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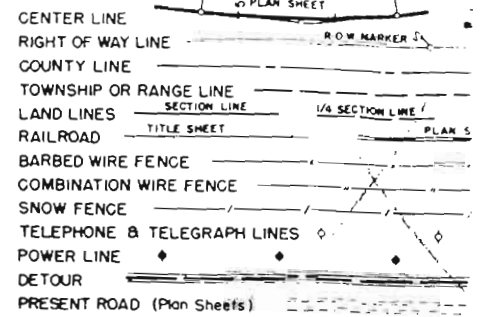
COLORADO DEPARTMENT OF HIGHWAYS

PLAN AND PROFILE OF PROPOSED FEDERAL AID PROJECT NO. I.N. 002-2 (40) STATE HIGHWAY NO. 1 EL PASO COUNTY

250-05104

SECTION NO.	JOB NO.
5	COLORADO
Rev. 12-	

CONVENTIONAL SIG

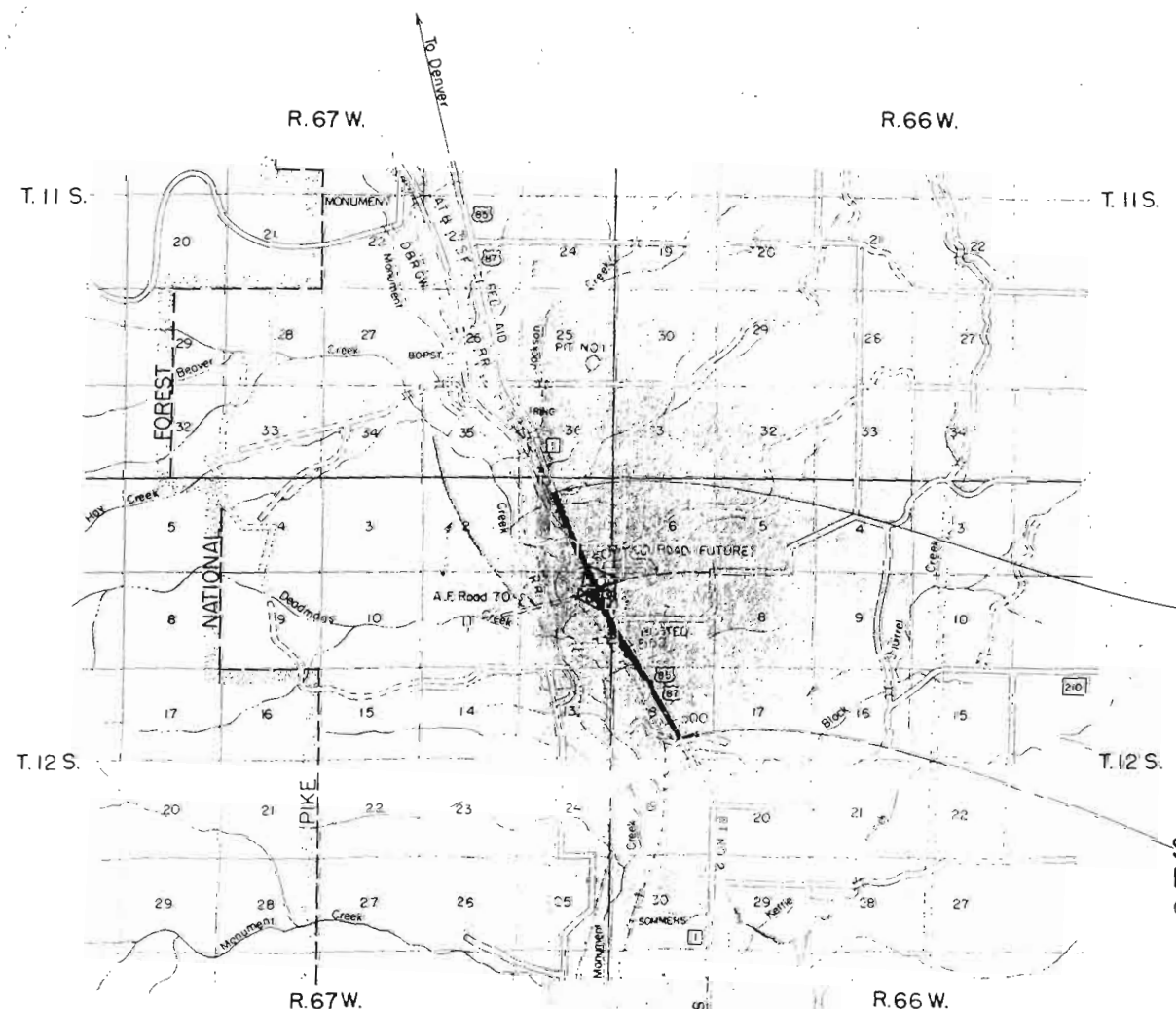


SCALES OF ORIGINAL DRAWINGS

ON PLAN 1 IN = 100 FT
 ON PROFILE 1 IN = 20 FT HORIZONTAL
 1 IN = 10 FT VERTICAL
 GRADE LINE ON PROFILE IS SHOWN AS GRADE OF FINISHED ROAD
 GROSS LENGTH OF PROJECT 15,022.6 ft = 2.845 mi.
 NET LENGTH OF PROJECT

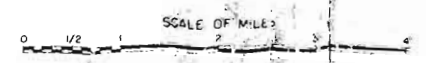
TABULATION OF LENGTH & DESIGN DATA

STATION	ROADWAY	MAJOR STRUCTURES	
	(SO. BOUND LANE)	LIN. FT.	LOADING
491+30 Begin I.N. 002-2(40)			
OPP 491+30 on F.I. 002-2(25) UNIT 2	700		
492+00 End F.I. 002-2(25) UNIT 2			
Begin F.I. 002-2(25) UNIT 1	595.1		
197+95.1 Bk			
197+95.3 Ah Equation	2249.1		
20+44.4 Bk Equation			
20+44.3 Ah	1810.1		
538+54.4 Db' 12'x10' C.B.C.		31.2	H20-S16-44
538+85.6	3822.9		
577+08.5 Db' 10'x10' C.B.C.		23.0	H20-S16-44
577+31.5	811.8		
565+43.3 Overpass		188.8	H20-S16-44
587+32.1	2027.2		
607+59.3 Bk			
607+73.5 Ah Equation	3393.4		
641+66.9 Bk End I.N. 002-2(40)			
OPP 640+93.1 Ah on F.I. 002-2(25) UNIT 1			
TOTALS	14,779.6	243.0	
SUMMARY			
I.N. 002-2(40) Roadway	14,779.6	2,799	MILES
I.N. 002-2(40) Structures	243.0	0.046	
TOTALS I.N. 002-2(40)	15,022.6	2.845	
DESIGN DATA			
Maximum Degree of Curve		1°06'	
Maximum Grade		4.10 %	
Minimum N.P.S.D - Horizontal		1300'	
Minimum N.P.S.D - Vertical		620'	
Maximum Design Speed		70 M.P.H.	



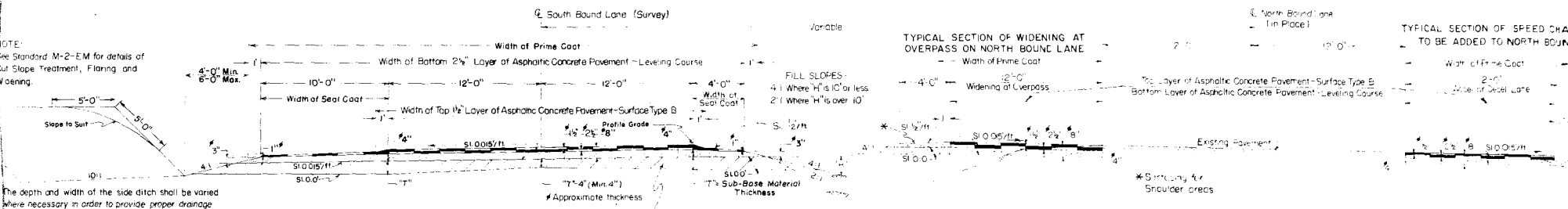
STA. 641+66.9 Bk.
END I.N. 002-2 (40)
 Opposite Sta. 640+93.1 Ah.
 on F.I. 002-2(25) Unit 1

STA. 491+30
BEGIN I.N. 002-2(40)
 Opposite Sta. 491+30
 on F.I. 002-2 (25) Unit 2



TYPICAL CROSS SECTION OF IMPROVEMENT

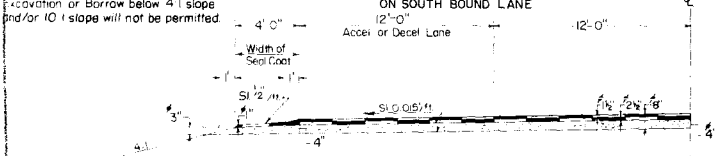
NOTE:
 See Standard M-2-EM for details of
 Cut Slope Treatment, Flaring and
 Widening.



The depth and width of the side ditch shall be varied
 where necessary in order to provide proper drainage
 and/or entrance to drainage structures.

Gradation or Borrow below 4:1 slope
 and/or 10:1 slope will not be permitted.

TYPICAL SECTION OF SPEED CHANGE LANES ON SOUTH BOUND LANE



NOTE:
 Bottom Layer of Bituminous Surfacing shall be completed for full width
 before Top Layer of Bituminous Surfacing is placed. Paving joints in
 Top Layer will overlap min. 1ft. over joints in Bottom Layer.

GENERAL NOTES

This project is to be constructed in conformity with the Standard Specifications of the Colorado
 Department of Highways adopted June 1, 1952.

- All quantities on preliminary plans are to be considered approximate only.
- All poles and signs encroaching on construction are to be moved by owners.
- All Concrete Pipe Cross Culverts shall be laid with flared end sections.
- All curves are to be superelevated and widened as provided by the Standard Superlevation sheet included with the plans. Except curves on Ramps which are to be superelevated for a 7° curve.
- The force account item, Clearing of Building Sites, including Removal of Foundation and Appurtenances, shall include removal of all foundations, wells, outhouses, driveways & other appurtenances not removed by the owner, and any necessary backfilling of cellars, cess pools, wells, ect. to provide neat road-side conditions.

It is estimated that this item applies at the following locations:
 Sta 557 ± to Sta 564 ±
 Sta 580 ± to Sta 584 ±

Gravel or Crushed Rock Surfacing shall be placed in separate courses at the following rates per 100 lin. ft. of roadway:

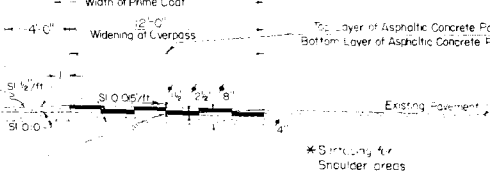
	TOP LAYER	BOTTOM LAYER	BASE COURSE	SHOULDER SURFACING
Roadway	2.3 tons	5 tons	8.3 tons	
Ramps "C" & "D"	2.7 "		5.4 "	
Ramps "G" & "H"	2.7 "		7.3 "	10 tons
County Road	2.4 "		5.1 "	

For preliminary plan quantities of Asphaltic Road Materials, the following rates of application were used:
 PRIME COAT at 0.10 Gals per Sq. Yd.
 PAVING ASPHALT (Type B) at 6.0 % by weight
 SEAL COAT at 0.24 Gals per Sq. Yd.
 STONE SCREENINGS at 24.0 Lbs. per Sq. Yd.
 PAVING ASPHALT (Level Course) at 5.0 % by weight
 Rate of application and grade of Asphaltic Material shall be as determined by the Engineer at time of application.

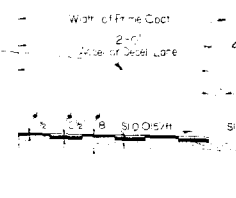
From Sta. 491 ± to Sta. 576 ± and from Sta. 600 ± to Sta. 641 ± the constructed cut & fill slopes are to be covered with an approximate 3" thickness of topsoil. Topsoil is to be obtained from areas 3ft. inside stake-out limits or other areas approved by the Engineer and stockpiled at ends of cuts or at intervals of approximately 1000 ft.

From Sta. 576 ± to Sta. 600 ± topsoil within grading area of intersection is to be stockpiled and is not to be placed on this construction. Location of Stockpile to be as directed by the Engineer. Quantity of Topsoil to be stockpiled at this location is estimated to be 45,000 Cu. Yds.

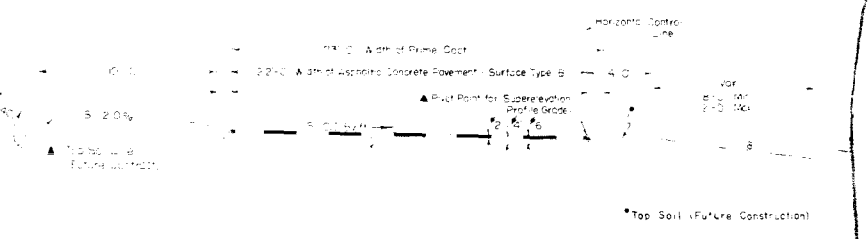
TYPICAL SECTION OF WIDENING AT OVERPASS ON NORTH BOUND LANE



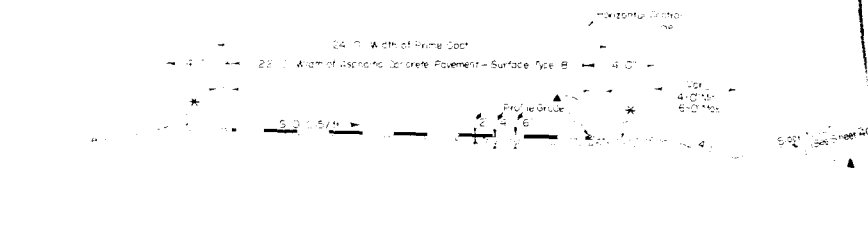
TYPICAL SECTION OF SPEED CHANGE TO BE ADDED TO NORTH BOUND



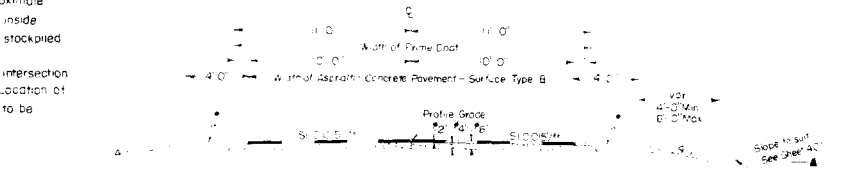
TYPICAL SECTION FOR COUNTY ROAD RAMPS "C" & "D"



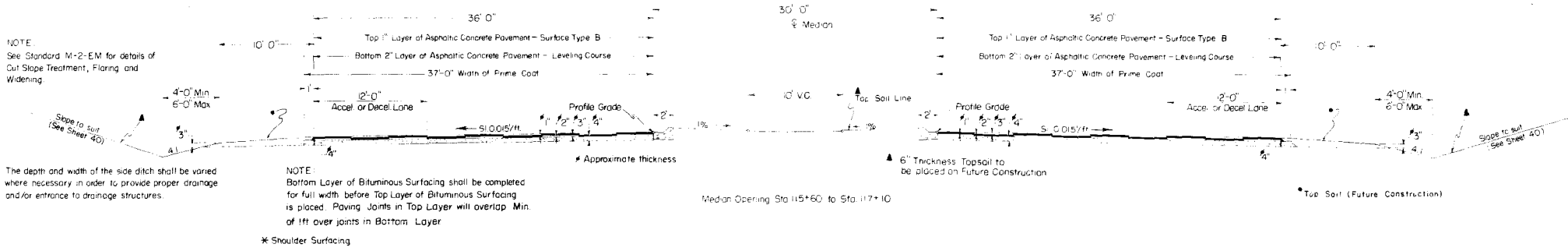
TYPICAL SECTION FOR COUNTY ROAD RAMPS "G" & "H"



TYPICAL SECTION FOR COUNTY ROAD



TYPICAL SECTION FOR AIR FORCE ROAD 70 STA. 114+00 to STA. 130+50



Gravel or Crushed Rock Surfacing shall be placed in separate courses at the following rates per 100 sq. ft. of roadway.

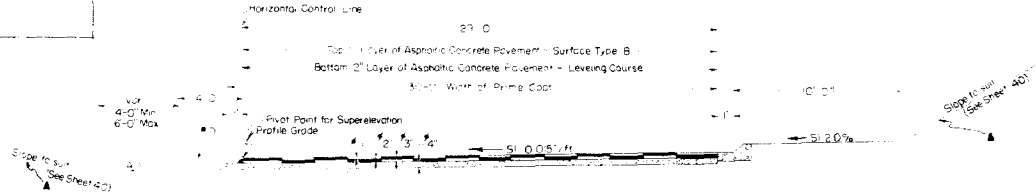
	TOP LAYER	BOTTOM LAYER	BASE COURSE
Roadway	4.4 tons	6.7 tons	16.5 tons
Ramps	1.8 "	3.5 "	6.7 "

For preliminary plan quantities of Asphalt Road Materials, the following rates of application were used:

PRIME COAT at 0.40 Gals per Sq. Yd.
 PAVING ASPHALT (Type 'E') at 6.0 % by weight
 SEAL COAT at 0.24 Gals per Sq. Yd.
 STONE SCREENINGS at 25.0 Lbs per Sq. Yd.
 PAVING ASPHALT (Leaving Course) at 3.0 % by weight

Rate of application and grade of Asphaltic Material shall be as determined by the Engineer at time of application.

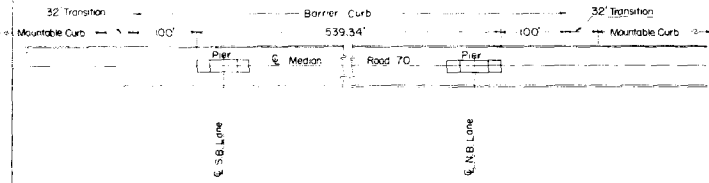
TYPICAL SECTION FOR AIR FORCE RAMPS 'A', 'B', 'E' & 'F'



REMOVE OR BREAK CONCRETE PAVEMENT

STATION	REMOVE	BREAK
	CONCRETE	CONCRETE
	SQ. YDS.	SQ. YDS.
503+75 to 536+00	6,450	
536+00 to 538+51		502
538+78 to 541+00		444
541+00 to 565+00	4,800	
565+00 to 603+00	7,600	
603+00 to 618+00	3,000	
618+00 to 628+00		2,000
628+00 to 641+00	2,600	
TOTALS - INTERSTATE	24,450	2,946

BARRIER CURB PLAN

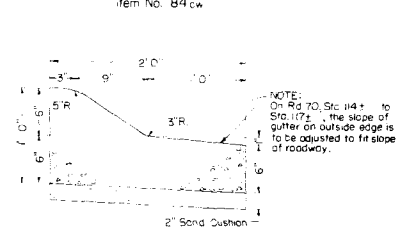


NOTE: Payment for transition of Mountable type Curb and Gutter to Barrier type Curb and Gutter is to be included in Contract Unit Price for Item 84cw.

NOTE: Removed Concrete Pavement to be disposed of as directed by the Engineer.

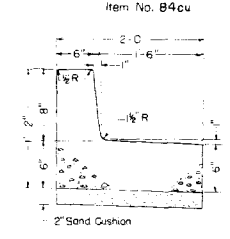
DETAIL OF MOUNTABLE TYPE CONCRETE COMBINATION CURB & GUTTER

Item No. 84cw



DETAIL OF BARRIER TYPE CONCRETE COMBINATION CURB & GUTTER

Item No. 84cu



SUMMARY OF APPROXIMATE QUANTITIES

ITEM NO.	ITEM	UNIT	INTERSTATE				AIR FORCE				LN.002-2 (40)	AW-1-01-12	COMBINED		
			ROADWAY	C.B.C. Sta. 538+	C.B.C. Sta. 577+	TOTAL INTERSTATE	ROAD 70	BRIDGE Sta. 586+ (S.B. Lane)	BRIDGE Sta. 586+ (N.B. Lane)	TOTAL AIR FORCE	PROJECT TOTALS	PROJECT TOTALS	COMBINED TOTALS		
10a	Clearing and Grubbing Entire Project	AW-1-01-12	Lump Sum												
10c	" " " " " " " "	I.N.002-2 (40)	" " "												
11a	Removal of Bridge, Sta. 538+	" " "	" " "												
11b	" " " " " " " "	Rt. Sta. 577+	" " "												
11c	" " " " " " " "	Lt. Sta. 580+	" " "												
11d	Removal of D.B.I. 10x6 C.B.C. Lt. Sta. 577+	" " "	" " "												
11e	Remove Headwall	AW-1-01-12	Each												
11f	Plug Culvert	AW-1-01-12	" " "												
11g	Removal of 18 Structures	" " "	Lump Sum												
11h	Remove Headwall & Cut Keyway	" " "	Each												
11i	Plug Culverts	I.N.002-2 (40)	" " "												
11j	Removing Guard Posts	" " "	" " "												
11k	Removing Concrete Pavement	" " "	Sq. Yd.	24,450			24,450				24,450			24,450	
11l	Breaking Concrete Pavement	" " "	" " "	2,950			2,950				2,950			2,950	
11m	Remove & Reset Flared End Section	" " "	Each												
11n	Removing & Resetting Mail Boxes	" " "	Lump Sum												
12a	Removing Fence	" " "	Lin. Ft.										1,200		1,200
13c	Unclassified Excavation	" " "	Cu. Yd.	404,900	7.5	25	405,000	843,000			843,000	1,248,000		266,000	1,514,000
13d	Unclassified Ditch Excavation	" " "	" " "	100			100				100		1,100		1,200
14e	Unclassified Structural Excavation	" " "	Cu. Yd.	520	15.6	10	686	204			204	890	1,620		2,510
4g	Common Excavation (Str.)	" " "	" " "						6.0	6.0	1,240	1,240			1,240
16ax	Structure Backfill (Class 1)	" " "	Cu. Yd.	235	20	5	260	145	38.5	38.5	91.0	1,176	1,910		3,086
16c	Mechanical Tamping	" " "	Hour	60	3.5	6.0	15.5	25	5.0	5.0	12.0	28.0	28.0		56.0
17c	Rolling with Flat Wheeled Roller (Tandem)	" " "	Hour	270			270	110			110	380			380
17d	" " " " " " (Three (3) Wheel)	" " "	" " "	15			15	5			5	20			30
17e	" " Rubber Tired Roller (One (1) Unit)	" " "	" " "	60			60	30			30	90	30		120
17ex	" " " " " " (Two (2) Unit)	" " "	" " "	15			15	5			5	20	10		30
17h	Furnishing Flat Wheeled Roller (Tandem)	" " "	Each	14			14	0.6			0.6	2			2
17i	" " " " " " (Three (3) Wheel)	" " "	" " "	0.75			0.75	0.25			0.25	1			2
17j	" " Rubber Tired " (One (1) Unit)	" " "	" " "	0.65			0.65	0.35			0.35	1			2
17k	" " " " " " (Two (2) Unit)	" " "	" " "	0.75			0.75	0.25			0.25	1			2
17x	Wetting	" " "	M. Gal.	8,410			8,410	8,160			8,160	16,570	7,830		14,400
17y	Compaction	" " "	Cu. Yd.	300,750			300,750	321,250			301,250	622,000	713,000		1,335,000
18a	Station Yard Overhaul	" " "	Sta. Yd.	1,641,000			1,641,000	518,000			518,000	2,159,000	2,599,000		3,018,000
18b	Yard Mile Overhaul	" " "	Yd. Mile	8,600			8,600				8,600	16,150			24,750
19a	Placing Topsoil	" " "	Cu. Yd.	7,000			7,000				7,000				7,000
23ax	Sub-Base Material (Class 1)	" " "	Tons	7,400			7,400				7,400		9,300		16,700
26cx	Gravel or Crushed Rock Surfacing (Grading C)	" " "	Tons	18,150			18,150	7,050			7,050	25,200			25,200
29c	Asphalt (100-120 Penetration)	" " "	Tons	865			865	345	10	10	365	1,230			1,230
30x	Asphaltic Road Material MC (Prime)	" " "	Gal.	34,000			34,000	13,000			13,000	47,000			47,000
30y	Asphaltic Road Material RC (Seal)	" " "	Gal.	5,600			5,600	300			300	5,900			5,900
31c	Stone Screenings (Type 1)	" " "	Ton	290			290	20			20	310			310
34b	Asphaltic Concrete Pavement (Leveling Course)	" " "	Ton	7,900			7,900	3,390			3,390	11,290			11,290
34d	" " " " " " (Surface Type B)	" " "	" " "	5,210			5,210	1,824	108	108	2,040	7,250			7,250
37c	Sand Cushion	" " "	Cu. Yd.	20			20	100			100	120			120
46a	Class "A" Concrete	" " "	Cu. Yd.	250	390	447	1,087	10	581	628	1,219	2,306		301	2,607
46p	" " " " " " " "	" " "	" " "						394	788	788				788
47	Reinforcing Steel	" " "	Lb.	30,800	40,100	44,300	115,200	1,100	105,700	110,500	217,300	352,500	37,300		389,800
48	Structural Steel	" " "	" " "						44,500	43,900	88,400	88,400			88,400
52b	18" Reinforced Concrete Culvert Pipe (Standard Strength)	" " "	Lin. Ft.	96			96				96		480		576
52c	24" " " " " " " " "	" " "	" " "	250			250				250				250
52q	48" " " " " " " " "	" " "	" " "	56			56				56				56
53w	8" Corrugated Metal Culvert Pipe	" " "	Lin. Ft.					956			956	956			956

SUMMARY OF APPROXIMATE QUANTITIES

ITEM NO.	ITEM	UNIT	INTERSTATE				AIR FORCE			I. N. 002-2 (40)	AW-1-01-12	COMBINED TOTALS
			ROADWAY	C.B.C Sta. 538*	C.B.C Sta. 577*	TOTAL INTERSTATE	ROAD 70	BRIDGE Sta. 586* (S.B. Lane)	BRIDGE Sta. 586* (N.B. Lane)	TOTAL AIR FORCE	PROJECT TOTALS	
58cx	24" 14ga. Asbestos Bonded Corrugated Metal Culvert Pipe (Bit Coated)	Lin. Ft.									315	315
58qx	48" 8-ga. " " " " " " " "	" "									311	311
60x	Drilling Holes to Facilitate Pile Driving	Lin. Ft.						665	1,517	1,517		1,517
61x	Steel Pipe Piling (2 1/2" O.D. x 0.25" thick)	" "						1,395	3,148	3,148		3,148
63	Grouted Rubble Slope & Ditch Paving	Cu. Yd.									338	338
67a	Rrap	Cu. Yd.	375		15	390				390		390
71wa	8" Asbestos Bonded Perforated Corrugated Metal Pipe Underdrain (Bit Coated)	Lin. Ft.									1,769	1,769
71xa	8" " " Unperforated " " " " " "	" "									305	305
80c	Sheet Copper (32 oz)	Lb.						352	726	726		726
84cu	Concrete Combination Curb and Gutter (1"-6" Gutter)	Lin. Ft.					1,520		1,520	1,520	567	2,087
84cw	" " " " (1"-0" Gutter)	" "	1,270			1,270	6,516		6,516	7,786	5,885	13,671
85x	Trash Guard	Each										1
85y	" " (For 42" Pipe)	" "										1
90b	2" Electrical Conduit with Junction Boxes	Lin. Ft.						465	830	830		830
92	Timber Guard Posts	Each	205			205			205	205		205
95cz	Metal Aprons for 24" Corrugated Metal Pipe Culverts (Bit Coated)	Each										1
95qz	" " " " 48"	" "										1
132ca	12" Reinforced Concrete Pipe Sewer	Lin. Ft.	546			546	738		738	1,084		1,084
132cb	" " 15"	" "	482			482	64		64	546		546
132cg	" " 18"	" "					542		542	542		542
132cx	" " 24"	" "					96		96	96		96
132cm	" " 42"	" "	948			948				948		948
132m	Manholes	Each	2			2	2		2	4		4
132my	" "	" "									1	1
132gb	No. 13 Inlet Grating & Frame	" "	4			4	6		6	0		10
132gz	Inlet Grating & Frame (Median)	" "					3		3	3		6
132ry	Manhole Ring & Cover (Grating)	" "										1
152b	Fixed End Sections for 18" Reinforced Concrete Culvert Pipe	Each	2			2				2	3	5
152c	" " " " 24"	" "	11			11				11		11
152g	" " " " 48"	" "	2			2				2		2
201	Permits & Railroad Crossings	Lump Sum										
91c	Project Markers (State Forces)	Each	2			2				2		2
FORCE ACCOUNT												
20a	Cleaning of Building Sites, including Removal of Foundations & Appendances	Lump Sum										
	Calibrating Old Road	" "										
FORCE ACCOUNT (Non-Federal Aid)												
	Signing and Striping (State Forces)	Lump Sum										
	Relocating Power Line (work by City of Colo. Springs Forces)	" "										
	Relocating Power Line (Mountain View Elec. Ass'n Inc.)	" "										
	Relocating Telephone Line (work by A.T. & T. Co. Forces)	" "										

* 1'-12" Lane to be built with Federal Aid Funds.

The source of material for Gravel Surfacing and Sub-Base Material for the project is undesignated. Estimated quantities involved in these operations are shown below.

Alteration of these Plans as here outlined will be allowed only on written permission from the Department.

FENCING REQUIREMENTS

STATION	SIDE	REMOVE FENCE	REMOVE & REBUILD FENCE	BUILD FENCE	
		LIN. FT.	LIN. FT.	BARBED WIRE	LIN. FT.
495+65 to 520+00	Lt		2,435		
520+00 to 528+75	"		875		
528+75 to 537+12	"		812		
537+12 to 539+00	"		188		
539+00 to 554+36	"		4,536		
554+36 to 571+00	"		1,700		
571+00 to 577+00	"		600		
594+00 to 599+20	"		520		
599+20 to 609+15	"		1,015		
609+15 to 622+30	"		1,315		
622+30 to 640+00	"		1,770		
576+75 to 593+38	"	1,760			
505+52 to 520+00	Rt	2,235			
528+75 to 538+40	"	1,107			
539+70 to 558+30	"	540			
564+70 to 577+00	"	1,790			
580+32 to 581+20	"	140			
582+48 to 584+32	"	440			
599+20 to 600+75	"	250			
603+50 to 607+10	"	910			
607+10 to 619+50	"	185			
620+35 to 625+38	"	1,060			
576+00 to 603+00	Rt & N.B. LANE		2,700		
576+00 to 603+00	LANE			770	
TOTALS		10,417	15,466		770

SURFACING PLAN

MATERIAL TO BE PLACED	SOURCE	AVAILABLE	QUANTITY TONS USED				
			ASPHALTIC TYPE B		CONCRETE	GRADING & SHOULDER AREAS	
			TYPE B	Leaving Course	BOTTOM COURSE		
491+30 to 585+29.7	Undesignated		2,162	4,794	7,802		
587+48.7 to 641+66.9			1,243	2,755	4,484		
Accel. Lane Ramp "D"			72	79	98		
Overpass Widening			65	108	160		
Decel. Lane Ramp "G"			26	28	35		
Taper Ramp "G"			12	13	16		
Accel. Lane Ramp "H"			96	105	131		
Ramp "C"			177		353		
Ramp "D"			171		342		
Ramp "G"			367		993	136	
Ramp "H"			497		1,343	184	
County Road			96		205		
County Road Transition			183		320		
List of Structures					260		
Apprs. to Project				15	40		
Estimated for:							
Irregularities in Sub-Grade					1200		
Approach Slabs, Sta. 586+ (S.B. Lane)			16				
" " " " 586+ (N.B. Lane)			19				
Ramp "A"			215	414	794		
Ramp "B"			194	378	725		
Ramp "E"			217	422	809		
Ramp "F"			217	422	809		
Road 70			728	1,440	2,742		
Accel. Lane Ramp "A"			63	69	86		
Decel. Lane Ramp "B"			19	21	26		
Accel. Lane Ramp "E"			138	151	188		
Sta. 115+62 to 117+12*			27	54	100		
Sta. 130+25 to 130+50			6	11	20		
Estimated for Correcting Irregularities in Sub-Grade					741		
TOTALS - INTERSTATE			5,202	7,897	17,782	320	
TOTALS - AIR FORCE			1,822	3,382	7,040		

* Median opening

SUB-BASE MATERIAL PLAN

MATERIAL TO BE PLACED	SOURCE	AVAILABLE	QUANTITY AND THICKNESS			TONS
			THICKNESS		CLASS	
516+75 to 529+00			15"			4,141
529+00 to 537+30			4"			706
537+30 to 541+00			15"			1,251
545+00 to 549+00			8"			620
Estimated for Correcting Irregularities in Sub-Grade						672
TOTALS						7,390

▲ Based on Curve "D"

CONCRETE COMBINATION

CURB & GUTTER

STATION	MAINTAINABLE TYPE	BARRIER TYPE
	ITEM NO. 840w LIN. FT.	
114+00 to 115+60 Median	340	
114+75 to 118+00 Lt	290	
115+25 to 118+35 Rt	310	
117+00 to 119+63.8 Median	505	
119+63.8 to 127+23.1	646	1,519
127+23.1 to 130+25		
Ramp "A"	1,010	
" " "B"	975	
" " "E"	180	
" " "F"	1,260	
Ramp "C"	640	
" " "D"	630	
TOTALS - A-F Road 70	6,516	1,519
TOTALS - Interstate	1,270	

Estimated for Sand Cushion
Interstate 16 Cu Yds
Air Force 100 Cu Yds

NOTE: For plan of Barrier Curb and transitions of Barrier Curb to Maintainable Curb, see Sheet 3.

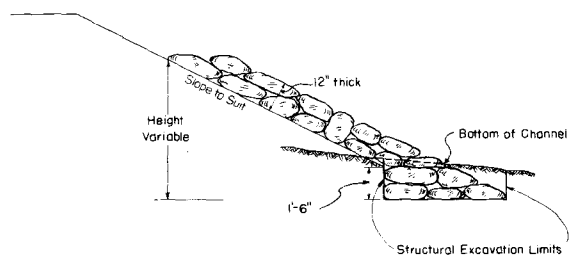
TIMBER GUARD POSTS

STATION	SPACING	SIDE	NO
495+50 to 500+00	50'	Lt	10
509+75	Culv.	Lt & Rt	2
521+00	"	"	2
535+40 to 540+40	50'	Lt	11
535+40 to 542+90	50'	Rt	16
545+50 to 550+50	50'	Lt	11
545+50 to 549+00	50'	Rt	8
560+45	Culv.	Lt & Rt	2
571+00 to 584+50	50'	Lt	28
572+00 to 585+00	50'	Rt	27
585+00	Overpass	Lt & Rt	10
605+05	C.B.C.	"	2
585+ N.B. Lane	Overpass	Lt & Rt	10
607+89	C.B.C.	"	2
608+00 to 611+00	50'	"	14
617+00 to 628+50	50'	Lt	24
618+00 to 627+50	50'	Rt	20
5+00 Ramp "G"	Culv.	Lt & Rt	2
133+00 County Road	"	"	2
5+00 Ramp "H"	"	"	2
TOTALS - Interstate			205

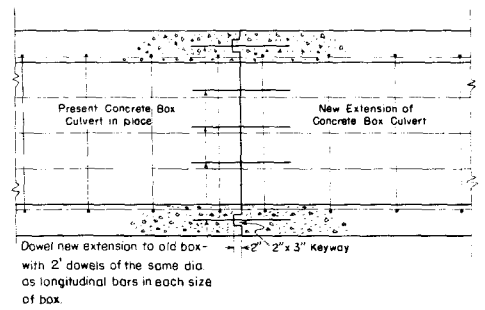
It is estimated that removal of 93 Guard Posts will be required.

Revised 12-14-56 R.L.F.

DETAILS OF RIPRAP FOR CHANNEL IMPROVEMENT



DETAIL OF JOINT FOR BOX CULVERT EXTENSION



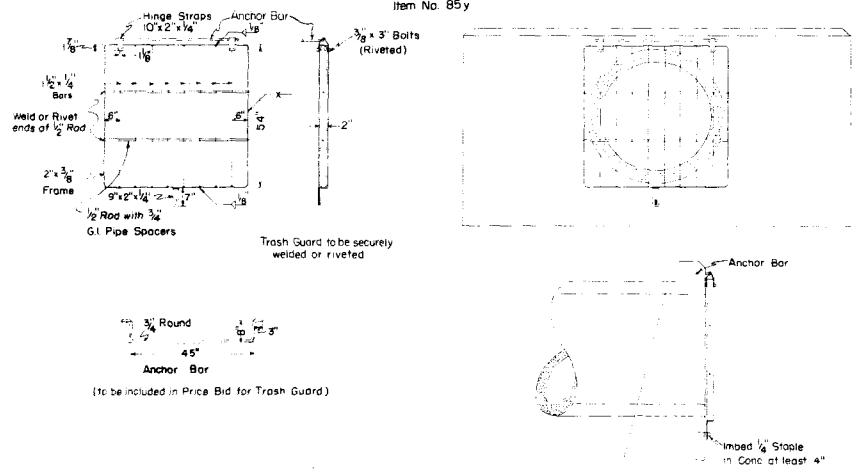
NOTE

The cost of removing headwall & cutting keyway is to be paid for at the unit price for "Remove Headwall & Cut Keyway."

Place one Dowel for each longitudinal bar in CBC's as shown on Standard M-50-A

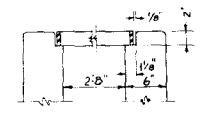
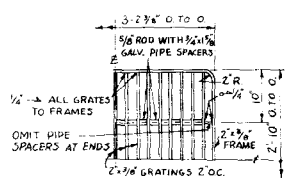
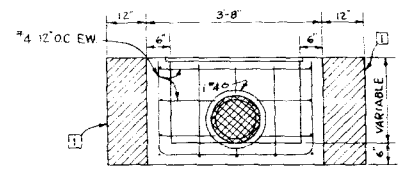
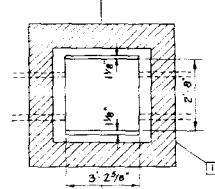
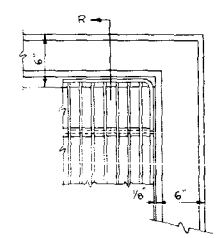
Dowel bars are to be grouted in place with a cement grout composed of one part cement and two parts clean well graded sand. The cost of drilling holes, grouting and placing dowels is to be included in payment for Reinforcing Steel.

DETAILS OF TRASH GUARD FOR HEADWALL FOR STORM SEWER OUTLET



MEDIAN DRAIN DETAILS

SCALE AS NOTED



LIST OF STRUCTURES



FED. ROAD DIVISION NO.	DISTRICT	PROJECT NO.	SHEET NO.	TOTAL SHEETS
5	COLO.	I.N. 002-2 (40)	B	

NOTE NO.	LOCATION	DESCRIPTION	REMOVE STRUCTURE NO. KIND	EXCAVATION CUBIC YARDS			STRUCTURAL EXCAVATION CUBIC YARDS	MAN-HOLES NO.	STRUCTURE BACKFILL CUBIC YARDS	MECH. TAMING HOURS	GRAVEL OR CRUSHED ROCK SURFACING TONS	INLET GRATING & FRAME NO.	CONCRETE CUBIC YARDS	REINFORCING STEEL LBS.	CORRUGATED METAL CULV. PIPE L'	REINFORCED CONCRETE PIPE SEWER					REINFORCED CONCRETE CULVERT PIPE			FLARED END SECTIONS				MISCELLANEOUS		
				CUBIC YARDS												REINFORCED CONCRETE PIPE SEWER	REINFORCED CONCRETE CULVERT PIPE				FLARED END SECTIONS									
				LINEAL	EMB.	VERT.											LINEAR FEET	LINEAR FEET				NO.								
				NO.	12"	15"										18"	24"	42"	18"	24"	48"	18"	24"	48"	18"	24"	48"			
43 44 45 46	613+90 620+00 626+20 628-25	Remove Appr Lt Median Crossing, Rt Remove 18" S.M.B. & Appr to A.S. Lane Remove Hedgecut, Cut Keyway & Extend Sidecut 20' to Rt Hedgecut Ditch & 2' Details on Sheet 6 1, Type 9B	1	10	200			10	16																			Remove median wall & Cut Keyway		
47 48	629+70 641+669	Remove Appr & 18" S.M.B. Lt Appr to Project	1	10						0																				
49	641+669	Project Marker, Rt																											Project Marker (State Forces)	
50 51 52 53	0+ to 15+ Ramp G 4+ to 7+ Ramp G 5+00 Ramp G 133+00 County Road	Reqt Channel Change Lt (W = 20') Reqt Riprap Slope of Channel (Details on 6) Reqt Cross Culvert Ditches Reqt Cross Culvert Ditches		3500																64 34								175 Cu Yd Riprap		
54	5+00 Ramp H	Reqt Cross Culvert Ditches Mechanical Tamping other than C.B.C							28										10											
55 56 57 58	115+80 Rd 70 117+30 to 126+80 (Rd 70) 123+50 Rd 70 128+00 Rd 70	Reqt Sleeve for Irrigation Pipe Reqt Storm Sewer (Details Sheet 44) Reqt Sleeve for Irrigation Pipe Reqt Sleeve for Irrigation Pipe																												
59 60 61 62	2+25 Ramp A 2+50 Ramp C 18+ Road 70 Rt 3+00 Ramp D	" " " " " " " "																												
63 64 65 66	5+25 Ramp D 132+00 Ramp E 137+00 Ramp F 133+00 Ramp F	" " " " " " " "																												
67 68 69 70	138+00 Ramp F 7+00 Ramp B 7+00 Ramp G 9+00 Ramp H	" " " " " " " "																												
		Mechanical Tamping other than C.B.C							21																					
	INTERSTATE AIR FORCE																													
				18	13,799	5,700	78	518	2	233	57	260	4	24,994	30,718															
									2	143	21		3	6,977	1016	956	738	64	542	96		250	56	2	11		2			

φ Quantities included in Surfacing Plan
* Not included in Roadway Totals (Included in Summary)

▲ To be obtained from Excess Excavation Ramp H

PIT NO. 1 (FOR INFORMATION ONLY)

LOCATION: SE 1/4 of Sec. 25, T. 13S, R. 67W (5 acres)

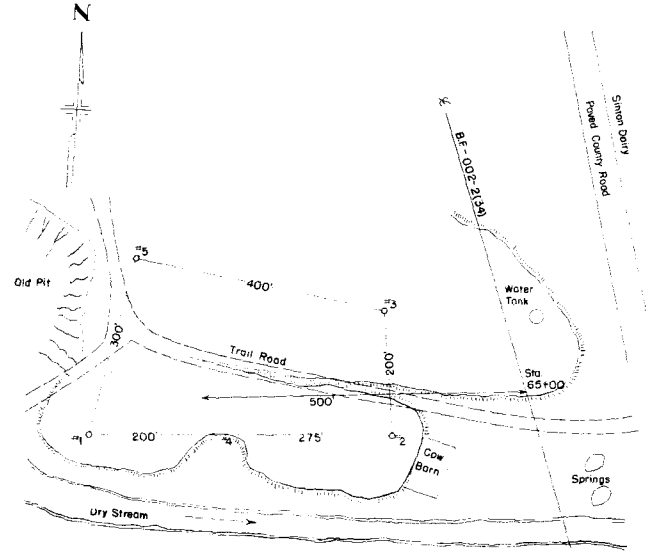
OWNER: A.L. Trowbridge

QUANTITY AVAILABLE: 80,000 Cu. Yds

PROPOSED USE:

HAUL DISTANCE: 9.4 Miles to Sta. 495 + 00

Estimated for Stripping Overburden.



FIELD SAMPLE NO. 1570

TEST NO.	DEPTH IN FEET	DESCRIPTION OF TEST HOLE MATERIAL
1	0.0- 14.0+	SAND & GRAVEL
2	0.0- 2.0	OVERBURDEN
2-A	2.0- 7.0	SAND & GRAVEL (Sim to No. 1) Clay at 7.0
3	0.0- 0.8	OVERBURDEN (Sim to No. 2)
3-A	0.8- 14.0+	SAND & GRAVEL
4	0.0- 8.0	SAND & GRAVEL (Sim to No. 1)
5	0.0- 14.0+	SAND & GRAVEL

REVISION: ADDED CONCRETE FINISH NOTE 12-14-56 R.R.A.
 REVISION: CHANGED BAR QUANTITIES 3-29-57 J.V.G.

FED. ROAD DIST. NO.	DIST.	PROJ. NO.
11	COLO.	11(002-240)

SUMMARY OF QUANTITIES

ITEM No.	ITEM	UNIT	SUPER	ABT. A'	PIER	ABT. B'	TOTAL
147	DRY COMMON EXCAVATION (STR.)	CY/D		250	88	266	604
160	STRUCTURE BACKFILL (CLASS 1)	CY/D		196	56	173	385
166	MECHANICAL TAMPING	HR		20	6	22	50
34d	PLAN MIXED ASPHALTIC SURFACING	TON	100				108
46a	CLASS 'A' CONCRETE	CY/D		111	85	134	330
46b	CLASS 'P' CONCRETE - BEAM	CY/D		374			374
47	REINFORCING STEEL (+1% OVERRUN)	LG	70964	7650	18590	8395	107999
48	STRUCTURAL STEEL (+2% FOR PAINT)	LG	6580	5100	10180	8100	26330
61a	STEEL PILING 12 1/2" O.D. 7/8" WALL	LINEAL FT.		541	351	503	1395
60x	DRILLING HOLES TO FACILITATE PILE DRIVING	LINEAL FT.		261	162	242	665
60c	SHEET ZINC (32 OZ. PER SQ. FT.)	LG	232	54		44	330
*	HARD LEAD (3/4" THICK)	LG			10	2	12
*	FELT (3/4" THICK)	LG			13	0	13
90L	ELECTRICAL CONDUIT 2" Ø	LINEAL FT.	400	30		35	465
*	1/2" EXPANSION JOINT MATERIAL	LINEAL FT.					
*	WATER PROOFING COAT	SGY		93		120	213

SUMMARY OF QUANTITIES - REFERENCE NOTES

- Ø STONE BACKFILL INCLUDED
- Ø PRESTRESSING STEEL WITH ANCHORS INCLUDED WITH BID PRICE FOR CLASS 'P' CONCRETE (160 UNITS REQUIRED IN GIRDERS)
- Δ INCLUDES STEEL RAILING, PLATES, ANCHOR BOLTS, ANCHOR BARS AND BEARINGS
- * INCLUDES WITH BID PRICE FOR CLASS 'A' CONCRETE
- NOTE: ITEM 47 DOES NOT INCLUDE PRESTRESSING STEEL

DESIGN SPECIFICATIONS:

- Ø 55 A.A.S. 110 WITH 1955 AND 1954 AMENDMENTS.
- Ø LIVE LOAD H20-516-44
- Ø 20000 P.S.I.
- Ø WEIGHT OF EARTH 120 LBS. PER CU. FT.
- Ø EQUIVALENT FLUID PRESSURE 30 LBS. PER CU. FT.
- Ø MAX ALLOWABLE LOAD PER STEEL PIPE PILE 12" DIA. FILLED WITH CONCRETE 3000 P.S.I., 147 TONS.

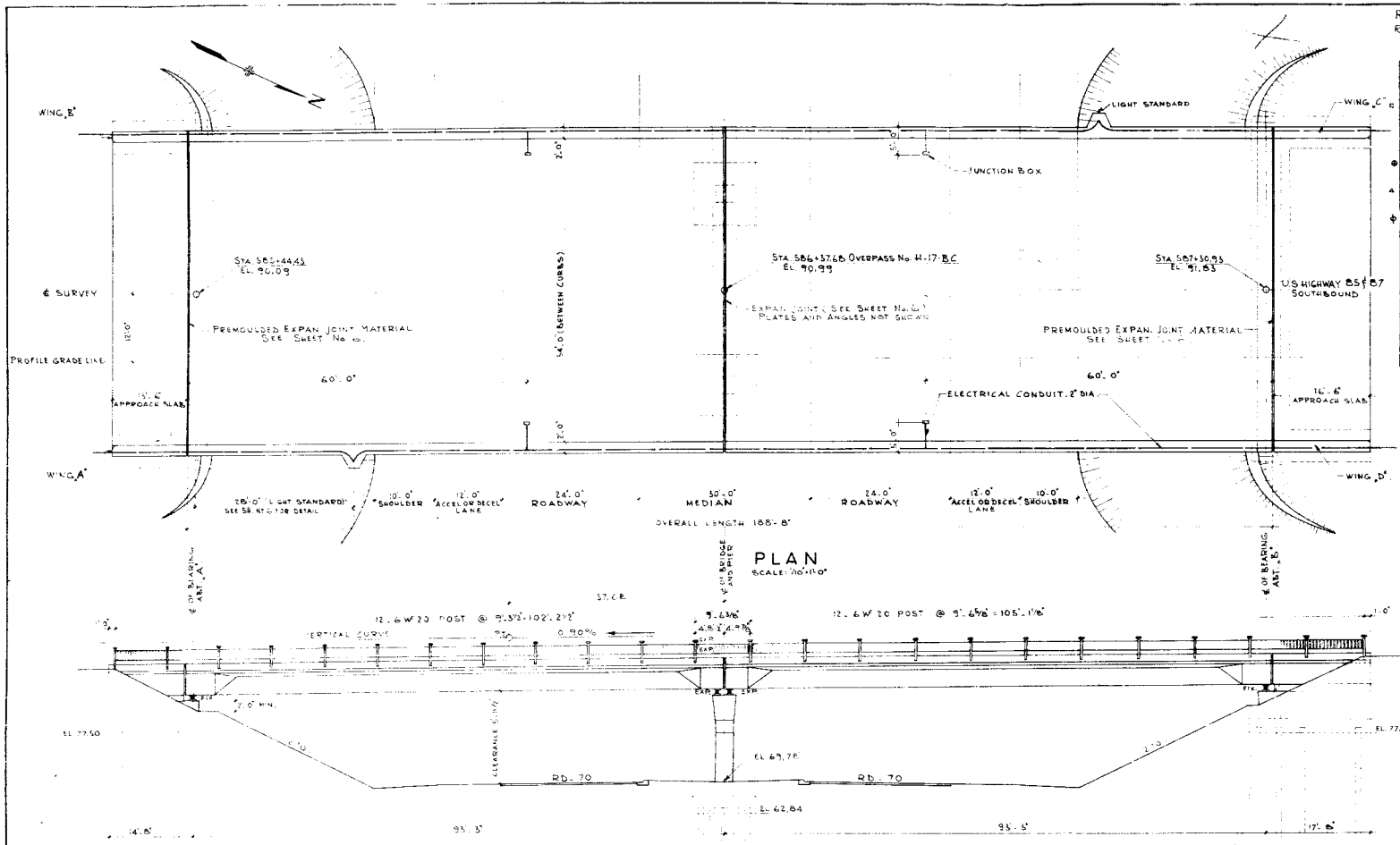
GENERAL NOTES

- Ø ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS, ADOPTED JUNE 1, 1952.
- Ø SOUNDINGS AND DEPTH OF FOOTINGS SHOWN ACCORDING TO THE BEST AVAILABLE DATA. IF ESSENTIALLY DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.
- Ø ALL CONCRETE SHALL BE CLASS 'A' AND AD MIX RAINED AS SPEC' EXCEPT OTHERWISE NOTED FOR PRESTRESSED GIRDERS, ABUTMENT AND WING WALLS.
- Ø CHAMFER ALL EXPOSED CORNERS 30' EXCEPT AS NOTED.
- Ø ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE DEFORME BARS CONFORMING TO A.A.S. 40. SPECIFICATIONS M31 AND M37 (A.S.T.M. DESIGNATIONS A15 AND A305).
- Ø ALL REINFORCING BARS SHALL BE TAGGED WITH THE STRUCTURE NUMBER AND MARK.
- Ø ALL DIMENSIONS ON BAR DETAILS ARE OUT TO OUT.
- Ø ALL HOOPS AND BENDS IN BARS SHALL CONFORM TO A.C.I.
- Ø STANDARD 3/8-31 2" MINIMUM CLEAR TO STEEL, EXCEPT AS NOTED.
- Ø ALL STRUCTURAL STEEL SHALL RECEIVE ONE SHOP COAT OF ZINC CHROMATE AND TWO FIELD COATS OF ALUMINUM PAINT.
- Ø WHEN EXCAVATING FOR FOOTINGS THE FINAL ONE FOOT IN DEPTH SHALL BE DONE BY HAND LABOR METHODS.
- Ø ALL CONCRETE SURFACES EXPOSED TO NORMAL VIEW BY HIGHWAY TRAFFIC SHALL RECEIVE CLASS 'T' SURFACE FINISH WING FACES SHALL RECEIVE ORDINARY SURFACE FINISH.

- * INDEX OF SHEETS**
- SHEET NO. 1 GENERAL PLAN AND ELEVATION
 - 2 PIER
 - 3 ABUTMENT 'A'
 - 4 ABUTMENT 'B'
 - 5 GIRDERS
 - 6 DECK
 - 7 RAILING

COLORADO DEPARTMENT OF HIGHWAYS
U.S. HIGHWAY 85-87 SOUTH BY NORTH ENTRANCE INTERCHANGE A. F. A.
OVERPASS N#H-17-E
GENERAL PLAN AND ELEVATION
L. BODUROFF & ASSOCIATES
 CONSULTING ENGINEERS
 DENVER - COLORADO

Designed: N.N. Scale: as noted Sheet:
 Drawn: J.V.G. Date: 11-28-55 No. of
 Checked: N.N.



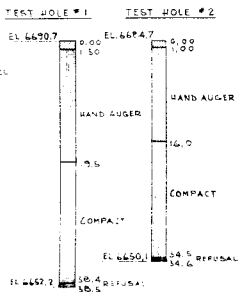
PLAN
SCALE: 1" = 10'-0"

ELEVATION
SCALE: 1" = 10'-0"

LOCATION PLAN
SCALE: 1" = 200'-0"

LEGEND

- TOP 50' WIDE SAND
- CLEAN WHITE SAND AND GRAVEL
- CLEAN GRAY SAND

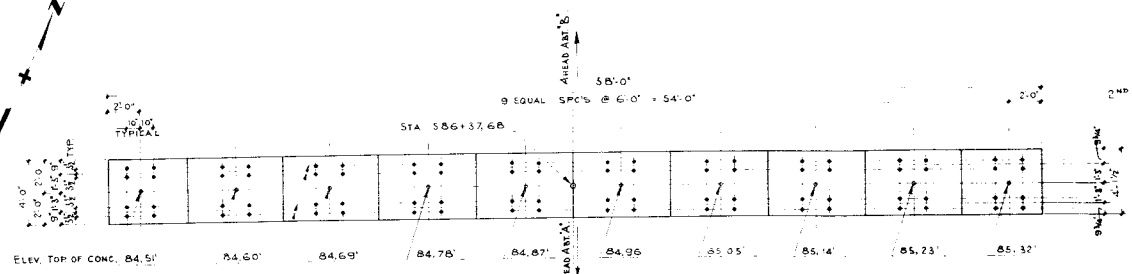


Ø HOLES FOR PILES SHALL NOT BE DRILLED UNTIL IT IS DEFINITELY DETERMINED BY THE ENGINEER THAT PILES CANNOT BE DRIVEN WITHOUT THEM.

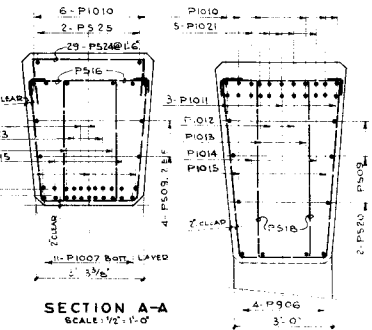
* Sheet numbers shown refer to Bridge Sheet numbers.

J. Boduroff
11.28.55

Rev. Changed Reinf. Steel quantities 3-29-57 JVG



CAP PLAN
SCALE: 1/4" = 1'-0"

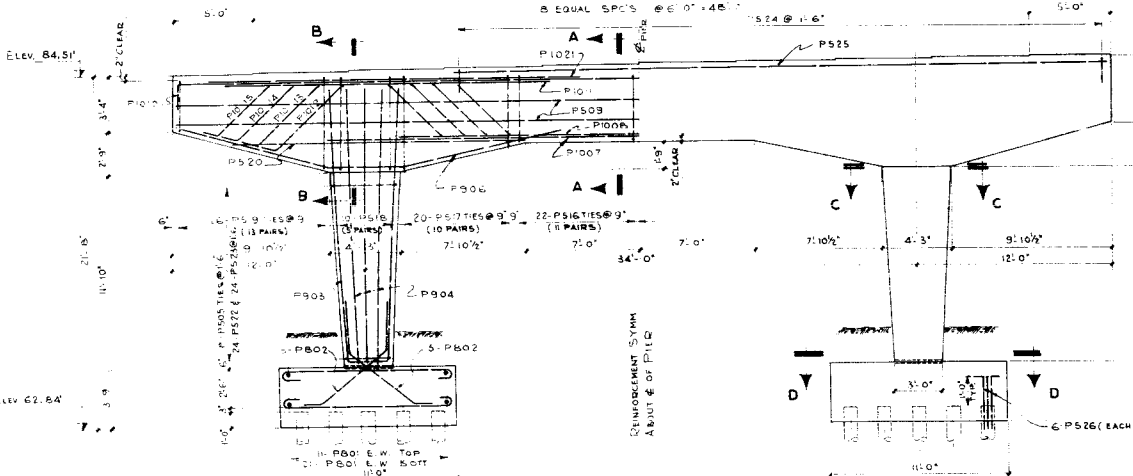


SECTION A-A
SCALE: 1/2" = 1'-0"

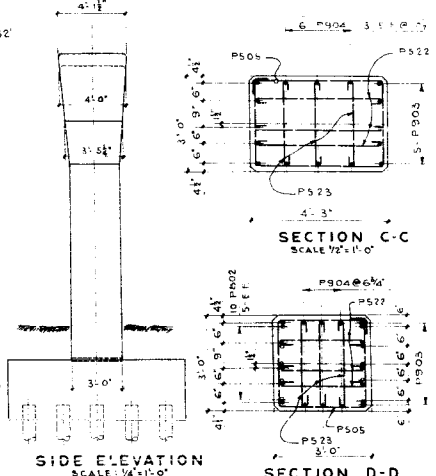
SECTION B-B
SCALE: 1/2" = 1'-0"

BAR LIST FOR PIER

MARK	TYPE	LENGTH	QTY	SIZE
P501	BENT	12'-8"	128	8
P502	BENT	9'-0"	20	8
P503	BENT	35'-3"	0	9
P504	STR	16'-6"	12	9
P505	BENT	11'-4 1/4"	16	5
P506	BENT	24'-9"	8	9
P507	STR	36'-0"	11	10
P508	BENT	30'-0"	3	10
P509	BENT	59'-6"	4	5
P510	STR	60'-0"	6	10
P511	STR	20'-0"	6	10
P512	BENT	52'-9"	2	10
P513	BENT	54'-9"	2	10
P514	BENT	56'-9"	2	10
P515	BENT	58'-9"	2	10
P516	BENT	13'-0"	44	5
P517	BENT	15'-1 1/2"	40	5
P518	BENT	16'-6"	20	5
P519	BENT	31'-0"	32	5
P520	STR	15'-0"	4	5
P521	STR	23'-0"	4	5
P522	BENT	41'-6"	48	5
P523	BENT	37'-6"	48	5
P524	BENT	54'-3"	5	5
P525	BENT	42'-0"	5	5
P526	BENT	3'-0"	40	5



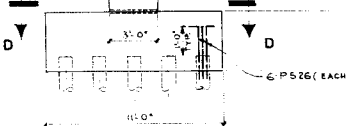
ELEVATION
SCALE: 1/4" = 1'-0"



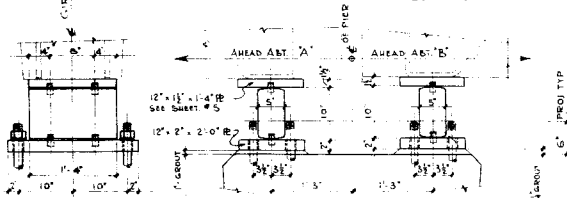
SIDE ELEVATION
SCALE: 1/4" = 1'-0"

SECTION C-C
SCALE: 1/2" = 1'-0"

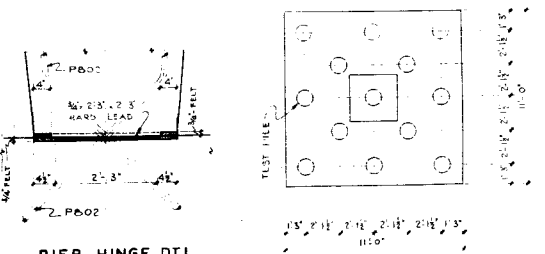
SECTION D-D
SCALE: 1/2" = 1'-0"



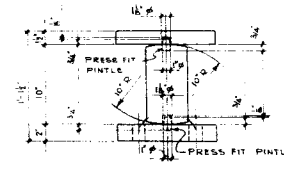
FOOTING PLAN
SCALE: 1/4" = 1'-0"



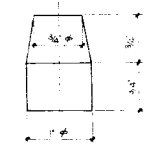
EXPANSION BEARING DETAILS
SCALE: 1" = 1'-0"



PIER HINGE DTL.
SCALE: 3/4" = 1'-0"



ROCKER DTL
SCALE: 1/2" = 1'-0"



PINTLE DTL.
FULL SIZE

QUANTITIES

DESCRIPTION	QUANTITY	UNIT
COMMON EXCAVATION	85	CY
CLASS 'A' CONCRETE		
FOOTINGS	36	CU YD
COLUMNS	9.6	CU YD
BEAM	41.5	CU YD
STEEL PILING (10" x 10" WALL)	351	LF
HARD LEAD 3/2"	112	SQ FT
FELT 3/4"	50	SQ FT
WELDING BARS	1550	LB
1/2" x 2 1/2" SW x 800 N	120	EA
1/2" x 2 1/2" SW x 800 N	800	EA
BACKFILL	55	CU YD
MECH. TAMPING	0	EA
TOTAL	163	

FOR GENERAL NOTES SEE SHEET 10

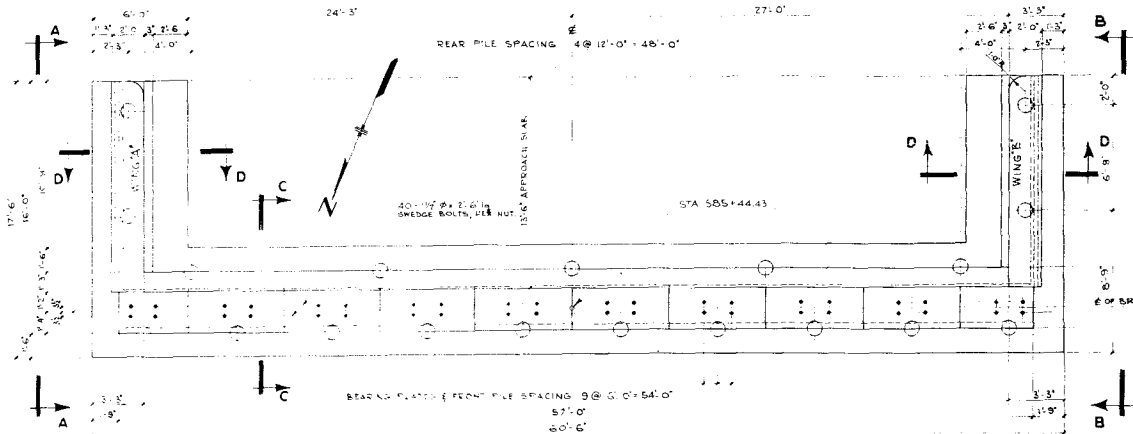
COLORADO DEPARTMENT OF HIGHWAYS
U.S. HIGHWAY 85-87 SOUTH BOUND

NORTH ENTRANCE INTERCHANGE
A. F. A.
OVERPASS N°H 17 BC
PIER

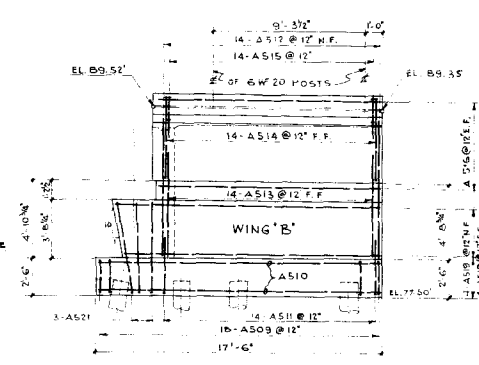
L. BODUROFF & ASSOCIATE
CONSULTING ENGINEERS

Designed: N.N. Scale: as noted Sheet: 11 of 2
Drawn: N.M.D. Date: 11-28-50 No. of Sheets: 11
Checked: N.N.

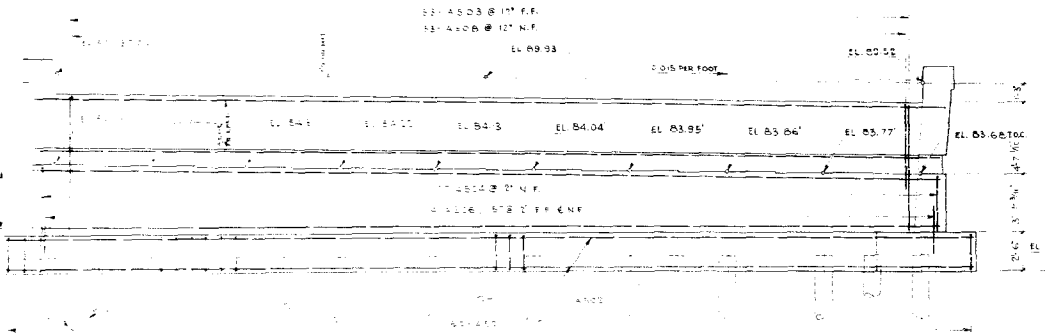
Rev. Changed Reinf Steel Quantities 3-29-57 J.V.G.



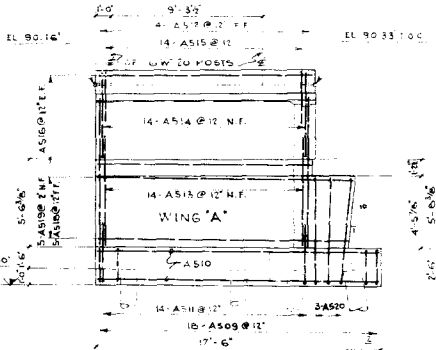
ABUTMENT 'A' - PLAN
SCALE 1/4" = 1'-0"



ELEVATION B-B
SCALE 1/4" = 1'-0"



ABUTMENT A - ELEVATION
SCALE 1/4" = 1'-0"



ELEVATION A-A
SCALE 1/4" = 1'-0"

BAR LIST FOR ABUTMENT 'A'

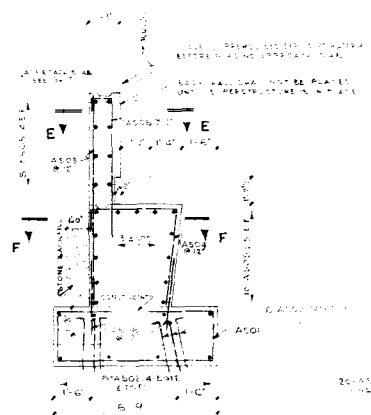
MARK	TYPE	LENGTH	QUANTITY
AS01	REIN	15'-3"	60
AS02	STR	60'-0"	6
AS03	REIN	8'-3"	53
AS04	STR	7'-3"	57
AS05	STR	50'-0"	21
AS06	REIN	3'-3"	14
AS07	REIN	3'-0"	14
AS08	STR	6'-0"	53
AS09	REIN	10'-2"	16
AS10	STR	17'-0"	20
AS11	REIN	10'-4"	28
AS12	STR	10'-0"	28
AS13	REIN	6'-6"	15
AS14	REIN	5'-0"	28
AS15	STR	13'-0"	28
AS16	STR	14'-0"	9
AS17	STR	15'-0"	9
AS18	STR	13'-0"	9
AS19	STR	14'-0"	9
AS20	REIN	7'-6"	3
AS21	REIN	6'-0"	3
AS22	REIN	6'-0"	3

BAR SUMMARY
 7267 Lin. Ft. 5 @ 100s = 7570
 1% Overhaul 71'
 TOTAL 7650'

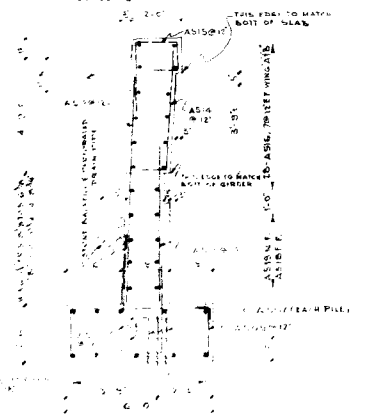
QUANTITIES.

ITEM	QUANTITY	UNIT
STEEL PILING 12 1/2" x 60" x 1/2" WALL	541	Lin. Ft.
REINFORCEMENT	7,650	LBS.
COMMON EXCAVATION	230	CYD
CONCRETE CLASS 'A' FOOTING	50	CYD
WALLS	0	
2" FIXED BRG TYPE (ROCKER + BASE BR)	2	PAIRS
8" 14008 ST BRGMS (SEE SHEET N16)	2	
40-14010 BOLTS W 5/8" Nut, Hex Nut, Posts	41	
40-14012 2 1/2" SWSG Bolt, Hex Nut	610	
STONE BACKFILL	16	CYD
STRUCTURE BACKFILL CLASS	150	
MECHANICAL TAMPING	20	Sq Yd
WATER PROOFING	95	Sq Yd
SELECT COPPER 152.02 PER Sq Ft	54	Lbs.
ELECTRICAL CONDUIT 2" φ	35	Lin. Ft.

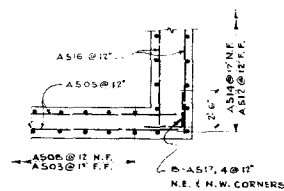
MAX. DESIGN PILE LATERAL LOADS
 ALL PILES SHALL BE 100%
 STEEL FILLED WITH CONCRETE



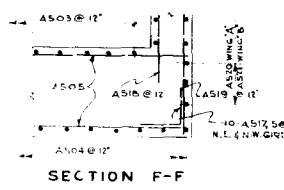
SECTION C-C
SCALE 3/8" = 1'-0"



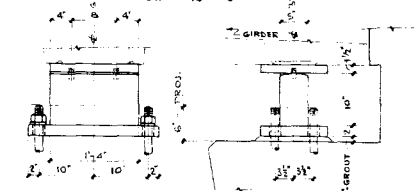
SECTION D-D
SCALE 1/2" = 1'-0"



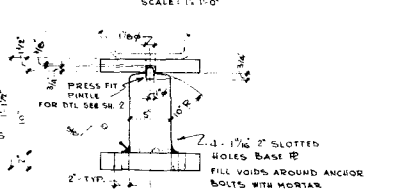
SECTION E-E



SECTION F-F



FIXED BEARING - DTL.
SCALE 1/2" = 1'-0"



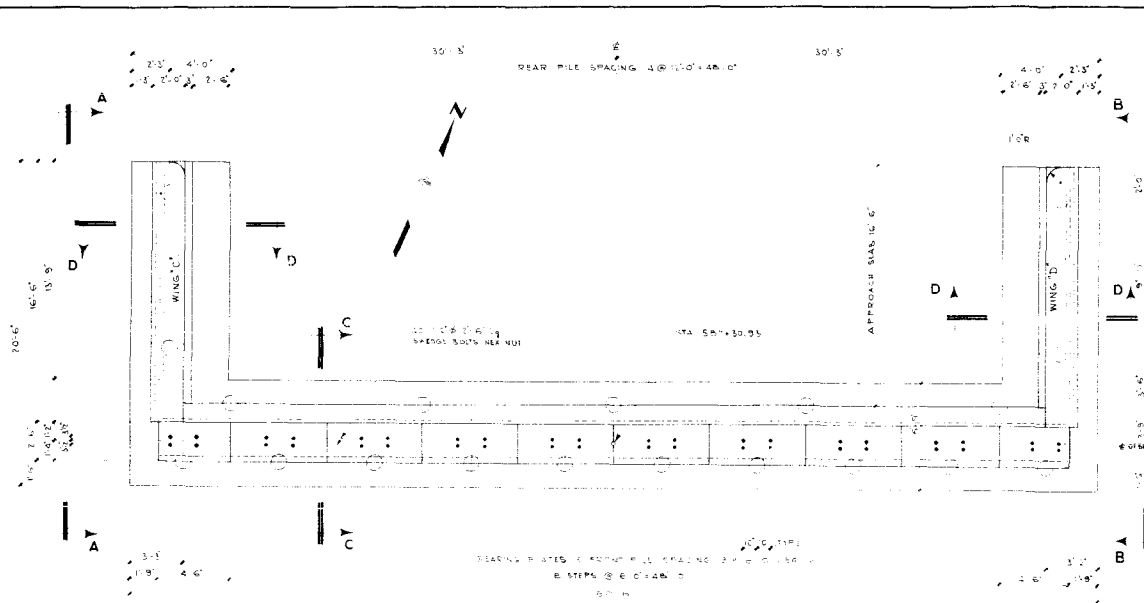
ROCKER DTL.
SCALE 1/2" = 1'-0"

NOTE: PLACE TWO-COAT PAINTED WATERPROOFING ON TOPS OF HEELS AND ON REAR FACES OF AB'S AND WING WALLS UP TO A LINE 1/2" BELOW TOPS OF WALLS.
 FOR GENERAL NOTES SEE SHEET N.1.

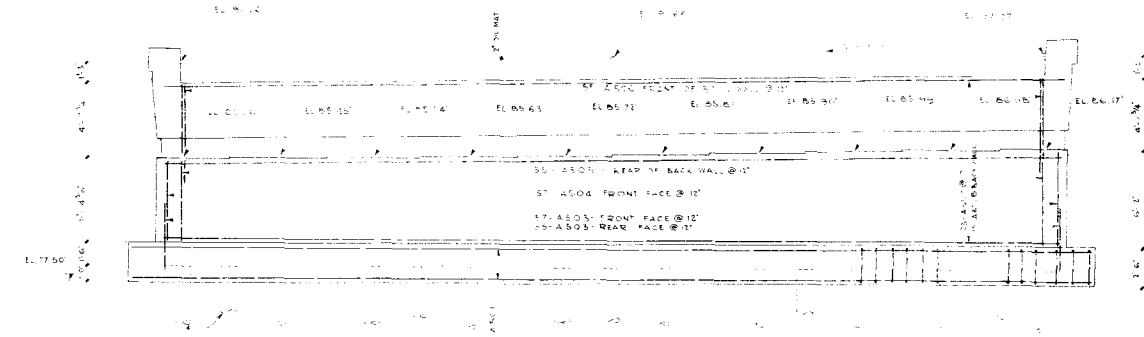
COLORADO DEPARTMENT OF HIGHWAY
 U.S. HIGHWAY 85 - 87 SOUTH BOUND
 NORTH ENTRANCE INTERCHANGE
 A. F. A.
 OVERPASS N^o H-17-9 C
 ABUTMENT 'A'

L. BODUROFF & ASSOCIATE
 CONSULTING ENGINEERS

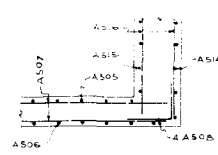
Design: N.A. Scale: 1/4" = 1'-0"
 Drawn: N.M.C. Date: 1/28/56
 Checked: N.N. Date: 1/28/56



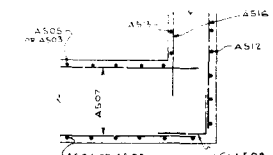
ABUTMENT "B" - PLAN
SCALE: 1/4" = 1'-0"



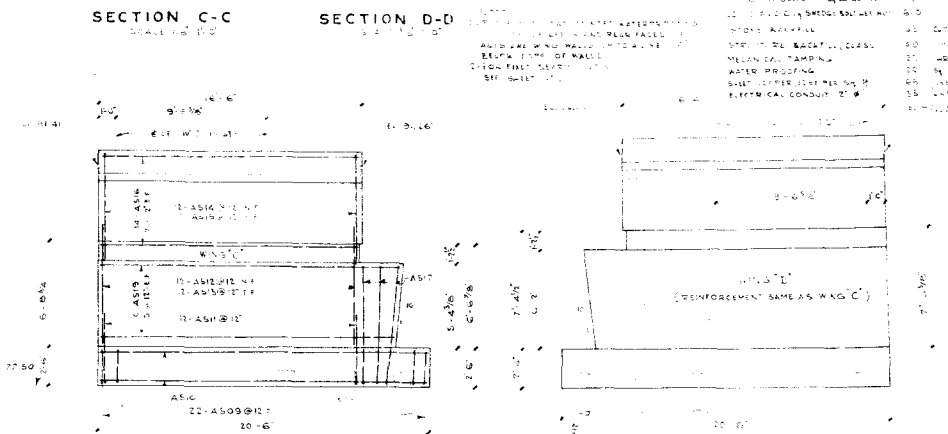
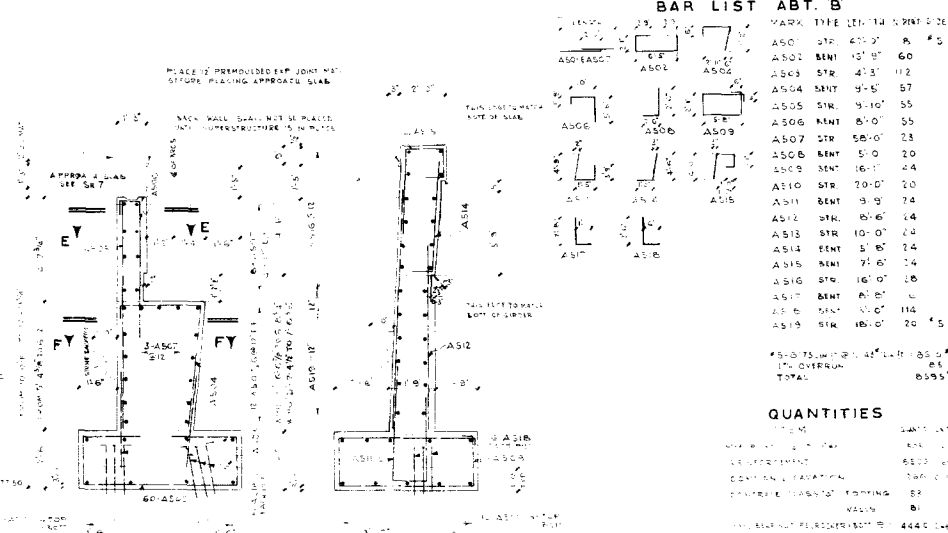
ABUTMENT "B" ELEVATION
SCALE: 1/4" = 1'-0"



SECTION E-E
SCALE: 3/4" = 1'-0"



SECTION F-F
SCALE: 3/4" = 1'-0"



ELEVATION A-A
SCALE: 1/4" = 1'-0"

ELEVATION B-B
SCALE: 1/4" = 1'-0"

FOR GENERAL NOTES, SEE SHEET 101

COLORADO DEPARTMENT OF HIGHWAYS
U.S. HIGHWAY 85-87, SOUTH BOUND

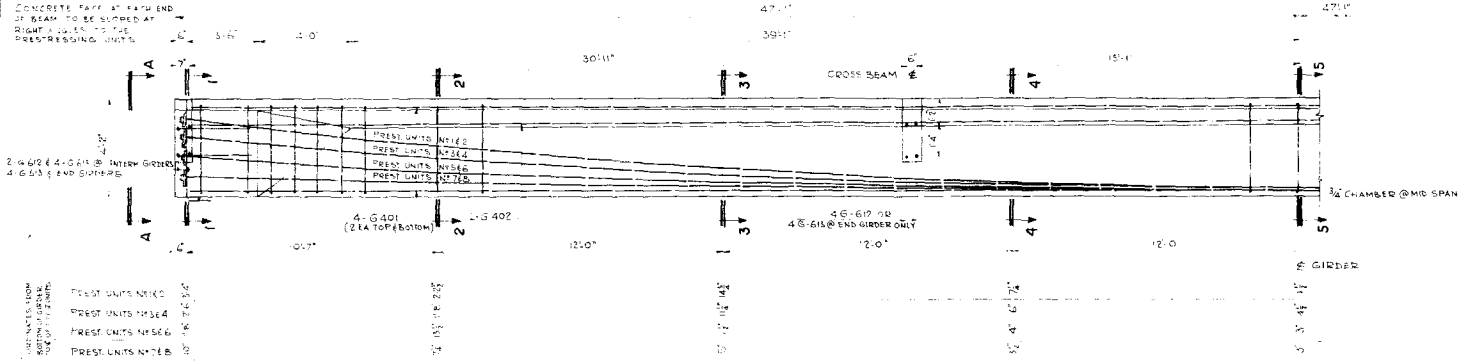
NORTH ENTRANCE INTERCHANGE
A F A
OVERPASS N^o H-17-B-C
ABUTMENT "B"

L. BODUROFF & ASSOCIATE
CIVIL ENGINEERS

DESIGNED BY: [Signature] DRAWN BY: [Signature] CHECKED BY: [Signature] DATE: [Date]

CONCRETE PAVEMENT END OF BEAM TO BE SHOWN AT RIGHT ANGLE TO THE PRESTRESSING UNITS.

SYMMETRICAL ABOUT \bar{X}

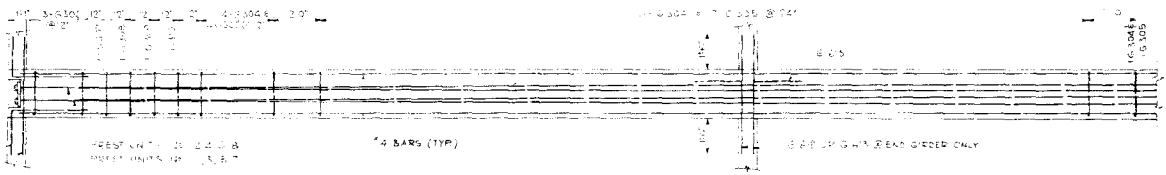


PRESTRESSING UNITS:
 PREST. UNITS N#12
 PREST. UNITS N#14
 PREST. UNITS N#16
 PREST. UNITS N#18

INTERMEDIATE & SIDE GIRDER - ELEVATION
 SCALE 3/8" = 1'-0"

SHAPE	MARK	SIZE	LENGTH	NO. REQ'D
G-401	#4	35'-0"	80	
G-402	#4	19'-6"	40	
G-403	#4	7'-3"	80	
G-304	#3	7'-10"	860	
G-305	#3	25'-1"	860	
G-306	#3	11'-1"	120	
G-307	#3	11'-1"	40	
G-308	#3	9'-1"	40	
G-309	#3	9'-1"	40	
G-310	#3	9'-1"	40	
G-611	#6	1'-6"	80	
G-612	#6	5'-0"	192	
G-613	#6	5'-0"	192	
G-714	#7	8'-6"	80	

N#12	120	120	14,400
N#14	40	40	5,600
N#16	120	120	15,840
N#18	40	40	5,280
TOTAL OVER RUN			41,120
TOTAL COST			8,400



INTERMEDIATE & SIDE GIRDER - PLAN
 SCALE 3/8" = 1'-0"

INITIAL PRESTRESSING FORCES ARE COMPUTED FOR 15% LOSS ON STRAIGHT TENDONS - FRICTION LOSSES FOR FRICTION COEFFICIENT $\mu = 0.30$

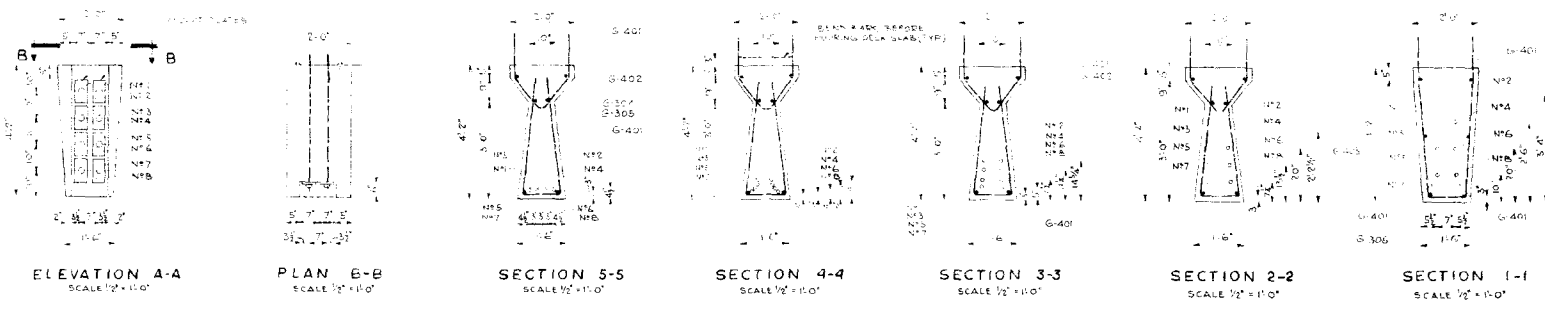
PRESTRESSING FORCES IN TENDONS.

UNIT	INITIAL FORCE	FINAL FORCE
N#12	108 KIPS	109 KIPS
N#14	26 KIPS	109 KIPS
N#16	26 KIPS	109 KIPS
N#18	108 KIPS	109 KIPS

PRESTRESSING ORDER:
 N#12 - N#16
 N#14 - N#18
 N#1 - N#8
 N#1 - N#7

QUANTITIES FOR 20 GIRDERS:

ITEM	QUANTITY	UNIT
CONCRETE	384	CU. YD.
DEVELOPING BARS	18,450	LBS.
REINFORCING BARS	418	LBS.
40 # 6 BARS	3,264	LBS.



ELEVATION A-A
 SCALE 1/2" = 1'-0"

PLAN B-B
 SCALE 1/2" = 1'-0"

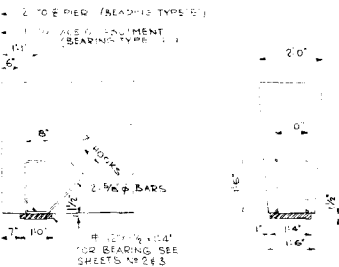
SECTION 5-5
 SCALE 1/2" = 1'-0"

SECTION 4-4
 SCALE 1/2" = 1'-0"

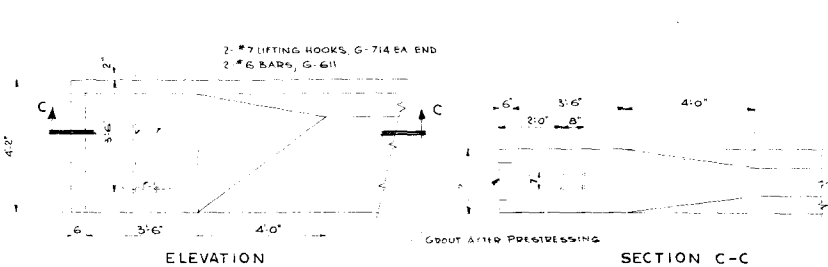
SECTION 3-3
 SCALE 1/2" = 1'-0"

SECTION 2-2
 SCALE 1/2" = 1'-0"

SECTION 1-1
 SCALE 1/2" = 1'-0"



TOP BEARING PLATE
 (TYPE 'E' & 'F' SAME EXCEPT AS NOTED)

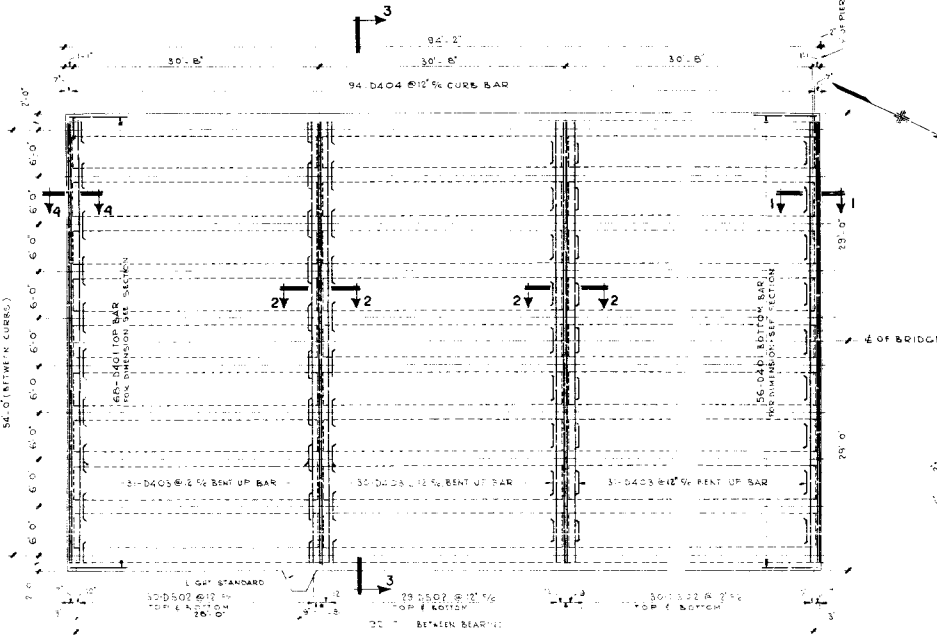


DETAIL END OF GIRDER
 (CONCRETE OUTLINES & LIFTING HOOKS SHOWN ONLY)
 SCALE 1/2" = 1'-0"

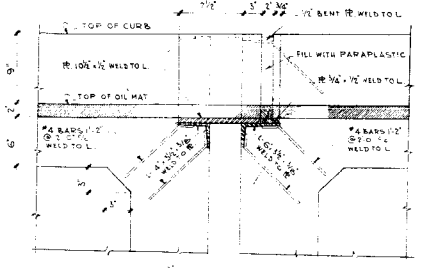
NOTES:
 CONCRETE FOR THE PRECAST GIRDERS TO BE 3500 P.S.I. UNDER STRENGTH AT 28 DAYS.
 HIGH TENSILE STEEL FOR PRESTRESSING UNITS TO HAVE MIN. ULTIMATE STRENGTH OF 120,000 P.S.I. AND UNIT ELONGATION AT BREAKING POINT OF 4% ON TYPICAL TESTING SPECIMEN.
 THE WATER-CEMENT RATIO OF THE CONCRETE FOR GIRDERS TO BE MAX. 0.5 AND SLUMP NOT MORE THAN 2".
 ALL EXPOSED SURFACES OF BEARING PLATES, ALUMINUM SPRAYED.
 FOR GENERAL NOTES SEE SHEET NO. 1.

COLORADO DEPARTMENT OF HIGHWAYS
 U.S. HIGHWAY 85-87 SOUTH BOUND
 NORTH ENTRANCE INTERCHANGE
 A F A
 OVERPASS N#H-17-BC
 PRESTRESSED GIRDER
 L. BODUROFF & ASSOCIATE
 CONSULTING ENGINEERS

Designed: L.B. Scale: as noted Sheet: N# 5
 Drawn: J.F.W. Scale: as noted Sheet: N# 5
 Checked: J.F.W. Date: 11-28-56 1/2 of Steel



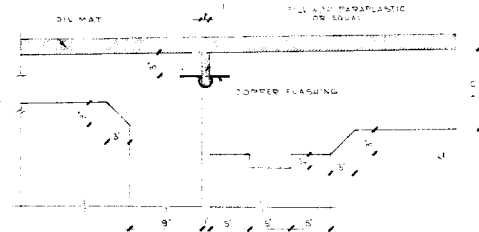
HALF PLAN OF DECK
SCALE: 1/2" = 1'-0"



EXP JOINT AT PIER
SCALE: 1/2" = 1'-0"

BAR LIST FOR DECK

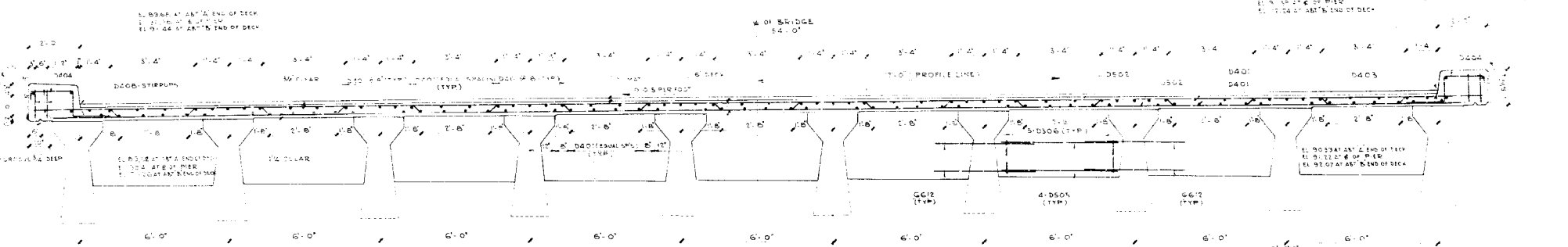
MARK	SIZE	LENGTH	REQ'D
D401	#4	97'-0"	249
D502	#5	56'-0"	388
D403	#4	68'-0"	184
D404	#4	4'-0"	376
D505	#5	4'-0"	268
D506	#5	8'-0"	180
D507	#3	7'-7"	180
D406	#4	3'-0"	80
D509	#5	3'-3"	8
D510	#5	3'-0"	4
D511	#5	10'-6"	8
D512	#5	5'-0"	4
TOTAL WEIGHT 51,574			



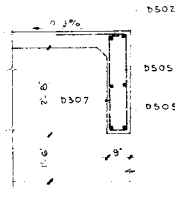
SECTION 4-4 (AT ABTS 'A' AND 'B')
SCALE: 1/2" = 1'-0"

QUANTITIES FOR DECK
 CLASS CONCRETE 150.00 CU YD
 REINFORCING BARS 533.00 LBS
 OIL MAT 431.80 LBS
 PARAPLASTIC 143.10 LBS
 TOPPER FLASHING 70.00 LBS
 ELECTRICAL CONDUIT 400.00 FT
 4" X 4" STUB PIPE 30.00 LBS

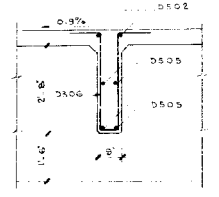
NOTE:
 TO FORM THE VERTICAL CURVE DECK THICKNESS IS UNIFORMLY DECREASED FROM 6" AT STA 508+00 TO 5" AT STA 505+44.5



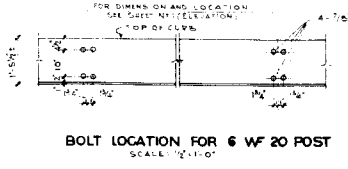
SECTION 3-3
SCALE: 1/2" = 1'-0"



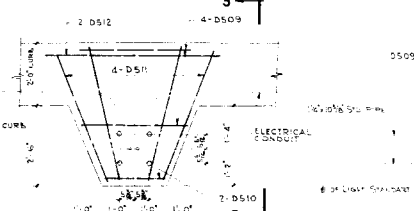
SECTION 1-1
SCALE: 1/2" = 1'-0"



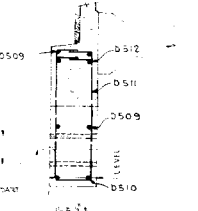
SECTION 2-2
SCALE: 1/2" = 1'-0"



BOLT LOCATION FOR 6 W F 20 POST
SCALE: 1/2" = 1'-0"



LIGHT STANDART SUPPORT
SCALE: 1/2" = 1'-0"

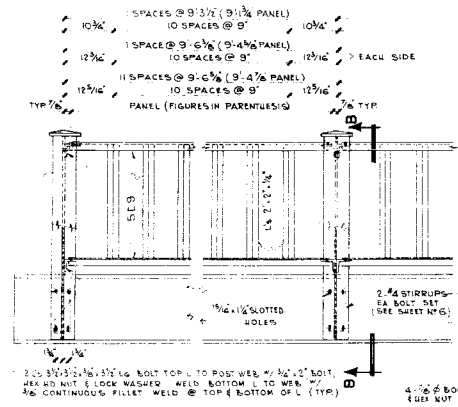


SECTION 5-5
SCALE: 1/2" = 1'-0"

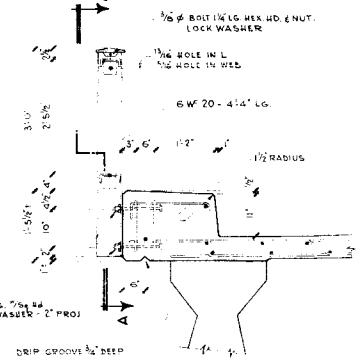
FOR GENERAL NOTES, SEE SHEET N-1

COLORADO DEPARTMENT OF HIGHWAYS
U.S. HIGHWAY 85-87 SOUTH BOUND
NORTH ENTRANCE INTERCHANGE AEA
OVERPASS N# H-17-B.C.
DECK PLAN AND SECTIONS
L. BODUROFF & ASSOCIATE
CONSULTING ENGINEERS

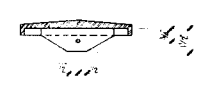
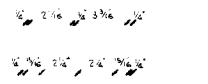
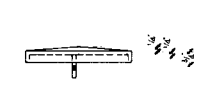
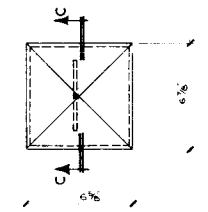
Designed H.W. Scale 1/2" = 1'-0" Sheet No. 6
 Checked G.W. Date 11-28-56



SECTION A-A
 SCALE 3/4" = 1'-0"



SECTION B-B
 SCALE 3/4" = 1'-0"



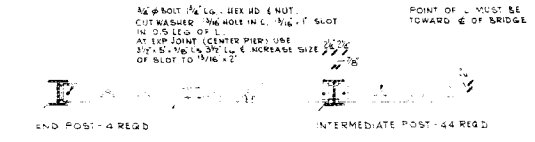
SECTION

BAR LIST FOR TWO APPROACH SLAB

MARK	TYPE	LENGTH	N REQD	SIZE
S501	STRAIGHT	21'-0"	19	#3
S502	"	26'-6"	62	#5
S503	"	21'-0"	106	#6
S504	"	13'-0"	82	#8
S505	"	16'-0"	82	#8
S506	"	26'-6"	32	#3
S507	"	13'-0"	54	#3
S508	"	16'-0"	54	#3
#3 BARS - 2457 LBS @ 376" L/W B				914.00
#5 BARS - 1653 " @ 1.043 "				1724.10
#6 BARS - 216 " @ 1.502 "				324.40
#8 BARS - 2376 " @ 2.670 "				6345.20
				9321.70
1" OVERRUN				93.30
TOTAL WEIGHT				10415.00

QUANTITIES

ITEM	QUANTITIES	UNIT
REINFORCING STEEL	9415	LBS.
CONCRETE CLASS #4	62	CYBS
PLAN MIXED ASPHALTING	16	TONS
1/2" EXPANSION JOINT MATERIAL	88	50 FT
STEEL HANDRAILING	16550	LBS.

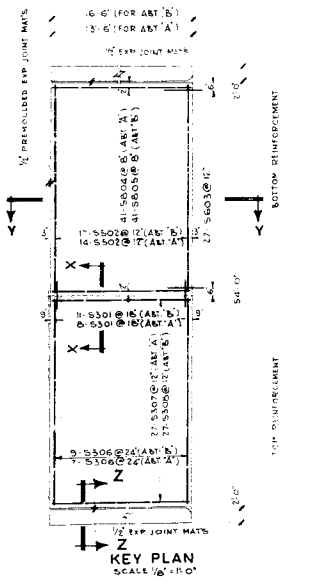


PLAN
 CAP REMOVED
 SCALE 3/4" = 1'-0"

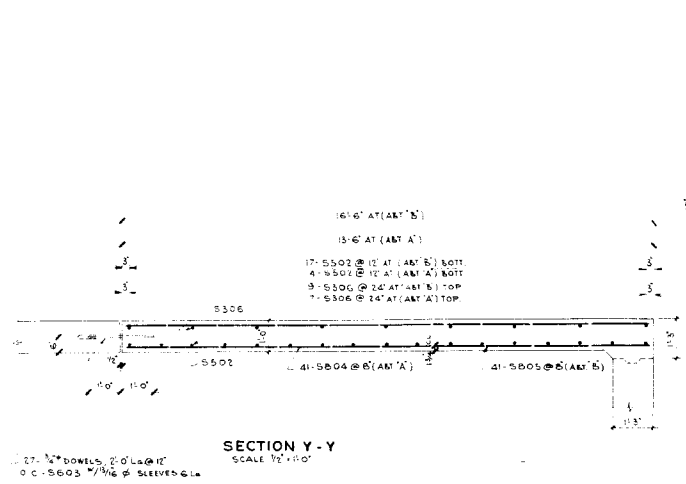
NOTE FOR GENERAL ELEVATION OF STEEL HANDRAIL SEE SHEET NO.

STEEL HANDRAIL

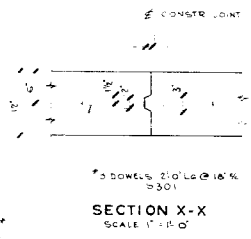
CAST IRON CAP FOR POST
 4" WELD
 SCALE 3/4" = 1'-0"



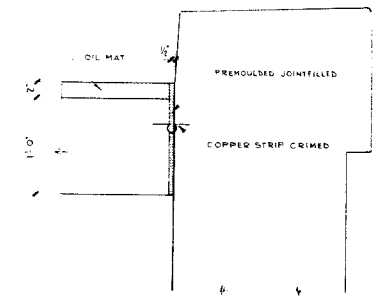
KEY PLAN
 SCALE 1/8" = 1'-0"



SECTION Y-Y
 SCALE 1/2" = 1'-0"



SECTION X-X
 SCALE 1/2" = 1'-0"



SECTION Z-Z
 SCALE 1/2" = 1'-0"

COLORADO DEPARTMENT OF HIGHWAYS
 U.S. HIGHWAY 85-87 SOUTH BOUND
 NORTH ENTRANCE INTERCHANGE
 A. F. A.
 OVERPASS N^o8 H-17-B.C
 STEEL HANDRAIL
 APPROACH SLAB
 L. BODUROFF & ASSOCIATE
 CONSULTING ENGINEERS
 DENVER, COLORADO

Designed: N.N. Scale as shown Sheet No. 7
 Checked: T.N. Date 11-28-56 No. of Sheets 7

SUMMARY OF QUANTITIES

ITEM NO.	ITEM	UNIT	SUPER	PIER	ABUT.	TOTAL	% APP. SLAB
14	DRY COMMON EXCAVATION	CY'S	410	65	330	626	
16A	STRUCTURE BACKFILL (CLASS I)		134	56	188	376	
16C	MECHANICAL TAMPING	48	6	25	50		
34	PLAN MIXED ASPHALTIC SURFACING	TONS	106			106	19
46A	CLASS 'A' CONCRETE	CY'S	260	105	85	450	73
46B	CLASS 'P' CONCRETE		394			394	
47	REINFORCING STEEL (4% OVERRUN)	LBS	70964	7284	18610	156278	11205
48	STRUCTURAL STEEL (1 1/2% FOR PAINT)		6570	5150	10150	5150	27020
61A	STEEL PILING (2 1/2" O.D. 1/2" WALL)	L-FT	606	420	725	1751	
62	DRILLING HOLES TO FACILITATE PILE DRIVING		285	197	360	852	
80C	SHEET COPPER (32 OZ PER SQ FT)	LBS	232	52	90	374	
	HARD LEAD (3/4" THICK)	Sq Ft			102	102	
	FELT (1/2" THICK)	Sq Ft			150	150	
90A	ELECTRICAL CONDUIT 2"	L-FT	285	30		315	
	1/2" EXPANSION JOINT MATERIAL	Sq Ft			50	50	
	WATER PROOFING COAT	Sq Yd	66		90	276	

SUMMARY OF QUANTITIES - REFERENCE NOTES

- 1. STONE BACKFILL INCLUDED
- 2. PRESTRESSING STEEL WITH ANCHORS INCLUDED WITH BID PRICE FOR CLASS 'D' CONCRETE. (160 UNITS REQUIRED IN GIRDERS)
- 3. INCLUDES STEEL RAILING, PLATTS, ANCHOR BOLTS, AND OTHER SMALL ACCESSORIES
- 4. INCLUDES WITH BID PRICE FOR CLASS 'A' CONCRETE
- NOTE: ITEM 47 DOES NOT INCLUDE PRESTRESSING STEEL

DESIGN SPECIFICATIONS

- 1. 53 A.S.H.O. WITH 1955 AND 1954 AMENDMENTS
- 2. LIVE LOAD: H20-S16-44
- 3. E: 20000 P.S.I.
- 4. WEIGHT OF EARTH: 120 LBS PER CU FT
- 5. EQUIVALENT FLUID PRESSURE: 30 LBS PER CU FT
- 6. MAX ALLOWABLE LOAD PER STEEL PIPE PILE: 12" DIA. FILLED WITH CONCRETE 3000 P.S.I. = 47 TONS.

GENERAL NOTES

- 1. ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS, ADOPTED JUNE 1, 1952
- 2. SOUNDING AND NORTH OF FOOTINGS SHOWN ACCORDING TO THE BEST AVAILABLE DATA. IF ESSENTIALLY DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.
- 3. ALL CONCRETE SHALL BE CLASS 'A' AND AIR ENTRAINED AS SPECIFIED. EXCEPT OTHERWISE NOTED FOR PRESTRESSED GIRDERS, ABUTMENTS AND WING WALLS.
- 4. CHAMFER ALL EXPOSED CORNERS 3/4", EXCEPT AS NOTED.
- 5. ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE DEFORMED BARS CONFORMING TO A.A.S.H.O. SPECIFICATIONS #31 AND #37 (A.S.T.M. DESIGNATIONS A15 AND A305).
- 6. ALL REINFORCING BARS SHALL BE TAGGED WITH THE STRUCTURE NUMBER AND MARK.
- 7. ALL DIMENSIONS ON BAR DETAILS ARE OUT TO OUT.
- 8. ALL HOOKS AND BENDS IN BARS SHALL CONFORM TO A.C.I. STANDARD 315-51. 2" MINIMUM CLEAR TO STEEL, EXCEPT AS NOTED.
- 9. ALL STRUCTURAL STEEL SHALL RECEIVE ONE SHOP COAT OF ZINC CHROMATE AND TWO FIELD COATS OF ALUMINUM PAINT.
- 10. WHEN EXCAVATING FOR FOOTINGS THE FINAL ONE FOOT IN DEPTH SHALL BE DONE BY HAND LABOR METHODS.
- 11. ALL CONCRETE SURFACES EXPOSED TO NORMAL VIEW BY HIGHWAY TRAFFIC SHALL RECEIVE CLASS 'F' SURFACE FINISH. WING SURFACES SHALL RECEIVE ORDINARY SURFACE FINISH.

*** INDEX OF SHEETS**

- SHEET NO. 1. GENERAL PLAN AND ELEVATION
- 2. PIER
- 3. ABUTMENT 'A'
- 4. ABUTMENT 'B'
- 5. GIRDERS
- 6. DECK
- 7. RAILING

COLORADO DEPARTMENT OF HIGHWAYS
 U.S. HIGHWAY 85-87 NORTHBOUND

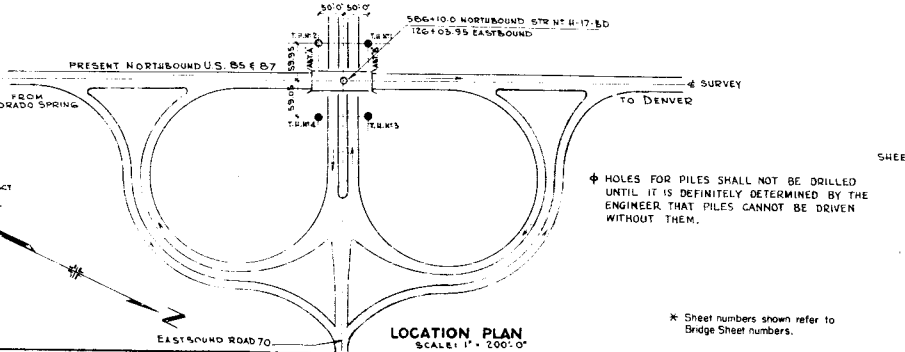
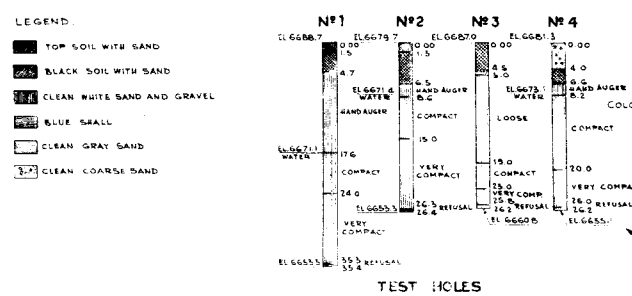
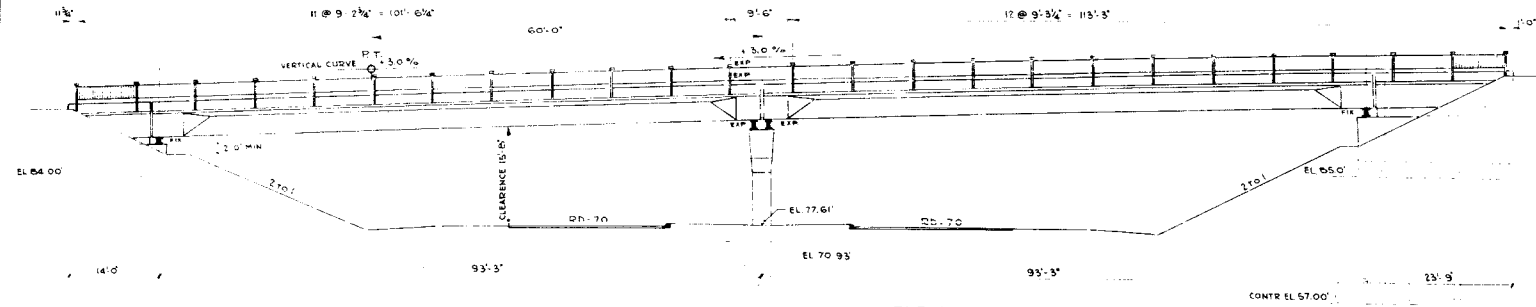
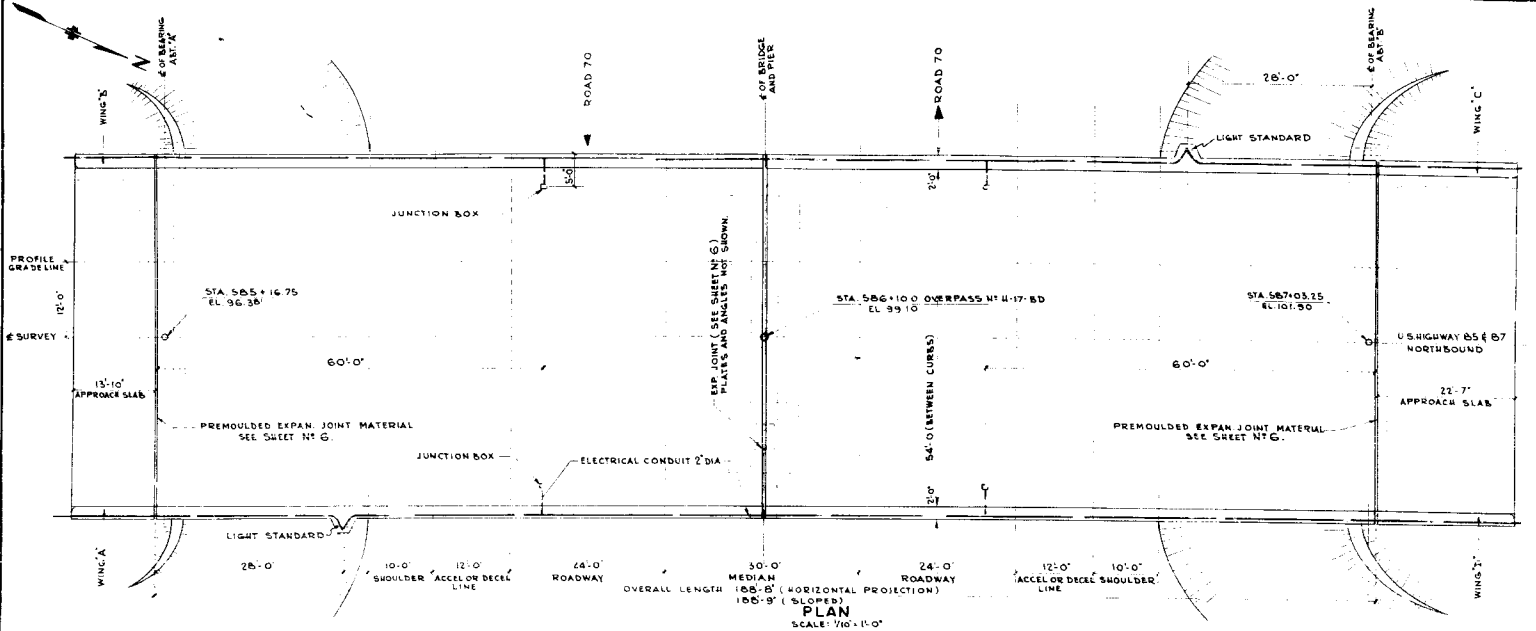
NORTH ENTRANCE INTERCHANGE A.F.A.
 OVERPASS NO. H-17-BD

GENERAL PLAN & ELEVATION

L. BOUROFF & ASSOCIATE
 CONSULTING ENGINEERS
 DENVER, COLORADO

Designed: N.N.
 Drawn: J.N.
 Checked: N.N.

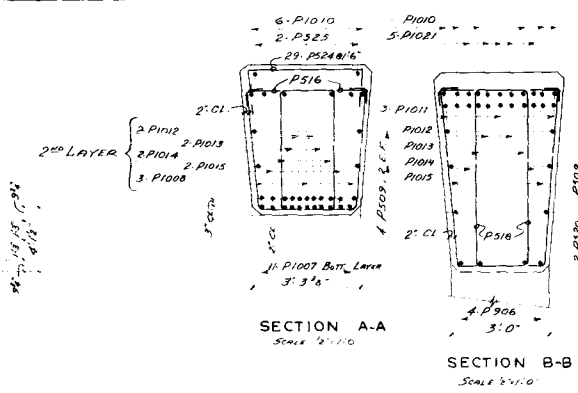
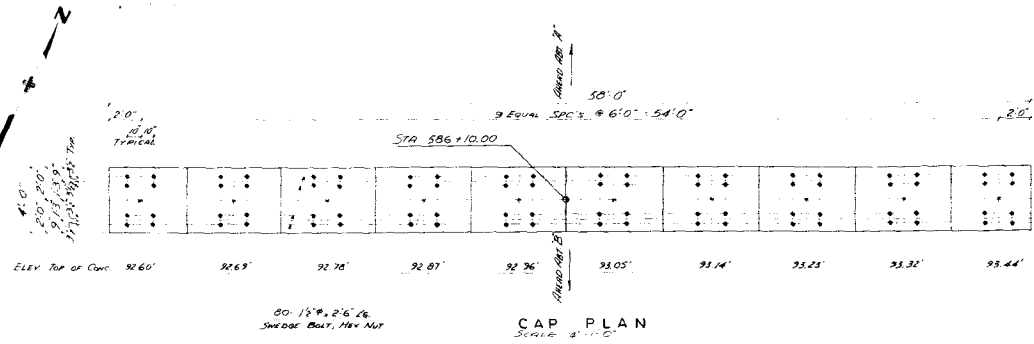
Scale: as noted
 Date: 1-28-56
 Sheet No. 1
 No. of Sheets 7



HOLES FOR PILES SHALL NOT BE DRILLED UNTIL IT IS DEFINITELY DETERMINED BY THE ENGINEER THAT PILES CANNOT BE DRIVEN WITHOUT THEM.

* Sheet numbers shown refer to Bridge Sheet numbers.

L. Bouroff
 1-28-56



BAR LIST FOR PIER

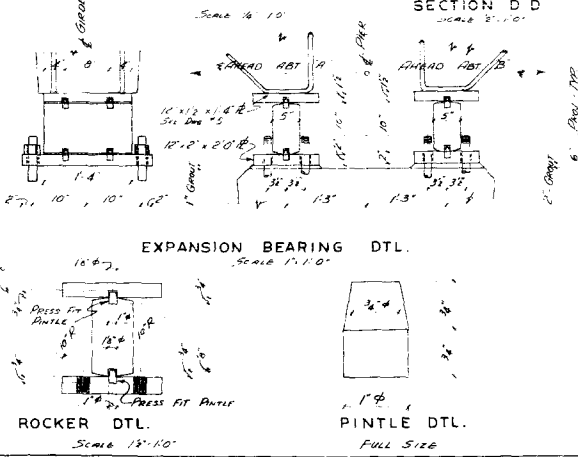
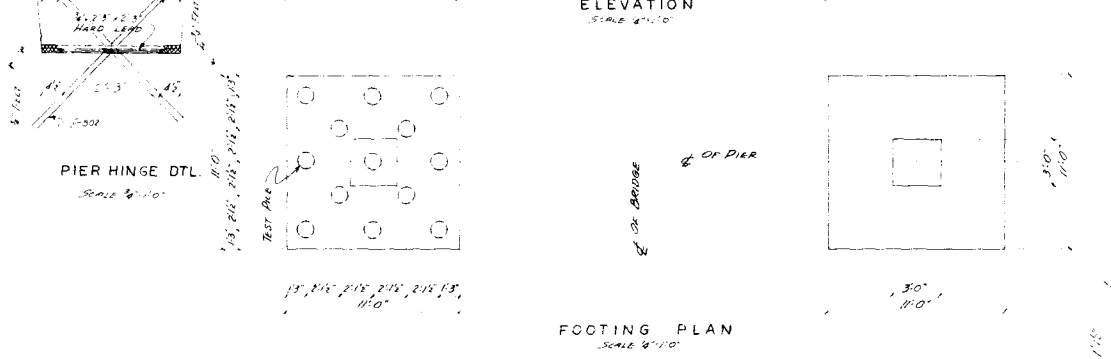
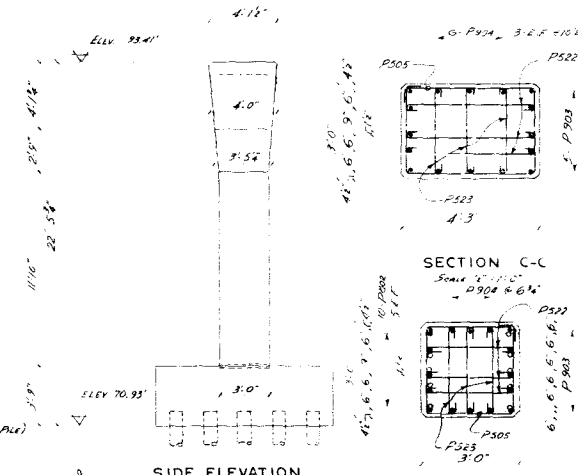
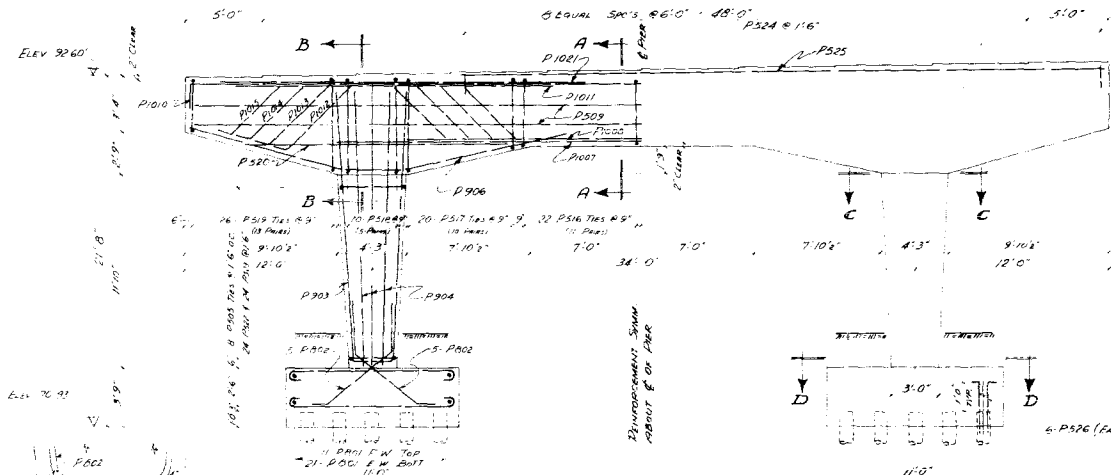
MARK	TYPE	LENGTH	#	STA
P501	Bar	12'0"	12	0
P502	Bar	9'10"	20	0
P503	Bar	35'8"	10	0
P504	STR	16'6"	18	0
P505	Bar	11'4 1/2"	16	5
P506	Bar	24'9"	8	0
P507	STR	36'0"	11	10
P508	Bar	30'0"	3	10
P509	Bar	59'6"	4	5
P510	Bar	60'0"	6	10
P511	STR	20'0"	6	10
P512	Bar	38'9"	2	10
P513	Bar	34'9"	2	10
P514	Bar	56'8"	2	10
P515	Bar	38'8"	2	10
P516	Bar	13'0"	44	5
P517	Bar	13'4"	40	5
P518	Bar	16'6"	20	5
P519	Bar	14'2 1/2"	52	5
P520	STR	15'0"	4	5
P521	Bar	23'0"	10	10
P522	Bar	4'1"	48	5
P523	Bar	5'7"	48	5
P524	Bar	5'4"	28	5
P525	STR	42'0"	2	5
P526	Bar	5'0"	156	5

VARIABLE BARS

MARK	TYPE	LENGTH	#	STA						
P505	3'4"	2'6"	12'5"	10'6"	12'7"	2	0	1,2,8	198'3'40"	2,547
P517	5'4"	4'0"	14'8"	11'6"	2'9"	4'10"	7,49	198'3'40"	1,547	
P519	5'5"	3'10"	16'5"	12'6"	22'2"	4'13"	1,61	198'3'40"	7,261	
P522	3'4"	2'6"	4'6"	3'8"	12'7"	6'8"	1,2,8,9	198'3'40"	185	
Total										

BAR SUMMARY

ITEM	QUANTITY
CONCRETE ESTIMATION	35
CLASS 4 CONCRETE	35
STEEL PILING	34
COLUMNS	96
BEAM	415
STEEL PILING	420
HARD LEAD	107
FASTENERS	107
PROTECTIVE BARS	1840
80' 1 1/2" x 2 1/2" x 8' 1/2" x 1/2"	1220
2" x 1 1/2" x 2 1/2" x 8' 1/2"	880
BRICK	56
MESH TIGHTENING	8



QUANTITIES

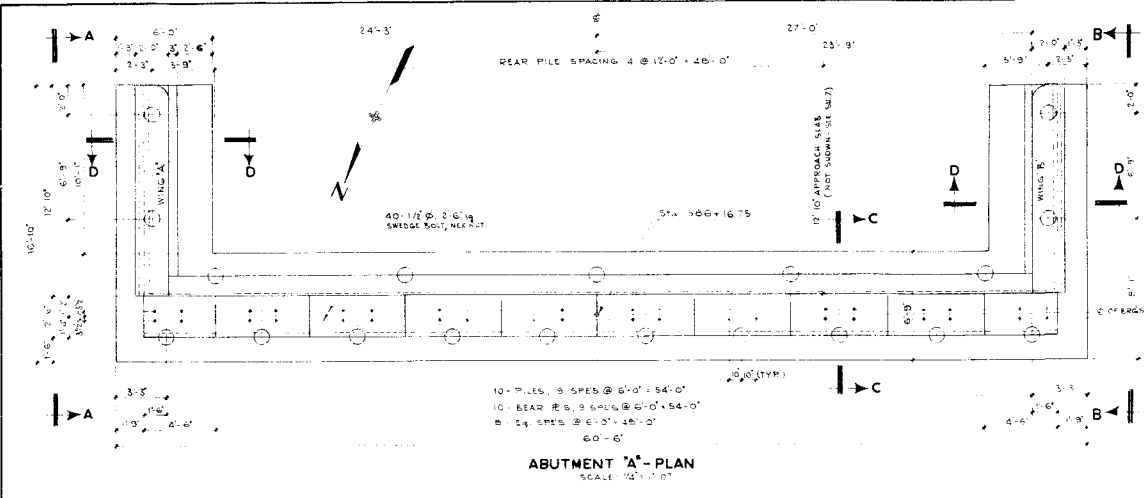
ITEM	QUANTITY
CONCRETE ESTIMATION	35
CLASS 4 CONCRETE	35
STEEL PILING	34
COLUMNS	96
BEAM	415
STEEL PILING	420
HARD LEAD	107
FASTENERS	107
PROTECTIVE BARS	1840
80' 1 1/2" x 2 1/2" x 8' 1/2" x 1/2"	1220
2" x 1 1/2" x 2 1/2" x 8' 1/2"	880
BRICK	56
MESH TIGHTENING	8

FOR GENERAL NOTES SEE SHEET 1741

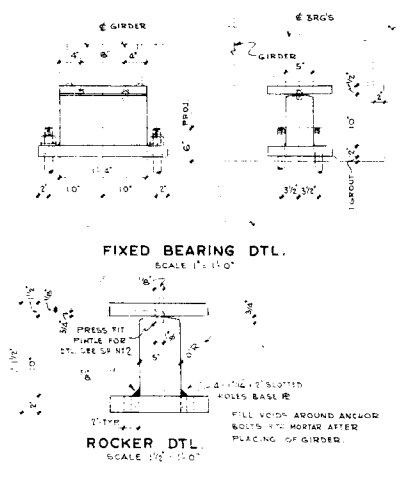
COLORADO DEPARTMENT OF HIGHWAYS
U.S. HIGHWAY 85-87 NORTH BOUND
NORTH ENTRANCE INTERCHANGE
A. F. A.
OVERPASS N^o 17-B.D.
PIER

L. BODURFF & ASSOCIATE
CONSULTING ENGINEERS
DENVER - COLORADO

Designed: N.N. Scale: as shown Sheet N^o 2
Drawn: N.M.D. Date: 2/25/50 No. of Sheets 7
Checked: V.N.



ABUTMENT 'A' - PLAN
SCALE 1/2" = 1'-0"



FIXED BEARING DTL.
SCALE 1 1/2" = 1'-0"

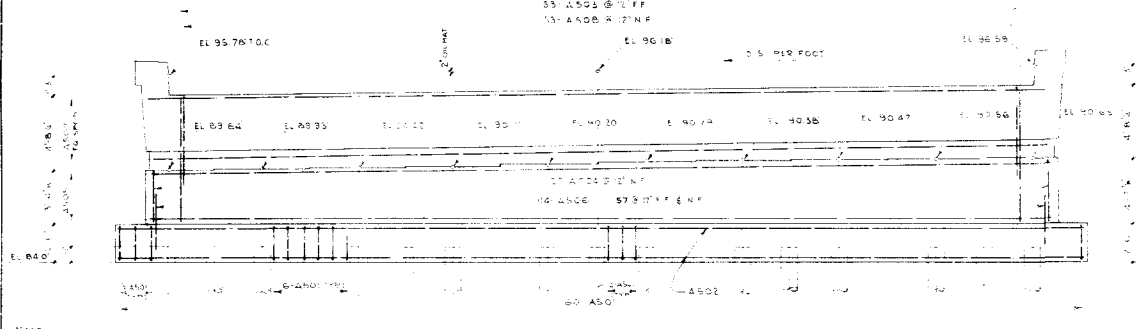
ROCKER DTL.
SCALE 1/2" = 1'-0"

BAR LIST FOR ABUTMENT 'A'

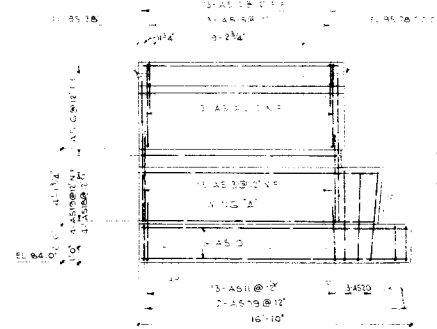
NO.	TYPE	LENGTH	QUANTITY
A501	BAR	12'-0"	6
A502	STR	6'-0"	5
A503	STR	7'-0"	5
A504	BAR	6'-0"	5
A505	STR	16'-0"	21
A506	STR	3'-0"	14
A507	STR	16'-0"	5
A508	BAR	6'-0"	5
A509	STR	16'-0"	34
A510	STR	16'-0"	20
A511	STR	10'-4"	24
A512	STR	9'-6"	26
A513	STR	6'-4"	26
A514	BAR	5'-0"	26
A515	STR	5'-0"	26
A516	STR	2'-3"	26
A517	BAR	4'-0"	6
A518	STR	4'-0"	6
A519	STR	4'-0"	6
A520	BAR	6'-6"	6
A521	STR	3'-0"	14

BAR SUMMARY

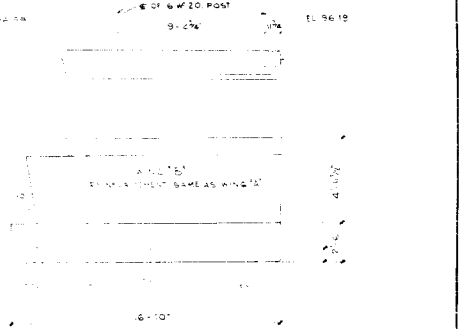
40 #12 @ 2'-0" SWIDGE FOOT	72
10 #12 @ 2'-0" SWIDGE FOOT	72
TOTAL	144



ABUTMENT 'A' ELEVATION
SCALE 1/2" = 1'-0"



ELEVATION A-A
SCALE 1/2" = 1'-0"



ELEVATION B-B
SCALE 1/2" = 1'-0"

NOTE
MAX. DESIGN PILE LOAD: 47 TONS
ALL PILES, SMALL # 17 DIA.
STEEL FILLED WITH CONCRETE

NOTE:
PLACE TWO-COAT PAINTED WATERPROOFING ON TOP OF BEELS AND ON REAR FACES OF ABUTS AND WING WALLS UP TO A LINE 1'-0" BELOW TOPS OF WALLS.

QUANTITIES

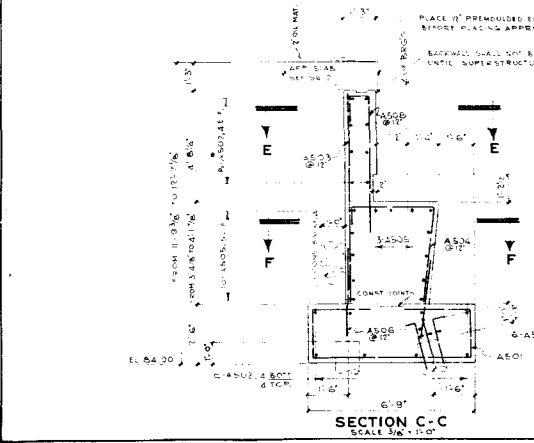
ITEM	QUANTITY	UNIT
STEEL PILING (100% QTY) WALL	608	LINEAL FEET
REINFORCEMENT	7264	LINEAL FEET
COMMON EXCAVATION	210	CUBIC YARDS
CONCRETE (CLASS 'A') FOOTINGS	13	CUBIC YARDS
WALLS	56	CUBIC YARDS
10 FIXED BRG. TYPE (ROCKER-BASE) BRG. (BASE) STRIPUPS (SEE SH. INT.)	4440	LINEAL FEET
10 1/2" DIA. BOLTS W/ 64.42 HEX NUT (POST)	10	PAIRS
40 1/2" DIA. BOLTS W/ 64.42 HEX NUT (POST)	41	PAIRS
STRIPUP (CLASS 'A')	24	CUBIC YARDS
STRIPUP (CLASS 'B')	10	CUBIC YARDS
MECHANICAL LAMPING	17	FEET
WATER STOPPING	66	LINEAL FEET
SWELL LOPPING (32oz 64x 64 #1)	52	LINEAL FEET

FOR GENERAL NOTES, SEE SHEET N-1

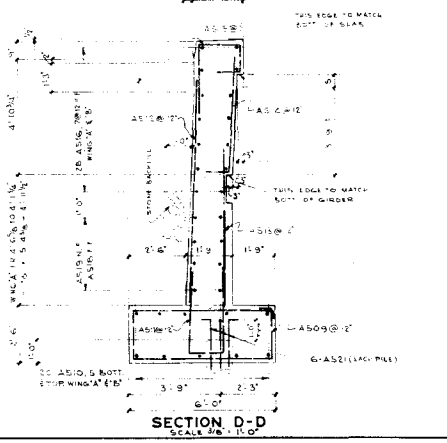
COLORADO DEPARTMENT OF HIGHWAYS
U.S. HIGHWAY 85-87 NORTH BOUND
NORTH ENTRANCE INTERCHANGE
A. F. A.
OVERPASS N° H-17-B.D.
ABUTMENT 'A'

L. BODUROFF & ASSOCIATE
CONSULTING ENGINEERS
DENVER - COLORADO

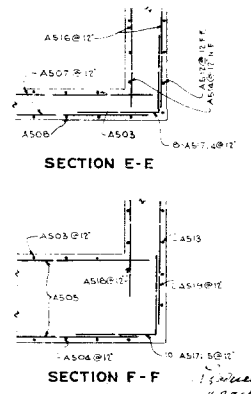
Designed by N.M. Brown, N.M.E. Scale as noted Sheet No. 3
Checked by J.V. Date: 11/28/56 1 of 3 Sheets 7



SECTION C-C
SCALE 3/8" = 1'-0"

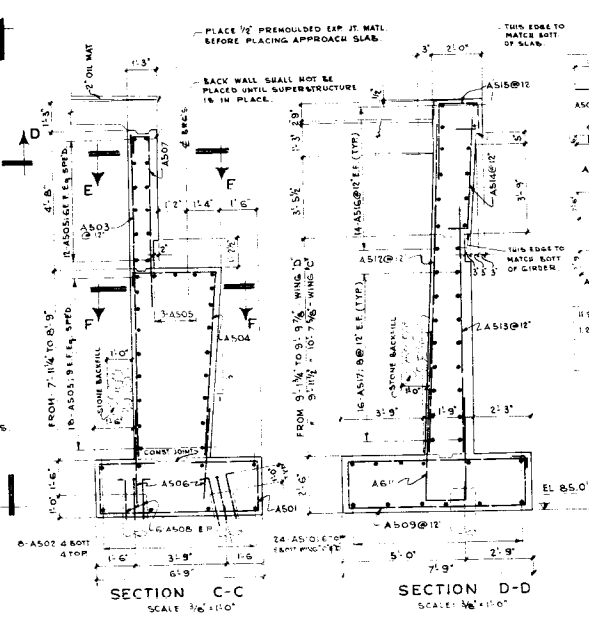
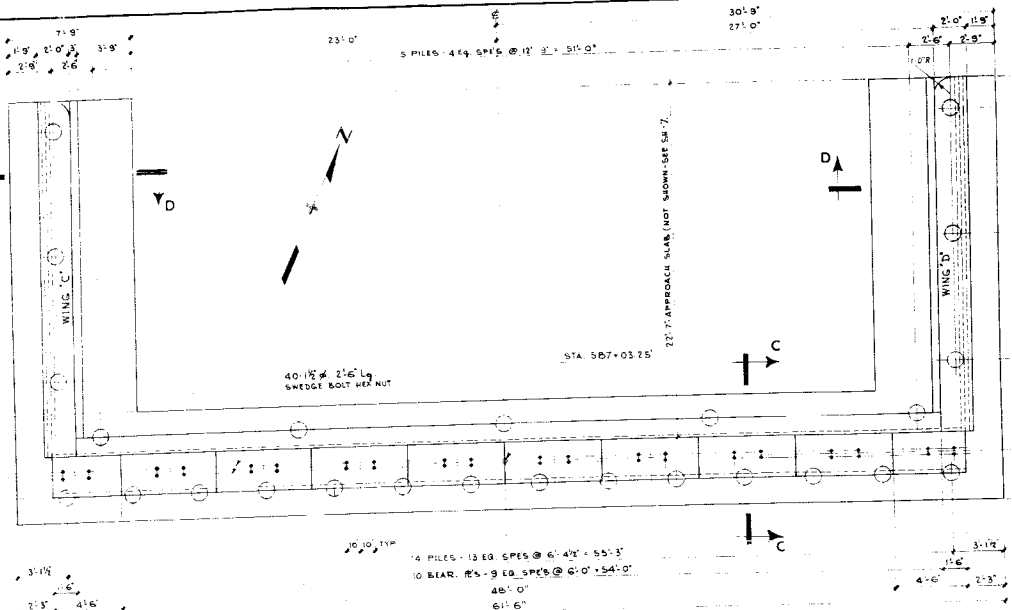


SECTION D-D
SCALE 3/8" = 1'-0"



SECTION E-E

SECTION F-F



BAR LIST FOR ABUTMENT "B"

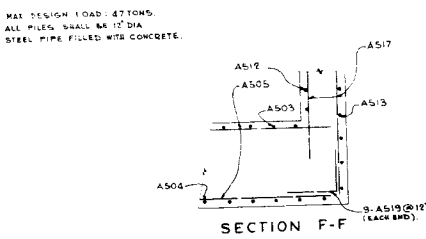
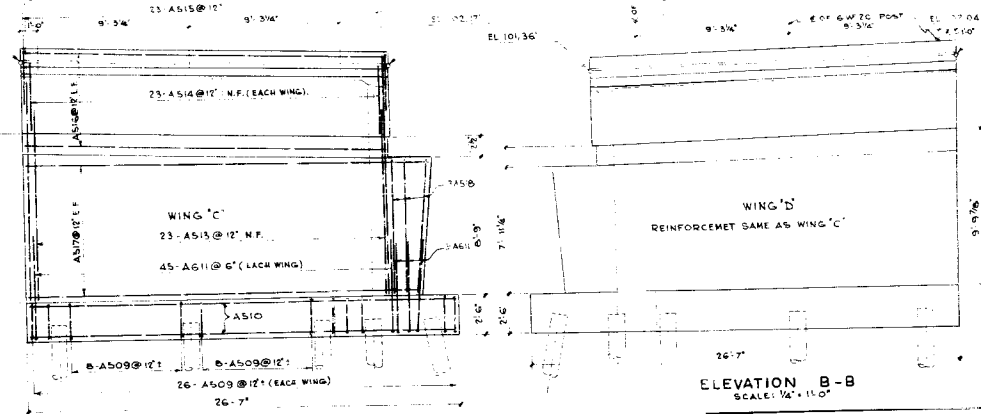
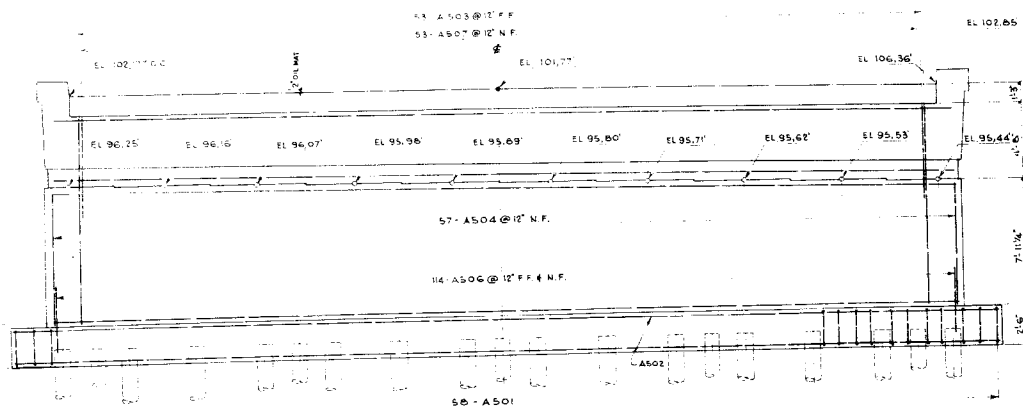
MARK	TYPE	LENGTH	NO.	SIZE
A501	STR	63'-0"	5	#5
A502	STR	15'-7"	50	#5
A503	STR	12'-6"	53	#5
A504	STR	11'-6"	57	#5
A505	STR	50'-0"	33	#5
A506	STR	3'-9"	114	#5
A507	BENT	6'-11"	53	#5
A508	BENT	3'-0"	150	#5
A509	BENT	19'-0"	52	#5
A510	STR	26'-0"	24	#5
A511	BENT	15'-0"	96	#5
A512	STR	13'-9"	46	#5
A513	STR	11'-6"	46	#5
A514	BENT	6'-0"	46	#5
A515	STR	6'-5"	46	#5
A516	STR	22'-0"	32	#5
A517	STR	24'-0"	26	#5
A518	BENT	6'-5"	6	#5
A519	STR	5'-0"	30	#5

BAR SUMMARY

1248	#5 @ 1045%	11674
1248	#6 @ 1503	18764
	1% OVERBUR	135*
TOTAL WEIGHT		113220*

QUANTITIES

ITEM	QUANTITY	UNIT
5' EEL PILING 12" x 10" W. WALL	725	LIN FT
REINFORCEMENT	13820	LBS
COMMON EXCAVATION	350	CU YD
CONCRETE CLASS A, FOOTING WALLS	67	CU YD
10' FIXED TYPE BARS (ROCKERS & BOTTOM)	4440	LBS
12" x 12" x 12" x 12" x 12" x 12"	15.0	CU YD
24-7/8" x 12" x 12" x 12" x 12" x 12"	600	CU YD
40-1/2" x 2-1/2" L _y SWEDGE BOLT Hex Nut	610	CU YD
STONE BACKFILL	38.0	CU YD
STRUCTURE BACKFILL (CLASS A)	1500	CU YD
MECHANICAL TAMPING	25.0	CU YD
WATER PROOFING	100.0	SQ FT
SHEET COPPER (32 oz per sq ft)	90.0	LBS

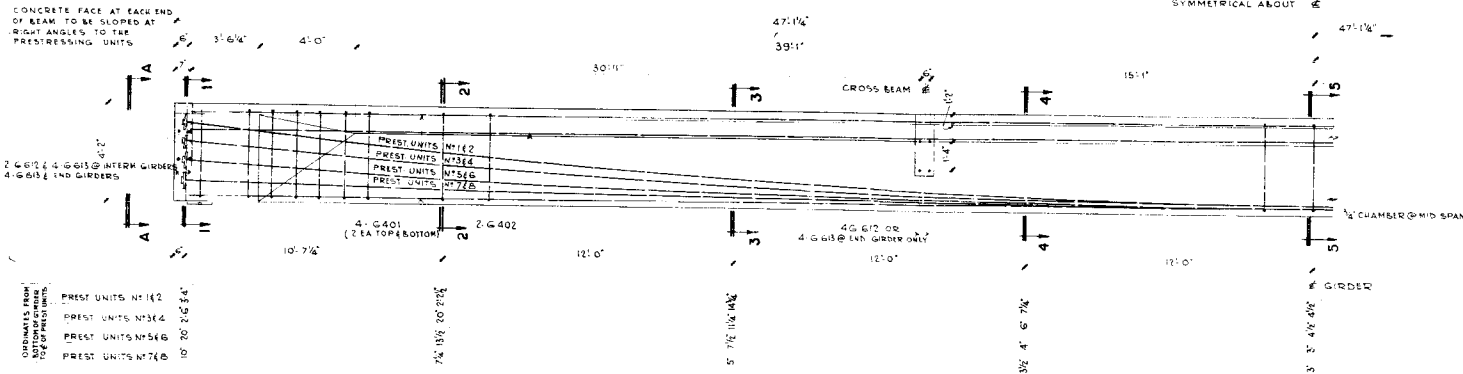


NOTE:
FOR FIXED BEARING DETAILS, SEE SH-3
FOR GENERAL NOTES, SEE SH-1.

COLORADO DEPARTMENT OF HIGHWAYS
US HIGHWAY 85-87 NORTH BOUND
NORTH ENTRANCE INTERCHANGE
A. F. A
OVERPASS N^o H-17-B.D.
ABUTMENT "B"

L. BODUROFF & ASSOCIATE
CONSULTING ENGINEERS
DENVER - COLORADO

Designed: N.H. Scale: as noted Sheet N^o 4
Drawn: N.M.O. Date: 11-28-56 1 of 4 Sheets
Checked: H.H.



INTERMEDIATE AND SIDE GIRDER - ELEVATION

SCALE: 3/8"=1'-0"

BAR LIST FOR 20 GIRDERS

SHAPE	MARK	SIZE	LENGTH	NO. REQ'D
G401	G401	#4	95'-0"	30
G402	G402	#4	79'-6"	40
G403	G403	#4	71'-3"	80
G304	G304	#3	71'-0"	660
G305	G305	#3	81'-1"	660
G306	G306	#3	111'-1"	120
G307	G307	#3	111'-1"	40
G611	G611	#6	91'-1"	40
G612	G612	#6	91'-1"	40
G613	G613	#6	51'-0"	192
G614	G614	#7	81'-6"	80

1% OVERDUN 18266

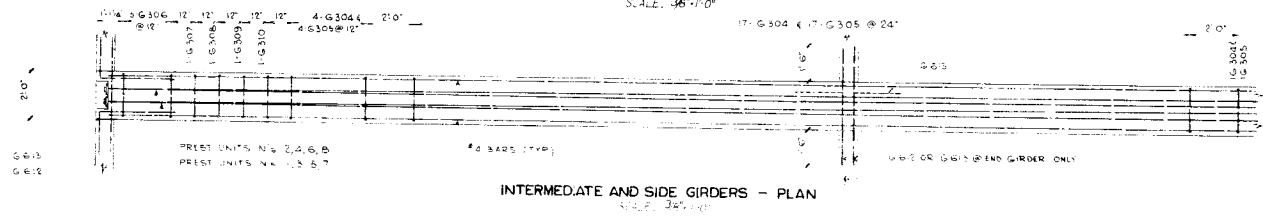
TOTAL WEIGHT 18450*

INITIAL PRESTRESSING FORCES
WAS COMPUTED FOR 5% LOSS
ON STRAIGHT TENDONS + FRICTION
LOSSES FOR FRICTION COEFFICIENT = .30

UNIT	INITIAL PRESTRESSING	FINAL PRESTRESSING
N142	128.0 KIPS	109.0 KIPS
N134	128.0	109.0
N154	128.0	109.0
N174	128.0	109.0

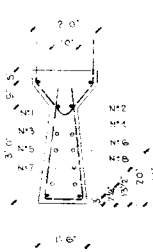
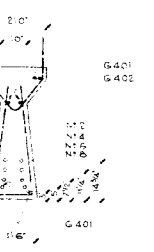
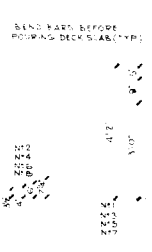
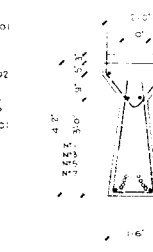
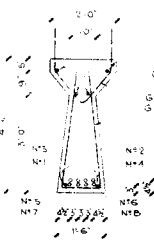
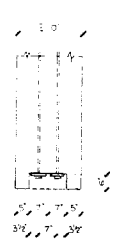
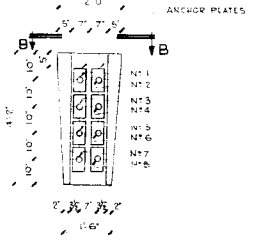
PRESTRESSING ORDER:
N13 - N16,
N14 - N15,
N11 - N13,
N12 - N17

ITEM	QUANTITY
5500psi CONCRETE	394 CuYds
REINFORCING STEEL #18 450	lbs
80# ANCHOR BARS 50" dia	418
40" x 12" x 1/4" #4	3264



INTERMEDIATE AND SIDE GIRDERS - PLAN

SCALE: 3/8"=1'-0"



ELEVATION A-A

SCALE: 1/2"=1'-0"

PLAN B-B

SCALE: 1/2"=1'-0"

SECTION 5-5

SCALE: 1/2"=1'-0"

SECTION 4-4

SCALE: 1/2"=1'-0"

SECTION 3-3

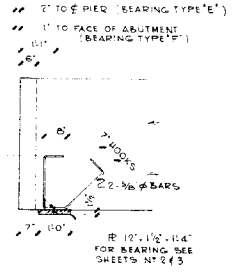
SCALE: 1/2"=1'-0"

SECTION 2-2

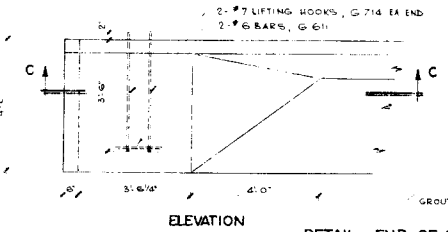
SCALE: 1/2"=1'-0"

SECTION 1-1

SCALE: 1/2"=1'-0"



TOP BEARING PLATE
(TYPE 'E' & 'F' SAME EXCEPT AS NOTED)
SCALE: 1/2"=1'-0"



DETAIL - END OF GIRDER
(CONCRETE OUTLINES & LIFTING HOOKS SHOWN ONLY)
SCALE: 1/2"=1'-0"

GRout AFTER PRESTRESSING



SECTION C-C

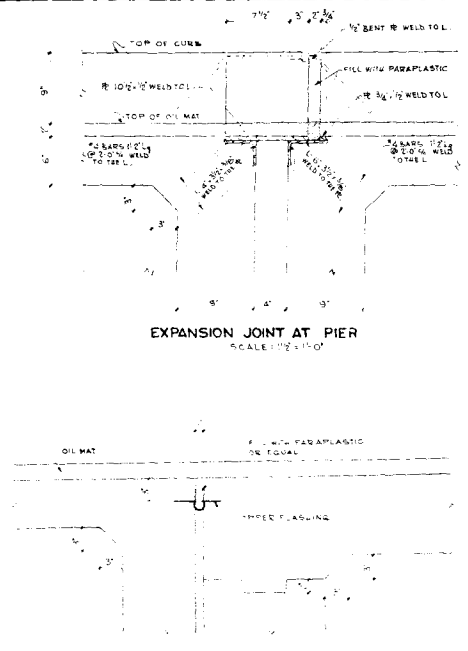
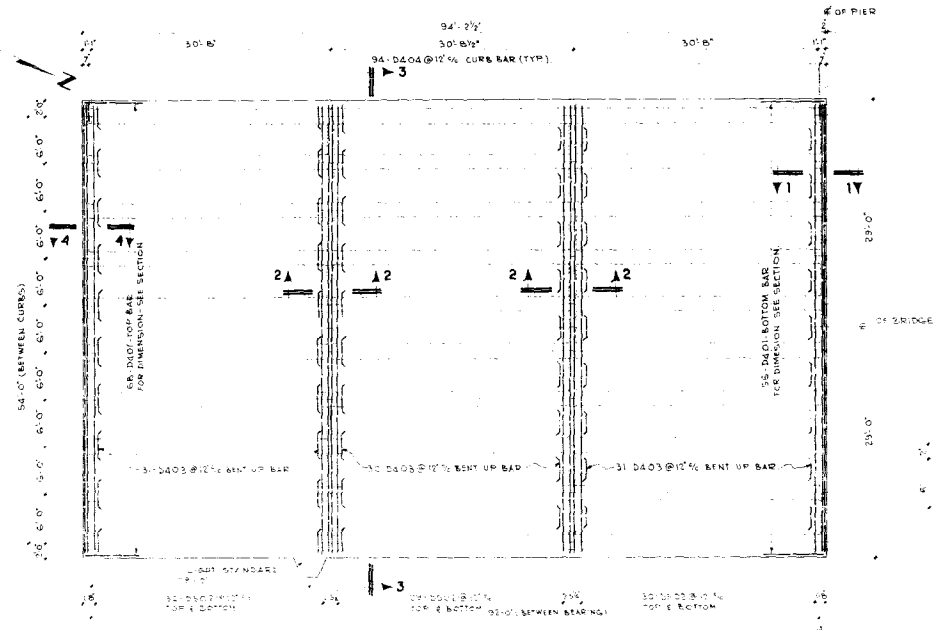
COLORADO DEPARTMENT OF HIGHWAYS
U.S. HIGHWAY 85-NORTH BOUND

NORTH ENTRANCE INTERCHANGE AFA
OVERPASS N17-7-BD
PRESTRESS GIRDER DETAILS

L'BOURVILLON & ASSOCIATE
CONSULTING ENGINEERS
DENVER, COLORADO

Designed: L.B.	Scale: As Noted	Sheet No: 5
Drawn: B.F.W.		
Checked: L.B.	Date: 11-28-51	No. of Sheets: 7

FED. ROAD DIST. NO.	DIS.	PROJ. NO.	SHEET NO.
5	203	11703-2(40)	22



BAR LIST FOR DECK

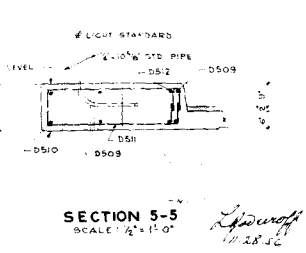
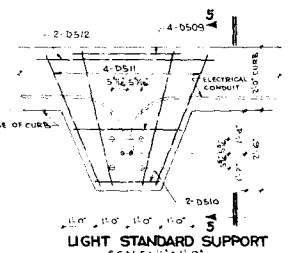
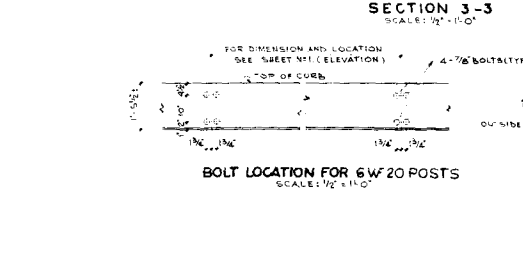
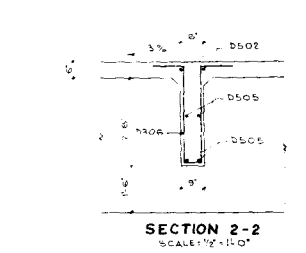
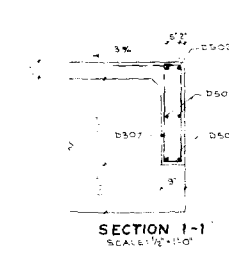
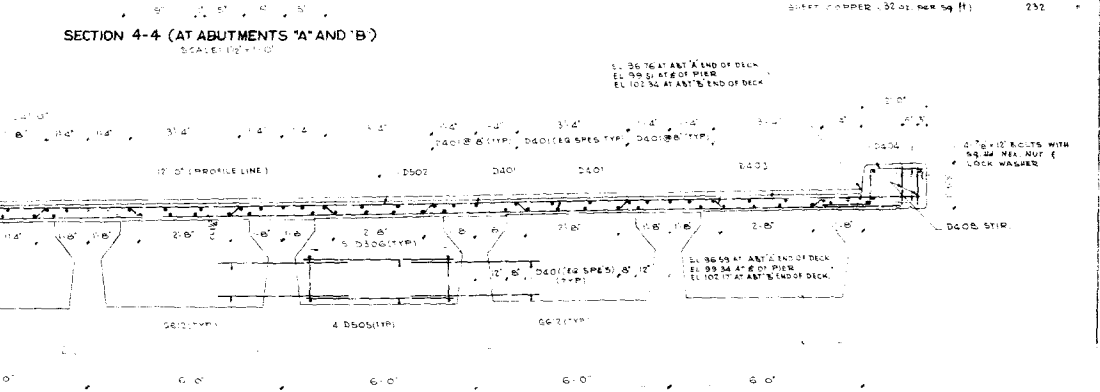
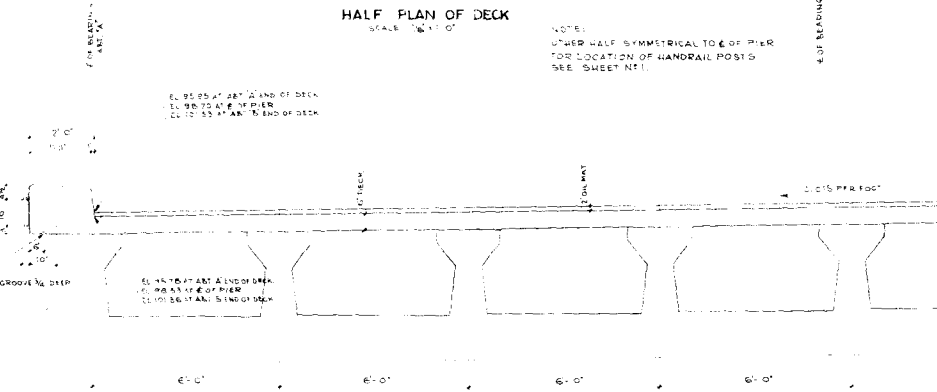
MARK	SIZE	LENGTH	#REQD
D401	#2	9'-10"	746
D502	#5	58'-0"	386
D403	#4	68'-11"	184
D404	#4	4'-6"	576
D505	#5	4'-6"	288
D306	#3	8'-0"	180
D307	#3	7'-7"	180
D408	#4	3'-0"	80
D509	#5	3'-3"	6
D510	#5	2'-0"	4
D411	#5	10'-6"	8
D512	#5	5'-6"	4

BAR SUMMARY

33942 LBS	#5 @ 1047' LBS	124971 CO.
38675	#4 @ 668	135869 CO.
7840	#3 @ 374	11054 CO.
		51994 CO.
		503 CO.
	OVER RUN	51314 CO.
	TOTAL WEIGHT	

QUANTITIES FOR DECK

ITEM	QUANTITY	UNIT
CLASS 'A' CONCRETE	260	CY
PLAN MIXED ASPHALTIC SURFACING	106	TONS
REINFORCING STEEL (THIS OVER RUN)	52514	LBS
160 #10 @ 12" BOLTS	40160	#
14 #4 ANCHOR BARS @ 12"	88176	#
#3 @ 10' @ 12" @ 60' @	1074	#
#3 @ 12" @ 12" @ 60' @	7680	#
#5 @ 12" @ 12" @ 60' @	5808	#
#4 @ 12" @ 12" @ 60' @	49140	#
#5 @ 12" @ 12" @ 54' @	63180	#
SAFETY COPPER @ 32 OZ PER SQ FT	232	#



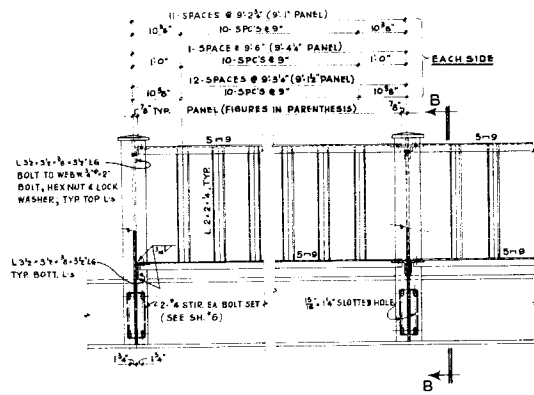
FOR GENERAL NOTES, SEE SHEET N01.

COLORADO DEPARTMENT OF HIGHWAYS
U.S. HIGHWAY 65-67 NORTH BOUND
NORTH ENTRANCE INTERCHANGE A.F.A.
OVERPASS NO H-17-BD

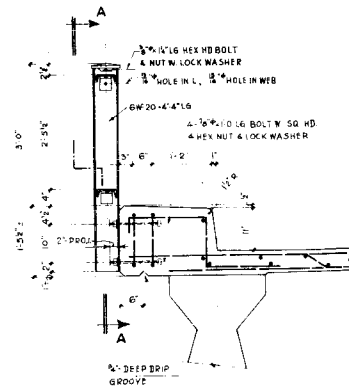
DECK PLAN AND SECTIONS

LBODUROFF & ASSOCIATE
 CONSULTING ENGINEERS
 DENVER - COLORADO

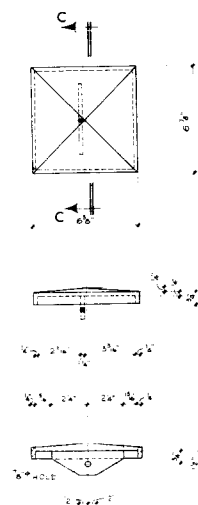
Designed: N.N. Scale: As Noted Sheet No: 6
 Drawn: N.M.D. Date: 11.28.56 No. of Sheets: 7
 Checked: N.W.



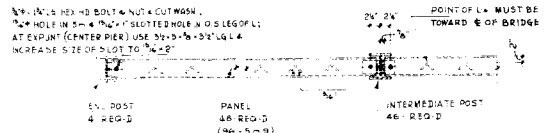
SECTION A-A
SCALE: 3/4" = 1'-0"



SECTION B-B
SCALE: 3/4" = 1'-0"



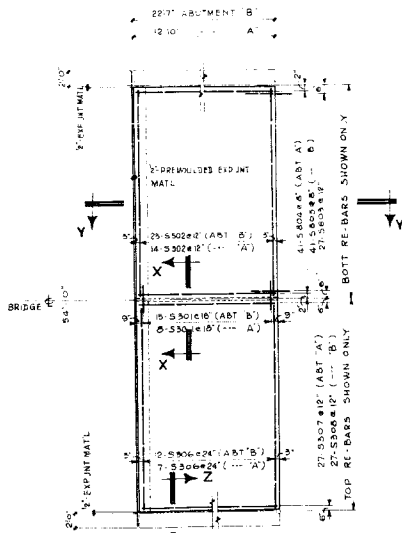
CAST IRON CAP FOR POST
SCALE: 3/4" = 1'-0"



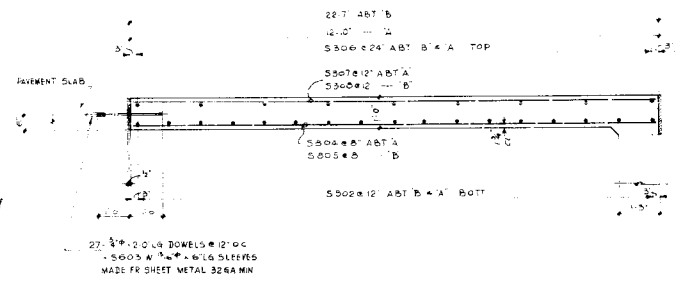
PLAN
CAP REMOVED
SCALE: 3/4" = 1'-0"

(NOTE: FOR GENERAL ELEVATION OF STEEL HANDRAIL SEE SH-71)

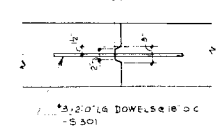
STEEL HANDRAIL



KEY PLAN
SCALE: 3/4" = 1'-0"

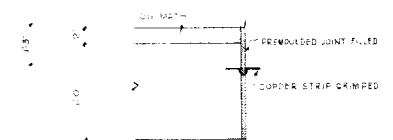


SECTION Y-Y
SCALE: 1/2" = 1'-0"



SECTION X-X
SCALE: 1" = 1'-0"

APPROACH SLAB



SECTION Z-Z
SCALE: 1/2" = 1'-0"

BAR LIST FOR TWO APPR SLAB

MARK	TYPE	LENGTH	REQD	SIZE
S301	STR	2'-0"	23	#3
S302		26'-8"	74	#5
S303		2'-0"	106	#6
S304		12'-8"	82	#8
S305		22'-3"	82	#8
S306		26'-8"	36	#8
S307		12'-6"	54	#8
S308		22'-3"	54	#8

BAR SUMMARY

NO. BARS	2926	111	# 3/8	316	111	1103	
#5	1974	-	# 1043	-	-	12,059	
#6	216	-	# 1502	-	-	324	
#8	2850	-	# 2670	-	-	7,609	
						11,355	
						11,010	
						TOTAL WEIGHT	11,205

QUANTITIES

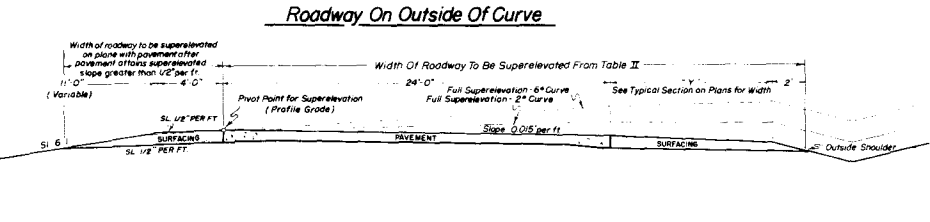
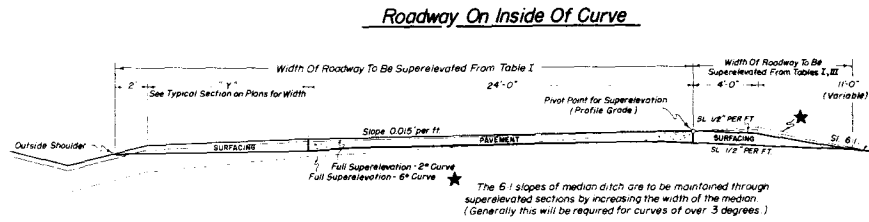
ITEM	QUANTITY	UNIT
REINFORCING STEEL	11,205	LB.
CONCRETE - CLASS 'A'	75	CY
PLAIN MIXED ASPHALTING	12	TON
1/2" EXPANSION JOINT MATERIAL	94	SQ FT
STEEL HANDRAILING	6,025	LB.

COLORADO DEPARTMENT OF HIGHWAYS
U.S. HIGHWAY 85-87 NORTH BOUND
NORTH ENTRANCE INTERCHANGE
A. F. A.
OVERPASS N^o 17-B.D
STEEL HANDRAIL
APPROACH SLAB

L. BODUROFF & ASSOCIATE
CONSULTING ENGINEERS
DENVER - COLORADO

Designed: N.N. Scale as noted Sheet N^o 7
Drawn: N.N. Date: 11/28/58 N^o of Sheets 7
Checked: N.N.

Standard Methods for Superelevating Curves on Divided Highways



Superelevation Tables

TABLE I - FOR ROADWAY ON INSIDE OF CURVE

(Figures in columns are Rates of Superelevation per Foot of Roadway Width)

Percent Of Transition Distance	Distance From BT In Feet	DEGREE OF CURVE				
		2°+2°	3°+3°	4°+4°	5°+5°	6°+6°
2	5	0.000	0.000	0.000	0.000	0.000
4	10	0.000	0.001	0.001	0.001	0.002
6	15	0.000	0.001	0.002	0.003	0.004
8	20	0.001	0.002	0.004	0.005	0.006
10	25	0.001	0.003	0.006	0.008	0.010
12	30	0.002	0.005	0.008	0.011	0.014
14	35	0.002	0.007	0.011	0.015	0.020
16	40	0.003	0.009	0.014	0.020	0.026
18	45	0.004	0.011	0.018	0.025	0.032
20	50	0.005	0.014	0.023	0.031	0.040
22	55	0.006	0.017	0.027	0.038	0.048
24	60	0.007	0.020	0.032	0.045	0.058
26	65	0.008	0.024	0.038	0.053	0.068
28	70	0.010	0.027	0.044	0.061	0.078
30	75	0.011	0.031	0.051	0.071	0.090
32	80	0.013	0.035	0.058	0.080	0.102
34	85	0.014	0.040	0.065	0.091	0.116
36	90	0.016	0.045	0.073	0.101	0.130
38	95	0.018	0.050	0.081	0.113	0.146
40	100	0.020	0.055	0.090	0.125	0.160
42	105	0.022	0.061	0.099	0.138	0.176
44	110	0.024	0.066	0.108	0.150	0.192
46	115	0.026	0.072	0.117	0.163	0.208
48	120	0.028	0.077	0.126	0.175	0.224
50	125	0.030	0.083	0.135	0.188	0.240
52	130	0.032	0.088	0.144	0.200	0.256
54	135	0.034	0.094	0.153	0.213	0.272
56	140	0.036	0.099	0.162	0.226	0.288
58	145	0.038	0.105	0.171	0.238	0.304
60	150	0.040	0.110	0.180	0.250	0.320
62	155	0.042	0.116	0.189	0.263	0.336
64	160	0.044	0.120	0.197	0.274	0.350
66	165	0.046	0.126	0.205	0.285	0.364
68	170	0.047	0.130	0.212	0.295	0.378
70	175	0.049	0.135	0.219	0.305	0.390
72	180	0.050	0.138	0.226	0.314	0.402
74	185	0.052	0.142	0.232	0.323	0.412
76	190	0.053	0.145	0.238	0.330	0.422
78	195	0.054	0.149	0.243	0.338	0.432
80	200	0.055	0.151	0.247	0.344	0.440
82	205	0.056	0.154	0.252	0.350	0.448
84	210	0.057	0.156	0.256	0.355	0.454
86	215	0.058	0.158	0.259	0.360	0.460
88	220	0.059	0.160	0.262	0.364	0.466
90	225	0.059	0.162	0.264	0.367	0.470
92	230	0.059	0.163	0.266	0.370	0.474
94	235	0.060	0.164	0.268	0.374	0.476
96	240	0.060	0.164	0.269	0.374	0.478
98	245	0.060	0.165	0.270	0.375	0.480
Full Super	250	0.060	0.165	0.270	0.375	0.480

TABLE II - FOR ROADWAY ON OUTSIDE OF CURVE

(Figures in columns are Rates of Superelevation per Foot of Roadway Width)

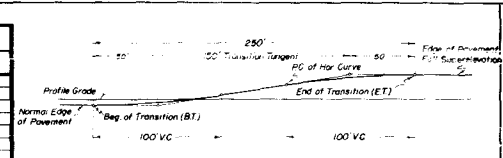
Percent Of Transition Distance	Distance From BT In Feet	DEGREE OF CURVE				
		2°+2°	3°+3°	4°+4°	5°+5°	6°+6°
2	5	0.000	0.000	0.000	0.000	0.000
4	10	0.001	0.002	0.002	0.002	0.003
6	15	0.003	0.004	0.004	0.005	0.006
8	20	0.005	0.006	0.006	0.008	0.010
10	25	0.008	0.010	0.012	0.014	0.016
12	30	0.011	0.014	0.017	0.020	0.023
14	35	0.015	0.019	0.023	0.028	0.032
16	40	0.019	0.025	0.030	0.036	0.042
18	45	0.024	0.031	0.038	0.046	0.053
20	50	0.030	0.039	0.048	0.056	0.065
22	55	0.036	0.047	0.057	0.069	0.079
24	60	0.043	0.056	0.068	0.081	0.094
26	65	0.051	0.066	0.080	0.096	0.110
28	70	0.059	0.076	0.093	0.110	0.127
30	75	0.068	0.088	0.107	0.127	0.146
32	80	0.077	0.099	0.122	0.144	0.166
34	85	0.087	0.113	0.137	0.163	0.188
36	90	0.097	0.126	0.154	0.182	0.211
38	95	0.108	0.140	0.171	0.204	0.235
40	100	0.120	0.155	0.190	0.225	0.260
42	105	0.132	0.171	0.209	0.248	0.286
44	110	0.144	0.186	0.228	0.270	0.312
46	115	0.156	0.202	0.247	0.293	0.338
48	120	0.168	0.217	0.266	0.315	0.364
50	125	0.180	0.233	0.285	0.338	0.390
52	130	0.192	0.248	0.304	0.360	0.416
54	135	0.204	0.264	0.323	0.383	0.442
56	140	0.216	0.279	0.342	0.405	0.468
58	145	0.228	0.295	0.361	0.428	0.494
60	150	0.240	0.310	0.380	0.450	0.520
62	155	0.252	0.326	0.399	0.472	0.545
64	160	0.263	0.339	0.416	0.493	0.569
66	165	0.273	0.353	0.433	0.513	0.592
68	170	0.283	0.366	0.449	0.531	0.614
70	175	0.292	0.378	0.463	0.549	0.634
72	180	0.301	0.389	0.477	0.565	0.653
74	185	0.309	0.400	0.490	0.580	0.670
76	190	0.317	0.409	0.502	0.594	0.686
78	195	0.324	0.419	0.513	0.607	0.701
80	200	0.330	0.426	0.522	0.619	0.715
82	205	0.336	0.434	0.532	0.629	0.727
84	210	0.341	0.440	0.540	0.639	0.738
86	215	0.345	0.446	0.547	0.647	0.748
88	220	0.349	0.451	0.553	0.655	0.757
90	225	0.352	0.455	0.558	0.661	0.764
92	230	0.355	0.459	0.562	0.666	0.770
94	235	0.357	0.461	0.566	0.670	0.774
96	240	0.359	0.463	0.568	0.673	0.777
98	245	0.360	0.465	0.570	0.674	0.779
Full Super	250	0.360	0.465	0.570	0.675	0.780

TABLE III - FOR INSIDE SHOULDER OF ROADWAY INSIDE OF CURVE

(Rate of Superelevation Per Foot of Shoulder Width)

Percent Of Transition Distance	Distance Back Of BT	Rate Of Superelevation Per Foot Of Shoulder Width
100	BT	0.5666
80	10	0.4533
60	20	0.3400
40	30	0.2266
20	40	0.1133
0	50	0.0000

PROFILE VIEW SHOWING TRANSITION TO FULL SUPERELEVATION ON ROADWAY OUTSIDE OF CURVE



Circular Curve with Unlimited Tangent Approach

The Transition shown above illustrates the effect of Superelevation on the outside edge of the pavement by gradually raising the outside shoulder over a distance of 250 feet. The beginning of this transition takes place at a point 150 feet back of the end of the curve and acquires full Superelevation at a point 100 feet inside of the curve.

GENERAL NOTES

- All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project.
- Special transition problems not covered by this Standard Sheet shall be covered by appropriate notes, included with curve data on plans.
- In cases where spiral curves are used, the transition from normal crowned section to full superelevation shall take place over the full length of spiral curve.
- The use of this Standard Sheet is restricted to Divided Highways having a normal crown slope of 0.015 per foot on pavements and a normal crown slope of 1/2% per foot on the inside shoulders.

COLORADO STATE HIGHWAY DEPARTMENT

Standard Methods for Superelevating Curves on Divided Highways

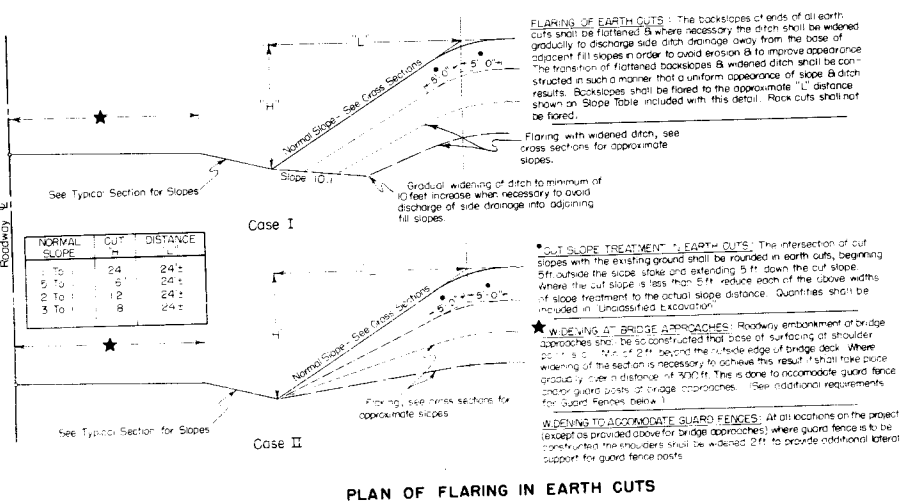
Designed by GCM	Approved by H.L. Smith, Chief Engineer, Surveys & Plans
Made by GCM	Date: Feb. 8 1950
Checked by MRH	

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

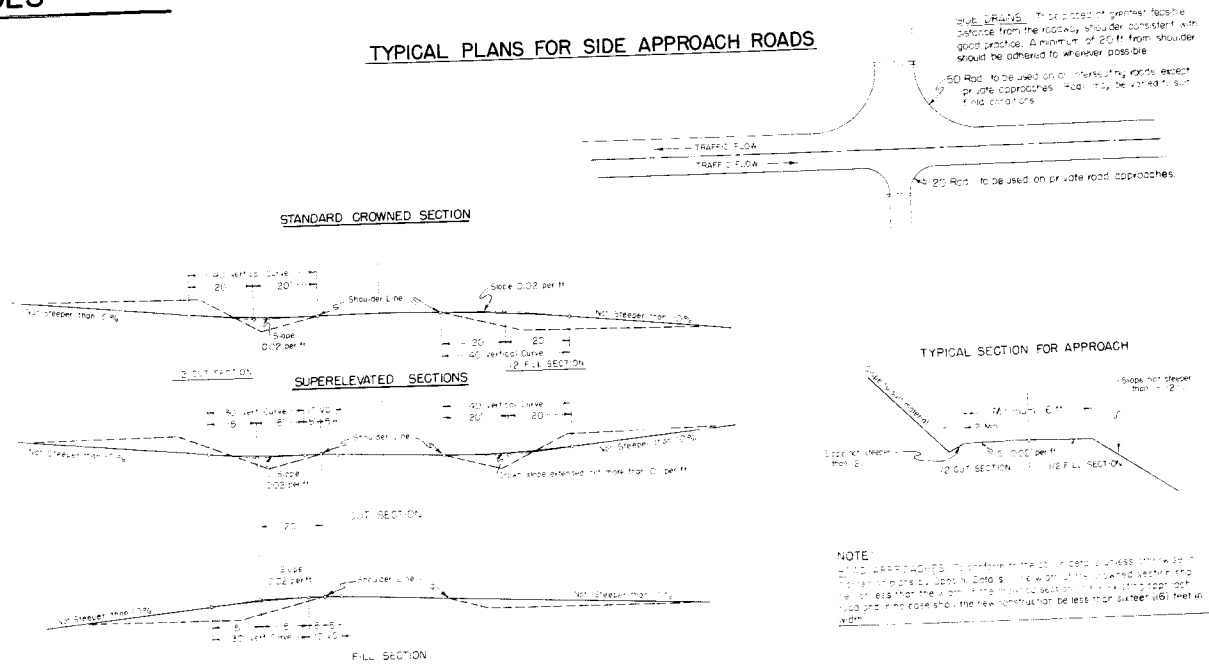
STANDARD M-2-EM

RED ROAD DIV. NO. DISTRICT **1-N** SHEET NO. **25** TOTAL SHEETS **25**
 COLO. **002-2(40)**
 Rev. 12-9-53, Details of Road Approaches, J.C.R.
 Rev. 10-28-55, Widening of Bridge Approaches Note, S.U.M.

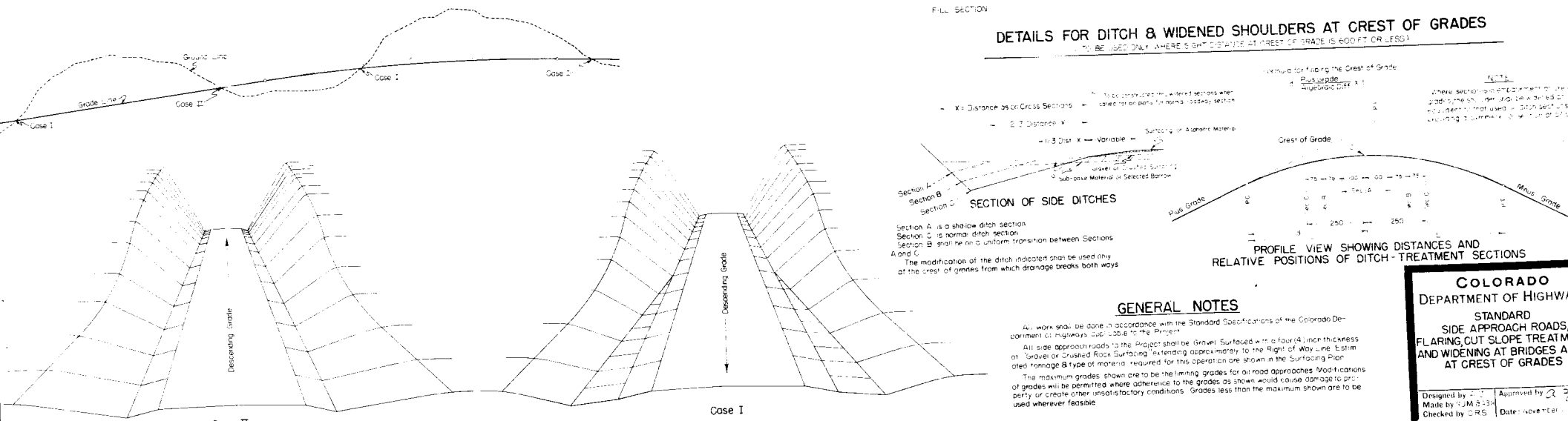
GENERAL DETAILS FOR FLARING OF EARTH CUTS, CUT SLOPE TREATMENT & WIDENING AT BRIDGES



TYPICAL PLANS FOR SIDE APPROACH ROADS



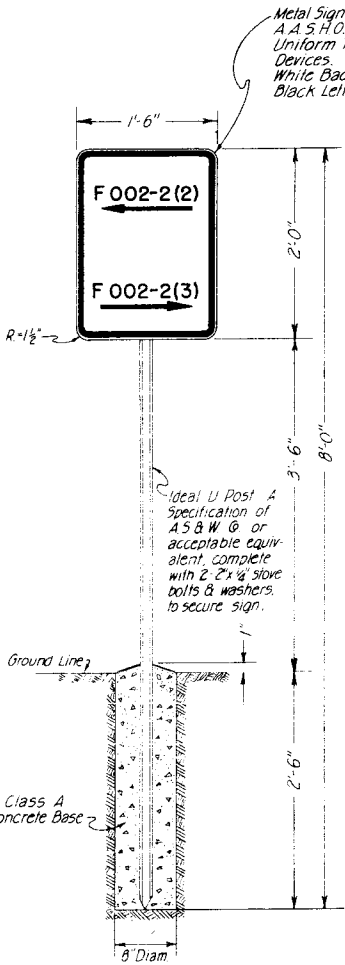
DETAILS FOR DITCH & WIDENED SHOULDERS AT CREST OF GRADES



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

Designed by **J.C.R.** Approved by **R. B. ...**
 Made by **H.M.S.-34**
 Checked by **C.R.S.** Date: **November, 1954**

PROJECT MARKER POST



NOTES FOR PROJECT MARKER POSTS

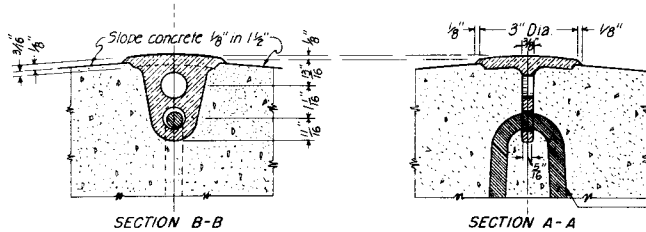
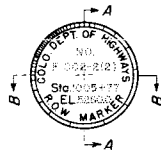
All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to this project.

Numbers and arrows shall show the proper numbers and directions of the projects each way from where the post is placed. Post is to be set with sign facing the road 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 Department of Highways applicable to the project. Posts shall be made of Class A Concrete. The upper 12 inches of marker posts shall be rubbed free of form marks, and the top surface of the post must be constructed to drain thoroughly.

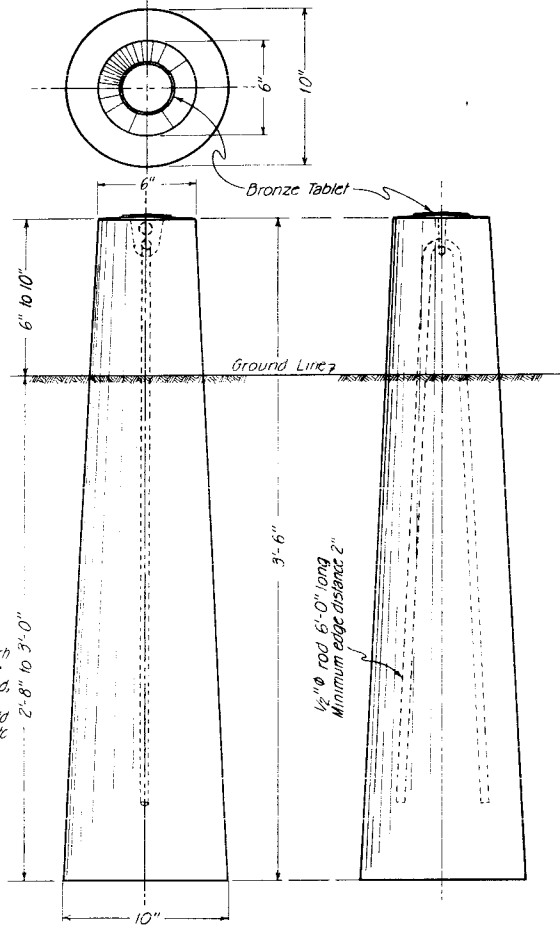
All exposed surfaces of the bronze tablet are to be ground to a smooth surface. All letters are to be depressed a minimum of 1/16 inch. Information on the bronze tablet indicated by pin lines is to be stamped in field by the engineering party after post is placed, 3/16 inch letters and figures to be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



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

Omit and use 12"x1/2" bar for Bench Mark Tablet

RIGHT OF WAY MARKER POST



STANDARD M-7-C

FEDERAL ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	11.002-2(40)	26	

Rev. 4-4-56, Added Bridge Bench Mark, J.C.R.

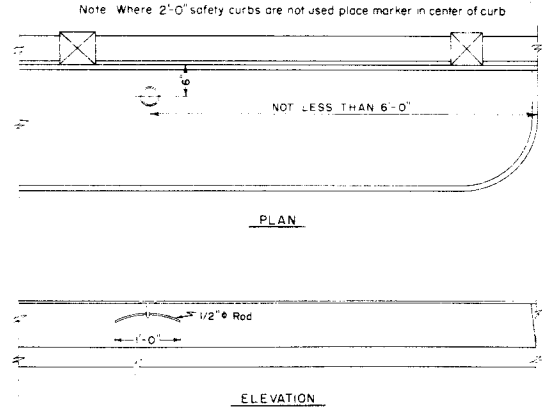
BENCH MARK

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

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

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

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



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

COLORADO DEPARTMENT OF HIGHWAYS
STANDARD MARKER POSTS AND BENCH MARKS
 Made by E.E. [Signature]
 Checked by R.E.L. Date: Nov. 12, 1953

REVISIONS
 Rev 12-13-47 J.P.K.
 Rev 7-1-45 J.R.E.
 Rev 9-14-50 J.E.R.
 Rev 7-10-52 T.M.C.
 Rev 10-24-58 W.E.S.

STANDARD M-10-B.

FED. ROAD DIST. NO.	STATE	CONTRACT NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	002-41	27	

1 2 3 4 5 6 7 8 9 0

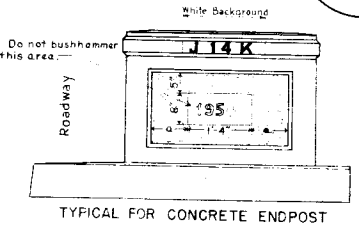
A B C D E F G H I J K L

M N O P Q R S T U V W

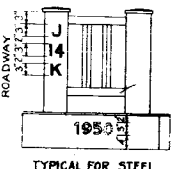
a b c d e f g h i j k l m n o p q r s t u v w x y z

J 14 K 1953

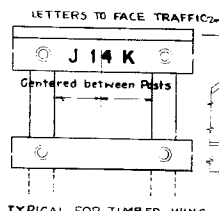
Scale in inches



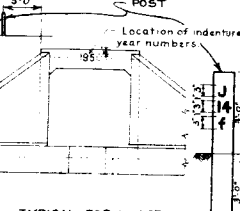
TYPICAL FOR CONCRETE ENDPOST



TYPICAL FOR STEEL HANDRAIL END POST



TYPICAL FOR TIMBER WING HANDRAIL



TYPICAL FOR LARGE BOX CULVERTS

SAMPLE BRIDGE NUMBER

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS APPLICABLE TO THE PROJECT.

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

THE SIZE, SHAPE AND SPACING OF THE LETTERS AND FIGURES SHALL BE IN ACCORDANCE WITH THE FULL SIZE SHOWN ON THIS SHEET.

ADDITIONAL COPIES OF THIS FULL SIZE SHEET CAN BE OBTAINED FROM THE DEPARTMENT WITHOUT CHARGE.

THE YEAR NUMBERS ARE RECESSED IN CONCRETE OR MINIMUM AS SHOWN IN PLAN DETAILS.

SIDE OF EACH BRIDGE END AND INTO THE FACE OF THE DOWNSTREAM HEADWALL OF CULVERTS AS SHOWN ON PLAN DETAILS.

NUMBERS TO BE MADE OF WOOD, METAL OR OTHER SUITABLE MATERIAL AND ATTACHED TO THE FORMS BEFORE CONCRETE IS POURED.

THE YEAR NUMBER OF EACH STRUCTURE SHALL CORRESPOND WITH THE YEAR IN WHICH THE CONCRETE IS POURED.

THE STRUCTURE NUMBER SHALL BE STENCILED ON THE RIGHT HAND SIDE OF EACH BRIDGE END AS SHOWN ON THIS STANDARD AND AS SPECIFIED FOR MAJOR STRUCTURES OVER 20'-0" CLEAR SPAN.

A PROPER WHITE BACKGROUND RECTANGULAR IN SHAPE AND EXTENDING THREE INCHES BEYOND THE LIMITS OF THE NUMBER SHALL BE PAINTED WITH TWO COATS OF ACCEPTABLE WHITE PAINT UNLESS AN APPROVED WHITE CONCRETE PAINT IS USED. BEFORE PAINTING THE SURFACE MUST BE THOROUGHLY DRIED, CLEANED AND PROPERLY SIZED. ON TIMBER HANDRAILS THE WHITE PAINT USED AFTER THE WHITE BACKGROUND HAS DRIED SUFFICIENTLY THE CORRECT STRUCTURE NUMBER SHALL BE CAREFULLY STENCILED ON STENCILED LETTERS AND FIGURES SHALL BE CAREFULLY FILLED IN BY HAND TO MAKE SOLID FIGURES.

MAJOR STRUCTURES WITH CLEAR SPANS 12 TO 20 FEET INCLUSIVE SHALL BE STENCILED WITH STRUCTURE NUMBER THUS WRITTEN ON 4" X 4" X 6" TIMBER POST TO BE FURNISHED AND PLACED BY THE CONTRACTOR. POST SHALL BE PLACED 4 FT ± OUTSIDE THE ROADWAY SHOULDER. THIS SHALL BE CONSIDERED SUBSIDIARY WORK AND WILL NOT BE PAID FOR AS A SEPARATE ITEM.

SAMPLE YEAR NUMBER

COLORADO
 DEPARTMENT OF HIGHWAYS
 STANDARD
 LETTERS AND FIGURES
 FOR
 YEAR NUMBERS AND
 STRUCTURE NUMBERS

Designed by G.H.C. Approved by *W.P.M.*
 Made by W.P.M. Bridge Engineers
 Checked by Date: June 1, 1948

STRUCTURE NO.

DETAILS OF MANHOLE

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

FEDERAL ROAD DIVISION NO.	DISTRICT	14	SHEET NO.	TOTAL SHEETS
9	COLO.	002-2(40)	28	

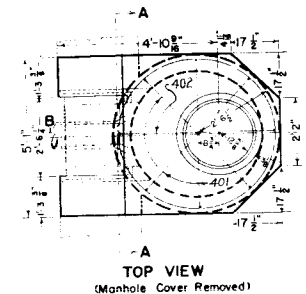
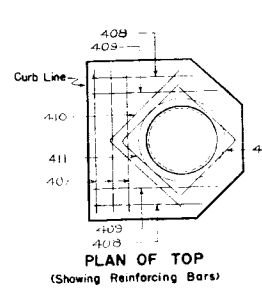
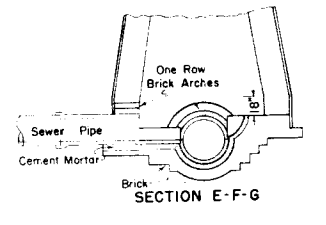
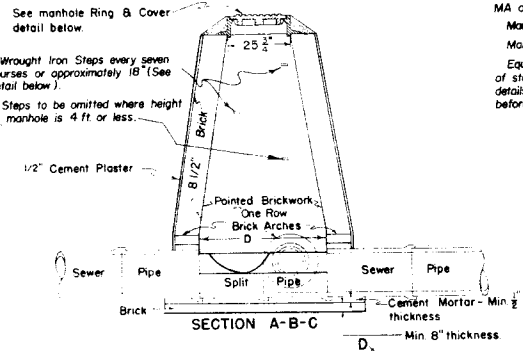
REV FOR SPECS - 9/26/52-E.E.O.
REV MANHOLE RING & COVER - 11/5/54 - J.C.R.
Rev 5-2-56, Deleted Finish Note, J.C.R.

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.

See manhole Ring & Cover detail below.
Wrought Iron Steps every seven courses or approximately 18" (See detail below).
Steps to be omitted where height manhole is 4 ft. or less.

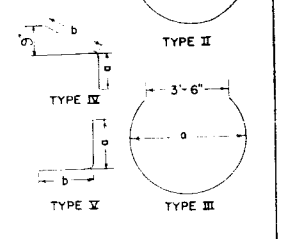
1/2" Cement Plaster



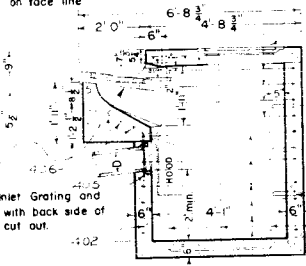
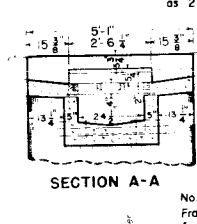
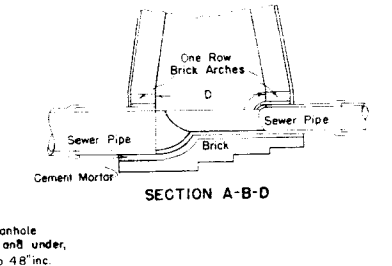
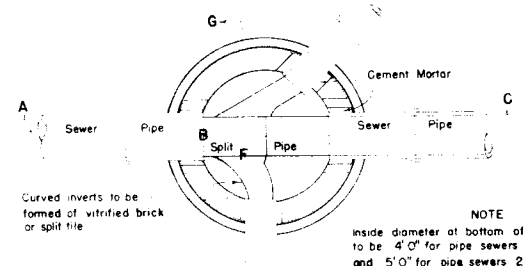
BAR LIST FOR H=6'-6"

MARK	SIZE	NO. REQD.	LENGTH	TYPE	DIMENSIONS a b c	TOTAL LENGTH	BENDING DIAGRAM ALL DIMENSIONS ARE OUT TO OUT OF BAR
401	1/2" # 3	16	10'-0"	I	6'-2 4/8" 7'-6 2/8"	50'-6"	
402	1/2" # 1	14	4'-0"	I	6'-2 4/8" 7'-6 2/8"	14'-4"	
403	1/2" # 6	16	9'-0"	II	4'-8" - - -	100'-6"	
404	1/2" # 4	10	11'-0"	III	4'-8" - - -	43'-8"	
405	3/4" # 3	2	6'-0"	IV	0'-10" 0'-10"	7'-6"	
406	1/2" # 2	3	6'-0"	IV	2'-0" 1'-6"	7'-0"	
407	1/2" # 3	4	7'-0"	Str.	- - - - -	13'-9"	
408	1/2" # 3	4	7'-0"	Str.	- - - - -	6'-8"	
409	1/2" # 2	3	10'-0"	Str.	- - - - -	7'-10"	
410	1/2" # 1	1	6'-6"	V	3'-3" 3'-3"	6'-6"	
411	1/2" # 2	2	5'-0"	V	2'-6" 2'-6"	10'-0"	

These dimensions to be increased in increments of 6" for H above 6'-6"
Add 1-4.03 for each 6" additional height above 6'-6"
Additional #61 required as follows:
H= 7'-6" to 8'-6" 1 bar;
H= 9'-0" to 10'-0" 2 bars;
Cut or bend bars around pipes as required.



The minimum depth of gutter is here shown, said depth being variable. Forms must be constructed so as to admit increasing said depth as much as 2 1/2" on face line

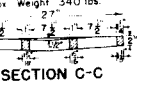


STORM SEWER RING AND COVER

Ref. H. & B. Cat. 150, P. 371, 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

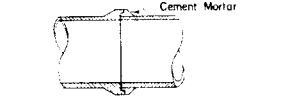


NOTE: ALL REINFORCING STEEL BARS SHALL CONFORM TO A S.T.M. SPECIFICATION AT JOBS - 507 OF LATEST REVISION THEREOF.

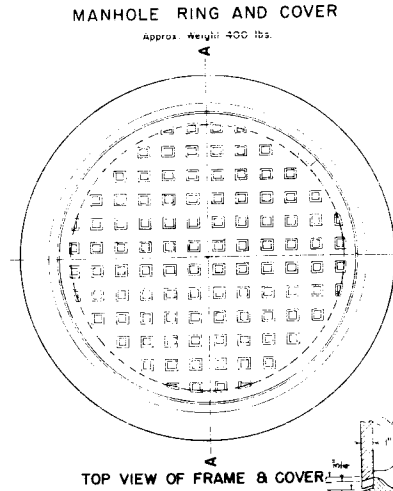
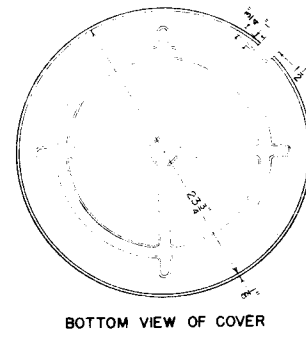
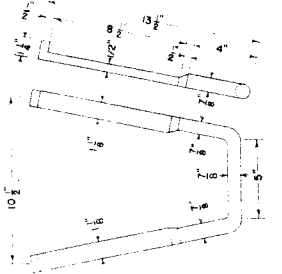
H	QUANTITIES	
	CLASS "A" CONCRETE * CU YDS	REINFORCING * STEEL 192 lbs
6' 6"	2.4	192
7' 0"	2.5	206
7' 6"	2.7	224
8' 0"	2.8	238
8' 6"	2.9	252
9' 0"	3.0	270
9' 6"	3.2	284
10' 0"	3.3	298

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

DETAIL OF JOINTS FOR SEWER PIPE



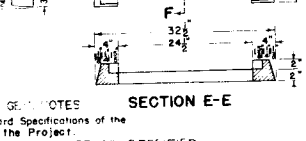
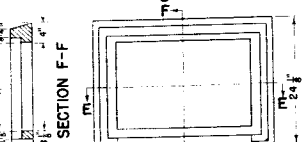
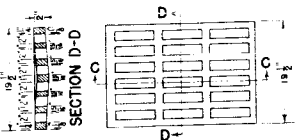
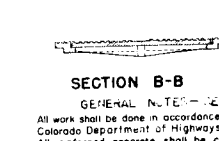
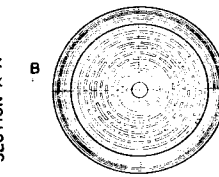
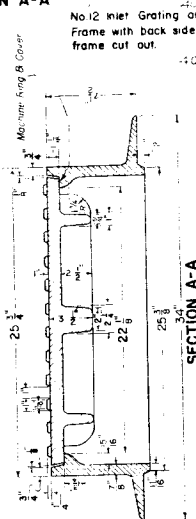
WROUGHT IRON OR MILD STEEL STEPS



Section thru slot used to lift cover.

STORM SEWER RING & COVER

Ref. H. & B. Cat. 150, P. 371, Fig. 371-C, or Equivalent. Approx. Weight 220 lbs.



GENERAL NOTES - SEE ADDITIONAL GENERAL NOTES
All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the Project.
All reinforced concrete shall be formed on both sides.
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 BAR designation and station number.
All castings shall be painted with two coats of asphalt or coal tar and oil.

COLORADO DEPARTMENT OF HIGHWAYS STANDARD
NO. 8 CONCRETE INLET, MANHOLE & PIPE JOINTS ON SEWERS

Designed by A.P.G. Made by A.P.G. Check design A.Z. Check detail C.R.S. Date JUL 10 1951

Approved by P.S. Bailey Bridge Engineer

NO. 12 CONCRETE INLET

BAR LIST FOR H = 3' 0"

MARK	SIZE	NO. REQD.	LENGTH	DIMENSIONS		BENDING DIAGRAM
				l	m	
601	3/4"	Note	2' 6"	I	1' 0" 0'-10"	
401	1/2"	3	11' 10"	II	2' 6" 2'-6"	
402	1/2"	5	5' 6"	II	2' 6" 2'-6"	
403	1/2"	5	7' 1"	I	2' 7" 2'-6"	
404	1/2"	2	2' 7"	STR		

* Omit 601 when H is 4'-0" or less
 * These dimensions to be increased in increments of 6" for H above 3'-0"
 Add 1'-401 for each 6" additional height above 3'-0"
 601 required as follows:
 H: 4'-6" to 5'-6" - 1 bar; H: 9'-0" to 10'-0" - 4 bars
 H: 6'-0" to 7'-0" - 2 bars;
 H: 7'-6" to 8'-6" - 3 bars;
 Cut or bend bars around pipes as required.

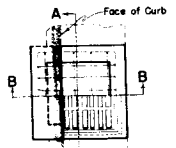
See Plans for size and locations of outlets.

BAR LIST FOR H = 3' 0"

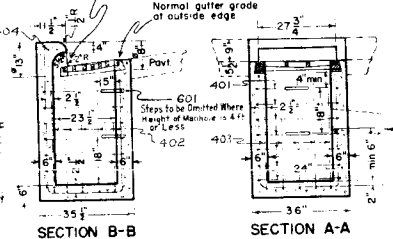
MARK	SIZE	NO. REQD.	LENGTH	DIMENSIONS		BENDING DIAGRAM
				p	q	
601	3/4"	Note	2' 6"	I	0' 0" 0'-10"	
401	1/2"	4	11' 10"	II	3' 5" 2'-11"	
402	1/2"	7	6' 1"	I	2' 0" 2'-11"	
403	1/2"	4	7' 5"	I	3' 4" 2'-11"	

* Omit 601 when H is 4'-0" or less
 * These dimensions to be increased in increments of 6" for H above 3'-0"
 Add 1'-401 for each 6" additional height above 3'-0"
 601 required as follows:
 H: 4'-6" to 5'-6" - 1 bar; 9'-0" to 10'-0" - 4 bars
 H: 6'-0" to 7'-0" - 2 bars;
 H: 7'-6" to 8'-6" - 3 bars;
 Cut or bend bars around pipes as required

See Plans for size and locations of outlets

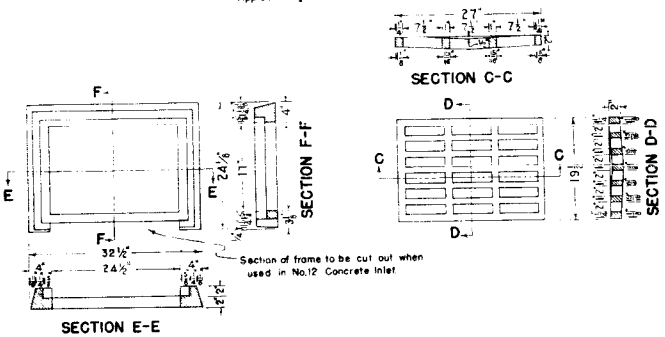


Warp inside gutter grade each side of inlet to meet grade of inlet



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

NO. 12 INLET GRATING & FRAME



QUANTITIES

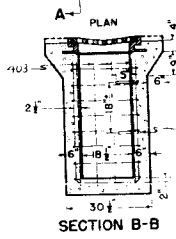
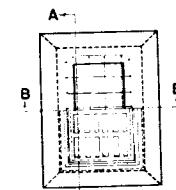
H	CLASS "A" CONCRETE CU. YDS.	REINFORCING STEEL LBS.
3' 0"	0.54	70
3' 6"	0.63	85
4' 0"	0.72	100
4' 6"	0.81	119
5' 0"	0.90	127
5' 6"	0.99	152
6' 0"	1.08	166
6' 6"	1.17	185
7' 0"	1.27	200
7' 6"	1.36	215
8' 0"	1.45	233
8' 6"	1.54	248
9' 0"	1.63	263
9' 6"	1.73	282
10' 0"	1.82	297

* 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 Department of Highways applicable to the project.
 All reinforcing steel shall be class "A" and AIREINTRAINED AS SPECIFIED.
 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.

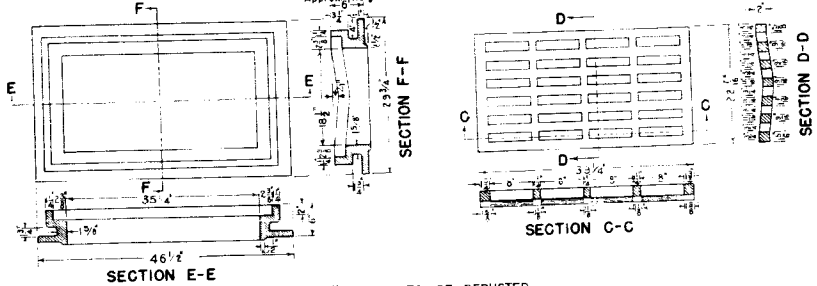
ALL DIMENSIONS NOT SHOWN AS CLEAR ARE TO $\frac{1}{2}$ OF BAR.
 ALL REINFORCING STEEL BARS SHALL CONFORM TO A.S.T.M. SPECIFICATION A-305-50T OR LATEST REVISION THEREOF.



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

601 Steps to be Omitted Where Height of Manhole is 4 ft or Less

NO. 13 INLET GRATING & FRAME



* VOLUME TO BE DEDUCTED FOR EACH OPENING

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

QUANTITIES

H	CLASS "A" CONCRETE CU. YDS.	REINFORCING STEEL LBS.
3' 0"	0.86	84
3' 6"	0.96	100
4' 0"	1.06	116
4' 6"	1.16	136
5' 0"	1.26	156
5' 6"	1.36	172
6' 0"	1.46	192
6' 6"	1.57	208
7' 0"	1.67	225
7' 6"	1.77	245
8' 0"	1.87	26
8' 6"	1.97	277
9' 0"	2.07	297
9' 6"	2.17	313
10' 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
DEPARTMENT OF HIGHWAYS
STANDARD
NO. 12 AND NO. 13
CONCRETE INLETS

Designed by A.P.G. | Approved by *P. J. Paly*
 Made by A.P.G. | Bridge Engineer
 Check Design A.Z. |
 Check Detail C.R.S. | Date: 11.10.1951

STANDARD TIMBER GUARD POSTS

STANDARD M-19-D

SPECIFICATIONS (Work By Contractor)

POSTS - Lodgepole Pine, Southern Yellow Pine or West Coast Douglas Fir, not less than six (6) inches in diameter. All posts shall be pressure treated with Pentachlorophenol as provided under paragraph 42.2.20 of the specifications, after being peeled and shovied in accordance with specifications.

PAINTING - Posts shall be painted with aluminum paint and a black band placed around each post as per details on this sheet. Number of coats and type of paint applied shall be in accordance with specifications.

(Work By State Forces)

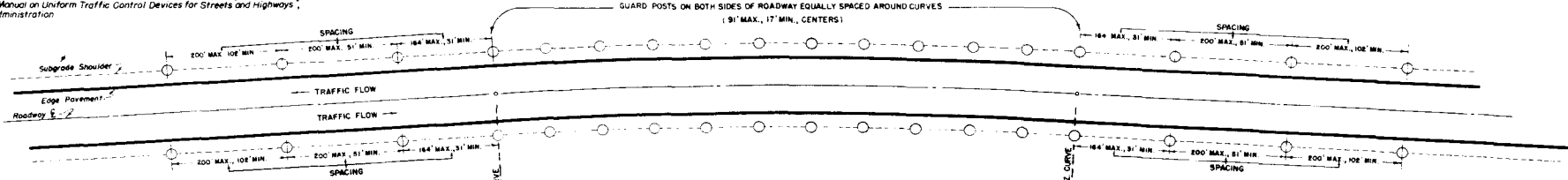
REFLECTIVE SHEETING - in accordance with the details hereon, State Forces will furnish and place the required 2"x6" smooth surfaced reflective delineators fabricated from 3s - H14 aluminum alloy, minimum thickness 0.025", reflectorized with reflective shearing strips or other approved reflective materials. Strips shall be suitable for placement around a curved surface.

STATE ROAD DIVISION NO.	DISTRICT
9	CULC.
	WPO 2-2(40)
	30

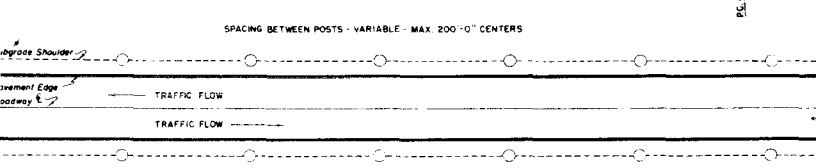
Rev. 5-13-53, Specifications, J.C.R.
Rev. 12-4-53, Date Nails Deleted, D.L.V.
Rev. 2-1-54, Delineation by State Forces, J.C.R.

Typical Installation on Curves

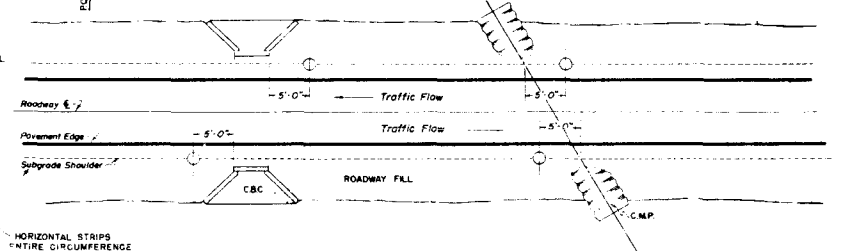
INSTALLATION of guard posts on curves shall be in accordance with details shown below. Spacing shall be in conformity with Section 157, Table 1 of "Manual on Uniform Traffic Control Devices for Streets and Highways", 1 Aug. 1948 by the Public Roads Administration.



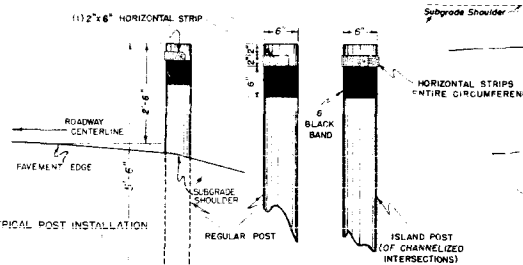
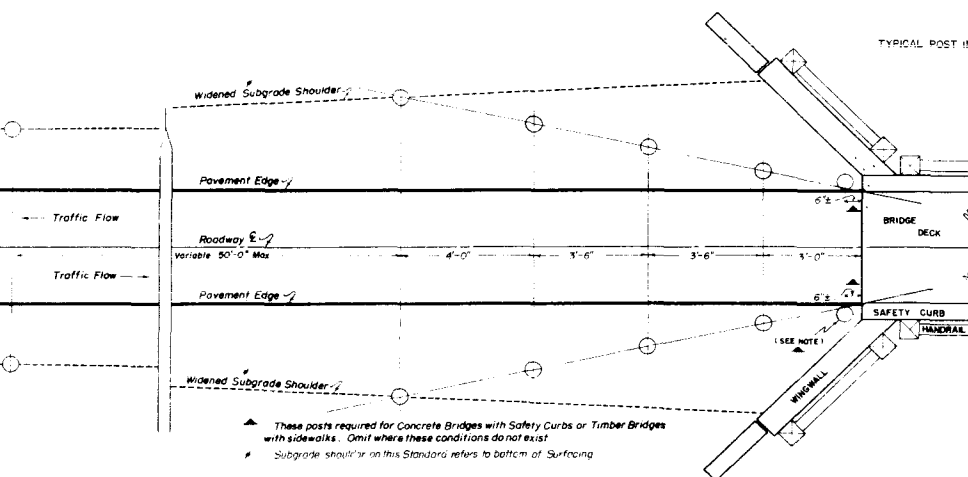
Method of Placement on Tangents



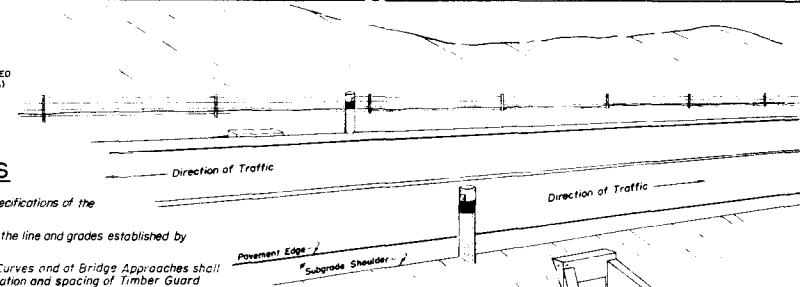
Plan View Showing Placement at Isolated Minor Structures



Typical Installation at Bridge Approaches



Pictorial View Showing Location at Isolated Minor Structures



(Work By State Forces)
INSTALLATION DETAILS OF REFLECTORIZED STRIPS

GENERAL NOTES

(Work By Contractor)

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

All posts shall be set and tamped in, plumb and firm, to the line and grades established by the Engineer.

INSTALLATION of Timber Guard Posts on Tangents, Curves and at Bridge Approaches shall be in conformity with details on this sheet. The number, location and spacing of Timber Guard Posts is shown on plans.

(Work By State Forces)

Reflective delineators shall be furnished and installed by State Forces after the Contractor has finished his operations.

Installation of reflective delineators shall be in accordance with the following: Wrap Around Reflective Sheeting Strips shall be installed horizontally one (1) sheet on all posts. Island posts shall have Wrap Around Reflective Sheeting Strips placed horizontally to cover entire circumference of Post.

On Divided Highways and Islands, Reflective Sheeting Strips shall be placed in a manner to obtain maximum visibility for the primary direction of travel. In all instances tests shall be made to insure the maximum effectiveness of reflective delineators.

All Traffic Islands shall be marked with Island Posts as indicated hereon.

These posts required for Concrete Bridges with Safety Curbs or Timber Bridges with sidewalks. Omit where these conditions do not exist.
Subgrade shoulder on this Standard refers to bottom of Surfacing.

COLORADO
DEPARTMENT OF HIGHWAYS

STANDARD
TIMBER GUARD POSTS

Designed by Made by	Approved by <i>C. Sullivan</i> Engineer, Survey & Plans
Checked by	Date: <i>March 25, 1953</i>

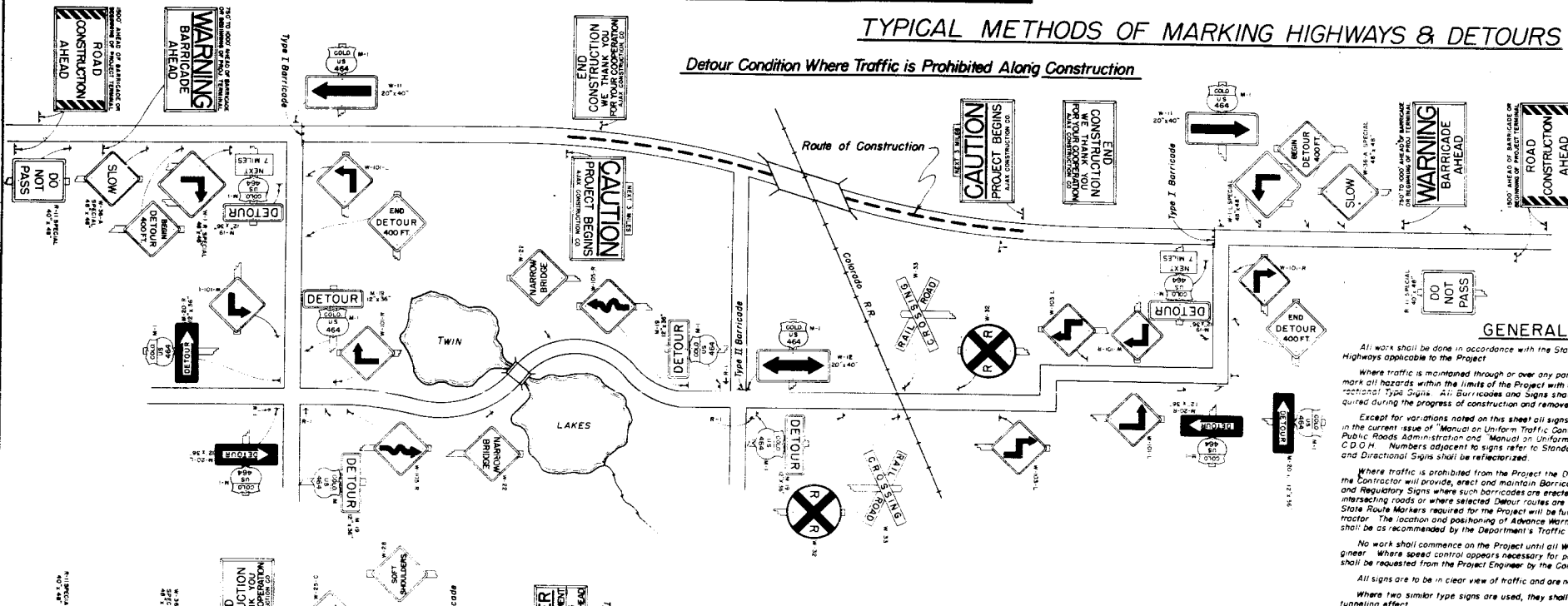
STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

STANDARD M-29-B
(SHEET 1 OF 2 SHEETS)

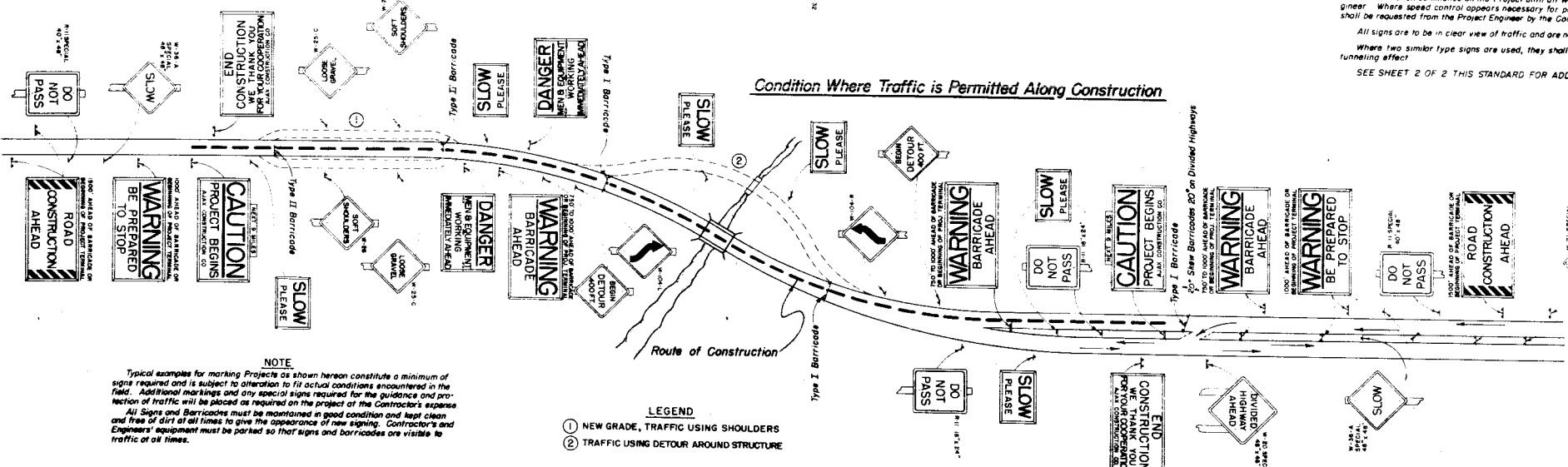
FED. ROAD DISTRICT	NO. 111	SHEET NO.	31	TOTAL SHEETS	31
COLO.	RD-2(4)				

TYPICAL METHODS OF MARKING HIGHWAYS & DETOURS

Detour Condition Where Traffic is Prohibited Along Construction



Condition Where Traffic is Permitted Along Construction



GENERAL NOTES

- All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways 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 well maintained Barricades, Warning Signs and Directional Signs. All Barricades and Signs shall be moved, added to, changed or removed as required during the progress of construction and removed entirely when project is completed.
- Except for variations noted on this sheet all signs will be in conformity with the specification outlined in the current issue of "Manual on Uniform Traffic Control Devices for Streets & Highways" by the U.S. Public Roads Administration and "Manual on Uniform Traffic Control Devices for Streets and Highways," C.D.O.H. Numbers adjacent to signs refer to Standards in the manual. Standard Warning, Regulatory and Directional Signs shall be retrofitted.
- Where traffic is prohibited from the Project the Detour will be marked by the Department except that the Contractor will provide, erect and maintain Barricades complete with approved Directional Arrows and Regulatory Signs where such barricades are erected and maintained at the ends of the Project and intersecting roads or where selected Detour routes are in advance of the actual project terminal. U.S. or State Route Markers required for the Project will be furnished by the Department and installed by the Contractor. The location and positioning of Advance Warning Signs, Barricades and Speed Control Signs shall be as recommended by the Department's Traffic Operations Section.
- No work shall commence on the Project until all Warning Signs are in place and approved by the Engineer. Where speed control appears necessary for protection of the travelling public, such speed control shall be requested from the Project Engineer by the Contractor.
- All signs are to be in clear view of traffic and are not to be obstructed by equipment, weeds or otherwise.
- Where two similar type signs are used, they shall be placed approximately 75 feet apart to avoid a tunneling effect.
- SEE SHEET 2 OF 2 THIS STANDARD FOR ADDITIONAL NOTES AND DETAILS.

NOTE
Typical examples for marking Projects as shown hereon constitute a minimum of signs required and is subject to alteration to fit actual conditions encountered in the field. Additional markings and any special signs required for the guidance and protection of traffic will be placed as required on the project at the Contractor's expense. All Signs and Barricades must be maintained in good condition and kept clean and free of dirt at all times to give the appearance of new signing. Contractor's and Engineer's equipment must be parked so that signs and barricades are visible to traffic at all times.

- LEGEND**
- ① NEW GRADE, TRAFFIC USING SHOULDERS
 - ② TRAFFIC USING DETOUR AROUND STRUCTURE

COLORADO DEPARTMENT OF HIGHWAYS

Standard Roadway Construction Traffic Signs

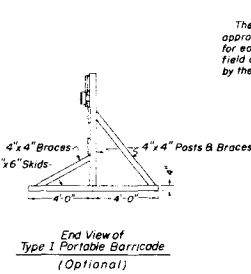
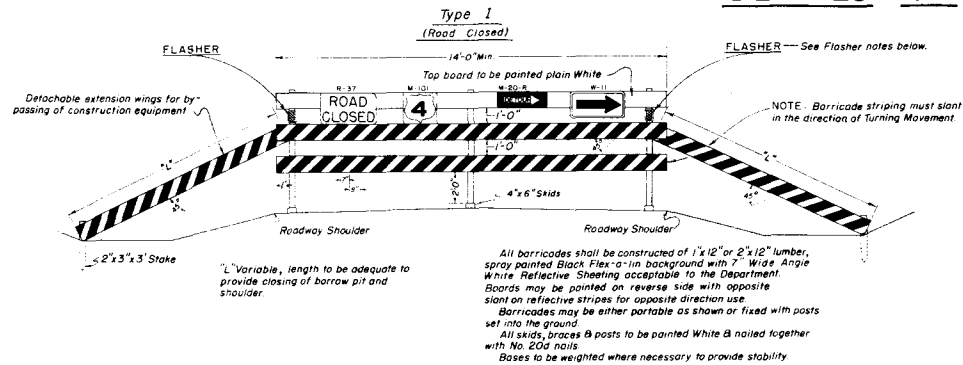
Designed by JCR Approved by JCR
Made by JCR Engineer, Survey & Plans
Checked by Date: July 22, 1955

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

STANDARD M-29-B
(SHEET 2 OF 2 SHEETS)

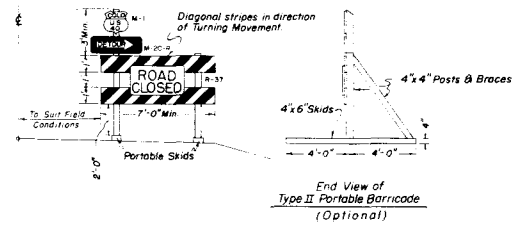
FED. ROAD DISTRICT **111** SHEET NO. **32** TOTAL SHEETS **32**
 DIV. **8** COLO. **002-240**
 Rev. 7-10-56, Reflective Materials, L.N.P.

DETAILS OF BARRICADES



NOTE
 The various types & combinations of approved signs for barricades required for each project will be governed by field conditions and subject to approval by the Engineer.

Type II (Beg. of Detour, By-Pass Areas within Proj., Extreme Hazards, etc.)



NOTE: Alternate materials or other reflecting elements on Construction Traffic Signs and Barricades will be permitted only after approval of such material by the Department.

DETAILS OF CONSTRUCTION SIGNS



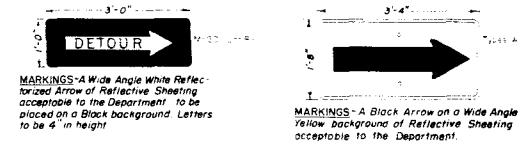
S I G N M A R K I N G S

Construction Signs "A" through and including "G" shall be made of 3/4" plywood or other material after approval by the Department, and as per details above. Signs shall be reflectorized with reflective sheeting or other reflective materials of types approved by the Department.
CONSTRUCTION SIGN "A" - Wide Angle White background with painted Black lettering. Barricade stripes of 4" Wide Angle White placed over Black painted vertical stripes spaced as shown above. This sign is the First advance warning sign and shall be placed 1500 feet ahead of barricade or beginning of project terminal and on both sides of the travelled way in all cases.
CONSTRUCTION SIGN "B" - The word "WARNING" and 1" underline shall be painted white on a 23" strip of Wide Angle Flat Top Red. Balance of lettering painted Black on a 22" strip of Wide Angle White. This sign is the Second advance warning sign and shall be placed 1000 feet ahead of barricade or beginning of project terminal and on both sides of the travelled way on divided highways and singly on two-lane highways.
CONSTRUCTION SIGN "C" - The word "WARNING" and 1" underline shall be painted white on a 23" strip of Wide Angle Flat Top Red. Balance of lettering painted Black on a 22" strip of Wide Angle White. This sign is the Third advance warning sign in cases where barricades are used and shall be placed 750 to 1000 feet ahead of barricade or beginning of project terminal and on both sides of the travelled way on divided highways and singly on two-lane highways.
REVERSE SIDES OF SIGNS "A", "B" and "C" - The word "SLOW" shall be painted Black and superimposed over a yellow miniature W-36-A background panel. Balance of lettering shall be painted Black on a white background.
CONSTRUCTION SIGN "D" - The word "CAUTION" and 1/2" underline shall be painted white on a 24 1/2" strip of Wide Angle Flat Top Red. Balance of lettering painted Black on a 20 1/2" strip of Wide Angle White. This sign will be provided with a detachable 1" material board mounted on back of sign with 2" x 4" bolts. This board shall be painted White with Black lettering (Indicate to the nearest Mile). This sign shall be placed to mark the Beginning of the Project. To be placed singly and may be placed opposite barricade if desirable.
CONSTRUCTION SIGN "E" - The word "DANGER" and 1" underline shall be painted white on a 17 1/2" strip of Wide Angle Flat Top Red. Balance of lettering painted Black on a

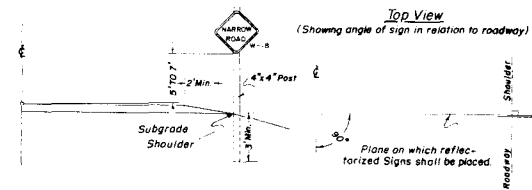
12 1/2" strip of Wide Angle White. The sign is of the hinged and fold type to facilitate the closing down of sign when the need is not prevalent. This sign shall be placed 500 feet ahead of the situation on hand.
CONSTRUCTION SIGN "F" - The words "END CONSTRUCTION" and "CONTRACTORS NAME" shall be painted Black on stripes 22" and 6 1/2" respectively of Wide Angle White. Balance of lettering shall be painted white on a 16 1/2" strip of Wide Angle Flat Top Red. This sign shall be placed to mark the Ending of the Project. To be placed singly and may be placed opposite barricade if desirable.
CONSTRUCTION SIGN "G" - The words "SLOW" and "PLEASE" shall be painted Black on a background of Wide Angle Yellow. This sign shall be used frequently within the limits of the Project.
 All of the preceding signs shall be fastened to 2" x 4" posts set 4 feet in the ground with a minimum of 3-1/4" nailing strips on the back. Bottom of sign to be not less than 36" above ground.
FLAGMAN WARNING SIGN "H" - This sign shall be made of Plastic or other light-weight material, painted Red background with White lettering on the "STOP" side and painted Green background with White lettering on the "GO" side. Handle to be grooved on one side to indicate reading of sign to flagman. This sign will be used whenever flagmen are necessary. Sign to be reflectorized if used to stop traffic at night.
DETOUR WARNING SIGN "I" - To be of 3/8" (Minimum) plywood or No 16 (Minimum) gauge metal with Black painted letters on a Wide Angle Yellow background.
CONSTRUCTION SIGN "J" - 3/4" x 9" metal slides to be placed between "NEXT" - MILES, spaced so as to accommodate appropriate size numerals. Required numerals to be furnished by the Department and to be installed by the Contractor. Numerals calculated to the nearest Mile.
 All material shall be sound and durable. Barricades, signs, symbols and lettering conforming to styles noted herein will be of good workmanship and well maintained. Unworn lettering will not be accepted.
 Flares and Torches shall be of the oil burning type approved by the Department and

shall be placed 3 feet to 5 feet ahead of the object to be illuminated. Particular care shall be taken to protect all signs and barricades from smoke and smudges arising from the use thereof. Flashers used on Type I Barricade shall be of the Battery or Electrical Type. The Illuminating element in a flashing amber beacon or signal shall be flashed continuously at a rate between 50 or 50 flashes per minute which will be clearly distinguishable to traffic. The duration in which Flashers will be left in operation will be governed by field conditions and subject to approval by the Engineer.
 Alternate methods of processing signs or the substitution of pressure sensitive symbols or other reflecting elements for painted symbols will be permitted only after approval of such methods or materials by the Department.
 The Department shall furnish and install the following as required outside the limits of the Project:
 1. ROAD CONSTRUCTION AHEAD Minimum 4
 2. WARNING BE PREPARED TO STOP Minimum 2
 3. WARNING BARRICADE AHEAD As Required
 4. Standard Warning & Directional Signs As Required
 The Contractor shall furnish and install the following as required within the limits of the Project:
 1. All Barricades As Required
 2. CAUTION PROJECT BEGINS Minimum 2
 3. DANGER MEN & EQUIPMENT WORKING IMMEDIATELY AHEAD As Required
 4. END CONSTRUCTION WE THANK YOU FOR YOUR COOPERATION Minimum 2
 5. SLOW PLEASE As Required
 6. Standard Warning & Directional Signs As Required
 7. Approved Directional Arrows & Regulatory Signs for Barricades As Required
 8. Torches and Flares as follows: Type I Barricade Minimum 3
 Type II Barricade Minimum 1
 9. Flashers - Type I Barricade 2 Required

Details of Reflectorized Arrows



Position of Signs Relative to Roadbed & Hazards



NOTE:
 Warning Signs to be made of 3/8" (1mm) plywood or No 16 Gauge (Min.) metal and shall be reflectorized. Location to be governed by field conditions. Exact location to be stated by the Engineer. In all cases warning signs are to be placed well in advance of hazard, the distance depending on topography, and existing approach speeds.

COLORADO DEPARTMENT OF HIGHWAYS
 Standard Roadway Construction Traffic Signs
 Designed by J.C.R. Approved by J.C.R.
 Made by J.C.R. Engineer, Surveys & Plans
 Checked by J.C.R. Date: July 22, 1955

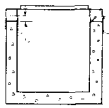
STANDARD M-46-A

REV. PC 9-18-52 Added 18" pipe.
 REV. CUM 10-5-52 Added Grating Note
 REV. 3-10-54 Rev. Quantities & 12" cut steps
 REV. B.I. 10-2-56 Added Front Note

REVISIONS

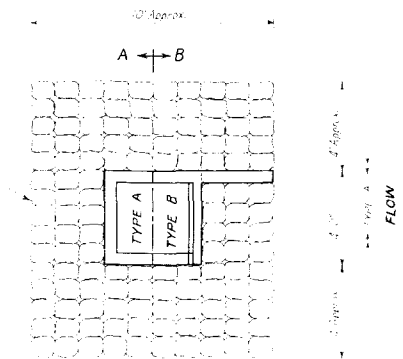
FED. ROAD DISTRICT **1-N** SHEET NO. **33**
 COLORADO **002-2(40)**

TYPE A FOR USE AT BOTTOM OF VERTICAL CURVE



SECT. "A-A"

Materials used in the construction of inlet gratings shall meet with the requirements of Item 48, Structural steel in the Standard Specifications.



LAYOUT OF INLET IN MEDIAN DITCH

TYPE B

FOR USE AT TOP OF VERTICAL CURVE



SECT. "B-B"

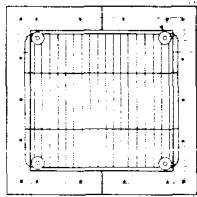
QUANTITIES FOR ONE INLET

H	CLASS "A" CONCRETE		REINFORCING STEEL	
	CU YDS		O LBS	
	TYPE A	TYPE B	TYPE A	TYPE B
3'-6"	1.05	1.36	98	127
4'-0"	1.18	1.49	104	133
4'-6"	1.31	1.62	115	143
5'-0"	1.44	1.75	135	163
5'-6"	1.56	1.88	141	169
6'-0"	1.69	2.01	158	185
6'-6"	1.82	2.13	168	195
7'-0"	1.95	2.26	184	212
7'-6"	2.08	2.39	190	218
8'-0"	2.21	2.52	211	238
8'-6"	2.34	2.65	217	244
9'-0"	2.47	2.78	233	261
9'-6"	2.60	2.91	243	270
10'-0"	2.73	3.04	259	287
10'-6"	2.86	3.17	265	293
11'-0"	2.99	3.30	286	313
11'-6"	3.12	3.43	292	320
12'-0"	3.25	3.56	308	336

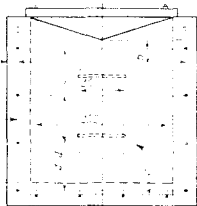
0.1 includes 1 1/2% for overrun

Volume occupied by pipes to be deducted for any quantity of concrete

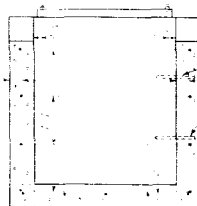
SIZE	C.M.P.	CONCRETE PIPE
18"	0.03	0.05
24"	0.06	0.09
30"	0.09	0.14
36"	0.13	0.20



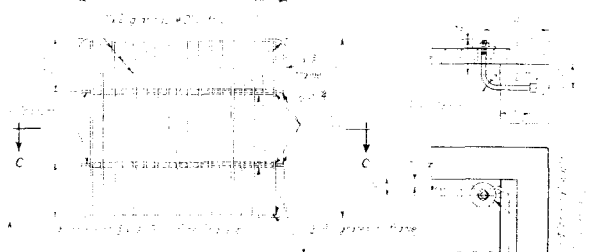
PLAN



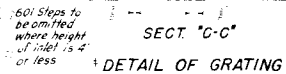
FRONT ELEV.



SECT. "D-D"



DETAIL OF FASTENER
 4" HOOD FOR EACH INLET

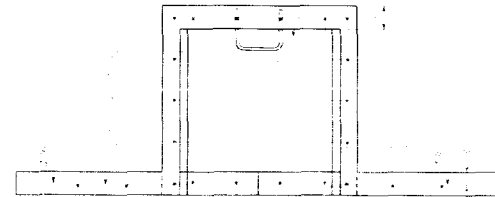


DETAIL OF GRATING

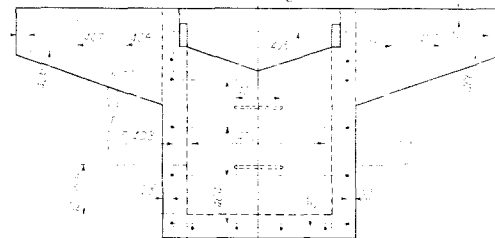
60# Steps to be omitted where height of inlet is 4' or less

TYPE	NO. OF STEPS	NO. OF BARS	NO. OF BARS
18"	1	1	1
24"	2	2	2
30"	3	3	3
36"	4	4	4

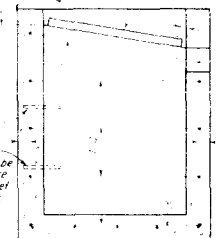
Note: Acceptable equivalent steel may be substituted after approval by the Engineer



PLAN



FRONT ELEV.



SECT. "E-E"

GENERAL NOTES

- Work shall be done according to the Standard Specifications of the State Department of Highways and the Department of Transportation.
- Concrete shall be Class A concrete as specified.
- Reinforcing steel shall be as specified.
- Grating shall be as specified.
- Fasteners shall be as specified.
- Grating shall be galvanized steel.
- Grating shall be galvanized steel.
- Grating shall be galvanized steel.
- Grating shall be galvanized steel.
- Grating shall be galvanized steel.

BENDING DIAGRAMS (SAME FOR TYPES A & B) All dimensions cut to cut of bars

STEPS	NO. OF STEPS	NO. OF BARS	NO. OF BARS
18"	1	1	1
24"	2	2	2
30"	3	3	3
36"	4	4	4

BAR LIST FOR H=4'-0"

MARK	NO.	MISC.	TYPE A				TYPE B				
			M	N	O	L	M	N	O	L	
30	2	3/8	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"
402	2	3/8	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"
403	5	3/8	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"
404	2	3/8	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"
30E	1	3/8	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"
40E	1	3/8	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"
40F	1	3/8	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"
40G	1	3/8	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"
60I	1	3/8	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"

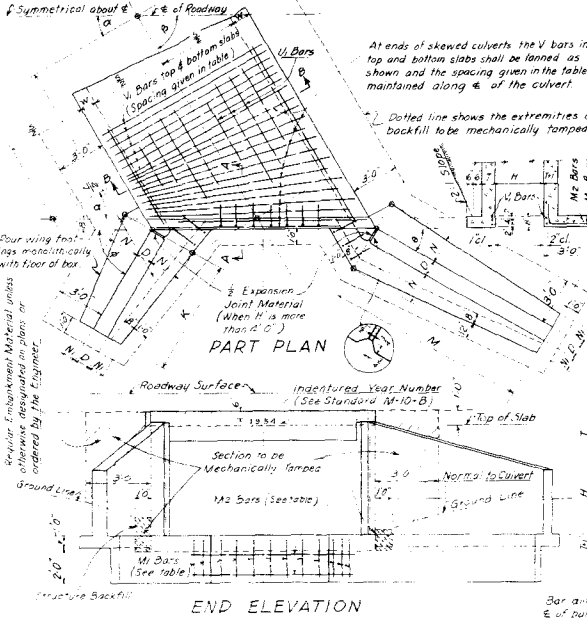
No reinforcing bars to be 1/2"

COLORADO DEPARTMENT OF HIGHWAYS
TYPES A & B CONCRETE INLETS FOR MEDIAN DITCH
 18", 24", 30" and 36" CULVERTS
 Designed by M. W. Bridge Engineer
 Made by T. C. P. Date: March 1, 1957

SINGLE CONCRETE BOX CULVERT

Dimensions & Quantities (See Standard M-50-AW for Wings)

Height of Culvert	Type	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size
15	0	24	2.0	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
30	0	34	3.0	0	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
20	0	44	4.0	0	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
16	0	54	5.0	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
20	0	58	5.0	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
40	0	64	6.0	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
26	0	68	6.0	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
16	0	74	7.0	0	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
19	0	78	7.0	0	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
25	0	70	7.0	0	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
0	0	84	8.0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
16	0	88	8.0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
20	0	80	8.0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	0	94	9.0	0	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
12	0	14	14.0	0	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
20	0	26	26.0	0	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13



Bar List for Culvert & Headwalls (See Standard M-50-AW for Wings)

Mark	Size	No. Req'd	Type	Length
V ₁	See table I	2L	I	5'-2" x 6'
W ₁	See table I	4	I	5'-2" x 6'
U ₁	See table I	L	I	L+1'-0"
M ₁	See table II	3'-6"	I	3'-6"
M ₂	See table II	4	I	5'-2" x 6'

Possible Combinations (Span & Height)

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

SECTION A-A

SECTION B-B

STANDARD M-50-A

Use in conjunction with Standard M-50-AW

Bar List for Culvert & Headwalls (See Standard M-50-AW for Wings)

Mark	Size	No. Req'd	Type	Length
V ₁	See table I	2L	I	5'-2" x 6'
W ₁	See table I	4	I	5'-2" x 6'
U ₁	See table I	L	I	L+1'-0"
M ₁	See table II	3'-6"	I	3'-6"
M ₂	See table II	4	I	5'-2" x 6'

Possible Combinations (Span & Height)

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

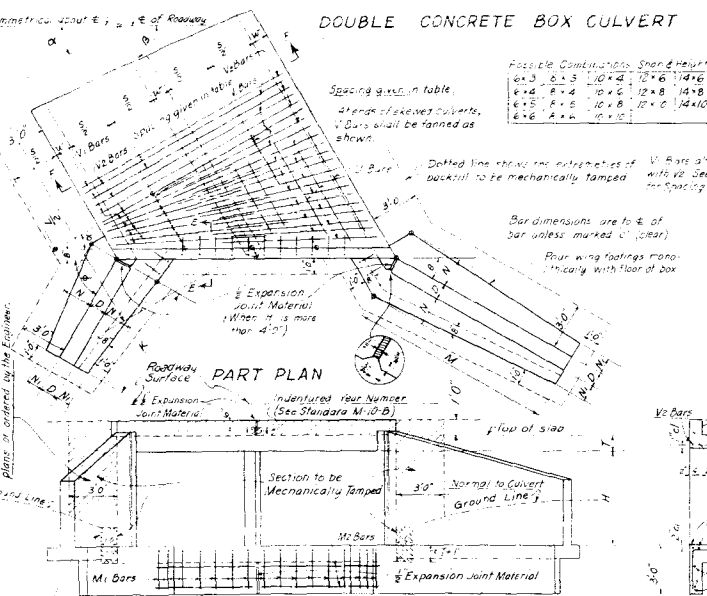
SECTION A-A

SECTION B-B

SECTION E-E

Dimensions & Quantities (See Standard M-50-AW for Wings)

Height of Culvert	Type	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size	Span	Height	Slab Wall	Clear Size
10	0	14	14.0	0	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
15	0	26	26.0	0	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
20	0	38	38.0	0	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
25	0	50	50.0	0	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
30	0	62	62.0	0	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
35	0	74	74.0	0	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
40	0	86	86.0	0	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
45	0	98	98.0	0	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
50	0	110	110.0	0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
55	0	122	122.0	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
60	0	134	134.0	0	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
65	0	146	146.0	0	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
70	0	158	158.0	0	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
75	0	170	170.0	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
80	0	182	182.0	0	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
85	0	194	194.0	0	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
90	0	206	206.0	0	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
95	0	218	218.0	0	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
100	0	230	230.0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30



DOUBLE CONCRETE BOX CULVERT

Bar List for Culvert and Two Headwalls (See Standard M-50-AW for Wings)

Mark	Size	Number	Type	Total Length
V ₁	See table I	2L	I	5'-2" x 6'
W ₁	See table I	4	I	5'-2" x 6'
U ₁	See table I	L	I	L+1'-0"
M ₁	See table II	3'-6"	I	3'-6"
M ₂	See table II	4	I	5'-2" x 6'

Possible Combinations (Span & Height)

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

SECTION A-A

SECTION B-B

SECTION E-E

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

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

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

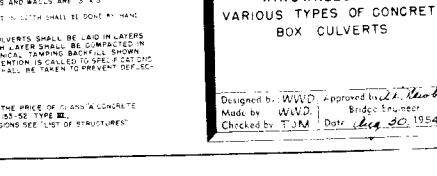
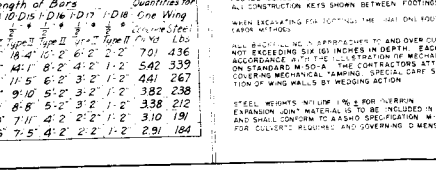
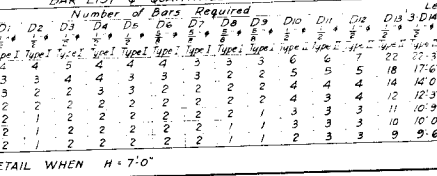
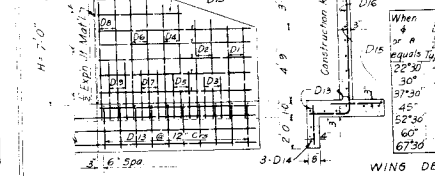
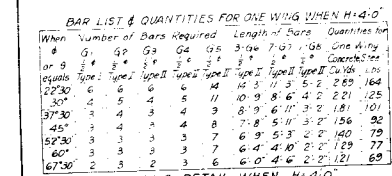
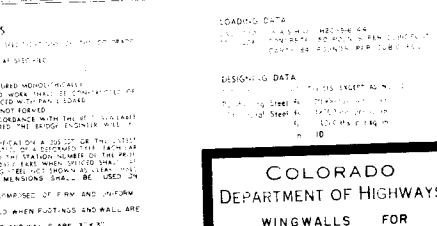
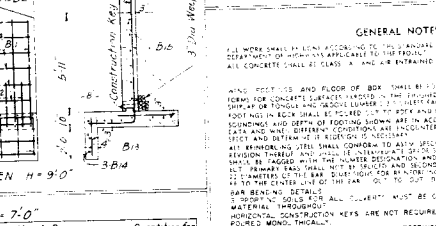
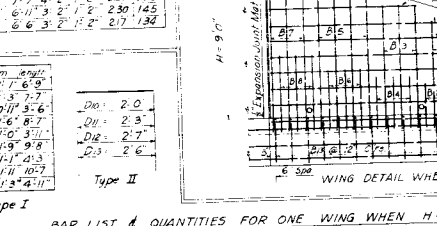
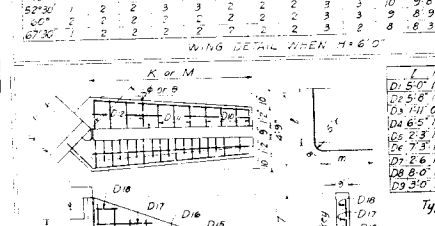
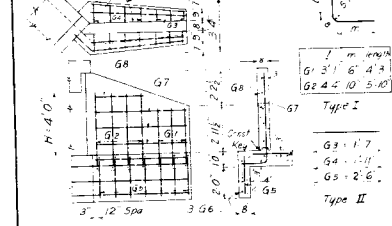
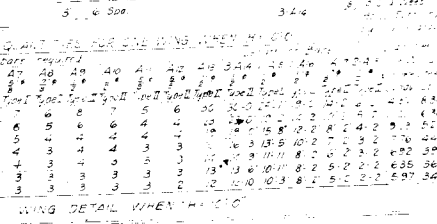
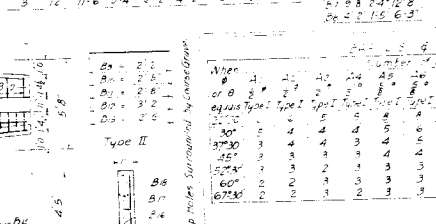
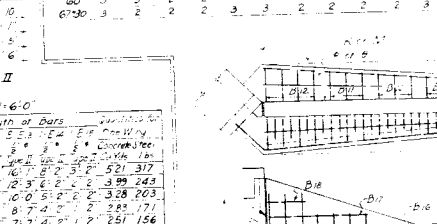
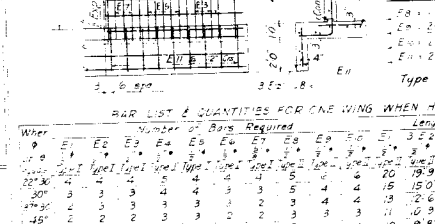
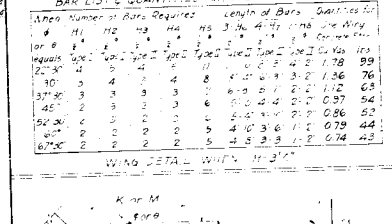
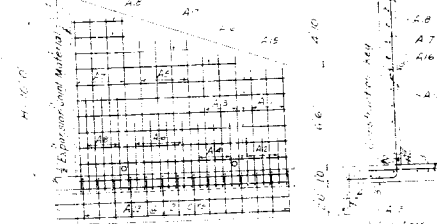
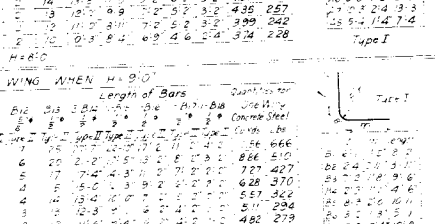
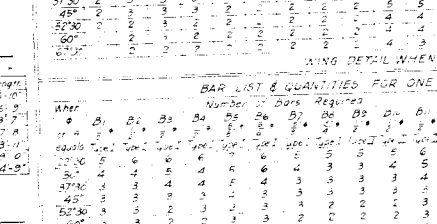
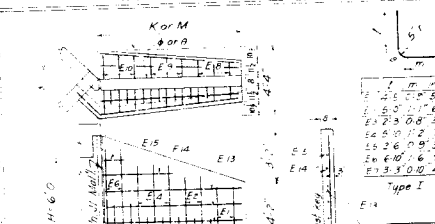
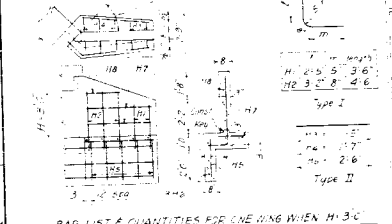
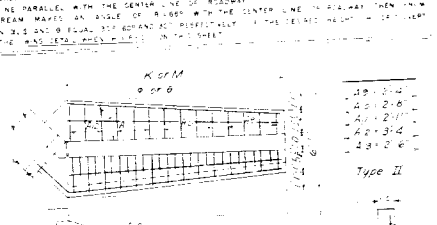
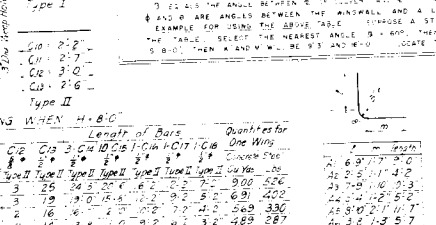
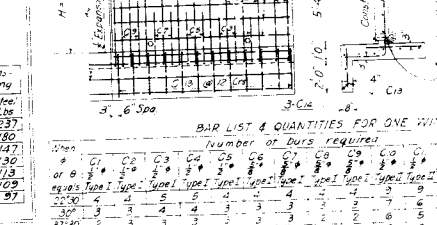
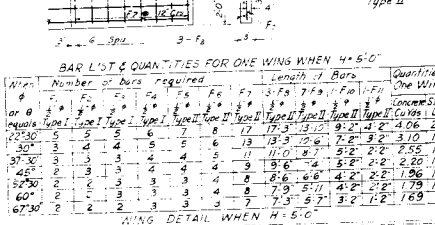
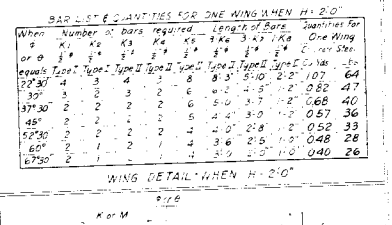
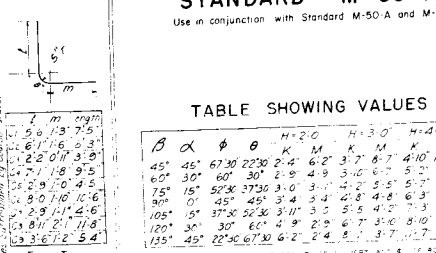
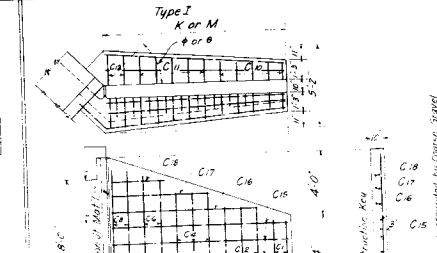
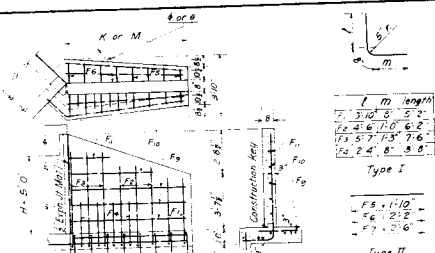
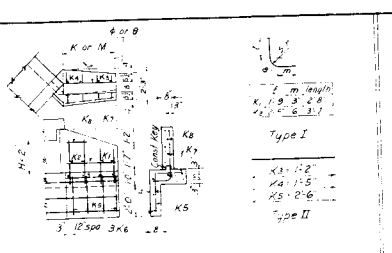
STANDARD M-50-AW

Use in conjunction with Standard M-50-A and M-55-A

Form with fields for DISTRICT (100), COUNTY (202-240), and SHEET (35). Includes project name 'Rev 5-2-56, Deleted Finish Note, J.C.R.'

TABLE SHOWING VALUES OF K AND M WHEN B AND H ARE GIVEN

Table with columns for angle (beta), width (B), height (H), and values for K and M. Includes a note: 'B IS THE ANGLE BETWEEN THE CENTER LINE OF ROADWAY AND A LINE PARALLEL WITH THE CENTER LINE OF ROADWAY...'



GENERAL NOTES

1. ALL WORK SHALL BE ACCORDING TO THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION... 2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS... 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS...

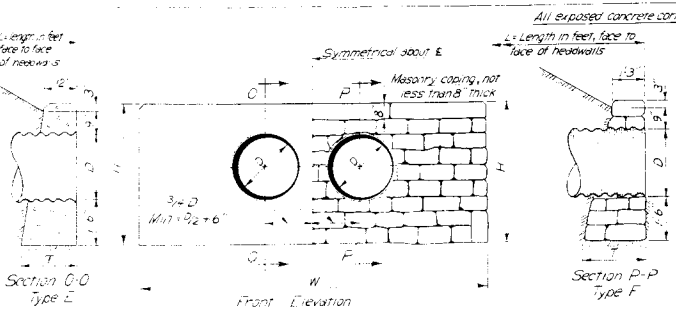
COLORADO DEPARTMENT OF HIGHWAYS WINGWALLS FOR VARIOUS TYPES OF CONCRETE BOX CULVERTS

Designed by: W.W.D. Approved by: J.C.R. Made by: W.W.D. Checked by: T.J.M. Date: Aug. 30, 1954

STANDARD M-102-H

FEDERAL ROAD DIVISION NO.	DISTRICT	PROJECT NO.	SHEET NO.
9	COLORADO	11-002-2(40)	36

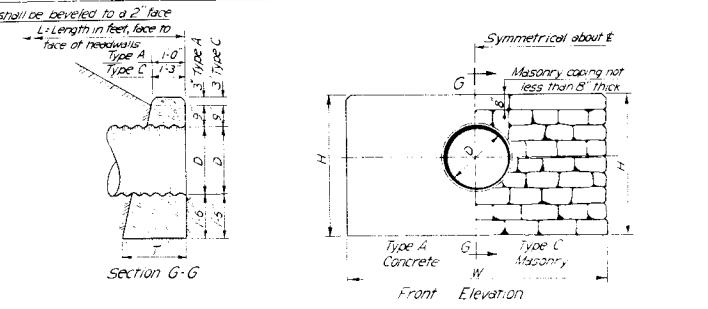
Rev 5-2-56, Deleted Finish Note, JCR



STANDARD HEADWALLS FOR DOUBLE CORRUGATED METAL PIPE CULVERTS

Table of Dimensions and Quantities

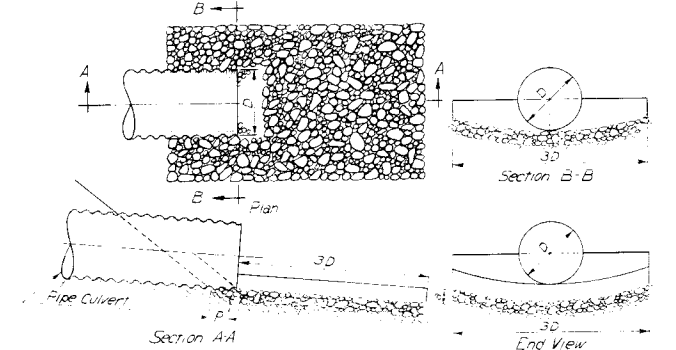
D Diam.	T	Type B Concrete in Two Headwalls		Both Types		Type F Cement Rubble Masonry in Two Headwalls		D Diam.
		W	H	Corrugated Metal Pipe	Corrugated Metal Pipe	Corrugated Metal Pipe	Corrugated Metal Pipe	
5	0	2.4	10.105	7.0	0	3.0	10.105	5
8	0	3.0	10.0	8.0	0	3.8	10.0	8
12	0	4.0	10.0	10.0	0	5.0	10.0	12
18	0	5.0	10.0	14.0	0	7.5	10.0	18
24	0	6.0	10.0	18.0	0	10.0	10.0	24
30	0	7.0	10.0	22.0	0	12.0	10.0	30
36	0	8.0	10.0	26.0	0	14.0	10.0	36
42	0	9.0	10.0	30.0	0	16.0	10.0	42
48	0	10.0	10.0	34.0	0	18.0	10.0	48



STANDARD HEADWALLS FOR SINGLE CORRUGATED METAL PIPE CULVERTS

Table of Dimensions and Quantities

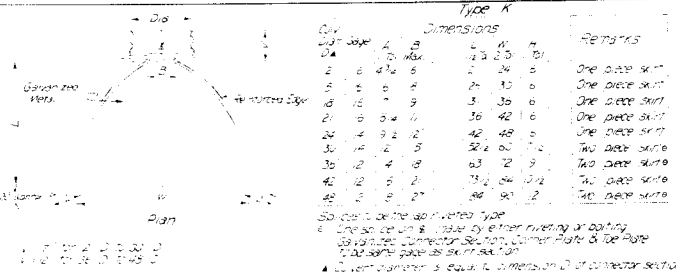
D Diam.	T	Type B Concrete in Two Headwalls		Both Types		Type C Cement Rubble Masonry in Two Headwalls		D Diam.
		W	H	Corrugated Metal Pipe	Corrugated Metal Pipe	Corrugated Metal Pipe	Corrugated Metal Pipe	
5	0	2.4	10.105	7.0	0	3.0	10.105	5
8	0	3.0	10.0	8.0	0	3.8	10.0	8
12	0	4.0	10.0	10.0	0	5.0	10.0	12
18	0	5.0	10.0	14.0	0	7.5	10.0	18
24	0	6.0	10.0	18.0	0	10.0	10.0	24
30	0	7.0	10.0	22.0	0	12.0	10.0	30
36	0	8.0	10.0	26.0	0	14.0	10.0	36
42	0	9.0	10.0	30.0	0	16.0	10.0	42
48	0	10.0	10.0	34.0	0	18.0	10.0	48



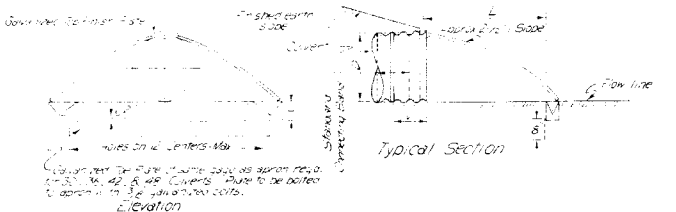
STANDARD GROUTED RUBBLE APRON FOR PIPE CULVERT

Square Yards Grouted Rubble Slope and Ditch Facing One Foot Thick

Fill	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
1	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0



STANDARD METAL APRONS FOR CORRUGATED METAL PIPE CULVERTS TYPE K



STANDARD METAL APRONS FOR CORRUGATED METAL PIPE ARCH CULVERTS TYPE L

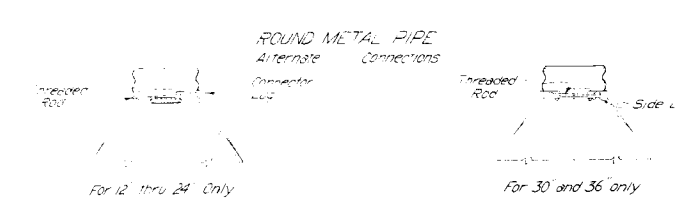
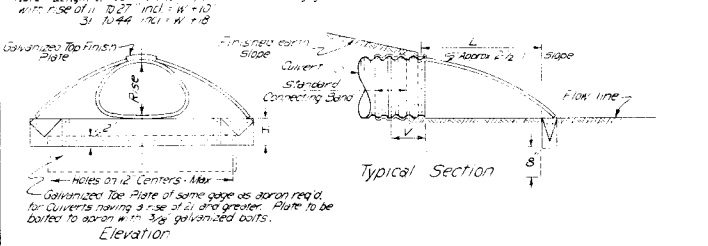


Table of Dimensions and Quantities for Type L

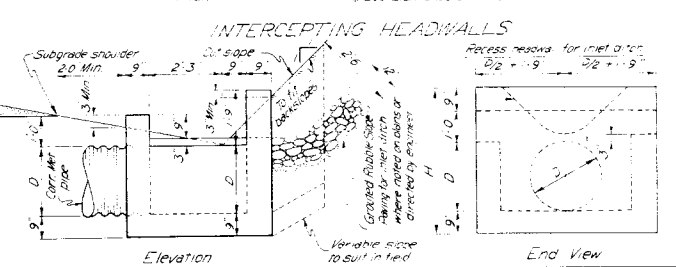
Span	Type L Dimensions		Remarks
	Span	Height	
15	15	19	One piece skirt
20	22	23	One piece skirt
24	29	31	One piece skirt
30	36	38	One piece skirt
36	43	47	Two piece skirt
42	50	54	Two piece skirt
48	58	63	Two piece skirt
54	65	70	Two piece skirt
60	72	77	Three piece skirt



STANDARD METAL APRONS FOR CORRUGATED METAL PIPE ARCH CULVERTS TYPE L

Quantities of Concrete or Cement Rubble Masonry

D Diam.	T	Type B Concrete in Two Headwalls		Both Types		Type C Cement Rubble Masonry in Two Headwalls		D Diam.
		W	H	Corrugated Metal Pipe	Corrugated Metal Pipe	Corrugated Metal Pipe	Corrugated Metal Pipe	
5	0	2.4	10.105	7.0	0	3.0	10.105	5
8	0	3.0	10.0	8.0	0	3.8	10.0	8
12	0	4.0	10.0	10.0	0	5.0	10.0	12
18	0	5.0	10.0	14.0	0	7.5	10.0	18
24	0	6.0	10.0	18.0	0	10.0	10.0	24
30	0	7.0	10.0	22.0	0	12.0	10.0	30
36	0	8.0	10.0	26.0	0	14.0	10.0	36
42	0	9.0	10.0	30.0	0	16.0	10.0	42
48	0	10.0	10.0	34.0	0	18.0	10.0	48



General Notes for All Structures

All work shall be done according to the standard specifications of the Colorado Department of Highways applicable to the Project.

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

All walls shall have forms on both sides.

The minimum fill over top of culverts shall be 1'-0".

When culvert is skewed, headwalls shall be placed parallel to E of roadway.

Minimum grade of pipe shall be 1/8".

For size and location of culverts see plan sheets for project.

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

Mechanical Tamping, as provided under Item No. 16 of the specifications, shall be applied over such areas as shown on the plans or as ordered by the Engineer.

COLORADO
DEPARTMENT OF HIGHWAYS

**STANDARD HEADWALLS
INTERCEPTING HEADWALLS
GALVANIZED METAL APRONS
GROUTED RUBBLE APRONS
FOR CORR. METAL PIPE CULVERT**

Designed by P. H. ...
Approved by ...
Made by ...
Checked by ...

STANDARD TYPES *of* DITCHES *and* CONSTRUCTION METHODS

STANDARD M-107-C

REV. NO.	DISTRICT	DATE	TOTAL SHEETS
5	COLO	11/20/2-2(4)	57

DETAILS *for* CONTOUR INTERCEPTING DITCHES

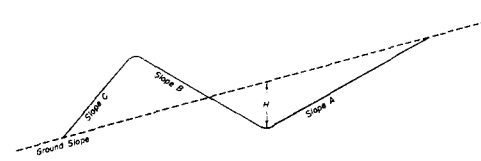
Table of Slopes and Yardages

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
	2:1	3:1	2:1	15"	15
				18"	22
				21"	30
	2:1	2:1	1-1/2:1	15"	14
				18"	20
				21"	27
	1-1/2:1	4:1	1-1/2:1	15"	13
				18"	19
				21"	25
	1-1/2:1	3:1	1-1/2:1	15"	12
				18"	18
				21"	25
4:1	2:1	4:1	15"	12	
			18"	17	
			21"	23	
4:1	2:1	4:1	15"	10	
			18"	15	
			21"	20	
4:1	1-1/2:1	2:1	15"	10	
			18"	14	
			21"	19	
4:1	2:1	4:1	15"	17	
			18"	25	
			21"	34	
4:1	3:1	2:1	15"	17	
			18"	24	
			21"	32	
4:1	2:1	4:1	15"	15	
			18"	22	
			21"	30	
4:1	1-1/2:1	2:1	15"	15	
			18"	21	
			21"	29	
4:1	1-1/2:1	4:1	15"	13	
			18"	18	
			21"	25	
4:1	3:1	2:1	15"	12	
			18"	17	
			21"	23	
4:1	2:1	4:1	15"	11	
			18"	16	
			21"	21	
4:1	1-1/2:1	2:1	15"	10	
			18"	14	
			21"	20	
4:1	2:1	4:1	15"	22	
			18"	31	
			21"	43	
4:1	2:1	4:1	15"	21	
			18"	30	
			21"	41	
4:1	1-1/2:1	2:1	15"	20	
			18"	29	
			21"	40	
4:1	1-1/2:1	3:1	15"	13	
			18"	19	
			21"	26	
4:1	2:1	4:1	15"	12	
			18"	17	
			21"	23	
4:1	1-1/2:1	2:1	15"	20	
			18"	29	
			21"	40	
4:1	1-1/2:1	1-1/2:1	15"	13	
			18"	19	
			21"	26	
4:1	2:1	4:1	15"	12	
			18"	17	
			21"	23	
4:1	1-1/2:1	2:1	15"	20	
			18"	29	
			21"	40	
4:1	1-1/2:1	1-1/2:1	15"	9	
			18"	13	
			21"	17	
4:1	1-1/2:1	1-1/2:1	15"	8	
			18"	12	
			21"	16	
4:1	1-1/2:1	1-1/2:1	15"	11	
			18"	16	
			21"	21	

Slopes are approximate and may be varied to suit conditions encountered during construction.

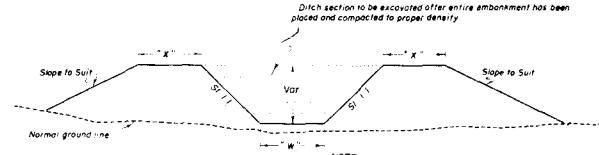
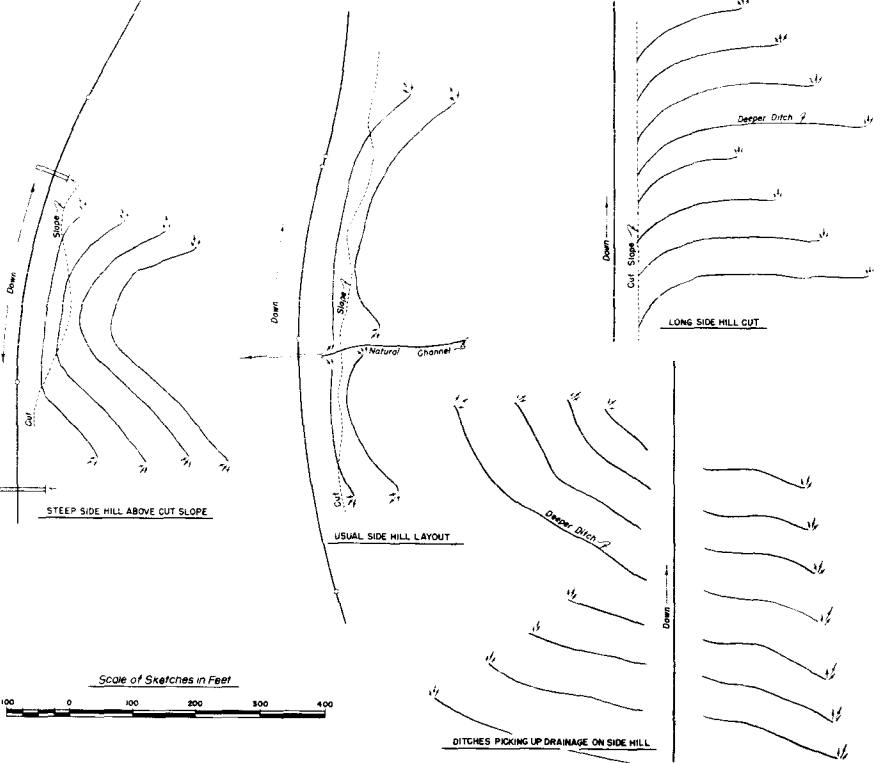
TYPICAL SECTIONS *for* DRAINAGE, IRRIGATION DITCHES *and* CHANNEL CHANGES

Typical Section for Contour Intercepting Ditches



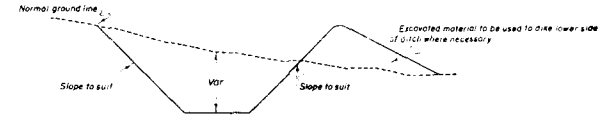
PURPOSE & USE OF THE TABLE
 The primary purpose of the information for Contour and Intercepting Ditches shown on this sheet is to serve as a guide in construction and to readily arrive at yardages of excavation involved.
 Foremost consideration in constructing these ditches is given first to the natural ground line slope confronted in construction, thence to the other values shown on the Typical Section.
 By properly arriving of 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



For Embankment Sections

(Generally for use in Irrigation Ditches & Channel Changes)



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.
- All 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 not 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 contour is, 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 1-1/2:1 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

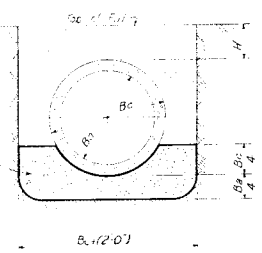
Designed by C.G.M. Made by C.G.M. Checked by [Signature]
 Approved by [Signature] Engineer, Survey & Plans
 Date: Aug. 14, 1950

STANDARD M-112-E

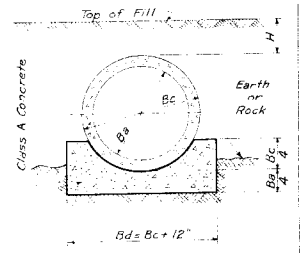
FED. ROAD DIST. NO.	DISTRICT	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	11107-244	38	

Rev by PC 7-1-52 Added 84" Pipe
Rev by RT 5-31 Backfill & Excavation

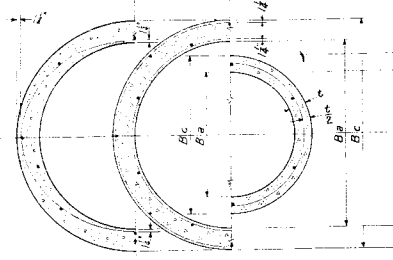
Class A Concrete



CONCRETE CRADLE BEDDING IN TRENCHES



CONCRETE CRADLE BEDDING IN FILLS



PIPE CROSS SECTIONS

Where two lines of steel are contemplated a single line placed elliptically may be used and the area of this shall be at least 50% of the total steel area required for two lines of reinforcement. Pipe with elliptical reinforcing shall have the words "Top" or "Bottom" clearly stenciled on the inside of the ends of the correct pipe to indicate the correct position when laid.

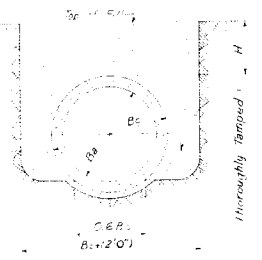
Not less than 3 ft. or more than 8 ft. in length

LONGITUDINAL SECTIONS

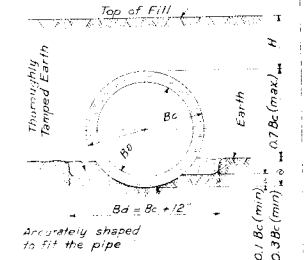
If machine made pipe is used a modified bell will be acceptable to the department.

CONCRETE COLLAR

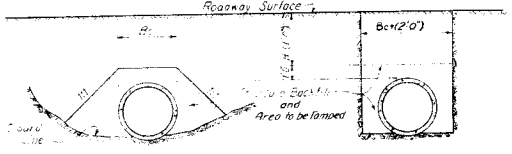
Where the flow line grade of the pipe is 10% or greater, all pipe shall be the bell and spigot type or shall be tongue and groove pipe with concrete collars as detailed above or a type approved in writing by the Engineer.



FIRST CLASS BEDDING IN TRENCHES

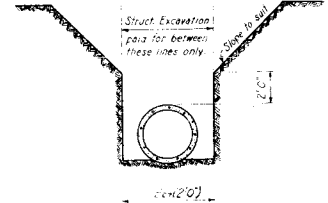


FIRST CLASS BEDDING IN FILLS

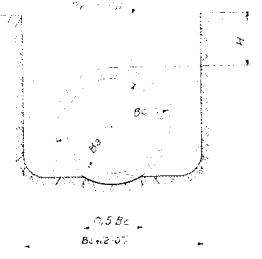


STRUCTURE BACKFILL AND MECHANICAL TAMPING DIAGRAM

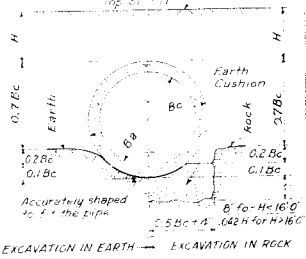
All material that is to be mechanically tamped shall be placed in horizontal layers not more than 6 inches in depth and tamped before the next layer is placed. Backfill for all types of bedding shall be brought up uniformly on each side of the pipe to maintain equal lateral pressures against the pipe. All structure backfill shall conform to the specifications for Class A Backfill.



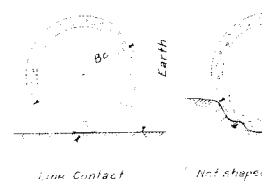
Where it is necessary to bed the pipe in a deep trench the contractor may, for his own convenience and at his own expense, slope the cut from a point 2'0" above the top of the pipe as shown above. Note: For Concrete Sewer Pipe Structural Excavation is not a separate pay item.



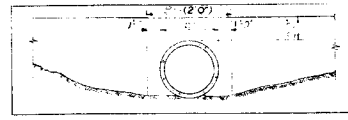
ORDINARY BEDDING IN TRENCHES



ORDINARY BEDDING IN FILLS



IMPERMISSIBLE BEDDINGS IN TRENCHES OR FILLS
THESE THREE TYPES SHALL NOT BE USED



If the desired fill height for pipe in a fill exceeds that given in the table, new embankment may be constructed to an elevation of two feet above the top of the pipe; a trench may then be excavated in the embankment and the pipe installed in accordance with a pipe in a trench. This work shall conform to the requirements for "Embankments" as shown in the specifications.

Diameter (Inches)	Bracing Method	Ultimate Load (Pounds)	Concrete Collar	Standard Strength Reinforced Concrete Collar		Extra Strength Reinforced Concrete Collar		H.C. Unit Conc. Sewer Pipe		Unreinforced Conc. Sewer Pipe	
				AA SHO #41-49	AA SHO #41-49	AA SHO #41-49	AA SHO #41-49	AA SHO #41-49	AA SHO #41-49		
12	16	2250	3500	29	No Limit	18	No Limit	15	25	13	20
15	19	2625	4065	22	No Limit	14	No Limit	12	19	12	17
18	23	3000	4500	28	No Limit	16	No Limit	15	22	14	21
24	30	3000	5000	22	44	14	18	12	18	12	17
30	37	3375	5750	21	25	14	15	12	17	11	16
36	44	4050	6600	54	21	17	14	14	14	12	14
42	51	4725	7350	47	22	17	14	13	12	12	12
48	58	5400	8000	46	22	17	14	13	12	12	12
54	65	5850	9000	36	22	17	14	12	12	12	12
60	72	6000	10000	32	21	15	14	11	12	11	12
66	79	6300	11000	28	20	15	13	10	11	10	11
72	86	6600	12000	24	20	14	13	10	11	10	11
84	100			24	20	13	13	10	11	10	11
24	30	2000	6000	29	No Limit	18	No Limit	15	25	13	20
30	37	5000	7500	30	No Limit	19	No Limit	16	26	14	21
36	44	6000	9000	30	40	19	22	16	27	15	22
42	51	7000	10500	31	40	20	22	17	28	16	23
48	58	8000	12000	31	37	20	23	17	29	16	24
54	65	9000	13500	32	36	20	23	17	30	16	25
60	72	9000	15000	29	28	19	20	16	31	16	26
66	79	9500	16500	128	26	19	18	16	32	16	27
72	86	5500	18000	22	20	18	17	15	33	16	28
84	100			46	20	22	18	16	34	16	29
12	16	1800	2700	24	No Limit	15	25	13	35	16	30
15	19	2000	3000	22	No Limit	14	19	12	36	16	31
18	23	2200	3300	21	48	13	16	11	37	16	32
21	26	2400	3600	20	28	13	14	11	38	16	33
24	30	2400	3600	18	18	12	12	10	39	16	34
27	33	2550	3800	18	17	11	11	10	40	16	35
30	37	2700	4050	17	15	11	10	9	41	16	36
33	40	2850	4300	17	14	11	10	9	42	16	37
36	44	3000	4500	22	16	11	11	8	43	16	38
42	51	3200	4800	19	16	10	10	7	44	16	39
48	58	3400	5100	17	15	9	10	7	45	16	40
54	65	3700	5550	17	15	9	10	7	46	16	41
60	72	4000	6000	16	15	9	10	6	47	16	42
66	79	4250	6350	16	15	9	10	6	48	16	43
72	86	4500	6750	15	15	8	10	6	49	16	44
4	5	7000		35		24	No Limit	20			
6	7	700		31		20	No Limit	17			
8	9	300		28		16	No Limit	15			
10	11	400		25		14	No Limit	13			
12	14	500		23		14	No Limit	12			
15	17	1750		21		13	No Limit	11			
18	21	2000		21		13	No Limit	11			
21	24	2200		20		12	No Limit	10			
24	28	2400		19		12	No Limit	10			

GENERAL NOTES

All work shall be done according to the Standard Specifications of the Colorado State Highway Department applicable to the project. Reinforced Concrete Culvert Pipe shall conform to A.A.S.H.O. M-11-45. Reinforced Concrete Sewer Pipe shall conform to A.A.S.H.O. M-87-49. Unreinforced Concrete Sewer Pipe shall conform to A.A.S.H.O. M-86-45. The type of Pipe Joint used and the field construction thereof to make the joint reasonably water-tight shall be submitted to the Department for approval. Unless otherwise noted the type of bedding shall be Ordinary Bedding. When the maximum fill height as noted hereon, for this type of bedding, is exceeded then that type of bedding which is indicated by the allowable fill height shall be used. All culverts shall have headwalls or flared end sections if and as shown on the plans in accordance with Department Standards. For size, type and location of pipe see plan sheets for project. Supporting soils shall be composed of firm and uniform material throughout the entire length of Culvert. The soil shall be accurately shaped to fit the Pipe in accordance with the bedding conditions shown. The pipe shall be laid with the Bell or Groove end placed upstream.

Minimum depth of fill over Concrete Pipe shall be two feet. * Note: External diameter of pipe shown in the table is approximate only, having been determined by using 3000 lbs per sq in. concrete. If greater strength concrete is used this diameter may be decreased accordingly.

COLORADO STATE HIGHWAY DEPARTMENT
REINFORCED CONCRETE CULVERT PIPE
 STD STRENGTH 12, 15, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 84
 EXTRA STRENGTH 24, 30, 36, 42, 48, 54, 60, 66, 72, 84
CONCRETE SEWER PIPE
 REINFORCED 12, 15, 18, 21, 24, 27, 30, 33, 36, 42, 48, 54, 60, 66, 72, 84
 UNREINFORCED 4, 6, 8, 10, 12, 15, 18, 21, 24
 Designed by WWD Approved by WWD
 Made by WWD Bridge Builders
 Checked by PC Date: May 17, 1952

STANDARD M-118-A

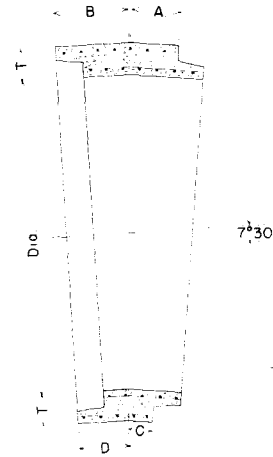
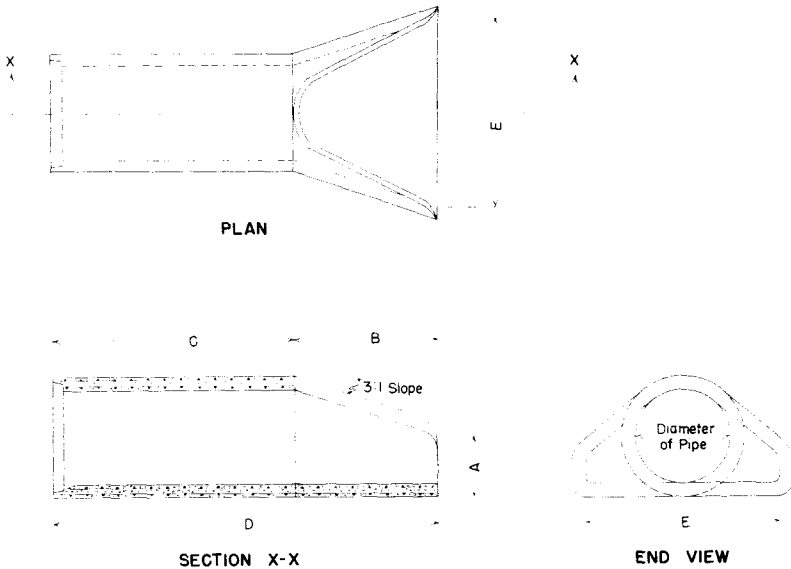
FED. ROAD DIV. NO.	DISTRICT	SHEET NO.	TOTAL SHEETS
9	COLO.	1102-2(40) 39	

Rev. Dimensions of End Sec. 10/18/49 = E. E. O.
 Rev. Dim. Line of End Sec. 12/15/49 C. J. W.
 Rev. Dim. of Seal 'B' added Note - 1/17/50 - E. E. O.

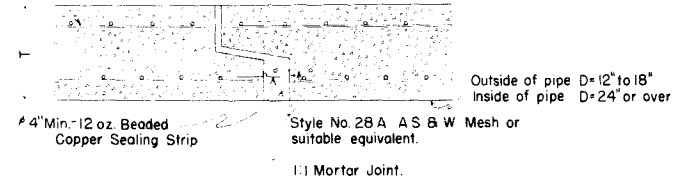
FLARED END SECTION FOR CONCRETE PIPE

7°30' ANGLE SECTION FOR CONCRETE PIPE

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

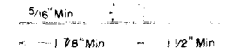


Reinforcing to conform with the requirements of the pipe with which this joint is used.



*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\"/>

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'-6"
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"
24"	9 ¹ / ₂ "	3'-7 ¹ / ₂ "	4'-6"	8'-1 ¹ / ₂ "	4'-0"
30"	1'-0"	4'-6"	3'-7 ³ / ₄ "	8'-1 ³ / ₄ "	5'-0"
36"	1'-3"	5'-3"	2'-10 ³ / ₄ "	8'-1 ³ / ₄ "	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-6"	6'-0"	2'-3"	8'-3"	7'-6"
60"	2'-6"	5'-0"	3'-3"	8'-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 ϵ
	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 / ₂ "	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 ⁷ / ₈ "	2"	5 ⁹ / ₁₆ "	10 ⁷ / ₁₆ "
42"	6"	9 ¹ / ₂ "	2 ⁹ / ₈ "	6 ¹ / ₈ "	12 ¹ / ₈ "
48"	7"	11"	3 ¹ / ₁₆ "	7 ¹ / ₁₆ "	14 ³ / ₁₆ "
54"	8 ¹ / ₈ "	12 ¹ / ₈ "	4"	8"	16 ¹ / ₈ "
60"	9 ¹ / ₈ "	14"	4 ⁷ / 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
 Made by J. M. K. Date 12/15/49
 Checked by R. S. M. Date January 14, 1949

FEDERAL ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	I.N. 002-2(40)	40	

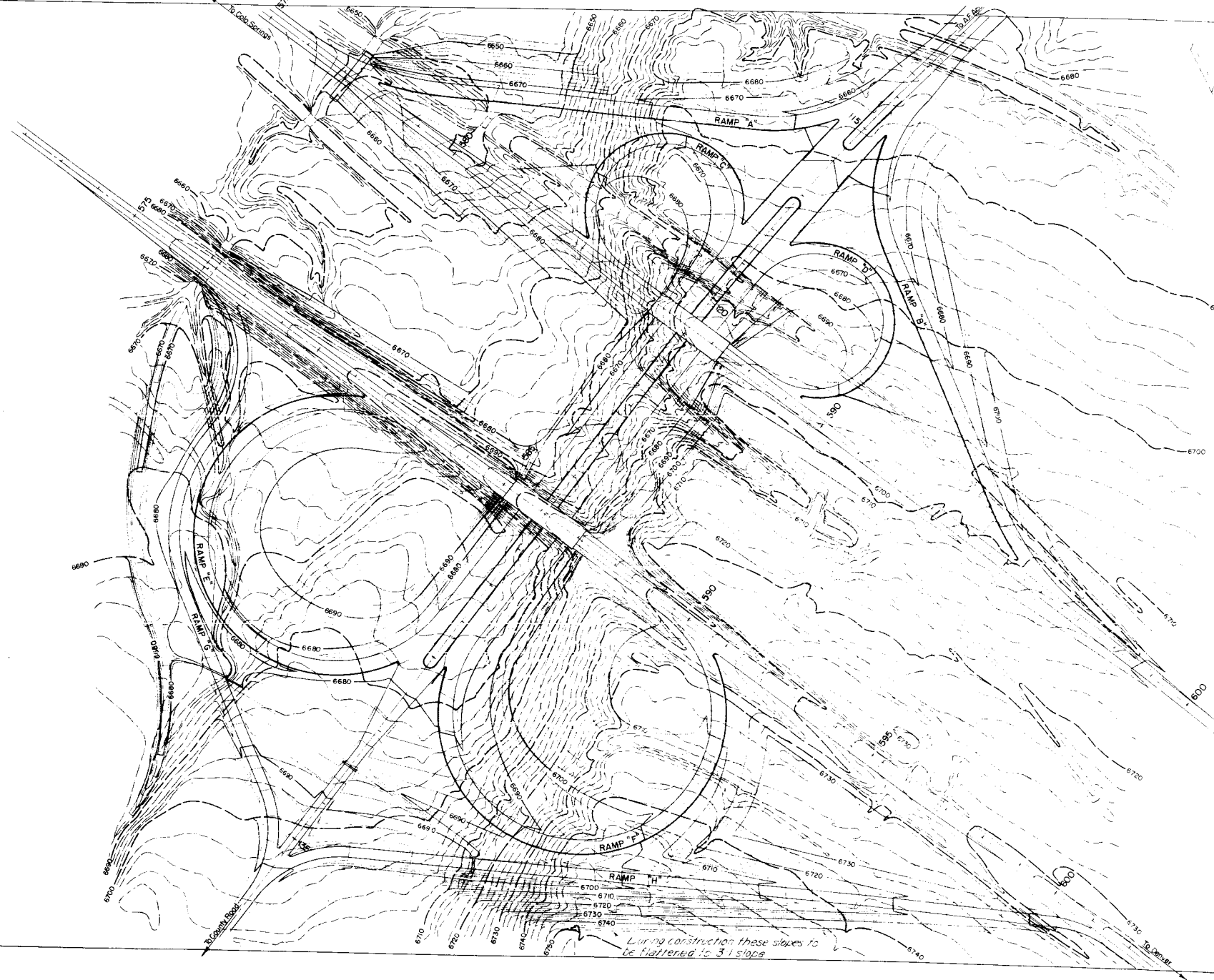
Rev. 12-14-56, S.J.M.

GRADING SHEET FOR INTERSECTION

LEGEND

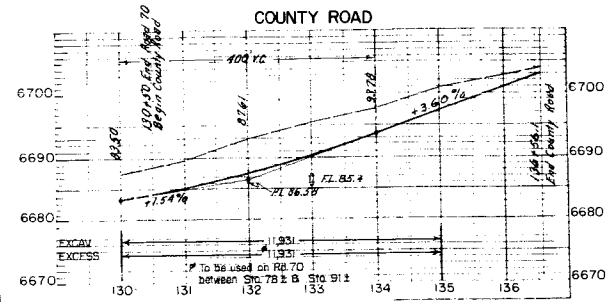
	EXISTING	NEW
CONCRETE CURB & GUTTER		
EDGE OF PAVEMENT		
CONTOURS		
OVERPASSES		
CULVERTS		
CENTERLINE OF ROADWAY		
CONCRETE BOX CULVERTS		

SCALE IN FEET

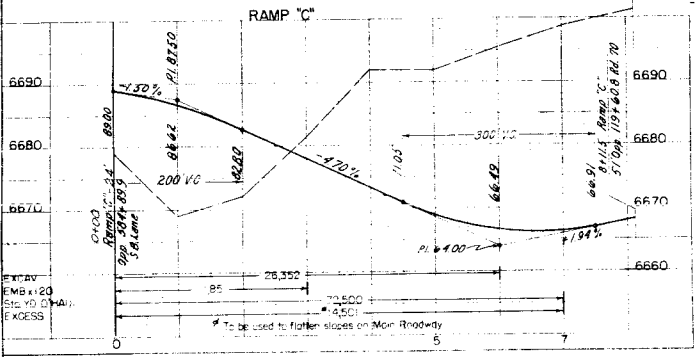




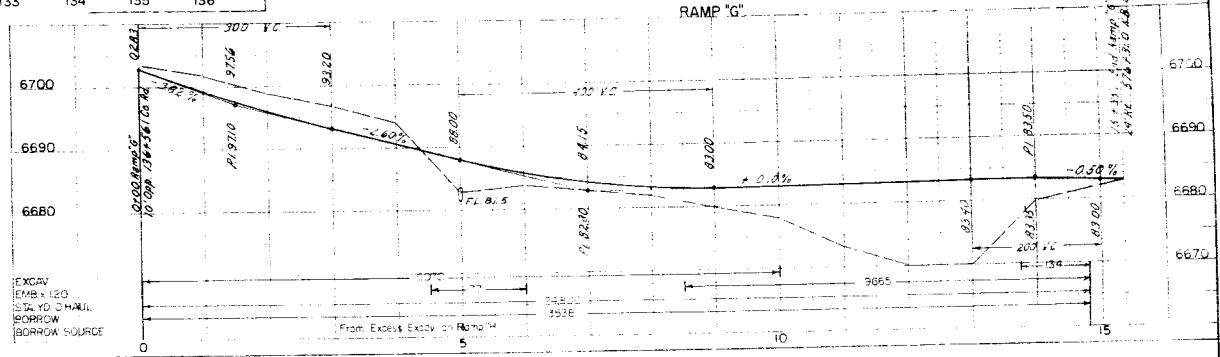
COUNTY ROAD



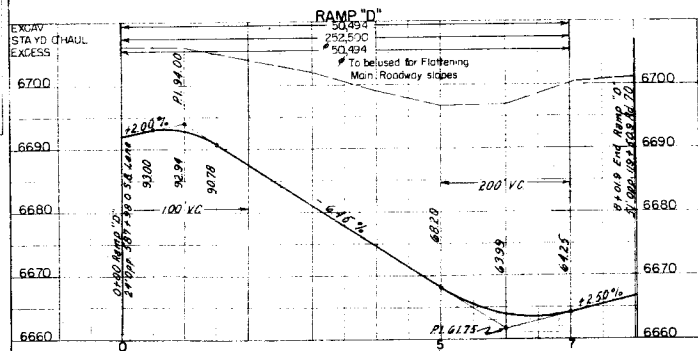
RAMP "C"



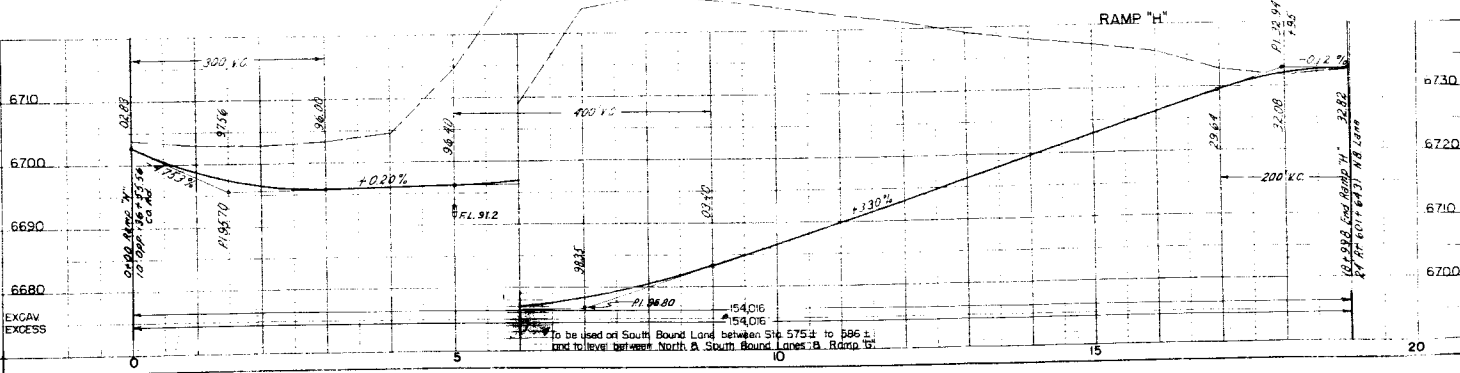
RAMP "G"



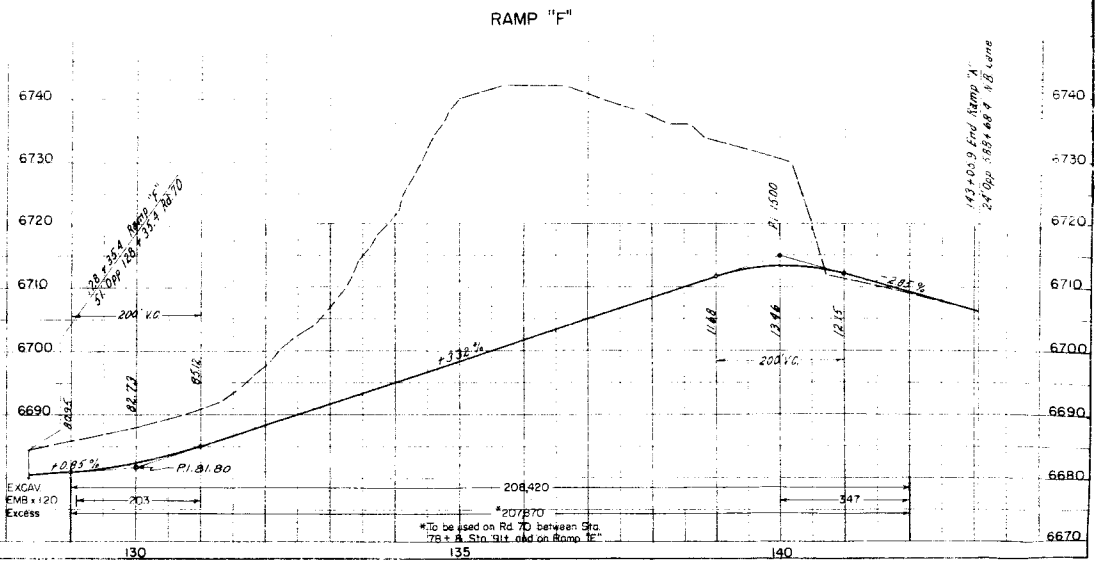
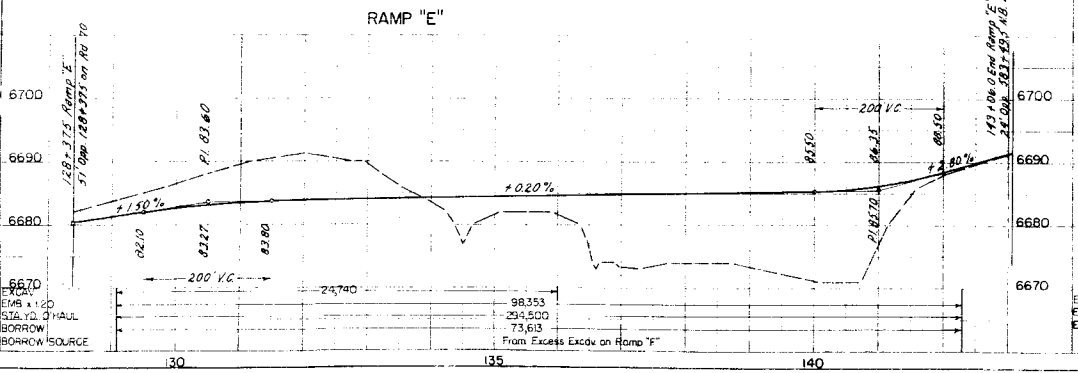
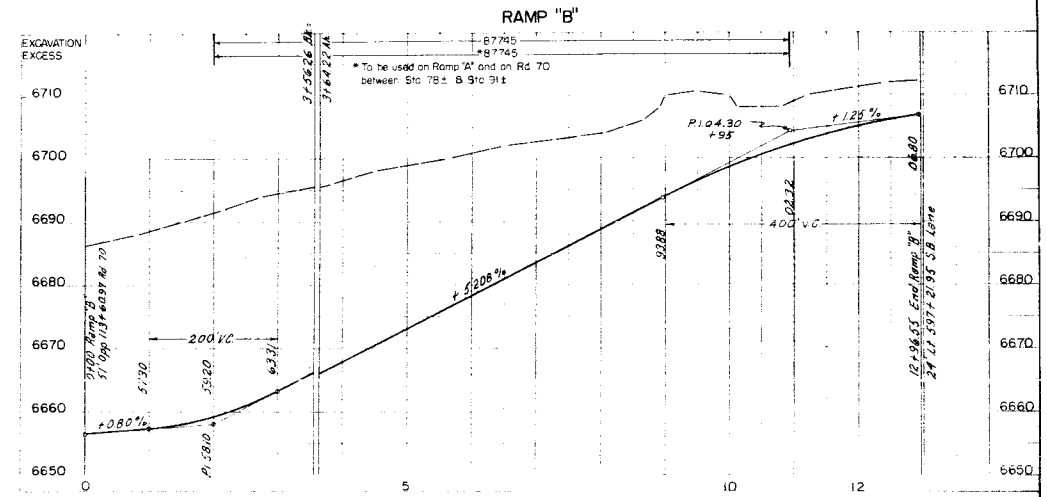
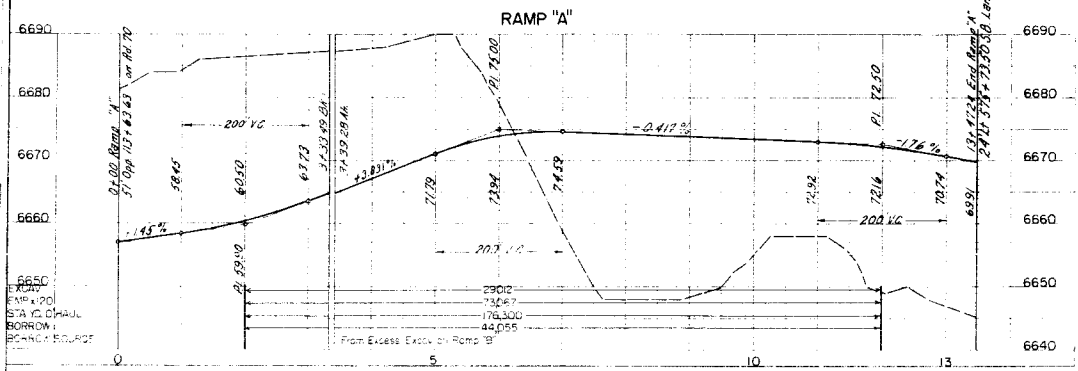
RAMP "D"



RAMP "H"



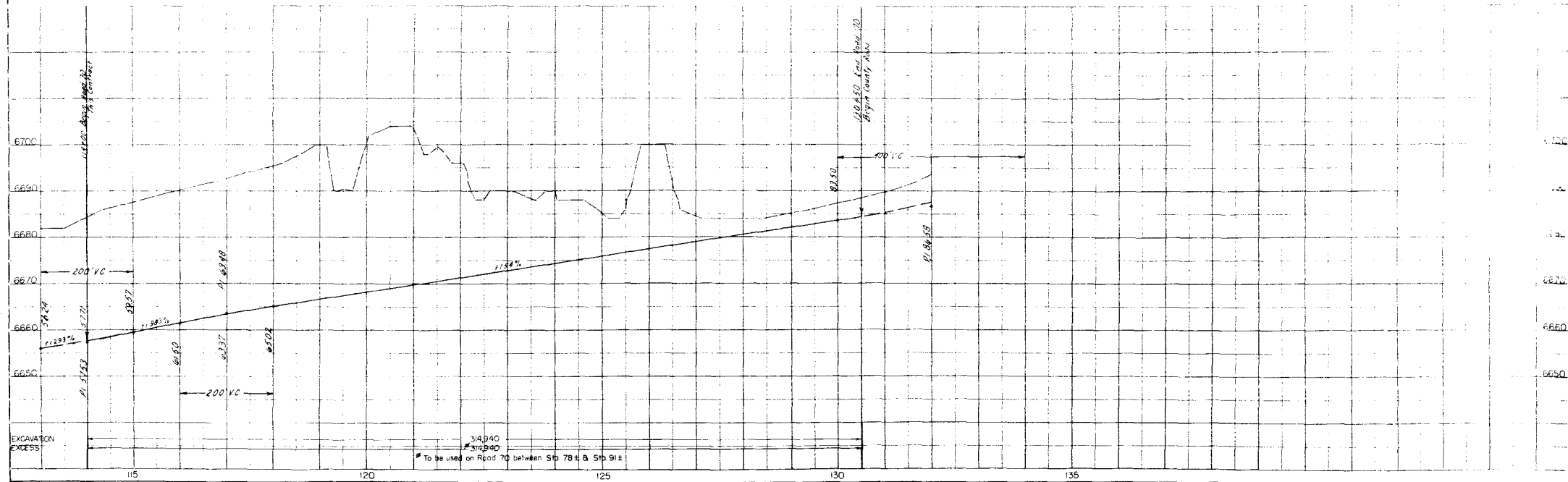
PROFILES RAMPS A, B, E & F



PROFILE ROAD 70

(For Alignment see sheets 46 & 49)

NO. 1002-2(40) 43



STORM SEWER LAYOUT

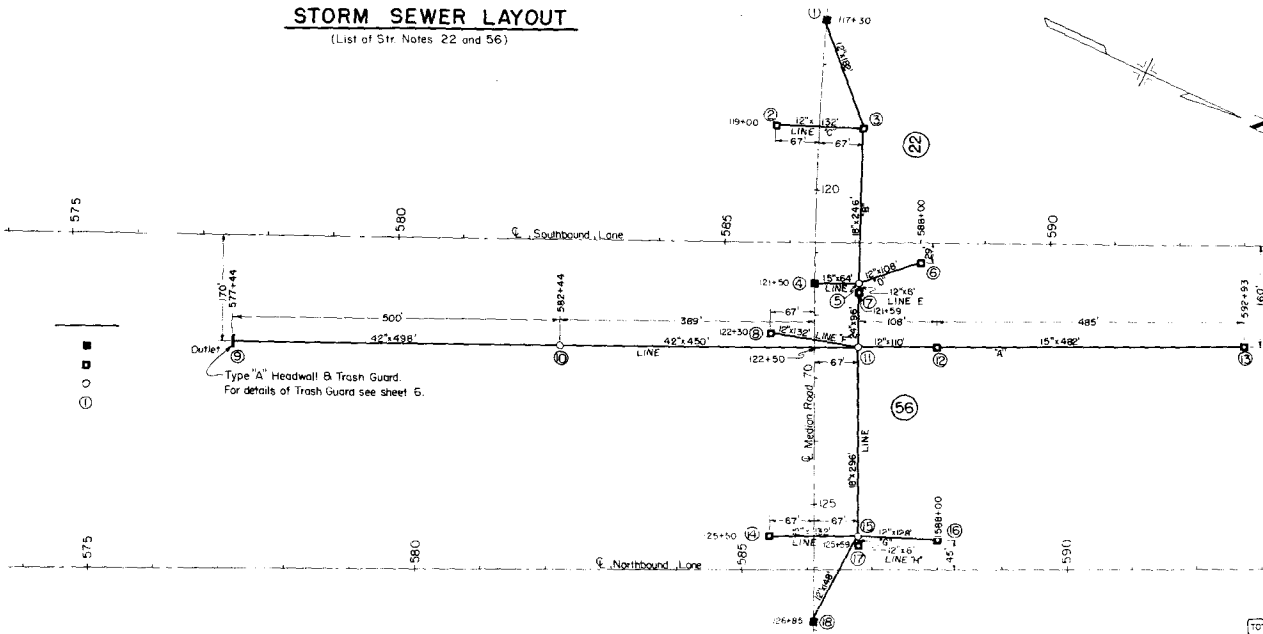
(List of Str. Notes 22 and 56)

REG. ROAD DIST.	DIST.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	000	I.N.002-2 (40)	44	

Rev. 12-14-56 Median Type Inlet

LEGEND

STORM SEWER
 MEDIAN INLETS (TYPE A)
 NO. 13 INLETS
 MANHOLES
 STRUCTURE DESIGNATIONS



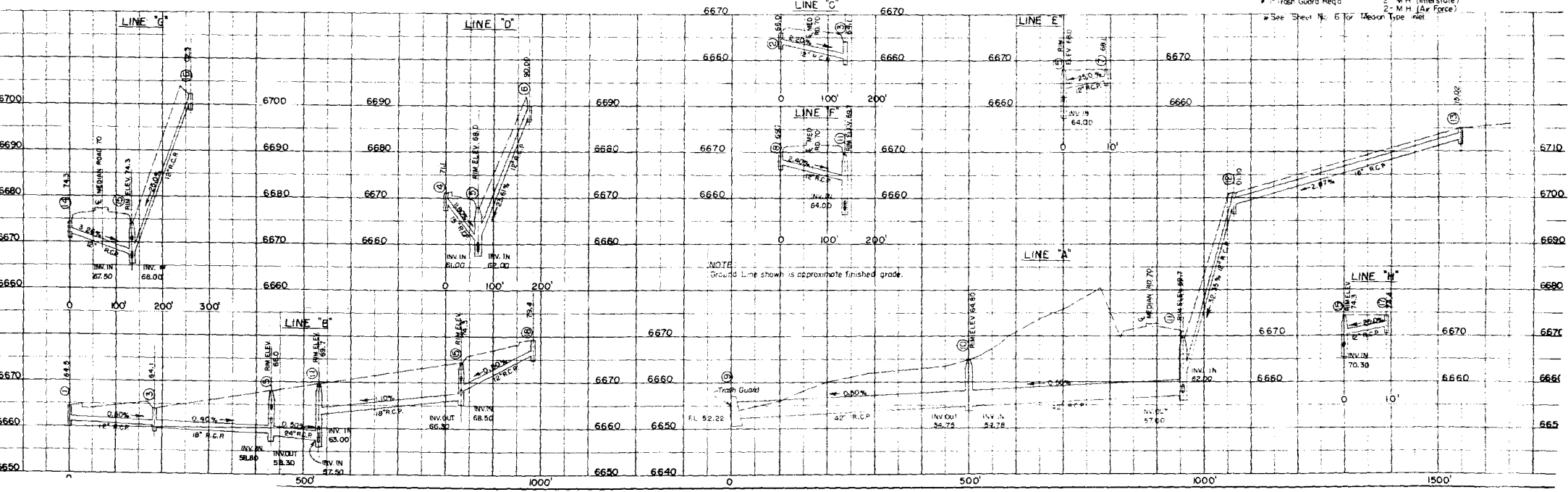
REINFORCED CONCRETE PIPE SEWER

LOCATION	LINEAR FEET			
	12'	15'	18'	24'
Interstate	108			498
				450
	110			
		482		
	128			
	182			
	132			
		246		
	64			
Air Force	6			96
	132			
		296		
	132			
	6			
	48			
TOTALS - INTERSTATE	346	482		948
TOTALS - AIR FORCE	738	64	542	96

INLET & MANHOLE REQUIREMENTS

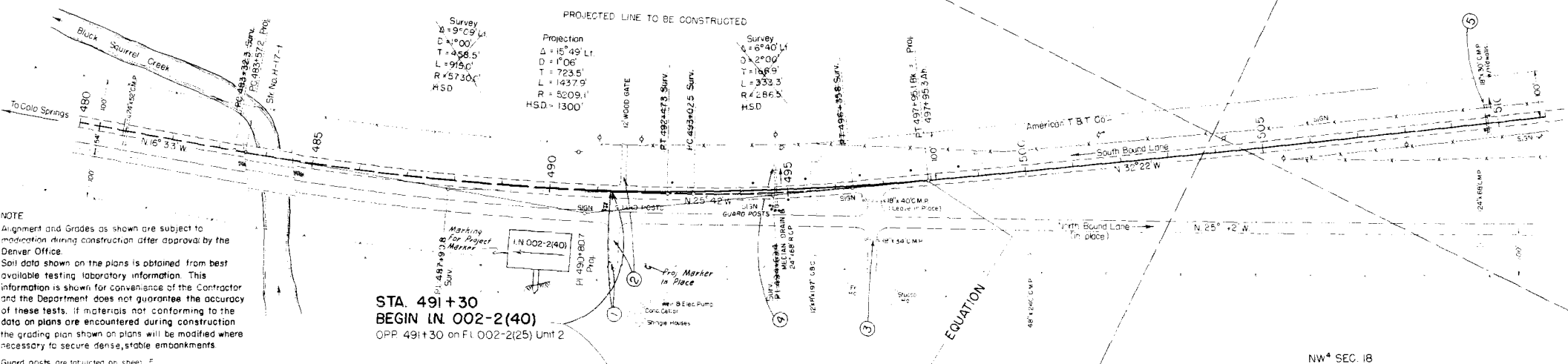
STRUCTURE NUMBER	TYPE	DIAMETER	"H"	CONCRETE		REINF. STEEL		GRATING & FRAME	
				CU YDS	LB	NO. 13	MEG.	NO. 13	MEG.
⑥	No. 13	3'-6"		0.93		100			
	#1 Headwall			3.10					
⑦	M.H.	5'							
	M.H.	5'							
⑧	No. 13	4'-6"		1.09		136			
	"	3'-6"		0.92		100			
	"	3'-6"		0.93		100			
⑨	#Med	4'-6"		1.28		175			
	No. 13	5'-0"		1.23		156			
	"	5'-0"		1.15		156			
⑩	#Med	4'-0"		1.11		104			
	"	"		"		"			
⑪	M.H.	5'							
	No. 13	3'-6"		0.93		100			
⑫	"	3'-6"		0.93		100			
	"	3'-6"		0.93		100			
⑬	M.H.	4'							
	No. 13	3'-6"		0.93		100			
⑭	"	4'-0"		1.20		115			
	"	"		"		"			
TOTALS - INTERSTATE				6.97		436	4		
TOTALS - AIR FORCE				9.77		604	6	3	

* Trash Guard Req'd
 * See Sheet No. 6 for Median Type Inlet



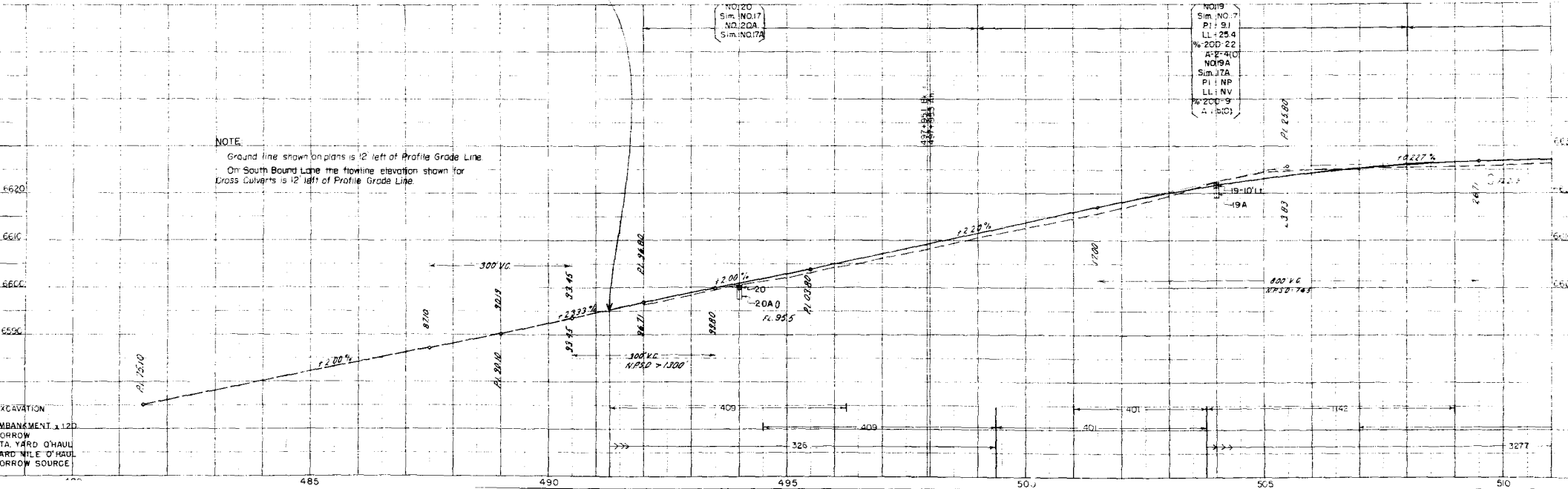
NOTE STRUCTURE REQUIREMENTS ARE INDICATED BY CIRCLED NUMBERS. FOR NOTES SEE LIST OF STRUCTURES

NW⁴ SEC. 18



NOTE
 Alignment and Grades as shown are subject to modification during construction after approval by the Denver Office.
 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 Department does not guarantee the accuracy of these tests. If materials not conforming to the data on plans are encountered during construction the grading plan shown on plans will be modified where necessary to secure dense, stable embankments.
 Guard posts are furnished on sheet 2.

STA. 491+30
 BEGIN IN. 002-2(40)
 OPP. 491+30 on FI 002-2(25) Unit 2



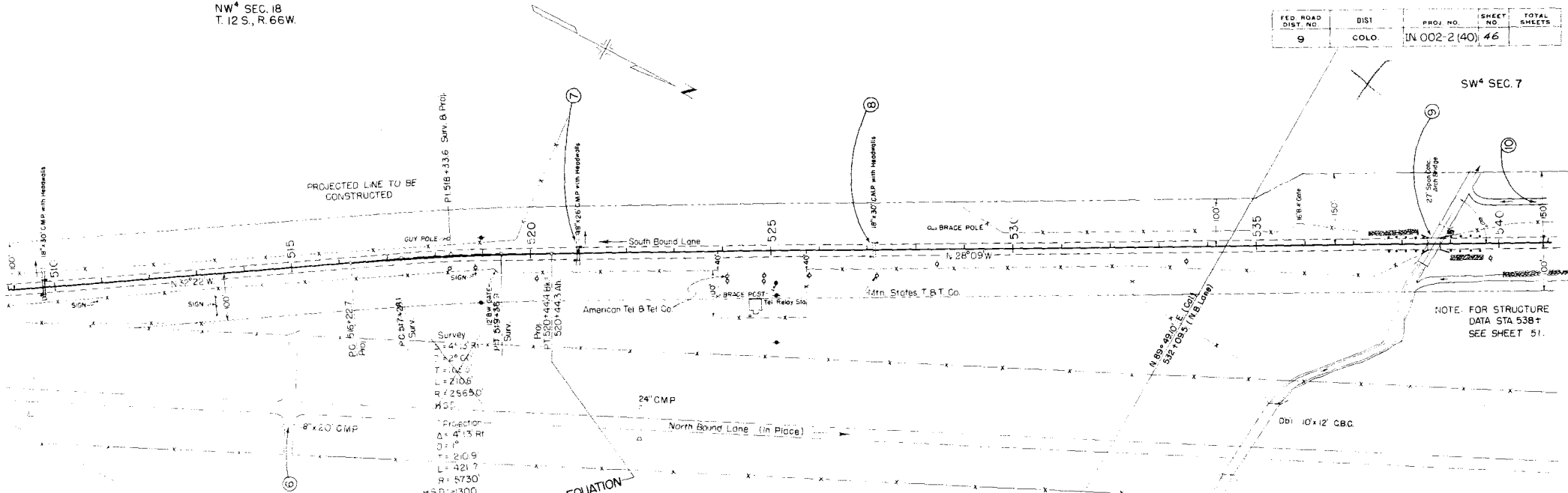
NO.120
 Sim. NO.17
 NO.22A
 Sim. NO.77A

NO.19
 Sim. NO.7
 PI: 9.1
 LL: 25.4
 % ZOD: 22
 A: 2'40'
 NO.19A
 Sim. JTA
 PI: NP
 LL: NV
 % ZOD: 9
 A: SIC

NW⁴ SEC. 18
T. 12 S., R. 66W.

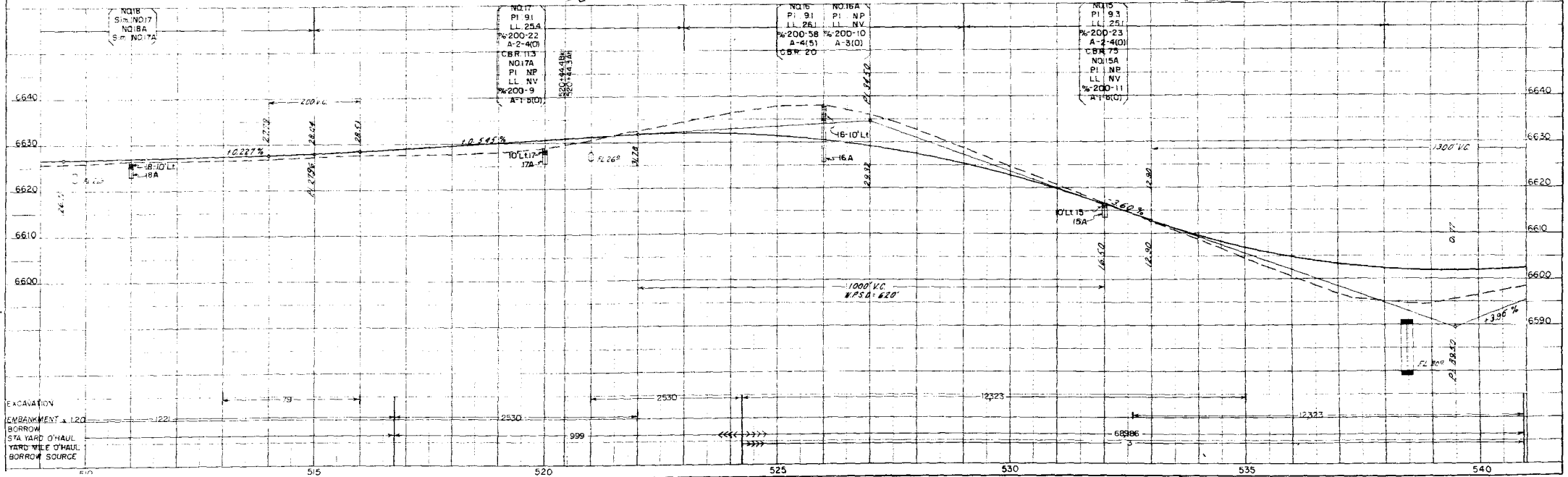
FED. ROAD DIST. NO.	DIST.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	IN 002-2 (40)	46	

SW⁴ SEC. 7



Projection
 $\Delta = 4.13$ Ft
 $\Delta = 3.1$ ft
 $\Delta = 210.9$
 $L = 421.7$
 $R = 5730$
 $HSD = 300$

EQUATION

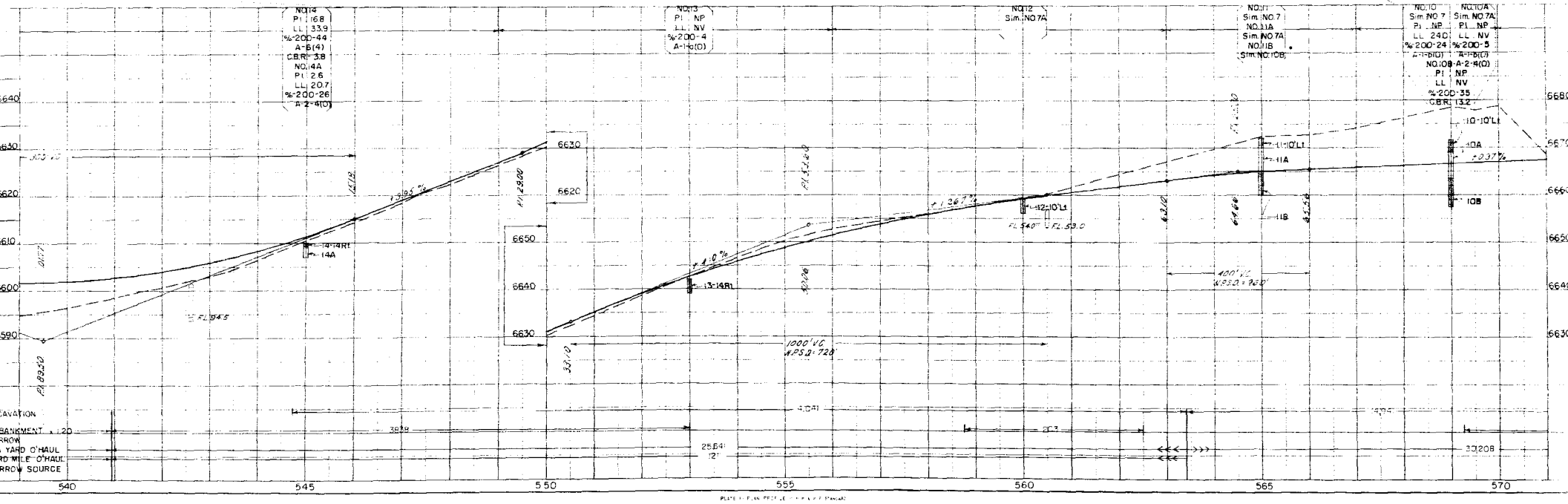
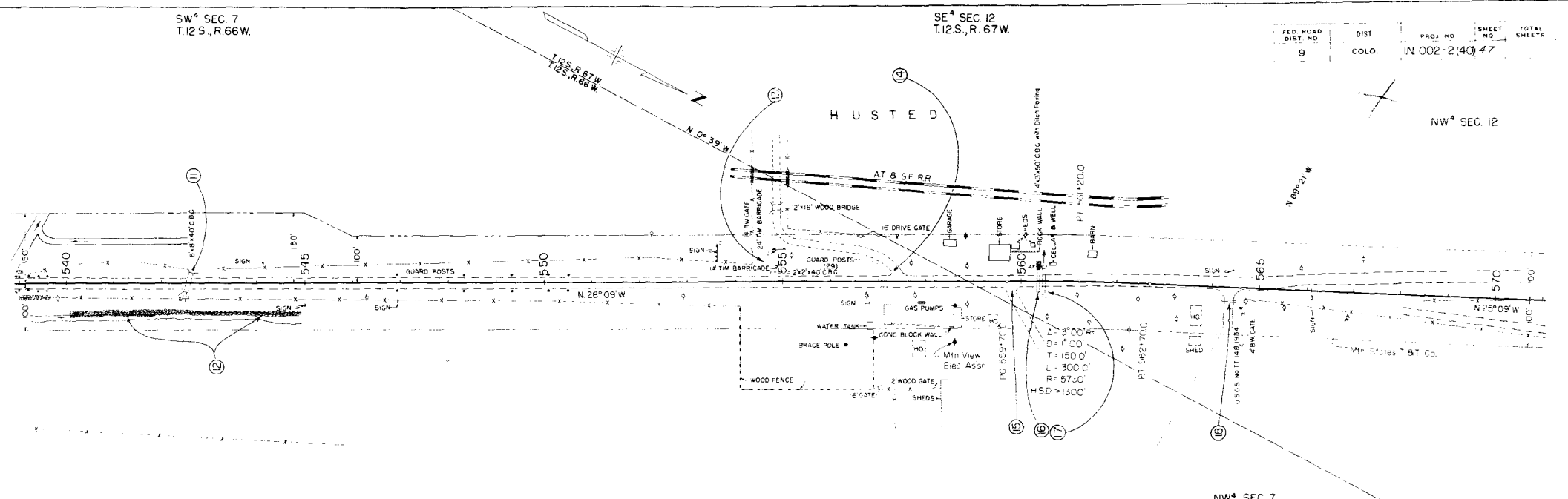


EXCAVATION
 EMBANKMENT 1:20
 BORROW
 STA YARD O'HAUL
 YARD W/LE O'HAUL
 BORROW SOURCE

NO17
 PI 91
 LL 25.4
 %200-22
 A-2-400
 CBR 113
 NO17A
 PI NP
 LL NV
 %200-9
 A-1-800

NO16
 PI 91
 LL 26.1
 %200-58
 A-4-51
 CBR 20
 NO16A
 PI NP
 LL NV
 %200-10
 A-3-100

NO15
 PI 9.3
 LL 25.1
 %200-23
 A-2-400
 CBR 75
 NO15A
 PI NP
 LL NV
 %200-11
 A-1-800



NE⁴ SEC. 12
T. 12 S., R. 67 W.

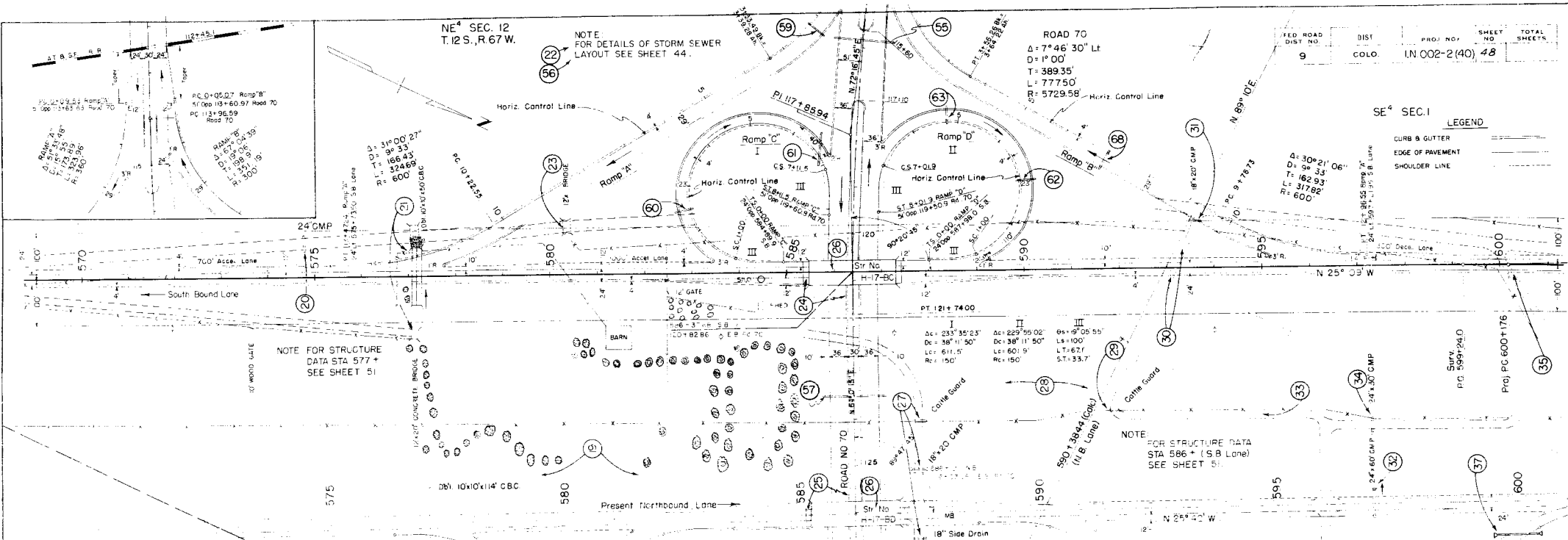
NOTE
FOR DETAILS OF STORM SEWER
LAYOUT SEE SHEET 44.

ROAD 70
Δ = 7°46'30" Lt
D = 1°00'
T = 389.35'
L = 777.50'
R = 5729.58'

FED ROAD DIST NO.	DIST	PROJ NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	IN 002-2(40)	48	

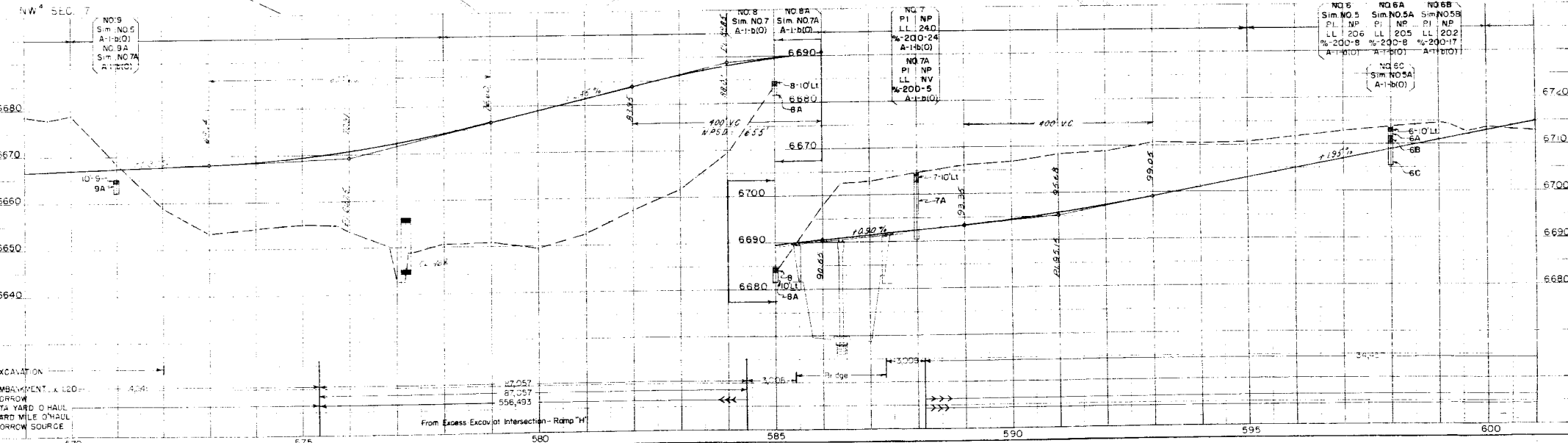
SE⁴ SEC. 1

LEGEND
CURB & GUTTER
EDGE OF PAVEMENT
SHOULDER LINE



NOTE FOR STRUCTURE
DATA STA 577 +
SEE SHEET 51

NOTE
FOR STRUCTURE DATA
STA 586 + (S.B. Lane)
SEE SHEET 51



EXCAVATION
EMBANKMENT A 120'
BORROW
STA YARD 0 HAUL
YARD MILE 0 HAUL
BORROW SOURCE

From Excess Excavator Intersection - Ramp "H"

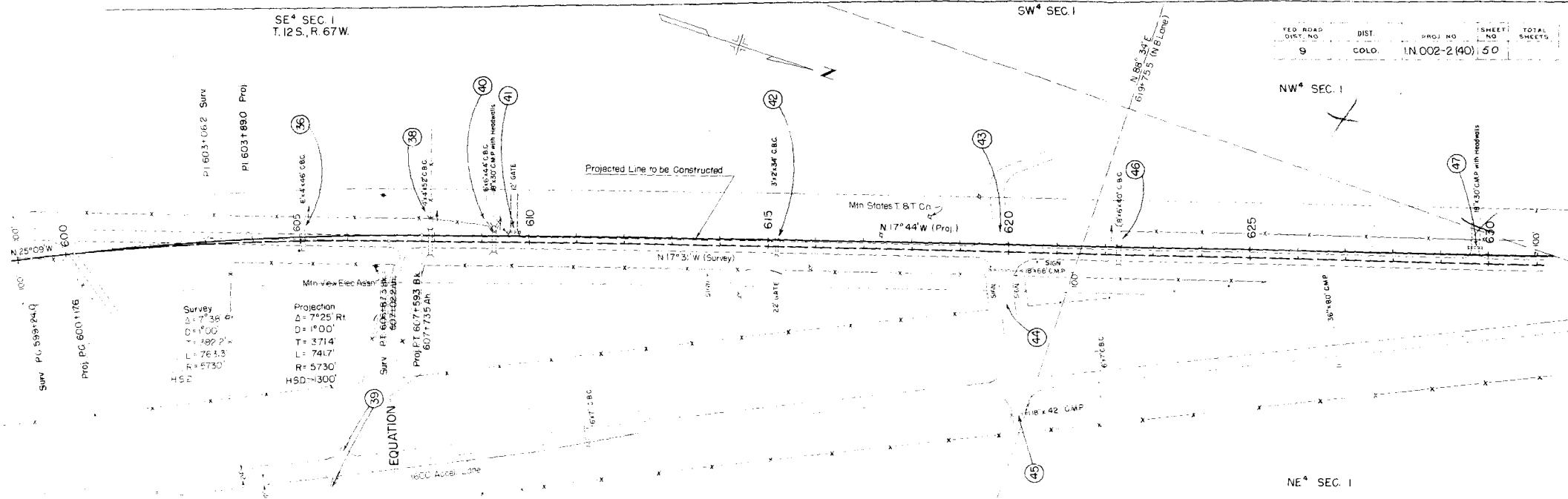
SE⁴ SEC. 1
T.12S., R. 67W.

SW⁴ SEC. 1

FED. ROAD DIST. NO.	DIST.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	IN CO2-2 (40)	50	

NW⁴ SEC. 1

NE⁴ SEC. 1



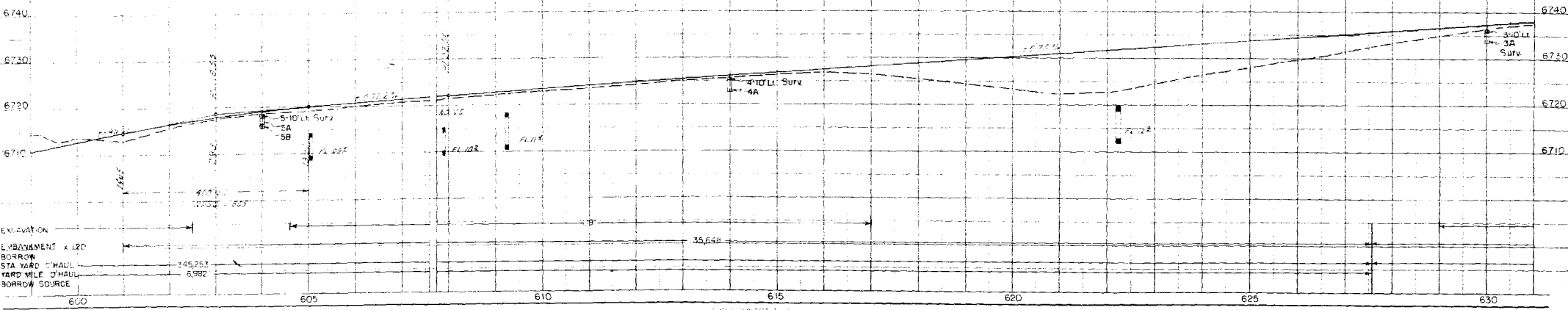
Survey
 $\Delta = 7^{\circ} 38'$
 $D = 1^{\circ} 00'$
 $T = 382.2'$
 $L = 76.33'$
 $R = 5730'$
 H.S.D.

Projection
 $\Delta = 7^{\circ} 25'$ Rt
 $D = 1^{\circ} 00'$
 $T = 371.4'$
 $L = 741.7'$
 $R = 5730'$
 H.S.D.

EQUATION

NO. 5
 PI NP
 LL 20.6
 % 200-6
 A=100'
 NO. 5A
 PI NP
 LL 20.5
 % 200-8
 A=100'
 NO. 5B
 PI NP
 LL 20.2
 % 200-17
 A=100'

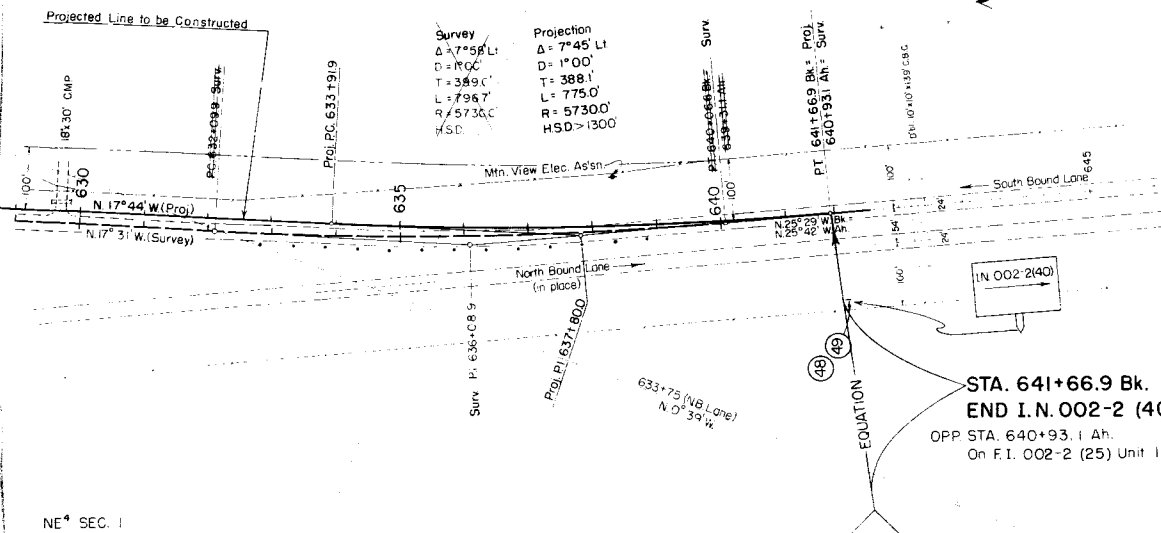
NO. 4
 S.M. NO. 1
 PI NP
 LL NV
 % 200-7
 A=100'
 NO. 4A
 PI NP
 LL NV
 % 200-19
 A=100'



EXCAVATION
 EMBANKMENT x 120
 BORROW
 STA. HAD. CHAUL
 YARD MILE CHAUL
 BORROW SOURCE

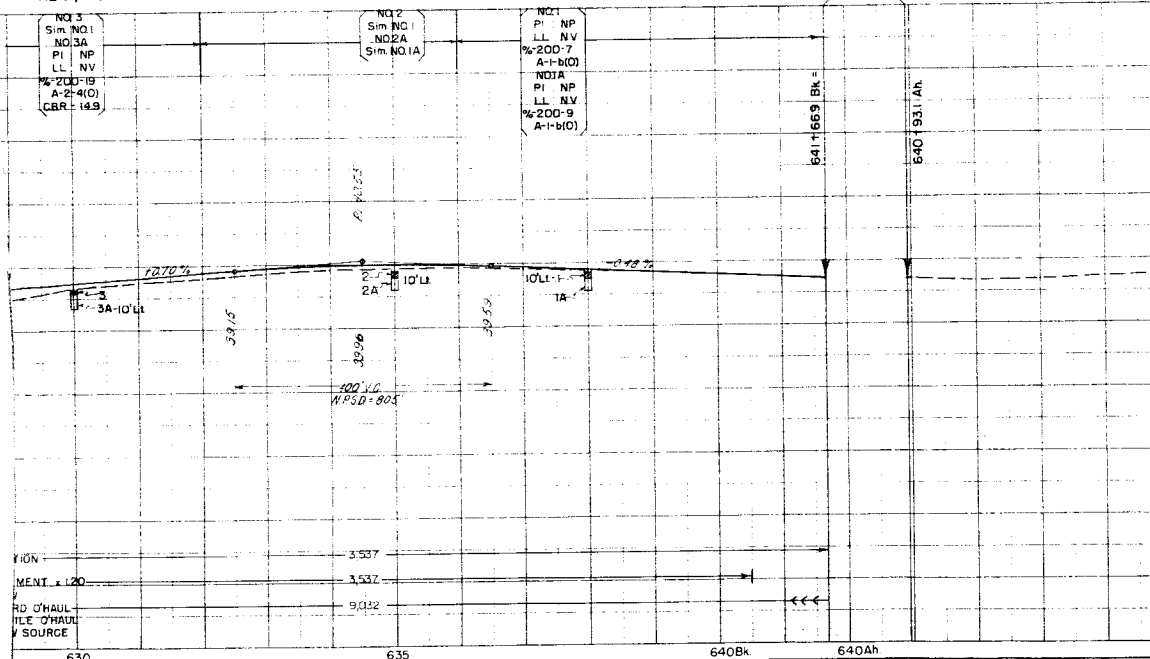
NW⁴ SEC. 1

FED. ROAD DIST. NO. 9
 DIST. COLO. IN 002-2 (40), 51
 PROJ. NO. IN 002-2 (40), 51
 SHEET NO. 51
 TOTAL SHEETS



NE⁴ SEC. 1
 T.12 S., R.67 W.

SW⁴ SEC. 36
 T.11 S., R.67 W.



PROPOSED STRUCTURES	STRUCTURE DATA			
	Sta. 538+544 - 538+85.6	Sta. 577+085 - 577+31.6	Sta. 585+433 - 587+32.1	Sta. 585+675 - 587+03.25
STRUCTURE NUMBERS	H-17-I	H-17-M	H-17-BC (So Bound Lane)	H-17-B0 (No Bound Lane)
PROPOSED STRUCTURE POSITION REFERRED TO PRESENT STRUCTURE - SPAN - CLEAR ROADWAY - CLEAR WATERWAY - TYPE OF SUPERSTRUCTURE - TYPE OF SUBSTRUCTURE - DETOUR STRUCTURE REQUIREMENTS - R.R. SIDING -	Same Double 12 x 10 CBC 2-24' Lanes 240' Conc. Box Culvert Conc. Box Culvert	00' + Upstream Double 10 x 10 CBC 2-24' Lanes 196' Conc. Box Culvert Conc. Box Culvert	2 or 92'-0" C to C Brngs 54'-0" Conc. Slab on Prest. Grid Abuts - Conc. Semi Grav. -ity Pier - 2 Col. Conc. Husted	2 or 92'-0" C to C Brngs 54'-0" Conc. Slab on Prest. Grid Abuts - Conc. Semi Grav. -ity Pier - 2 Col. Conc. Husted
NEARBY STRUCTURES ON SAME STREAM RECORD DURING FLOODS - LOCATION -				
PRESENT STRUCTURES STREAM DATA DRAINAGE AREA IN SQ. MILES - VELOCITY DURING HIGH WATER - ELEVATION OF - MAXIMUM HIGH WATER - NORMAL STAGE - DRIFT - SCOUR -	1 or 24'-0" Clear 20'-0" 250' Conc. Arch CU To Be Removed	2-10 x 10' CBC x 48' Long 28'-0" 196' Conc. Box Culvert Conc. Box Culvert To Be Removed		
	2 1/2 Mi			
	Light Drift No Ice	Dry	Dry	66405

