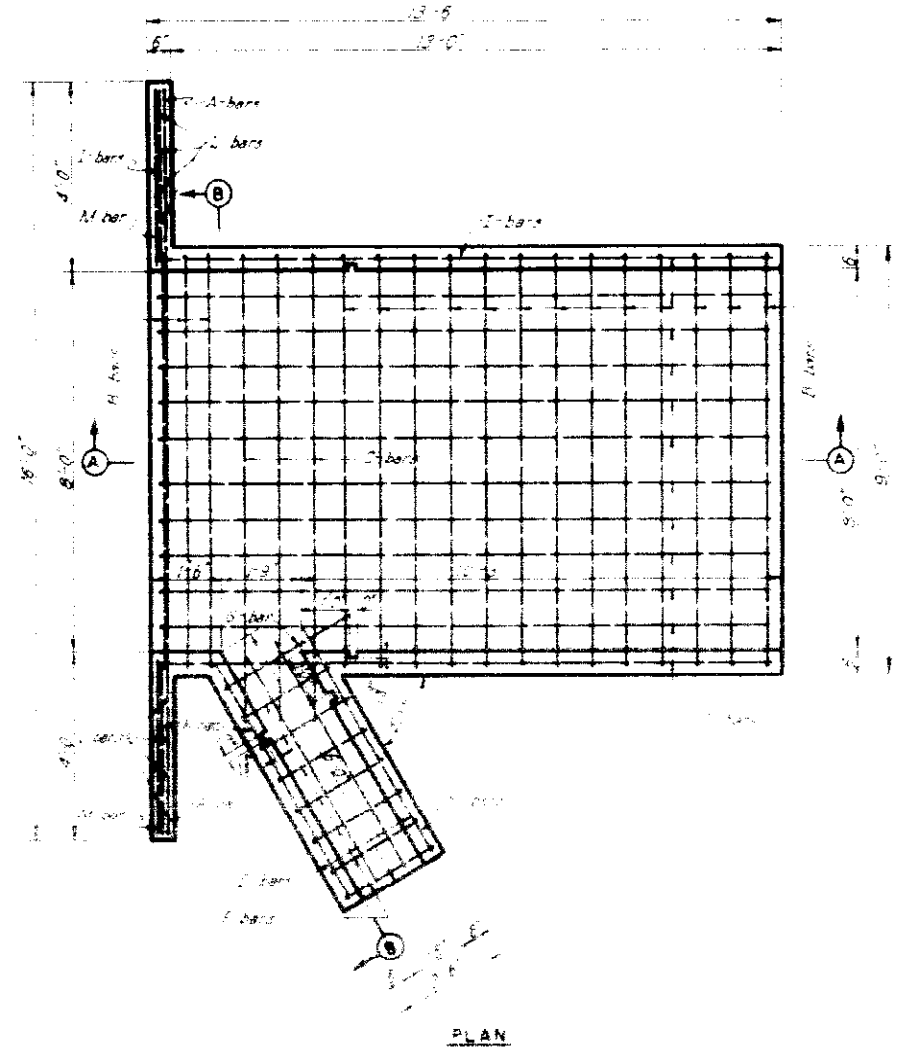


BAR LIST - BOX A

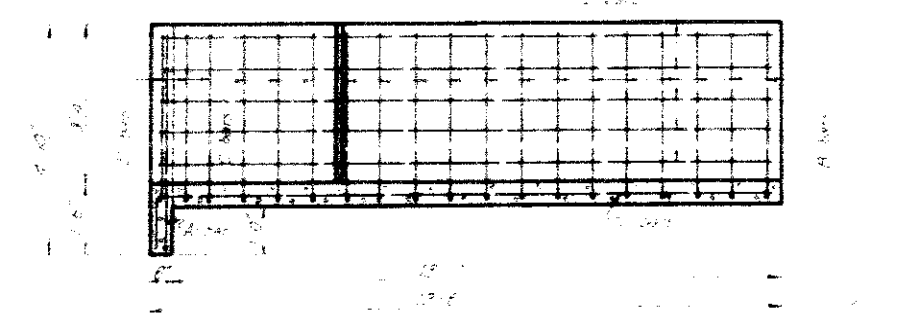
Bar No.	Length	No. of Bars	Total Length	Remarks
1	10.0	1	10.0	
2	10.0	1	10.0	
3	10.0	1	10.0	
4	10.0	1	10.0	
5	10.0	1	10.0	
6	10.0	1	10.0	
7	10.0	1	10.0	
8	10.0	1	10.0	
9	10.0	1	10.0	
10	10.0	1	10.0	
11	10.0	1	10.0	
12	10.0	1	10.0	
13	10.0	1	10.0	
14	10.0	1	10.0	
15	10.0	1	10.0	
16	10.0	1	10.0	
17	10.0	1	10.0	
18	10.0	1	10.0	
19	10.0	1	10.0	
20	10.0	1	10.0	

BAR LIST - BOX B

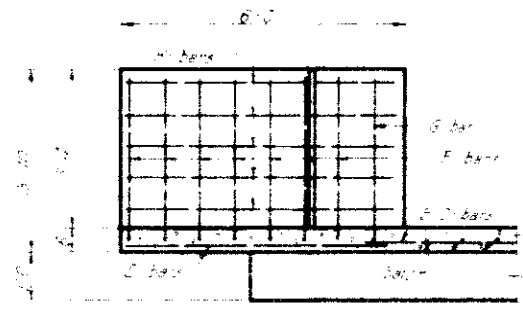
Bar No.	Length	No. of Bars	Total Length	Remarks
1	10.0	1	10.0	
2	10.0	1	10.0	
3	10.0	1	10.0	
4	10.0	1	10.0	
5	10.0	1	10.0	
6	10.0	1	10.0	
7	10.0	1	10.0	
8	10.0	1	10.0	
9	10.0	1	10.0	
10	10.0	1	10.0	
11	10.0	1	10.0	
12	10.0	1	10.0	
13	10.0	1	10.0	
14	10.0	1	10.0	
15	10.0	1	10.0	
16	10.0	1	10.0	
17	10.0	1	10.0	
18	10.0	1	10.0	
19	10.0	1	10.0	
20	10.0	1	10.0	



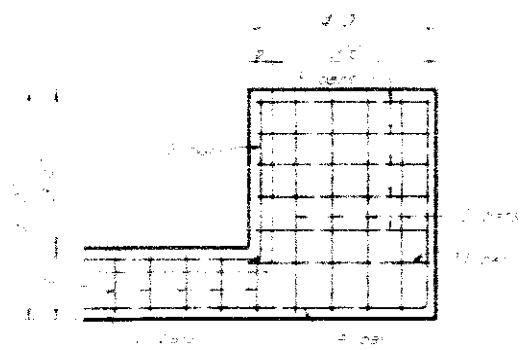
PLAN



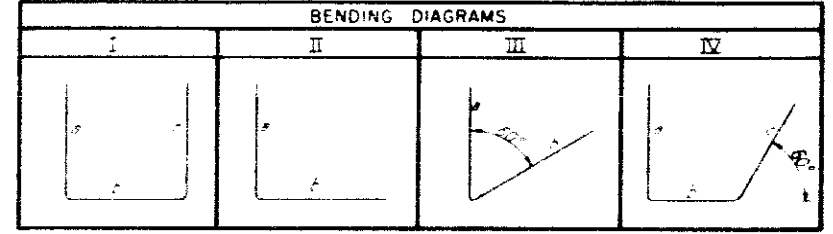
SECTION A-A



PART SECTION B-B



PARTIAL ELEVATION OF HEADWALL



BAR LIST						
Bar No.	Type	Length of One Bar	No. of Bars	Total Length of Bars	Rebar	Remarks
1	Vertical	13'-0"	1	13'-0"	1	See Detail
2	Vertical	13'-0"	1	13'-0"	1	See Detail
3	Vertical	13'-0"	1	13'-0"	1	See Detail
4	Vertical	13'-0"	1	13'-0"	1	See Detail
5	Vertical	13'-0"	1	13'-0"	1	See Detail
6	Vertical	13'-0"	1	13'-0"	1	See Detail
7	Vertical	13'-0"	1	13'-0"	1	See Detail
8	Vertical	13'-0"	1	13'-0"	1	See Detail
9	Vertical	13'-0"	1	13'-0"	1	See Detail
10	Vertical	13'-0"	1	13'-0"	1	See Detail
11	Vertical	13'-0"	1	13'-0"	1	See Detail
12	Vertical	13'-0"	1	13'-0"	1	See Detail
13	Vertical	13'-0"	1	13'-0"	1	See Detail
14	Vertical	13'-0"	1	13'-0"	1	See Detail
15	Vertical	13'-0"	1	13'-0"	1	See Detail
16	Vertical	13'-0"	1	13'-0"	1	See Detail
17	Vertical	13'-0"	1	13'-0"	1	See Detail
18	Vertical	13'-0"	1	13'-0"	1	See Detail
19	Vertical	13'-0"	1	13'-0"	1	See Detail
20	Vertical	13'-0"	1	13'-0"	1	See Detail
21	Vertical	13'-0"	1	13'-0"	1	See Detail
22	Vertical	13'-0"	1	13'-0"	1	See Detail
23	Vertical	13'-0"	1	13'-0"	1	See Detail
24	Vertical	13'-0"	1	13'-0"	1	See Detail
25	Vertical	13'-0"	1	13'-0"	1	See Detail
26	Vertical	13'-0"	1	13'-0"	1	See Detail
27	Vertical	13'-0"	1	13'-0"	1	See Detail
28	Vertical	13'-0"	1	13'-0"	1	See Detail
29	Vertical	13'-0"	1	13'-0"	1	See Detail
30	Vertical	13'-0"	1	13'-0"	1	See Detail
31	Vertical	13'-0"	1	13'-0"	1	See Detail
32	Vertical	13'-0"	1	13'-0"	1	See Detail
33	Vertical	13'-0"	1	13'-0"	1	See Detail
34	Vertical	13'-0"	1	13'-0"	1	See Detail
35	Vertical	13'-0"	1	13'-0"	1	See Detail
36	Vertical	13'-0"	1	13'-0"	1	See Detail
37	Vertical	13'-0"	1	13'-0"	1	See Detail
38	Vertical	13'-0"	1	13'-0"	1	See Detail
39	Vertical	13'-0"	1	13'-0"	1	See Detail
40	Vertical	13'-0"	1	13'-0"	1	See Detail
41	Vertical	13'-0"	1	13'-0"	1	See Detail
42	Vertical	13'-0"	1	13'-0"	1	See Detail
43	Vertical	13'-0"	1	13'-0"	1	See Detail
44	Vertical	13'-0"	1	13'-0"	1	See Detail
45	Vertical	13'-0"	1	13'-0"	1	See Detail
46	Vertical	13'-0"	1	13'-0"	1	See Detail
47	Vertical	13'-0"	1	13'-0"	1	See Detail
48	Vertical	13'-0"	1	13'-0"	1	See Detail
49	Vertical	13'-0"	1	13'-0"	1	See Detail
50	Vertical	13'-0"	1	13'-0"	1	See Detail
51	Vertical	13'-0"	1	13'-0"	1	See Detail
52	Vertical	13'-0"	1	13'-0"	1	See Detail
53	Vertical	13'-0"	1	13'-0"	1	See Detail
54	Vertical	13'-0"	1	13'-0"	1	See Detail
55	Vertical	13'-0"	1	13'-0"	1	See Detail
56	Vertical	13'-0"	1	13'-0"	1	See Detail
57	Vertical	13'-0"	1	13'-0"	1	See Detail
58	Vertical	13'-0"	1	13'-0"	1	See Detail
59	Vertical	13'-0"	1	13'-0"	1	See Detail
60	Vertical	13'-0"	1	13'-0"	1	See Detail
61	Vertical	13'-0"	1	13'-0"	1	See Detail
62	Vertical	13'-0"	1	13'-0"	1	See Detail
63	Vertical	13'-0"	1	13'-0"	1	See Detail
64	Vertical	13'-0"	1	13'-0"	1	See Detail
65	Vertical	13'-0"	1	13'-0"	1	See Detail
66	Vertical	13'-0"	1	13'-0"	1	See Detail
67	Vertical	13'-0"	1	13'-0"	1	See Detail
68	Vertical	13'-0"	1	13'-0"	1	See Detail
69	Vertical	13'-0"	1	13'-0"	1	See Detail
70	Vertical	13'-0"	1	13'-0"	1	See Detail
71	Vertical	13'-0"	1	13'-0"	1	See Detail
72	Vertical	13'-0"	1	13'-0"	1	See Detail
73	Vertical	13'-0"	1	13'-0"	1	See Detail
74	Vertical	13'-0"	1	13'-0"	1	See Detail
75	Vertical	13'-0"	1	13'-0"	1	See Detail
76	Vertical	13'-0"	1	13'-0"	1	See Detail
77	Vertical	13'-0"	1	13'-0"	1	See Detail
78	Vertical	13'-0"	1	13'-0"	1	See Detail
79	Vertical	13'-0"	1	13'-0"	1	See Detail
80	Vertical	13'-0"	1	13'-0"	1	See Detail
81	Vertical	13'-0"	1	13'-0"	1	See Detail
82	Vertical	13'-0"	1	13'-0"	1	See Detail
83	Vertical	13'-0"	1	13'-0"	1	See Detail
84	Vertical	13'-0"	1	13'-0"	1	See Detail
85	Vertical	13'-0"	1	13'-0"	1	See Detail
86	Vertical	13'-0"	1	13'-0"	1	See Detail
87	Vertical	13'-0"	1	13'-0"	1	See Detail
88	Vertical	13'-0"	1	13'-0"	1	See Detail
89	Vertical	13'-0"	1	13'-0"	1	See Detail
90	Vertical	13'-0"	1	13'-0"	1	See Detail
91	Vertical	13'-0"	1	13'-0"	1	See Detail
92	Vertical	13'-0"	1	13'-0"	1	See Detail
93	Vertical	13'-0"	1	13'-0"	1	See Detail
94	Vertical	13'-0"	1	13'-0"	1	See Detail
95	Vertical	13'-0"	1	13'-0"	1	See Detail
96	Vertical	13'-0"	1	13'-0"	1	See Detail
97	Vertical	13'-0"	1	13'-0"	1	See Detail
98	Vertical	13'-0"	1	13'-0"	1	See Detail
99	Vertical	13'-0"	1	13'-0"	1	See Detail
100	Vertical	13'-0"	1	13'-0"	1	See Detail

All bars shall be placed in center of walls and caps.
 Note: Cement for back boards shall be considered included in the bid price for steel and concrete.

1 2 3 4 5 6 7 8 9 0.

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

M N O P Q R S T U V W

a b c d e f g h i j k l m n o p q r s t u v w x y z
 J 14 K 1 4 K 1 9 5 0

Scale in Inches
0 1 2 3

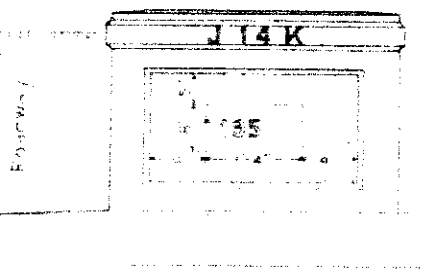
SECTION

SAMPLE BRIDGE NUMBER

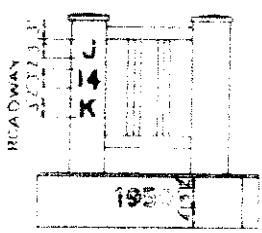
GENERAL NOTES

SAMPLE YEAR NUMBER

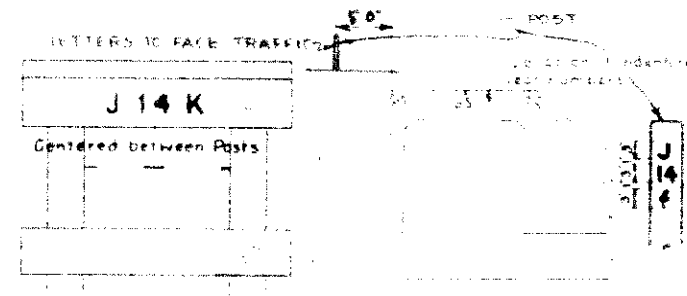
ALL LETTERS SHALL BE THE SAME SIZE AND IN THE SAME FONT AS SHOWN IN THIS STANDARD. THE COLORADO STATE HIGHWAY DEPARTMENT ADOPTED JANUARY 15, 1944. THE YEAR NUMBERS ARE REGISTERED IN CONCRETE AND SHALL BE PAINTED ON THE FACE OF THE STRUCTURE NUMBER. THE YEAR NUMBER SHALL BE PAINTED ON THE FACE OF THE STRUCTURE NUMBER. THE YEAR NUMBER SHALL BE PAINTED ON THE FACE OF THE STRUCTURE NUMBER. THE YEAR NUMBER SHALL BE PAINTED ON THE FACE OF THE STRUCTURE NUMBER.



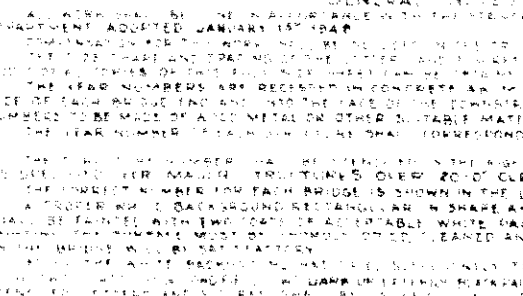
TYPICAL FOR CONCRETE ENDPOST



TYPICAL FOR STEEL HANDRAIL END POST



TYPICAL FOR TIMBER WING HANDRAIL

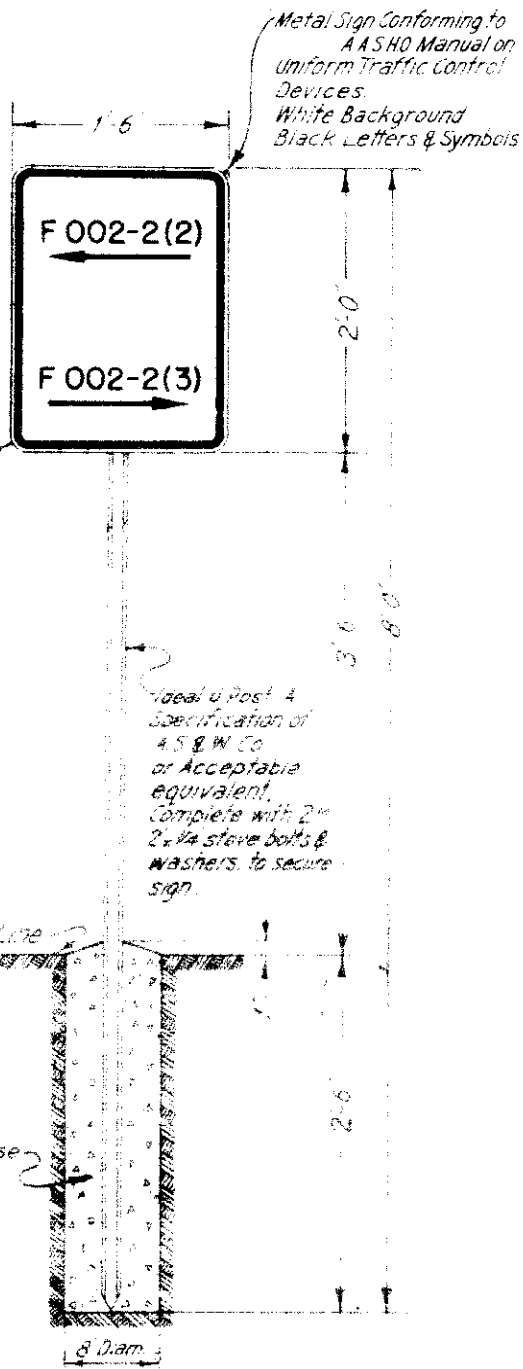


TYPICAL FOR LARGE BOY CULVERTS

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
LETTERS AND FIGURES
FOR
YEAR NUMBERS AND
STRUCTURE NUMBERS

Designed by [Signature] Approved by [Signature]
 Made by W.P.M. Bridge Engineer
 Checked by [Signature] Date June 1, 1946

PROJECT MARKER POST
ITEM N° 818



NOTES FOR PROJECT MARKER POSTS

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, adopted January 1st 1948.

Numbers and arrows shall show the proper numbers and directions of the projects each way from where the post is placed. Post to be set with sign facing the road at 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.

NOTES FOR R.O.W. MARKER POSTS

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, adopted January 1st 1948.

Posts shall be made of Class A Concrete.

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

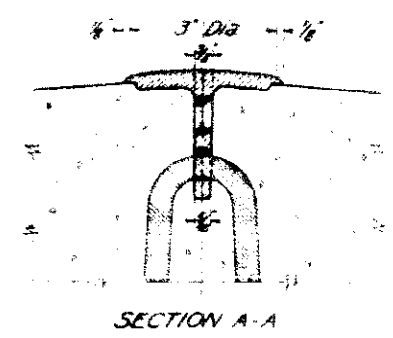
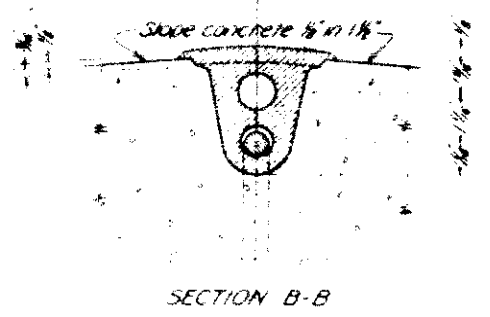
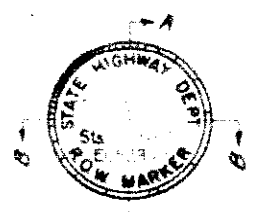
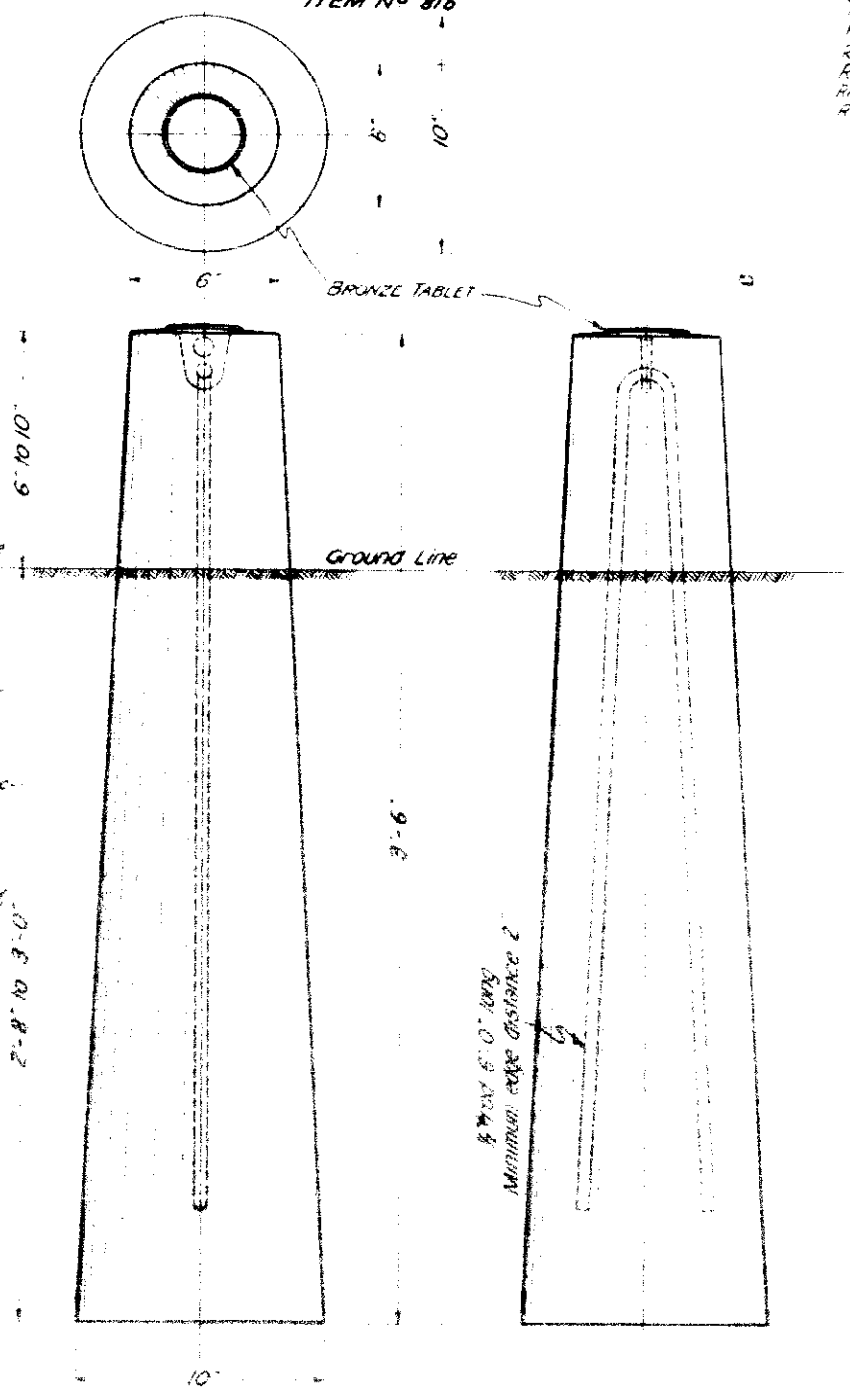
All exposed surfaces of the bronze tablet are to be ground to a smooth surface.

All letters are to be depressed a minimum of 1/8 inch.

Information on the bronze tablet indicated by pin lines is to be stamped in the field by the engineering party after post is placed. 1/4 inch letters and figures to be used.

Project designations on tablets shall be properly shown (i.e., F1 for Fed Aid Interstate, F for Fed Aid Primary, S for Fed Aid Secondary, etc., & S.P.N. for State Projects. See detail below.

RIGHT OF WAY MARKER POST
ITEM N° 816



DETAIL OF BRONZE TABLET FOR RIGHT OF WAY MARKER POST

STANDARD M-7-B

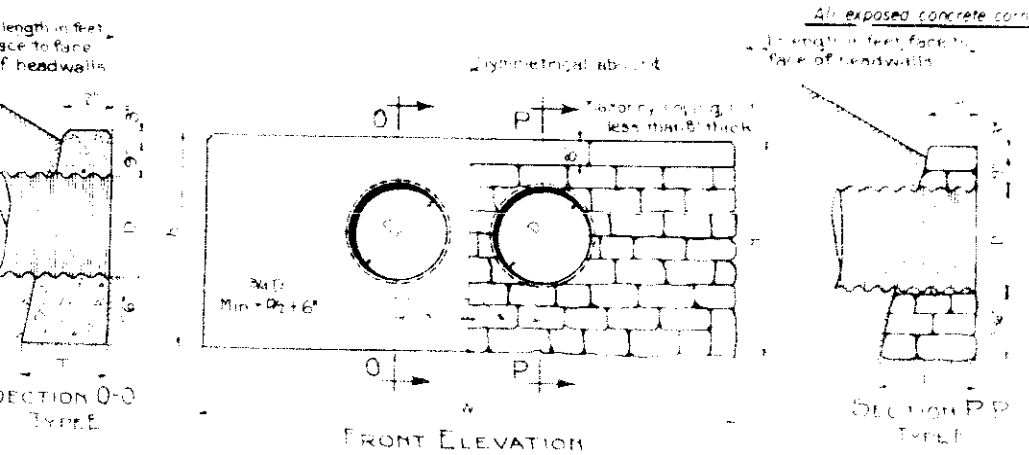
Rev. 5-25-40 A.S.D. 110 Spd.
Rev. 1-2-46, C.S.D. Item 816
Rev. 8 Jan. 46 P.S.B. 1/2" to 1/2"
Rev. June 10 '46, W.E.M. Bronze Tablet
Rev. Mar. 21-947, W.T.M. - Project Marker Post
Rev. Nov. 20-1947, L.P.K. in Metal Project Marker
Rev. Dec. 1948, P.S.B. - Project Marker
Rev. July 5, 1953, C.S.D. - Re: Auto Re Metal Sign for Project Marker, & ROW Marker Markings

FED. ROAD DIST. NO.	STATE	SHEET NO.	TOTAL SHEETS
3	COLO.	20	

COLORADO STATE HIGHWAY DEPARTMENT
STANDARD MARKER POSTS

Designed by A.C. [Signature]
Made by F.C.S.
Checked by P.C. [Signature]

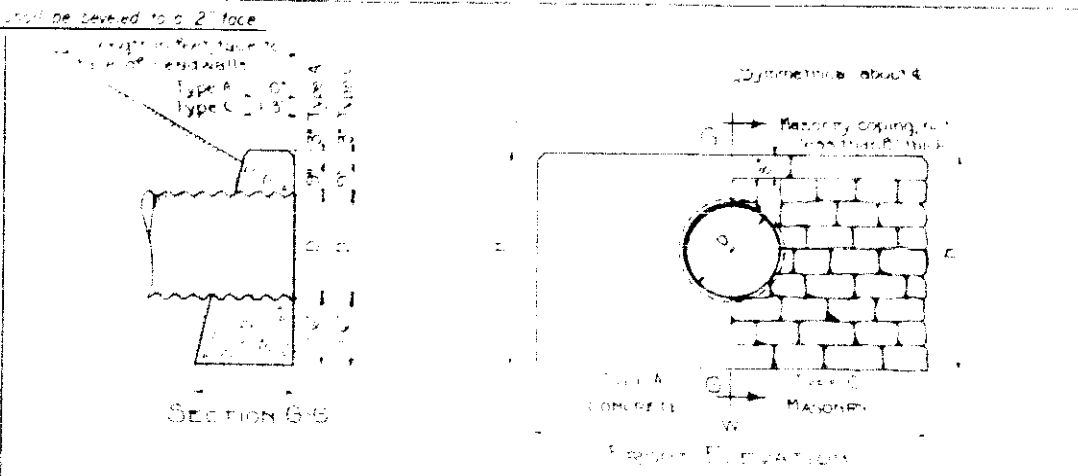
Approved by [Signature]
Date: January 1948



STANDARD HEADWALLS FOR DOUBLE CORRUG METAL PIPE CULVERTS

TABLE OF DIMENSIONS AND QUANTITIES

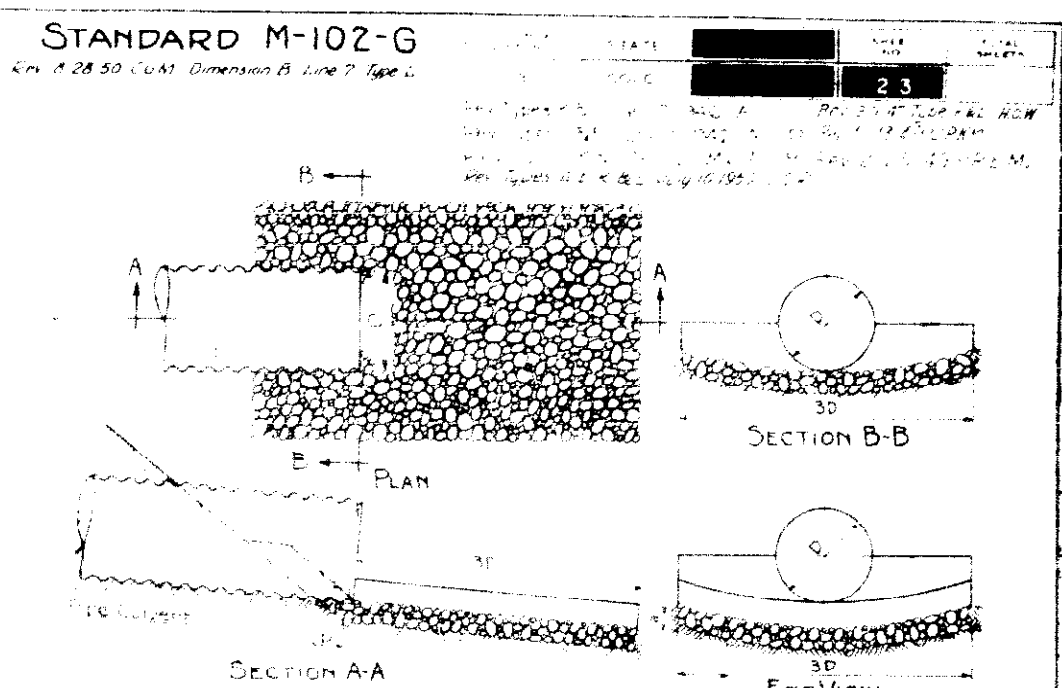
TYPE E		BOTH TYPES		TYPE F	
DIAM	LENGTH	W	H	CONCRETE	QUANTITY
18"	10'	3.6	3.9	10 Cu Yds	2.1
18"	15'	5.4	4.0	16 Cu Yds	3.4
24"	10'	4.8	4.6	14 Cu Yds	2.7
30"	10'	6.0	5.0	18 Cu Yds	3.5
36"	10'	7.2	5.4	22 Cu Yds	4.3
42"	10'	8.4	5.8	26 Cu Yds	5.1
48"	10'	9.6	6.2	30 Cu Yds	5.9



STANDARD HEADWALLS FOR SINGLE CORRUG METAL PIPE CULVERTS

TABLE OF DIMENSIONS AND QUANTITIES

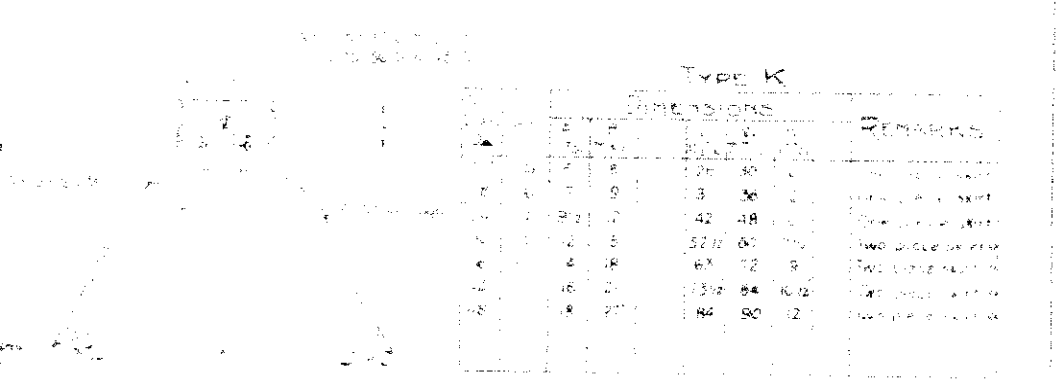
TYPE A		BOTH TYPES		TYPE C	
DIAM	LENGTH	W	H	CONCRETE	QUANTITY
18"	10'	3.3	3.6	9 Cu Yds	1.9
18"	15'	5.0	3.7	14 Cu Yds	2.8
24"	10'	4.0	4.0	11 Cu Yds	2.4
30"	10'	4.8	4.3	13 Cu Yds	2.8
36"	10'	5.6	4.6	15 Cu Yds	3.2
42"	10'	6.4	4.9	17 Cu Yds	3.6
48"	10'	7.2	5.2	19 Cu Yds	4.0



STANDARD GROUDED RUBBLE APRON FOR PIPE CULVERTS

SQUARE YARDS GROUDED RUBBLE SLOPE AND DITCH PAVING 1 FOOT THICK

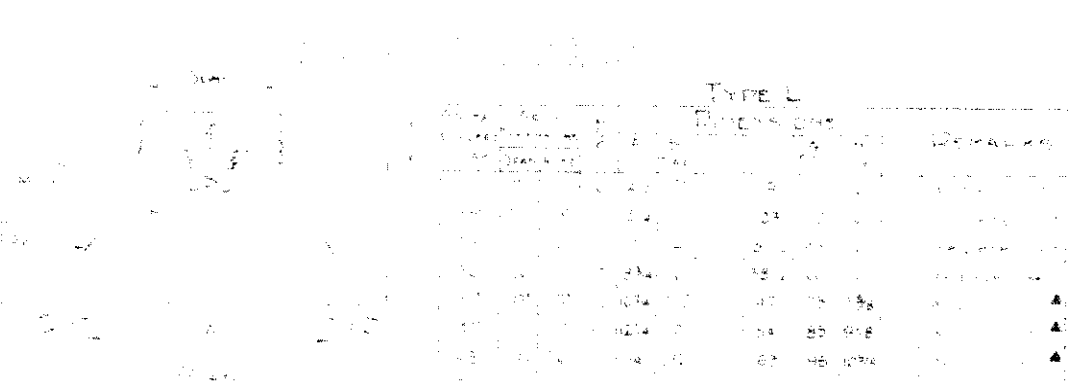
DIAM	LENGTH	APRON	DITCH
18"	10'	1.2	1.2
18"	15'	1.8	1.8
24"	10'	1.6	1.6
30"	10'	2.0	2.0
36"	10'	2.4	2.4
42"	10'	2.8	2.8
48"	10'	3.2	3.2



STANDARD METAL APRONS FOR CORRUGATED METAL PIPE CULVERTS TYPE K

TABLE OF DIMENSIONS AND QUANTITIES

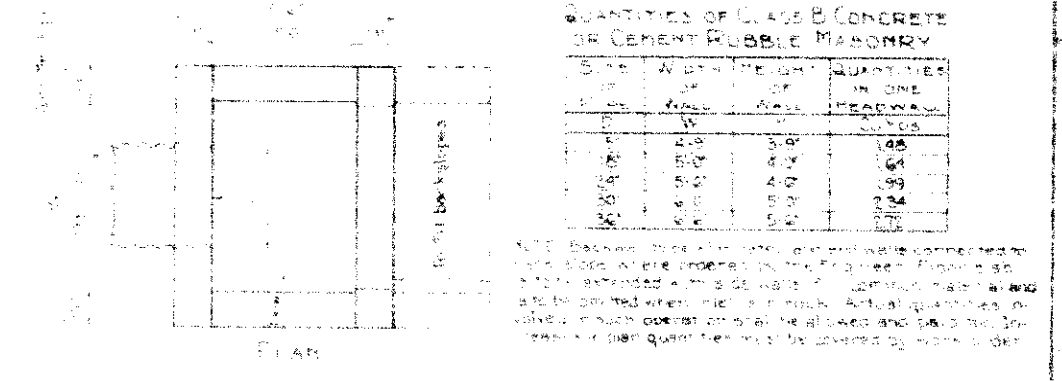
DIAM	LENGTH	W	H	CONCRETE	QUANTITY
18"	10'	3.6	3.9	10 Cu Yds	2.1
18"	15'	5.4	4.0	16 Cu Yds	3.4
24"	10'	4.8	4.6	14 Cu Yds	2.7
30"	10'	6.0	5.0	18 Cu Yds	3.5
36"	10'	7.2	5.4	22 Cu Yds	4.3
42"	10'	8.4	5.8	26 Cu Yds	5.1
48"	10'	9.6	6.2	30 Cu Yds	5.9



STANDARD METAL APRONS FOR CORRUGATED METAL PIPE ARCH CULVERTS TYPE L

TABLE OF DIMENSIONS AND QUANTITIES

DIAM	LENGTH	W	H	CONCRETE	QUANTITY
18"	10'	3.3	3.6	9 Cu Yds	1.9
18"	15'	5.0	3.7	14 Cu Yds	2.8
24"	10'	4.0	4.0	11 Cu Yds	2.4
30"	10'	4.8	4.3	13 Cu Yds	2.8
36"	10'	5.6	4.6	15 Cu Yds	3.2
42"	10'	6.4	4.9	17 Cu Yds	3.6
48"	10'	7.2	5.2	19 Cu Yds	4.0



INTERCEPTING HEADWALLS

TABLE OF DIMENSIONS AND QUANTITIES

DIAM	LENGTH	W	H	CONCRETE	QUANTITY
18"	10'	3.6	3.9	10 Cu Yds	2.1
18"	15'	5.4	4.0	16 Cu Yds	3.4
24"	10'	4.8	4.6	14 Cu Yds	2.7
30"	10'	6.0	5.0	18 Cu Yds	3.5
36"	10'	7.2	5.4	22 Cu Yds	4.3
42"	10'	8.4	5.8	26 Cu Yds	5.1
48"	10'	9.6	6.2	30 Cu Yds	5.9

GENERAL NOTES FOR ALL STRUCTURES

All work shall be done according to the standard specifications of the Colorado State Highway Department. Grouted rubble aprons shall be placed on slopes where they are required. Grouted rubble aprons shall be placed on slopes where they are required. Grouted rubble aprons shall be placed on slopes where they are required.

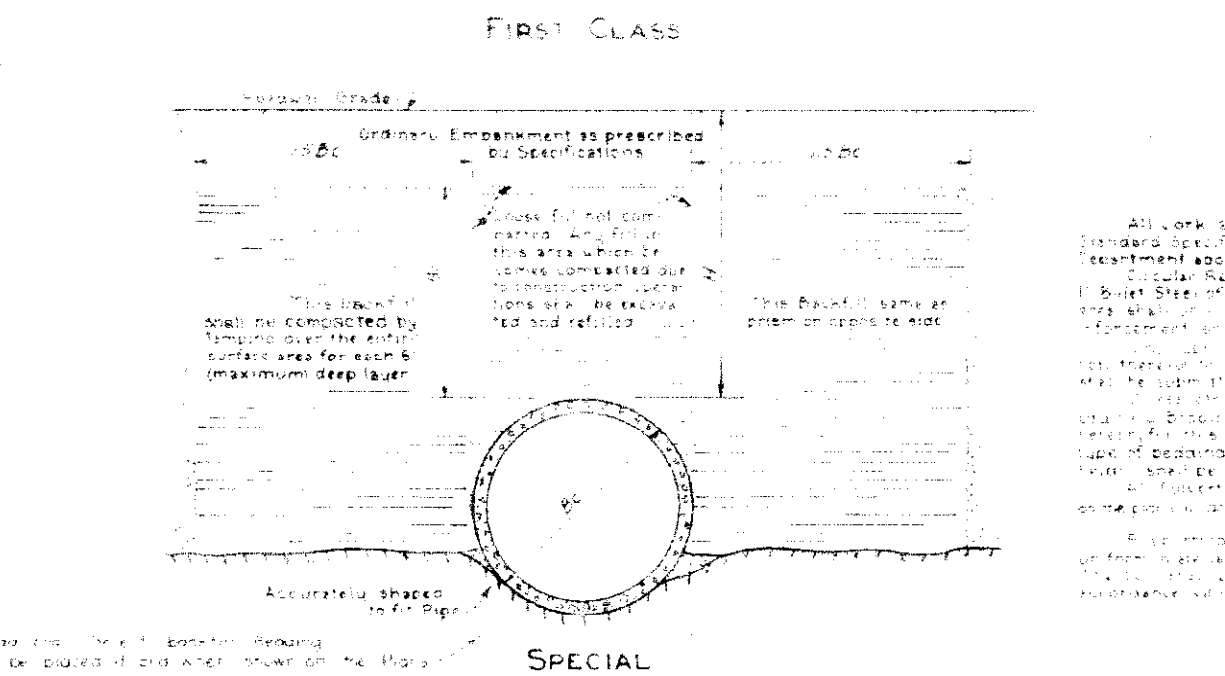
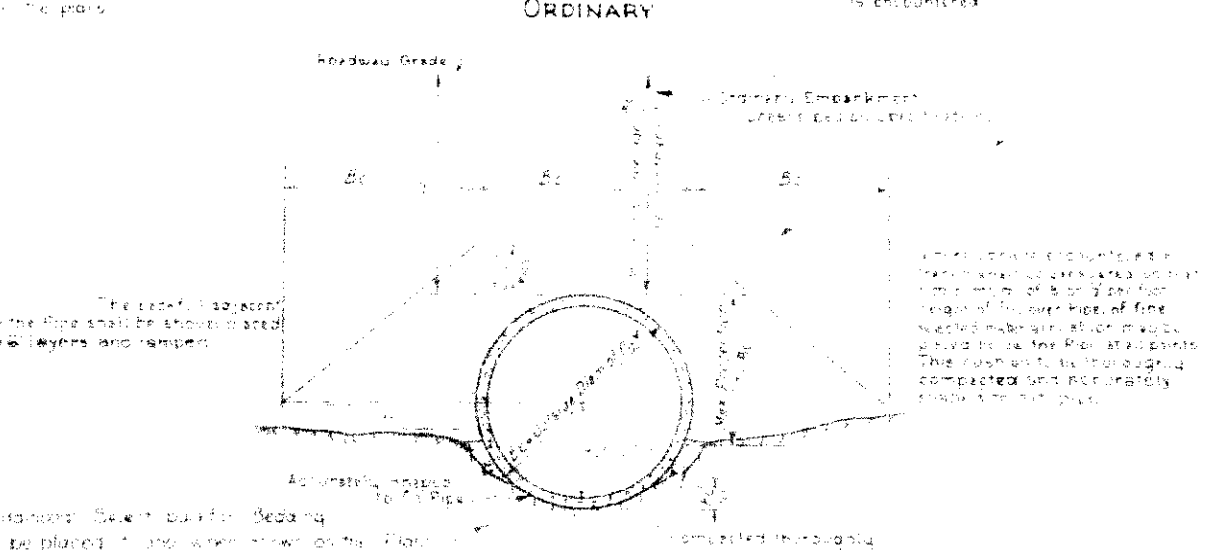
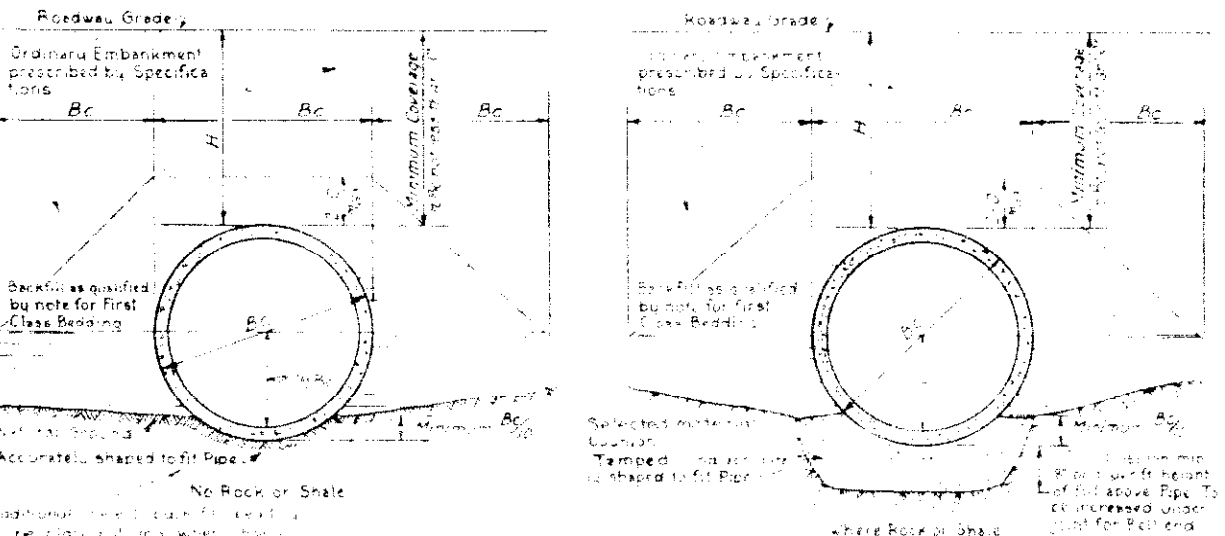
COLORADO STATE HIGHWAY DEPARTMENT

STANDARD HEADWALLS
INTERCEPTING HEADWALLS
GALVANIZED METAL APRONS
GROUDED RUBBLE APRONS
FOR CORRUG METAL PIPE CULVERTS

Designed by *[Signature]* Approved by *[Signature]*
Made by *[Signature]* Bridge Engineer
Checked by *[Signature]* Date December 2, 1945

TYPES OF BEDDING

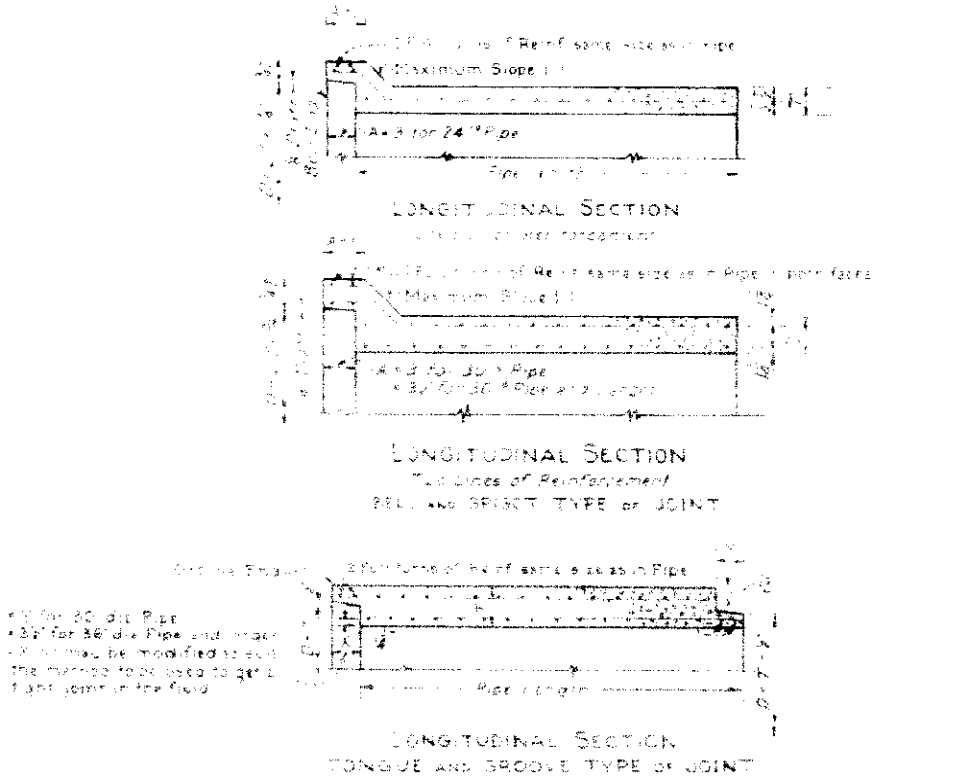
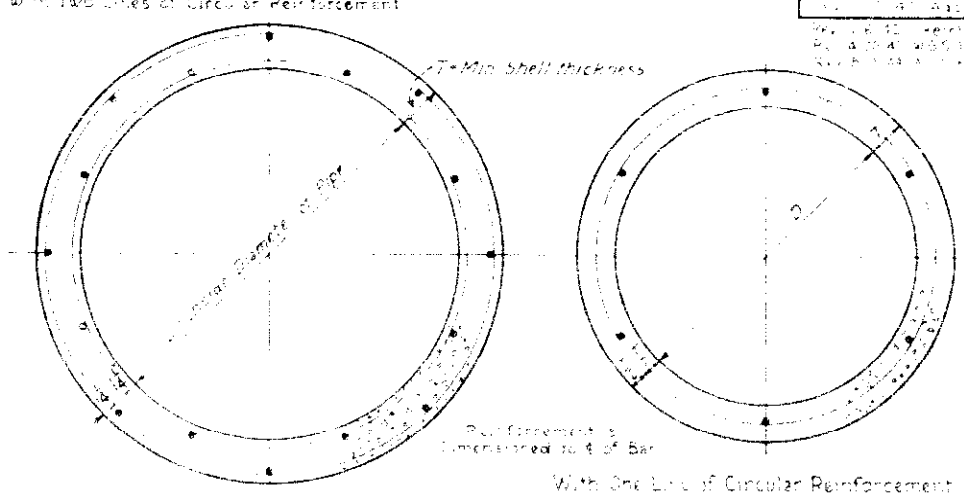
Note: Backfill layers for all Types of Bedding must be placed simultaneously on each side of the pipe to maintain equal lateral pressure.



A construction which consists of Ordinary Bedding or First Class Bedding combined with Special Backfill may be used when height H exceeds limits noted in Table for Ordinary or First Class Bedding.

NOTE: When Special Bedding is called for or implied by the maximum fill height limits the placement of the pipe and the backfill shall not be done except in the presence of the Engineer.

PIPE CROSS SECTIONS



GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department adopted January 1, 1928.

Circular Reinforcement shall be cold drawn steel wire or galvanized steel or galvanized steel pipe. Reinforcement shall be better steel of intermediate grade.

Reinforcement shall be placed in the concrete bed and the field surface to make the joint reasonably water-tight.

When the joint is not designed for pressure, the type of bedding shall be as shown on the plans and shall be in accordance with the Standard Specifications of the Colorado State Highway Department.

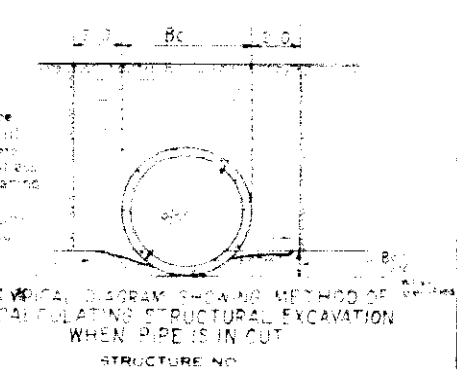
When the joint is designed for pressure, the type of bedding shall be as shown on the plans and shall be in accordance with the Standard Specifications of the Colorado State Highway Department.

STANDARD M-112-D

Revised to conform to A.S.T.M. Spec. (76.4) of A.C.I. 12-30-41.

STANDARD STRENGTH REINFORCED CONCRETE CULVERT PIPE				
Based on Concrete with an ultimate Compressive Strength of 3500 P.S.I. and the Pipes Passed Bearing Tests in Table I, A.A. Specifications M-112-46				
Max. Fill Height above Top of Pipe for Standard Pipe	D Inches	T Inches	Circular Reinforcement Sq. Ins. per Lin. Ft. of Pipe	Longitudinal Reinforcement Min. Total Area Reqd.
0	0	1	0.07	0.19
4	4	2	0.09	0.24
8	8	3	0.11	0.29
12	12	4	0.13	0.34
16	16	5	0.15	0.39
20	20	6	0.17	0.44
24	24	7	0.19	0.49
28	28	8	0.21	0.54
32	32	9	0.23	0.59
36	36	10	0.25	0.64
40	40	11	0.27	0.69
44	44	12	0.29	0.74
48	48	13	0.31	0.79
52	52	14	0.33	0.84
56	56	15	0.35	0.89
60	60	16	0.37	0.94
64	64	17	0.39	0.99
68	68	18	0.41	1.04
72	72	19	0.43	1.09
76	76	20	0.45	1.14
80	80	21	0.47	1.19
84	84	22	0.49	1.24

EXTRA STRENGTH REINFORCED CONCRETE CULVERT PIPE				
Based on Concrete with an ultimate Compressive Strength of 3500 P.S.I. and the Pipes Passed Bearing Tests in Table I, A.A. Specifications M-112-46				
Max. Fill Height above Top of Pipe for Extra Strength Pipe	D Inches	T Inches	Circular Reinforcement Sq. Ins. per Lin. Ft. of Pipe	Longitudinal Reinforcement Min. Total Area Reqd.
0	0	1	0.07	0.19
4	4	2	0.09	0.24
8	8	3	0.11	0.29
12	12	4	0.13	0.34
16	16	5	0.15	0.39
20	20	6	0.17	0.44
24	24	7	0.19	0.49
28	28	8	0.21	0.54
32	32	9	0.23	0.59
36	36	10	0.25	0.64
40	40	11	0.27	0.69
44	44	12	0.29	0.74
48	48	13	0.31	0.79
52	52	14	0.33	0.84
56	56	15	0.35	0.89
60	60	16	0.37	0.94
64	64	17	0.39	0.99
68	68	18	0.41	1.04
72	72	19	0.43	1.09
76	76	20	0.45	1.14
80	80	21	0.47	1.19
84	84	22	0.49	1.24



COLORADO STATE HIGHWAY DEPARTMENT

UNREINFORCED CONCRETE PIPE

REINFORCED CONCRETE PIPE

STANDARD & EXTRA STRENGTH

SIZES: 12", 15", 18", 24", 30", 36", 42", 48", 54", 60", 66", 72", 78", 84"

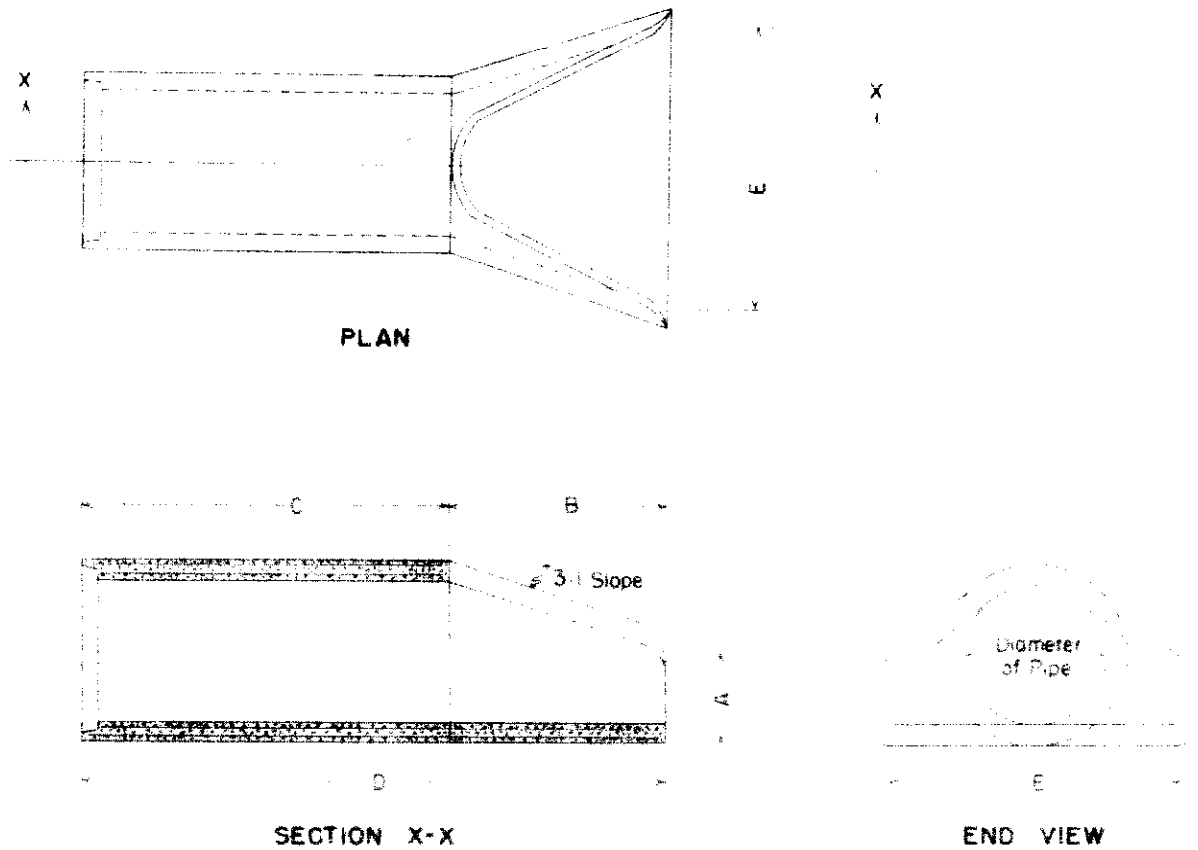
Designed by W. S. ...
Checked by F. C. ...

Approved by O. S. ...
Date: June 1, 1940

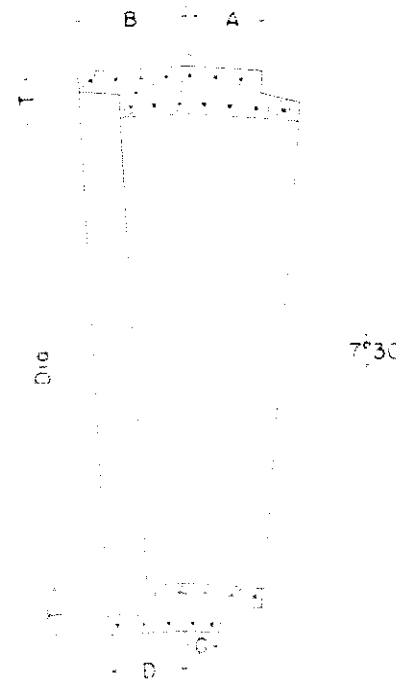
STANDARD M-118-A

DISTRICT: [REDACTED] COUNTY: [REDACTED] SHEET: 25 TOTAL SHEETS: [REDACTED]
 DIVISION: 9 COLORADO
 Rev. Dimensions of End Sec. 10/18/49 - E. E. O.
 Rev. Dimensions of End Sec. 12/10/49 - C. J. W.
 Rev. Dim. of Sect. B added Note - 1/17/50 - E. E. O.

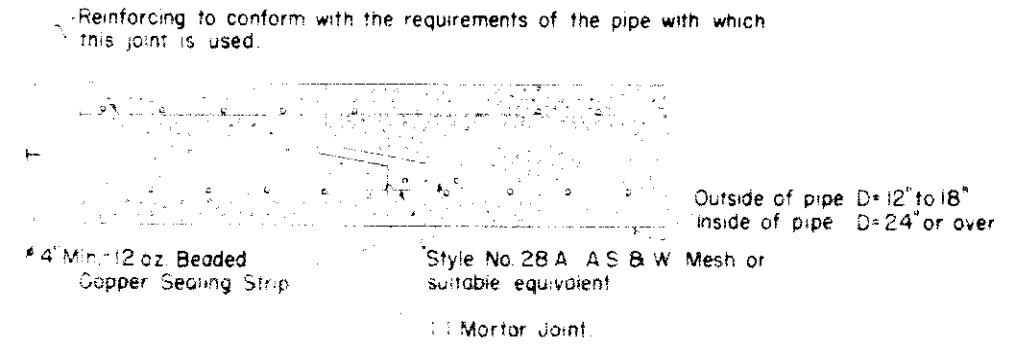
FLARED END SECTION FOR CONCRETE PIPE



7° 30' ANGLE SECTION FOR CONCRETE PIPE



COPPER EXPANSION JOINT FOR CONCRETE PIPE (WHEN REQUIRED ON PLANS)



When Welded Rectangular Mesh is used for the reinforcing steel in the pipe the inner line of Mesh may be extended into the joint space instead of using a separate strip of Triangular Mesh.

COPPER SEALING STRIP



Copper Sealing Strips shall be made from sheet copper, 4 1/2 mm width, bent as shown and weighing 12oz per sq. ft. Both legs of strip shall be perforated in a satisfactory manner to secure bond. Each sealing strip shall be continuous around each pipe joint with a 1/4" end lap.

DIMENSIONS FOR FLARED END SECTIONS

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

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

DIMENSIONS FOR 7° 30' ANGLE SECTIONS

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

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

GENERAL NOTES

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

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

Alternate types of expansion joints may be substituted for the expansion joint shown on this sheet after approval by the Department.

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

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
 FLARED END SECTION
 7° 30' ANGLE SECTION
 AND
 COPPER EXPANSION JOINT
 FOR
 CONCRETE PIPE STRUCTURES
 Designed by R. S. M. Approved by [Signature]
 Made by J. M. K. [Signature]
 Checked by G. S. A. Date Jan 27, 1949

STANDARD C.M.P. SIPHON with METAL APRONS for INLETS & OUTLETS

STANDARD M-124-A

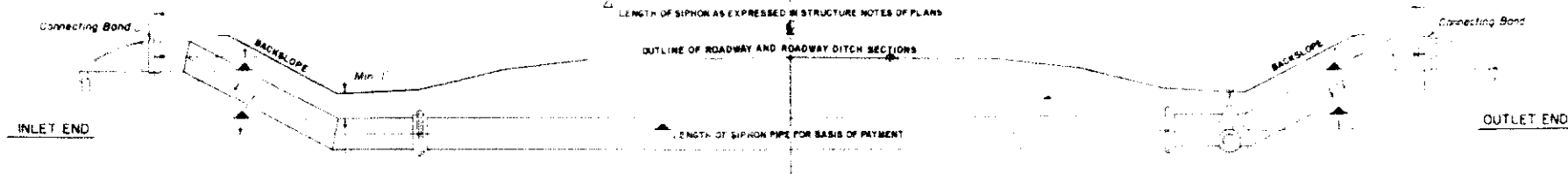
REVISIONS

NO.	DATE	DESCRIPTION

DIVISION NO. 9 DISTRICT _____

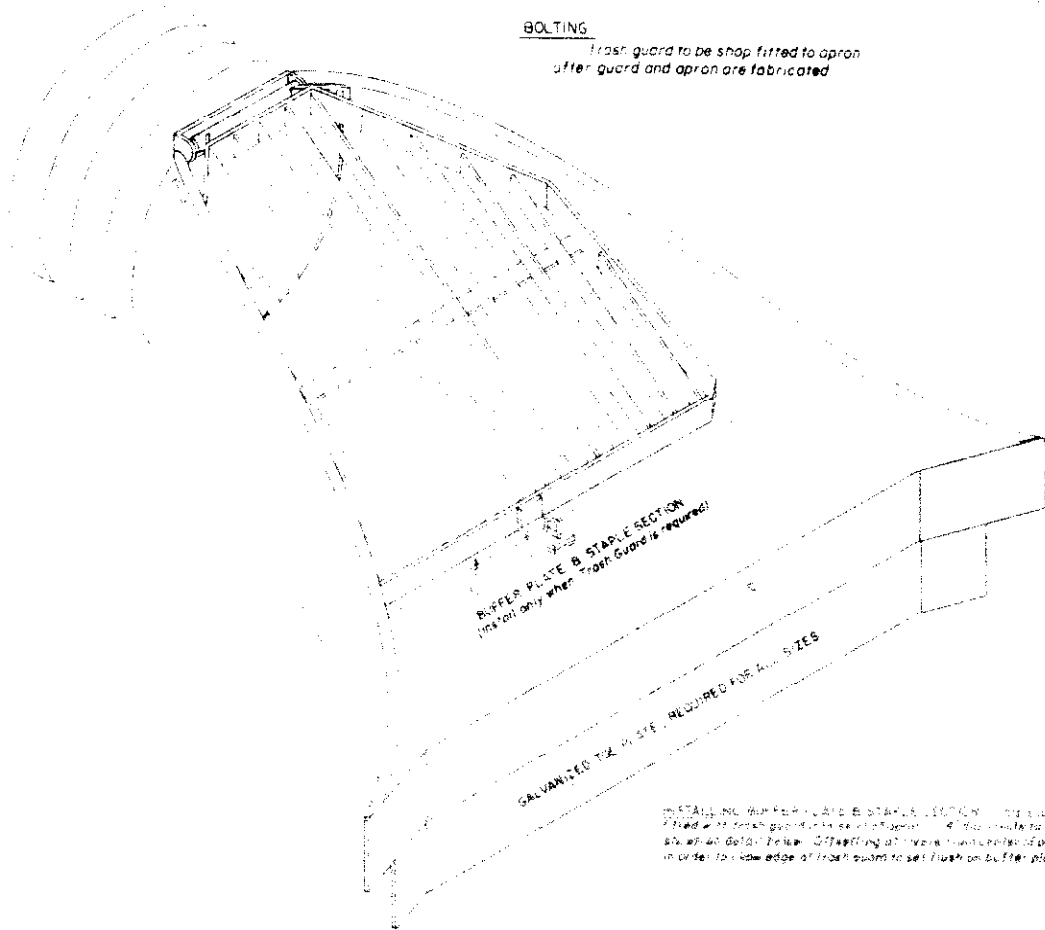
BOLTING
Trash guard to be shop fitted to apron after guard and apron are fabricated

Cross Sectional View Showing Typical Relationship of Siphon to Roadway



See plans for details showing various lengths and angles for each siphon required.
A tolerance of 2% will be permitted in angles of sections of pipe to be fabricated.

Minimum clearance of 4 inches will be allowed in the length of siphon



Illustrative Sketch of Metal Apron with Trash Guard Installed

NOTE

Sections shown to be furnished and installed as part of trash guard unit. The cost of assemblies, installing, drilling, bolts, washers, rivets, painting, labor and equipment necessary shall be included for payment. Bid price for item 89, Trash Guards.

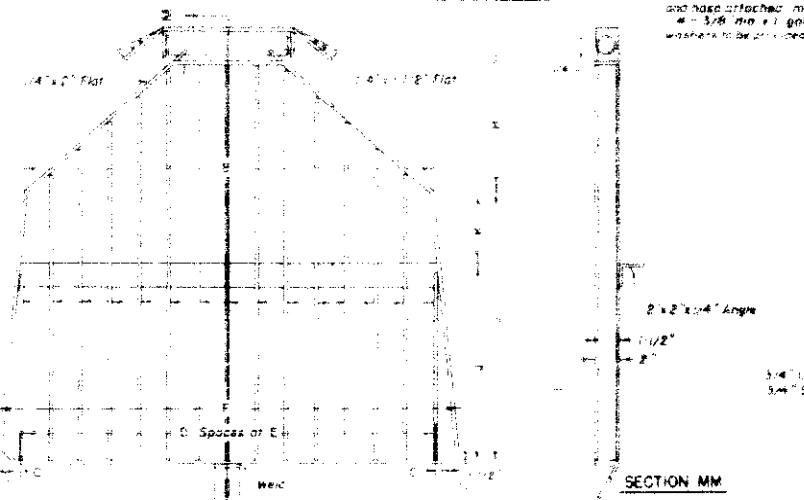
Details of Parts for Trash Guard Assembly

TABLE OF DIMENSIONS

DIAM. OF SIPHON	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
6"	6"	2 1/2"	10"	2 1/2"	30"	5"	1 1/2"	18"	3"	9"	26"	16 1/2"	7"						
24"	6"	3 1/2"	10"	2 1/2"	30"	5"	1 1/2"	18"	3"	9"	26"	16 1/2"	7"						
30"	2"	4 1/2"	10"	3"	2 1/2"	4 3/4"	2 1/2"	18"	1"	10"	29"	16 1/2"	7"						
36"	2"	5 1/2"	10"	3"	2 1/2"	5 1/4"	2 1/2"	18"	1"	10"	34"	16 1/2"	7"						

NOTE: All dimensions shown above to have $\pm 2\%$ tolerance except dimensions A, B & L.

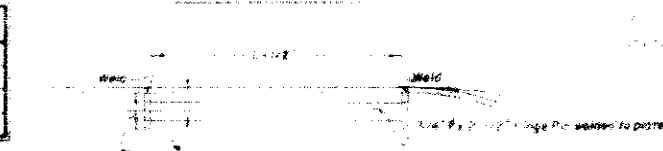
TRASH GUARD



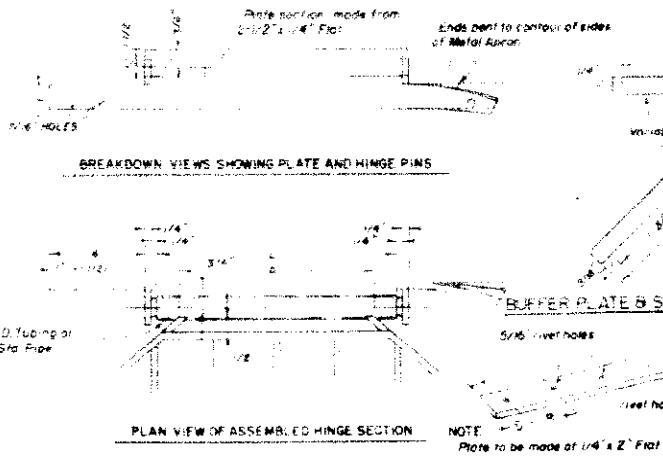
NOTE

Trash Guard to be all welded construction with hinge section and hand attached making one integral unit.
Use 3/8" dia x 1 1/2" galvanized machine bolts with flat and lock washers to be provided for mounting Trash Guard to Apron.

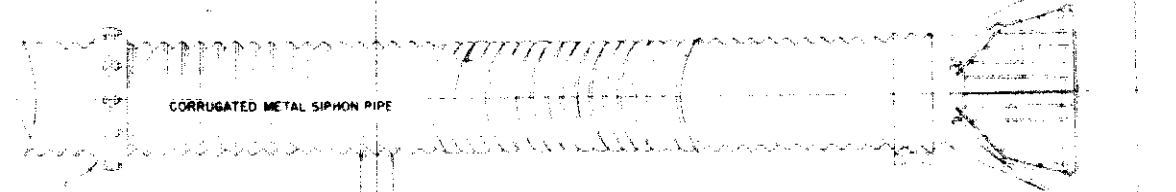
TRASH GUARD HINGE



BREAKDOWN VIEWS SHOWING PLATE AND HINGE PINS



NOTE: Plate to be made of 1/4" x 2" Flat, paint same as trash guard

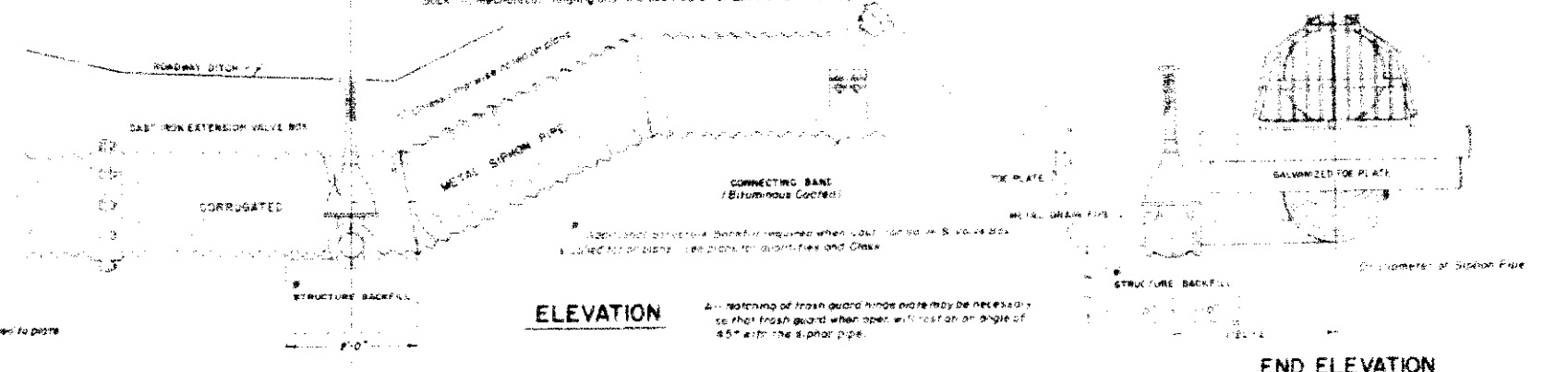


QUANTITIES FOR ONE SIPHON

DIAMETER OF SIPHON	ITEM 25 CORR METAL SIPHON PIPE	ITEM 26 CORR METAL APRONS FOR IMPULSIVE USE	ITEM 27 CORR METAL APRONS FOR IMPULSIVE USE	ITEM 28 CORR METAL APRONS FOR IMPULSIVE USE	ITEM 29 CORR METAL APRONS FOR IMPULSIVE USE
6"	16.50 per req'd	2.50 per each	2.16	4.00 per req'd	1.16
24"	14.00 per req'd	3.00 per each	2.16	4.00 per req'd	1.16
30"	14.00 per req'd	2.50 per each	2.50	6.00 per req'd	1.16
36"	12.50 per req'd	2.50 per each	2.50	4.00 per req'd	1.16

METAL APRONS— Except for the following, Metal aprons used on C.M.P. Siphons shall be of the same specifications as those shown on the Standard Sheet included in plans for Metal Aprons.
1. Galvanized Top Plates will be required on all sizes.
2. The galvanized Top Finish Plate normally required on all Metal Aprons will not be required. This unit is eliminated to facilitate installation of the Trash Guard Hinge.
TRASH GUARDS— Structural Steel Trash Guards conforming to details shown on this sheet shall be painted as per specifications for Structural Steel. These specifications may be found under the item 'Paints and Painting'.
CAST IRON VALVE & VALVE BOX— Cast Iron Extension Valve Box, Size B, with No. 6 Base as shown in Hendrie & Bathoff Catalog No. 150, (Pg. 387), or an acceptable equivalent will be used. Valves used shall be Crane No. 461 Standard Body Wedge Gate valve with brass seats and stem or an acceptable equivalent.
METAL DRAIN PIPE— Metal Drain Pipe conforming to specifications shall be used in the following sizes:
18" & 24" Dia. Siphon - 4" Dia. Drain Pipe with 4" Valve & Drain Box
30" & 36" Dia. Siphon - 6" Dia. Drain Pipe with 6" Valve & Drain Box
CORRUGATED METAL SIPHON PIPE— Siphon Pipe conforming to specifications shall be double riveted along the longitudinal seams and riveted on three (3) inch centers along the circumferential seams. Assembly of sections shall be accomplished in accordance with details for flanges, bolts and gaskets shown on this sheet.

Top plates should be installed where Trash Guards are not required.



Details for Installing Valve, Valve Box, Metal Drain Pipe & Metal Apron at Outlets

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project.
Trash Guards, Metal Drain Pipe and Cast Iron Valve and Valve Boxes will be furnished when called for on plans.
Adequate equivalent hardware and fittings will be accepted subject to the Engineers approval.

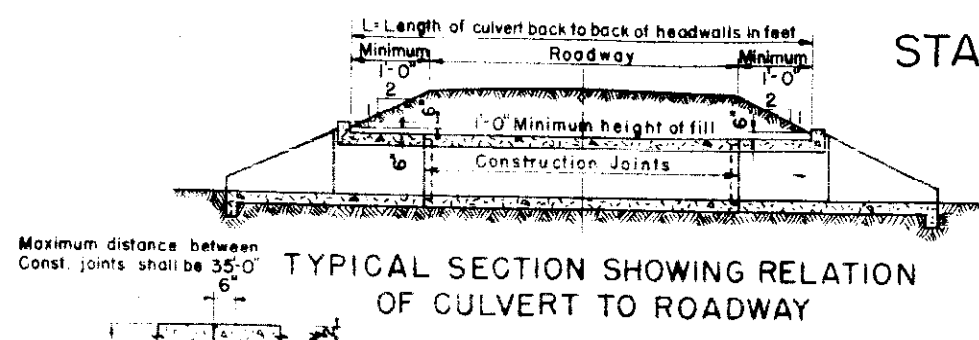
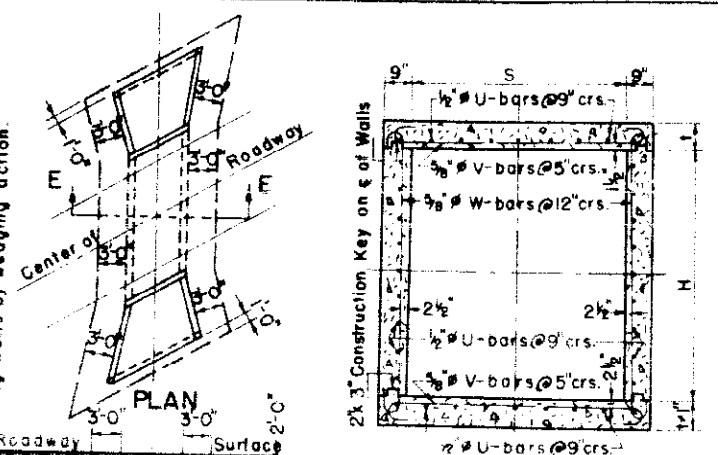
COLORADO STATE HIGHWAY DEPARTMENT

Standard C.M.P. Siphon with Metal Aprons for Inlets & Outlets

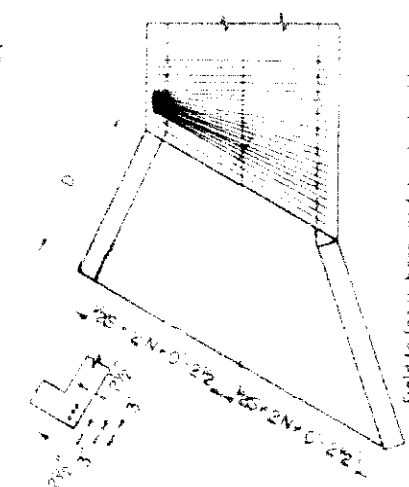
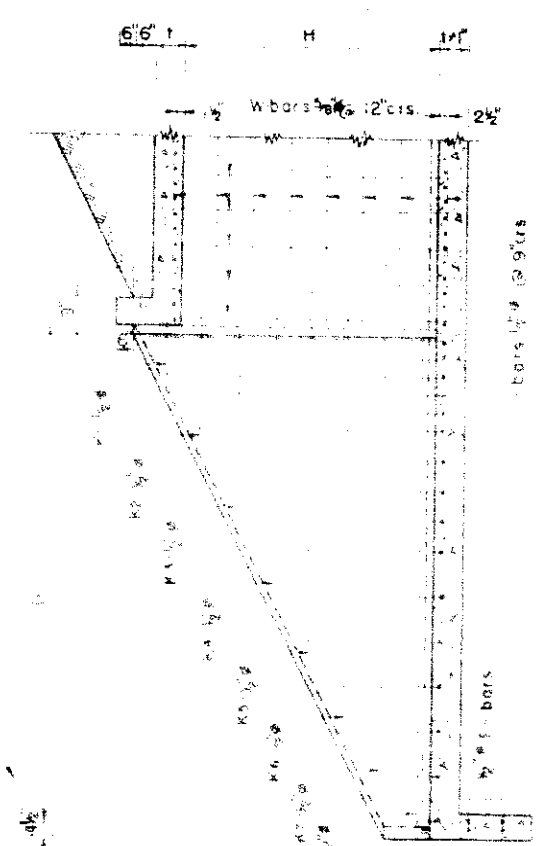
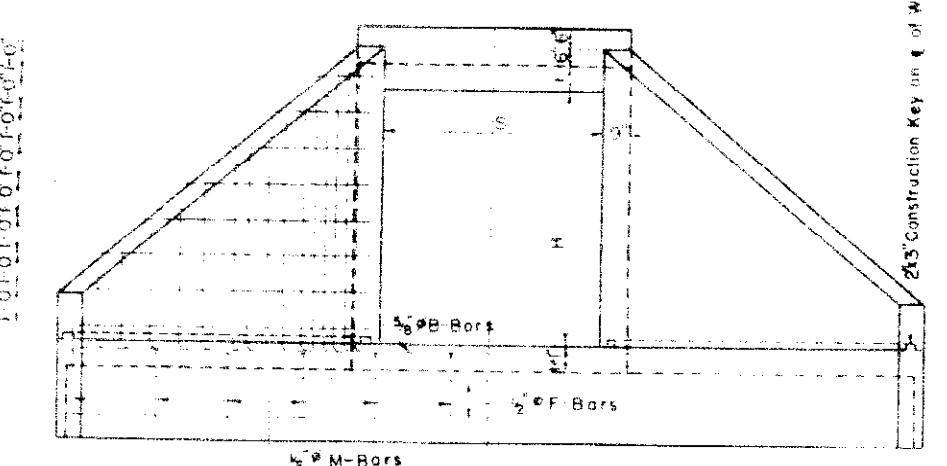
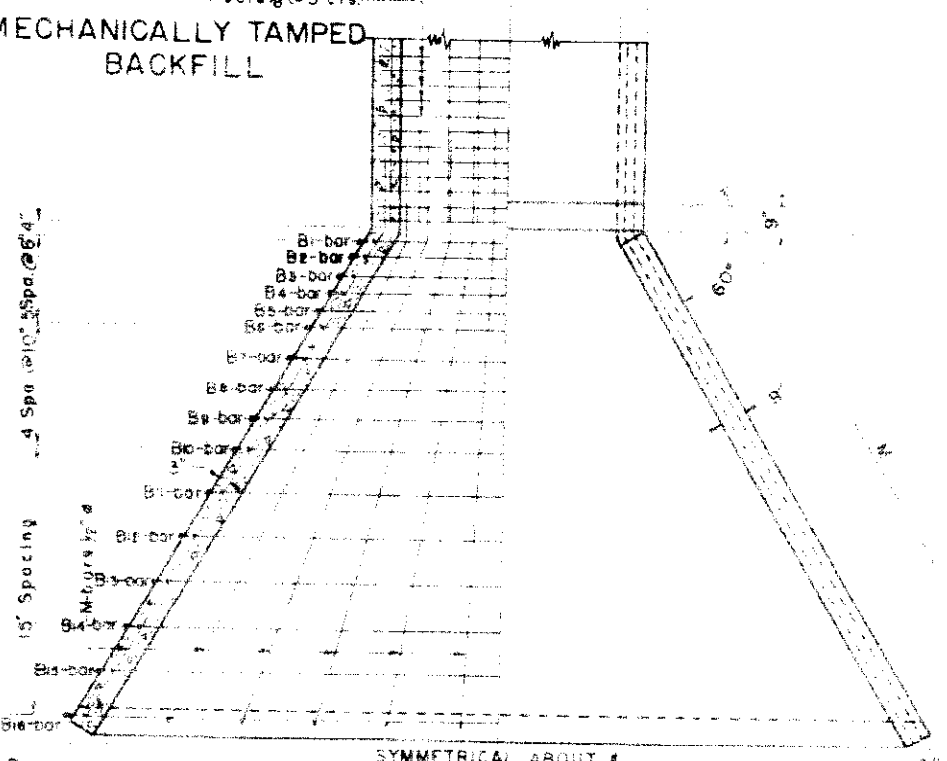
Designed by T.C. ...
Made by C.G.M. ...
Approved by ...
Checked by ...

STATE	NO.	TOTAL SHEETS
COLORADO	103	1

STANDARD M-103-G



HALF-LAP CONST. JOINT



REINFORCEMENT BAR LIST

USE BARS FOR	MARK	SIZE	NUMBER	DIMENSION P	DIMENSION Q	TOTAL LENGTH	BENDING DIAGRAM
ALL SIZES	V	5/8"	4	9'-8"		5'-2'-4"	ALL DIMENSIONS ARE TO ϵ OF BARS
	W	5/8"	3	H'-3"		H'-7'-11"	
	F	1/2"	4			5'-6'-2"	2'-0" Radius
	U	1/2"	4			L'-1'-2"	
	K1	1/2"	4		1'-8"	3'-8"	30°
	K2	1/2"	4		3'-11"	5'-11"	
	K3	1/2"	4		6'-3"	8'-3"	2'-0"
	K4	1/2"	4		8'-7"	10'-7"	
H=3'-0" Or more	K5	1/2"	4		10'-11"	12'-11"	2'-0"
H=4'-0" Or more	K6	1/2"	4		13'-2"	15'-2"	
H=5'-0" Or more	K7	1/2"	4		15'-6"	17'-6"	2'-0"
H=6'-0" Or more	K8	1/2"	4		15'-9"	17'-9"	
ALL SIZES	B1	5/8"	10	1'-5"	H'-0"	10'-0"	2'-0"
	B2	5/8"	10	1'-11"	H'-0"	10'-0"	
	B3	5/8"	10	2'-7"	H'-0"	10'-0"	2'-0"
	B4	5/8"	10	3'-3"	H'-0"	10'-0"	
	B5	5/8"	10	4'-3"	H'-0"	10'-0"	2'-0"
	B6	5/8"	10	5'-3"	H'-0"	10'-0"	
	B7	5/8"	10	6'-11"	H'-0"	10'-0"	2'-0"
	B8	5/8"	10	7'-11"	H'-0"	10'-0"	
	B9	5/8"	10	9'-7"	H'-0"	10'-0"	2'-0"
	B10	5/8"	10	12'-0"	H'-0"	10'-0"	
	B11	5/8"	10	13'-11"	H'-0"	10'-0"	2'-0"
	B12	5/8"	10	15'-11"	H'-0"	10'-0"	
	B13	5/8"	10	17'-6"	H'-0"	10'-0"	2'-0"
	B14	5/8"	10	18'-9"	H'-0"	10'-0"	
	B15	5/8"	10	20'-9"	H'-0"	10'-0"	2'-0"
	B16	5/8"	10	22'-9"	H'-0"	10'-0"	

TABLE OF DIMENSIONS AND QUANTITIES

QUANTITIES GIVEN BELOW INCLUDE ALLOWANCE FOR OVERRUN OF 5%
ALL QUANTITIES FOR TWO HEADWALLS PLUS QUANTITY FOR ONE LINEAR FT. OF BOX

DEPTH OF BOX	HEIGHT OF WALL	THICKNESS OF WALL	NUMBER OF SLABS	DIMENSIONS AND QUANTITIES FOR ONE LINEAR FT. OF BOX	QUANTITIES FOR TWO HEADWALLS		STRUCTURAL EXCAVATOR	
					CONCRETE	STEEL	TWO HEADWALLS	TWO CUT-OFF WALLS
0-2	4	12	1	0.550	4.0	4.0	4.0	4.0
2-4	4	12	2	1.100	8.0	8.0	8.0	8.0
4-6	4	12	3	1.650	12.0	12.0	12.0	12.0
6-8	4	12	4	2.200	16.0	16.0	16.0	16.0
8-10	4	12	5	2.750	20.0	20.0	20.0	20.0
10-12	4	12	6	3.300	24.0	24.0	24.0	24.0
12-14	4	12	7	3.850	28.0	28.0	28.0	28.0
14-16	4	12	8	4.400	32.0	32.0	32.0	32.0
16-18	4	12	9	4.950	36.0	36.0	36.0	36.0
18-20	4	12	10	5.500	40.0	40.0	40.0	40.0

GENERAL NOTES

All work shall be done according to the Standard Specifications of the Colorado State Highway Department, Adopted January 1, 1948.

All concrete shall be Class W.

Horizontal construction joints not required when floor and side walls are poured monolithically. All walls shall have forms on both sides.

Minimum distance between centerline of bar and edge of concrete to be 1/2".

All construction joints shall be thoroughly cleaned before fresh concrete is poured. Footings or rock shall be poured out to the rock and not formed.

For culverts required and governing dimensions see List of Structures.

Reinforcing bars shall be deformed.

Reinforcing bars shall be tagged with the station number and letter designation.

Sections of bars when spaced shall be given a lap of 50 diameters.

Main bars shall not be spliced.

Locations and depths of footings shown are according to the best available data; if essentially different conditions are encountered the engineer will inspect and determine if necessary.

Pouring 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 be Half-Lap Joints as shown in detail.

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 18" depth and each layer shall be compacted in accordance with the illustration of Mechanically Tamped Backfill shown on this drawing.

All surfaces exposed to view in the box and wing walls shall receive dress surface finish, except culvert barrels.

LOADING DATA
LIVE LOAD 4 ASKD H 20-S16-44
DEAD LOAD EARTH 120 (upper curb)
CONCRETE 150 (lower curb)

DESIGNING DATA
SCALE 1" = 10'-0"
DESIGNED BY W.W.D.
CHECKED BY J.C.
DATE 10-1-48

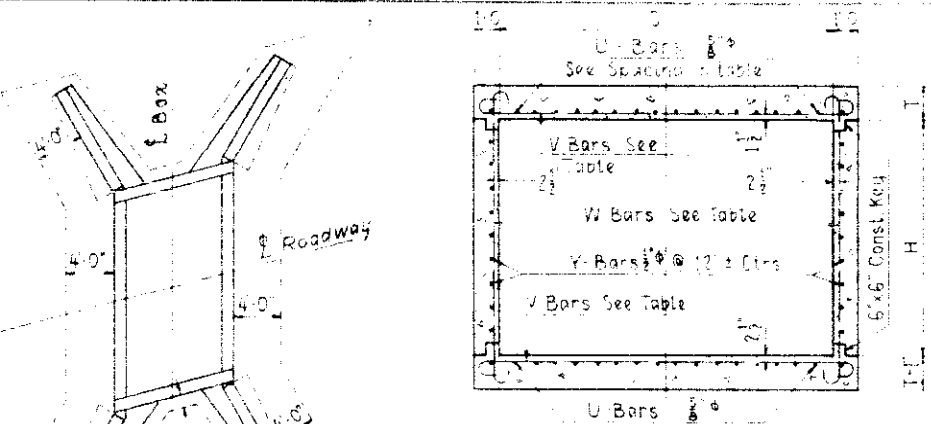
APPROVED BY J.E.R.
BRIDGE ENGINEER
DATE 10-1-48

COLORADO STATE HIGHWAY DEPARTMENT

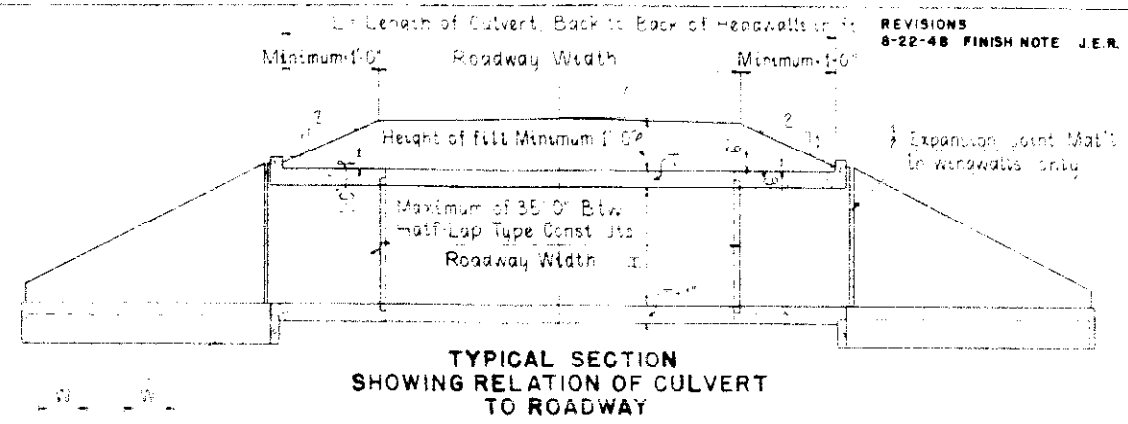
CONCRETE BOX CULVERT

2'x2'	4'x3'	5'x5'
3'x2'	4'x4'	6'x4'
3'x3'	5'x3'	6'x6'
4'x2'	5'x4'	6'x7'

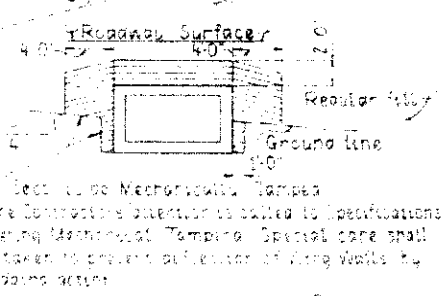
Designed by W.W.D. Approved by J.E.R.
Checked by J.C. Bridge Engineer
Date 10-1-48



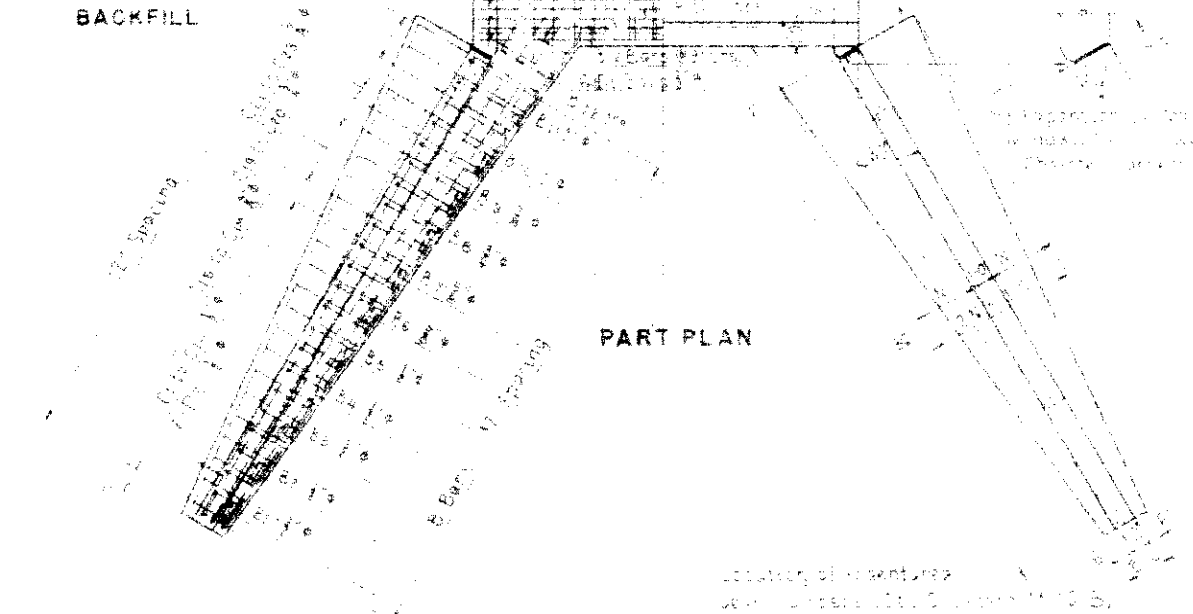
TYPICAL SECTION THRU BOX



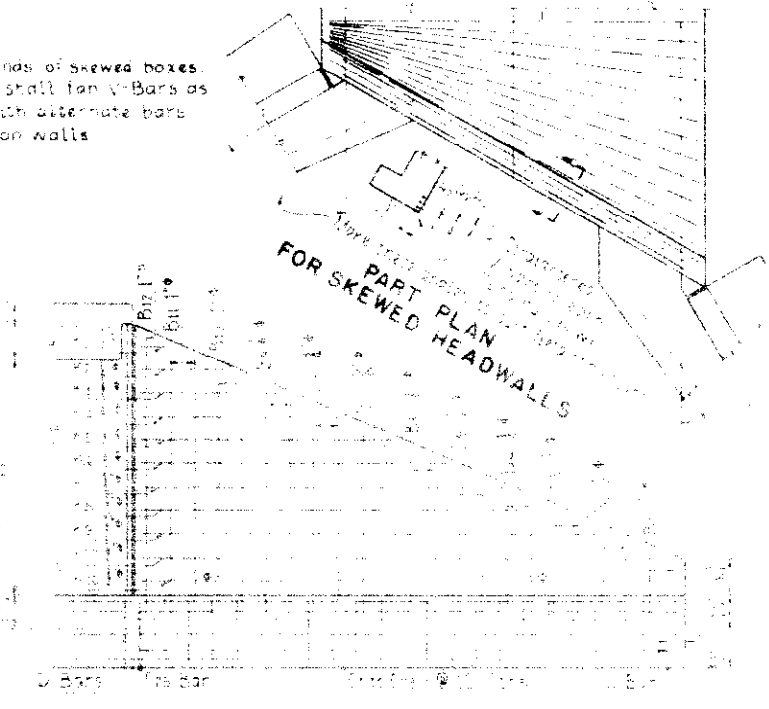
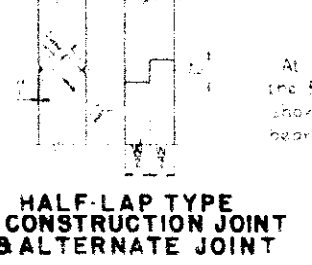
TYPICAL SECTION SHOWING RELATION OF CULVERT TO ROADWAY



MECHANICALLY TAMPED BACKFILL



PART PLAN



TRUE ELEVATION OF WINGWALL

REVISIONS
8-22-48 FINISH NOTE J.E.R.

STANDARD M-104-F

STATE

3

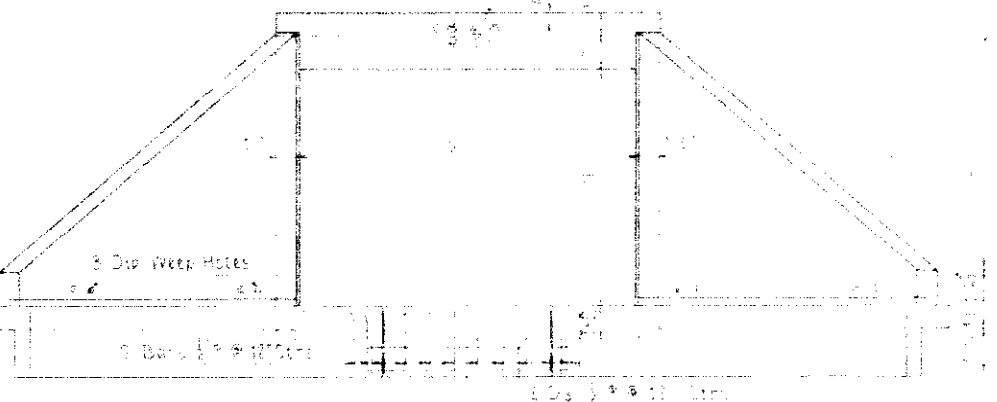
28

Use Bars For	Mark	Size	Quantity	Remarks	Total Length	Remarks
All Sizes See Table	W	1/2"	12	Bottom Slab	12	
All Sizes See Table	V	1/2"	12	Bottom Slab	12	
All Sizes See Table	U	1/2"	12	Top Slab	12	
All Sizes See Table	Y	1/2"	12	Bottom Slab	12	
All Sizes See Table	B	1/2"	12	Bottom Slab	12	
All Sizes See Table	C	1/2"	12	Bottom Slab	12	
All Sizes See Table	D	1/2"	12	Bottom Slab	12	
All Sizes See Table	E	1/2"	12	Bottom Slab	12	
All Sizes See Table	F	1/2"	12	Bottom Slab	12	
All Sizes See Table	G	1/2"	12	Bottom Slab	12	
All Sizes See Table	H	1/2"	12	Bottom Slab	12	
All Sizes See Table	I	1/2"	12	Bottom Slab	12	
All Sizes See Table	J	1/2"	12	Bottom Slab	12	
All Sizes See Table	K	1/2"	12	Bottom Slab	12	
All Sizes See Table	L	1/2"	12	Bottom Slab	12	
All Sizes See Table	M	1/2"	12	Bottom Slab	12	
All Sizes See Table	N	1/2"	12	Bottom Slab	12	
All Sizes See Table	O	1/2"	12	Bottom Slab	12	
All Sizes See Table	P	1/2"	12	Bottom Slab	12	
All Sizes See Table	Q	1/2"	12	Bottom Slab	12	
All Sizes See Table	R	1/2"	12	Bottom Slab	12	
All Sizes See Table	S	1/2"	12	Bottom Slab	12	
All Sizes See Table	T	1/2"	12	Bottom Slab	12	
All Sizes See Table	U	1/2"	12	Bottom Slab	12	
All Sizes See Table	V	1/2"	12	Bottom Slab	12	
All Sizes See Table	W	1/2"	12	Bottom Slab	12	
All Sizes See Table	X	1/2"	12	Bottom Slab	12	
All Sizes See Table	Y	1/2"	12	Bottom Slab	12	
All Sizes See Table	Z	1/2"	12	Bottom Slab	12	

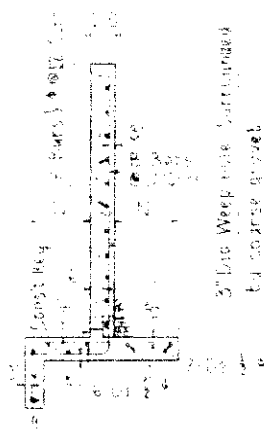
GENERAL NOTES
LOADING DATA
DESIGNING DATA

TABLE OF DIMENSIONS AND QUANTITIES
STEEL QUANTITIES GIVEN BELOW INCLUDE ALLOWANCE OF 1% FOR OVERRUN

Span	Box	Wingwall	Bar	Quantity	Remarks
10	8x6	8x6	W	12	
10	8x6	8x6	V	12	
10	8x6	8x6	U	12	
10	8x6	8x6	Y	12	
10	8x6	8x6	B	12	
10	8x6	8x6	C	12	
10	8x6	8x6	D	12	
10	8x6	8x6	E	12	
10	8x6	8x6	F	12	
10	8x6	8x6	G	12	
10	8x6	8x6	H	12	
10	8x6	8x6	I	12	
10	8x6	8x6	J	12	
10	8x6	8x6	K	12	
10	8x6	8x6	L	12	
10	8x6	8x6	M	12	
10	8x6	8x6	N	12	
10	8x6	8x6	O	12	
10	8x6	8x6	P	12	
10	8x6	8x6	Q	12	
10	8x6	8x6	R	12	
10	8x6	8x6	S	12	
10	8x6	8x6	T	12	
10	8x6	8x6	U	12	
10	8x6	8x6	V	12	
10	8x6	8x6	W	12	
10	8x6	8x6	X	12	
10	8x6	8x6	Y	12	
10	8x6	8x6	Z	12	



END ELEVATION



TYPICAL SECTION THRU WINGWALL

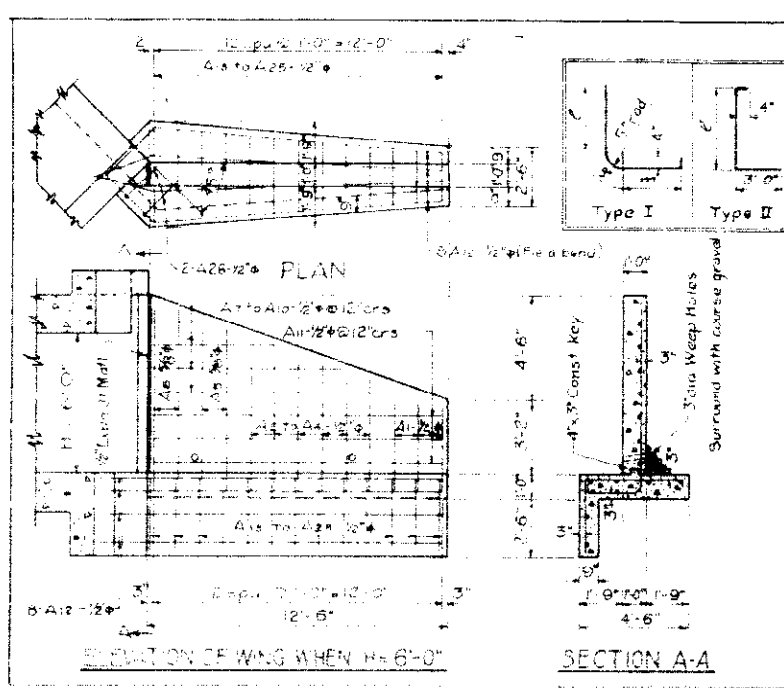
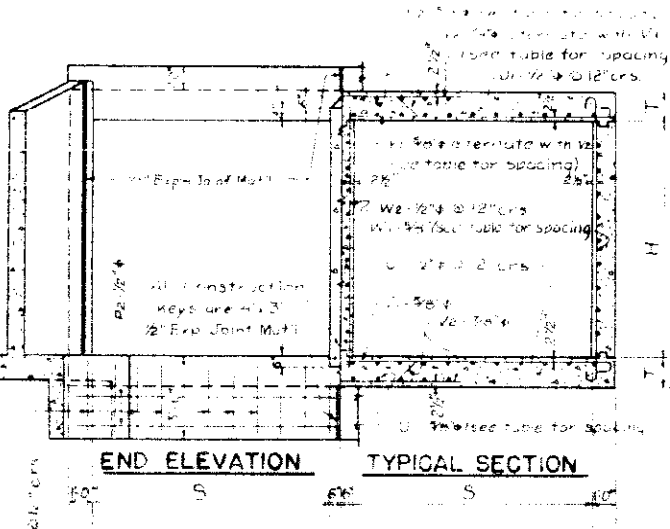
COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
CONCRETE BOX CULVERT

8x4 10x6 12x6 14x8
8x6 10x8 12x8 14x10
8x8 10x10 12x10 14x10

DATE 12-1-48

STANDARD M-110 D

FED. ROAD DIST. NO.	STATE	SHEET NO.	TOTAL SHEETS
3	COLO.	29	



*** Bar List and Summary For 4 Wings ***

Mark	Size	Req'd	Length	Type	Q	m
A1	1/2"	12	5'-2"	I	3'-4"	10'
A2	3/8"	8	6'-7"	I	4'-5"	1'-2"
A3	3/8"	8	7'-6"	I	5'-2"	1'-4"
A4	1/2"	8	8'-4"	I	5'-10"	1'-6"
A5	3/8"	8	9'-3"	I	6'-7"	1'-8"
A6	3/8"	8	10'-2"	I	7'-4"	1'-10"
A7	4	2	2'-6"	to	2'-11"	to
A8	1/2"	of 10'-9"	Struc.			
A9	each	by 2'-0"				
A10	1/2"	12	12'-2"	Struc.		
A11	1/2"	32	15'-0"	Struc.		
A12	1/2"	4	5'-11"	to	2'-11"	to
A13	1/2"	of 7'-6"	II	4'-1"		
A14	each	by 2'				
A15	3/8"	8	5'-4"	II	2'-0"	

1350 Lin Ft 1/2" bar @ 0.668' ft = 902 Lbs
156 3/8" @ 1.043' = 163
Plus 1% Overrun = 10
Total = 1075 LBS

Class A Concrete For 4 Wings 2428 Cu Yds

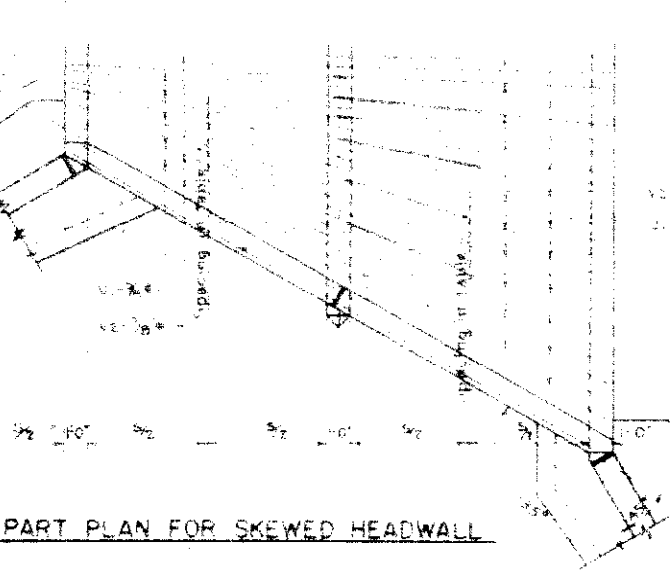
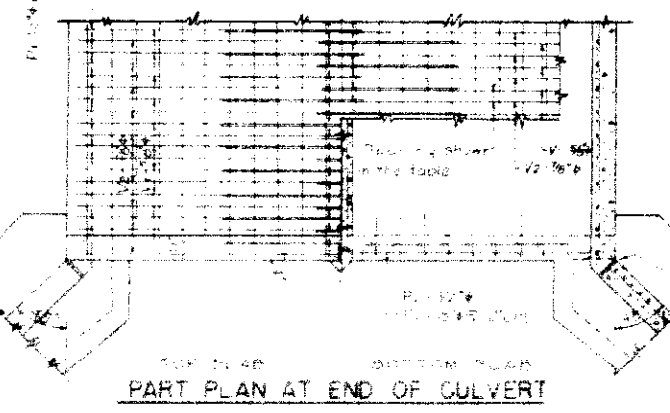
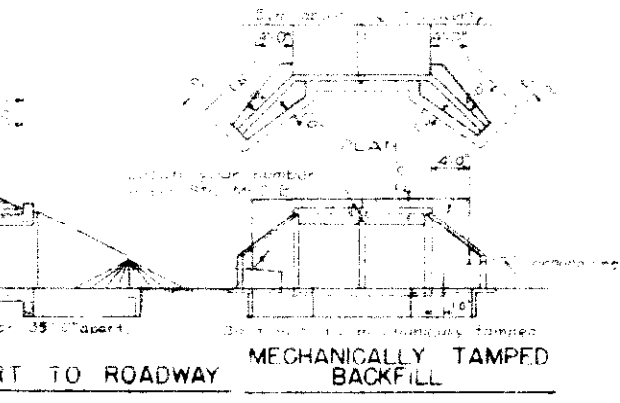


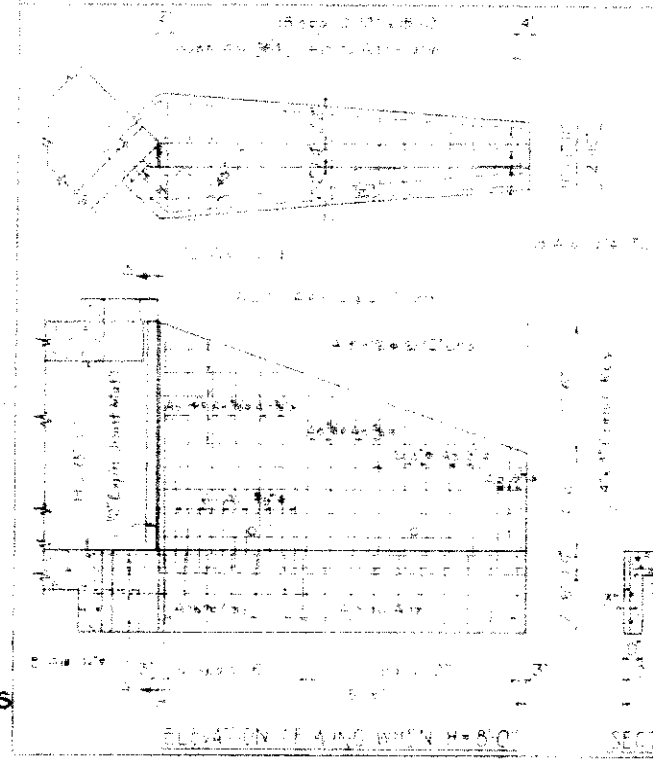
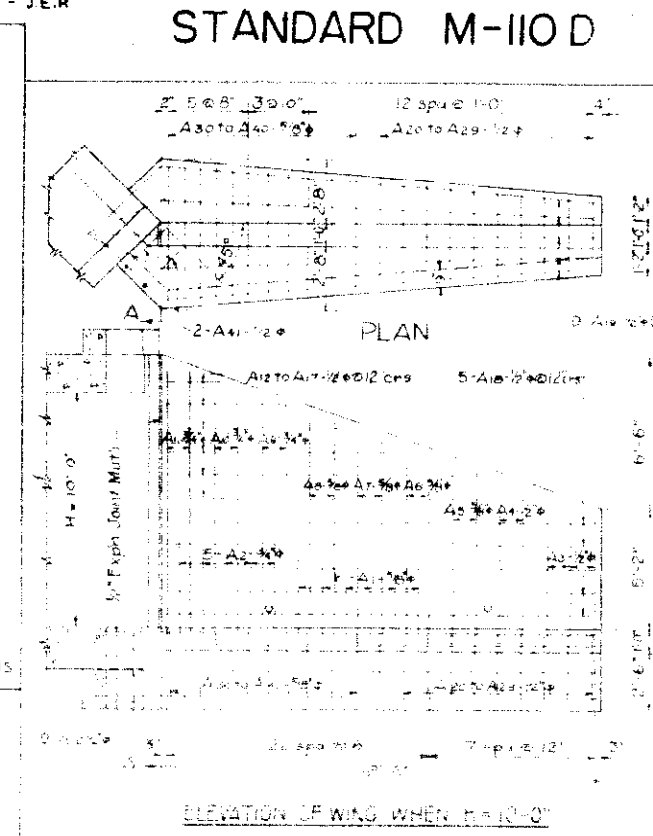
TABLE OF DIMENSIONS & QUANTITIES

Wing	Span	Rise	Base	Quantities For		Concrete	Reinforcing Steel
				4 Wings	1 Wing		
1	10.0	5.0	64	3370	780	2128	1075
2	12.0	6.0	80	4140	900	2592	1286
3	14.0	7.0	98	4910	1020	3060	1500
4	16.0	8.0	116	5680	1140	3528	1714
5	18.0	9.0	134	6450	1260	3996	1928
6	20.0	10.0	152	7220	1380	4464	2142
7	22.0	11.0	170	7990	1500	4932	2356
8	24.0	12.0	188	8760	1620	5400	2570
9	26.0	13.0	206	9530	1740	5868	2784
10	28.0	14.0	224	10300	1860	6336	3000
11	30.0	15.0	242	11070	1980	6804	3214
12	32.0	16.0	260	11840	2100	7272	3430
13	34.0	17.0	278	12610	2220	7740	3644
14	36.0	18.0	296	13380	2340	8208	3860
15	38.0	19.0	314	14150	2460	8676	4074
16	40.0	20.0	332	14920	2580	9144	4290
17	42.0	21.0	350	15690	2700	9612	4504
18	44.0	22.0	368	16460	2820	10080	4720
19	46.0	23.0	386	17230	2940	10548	4934
20	48.0	24.0	404	18000	3060	11016	5150
21	50.0	25.0	422	18770	3180	11484	5364
22	52.0	26.0	440	19540	3300	11952	5580
23	54.0	27.0	458	20310	3420	12420	5794
24	56.0	28.0	476	21080	3540	12888	6010
25	58.0	29.0	494	21850	3660	13356	6224
26	60.0	30.0	512	22620	3780	13824	6440
27	62.0	31.0	530	23390	3900	14292	6654
28	64.0	32.0	548	24160	4020	14760	6870
29	66.0	33.0	566	24930	4140	15228	7084
30	68.0	34.0	584	25700	4260	15696	7300
31	70.0	35.0	602	26470	4380	16164	7514
32	72.0	36.0	620	27240	4500	16632	7730
33	74.0	37.0	638	28010	4620	17100	7944
34	76.0	38.0	656	28780	4740	17568	8160
35	78.0	39.0	674	29550	4860	18036	8374
36	80.0	40.0	692	30320	4980	18504	8590
37	82.0	41.0	710	31090	5100	18972	8804
38	84.0	42.0	728	31860	5220	19440	9020
39	86.0	43.0	746	32630	5340	19908	9234
40	88.0	44.0	764	33400	5460	20376	9450
41	90.0	45.0	782	34170	5580	20844	9664
42	92.0	46.0	800	34940	5700	21312	9880
43	94.0	47.0	818	35710	5820	21780	10094
44	96.0	48.0	836	36480	5940	22248	10310
45	98.0	49.0	854	37250	6060	22716	10524
46	100.0	50.0	872	38020	6180	23184	10740



BAR LIST FOR CULVERT & TWO HEADWALLS

NUMBER	SIZE	REQUIRED	TYPE	LENGTH	BENDING DIAGRAM
V1	1/2"	24	Spacing	2'-10"	
V2	3/8"	8	Spacing	2'-6"	
A1	1/2"	8	Spacing	1'-2'-8"	
V1	1/2"	24	Spacing	1'-6"	
V2	3/8"	8	Spacing	1'-6"	
R1	2"	8	Struc.	1'-2'-2"	



*** Bar List and Summary For 4 Wings ***

Mark	Size	Req'd	Length	Type	Q	m
A1	1/2"	24	5'-8"	I	3'-4"	1'-4"
A2	3/8"	20	6'-6"	I	4'-4"	1'-0"
A3	3/8"	12	7'-6"	I	5'-3"	1'-3"
A4	1/2"	8	8'-10"	I	6'-4"	1'-6"
A5	3/8"	8	9'-8"	I	7'-2"	1'-8"
A6	3/8"	8	12'-2"	I	9'-0"	2'-2"
A7	each	by 10'			by 5'	by 2'
A8	1/2"	13	13'-2"	to	9'-10"	2'-4"
A9	1/2"	of 14'-10"	II	11'-2"	2'-5"	
A10	each	by 10'			by 8'	by 2'
A11	1/2"	4	2'-2"	to	2'-2"	to
A12	1/2"	of 16'-4"	Struc.			
A13	each	by 10'				
A14	1/2"	20	18'-2"	Struc.		
A15	1/2"	36	21'-6"	Struc.		
A16	4	6	6'-5"	to	2'-11"	to
A17	1/2"	of 7'-9"	II	4'-8"		
A18	each	by 2'				
A19	4	7	7'-11"	to	4'-7"	to
A20	1/2"	of 9'-0"	II	5'-10"		
A21	each	by 10'				
A22	1/2"	4	5'-4"	II	2'-0"	

442 Lin Ft 1/2" bar @ 0.668' ft = 295 Lbs
568 3/8" @ 1.043' = 591
Total = 886 LBS

Class A Concrete For 4 Wings 4363 Cu Yds

*** Bar List and Summary For 4 Wings ***

Mark	Size	Req'd	Length	Type	Q	m
A1	1/2"	24	5'-8"	I	3'-4"	1'-4"
A2	3/8"	8	6'-6"	I	4'-4"	1'-0"
A3	3/8"	8	7'-6"	I	5'-3"	1'-3"
A4	1/2"	8	8'-10"	I	6'-4"	1'-6"
A5	3/8"	8	9'-8"	I	7'-2"	1'-8"
A6	3/8"	8	12'-2"	I	9'-0"	2'-2"
A7	each	by 10'			by 5'	by 2'
A8	1/2"	13	13'-2"	to	9'-10"	2'-4"
A9	1/2"	of 14'-10"	II	11'-2"	2'-5"	
A10	each	by 10'			by 8'	by 2'
A11	1/2"	4	2'-2"	to	2'-2"	to
A12	1/2"	of 16'-4"	Struc.			
A13	each	by 10'				
A14	1/2"	20	18'-2"	Struc.		
A15	1/2"	36	21'-6"	Struc.		
A16	4	6	6'-5"	to	2'-11"	to
A17	1/2"	of 7'-9"	II	4'-8"		
A18	each	by 2'				
A19	4	7	7'-11"	to	4'-7"	to
A20	1/2"	of 9'-0"	II	5'-10"		
A21	each	by 10'				
A22	1/2"	4	5'-4"	II	2'-0"	

442 Lin Ft 1/2" bar @ 0.668' ft = 295 Lbs
568 3/8" @ 1.043' = 591
Total = 886 LBS

Class A Concrete For 4 Wings 4363 Cu Yds

GENERAL NOTES

All work shall be done according to the standard specifications of the Colorado State Highway Department, adopted January 17, 1949.

Reinforcing bars shall be Class A and the exposed corners shall be beveled to 2" radius.

For further construction keys are not required when floors and sidewalks are placed monolithically.

Construction joints shall be placed in concrete surfaces before fresh concrete is placed. All concrete surfaces exposed to view shall be finished in the same manner as the finished surface.

Construction joints shall be placed in concrete surfaces before fresh concrete is placed. All concrete surfaces exposed to view shall be finished in the same manner as the finished surface.

Reinforcing bars are shown as bent with flanges with the same angle as shown in the drawings.

Minimum shall not be placed and shall be used when the length of the bars is less than 10'.

Construction joints shall be placed in concrete surfaces before fresh concrete is placed. All concrete surfaces exposed to view shall be finished in the same manner as the finished surface.

Reinforcing bars shall be placed in accordance with the drawings for mechanically tamped backfill.

The design shall be used when half of the excess that gives in the table as allowable.

COLORADO STATE HIGHWAY DEPARTMENT STANDARD DOUBLE CONCRETE BOX CULVERT

10' x 8'	12' x 6'	14' x 6'
10' x 8'	12' x 8'	14' x 8'
10' x 10'	12' x 10'	14' x 10'

Designed by W.W.D. Approved by H.H. Kelly
Checked by W.C.L. Bridge Engineer
Date: 7/1/50

DETAILS OF MANHOLE

STANDARD M-12-C 8 NO. 8 CONCRETE INLET

FED. ROAD DIST. NO.	STATE	SHEET NO.	TOTAL SHEETS
3	COLO.	50	

Revised 10-40 P.B. Added Rd. Bar Symbols to Bar List
Changed Standard No.
Revised 11-21-47 C.G.M. - Steps B Alternate for Brick Manhole
Rev. 11-21-47 C.G.M.

NOTE

All brick in manholes to conform to requirements of Grade MA of A.A.S.H.O. Designation M-91-42.
Manhole bottoms may be either brick or concrete.
Manhole benches shall be of brick as specified.
Equivalent reinforced concrete manholes may be used in lieu of standard masonry manhole. However all departures from details shown hereon must be approved by the Department before being used.

BAR LIST FOR H=6'-6"

MARK	SIZE	NO. REQD.	LENGTH	TYPE	DIMENSIONS			TOTAL LENGTH	BENDING DIAGRAM
					a	b	c		
K	1/2"	3	16' 9"	I	6'0"	4'3"	6'0"	50' 3"	
L	1/2"	1	14' 3"	I	6'0"	4'3"	36"	4' 3"	
M	1/2"	6	16' 9"	II	4'8"	-	-	100' 6"	
N	1/2"	4	10' 11"	III	4'8"	-	-	43' 8"	
O	3/4"	3	2' 6"	I	0'8"	0'8"	0'8"	7' 6"	
P	1/2"	2	3' 6"	IV	2'0"	1'6"	-	7' 0"	
R	1/2"	3	2' 4"	Str.	-	-	-	7' 0"	
R1	1/2"	3	4' 7"	Str.	-	-	-	13' 9"	
R2	1/2"	2	3' 4"	Str.	-	-	-	6' 8"	
R3	1/2"	2	3' 10"	Str.	-	-	-	7' 8"	
S	1/2"	1	6' 5"	V	3' 1"	3' 1"	-	6' 5"	
S1	1/2"	2	4' 11"	VI	2' 4"	2' 4"	-	9' 10"	

These dimensions to be increased in increments of 6" for H above 6'-6"
Add 1 M bar for each 6" additional height above 6'-6"
Additional O bars required as follows:
H= 7'-6" to 8'-6" 1 bar
H= 8'-0" to 10'-0" 2 bars
Cut or bend bars around pipes as required
N-Bars

STORM SEWER RING AND COVER

Ref H & B, Col. 150, P. 37, Fig. 371-C, D, or Equal. Approx. weight with hood and hinge plate 285 lbs.

Hood to be used only when specified.

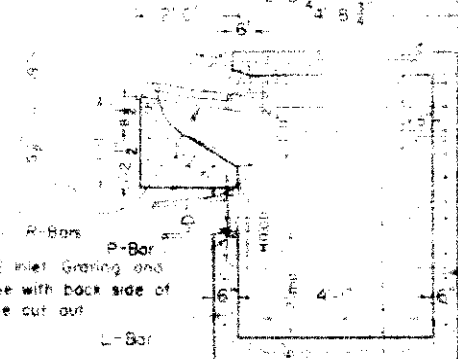
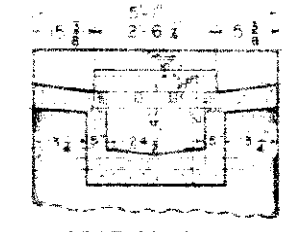
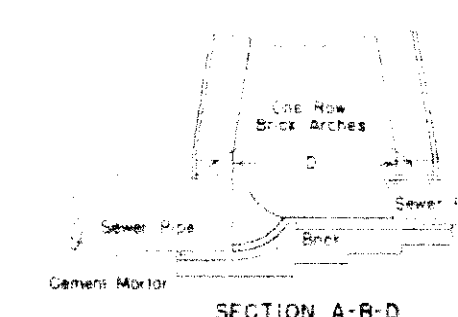
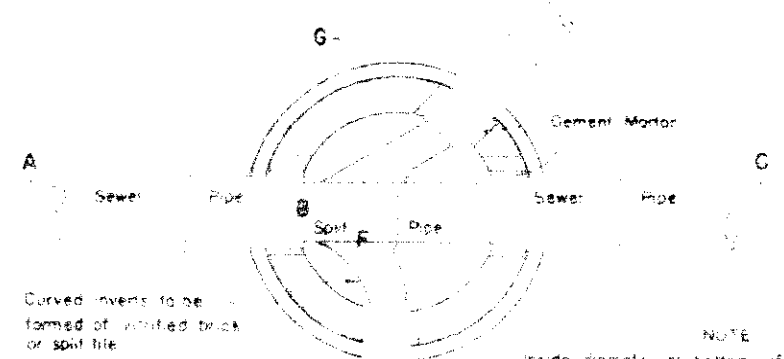
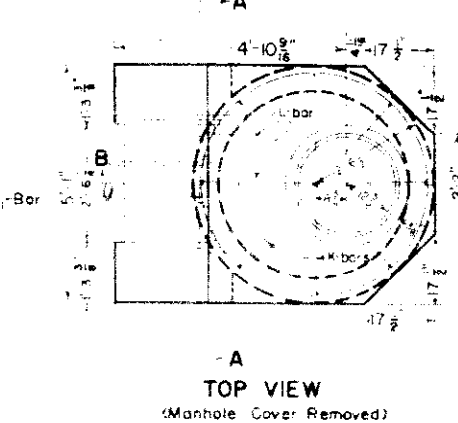
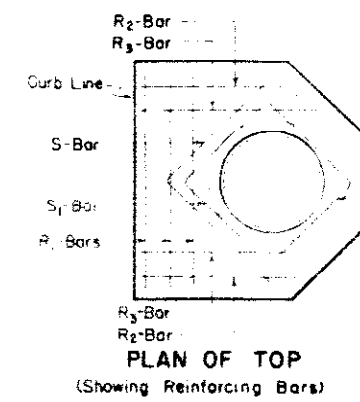
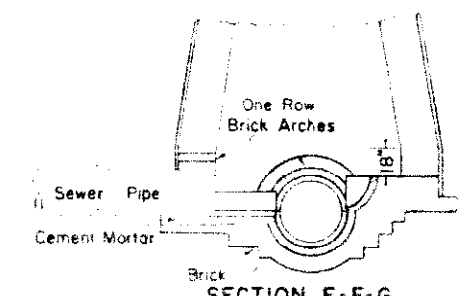
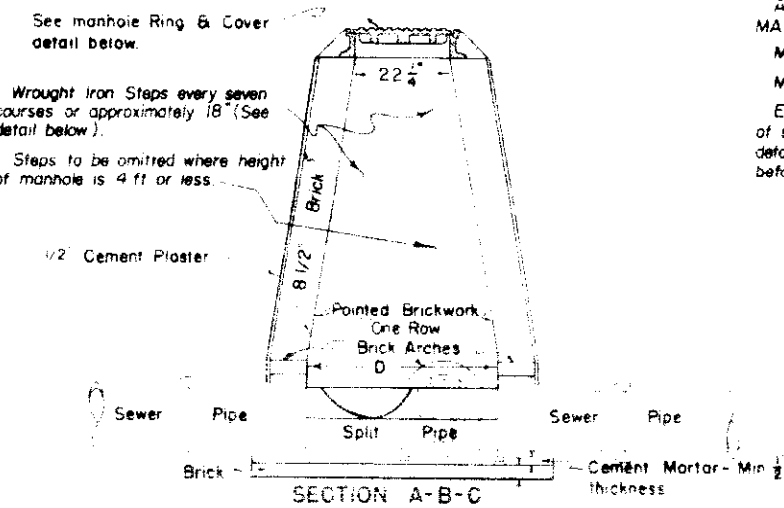
NO. 12 INLET GRATING & FRAME

Approx. weight 400 lbs.
N-Bars - Steps to be omitted when H is 4 feet or less.
K-Bar

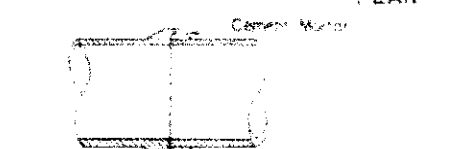
QUANTITIES

H	CLASS 'A' CONCRETE (CY)	REINFORCING STEEL (LBS)
6' 0"	2.4	152
7' 0"	2.5	206
8' 0"	2.7	224
9' 0"	2.8	238
10' 0"	2.9	252
11' 0"	3.0	270
12' 0"	3.2	284
13' 0"	3.3	298

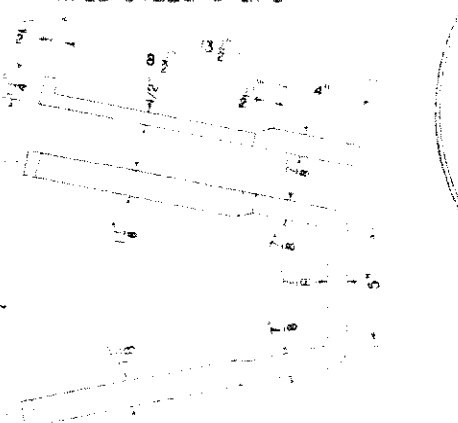
Includes 1% allowance for overrun
* Volume for wet volume occupied by pipes to be deducted for pay quantity of concrete.



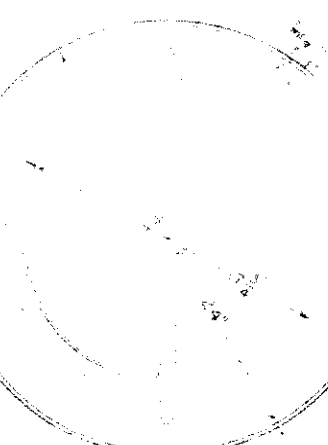
DETAIL OF JOINTS FOR SEWER PIPE



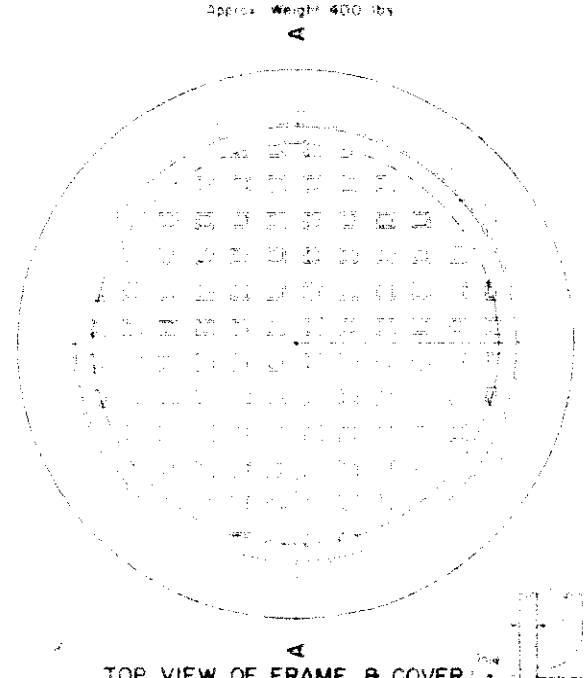
WROUGHT IRON OR MILD STEEL STEPS



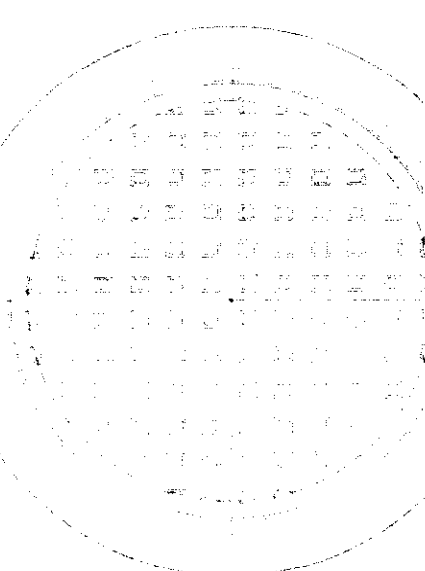
BOTTOM VIEW OF COVER



DENVER PATTERN MANHOLE RING & COVER OR EQUIVALENT

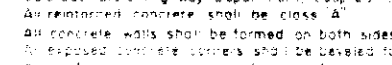
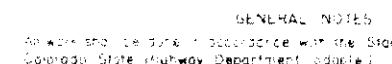
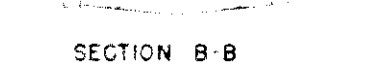
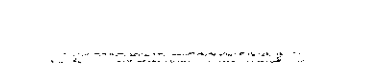
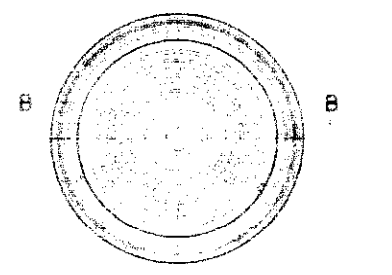


TOP VIEW OF FRAME & COVER



STORM SEWER RING & COVER

Ref H & B, Col. 150, P. 37, Fig. 371-C, or Equal. Approx. Weight 220 lbs.



GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, adopted January 1, 1948.
All reinforced concrete shall be class 'A'.
All concrete walls shall be formed on both sides.
All exposed concrete corners shall be beveled to a 1" face.
All reinforcing bars shall be deformed, of intermediate grade, and shall be tagged with mark designation and station number.
All castings shall be painted with two coats of asphalt or red lead and oil on surfaces exposed to view on the box shall receive cross surface finish.

COLORADO STATE HIGHWAY DEPARTMENT STANDARD NO. 8 CONCRETE INLET, MANHOLE & PIPE JOINTS ON SEWERS

Designed by A.P.G. Approved by A.P.G.
Made by A.P.G. Approved by A.P.G.
Check design A.Z. Approved by A.Z.
Check detail H.S. Date 11/21/47

NO. 12 CONCRETE INLET

STANDARD M-12-C 13

NO. 13 CONCRETE INLET

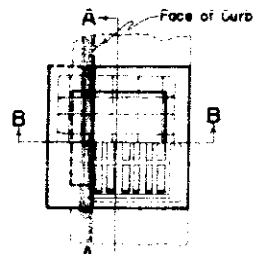
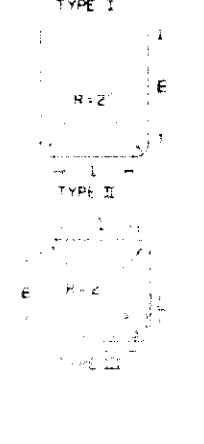
FED. ROAD DIV. NO.	DISTRICT	SHEET NO.	TOTAL SHEETS
9	COLO.	31	

Revision 1-10-46 BB Changed Standard No.
 Revised 12-13-47 JPK
 Rev 2-11-48 Extended tables to H=3' GRB
 Rev 12-14-49 D.M. for No 12 inlet - P.S.M.
 Re. 9-1-50 - Volumes to be deducted - D.H.H.

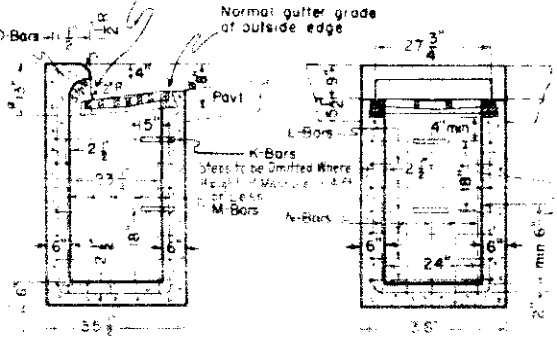
BAR LIST FOR H = 3' 0"

MARK	SIZE	NO REQD	LENGTH	TYPE	DIMENSIONS		BENDING DIAGRAM
					l	m	
K	3/4"	Note	2' 6"	I	0' 8"	0' 8"	
L	1/2"	3	12' 0"	III	2' 2"	2' 2"	
M	1/2"	5	5' 5"	II	2' 1"	1' 5"	
N	1/2"	5	6' 11"	I	2' 3"	1' 6"	
O	1/2"	2	2' 7"	STR	-	-	

- * Omit K bars when H is 4' 0" or less.
- * These dimensions to be increased in increments of 6" for H above 3' 0".
- Add 1 L bar for each 6" additional height above 3' 0".
- K bars required as follows:
 H= 4' 6" to 5' 6" - 1 bar;
 H= 6' 0" to 7' 0" - 2 bars;
 H= 7' 6" to 8' 6" - 3 bars.
- * Add 1 L bar for each 6" additional height above 3' 0".
- H= 9' 0" to 10' 0" - 4 bars.
- * Cut or bend bars around pipes as required.
- * See Plans for size and locations of outlets.



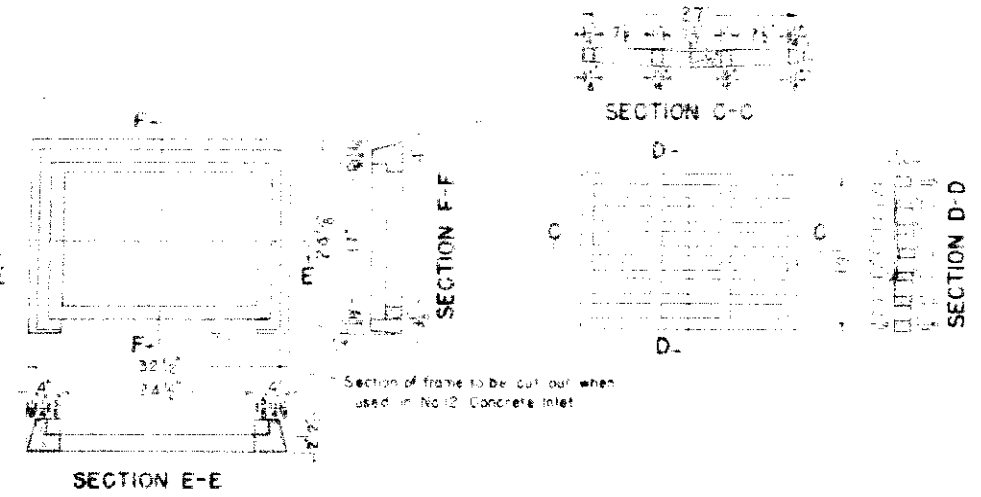
Warp inside gutter grade each side of inlet to meet grade of inlet.



SECTION B-B SECTION A-A

* These dimensions for 6" curb. Dimensions to be modified as required for other heights of curb.

NO. 12 INLET GRATING & FRAME
 Approx. weight 340 lbs.



SECTION E-E

Section of frame to be cut out when used in No. 12 Concrete Inlet.

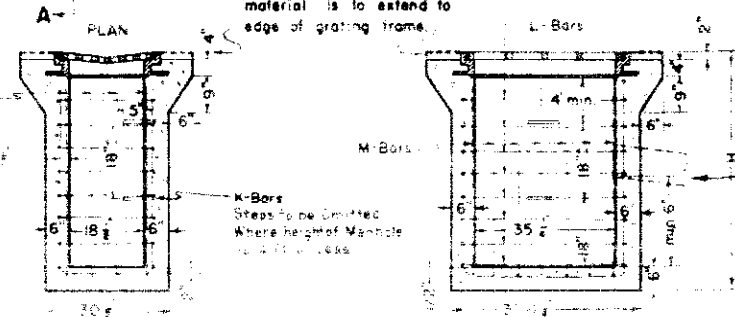
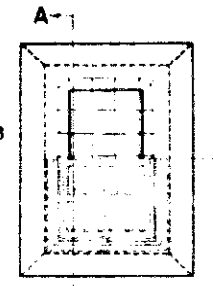
QUANTITIES

H	CLASS "A" CONCRETE	REINFORCING STEEL
3' 0"	0.54	70
4' 6"	0.63	85
6' 0"	0.72	100
7' 6"	0.81	119
9' 0"	0.90	137
10' 0"	1.09	156
11' 6"	1.17	175
13' 0"	1.27	190
14' 6"	1.36	215
16' 0"	1.45	233
18' 0"	1.54	248
19' 6"	1.63	263
21' 6"	1.73	282
23' 0"	1.82	297

* Volume for inlet volume occupied by pipes to be deducted for pay quantity of concrete.
 * Includes 1% allowance for overrun.

GENERAL NOTES

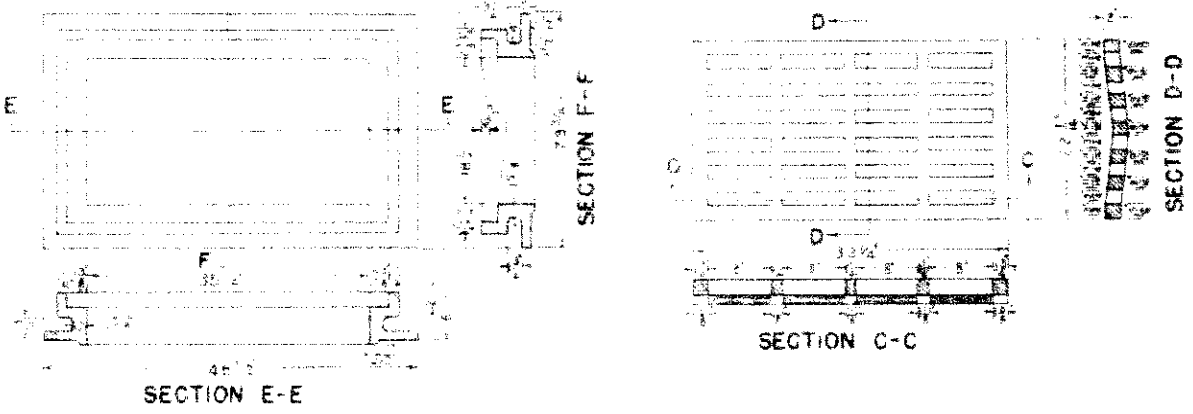
- All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, adopted January 15, 1948.
- All reinforced concrete shall be class "A".
- All concrete walls shall be formed on both sides.
- All exposed concrete corners shall be beveled to a 1" face.
- All reinforcing bars shall be deformed, of intermediate grade, and shall be tagged with mark, designation and station number.
- All castings shall be painted with two coats of asphalt or coal tar and oil.
- All surfaces exposed to view in the box shall receive class 1 surface finish.



SECTION B-B SECTION A-A

0.06 Cu. Yds. of concrete is included in quantities in table. To be deducted when all processed material is to extend to edge of grating frame.

NO. 13 INLET GRATING & FRAME
 Approx. weight 580 lbs.



SECTION E-E

* VOLUME TO BE DEDUCTED FOR EACH OPENING

	C.M.P.	P.C.P.
18"	0.03	0.05
24"	0.06	0.09
30"	0.09	0.14
36"	0.13	0.21

QUANTITIES

H	CLASS "A" CONCRETE	REINFORCING STEEL
3' 0"	0.54	84 lbs
4' 6"	0.63	100
6' 0"	0.72	116
7' 6"	0.81	136
9' 0"	0.90	156
10' 0"	1.09	172
11' 6"	1.17	192
13' 0"	1.27	208
14' 6"	1.36	225
16' 0"	1.45	245
18' 0"	1.54	261
19' 6"	1.63	277
21' 6"	1.73	297
23' 0"	1.82	313
24' 0"	2.28	329

* Volume for inlet volume occupied by pipes to be deducted for pay quantity of concrete.
 * Includes 1% allowance for overrun.

COLORADO STATE HIGHWAY DEPARTMENT STANDARD NO. 12 AND NO. 13 CONCRETE INLETS

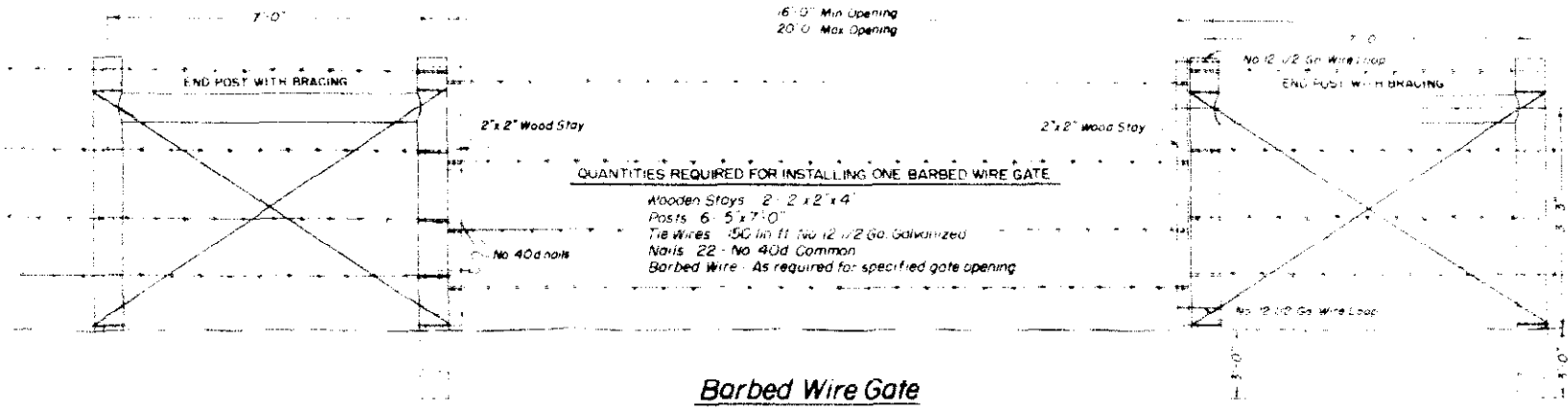
Designed by A.P.G. Made by A.P.G. Check Design A.Z. Check Detail G.R.5. Date January 15, 1945.

Approved by P.A. Bailey Bridge Engineer

Standard Wire Fence With Wooden Posts

STANDARD M-24-H

DIVISION NO. 9 DISTRICT 32
 Rev. 3-1-50, C.G.M., Post spacing, Driveway gate, Added Gen. Note



QUANTITIES REQUIRED FOR INSTALLING ONE BARBED WIRE GATE

Wooden Stays - 2 - 2"x2"x4'
 Posts - 6 - 5"x7'-0"
 Tie Wires - 50 lbs. 11 No. 12 1/2 Ga. Galvanized
 Nails - 22 - No. 40d Common
 Barbed Wire - As required for specified gate opening

METAL STAYS

Required:

1. Between line posts @ posts having braces
2. Equally spaced between line posts

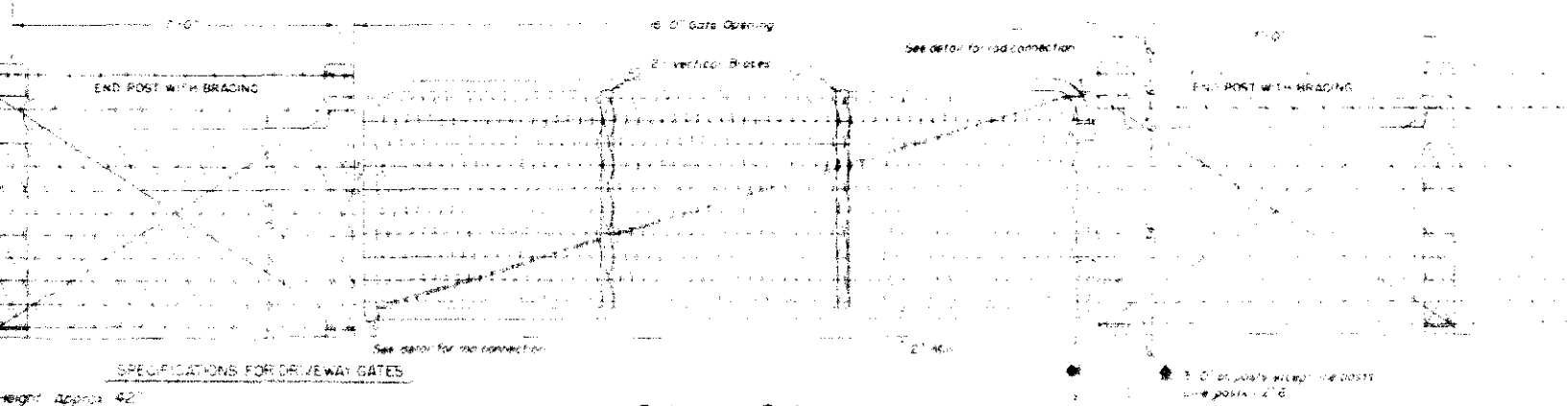
Metal Stays shall be manufactured from wire base not lighter than 9/16" Ga. Galvanized

SPECIFICATIONS FOR BARBED WIRE

Wire shall be of Standard Make, No. 12 1/2 Ga. Galvanized, having two (2) point barb spaced not more than five (5) inches apart.

Barbed Wire Gate

BARBED WIRE FENCE WITH WOODEN POSTS



SPECIFICATIONS FOR DRIVEWAY GATES

Height - Approx. 42"
 Weight - Not less than 9 lbs. complete with latch and hinges
 Width of Gate Opening - 16'-0"
 Gate Frame - 3/4" Standard Galvanized pipe or acceptable equivalent and shall be of welded construction.
 Wire - 1 strand No. 10 Ga. spaced 4" apart for horizontal wires to be woven with 1 strand No. 22 Ga. spaced 2" apart for cross wires.
 Rod Brace - 1/4" Round, minimum.
 Latches & Hinges - Steel, Galvanized, Standard Make

Driveway Gates

SPECIFICATIONS FOR 4 x 4 WIRE MESH FENCE

Width - 34"
 Weight - 276 lbs. per linear foot minimum
 Horizontal wires - 2 strands, No. 2 - R 50 Wire
 Cross wires - 1 strand, No. 14 Ga. wire
 Construction - Cross wires to be woven with horizontal wires making a one piece fabric.

SPECIFICATIONS FOR WALK GATES

Height - Approx. 42"
 Weight - Not less than 15 lbs. complete with latch and hinges
 Width of Gate Opening - 3'-0"
 Gate Frame - 3/4" Standard Galvanized pipe or acceptable equivalent and shall be of welded construction.
 Wire - 1 strand No. 10 Ga. spaced 4" apart for horizontal wires to be woven with 1 strand No. 22 Ga. spaced 2" apart for cross wires.
 Latches & Hinges - Steel, Galvanized, Standard Make

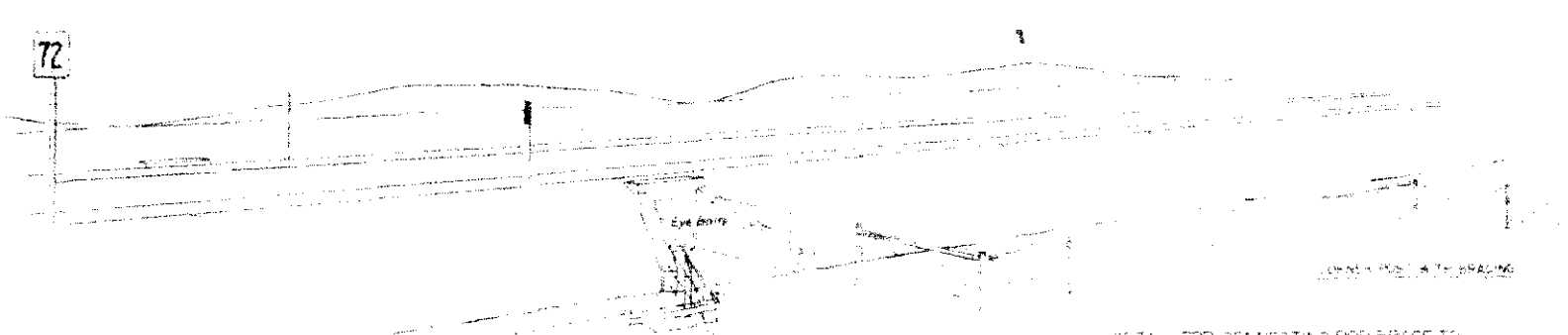
POSTS

All line posts shall have a minimum diameter of four (4) inches
 All end, corner, intersection and brace posts shall have a minimum diameter of five (5) inches
 Cross braces shall be securely nailed with No. 40d Common Nails

Walk Gates

COMBINATION WIRE FENCE WITH WOODEN POSTS

Illustrative Sketch Showing Typical Examples For Constructing Fences

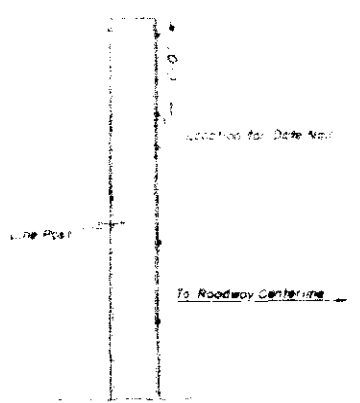


NOTE

End post with bracing to be used at all gates and fence ends. Corner posts with bracing shall be used at all corners and angles in fences. Fence intersection with bracing to be used at all intersecting fences.
 At all structures of 4 x 4 and over the fence shall be ended at eye bolts in the wings of the structure. Where the type of construction prohibits the use of eye bolts, an end post with bracing shall be used.
 Eye bolts are to be made from 1/2" round iron bars with a minimum of 6" of body length embedded in the concrete and a minimum of 1" inside eye diameter.

DETAILS FOR PLACING DATE NAILS

To be installed on Treated wooden Posts only.



NOTE

Date Nails shall be placed on every tenth (10th) post and shall be driven flush.
 Gate Nails to be furnished and installed by State Forces as part of Engineering Costs.

General Notes

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project.

Wire mesh used in Combination Wire Fences as shown above shall be galvanized. Wire mesh used in walk and driveway gates shall be galvanized or painted with an approved waterproof asphalt or mineral paint.

Fence Staples shall be galvanized and of at least 1 1/2" in length and shall be made from wire base not less than No. 9 Ga. Barbed wire fence shall have eight (8) staples per line post. Combination wire fence shall have four (4) staples per line post.

Fence wire to be placed on either road or field side of posts depending on local conditions. On curves the wire should be placed on side of post which would prevent tension on staples. This will also apply where wind drift, tumble weeds or other conditions would exert unusual pressure against the wire.

POSTS

Posts shall be treated or untreated as specified on plans and shall conform to the following:

Untreated posts shall be made of seasoned straight native cedar. The tops of posts shall be sawed off square and peeling of the posts will not be required. Split posts will not be acceptable for use unless specifically permitted in the Special Provisions of plans.

Treated posts shall be made of seasoned, straight, sound Lodgepole Pine or Southern Pine, to be opened and tops to be cut off square before pressure treatment. Posts shall be pressure treated in conformity with requirements of the Specifications.

Use of Galvanized Finish on Gate Frames, Girders, Plated Pipe or Aluminum Painting with zinc chromate Primer as per Specifications will be considered to be equivalent.

COLORADO STATE HIGHWAY DEPARTMENT

Standard Wire Fence With Wooden Posts

Designed by J.C.M. Approved by J.C.M.
 Made by J.C.M. Engineer, Surveys & Plans
 Checked by J.C.M. Date: Nov. 1950

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

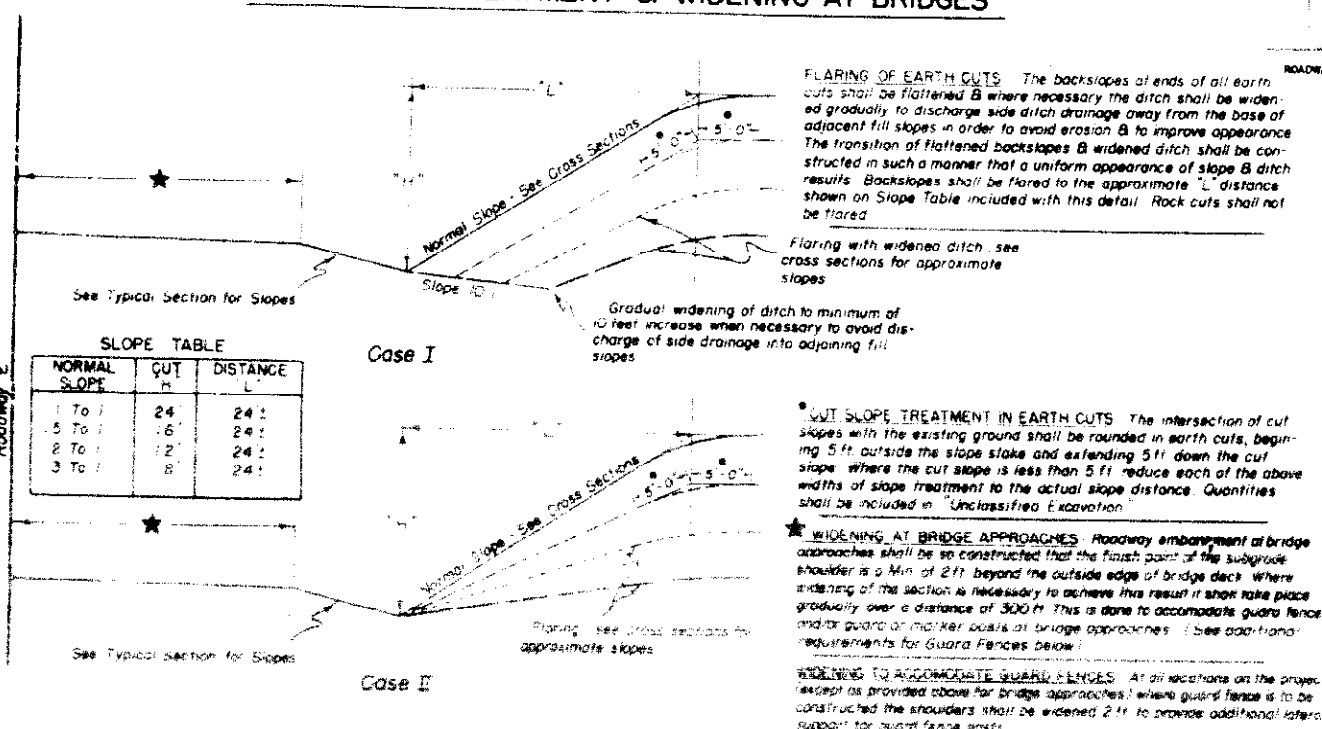
REVISIONS

STANDARD M-2-DM

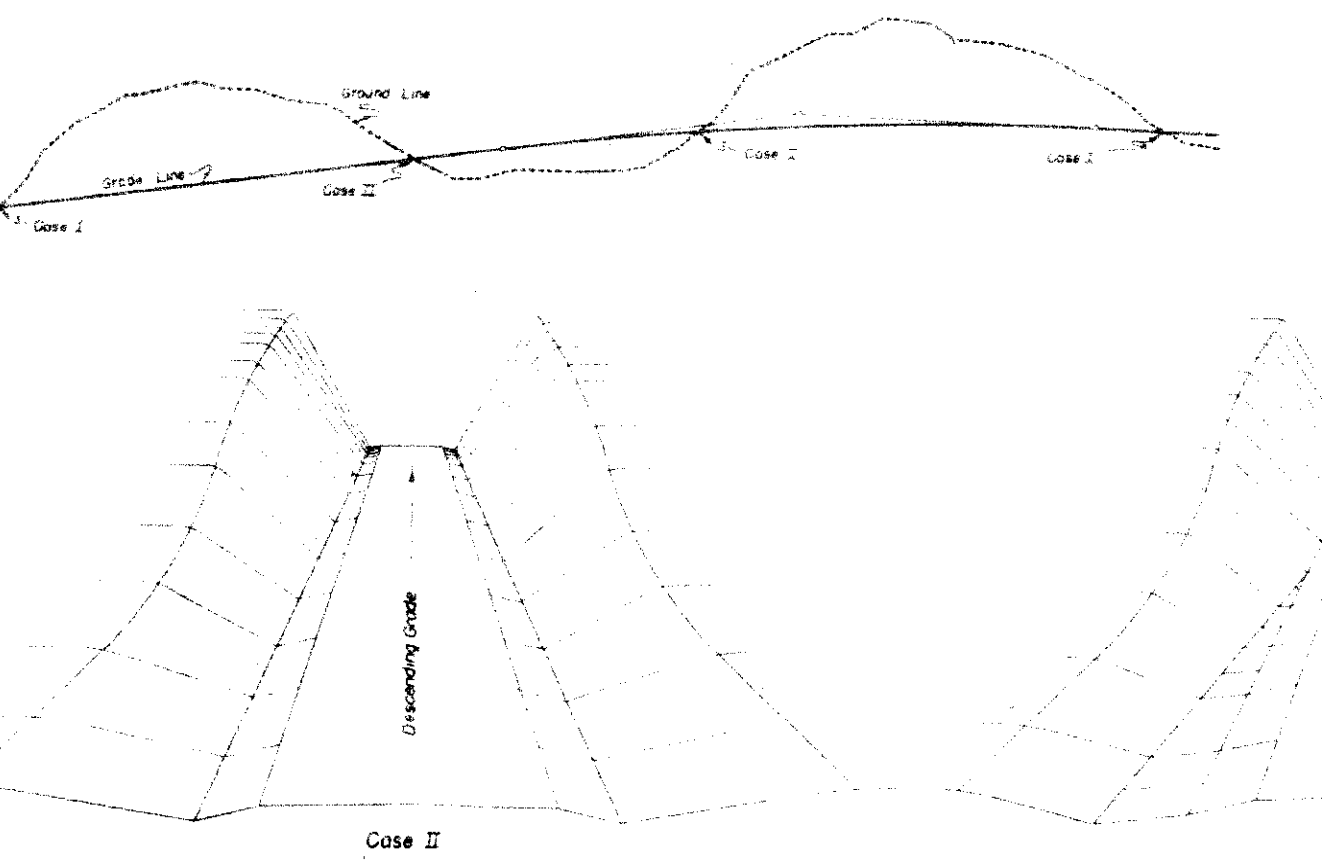
Rev 7-12-49, GGM, Details for widening at Crest of Grades
Rev 12-7-49, GGM, Rev notes re Type I Rd. Apprs. & widen at Bridge Apprs., added note re accel & decel. lanes

DIVISION NO.	DISTRICT	SHEET NO.	TOTAL SHEETS
9	COLO.	34	

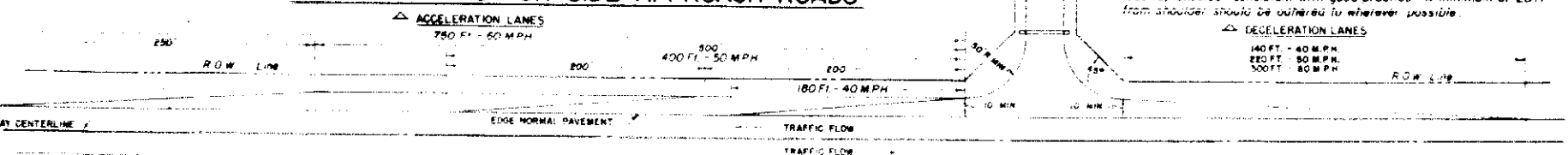
GENERAL DETAILS FOR FLARING OF EARTH CUTS, CUT SLOPE TREATMENT & WIDENING AT BRIDGES



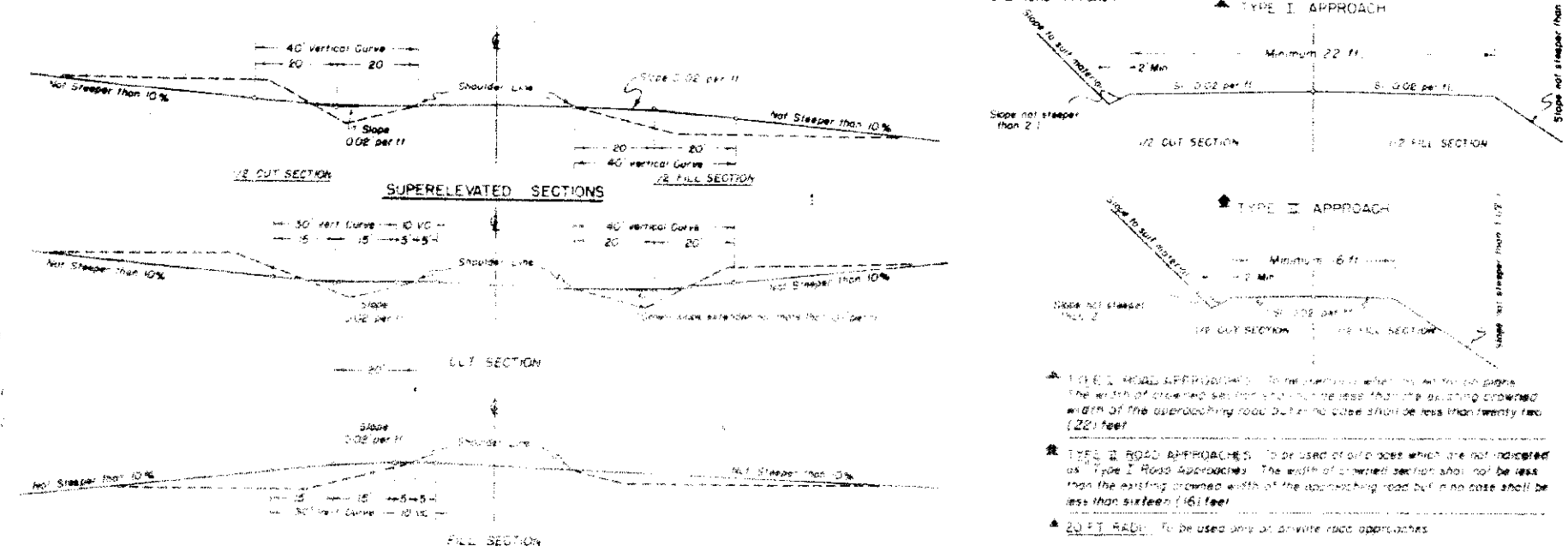
PLAN OF FLARING IN EARTH CUTS



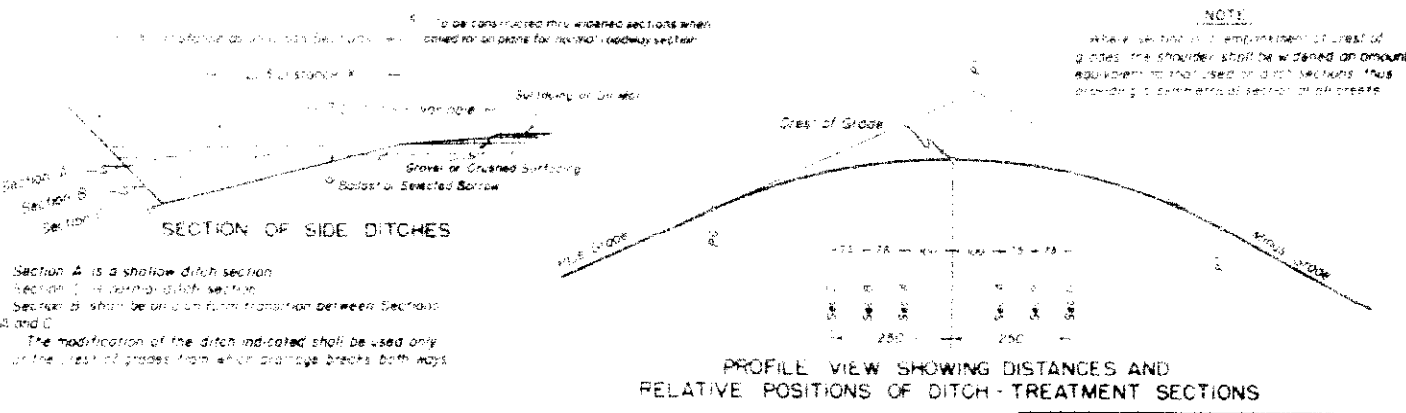
TYPICAL PLANS FOR SIDE APPROACH ROADS



STANDARD CROWNED SECTION



DETAILS FOR DITCH & WIDENED SHOULDERS AT CREST OF GRADES



GENERAL NOTES

- Work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project.
- Side approach roads to the Project shall be grave surfaced with a 4 inch thickness of Gravel or Crushed Rock Surfacing extending approximately to the Right of Way Line. Estimated tonnage & type of material required for this operation are shown in the Surfacing Plan.
- The maximum grades shown are to be the existing grades for all road approaches. Modifications of grades will be permitted where adherence to the grades as shown would cause damage to property or create other unsatisfactory conditions. Grades less than the maximum shown are to be used wherever feasible.

COLORADO STATE HIGHWAY DEPARTMENT

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

Designed by: [Signature]
Made by: GGM
Checked by: [Signature]

Approved by: [Signature]
Engineer James A. [Signature]
Date: April 20th 1949

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

STANDARD M-2-DS

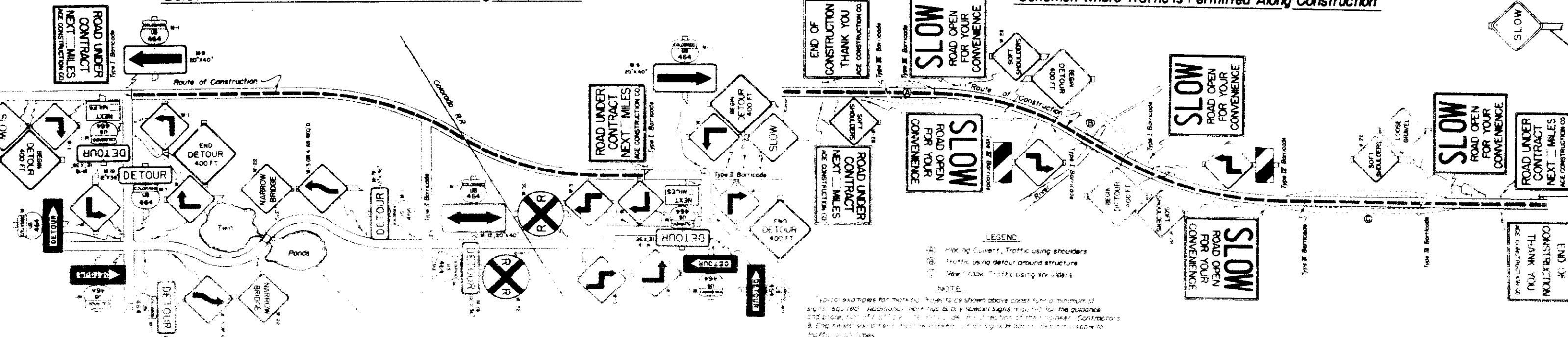
REVISIONS

DIVISION NO. 9	DISTRICT COLO.	SHEET NO. 35	TOTAL SHEETS
REV - 8/16/49 - E E O		REV - 2/3/50 - E A R	

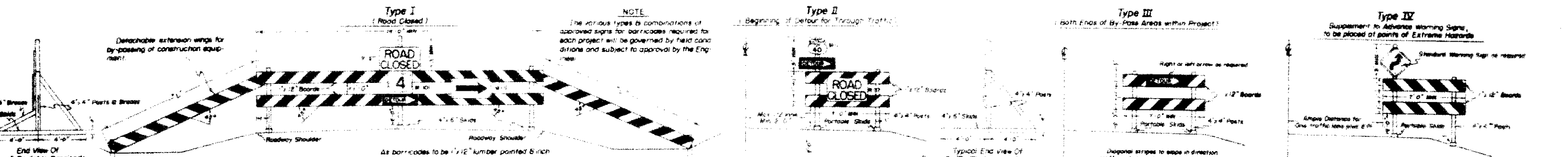
Typical Methods Of Marking Highways & Detours

Detour Condition Where Traffic Is Prohibited Along Construction

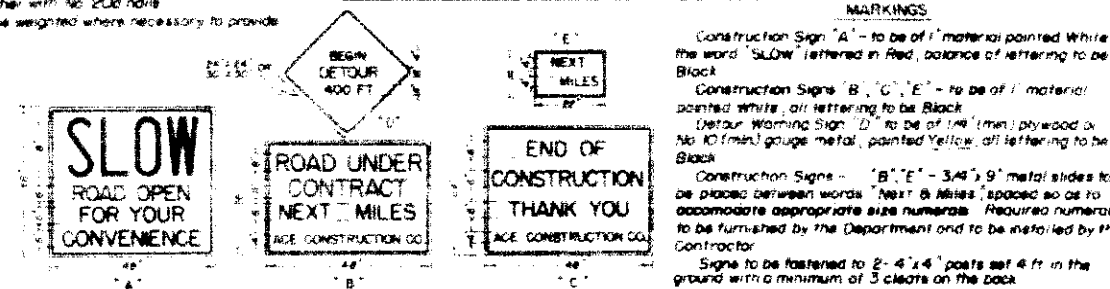
Condition Where Traffic Is Permitted Along Construction



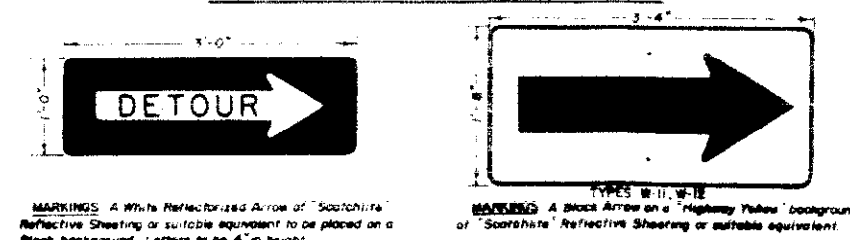
Details Of Barricades



Details Of Construction Signs



Details Of Reflectorized Arrows

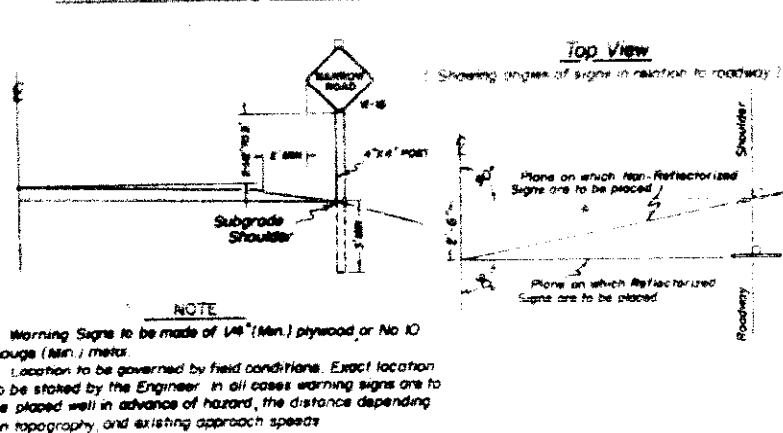


GENERAL NOTES

- All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project.
- Where traffic is maintained through or over any part of the Project, the Contractor will be required to mark all hazards within the limits of the Project with a painted, well maintained Barricades, Warning Signs and Directional Type Signs. All Barricades & Signs shall be moved, added to, changed or removed as required during the progress of construction.
- All Warning & Directional Type Signs will be "Reflectorized" with "Scotchite" Reflective Sheeting or a suitable equivalent. Except for variations noted on this sheet all signs will be in conformity with the specifications outlined in Manual on Uniform Traffic Control Devices for Streets & Highways, issue of August 1948 by the U.S. Public Roads Administration. U.S. or State Route Markers required for the Project will be furnished by the Department and installed by the Contractor. Numbers adjacent to signs refer to Standards in the Manual.
- The Contractor shall furnish & install the following as required within the limits of the Project:
 - All Barricades
 - "SLOW, ROAD OPEN FOR YOUR CONVENIENCE" signs
 - Standard Warning & Directional Signs
 - "ROAD UNDER CONTRACT, NEXT MILES, CONTRACTORS NAME" signs
 - Approved Directional Arrows for Barricades
 - END OF CONSTRUCTION, THANK YOU, CONTRACTORS NAME" signs
 - Torches and Flares as follows:

Type I Barricades	Minimum 3
Type III, IV Barricades	Minimum 1
Standard Warning Signs	Minimum 1
- When traffic is prohibited from the Project, the Detour will be marked by the Department except for Barricades complete with approved Warning Signs & Arrows which will be provided, erected & maintained by the Contractor at ends of Project and intersecting roads.
- All timber used shall be of sound durable material. Barricades, Signs, Symbols & Lettering conforming to types noted herein will be well painted & maintained. Unpainted or smeared lettering will not be accepted.
- Flares and Torches shall be of the Oil-Burning Type approved by the Department and shall be placed 5 ft to 5 ft ahead of the object to be illuminated. Particular care shall be taken to protect all signs and barricades from smoke and grudge arising from torches and flares.

Position Of Signs Relative To Roadbed & Hazards



COLORADO
STATE HIGHWAY DEPARTMENT

Standard Roadway
Construction Traffic Signs

Designed by _____
Made by CGM
Checked by _____

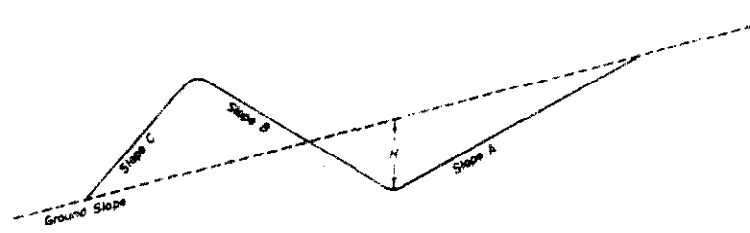
Approved by _____
Engineer _____
Date 7-25-1949

STANDARD TYPES *of* DITCHES *and* CONSTRUCTION METHODS

STANDARD M-107-C

DETAILS *for* CONTOUR INTERCEPTING DITCHES

Typical Section for Contour Intercepting Ditches



PURPOSE & USE OF THE TABLE

The primary purpose of the information for Contour and Intercepting Ditches shown on this sheet is to serve as a guide in construction and to readily arrive at yardages of excavation involved. Foremost consideration in constructing these ditches is given first to the natural ground line slope confronted in construction, thence to the other values shown on the Typical Section. By properly arriving at the combination of values shown on the Typical Section and in the Table for a specified condition, the number of cubic yards of excavation per 100 lin. ft. of ditch may be read under the appropriate column for this item.

Typical Construction Layouts

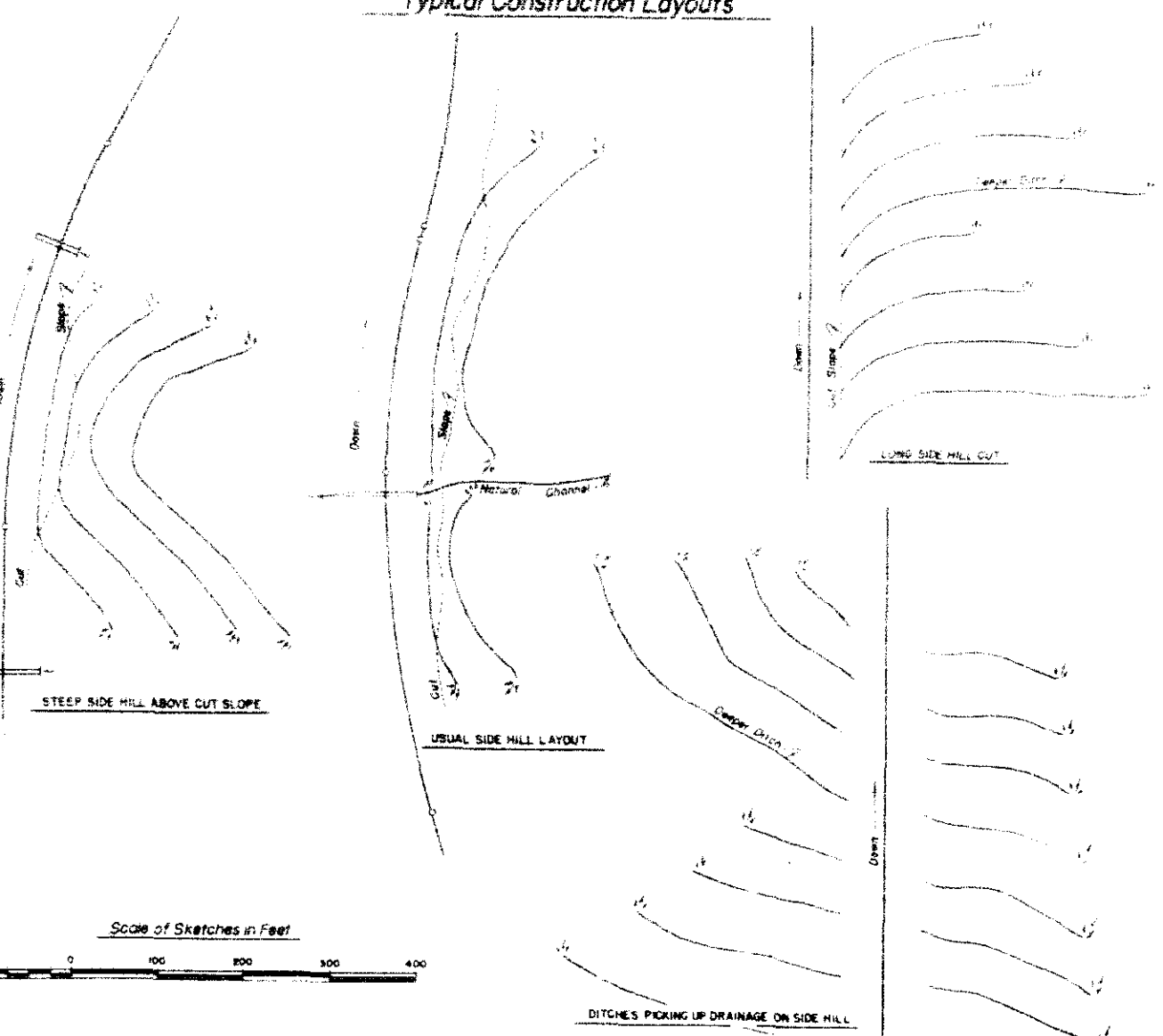
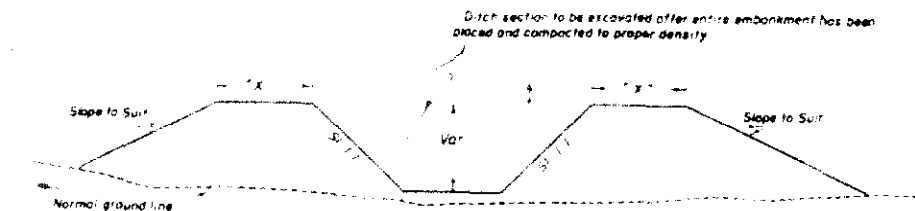


Table of Slopes and Yardages

Ground	▲ SLOPES			H	Cubic Yards per 100 lin. ft. of Ditch	
	A	B	C			
5:1 Or Flatter	2:1	4:1	2:1	15"	16	
				18"	23	
				21"	32	
	1 1/2:1	3:1	2:1	15"	15	
				18"	22	
				21"	30	
		1 1/2:1	4:1	1:1/2	15"	14
					18"	20
					21"	27
	4:1	2:1	4:1	5"	13	
				8"	19	
				11"	25	
1 1/2:1		3:1	1:1/2	15"	12	
				18"	18	
				21"	25	
		1 1/2:1	4:1	1:1/2	15"	12
					18"	17
					21"	23
3:1		2:1	3:1	15"	10	
				18"	15	
				21"	20	
	1 1/2:1	3:1	2:1	15"	10	
				18"	14	
				21"	19	
		1 1/2:1	4:1	1:1/2	15"	17
					18"	25
					21"	33
	2:1	1 1/2:1	2:1	15"	10	
				18"	15	
				21"	20	
1 1/2:1		2:1	3:1	15"	10	
				18"	15	
				21"	20	
		1 1/2:1	3:1	4:1	15"	12
					18"	18
					21"	25
1 1/2:1		2:1	3:1	15"	12	
				18"	18	
				21"	25	
	1 1/2:1	3:1	2:1	15"	12	
				18"	18	
				21"	25	
		1 1/2:1	4:1	1:1/2	15"	12
					18"	18
					21"	25
	1 1/2:1	1 1/2:1	2:1	15"	12	
				18"	18	
				21"	25	
1 1/2:1		2:1	3:1	15"	12	
				18"	18	
				21"	25	
		1 1/2:1	3:1	4:1	15"	12
					18"	18
					21"	25

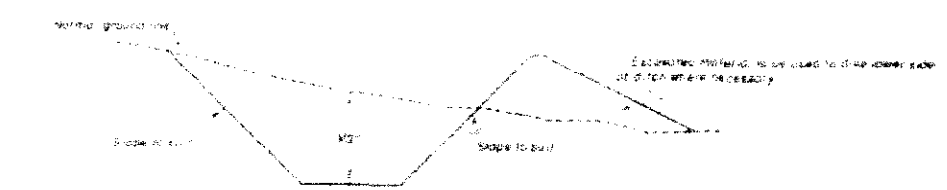
TYPICAL SECTIONS *for* DRAINAGE, IRRIGATION DITCHES *and* CHANNEL CHANGES



NOTE—
 See Structure notes in plans for dimension "W"
 Dimension "X" = $W \sqrt{\frac{S}{2}}$ with minimum of 2 feet.

For Embankment Sections

Generally for use in Irrigation Ditches & Channel Changes.



NOTE—
 Unless otherwise shown in Structure Notes of plans,
 dimension "W" = 12 feet.

For Cut Sections

GENERAL NOTES

- All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project.
- Ditches are to be constructed to lines and grades as staked by the Engineer using the ditch section shown on plans or as ordered by the Engineer.
- CONTOUR INTERCEPTING DITCHES—Ditches are to be laid out along the ground contour on a grade of no over 1% (Type of soil shall govern the grade).
- Ends of ditches are to be lined up so that concentration of flow from a higher contour ditch into one of lower contours, as far as possible avoided. The use of a deeper ditch is recommended where this condition is encountered.
- The following horizontal spacing of ditches is recommended:
 - 4% to 6% Slope: Approximately 70 Centers
 - 8% to 10% Slope: Approximately 60 Centers
 - 20% to 4:1 Slope: Approximately 55 Centers
 - 30% to 1:1/2 Slope: Approximately 50 Centers
- Where ditch checks are required the intervening ditch between one set of ditch checks shall not exceed a grade of 10%. Details of checks will be shown on plans when required.

COLORADO
 STATE HIGHWAY DEPARTMENT

*Standard Types of Ditches
 and
 Construction Methods*

Designed by J.G.M. Approved by *[Signature]*
 Made by J.G.M. Engineer, Survey & Plans
 Checked by _____ Date: Aug. 1, 1950

Notes:
Alignment and Grades as shown are subject to modification during construction after approval by the Engineer.
Soil data shown on the plans is obtained from best available testing laboratory information. This information is shown for convenience of the contractor and the Engineer does not guarantee the accuracy of these tests. If materials not conforming to the data on plans are encountered during construction the grading plans shown on plans will be modified where necessary to secure dense, stable embankments.
Location and Grade of Cross Culverts, Siphons and Median Drains may be modified to fit existing conditions in the field after approval by the Engineer.
Grading quantities shown on Turnpike Plan-Profile sheets include quantities for all intersecting and access roads except 16' access road on Haselwood property Lt. of Sta. 727+20. Grading quantities shown on Plan-Profile sheets for intersecting roads are for information only. Grading quantities for Haselwood access road are shown with access road profile.
Ballast material plan is shown on sheet 4. This plan is based on all ballast material being secured from Ballast Pit No. 1 on the Chaussard property left of Sta. 344.
If for any reason the foundation material in roadway cuts should prove unsatisfactory the Engineer may require the Contractor to excavate additional material and backfill with a suitable base material to provide a stable base course for the roadway pavement.
Borrow material shall be secured from the following Borrow pits:
Borrow Pit No. 2 Left Sta. 730+ to 755+
Borrow Pit No. 3 Left Sta. 970+ to 985+
Borrow Pit No. 4 Left Sta. 955+

Curve Data
1 30° 52' 30" R
2 17° 30'
3 1562.5
4 3087.5
5 5330

666+05.6 - Project Marker (to be furnished and installed by State Forces)
611+75 - Reg'd 24" x 104" Cross Culvert and 24" x 24" Cross Culvert (Access Road) Ditches (W-20)

675+50 - Reg'd 18" x 48" Median Drains Lt. & Rt. Conc. Inlet (A-30) Ditch Lt.

677+90 - Reg'd 24" x 110" Pipe Siphon (W-20) Lt. & Rt. 12" R.I. & 6" C.I. Pipe and Valve Box 4' x 4' 1/2" Metal Drain, Ditches (W-20) Dry Rubble apron & ramp for Ditch, 2' x 2' x 1' 6" Siphon (H-7.0) Lt. & Rt. 4' Valve and Valve Box 4' x 5' 0" Metal Drain, Ditches (W-20)

678+40 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)
678+60 - Reg'd 24" x 110" Pipe Siphon (H-28) Lt. & Rt. 4' Valve and Valve Box 4' x 5' 0" Metal Drain, Ditches (W-20)
678+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+00 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)
679+20 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+50 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+80 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

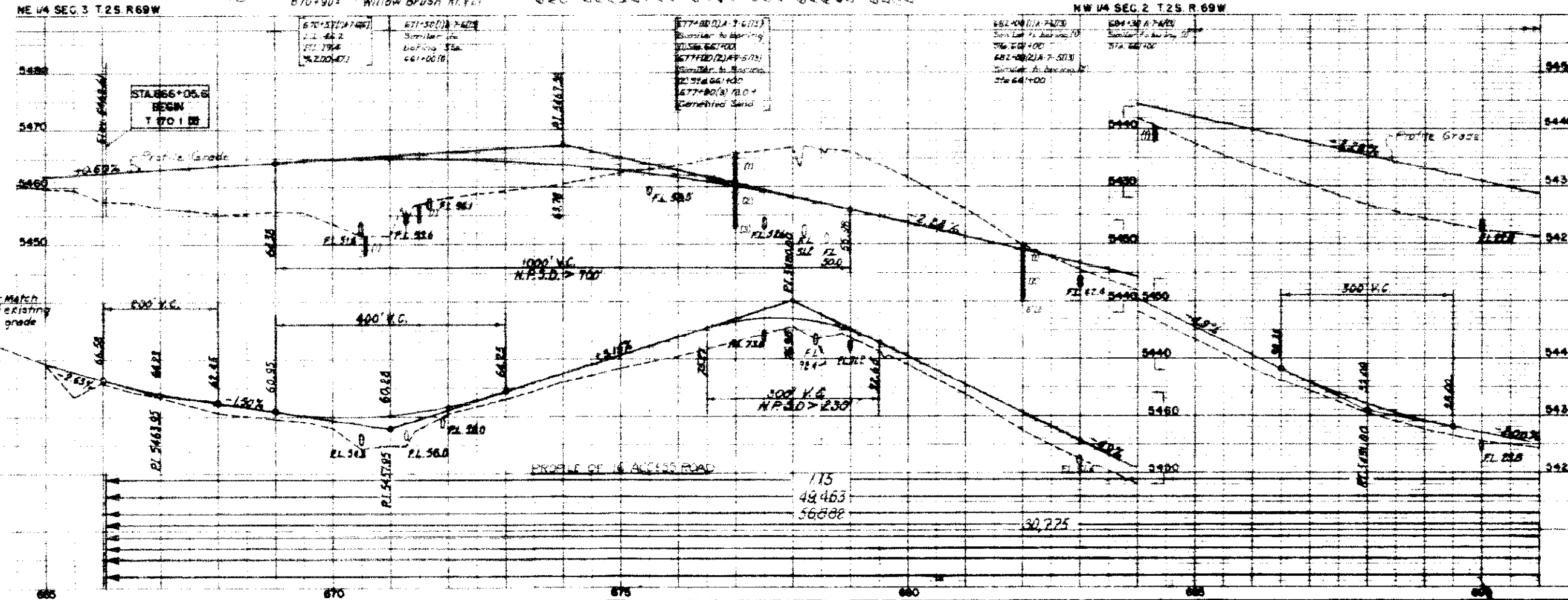
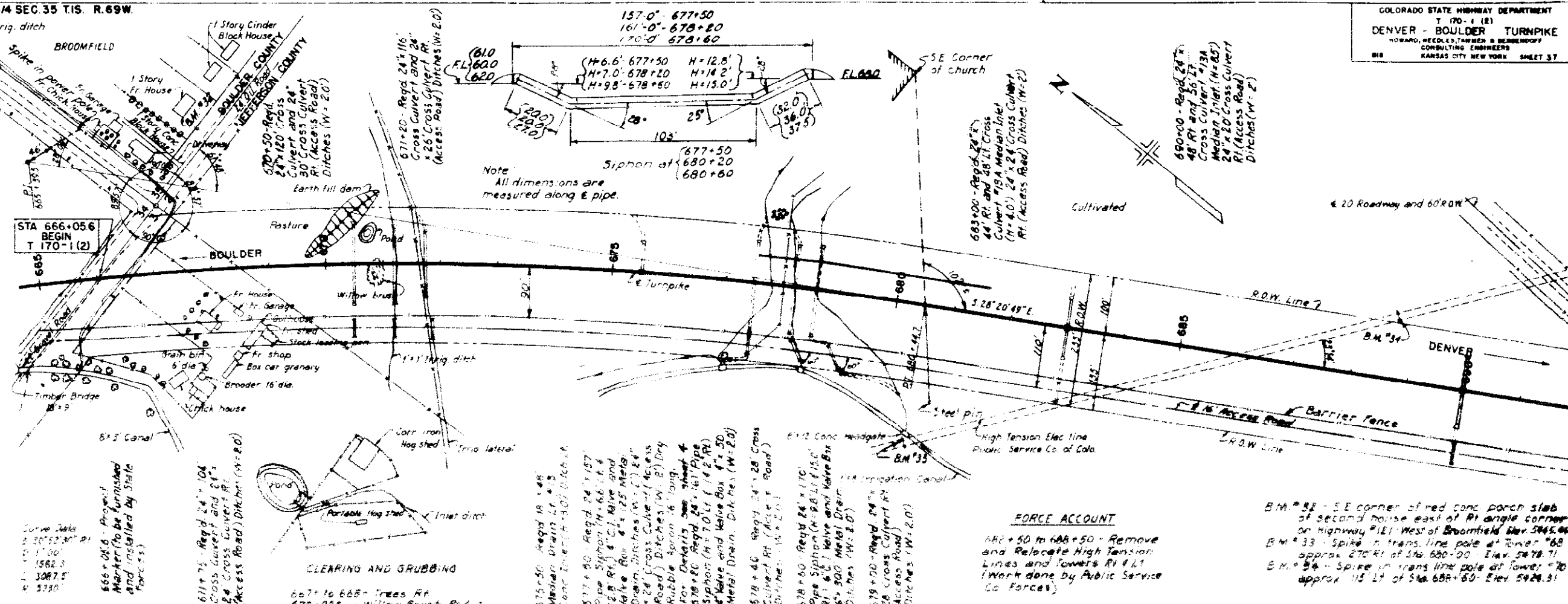
679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

679+90 - Reg'd 24" x 28" Cross Culvert Rt. (Access Road) Ditches (W-20)

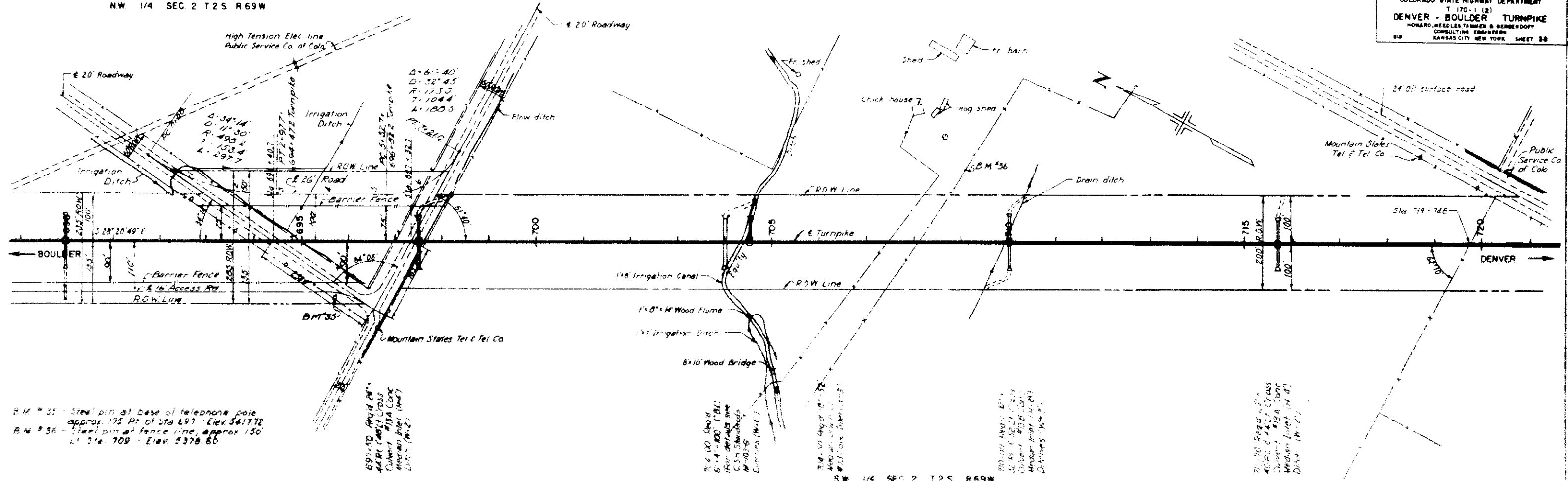


EMBAK. FACTOR
EMBAKMENT
EMBAK. X FACTOR
EXCAVATION
BORROW
STA. YD. O.H.
YD. MI. O.H.
BORROW SOURCE

FORCE ACCOUNT

666+50 to 686+50 - Remove and Relocate High Tension Lines and Towers RI 4 & 5 (Work done by Public Service Co. Forces)
--

B.M. #32 - S.E. corner of red conc. porch slab of second house east of Rt. angle corner on Highway #121 West of Broomfield St. 5465.44
B.M. #33 - Spike in trans. line pole at Tower #68 approx 270 Rt. of Sta. 680+00 Elev. 5478.71
B.M. #34 - Spike in trans. line pole at Tower #70 approx 115 Lt. of Sta. 680+60 Elev. 5426.31



B.M. # 35 - Steel pin at base of telephone pole
approx. 175 ft of Sta 697 - Elev. 5417.72
B.M. # 36 - Steel pin at fence line, approx 150'
of Sta. 709 - Elev. 5376.66

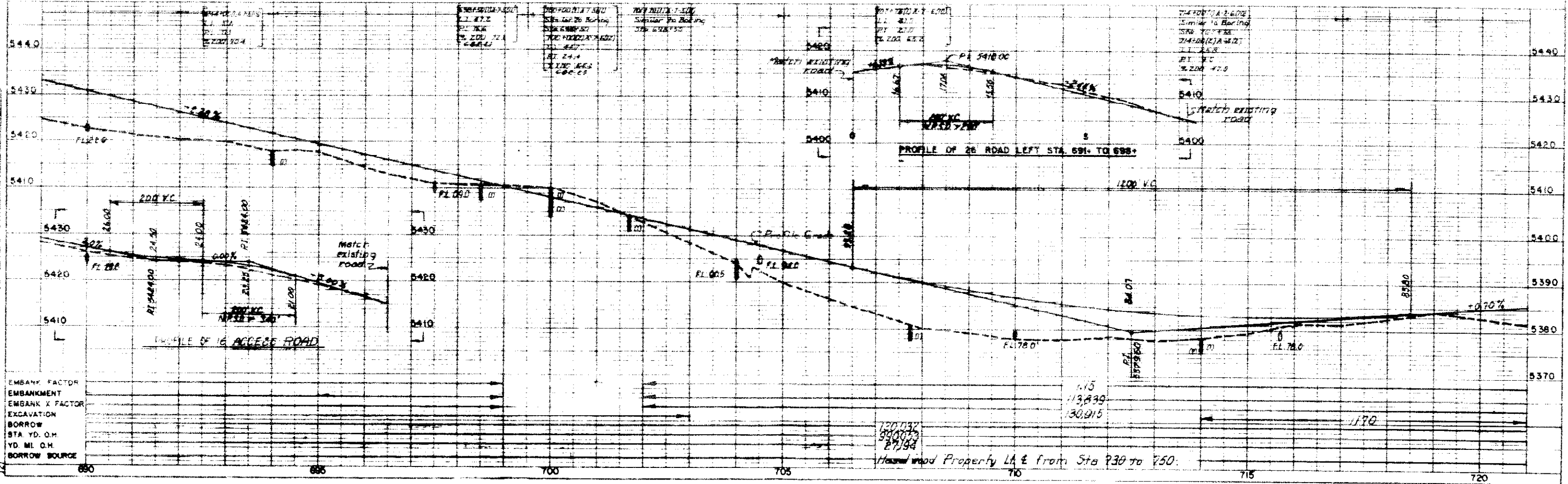
697+50 P.V. of 2nd
44.81' (140') Cross
Curvature 1/16" Conc
Mountain State (1/4" d)
Ditch - (M-2)

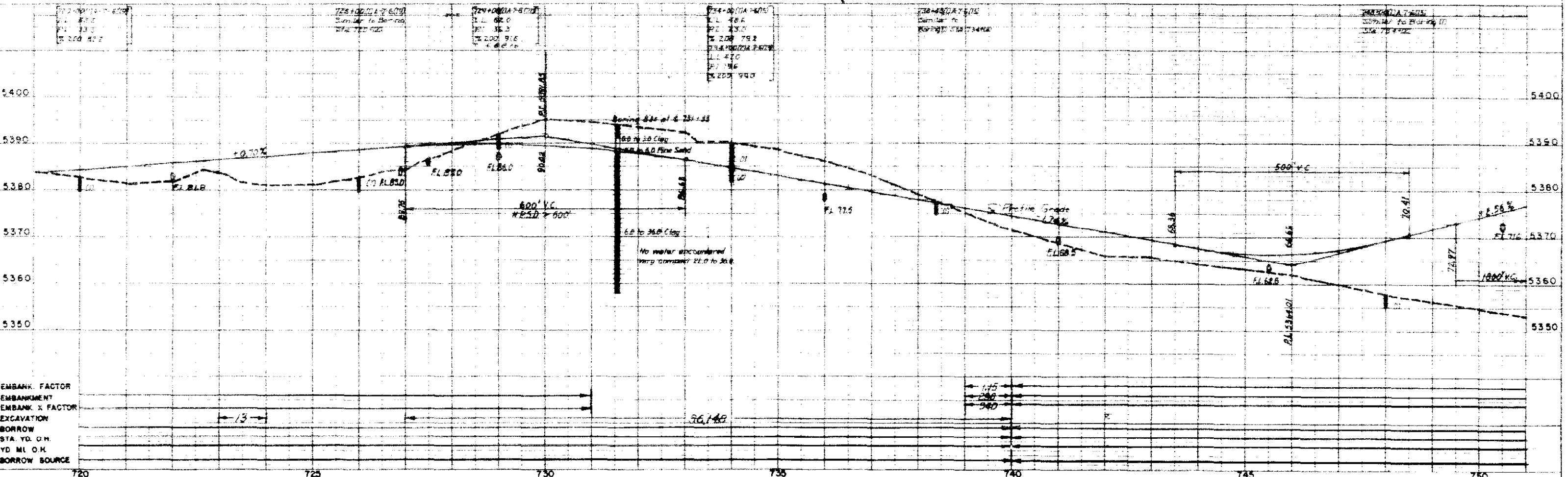
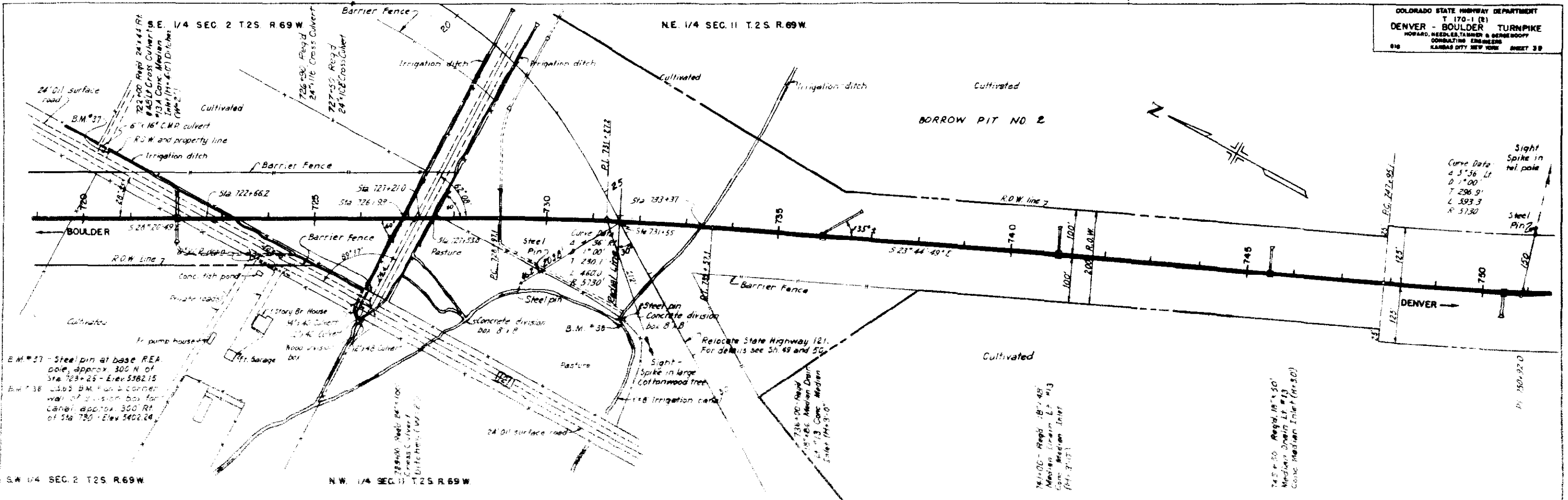
706+00 4' x 6'
6' x 4' 100' P.V.C
100' drainage pipe
C 2 1/2" diameter
M-103'S
Ext. to (M-2)

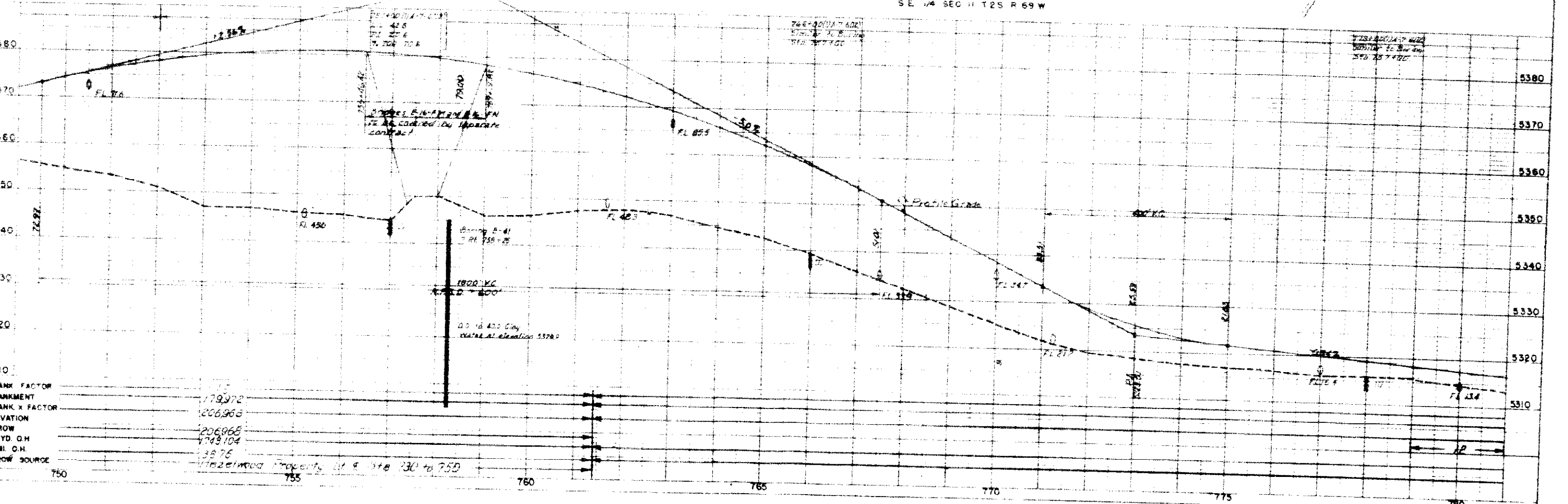
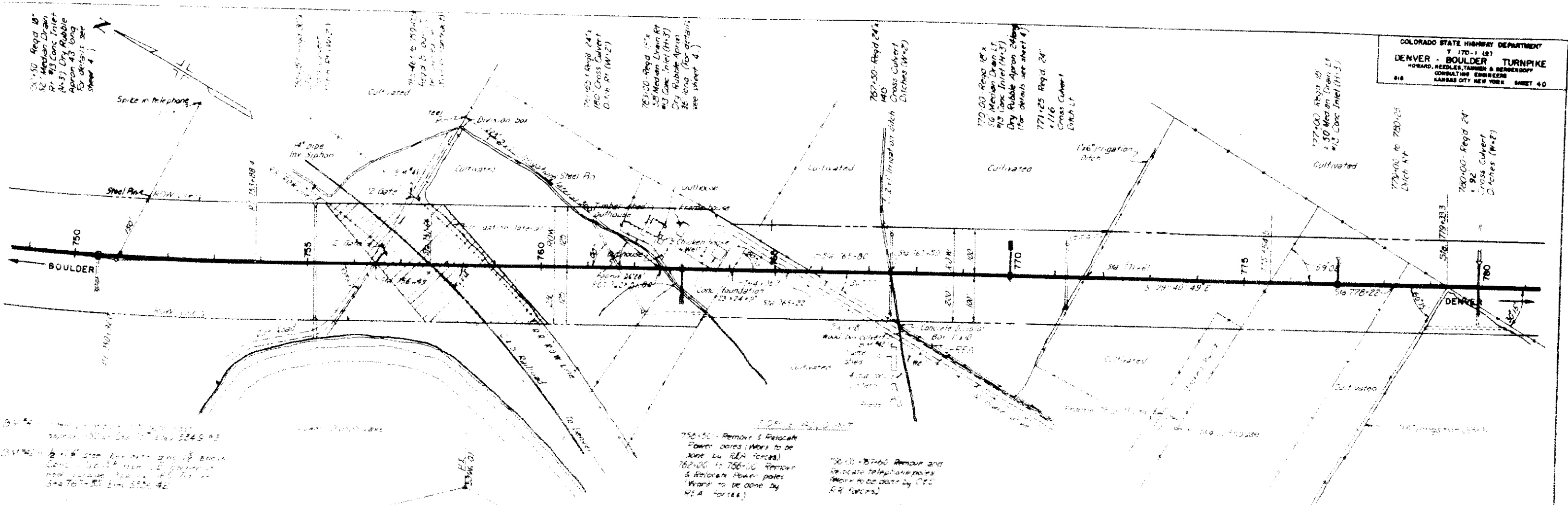
714+50 10' x 12' 12"
4' x 4' 100' P.V.C
100' drainage pipe
C 2 1/2" diameter
M-103'S
Ext. to (M-2)

709+50 4' x 6'
6' x 4' 100' P.V.C
100' drainage pipe
C 2 1/2" diameter
M-103'S
Ext. to (M-2)

717+50 8' x 8' 8"
4' x 4' 100' P.V.C
100' drainage pipe
C 2 1/2" diameter
M-103'S
Ext. to (M-2)





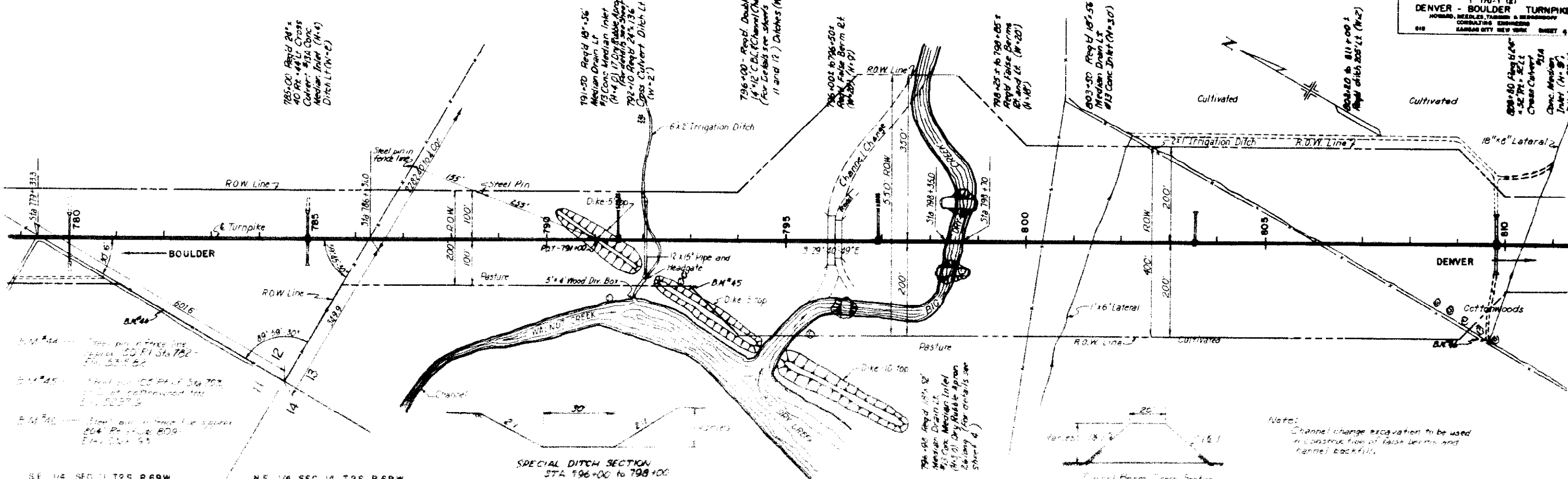


EMBANK FACTOR	1.15
EMBANKMENT	179,972
EMBANK X FACTOR	206,968
EXCAVATION	206,968
ROADWAY	174,310.4
TOTAL VOLUME	38,76
ROADWAY SOURCE	

11621000 Property of S. Ste 230 to 250

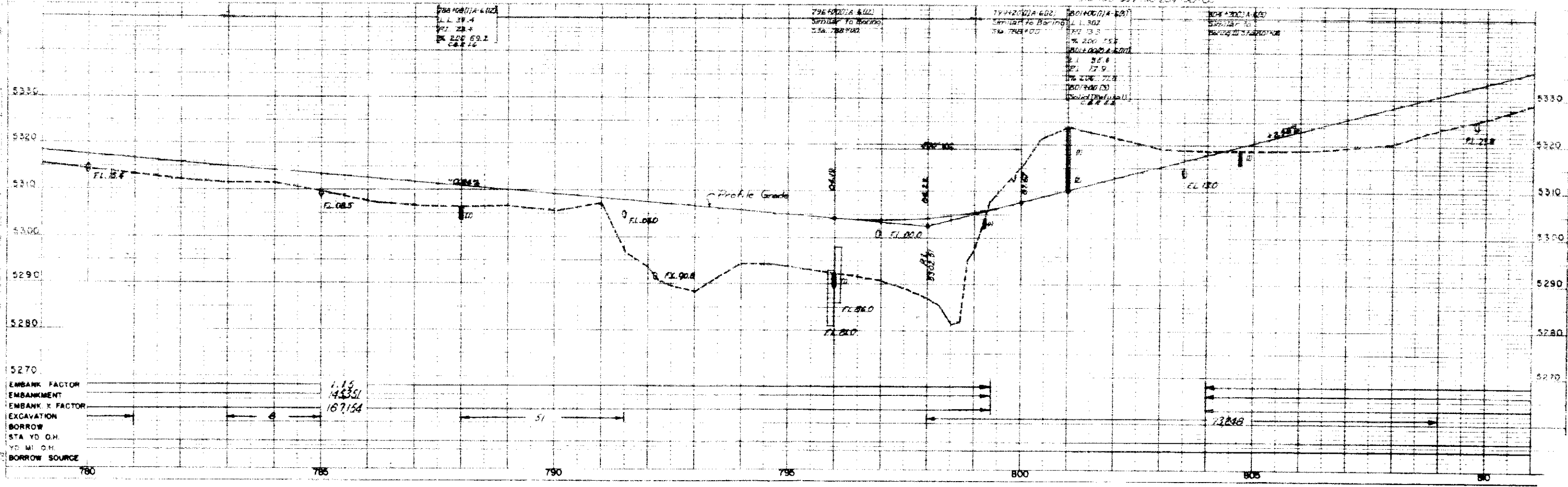
750-50 - Remove & Relocate Power poles (Work to be done by RIA forces)
 760-00 to 766-00 Remove & Relocate Power poles (Work to be done by RIA forces)
 766-00 - 774-00 Remove and Relocate telephone poles (Work to be done by C.C. R.R. forces)

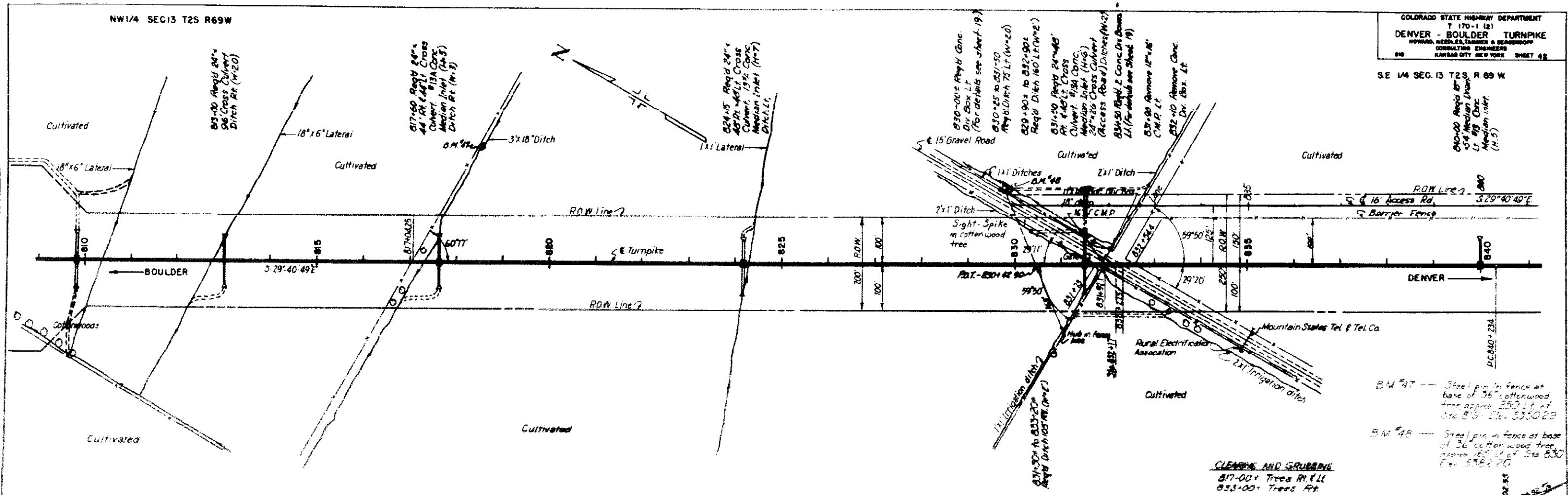
SE 1/4 SEC 11 T25 R 69 W



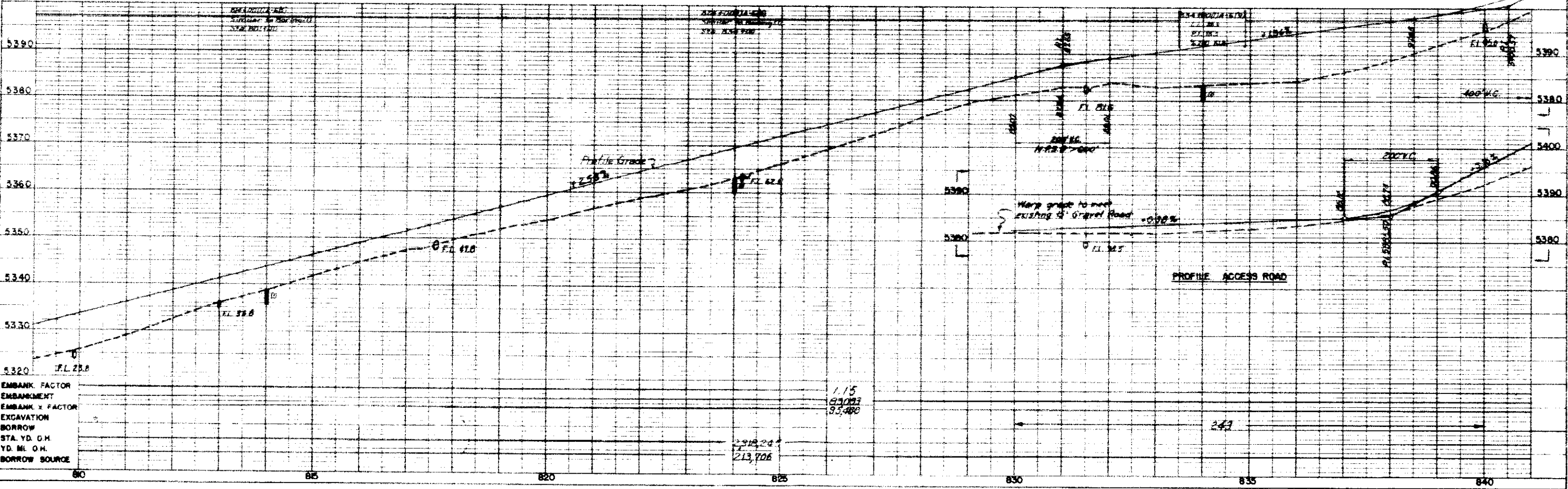
SE 1/4 SEC 11 T2S R69W

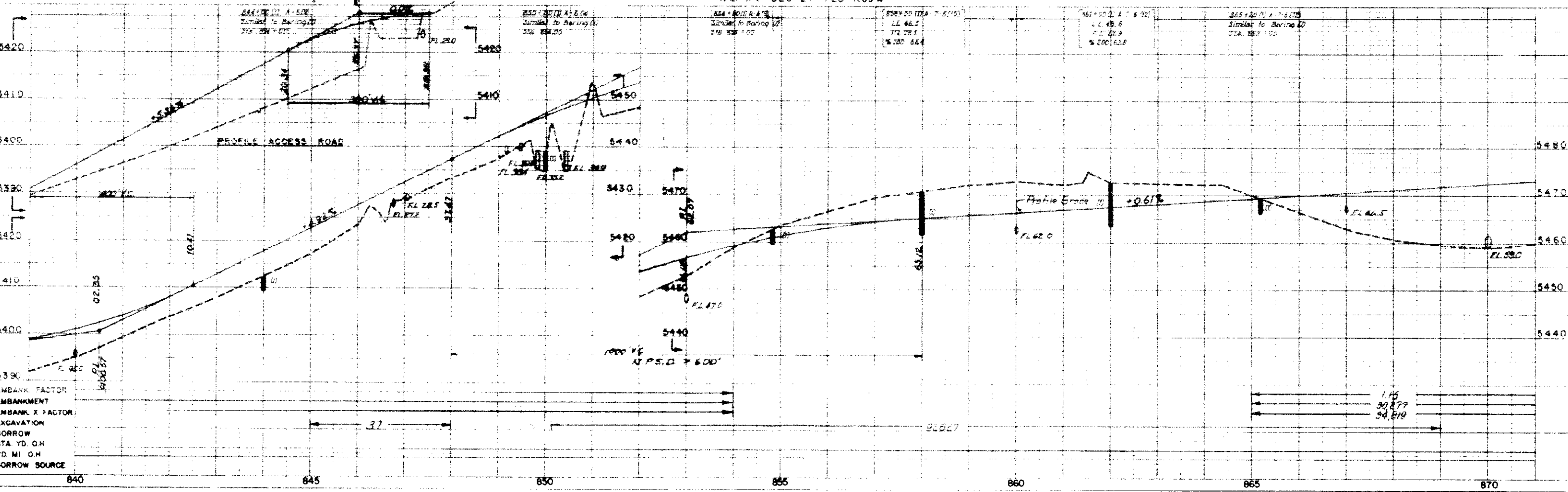
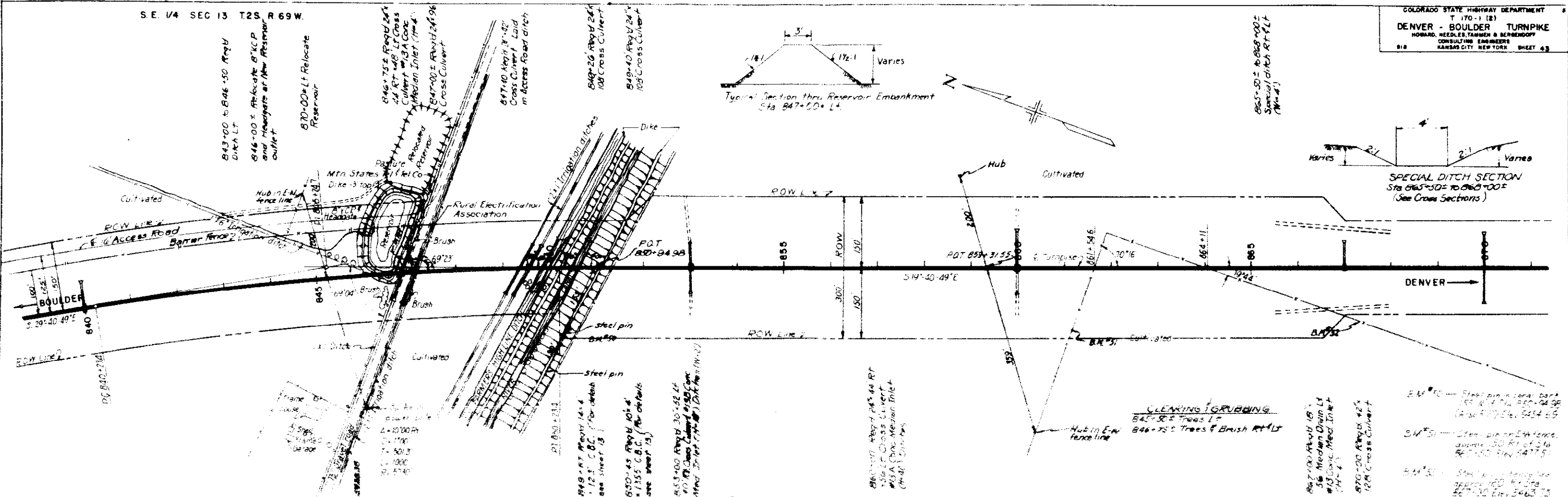
NE 1/4 SEC 14 T2S R69W





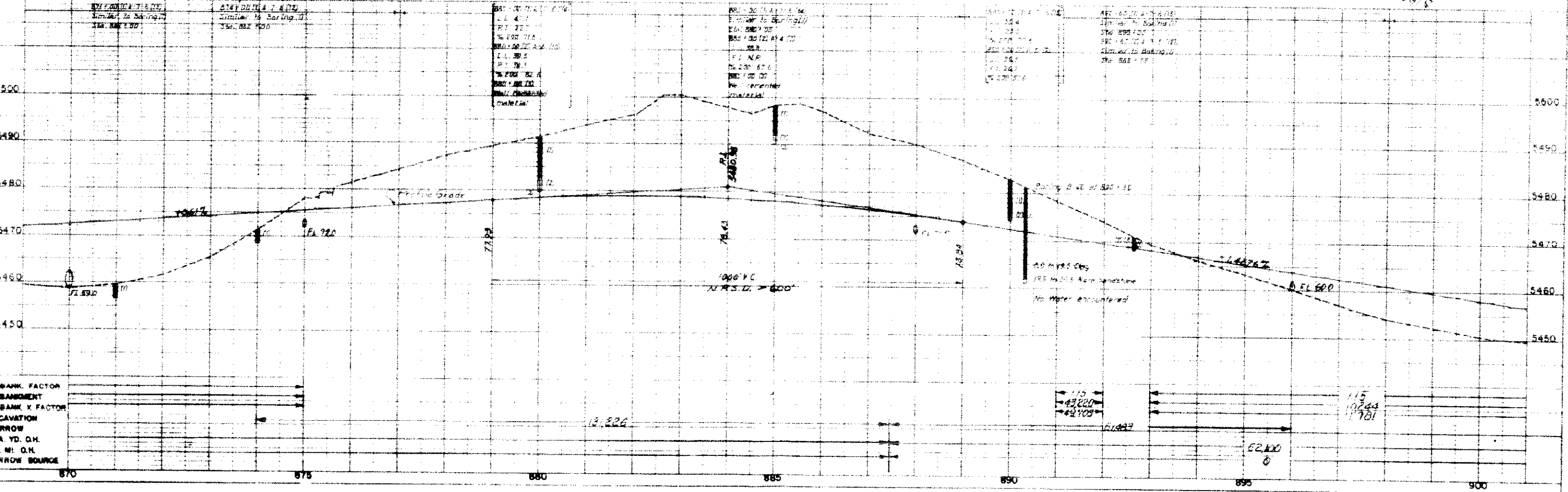
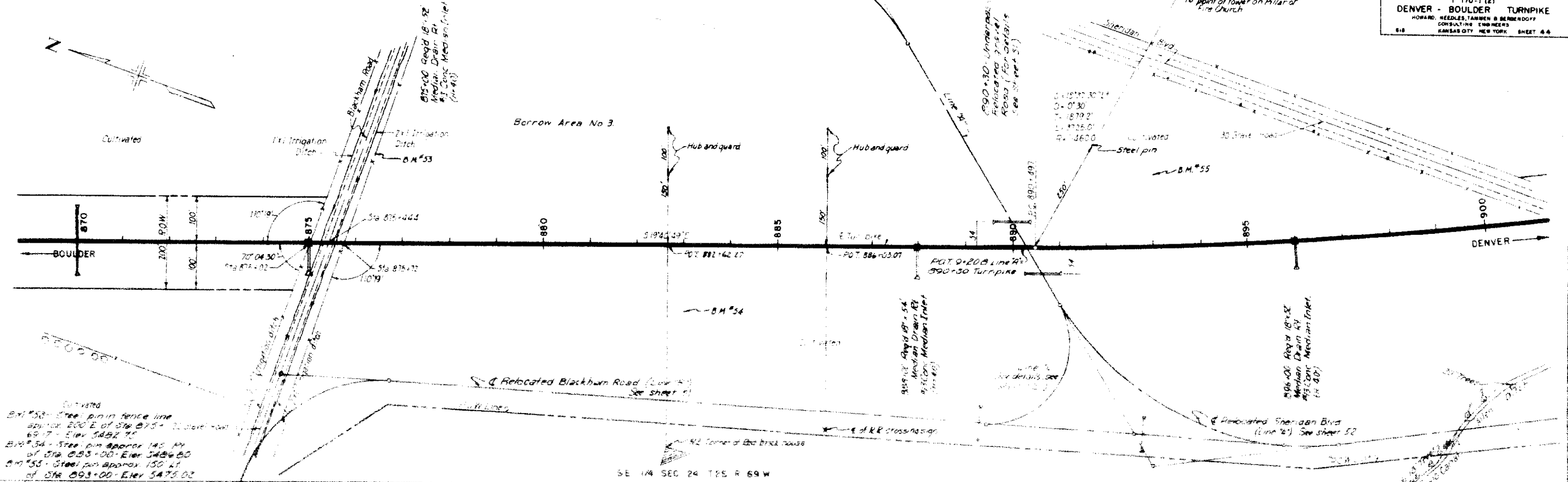
SW 1/4 SEC 13 T2S R 69 W





NE 1/4 SEC 24 T2S R69W

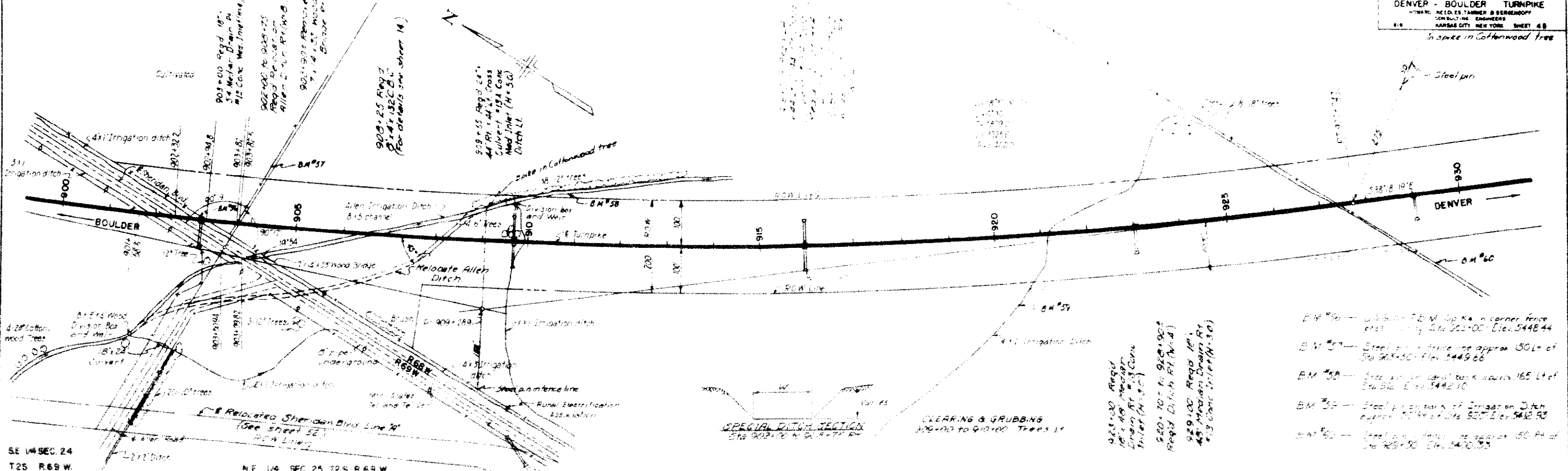
DATE: 10/15/54



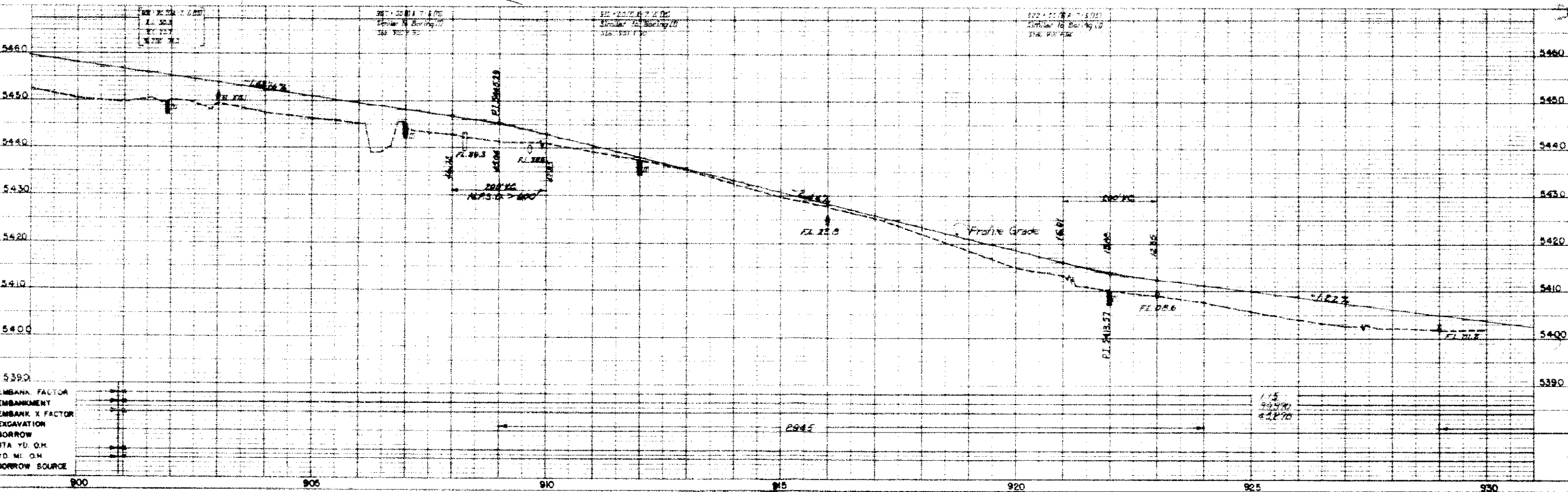
Cultivated
 B.M. #53 - Steel pin in fence line
 approx. 200' E. of Sta. 875 - Elevation
 5497.7 - Elev. 5482.75
 B.M. #54 - Steel pin approx. 145' W.
 of Sta. 885+00 - Elev. 5484.50
 B.M. #55 - Steel pin approx. 150' W.
 of Sta. 893+00 - Elev. 5475.02

SE 1/4 SEC. 24 T.2 S. R. 69 W.

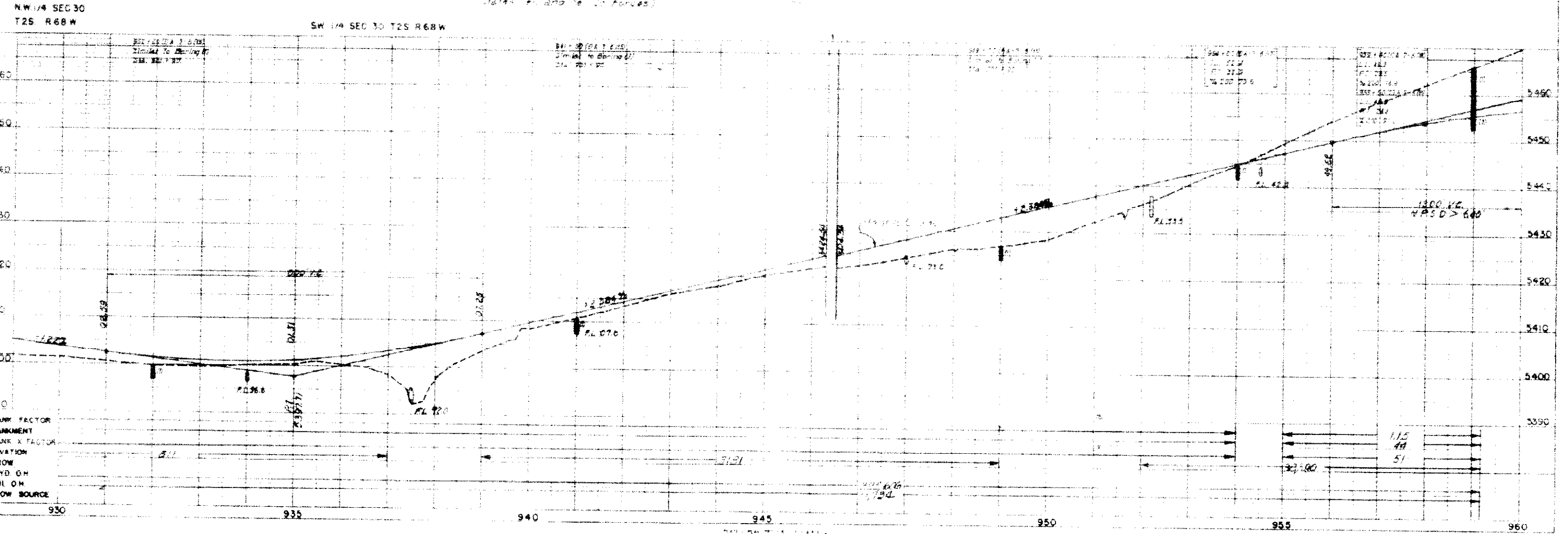
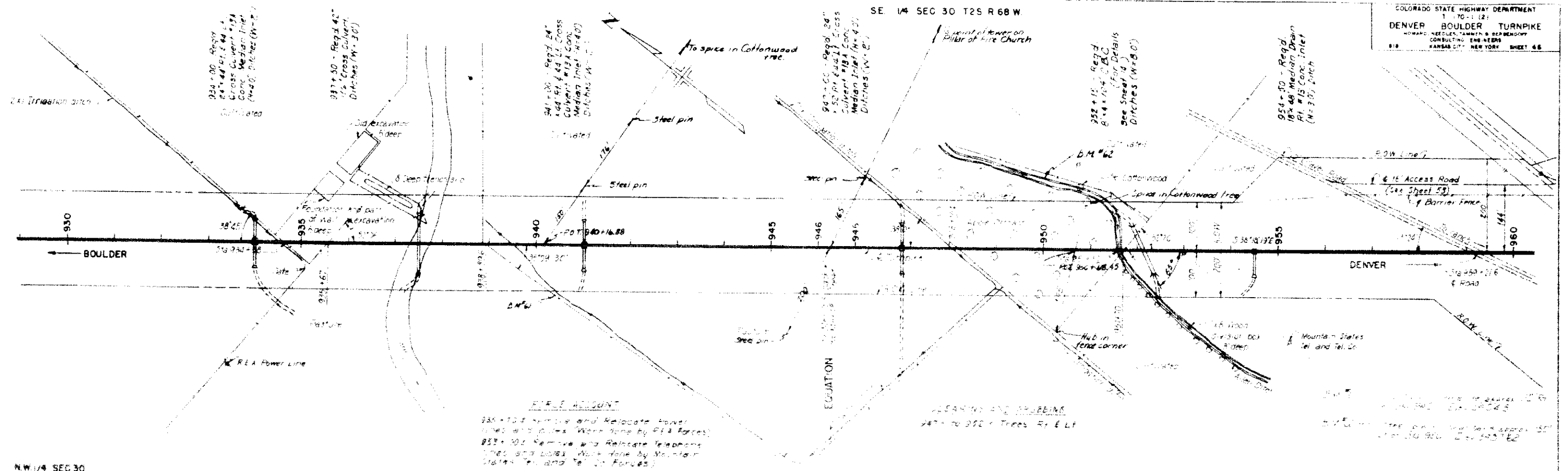
SW 1/4 SEC 19 T2S R.68W NW 1/4 SEC 30 T2S R.68W



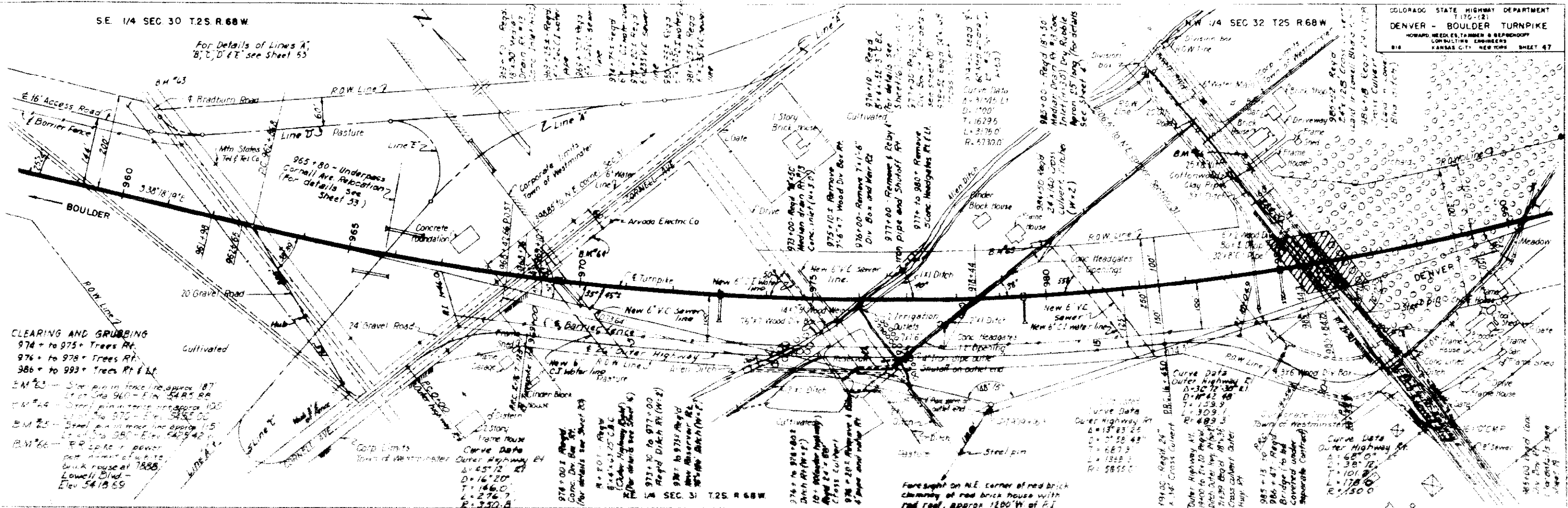
- BM 50 - USGS - TBM on N.E. corner fence east corner Sta 903+00 Elev. 5448.44
- BM 51 - Steel pipe in fence line approx 150 ft of Sta 903+50 Elev. 5449.26
- BM 52 - Steel pipe in ditch bank approx 165 ft of Sta 910 Elev. 5442.10
- BM 53 - Steel pipe in bank of Irrigation Ditch approx 150 ft of Sta 920 Elev. 5428.93
- BM 54 - Steel pipe in fence line approx 150 ft of Sta 925+50 Elev. 5430.53



SE 1/4 SEC 30 T2S R68W

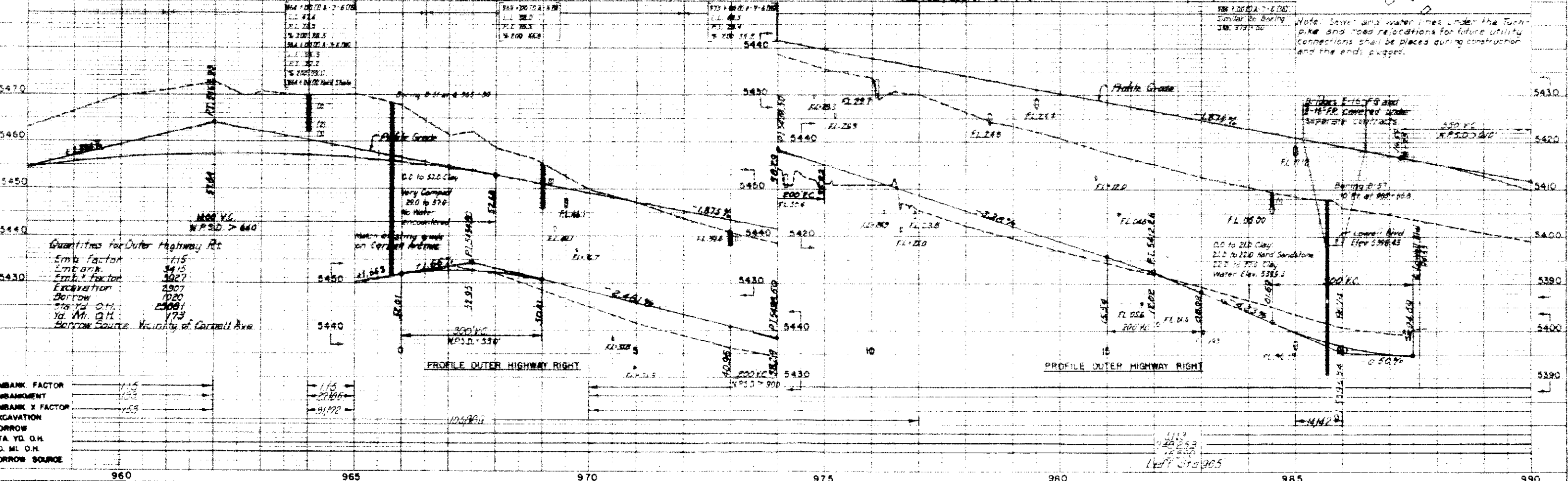


For Details of Lines A, B, C, D & E see Sheet 53



CLEARING AND GRUBBING
 974+ to 975+ Trees Rt.
 976+ to 978+ Trees Rt.
 986+ to 993+ Trees Rt & Lt

B.M. 63 - Steel pin in fence line approx 187 ft. of Sta 960 - Elev. 5485.88
 B.M. 64 - Steel pin in fence line approx 100 ft. of Sta 970 - Elev. 5455.00
 B.M. 65 - Steel pin in fence line approx 105 ft. of Sta 980 - Elev. 5429.42
 B.M. 66 - 5" R.C.P. pipe set in limit of white brick house at 1888 - Lowell Blvd - Elev. 5418.59



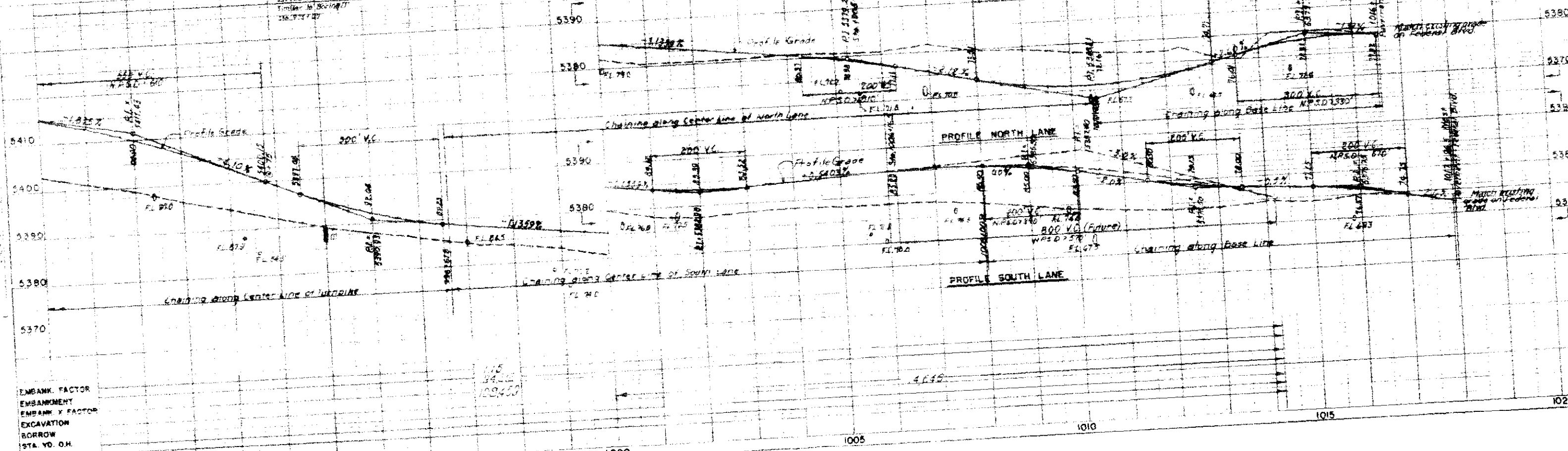
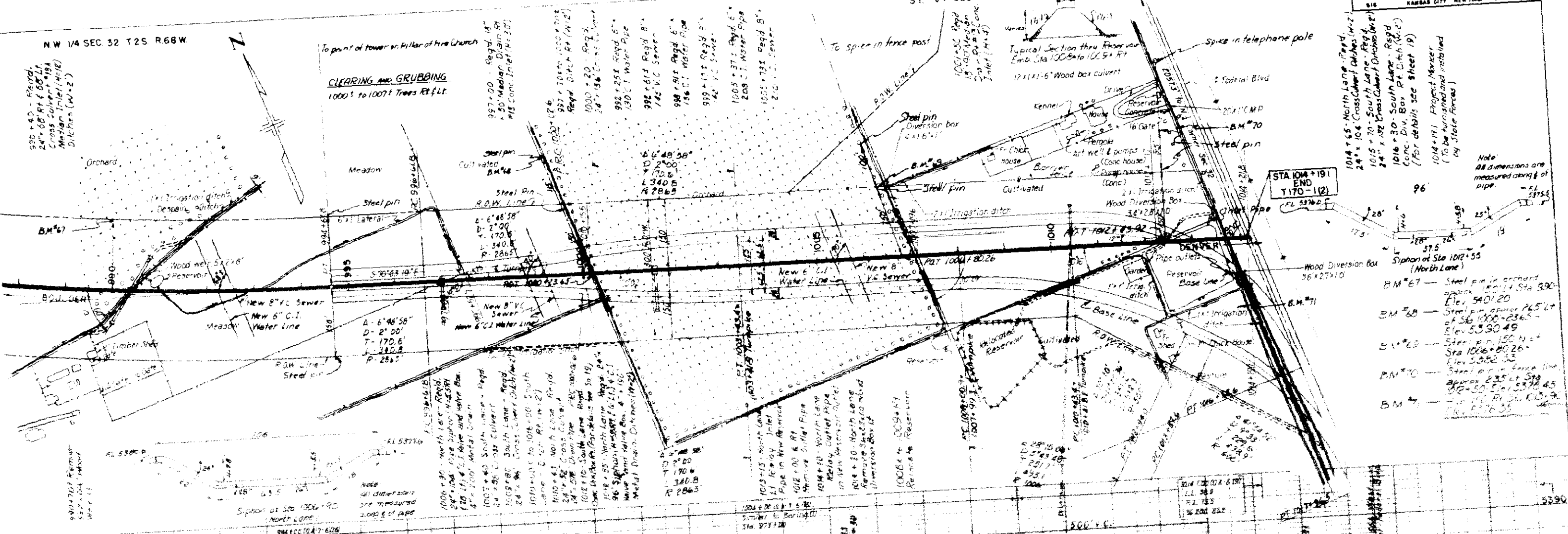
Note: Sewer and water lines under the Turnpike and road relocations for future utility connections shall be placed during construction and the ends plugged.

EMBANK FACTOR	115
EMBANK	3415
EMBANK FACTOR	3927
EXCAVATION	2907
BORROW	1020
STA. YD. O.H.	25091
YD. ML. O.H.	173
BORROW SOURCE	Neighborhood of Cornell Ave

NW 1/4 SEC 32 T2S R68W

SE 1/4 SEC 32 T2S R68W

SW 1/4 SEC 33 T2S R68W



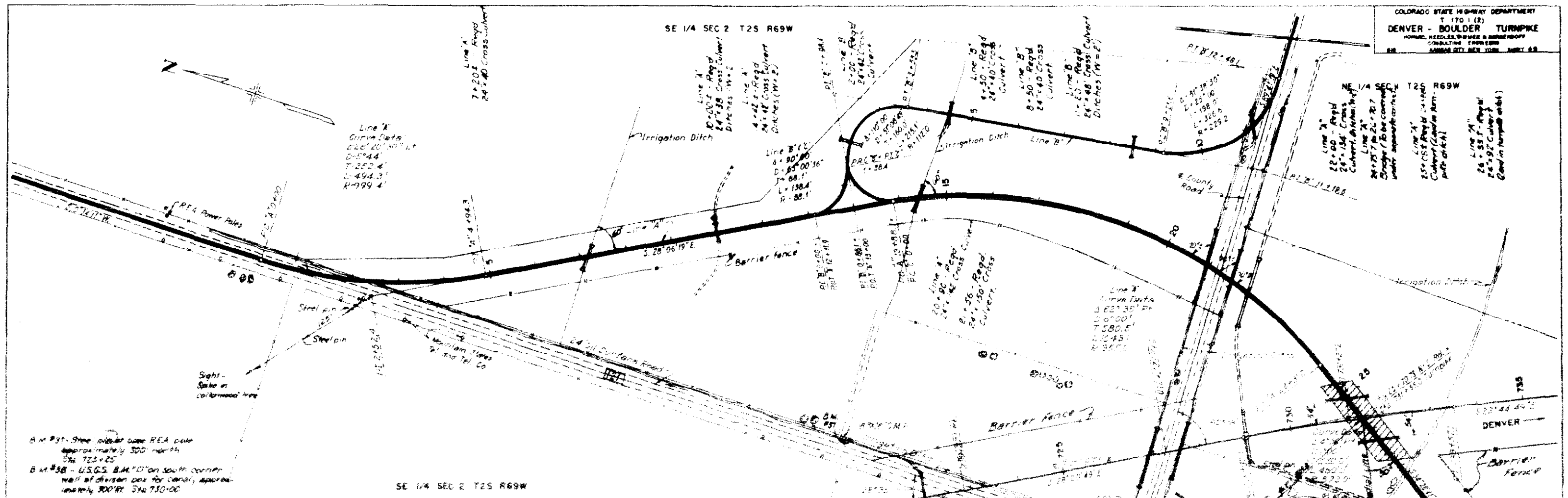
EMBANK. FACTOR	
EMBANK. X FACTOR	
EXCAVATION	
BORROW	
STA. VD. O.H.	
YD. WL. O.H.	

- Note
 All dimensions are measured along & of pipe
- BM #67 - Steel pin in orchard approx 150' N. Sta 990 Elev. 5401.20
 - BM #68 - Steel pin approx 745' E of S6 1000-2365 Elev. 5330.49
 - BM #69 - Steel pin 150' N of Sta 1006+80.26 Elev. 5352.33
 - BM #70 - Steel pin in fence line approx 235' E Sta 1006+50 Elev. 5378.45
 - BM #71 - Steel pin 170' E Sta 1006+33 Elev. 5376.33

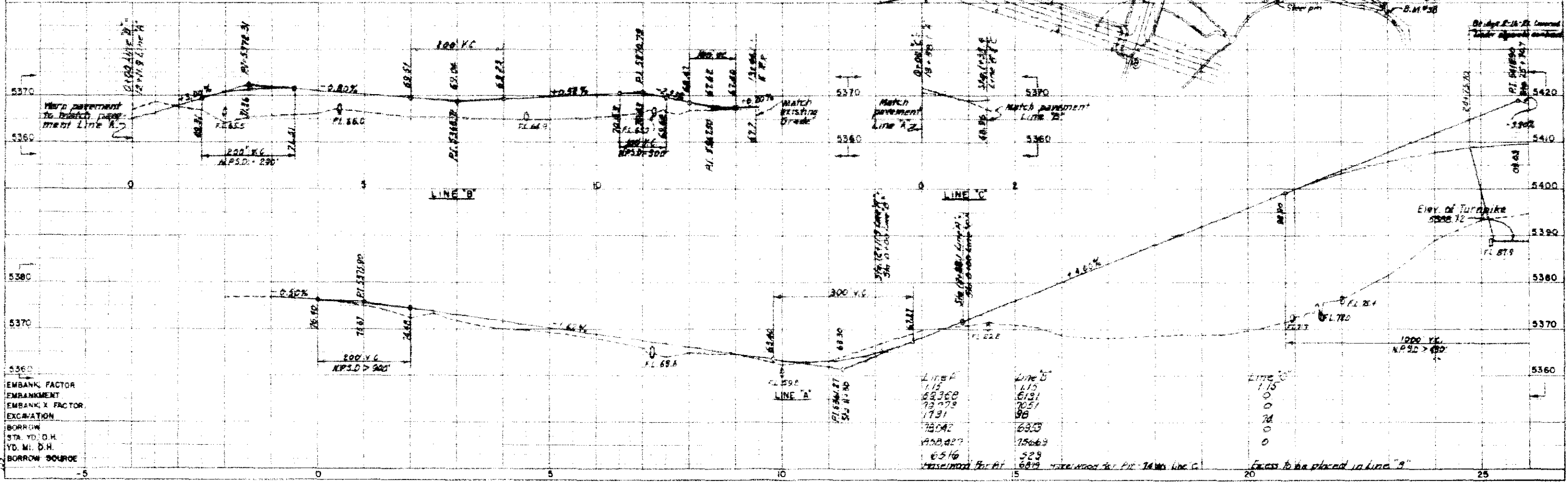
STA 1004+191
 END
 T170-1(18)
 FL 5376.2

1014+65 - North Lane - Regd
 24" x 104" Cross Culvert - Regd
 1015+70 - South Lane - Regd
 24" x 102" Cross Culvert - Regd
 1016+30 - South Lane - Regd
 Conc. Div. Box at Sta 1016+2
 (For details see Sheet 19)
 1014+191 Project Marker
 (To be furnished and installed
 by State Forces)

SE 1/4 SEC 2 T2S R69W

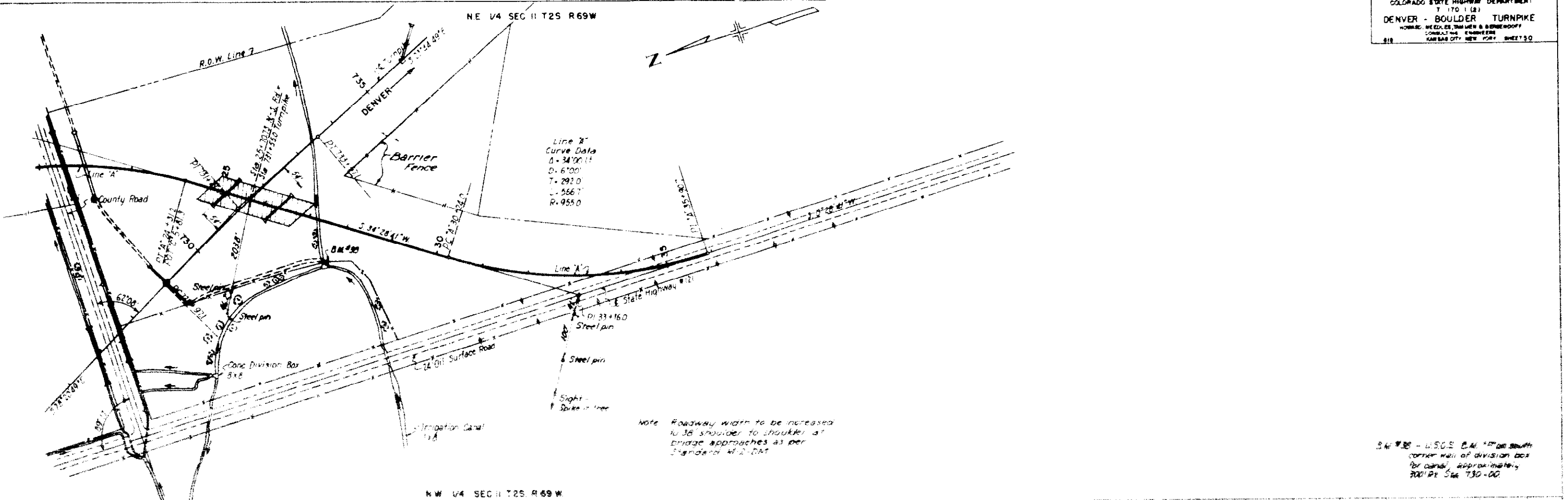


B.M. #31 - Steel pipe at base REA dam approximately 300' north Sta 733+25
 B.M. #38 - U.S.G.S. B.M. #10 on south corner wall of division box for canal, approximately 300' N Sta 730+00

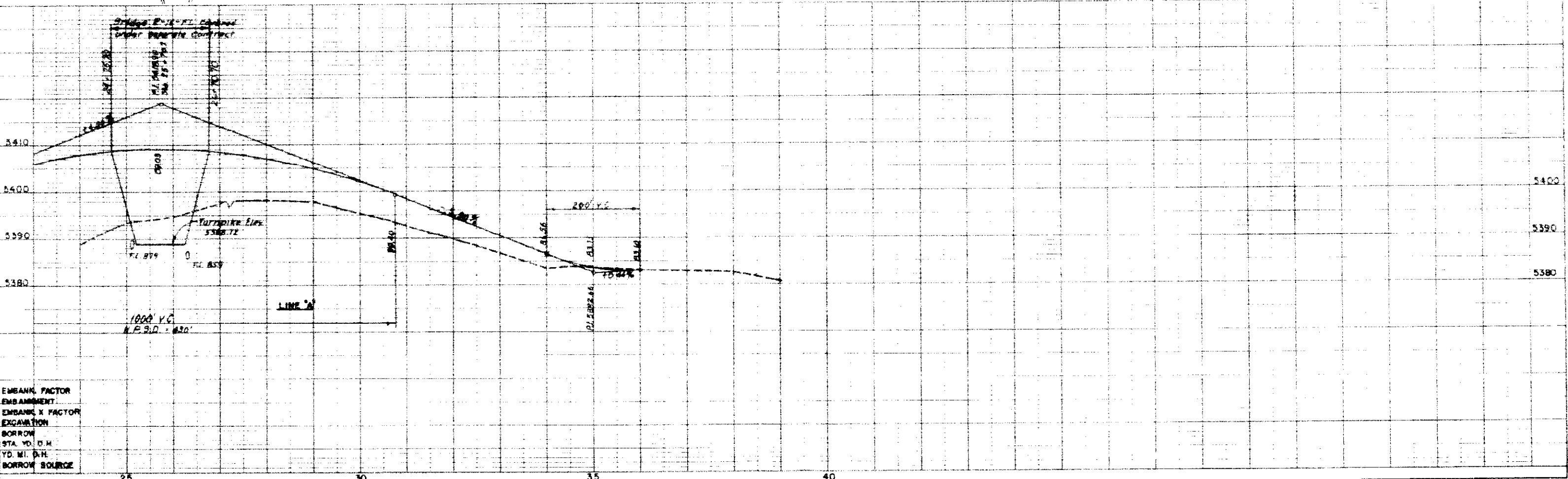


EMBANK FACTOR	
EMBANKMENT	
EMBANK X FACTOR	
EXCAVATION	
BORROW	
STA. YD. D.H.	
YD. MI. D.H.	
BORROW SOURCE	

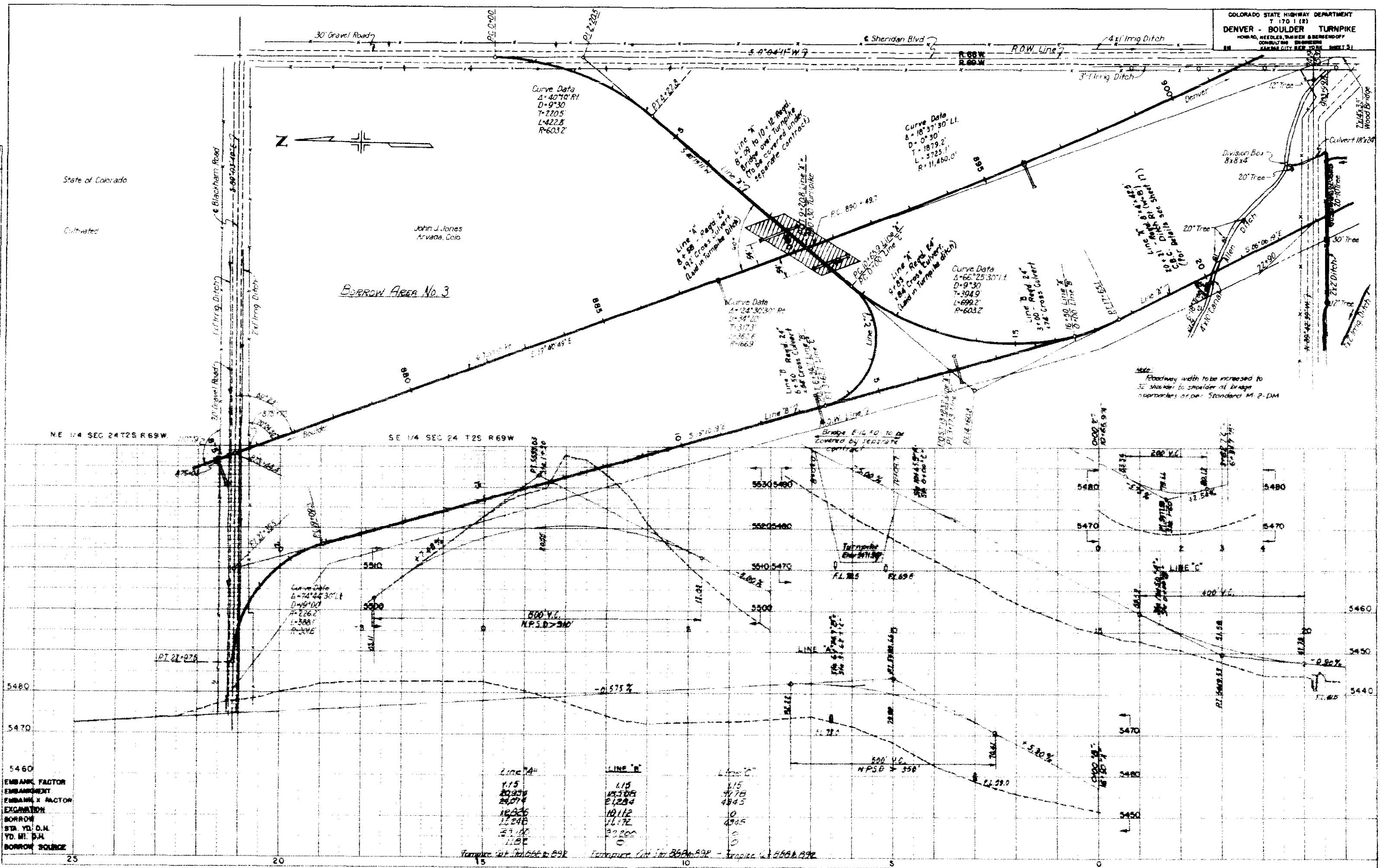
Grass to be placed in line "A"



34' 38" - U.S.G.S. B.M. #1700 South
 corner wall of division box
 for canal approximately
 700' P.C. Sta. 730+00



EMBANK. FACTOR
EMBANKMENT
EMBANK. X FACTOR
EXCAVATION
BORROW
STA. YD. O.M.
YD. MI. O.M.
BORROW SOURCE

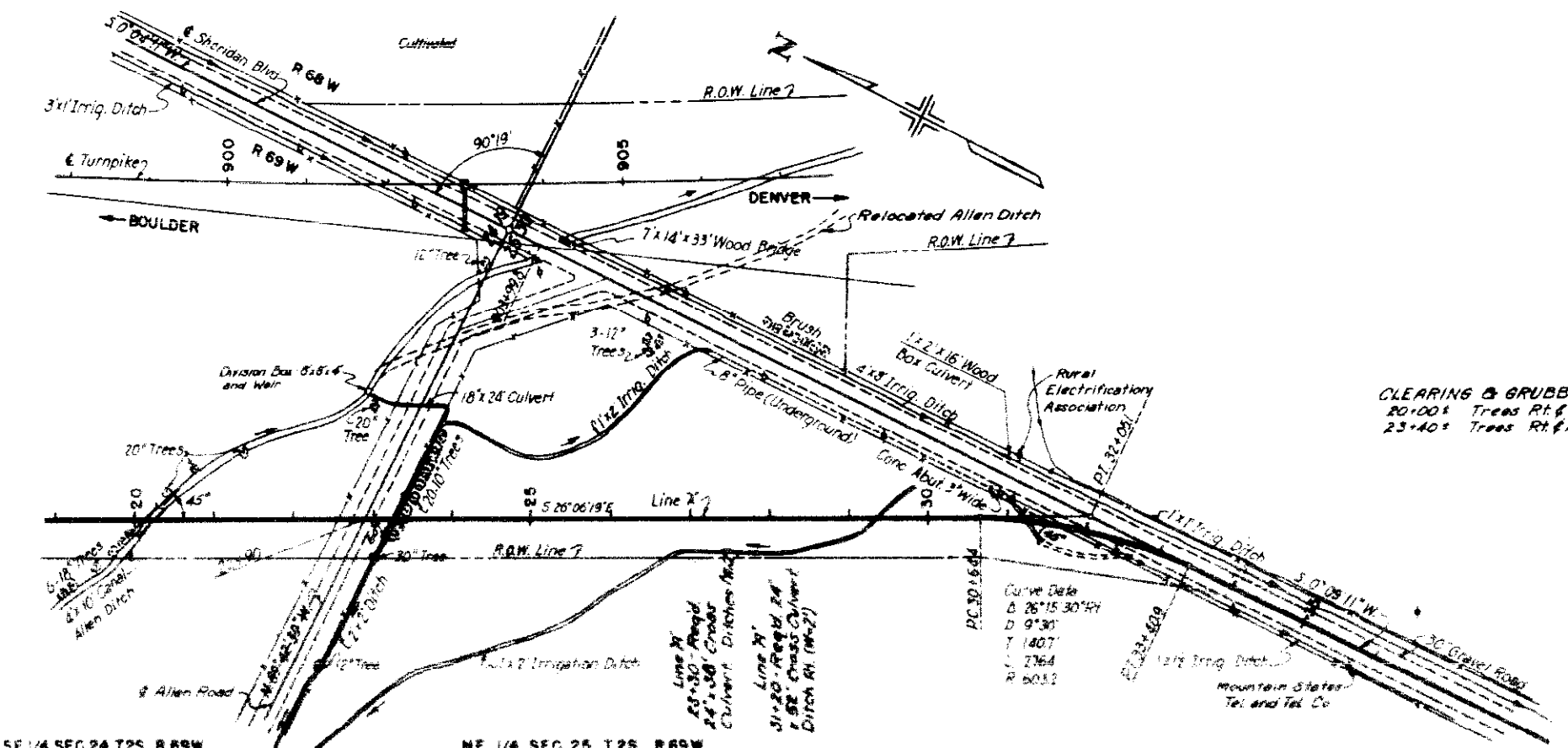


EMBANK FACTOR
 EMBANKMENT
 EMBANK X FACTOR
 EXCAVATION
 BORROW
 STA. YD. O.M.
 YD. MI. P.M.
 BORROW SOURCE

Turnpike Cut In 850+892
 Turnpike Cut In 850+892 - Topline 850+892

SW 1/4 SEC. 19 T2S R.68W

NW 1/4 SEC. 30 T2S R.68W

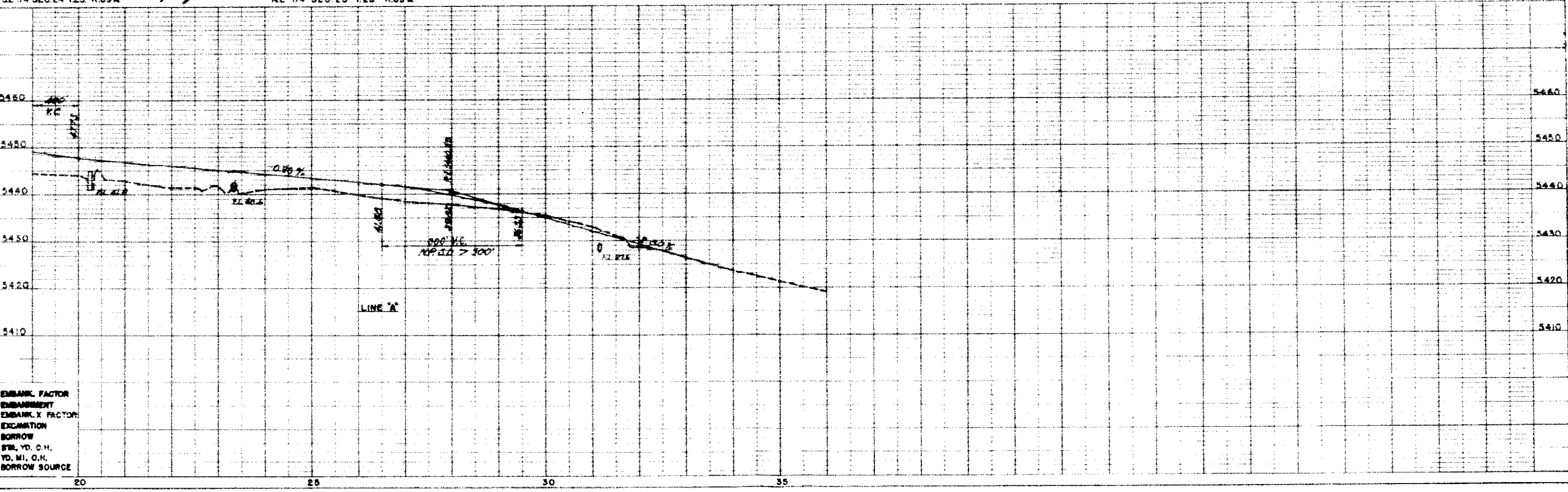


CLEARING & GRUBBING
 20,000 Trees RT&AT
 23,400 Trees RT&AT

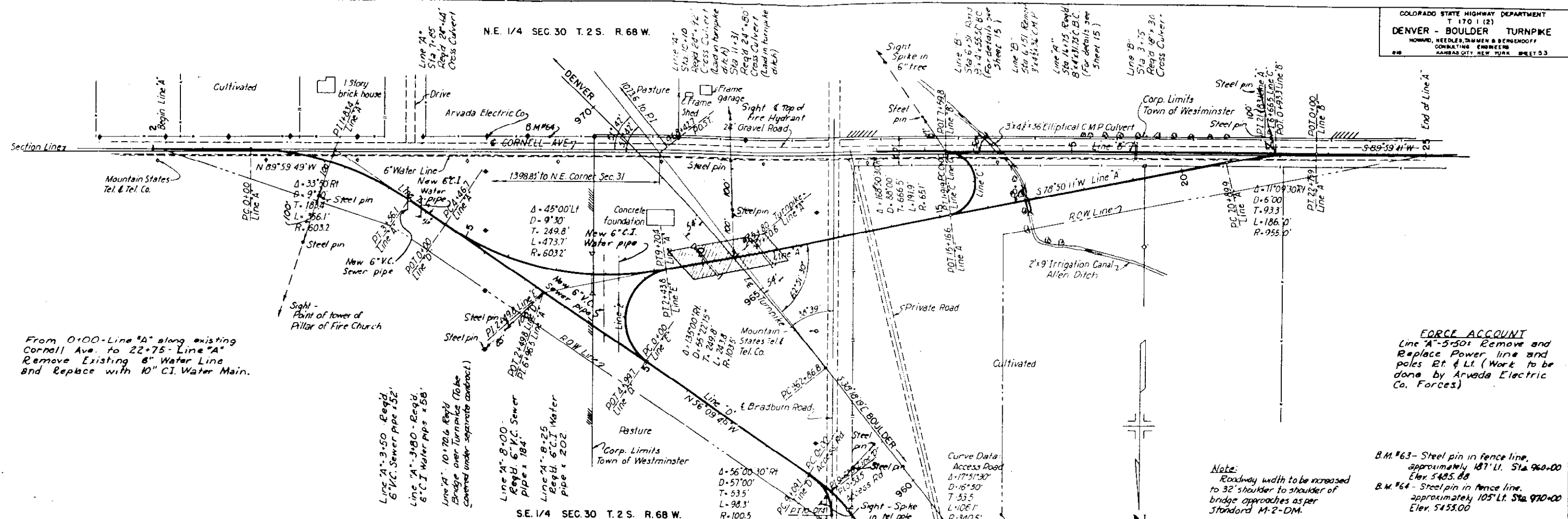
Curve Data
 Δ 26°15'30"PH
 D 9°30'
 T 1407'
 Y 7364'
 R 5032'

SE 1/4 SEC. 24 T2S R.69W

NE 1/4 SEC. 25 T2S R.69W



EMBANK. FACTOR
 EMBANKMENT
 EMBANK. X FACTOR
 EXCAVATION
 BORROW
 FT. YD. C.H.
 YD. MI. C.H.
 BORROW SOURCE

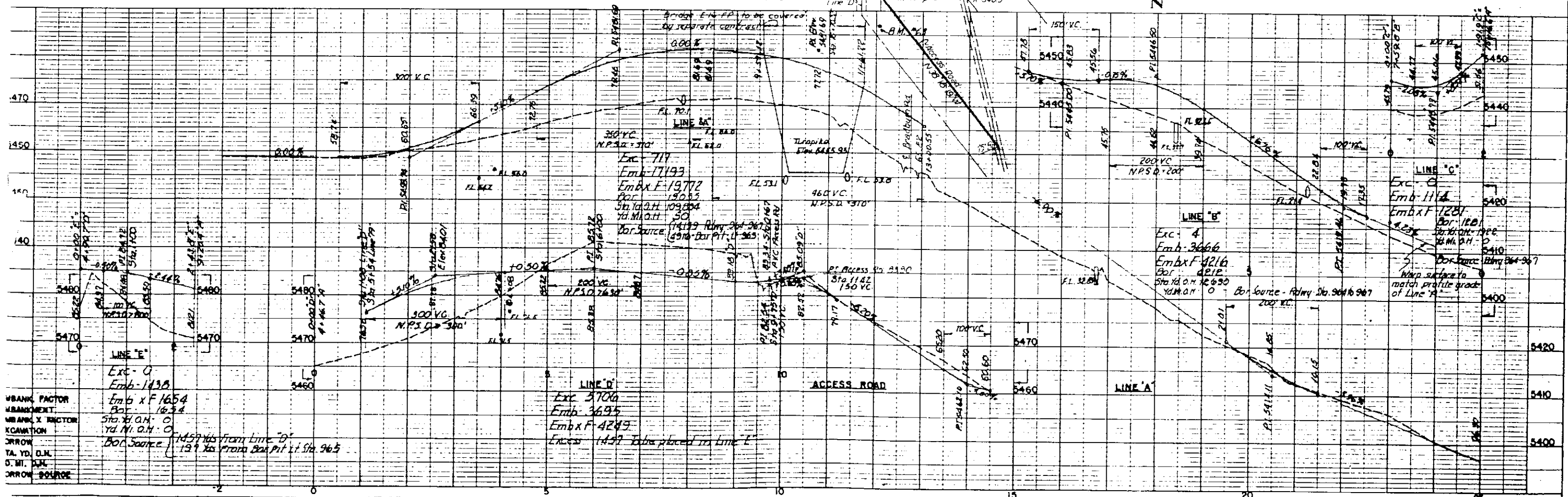


From 0+00-Line "A" along existing Cornell Ave. to 22+75-Line "A" Remove Existing 6" Water Line and Replace with 10" C.I. Water Main.

FORCE ACCOUNT
 Line "A"-5+50+ Remove and Replace Power line and poles Et. & Lt. (Work to be done by Arvada Electric Co. Forces)

Note:
 Roadway width to be increased to 32' shoulder to shoulder of bridge approaches as per Standard M-2-DM.

B.M. #63 - Steel pin in fence line, approximately 187' Lt. Sta. 960+00 Elev. 5485.88
 B.M. #64 - Steel pin in fence line, approximately 105' Lt. Sta. 970+00 Elev. 5453.00



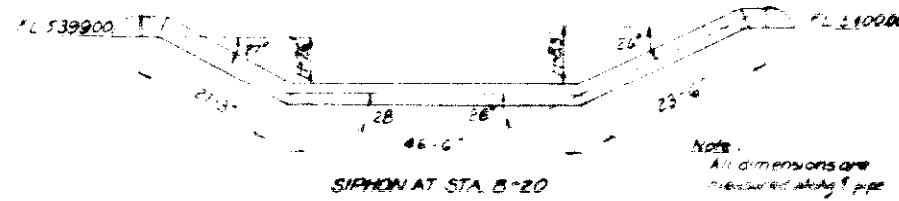
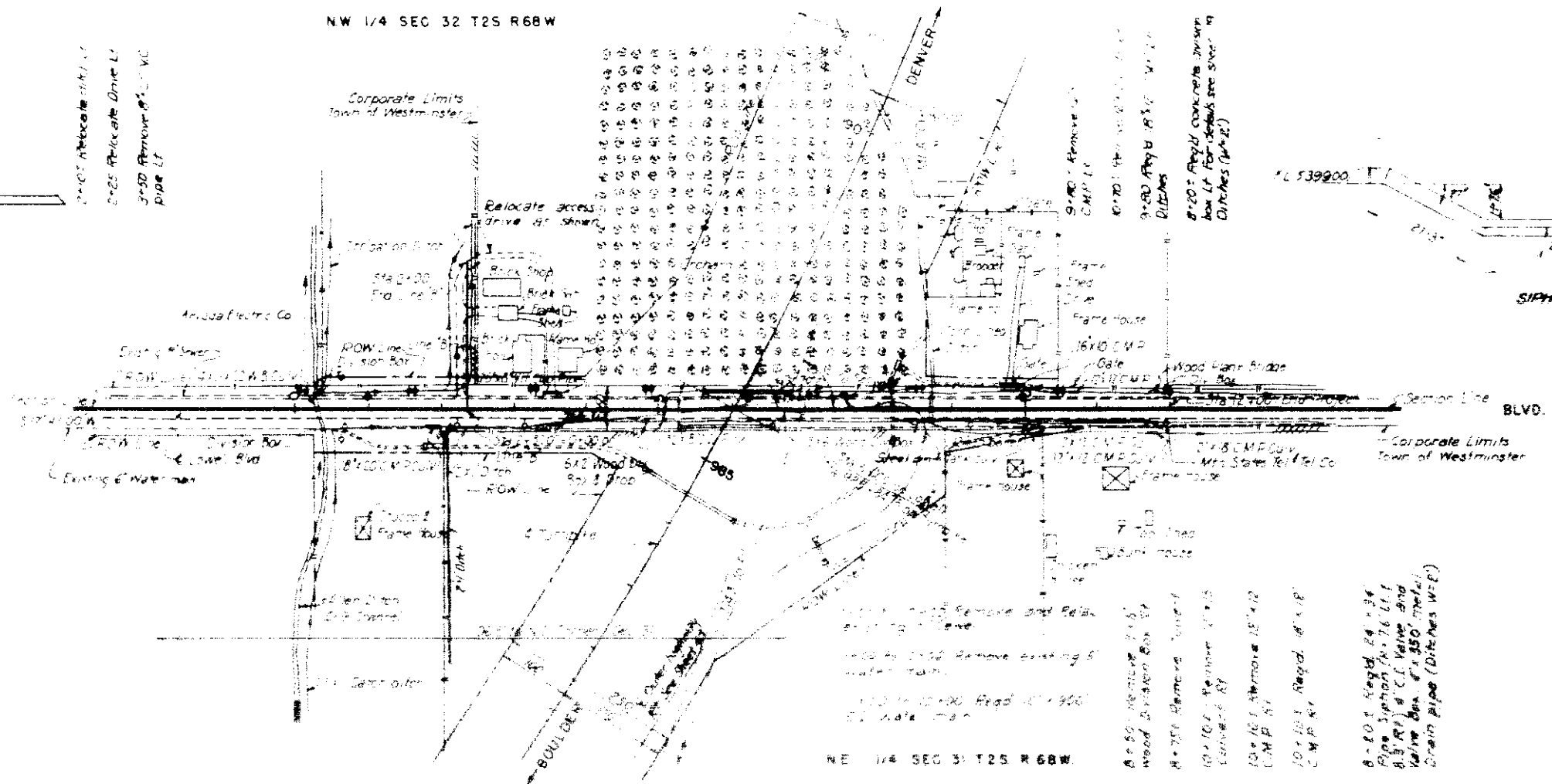
WBANK FACTOR
WBANKMENT
WBANK X FACTOR
XCAMATION
DRROW
TA. YD. O.M.
O. M. PLAN
DRROW SOURCE

NW 1/4 SEC 32 T2S R68W



Clearing & Grubbing
 2400 Trees Rf
 3140 Trees Rf
 4-25 to 8-50 Trees Lt

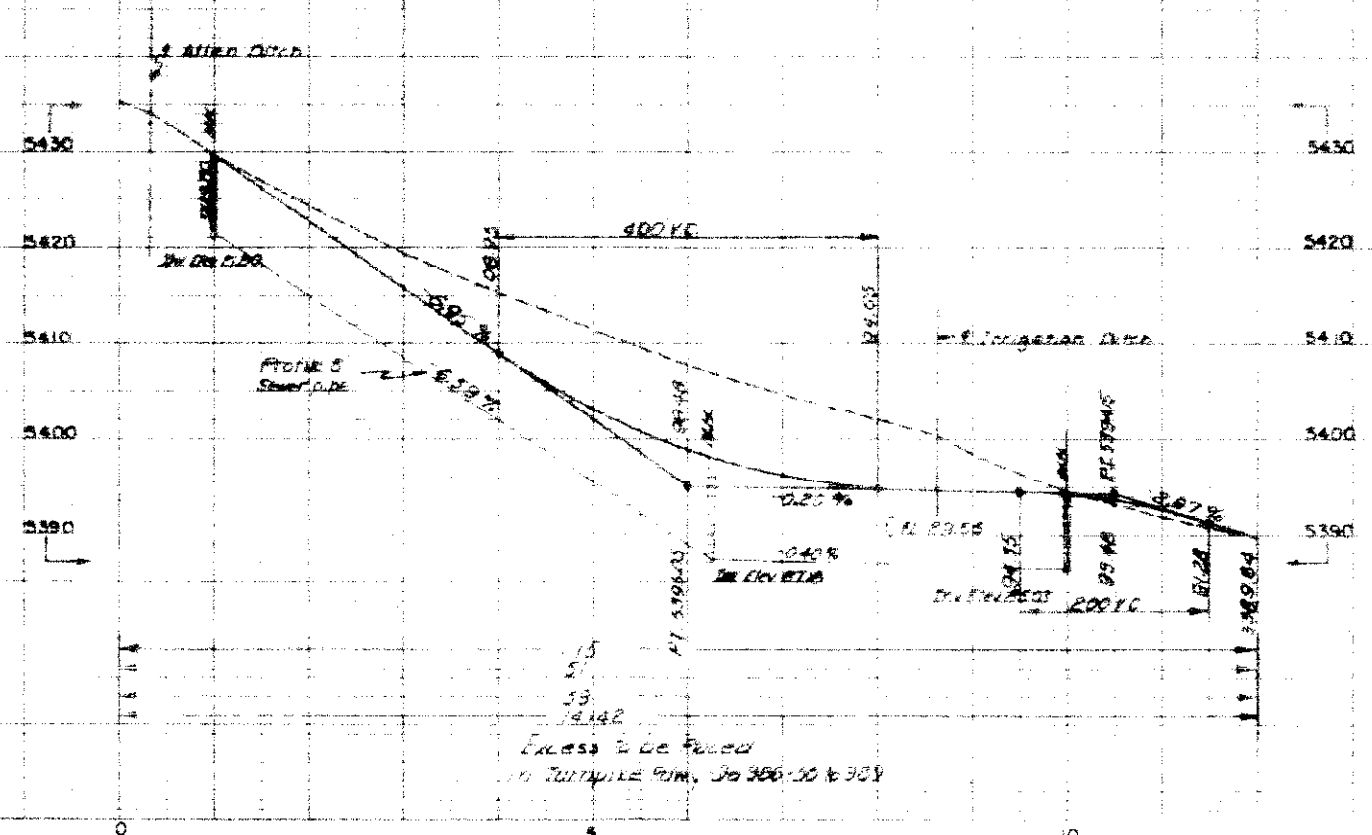
- 1-20" Remove 15' 20" MP RT
- 4-18" Remove 6' 2" Wood division box Rf
- 5-12" Remove 15' 30" CI pipe
- 1-14" 4" x 14" 24' 20" MP RT
- 1-18" 4" x 18" 14' 0" CI
- 1-24" 4" x 24" 14' 0" CI
- 1-30" 4" x 30" 14' 0" CI
- 1-36" 4" x 36" 14' 0" CI
- 1-42" 4" x 42" 14' 0" CI
- 1-48" 4" x 48" 14' 0" CI
- 1-54" 4" x 54" 14' 0" CI
- 1-60" 4" x 60" 14' 0" CI



NE 1/4 SEC 31 T2S R68W

Note:
 Sewer grades and manhole locations are tentative only and may be altered to meet flow lines of existing sewer pipes.

EMBANK. FACTOR
 EMBANKMENT
 EXCAVATION FACTOR
 EXCAVATION
 BORROW
 STA. YD. D.H.
 YD. MI. D.H.
 BORROW SOURCE



Excess to be filled
 in Turnpike R/W, Sta 356+30 to 358