COLORADO
STATE HIGHWAY DEPARTMENT

PLAN AND PROFILE OF PROPOSED
STATE PROJECT NO. SP 12-382-501
STATE HIGHWAY NO. 382
ADAMS COUNTY

FED. ROAD DIV. NO.	DISTRICT	PROJ. NO.	SHEET NO.
9	COLO	SP 12-382-501	1

Rev. Index of Sheets ... C.H.

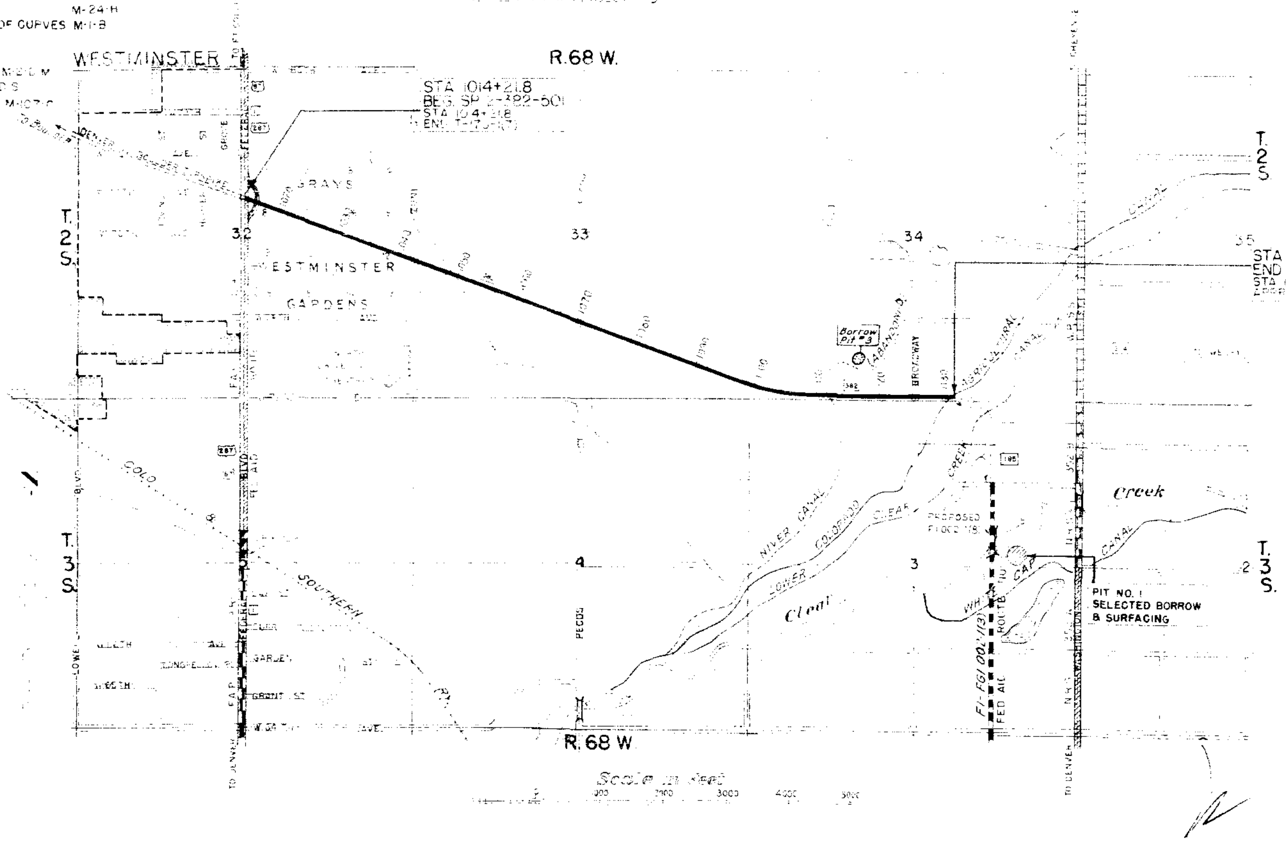
INDEX OF SHEETS

CONVENTIONAL SIGNS

- CENTER LINE — TITLE SHEET
- RIGHT OF WAY LINE
- TOWNSHIP OR RANGE LINE
- SECTION LINE
- QUARTER SECTION LINE
- SIXTEENTH SECTION LINE
- PROPERTY OR TRACT LINE
- CITY LIMITS LINE
- RAILROAD
- BARBED WIRE FENCE
- COMBINATION WIRE FENCE
- TELEP & TELEG LINE
- POWER LINE
- DETOUR

SCALES ON ORIGINAL TRACINGS

GROSS LENGTH OF PROJECT / NET LENGTH OF PROJECT } 11,789.9 Feet = 2.233 Miles



TABULATION OF LENGTH AND DESIGN DATA

STATION	DESCRIPTION	ROADWAY WIDTH FT.	LENGTH LIN. FT.
1014+21.8	Beg SP 12-382-501 = End. Proj. T-170-1(7)	48	1,213.3
1026+35.1			
		24	10,576.6
1132+11.7	End SP 12-382-501 = 0+00 Approach F.I. 002-1(8)		
	TOTALS		11,789.9

SUMMARY	LINEAR FT.	MILES
SP 12-382-501		
48 Roadway	1,213.3	0.230
24 Roadway	10,576.6	2.003
SP 12-382-501 PROJECT TOTALS	11,789.9	2.233

DESIGN DATA	
Maximum Degree of Curve	3°
Maximum Grade	4.985%
Minimum N.P.S.D. - horizontal	870'
Minimum N.P.S.D. - vertical	570'
Maximum Design Speed	60 M.P.H.

NOTICE TO BIDDERS

[illegible]
Oren McL... Construction ... Denver, Colo.
Paul R Morley Resident Engineer Denver Colo.

HIGHWAY DEPARTMENT
STATE OF COLORADO

RECOMMENDED FOR APPROVAL
[signature] 7-...-51
DISTRICT ENGINEER DATE

APPROVED
[signature] 7-16-51
STATE HIGHWAY ENGINEER DATE

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

RECOMMENDED FOR APPROVAL

DISTRICT ENGINEER DATE

APPROVED

DIVISION ENGINEER DATE

TYPICAL CROSS SECTION OF IMPROVEMENT

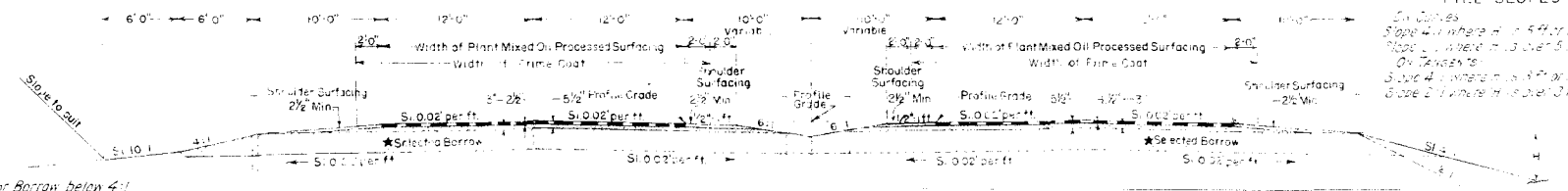
NOTE:
See Standard M 2-DM for details of Cut Slope Treatment, Flaring and widening for guard fence and/or guard posts

TYPICAL SECTION

NORTH LANE
(FUTURE CONSTRUCTION)

SOUTH LANE
☆ PRESENT CONSTRUCTION

#1026+35.1 TO 1033+15.1 TRANSITION
FROM 4 LANES TO 2 LANES
(SEE SHEET NO. 23)

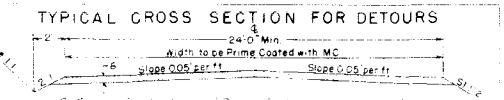


FILL SLOPES
On Curves
Slope 4:1 where H is 5 Ft. or less
Slope 3:1 where H is over 5 Ft.
On Tangents
Slope 4:1 where H is 6 Ft. or less
Slope 3:1 where H is over 6 Ft.

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

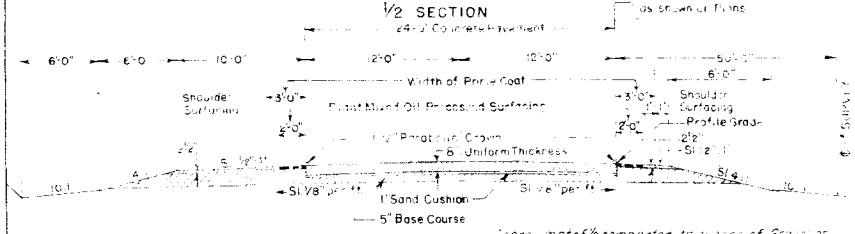
★ The upper section of Subgrade is to be constructed of Selected Borrow material at locations designated in the Selected Borrow Material Tabulation. Estimated quantities involved in this operation and thickness of material required, are tabulated in the Selected Borrow Plan

TYPICAL CROSS SECTION FOR DETOURS



6" Compacted thickness of Detour Surfacing to be placed at the rate of approximately 81 Cu Yds per 100 Lin Ft of Roadway

* CONCRETE SECTION
STA 1014+ TO STA. 1026+35.1
½ SECTION

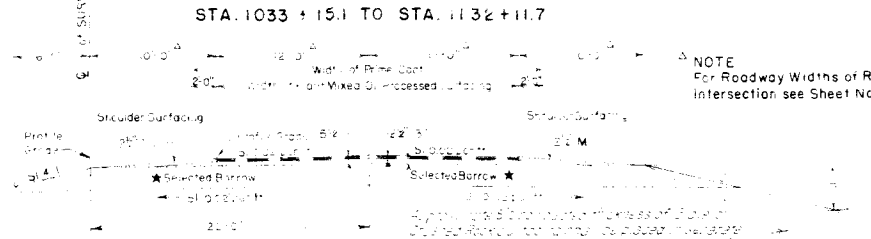


* Concrete Pavement to be placed under Work Order on Project No. T 170 (17). Grading to be done on this Project.

Approximately compacted thickness of Gravel or Crushed Rock Surfacing Shall be placed in separate courses at the following approximate rates per 100 Lin. Feet of Roadway (Rates for 4 Lanes)

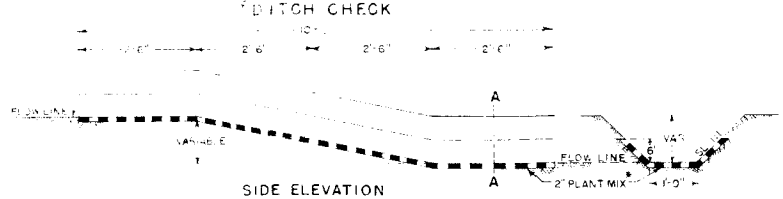
Plant Mixed Oil Processed Course	12 Tons
Bottom Course	341 Tons
Surfacing for Shoulder Areas	31 Tons

☆ PRESENT CONSTRUCTION
SOUTH LANE
STA. 1033 + 15.1 TO STA. 1132 + 11.7



NOTE
For Roadway Widths of Ramps in Intersection see Sheet No. 23

DITCH SECTION
(RIGHT SIDE)



SIDE ELEVATION

SECTION A-A

* PLANT MIX TO BE PAID FOR UNDER ITEM NO. 32

☆ LOCATIONS TO BE DESIGNATED BY THE ENGINEER

GENERAL NOTES

This Project is to be constructed in conformity with the Standard Specifications of the Colorado State Highway Department adopted Jan 1, 1948.

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

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

It is estimated that rolling of the Oil Mat with Flat Wheeled Roller will be necessary after compaction with Rubber Tired Rollers in order to provide a firm smooth surface.

All Concrete used on this Project shall be "Air-entrained Concrete."

Culverts projecting from embankments shall be covered with approximately 6 inches of embankment material in such a manner that a minimum of pipe shall be exposed in the completed work. This shall be accomplished by warping embankment slopes around and adjacent to the culvert.

Payment for Overhaul will be based on measurement along the centerline of the Project.

All Curves are to be Superelevated and Widened as provided by the Standard Superelevation Sheet included with the plans.

Approximate location and quantities involved in construction of intercepting ditches are tabulated on Summary of Earthwork Quantities sheet.

All side approach roads to the Project shall be Prime Coated to approximately 50 feet from edge of Oil Mat or to the Right of Way line, whichever is less.

At Bridge Approaches the Plant Mixed Surfacing shall be widened to meet the curbed width of the Bridge and shall take place gradually over a distance of 300 feet each way from the Bridge ends. Prime Coat shall extend 2 feet beyond the 0.1 Mat.

For preliminary plan quantities of Asphaltic Road Materials the following rates of application were used

Prime Coat MC	@ 0.40 Gal. per Sq Yd
Paving Asphalt (for Plant Mixed Oil Mat) 150-200 Penetration	@ 5.7 lbs. per Sq Yd per inch thickness

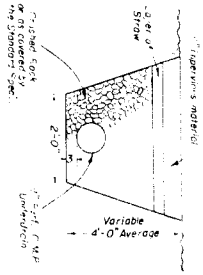
Rate of application and grade of Oil shall be determined by the Engineer at the time of application.

The force-account item "Clearing of Building Sites, including Removal of Foundation and Appurtenances" shall include removal of all foundations, wells, outhouses and other appurtenances not removed by the owner and any necessary backfilling of cellars, cess pools, wells, etc., to provide neat road-side conditions.

It is estimated that this item applies at the following locations:- Sta 1017+ Rt.

SUMMARY OF APPROXIMATE QUANTITIES

ITEM NO	DESCRIPTION	UNIT	ROADWAY 48' WIDTH	ROADWAY 24' WIDTH	OVERPASS STA 13+63-16+37	OVERPASS STA 21+92-24+36.5	PROJECT TOTALS
10ay	Clearing & Grubbing Entire Project	Lump Sum	•	•			•
11b	Removal of 4 Structures (48' Width)	Lump Sum	•				•
11c	Removal of 5 Structures (24 Width)	Lump Sum		•			•
11f	Removing & Resetting Mail Boxes	Lump Sum	•				•
11g	Removing & Resetting Concrete Ditch Checks	Each		14			14
11h	Disconnecting & Connecting Water Line	Lump Sum		•			•
11i	Removing Concrete Pavement	Sq Yd	3,930				3,930
12a	Removing Fence	Lin Ft	2,680	4820			7,500
13c	Unclassified Excavation	Cu Yd	176,000	71,000			247,000
13d	Unclassified Ditch Excavation	Cu Yd	1,000	1500			2,500
13x	Selected Borrow	Cu Yd	11,690	42,810			54,500
13y	Unclassified Excavation (Stripping)	Cu Yd	1,000	2,000			3,000
14a	Dry Rock Excavation (Struct)	Cu Yd	110	55		5	170
14b	Dry Common Excavation (Struct)	Cu Yd	960	468	312	140	1880
14c	Wet Rock Excavation (Struct)	Cu Yd	40	15		5	60
14d	Wet Common Excavation (Struct)	Cu Yd	320	155		5	480
16a	Structure Backfill (Class 1)	Cu Yd	600	1220	472	316	2510
16d	Mechanical Tamping	Hour	65	129	43	33	270
17ax	Rolling with Tamping Roller (2 Unit)	Hour	160	380			540
17ay	Rolling with Tamping Roller (4 Unit)	Hour	180	90			270
17b	Rolling with Flat Wheeled Roller	Hour	100	220			320
17c	Rolling with Rubber Tired Roller	Hour	35	75			110
17dx	Furnishing Tamping Roller (2 Unit)	Each	01	03			1
17dy	Furnishing Tamping Roller (4 Unit)	Each	01	03			1
17e	Furnishing Flat Wheeled Roller	Each	03	07			1
17f	Furnishing Rubber Tired Roller	Each	03	07			1
17g	Wetting	M Gal	4,800	9400			8,200
18a	Station Yard Overhaul	Sta Yd	1,464,900	794,100			2,259,000
18b	Yard Mile Overhaul	Yd M.	176,660	82,840			259,500
18c	Ton Mile Overhaul	Ton Mile	19,020	7,480			26,500
26c	Gravel or Crushed Rock Surfacing (Grading C)	Ton	9,060	9,340			18,400
26x	Detour Surfacing	Cu Yd	1,600				1600
29d	Asphalt (150-200 Penetration)	Ton	155	235			390
30x	Asphaltic Road Material MC	Gal	12,080	14,620			26,700
32a	Plant Mixed Oil Processed Surfacing	Ton	2,620	4020			6,640
42a	Untreated Bridge Timber	M Ft bm			63	05	68
44a	Miscellaneous Untreated Timber	M Ft bm	01	01			02
46a	Class 'A' Concrete	Cu Yd	15	1.1	554	335	1062
46b	Class 'B' Concrete	Cu Yd	13	2			15
47x	Reinforcing Steel - Transport & Place	Lb	1240	16,300	66,460	43,050	127,050
48x	Structural Steel - "	Lb			273,000	238,100	511,100
53x	8" Corrugated Metal Culvert Pipe	Lin Ft		120			120
53b	18" Corrugated Metal Culvert Pipe	Lin Ft	150	638			788
53c	24" Corrugated Metal Culvert Pipe	Lin Ft	1064	874			1938
53e	36" Corrugated Metal Culvert Pipe	Lin Ft		108			109
55b	18" Corrugated Metal Siphon Pipe	Lin Ft	330				330
55c	24" Corrugated Metal Siphon Pipe	Lin Ft	235	230			465
60ax	Treated Timber Piling (Driving)	Lin Ft			2940	2750	5690
71b	8" Vert. Corr. Metal Pipe Underdrain	Lin Ft	1000				1000
67a	Riprap	Cu Yd		20			20
75c	Metal Plate Guard Fence (Beam Type)	Lin Ft	2,000				2000
76a	Barbed Wire Fence with Treated Wooden Posts	Lin Ft		3,800			13600
76d	Combination Wire Fence with Treated Wooden Posts	Lin Ft	3460	6740			10,200
76g	Barbed Wire Gates	Each		8			8
81b	Right of Way Markers	Each		9			9
85b	Trash Guards for 18" Siphons	Each	4				4
85c	Trash Guards for 24" Siphons	Each	2	4			6
89b	Drain Pipe (Concrete Floor) (4'x2'0")	Each			4		4
92	Timber Guard Posts	Each	265	96			361
110pa	4" Metal Drain Pipe	Lin Ft	425	550			975
110va	4" Cast Iron Valve & Valve Box	Each	3	2			5
110pb	6" Metal Drain Pipe	Lin Ft	52				52
110vb	6" Cast Iron Valve & Valve Box	Each	2				2
132g	No 13 Inlet Grating & Frame	Each		1			1
134g	58"x36" Corrug Metal Pipe Arch Culverts	Lin Ft		246			246
	STATE FORCES						
81a	Project Markers	Each		1			1
	Signing & Striping Entire Project	Lump Sum	•	•			•
	FORCE ACCOUNT						
	Move Power Lines (Work by Public Service Co.)	Lump Sum		•			•
	Move Power Lines (Work by Union R.E.A forces)	Lump Sum		•			•
	Clearing Building Sites, etc	Lump Sum	•				•
	RIGHT OF WAY						
	Right of Way, entire Project including moving of Buildings and Appurtenances	Lump Sum	•	•			•
	STATE FURNISHED MATERIALS						
47	Reinforcing Steel	Lb	1240	12,360	66,460	43,050	123,300
48	Structural Steel	Lb			273,000	238,100	511,100
60a	Treated Timber Piling	Lin Ft			2,940	2,750	5,690



TYPICAL SECTION OF TRENCH FOR 6" PERFORATED C.M.P. UNDERDRAIN

FED. ROAD DIV. NO.	DISTRICT	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	0010	S.P. 12-382-501	4	

Rev. Fencing Requirements -- 7-30-51 -- J.C.R.

SELECTED BORROW PLAN

It is estimated that Selected Borrow material for the project is available in the vicinity of the pit indicated in the following tabulation. Estimated quantities involved in this operation are shown below.
Alteration of the plan as here outlined will be allowed only on written permission from the Department.

MATERIAL TO BE PLACED	SOURCE	QUANTITY AND THICKNESS AVAILABLE	THICKNESS *	CU. YDS.	OVERHAUL STA. YD.	OVERHAUL YD. MI.
Intersection — 1014+21.8 ~ 1026+35	Copeland					
RAMP "D"	P.I. #1	761,600	9"			
1+15 ~ 8+35	E½, Sec. 3,	Tons	"	843	9,273	2,362
RAMP "E"	T3S, R6W,		9"			
8+08.2 ~ 4+36.5	1000 to Sta.		"	517	5,687	1,420
4+36.5 OVERPASS	375+00					
2+19.2	Project					
2+19.2 ~ 0+73	FI-F61		"	204	2,244	579
8+08.2 ~ 17+72.9	002-1(3)		"	1,611	17,721	4,514
RAMP "F"	R-69					
7+18.1 ~ 0+39.8			"	943	10,373	2,496
NORTH FEDERAL BLVD.			9"			
13+63						
16+37 OVERPASS						
13+63 ~ 4+81.1			"	1,473	16,203	4,303
4+81.1 ~ 3+81.1			"	157	1,727	474
			"			
16+37 ~ 20+00			"	607	6,677	1,744
20+00 ~ 29+67.1			"	2,041	22,451	6,119
29+67.1 ~ 32+43			"	701	7,711	2,184
32+43 ~ 35+43			"	600	6,600	1,902

MATERIAL TO BE PLACED	SOURCE	QUANTITY AND THICKNESS AVAILABLE	THICKNESS *	CU. YDS.	OVERHAUL STA. YD.	OVERHAUL YD. MI.
Estimated for Accel. & Decel. Lanes				956	10,956	2,889
Correcting irregularities in Subgrade (10%)				970	10,667	2,810
TOTAL - 48' WIDTH				11,663	128,290	33,796
Roadway — 1026+35.1 ~ 1034+34.1			17"	4,595	50,545	11,516
1034+34.1 ~ 1132+11.7			"	34,322	377,542	51,639
Correcting irregularities in Subgrade (10%)				3,892	42,809	6,316
TOTAL - 24' WIDTH				42,809	470,896	69,471

* Based on Curve "E" of S.H.D. Design #12

SURFACING PLAN

It is estimated that material for Gravel Surfacing for the project is available in the vicinity of the pit indicated in the following tabulation. Estimated quantities involved in this operation are shown below.
Alteration of the Surfacing Plan as here outlined will be allowed only on written permission from the Department.

MATERIAL TO BE PLACED	SOURCE	QUANTITY AVAILABLE	TONS USED SHOULDER COURSE * Grading "C"	TONS USED BOTTOM COURSE Grading "C"	OVERHAUL TON MILES SHOULDER	OVERHAUL TON MILES BOTTOM
Intersection — 1014+21.8 ~ 1026+35	Copeland		377	4,138	754	8,275
RAMP "D"	P.I. #1	761,600				
1+15 ~ 8+35	E½, Sec. 3,	Tons	108	238	228	501
RAMP "E"	T3S, R6W,					
8+08.2 ~ 4+36.5	1000 to Sta.		82	130	168	267
4+36.5 OVERPASS	375+00					
2+19.2	Project					
2+19.2 ~ 0+73	FI-F61		33	52	71	112
8+08.2 ~ 17+72.9	002-1(3)		213	473	449	996
RAMP "F"	R-78					
7+18 ~ 0+39.8			150	238	293	464
NORTH FEDERAL BLVD.						
13+63						
16+37 OVERPASS						
13+63 ~ 4+81.1			194	433	492	963
4+81.1 ~ 3+81.1			22	44	51	102
16+37 ~ 20+00			80	178	174	388
20+00 ~ 29+67.1			213	668	491	1,537
29+67.1 ~ 32+43			61	246	148	595
32+43 ~ 35+43			66	192	164	475

MATERIAL TO BE PLACED	SOURCE	QUANTITY AVAILABLE	TONS USED SHOULDER COURSE * Grading C	TONS USED BOTTOM COURSE Grading C	OVERHAUL TON MILES SHOULDER	OVERHAUL TON MILES BOTTOM
Estimated for Accel. & Decel. Lanes			56	367	120	769
TOTAL - 48' WIDTH			1,655	7,397	3,543	15,444
Roadway — 1026+35.1 ~ 1034+34.1			224	632	406	1,144
1034+34.1 ~ 1125+86.6			2,014	4485	1,747	3889
1125+86.6 ~ 1132+11.7			138	307	F.H.	F.H.
Estimated for Road Approaches				700		585
TOTAL - 24' WIDTH			2,376	6,124	2,153	5,618

* Shoulder Surfacing shall not be placed across Road Approaches.

FENCING REQUIREMENTS

STATION	SIDE	REMOVE FENCE Lin Ft	BUILD BARBED WIRE FENCE Lin Ft	BUILD COMBINATION WIRE FENCE Lin Ft	GATES BARBED WIRE Each	GATES DRIVE
(Federal Blvd.)						
7+50 - 34+16	Lt.	2,675				
1014+ - 1026+35	Lt.			1660		
1014+ - 1026+35	Rt.			1790		
TOTAL - 48' WIDTH		2,675		3,450		
1026+35 - 1041+70	Lt.			1540		
1026+35 - 1042+40	Rt.			1610		
1042+05	X	210				
1042+25 - 1049+00	Lt.		675			
1042+60	X	210				
1042+60 - 1044+40	Lt.	210				
1043+00 - 1055+40	Rt.			1240		
1047+40 - 1050+50	Lt. & Rt.	660				
1049+00 - 1069+80	Lt.		2080			
1055+40 - 1070+50	Rt.		1510			
1058+10	X	530				
1060+75	X	210				
1050+00	- S.R.					*2
1065+60	X	220				
1067+25	X	220				
1070+20	X	200				
1070+40 - 1077+75	Lt.			735		
1071+15 - 1077+75	Rt.			660		
1077+75 - 1124+95	Lt.		4720			
1077+50	Lt. & Rt.					*2
1078+60	X	320				
1077+75 - 1124+95	Rt.		4720			
1098+60	X	220				
1111+10	X	220				
1111+60	X	210				
1105+00	Lt. & Rt.				2	
1112+00 - 1117+00	Rt.	500				
1117+50	Lt. & Rt.				2	
1118+50	X	190				
1124+95	X	200				
1125+35	X	200				
1125+35 - 1132+00	Lt.			670		
1130+00 - 1132+00	Rt.			220		
1130+00 - 1130+60	Rt.	60				
TOTAL - 24' WIDTH		4,810	13,705	6,675	8	

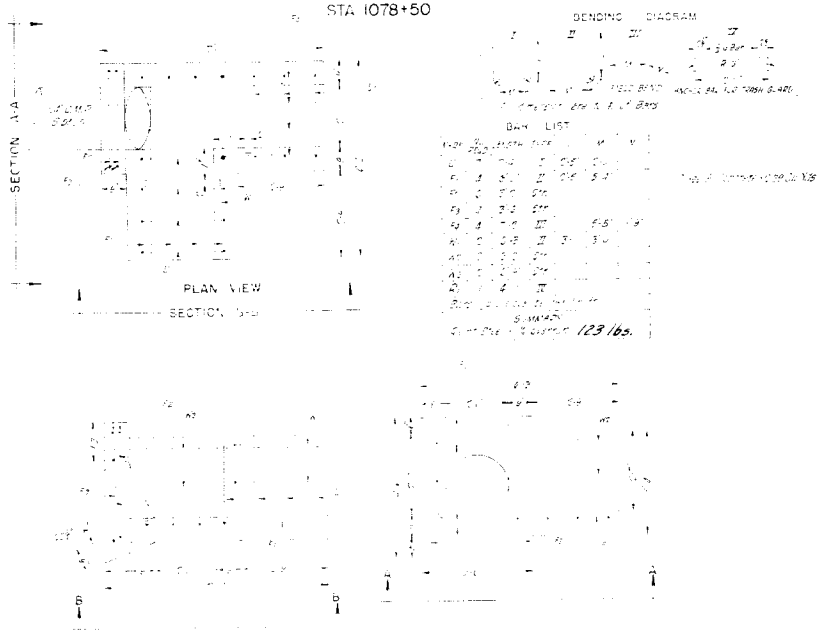
& Estimated 120 Date Nails to be installed by State Forces.
* 24' Width opening

R.O.W. MARKERS

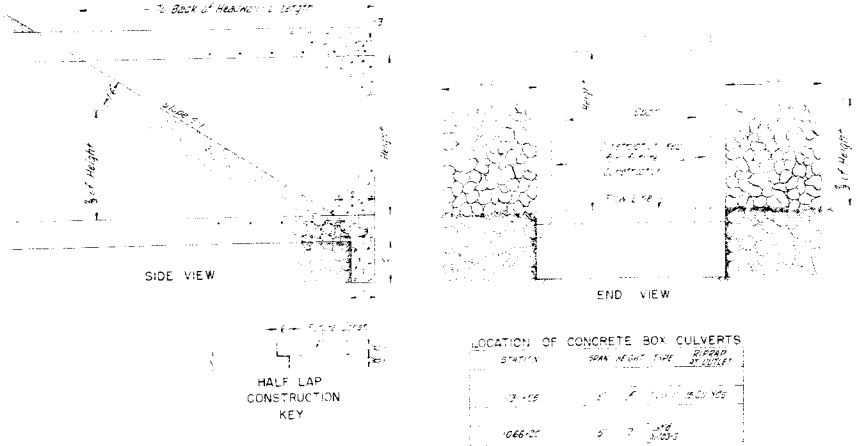
STATION	SIDE		NUMBER
1028+00	Lt.		1
1060+00	Rt.		1
1054+00	Lt.		1
1067+00	Rt.		1
1080+00	Lt.		1
1094+00	Rt.		1
1107+00	Lt.		1
1120+00	Rt.		1
1152+00	Lt.		1
TOTAL - 24' WIDTH			9

FED. ROAD DIV. NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	COLO.	S [illegible]	5	

DETAILS OF TWO-WAY DIVISION BOX FOR 24" SIPHON OUTLET, STA 1078+50

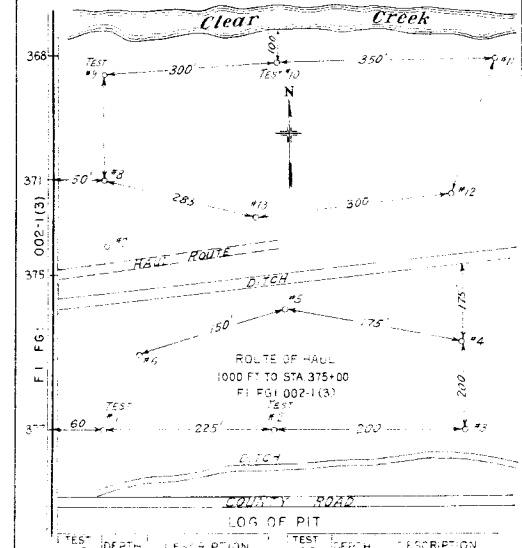


DETAILS OF CUT-OFF WALL AND KEYWAY FOR UNFINISHED CONCRETE BOX CULVERTS



SELECTED BORROW & SURFACING PIT NO. 1

E 1/2 SEC. 3, T. 3 S., R. 68 W.
OWNER - COPELAND
SAMPLE NO. 817
AMOUNT AVAILABLE 550,000 CU YDS.



LOG OF PIT

TEST NO.	DEPTH	DESCRIPTION
1	00-05	Overburden
	05-30	Sand & Gravel, Shale 5%
2	00-05	O.B.
	05-20	Sand & Gravel, Shale 3%
3	00-30	Sand & Gravel
	30-60	Clay, Water at 65
4	00-03	O.B.
	03-20	S & G, Water at 65
5	00-03	O.B.
	03-140	Sand & Gravel
6	00-03	O.B.
	03-190	S & G, Water at 70
7	00-05	Overburden
	05-30	S & G, Water 40, Shale 2%
8	00-30	O.B.
	30-220	S & G, Water 45, Shale 2%
9	00-02	O.B.
	02-220	S & G, Water 45, Shale 2%
10	00-190	S & G, Water 45
	190-210	Brown Clay
11	00-03	O.B.
	03-150	S & G, Water 45, Clay 3%
12	00-70	S & G, Water 40, Shale 3%
13	00-130	Sand & Gravel

TIMBER GUARD POSTS & GUARD FENCE

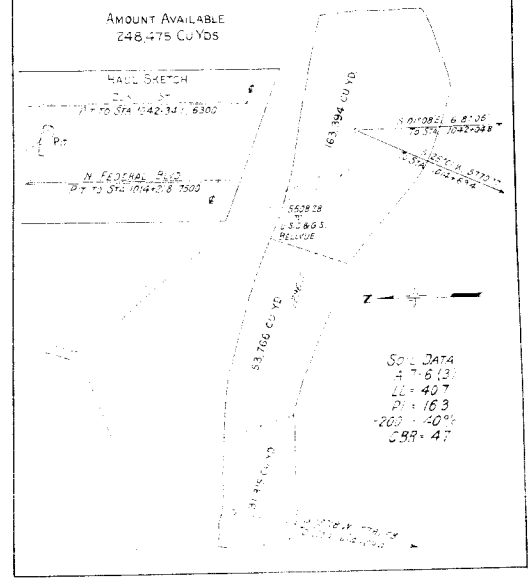
STATIONS	SIDE	SPACING	GUARD POSTS EACH	GUARD FENCE LIN FT.
1050+40	Lt & Rt	Culvert	2	
1026+50 to 1031+00	NO LANE Lt & Rt	50'	20	
1026+50 to 1031+50	SO LANE Lt & Rt	50'	23	
1032+00 to 1034+00	SO LANE Lt & Rt	50'	10	
1042+09	Lt & Rt	Culvert	2	
1042+52	Lt & Rt	"	2	
1049+00	Lt & Rt	"	2	
1056+00	Lt & Rt	"	2	
1060+79	Lt & Rt	"	2	
1066+20	Lt & Rt	"	2	
1070+22	Lt & Rt	"	2	
1070+70	Lt & Rt	"	2	
1072+50	Lt & Rt	"	2	
1089+25 to 1091+25	Rt	50'	5	
1092+60	Lt & Rt	Culvert	2	
1098+67	Lt & Rt	"	2	
1108+51 to 1113+58	Lt & Rt	115, 192, 200'	8	
1118+50	Lt & Rt	Culvert	2	
1131+25	Lt	C.B.C.	1	
Appr. to 500 Rad. Curve	Rt		3	
TOTAL - 24' WIDTH			96	

Roadway

BORROW PIT NO. 2

S E 1/4 SEC. 29, T. 2S, R. 68 W.
OWNER - PILLAR OF FIRE
SAMPLE NO. 1681

AMOUNT AVAILABLE
248,475 CU YDS



TIMBER GUARD POSTS & GUARD FENCE

STATIONS	SIDE	SPACING	GUARD POSTS EACH	GUARD FENCE LIN FT.
FEDERAL BLVD.				
5+00 to 10+00	Rt	100'	6	
5+00 to 8+00	Lt	100'	4	
10+60 to 13+60	Lt & Rt			600
16+40 to 19+15	Lt & Rt			550
20+00 to 34+00	Lt & Rt	100'	30	
RAMP D				
0+00 to 8+99	Rt	29'	32	
2+00 to 7+22	Lt	29'	19	
RAMP E				
0+92 to 2+17	Lt & Rt			250
4+35 to 7+35	Lt & Rt			600
8+50 to 16+50	Lt & Rt	50'	35	
RAMP E CONNECTION	Lt & Rt		9	
RAMP F				
0+28 to 7+00	Rt	28'	25	
1+00 to 6+04	Lt	28'	19	
MAIN LINE				
1015+00 to 1025+00	SO LANE Lt & Rt	50'	41	
1014+50 to 1017+00	NO LANE Lt & Rt	50'	10	
1017+50 to 1023+00	NO LANE Rt	50'	17	
1020+00 to 1026+00	NO LANE Lt	50'	13	
1026+00	NO LANE Rt		3	
1026+00	SO LANE Lt		2	
TOTAL - 48' WIDTH			265	2000

Intersection

FED. ROAD DIV. NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	SP 12-382-501	6	

Rev Str 1014+10 to 1022+ + 7-30-51 - J.C.R.

LIST OF STRUCTURES

STATION	DESCRIPTION	REMOVE STRUCTURE NO.	EXCAVATION UNCLASSIFIED CUBIC YARDS EXCAV.	EMB.	UNCLASS. DITCH CU. YDS.	STRUCTURAL EXCAVATION CUBIC YARDS ●	STRUCTURE BACKFILL CU. YDS.	MECHANICAL TAMPING HOUR	GRAVEL OR CR. ROCK SURFACING TON	DETOUR SURFACING CU. YD.	CONCRETE CLASS "A" CU. YD.	CONCRETE CLASS "B" CU. YD.	REINFORCING STEEL LBS.	CORRUGATED METAL SIPHON PIPE LIN. FT. 18"	24"	CORRUGATED METAL CULVERT PIPE LIN. FT. 18"	24"	TOTAL LIN. FT. 4" DRAIN PIPE	MISCELLANEOUS
1014+218 to 1026+38.1	Intersection & Ramps			*															
1014+218	Overpass																		
1014+ to 1022+	Perf. C.M.P. Underdrain Lt. & Rt. Outlet Ditch				64	720			Quantities in Summary										1600 Lin. Ft. 8" Perf. C.M.P. Underdrain
1014+90 to 1015+25	Side Drain under Siphons & Berm for Siphon			130		1	13										38		
1019+00	18" X 227'-5" Siphon (H=2'-6" Lt. & H=6'-6" Rt.)																		
	Siphon Drain & Headwalls					120	60				3.90		308	232				225	1-4" G.I. Valve & Valve Box, 2-Trash Guards for 18" Siphon.
1018+18	24" X 229'-3" Siphon (H=2'-0" Lt. & H=7'-6" Rt.),																		
	Siphon Drain & Headwalls.					130	30				4.05		320		238				1-4" G.I. Valve & Valve Box, 2-Trash
1025+00	Cross Culvert & Ditches				5	20	42										130		Guards for 24" Siphon.
	North Federal Blvd. Approaches																		
3+81 to 6+50	Remove Concrete Pavement																		Remove 538 Sq. Yds. Concrete Pavement
13+50 to 16+50	Remove Concrete Pavement																		Remove 600 Sq. Yds. Concrete Pavement
7+00 to 10+23	Irrigation Ditch Change, Lt.				50														
7+70 to 10+53	Irrigation Ditch Change, Lt.				45														
7+70	Concrete Division Box, Lt.					3	2				.60		150						
8+80 to 31+50	Build Detour, Lt.			9,860						1,600									16.0 Bd. Ft. Miscellaneous Units Timber
7+70	Remove 18"x31' C.M.P. with Concrete Headwalls.	1																	
12+77 to 14+15	Irrigation Ditch Change, Lt.				20														
12+86 to 14+20	Irrigation Ditch Change, Lt.				30														
16+ to 28+	Bituminous Ditch Checks Lt.					.5													20 Tons Road Mix - Oil Processed Surf. &
15+ to 21+	Remove Detour Lt.		1,900																1 Ton Asphalt
16+90 to 25+90	Irrigation Ditch Change, Lt.				140														
16+55 to 26+00	Irrigation Ditch Change, Lt.				205														
20+00	Remove 18"x30' C.M.P. with Concrete Headwals	1																	
21+00	Remove 18"x38' & 18"x41' Side Drains, Lt.	2																	
21+12	Concrete Division Box, Lt.					3	2				1.60		150						16.0 Bd. Ft. Miscellaneous Units Timber
24+	Culvert in Irrigation Ditch, Lt.																24		
26+	Culvert in Irrigation Ditch, Lt. "Type "A" Hdwl																		
	at Inlet.					23	33				1.65						104		
22+00 to 35+43	Remove Concrete Pavement																		Remove 2,686 Sq. Yds. Concrete Pavement
26+86 to 28+80	Irrigation Ditch Change, Lt.				25														
28+90 to 30+90	Irrigation Ditch Change Lt.				60														
34+	Reservoir Site, 2-6"x26' Metal Drain Pipes																		
	& 2-6" G. Valve & Valve Boxes for Outlets			5120		20	10												2-6" G. Valve & Valve Boxes and 2-6"x26' Metal Drain Pipe
	Ramp "D"																		
6+05	Cross Culvert in Irrigation Ditch, Type "A" Hdwl at Inlet.					38	60				1.10					150			
5+90	Cross Culvert in Irrigation Ditch, Type "A"																		
	Hdwl at Inlet					53	77				1.65						154		
3+00	Cross Culvert, Type "A" Hdwl at Inlet & Ditches				30	12	25				1.65						72		
	Ramp "E"																		
2+92 to 4+36.5	Overpass								Quantities in Summary										
2+70	Cross Culvert, Type "A" Hdwl at Inlet & Ditches				26	161	54				1.65						154		
3+91	Cross Culvert, Type "A" Hdwl at Inlet & Ditches				5	28	47				.65						132		
7+43	Cross Culvert in Irrigation Ditch, Type "A"																		
	Hdwl at Inlet & Ditches				10	20	67				1.65						200		
13+22	18"X 94' Siphon (H=3'-6" Lt. & H=4'-0" Rt), Hdwls																		
	& Siphon Drain.					40	28				3.90		308	98				200	1-4" G.I. Valve & Valve Box, 2-Trash Guards for 18" Siphon.
13+22 to 15+80	Irrigation Ditch, Lt.				54														
14+50 to 18+	Dyke for Reservoir, Lt.			1050															
16+22	Cross Culvert in Irrigation Ditch, Type "A"																		
	Hdwl at Inlet.					15	23				1.65						66		
Intersection	Mechanical Tamping							83											
TOTAL - 48' WIDTH		4	1,900	16,100	758	1415	629	83		1,600	15.05	12.65	.230	330	235	150	1064	425	

INTERSECTION

Rev. Structures, 1077+50 & 1105+00 - 7-30-51 - J.C.R.

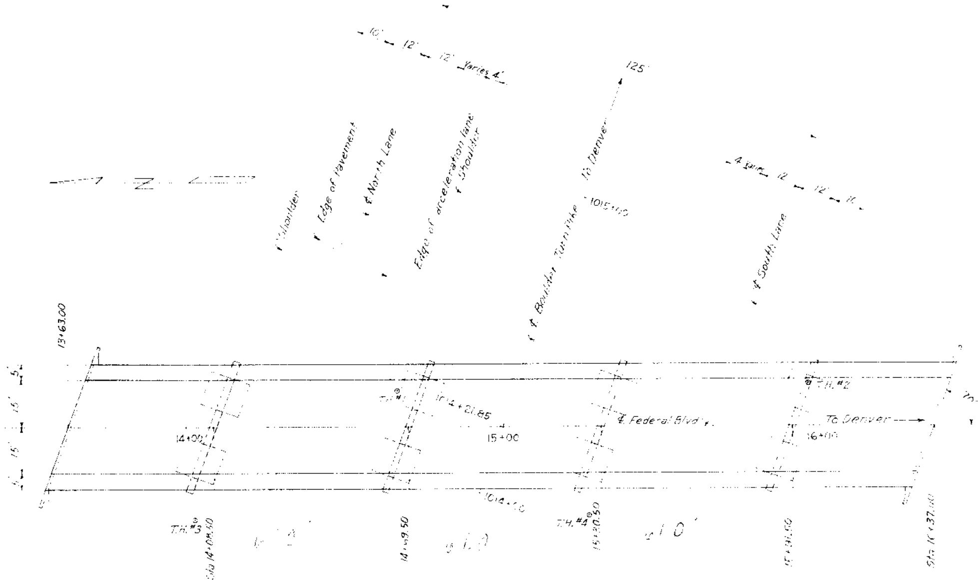
LIST OF STRUCTURES

STATION	DESCRIPTION	REMOVE STRUCTURE NO.	EXCAVATION UNCLASSIFIED CUBIC YARDS EXCAV.	EXCAVATION UNCLASSIFIED CUBIC YARDS EMB.	UNCLASS. DITCH CU. YDS.	STRUCTURAL EXCAVATION CUBIC YARDS ●	STRUCTURE BACKFILL CU. YDS.	MECHANICAL TAMPING HOUR	GRAVEL OR CR. ROCK SURFACING TON	DETOUR SURFACING CU. YD.	CONCRETE CLASS "A" CU. YD.	CONCRETE CLASS "B" CU. YD.	REIN-FORCING STEEL LBS.	CORRUGATED METAL SIPHON PIPE LIN. FT. 18"	CORRUGATED METAL SIPHON PIPE LIN. FT. 24"	CORRUGATED METAL CULVERT PIPE LIN. FT. 8"	CMP LIN. FT. 18"	CMP LIN. FT. 24"	CMP LIN. FT. 36"	CMP ARCH 58"x36"	METAL DRAIN PIPE LIN. FT. 4"	MISCELLANEOUS
1028+ to 1034+	Remove & Reset Concrete Ditch Checks in Irrigation Ditches, Lt. & Rt.																					Removing & Resetting 14 Concrete Ditch Checks
1029+00	Cross Culvert in Irrigation Ditch & Ditches, Type "A" Headwall at Inlet				5	35	57					1.65						174				
1029+00 to 1032+50	Irrigation Ditch, Rt.				50																	
1029+00 to 1035+00	Irrigation Ditch, Lt.				100																	
1030+00	Cross Culvert & Outlet Ditch. No. 13 Conc. Inlet in Median, (H=3'6")				5	22	27				0.90		100					76				1-No. 13 Inlet Grating & Frame.
1043+	Cross Culvert to encase water line					50	20									120						
1042+	Road Approaches, Lt. & Rt.			100					70													
1042+09	Cross Culvert & Ditches				5	6	25											74				
1042+52	Cross Culvert & Ditches				5	5	22											66				
1049+00	Arch Cross Culvert & Ditches				40	18	50													78		
1050+40	Cross Culvert in Irrigation Ditch & Ditches				10	10	18										66					
1052+00	Road Approaches & Side Drains & Ditches, Lt. & Rt.			35	25	15	16		70								30 30					
1066+20	6x7x70 C.B.C. Hdwl. at Outlet & Special Hdwl. at Inlet & Ditches				75	70	100				69.14		6758									
1056+00	Cross Culvert in Irrigation Ditch & Ditches Rem. 12x10' Pipe	1			5	12	17										64					
1060+79	Cross Culvert in Irrigation Ditch & Ditches				5	7	19										12					
1070+22	Cross Culvert in Irrigation Ditch & Ditches				5	12	27											82				
1070+48	Road Approaches, Lt. & Rt.			125					70													
1070+70	Cross Culvert in Irrigation Ditch & Ditches				5	[illegible]	27											82				
1072+50	Cross Culvert & Ditches				5	10	24											72				
1076+50	24"x126' [illegible] Siphon (H=5'0" Lt. & H=7'0" Rt.) & Siphon Drain, Concrete Headwall at Inlet & Special Headwall at Outlet & Ditches. Rem. 1-4' Wd. Div. Box & 18"x16' Tile Pipe, Rt.	2			10	38	127				4.92		255		[illegible]						340	1-4" C.I. Valve & Valve Box & 2 Trash Guards for 24" Siphon.
1078+ to 1079+	Irrigation Ditch, Rt.				15																	
1079+ to 1098+	Irrigation Ditch, Rt.				300																	
1092+60	Cross Culvert & Inlet Ditch				5	11	27											80				
1098+67	Cross Culvert in Irrigation Ditch & Ditches				5	18	26											78				
1106+96	24"x97.5' Siphon (H=6'0" Lt. & H=5'6" Rt.) & Siphon Drain, Concrete Headwalls & Ditches				20	90	64				4.65		320		103						200	1-4" C.I. Valve & Valve Box & 2 Trash Guards for 24" Siphon.
1105+00	Side Drains & Road Approaches, Rt. & Lt., Ditches		275		10	7	14		70								{26 {26					
1111+36	Cross Culvert in Irrigation Ditch & Ditches				5	20	52												108			
1111+79	Cross Culvert in Irrigation Ditch & Ditches				5	7	26										100					
1114+00	Cross Culvert in Irrigation Ditch & Ditches				5	10	30											90				
1117+50	Side Drain, Rt. & Road Approaches, Lt. & Rt.			470		4	10		70								38					
1118+50	Double Arch Cross Culvert in Irrigation Ditch		50			5	85													84		
1112+00	Cross Culvert in Irrigation Ditch & Ditches				10	15	27										104			84		
1117+ to 1125+	Gravel for Service Road, Rt.								280													
1125+00	Side Drain & Ditches, Lt. & Road Approaches Lt. & Rt.				5	10	8										30					
	Remove 12"x26' C.M.P. Lt.	1		45					70													
1131+25	8x5x84' Special C.B.C. & Ditches, (W=18'). Headwall at Inlet. Special Headwall & Riprap at Outlet.		300			50	235				97.00		8810									102 Bd. Ft. Misc. Untreated Timber. 15 Cu. Yds. Riprap
	Removal Concrete Riser, Rt.	1																				
1077+50	Road Approaches Rt. & Lt. & Side Drains Rt. & Lt.					17	14		70								{26 {26					
1132+11.7	Project Marker																					1-Project Marker (by State Forces)
Roadway	Mechanical Tamping							125														
	TOTAL - 24' WIDTH	5	625	775	740	684	1,194	125	770		176.61	1.65	16,271		230	120	638	874	108	246	550	

ROADWAY

● Structural Excavation is estimated to be 90% Common and 10% Rock, each of which is estimated to be 75% Dry and 25% Wet.

* Included in Roadway Quantities



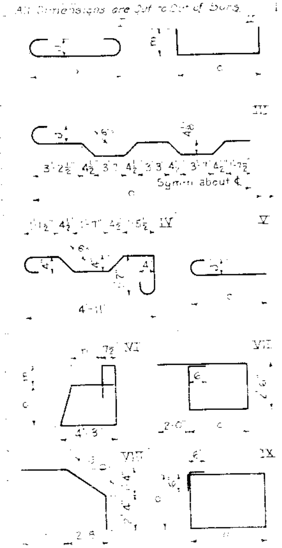
Bar List For Piers

Mark	Size	Length	Type	o	m	n	J	No. Req'd for Piers 2	3	4	5
421 to 434	½"φ	1'-8" by ½ 0'-10"	IX	1'-8" by ½ 2'-2½	1'-8" by ½ 2'-2½			2ea	2ea	2ea	2ea
435	½φ	10'-0	IX	2'-3"	2'-3"					2	
436	½φ	10'-2	IX	2'-3½	2'-3½					2	
437	½φ	10'-0"	Str					8	8	8	8
438	½φ	9'-5"	IX	2'-8	1'-6½			4	4	4	4
506	⅝φ	23'-0"	Str					8	8	8	8
507	⅝φ	12'-6"	Str					6	6	6	6
508	⅝φ	13'-6	IX	4'-7"	1'-8"			40			40
509	⅝φ	16'-11	IX	6'-3½	1'-8			[illegible]			3
510	⅝φ	13'-10	IX	4'-3"	1'-8"				40	40	
511	⅝φ	17'-3	IX	6'-5½	1'-8"				3	3	
512	⅝φ	17'-7"	IX	6'-7½	1'-8"				3		
513	⅝φ	17'-5"	IX	6'-6½	1'-8"						3
514	⅝φ	17'-9"	IX	6'-8½	1'-8"					3	
901	1⅛φ	12'-8"	I	10'-6"			10"	32	32	16	32
902	1⅛φ	18'-3"	Str					12	12		12
903	1⅛φ	13'-0"	Str					4	4		4
904	1⅛φ	20'-0"	Str							17	
1001	1¼φ	7'-10"	V	6'-7			1'1¼	16	16	16	16
1002	1¼φ	14'-0"	I	11'-6"			1'1¼			16	
1003	1¼φ	15'-6"	Str							4	
1101	1⅜φ	15'-4"	I	12'-6"			1'-0½	2	2	2	2
1102	1⅜φ	26'-6"	I	23'-8"			1'-0½	3	3	3	3
1103	1⅜φ	13'-10"	I	11'-0"			1'-0½	4	4	4	4
1104	1⅜φ	25'-5"	V	24'-0			1'-0½	6	6	6	6

EFS WLP

Bending Diagrams

All Dimensions are Out to Out of Bars.



Bar Summary For Piers

Bar No	Bar Size	Weight Lb/Lin Ft	Linear Feet Req'd for each Pier: Pier #2	Pier #3	Pier #4	Pier #5	Lbs Reinf Steel Req'd for each Pier: Pier #2	Pier #3	Pier #4	Pier #5
4	½φ	0.668	363	363	403	36?	242	242	26?	[illegible]
5	⅝φ	1.043	[illegible]	9?7	917	907	940	95?	956	941
9	1φ	3.400	[illegible]	[illegible]	44?	67?	2343	2208	1506	2298
10	1¼φ	4.303	133	125	41?	125	572	536	1?3	538
11	1⅜φ	5.313	332	31?	318	318	764	1690	690	1690
					1% for overrun		59	56	60	6?
					TOTALS		5320	5780	6250	5770

Bar List For Superstructure

EFS PG

Mark	Size	No Req'd	Length	Type	o	m	n	J
501	⅝φ	217	34'-8	I	33'-8			
502	⅝φ	217	35'-0	II	32'-10"			2'2"
503	⅝φ	7??	35-8	III	33'-2"			4"
40?	½φ	5??	?3	IV				
???	½φ	?1?	3'-?	Str				
???	½φ	2?4	22'-8	Str				

Bar Summary For Superstructure

15 ??? lin ft ½φ bars @ 0.668# = 15601#
22 857 ⅝φ @ 1.043 = 23840
1% for overrun 389
TOTAL 39830

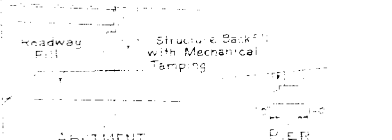
Summary of Quantities

Item	Description	Unit	Supers	Abut #1	Pier #2	Pier #3	Pier #4	Pier #5	Abut #6	Total
4?	Dry Common Excavation	CuYd			76	63	82	85		312
12a	Structure Backfill	CuYd		120	45	36	48	53	120	422
16d	Mechanical Tamping	Hours		12	5	4	5	5	12	43
42a	Untreated Bridge Timber	Mftbm		0.128					0.128	0.256
46a	Class "A" Concrete	CuYd	249	50.1	50.0	50.5	54.0	50.3	50.1	554
47	Reinforcing Steel	Lb	39830	1460	5320	5780	6250	5770	1450	66460
A48	Structural Steel	Lb.	273,000							273,000
60a	Treated Timber Piling	Lin Ft		510	480	480	480	480	510	2940
89	Drain Pipe 4" x 2'-0"	Ea	14							14
*	½" Expansion Joint Mat'l	Sq Ft	170							170
*	Sheet Metal (Galv.)	Sq Ft	3							3

* Include in Bid Price of Class "A" Concrete.

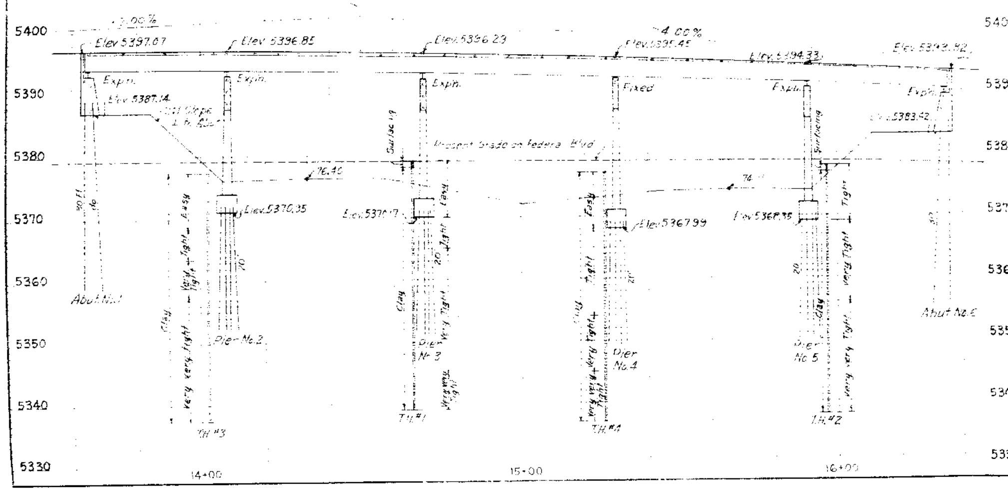
Reference Drawings

Sheet No 12 Details of Piers



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.

STRUCTURE BACKFILL AND MECHANICAL TAMPING DIAGRAMS



ALL RIVETS TO BE ⅞" DIA.

STRUCTURE NO E-16-Q

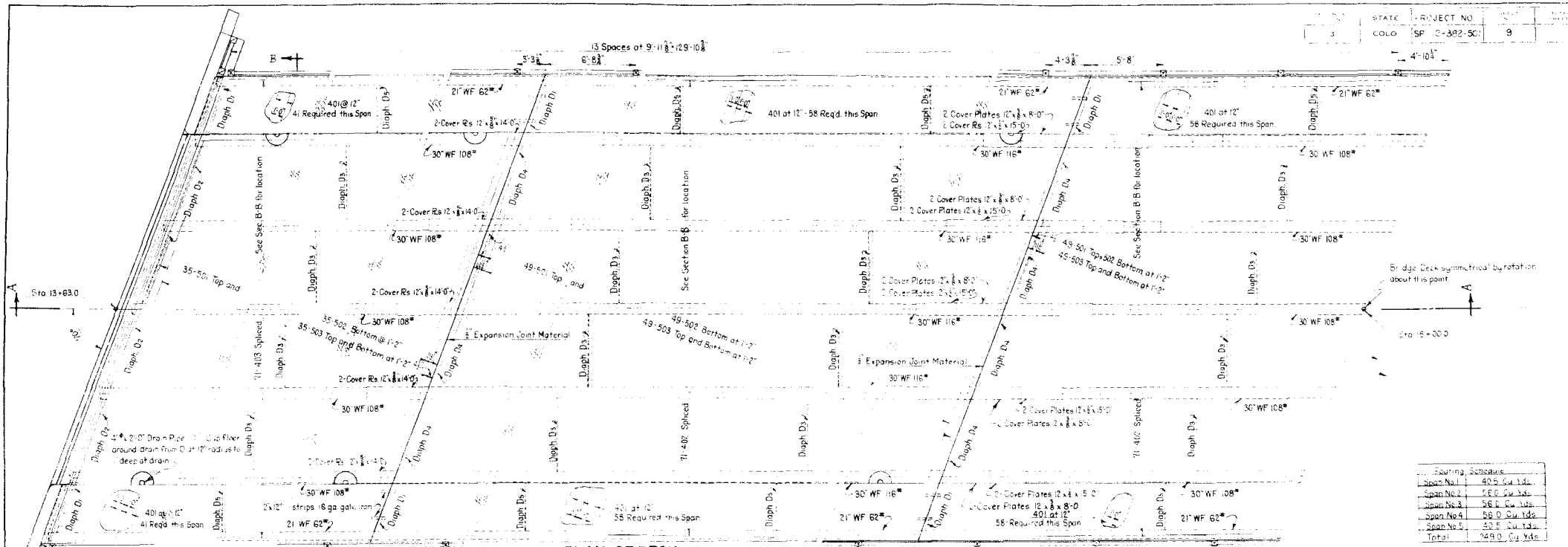
STATE	PROJECT NO.	SHEET NO.
COLO	SP 12(?)...	8

COLORADO STATE HIGHWAY DEPARTMENT

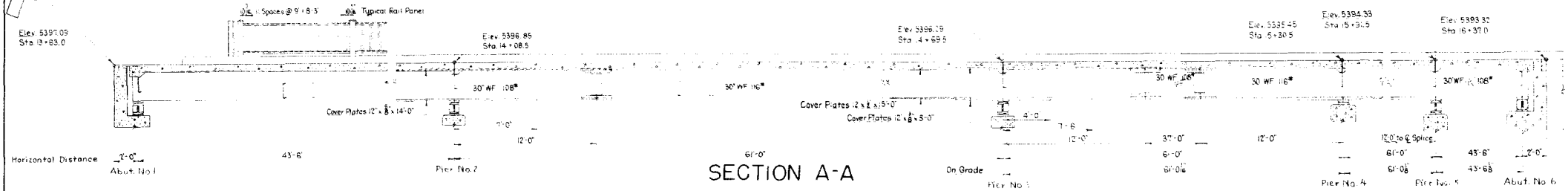
5 SPAN CONTINUOUS
43'-6", 61', 61', 61', 43'-6"
CONCRETE AND I-BEAM OVERPASS
30' ROADWAY AND 2-5' SIDEWALKS
Across Boulder Turnpike on Federal Blvd
Sta 13+63.00 to 16+37.00
Near Westminster Sec. 32 T 2 S R 68 W

Designed by A.D.N. | Approved by O.J. Bailey, Bridge Engineer
Made by A.D.N.
Checked by
Date: April 27, 1951

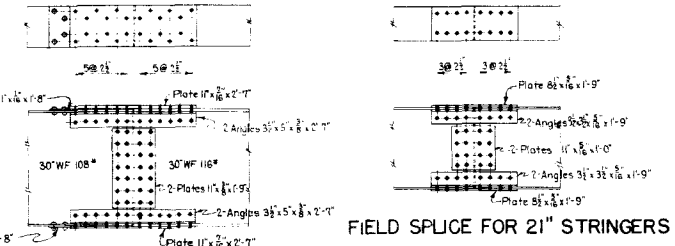
	STATE	PROJECT NO.		
3	COLO	SP 0382-501	9	



PLAN OF DECK
FOR SECTION B-B SEE SHEET NO. 10



SECTION A-A



FIELD SPLICE FOR 30" STRINGERS

FIELD SPLICE FOR 21" STRINGERS

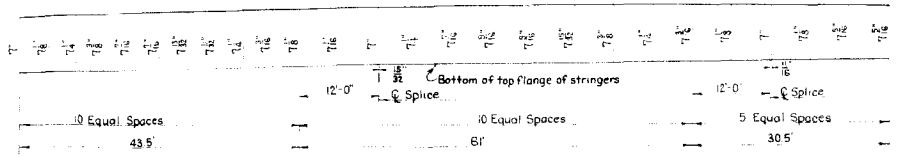
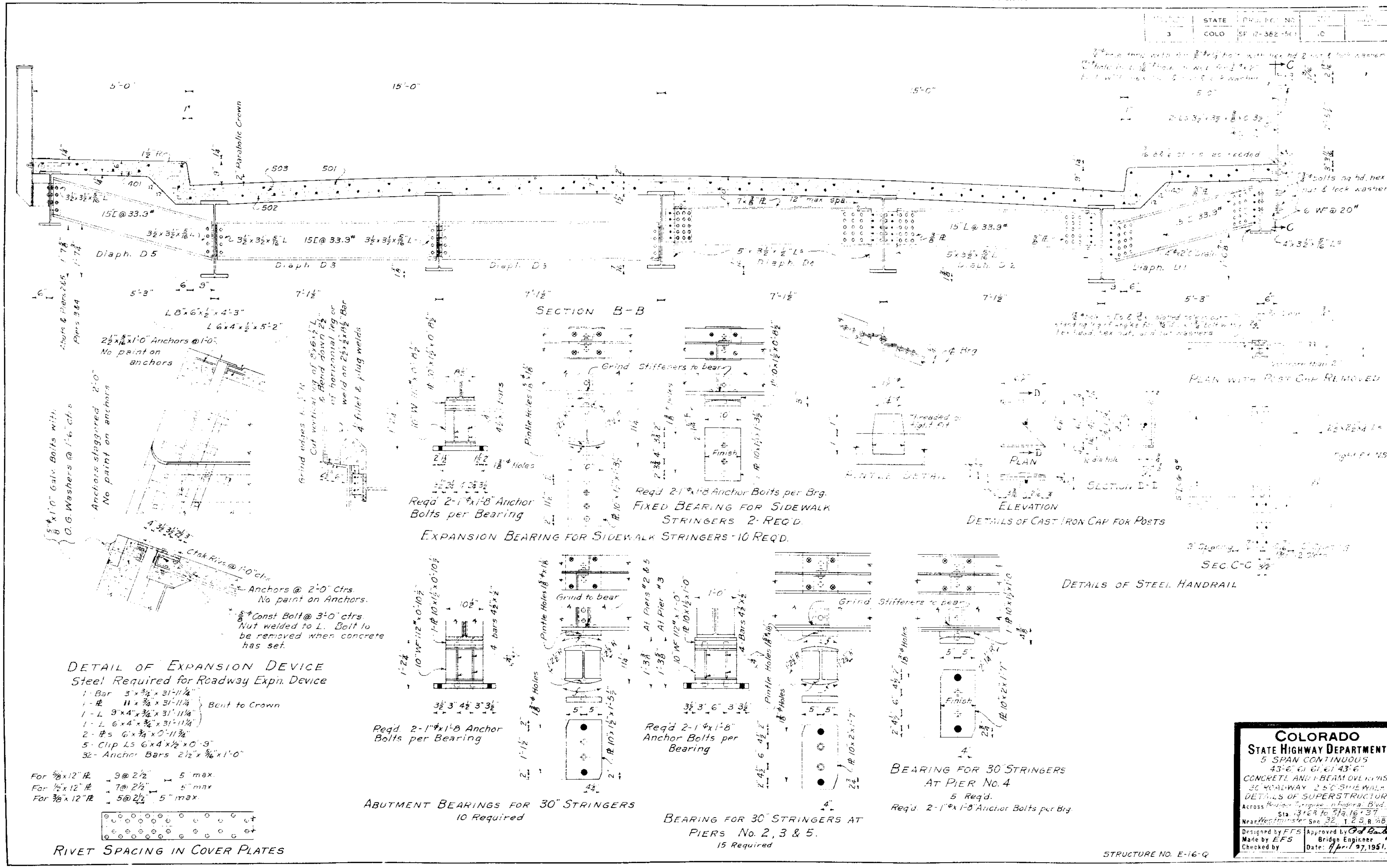


DIAGRAM OF BEAM BLOCKING AND SLAB THICKENING FOR D.L. DEFLECTION AND V.C.

Structure No E-16-Q

COLORADO
STATE HIGHWAY DEPARTMENT
5 SPAN CONTINUOUS(43'-6",6(61',61',61',43'-6"
CONCRETE AND I BEAM OVERPASS
30' ROADWAY AND 2'-5'-0" SIDEWALKS
DETAILS OF SUPERSTRUCTURE
Across Boulder Turn Pike on Federal Blvd.
Sta 13+63 to 16+37
Near Westminster Sec. 32 T. 2S R68W

Designed by E.F.S.	Approved by Ral Bailey
Made by E.F.S.	Bridge Engineer
Checked by	Date: April 27, 1971



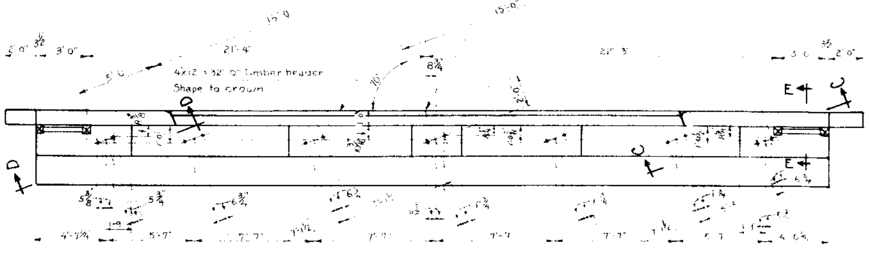
COLORADO
STATE HIGHWAY DEPARTMENT
5 SPAN CONTINUOUS
43'-6" 61' 61' 61' 43'-6"
CONCRETE AND I-BEAM OVERPASS
30' ROADWAY 2-5'-0" SIDEWALKS
DETAILS OF SUPERSTRUCTURE

Designed by E.F.S.
Made by E.F.S.
Checked by
Approved by
Bridge Engineer
Date: April 27, 1951.

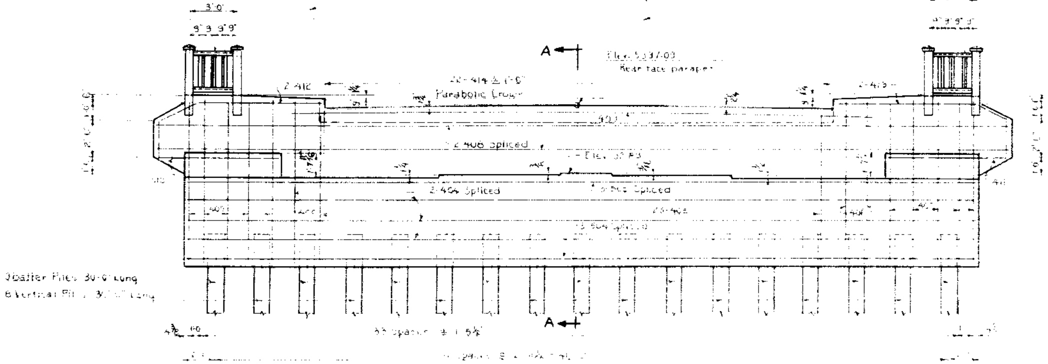
STRUCTURE NO. E-16-Q

	STATE	PROJ. NO.		
3	COLO	[illegible]	11	

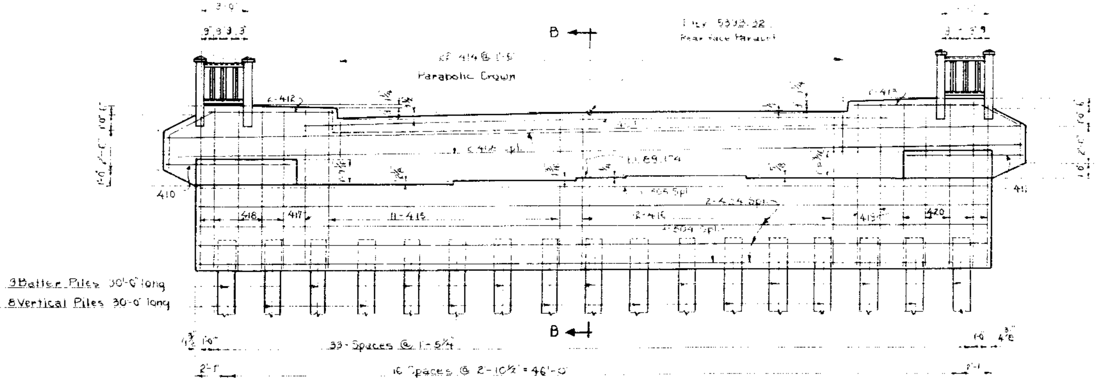
Sta. 13+63.00 Abut. No. 1
Sta. 16+37.00 Abut. No. 6



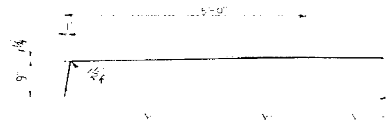
PLAN ABUTMENTS No. 1 & 6

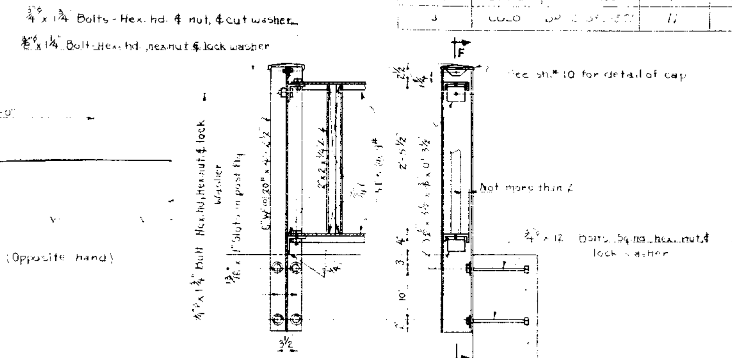


ELEVATION ABUTMENT No. 1
Max. Pile Load 20 Tons.
All Piles Treated Timber



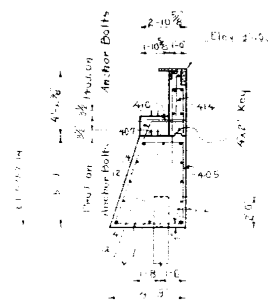
ELEVATION ABUTMENT No. 6
Max. Pile Load 20 Tons.
All Piles Treated Timber



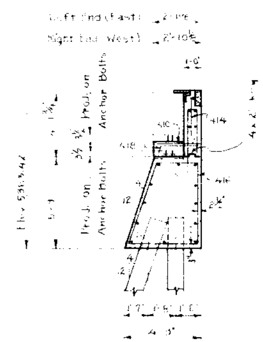


Sec. F-F

Sec. E-E



SECTION A-A



SECTION B-B

CUBIC YARDS CONCRETE

	ABUTMENT No. 1	ABUTMENT No. 6
BRIDGE SEAT	40.0	40.0
PARAPET	10.1	10.1
TOTAL	50.1	50.1

BAR LIST ABUTMENTS No. 1 & 6

(All Dimensions are out to out of Bars)

Abut No. 1 Mark	No. Reqd	Abut No. 6 Mark	No. Reqd	Size	Length	Type	a	m	n	o
404	12	404	12	[illegible]	25'-6"	Str.				
405	23			[illegible]	25'-10"	VI	5'-2	3'-5	[illegible]	
406	3			[illegible]	28'-2	VI	5'-2	4'-[illegible]	[illegible]	
407	10			[illegible]	28'-3	VI	[illegible]	3'-3	1'-[illegible]	
408	8	408	8	[illegible]	27'-4	Str.				
409	1	409	1	½"	34'-0	Str.				
410	1	410	1	½"	13'-6"	VII	6'-0"			
411	1	411	1	½"	18'-5"	VII	5'-5½"			
412	2	412	2	½"	12'-10	VIII	7'-6"			
413	2	413	2	½"	13'-5"	VIII	8'-1			
414	22	414	22	⅜"	[illegible]	Str.				
		415	11	½"	25'-3"	VI	5'-0	3'-1½	[illegible]	
		416	12	½"	25'-10	VI	5'-4	3'-1½"	1'-10"	
		417	1	½"	28'-[illegible]	VI	5'-0"	4'-[illegible]	1'-[illegible]	
		418	5	½"	28'-3	VI	6'-8	3'-4"	1'-5	
		419	2	½"	29'-1"	VI	5'-4	4'-[illegible]	1'-10	
		420	5	½"	28'-8"	VI	7'-0	3'-3"	1'-3½	
504	6	504	6	⅝"	[illegible]'-9	Str.				
505	6	505	6	⅝"	30'-4	V	25'-9			

BAR SUMMARY ABUTMENT No. 1
1057 lin. ft. ½" bar @ .668 lbs. per sq. ft. = 1107 lbs.
312 " " ⅝" " @ 1.043 " " " " = 326 lbs.
1433 lbs.
+ 1% ± Overrun = 27
Total = 1460 lbs.

BAR SUMMARY ABUTMENT No. 6
1053 lin. ft. ½" bar @ .668 lbs. per sq. ft. = 1104 lbs.
313 " " ⅝" " @ 1.043 " " " " = 326 "
1430 "
+1% ± Overrun = 20 "
Total = 1450 lbs.

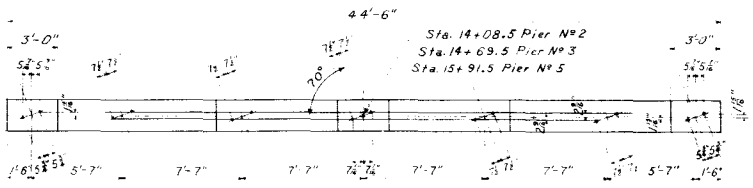
Structure No. F-16-G

COLORADO
STATE HIGHWAY DEPARTMENT
5 SPANS CONT. (43'-0", [illegible], 43'-0")
CONCRETE & I BEAM OVERPASS
30' ROADWAY WITH 2-5'-0" SIDEWALKS
DETAILS OF ABUTMENTS
Across Boulder Turnpike on Federal
Sta. 13+63.00 to Sta. 16+37.00
Near Westminster Sec. 32 T. 2 S. R. 68 W.

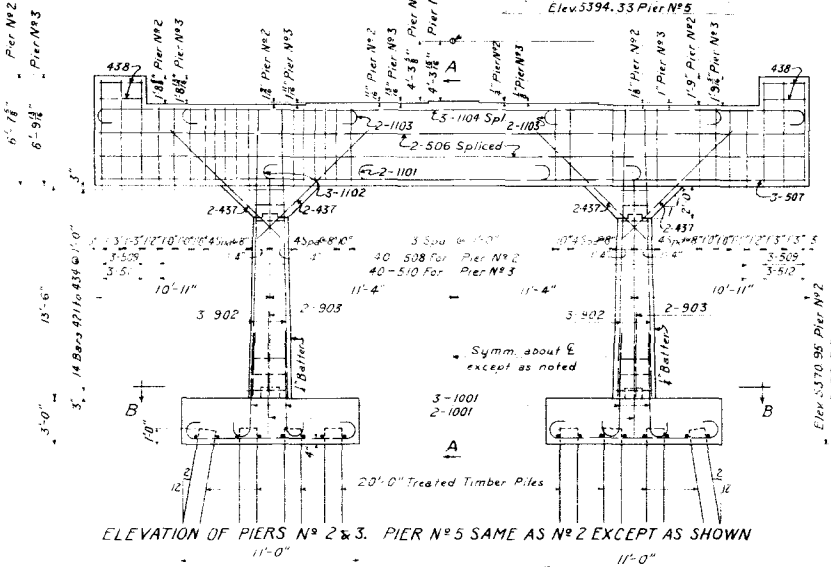
Designed by E.F.S.	Approved by R.J. Bailey, Bridge Engineer
Made by E.F.S.	
Checked by	Date: April 27, 1951.

REVISIONS

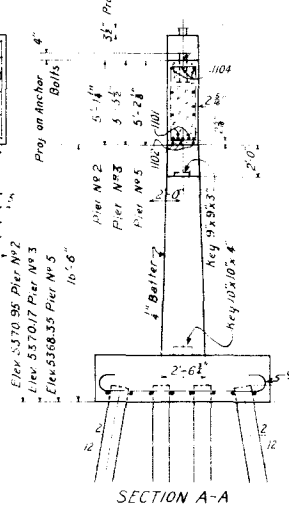
	STATE	PROJECT No.		
3	COLO.	SP12-052-501	12	



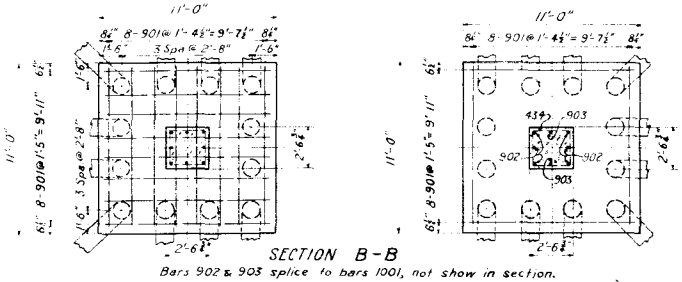
PLAN OF CAP PIERS Nº 2, 3 & 5



ELEVATION OF PIERS Nº 2 & 3. PIER Nº 5 SAME AS Nº 2 EXCEPT AS SHOWN



SECTION A-A



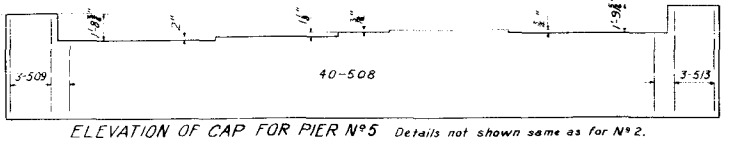
SECTION B-B

Bars 902 & 903 splice to bars 1001, not show in section.

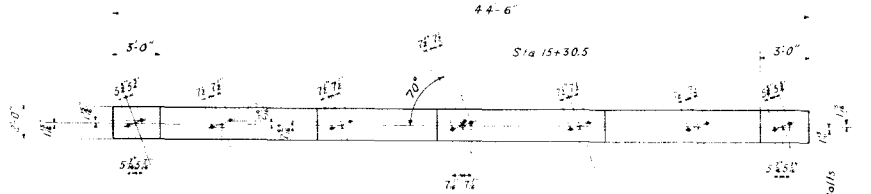
DETAILS OF PIERS Nº 2, 3 & 5

Max. Pile Load 19.5 Tons

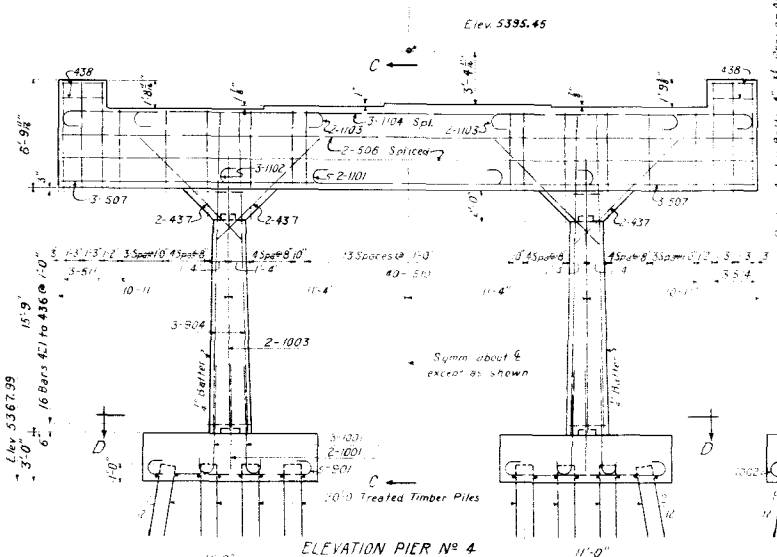
CUBIC YARDS CONCRETE	PIER Nº2	PIER Nº3	PIER Nº4	PIER Nº5
FOOTINGS	26.9	26.9	29.3	26.9
COLUMNS	4.6	4.6	5.7	4.6
CAP	18.5	19.0	19.0	18.9
TOTAL	50.0	50.5	54.0	50.3



ELEVATION OF CAP FOR PIER Nº 5 Details not shown same as for Nº 2.

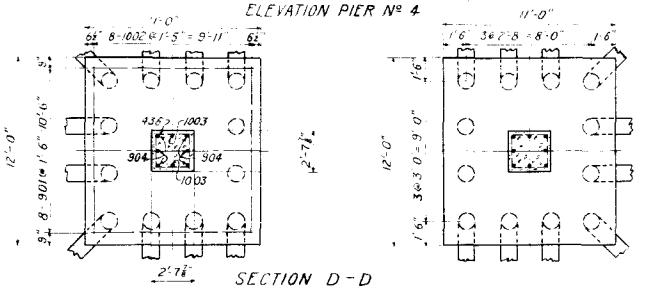


PLAN OF CAP PIER Nº 4



ELEVATION PIER Nº 4

SECTION C-C



SECTION D-D

Bars 1001, not shown, splice to bars 904 & 1003

DETAILS OF PIER Nº 4

Max. Pile Load 21.5 Tons

STRUCTURE Nº E-16-Q

COLORADO
STATE HIGHWAY DEPARTMENT

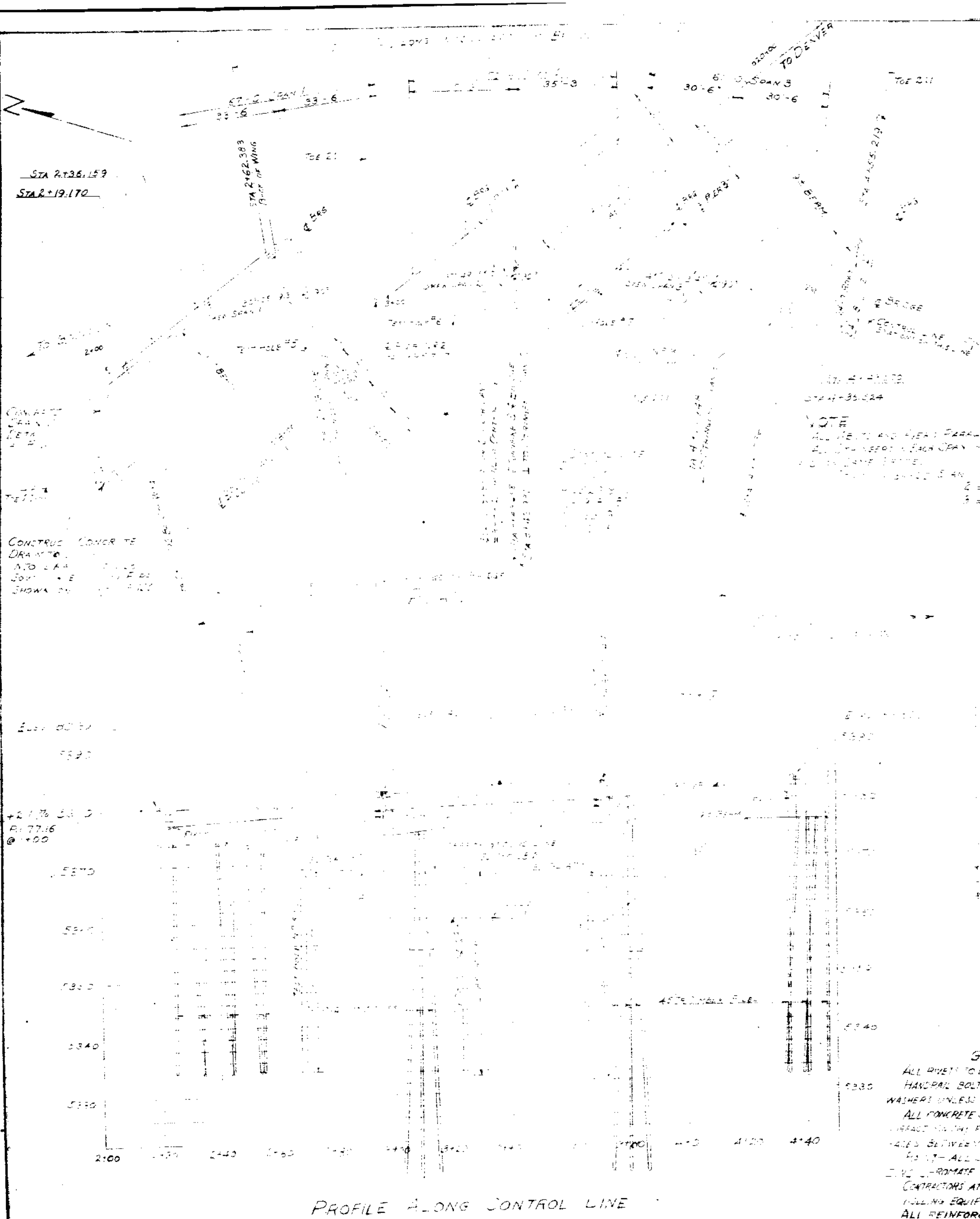
5 SPAN CONTINUOUS (45'6, 6, 6, 6, 45'6") CONCRETE & I BEAM OVER PASS
30'-0" ROADWAY WITH 2'-5'-0 SIDEWALKS

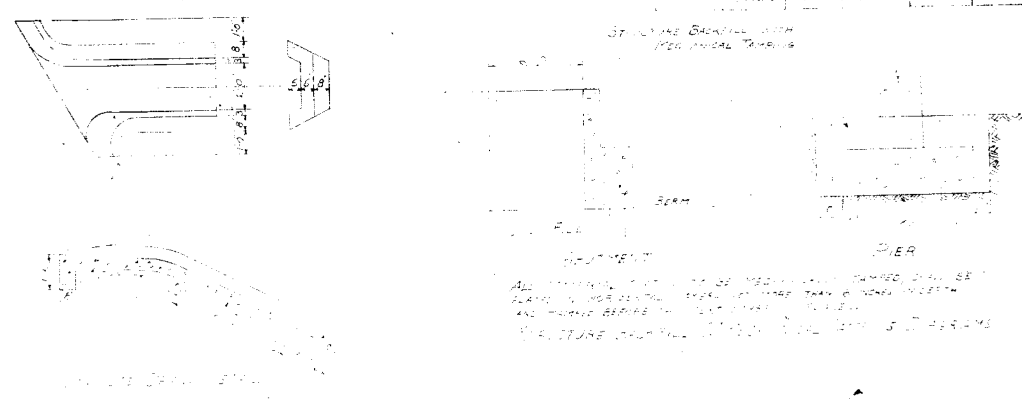
DETAILS OF PIERS

Across: Boulder Turnpike on Federal
Sta. 13+63.0 To 16+37.0
Near: Westminster Sec. 32 T. 2S R. 68W

Designed by E F S	Approved by [signature]
Made by E F S	Bridge Engineer
Checked by	Date Apr. 1 31, 1951

Sheet No.	Total Sheets
13	





GENERAL NOTES CONTINUED

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

HANDRAIL BOLTS SHALL HAVE HEX HEADS AND NUTS WITH LOCK WASHERS UNLESS OTHERWISE SPECIFIED.

ALL CONCRETE SURFACES EXPOSED TO VIEW SHALL RECEIVE CLASS I SURFACE FINISH EXCEPT UNDERSIDE OF FLOOR SLABS AND SURFACES BETWEEN OUTSIDE STRINGERS.

PAINT—ALL STRUCTURAL STEEL SHALL RECEIVE ONE SHOP COAT ZINC CHROMATE AND TWO FIELD COATS OF ALUMINUM PAINT.

CONTRACTORS ATTENTION IS CALLED TO SPECS. COVERING MECHANICAL TAMPING. ROLLING EQUIPMENT SHALL NOT BE USED ... OF WALLS.

ALL REINFORCING STEEL BARS SHALL CONFORM TO A.S.T.M. SPECIFICATION A-305-50T OR THE LATEST REVISION THEREOF.

GENERAL NOTES

ALL WORK ... JANUARY 1948.

... SPECIFIED.

... EXPOSED IN THE FINISHED WORK SHALL BE ... OF TONGUE & GROOVE LUMBER ... UNLESS FACED WITH PANELS ...

... SHALL BE POURED MONOLITHICALLY.

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

ALL REINFORCING BARS SHALL BE INTERMEDIATE GRADE.

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

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

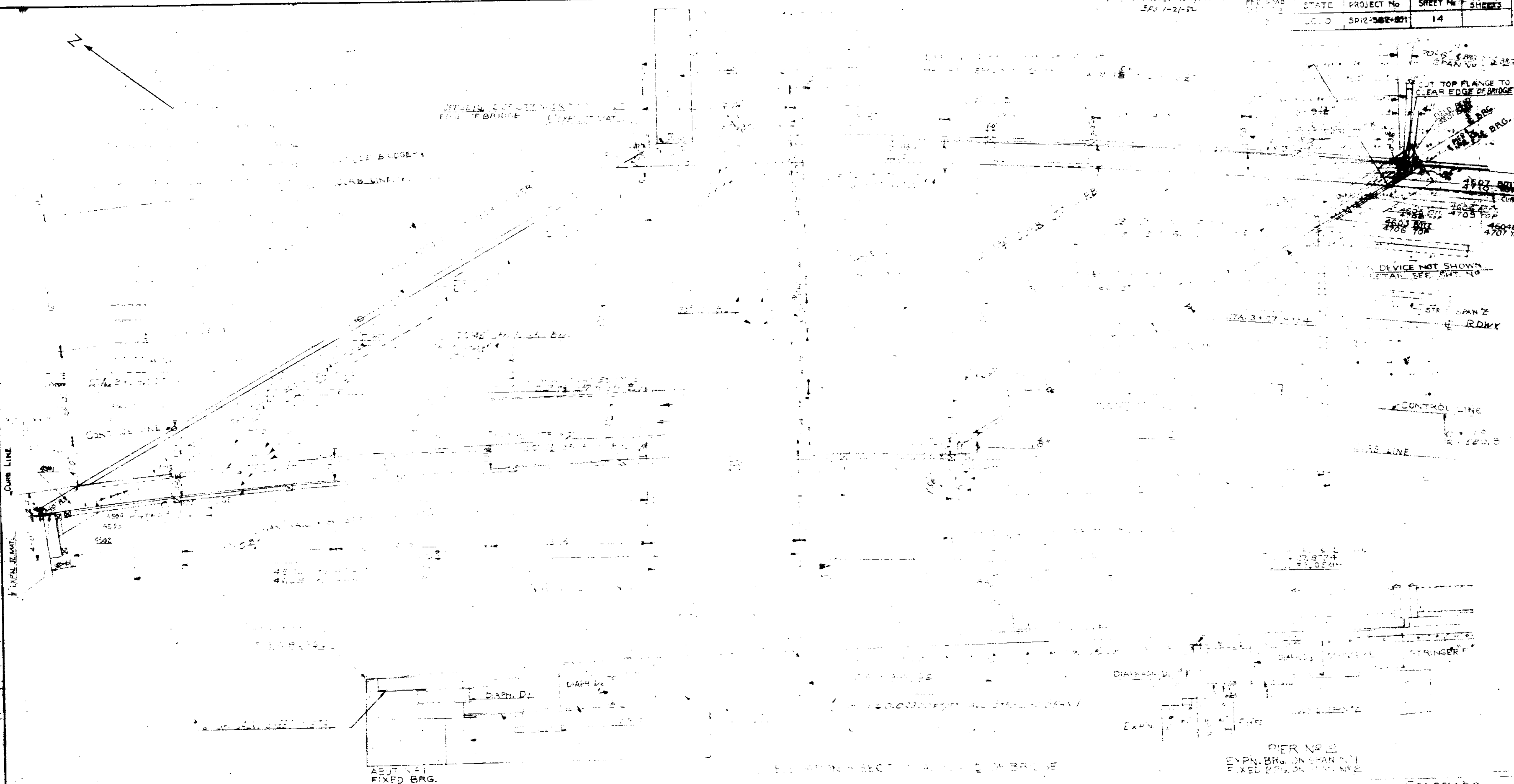
STR. No. E-16

... 24' Roadway

... R68W

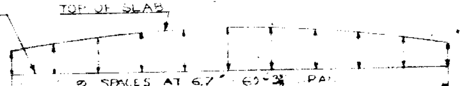
Approved by [signature]
Bridge Engineer
Date April 1951

STATE	PROJECT No	SHEET No	TOTAL SHEETS
COLO	SP12-[illegible]	14	



BOTTOM OF SLAB

TOP OF SLAB



10 SPACES AT 6.7" ... PAN

STRINGER "F"	6 5/8"	7 1/8"	7 1/2"	7 5/8"	[illegible]	[illegible]	8"	7 3/4	[illegible]	6 5/8	6 1/4"
STRINGER "E"	6 1/2	6 7/8"	7 1/8"	7 3/8"	7 1/2	[illegible]	7 5/8"	7 3/4"	7 1/4	6 7/16"	6 1/4"
STRINGER "D"	6 1/2"	6 7/16"	7 1/8"	7 5/16"	7 1/2"	7 9/16	7 1/2"	7 3/8"	7 1/4	6 3/8"	6 3/16"
STRINGER "C"	6 1/4"	6 3/8	7	7 1/2"	7 1/2	7 3/8	7 3/8"	7 1/2"	7 1/4"	7	6 9/16"
STRINGER "B"	[illegible]	[illegible]	6 5/8	6 7/8"	7 3/8"	7 1/2"	7 1/2"	7 5/16"	7 1/4"	7"	7 1/8"
STRINGER "A"	[illegible]	[illegible]	6 5/8"	7 3/16"	7 3/8	7 3/16"	7 3/8"	7 5/16"	7 5/16"	7"	6 15/16"

SLAB CAMBER DIAGRAM

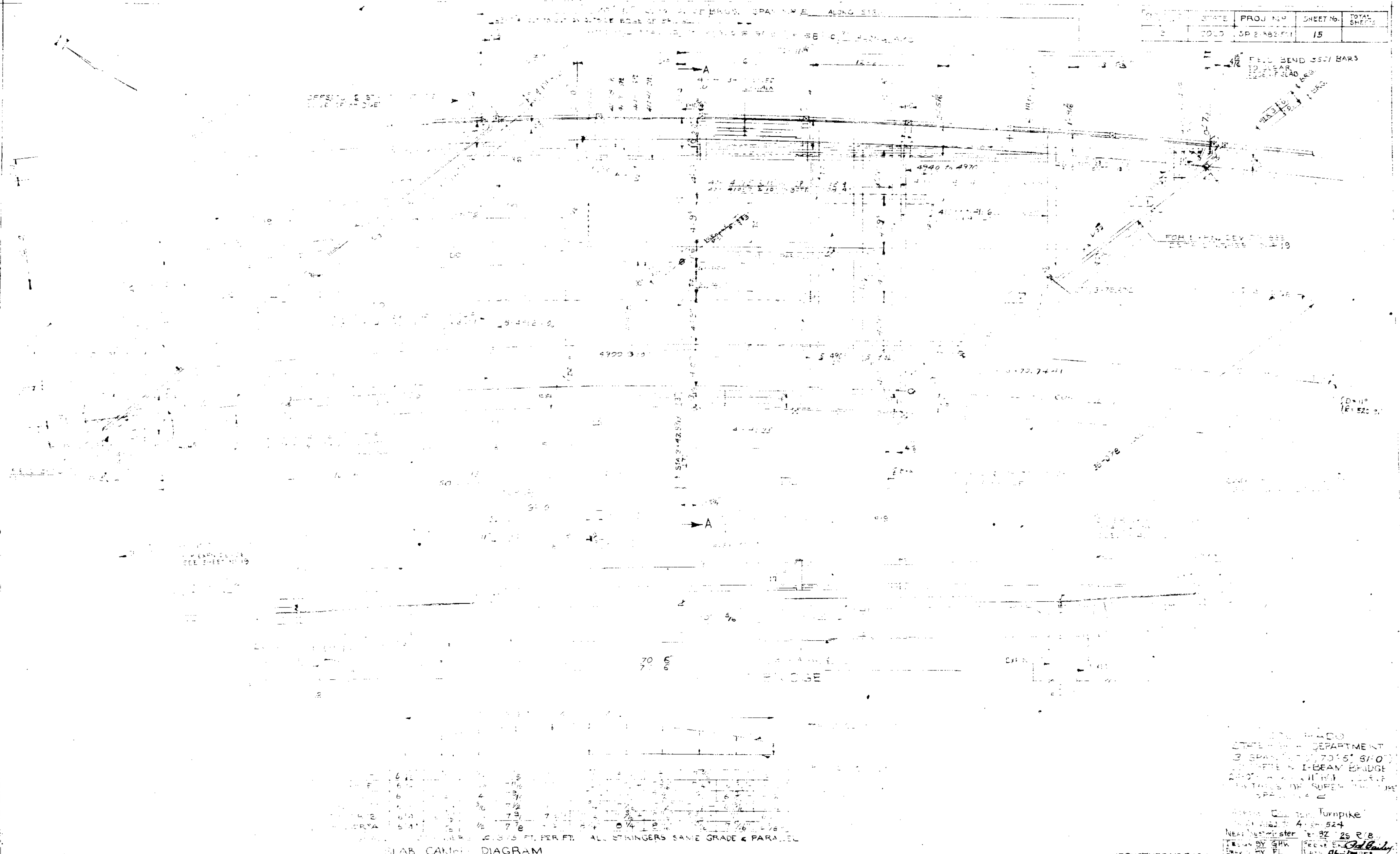
STRUCTURE No E-16-L

COLORADO
STATE HIGHWAY DEPARTMENT
3 SPANS CONCRETE-I BEAM
67'0", 70'6", 61'0" - 24' Roadway
DETAILS of SPAN No. 1
HORIZONTAL CURVE

Across – BOULDER [illegible]
Sta. [illegible]

Designed by: [illegible]
Drawn by: FL
Checked by: [illegible]

	STATE	PROJ. Nº	SHEET No.	TOTAL SHEETS
3	COLO	SP 2-(3)83-F(1)	15	



STATE HIGHWAY DEPARTMENT

3 SPANS 70'-6", 87'-0"

I-BEAM BRIDGE

DETAILS OF SUPERSTRUCTURE

SPAN Nº 2

Turnpike

4-SH-524

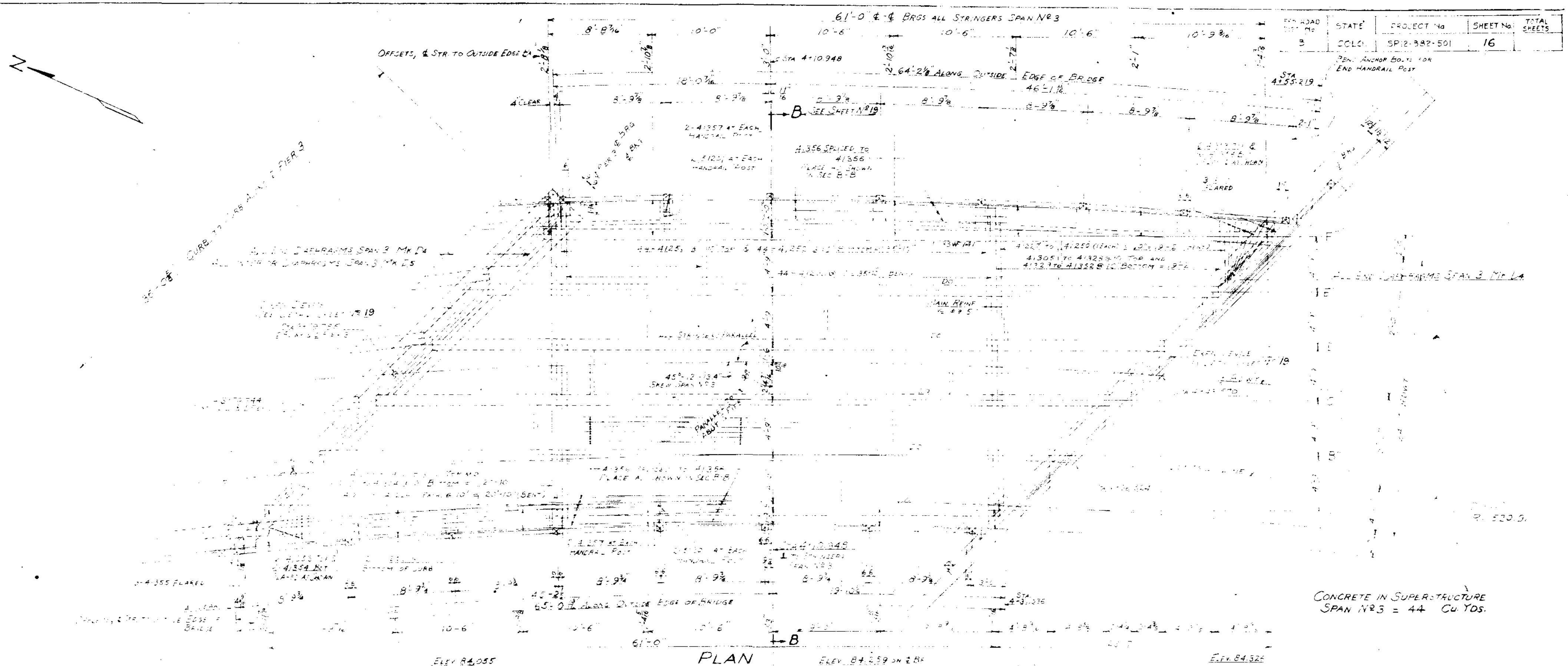
Near Westminster Sec. 32 T. 2S R. 68

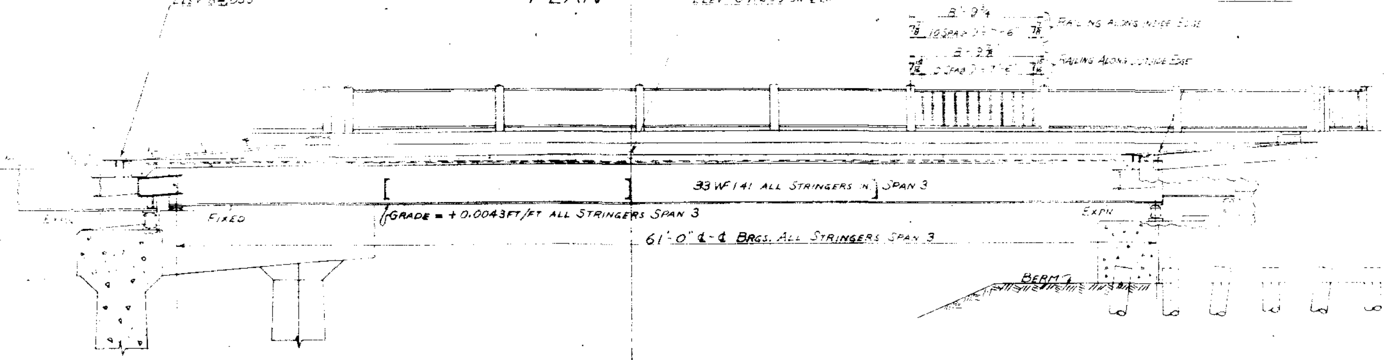
Design BY GHW | Project Engr. Ted Bailey

Drawn BY FL | Date April 1951

STRUCTURE Nº E-16-L

Fed. Road Dist. No.	State	Project No.	Sheet No.	Total Sheets
3	Colo.	SP 2-382-501	16	





SECTION ALONG ¢ OF BRIDGE

Top of Slab — ¢ Brg — 10 Spaces @ 6'1" = 61'-0" — ¢ Brg

Stringer F	6½	6 5/16	7¼	7½	7⅝	7 [illegible]/16	7⅝	7 7/16	7⅛	6 [illegible]/16	6¼
E	6⅜	6 [illegible]/16	7	7 3/16	7 5/16	7 5/16	7¼	7⅛	6⅞	6 9/16	6¼
D	6 5/16	6 [illegible]/16	6 15/16	7⅛	7¼	7 5/16	7¼	7⅛	6⅞	6 9/16	6¼
C	6¼	6 9/16	6⅞	7⅛	7¼	7 5/16	7¼	7⅛	6⅞	6⅝	6¼
B	6¼	6⅝	6⅞	7⅛	7¼	7 5/16	7 5/16	7 3/16	7	6¾	6⅜
A	6¼	6¾	7⅛	7⅛	7 7/16	7⅝	7⅝	7½	7¼	6 15/16	6½

Bottom of Slab

SLAB CAMBER DIAGRAM ALONG ¢ STRINGERS

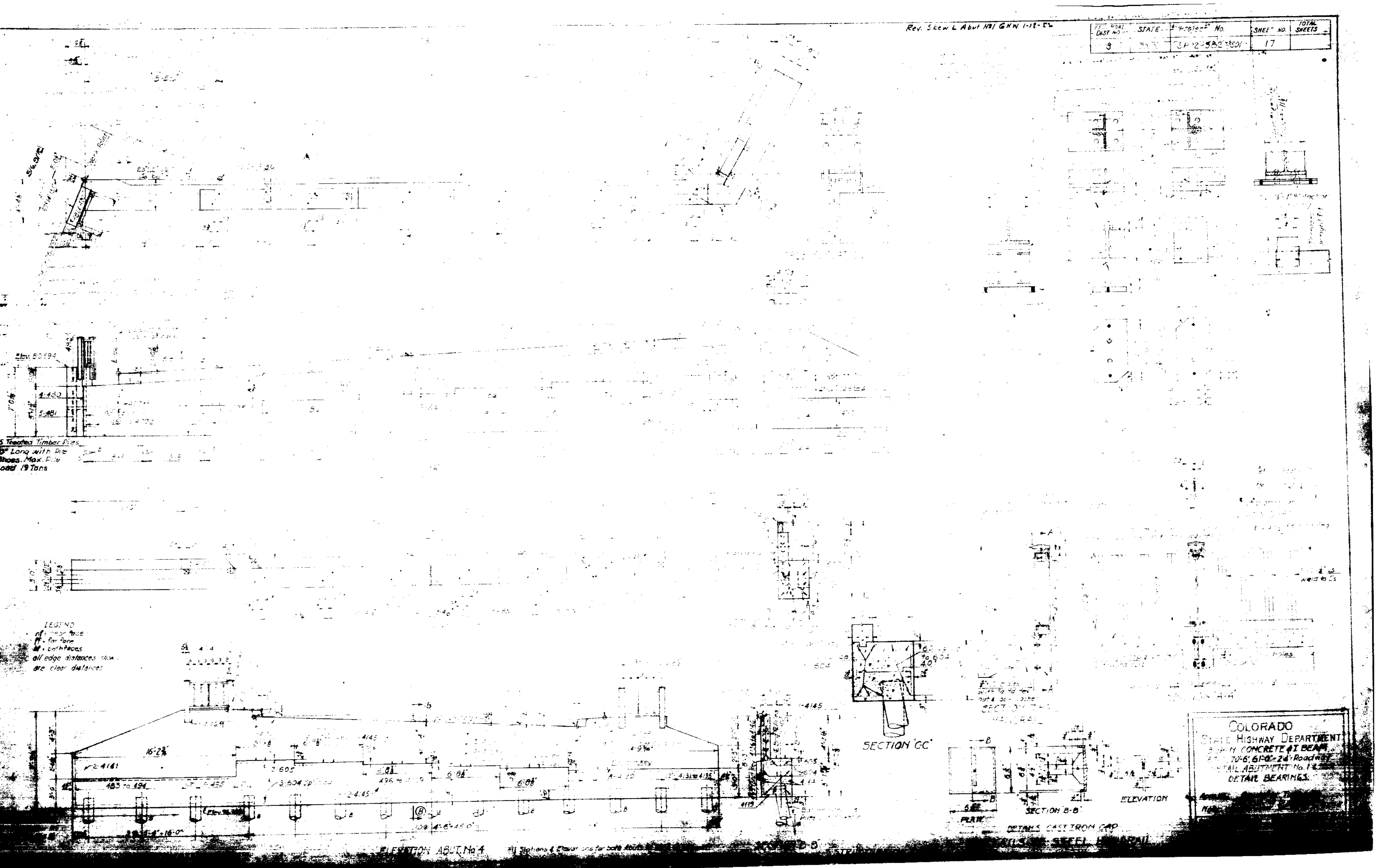
CONCRETE IN SUPERSTRUCTURE SPAN Nº 3 = 44 CU. YDS.

COLORADO
STATE HIGHWAY DEPARTMENT
3 Span Concrete & I Beam
67'-0" 70'-6" 61'-0" - 24' Roadway
DETAILS SPAN No. 3
ON HORIZONTAL CURVE

Across: Boulder Turnpike.
Sta. 2+19.169 to 4+56.524
Near: Westminster Sec. 23 T2S R68W

Designed by	G.H.W.	Approved by [signature]
Drawn by	G.H.W.	Bridge Engineer
Checked by		Date April 30, 1951.

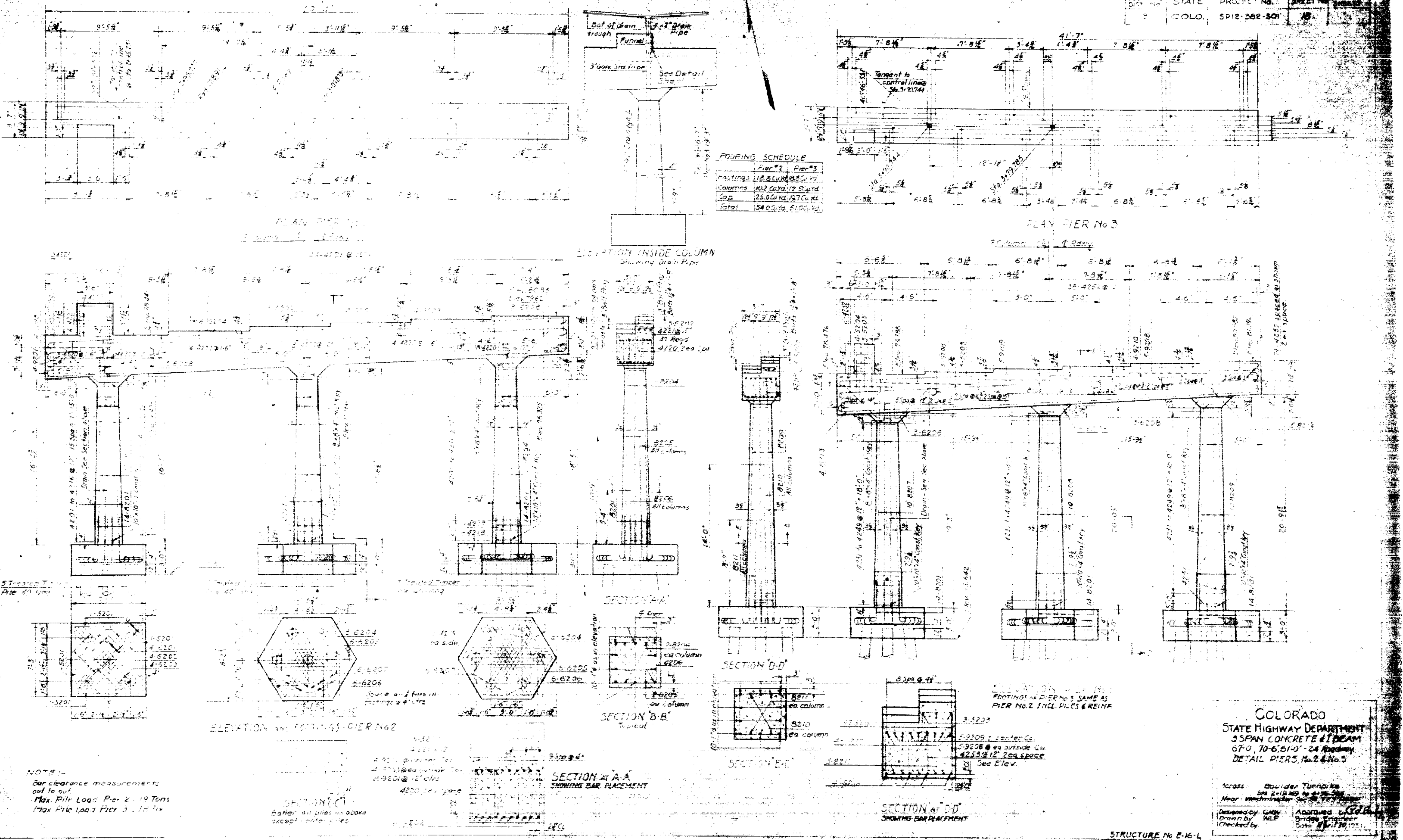
STR Nº E-16-L



Rev. Skew L Abut No1 GNW 1-18-56
SHEET NO.
TOTAL SHEETS
STATE
17
Elev. 5359.4
Treated Timber Piles
Long with Pile
Shoes. Max. Pile
Load 19 Tons
LEGEND
all edge distances shown
are clear distances
SECTION "CC"
SECTION B-B
ELEVATION
PLATE
DETAILS CAST IRON CAP
ELEVATION ABUT. No 4
COLORADO
STATE HIGHWAY DEPARTMENT
CONCRETE I BEAM
70'-6", 61'-0" - 24' Roadway
DETAIL BEARINGS

Rev. 11/30/51 - JYG - Change anchor bolt spacing.

FED. ROAD DIST. No.	STATE	PROJECT No.	SHEET No.	TOTAL SHEETS
5	COLO.	SP12-382-301	18	[illegible]



POURING SCHEDULE

	Pier #2	Pier #3
Footings	18.8 Cu.Yd.	18.8 Cu.Yd.
Columns	10.2 Cu.Yd.	12.5 Cu.Yd.
Cap	25.0 Cu.Yd.	19.7 Cu.Yd.
Total	54.0 Cu.Yd.	51.0 Cu.Yd.

NOTE:-
Bar clearance measurements out to out.
Max. Pile Load Pier 2 - 19 Tons
Max. Pile Load Pier 3 - 18 Tons

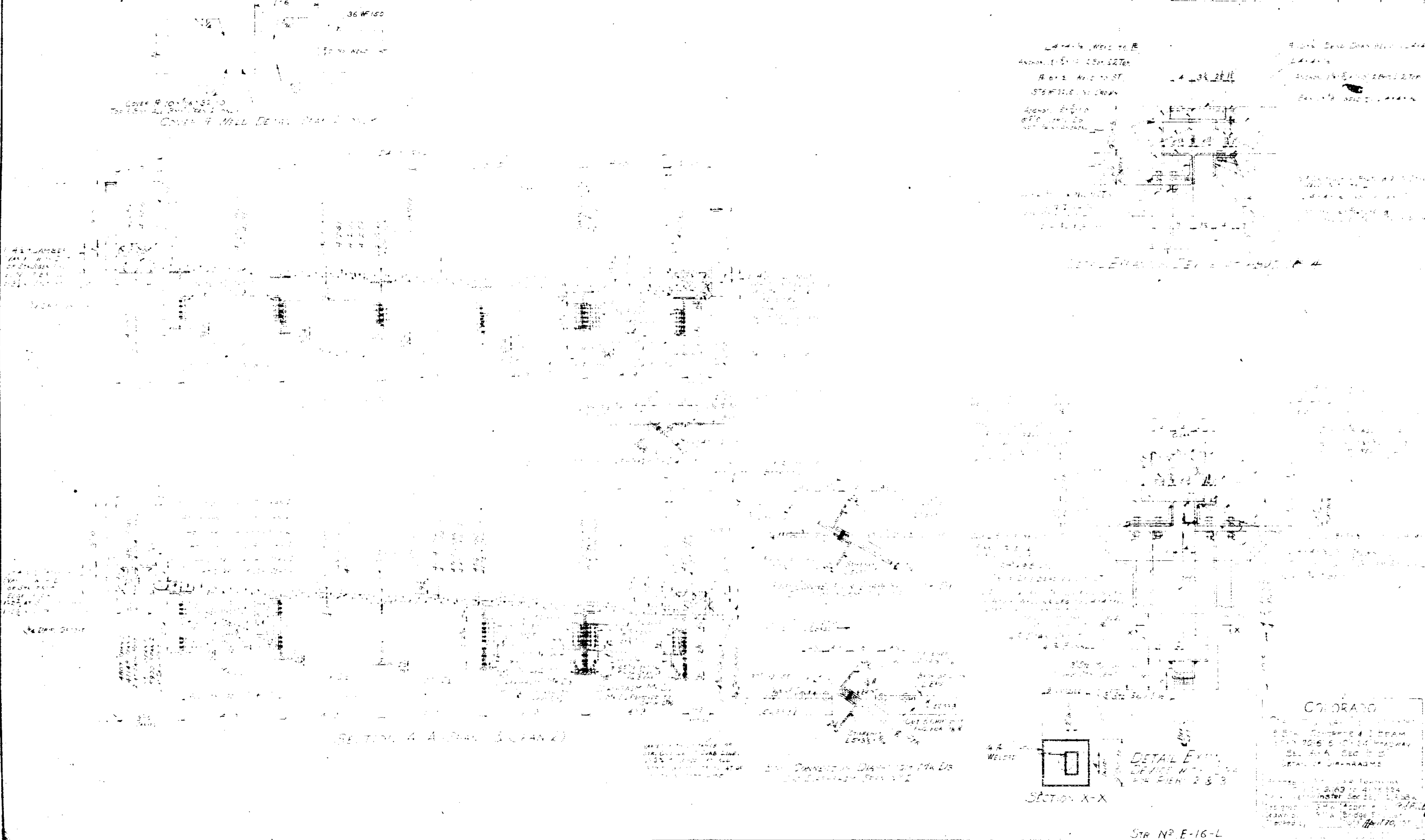
COLORADO
STATE HIGHWAY DEPARTMENT
3 SPAN CONCRETE & I BEAM
67-0", 70-6", 61-0" - 24' Roadway
DETAIL PIERS No. 2 & No. 3

Across - Boulder Turnpike
Sta. 2+13.189 to [illegible]
Near - Westminster [illegible]

Designed by: GMW
Drawn by: WLP
Checked by:
Approved: [illegible]
Bridge Engineer
Date: April 30, [illegible]

STRUCTURE No E-16-L

FED. ROAD DIST. No.	STATE	PROJECT No.	SHEET No.	TOTAL SHEETS
3	COLO.	SP 2-282-501	19	



COLORADO

[illegible] CONCRETE & I BEAM
[illegible] ROADWAY
SEC A-A SEC B-B
DETAIL OF DIAPHRAGMS

Rev. JVG 8-16-51 Added Note

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	SP12-382-501	20	

SUPERSTRUCTURE BAR LIST FOR SPAN No. 1

MARK	SIZE	No. REQ.	LENGTH	TYPE	J	m	n
4501	½"φ	2	4'-0"	IX	3'-0"		
4502	⅝"φ	3	4'-5¾"	VII		0'-8"	2'-3"
4503	⅝"φ	1	4'-6¾"	VII		1'-0"	2'-0"
4504	½"φ	4	4'-6¾"	VII		1'-3"	1'-9"
4505			5'-2¾"			1'-6"	
to	½"φ	1ea.	by 4⅛" to	VI		by 4⅛" to	
4523			12'-6"			8'-9⅞"	
4524			12'-10⅝"			9'-2"	
to	½"φ	1ea.	by 5⅛" to	VI		by 5⅛" to	
4540			19'-8¾"			16'-0"	
4541			20'-1¼"			16'-5"	
to	½"φ	1ea.	by 5⅜" to	VI		by 5¼" to	
4560			28'-5"			24'-8¾"	
4561	½"φ	32	30'-9½"	XI	24'-5"		
4562			28'-4¾"			24'-8¼"	
to	½"φ	1ea.	by 6¼" to	VI		by 2¼" to	
4580			19'-0⅝"			15'-4"	
4581			18'-6¼"			14'-10"	
to	½"φ	1ea.	by 6½" to	VI		by 6½" to	
4601			7'-8¾"			4'-0"	
4602	½"φ	1	6'-10¼"	VII		3'-10"	1'-8"
4603	½"φ	3	6'-8¼"	VII		[illegible]	[illegible]
4604	½"φ	2	6'-3¼"	VII		3'-2"	1'-7"
4605	½"φ	2	6'-0¼"	VII		2'-10"	1'-8"
4606	½"φ	2	5'-9¼"	VII		[illegible]	[illegible]
4607	½"φ	1	5'-9¼"	VII		[illegible]	[illegible]
4608			3'-4"		2'-4"		
to	½"φ	1ea.	by 4⅛" to	V	by 4⅛" to		
4626			10'-7¾"		9'-7¾"		
4627			11'-0"		[illegible]		
to	½"φ	1ea.	by 5⅛" to	V	by 5⅛" to		
4643			17'-10"		16'-10"		
4644			18'-3"		17'-3"		
to	½"φ	1ea.	by 5¼" to	V	by 5¼" to		
4663			26'-6¾"		[illegible]		
4664	½"φ	32	27'-0"	IX	26'-0"		
4665			26'-6⅝"		[illegible]		
to	½"φ	1ea.	by 6¼" to	V	by 6¼" to		
4683			17'-2"		16'-2"		
4684			16'-8"		15'-8"		
to	½"φ	1ea.	by 6⅝" to	V	by 6½" to		
4704			5'-10"		4'-0"		
4705	½"φ	1	5'-8"	V	4'-8"		
4706	½"φ	3	5'-5"	V	4'-5"		
4707	½"φ	2	5'-0"	V	4'-0"		
4708	½"φ	2	4'-8"	V	3'-8"		
4709	½"φ	2	4'-4"	V	3'-4"		
4710	½"φ	1	3'-10"	V	2'-10"		
4711	½"φ	2	3'-0"	V	2'-0"		
4712			3'-8"		2'-8"		
to	½"φ	1ea.	by 4⅛" to	V	by 4⅛" to		
4719			[illegible]		[illegible]		
4720 to 4806	See Adjoining List →						
4807	½"φ	34	3'-8"	II	1'-0"	3'-6"	
4808	½"φ	1	35'-3"	Str.			
4809	½"φ	2	23'-4"	Str.			
4810	½"φ	2	26'-3"	Str.			
4811	⅝"φ	2	30'-0"	Str.			
4812	½"φ	2	33'-4"	Str.			
4813	½"φ	2	36'-6"	Str.			
4814	½"φ	118	34'-6"	Str.			
4815	½"φ	1	38'-9"	Str.			
4816	½"φ	1	32'-0"	Str.			
4817	½"φ	1	24'-6"	Str.			
4818	½"φ	1	19'-6"	Str.			
4819	⅝"φ	1	12'-0"	Str.			
4820	⅝"φ	8	34'-1"	Str.			
4821	½"φ	8	40'-8"	Str.			
6501	⅝"φ	34	4'-3¼"	XIII			
7501	⅞"φ	2	30'-0"	Str.			

MARK	SIZE	No. REQ.	LENGTH	x	2'-1½" spaces	end	end
4720	½"φ	1	6'-10"	3'-9"			1'-9"
4721	½"φ	1	7'-3"	3'-8"			2'-5"
4722	⅝"φ	1	7'-8"	3'-7"			2'-9"
4723	½"φ	1	8'-1"	3'-6"			3'-2"
4724	½"φ	1	8'-6"	3'-5"			3'-9"
4725	½"φ	1	8'-11"	3'-4"			4'-3"
4726	½"φ	1	9'-6½"	3'-3"	2'-1½"	2'-6"	
4727	½"φ	1	9'-11½"	3'-2"	"	3'-0"	
4728	½"φ	1	10'-4½"	3'-1"	"	3'-6"	
4729	½"φ	1	10'-8"	3'-1"	" 2'-1½"		1'-4"
4730	½"φ	1	11'-1"	3'-0"	" "		1'-10"
4731	½"φ	1	11'-6"	2'-11"	" "		2'-4"
4732	½"φ	1	11'-11"	2'-10"	" "		2'-10"
4733	½"φ	1	12'-4"	2'-10"	" "		3'-4"
4734	½"φ	1	12'-10"	2'-9"	" "		3'-10"
4735	½"φ	1	13'-2"	2'-8"	" "		4'-5"
4736	½"φ	1	13'-11½"	2'-7"	" " 2'-1½"	2'-8"	
4737	½"φ	1	14'-4½"	2'-7"	" " "	3'-1"	
4738	½"φ	1	14'-9½"	2'-7"	" " "	3'-7"	
4739	½"φ	1	15'-1"	2'-6"	" " " 2'-1½"		1'-5"
4740	½"φ	1	[illegible]	2'-5"	"		1'-11"
4741	½"φ	1	[illegible]	2'-4"	"		2'-5"
4742	½"φ	1	16'-4"	2'-4"	"		2'-10"
4743	½"φ	1	16'-10"	2'-4"	"		3'-4"
4744	½"φ	1	17'-3"	[illegible]	"		3'-10"
4745	½"φ	1	17'-8"	[illegible]	"		4'-4"
4746	½"φ	1	18'-2½"	[illegible]	2'-1½"	2'-5"	
4747	½"φ	1	18'-8½"	[illegible]	"	2'-11"	
4748	½"φ	1	19'-1½"	2'-0"	"	3'-5"	
4749	½"φ	1	19'-7"	[illegible]	2'-1½"		1'-5"
4750	½"φ	1	19'-11"	1'-11"	"		1'-8"
4751	½"φ	1	20'-5"	1'-11"	"		2'-5"
4752	½"φ	1	20'-10"	1'-10"	"		[illegible]
4753	½"φ	1	21'-4"	1'-10"	"		[illegible]
4754	½"φ	1	21'-3"	1'-9"	"		[illegible]
4755	½"φ	1	22'-3"	[illegible]	"		[illegible]
4756	½"φ	1	22'-8½"	1'-8"	" 2'-1½"		4'-5"
4757	½"φ	1	23'-2½"	1'-5"	"	[illegible]	
4758	½"φ	1	23'-7½"	1'-7"	"	3'-6"	
4759–4792	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4793	½"φ	1	13'-5½"	1'-10"		2'-8"	
4794	½"φ	1	12'-10½"	[illegible]		2'-6"	
4795	½"φ	1	[illegible]	[illegible]		[illegible]	
4796	½"φ	1	11'-2½"	1'-5"	2'-1½"	[illegible]	
4797	½"φ	1	10'-11"	1'-5"			[illegible]
4798	½"φ	1	10'-5"	1'-5"	"		3'-3"
4799	½"φ	1	9'-11"	1'-5"	"		2'-9"
4800	½"φ	1	9'-5"	1'-5"	"		2'-3"
4801	½"φ	1	8'-9"	1'-5"	"		1'-9"
4802	½"φ	1	8'-5"	1'-5"	" 2'-1½"		[illegible]
4803	½"φ	1	[illegible]	1'-5"	"	2'-8"	
4804	½"φ	1	[illegible]	[illegible]	"	2'-2"	
4805	½"φ	1	[illegible]	[illegible]		2'-8"	
4806	½"φ	1	6'-7½"	1'-5"	2'-1½"	[illegible]	

BAR SUMMARY FOR SPAN NO. 1

12402 Lin. ft. ½"φ Bars @ 0.668 Lbs. Per Ft.	=	8284	Lbs.
145 " " ⅝"φ " @ 1.043 " " "	=	151	"
60 " " ⅞"φ " @ 2.044 " " "	=	123	"
1% (Overrun)	=	82	"
TOTAL	=	8640	Lbs.

SUPERSTRUCTURE BAR LIST FOR SPAN No. 2

MARK	SIZE	No. REQ.	LENGTH	TYPE	J	m	n
4900 to 4970	½"φ	See Adjoining List →					
4971	⅝"φ	1	4'-8½"	V	3'-8½"		
4972	½"φ	1	4'-1½"	V	3'-1½"		
4973	½"φ	1	3'-6"	V	2'-6"		
4974	½"φ	1	3'-0"	V	2'-0"		
4975	½"φ	1	2'-9"	V	1'-9"		
4976	½"φ	1	2'-6"	V	1'-6"		
4977	½"φ	1	4'-4"	V	3'-4"		
4978	½"φ	1	4'-0"	V	3'-0"		
4979	½"φ	1	3'-6"	V	2'-6"		
4980	½"φ	2	3'-0"	V	2'-0"		
4981			24'-3"		23'-8"		
to	½"φ	1ea.	by 8¼" to	V	by 8¼" to		
41014			3'-6½"		2'-6½"		
41015	½"φ	47	26'-11"	IX	25'-11"		
41016			2'-10"		1'-10"		
to	½"φ	1ea.	by 7" to	V	by 7" to		
41036			14'-6"		[illegible]		
41037			[illegible]		[illegible]		
to	½"φ	1ea.	by 7" to	V	by 7" to		
41056			[illegible]		[illegible]		
41057	½"φ	47	30'-9"	XI			
41058			4'-6"				6'-10"
to	½"φ	1ea.	by [illegible] to	VI			by [illegible] to
41078			10'-2"				12'-6"
41079			12'-9⅝"				13'-1½"
to	½"φ	1ea.	by [illegible] to	VI			by [illegible] to
41098			25'-5"				25'-0"
41099			25'-4"				24'-8"
to	½"φ	1ea.	by 8 to	VI			by 8 to
41116			16'-5"				13'-0"
[illegible]			[illegible]				12'-4"
[illegible]			by 8	VI			by 5½ to
[illegible]			[illegible]				1'-0"
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	½"φ	3	39'-4"	Str.			
[illegible]	½"φ	4	37'-2"	Str.			
[illegible]	[illegible]	[illegible]	[illegible]	Str.			
[illegible]	½"φ	2	[illegible]	Str.			
[illegible]	½"φ	[illegible]	[illegible]	Str.			
41140	⅝"φ	[illegible]	[illegible]	Str.			
41141	½"φ	2	[illegible]	Str.			
41142	[illegible]	[illegible]	[illegible]	Str.			
41143	[illegible]	[illegible]	[illegible]	Str.			
41144	½"φ	[illegible]	[illegible]	Str.			
41145	½"φ	1	14'-0"	Str.			
41146	½"φ	1	9'-0"	Str.			
[illegible]	[illegible]	[illegible]	[illegible]	Str.			
[illegible]	[illegible]	34	[illegible]	[illegible]	[illegible]	[illegible]	
5900	⅝"φ	34	4'-3¼"	VIII			
7900	⅞"φ	2	24'-[illegible]	Str.			

BAR SUMMARY FOR SPAN NO. 2

12061 Lin. ft. ½"φ Bars @ 0.668 Lbs. Per Ft.	=	8057	Lbs.
145 " " ⅝"φ " @ 1.043 " " "	=	151	"
46 " " ⅞"φ " @ 2.044 " " "	=	98	"
1% Overrun	=	84	"
TOTAL	=	8390	Lbs.

SUPERSTRUCTURE BAR LIST FOR SPAN No. 2 (CONTINUED)

MARK	SIZE	No. REQ.	LENGTH	x	2'-1½" spaces	end
4900	⅝"φ	29	27'-8½"	1'-4	" " " " " " " " "	2'-11"
4901	⅝"φ	13	27'-8½"	1'-6"	" " " " " " " " "	2'-9"
4902	⅝"φ	5	27'-7½"	1'-7	" " " " " " " " "	2'-7"

MARK	SIZE	No. REQ.	LENGTH	x	2'-1½" spaces	end	end
4903	½"φ	1	28'-0½"	1'-7"	" " " " " " " " "	3'-0"	
4904	½"φ	1	27'-9½"	1'-7"	" " " " " " " "	2'-9"	
4905	½"φ	1	27'-4"	1'-7½"	2'-1½"	[illegible]	
4906	½"φ	1	25'-9½"	1'-7½"	"		[illegible]
4907	½"φ	1	25'-2"	1'-8"	"		3'-2"
4908	½"φ	1	24'-6"	1'-8½"	"		2'-6"
4909	½"φ	1	23'-1[illegible]"	1'-9"	"		1'-9½"
4910	½"φ	1	23'-2½"	1'-9½"	2'-1½"		1'-1"
4911	½"φ	1	22'-7"	1'-10"			0'-5"
4912	½"φ	1	21'-11½"	1'-10"		2'-2½"	
4913	½"φ	1	21'-2½"	1'-10½"	2'-1½"	1'-7"	
4914	½"φ	1	20'-8"	1'-11"	"		3'-3"
4915	½"φ	1	19'-[illegible]"	2'-0"	"		2'-5"
4916	½"φ	1	19'-3"	2'-1"	"		1'-10½"
4917	½"φ	1	18'-7"	[illegible]	2'-1½"		[illegible]
4918	½"φ	[illegible]	[illegible]	2'-1"			[illegible]
4919	½"φ	1	17'-4½"	2'-2"	2'-1½"	2'-2"	
4920	½"φ	1	16'-5½"	[illegible]		[illegible]	
4921	½"φ	1	16'-1"	2'-3"			[illegible]
4922	½"φ	1	15'-4"	[illegible]			2'-8"
4923	½"φ	1	15'-0"	2'-5"			[illegible]
4924	½"φ	[illegible]	14'-3½"	2'-5½"			[illegible]
4925	[illegible]	[illegible]	13'-3"	2'-6½"	2'-1½"		[illegible]
4926–4937	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4938	½"φ	1	[illegible]	3'-5½"			[illegible]
4939	½"φ	[illegible]	[illegible]	3'-7"			[illegible]
4940	½"φ	1	26'-10"	2'-7"	2'-1½"		[illegible]
4941	½"φ	[illegible]	[illegible]	[illegible]			[illegible]
4942	½"φ	1	[illegible]	2'-6½"			[illegible]
4943	½"φ	[illegible]	24'-10"	2'-6"			1'-4"
4944	½"φ	1	24'-3"	2'-6"	2'-1½"		[illegible]
4945–4962	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4963	½"φ	1	10'-4½"	1'-7½"			[illegible]
4964	½"φ	[illegible]	[illegible]	1'-7"			[illegible]
4965	½"φ	[illegible]	9'-0"	1'-6"	2'-1½"		2'-0"
4966	½"φ	1	8'-0½"	1'-5"			
4967	½"φ	1	7'-5½"	1'-4"		[illegible]	
4968	½"φ	1	6'-9½"	1'-3"	2'-1½"	[illegible]	
4969	½"φ	1	6'-0"	1'-2"		1'-9"	
4970	½"φ	1	5'-2"	1'-1"			[illegible]

Note: For Bending Diagrams See Sheet No 20a

Hook details to be in accordance with the recommended sizes as shown in A.A.S.H.O. Manual of Standard Practice for Reinforced Concrete Highway Structures.

STR. No. E-16-L

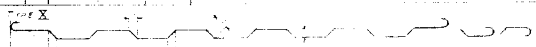
COLORADO
STATE HIGHWAY DEPARTMENT
3-Span (27'-10¼"-[illegible]) [illegible] Bridge
24'-0 Rdwy.
Superstructure Bar List [illegible]
For Spans No. 1 & No. 2
[illegible]
Sta. [illegible] to 4+38.524
Near Westminster [illegible]
Ch. By G.M.H. | Approved By Bailey
Made By | Bridge Engineer
Date April 10, 1951

Rev. JVG. 8-16-51 Added Note

Fed Road Dist. No.	State	Project No.	Sheet No.	Total Sheets
3	[illegible]	[illegible]-383-[illegible]	208	

Bar List Superstructure Span No. 3

Mark	Size	No. Reqd	Length	Type	Dimensions l	m	n
[illegible]	5/8"φ	44	27'-5"	IX	26'-5"		
[illegible]	1/2"φ	44	30'-9"	XI			
			5'-8 3/4"		4'-3 1/2		
[illegible]	1/2"φ	1 Ea	by 9 3/4 to	V	[illegible]		
			26'-0"		25'-0		
			7'-10"			4'-2	
[illegible]	1/2"φ	1 Ea	by 9 1/2 to	VI		[illegible]	
			[illegible]-7 3/4"			[illegible]	
			6'-6		[illegible]		
[illegible]	1/2"φ	1 Ea	by 10 1/2 to	V	[illegible]		
			26'-7 1/2		25'-7 1/2		
			[illegible]				
[illegible]	1/2"φ	1 Ea	by 10 3/4 to	VI		[illegible]	
			28'-5 1/2			[illegible]	
[illegible]	1/2"φ	12	5'-4	V	4'-[illegible]		
[illegible]	1/2"φ	12	7'-2	VII		4'-[illegible]	[illegible]
[illegible]	1/2"φ	6	6'-6	VII		3'-[illegible]	1'-[illegible]
[illegible]	1/2"φ	158	31'-9	Str			
[illegible]	1/2"φ	32	3'-6	II	1'-0"		
[illegible]	5/8"φ	32	4'-2	VIII			
[illegible]	7/8"φ	2	20'-0	Str			



Mark	Size	No. Reqd	Length	Dimensions					
[illegible]	[illegible]	44	26'-3	[illegible]	[illegible]				
[illegible]	[illegible]	1	6'-[illegible]	2'-6					
[illegible]	[illegible]	1	7'-5	2'-6	2'-1/2				
[illegible]	[illegible]	1	7'-11	2'-5	2'-[illegible]				
[illegible]	[illegible]	1	8'-8	2'-4	[illegible]				
[illegible]	[illegible]	1	9'-6	2'-4					
[illegible]	[illegible]	1	10'-4	[illegible]	[illegible]				
[illegible]	[illegible]	1	11'-1	[illegible]	[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	[illegible]	1	[illegible]	[illegible]	2'-1/2				
[illegible]	[illegible]	1	[illegible]	[illegible]	2'-1/2				
[illegible]	[illegible]	1	14'-5	[illegible]		2'-1/2			
[illegible]	[illegible]	1	15'-3	[illegible]	[illegible]	2'-1/2			
[illegible]	[illegible]	1	16'-[illegible]	[illegible]	2'-1 1/2"	2'-1/2	2'-1/2		
[illegible]	[illegible]	1	17'-5	[illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	[illegible]	[illegible]	18'-8"	1'-11"	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	19'-[illegible]						
[illegible]	[illegible]	[illegible]	[illegible]						
[illegible]	[illegible]	[illegible]	[illegible]						
[illegible]	[illegible]	[illegible]	22'-[illegible]	[illegible]					
[illegible]	[illegible]	[illegible]	22'-10	1'-10					
[illegible]	[illegible]	[illegible]	23'-9	1'-10					
[illegible]	[illegible]	[illegible]	24'-8	1'-8					
[illegible]	[illegible]	1	25'-5	[illegible]					
[illegible]	[illegible]	1	26'-5	1'-10					
[illegible]	[illegible]	1	27'-4	1'-10					
[illegible]	[illegible]	1	27'-0	[illegible]					
[illegible]	[illegible]	1	[illegible]	[illegible]					
[illegible]	[illegible]	1	25'-2	[illegible]					
[illegible]	[illegible]	1	24'-4	[illegible]					
[illegible]	[illegible]	1	23'-5	[illegible]					
[illegible]	[illegible]	1	22'-5	[illegible]	2'-1/2				
[illegible]	[illegible]	1	21'-6	[illegible]					
[illegible]	[illegible]	1	20'-9	2'-[illegible]					
[illegible]	[illegible]	1	19'-9	2'-6	[illegible]				
[illegible]	[illegible]	1	18'-10	[illegible]					
[illegible]	[illegible]	1	18'-0	2'-5	[illegible]	2'-1/2			
[illegible]	[illegible]	1	17'-2	2'-5	2'-1/2	2'-1/2	2'-1/2		
[illegible]	[illegible]	1	16'-1	2'-4	2'-1/2	2'-1/2	2'-1/2	[illegible]	
[illegible]	[illegible]	1	15'-3	2'-4	2'-1/2	2'-1/2	2'-1/2	[illegible]	
[illegible]	[illegible]	1	14'-5	2'-3	2'-1/2	2'-1/2	2'-1/2	[illegible]	
[illegible]	[illegible]	1	13'-5	2'-2	2'-1/2	2'-1/2	2'-[illegible]		
[illegible]	[illegible]	1	12'-7	2'-2	2'-1/2	2'-1/2	2'-1/2		
[illegible]	[illegible]	1	11'-5	2'-2	2'-1/2	2'-1/2	2'-1/2		
[illegible]	[illegible]	1	10'-8	2'-1	2'-1/2	2'-1/2			
[illegible]	[illegible]	1	3'-11	2'-1	2'-1/2	2'-1/2			
[illegible]	[illegible]	1	3'-10	2'-0	2'-1/2				
[illegible]	[illegible]	1	5'-0	2'-0	2'-1/2				
[illegible]	[illegible]	1	7'-3	2'-0	[illegible]				
[illegible]	[illegible]	1	6'-3	2'-0					

Summary

[illegible]75 Lin Ft	1/2 φ @ [illegible]	=	7795 lbs	
[illegible]33	" "	5/8 φ @ [illegible]	=	133
[illegible]40	" "	7/8 φ @ 2.044#	=	82
		± 1% Overrun		90
		Total	=	8100 lbs

	Initial	Date
[illegible]	GKW	4-[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	J.E.R.	4-21-51

Bar List Abutment No. 1

W.L.P. / R.C.

Mark	Size	No. Reqd	Length	Type	Dimensions l	m	n	o
401	5/8"φ	4	39'-[illegible]"	Str		[illegible]	Bend	
402			16'-10"		2'-8"			
To	[illegible]	1 Ea	by 1 1/4 to	I	by 5/16 to	2'-7"		
[illegible]			[illegible]		2'-[illegible]			
[illegible]			[illegible]			[illegible]		
To	[illegible]	[illegible]	by 1 3/8 to	I	3'-[illegible]	by 1/16 to		
450			[illegible]			5'-0		
[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]		Field	Bend	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5'-3"	2'-7"		
					2'-7"	2'-7"		
[illegible]				[illegible]	8'-2	0'-8"		
			7'-3"					
[illegible]				Str				
[illegible]			3'-6"	Str				
[illegible]				Str		Field	Bend	
[illegible]				Str				
448						4'-8"		
To			[illegible] to		3'-7"	by 5/16 to		
[illegible]			[illegible]-4"			3'-3"		
430	[illegible]							
431	[illegible]		[illegible]	Str		Field	Bend	
432	[illegible]	[illegible]	[illegible]-8	Str				
[illegible]	3/4"φ		39'-[illegible]	IX	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	3/4"φ		30'-[illegible]	IX	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	3/4"φ		[illegible]					
[illegible]4	3/4"φ		4[illegible]					

Summary

[illegible]

Bar List [illegible]

Mark	Size	No. Reqd	Length	Type	Dimensions			
[illegible]			[illegible]8		[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	5'-[illegible]		[illegible]	[illegible]		
			[illegible]		4'-9	[illegible]		
			8'-8		3'-2			
			7'-11		6'-9			
	[illegible]		26'-7	[illegible]	26'-[illegible]	Splice in Center Cap		
	3/4"φ		3'-1"	X	7'-9			
	[illegible]		3'-9"	[illegible]	8'-5			
	[illegible]		10'-5"	[illegible]	[illegible]			
	[illegible]		[illegible]	[illegible]	8'-9			
[illegible]	[illegible]		[illegible]					
[illegible]	[illegible]		[illegible]-4					
[illegible]	3/4"φ		8'-11	X				
[illegible]	3/4"φ		10'-10	I				
[illegible]	[illegible]		5'-4	[illegible]	4'-3			
[illegible]	[illegible]		15'-[illegible]	[illegible]				
8203	1"φ	10	19'-5"	Str				
8204	1"φ	10	20'-4"	Str				
8205	1"φ	6	5'-4"	[illegible]				
8206	[illegible]	6	10'-9"	[illegible]				
9201	1 1/8"φ	16	27'-5"	XIV	26'-5"	Splice in Center Cap		
9202	1 1/8"φ	6	41'-2"	IX	39'-0"			
9203	1 1/8"φ	8	12'-2"	X	10'-0"			
9204	1 1/8"φ	6	14'-2"	X	12'-0"			

Summary

1642	Lin Ft	1/2"φ @ 0.668#/Ft	=	1097 lbs
191	" "	5/8"φ @ 1.043#/Ft	=	199 "
610	" "	3/4"φ @ 1.502#/Ft	=	916 "
902	" "	1"φ @ 2.044#/Ft	=	1844 "
873	" "	1 1/8"φ @ 3.400#/Ft	=	2968 "
		± 1% Overrun	=	66
		Total	=	7090 lbs

Bar List Pier No. 3.

W.L.P. / L.H.F.

Mark	Size	No. Reqd	Length	Type	Dimensions l	m	n
4219	1/2"φ	12	4'-6"	Str			
4231			6'-8"		1'-6	1'-6"	
To	1/2"φ	31 Ea	by 2" to	II	by 1/2" to	by 1/2" to	
4249			9'-8"		2'-3"	2'-4"	
4251	1/2"φ	1	10'-0"	II	2'-4"	2'-4"	
4252	1/2"φ	40	5'-11"	III	2'-3	1'-5"	
4253	1/2"φ	74	5'-[illegible]	[illegible]	2'-4"	2'-2"	
5201	5/8"φ	4	[illegible]	IX	[illegible]		
5202	5/8"φ	[illegible]	4'-[illegible]	IX	3'-1"		
[illegible]	5/8"φ	[illegible]	[illegible]	II	[illegible]	[illegible]	
5205	5/8"φ	[illegible]	9'-[illegible]	II	4'-[illegible]	[illegible]	
6201	3/4"	[illegible]	[illegible]	[illegible]			
6202	3/4"φ	[illegible]	[illegible]	[illegible]			
6203	[illegible]						
6204	3/4"φ	[illegible]	[illegible]	[illegible]	8'-9"		
6205	3/4"φ	12	9'-5"		8'-4		
6206	3/4"φ	12	9'-4"		8'-0"		
6207	3/4"φ	12	8'-11		7'-7		
6208	3/4"φ	9	10'-10"				
8201	1"φ	42	5'-4"		4'-3"		
8207	1"φ	12	21'-1"	Str			
8208	1"φ	[illegible]	21'-10"	Str			
[illegible]	[illegible]	[illegible]	[illegible]	Str			
[illegible]	1"φ	6	14'-[illegible]	[illegible]			
[illegible]	1"φ	6	[illegible]	Str			
[illegible]	[illegible]	[illegible]	34'-6		32'-3		
[illegible]	[illegible]	4	43'-[illegible]		41'-1		
9208	1 1/8"φ	[illegible]	[illegible]		[illegible]		
[illegible]	1 1/8"φ	[illegible]	[illegible]		10'-[illegible]		
9210	1 1/8"φ	4	43'-3		41'-1"		

Summary

443	[illegible]	1/2"φ @ 0.668#/Ft	=	365 lbs
		[illegible]		[illegible]
		[illegible]		
		[illegible]		
		[illegible] Overrun		[illegible]
		Total	=	[illegible] lbs

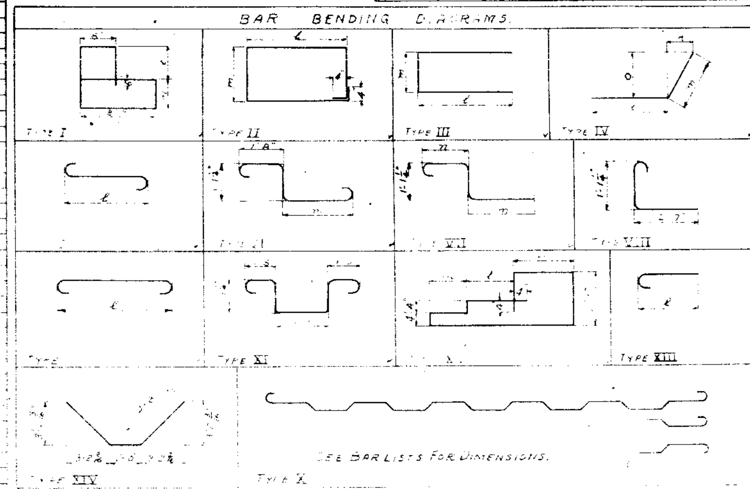
Bar List Abut. No. 4

Mark	Size	No. Reqd	Length	Type	Dimensions l	m	n
[illegible]			[illegible]				
To	1/2"φ	1 Ea	by 5 1/2 to	I	by 4 3/4 to	2'-7	
4'-4			35'-0		[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		
[illegible]			[illegible]			4'-[illegible]	
To	[illegible]	[illegible]	[illegible]		[illegible]	by 9/16 to	
[illegible]						[illegible]	
[illegible]	1/2"φ	3	[illegible]	[illegible]	2'-3	[illegible]	
[illegible]			[illegible]				
To	1/2"φ	1 Ea	by 4 1/2 to	Str			
4135			4'-9				
4136	1/2"φ	2	25'-4	Str	Field Bend		
[illegible]	1/2"φ	4	28'-4"	Str			
41[illegible]		[illegible]	10'-0	Str			
[illegible]		4	31'-5	[illegible]			
[illegible]		[illegible]	25'-9	Str			
4141	1/2"φ	3	18'-6"	Str			
4142	1/2"φ	[illegible]	7'-6	Str	Field Bend		
4143	[illegible]		5'	Str			
4144	[illegible]	[illegible]	37'-8"	Str	Splice		
[illegible]	1/2"φ	1	[illegible]	Str			
4146	[illegible]	1	9'-0"	Str			
4147	1/2"φ	1	8'-0"	Str			
604	3/4"φ	12	32'-9	Str			
605	3/4"φ	2	34'-0	Str			

Summary.

2078	Lin Ft	1/2"φ @ 0.668#/Ft =	1388 lbs	
461	" "	3/4"φ @ 1.502#/Ft =	692	
		± 1% Overrun	20	
		Total =	2100 lbs	

Bar Bending Diagrams



Note: All [illegible]

Hook details to be in accordance with the recommended sizes as shown in AASHO Manual of Standard Practice for Reinforced Concrete Highway Structures.

Structure No E-16-L

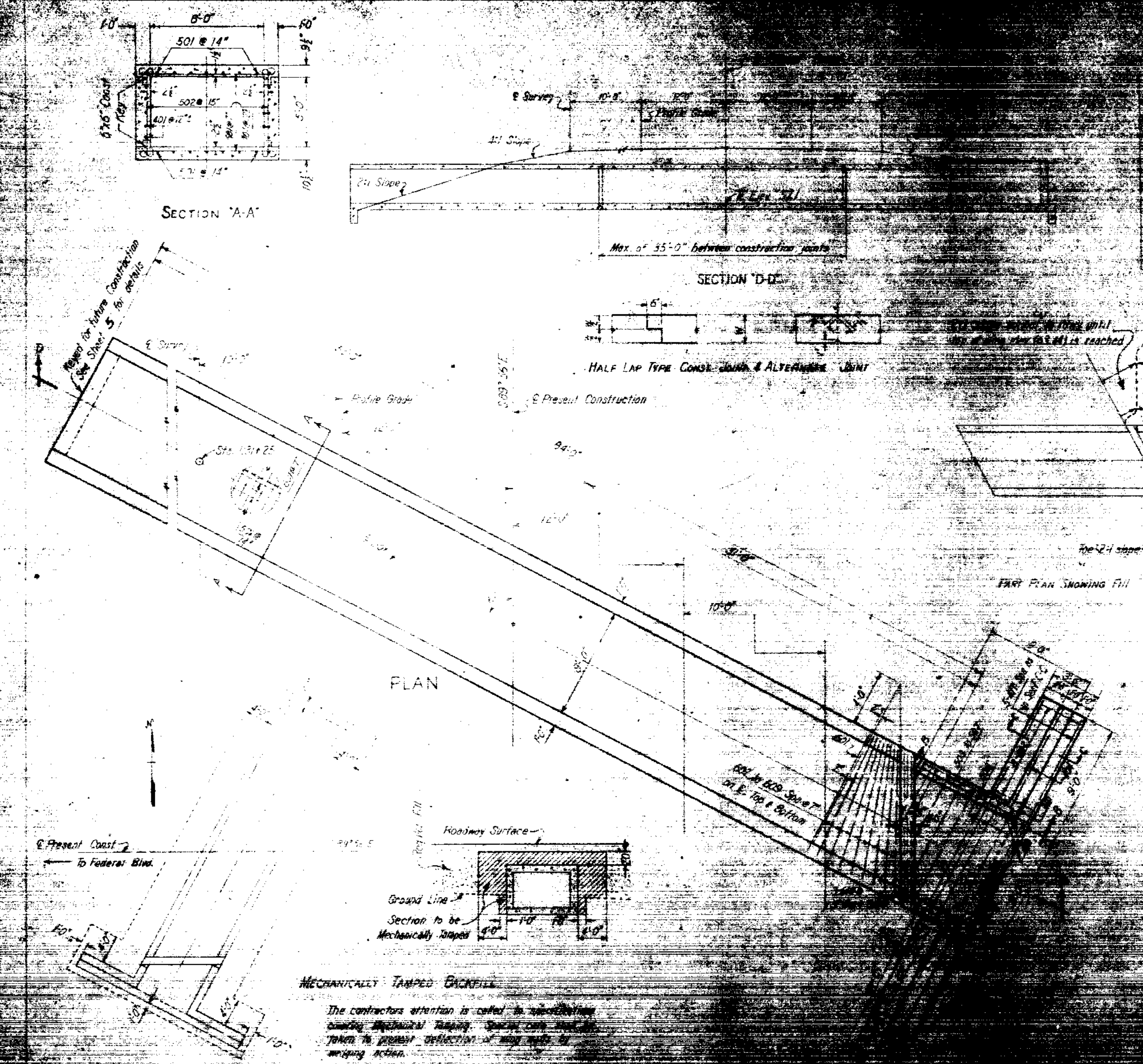
Colorado
State Highway Department

[illegible] Span [illegible] Concrete I Beam
37'6"-70'6"-51'0" 24 Ft Roadway
Bar List & Bending Diagrams
[illegible] Boulder Turnpike
Sta [illegible] To Sta 4+36.524
Near Westminster Sec 32, T2S, R 68W.

Designed by GKW
Made by W.L.P.
Check Design
Check Detail
Approved by R.L. Bailey
Bridge Engineer
Date: April 30, 1951.

FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	S.P. 12-382-501	21	

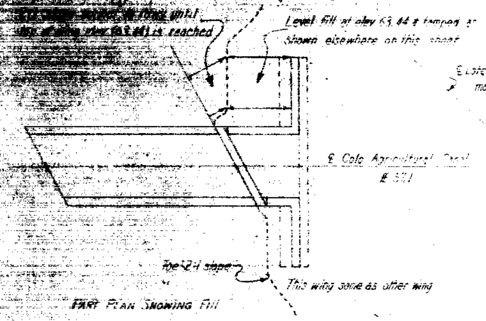
Rev. 6-16-51 Added Note



SUMMARY OF QUANTITIES

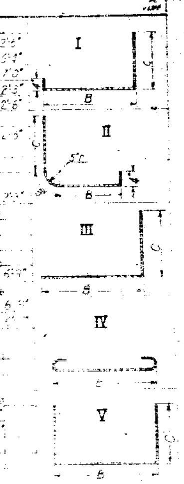
ITEM		UNIT	QUANTITY
[illegible]	STRUCTURAL EXCAVATION	CU. YD.	50
[illegible]	STRUCTURAL BACKFILL	CU. YD.	235
[illegible]	MECHANICAL TAMPING	HOUR	23.5
[illegible]	MISC. UNTREATED TIMBER ▲	M ft bm	0.102
[illegible]	CLASS "A" CONCRETE	CU. YD.	97
[illegible]	REINFORCING STEEL	LB.	8810
[illegible]	REMOVAL OF CONC. RAISER	L.S.	LUMP SUM
13C	UNCLASSIFIED EXCAVATION	CU. YD.	300
K	½" EXPANSION JOINT MATERIAL	SQ. FT.	13

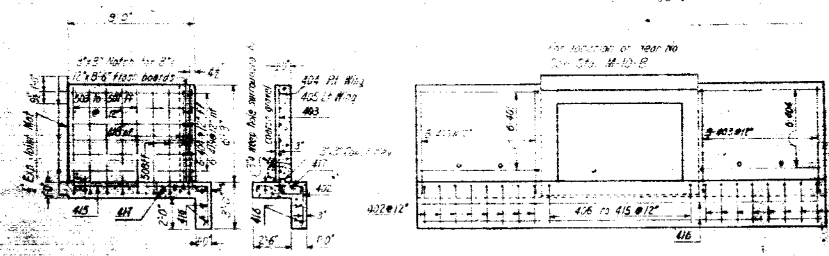
✱ To be included in bid price for Class "A" Concrete.
▲ Furnish 4 pieces 3"x12"x8'-6" to be used as flash boards.



BAR LIST

MARK	SIZE	NO. REQD.	LENGTH	TYPE	B	C
401	#[illegible]	42	30'-1"	Str.		
402	do	16	5'-9"	I	3'-0"	2'-6"
403	do	16	8'-5"	II		
404	do	6	15'-0"	III		
405	do	6	10'-3"	III	8'-0"	2'-3"
406	do		6'-6"			2'-6"
to	do	1 ea	by 6" to	I	by 6" to	
415	do		11'-2"		8'-5"	
416	do	2	25'-6"	Str.		
417	do	5	25'-6"	Str.		
418	do	4	6'-6"	Str.		
419	do	12	4'-6"	III		
501	#5	42	30'-3"	Str.		
502	do	138	[illegible]	II		





n.f. = near face
f.f. = far face
Edge distances to € of bar

GENERAL NOTES

All work shall be done according to the Standard Specifications of the Colo. State [illegible] January 1, 1948.
[illegible] Class "A" and Air Entrained as specified. Bevel all exposed corners to [illegible] construction keys are not required when floors and sidewalls are [illegible]
[illegible] exposed to view, except barrel of culvert, shall [illegible] Class I [illegible]

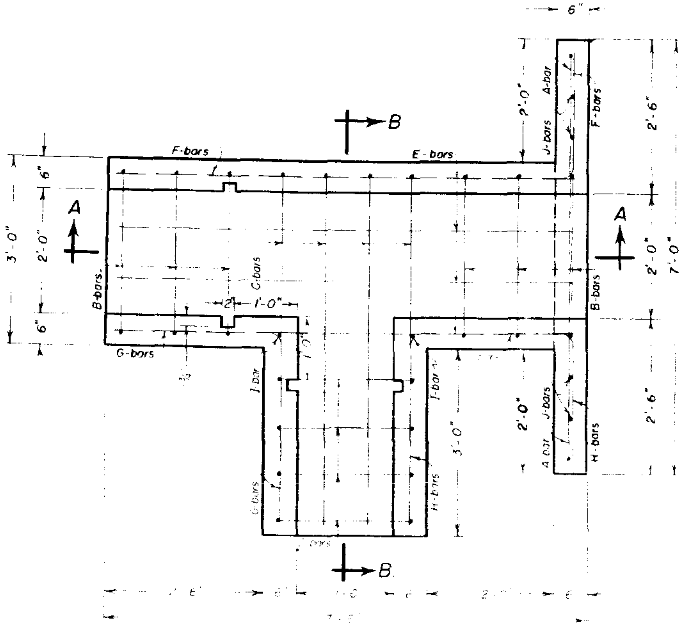
LOADING DATA: AASHO. H20-S16-44
DESIGN DATA: fs = 20,000 psi, fc = 1200 psi, n = 10

COLORADO
STATE HIGHWAY DEPARTMENT
8'x5'x84'-0" C.B.C.

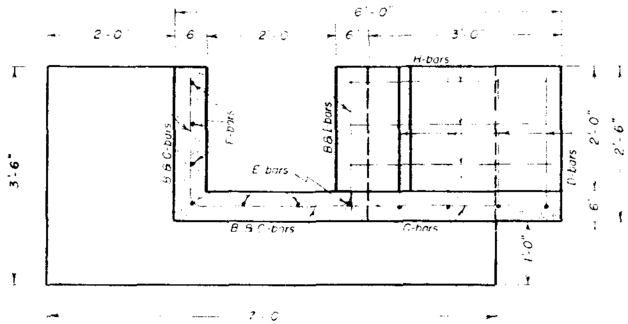
	STATE		SHEET NO.	TOTAL SHEETS
[illegible]	COLO	SP 12-382-501	22	

DETAILS OF CONCRETE DIVISION BOX

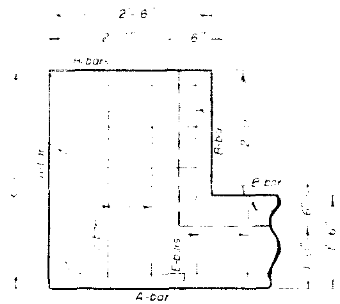
REQUIRED AT STA. 7+70 LT.
21+12 LT.



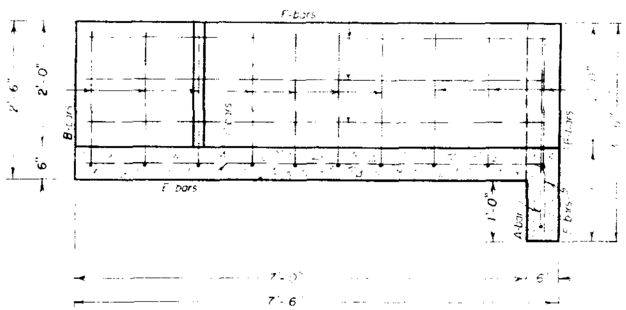
PLAN



SECTION "B-B"

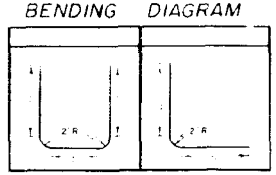


1/2 ELEVATION OF HEADWALL



SECTION "A-A"

BENDING DIAGRAM



BAR LIST

All dimensions are to ℄ of bars.

MARK	TYPE	DIMENSIONS a	DIMENSIONS b	DIMENSIONS c	LENGTH OF ONE BAR	[illegible]	TOTAL LENGTH OF BARS	SPACING
A	I	2'-11"	6'-2"	2'-11"	12'-6"	1	12'-6"	See Detail
[illegible]	[illegible]				[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	5'-5"		7'-7"	4	3[illegible]'-4"	6"
[illegible]	[illegible]	1'-8"	1'-8"	1'-11"	6'-0"	4	24'-0"	9"
E	II	6'-11"	0'-11"		8'-1"	4	32'-4"	10"
F	II	6'-11"	1'-11"		9'-1"	3	27'-3"	8"
G	[illegible]	2'-[illegible]"	2'-11"		5'-[illegible]"	3	[illegible]6'-9"	8"
H	[illegible]	2'-11"	2'-2"	[illegible]	7'-6"	3	22'-6"	8"
I	Straight				2'-2"	2	4'-4"	See Detail
J	Straight				3'-2"	4	12'-[illegible]	[illegible]

TOTAL = 221'-8"

All bars 1/2" ⌀ @ 0.668 lbs. per lin. ft.
[illegible] x 0.668 lbs. per lin. ft. = 148 lbs
Plus 1% [illegible] Over-run = 2 lbs
Total Reinforcing Steel = 150 lbs

4 pcs. 2" x 6" x 2'-3" [illegible] 9.[illegible] Bd. Ft.
4 pcs. 2" x 6" x 1'-9" [illegible] Float Boards [illegible] Bd. Ft.
Total = 16.0 Bd. Ft.

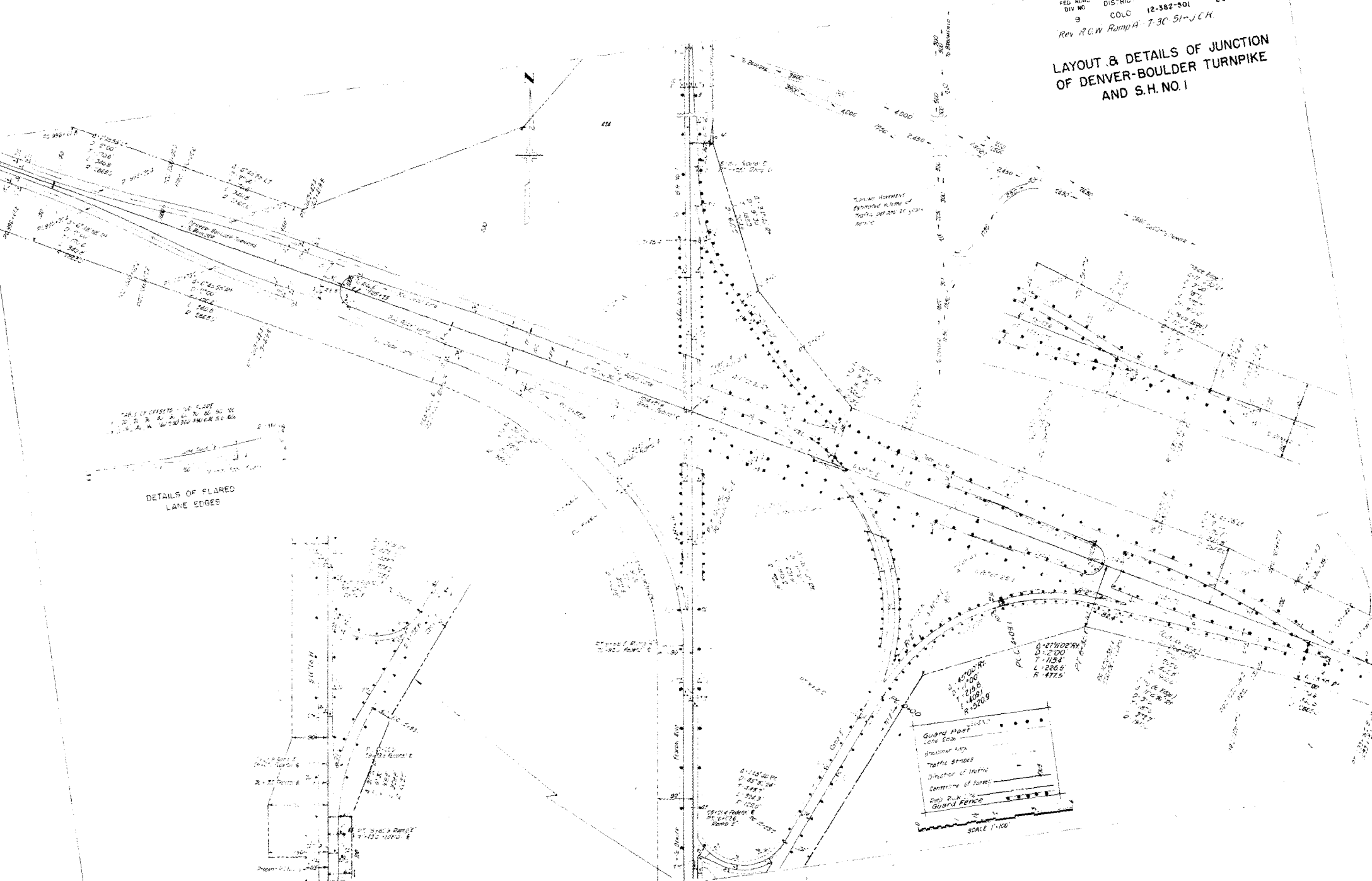
1.6 Cu. Yds. Class "A" Concrete

All bars are to be placed in center of Walls and Slabs.

FED. ROAD DIV. NO. 9 | DIS-RIC | COLO | 12-382-501

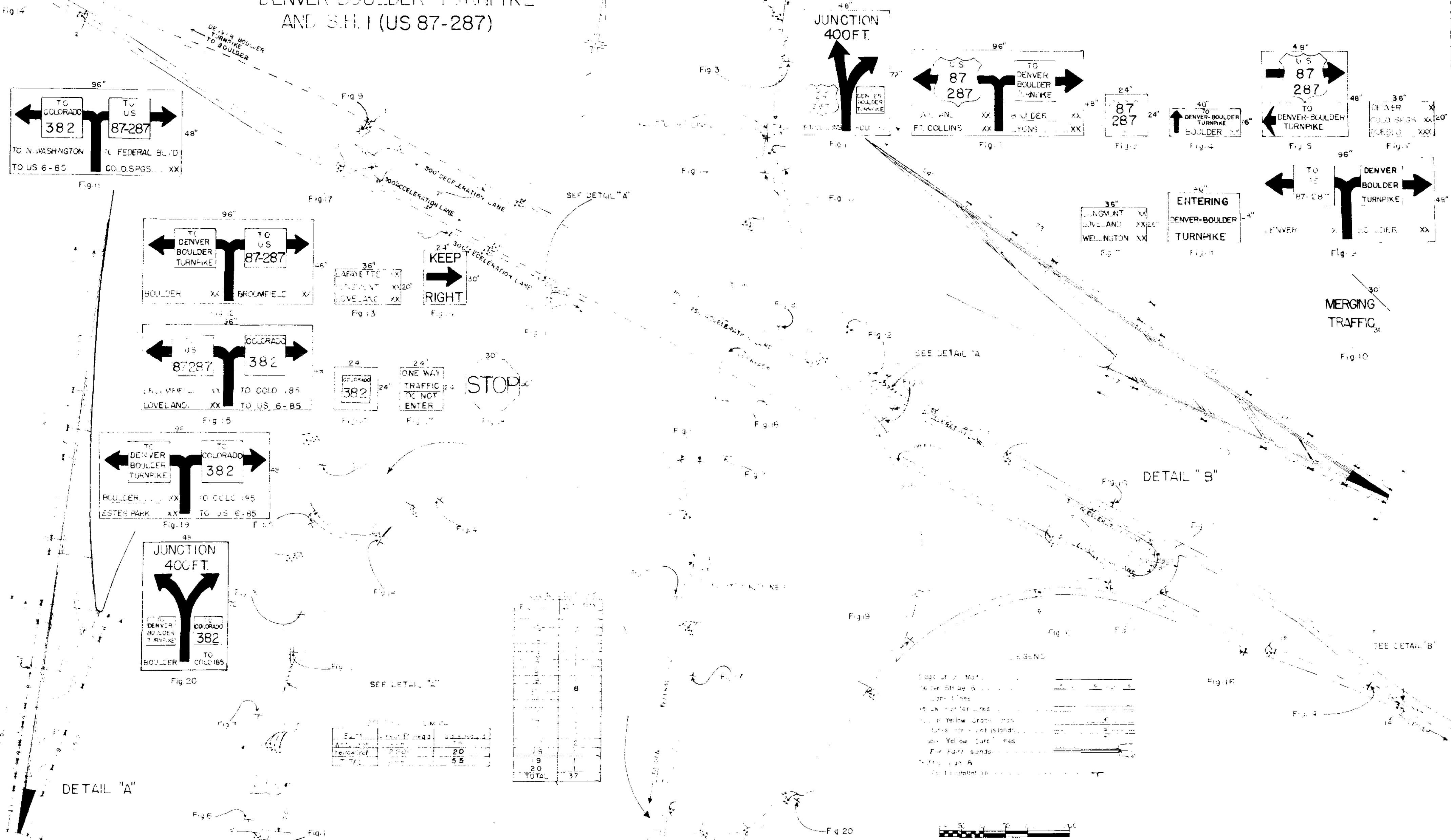
Rev. R.C.W. Ramp A 7-30-51-J.C.K.

LAYOUT & DETAILS OF JUNCTION OF DENVER-BOULDER TURNPIKE AND S.H. NO. 1



SIGNING & STRIPING PLAN DENVER-BOULDER TURNPIKE AND S.H. I (US 87-287)

FED. ROAD DIV. NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	~~SPS OUT OFF 500~~ SP 12-382-501	23A	



Excavation Cu. Yds.	Excavation Area	Embankment Area	Embankment Cu. Yds.	Excavation Cu. Yds.	Excavation Area	Embankment Area	Embankment Cu. Yds.

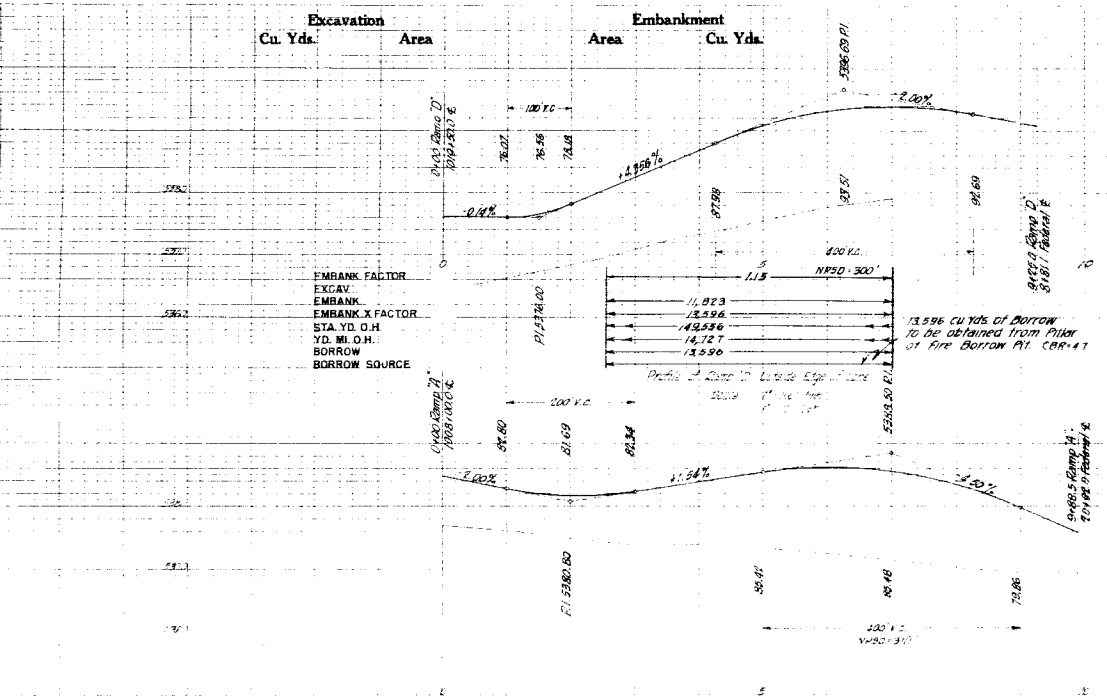
FED. ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	SP 2-38-301	22	

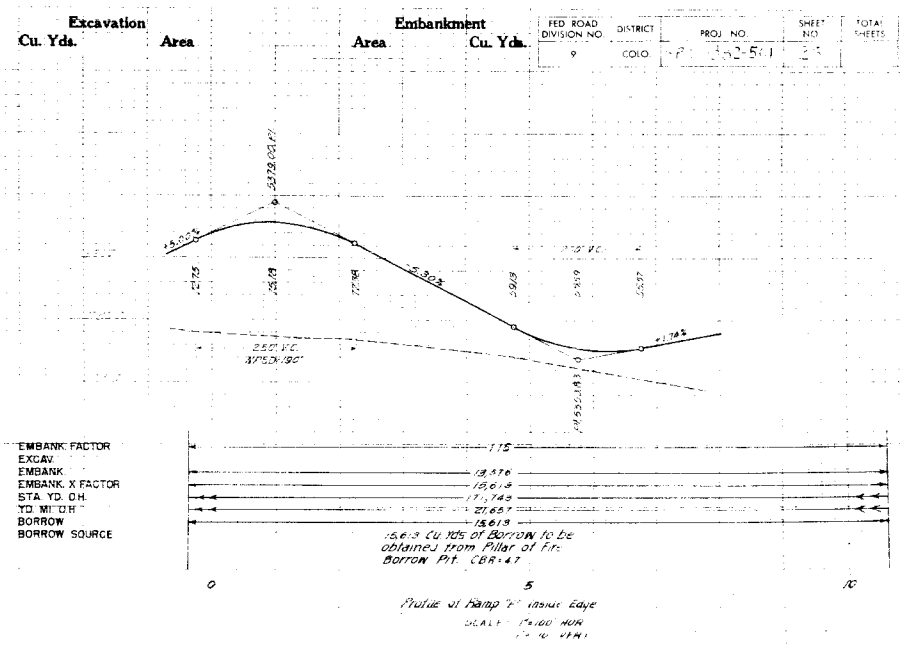
PROFILE OF NORTH LANE
scale 1"=100 hor.
1"=10 ver.

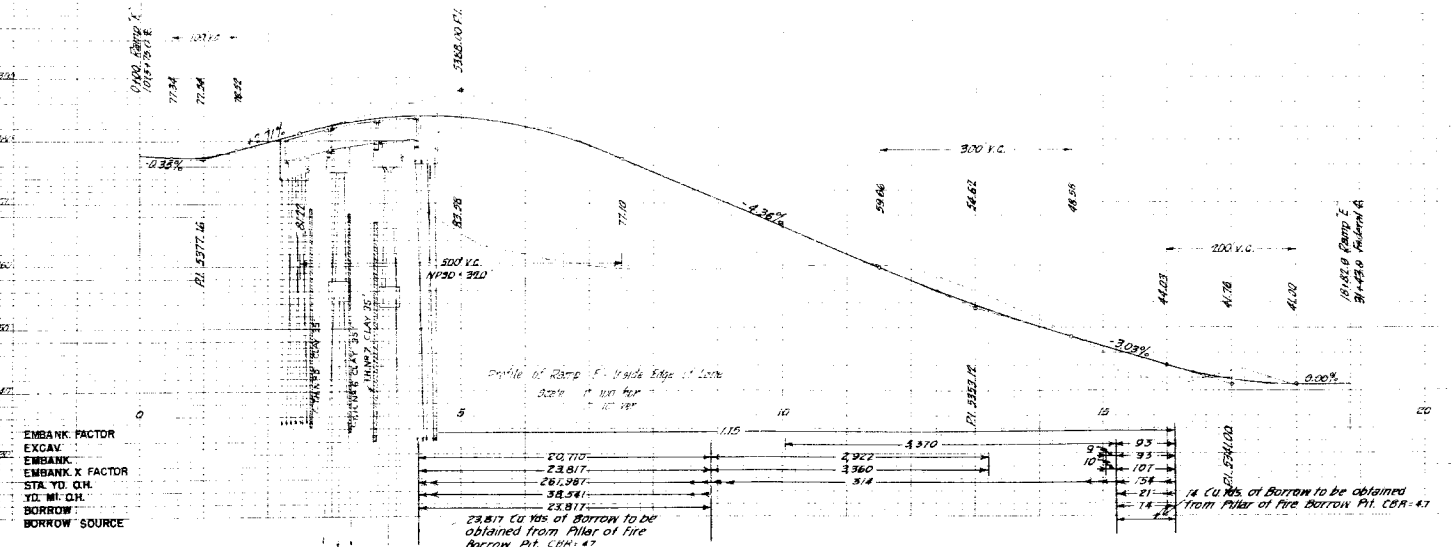
PROFILE OF SOUTH LANE
scale 1"=100 hor.
1"=10 ver.

PROFILE OF FEDERAL BLVD.
scale 1"=100 hor.
1"=10 ver.

FED. ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	[illegible]	[illegible]	







SHEET TOTALS		
	EXCAVATION	CU. YDS.
	EXCAVATION	CU. YDS.
	EMBANKMENT	CU. YDS.

REVISIONS

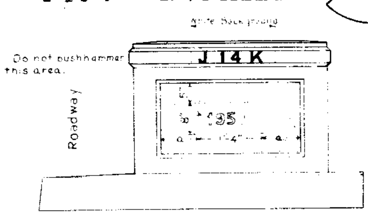
STANDARD M-10-B. [redacted]

STATE [redacted]

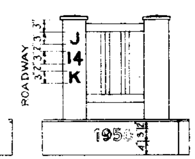
SP 2-382-SDI

SAMPLE BRIDGE NUMBER

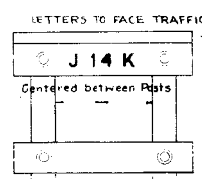
SAMPLE YEAR NUMBER



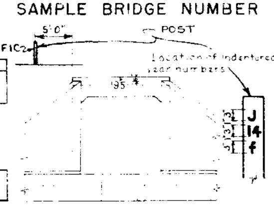
TYPICAL FOR CONCRETE ENDPOST



TYPICAL FOR STEEL HANDRAIL END POST



TYPICAL FOR TIMBER WING HANDRAIL



TYPICAL FOR LARGE BOX CULVERTS

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department adopted January 1st 1946.

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 3/8" minimum as shown into the panel of the endpost on the right hand side of each bridge end and into the face of the downstream headwall of culverts as shown on plan details. Numbers to be made of wood, metal or other suitable material and attached to the forms before concrete is poured.

The year number of each structure shall correspond with the year in which the concrete is poured.

The structure number shall be stenciled on the right hand side of each bridge end as shown on the standard and [illegible] as specified for major structures over 20'-0" clear span.

The correct number for each bridge is shown in the lower right hand corner of the detail sheets for that bridge.

A proper white background rectangular in shape and extending three inches beyond the limits of the number shall be painted with two coats of acceptable white paint unless an approved white concrete paint is used. Before painting the surface must be thoroly dried, cleaned and properly sized. On timber handrails the white paint used on the bridge will be satisfactory.

After the white background has dried sufficiently the correct structure number shall be carefully stenciled on it with two coats of second field coat-dark or exterior black paint (maint) as specified under item 38 "Paints and Painting." The braces of the stenciled letters and figures shall be carefully filled in by hand to make solid figures.

Sufficient time between successive coats shall be allowed to permit thoro drying.

Minor structures with clear spans 12 to 20 feet inclusive shall be stenciled with structure number thus **W-18-ℓ** on 3" steel marker posts where provided and as shown on State Highway Std M 23-A

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

Designed by	Approved by R. Bailey
Made by W.P.M.	Bridge Engineer
Checked by	Date June 1, 1946

STRUCTURE NO.

STANDARD M-10-B

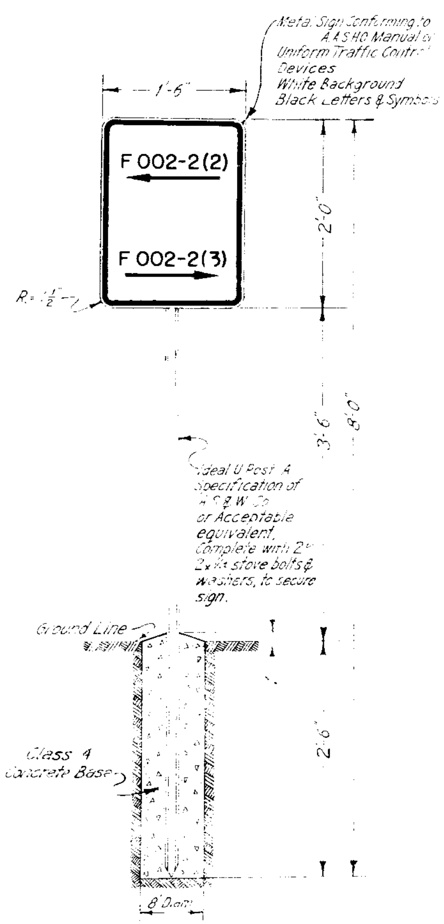
STANDARD M-7-B

Rev. July 8 1955 ... Note Re Metal Sign for Project Marker, & ROW Marker Markings

STATE | COLO | SP(2-382-S07

PROJECT MARKER POST

ITEM Nº 81a



NOTES FOR PROJECT MARKER POSTS

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

Numbers and arrows shall show the proper numbers and directions of the projects each way from where the post is placed. Post to be set with sign facing the road at the end of the project two feet inside the R.O.W. line or at a point amply protected from traffic in such a position that the sign will indicate properly the projects to which it refers.

NOTES FOR R.O.W. MARKER POSTS

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

Posts shall be made of Class "A" Concrete.

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

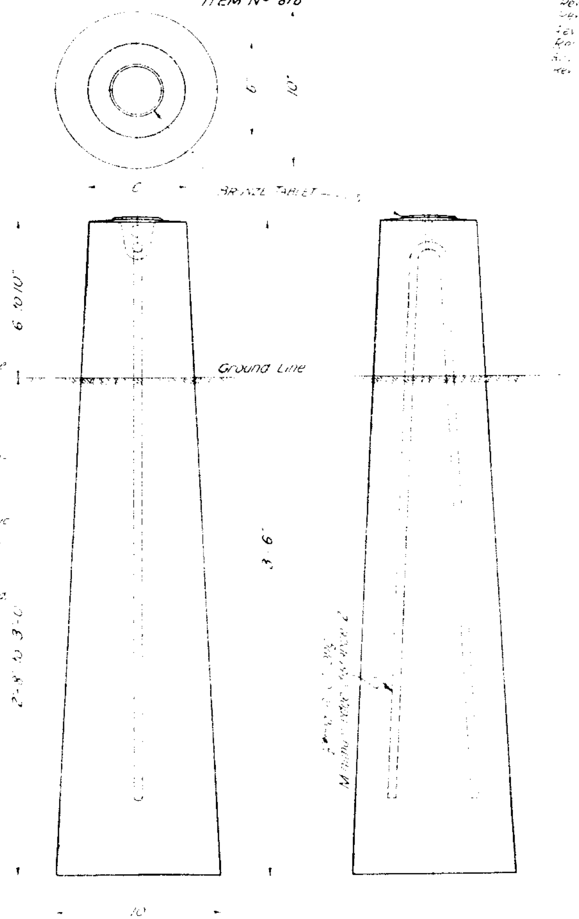
All exposed surfaces of the bronze tablet are to be ground to a smooth surface.

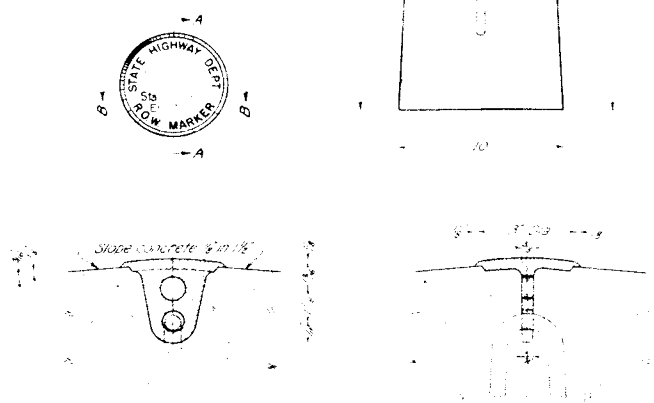
All letters are to be embossed ... information on the bronze tablet indicated by ... stamped in the field by the engineering party after post is placed. ⅛" letters and figures to be used.

Project designations on tablets shall be properly shown I.E., F.I. for Fed Aid Interstate, F for Fed Aid Primary, S for Fed Aid Secondary etc. & S.P. Nº for State Projects, See detail below.

RIGHT OF WAY MARKER POST

ITEM Nº 81b





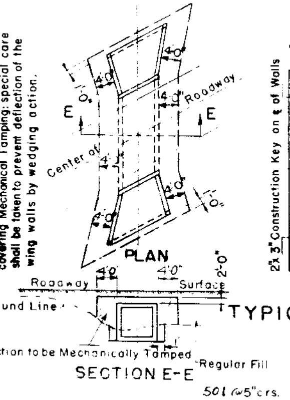
SECTION B-B

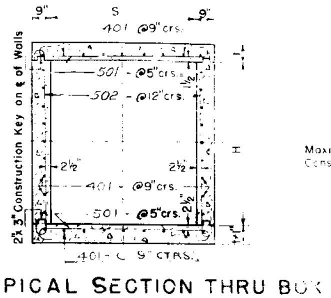
SECTION A-A

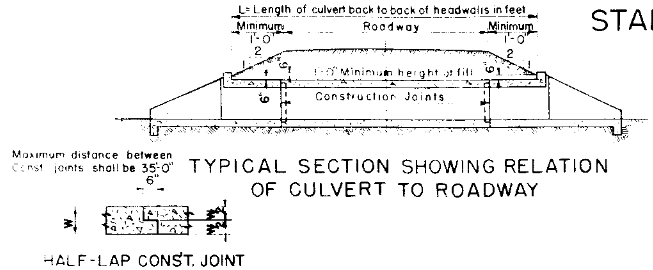
DETAIL OF BRONZE TABLET FOR RIGHT OF WAY MARKER POST

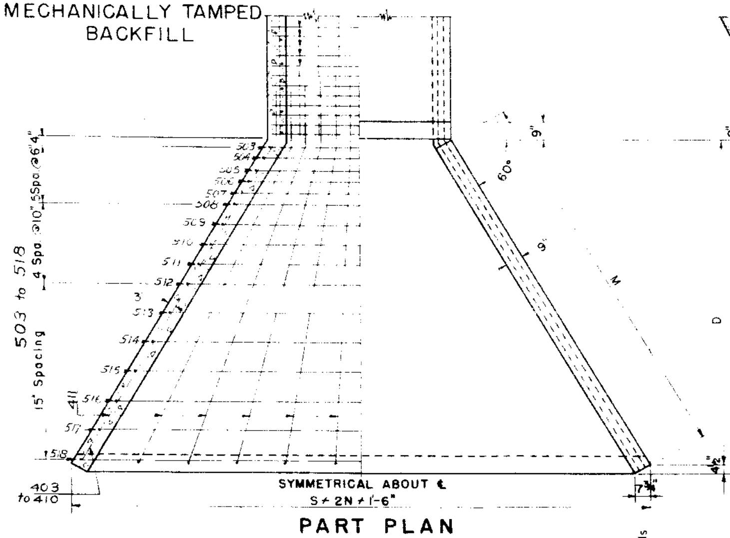
COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
MARKER POSTS

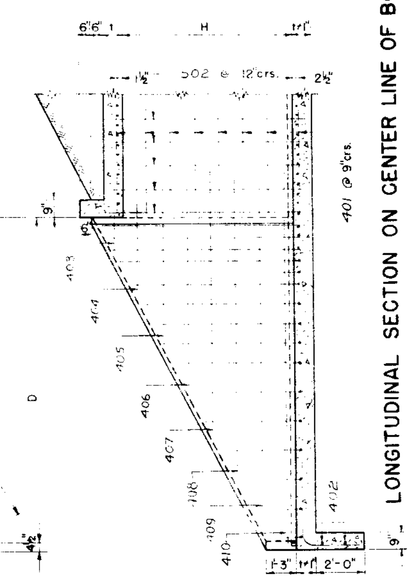
STANDARD M-103-H

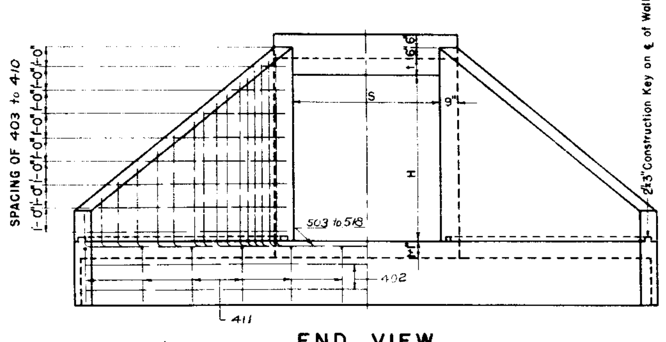


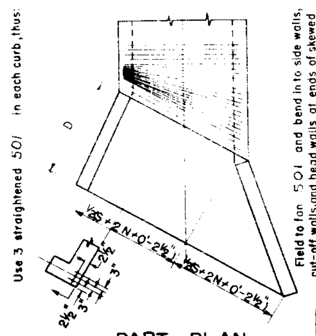












REINFORCEMENT BAR LIST

USE BARS FOR	MARK	SIZE	NUMBER	DIMENSION B	DIMENSION C	TOTAL LENGTH	BENDING DIAGRAM ALL DIMENSIONS ARE OUT TO OUT OF BAR
ALL SIZES	501	5/8"ϕ	4.8L+7	S+7-1		S+2'-3"	
" "	502	5/8"ϕ	2L+3	H+8"		H+1'-10"	
" "	402	1/2"ϕ	4			S+6"+2N	DIMS.
" "	401	1/2"ϕ	★			L+1'-2"	
" "	403	1/2"ϕ	4		1'-8"	3'-8"	0'-10"
" "	404	1/2"ϕ	4		3'-11"	5'-11"	1'-1½"
" "	405	1/2"ϕ	4		6'-3"	8'-3"	3'-1½"
H=3'-0" Or more	406	1/2"ϕ	4		8'-7"	10'-7"	4'-3½"
H=4'-0" " "	407	1/2"ϕ	4		10'-11"	12'-11"	5'-5½"
H=5'-0" " "	408	1/2"ϕ	4		13'-2"	15'-2"	[illegible]
H=6'-0" " "	409	1/2"ϕ	4		15'-6"	17'-6"	7'-[illegible]
H=7'-0"	410	1/2"ϕ	4		15'-9"	17'-9"	7'-10½"
ALL SIZES	503	5/8"ϕ	2	S+1'-5"	H+0'-10"	B+2C-2"	
" "	504	5/8"ϕ	2	S+1'-11"	H+0'-7"		
" "	505	5/8"ϕ	2	S+2'-7"	H+0'-4"		
" "	506	5/8"ϕ	2	S+3'-1"	H+0'-1"		
" "	507	5/8"ϕ	2	S+3'-8"	H-0'-2"		
" "	508	5/8"ϕ	2	S+4'-3"	H-0'-5"		
H=3'-0" Or more	509	5/8"ϕ	2	S+5'-3"	H-0'-10"		
H=3'-0" " "	510	5/8"ϕ	2	S+6'-2"	H-1'-3"		
H=3'-0" " "	511	5/8"ϕ	2	S+7'-2"	H-1'-8"		
H=4'-0" " "	512	5/8"ϕ	2	S+8'-1"	H-2'-1"		
H=4'-0" " "	513	5/8"ϕ	2	S+9'-7"	H-2'-9"		
H=5'-0" " "	514	5/8"ϕ	2	S+11'-0"	H-3'-4"		
H=6'-0" " "	515	5/8"ϕ	2	S+12'-5"	H-4'-0"		
H=6'-0" " "	516	5/8"ϕ	2	S+13'-11"	H-4'-7"		
H=7'-0"	517	5/8"ϕ	2	S+15'-4"	H-5'-3"		
H=7'-0"	518	5/8"ϕ	2	S+16'-9"	H-5'-10"		
ALL SIZES	411	1/2"ϕ	(S+1)4	D+3'-0"		D+5'-4"	

★ See table of Dimensions and Quantities

TABLE OF DIMENSIONS AND QUANTITIES

STEEL QUANTITIES GIVEN BELOW INCLUDE ALLOWANCE FOR OVERRUN OF 1%

TOTAL QUANTITIES FOR ONE BOX EQUALS THE QUANTITY FOR TWO HEADWALLS PLUS (L x QUANTITY FOR ONE LINEAR FT OF BOX)

SPAN S	HEIGHT H	HEIGHT OF FILL ALLOWED	DIMENSION M	DIMENSION N	DIMENSION O	THICKNESS OF SLAB t	NUMBER OF 401 PER BOX	QUANTITIES FOR ONE LINEAL FT OF BOX: CONCRETE CU YDS	QUANTITIES FOR ONE LINEAL FT OF BOX: STEEL LBS	QUANTITIES FOR TWO HEADWALLS: CONCRETE CU YDS	QUANTITIES FOR TWO HEADWALLS: STEEL LBS	STRUCTURAL TWO HEADWALLS SQ FT	EXCAVATION TWO CUT-OFF WALLS CU YDS
2'-0"	2'-0"	37'-0"	4'-0½"	2'-0¼"	3'-6"	6"	12	0.252	38.5	3.3	301	79	3
3'-0"	2'-0"	29'-0"	4'-2¾"	2'-[illegible]⅜"	3'-6"	7"	[illegible]	319	45.4	4.0	356	94	3
3'-0"	3'-0"	29'-0"	6'-6½"	3'-3¼"	5'-8"	7"	18	375	49.0	6.0	522	144	4
4'-0"	2'-0"	20'-0"	4'-2¾"	2'-1⅜"	3'-8"	7"	18	365	51.8	4.4	404	106	4
4'-0"	3'-0"	20'-0"	6'-6½"	3'-3¼"	5'-8"	7"	20	422	55.3	6.8	581	159	4
4'-0"	4'-0"	20'-0"	8'-10¼"	4'-5⅛"	7'-8"	7"	24	477	60.1	9.6	761	222	5
5'-0"	3'-0"	16'-0"	6'-9"	3'-4½"	5'-10"	8"	24	508	63.0	7.9	646	180	5
5'-0"	4'-0"	16'-0"	9'-0½"	4'-6¼"	7'-10"	8"	26	564	66.5		833	248	6
5'-0"	5'-0"	16'-0"	11'-4¼"	5'-8⅛"	9'-10"	8"	28	620	69.9	14.7	1004	325	7
6'-0"	4'-0"	13'-0"	9'-1¾"	4'-6⅞"	7'-11"	8½"	28	639	72.9	12.3	904	271	6
6'-0"	6'-0"	13'-0"	13'-9"	6'-10½"	11'-11"	8½"	34	750	81.[illegible]	20.6	1325	443	8
6'-0"	7'-0"	13'-0"	16'-0¾"	8'-0⅜"	13'-11"	8½"	36	805	84.6	24.8	1586	542	9

ALL REINFORCING STEEL BARS SHALL CONFORM TO A.S.T.M. SPECIFICATION A-305-50T OR LATEST REVISION THEREOF.

GENERAL NOTES

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

All concrete shall be class "A", AND AIR ENTRAINED AS SPECIFIED.

Horizontal const. keys not required when floors and side walls are poured monolithically.

All walls shall have forms on both sides.

Minimum distance between centerline of bar and edge of concrete to be 1½".

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

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

For culverts required and governing dimensions see "List of Structures"

All reinforcing bars shall be deformed.

All reinforcing bars shall be tagged with the station number and BAR designation.

Secondary bars when spliced shall be given a lap of 35 diameters.

Main bars shall not be spliced.

Soundings and depth of footings shown are according to the best available data, if essentially different conditions are encountered the engineer will inspect and determine if redesign is necessary.

Pour wing footings monolithically with floor of box.

The use of additional construction joints undesirable, should field conditions require, construction joints may be made on a vertical plane perpendicular to centerline of culvert and shall be Half-Lap Joints as shown in detail.

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

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

All backfilling in approaches to and over culverts shall be laid in layers not exceeding six inches in depth and each layer shall be compacted in accordance with the illustration for Mechanically Tamped Backfill shown on this drawing.

All surfaces exposed to view on the box and wing walls shall receive class 1 surface finish, except culvert barrel.

ALL DIMENSIONS NOT SHOWN AS CLEAR ARE TO THE ℄ OF THE BAR.

LOADING DATA
LIVE LOAD: A.A.S.H.O. H 20-S16-44
DEAD LOAD: EARTH 120 lb. per cu. ft.
CONCRETE 150 lb. per cu. ft.

DESIGNING DATA
A.A.S.H.O. 1944 UNIT STRESSES
fc=1000
fs=20000
n=10

	INITIAL	DATE
ORIGINAL BY		
CHECKED BY		
VANDYKE BY		
CHECKED BY		

COLORADO
STATE HIGHWAY DEPARTMENT
CONCRETE BOX CULVERT
2'x2' 4'x3' 5'x5'
3'x2' 4'x4' 6'x4'
3'x3' 5'x3' 6'x6'
4'x2' 5'x4' 6'x7'

Designed by W.W.D.
Made by R.C.
Checked by S.L.
Approved by [signature] Bridge Engineer
Date:

STRUCTURE NO.

REVISIONS

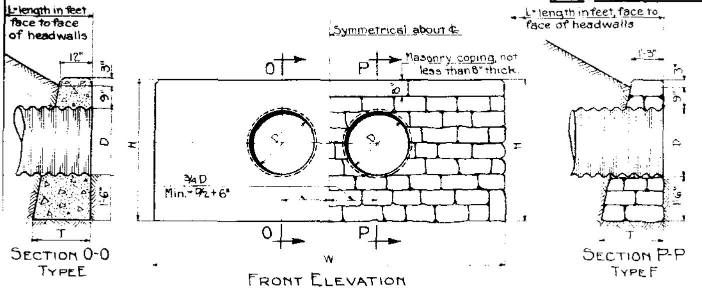
STANDARD M-102-G

Rev. 8-28-50, CGM- Dimension B, Line 7, Type L

FED. ROAD DIST. NO.	STATE	[redacted]	SHEET NO.	TOTAL SHEETS
3	COLO	SP12-382-[illegible]	87	

Rev Types K&L Jan 17, 1946; A.L.P. *Rev 3-7-47 Type K&L H.O.W.*
Rev Types C&F June 11, 1946, A.L.P. *Rev 10-13-47 UPK*
Rev Types K&L Nov 1, 1946, A.L.P. *Rev. 2-25-49 R.E.M.*
Rev Types A, E, K & L, July 10, 1950, J.C.R.

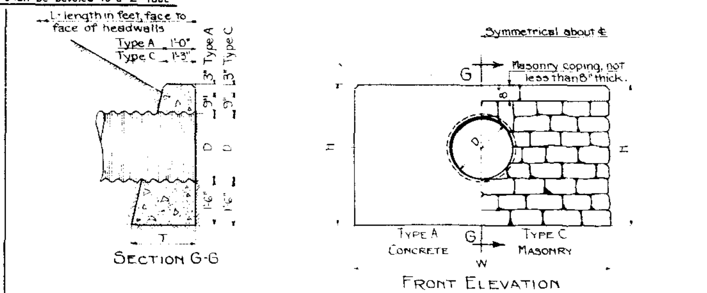
All exposed concrete corners shall be beveled to a 2" face



STANDARD HEADWALLS FOR DOUBLE CORRUG. METAL PIPE CULVERTS

TABLE OF DIMENSIONS AND QUANTITIES

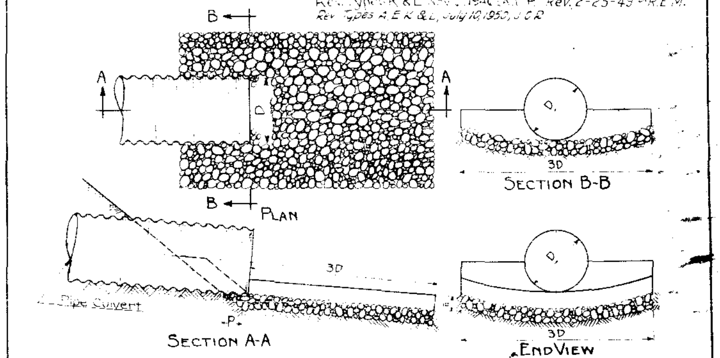
Type E			Both Types				Type F		
D Diam.	T	Class B Concrete in Two Headwalls	W	H	Corrugated Metal Pipe		Cement Rubble Masonry in Two Headwalls	T	D Diam.
15"	1'-6"	2.4 Cu. Yds.	7'-6"	3'-9"	16 Gage	2xL= Lin. Ft.	3.1 Cu. Yds.	2'-0"	15"
18"	1'-7"	3.0 Do	8'-6"	4'-0"	16 Do	2xL= Do	3.8 Do	2'-1"	18"
24"	1'-10"	4.4 Do	10'-6"	4'-6"	14 Do	2xL= Do	5.5 Do	2'-4"	24"
30"	2'-0"	6.1 Do	12'-9"	5'-0"	14 Do	2xL= Do	7.5 Do	2'-6"	30"
36"	2'-2"	8.1 Do	15'-0"	5'-6"	12 Do	2xL= Do	10.0 Do	2'-8"	36"
42"	2'-5"	10.8 Do	17'-3"	6'-0"	12 Do	2xL= Do	12.8 Do	2'-10"	42"
48"	2'-7"	13.6 Do	19'-6"	6'-6"	12 Do	2xL= Do	16.3 Do	3'-0"	48"



STANDARD HEADWALLS FOR SINGLE CORRUG. METAL PIPE CULVERTS

TABLE OF DIMENSIONS AND QUANTITIES

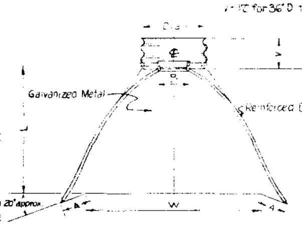
Type A			Both Types				Type C		
D Diam.	T	Class B Concrete in Two Headwalls	W	H	Corrugated Metal Pipe		Cement Rubble Masonry in Two Headwalls	T	D Diam.
15"	1'-6"	1.8 Cu. Yds.	5'-3"	3'-9"	16 Gage	L= Lin. Ft.	2.2 Cu. Yds.	2'-0"	15"
18"	1'-7"	2.2 Do	6'-0"	4'-0"	16 Do	L= Do	2.8 Do	2'-1"	18"
24"	1'-10"	3.3 Do	7'-6"	4'-6"	14 Do	L= Do	4.1 Do	2'-4"	24"
30"	2'-0"	4.5 Do	9'-0"	5'-0"	14 Do	L= Do	5.6 Do	2'-6"	30"
36"	2'-2"	6.0 Do	10'-6"	5'-6"	12 Do	L= Do	7.4 Do	2'-8"	36"
42"	2'-5"	8.0 Do	12'-0"	6'-0"	12 Do	L= Do	9.2 Do	2'-10"	42"
48"	2'-7"	10.0 Do	13'-6"	6'-6"	12 Do	L= Do	11.5 Do	3'-0"	48"



STANDARD GROUTED RUBBLE APRON FOR PIPE CULVERTS

Square Yards Grouted Rubble Slope and Ditch Paving 1 foot Thick														
Fill Slope	D	15"	18"	24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"
	p \ a	7½"	9"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"
1½:1	2'-0"	3	4	6	9	12	17	21	27	33	39	46	54	62
2:1	2'-0"	3	4	7	10	13	18	22	28	34	41	49	57	66
3:1	3'-0"	3	4	7	11	15	20	25	31	38	45	54	63	72
4:1	4'-0"	3	5	8	12	16	22	28	34	42	50	59	69	79

V= 1" for 12"D to 30"D.
V= 1½" for 36"D to 48"D.

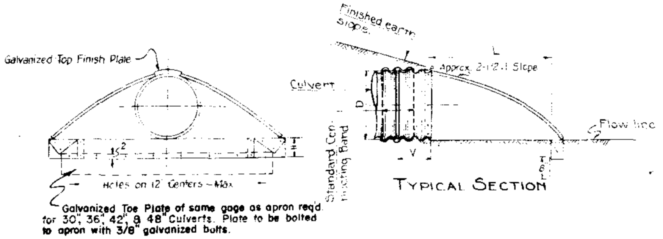


TYPE K

Culv. Diam. D▲	Gage	A 1" Tol.	B Max.	L 1½" Tol.	W 2" Tol.	H 1" Tol.	Remarks
15"	16	6"	8"	26"	30"	6"	One piece skirt
18"	16	7"	9"	31"	36"	6"	One piece skirt
24"	14	9½"	12"	42"	48"	6"	One piece skirt
30"	14	12"	15"	52½"	60"	7½"	Two piece skirt ⊖
36"	12	14"	18"	63"	72"	9"	Two piece skirt ⊖
42"	12	16"	21"	73½"	84"	10½"	Two piece skirt ⊖
48"	12	18"	27"	84"	90"	12"	Two piece skirt ⊖

Splices to be the lap riveted type
⊖ One splice on ℄, made by either riveting or bolting
Galvanized Connector Section, Corner Plate & Toe Plate to be same gage as skirt Section
▲ Culvert diameter is equal to dimension D of connector section.

NOTE: Length of Toe Plate for Culverts 15" to 30" Dia. incl. ="W"+10". 36" to 48" Dia. incl. ="W"+22".

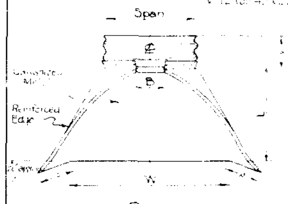


Galvanized Toe Plate of same gage as apron req'd for 30", 36", 42" & 48" Culverts. Plate to be bolted to apron with 3/8" galvanized bolts.

ELEVATION

STANDARD METAL APRONS FOR CORRUGATED METAL PIPE CULVERTS TYPE K

V= 1" for [illegible] to 36"x22" PIPE-ARCHES
V= 1½" for 43"x27" to 72"x44" PIPE-ARCHES

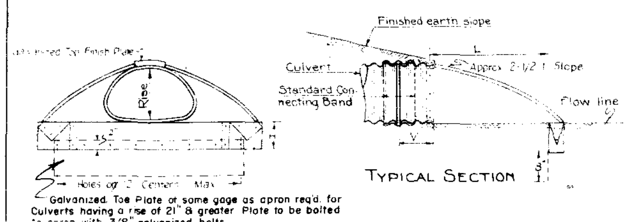


TYPE L

Normal Culvert Diam.	Arch Dimensions Span	Arch Dimensions Rise	Gage	A 1" Tol.	B Max.	L 1½" Tol.	W 2" Tol.	H 1" Tol.	Remarks
15"	18"	11"	16	4½	9"	19"	30"	6"	One piece skirt
18"	20"	13"	16	5¼	10	23"	36"	6"	One piece skirt
24"	29"	18"	14	7"	14"	31½"	45"	6"	One piece skirt
30"	36"	21"	14	8¾	16	38½"	60"	6"	One piece skirt
36"	43"	27"	12	10¾	17½"	47"	75"	7⅝	Two piece skirt ▲
42"	[illegible]	[illegible]	12	12¼	20"	54"	85"	9⅛	Two piece skirt ▲
48"	58"	36"	12	14"	26"	63"	96"	10⅝	Two piece skirt ▲
54"	65"	40"	12	15¾	23"	70"	112"	10⅝	Three piece skirt ⊕
60"	72"	44"	10	17¼	24"	77"	128"	12⅛	Three piece skirt ⊕

▲ Splices to be the lap riveted or bolted on ℄.
⊕ Sections to be joined by riveting or bolting equal distance from ℄. Galvanized Connector Section, Corner Plate & Toe Plate to be same gage as skirt Section.

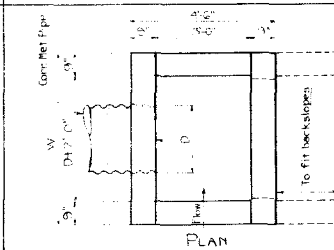
NOTE: Length of Toe Plate for Pipe-Arch Culverts with rise of 11" to 27" incl.="W"+10". 31" to 44" incl.="W"+18".



Galvanized Toe Plate of same gage as apron req'd for Culverts having a rise of 21" & greater. Plate to be bolted to apron with 3/8" galvanized bolts.

ELEVATION

STANDARD METAL APRONS FOR CORRUGATED METAL PIPE ARCH CULVERTS TYPE L

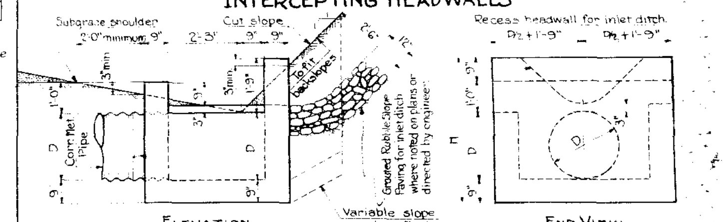


QUANTITIES OF CLASS B CONCRETE OR CEMENT RUBBLE MASONRY

Size of Pipe	Width of Wall	Height of Wall	Quantities in One Headwall
D	W	H	Cu. Yds.
15"	4'-9"	3'-9"	1.48
18"	5'-0"	4'-0"	1.64
24"	5'-6"	4'-6"	1.99
30"	6'-0"	5'-0"	2.34
36"	6'-6"	5'-6"	2.72

NOTE: Back wall to be eliminated and end walls connected to back slope where ordered by the Engineer. Floor slab is to be extended with side walls if in common material and is to be omitted when inlet is in rock. Actual quantities involved in such operation shall be allowed and paid for. Increases in plan quantities must be covered by work order.

INTERCEPTING HEADWALLS



GENERAL NOTES FOR ALL STRUCTURES

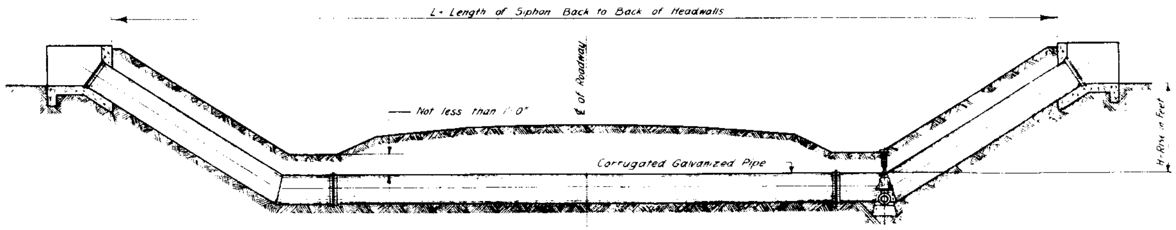
All work shall be done according to the standard specifications of the Colorado State Highway Department, adopted January 1st 1948
All exposed concrete surfaces shall receive class 1 surface finish.

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 ℄ of roadway.
Minimum grade of pipe shall be 1%.
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 STATE HIGHWAY DEPARTMENT

STANDARD HEADWALLS
INTERCEPTING HEADWALLS
GALVANIZED METAL APRONS
GROUTED RUBBLE APRONS
FOR CORR. MET. PIPE CULVERTS

Designed by P.S.B.-G.M.D.	Approved by [signature] Bridge Engineer
Made by A.L.P.	
Checked by H.W.P.	Date December 15, 1945



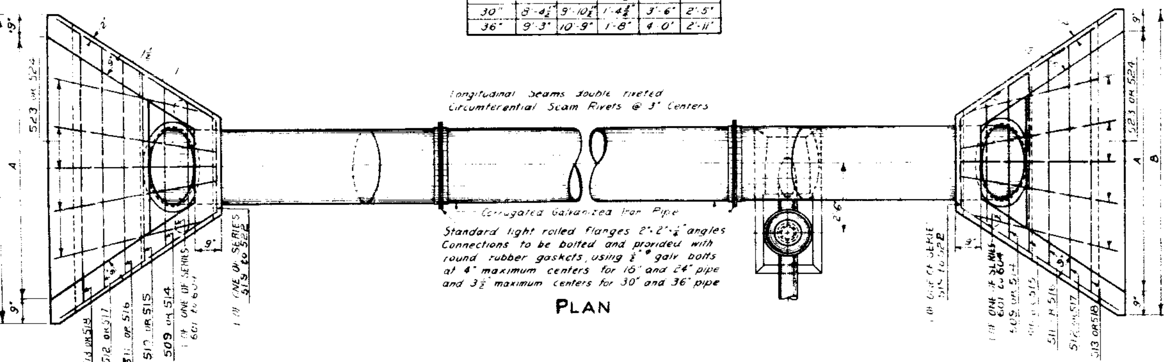
SECTIONAL ELEVATION OF SIPHON

TABLE OF DIMENSIONS					
Dia of Siphon \ Dimension	A	B	C	F	E
18"	6'-7½"	8'-1½"	0'-10"	2'-6"	1'-5"
24"	7'-6"	9'-0"	1'-1½"	3'-0"	1'-11"
30"	8'-4½"	9'-10½"	1'-4¾"	3'-6"	2'-5"
36"	9'-3"	10'-9"	1'-8"	4'-0"	2'-11"

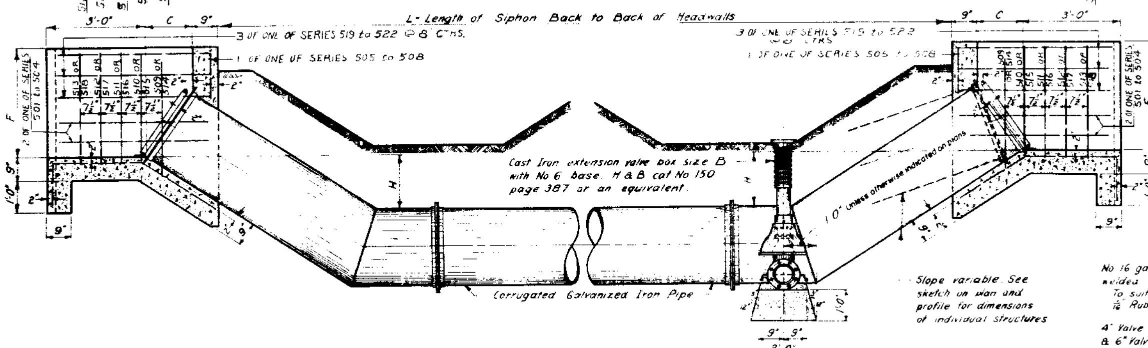
QUANTITIES FOR ONE SIPHON					
	Item No 55	Item No 46a	Item No 47	Item No 85	
Siphon Sizes	Pipe Gauge U.S. Std	Concrete Class "A"	Reinforcing Steel	Trash Guards	Size Drain
18" Dia	16	3.50 Cu.Yd	304 Lb.	2 @ 30 Lb Each	4"
24" Dia.	14	4.25 Cu.Yd.	317 Lb.	2 @ 40 Lb Each	4"
30" Dia	14	5.25 Cu.Yd	377 Lb.	2 @ 60 Lb Each	6"
36" Dia	12	6.25 Cu.Yd.	385 Lb.	2 @ 80 Lb. Each	6"
Item No 46a Class "A" Concrete for one siphon drain - 0.4 Cu.Yd.					
Item No 110v Valve and Valve Box					Each

Diameter 18" and 24"			BAR LIST FOR 1 SIPHON	Diameter 30" and 36"		
Mark	Number	Length	BENDING DIAGRAM All Bars ⅝"ϕ except 600 SERIES	Length	Number	Mark
18" 601	2	4'-9"	18"-3'-5", 24"-3'-11", 30"-4'-5", 36"-4'	5'-9"	2	30" 603
24" 602	2	5'-3"		6'-3"	2	36" 604
18" 501	8	4'-2"	18"-4'-2", 24"-4'-5", 30"-4'-9", 36"-5'-0"	4'-9"	8	30" 503
24" 502	8	4'-5"		5'-0"	8	36" 504
18" 505	4	4'-0"	18"-4'-0", 24"-4'-6", 30"-5'-4", 36"-5'-10"	5'-4"	4	30" 507
24" 506	4	4'-6"		5'-10"	4	36" 508
18" & 24" 509 to 51[illegible]	2 Each	8'-4" to 11'-8" Increase by 10"	18" & 24" 3'-6" to 6'-10" by 10"; 30" & 36" 5'-4" to 8'-8" by 10"; 2'-6" 18 & 24; 3'-6" 30 & 36	12'-2" to 15'-6" Increase by 10"	2 Each	30" & 36" 5[illegible] to 518
18" 5[illegible]	6	12'-0"	18"-2'-0", 24"-2'-6", 30"-3'-0", 36"-3'-6"	14'-0"	6	30" 52[illegible]
24" 520	6	13'-0"		15'-0"	6	36" 522
18" & 24" 5[illegible]3	[illegible]	5'-[illegible]"	2'-6" All Sizes; 18 & 24; 30 & 36; Bend in Field	5'-[illegible]	[illegible]	30" & 36" [illegible]24

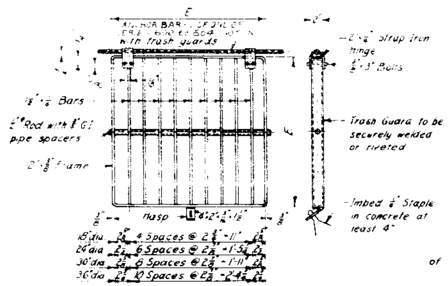
ALL DIMENSIONS ARE OUT TO OUT OF BAR



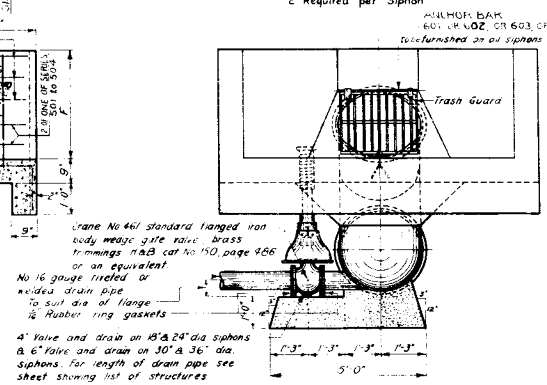
PLAN



SECTIONAL ELEVATION



DETAIL OF TRASH GUARD
2 Required per Siphon



FRONT ELEVATION

GENERAL NOTES

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

All concrete shall be Class "A", AND AIR ENTRAINED AS DIRECTED

All walls shall have forms on both sides

All reinforcing bars shall be deformed

All reinforcing bars shall be tagged with the Station number and BAR designation

All exposed corners in concrete shall be beveled to a 2" face

All corrugated pipe to conform to the Colorado State Highway Specifications.

All flanges to be 2"-2"-¼" standard light rolled, securely riveted to CORRUGATED pipe

Trash guards to be furnished only when called for on plans.

For siphons required and governing dimensions see plans

Trash guards to be painted as per specifications for structural steel

"Siphon Drains" & "Valve and Valve Boxes" are to be provided only when called for on plans and tabulated in the List of Structures.

Backfill of areas inaccessible to rollers shall be compacted with Mechanical Tampers in accordance with Item 16 of the Specification

All surfaces exposed to view on the head walls shall receive class 1 surface finish.

ALL DIMENSIONS NOT SHOWN AS CLEAR ARE TO THE ℄ OF THE BAR

ALL REINFORCING STEEL BARS SHALL CONFORM TO A.S.T.M. SPECIFICATION A-305-50T OR LATEST REVISION THEREOF

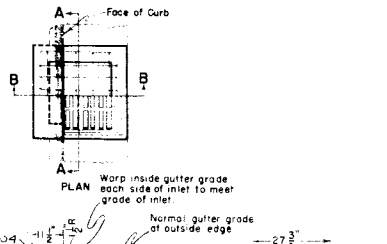
COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD SIPHON
CORRUGATED GALVANIZED IRON PIPE WITH CONCRETE INLET & OUTLET BOXES
SIZES 18"-24"-30"-36"

Designed by A G K	Approved by P. J. Bailey
Made by P. C.	Bridge Engineer
Checked by W. N. M.	Date:

STANDARD M-12-D-13

FED. ROAD DIVN. NO.	DISTRICT	SHEET NO.	TOTAL SHEETS
9	SP 12		
	COLO.	362-501	33

NO. 12 CONCRETE INLET

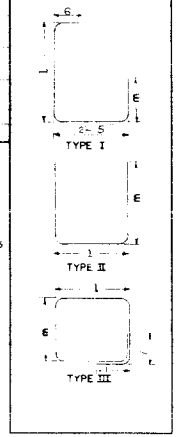


*These dimensions for 6" curb Dimensions to be modified as required for other heights of curb

BAR LIST FOR H = 3'0"

MARK	SIZE	NO REQD	LENGTH	TYPE	DIMENSIONS l	DIMENSIONS m
401	1/2"ø	3	1'-10"	III	2'-6	2'-6
402	1/2"ø	5	5'-6"	II	2'-5	1'-7"
403	1/2"ø	5	7'-5"	I	*2'-7"	1'-8"
404	1/2"ø	2	2'-7"	STR	—	—

BENDING DIAGRAM (ALL DIMENSIONS ARE OUT TO OUT OF BAR)



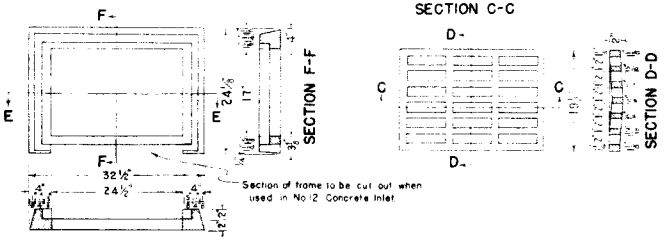
*3rm 601 when H is 4'0 or less

* 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.

NO. 12 INLET GRATING & FRAME

Approx. Weight 340 lbs.



QUANTITIES

H	CLASS "A" CONCRETE *CU. YDS	* REINFORCING STEEL
3'0"	0.54	70 lbs.
3'6"	0.63	85 "
4'0"	0.72	100 "
4'6"	0.81	119 "
5'0"	0.90	137 "
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

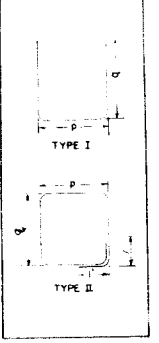
* Includes 1% allowance for overrun

NO. 13 CONCRETE INLET

BAR LIST FOR H = 3'0"

MARK	SIZE	NO REQD	LENGTH	TYPE	DIMENSIONS P	DIMENSIONS q
601	3/4"ø	None	2'-6"	I	0'-10"	0'-10"
401	1/2"ø	4	1'-10"	II	1'-5	2'-1"
402	1/2"ø	7	6'-1"	I	2'-0"	*2'-1"
403	1/2"ø	4	7'-5"	I	3'-4"	*2'-1"

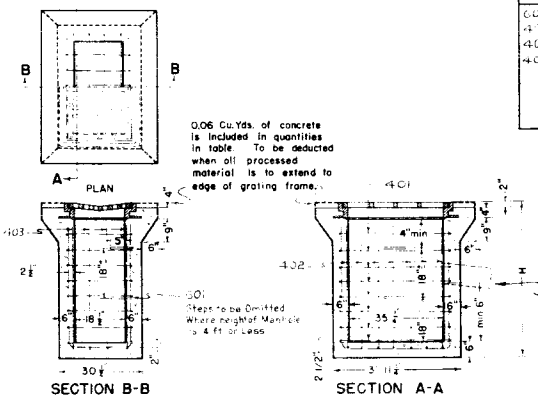
BENDING DIAGRAM (ALL DIMENSIONS ARE OUT TO OUT OF BAR)



*3rm 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

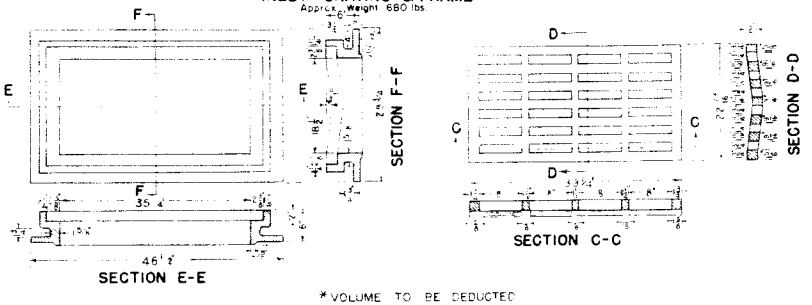
See Plans for size and locations of outlets.



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

NO. 13 INLET GRATING & FRAME

Approx. Weight 680 lbs.



QUANTITIES

H	CLASS "A" CONCRETE *CU. YDS	* REINFORCING STEEL
3'0"	.86	84 lbs
3'6"	.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	206 "
7'0"	1.67	225 "
7'6"	1.77	245 "
8'0"	1.87	261 "
8'6"	1.97	277 "
9'0"	2.07	297 "
9'6"	2.17	315 "
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.

*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	—

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, adopted January 1st 1948
All reinforced concrete shall be class "A" AND AIR ENTRAINED 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 BAR designation and station number.
All castings shall be painted with two coats of asphalt or coal tar and oil.
All surfaces exposed to view on the box shall receive class 1 surface finish.
ALL DIMENSIONS NOT SHOWN AS CLEAR ARE TO ℄ OF BAR.
ALL REINFORCING STEEL BARS SHALL CONFORM TO A.S.T.M. SPECIFICATION A-305-50T OR LATEST REVISION THEREOF.

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

Designed by A.P.G.
Made by A.P.G.
Check Design A.Z.
Check Detail C.N.L. Date

Approved by P. A. Bailey
Bridge Engineer

STANDARD TIMBER GUARD POSTS

STANDARD M-19-C

DIVISION NO 9 | DISTRICT [redacted] | COUNTY [redacted] | [redacted]

SPECIFICATIONS

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 after being peeled and shaved in accordance with specifications.

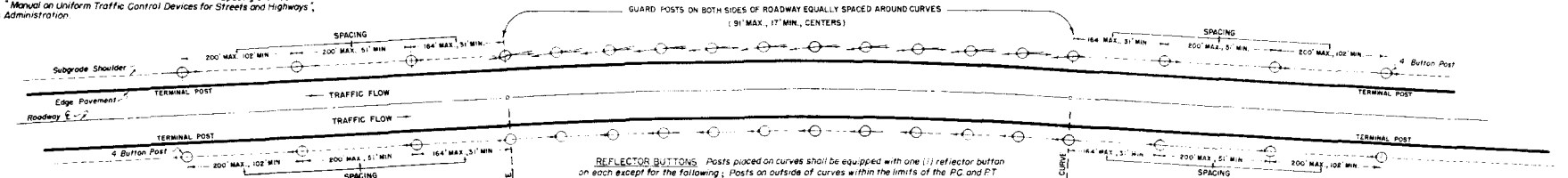
REFLECTOR BUTTONS - No. 1 Stimsonite reflector buttons or an acceptable equivalent including reflectorized sheeting or prefabricated delineator units. Holes drilled in posts to accomodate reflector buttons shall be 1/16" diameter less than the base of the button.

PAINTING (WORK BY STATE FORCES) - 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.

DATE NAILS (WORK BY STATE FORCES) - Nails shall be installed one (1) per post and driven flush. Cost of furnishing and installing to be charged to Engineering Costs.

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 I of "Manual on Uniform Traffic Control Devices for Streets and Highways", Issue of Aug. 1948 by the Public Roads Administration.

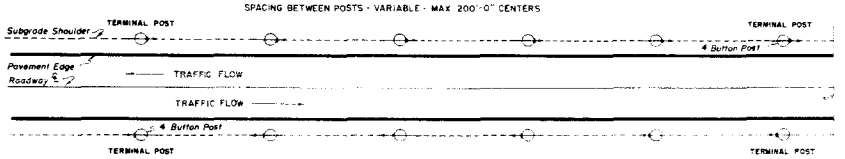


REFLECTOR BUTTONS Posts placed on curves shall be equipped with one (1) reflector button on each except for the following; Posts on outside of curves within the limits of the P.C. and P.T. shall have two (2) buttons, one for each direction of traffic flow. Terminal Posts to the right of and facing approaching traffic shall be equipped with four (4) buttons.

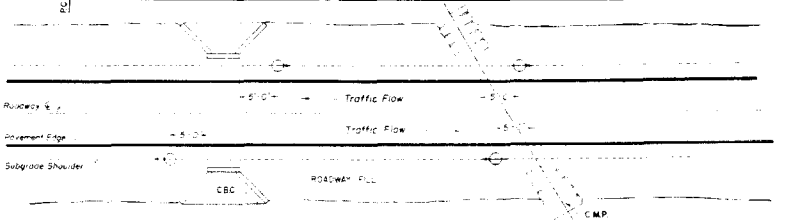
Reflector Buttons on posts to the right of and facing approaching traffic shall be placed on a line parallel to the roadway centerline. Buttons on posts on the outside of curves, to the left of and facing approaching traffic, shall be placed at angles whereby reflection is attained at a distance of 500 feet.

Method of Placement on Tangents

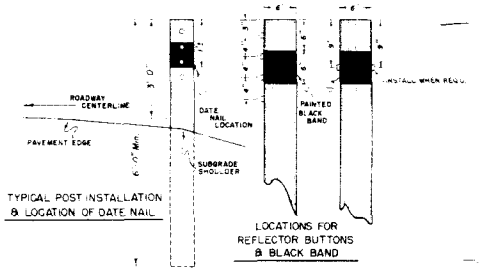
INSTALLATION of guard posts on tangents shall be in conformity with details shown below and in accordance with the following; Reflector Buttons shall be installed one (1) to each post except terminal posts to the right of and facing approaching traffic which will have four (4) buttons. All buttons shall be placed on a line parallel to the roadway centerline



Plan View Showing Placement at Isolated Minor Structures

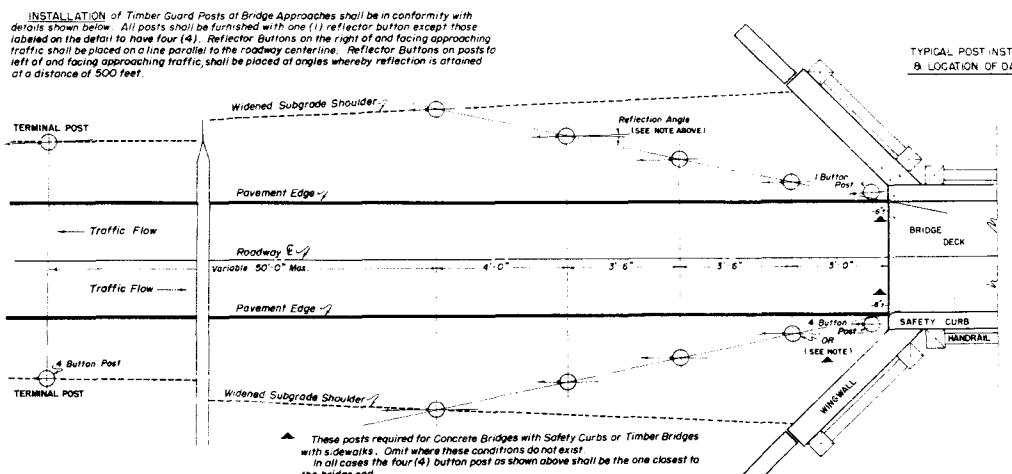


DETAILS OF POSTS



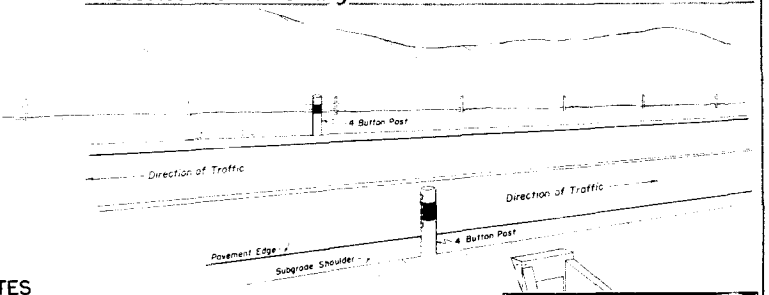
Typical Installation at Bridge Approaches

INSTALLATION of Timber Guard Posts at Bridge Approaches shall be in conformity with details shown below. All posts shall be furnished with one (1) reflector button except those labeled on the detail to have four (4). Reflector Buttons on the right of and facing approaching traffic shall be placed on a line parallel to the roadway centerline. Reflector Buttons on posts to left of and facing approaching traffic, shall be placed at angles whereby reflection is attained at a distance of 500 feet.



▲ These posts required for Concrete Bridges with Safety Curbs or Timber Bridges with sidewalks. Omit where these conditions do not exist.
In all cases the four (4) button post as shown above shall be the one closest to the bridge end.

Pictorial View Showing Location at Isolated Minor Structures



GENERAL NOTES

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

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

In all instances a test shall be made to assure the maximum effect from reflective units.

The number, location and spacing of guard posts will be shown on plans.

COLORADO
STATE HIGHWAY DEPARTMENT

STANDARD TIMBER GUARD POSTS

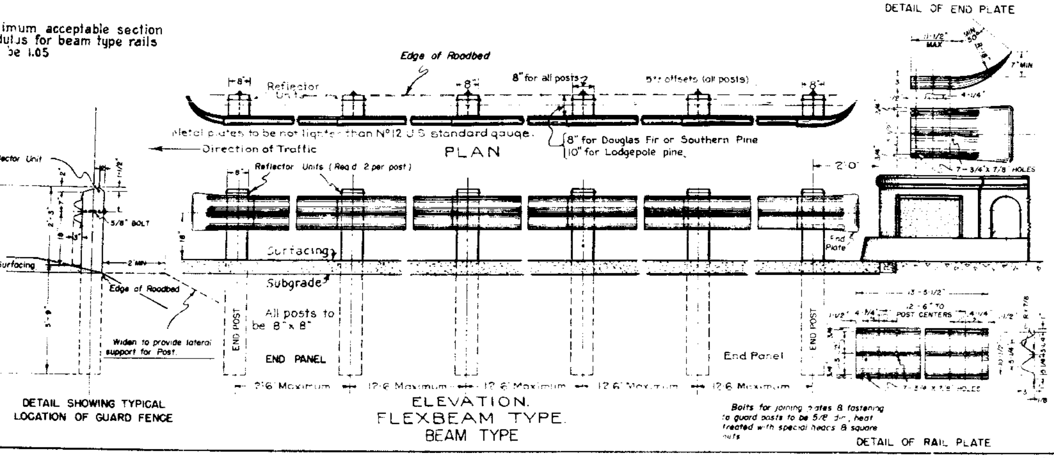
Designed by C.G.M. | Approved by [redacted]
Made by C.G.M. | Engineer, Surveys & Plans
Checked by | Date: March 2, 1951

REVISIONS

Rev. 11-24-39 Reflector Units
Rev. 3-25-40 W.G.S. Bolt Spacing Flex-beam Type.
Rev. 6-3-40 A.Z. Detail of rail element and offset spring.
Rev. 12-13-47 J.P.K.
Rev. 10-2-48 - C.G.M. - Revised Flexbeam Type Fence.
Rev. 12-3-48 - C.G.M. - Item No. 8 Title Block
Rev. 5-10-49, C.G.M., Fence Types, Notes, Title
Rev. 7-18-49 E.E.O.
Rev. 12-27-49, C.G.M., Added Date Nail Detail
Rev. 6-15-51 - E.A.R. - Flexbeam Type & Notes
Rev. 8-16-39 Minimum diameter for posts F.E.B.
Rev. 9-21-39 Square Posts. P.B.B.
Rev. 6-14-40 - A.Z. - 1940 Specs. - Changed timber post details & Location of guard fence.
Rev. 9-24-40 - A.Z. - Added "Suggested" to detail of rail element
Rev. 8-6-45 - A.Z. - Location of guard fence.
Rev. 7-22-46 - A.Z. - Flexbeam Section Added.
Rev. 10-21-46 - C.G.M. - Location of Guard Fence.

STANDARD M-21-B

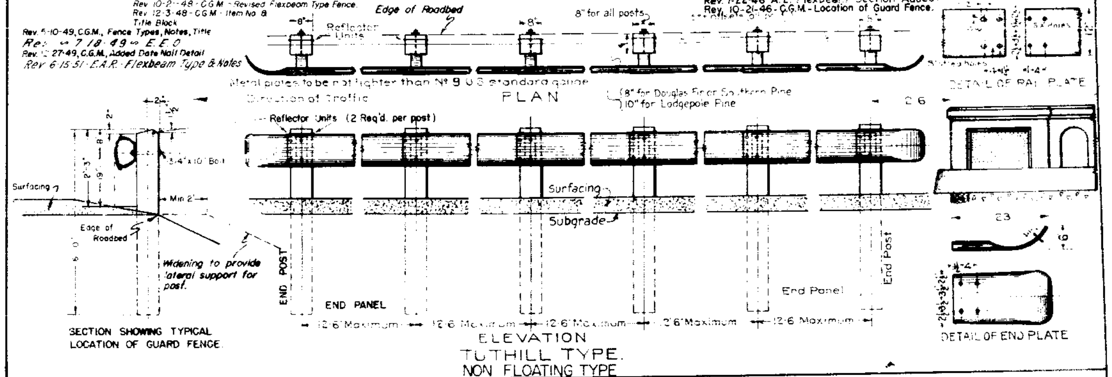
FED. ROAD DIVISION NO.	DISTRICT	[redacted]	SHEET NO.	TOTAL SHEETS
9	COLO.	SP(2-38)-01	35	[redacted]



Minimum acceptable section modulus for beam type rails to be 1.05
DETAIL OF END PLATE
Edge of Roadbed
8" for all posts
Reflector Unit
Metal plates to be not lighter than No. 12 U.S. standard gauge.
Direction of Traffic
PLAN
8" for Douglas Fir or Southern Pine
10" for Lodgepole pine.
Reflector Units (Req'd. 2 per post)
5/8" BOLT
Surfacing
Subgrade
Edge of Roadbed
All posts to be 8" x 8"
Widen to provide lateral support for Post.
END POST
END PANEL
End Panel
End Plate
2'6" Maximum
12'6" Maximum
Bolts for joining plates & fastening to guard posts to be 5/8" dia., heat treated with special heads & square nuts
DETAIL OF RAIL PLATE

DETAIL SHOWING TYPICAL LOCATION OF GUARD FENCE

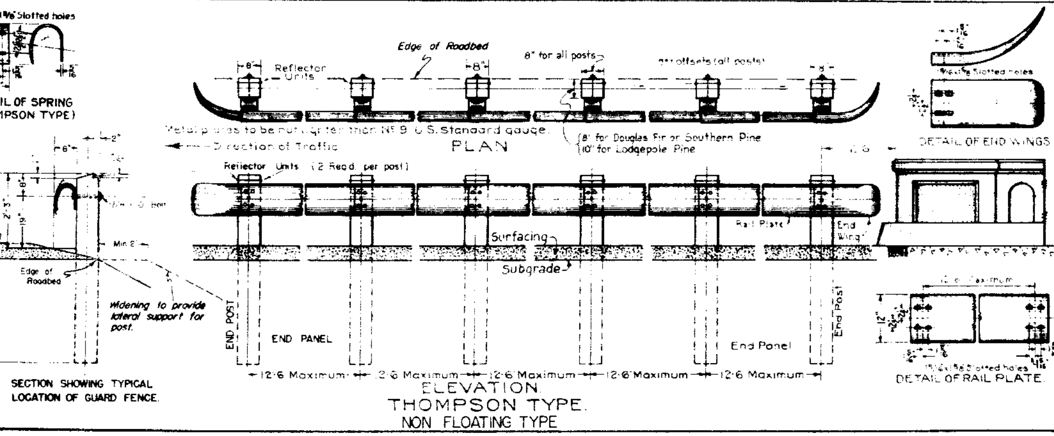
ELEVATION
FLEXBEAM TYPE
BEAM TYPE



Edge of Roadbed
8" for all posts
Reflector Units
Metal plates to be not lighter than No. 9 U.S. standard gauge
Direction of Traffic
PLAN
8" for Douglas Fir or Southern Pine
10" for Lodgepole Pine
Reflector Units (2 Req'd. per post)
3/4" x 10" Bolt
Surfacing
Subgrade
Edge of Roadbed
Widening to provide lateral support for post.
END POST
END PANEL
End Panel
End Post
12'6" Maximum
DETAIL OF RAIL PLATE
DETAIL OF END PLATE

SECTION SHOWING TYPICAL LOCATION OF GUARD FENCE

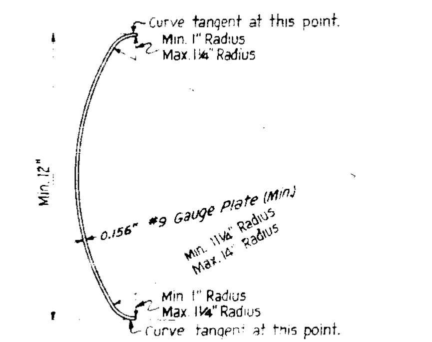
ELEVATION
TUTHILL TYPE.
NON FLOATING TYPE



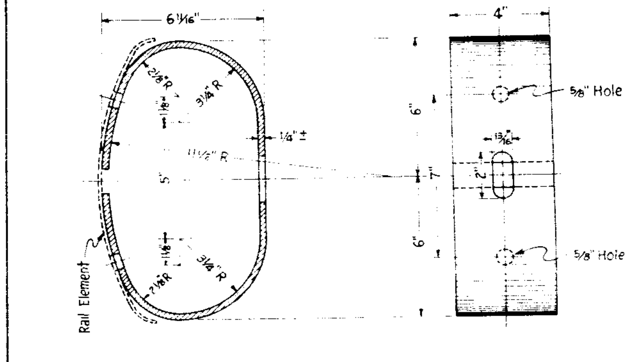
Slotted holes
DETAIL OF SPRING (THOMPSON TYPE)
Edge of Roadbed
8" for all posts
Reflector Units
Metal plates to be not lighter than No. 9 U.S. Standard gauge
Direction of Traffic
PLAN
8" for Douglas Fir or Southern Pine
10" for Lodgepole Pine
Reflector Units (2 Req'd. per post)
Surfacing
Subgrade
Rail Plate
End Wing
Edge of Roadbed
Widening to provide lateral support for post.
END POST
END PANEL
End Panel
End Post
12'6" Maximum
DETAIL OF END WINGS
DETAIL OF RAIL PLATE

SECTION SHOWING TYPICAL LOCATION OF GUARD FENCE

ELEVATION
THOMPSON TYPE.
NON FLOATING TYPE

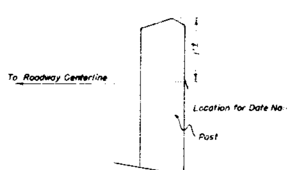


SUGGESTED
DETAIL OF RAIL ELEMENT



DETAIL OF OFFSET SPRING
(TUTHILL TYPE)

Detail for Placing Date Nails



NOTE:
Date Nails shall be placed on every post and shall be driven flush.
Date Nails to be furnished and installed by State Forces as part of Engineering Costs.

GENERAL NOTES

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

All wood posts shall be close grained Douglas Fir of the Coast Region, Dense Longleaf or Shortleaf Southern Pine, or Lodgepole Pine.

Only one type of metal plate guard fence or posts may be used on a project.

In lieu of the metal plate guard fence types as shown on this drawing, other equivalent types of metal plate guard fence approved by the department and complying with the specifications may be used.

All wood posts shall be square edged, full sawn, with tops beveled as shown. All bolt holes are to be drilled 1/16" larger than diameter of bolt before treatment is applied. All wood posts shall be pressure treated for the full length of the posts as provided for in the Specifications.

Timber posts fabricated from Douglas Fir or Southern Pine shall be 8"x8" square. Timber posts fabricated from Lodgepole Pine shall be 8"x10" and shall be installed with the 8" face parallel to the centerline of the roadway.

A 2"x10" test specimen for the type of Guard Rail used, must be submitted to the Laboratory for required tests.

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

All metal connecting devices, hardware and supports shall be hot dip galvanized, except that offset spring fittings may be electro-plated. Metal plates shall not be galvanized, but shall be painted as provided for in the specifications.

Metal plates shall not be lighter than that shown on this sheet for each type and in no case to be lighter than No. 12 U.S. standard gauge.

The length of guard fence to be paid for and designated on plans shall be measured from center to center of end posts.

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

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

Where guard fences are constructed on the approaches to bridges with sidewalks, the fence at bridge shall be placed in line with the face of the curbing on the bridge.

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

GEN. NOTES (CONT.)

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

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

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

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

COLORADO
STATE HIGHWAY DEPARTMENT

STANDARD
METAL PLATE GUARD FENCE
BEAM AND
NON FLOATING TYPES

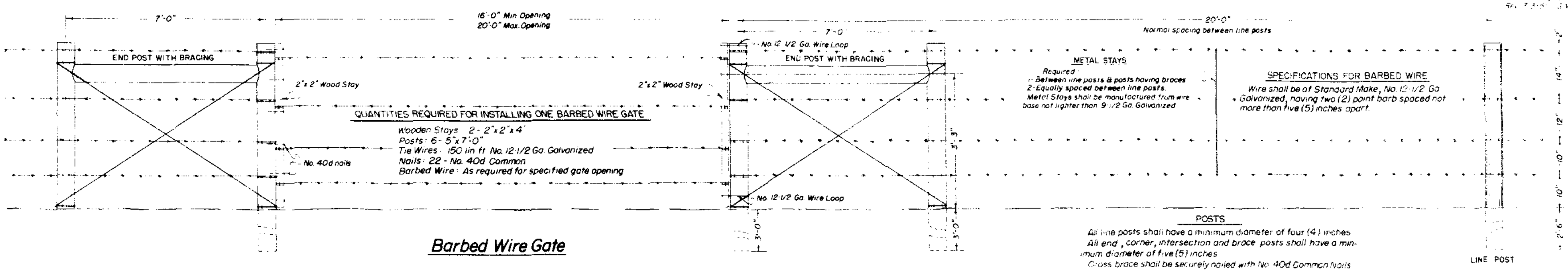
Designed by A.G.K.	Approved by
Made by A.G.K.	
Checked by	Date: January 1st 1948

Standard Wire Fence With Wooden Posts

STANDARD M-24-H

DIVISION NO. 9 | DISTRICT | 382-59 | 36

Rev. ...-50, C.G.M., Post spacing, Driveway gate, Added Gen. Note
Rev. ... C.G.M. Alternate Gate Note



QUANTITIES REQUIRED FOR INSTALLING ONE BARBED WIRE GATE

Wooden Stays: 2 - 2"x2"x4'
Posts: 6 - 5"x7'-0"
Tie Wires: 150 lin ft No. 12 1/2 Ga. Galvanized
Nails: 22 - No. 40d Common
Barbed Wire: As required for specified gate opening

Barbed Wire Gate

METAL STAYS

Required:
1 - Between line posts & posts having braces
2 - Equally spaced between line posts.
Metal Stays shall be manufactured from wire base not lighter than 9 1/2 Ga. Galvanized

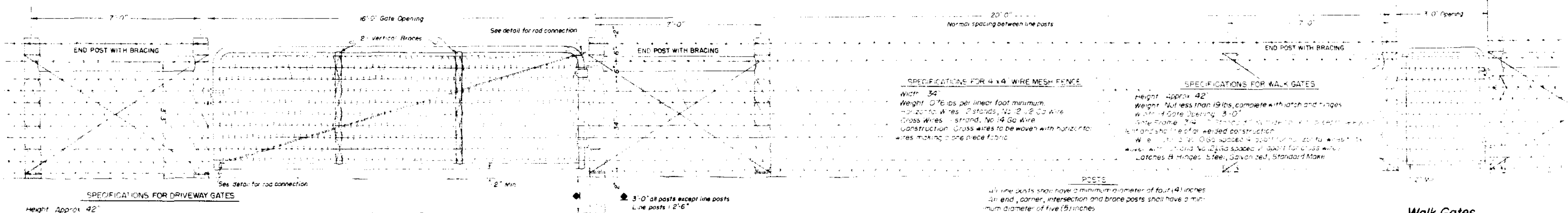
SPECIFICATIONS FOR BARBED WIRE

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

POSTS

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

BARBED WIRE FENCE WITH WOODEN POSTS



SPECIFICATIONS FOR 4"x4" WIRE MESH FENCE

Width: 34"
Weight: 0.76 lbs per linear foot minimum.
Horizontal Wires: ... strands, No. 12 1/2 Ga. Wire
Cross Wires: ... strand, No. 14 Ga. Wire
Construction: Cross wires to be woven with horizontal wires making a one piece fabric

SPECIFICATIONS FOR WALK GATES

Height: Approx. 42"
Weight: Not less than 19 lbs, complete with latch and hinges
Width of Gate Opening: 3'-0"
Gate Frame: ... and shall be of all welded construction
Wire: ... No. 10 Ga. spaced 4" apart for horizontal wires to be woven with ... strand No. 12 1/2 Ga. spaced 2" apart for cross wires
Latches & Hinges: Steel, Galvanized, Standard Make

POSTS

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

Walk Gates

SPECIFICATIONS FOR DRIVEWAY GATES

Height: Approx. 42"
Weight: Not less than 91 lbs complete with latch and hinges.
Width of Gate Opening: 16'-0"
Gate Frame: ... I.D. Standard Galvanized pipe or acceptable equivalent and shall be of all welded construction
Wire: 1 strand No. 10 Ga. spaced 4" apart for horizontal wires to be woven with 1 strand No. 12 1/2 Ga. spaced 2" apart for cross wires.
Rod Brace: 1/4" round, minimum
Latches & Hinges: Steel, Galvanized, Standard Make

Driveway Gates

ALTERNATE GATES

Alternate equivalent standard metal gates other than shown will be acceptable subject to the Engineer's approval.

COMBINATION WIRE FENCE WITH WOODEN POSTS

General Notes

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

Wire mesh used in Combination Wire Fence as shown above shall be galvanized. Wire mesh used in walk and driveway gates shall be galvanized ... coated with an approved waterproof asphaltic ... paint.

Fence Staples shall be galvanized and at least ... in length and shall be made from wire base not less than No. 9 Ga. Barbed wire fence shall have eight (8) staples per line post. Combination wire fence shall have fourteen (14) staples per line post.

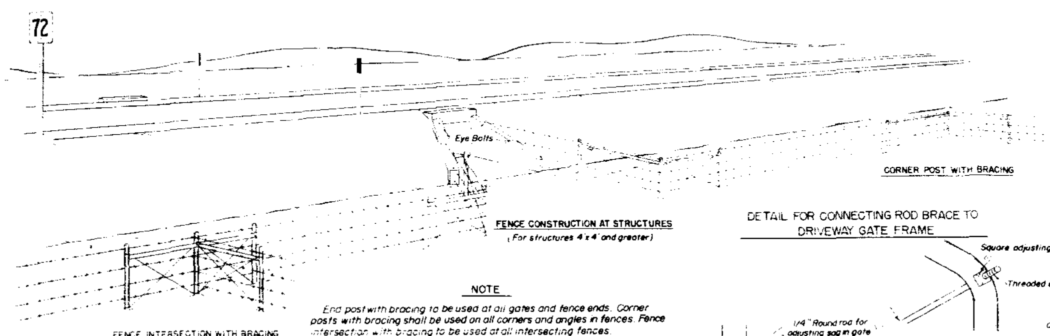
Fence wire to be placed on either road or field side of posts depending on local conditions, i.e. On curves the wire should be placed on side of post which would prevent tension on staples. This will also apply where wind drift, tumble weeds or other conditions would exert unusual pressure against the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

POSTS

Posts shall be treated or untreated as specified on plans and shall conform to the following:
Untreated posts shall be made of seasoned straight native cedar. The tops of posts shall be sawed off square and peeling of the posts will not be required. Split posts will not be acceptable for use unless specifically permitted in the Special Provisions of plans.
Treated posts shall be made of seasoned, straight ... Lodgepole Pine or Southern Pine, to be peeled and tops to be cut off square before pressure treatment. Posts shall be pressure treated in conformity with requirement of the Specifications.

In lieu of Galvanized Finish on Gate Frames, Cadmium Plated Pipe or Aluminum Painting with zinc chromate Primer as per specifications will be considered to be equivalent.

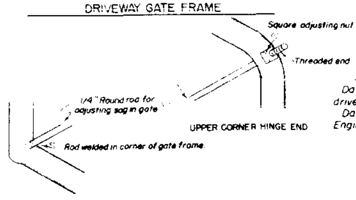
Illustrative Sketch Showing Typical Examples For Constructing Fences



NOTE

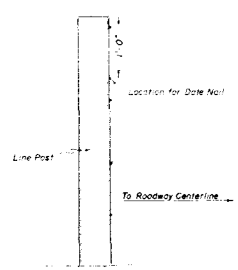
End post with bracing to be used at all gates and fence ends. Corner posts with bracing shall be used on all corners and angles in fences. Fence intersection with bracing to be used at all intersecting fences.
At all Structures of 4'x4' and over the fence shall be ended at eye-bolts in the wings of the structure. Where the type of construction prohibits the use of eye-bolts, an end post with bracing shall be used.
Eye-bolts are to be made from 1/2" round iron bars with a minimum of 6" of body length embedded in the concrete and a minimum of 1" inside eye diameter.

DETAIL FOR CONNECTING ROD BRACE TO DRIVEWAY GATE FRAME



DETAILS FOR PLACING DATE NAILS

(To be installed on Treated Wooden Posts only)



NOTE

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

COLORADO
STATE HIGHWAY DEPARTMENT

Standard Wire Fence
With
Wooden Posts

Designed by C.G.M.	Approved by ...
Made by C.G.M.	Engineer, Surveys & Plans
Checked by ...	Date: ... 19...

REVISIONS

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

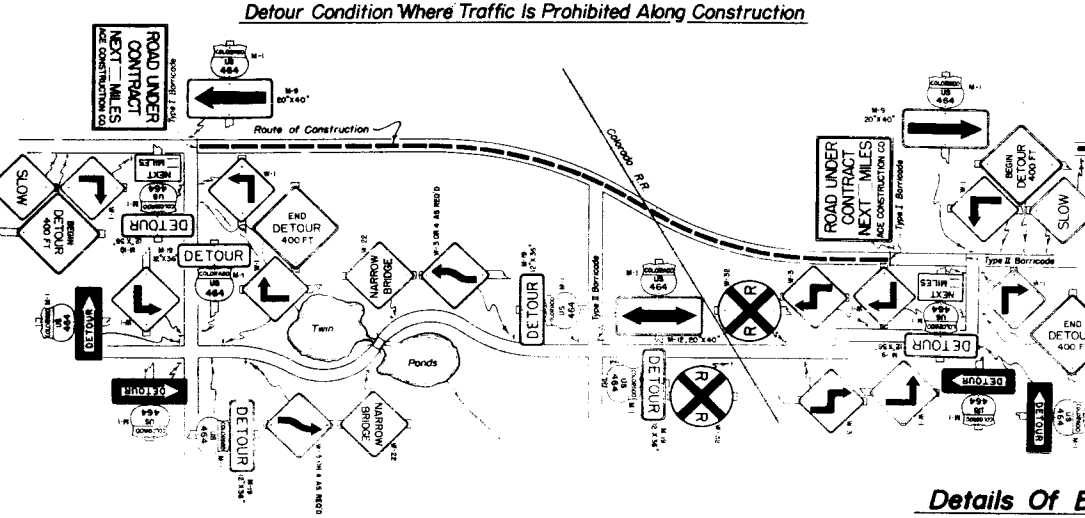
STANDARD M-2-DS

DIVISION NO.	DISTRICT			TOTAL SHEETS
9	COLO	SP 72-37-3	37	46

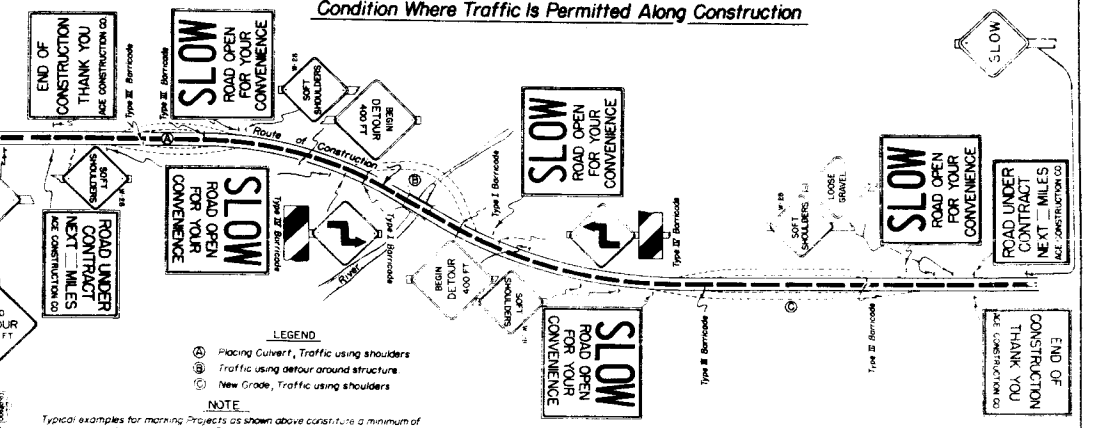
REV - 8/16/49 - E.E.O.
REV - 2/3/50 - E.A.R.

Typical Methods Of Marking Highways & Detours

Detour Condition Where Traffic Is Prohibited Along Construction



Condition Where Traffic Is Permitted Along Construction



LEGEND

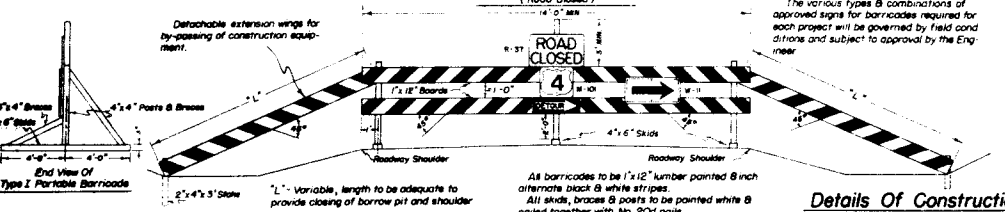
Ⓐ Placing Culvert, Traffic using shoulders
Ⓑ Traffic using detour around structure
Ⓒ New Grade, Traffic using shoulders

NOTE

Typical examples for marking Projects as shown above constitute a minimum of signs required. Additional markings & any special signs required for the guidance and protection of traffic will be done under the direction of the Engineer. Contractor's & Engineers equipment must be parked so that signs & barricades are visable to traffic at all times.

Details Of Barricades

Type I
(Road Closed)

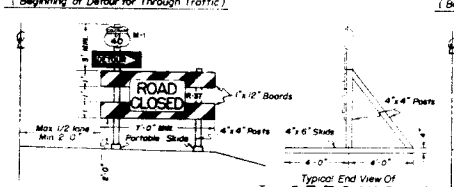


NOTE

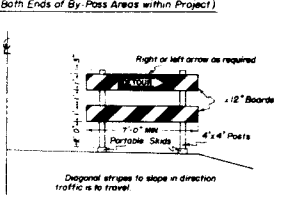
The various types & combinations of approved signs for barricades required for each project will be governed by field conditions and subject to approval by the Engineer.

All barricades to be 1"x12" lumber painted 8 inch alternate black & white stripes.
All skids, braces & posts to be painted white & nailed together with No. 20d nails.
Bases to be weighted where necessary to provide stability.

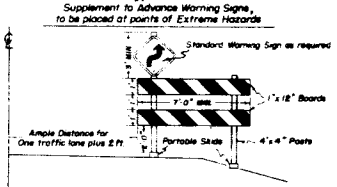
Type II
(Beginning of Detour for Through Traffic)



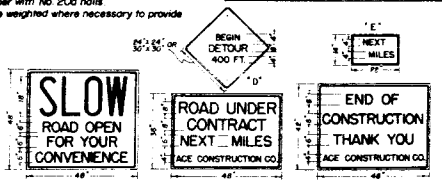
Type III
(Both Ends of By-Pass Areas within Project)



Type IV
Supplement to Advance Warning Signs, to be placed at points of Extreme Hazards



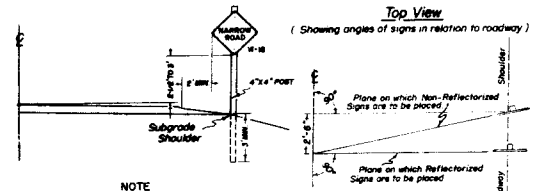
Details Of Construction Signs



MARKINGS

Construction Sign "A" - to be of 1" material painted White, the word "SLOW" lettered in Red, balance of lettering to be Black.
Construction Signs "B", "C", "E" - to be of 1" material painted White, all lettering to be Black.
Detour Warning Sign "D" to be of 1/4" (min.) plywood or No. 10 (min) gauge metal, painted Yellow, all lettering to be Black.
Construction Signs - "B", "E" - 3/4"x9" metal slides to be placed between words "Next & Miles", spaced so as to accomodate appropriate size numerals. Required numerals to be furnished by the Department and to be installed by the Contractor.
Signs to be fastened to 2-4"x4" posts set 4 ft. in the ground with a minimum of 3 cleats on the back.

Position Of Signs Relative To Roadbed & Hazards



NOTE

Warning Signs to be made of 1/4" (Min.) plywood or No 10 Gauge (Min.) metal
Location to be governed by field conditions. Exact location to be staked 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.

Details Of Reflectorized Arrows

MARKINGS *A White Reflectorized Arrow of "Scotchlite" Reflective Sheeting or suitable equivalent to be placed on a Black background. Letters to be 4" in height.*

TYPES W-11, W-12
MARKINGS *A Black Arrow on a "Highway Yellow" background of "Scotchlite" Reflective Sheeting or suitable equivalent.*

GENERAL NOTES

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

Where traffic is maintained through or over any part of the Project, the Contractor will be required to mark all hazards within the limits of the Project with reflectorized, well maintained Barricades, Warning Signs and Directional Type Signs. All Barricades & Signs shall be moved, added to, changed or removed as required during the progress of construction.

All Warning & Directional Type Signs will be "Reflectorized" with "Scotch lite" Reflective Sheeting or a suitable equivalent. Except for variations noted on this sheet all signs will be in conformity with the specifications outlined in "Manual on Uniform Traffic Control Devices for Streets & Highways" issue of August 1948 by the U.S. Public Roads Administration. U.S. or State Route Markers required for the Project will be furnished by the Department; and installed by the Contractor. Numbers adjacent to signs refer to Standards in the Manual.

The Contractor shall furnish & install the following as required within the limits of the Project.

1	All Barricades	As Required
2	"SLOW, ROAD OPEN FOR YOUR CONVENIENCE" Signs	Minimum 2
3	Standard Warning & Directional Signs	As Required
4	"ROAD UNDER CONTRACT, NEXT ___ MILES, CONTRACTORS NAME" Signs	Minimum 2
5	Approved Directional Arrows for Barricades	As Required
6	"END OF CONSTRUCTION, THANK YOU, CONTRACTORS NAME" Signs	Minimum 2
7	Torches and Flares as follows: Type I Barricades	Minimum 3
	Type III, IV Barricades	Minimum 1
	Standard Warning Signs	Minimum 1

Where traffic is prohibited from the Project, the Detour will be marked by the Department except for Barricades complete with approved Warning Signs & Arrows which will be provided, erected & maintained by the Contractor at ends of Project and intersecting roads.

All lumber used shall be of sound durable material. Barricades, Signs, Symbols & Lettering conforming to styles noted hereon will be well painted & maintained. Uneven, smeared lettering will not be accepted.

Flares and Torches shall be of the Oil Burning Type approved by the Department and shall be placed 3 ft. to 5 ft. ahead of the object to be illuminated. Particular care shall be taken to protect all signs and barricades from smoke and smudge arising from torches and flares.

COLORADO
STATE HIGHWAY DEPARTMENT

Standard Roadway Construction Traffic Signs

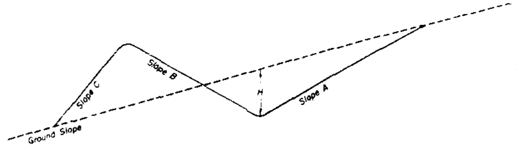
Designed by		Approved	
Made by C.G.M.		Engineer	
Checked by		Date	7-25-1949

STANDARD TYPES of DITCHES and CONSTRUCTION METHODS

STANDARD M-107-C

DETAILS for CONTOUR INTERCEPTING DITCHES

Typical Section for Contour Intercepting Ditches



PURPOSE & USE OF THE TABLE

The primary purpose of the information for Contour and Intercepting Ditches shown on this sheet is to serve as a guide in construction and to readily arrive at yardages of excavation involved.

Foremost consideration in constructing these ditches is given first to the natural ground line slope confronted in construction, thence to the other values shown on the Typical Section.

By properly arriving at the combination of values shown on the Typical Section and in the Table for a specified condition, the number of cubic yards of excavation per 100 lin ft of ditch may be read under the appropriate column for this item.

Typical Construction Layouts

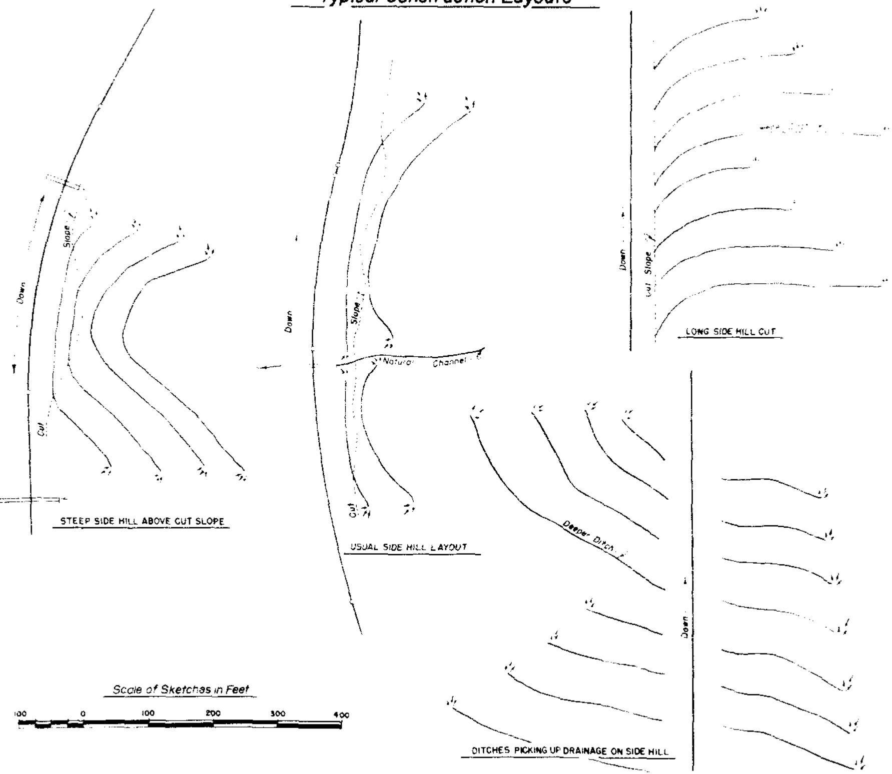
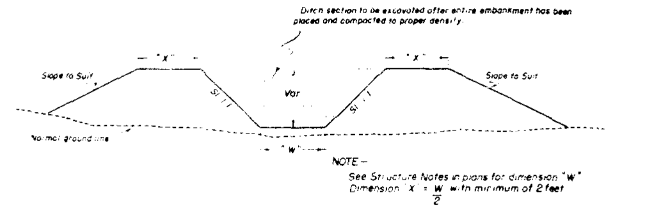


Table of Slopes and Yardages

▲ SLOPES Ground	A	B	C	H	Cubic Yards per 100 lin ft of Ditch
5:1 Or Flatter	2:1	4	2:1	15"	16
				18"	23
				21"	32
		3:1		15"	15
				18"	22
				21"	30
		2:1		15"	14
				18"	20
				21"	27
		1-1/2:1		15"	13
				18"	19
				21"	25
	1-1/2:1	4:1	1-1/2:1	15"	12
				18"	18
				21"	25
		3:1		15"	12
				18"	17
				21"	23
		2:1		15	[illegible]
				18"	15
				21	20
		1-1/2:1		15"	10
				18"	14
				21	19
4:1	2	4:1	2:1	15	[illegible]
				18	25
				21	34
		3:1		15	17
				18	24
				21	32
		2:1		15	15
				18	22
				21"	30
		1-1/2:1		15	15
				18"	2[illegible]
				21	29
	1-1/2:1	4:1	1-1/2	15"	13
				18"	18
				21"	25
		3:1		15"	12
				18	17
				21"	23
		2		15	11
				18	16
				21	2
		1-1/2:1		15	10
				18"	14
				21	20
3:1	2:1	3:1	2:1	15"	22
				18"	31
				21"	43
		[illegible]		15"	21
				18	30
				21	4
		1-1/2:1		15	20
				18	29
				21"	40
	1-1/2:1	3:1	1-1/2	15"	13
				18	19
				21"	26
		2:1		15"	12
				18"	17
				21"	24
		1-1/2:1		15"	12
				18"	17
				21"	23
2:1	1-1/2	2:1	1-1/2:1	15"	20
				18"	29
				21"	40
		1-1/2:1		15"	20
				18"	28
				21"	39
	1:1	2:1	1:1	15"	9
				18"	13
				21"	17
		1-1/2:1		15	6
				18"	12
				21"	16
1-1/2:1	1:1	1-1/2:1	1:1	15"	11
				18"	16
				21"	21

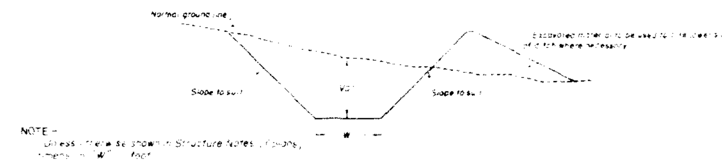
▲ Slopes are approximate and may be varied to suit conditions encountered during construction

TYPICAL SECTIONS for DRAINAGE, IRRIGATION DITCHES and CHANNEL CHANGES



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 [illegible]% (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:

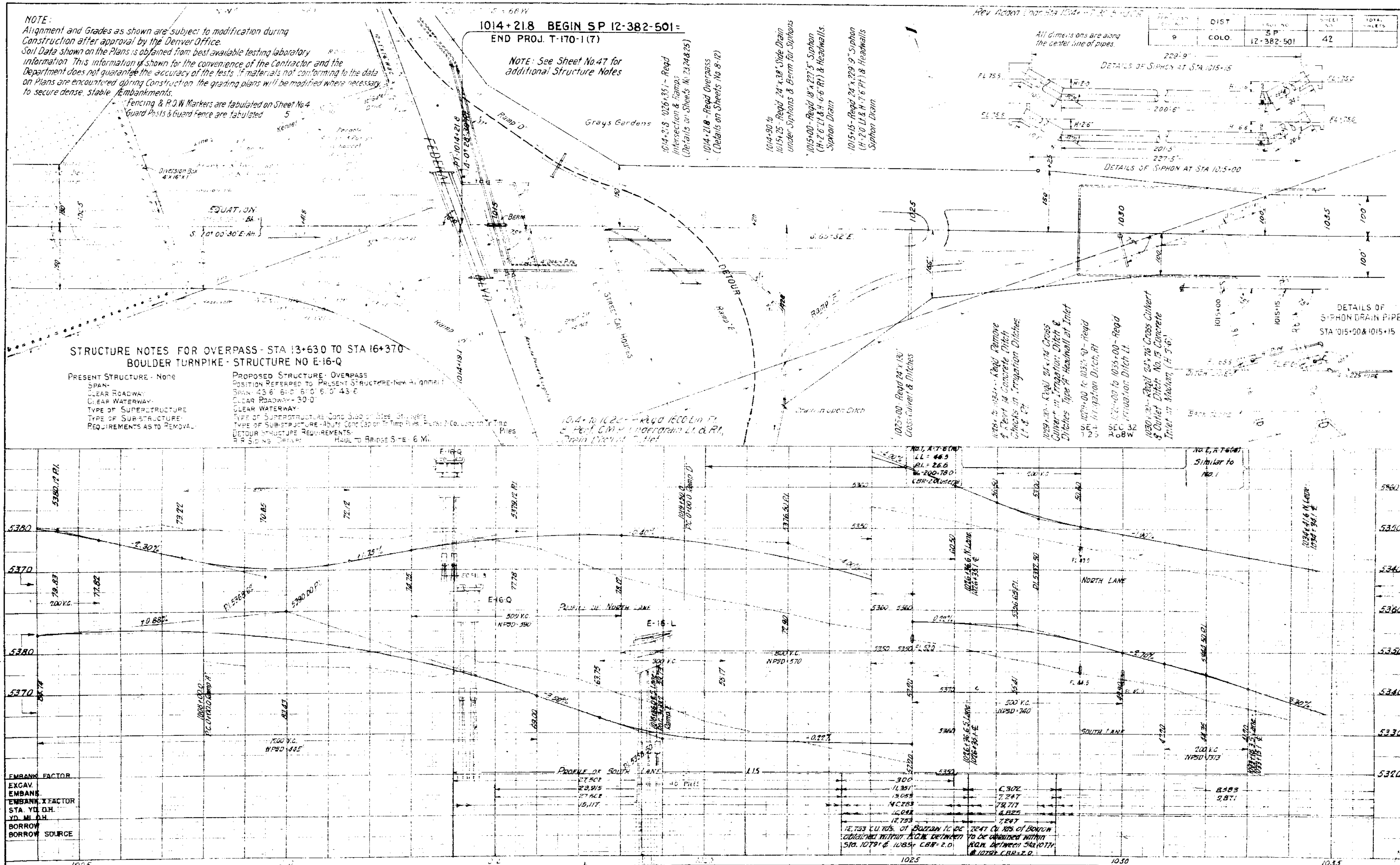
4% to 6%	Approximately 70' Centers
8% to 10%	Approximately 60' Centers
20% to 4:1 Slope	Approximately 55' Centers
30% to 1-1/2:1 Slope	Approximately 50' Centers

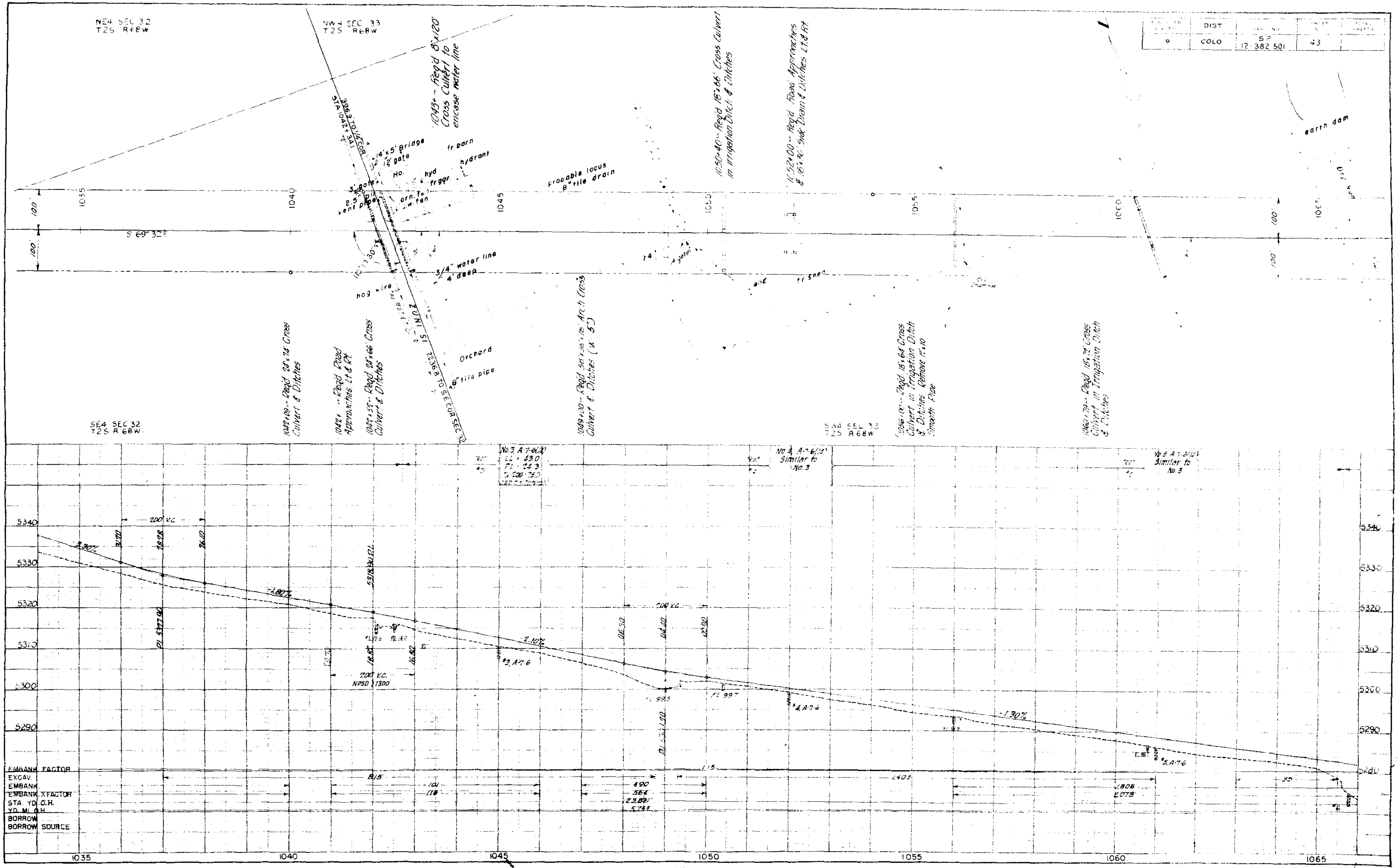
Where ditch checks are required the intervening ditch between one set of ditch checks shall not exceed a grade of [illegible]0%. Details of checks will be shown on plans when required.

COLORADO
STATE HIGHWAY DEPARTMENT

Standard Types of Ditches and Construction Methods

Designed by C.G.M
Made by C.G.M
Checked by
Approved by [signature]
Engineer, Surveys & Plans
Date: Aug [illegible] 195[illegible]


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 the convenience of the Contractor and the Department does not guarantee the accuracy of the tests. If materials not conforming to the data on Plans are encountered during Construction the grading plans will be modified where necessary to secure dense, stable Embankments.
Fencing & R.O.W. Markers are tabulated on Sheet No 4
Guard Posts & Guard Fence are tabulated 5
1014+21.8 BEGIN S P 12-382-501=
END PROJ. T-170-1(7)
NOTE: See Sheet No.47 for additional Structure Notes
DIST
COLO.
S P 12-382-501
42
All dimensions are along the center line of pipes.
DETAILS OF SIPHON AT STA 1015+15
DETAILS OF SIPHON AT STA 1015+00
DETAILS OF SIPHON DRAIN PIPE STA 1015+00 & 1015+15
Grays Gardens
EQUATION
FEDERAL
DETOUR
Ramp 'D'
Ramp 'E'
STREET CAR HOUSES
1014+21.8 - 1026+35± - Reqd Intersection & Ramps (Details on Sheets No 73,74 & 75)
1014+21.8 - Reqd Overpass (Details on Sheets No 8-12)
1014+90 to 1015+25 - Reqd 24"x18' Side Drain under Siphons & Berm for Siphons
1015+00 - Reqd 18"x227.5' Siphon (H 2.6' Lt & H 6.6' Rt) & Headwalls. Siphon Drain
1015+15 - Reqd 24"x229.9' Siphon (H 2.0' Lt & H 7.6' Rt) & Headwalls. Siphon Drain
STRUCTURE NOTES FOR OVERPASS - STA 13+63.0 TO STA 16+37.0
BOULDER TURNPIKE - STRUCTURE NO E-16-Q
PRESENT STRUCTURE - None
PROPOSED STRUCTURE - OVERPASS
1025+00 - Reqd 24"x Cross Culvert & Ditches
1030+00 - Reqd 24"x 76' Cross Culvert & Outlet Ditch No. 13 Concrete Inlet in Median (H 3.6')
SEC 32 R 68W
PROFILE OF NORTH LANE
PROFILE OF SOUTH LANE
NORTH LANE
SOUTH LANE
E-16-Q
E-16-L
Similar to No. 1
EMBANK. FACTOR
EXCAV.
EMBANK.
EMBANK. X FACTOR
STA. YD. O.H.
YD. MI. O.H.
BORROW
BORROW SOURCE
12,753 Cu. Yds. of Borrow to be obtained within R.O.W. between Sta. 1079+ & 1085+ CBR = 2.0
7247 Cu. Yds of Borrow to be obtained within R.O.W. between Sta 1077+ & 1079+ CBR = 2.0
1005
1025
1030
1035

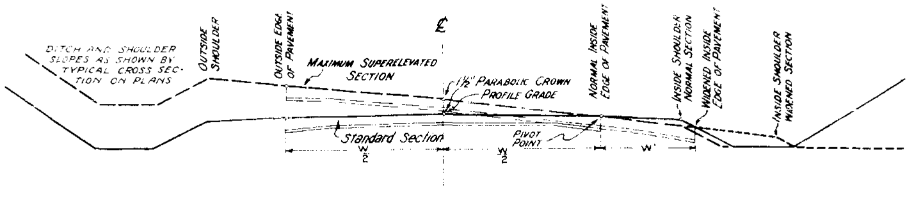


DIST.
9
COLO
S P
12:382.501
43
NE4 SEC 32
T2S R68W
NW4 SEC 33
T2S R68W
SE4 SEC 32
T2S R68W
1043+ -- Req'd 8"x120' Cross Culvert to encase water line
1050+40 -- Req'd 18"x66' Cross Culvert in Irrigation Ditch & Ditches
1052+00 -- Req'd Road Approaches & 18"x30' Side Drain & Ditches Lt.& Rt.
earth dam
fr barn
hydrant
hyd
Probable locus 8" tile drain
orchard
8" tile pipe
3/4" water line 4' deep
hog wire
S 69° 32' E
1041+09 -- Req'd 24"x74' Cross Culvert & Ditches
1042+ -- Req'd Road Approaches Lt.& Rt.
1042+52 -- Req'd 24"x66' Cross Culvert & Ditches
1049+30 -- Req'd 58"x36"x78' Arch Cross Culvert & Ditches
1056+00 -- Req'd 18"x64' Cross Culvert in Irrigation Ditch & Ditches Remove 15"x10 Smooth Pipe
1060+78 -- Req'd 18"x72' Cross Culvert in Irrigation Ditch & Ditches
200' V.C.
-1.80%
-2.10%
-1.30%
200' V.C.
NPSD 1300
EMBANK. FACTOR
EXCAV.
EMBANK.
EMBANK. X FACTOR
STA. YD. O.H.
YD. MI. O.H.
BORROW
BORROW SOURCE
1035
1040
1045
1050
1055
1060
1065
5340
5330
5320
5310
5300
5290

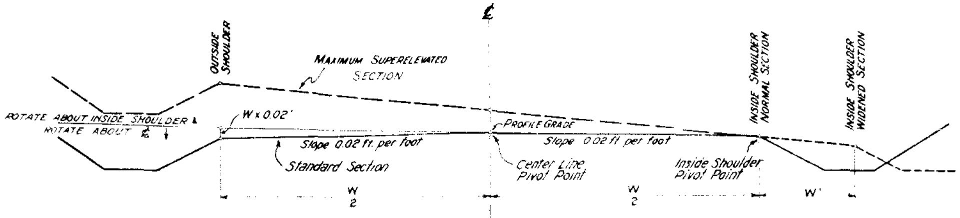
STANDARD M-I-B

SP12-372-01 37

Rev. 2 38 F.E.E. Widening transition



PAVEMENT SECTION

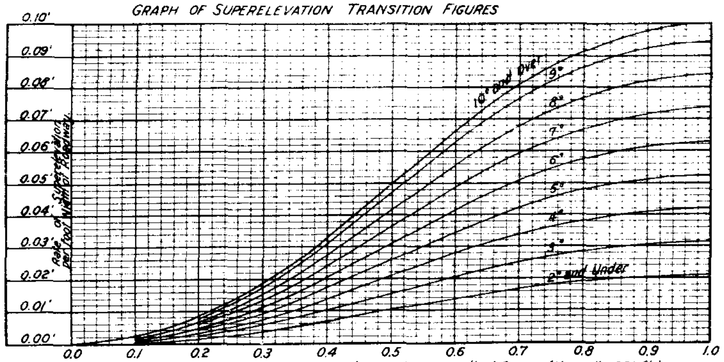


GRADED OR SURFACED SECTION

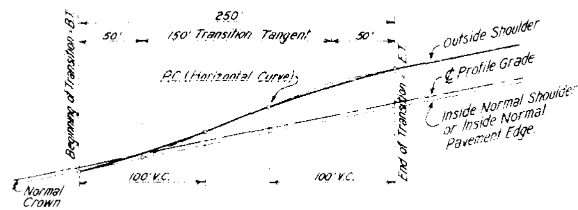
SUPERELEVATION AND WIDENING TABLES

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

GRAPH OF SUPERELEVATION TRANSITION FIGURES



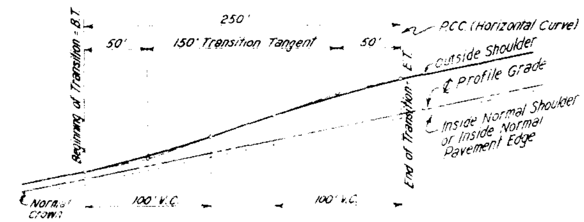
Proportion of Total Length of Transition including Vertical Curves (Normally 250 ft.)



CASE I: SIMPLE CURVE WITH UNLIMITED TANGENT APPROACH

NOTE CASE I

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



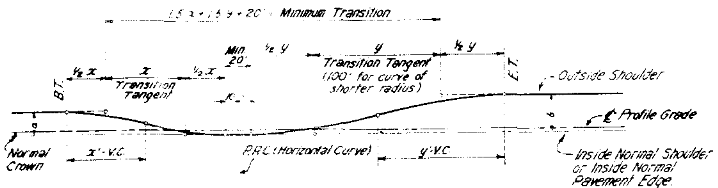
CASE II: COMPOUND CURVE

NOTE: CASE II

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

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

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



CASE III: REVERSE CURVES

NOTE CASE III

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

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

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

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

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

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

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

GENERAL NOTES

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

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

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

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

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

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

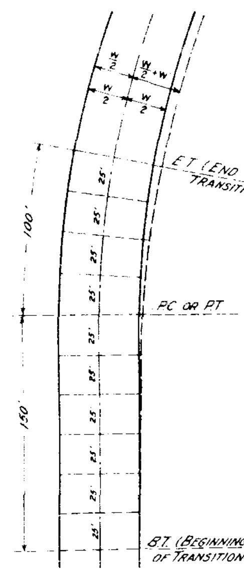
The rate of superelevation per foot width of roadway to be applied at the outside shoulder of the roadway is computed as follows:

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

0.0105 ft. x Degree of Curvature.

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

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



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

GENERAL PLAN OF WIDENING

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

Designed by R.E.L.
Made by P.B.B.
Checked by F.F.S. & P.B.B.
Marshall
January 1st 1948

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

REVISIONS

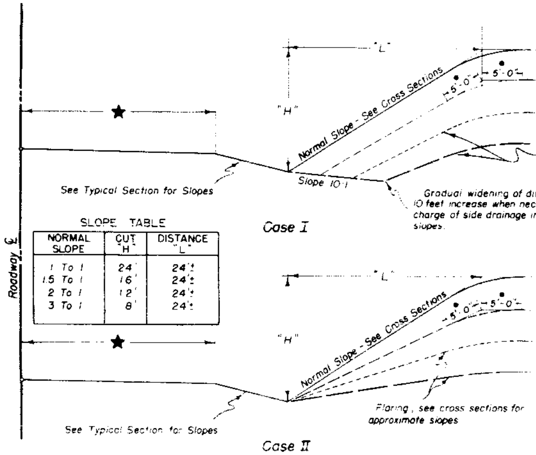
Rev 10-25-50-C.G.M., Accel Lanes, Ballast note re widen crest grades

STANDARD M-2-DM

Rev 7-12-49, C.G.M., Details for widening at Crest of Grades
Rev. 12-7-49, C.G.M., Rev notes re Type I Rd. Apprs. & widen at Bridge Apprs., added note re accell & decell lanes

DIVISION NO	DISTRICT			TOTAL SHEETS
9	COLO	SP12-392-97	37	[redacted]

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



SLOPE TABLE

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

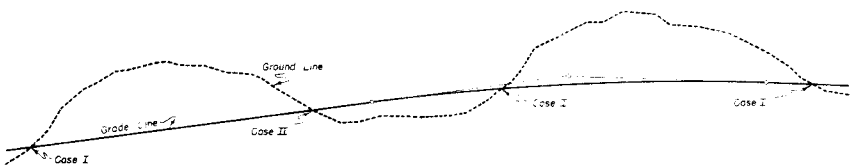
FLARING OF EARTH CUTS: The backslopes at ends of all earth cuts shall be flattened & where necessary the ditch shall be widened gradually to discharge side ditch drainage away from the base of adjacent fill slopes in order to avoid erosion & to improve appearance. The transition of flattened backslopes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

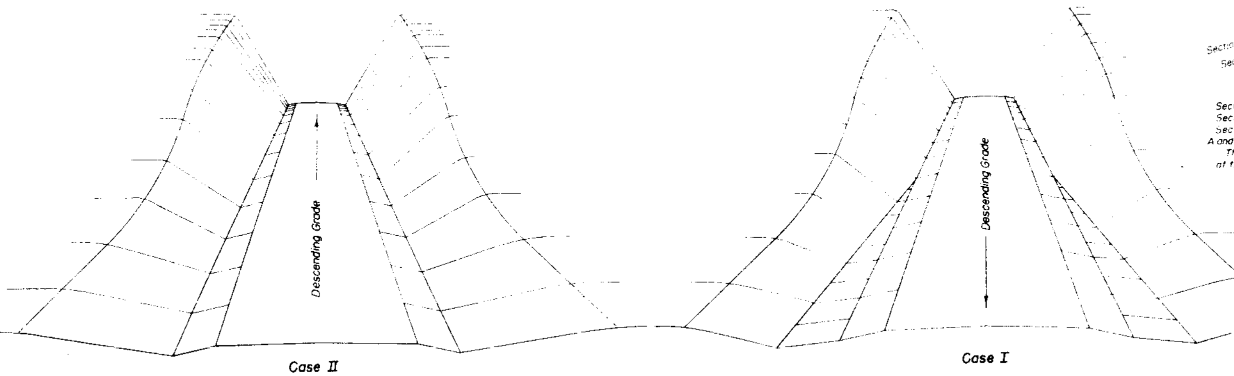
•CUT SLOPE TREATMENT IN EARTH CUTS: The intersection of cut slopes with the existing ground shall be rounded in earth cuts, beginning 5 ft outside the slope stake and extending 5 ft down the cut slope. Where the cut slope is less than 5 ft reduce each of the above widths of slope treatment to the actual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

★ WIDENING AT BRIDGE APPROACHES: Roadway embankment at bridge approaches shall be so constructed that the finish point of the subgrade shoulder is a Min. of 2 ft beyond the outside edge of bridge deck. Where widening of the section is necessary to achieve this result it shall take place gradually over a distance of 300 ft. This is done to accomodate guard fence and/or guard or marker posts at bridge approaches. (See additional requirements for Guard Fences below.)

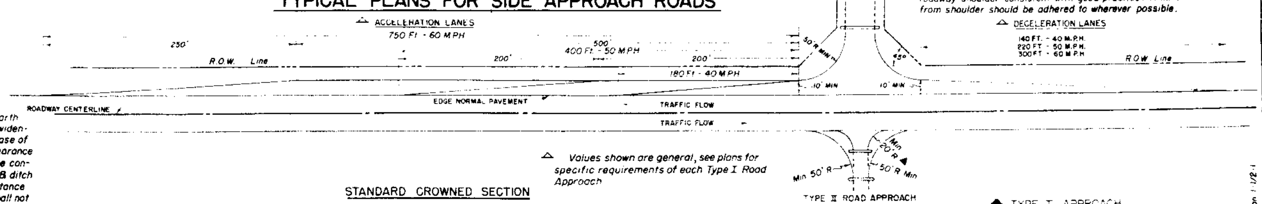
WIDENING TO ACCOMODATE GUARD FENCES: At all locations on the project (except as provided above for bridge approaches) where guard fence is to be constructed the shoulders shall be widened 2 ft to provide additional lateral support for guard fence posts.

PLAN OF FLARING IN EARTH CUTS



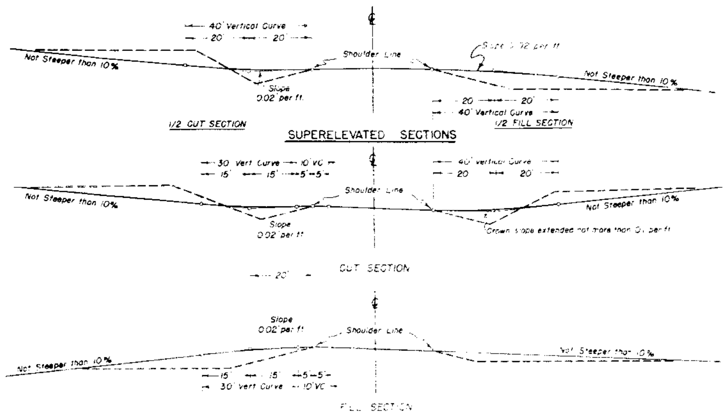


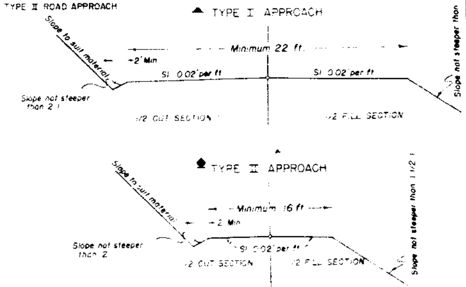
TYPICAL PLANS FOR SIDE APPROACH ROADS



SIDE DRAINS: To be placed at greatest feasible distance from the roadway shoulder consistent with good practice. A minimum of 20 ft from shoulder should be adhered to wherever possible.

△ Values shown are general, see plans for specific requirements of each Type I Road Approach





▲ TYPE I ROAD APPROACHES: To be used only when called for on plans. The width of crowned section shall not be less than the existing crowned width of the approaching road but in no case shall be less than twenty two (22) feet.

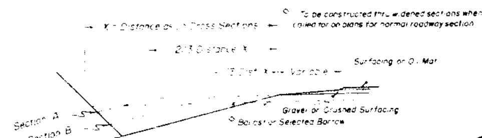
♠ TYPE II ROAD APPROACHES: To be used at all places which are not indicated as "Type I Road Approaches". The width of crowned section shall not be less than the existing crowned width of the approaching road but in no case shall be less than sixteen (16) feet.

▲ 20 FT. RADII: To be used only on private road approaches.

DETAILS FOR DITCH & WIDENED SHOULDERS AT CREST OF GRADES

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

◇ To be constructed thru widened sections when called for on plans for normal roadway section

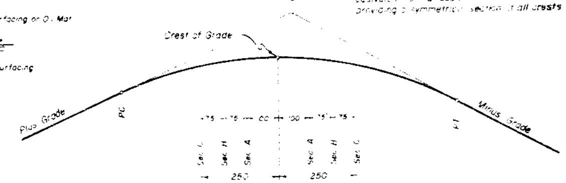


SECTION OF SIDE DITCHES

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

NOTE

Where ... embankment at crest of grades the shoulder ... equivalent to that used in ditch sections, thus providing a symmetrical section at all crests.



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

GENERAL NOTES

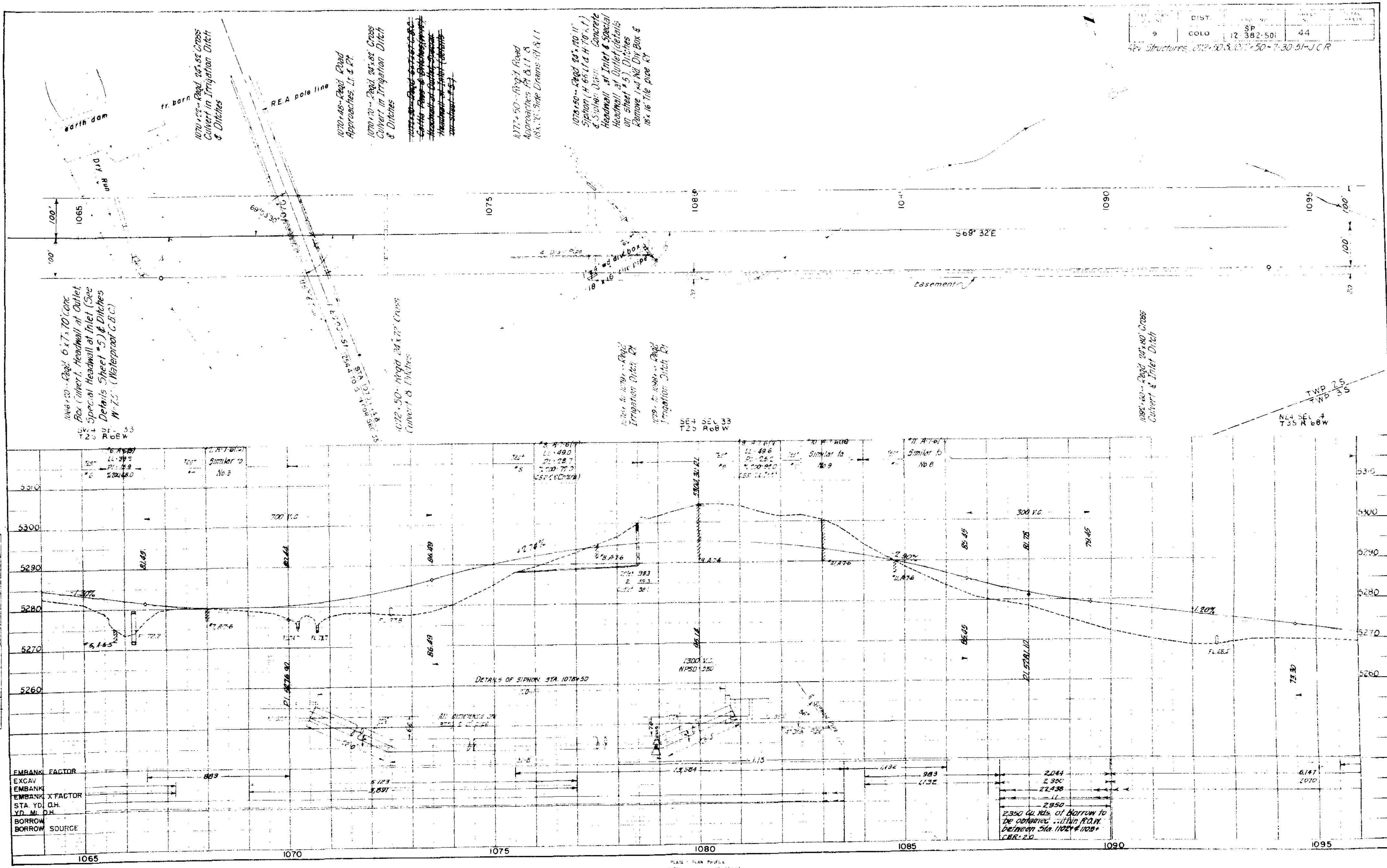
All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project.

All side approach roads to the Project shall be Gravel Surfaced with a four (4) inch thickness of "Gravel or Crushed Rock Surfacing" extending approximately to the Right of Way Line. Estimated tonnage & type of material required for this operation are shown in the Surfacing Plan.

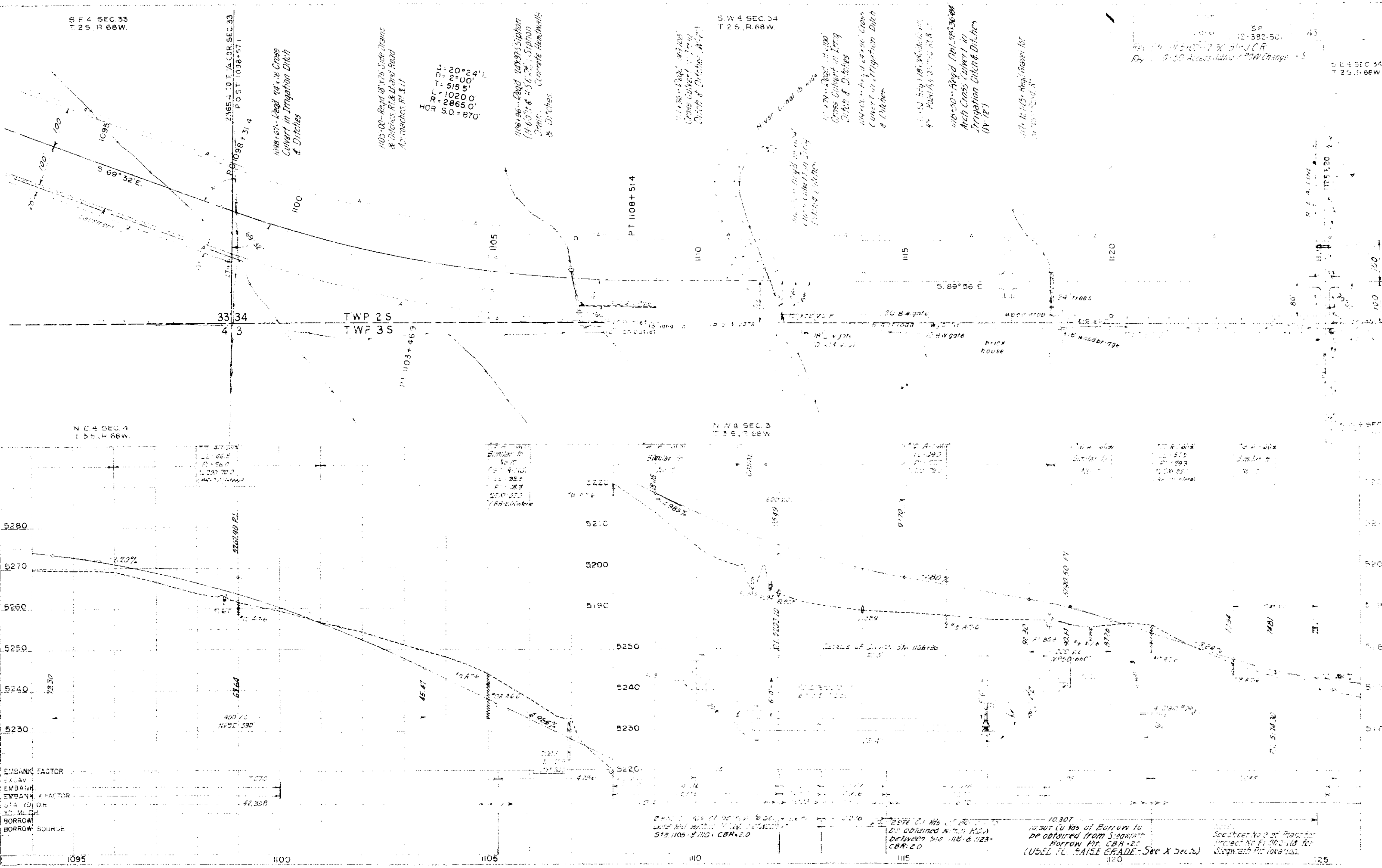
The maximum grades shown are to be the limiting grades for all road approaches. Modifications of grades will be permitted where adherence to the grades as shown would cause damage to property or create other unsatisfactory conditions. Grades less than the maximum shown are to be used wherever feasible.

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

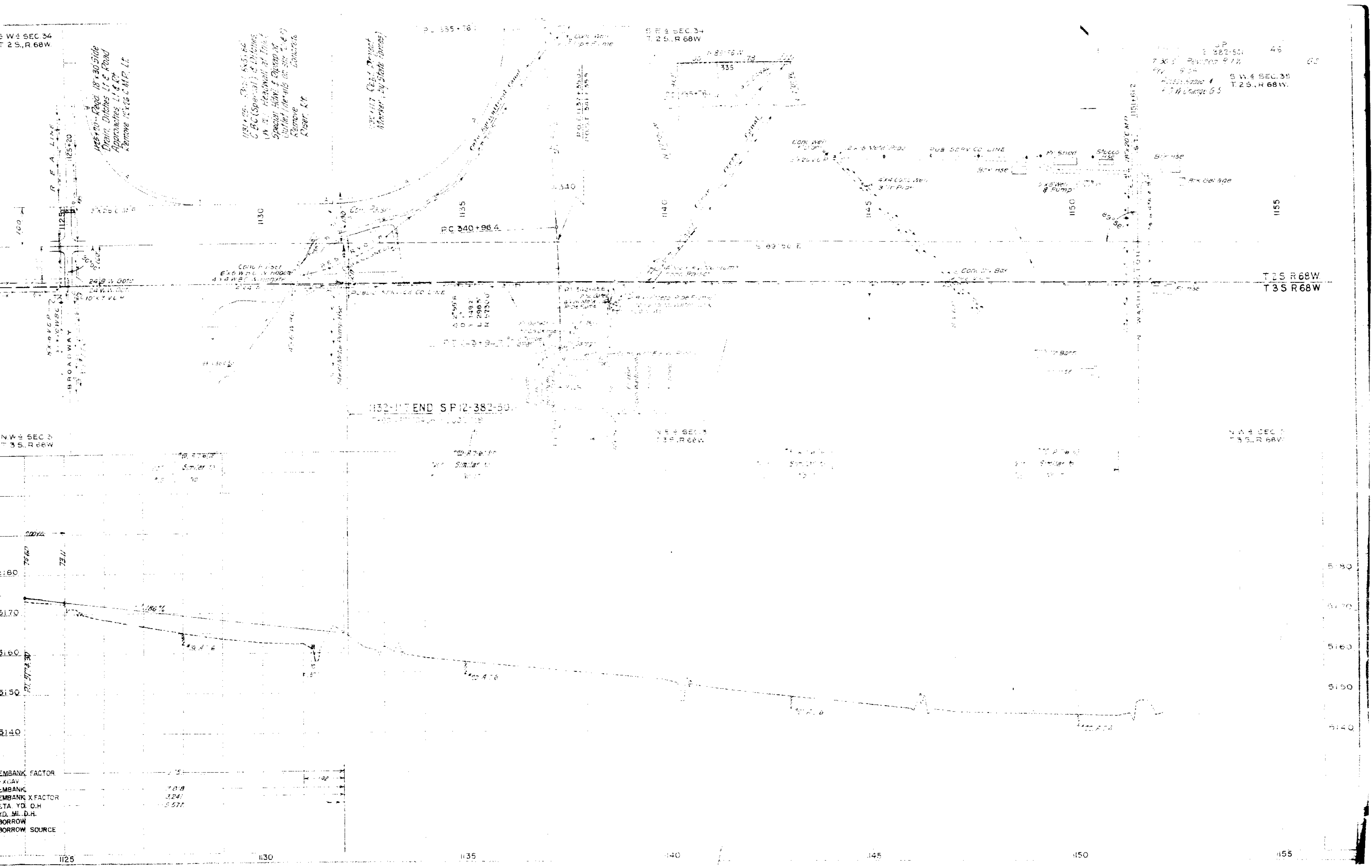
Designed by ... Approved by ... Marshall
Made by C.G.M.
Checked by ... Date April 20th, 1949



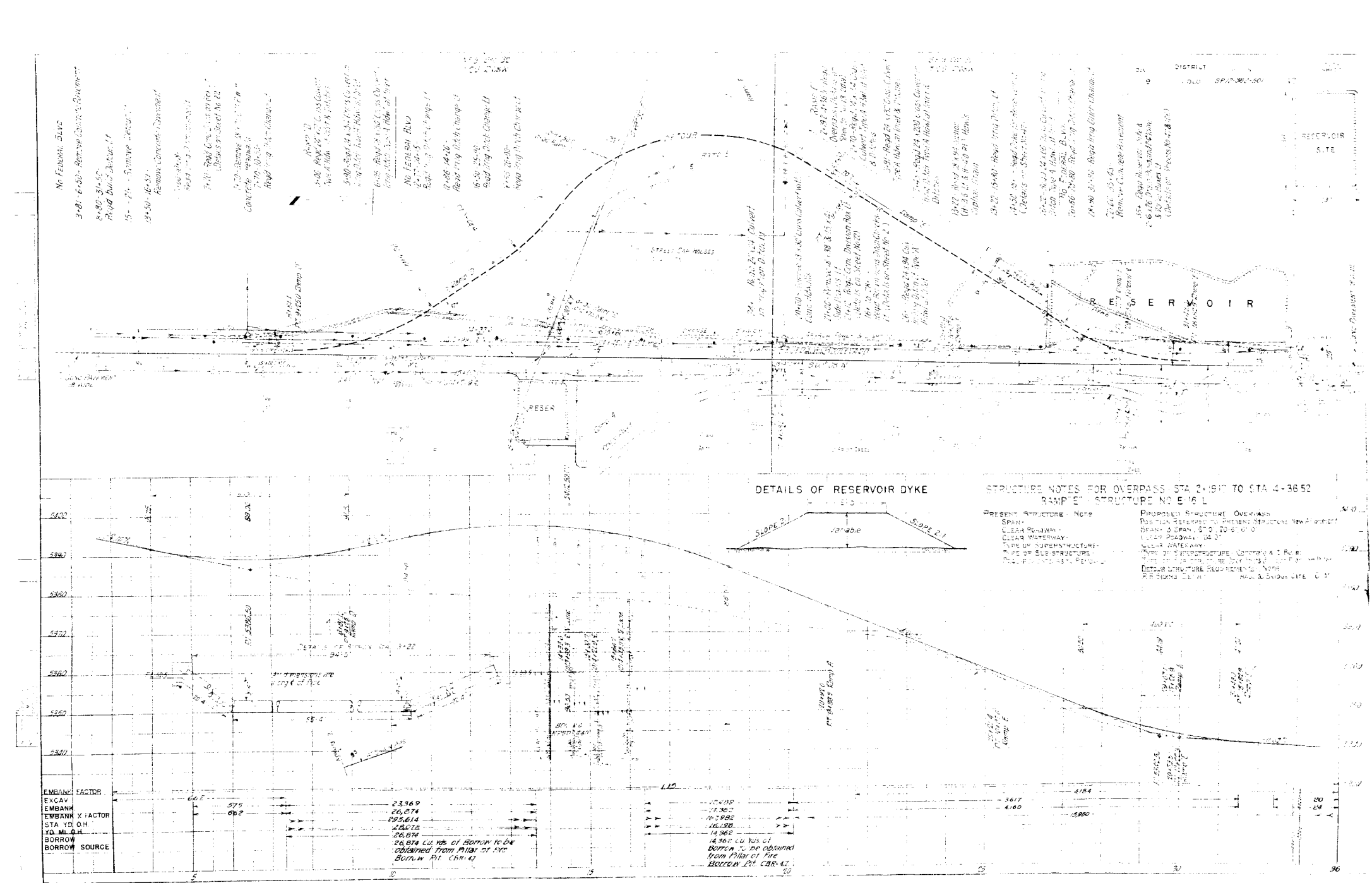
DIST.
9
COLO
SP 12 382:50I
44
Rev Structures 1072+50 & 1077+50 - 7-30-51 - JCR
earth dam
Dry Run
fr. barn
R.E.A. pole line
1070+57 - Reqd 24"x82' Cross Culvert in Irrigation Ditch & Ditches
1070+46 - Reqd Road Approaches Lt & Rt
1070+70 - Reqd 24"x82' Cross Culvert in Irrigation Ditch & Ditches
1077+50 - Reqd Road Approaches Rt & Lt & 18"x36' Side Drains Rt & Lt
1078+50 - Reqd 24"x120' (Lt) Siphon (H 68' Lt & H 70' Lt) & Siphon Drain Concrete Headwall at Inlet & Special Headwall at Outlet (details on sheet #5), Ditches Remove 1-4' Div Box & 18"x16' tile pipe Rt
1065
1070
1075
1080
1085
1090
1095
100'
S 69° 32' E
4" Dia. Pipe
4' wd div box
18"x16' tile pipe
Easement
1066+20 - Reqd 6'x7'x70' Conc. Box Culvert, Headwall at Outlet, Special Headwall at Inlet (See Details Sheet #5) & Ditches W-7.5' (Waterproof C.B.C.)
1072+50 - Reqd 24"x72' Cross Culvert & Ditches
1092+60 - Reqd 24"x80' Cross Culvert & Inlet Ditch
SW 1/4 SEC 33 T2S R68W
SE 1/4 SEC 33 T2S R68W
NE 1/4 SEC 4 T3S R68W
TWP 2S
TWP 3S
5310
5300
5290
5280
5270
5260
700' V.C.
300' V.C.
1300' V.C.
1.30%
2.78%
2.90%
1.20%
Similar to No 3
Similar to No 9
Similar to No 8
DETAILS OF SIPHON STA. 1078+50
All dimensions on
EMBANK. FACTOR
EXCAV
EMBANK.
EMBANK. X FACTOR
STA. YD. O.H.
YD. MI. O.H.
BORROW
BORROW SOURCE
889
5,123
3,891
13,984
1,132
983
1,132
2,044
2,350
22,438
2,350
6,147
2,350 Cu. Yds. of Borrow to be obtained within R.O.W. between Sta. 1102+ & 1109+
CBR: 20
PLATE - PLAN PROFILE



S.E.4 SEC.33
T.2S.,R.68W.
S 69°32'E.
POST 1098+57
S.W.4 SEC.34
T.2S.,R.68W.
S.E.4 SEC.34
T.2S.,R.68W.
Δ = 20°24' L
D = 2°00'
T = 515.5'
L = 1020.0'
R = 2865.0'
HOR. S.D. = 870'
P.T. 1108+51.4
P.I. 1103+46.9
S. 89°56' E
24" trees
brick house
TWP 2S
TWP 3S
N.E.4 SEC.4
T.3S.,R.68W.
N.W.4 SEC.3
T.3S.,R.68W.
CANAL
5280
5270
5260
5250
5240
5230
5220
5210
5200
5190
EMBANK. FACTOR
EXCAV.
EMBANK.
EMBANK. X FACTOR
STA. TO O.H.
YD. MI. O.H.
BORROW
BORROW SOURCE
10307 Cu. Yds. of Borrow to be obtained from Stegwrath Borrow Pit. CBR=2.0
(USED TO RAISE GRADE - See X Sects.)
1095
1100
1105
1110
1115
1120
1125



S W ¼ SEC 34
T 2 S., R 68 W.
S E ¼ SEC 34
T 2 S., R 68 W
S W ¼ SEC 35
T 2 S., R 68 W.
R. E. A. LINE
1125+20
PC 340+96.4
340
335
1130
1135
1140
1145
1150
1155
Conc. Well
Pub. Service Co. Line
Public Service Co. Line
Conc. Riser
T 2 S R 68 W
T 3 S R 68 W
BROADWAY
1132+11.7 END S.P. 12-382-50
N W ¼ SEC 3
T 3 S., R 68 W
N E ¼ SEC 3
T 3 S., R 68 W
Similar to
5180
5170
5160
5150
5140
EMBANK. FACTOR
EXCAV.
EMBANK.
EMBANK. X FACTOR
STA. YD. O.H.
YD. MI. D.H.
BORROW
BORROW SOURCE
1125
1130
1135
1140
1145
1150
1155


RESERVOIR
RESERVOIR SITE
STREET CAR HOUSES
DETAILS OF RESERVOIR DYKE
SLOPE 2:1
SLOPE 2:1
12' Table
STRUCTURE NOTES FOR OVERPASS STA 2+19.1 TO STA 4+36.52
RAMP E STRUCTURE NO 5-16 L
PRESENT STRUCTURE Note
PROPOSED STRUCTURE OVERPASS
EMBANK FACTOR
EXCAV
EMBANK
EMBANK X FACTOR
STA YD O.H
YD MI O.H
BORROW
BORROW SOURCE
23,369
26,874
295,614
28,075
26,874
26,874 cu yds of Borrow to be obtained from Pillar of Fire Borrow Pit CBR-47
14,362
14,362 cu yds of Borrow to be obtained from Pillar of Fire Borrow Pit CBR-47