Johnson

SEE STANDARD M-100-A FOR STANDARD SYMBOLS.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

PLAN AND PROFILE OF ~~PROPOSED~~

FEDERAL AID PROJECT NO. I 70-3(81)220

STATE HIGHWAY NO. 70

VIII	COLORADO	I 70-3(81)220	1	375

R.O.W. Acquired Under I 70-3(14)220, I 70-3(16), I 70-3(26)

P.E. under I 70-3(78)

AS CONSTRUCTED

NO REVISIONS ___ REVISED 6-23-75 ___

SUMMIT AND CLEAR CREEK COUNTIES

SCALES OF ORIGINAL DRAWINGS

ON PLANS AS SHOWN

ON PROFILES AS SHOWN

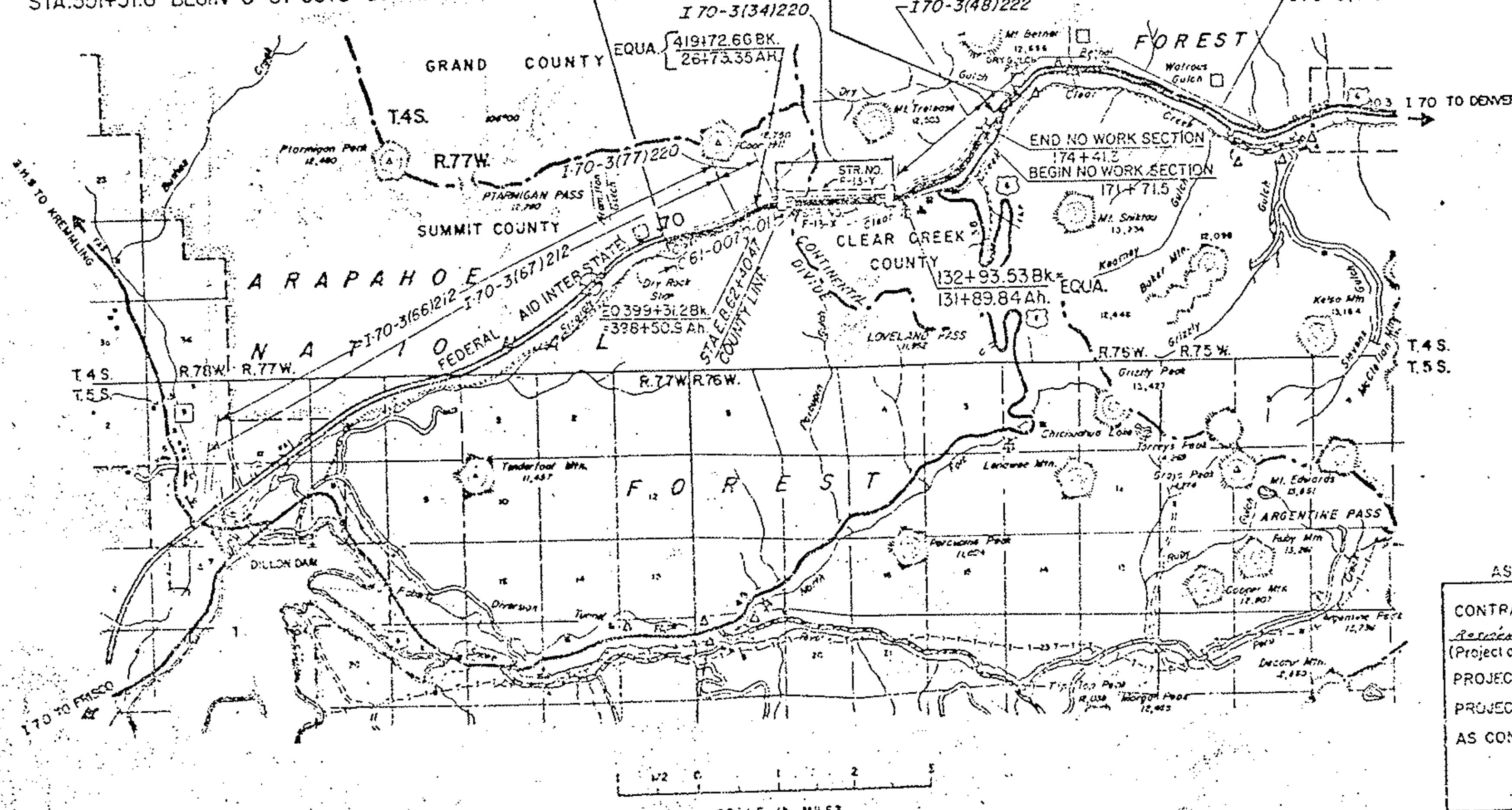
GRADE LINE ON PROFILES IS SHOWN AS GRADE OF FINISHED ROADWAYS

GROSS LENGTH OF PROJECT 25,851.70 FEET = 4.896 MILES

NET LENGTH OF PROJECT 25,581.90 FEET = 4.845 MILES

STA. 351+31.6 BEGIN I70-3(81)220=
STA. 351+31.6 ON I 70-3(67)212=
STA. 351+31.6 BEGIN C 61-0070-01

STA. 215+00.0 END I70-3(81)220=
STA. 215+00.0 END I 70-3(46)222=
STA. 215+00.0 BEGIN I 70-3(65)223



ALL SCALES SHOWN ARE FOR ORIGINAL DRAWINGS.

INDEX OF SHEETS
(SEE SHEET 2)

DIVISION OF HIGHWAYS

APPROVED: E.N. Haase 6/5/75
CHIEF ENGINEER DATE

AS CONSTRUCTED INFORMATION

CONTRACTOR Peter Kiewit Sons' - Peter Kiewit
Resident ENGINEER Jack E. Gay
(Project or Resident)
PROJECT STARTED August 18, 1975
PROJECT COMPLETED June 29, 1979
AS CONSTRUCTED PLANS APPROVED ___
TITLE ___ DATE ___

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED ___ DATE ___

DIVISION ENGINEER

TAL

CDOH 4464

REV FEB.,1977

VIII	COLORADO	I 70-3(81)220	2 AX	175

AS CONSTRUCTED

NO REVISIONS [ ] REVISED [6-28-79] VOID [ ]

INDEX OF SHEETS

REVISED MARCH 1974

REGION NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	2	23

NO REVISIONS | REVISED 8-29-75 | VOID

AS CONSTRUCTED

INDEX OF SHEETS

"M" STANDARDS

M-100-A	STANDARD SYMBOLS	5-11-73
M-102-A	TEMPORARY EROSION CONTROL	4-24-75
M-203-B	APPROACH ROADS, FLARING, CUT SLOPE TREATMENT, BRIDGE AND CREST WIDENING	12-11-72
M-203-C	DITCH TYPES	7-23-68
M-203-SC	SUPERELEVATION OF CURVES - CROWNED HIGHWAYS	3-24-75
M-203-SD	SUPERELEVATION OF CURVES - DIVIDED HIGHWAYS	3-24-75
M-206-AA	EXCAVATION AND BACKFILL FOR STRUCTURES (7 SHEETS)	4-9-74
M-530-A	LETTERS AND FIGURES FOR STRUCTURE NUMBERS	3-28-75
M-603-CA	CONCRETE AND METAL END SECTIONS	6-25-71
M-603-MA	METAL CULVERT PIPE - H-20 LOADING	1-11-74
M-604-BA	INLET, TYPE C	11-19-74
M-604-D	STEPS FOR MANHOLES AND INLETS	7-25-58
M-612-A	MARKER POSTS AND BENCH MARKS	6-30-71
M-614-TS	TRAFFIC SIGNING FOR HIGHWAY CONSTRUCTION (3 SHEETS)	11-22-71

"S" STANDARDS

S-614-52A	BARRICADES, DRUMS AND VERTICAL PANEL CHANNELIZING DEVICES	12-4-74

NO REVISIONS | REVISED 8-29-75 | VOID

TABULATION OF LENGTH AND DESIGN DATA

STATION	ROADWAY WEST APPROACH	TUNNEL, STR. NO. F-13-P SUMMIT COUNTY	TUNNEL, STR. NO. F-13-P CLEAR CREEK COUNTY	ROADWAY EAST APPROACH	NO WORK SECTION
351+31.60 EB BEGIN I 70-3(81)220 *					
351+31.60 ON I 70-3(67)212	4799.60				
399+31.20 BK. * EQUATION					
398+50.90 AH.	2121.76				
419+72.66 BK. * EQUATION					
26+73.35 AH.	924.47				
35+97.82		2642.65			
62+40.47 (COUNTY LINE)			6316.81		
125+57.28				736.25	
132+93.53 BK. * EQUATION					
131+89.84 AH.				3981.66	
171+71.5 Str. F-13-P (FUTURE)					269.80
174+41.3				4058.70	
215+00 END I 70-3(81)220 *					
215+00 END I 70-3(48)222					
215+00 BEGIN I 70-3(65)223					
TOTALS	7845.83	2642.65	6316.81	8776.61	269.80

SUMMARY

	LIN. FT.	MILES
WEST APPROACH	7845.83	1.486
TUNNEL - SUMMIT COUNTY	2642.65	.501
TUNNEL - CLEAR CREEK COUNTY	6316.81	1.196
EAST APPROACH	8776.61	1.662
TOTAL NET LENGTH	25,581.90	4.845
NO WORK SECTION	269.80	0.051
TOTAL GROSS LENGTH	25,851.70	4.896

DESIGN DATA

MAXIMUM DEGREE OF CURVE	4°00'
MAXIMUM GRADE	7.00%
MINIMUM S S D ~ HORIZONTAL	315'
MINIMUM S S D ~ VERTICAL	490'
MAXIMUM DESIGN SPEED	45 MPH
1994 DESIGN TRAFFIC	15,500 ADT 2,060 DDHV

INDEX OF SHEETS & TABULATION OF LENGTH & DESIGN DATA

SHEET G-2

SUMMARY OF ~~APPROXIMATE~~ FINAL QUANTITIES

INDEX BOOK	INDEX PAGE	INDEX SHEET	CONTRACT ITEM NO.	CONTRACT ITEM	UNIT			WEST APPROACH ROAD SUMMIT COUNTY	FINAL WEST APPROACH ROAD	TUNNEL STR NO. F-13-X SUMMIT COUNTY	FINAL SUMMIT COUNTY	CLEAR CREEK COUNTY	FINAL CLEAR CREEK CO. X-Y	EAST APPROACH ROAD CLEAR CREEK COUNTY	FINAL EAST APPROACH ROAD	PROJECT TOTALS	FINAL PROJECT TOTALS	DIFF.	%
		Folder #1	201	Clearing and Grubbing	L.S.			0.5	0.5	0.3	0.3	0.7	0.7	0.5	0.5	1	1	0	
		Folder #2	202	Removal of Structures and Obstructions	L.S.									1	1	1	1	0	
		Folder #3	202	Removal of Structure	Each			1	1					1	1	2	2	0	
		Folder #4	202	Removal of Asphalt Mat	Sq. Yd.									25	79	25	79	+54	316
		Folder #5	203	Unclassified Excavation (Haul)	Cu Yd.			35,200	86,650					40,800	52,696	74,000	139,346	+64,346	187
		Folder #6	203	Dozing	Hour			100	109					100	109	200	218	+ 18	109
		Folder #7	203	Dozing (Landscaping)	Hour			50	15.5					50	52.5	100	68	- 32	68
		Folder #8	206	Structure Excavation	Cu.Yd.			740	3,204	1,548	4,857	2,720	10,198	120	629	5,128	18,878	+13,750	368
		Folder #9	206	Structure Backfill (Class I)	Cu Yd.			95	1,463					0	677	95	2,140	+ 2,045	2,253
		Folder #10	206	Structure Backfill (Class 2)	Cu. Yd.			1,010	331	3,200	2,468	7,773	5,936	140	0	12,123	8,785	-3,338	72
		Folder #11	206	Filter Material (Class C)	Cu. Yd.					53	63	915	1,223			968	1,156	+ 188	119
R-1		Folder #12	207	Topsoil (Haul)	Cu. Yd.			1,300	0					3,100	5,500	4,400	5,500	+1,100	125
		Folder #13	210	Adjust Structure	Each			8	8					5	1	11	9	- 2	82
R-1		Folder #14	211	Tunnel Excavation, (Class A)	Cu.Yd.					126,299	125,739	131,255	131,255			257,554	257,054	- 500	100
R-1		Folder #15	211	Tunnel Excavation, (Class B)	Cu.Yd.							27,240	27,241			27,240	27,241	+ 1	100
R-1		Folder #16	211	Tunnel Excavation, (Class C)	Cu.Yd.							196,603	193,138			196,603	193,138	+2,469	101
		Folder #17	211	Tunnel Excavation, (Class D)	Cu.Yd.					124	147	276	281			400	428	+ 28	107
		Folder #18	211	Remine Pilot Bore (Class A)	Lin Ft					2,108	2,108	2,047	2,047			4,155	4,155	0	100
		Folder #19	211	Remine Pilot Bore (Class B)	Lin. Ft.							3,266	3,266			5,266	3,266	0	100
		Folder #20	211	Multiple Drift Structure	Lin. Ft.							503	503			503	503	0	100
		Folder #21	211	Foundation Drift (Class A)	Lin.Ft.							2,186	2,186			2,186	2,186	0	100
		Folder #22	211	Foundation Drift (Class B)	Lin. Ft.							1,080	1,080			1,080	1,080	0	100
		Folder #23	211	Crown Drift	Lin. Ft.							2,186	2,186			2,186	2,186	0	100
		Folder #24	211	1¼ Inch Drilled Hole	Lin. Ft.					27,847	29,118	74,274	77,661			102,121	106,779	+4,658	105
		Folder #25	211	2 Inch Drilled Hole	Lin.Ft.					7,905	7,350	58,095	54,018			66,000	61,368	-4,632	93
		Folder #26	211	3 Inch Drilled Hole	Lin Ft.					0	160	4,960	5,288			4,960	5,448	+ 488	110
		Folder #27	211	2 Inch Core Drilled Hole	Lin.Ft.					425	46	1,200	263			1,625	309	-1,316	19
		Folder #28	211	Buttress Berm Grouting	Ton							2,491	314			2,491	314	-2,177	13
		Folder #29	211	Pre-Grouting	Ton					396	14	3,411	117			3,807	131	-3,676	3
		Folder #30	211	Re-Grouting	Ton					78	7.67	228	0			306	7.67	- 298.33	2
		Folder #31	211	Grouting Connection	Each					527	758	9,173	13,188			9,700	13,946	+4,246	144
		Folder #32	211	Contact Grouting	Ton					1,189	1,240.09	3,323	3,466.15			4.512	4,706.24	+ 194.24	104
		Folder #33	211	Steel Pipe For Grouting	Pound					29,207	31,258	71,403	31,085			100,610	128,343	+27,733	128
R-1		Folder #34	211	Chemical Grout	Gallon					399	0	1,101	96			1,500	96	- 1,404	6
		Folder #35	211	Rock Reinforcement, Portland Cement Grouted (12 Foot)	Each					1,584	1,606	3,719	3,777			5,303	5,383	+ 80	102
		Folder #36	211	Rock Reinforcement, Portland Cement Grouted (18 Foot)	Each							5,697	5,535			5,697	5,535	- 162	97
		Folder #37	211	Rock Reinforcement, Portland Cement Grouted (20 Foot)	Each					1,068	1,052	1,048	1,032			2,116	2,084	- 32	98
		Folder #38	211	Rock Reinforcement, Threaded Tieback - Portland Cement Grouted (20 Foot)	Each							72	76			72	76	+ 4	106
		Folder #39	211	Rock Reinforcement, Resin Grouted (12 Foot)	Each					250	198	6,886	5,463			7,136	5,661	-1,475	79
		Folder #40	211	Rock Reinforcement, Resin Grouted (16 Foot)	Each							16,125	14,327			16,125	14,327	-1,798	89
		Folder #41	211	Rock Reinforcement, Threaded Tieback Resin Grouted (16 Foot)	Each					2,235	2,217	1,162	1,152			3,397	3,369	- 28	99
		Folder #42	211	Rock Reinforcement, Threaded Tieback Resin Grouted (20 Foot)	Each					2,136	2,125	5,376	5,351			7,512	7,476	- 36	100
		Folder #43	211	Sheet Metal For Panning	Pound					4,680	312.5	43,320	2,667.5			48,000	2,980	-45,020	6

SUMMARY OF ~~APPROXIMATE~~ FINAL QUANTITIES

SHEET G-3

6-23-73

SUMMARY OF ~~APPROXIMATE~~ FINAL QUANTITIES

INDEX (Book / Page / Sheet)	CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	WEST APPROACH ROAD SUMMIT COUNTY	FINAL WEST APPROACH ROAD	TUNNEL, STR. NO. F-13-X SUMMIT COUNTY	FINAL SUMMIT COUNTY	TUNNEL, STR. NO. F-13-X CLEAR CREEK COUNTY	FINAL CLEAR CREEK COUNTY	EAST APPROACH ROAD CLEAR CREEK COUNTY	FINAL EAST APPROACH ROAD	PROJECT TOTALS	FINAL	DIFF.	%
Folder #44	212	Seeding	Pound	51	126					111	274	162	400	+238	247
Folder #45	212	Fertilizing	Acre	2.5	3.1					5.5	6.9	8	10	+2	125
Folder #46	213	Mulching	Ton	5	6.2					11	13.8	16	20	+4	125
Folder #47	213	Soil Retention Blanket (Jute)	Sq.Yd.	11,670	14,633					27,170	34,069	38,840	48,702	-9862	125
Folder #48	304	Aggregate Base Course (Class 2) (Haul)	Ton	10	27.1	17,683	27,005.52	48,135	73,498.82	10	30.5	65,838	100,561.94	+34,723.94	153
Folder #49	506	Riprap	Cu.Yd.	5	274							5	274	+269	5480
Folder #50	507	Concrete Slope and Ditch Paving (Reinforced)	Cu.Yd.	17.8	9.9					7.0	11.0	24.8	20.9	-3.9	84
Folder #51	507	Grouted Rubble Slope and Ditch Paving	Cu.Yd.	18	268.48					54	54	72	322.48	+250.48	448
Folder #52	509	Structural Steel (Miscellaneous)	Ton			338	338	1,067	1,067.89			1,405	1,405.89	-0.89	100
Folder #53	509	Place Structural Steel	Ton			59	62.53	39	41.34			98	103.87	-5.87	106
Folder #54	509	Structural Steel (W 10X66)	Ton			37	38.02					37	38.02	-1.02	103
Folder #55	509	Structural Steel (W 12X106)	Ton					89	94.80			89	94.80	+5.8	107
Folder #56	509	Structural Steel (W 14X61)	Ton			1,681	1,670.20	798	792.88			2,479	2,463.08	-15.92	99
Folder #57	509	Structural Steel (W 14X95)	Ton			11	11	2,664	2,659.02			2,675	2,670.02	-4.98	100
Folder #58	509	Structural Steel (W 14X136)	Ton					2,131	2,134.60			2,131	2,134.60	+3.60	100
Folder #59	509	Structural Steel (W 14X150)	Ton					1,421	1,406.05			1,421	1,406.05	-14.95	99
Folder #60	509	Structural Steel (W 14X167)	Ton					716	716.82			716	716.82	+0.82	100
Folder #61	509	Structural Steel (W 14X211)	Ton					2,940	2,929.97			2,940	2,929.97	-10.03	100
Folder #62	515	Waterproof Coating	Sq.Yd.			20,675	22,103	59,295	63,390.			79,970	85,493	+5,523	107
Folder #63	518	Waterstop (6 Inch)	Lin.Ft.			1,963	1,977	5,147	5,182			7,110	7,159	+49	101
Folder #64	521	Pedestrian Overpass	Each	1	1					1	1	2	2	0	100
Folder #65	601	Concrete Class A (Miscellaneous)	Cu.Yd.	12	28.89					12	32.46	24	61.35	37.35	256
R-1 Folder #66	601	Concrete, Class T-1 (First Stage Lining)	Cu.Yd.			18,483	18,432.17	21,961	21,900.61			40,444	40,332.78	-111.22	100
R-1 Folder #67	601	Concrete, Class T-2 (Final Lining)	Cu.Yd.			12,153	12,413.49	16,060	16,404.24			28,213	28,817.73	+604.73	102
R-1 Folder #68	601	Concrete, Class T-2 (Invert)	Cu.Yd.					15,476	15,433.36			15,476	15,433.36	-42.64	100
R-1 Folder #69	601	Concrete, Class T-2 (Miscellaneous)	Cu.Yd.			4,470	4,661.93	7,206	7,515.40			11,676	12,177.33	+501.33	104
R-1 Folder #70	601	Concrete, Class T-3 (First Stage Lining)	Cu.Yd.			329	328.83	15,522	15,513.84			15,851	15,842.67	-8.33	100
R-1 Folder #71	601	Concrete Class T-4 (Final Lining)	Cu.Yd.			249	249	22,065	22,065.57			22,314	22,314.57	+0.57	100
R-1 Folder #72	601	Concrete Class T-4 (Invert)	Cu.Yd.			204	201.64	7,745	7,655.45			7,949	7,857.09	-91.91	99
Folder #73	602	Reinforcing Steel	Ton			357	387.20	1,432	1,631.97			1,789	2,019.17	-230.17	113
Folder #74	603	18 Inch Corrugated Steel Pipe	Lin.Ft.	88	136					48	102	136	238	+102	175
Folder #75	603	24 Inch Corrugated Steel Pipe	Lin.Ft.	898	1,093.5					552	770	1,450	1,860.5	+410.5	128

SUMMARY OF ~~APPROXIMATE~~ FINAL QUANTITIES

SUMMARY OF ~~APPROXIMATE~~ FINAL QUANTITIES

INDEX BOOK	INDEX PAGE	INDEX SHEET	CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	WEST APPROACH ROAD SUMMIT COUNTY	FINAL WEST APPROACH ROAD	TUNNEL, STR NO F-13-X SUMMIT COUNTY	TUNNEL, STR NO F-13-X FINAL SUMMIT COUNTY	TUNNEL, STR NO F-13-X CLEAR CREEK COUNTY	TUNNEL, STR NO F-13-X FINAL CLEAR CREEK	EAST APPROACH ROAD CLEAR CREEK COUNTY	FINAL EAST APPROACH ROAD	PROJECT TOTALS	FINAL	DIFF	%
Folder	#76		603	60 Inch Corrugated Steel Pipe	Lin.Ft.	320	320					0	230	320	550	+ 230	172
Folder	#77		603	66 Inch Corrugated Steel Pipe	Lin.Ft.	714	743							714	743	+ 29	104
Folder	#78		603	24 Inch Steel End Section	Each							2	2	2	2	0	100
Folder	#79		603	60 Inch Steel End Section	Each	1	1							1	1	0	100
Folder	#80		603	66 Inch Steel End Section	Each	1	1							1	1	0	100
Folder	#81		604	Inlet Type C (5 Foot)	Each	8	7					5	11	13	18	+ 5	139
Folder	#82		604	Inlet Special	Each			34	34	79	79			113	113	0	100
Folder	#83		604	Manhole Special	Each			13	13	33	33			46	46	0	100
Folder	#84		604	Inlet Grating and Frame Type C	Each	8	2					2	1	10	3	- 7	30
Folder	#85		604	4 & Inch Ductile Iron Pipe Sewer	Lin.Ft.			407	473	947	1,102			1,354	1,575	+ 221	116
Folder	#86		604	12 Inch Ductile Iron Pipe Sewer	Lin.Ft.			2,594	2,565	6,391	6,320			8,985	8,885	- 100	99
Folder	#87		604	2 Inch Plastic Pipe Sewer (Polyethylene)	Lin.Ft.			25,407	25,656	68,954	69,629			94,361	95,285	+ 924	101
Folder	#88		604	2 Inch Plastic Pipe Sewer (Polyvinyl Chloride)	Lin.Ft.					4,184	3,628			4,184	3,628	- 556	87
Folder	#89		604	4 Inch Plastic Pipe Sewer (Polyvinyl Chloride)	Lin.Ft.			2,148	2,221	18,137	18,754			20,285	20,975	+ 690	103
Folder	#90		604	12 Inch Plastic Pipe Sewer (Polyvinyl Chloride)	Lin.Ft.			4,830	4,824	12,473	12,459			17,303	17,283	- 20	100
Folder	#91		605	6 Inch Non-Perforated Corrugated Steel Pipe	Lin. Ft.	16	0							16	0	- 16	0
Folder	#92		605	4 Inch Perforated Plastic Pipe (Polyvinyl Chloride)	Lin.Ft.			4,823	4,796	28,809	28,645			33,632	33,441	- 191	99
Folder	#93		607	End Post (Chain Link)	Each	8	15					10	15	18	30	+ 12	167
Folder	#94		607	Corner and Line Brace Post (Chain Link)	Each	8	14					4	17	12	31	+ 19	258
Folder	#95		607	Fence Chain Link (Industrial)	Lin.Ft.	1,980	2,355					2,050	1,901	4,030	4,256	+ 226	106
Folder	#96		607	20 Foot Gate Double Driveway	Each	2	5					3	4	5	9	+ 4	180
Folder	#97		614	Flagging	Hour	8,000	5,996.75					8,000	5,996.75	16,000	11,993.5	-4,006.5	75
Folder	#98		614	Traffic Control Supervision	Day			445	489	445	489			890	978	+ 88	110
Folder	#99		614	Security Guard	Hour			30,720	33,082	30,720	33,082			61,440	66,164	+4,724	108
Folder	#100		620	Janitorial Service	Month	38	28							38	28	- 10	74
Folder	#101		622	Tunnel Waste Water Treatment	L.S.			0.5	0.5	0.5	0.5			1	1	0	100
Folder	#102		625	First Aid Attendant	Hour			10,680	10,005.5	10,680	10,005.5			21,360	20,011	-1,349	94
Folder	#103		625	Ambulance Driver	Hour			21,360	21,359	21,360	21,359			42,720	42,718	- 2	100
Folder	#104		625	Ambulance Attendant	Hour			250	33.5	250	33.5			500	67	- 433	13
Folder	#105		625	Furnish Ambulance	Each			1	1	1	1			2	2	0	100
Folder	#106		626	Mobilization	L.S.			0.2	0.2	0.8	0.8			1	1	0	100
Folder	#107		699	Fixed Fee	L.S.			0.2	0.2	0.8	0.8			1	1	0	100

SUMMARY OF ~~APPROXIMATE~~ FINAL QUANTITIES

SHEET G-5

FORM NO. 512 (REVISED) SEPT. 1972

(R-1) Delete F/A Item 7-3-75 T.A.L.

FEDERAL AID PROJECT NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
XXX	COLORADO	I 70-3(61)220	6	273

SUMMARY OF APPROXIMATE QUANTITIES

INDEX BOOK	INDEX PAGE	INDEX SHEET	CONTRACT ITEM NO.	CONTRACT ITEM	UNIT			WEST APPROACH ROAD SUMMIT COUNTY		TUNNEL, STR. NO. F-13-X SUMMIT COUNTY		CLEAR CREEK COUNTY		EAST APPROACH ROAD CLEAR CREEK COUNTY		PROJECT TOTALS			
				FORCE ACCOUNT															
			F/AC1	On-The-Job-Trainee	Each					9		21				30			
			F/AC2	Erosion Control	L.S.					0.5		0.5				1			
			F/AC3	Construction Monitoring	L.S.					0.3		0.7				1			
			F/AC4	Avalanche Control and Clean-up	L.S.					1						1			
			F/AC5	Furnish Employee Shuttle Bus	L.S.					0.3		0.7				1			
			F/AC6	Trial Testing for Rock Reinforcement	L.S.					0.3		0.7				1			
			F/AC7	Miscellaneous	L.S.					0.3		0.7				1			
(R-1)								See Sheet 6A											

SUMMARY OF ~~APPROXIMATE~~ FINAL QUANTITIES

SHEET G-6

FINAL SUMMARY OF CHANGE ORDERS

PCO NO	CMO NO	DESCRIPTION	PLAN AMT	FINAL AMT	DIFFERENCE	PERCENT	REFERENCE	REMARKS
1	PLANNED FORCE ACCOUNT	ON THE JOB TRAINEE	$ 24,000.00	$ 29,246.40	+ $ 5,246.40	121.9	CONTRACTORS BILLINGS	
2		EROSION CONTROL	$ 200,000.00	$ 85,436.20	- $ 114,563.80	42.7		
3		CONSTRUCTION MONITORING	$ 200,000.00	$ 152,633.78	- $ 47,366.22	76.3		
4		AVALANCHE CONTROL AND CLEANUP	$ 50,000.00	$ 2,724.30	- $ 47,275.70	5.4		
5		FURNISH EMPLOYEE SHUTTLE BUS		0.00		0		NEVER ACTIVATED *DELETED BY NCR FF#07 LINE ITEM 36*
6		TRIAL TESTING FOR ROCK REINFORCEMENT	$ 6,000.00	$ 1,399.33	- $ 4,600.67	23.3		
7	17051	MISCELLANEOUS:						
		LINE 1 PAVE OVERHEIGHT VEHICLE PULL OFF, W PORTAL	$ 6,800.00	$ 7,604.12	+ $ 704.12	110.2		
		LINE 2 ELECTRICAL GROUNDING MAT	$ 1,200.00	$ 1,194.73	- $ 5.27	99.6		
		LINE 3 GUARD RAIL AT PEDESTRIAN OVERPASS	$ 1,000.00	$ 2,234.78	+ $ 1,234.78	223.5		
		LINE 4 REMOVE CONCRETE BLOCK RT. & LT. IN SEGS. 165, 166, 167	$ 1,000.00	$ 1,951.86	+ $ 951.86	195.2		
		LINE 5 DRILL & GROUT DOWELS FOR 1st STAGE CURB IN SEGS. 165, 166, 167 & TRANSITION	$ 10,000.00	$ 7,206.28	- $ 2,793.32	72.1		
		LINE 6 MODIFICATION OF STATE FURNISHED MATERIAL IN SEGS. 5 & 6	$ 6,500.00	$ 6,499.94	- 0.06	100.0		SEE LINE 12 FOR SUPPLEMENT
		LINE 7 FAN LINE ERECTION IN E. VENT. BLDG. FOR VENTING OF CONTROL ROOM	$ 3,700.00	$ 1,705.73	- $ 1,994.27	46.1		
		LINE 8 CLEANOUT OF TUNNEL DRAINAGE EXTENSION, EAST PORTAL	$ 3,000.00	$ 3,300.00	+ $ 300.00	110.0		STATE EXPENSE
		LINE 9 PAYMENT FOR CONCRETE ADMIXTURES	$ 10,000.00	—	—	—		VOIDED; MOVED TO PCO 12
		LINE 10 REDUCTION OF THE PLACEMENT OF A QUANTITY OF EXCAVATED MINUS 6" MATERIAL AS EMBANKMENT FROM STA. 171+00 - 176+00 TO ENCOMPASS BRIDGE ABUTMENTS	- $ 4,000.50	- $ 4,000.50	0.00	100.0		
		LINE 11 MAN GATE EAST PORTAL	$ 269.50	$ 269.50	0.00	100.0		
		LINE 12 MODIFY STATE FURNISHED MATERIAL SUPPLEMENT TO LINE 6	$ 4,528.00	$ 4,528.00	0.00	100.0		
		LINE 13 SLOT HOLES IN HEAVY HORSESHOE PLATES	$ 3,140.00	$ 3,138.80	- $ 1.20	100.0		
		LINE 14 LINE 9 SUPPLEMENT	$ 10,000.00	—	—	—		VOIDED; MOVED TO PCO 12
		LINE 15 INSTALLATION OF ADDITIONAL GROUNDING CABLE IN WEST, CENTER & EAST CROSS PASSAGES	$ 500.00	$ 2,207.09	+ $ 1,707.09	441.4		
		LINE 16 CONNECT 8" EXISTING LONGITUDINAL DRAIN TO NEW 4" AT JOINT S5 & S6	$ 150.00	$ 41.54	- $ 108.46	27.7		
		LINE 17 REMOVE CONCRETE PEDESTALS & PLACE DOWELS IN OLD LINING FOR 1st STAGE CURB W.V.B. - S4	$ 8,000.00	$ 7,106.01	- $ 893.99	88.8		
		LINE 18 EXTEND EXISTING 4" CLAY PIPE THRU 1st STAGE CURB W.V.B. THRU S4 & 4" CEILING DRAIN IN S1.	$ 300.00	$ 278.46	- $ 21.54	92.8		
		LINE 19 REMOVAL OF SONOTUBE FROM CURBS OF EAST & WEST VENT BLDGS.	$ 1,000.00	$ 1,320.55	+ $ 320.55	132.1		
		LINE 20 PLACEMENT OF W. BOUND 2 WAY TRAFFIC SIGNS ON WEST APPROACH	$ 200.00	$ 158.85	- $ 41.15	79.4		
		LINE 21 RENTAL OF VERTICAL PANEL CHANNELIZING DEVICES, WEST APPROACH	$ 500.00	$ 998.25	+ $ 498.25	199.7		PER UNIFORM MANUAL OF TRAFFIC CONTROL DEVICES

REGION NO				
9	COLORADO	I 70-3(81)220	68X	273

FINAL SUMMARY OF CHANGE ORDERS

PCO NO	CMO NO	DESCRIPTION	PLAN AMT	FINAL AMT	DIFFERENCE	PERCENT	REFERENCE	REMARKS
7 CONT.		LINE 22 REPAIR OF PEDESTRIAN OVERPASS DAMAGED BY TRAFFIC ACCIDENT ON 8-15-77	$4,800.00	$4,524.68	-$275.32	94.3		INSURANCE COMPANY TO REIMBURSE
		LINE 23 CLEAN SLOPE & DITCH BETWEEN U.S.6 & I 70, STA. 178+ TO STA. 200+ ; TYPE C INLETS IN DITCH, STA. 184+ & 186+.	$1,000.00	$1,920.21	+$920.21	192.0		
		LINE 24 CLEANING & RESETTING 66" C.S.P. END SECT.	$3,000.00	$3,950.13	+$950.13	131.7		
		LINE 25 REPAIRING SOFT SPOTS IN SUBGRADE	$3,000.00	$4,161.91	+$1,161.91	138.7		
		LINE 26 LOCATING CONDUIT IN W. PORTAL	$400.00	$1,498.39	+$1,098.39	374.6		
		LINE 27 WELDING 2½" X 2½" X 4" UPPER ARCH DRIFTS	$1,600.00	$1,689.99	+$89.99	105.6		
		LINE 28 LOCATING CONDUIT IN E. PORTAL	$800.00	$893.55	+$93.55	111.7		
		LINE 29 A-36 STRUCTURAL STEEL PLATE	$10,000.00	$9,841.53	-$158.47	98.4		
		LINE 30 PLACING LEVELING COURSE ON U.S. 6	$1,000.00	$3,036.20	+$2,036.20	303.6		
		LINE 31 REPLACING PLASTIC NIPPLES WITH STEEL NIPPLES	$2,200.00	$2,488.26	+$288.26	113.1		
		LINE 32 RESHAPE SLOPES ALONG U.S. 6	$3,000.00	$1,796.45	-$1,203.55	59.9		
		LINE 33 ADJUST TELEPHONE MANHOLE, E. PORTAL	$500.00	$97.33	-$402.67	19.5		
		LINE 34 CLEARING TREES FOR EXTENSION OF EMBANKMENT, WEST PARKING AREA	$1,200.00	$1,338.91	+$138.91	111.6		
		LINE 35 REPAIR BLAST SHIELDS IN EAST & WEST VENTILATION BUILDINGS	$1,200.00	$1,128.32	-$71.68	94.0		
		LINE 36 BUS TRANSPORTATION (ON SITE) SUPPLIED BY CONTRACTOR	$3,600.00	0.00	-$3,600.00	0.0		
		LINE 37 ADJUST CONCRETE SLAB, N. SIDE OF EAST VENTILATION BUILDING	$500.00	$426.88	-$73.12	85.4		
		LINE 38 EXTEND EXISTING 36" C.M.P. RT. OF STA. 144+40 BY 20 FT.	$1,500.00	$1,737.17	+$237.17	115.8		
		LINE 39 INSTALL ELECTRICAL CONDUIT IN FINAL LINING AT X-PASSAGEWAYS, 5 WEST & EAST 10 CENTER	$600.00	$884.45	+$284.45	147.4		
		LINE 40 PLUG DROP HOLE IN TOP OF SOUTH TUNNEL TRANSITION - WEST PORTAL	$200.00	$260.67	+$60.67	130.3		
		LINE 41 DISMANTLE & DISPOSE OF METAL BUILDING N.E. OF STATE FIELD OFFICE	$4,000.00	-1.00	-$4,001.00	0.0		
		LINE 42 SHAPED ROAD TO WATER STORAGE TANK WEST PORTAL	$300.00	$2,849.97	+$2,549.97	950.0		
		LINE 43 INSTALL 350 LIN. FT. OF 6" PERFORATED UNDERDRAIN RT. OF STA. 11+ TO 14+, WEST LOOP RAMP.	$5,500.00	$5,811.80	+$311.80	105.7		
		LINE 44 INSTALL LUMINAIRES RT. OF STA. 204+60, 207+80, & 210+80.	$9,700.00	$9,649.83	-$50.17	99.5		
		LINE 45 REMOVE ROADWAY CROWN, STA. 185+ TO 214+, EASTBOUND ROADWAY	$500.00	$422.52	-$77.48	84.5		
		LINE 46 REPAIR ASPHALT ROADWAY AROUND MEDIAN INLET, STA. 147+93	$300.00	$219.40	-$80.60	73.1		
		LINE 47 INSTALL 4" PERFORATED UNDERDRAIN, STA. 353+ E.B. LANE	$1,200.00	$1,542.63	+$342.63	128.6		
		LINE 48 RELATED PREPARATIONS TO INSTALL 60" C.S.P., STA. 130+	$8,500.00	$8,324.57	-$175.43	97.9		

FINAL SUMMARY OF CHANGE ORDERS

PCO NO	CMO NO	DESCRIPTION	PLAN AMT	FINAL AMT	DIFFERENCE	PERCENT	REFERENCE	REMARKS
7 CONT.		LINE 49 PREPARE SLOPES FOR TOPSOIL	$10,000.00	$10,000.00	0.00	100.0		SEE LINE ITEM #66
		LINE 50 ACCESS ROAD FOR WESTERN SLOPE GAS CO., RT. OF STA. 414+.	$1,000.00	$1,014.77	+$14.77	101.5		
		LINE 51 ADDITIONAL CLEARING, RT. OF STA. 134±	$900.00	$894.04	-$5.96	99.3		
		LINE 52 DRY GULCH LANDSCAPING	$8,000.00	$7,998.65	-$1.35	100.0		
		LINE 53 REMOVE SOFT SPOT, EAST RAMP, STA 464+	$9,300.00	$9,258.69	-$41.31	99.6		
		LINE 54 WESTERN SLOPE GAS LINE REPAIR	$600.00	$599.80	$0.20	100.0		
		LINE 55 BUILD STARTER WALL FOR FINAL LINING FORMS, STA. 82+ TO 90+, LT & RT.	$10,000.00	$9,869.18	-$130.82	98.6		
		LINE 56 EXCAVATE INVERTS, SEG. 1 THRU 6, W. PORTAL	$7,200.00	$11,101.62	+$3,901.62	154.2		
		LINE 57 REPLACE PLASTIC TEE'S WITH STEEL TEE'S	$8,700.00	$18,389.76	+$9,689.76	211.4		SEE LINE ITEM #67
		LINE 58 REPAIR BLAST SHIELD, E. & W. VENT. BLDG.	$625.00	$620.90	-$4.10	99.3		
		LINE 59 CHIP ROCK AND/OR CONCRETE IN INVERT OF WEST VENTILATION BUILDING	$10,000.00	$14,085.31	+$4,085.31	140.9		
		LINE 60 REMOVE MATERIALS IN ARCH AREAS OF EAST & WEST STUB TUNNELS	$2,000.00	$5,350.48	+$3,350.48	267.5		
		LINE 61 CLEAN & FLUSH 18" C.I.P. IN EAST VENTILATION BUILDING, STA. 124+39	$1,500.00	$193.78	-$1,306.22	12.9		
		LINE 62 REMOVE BLAST SHIELDS IN EAST & WEST VENTILATION BUILDINGS	$3,000.00	$2,006.79	-$993.21	66.9		
		LINE 63 PURCHASE & INSTALL PLASTIC PIPE PLUGS FOR 4" PLASTIC SEEP RISERS	$600.00	0.00	-$600.00	0.0		
		LINE 64 REMOVE CHAIN LINK FENCE, SOUTH SIDE OF WEST PORTAL	$2,000.00	$1,440.50	-$559.50	72.0		
		LINE 65 CLEAN OUT & REPAIR OF SEWER LINE AT STATE FIELD OFFICE	$1,839.00	$1,839.41	+$0.41	100.0		
		LINE 66 SUPPLEMENT TO LINE #49	$4,700.00	$4,613.05	-$86.95	98.2		
		LINE 67 SUPPLEMENT TO LINE #57	$9,700.00					
		LINE 68 SUPPLEMENT TO LINE #5	$4,100.00					
		LINE 69 TOWING T.V. VANS	$2,000.00	$975.41	-$1,024.59	48.8		
		LINE 70 INSTALL 2" PERF. P.V.C.	$2,500.00	$10,449.72	+$7,949.72	418.0		
		LINE 71 REMOVE & RESET ROADWAY SIGNS, W. PORTAL	$1,000.00	$638.25	-$361.75	63.8		
		LINE 72 EXTEND 4" P.V.C. IN SO. CURB @ STA. 38+31	$500.00	$424.17	-$75.83	84.8		
		LINE 73 INSTALL 60 FT. OF 8" PERF. C.S.P., WEST LOOP ROAD	$800.00	$2,480.80	+$1,680.80	310.1		
		LINE 74 REPAIR OF 8" GAS LINE, EAST PORTAL CREDIT TO PROJECT	($5,838.72)	($5,838.72)	0	100.0		CREDIT TO PROJECT (NON-PARTICIPATING)
		LINE 75 INSTALL GROUNDING MAT - WEST PORTAL	$2,000.00	$1,991.26	-$8.74	99.6		
		LINE 76 THREE (3) TRANSFORMERS - EAST PORTAL CREDIT TO PROJECT	($3,234.00)	($3,234.00)	0	100.0		CREDIT TO PROJECT
		LINE 77 ADJUST FIXED FEE - CREDIT TO PROJECT	($43.12)	($43.12)	0	100.0		CREDIT TO PROJECT

REGION NO	DIVISION	PROJ. NO	NO	SHEETS
	COLORADO	I 70-3(81)220	6 DX	273

6-29-73

FINAL SUMMARY OF CHANGE ORDERS

PCO NO	CMO NO	DESCRIPTION	PLAN AMT	FINAL AMT	DIFFERENCE	PERCENT	REFERENCE	REMARKS
8	17052	FURNISH AND INSTALL A441 (GRADE 45) STEEL LEGS AND INVERT STRUTS, SEG. 163	-$4,314.35	—	—	—		PAID BY REDUCING PRICE ON BID ITEM 55
9	0256	BUTTRESS BERM GROUTING PRICE ADJUSTMENT	$171,233.00	$171,233.00	0.00	100.0		
10	0307	OUT OF SPECIFICATION MATERIAL	-$23,614.19	-$23,614.19	0.00	100.0		PRICE REDUCTION
11	0317	REVISE TORQUE INDICATOR WASHER REQUIREMENTS	-$887.62	—	—	—		WASHERS NOT USED WERE NOT PAID FOR UNDER THE VARIOUS STRUCTURAL STEEL ITEMS
12	0323	WATER REDUCING ADMIXTURES	$235,000.00	$210,569.52	-$24,430.48	89.6		
13	0320	ACCESS CROWN DRIFT	—	—	—	—		PERMISSION TO CONSTRUCT ACCESS CROWN DRIFT AT NO COST TO STATE
14	0321	REMEDIAL WORK, STA. 72+	$30,000.00	$17,140.07	-$12,859.93	57.1		
15	0269	DRAINAGE MODIFICATIONS	-$3,826.89	—	—	—		PAID BY REDUCED PRICES FOR SOME DRAINAGE BID ITEMS
16	0261	REMEDIAL WORK, STA. 71+76 TO 72+20	$14,000.00	$9,519.38	-$4,480.62	68.0		
17	0355	REMEDIAL WORK, STA. 81+ TO 82+	$46,200.00	$43,375.98	-$2,824.02	93.9		
18	0329	WEST APPROACH GRADE CHANGE	$521,200.00	$525,953.15	+$4,753.15	100.9		
19	0333	WATERPROOFING CHANGES	$119,955.00	$128,239.50	+$8,284.50	106.9		
20	0337	PREGROUT PRICE ADJUSTMENT	-$307,176.00	-$307,176.00	0	100.0		
21	0341	PLANT MIX BITUMINOUS BASE (CL.6) U.S. 6 RAMP	$12,200.00	$11,942.93	$257.07	97.9		
22	0347	TOPSOIL	—	—	—	—		VOIDED BY I70-3(104)220
23	0540	ADDITIONAL TOPSOIL & SEEDING	$39,924.10	$38,737.89	$1,186.21	97.0		
24		NOT USED						
25	4375	ADDITIONAL COST OF FLYASH & CEMENT	$63,634.83	$63,634.83	0.00	100.0		
26	0549	A.B.C. (CL. 2) SPECIFICATION MODIFICATION	0.00	0.00		0		
27	4728	UNDERRUN OF BID ITEM 211 - SHEET METAL FOR PANNING	$21,854.00	$21,854.00	0.00	100.0		
28		VOIDED BY P.C.O. # 29						
29	4983	OVERRUN OF BID ITEM 203 - UNCLASSIFIED EXCAVATION (HAUL)	$177,570.90	$177,570.90	0.00	100.0		
30	4953	REPAIR OF BRICK FACADE WALLS & BLAST DAMAGE TO VENTILATION BUILDING.	$9,175.70	$9,175.70	0.00	100.0		
31	8153	*DELAY CLAIM-EAST PORTAL TOP HEADING*	*$245,000.00*	*$245,000.00*	*0.00*	*100.0*		

XXX	COLORADO	170-3(81)220	7	273

COMPOSITE SUMMARY OF MINIMUM TEMPERATURE 10 WINTER SEASONS (1958-1967)

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH		APRIL	
	LEAST	MOST	LEAST	MOST	LEAST	MOST	LEAST	MOST	LEAST	MOST	LEAST	MOST	LEAST	MOST
No. of Days at Freezing or Below	7	31	26	30	30	31	29	31	26	28	30	31	26	30
No. of Days at 0° F. or Below	0	0	0	5	2	15	6	13	6	20	1	13	0	2
No. of Days at -10° F. or Below	0	0	0	2	0	3	1	9	0	6	0	4	0	0
No. of Days at -20° F. or Below	0	0	0	0	0	0	0	5	0	2	0	0	0	0

MONTHLY SUMMARY OF MAXIMUM SUMMER TEMPERATURE (1964-1967)

Number of Days warmer than	MAY				JUNE				JULY				AUGUST				SEPTEMBER			
	1964	65	66	67	64	65	66	67	64	65	66	67	64	65	66	67	64	65	66	67
80°						0	0		0	0	13			0	0				0	
70°			0			1	11		3②	12	28		1	0	15		0		4	
60°		0	8			14	24		8②	29	31		19	13	28		7③	0	18	
50°		16	21	2④		25	30		10②	30			27	27	30		11③	11	30	
40°		25	28	12④		30				30			31	30	31		16③	23		
30°		31		20④						31				31				26		
20°				21④														30		
10°																				
0°																				

② Based on 10 days of records. ③ Based on 16 days of records. ④ Based on 21 days of records.

TEMPERATURE READINGS IN THE PILOT TUNNEL

Number of Days warmer than	JANUARY						FEBRUARY						MARCH						APRIL					
	Sta. 39+		Sta. 74+		Sta. 118+		Sta. 39+		Sta. 74+		Sta. 118+		Sta. 39+		Sta. 74+		Sta. 118+		Sta. 39+		Sta. 74+		Sta. 118+	
	1966	67	66	67	66	67	1966	67	66	67	66	67	1966	67	66	67	66	67	1966	67	66	67	66	67
25°		29		29		31	12	23		23	11	26	27	31	6	31	27	31	27	30	27	30	27	30
30°		29		29		31	12	23		23	11	26	27	31	6	31	27	31	27	30	27	30	27	30
35°		29		29		31	12	23		23	11	26	27	31	6	31	25	31	27	30	27	30	24	26
40°		14		28		13	0	21		23	0	19	11	29	6	31	13	28	26	30	27	30	15	21
45°		0		28		0	0	0		23	0	0	0	1	6	31	0	1	3	18	27	30	1	0
50°		0		9		0	0	0		15	0	0	0	0	6	5	0	0	0	0	27	5	0	0
55°		0		0		0		0		0	0	0	0	0	0	0	0	0	0	0	4	0	0	0
60°		0		0		0		0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total No. Readings taken	0	29	0	29	0	31	12	23	0	23	11	28	27	31	6	31	27	31	27	30	27	30	27	27

Number of Days warmer than	MAY						JUNE						JULY						AUGUST					
	Sta. 39+		Sta. 74+		Sta. 118+		Sta. 39+		Sta. 74+		Sta. 118+		Sta. 39+		Sta. 74+		Sta. 118+		Sta. 39+		Sta. 74+		Sta. 118+	
	1966	67	66	67	66	67	1966	67	66	67	66	67	1966	67	66	67	66	67	1966	67	66	67	66	67
25°	31	31	31	31	31	31	3	30	4	30	3	31	31	31	31	31	31	31	30	30	30	30	30	30
30°	31	31	31	31	31	31	3	30	4	30	3	31	31	31	31	31	31	31	30	30	30	30	30	30
35°	31	31	31	31	31	31	3	30	4	30	3	31	31	31	31	31	31	31	30	30	30	29	30	30
40°	31	31	31	31	31	31	3	30	4	1	1	31	31	31	31	31	31	0	30	30	30	0	31	31
45°	31	31	31	31	31	31	1	0	0	3	30	0	0	0	30	31	31	0	30	30	30	0	4	31
50°	18	0	0	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0	16	30	0	0	0	31
55°	6	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	31
60°																								
Total No. Readings taken	31	31	31	31	31	31	3	30	4	30	3	31	31	31	31	31	31	31	30	30	30	29	31	31

Number of Days warmer than	SEPTEMBER						OCTOBER						NOVEMBER						DECEMBER					
	Sta. 39+		Sta. 74+		Sta. 118+		Sta. 39+		Sta. 74+		Sta. 118+		Sta. 39+		Sta. 74+		Sta. 118+		Sta. 39+		Sta. 74+		Sta. 118+	
	1966	67	66	67	66	67	1966	67	66	67	66	67	1966	67	66	67	66	67	1966	67	66	67	66	67
25°	30	30	30				31	31	31				28	30	23				20		17		24	
30°	30	30	30				31	31	31				28	30	23				20		17		23	
35°	30	30	29				31	31	31				28	30	23				20		17		21	
40°	30	30	0				31	31	0				14	30	0				9		11		12	
45°	30	30	0				4	31	0				0	30	0				1		4		0	
50°	16	30	0				0	31	0				0	30	0				0		4		0	
55°	0	22	0				0	31	0				0	30	0				0		4		0	
60°																								
Total No. Readings taken	30	30	30				31	31	31				28	30	23				20		17		24	

MONTHLY SUMMARY OF 1973-1974 TEMPERATURES ① Based on 25 days of records

Maximum Temperature	Number of Days												
	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MARCH	APRIL	MAY
80° or more			0	0									
70°		0	1	2	0	·							
60°	0	14	12	24	15	0							0
50°	1	20	30	30	18	10	0	0	0		0	0	2
40°	11	25	31	31	24	21	7	2	2	0	1	7	17
30°	13	30			28	25	16	9	2	5	14	17	19
20°	15				30	31	28	16	9	17	24	25	
10°							29	27	20	24	31	30	
0°							30	31	25	28			
-10°													
-20°													
Minimum Temperatur													
60° or less													
50°	15	30	31	31									
40°	13	29	30	17	30	31							19
30°	8	16	2	0	19	26	30				31	30	14
20°	2	2	0		1	9	21	31	25	23	27	27	4
10°	0	0			0	2	13	24	20	24	18	13	0
0°						0	4	10	8	10	4	3	
-10°							0	2	1	4	0	0	
-20°								0	1	0			
-30°									0				
-35°													

PARSHALL FLUME AND WIND DIRECTION IN THE PILOT TUNNEL

DATE	FLUME(gpm)	WIND	DATE	FLUME(gpm)	WIND	DATE	FLUME(gpm)	WIND	DATE	FLUME(gpm)	WIND
1-11-65	99	West	7-6-65	552	East	7-18-66	139	East	4-27-67	49	No information available
1-21-65	90	West	8-6-65	291	East	10-3-66	72		5-6-67	49	
2-3-65	65	West	9-15-65	130	East	10-30-66	63		5-22-67	49	
2-10-65	72	West	12-9-65	67	West	11-7-65	63		5-29-67	153	
2-17-65	72	West	1-4-66	64	—	11-21-66	63		6-5-67	251	
3-4-65	72	West	1-20-66	63	East	12-4-66	64				
3-17-65	67	West	2-24-66	63	West	1-9-67	45				
4-1-65	67	West	3-16-66	45	East	1-25-67	49				
4-12-65	59	West	4-15-66	45	West	2-20-67	45				
4-29-65	67	Varies	5-2-66	45	West	2-27-67	45				
5-11-65	67	West	5-23-66	175	West	3-13-67	45				
6-1-65	99	West	6-13-66	301	East	3-27-67	45				
6-16-65	242	West	7-4-66	188	East	4-10-67	40				

NOTE: TEMPERTURE SUMMARIES BASED ON EAST PORTAL DATA

AS CONSTRUCTED

NO REVISIONS 6-29-73 REVISED VOID

GENERAL PHYSICAL DATA

SHEET G-7

Rev. October, 1973

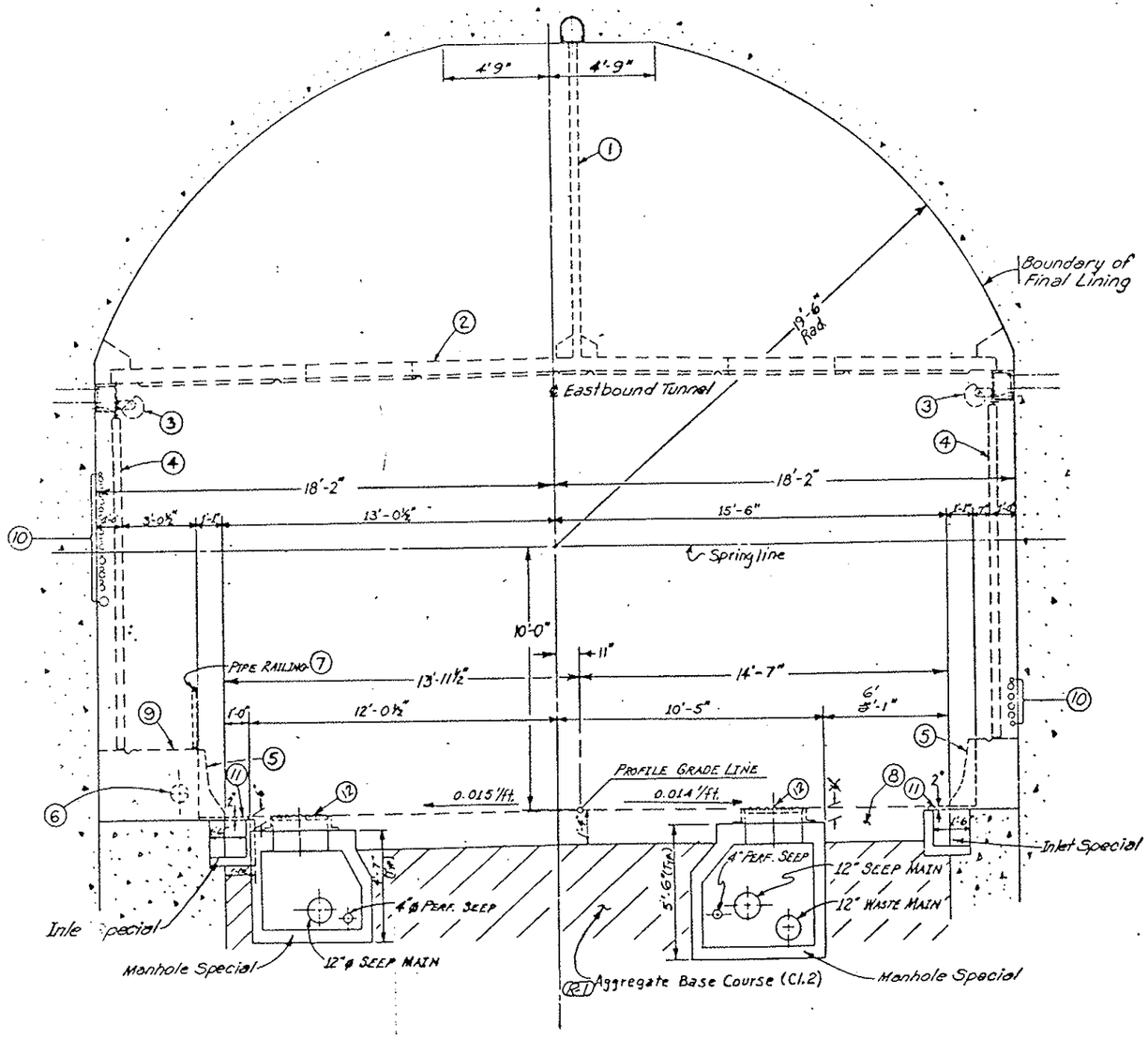
REGION NO.	STATE	PROJECT NO.	NO.	SHEETS
VI	COLORADO	I 70-3(81) 220	8	273

AS CONSTRUCTED

NO REVISIONS | REVISED 12-29-73 | VOID

Items not included in contract:

1. Duct Divider Wall
2. Ceiling
3. Tunnel Lights
4. Wall Finish
5. Safety Curbs
6. Water Main
7. Pipe Railing
8. Pavement (See Sheet AR-3)
9. Walkway
10. Electrical Conduit
11. Inlet Grating & Frame
12. Manhole Ring and Cover



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

TYPICAL INTERIOR DIMENSIONS

SHEET G-8

REGION NO.	DIVISION	PROJ. NO.	NO.	SHEETS
VIII	COLORADO	I 70-3(61)220	9	272

AS CONSTRUCTED

NO REVISIONS 6-29-73 REVISED BY#

SUB SURFACE INFORMATION

MAP SYMBOLS

Surficial Deposits

Granite

Metasedimentary Rock

Diorite

Decomposed Rock (D D D / D D D)

Shear Zone (S S S / S S S)

Contact (Strike and Dip) 75

Foliation 50

Joint (Most Predominant) 30

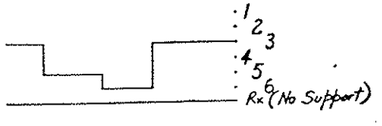
Fault 45 (<1 Ft.) 10 (1-5 Ft.) 50 (>5 Ft.)

PIS Primary Instrumentation Station Pilot Bore
SIS Secondary Instrumentation Station Pilot Bore
PLC Prop Load Cell Pilot Bore

P-No. / T-No. — Instrumentation Station North Tunnel

SUPPORT DATA

STEEL SET SPACING

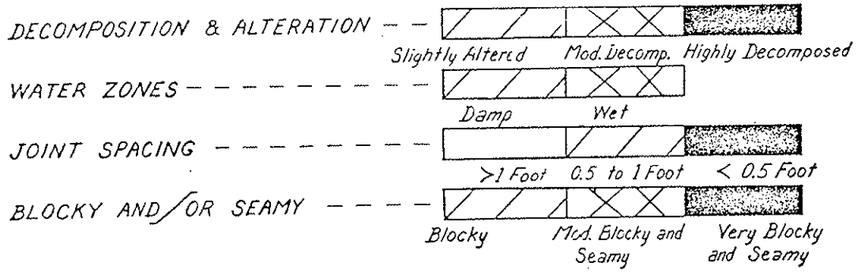


Spacing Information for the North Tunnel is for Crown Steel only.

NOTES

A. Geology is at spring line in the North tunnel and eye level in the Pilot bore.
B. For the relative positions of the Pilot bore and South tunnel, See Sheets A-2 thru A-7
C. The sub surface information and support data shown on these sheets is presented as general information. Circled numbers on Subsurface Information sheets refer to the following reports:
   (1) Geological Report on the Straight Creek Tunnel by J. Post. April, 1973
   (2) Rock Classification Report Pilot Bore Tunnel by J. Post. January, 1974
   (3) Final Geologic Report Straight Creek Tunnel Pilot Bore. by C.D.H. 1965
   (4) Preliminary Geologic Maps West Bound Lane and Pilot Bore Straight Creek Tunnel by C. S. Robinson and J. Post. 1971
   (5) Water Inflows and Drainage at the Eisenhower Memorial Tunnel by Leeds, Hill and Jewett, Inc. February, 1974

ROCK CHARACTERISTICS



ROCK CLASSIFICATION (1)

Rock Class	Description
Ia - Ib	Massive to slightly blocky, no alteration, joint spacing 1.0 feet or greater.
IIa - IIb	Moderately blocky, little or no alteration, joint spacing 0.5 feet or greater.
IIIa - IIIb	Very blocky, moderately to highly altered, joint spacing less than 1.0 feet.
IVa	Highly crushed and altered, non-plastic, abundant clay, joint spacing less than 0.5 feet.
IVb	Plastic, highly altered, squeezing or swelling ground, mainly clay fault gouge.

SUB SURFACE INFORMATION

Sheet G-9

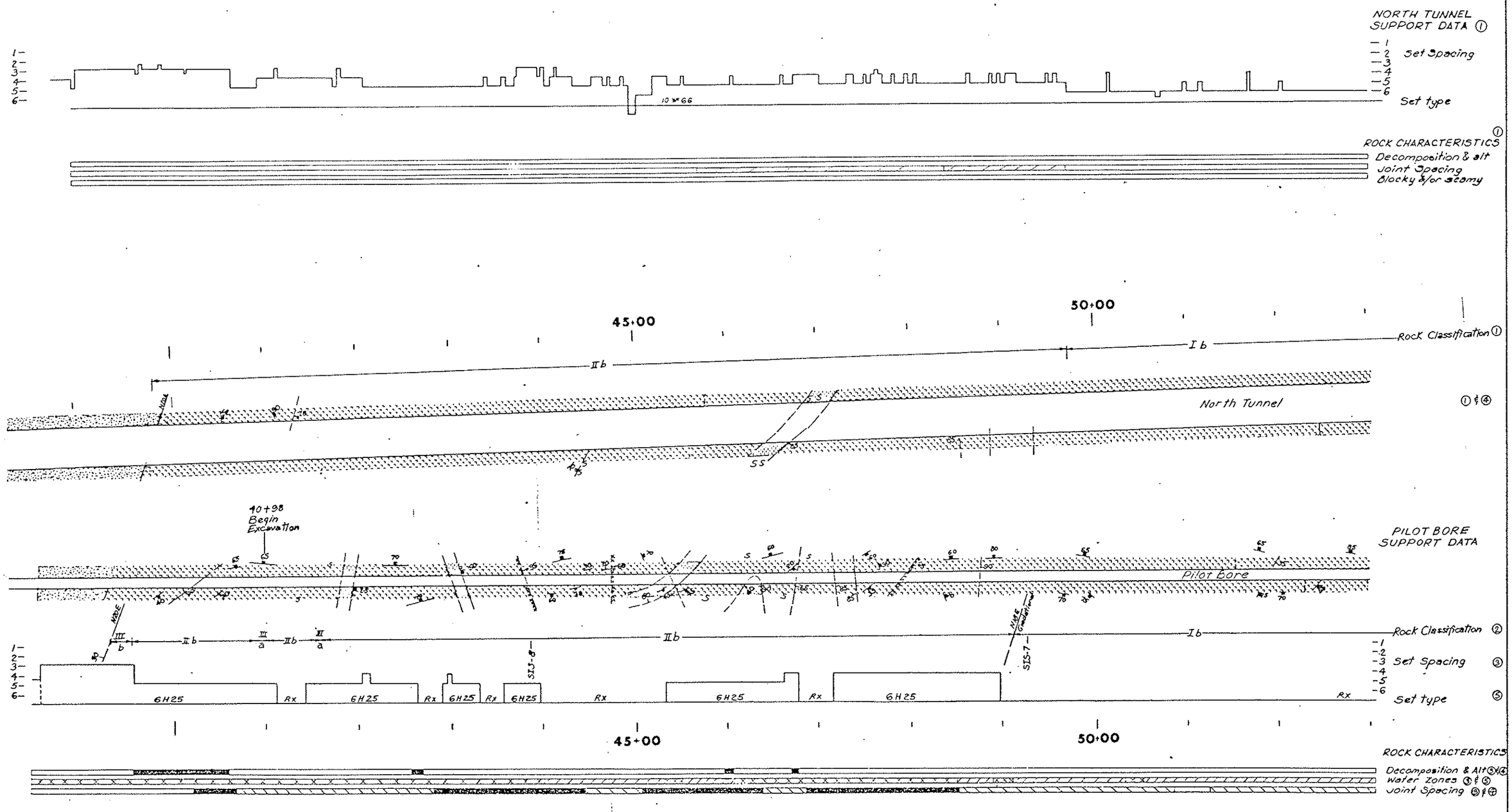
REGION NO.	DIVISION	PROJ. NO.	NO.	SHEETS
VIII	COLORADO	I 70-3(81)220	10	23

AS CONSTRUCTED

REVISIONS 6-23-78 REVISED VOID

SUB-SURFACE INFORMATION

Scale: 1" = 50'



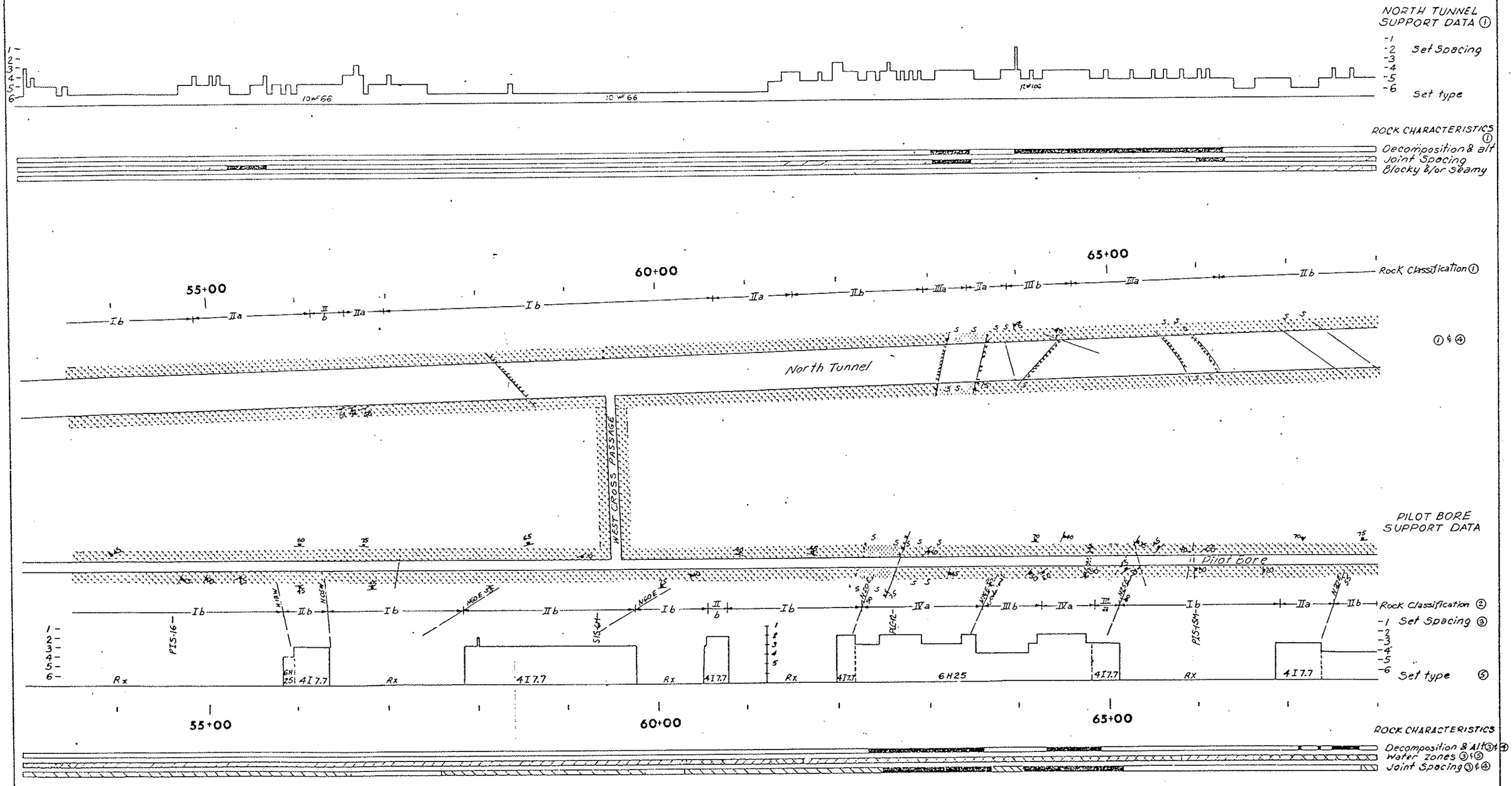
GEOLOGIC PLAN + PROFILE
STA 39+00 TO STA 53+00

SHEET G-10

REGION NO.	DIVISION	PROJ. NO.	NO.	SHEETS
VIII	COLORADO	I 70-3(81)220	11	275

SUB-SURFACE INFORMATION

Scale: 1"=50'

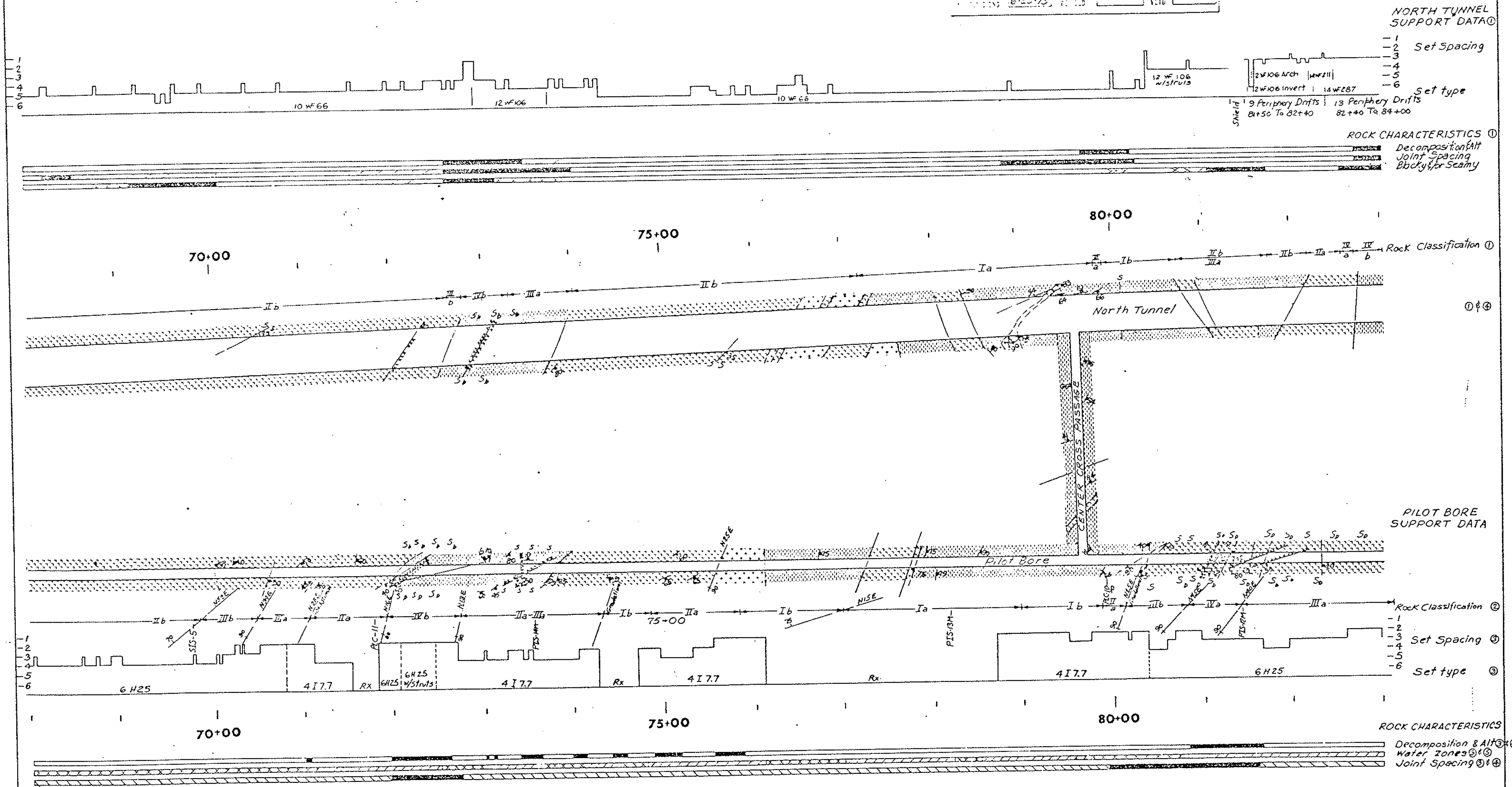


GEOLOGIC PLAN + PROFILE
STA 53+00 TO STA 68+00

SHEET G-11

VIII	COLORADO	I70-3(81)220	12	[illegible]

SUB-SURFACE INFORMATION



GEOLOGIC PLAN + PROFILE
STA 68+00 TO STA 83+00

SHEET G-12

SUB-SURFACE INFORMATION

NO REVISIONS 6-29-79

Scale: 1"=50'

NORTH TUNNEL SUPPORT DATA ①
1
2 Set Spacing
3
4
5
6 Set type

Alternating 14WF211 ARCH / 14WF184 — 14WF287 Invert — 9 Periphery Drifts 84+00 To 85+60
14WF184 — 5 Periphery Drifts 85+60 To 100+30
Alternating (2-1) 14WF184-211 Arch
Alternating (2-1) 14WF184-211 Arch
14WF184
12WF106 — 12WF106 Invert
14WF84 — 14WF287 Invert
12WF106 | 14WF184 — 12WF106 Invert
14WF184 — 14WF287 Invert
+85

ROCK CHARACTERISTICS ①
Decomposition/Alt
Joint Spacing
Blocky/or Seamy

85+00 90+00 95+00

Rock Class ①

North Tunnel

Access Drift filled with concrete

Pilot Bore

PILOT BORE SUPPORT DATA

Straight Creek Fault Zone

Rock Class ②

1 Set Spacing ③
2
3
4
5
6 Set type ③

SIS-4C SIS-4B SIS-4A PLC-9 PISH PLC-8 PISM SIS-3 PLC-6 PIS-B PLC-5

6H25 w/Struts | 6H25 w/A.H. Struts | 6H25 w/Struts | 6H25 | 4I7.7 | 6H25 | 6H25 w/Struts | 4I7.7 6H25 2'x6' Alternating on 1' Centers w/ modified struts | 4I7.7 | 6H Struts | 4I7.7 | CH 25 Struts | 4I7.7 | 6H25 w/Struts | 4I7.7

85+00 90+00 95+00

ROCK CHARACTERISTICS ③④
Decomposition / Alt
Water Zones ③④
Joint Spacing ③④

Heaving Ground

GEOLOGIC PLAN + PROFILE
STA 83+00 TO STA 98+00

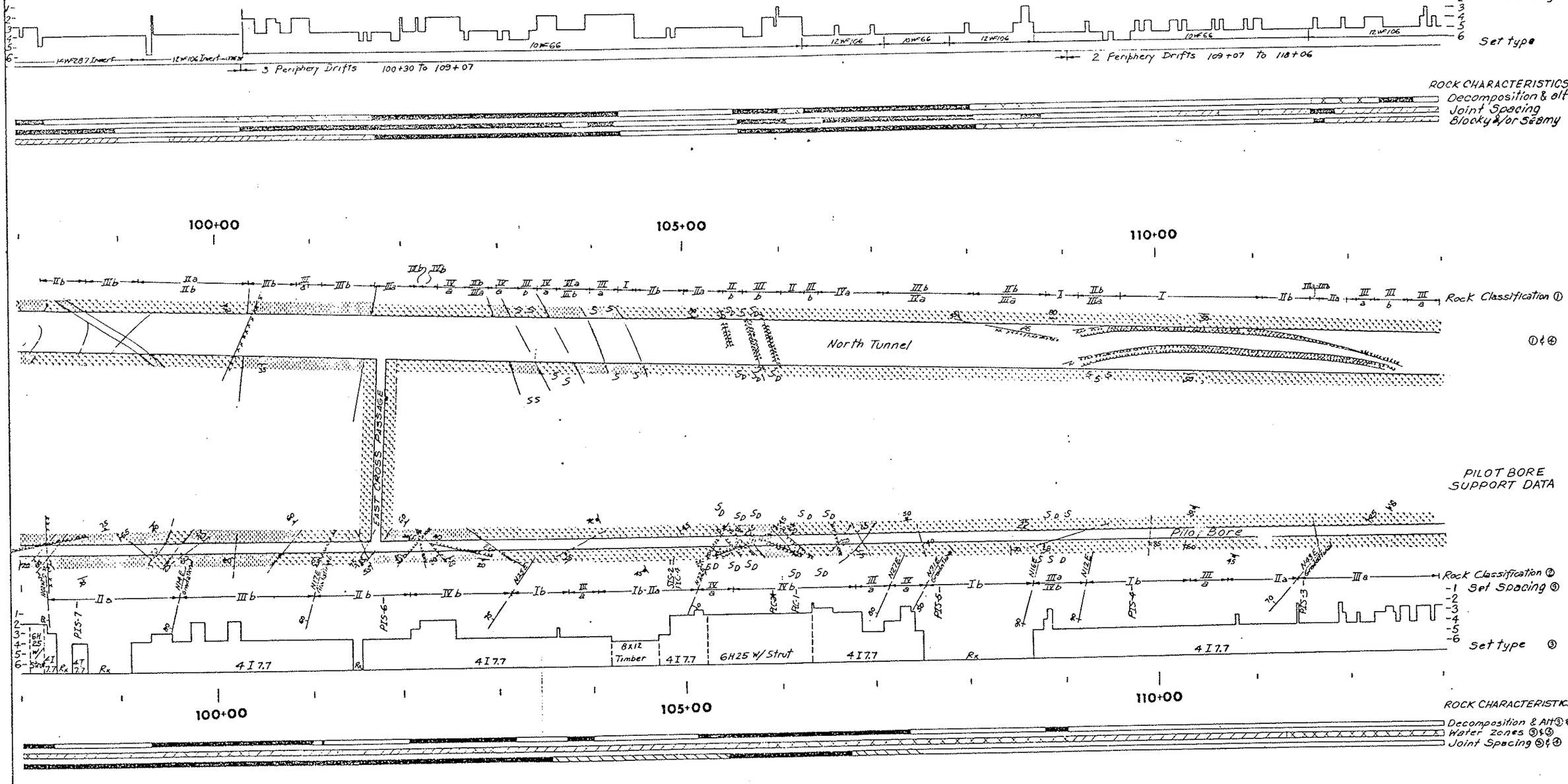
SHEET G-13

VIII	COLORADO	I 70-3(81)220	14	273

SUB-SURFACE INFORMATION

AS CONSTRUCTED
NO REV SIGNS 6-29-73 REVISED VOID

Scale: 1"=50'



GEOLOGIC PLAN + PROFILE
STA 98+00 TO STA 113+00

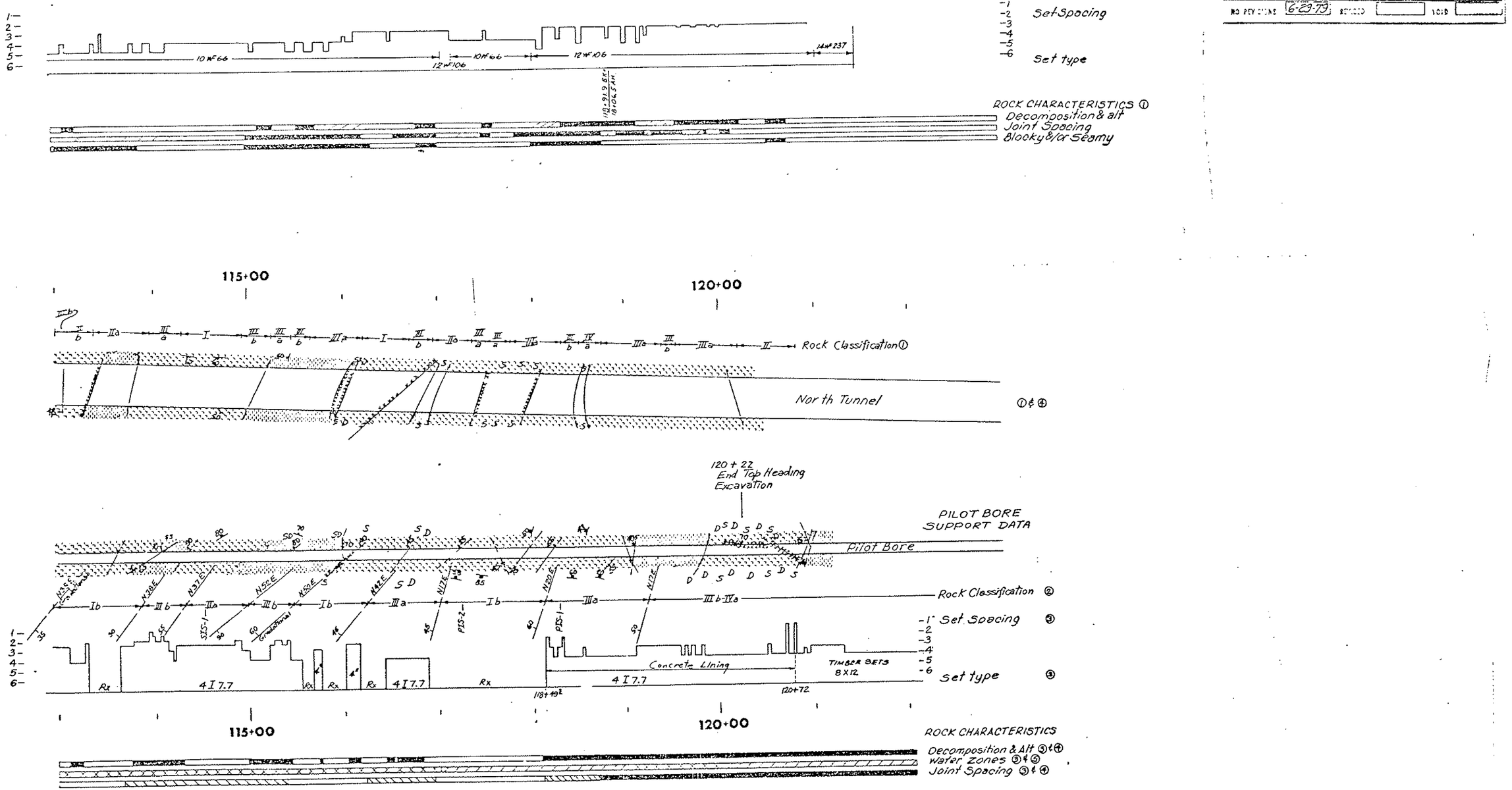
SHEET G-14

VIII	COLORADO	I70-3(81)220	15	273

SUB-SURFACE INFORMATION

Scale: 1"=50'

AS CONSTRUCTED
NO REVISIONS 6-23-75 REVISED VOID



GEOLOGIC PLAN + PROFILE
STA 113+00 TO STA 120+00

SHEET G-15

VIII	COLORADO	I 70-3(8)220	SFR	273
AS CONSTRUCTED				
NO REVISIONS	6-23-72	REVISED		VOID

EXPLANATION

MAP SYMBOLS

ROCK TYPE

GRANITIC ROCK

G_1	GRAY, MED. XLN., QTZ. PLAGIOCLASE
G_2	PINK, MED. XLN., ABUNDANT MICROCLINE
G_3	GRAY, FINELY XLN., EQUIGRAULAR
G^a	SLIGHTLY ALTERED
G^b	MODERATELY DECOMPOSED
G^c	HIGHLY DECOMPOSED
PEG	PEGMATITE

GNEISS or SCHIST ^{a} SLIGHTLY ALTERED

" " ^{b} MODERATELY DECOMPOSED

" " ^{c} HIGHLY DECOMPOSED

DIORITE

GEOLOGIC STRUCTURE SYMBOLS

(INCLUDING DIP and STRIKE)

LITHOLOGIC BREAK

CORRELATION LINE

FAULT

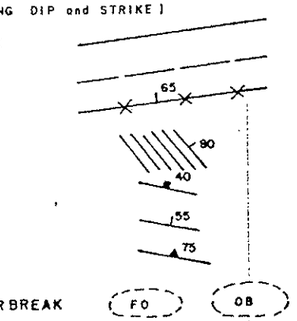
SHEAR ZONE

JOINT

SLIP

FOLIATION

FALLOUT and OVERBREAK



NOTE SECTION

1. The tunnelling method that was used for excavation started with a 11x11-foot Crown Drift and a 12x12-foot North Foundation drift being driven from the east portal to a point about half way through the tunnel. A Pilot Bore previously driven in 1964 was enlarged and used as a South Foundation drift. Following the completion of the drifts and the insertion of receiver and crown beams, the main tunnel was excavated by a top heading and bench method from east and west headings.

2. Geologic studies were initially carried out in the Pilot Bore in 1964. Geologic mapping in the South Tunnel was performed during the driving of the drifts, and during the excavation of the top heading. The geologic mapping was performed by John D. Post, Senior Geologist, with the Colorado Division of Highways.

3. Two series of geologic maps were prepared. The first is a series of field maps showing the major and more important lithologic and structural geologic features in the eastern half of the tunnel at a scale of 1" = 10'. These maps show the geology of the north and south foundation drifts in plan view, and a side view of the tunnel geology along the centerline. The side view uses the geology of the foundation drifts projected to the centerline for the lower half of the tunnel and the crown drift geology for the upper part of the tunnel. This view of the geology was of great value during the critical top heading excavation.

   The second is a series of detailed geologic maps at a scale of 1" = 20' that shows the geology as mapped at eye level in the drifts in the eastern half of the tunnel and as mapped in the top heading at springline in the western half of the tunnel. It should be noted that the crown drift geology is about 30 feet higher in elevation than that shown in the foundation drifts. Geologic contacts and structures that have dips other than vertical will be offset in plan view between the crown drift and foundation drifts.

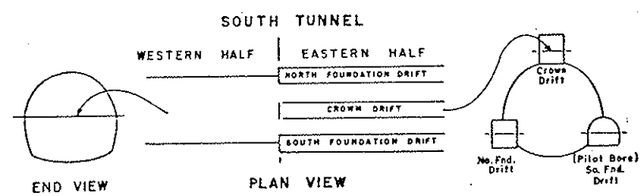
4. The geologic maps were updated as additional geologic mapping was performed.

5. The north tunnel was originally called the Straight Creek Tunnel and was later renamed the Eisenhower Tunnel. The excavation of the North Tunnel was started in early 1968 and completed in 1972.

   Some significant dates in the excavation of the south tunnel are as follows:

   - Crown drift started on 9/18/75.
   - North foundation drift started on 1/29/76.
   - East top heading started on 8/1/77.
   - West top heading started on 5/4/77.
   - Top heading holed through on 5/17/78 at Station 89+08.
   - East Bench started on 8/31/78.
   - West Bench started on 5/16/77.
   - The bench was completed on 11/28/78 at Station 95+82.

SKETCH SHOWING THE LOCATION OF THE MAPPED AREAS IN THE TUNNEL

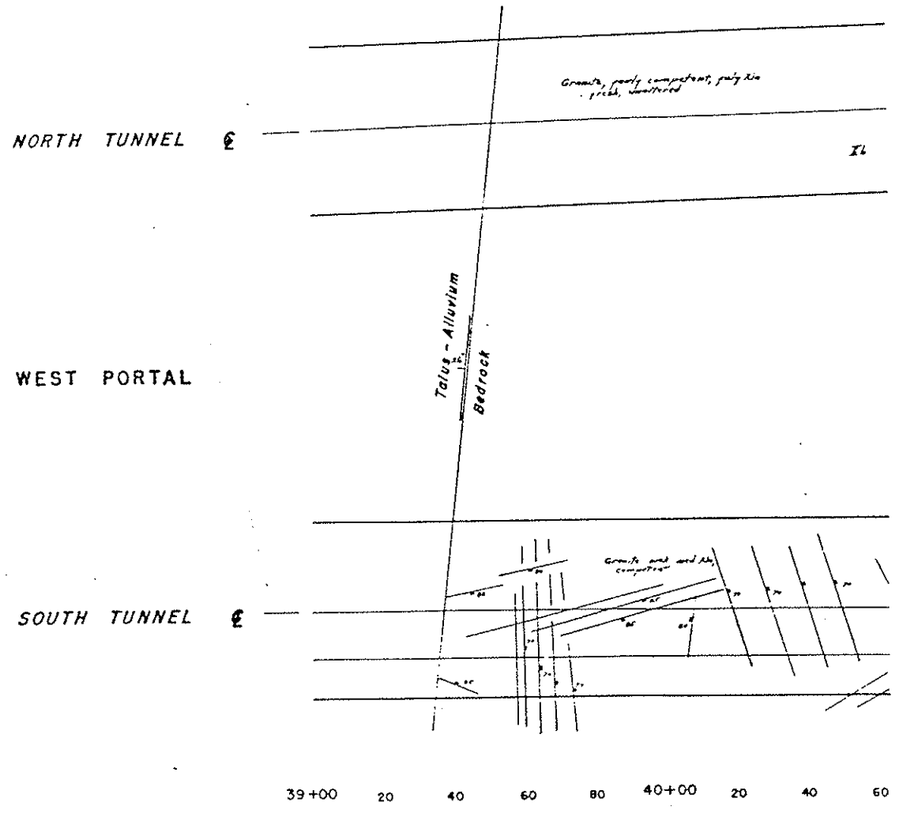


GEOLOGIC MAP

BY JOHN POST

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70 - 3(81)220	15Bx	273

STA 39+00 to 40+62



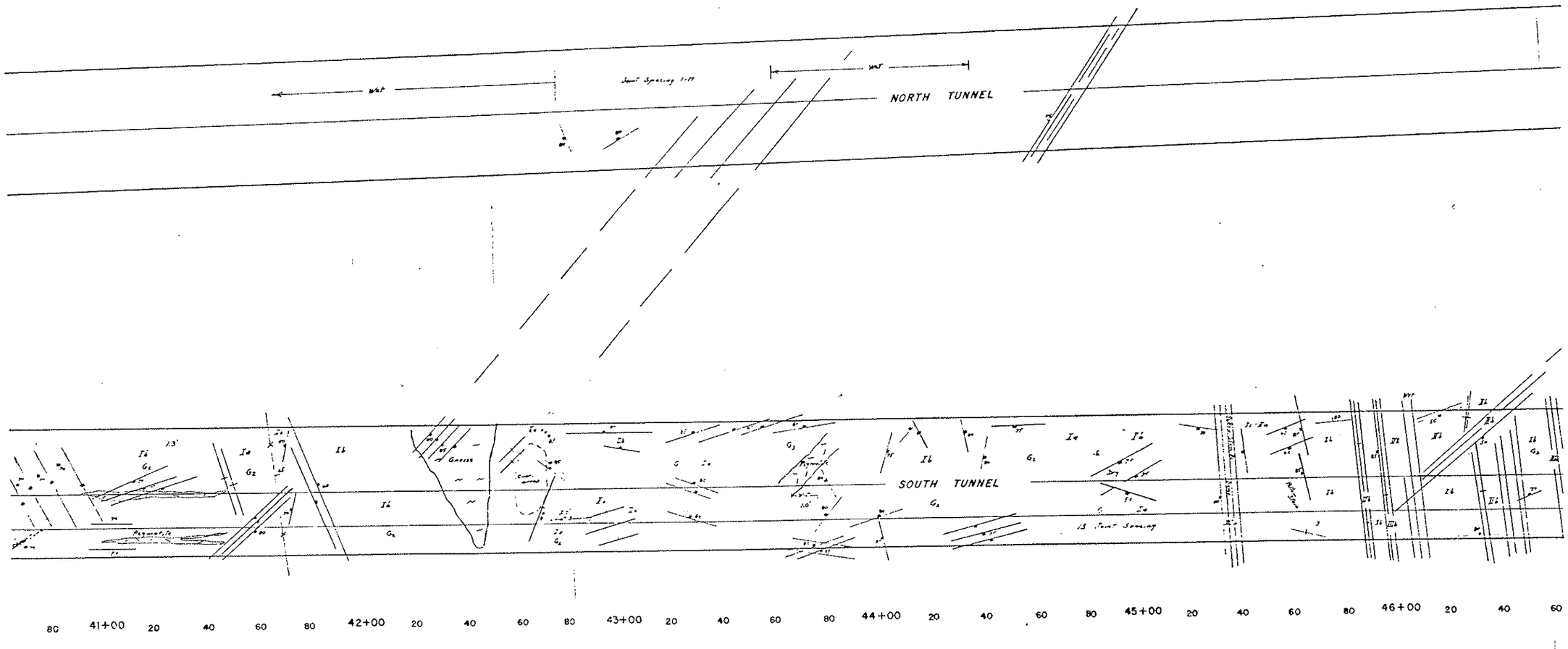
COLORADO DEPARTMENT OF HIGHWAYS

GEOLOGIC MAP

BY JOHN POST

	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70-3(81)220	15 Cx	273

STA. 40+62 to 46+62



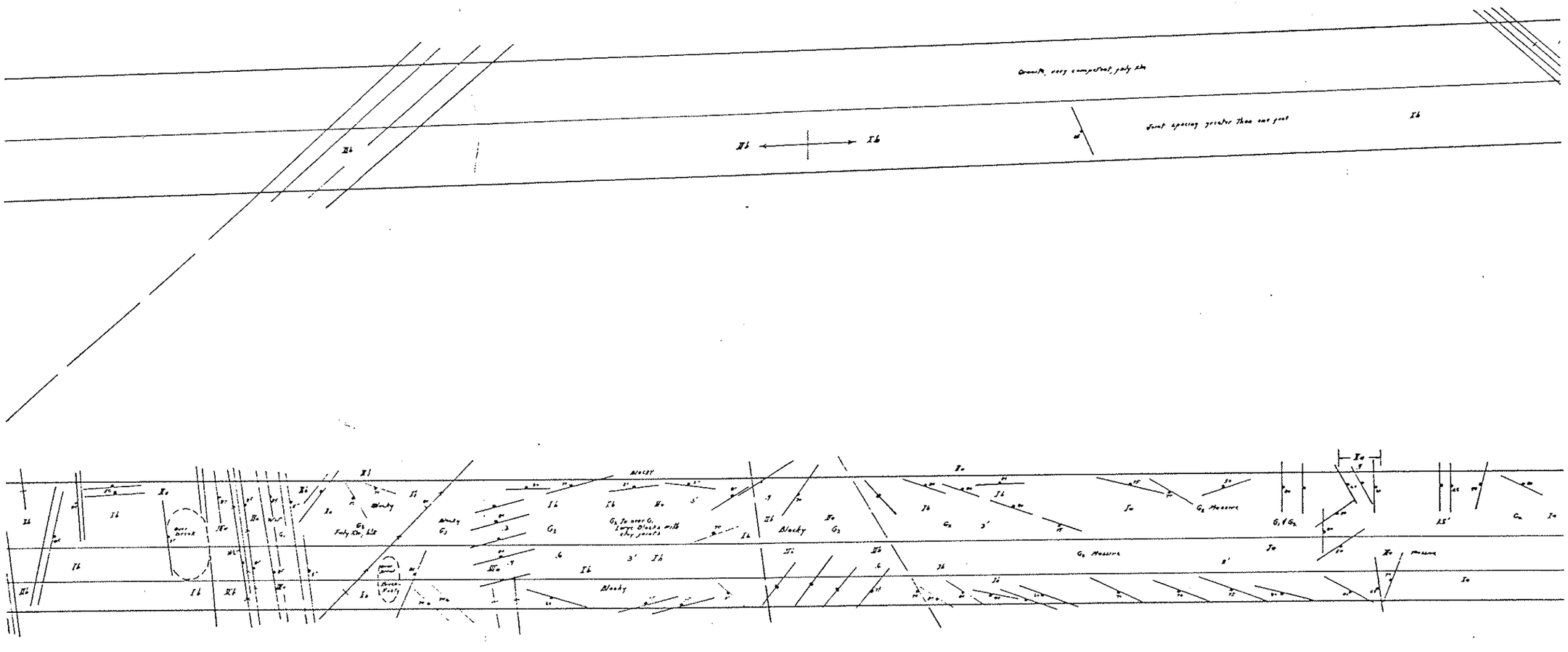
COLORADO DEPARTMENT OF HIGHWAYS

GEOLOGIC MAP

BY JOHN POST

FEDERAL AID ROAD	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70-3(81)220	15Dx	273

STA. 46+62 to 52+62



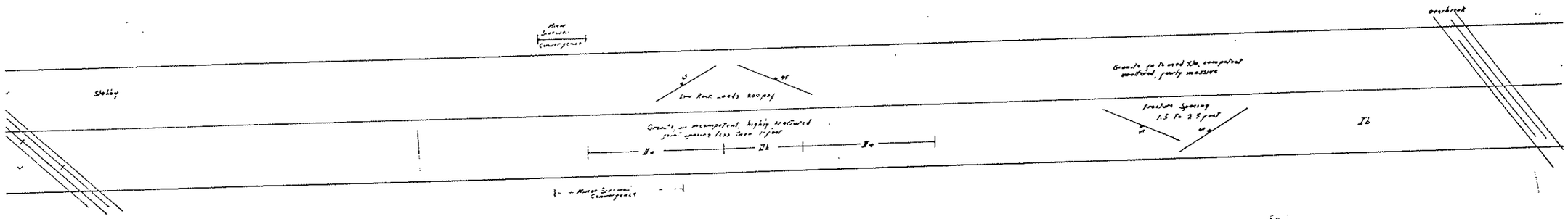
COLORADO DEPARTMENT OF HIGHWAYS

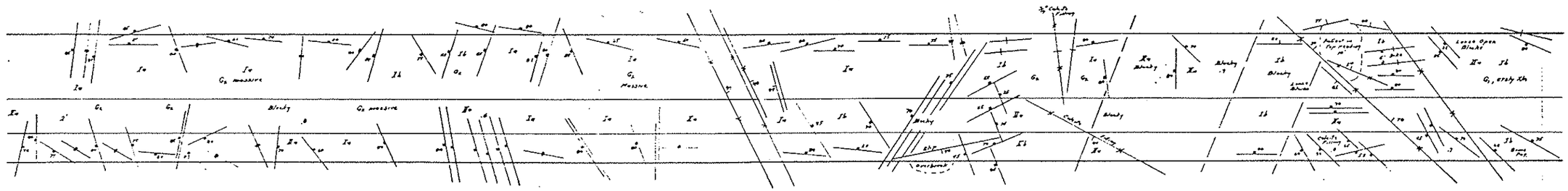
DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
COLORADO	I 70-3(81)220	15 E X	273

GEOLOGIC MAP

BY JOHN POST

STA. 52+62 to 58+62





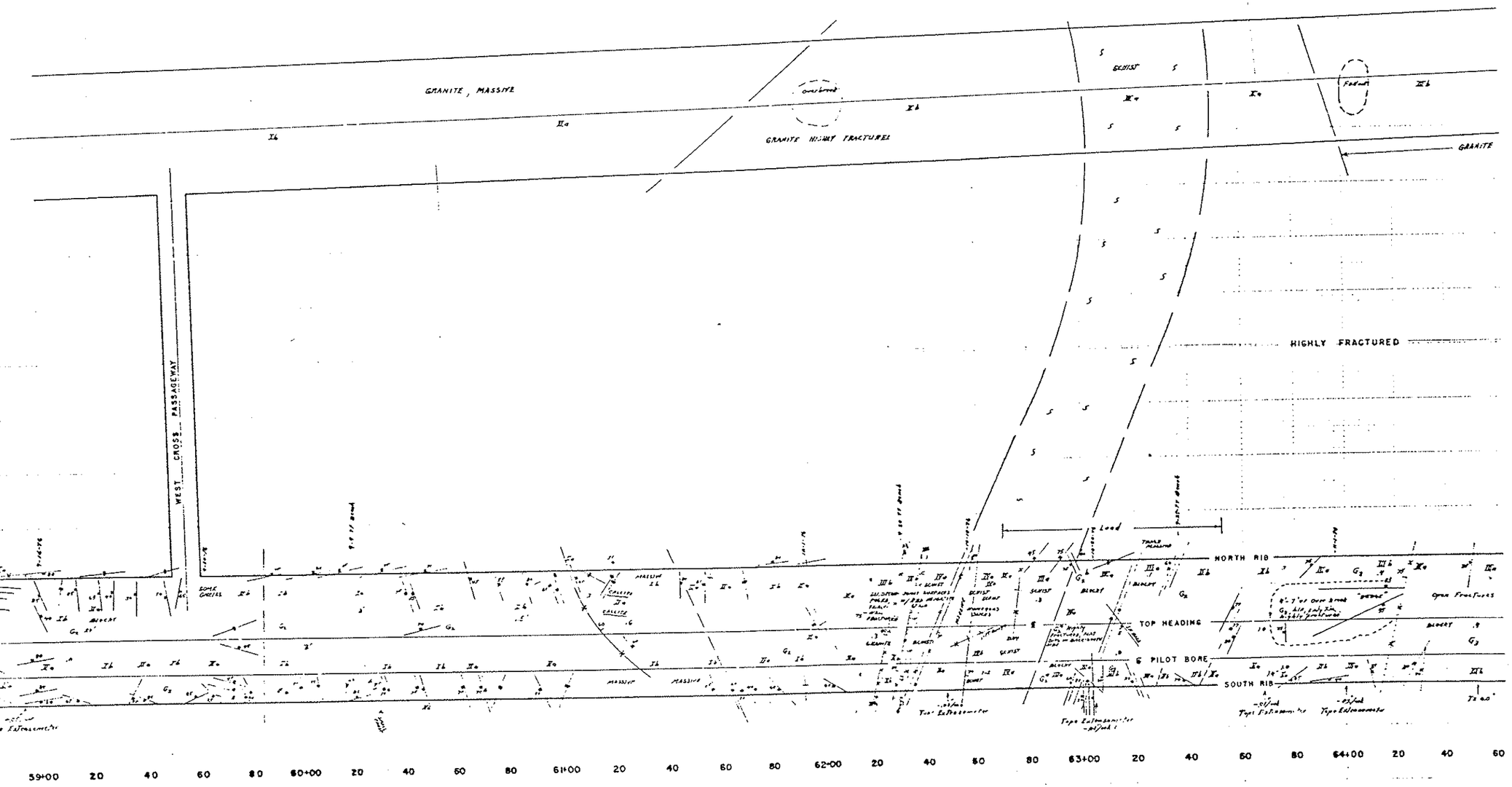
COLORADO DEPARTMENT OF HIGHWAYS

GEOLOGIC MAP

BY JOHN POST

DIVISION	PROJECT NO.	NO.	SHEETS
COLORADO	I 70-3(8)220	15Fx	273

STA. 58+62 to 64+62



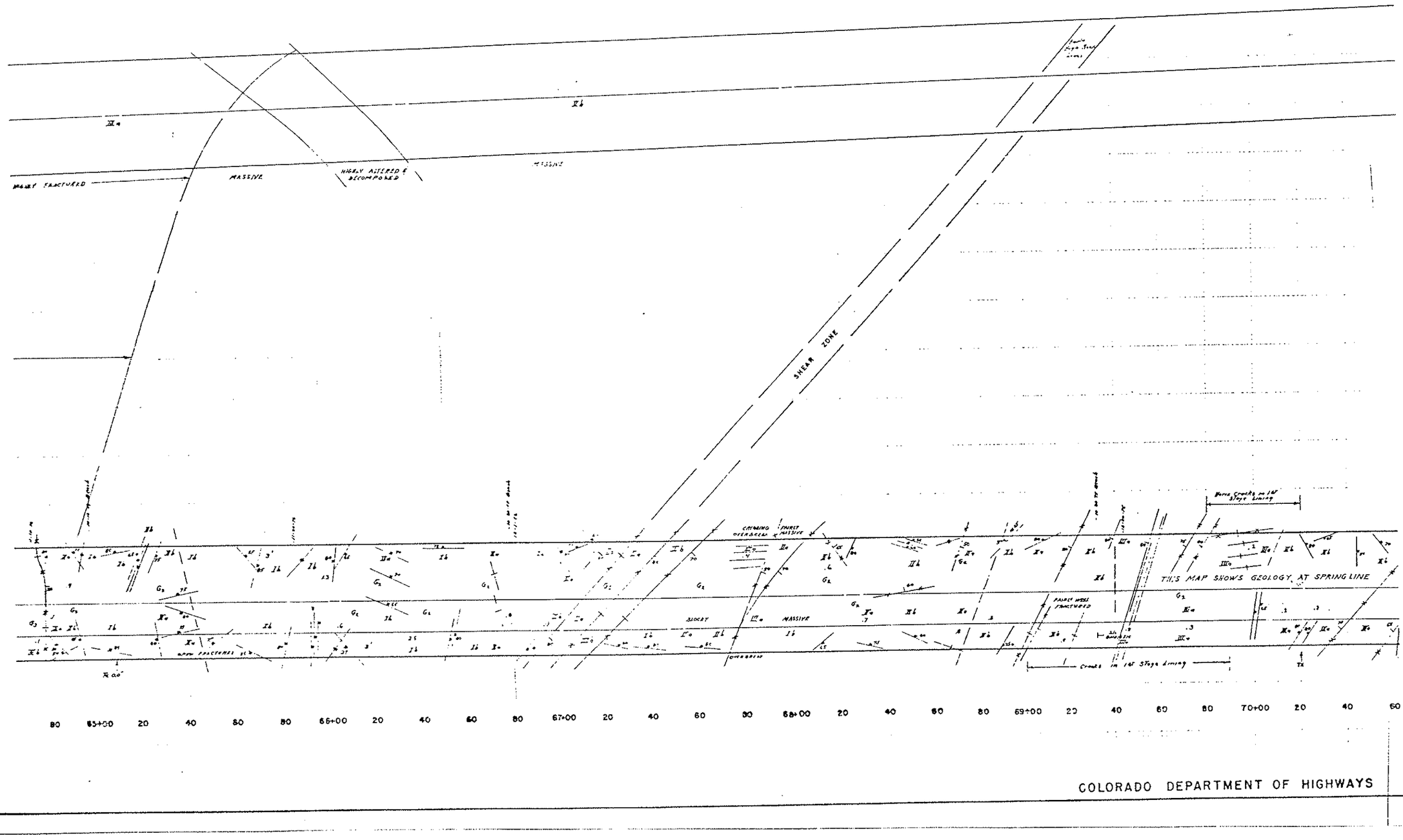
COLORADO DEPARTMENT OF HIGHWAYS

DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
COLORADO	I 70-3(81)220	15 Gx	273

GEOLOGIC MAP

BY JOHN POST

STA. 64+62 to 70+62



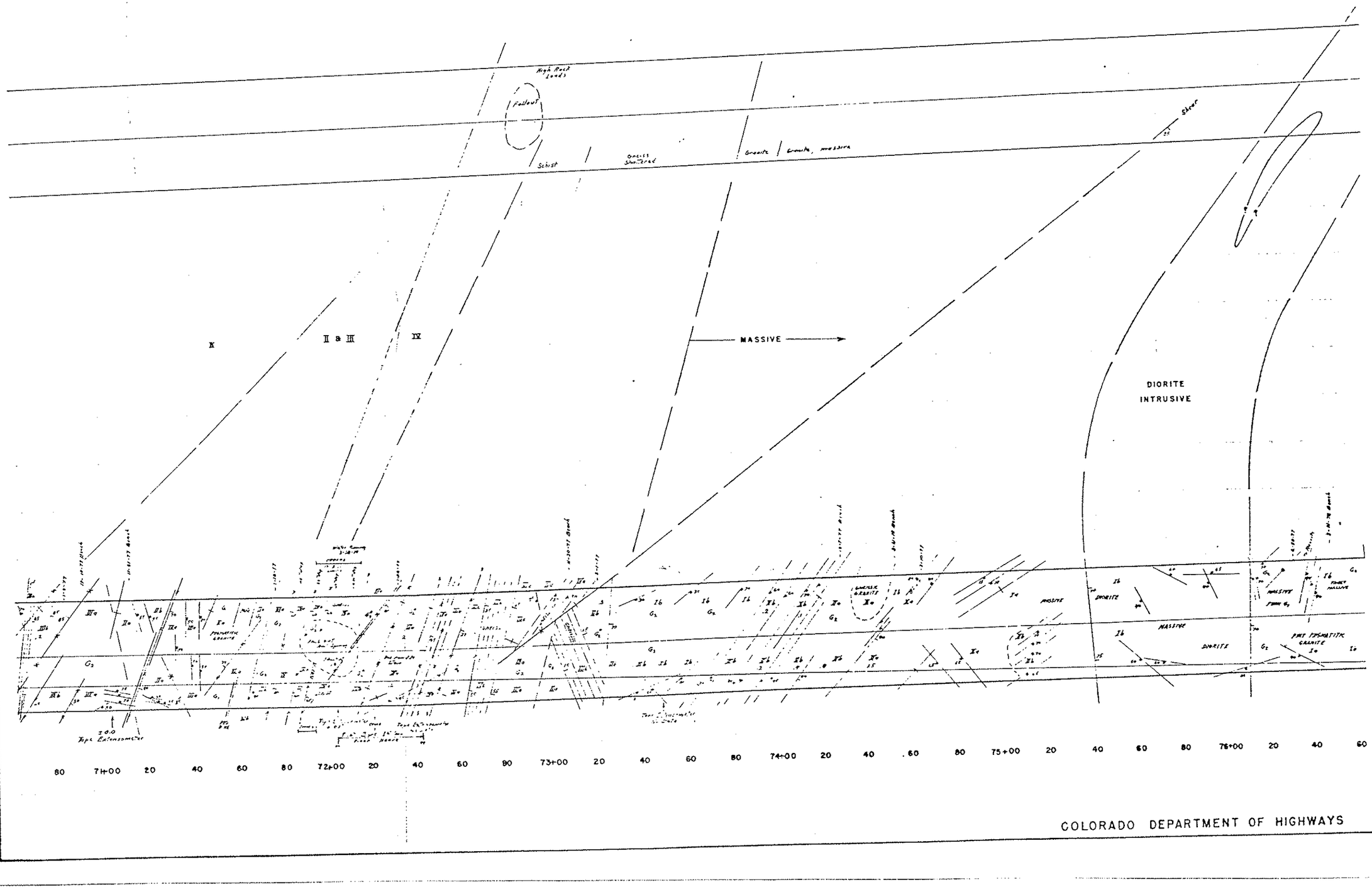
COLORADO DEPARTMENT OF HIGHWAYS

GEOLOGIC MAP

BY JOHN POST

FEDERAL ROAD PROJECT NO.	DIVISION	PROJECT NO.	NO.	SHEETS
	COLORADO	I 70-3(81)220	15Hx	273

STA. 70+62 to 76+62



COLORADO DEPARTMENT OF HIGHWAYS

	DIVISION	PROJECT NO.	R.F.	SHEETS
	COLORADO	I 70-3(81)220	15 I x	273

GEOLOGIC MAP

BY JOHN POST

STA. 76+62 to 82+62

DIORITE INTRUSIVE

GNEISS — GRANITE

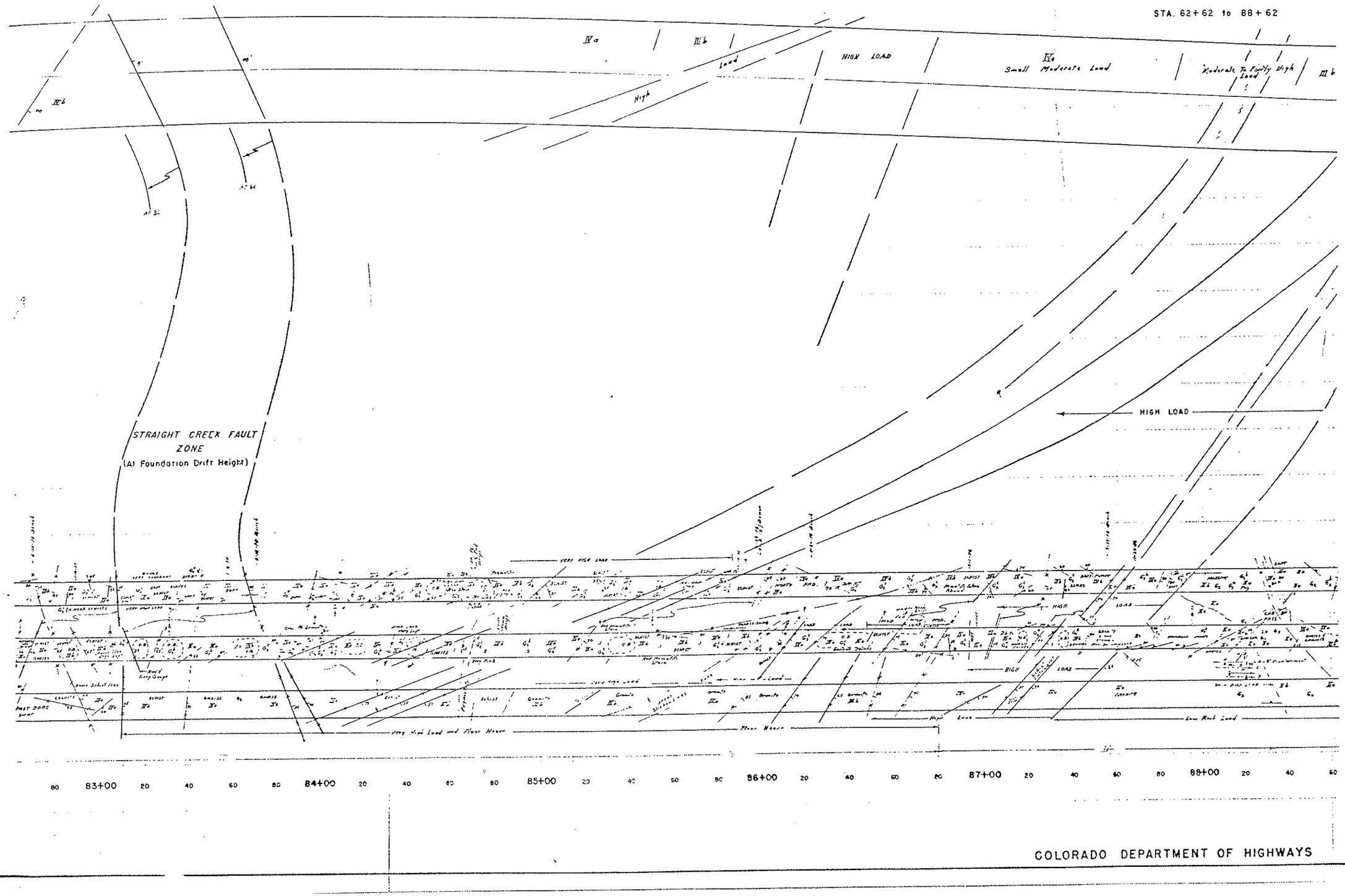
COLORADO DEPARTMENT OF HIGHWAYS

GEOLOGIC MAP

BY JOHN POST

FEDERAL AID PROJECT	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70 - 3(81)220	15Jx	273

STA. 62+62 to 88+62



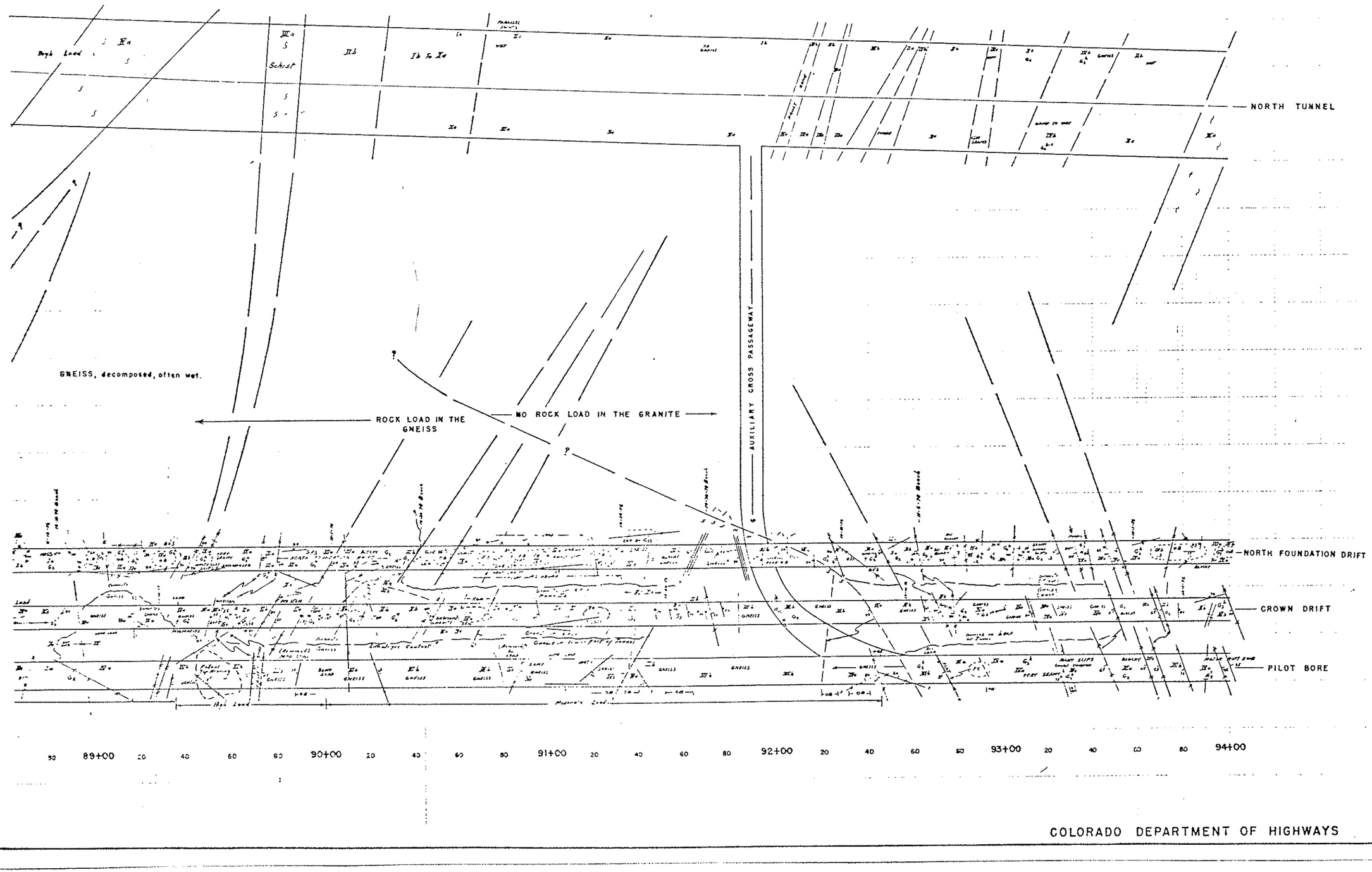
COLORADO DEPARTMENT OF HIGHWAYS

GEOLOGIC MAP

BY JOHN POST

FEDERAL AID PROJECT NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70-3(81)220	15K x	273

STA. 88+62 to 94+00



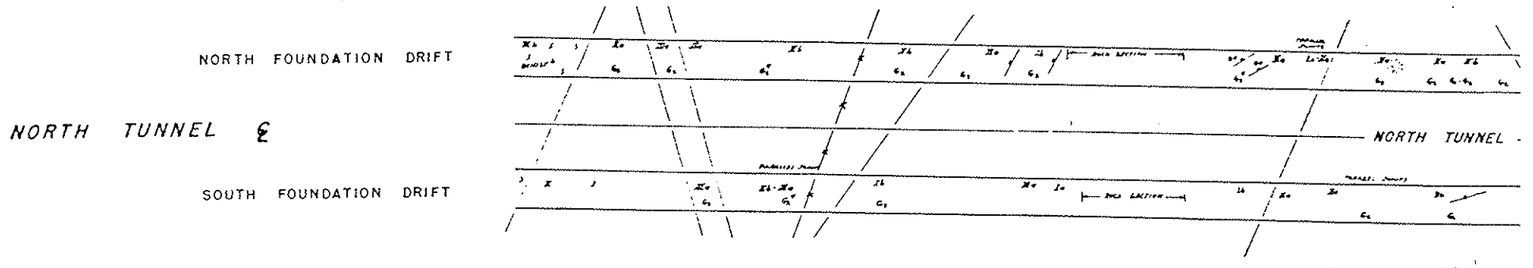
COLORADO DEPARTMENT OF HIGHWAYS

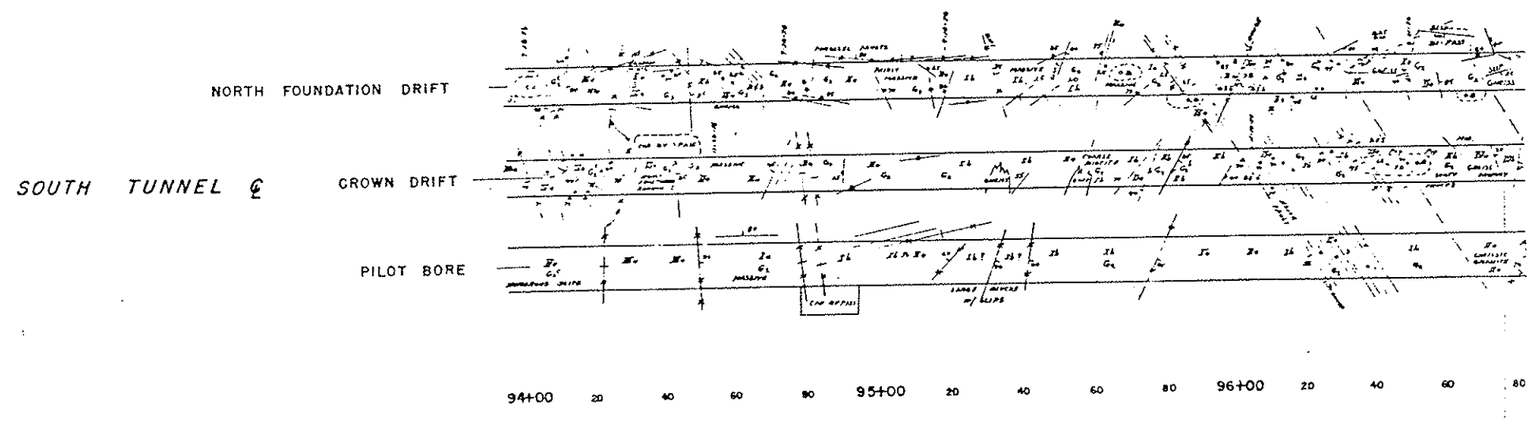
GEOLOGIC MAP

BY JOHN POST

FEDERAL AID NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70-3(81)220	15 L X	273

STA. 94+00 to 96+82.





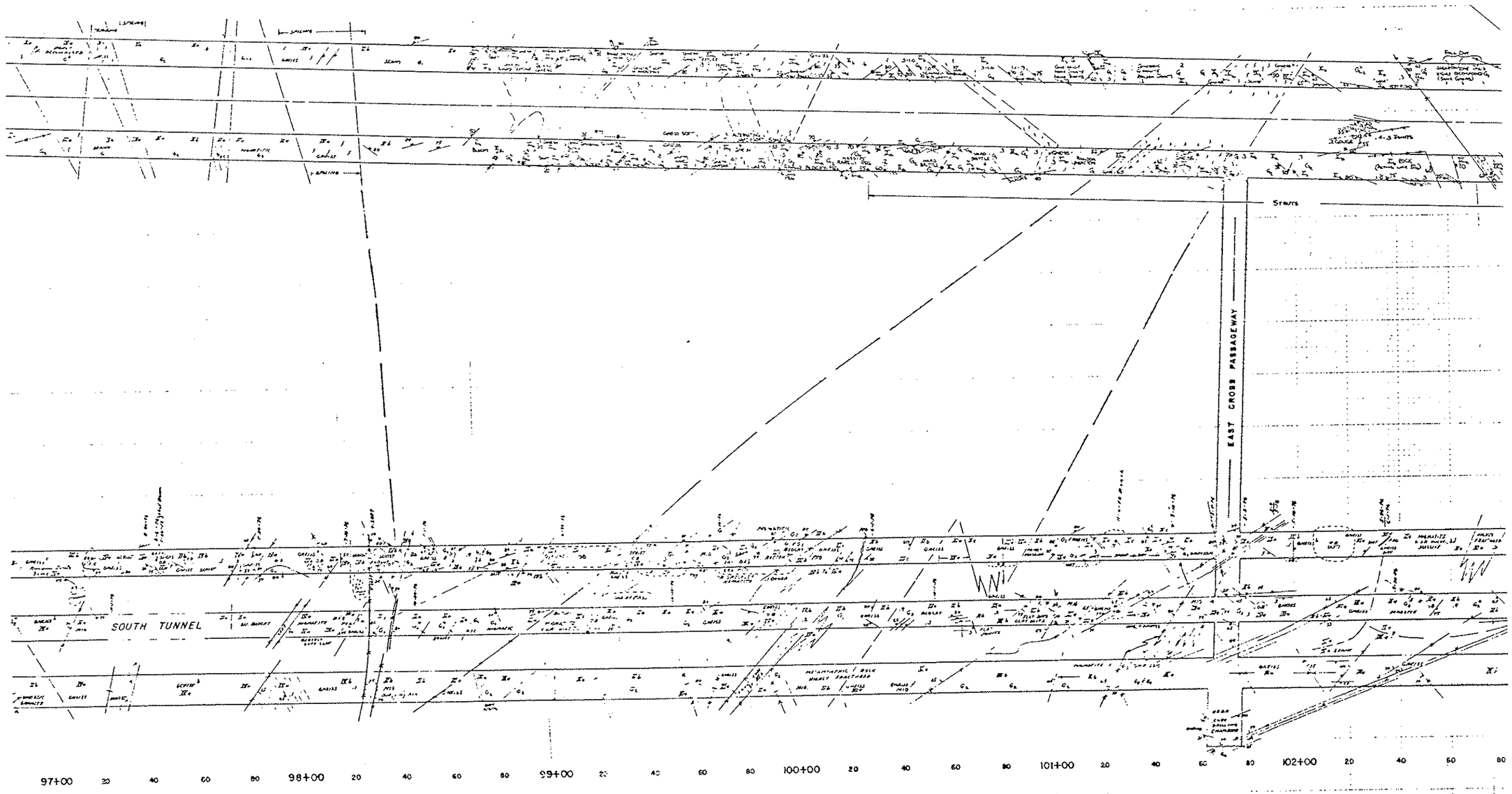
COLORADO DEPARTMENT OF HIGHWAYS

DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
COLORADO	I 70-3(81)220	15M X	273

GEOLOGIC MAP

BY JOHN POST

STA. 96+82 to 102+82



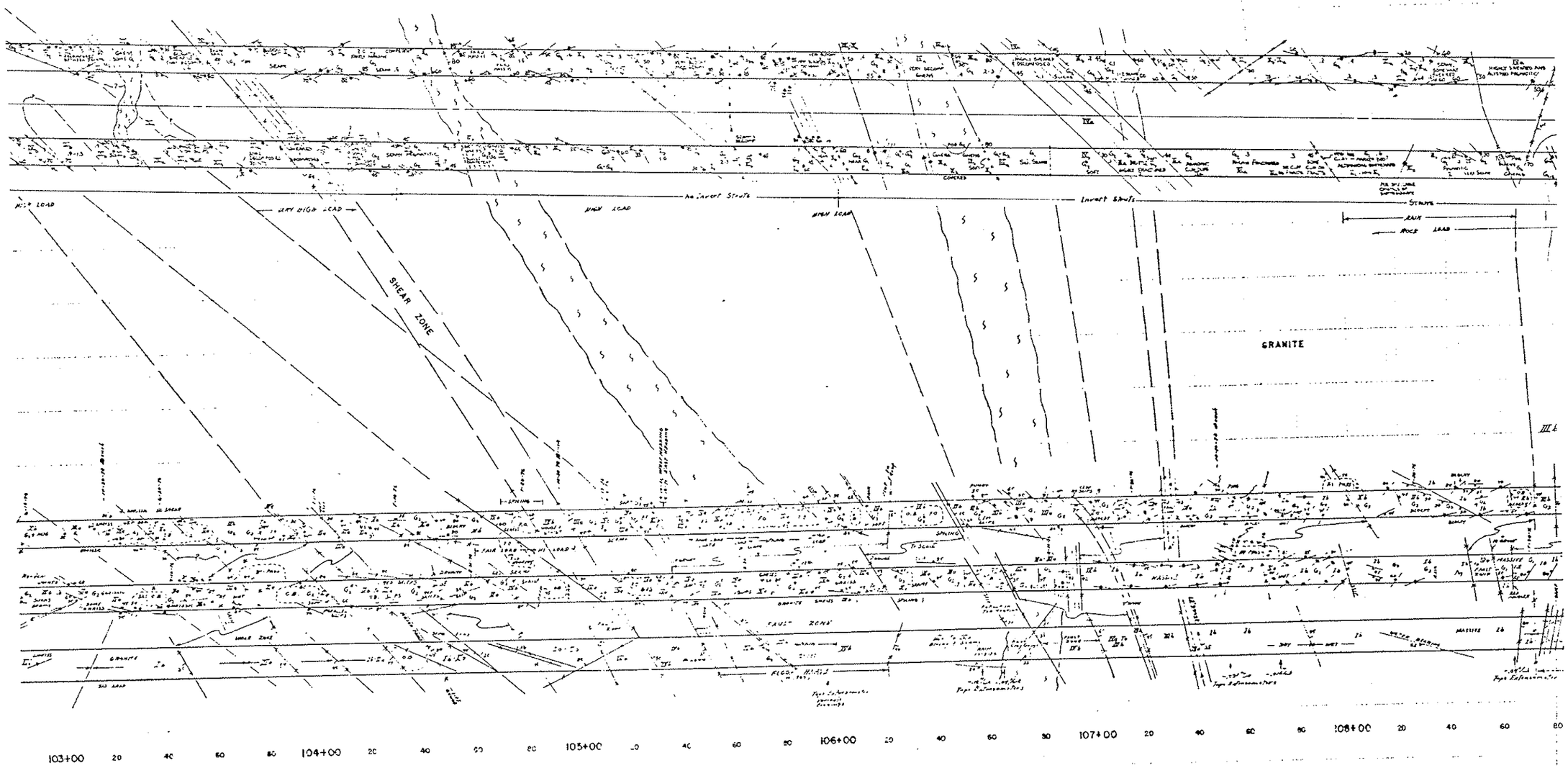
COLORADO DEPARTMENT OF HIGHWAYS

REGIONAL DIVISION	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70-3(81)220	15 N x	273

GEOLOGIC MAP

BY JOHN POST

STA. 102+82 to 108+82



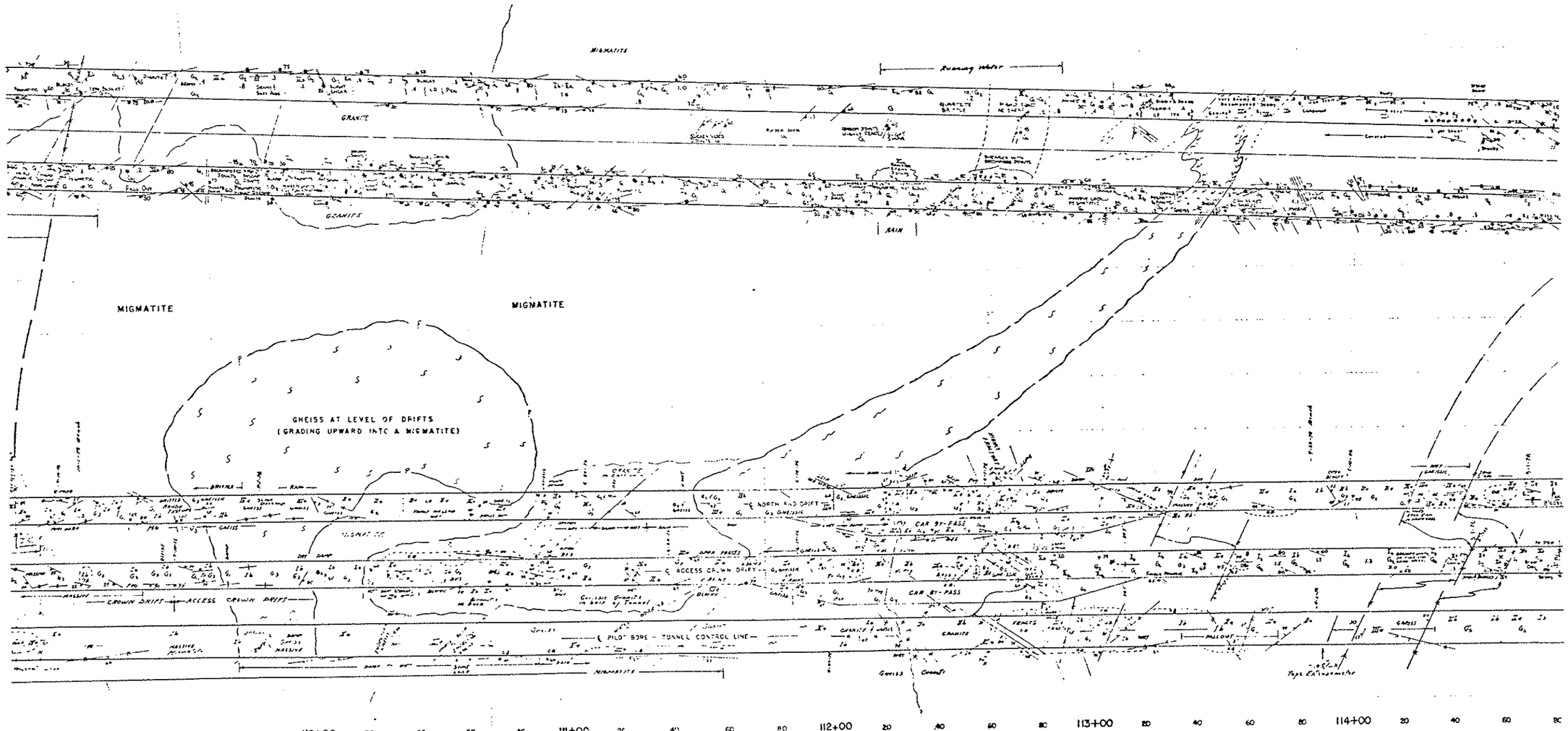
COLORADO DEPARTMENT OF HIGHWAYS

FEDERAL ROW REGION 8	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70-3(81)220	150X	273

GEOLOGIC MAP

BY JOHN POST

STA. 108+82 to 114+82



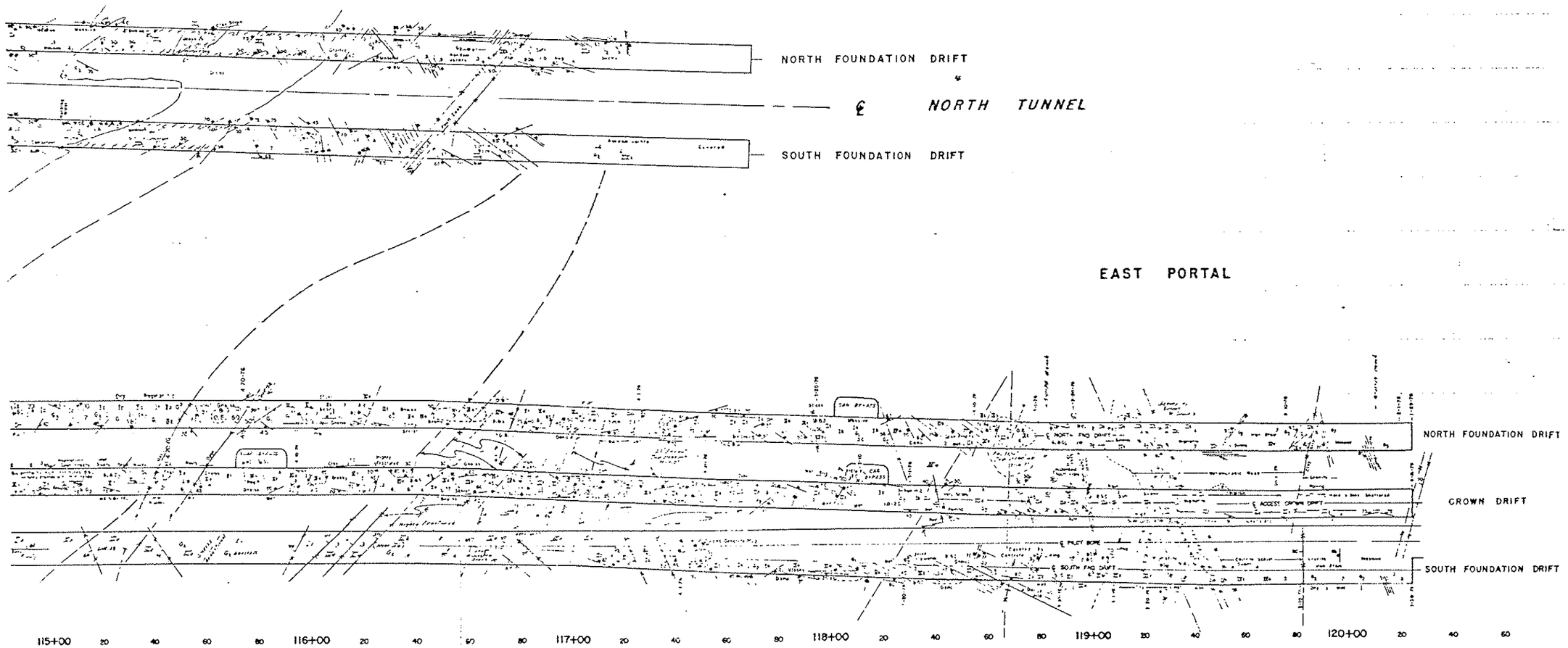
COLORADO DEPARTMENT OF HIGHWAYS

GEOLOGIC MAP

BY JOHN POST

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70-3(81)220	15 Px	273

STA. 114+82 to 120+28

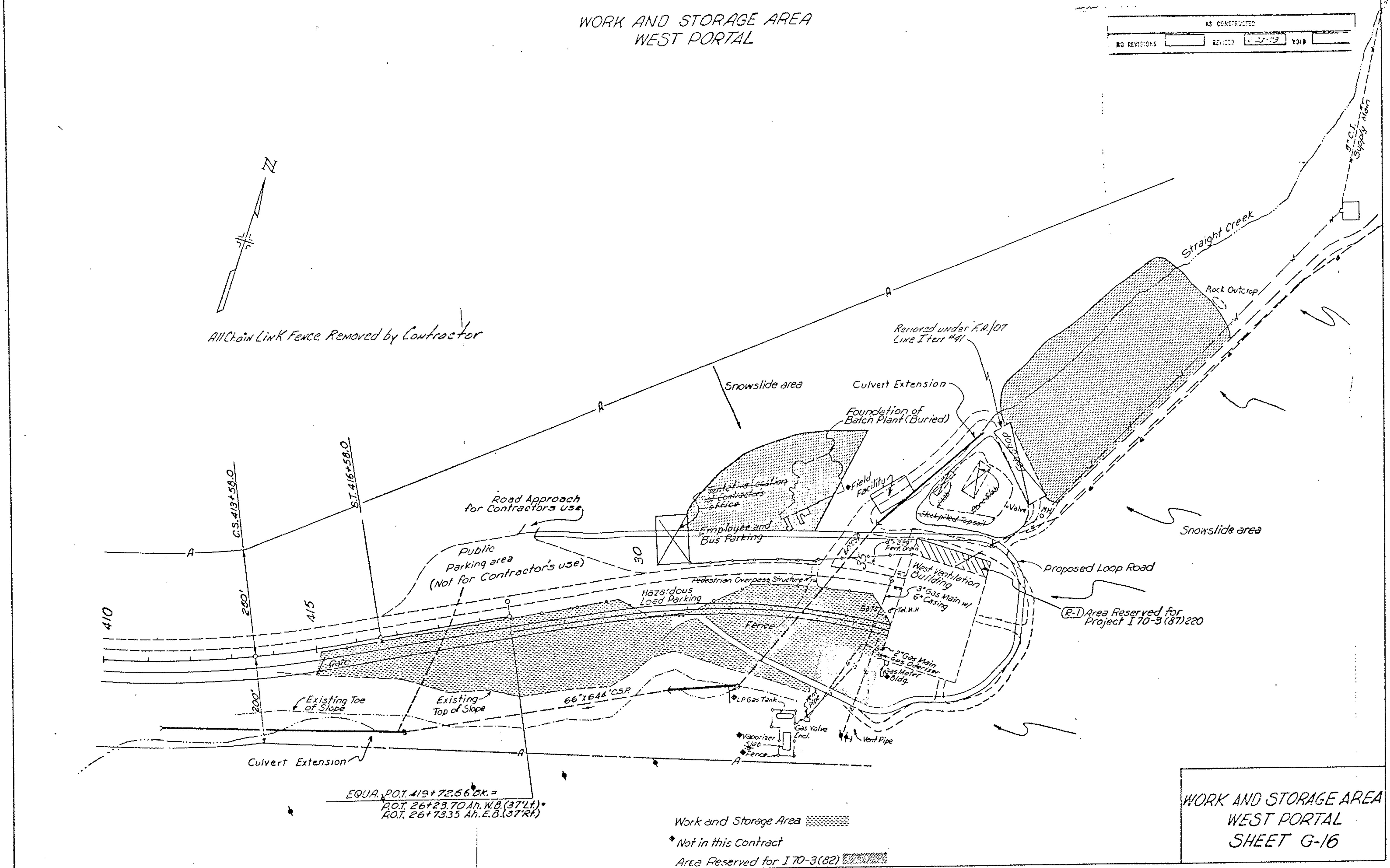


COLORADO DEPARTMENT OF HIGHWAYS

REGION NO	DIVISION	PROJ NO	NO	SHEETS
IX	COLORADO	I70-3(81)220	16	273

(R-1) Add Work Area 1-3-75

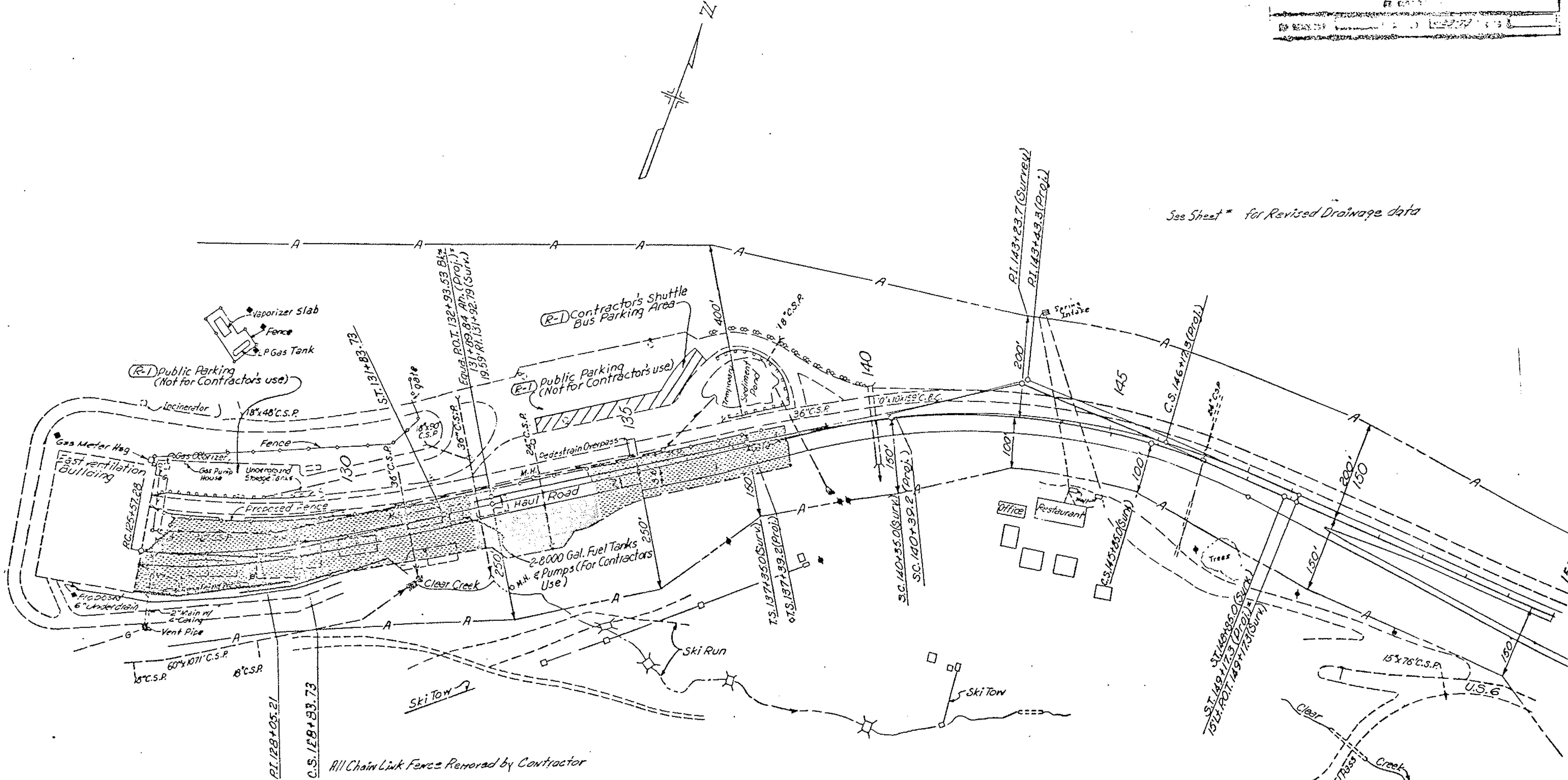
WORK AND STORAGE AREA WEST PORTAL



WORK AND STORAGE AREA WEST PORTAL SHEET G-16

WORK AND STORAGE AREAS EAST PORTAL

	COLORADO	I 70-3(81)220	17	273



Work and Storage area this Project

Area Reserved for I 70-3(82)

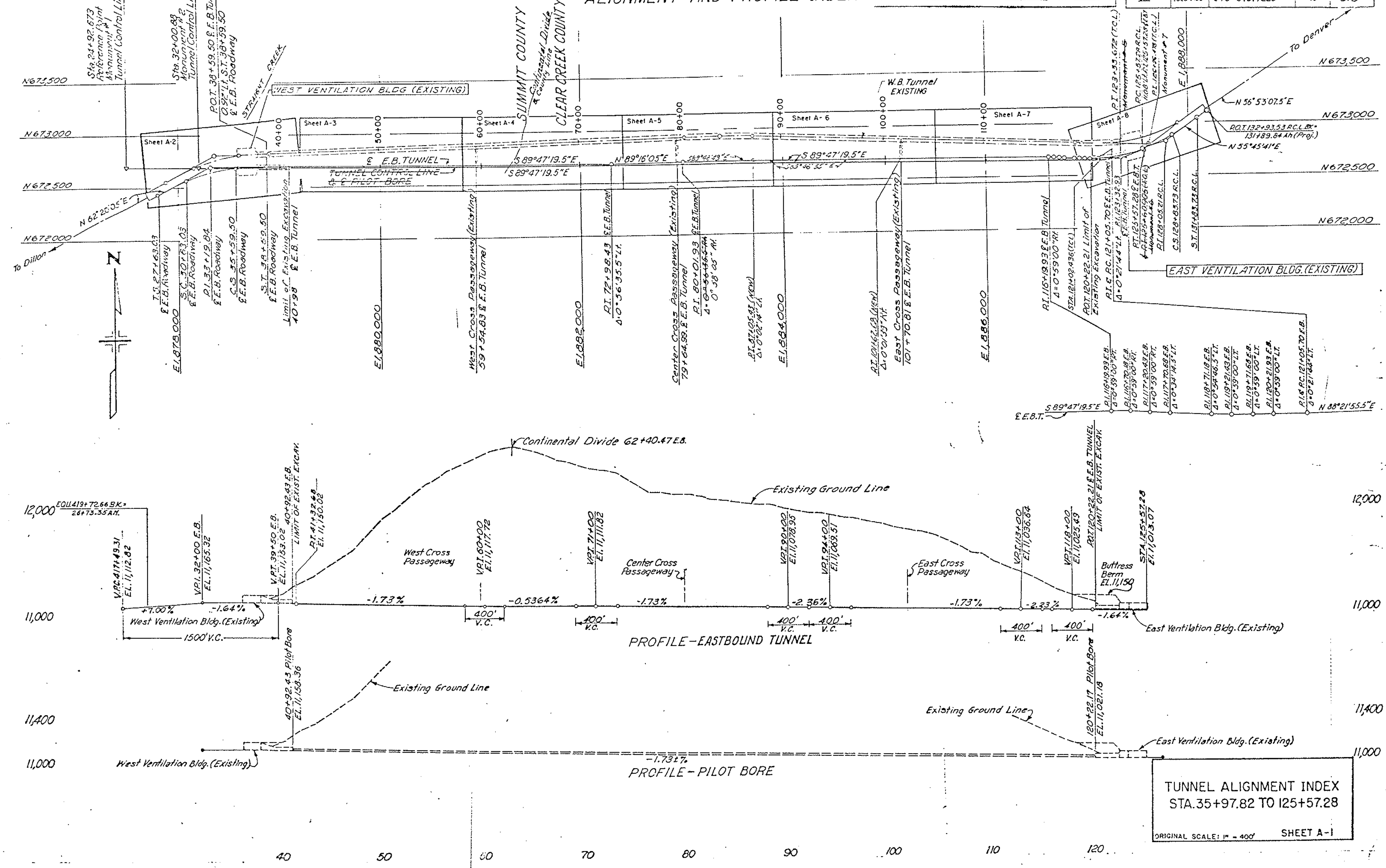
* Not in this Contract

**WORK AND STORAGE AREA
EAST PORTAL
SHEET G-17**

ALIGNMENT AND PROFILE INDEX

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	19	275

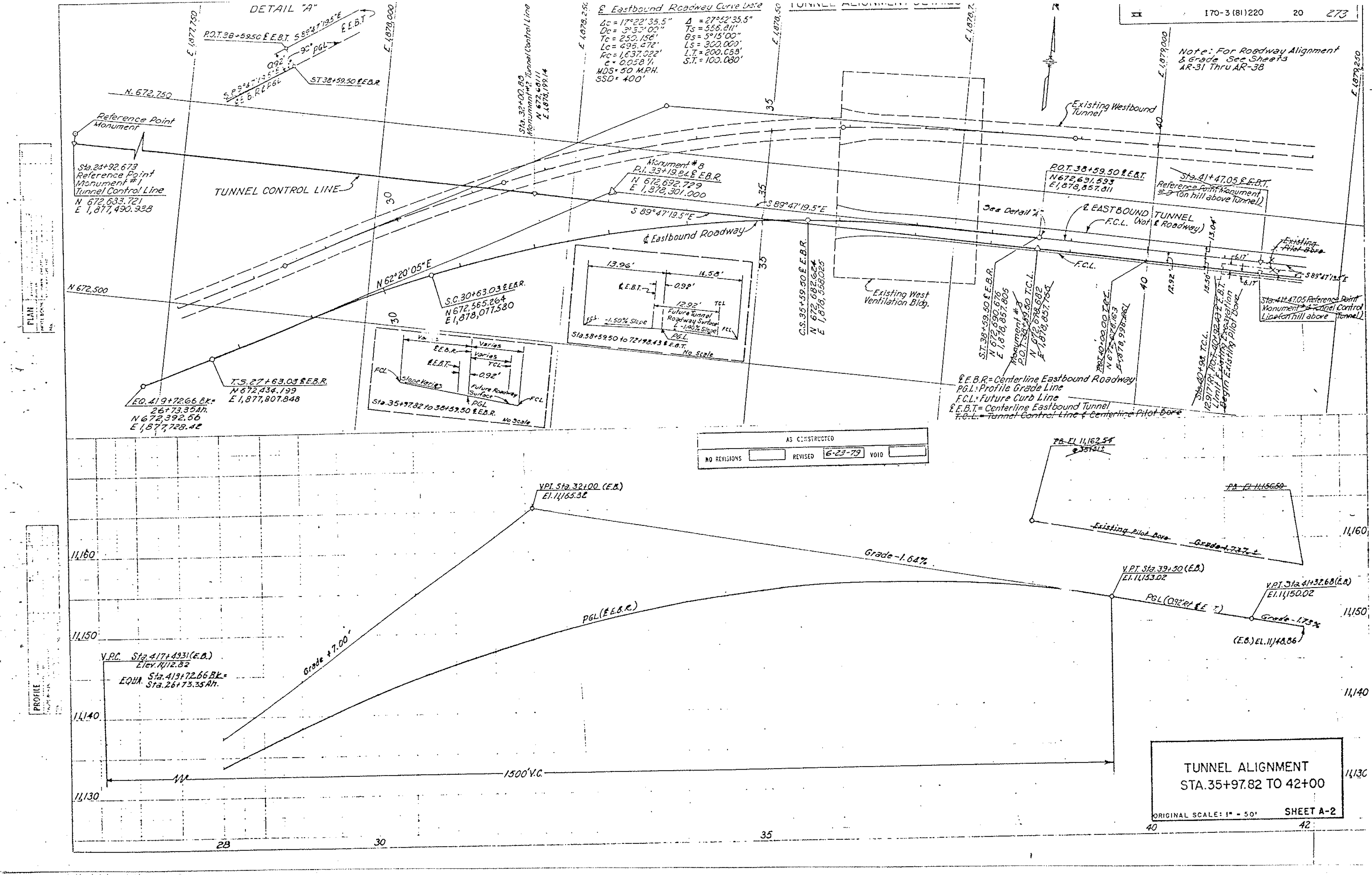
REVISED 6-23-79



TUNNEL ALIGNMENT INDEX
STA. 35+97.82 TO 125+57.28

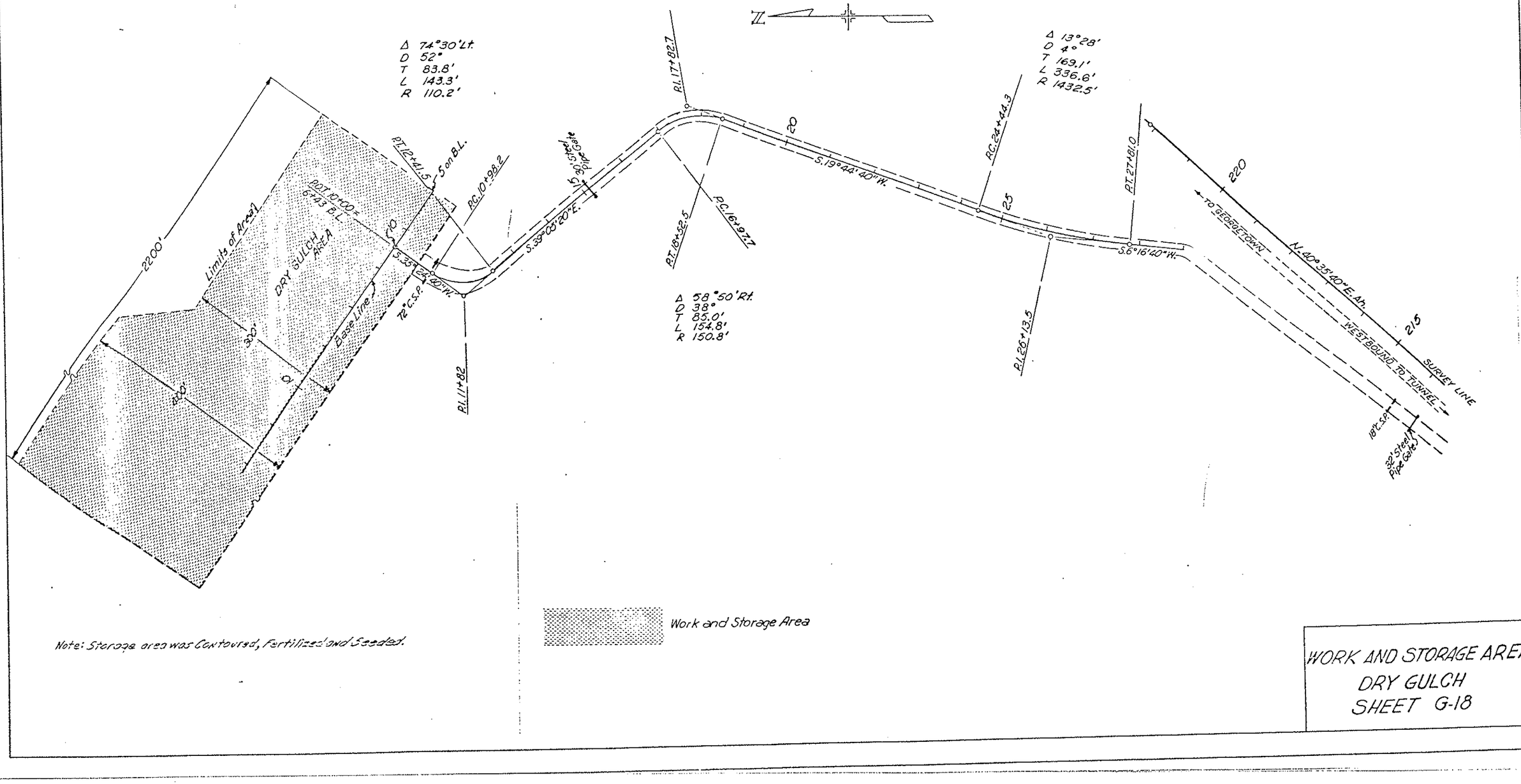
ORIGINAL SCALE: 1" = 400'

SHEET A-1


I70-3(81)220 20 273
DETAIL "A"
P.O.T. 38+59.50 ℄ E.B.T. S 89°47'19.5"E
℄ E.B.T.
PGL
0.92'
ST 38+59.50 ℄ E.B.R.
℄ Eastbound Roadway Curve Data
Δc = 17°22'35.5"
Dc = 3°30'00"
Tc = 250.156'
Lc = 496.472'
Rc = 1,637.022'
e = 0.058 '/,
MDS = 50 M.P.H.
SSD = 400'
Δ = 27°52'35.5"
Ts = 556.811'
θs = 5°15'00"
Ls = 300.000'
L.T. = 200.058'
S.T. = 100.080'
Note: For Roadway Alignment & Grade See Sheets AR-31 Thru AR-38
N 672,750
Reference Point Monument
Sta. 24+92.673 Reference Point Monument #1 Tunnel Control Line
N 672,633.721
E 1,877,490.938
TUNNEL CONTROL LINE
Sta. 33+00.89 Monument #2 Tunnel Control Line
Existing Westbound Tunnel
Monument #8 P.I. 33+19.84 ℄ E.B.R.
N 672,692.729
E 1,878,301.000
S 89°47'19.5"E
℄ Eastbound Roadway
P.O.T. 38+59.50 ℄ E.B.T.
N 672,691.593
E 1,878,857.811
Sta. 41+47.05 ℄ E.B.T. Reference Point Monument #3 (on hill above Tunnel)
See Detail "A"
℄ EASTBOUND TUNNEL
F.C.L. (Not ℄ Roadway)
Existing Pilot Bore
N 62°20'05"E
S.C. 30+63.03 ℄ E.B.R.
N 672,565.264
E 1,878,077.580
N 672,500
13.96'
14.58'
0.92'
12.92'
Future Tunnel Roadway Surface
-1.50% Slope
-1.40% Slope
P.G.L.
Sta. 38+59.50 to 72+98.43 ℄ E.B.T.
No Scale
C.S. 35+59.50 ℄ E.B.R.
N 672,682.624
E 1,878,558.025
Existing West Ventilation Bldg.
S.T. 38+59.50 ℄ E.B.R.
Monument #3 P.O.T. 38+59.50 T.C.L.
Sta. 41+47.05 Reference Point Monument #3 Tunnel Control Line (on hill above Tunnel)
Begin Existing Pilot Bore
Varies
Slope Varies
Future Roadway Surface
Sta. 35+97.82 to 38+59.50 ℄ E.B.R.
No Scale
T.S. 27+63.03 ℄ E.B.R.
N 672,434.199
E 1,877,807.848
EQ. 419+72.66 Bk = 26+73.35 Ah.
N 672,392.56
E 1,877,728.42
℄ E.B.R. = Centerline Eastbound Roadway
P.G.L. = Profile Grade Line
F.C.L. = Future Curb Line
℄ E.B.T. = Centerline Eastbound Tunnel
T.C.L. = Tunnel Control Line ℄ Centerline Pilot Bore
AS CONSTRUCTED
NO REVISIONS
REVISED 6-23-79
VOID
V.P.I. Sta. 32+00 (E.B.)
El. 11,165.32
Grade -1.64%
Existing Pilot Bore
V.P.T. Sta. 39+50 (E.B.)
El. 11,153.02
PGL (0.92' rt ℄ E.T.)
V.P.T. Sta. 41+32.68 (E.B.)
El. 11,150.02
Grade -1.73%
(E.B.) El. 11,148.86
Grade +7.00%
PGL (℄ E.B.R.)
V.P.C. Sta. 417+49.31 (E.B.)
Elev. 11,112.82
EQUA. Sta. 419+72.66 Bk = Sta. 26+73.35 Ah.
1500' V.C.
11,160
11,150
11,140
11,130
28
30
35
40
42
PLAN
PROFILE
TUNNEL ALIGNMENT
STA. 35+97.82 TO 42+00
ORIGINAL SCALE: 1" = 50'
SHEET A-2

XX | COLORADO | I 70-3(81)220 | 18 | 273
6-29-79

WORK AND STORAGE AREA
DRY GULCH



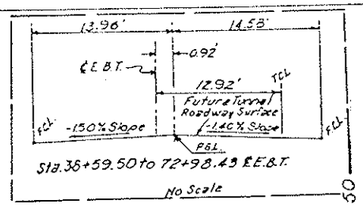
Work and Storage Area

Note: Storage area was Contoured, Fertilized and Seeded.

WORK AND STORAGE AREA
DRY GULCH
SHEET G-18

N 673,000

E 1,879,250 | E 1,879,500 | E 1,879,750 | E 1,880,000 | E 1,880,250 | E 1,880,500 | E 1,880,750



Sta. 36+59.50 to 72+98.43 ℄ E.B.T.

No Scale

N

Existing Westbound Tunnel

Sta. 45+00.00 ℄ E.B.T.
N 672,689.251
E 1,879,498.306

Sta. 55+00.00 ℄ E.B.T.
N 672,685.544
E 1,880,498.300

N 672,750

S 89°47'19.5" E (℄ E.B.T.)

℄ EASTBOUND TUNNEL (NOT ℄ ROADWAY)

F.C.L.

13.04'

~~S 89°47'19.5" E (T.C.L.)~~

~~Existing Pilot Bore~~

F.C.L.

6.17' 6.17' 12.92' 15.50'

~~Sta. 45+00.00 T.C.L.~~
~~N 672,676.320~~
~~E 1,879,498.257~~

~~TUNNEL CONTROL LINE ℄ PILOT BORE~~

Sta. 55+00.00 T.C.L.
N 672,672.633
E 1,880,498.251

P.G.L. ~ Profile Grade Line
F.C.L. ~ Future Curb Line
℄ E.B.T. ~ Centerline Eastbound Tunnel
~~T.C.L. ~ Tunnel Control Line ℄ Pilot Bore~~

~~PB. El. 11,166.50~~

El. 11,140.86 (E.B.)

~~Existing Pilot Bore~~ Grade -1.73%

P.G.L. (E.B. Tunnel) Grade -1.73%

~~PB. El. 11,129.02~~

VPC El. 11,121.18 (E.B.)

11,150 | 11,140 | 11,130 | 11,120

42 | 45 | 50 | 55 | 58

TUNNEL ALIGNMENT
STA. 42+00 TO 58+00

ORIGINAL SCALE: 1" = 50' SHEET A-3

TUNNEL ALIGNMENT DETAILS

N 673,000

N 672,750

E 1,881,000 | E 1,881,250 | E 1,881,500 | E 1,881,750 | E 1,882,000 | E 1,882,250

60 | 65 | 70

16-29-79

Existing Westbound Tunnel

Existing West Cross Passageway

N 01°22'41.5" W

SUMMIT COUNTY / CLEAR CREEK COUNTY

N 25°08'30" E

P.O.T. 59+54.83 ℄ E.B.T.
N 672,623.867
E 1,880,953.130

P.O.T. 62+40.47 ℄ E.B.T.
N 672,682.814
E 1,881,238.766

℄ EASTBOUND TUNNEL (Not ℄ Roadway)

S 89°47'19.5" E

F.C.L.

N 89°16'05" E

P.I. 72+98.43 ℄ E.B.T.
Δ 0°36'35.5" Lt.
N 672,674.913
E 1,882,296.717

13.04'

6.17' | 6.17' | 12.92' | 15.50'

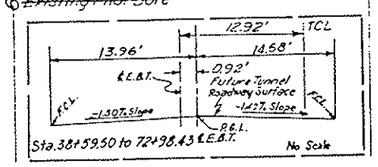
~~Existing Pilot Bore~~

~~S 89°47'19.5" E~~

~~TUNNEL CONTROL LINE & ℄ PILOT BORE~~

~~Sta. 70+00.00 T.C.L.~~
~~N 672,667.102~~
~~E 1,881,998.240~~

~~P.O.T. 49+55.220 T.C.L.~~
~~N 672,[illegible].955~~
~~E 1,880,953.441~~



P.G.L.=Profile Grade Line.
F.C.L.= Future Curb Line.
~~T.C.L.= Tunnel Control Line & ℄ P.B.~~
℄ E.B.T. = Centerline Eastbound Tunnel.

~~P.B. El. 11,123.82~~

11,120

Grade -1.73%

400' V.C.

V.P.C. El. 11,121.18 (E.B.)

V.P.I. El. 11,117.72 (E.B.)

P.G.L. (E.B. Tunnel) Grade -0.5364%

V.P.T. El. 11,116.65 (E.B.)

~~Existing Pilot Bore~~

Grade -1.73%

V.P.C. El. 11,112.89 (E.B.)

V.P.I. El. 11,111.82 (E.B.)

El. 11,106.63 (E.B.)

V.P.T. El. 11,108.36 (E.B.)

Grade -1.73%

400' V.C.

~~P.B. El. 11,101.14~~

11,120 | 11,110 | 11,100 | 11,090

58 | 60 | 65 | 70 | 74

TUNNEL ALIGNMENT
STA. 58+00 TO 74+00

ORIGINAL SCALE: 1" = 50'

SHEET A-4

N 673,000

E 1,882,500 E 1,882,750 E 1,883,000 E 1,883,250 E 1,883,500 E 1,883,750

75 80 85

Existing Westbound Tunnel

13.96' 14.58' T.C.L. ℄ E.B.T. 0.92' Future Tunnel Roadway Surface -1.40% Slope F.C.L. -1.50% Slope PGL F.C.L. * Varies

Sta. 72+98.43 to 80+01.93 No Scale

Existing Center Cross Passageway

N 672,750

Sta. 75+00.00 ℄ E.B.T.
N 672,681.488
E 1,882,498.271

N89°16'05"E

F.C.L.

P.O.T. 79+64.99 ℄ E.B.T.
N 672,687.428
E 1,882,963.223

N 01°29'50.5" W

P.I. 80+01.93 ℄ E.B.T.
Δ = 0°36'36.6" Rt.
N 673,687.900
E 1,883,000.160

℄ EASTBOUND TUNNEL (Not ℄ Roadway)

S 89°41'19.5" E
S 23°48'29" E

Sta. 85+00.00 ℄ E.B.T.
N 672,686.064
E 1,883,498.227

P.T. 81+06.43 ℄ E.B.T.
Δ = 0°02'14" Lt.

13.96' 14.58' 21.50' T.C.L. 0.92' ℄ E.B.T. Future Tunnel Roadway Surface -1.40% Slope -1.30% Slope F.C.L. PGL

Sta. 80+01.93 to 116+19.93 ℄ E.B.T. No Scale

N

13.04'

6.17' 6.17' 24.50' 13.50'

Sta. 75+00.00 T.C.L.
N 672,681.259
E 1,882,498.237

P.O.T. 79+65.578 T.C.L.
N 672,693.542
E 1,882,963.806

Existing Pilot Bore

S 89°41'19.5" E

TUNNEL CONTROL LINE ℄ ℄ PILOT BORE

Sta. 85+00.00 T.C.L.
N 672,681.572
E 1,883,498.230

P.G.L. = Profile Grade Line.
F.C.L. = Future Curb Line.
T.C.L. = Tunnel Control Line & ℄ Pilot Bore
℄ E.B.T. = Centerline Eastbound Tunnel.

EL. 11,106.63(E.B.)

P.B. EL. 11,101.16

P.G.L. (E.B. Tunnel) Grade -1.73%

Existing Pilot Bore Grade -1.73%

V.P.C. EL. 11,082.41(E.B.)

P.B. EL. 11,075.19

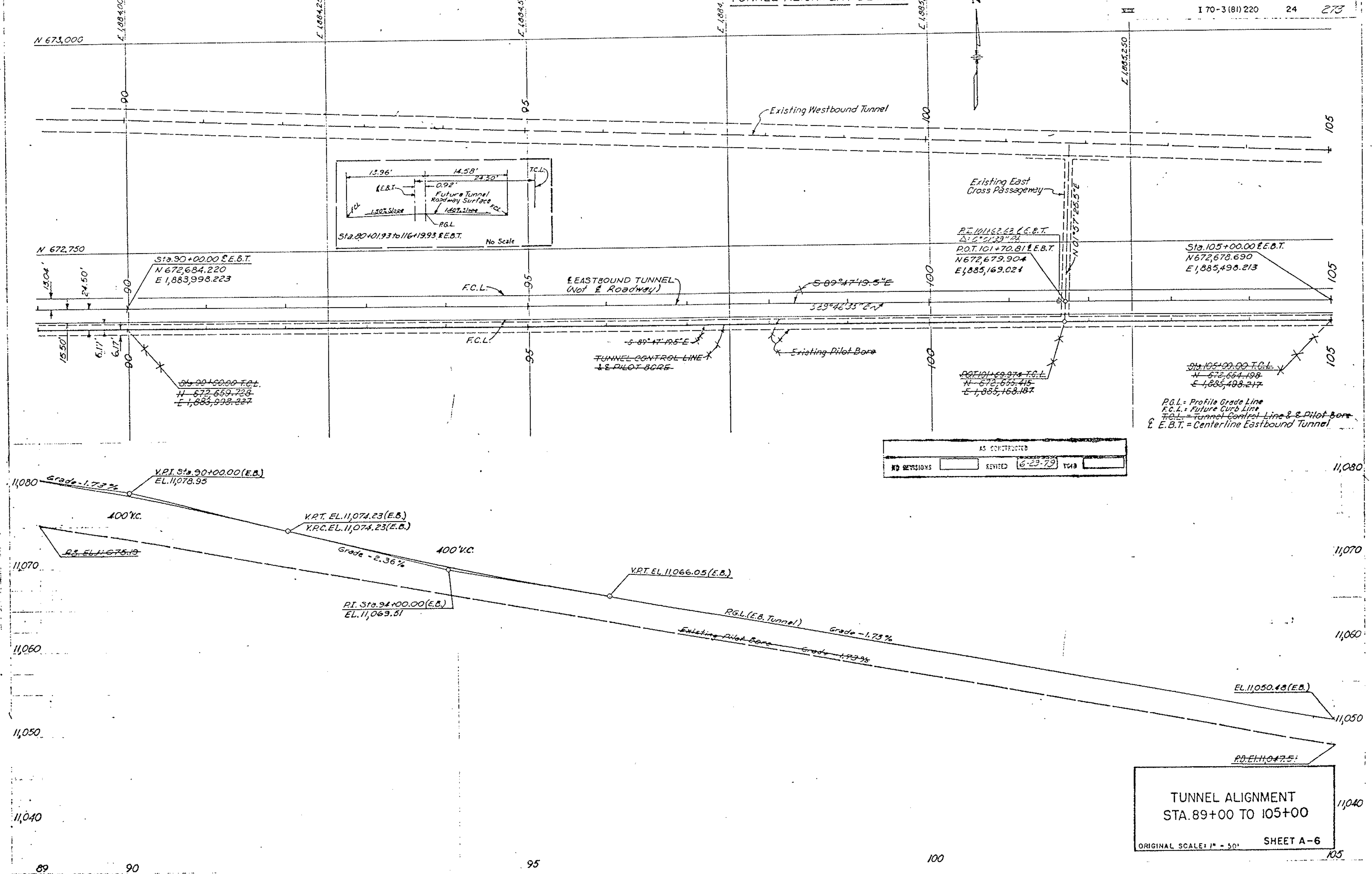
11,100 11,090 11,080 11,070

74 75 80 85 89

TUNNEL ALIGNMENT
STA. 74+00 TO 89+00

ORIGINAL SCALE: 1" = 50' SHEET A-5

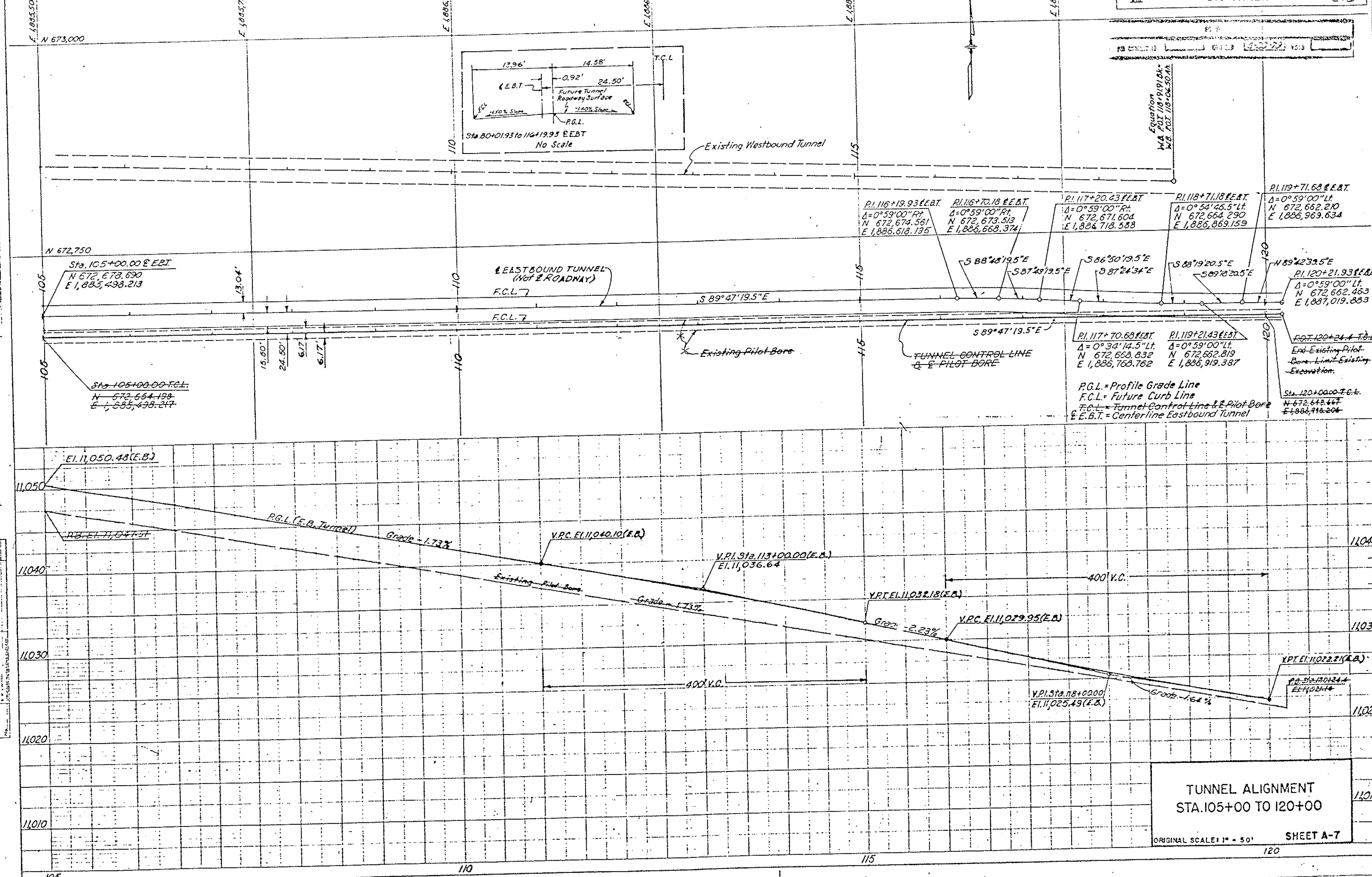
TUNNEL ALIGNMENT DETAILS

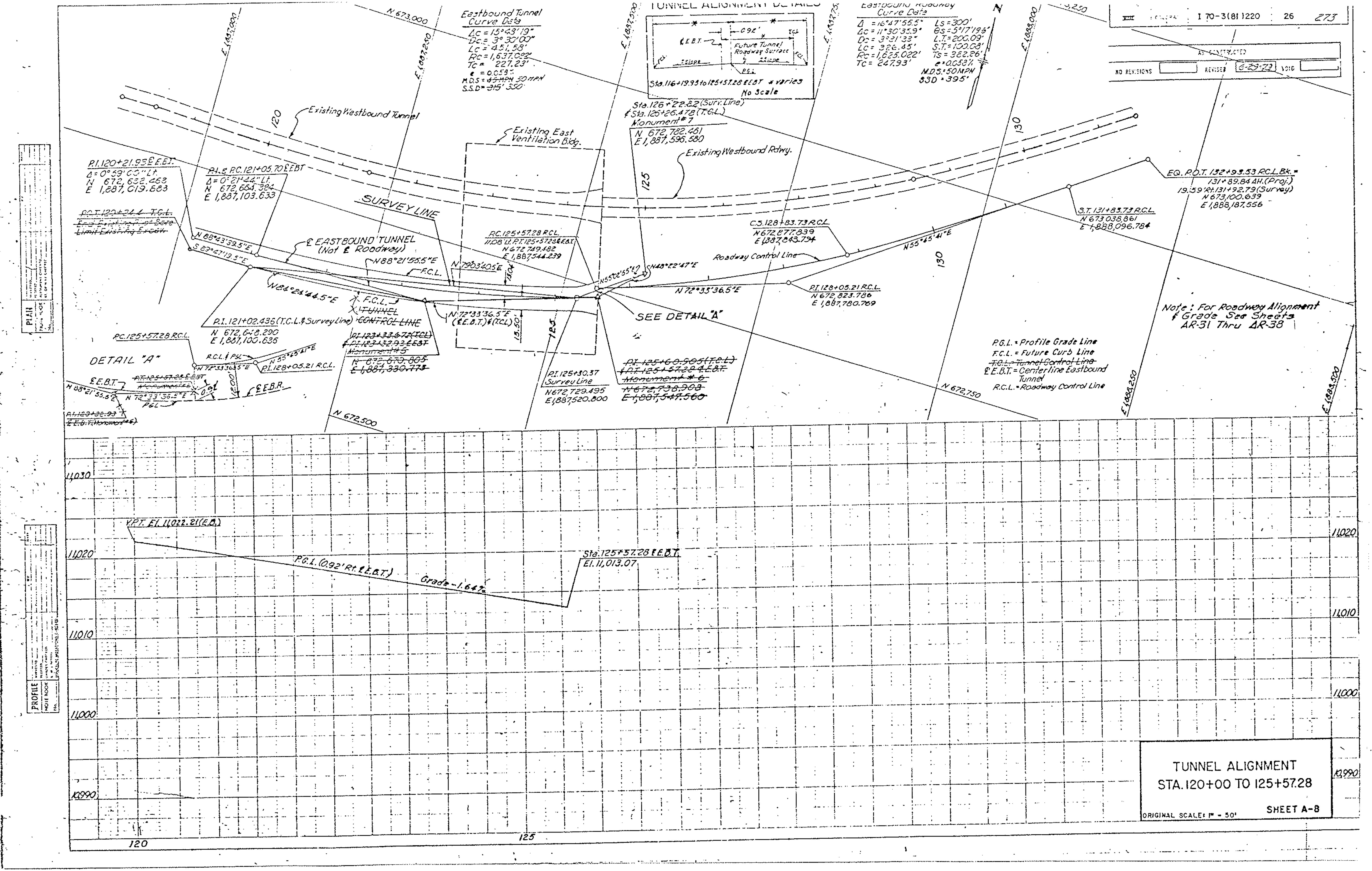


TUNNEL ALIGNMENT
STA. 89+00 TO 105+00

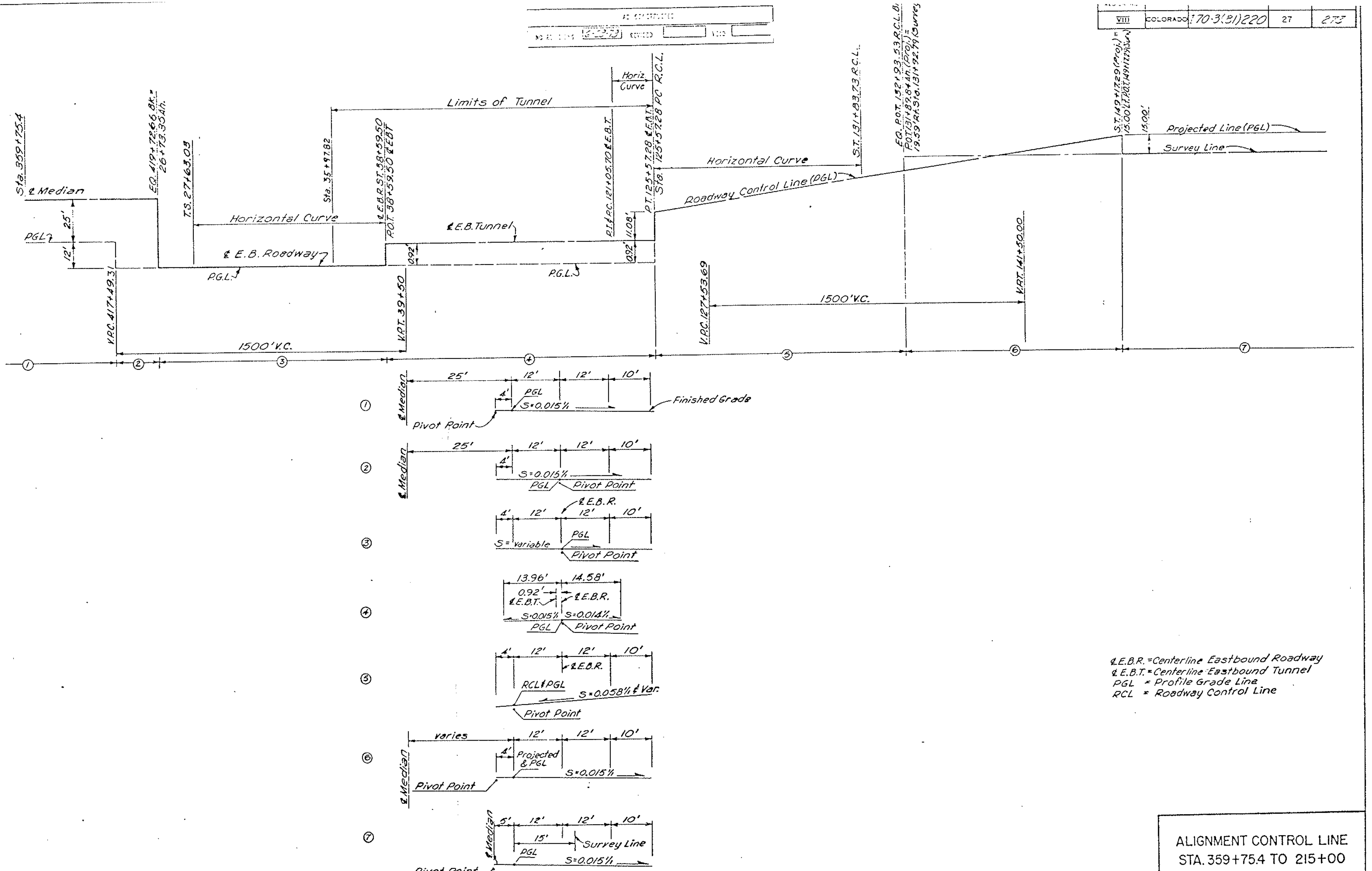
ORIGINAL SCALE: 1" = 50'

SHEET A-6


E 1,885,500
E 1,885,750
E 1,886,000
N 673,000
N 672,750
13.96'
14.58'
T.C.L
℄ E.B.T.
0.92'
24.50'
Future Tunnel Roadway Surface
P.G.L.
Sta.80+01.93 to 116+19.93 ℄ EBT
No Scale
Existing Westbound Tunnel
Equation
W.B. P.O.T. 118+91.91 Bk.=
W.B. P.O.T. 118+06.50 Ah.
P.I. 116+19.93 ℄ E.B.T.
Δ=0°59'00" Rt.
N 672,674.561
E 1,886,618.135
P.I. 116+70.18 ℄ E.B.T.
Δ=0°59'00" Rt.
N 672,673.513
E 1,886,668.374
P.I. 117+20.43 ℄ E.B.T.
Δ=0°59'00" Rt.
N 672,671.604
E 1,886,718.588
P.I. 118+71.18 ℄ E.B.T.
Δ=0°54'46.5" Lt.
N 672,664.290
E 1,886,869.159
P.I. 119+71.68 ℄ E.B.T.
Δ=0°59'00" Lt.
N 672,662.210
E 1,886,969.634
Sta. 105+00.00 ℄ E.B.T.
N 672,678.690
E 1,885,498.213
℄ EASTBOUND TUNNEL (Not ℄ ROADWAY)
F.C.L.
S 89°47'19.5"E
S 88°48'19.5"E
S 87°49'19.5"E
S 86°50'19.5"E
S 87°24'34"E
S 88°19'20.5"E
S 89°18'20.5"E
N 89°42'39.5"E
P.I. 120+21.93 ℄ E.B.T.
Δ=0°59'00" Lt.
N 672,662.463
E 1,887,019.883
13.04'
15.80'
24.50'
6.17
6.17'
Existing Pilot Bore
TUNNEL CONTROL LINE & ℄ PILOT BORE
S 89°47'19.5"E
P.I. 117+70.68 ℄ E.B.T.
Δ=0°34'14.5" Lt.
N 672,668.832
E 1,886,768.762
P.I. 119+21.43 ℄ E.B.T.
Δ=0°59'00" Lt.
N 672,662.819
E 1,886,919.387
P.O.T. 120+24.4 T.C.L.
End Existing Pilot Bore. Limit Existing Excavation.
Sta. 105+00.00 T.C.L.
N 672,654.198
E 1,885,498.217
Sta. 120+00.00 T.C.L.
N 672,643.667
E 1,886,998.206
P.G.L. = Profile Grade Line
F.C.L. = Future Curb Line
T.C.L. = Tunnel Control Line & ℄ Pilot Bore
℄ E.B.T. = Centerline Eastbound Tunnel
105
110
115
120
El. 11,050.48 (E.B.)
11,050
11,040
11,030
11,020
11,010
P.G.L. (E.B. Tunnel)
Grade -1.73%
V.P.C. El. 11,040.10 (E.B.)
V.P.I. Sta. 113+00.00 (E.B.)
El. 11,036.64
Existing Pilot Bore
Grade -1.73%
400' V.C.
V.P.T. El. 11,032.18 (E.B.)
Grade -2.23%
V.P.C. El. 11,029.95 (E.B.)
V.P.I. Sta. 118+00.00
El. 11,025.49 (E.B.)
Grade -1.64%
V.P.T. El. 11,022.21 (E.B.)
400' V.C.
TUNNEL ALIGNMENT
STA. 105+00 TO 120+00
ORIGINAL SCALE: 1" = 50'
SHEET A-7
PLAN
PROFILE



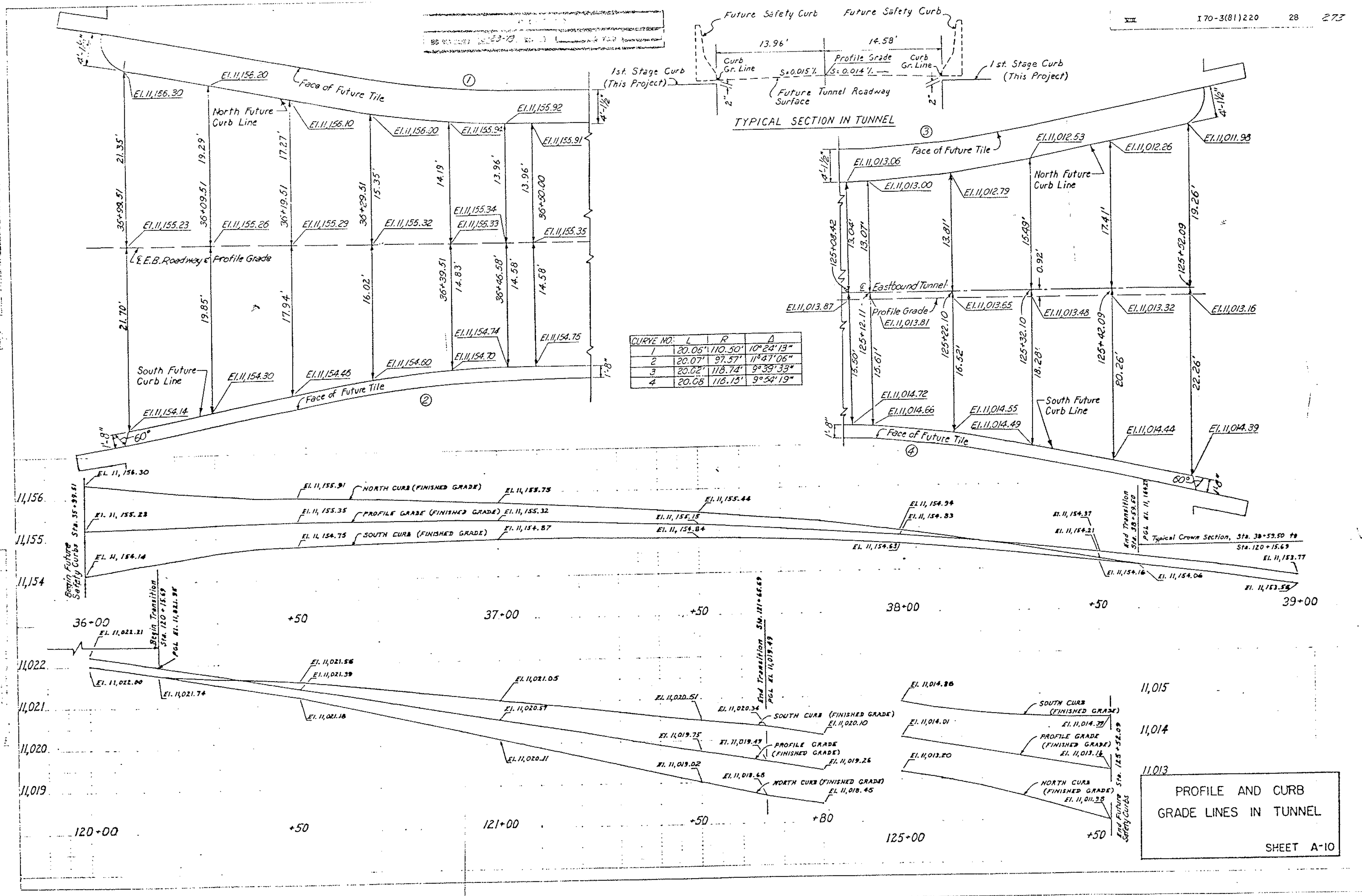
I 70-3(81)220 26 273
TUNNEL ALIGNMENT DETAILS
Sta.116+19.93 to 125+57.28 ℄E.B.T. * varies
No Scale
Future Tunnel Roadway Surface
Eastbound Tunnel Curve Data
Δc = 15°43'19"
Dc = 3°30'00"
Lc = 451.58'
Rc = 1,637.022'
Tc = 227.23'
e = 0.058%
M.D.S. = 50 MPH
S.S.D. = 350'
Eastbound Roadway Curve Data
Δ = 16°47'55.5"
Δc = 11°30'35.9"
Dc = 3°31'33"
Lc = 326.45'
Rc = 1,625.022'
Tc = 247.93'
Ls = 300'
θs = 5°17'19.5"
L.T. = 200.09'
S.T. = 100.08'
Ts = 362.26'
e = 0.058%
M.D.S. = 50 MPH
S.S.D. = 395'
N 673,000
N 672,750
N 672,500
Existing Westbound Tunnel
Existing East Ventilation Bldg.
Existing Westbound Rdwy.
SURVEY LINE
℄ EASTBOUND TUNNEL (Not ℄ Roadway)
Roadway Control Line
SEE DETAIL "A"
DETAIL "A"
P.I. 120+21.93 ℄E.B.T.
P.I. & P.C. 121+05.70 ℄EBT
P.I. 121+02.436 (T.C.L. & Survey Line)
N 672,648.290
E 1,887,100.636
P.C. 125+57.28 R.C.L.
P.I. 125+30.37 Survey Line
N 672,729.495
E 1,887,520.800
Sta. 126+22.82 (Surv. Line)
℄ Sta. 125+26.478 (T.C.L.)
Monument #7
N 672,782.461
E 1,887,596.580
C.S. 128+83.73 R.C.L.
N 672,877.839
E 1,887,843.794
P.I. 128+05.21 R.C.L.
N 672,823.786
E 1,887,780.769
S.T. 131+83.73 R.C.L.
N 673,038.861
E 1,888,096.784
EQ. P.O.T. 132+93.53 R.C.L. Bk. = 131+89.84 Ah. (Proj.)
19.59' Rt. 131+92.79 (Survey)
N 673,100.639
E 1,888,187.556
N 72°33'36.5"E
N 55°45'41"E
Note: For Roadway Alignment & Grade See Sheets AR-31 Thru AR-38
P.G.L. = Profile Grade Line
F.C.L. = Future Curb Line
T.C.L. = Tunnel Control Line
℄ E.B.T. = Centerline Eastbound Tunnel
R.C.L. = Roadway Control Line
V.P.T. El. 11,022.21 (E.B.)
P.G.L. (0.92' Rt. ℄E.B.T.)
Grade = -1.647%
Sta. 125+57.28 ℄E.B.T.
El. 11,013.07
11,030
11,020
11,010
11,000
10,990
120
125
PLAN
PROFILE
TUNNEL ALIGNMENT
STA. 120+00 TO 125+57.28
ORIGINAL SCALE: 1" = 50'
SHEET A-8



ALIGNMENT CONTROL LINE
STA. 359+75.4 TO 215+00

NO SCALE

SHEET A-9



CURVE NO.	L	R	Δ
1	20.05'	110.50'	10°24'13"
2	20.07'	97.57'	11°47'06"
3	20.02'	118.74'	9°39'33"
4	20.08'	116.15'	9°54'19"

PROFILE AND CURB GRADE LINES IN TUNNEL

SHEET A-10

Region No.	State	Project	Sheet No.	Total Sheets
VII	COLORADO	I70-4(81)220	29	2??

	Revisions		
R-1	6-17-75	Add Note #22	BRL
R-2	7-3-75	Add Note #23 & #24	BRL

As Constructed — 6-23-79

General Notes:

1. All work shall be done according to the project specifications.
2. Full face excavation of the main tunnel is prohibited.
3. All segment construction joints and steel support sets shall be placed perpendicular to the profile grade.
4. All structural steel not otherwise noted shall meet A.A.S.H.T.O. M-183 (ASTM A-36)
5. All bolts not otherwise noted shall be ¾" diameter, high strength, A.A.S.H.T.O. M-164.
6. All reinforcing steel, No. 5 bars and larger shall be Grade 60, A.A.S.H.T.O. M-31. All No. 4 bars may be Grade 40 or 60. All clearances to reinforcing bars shall be 2" unless otherwise noted.
7. All rock reinforcement bars shall be No. 11, Grade 60.
8. All concrete not otherwise noted shall be Class T-2.
9. The following table shows the minimum lap for common bar sizes:

Bar Size	#4	#5	#6	#7	#8	#9	#10	#11
Lap	1'-0	1'-2	1'-8	2'-3	3'-0	3'-0	4'-10	6'-0

10. Welding will not be permitted on the flanges of steel ribs unless specifically called for in the plans, or approved.

11. The maximum unsupported advance for the excavation of the top heading shall be:

Rock Class	Unsupported Advance
1a 1b	12 Ft
2a 2b	8 Ft.
3a 3b	6 Ft
4a 4b	4 Ft.

(R-1) See Note #22.

12. The bench shall be blasted and/or excavated at a maximum advance of 12 Ft. The bench may not be blasted more than 12 Ft ahead of the bench face. Steel and concrete invert support, where called for on the plans, shall be placed before continuing advance of the bench face. Invert concrete shall be protected by an approved method.
13. The first stage lining shall be placed within 200 Ft. of the top heading face, and the time period between excavation at a given station and the placing of first stage lining at that station shall not exceed 20 calendar days. The contractor shall temporarily move first stage lining operations to the immediate area of the top heading face if ground conditions require or as directed.
14. The final lining shall not be placed until the first stage structure has stabilized as determined by the engineer.
15. Concrete finishes shall be Class 1 unless otherwise specified.
16. Rock reinforcement installed in advance of the face shall be in place at least one hour prior to advancing the face.
17. Radial rock reinforcement must be installed so that it does not lag more than 40 Ft behind the heading face.
18. Rock reinforcement, threaded tieback, resin grouted, at spring line shall be installed so that it does not lag more than 40 Ft. behind the face.
19. Install rock reinforcement, Portland cement grouted, at spring line, 10 days minimum prior to bench excavation.
20. All stationing is on Centerline Eastbound Tunnel.
21. ~~It is estimated~~ the following ~~will be~~ was required:

Traffic Control Supervision	375	~~893~~	Day
Security Guard	66,164	~~61,449~~	Hr.
Tunnel Waste Water Treatment		1	L.S.
First Aid Attendent	20,011	~~2,369~~	Hr.
Ambulance Driver	42,718	~~41,729~~	Hr.
Ambulance Attendent	67	~~500~~	Hr.
Furnish Ambulance		2	Ea.

(R-1) 22. As the top-heading excavation work proceeds, the Engineer will monitor the behavior of the support structures and the bench by instrumentation, surveys, and other appropriate means. If the Engineer determines that either deformations or rates of deformation which are occurring in any area could be detrimental to the work, then the Contractor may be directed to excavate the bench and install the invert structure in the relevent area or areas.

(R-2) 23. All structural steel designated A.S.T.M. A-572 shall be Grade 55.

(R-2) 24. Construction joints in the final lining shall be provided as shown on sheet #59. Spacing shall be 50'-3" or 100'-6" and at right angles to grade.

Index of Drawings

Dwg. No B 1 - General Notes Index of Drawings
Dwg. No B 2 - Summary of Quantities
Dwg. No B 3 - Plan, Profile, Geology Summary, Tunnel Support Types and Rock Classification.
Dwg. No B 4 - Light Tunnel Support, Horseshoe Type
Dwg. No. B 5 - Medium Tunnel Support, Horseshoe Type
Dwg. No B 6 - Heavy Tunnel Support, Horseshoe Type
Dwg. No B 7 - Horseshoe Type Tunnel Support Details
Dwg. No. B 8 - Details Tunnel Support Horseshoe Type and Reinforcing Bar Bending Diagrams
Dwg. No. B 9 - Multiple Drift Tunnel Support, Required Section, Basis For Bid, Sta 82+53 to 87+56
Dwg. No. B 10 - Multiple Drift Tunnel Support, Division's Proposed Method of Construction, Sta. 82+53 to 87+56
Dwg. No. B 11 - Light Tunnel Support, 3 Drift Type, Required Section, Basis For Bid.
Dwg. No. B 12 - Heavy Tunnel Support, 3 Drift Type, Required Section, Basis For Bid
Dwg. No. B 13 - Light Tunnel Support, 2 Drift Type, Required Section, Basis For Bid.
Dwg. No. B 14 - Heavy Tunnel Support, 2 Drift Type, Required Section, Basis For Bid.
Dwg. No. B 15 - Details, Tunnel Support, Multiple Drift, 3 Drift and 2 Drift Types and Reinforcing Bar Bending Diagrams.
Dwg. No. B 16 - Multiple Drift Tunnel Support Details, Division's Proposed Method of Construction
Dwg. No. B 17 - Multiple Drift Tunnel Support Details, Division's Proposed Method of Construction.
Dwg. No. B 18 - Drift Details For Tunnel Support, 3 Drift and 2 Drift, Division's Proposed Method of Construction.
Dwg. No. B 19 - Details Crown Drift - 3 Drift Type and North Foundation Drift - 3 Drift and 2 Drift Types, Divisions Proposed Method of Construction
Dwg. No. B 20 - Rock Reinforcement Top Heading.
Dwg. No. B 21 - Main Bore, East Bound Tunnel Location Relative To Location of Pilot Bore
Dwg. No. B 22 - Main Bore, East Bound Tunnel Location Relative To Location of Pilot Bore
Dwg. No. B 23 - Main Bore, East Bound Tunnel Location Relative To Pilot Bore Division's Proposed
Dwg. No. B 24 - Locations of East Bound Tunnel Relative To Pilot Bore Division's Proposed Support of South Foundation Drift and Pilot Bore, Sta 116+00 to 120+22.
Dwg. No. B 25 - Pre-Grout and Contact Grout Requirements.
Dwg. No B 26 - Buttress Berm Grout Requirements, Sta 118+50 to 120+22.
Dwg. No B 27 - West Transition, Elevation.
Dwg. No B 28 - West Transition, Sections.
Dwg. No B 29 - East Transition, Elevation.
Dwg. No. B 30 - East Transition, Sections
Dwg. No B 31 - Reinforcement Final Lining, Horseshoe Tunnel Support, Typical Misc Details.
Dwg. No. B 32 - Reinforcement Final Lining, Multiple Drift Tunnel Support.
Dwg. No B 33 - Reinforcement Final Lining, 3 Drift and 2 Drift Tunnel Support
Dwg. No. B 34 - Reinforcement Final Lining, At West Cross Passage, S42
Dwg. No. B 35 - Reinforcement Final Lining, At Center Cross Passage, S82
Dwg. No B 36 - Reinforcement Final Lining, At East Cross Passage, S126
Dwg. No. B 37 - Reinforcement Final Lining, At Center Air Bulkhead, S84
Dwg. No B 38 - Reinforcement Final Lining, Segments S5 and S6, Elevation
Dwg. No B 39 - Reinforcement Final Lining, Segments S5 and S6, Sections
Dwg. No. B 40 - Reinforcement Final Lining, Segments S163 and S164, Elevation
Dwg. No B 41 - Reinforcement Final Lining, Segments S163 and S164, Sections
Dwg. No. B 42 - Cross Passage Plans
Dwg. No B 43 - Cross Passage Elevations.
Dwg. No B 44 - West Cross Passage Sections and Details
Dwg. No B 45 - Center Cross Passage Sections and Details.
Dwg. No B 46 - East Cross Passage Sections and Details.
Dwg. No B 47 - Steel Supports West Cross Passage.
Dwg. No B 48 - Steel Supports Center Cross Passage.
Dwg. No B 49 - Steel Supports East Cross Passage.
Dwg. No B 50 - Reinforcement Details, West Cross Passage
Dwg. No B 51 - Reinforcement Details, Center Cross Passage.
Dwg. No. B 52 - Reinforcement Details, East Cross Passage.
Dwg. No. B 53 - West and Center Cross Passage Entrance To Main Bore
Dwg. No B 54 - East Cross Passage Entrance To Main Bore.
Dwg. No B 55 - Instrumentation, Horseshoe Type
Dwg. No B 56 - Instrumentation, Multiple Drift Support.
Dwg. No B 57 - Instrumentation, 3 and 2 Drift Support.
Dwg. No B 58 - Instrumentation, Junction Boxes.
Dwg. No B 59 - Blast Protection Shield For Ventilation Buildings
Dwg. No B 60 - Removal of Structures and Obstructions.

Stamp: Paul Chutarsky, Registered Professional Engineer 4337, State of Colorado — 5/28/75

DIVISION OF HIGHWAYS

GENERAL NOTES

INDEX OF DRAWINGS

Designer: C.O.O.H.	Structure Numbers	F-13-X	
Detailer: B.R. Lemo			
Drawing No. B 1		of 60	Drawings

AS CONSTRUCTED

NO REVISIONS | REVISED 6-29-79 | THIS

GENERAL NOTES ON TOLERANCES

Unless otherwise noted, the following notes and tolerances apply to the fabrication of the products called for on this project.

1. NOTE: Reference made to mill rolling tolerances below are those tolerances for structural shapes and plates as specified in ASTM Spec. A6.

2. BENDING TOLERANCES.

A. Rib segment assembly shall conform to the template or made within tolerances quoted below. Ribs beams and plates may depart from true template plus or minus 3/8 inch provided departure shall not exceed 1/8 inch in any 5 ft. gage length for sections up to 14 inches deep and weighing up to 150#/lin. ft. For heavier sections, ribs beams and plates may depart from true template plus or minus 3/8 inch provided departure shall not exceed 3/16 inch in any 5 ft. gage length.

The rib shall be of uniform contour.

B. Flanges shall be true to shape within established mill rolling tolerances except that after bending, the outer flange will be permitted to droop 1/8" maximum toward the inner flange for all radii of bend which are 14 times the beam depth or greater. 1/4" maximum droop will be permitted for radii of bend which are less than 14 times the beam depth. Permissible flange droop will be in addition to any flange deviation allowed within mill rolling tolerances.

C. The web shall be true within established mill rolling tolerances and be free of cracks and wrinkles. Where radii of bend are 10 or more times the beam depth and where deviation from flat does not exceed plus or minus 1/8 inch buckling of the web for a distance of 1/2 the beam depth from each end will be permitted. Where radii of bend are less than 14 times the beam depth and where deviation from flat does not exceed plus or minus 3/16 inch buckling of the web for a distance equal to the beam depth from each end will be permitted.

D. Depth of beam at web after bending can be a maximum of 1/4" less than the nominal depth.

E. Sweep in beams between end plates will be permitted within established mill rolling tolerances.

3. FABRICATION TOLERANCES.

A. Chord out to out of butt and/or foot plates measured on centerline of rib to be within plus or minus 1/16" of theoretical length.

B. Face of butt or foot plates after welding shall be within plus or minus 1/16 inch of theoretical plane. Any burrs or ragged edges on connection plates foot plates or ribs caused by cutting or punching shall be removed.

C. Gap between ends of beams and butt or foot plates prior to welding shall not exceed 1/16" for at least 75% of the cross-sectional area of the beam. Where gaps are in excess of 1/16", they shall be filled by additional welding.

D. Mill rolling tolerances to apply to width of mill edge plates. Width or length of sheared plates to be within plus or minus 1/8" of theoretical dimensions.

E. Center to center of hole dimensions on butt or foot plates to be held within plus or minus 3/64".

F. Groups of holes in butt plates after assembly shall lie within 1/16" of correct location irrespective of the variations which may exist in the beam as a result of allowable tolerances.

G. Holes in butt plates can be pierced in plates up to and including 3/4" Thick - A36 5/8" Thick - A572. On thicker plates holes must be drilled.

H. Camber and sweep permitted in straight structural members not to exceed mill rolling tolerances.

4. WELDING

A. General - Welding of steel structures shall conform to the specifications for welding steel structures of the American Welding Society D1.1-72, as revised, and as amended by the Project Specifications," as per paragraph 500.17(a) of the Project Specifications.

B. Welding shall be done with automatic or semi-automatic equipment whenever possible and shall be done in the fabrication shop unless otherwise specified. Temporary or permanent welds, except for shop tack welds that will subsequently be incorporated into the final welds, that are not shown on the plans will not be permitted without prior approval. Shop tack welds, incorporated into final welds, shall be made with electrodes meeting the mechanical requirements of the final welds.

C. MINIMUM PREHEAT AND INTERPASS TEMPERATURE DEGREES F. (1), (2)

Welding Process (Base Metal)	Thickness of Thickest Part at Point of Welding-Inches: To 3/4 in. Incl.	Over 3/4 in. to 1½ in. Incl.	Over 1½ in. to 2½ in. Incl.	Over 2½ in.
Shielded Metal-Arc Welding with Low Hydrogen Electrodes; Submerged Arc Welding; Gas Metal-Arc Welding; or Flux Cored Arc Welding (ASTM A36(3); A441; A572 Grades 42, 45, 50, and A588)	50	70	150	225
A572 GR.55	70	150	220	300

1. Welding shall not be done when the ambient temperature is lower than zero F. When the base metal is below the temperature listed for the welding process being used and the thickness of material being welded, it shall be preheated (except as otherwise provided) in such manner that the surfaces of the parts on which weld metal is being deposited are at or above the specified minimum temperature for a distance equal to the thickness of the part being welded, but not less than 3 inches both laterally and in advance of the welding. Preheat and interpass temperatures must be sufficient to prevent crack formation. Welding shall be carried continuously to completion or to a point that will insure freedom from cracking before the joint is allowed to cool below the minimum specified preheat and interpass temperature.

D. Max. size fillet in one pass-

1/2" flat and vertical

5/16" horizontal

Root passes max. thickness 1/4"

5. Identification of Steels During Fabrication.

A. Each piece of steel shall at all times show its color code clearly and legibly. During fabrication color codes shall be maintained by paint stick or well-attached tags, until members are assembled and inspected. Color code shall conform to Table 509-3. Unused steel being returned to stock shall have heat numbers and color codes marked on all pieces. Individual pieces of steel which are furnished in tagged lifts or bundles shall be marked with the color code immediately upon being removed from the bundle or lift.

B. ASTM A6 IDENTIFICATION COLOR CODES

AASHTO DESIGNATION	ASTM DESIGNATION	COLOR CODE
M183	A 36	NONE
M223	A572	Grade 55 Green and Brown

C. Individual members of ring sets to be stencilled with part number for erection purposes.

APPROVED
[signature]

These General Notes are to compliment the Specifications and do not supersede them

APPROVED FINAL
DATE 5-3-76
BY [signature]

TOTAL WT.	UNIT WT.	DRAWING NO.	PART NO.	MARK NO.	NO. PROD.	DESCRIPTION	MATL. SPEC.

TOTAL WT. FOR ____ COURSE

REV. SYM.	DATE	REVISION	S.A. NO.	CHK. BY	CK. BY
1	4-23-76	CHANGED NOTES AS PER CUSTOMER'S MARKED PRINT DATED 4-1-76	2319	WRV	
2	3-12-76	CHANGED NOTES 2(C) 3(B) 3(A) AS PER CUST. MARKED PRINT	2230	JJS	EVR

COMMERCIAL SHEARING INC.
YOUNGSTOWN, OHIO 44501 U.S.A.

GENERAL NOTES & TOLERANCES
EISENHOWER MEMORIAL TUNNEL
2ND BORE
KIEWIT

DATE 10-29-75 | DR. BY | CK. BY | SCALE

DWG. NO. D5-559-5AAB-XXT

SPACE FOR RECEIVED & APPROVAL STAMP

Summary of Quantities

Item No.	Description	Unit	Total	Final Total
202	Removal of Structures and Obstructions	L.S.	1	1
(R-1) 211	Tunnel Excavation (Class A)	Cu.Yd.	257,554	[illegible]
(R-1) 211	Tunnel Excavation (Class B)	Cu.Yd.	27,240	[illegible]
(R-1) 211	Tunnel Excavation (Class C)	Cu.Yd.	196,669	[illegible]
211	Tunnel Excavation (Class D)	Cu.Yd.	400	228
211	Remine Pilot Bore (Class A)	Lin.Ft.	4,165	4,155
211	Remine Pilot Bore (Class B)	Lin.Ft.	3,266	3,266
211	Multiple Drift Structure	Lin.Ft.	503	502
211	Foundation Drift (Class A)	Lin.Ft.	2,186	2,186
211	Foundation Drift (Class B)	Lin.Ft.	1,080	1,080
211	Crown Drift	Lin.Ft.	2,186	2,186
211	2 Inch Drilled Hole	Lin.Ft.	66,000	[illegible]
211	2 Inch Core Drilled Hole	Lin.Ft.	1,625	203
211	Buttress Berm Grouting	Ton	2,491	314
211	Pre-Grouting	Ton	3,807	131
211	Re-Grouting	Ton	506	7.67
211	Grouting Connection	Each	9,700	[illegible]
211	Contact Grouting	Ton	4,512	4,706.24
211	Chemical Grout	Gal.	1,500	96
211	Rock Reinforcement, Portland Cement Grouted, (12 Ft)	Each	5,505	5,353
211	Rock Reinforcement, Portland Cement Grouted, (18 Ft)	Each	5,697	5,555
211	Rock Reinforcement, Portland Cement Grouted, (20 Ft)	Each	2,116	2,084
211	Rock Reinforcement, Threaded Tieback, Portland Cement Grouted, (20 Ft)	Each	72	76
211	Rock Reinforcement, Resin Grouted, (12 Ft)	Each	7,156	5,561
211	Rock Reinforcement, Resin Grouted, (16 Ft)	Each	16,125	[illegible]

Summary of Quantities

Item No.	Description	Unit	Total	Final Total
211	Rock Reinforcement, Threaded Tieback, Resin Grouted (16 Ft)	Each	3,397	3,329
211	Rock Reinforcement, Threaded Tieback, Resin Grouted, (20 Ft)	Each	7,512	7,476
(1) 509	Structural Steel (Miscellaneous)	Ton	1,405	1,405.83
509	Place Structural Steel	Ton	98	103.57
509	Structural Steel (W10 × 66)	Ton	37	38.02
(2) 509	Structural Steel (W12 × 106)	Ton	89	91.80
509	Structural Steel (W14 × 61)	Ton	2,479	2,463.08
(3) 509	Structural Steel (W14 × 95)	Ton	2,675	2,670.02
(4) 509	Structural Steel (W14 × 136)	Ton	2,131	2,134.60
509	Structural Steel (W14 × 150)	Ton	1,421	1,406.05
(5) 509	Structural Steel (W14 × 167)	Ton	716	716.82
(6) 509	Structural Steel (W14 × 211)	Ton	2,940	2,929.97
515	Waterproof Coating	Sq.Yd.	79,970	85,433
518	Waterstop	Lin.Ft.	7,110	7,159
(R-1) 601	Concrete, Class T-1 (First Stage Lining)	Cu.Yd.	40,444	40,332.78
(R-1) 601	Concrete, Class T-2 (Final Lining)	Cu.Yd.	28,213	28,817.73
(R-1) 601	Concrete, Class T-2 (Invert)	Cu.Yd.	15,476	15,433.36
(R-1) 601	Concrete Class T-2 (Miscellaneous)	Cu.Yd.	11,676	12,177.33
(R-1) 601	Concrete, Class T-3 (First Stage Lining)	Cu.Yd.	15,851	15,842.67
(R-1) 601	Concrete, Class T-4 (Final Lining)	Cu.Yd.	22,314	22,314.57
(R-1) 601	Concrete, Class T-4 (Invert)	Cu.Yd.	7,949	7,857.09
(R-1) 602	Reinforcing Steel	Ton	1,789	2,019.17
614	Traffic Control Supervision	Day	890	978
614	Security Guard	Hour	61,440	66,164
622	Tunnel Waste Water Treatment	L.S.	1	1
625	First Aid Attendant	Hour	21,360	20,011
625	Ambulance Driver	Hour	42,720	42,718
625	Ambulance Attendant	Hour	500	67
625	Furnish Ambulance	Each	2	2

Revisions		
(R-1) 7-3-75	Rev. Quan. & Item	BRL

AS CONSTRUCTED — REVISED 6-23-78

~~(1) Includes 58 Tons of A572 steel.~~
~~(2) Includes 67 Tons of A572 steel.~~
~~(3) Includes 529 Tons of A572 steel.~~
~~(4) Includes 1270 Tons of A572 steel.~~
~~(5) Includes 705 Tons of A572 steel.~~
~~(6) Includes 2901 Tons of A572 steel.~~

DIVISION OF HIGHWAYS

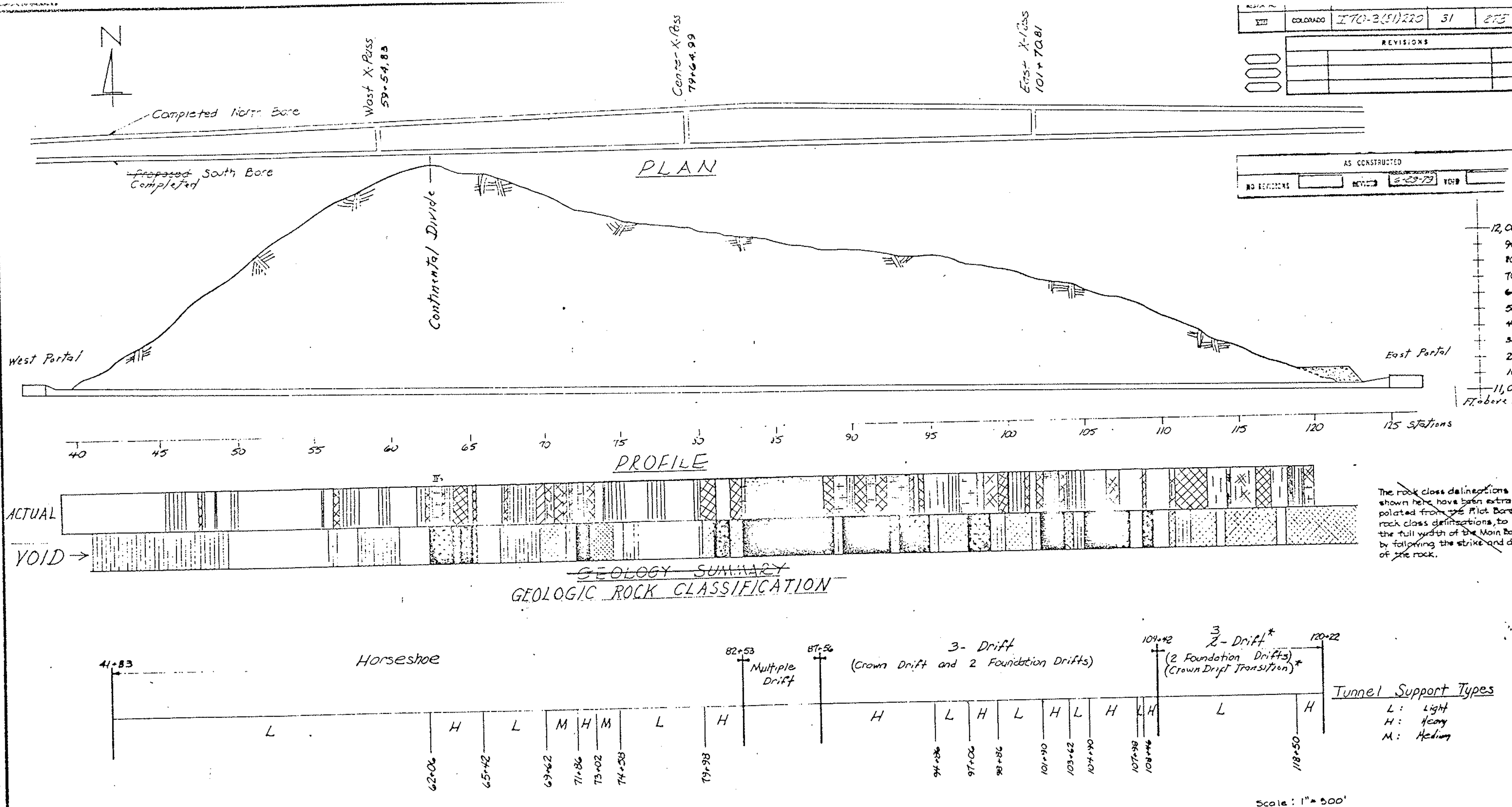
SUMMARY OF QUANTITIES

Designer C.D.O.H. — Structure Numbers F-15-X

Detailer B.R. Lere

Drawing Number B 2 of 60 Drawings

Revision Dates (Preliminary Stage Only)



Scale: 1" = 500'

ROCK CLASSIFICATION

Rock Class	Legend	Description
I a I b		Massive to slightly blocky, no alteration. Joint spacing 1.0 feet or greater
II a II b		Moderately blocky, little or no alteration. Joint spacing 0.5 feet or greater
III a III b		Very blocky, moderately to highly altered. Joint spacing less than 1.0 feet
IV a		Highly crushed and altered, non-plastic, abundant clay, Joint spacing less than 0.5 feet
IV b		Plastic, highly altered, squeezing or swelling ground, mainly clay gouge

~~Reference: "Rock classification report Pilot Bore Tunnel" by John Fest January 1974~~

COLORADO I70-3(51)220 31 875

REVISIONS

AS CONSTRUCTED

NO REVISIONS | REVISED 3-29-79 | VOID

DIVISION OF HIGHWAYS

PLAN
PROFILE
GEOLOGY SUMMARY
TUNNEL SUPPORT TYPES
ROCK CLASSIFICATION

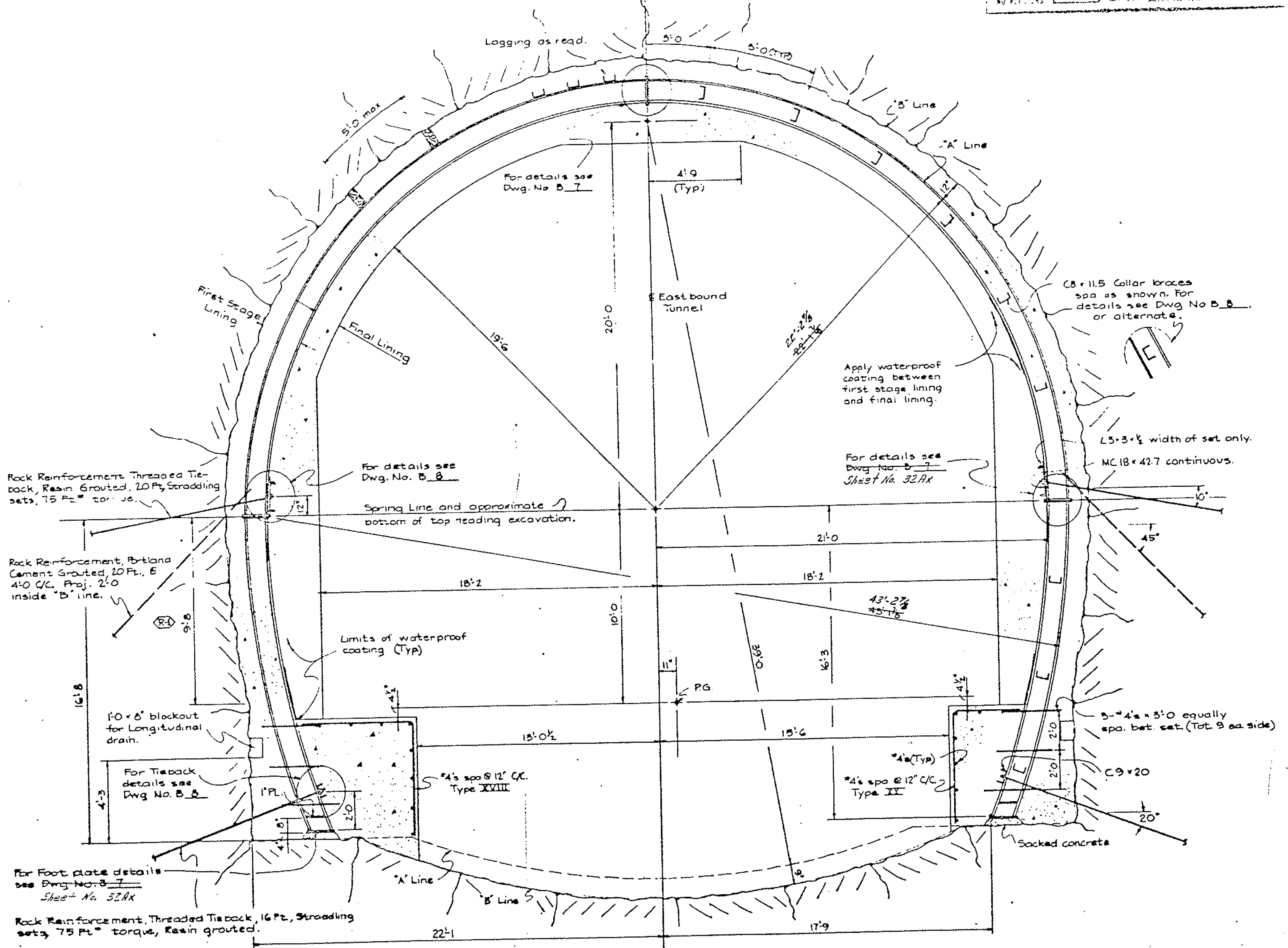
Designer: C DOH
Detailer: Condiotti
Structure Numbers: F-13-X
Drawing Number B 3 of 60 Drawings

XII	COLORADO	I70-3(81)220	32	273

REVISIONS

R-1	7-3-75	Rev. Dimens, Quans	BRL

See Sheet No. 32 Ax for As Placed Steel Dimensions and Weights



NOTES:

1. This support was used:
   Sta. 41+83 to Sta. 62+06
   Sta. 65+42 to Sta. 69+60
   Sta. 74+58 to Sta. 79+90
2. Steel support – Arch W14 × 61, A36 @ 4'-0 C/C.
   Leg W14 × 61, A36 @ 4'-0 C/C.
3. Concrete:
   First stage lining — Class T-1
   Final lining (Seg 57 thru Seg 546 and Seg 554 thru Seg 561 and Seg 573 thru Seg 581) — Class T-2
   All other concrete — Class T-2 (Misc)
4. The first stage lining in the sidewall shall be placed within 200 Ft of the bench face and the time period between excavation at a given station and the placing of first stage lining at that station shall not exceed 20 calender days. The contractor shall temporarily move first stage lining operations to the immediate area of the bench face if ground conditions require, or as directed.
5. For reinforcing steel bending diagrams see Dwg. No. B 8

Final

SUMMARY OF QUANTITIES – LIGHT HORSESHOE

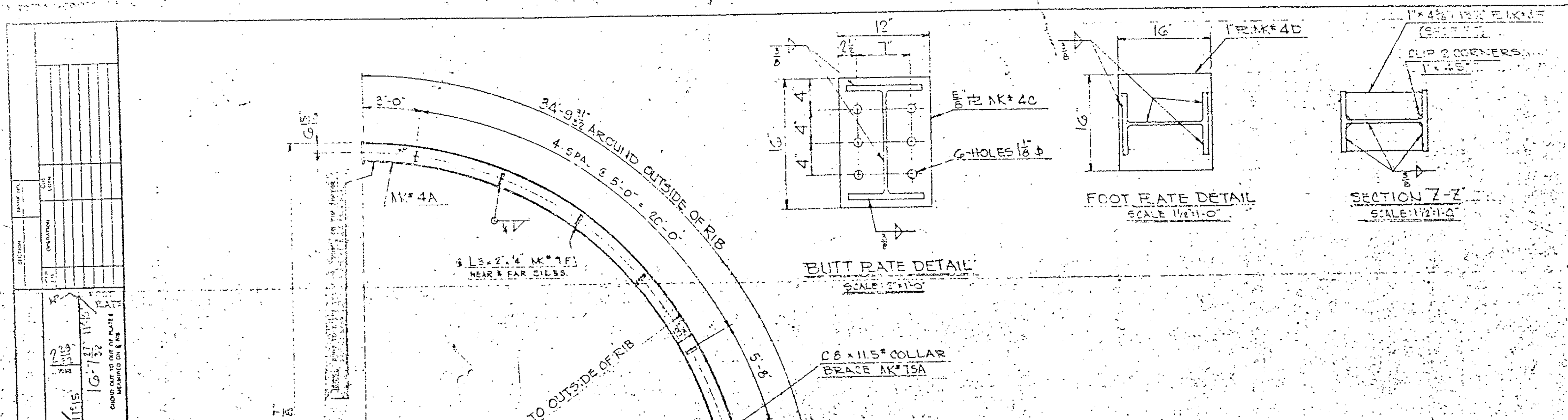
Rev.	Item	Descriptions	Unit	Total
R-1	211	Tunnel Excavation (Class A)	Cu Yd	122,945
	211	Rock Reinforcement, Portland Cement Grouted (12 Foot)	Ea	2,237
	211	Rock Reinforcement, Portland Cement Grouted (20 Foot)	Ea	1,478
	211	Rock Reinforcement, Threaded Tieback, Resin Grouted (16 Foot)	Ea	3,156
	211	Rock Reinforcement, Threaded Tieback, Resin Grouted (20 Foot)	Ea.	2,964
	509	Structural Steel (Misc)	Ton	512.23
	509	Structural Steel (W 14 × 61)	Ton	2,163.06
	515	Waterproof Coating	Sq Yd	28,522.4
R-1	601	Concrete, Class T-1 (First Stage Lining)	Cu Yd	26,129.78
R-1	601	Concrete, Class T-2 (Final Lining)	Cu Yd	17,127.36
R-1	601	Concrete, Class T-2 (Misc.)	Cu Yd	6,294.13
	602	Reinforcing Steel	Ton	45.53

DIVISION OF HIGHWAYS

LIGHT TUNNEL SUPPORT
HORSESHOE TYPE

Designer: C.D.O.H.	Structure	F-13-X
Detailer: B.R. Lane	Numbers	
Drawing Number B 4	of 60	Drawings

Designed by C.D.O.H.	Date 2-73
Checked by R.W.G.	Date 3-73
Quantities by	
Checked by	
Detailed by B.R.L.	Date 5-73



TOTAL WT.	UNIT WT.	DRAWING NO.	TOTAL PAY WT.	MARK NO.	NO. REQ'D	DESCRIPTION	MATERIAL
14.4	.10		14.4		144	STD. FLAT WASHERS FOR 3/4 φ BOLT	A307
10.1	.14		37.9		72	3/4" SQ. T.L. NUTS	
26.6	.37				72	3/4 φ x 2" SQ. HD. T.L. BOLTS	
835.4	46.9	DS 559-5AAB-007		7SA	18	C8 x 11.5# COLLAR BRACE 3' 10 3/4" LONG	A36
TOTAL WT FOR COLLAR BRACES ~~857~~ 8587							
2.2	.12		2.2		18	LOAD INDICATOR WASHERS FOR 1" φ BOLTS	A325
1.8	.10		21.1		18	HARDENED STEEL WASHERS FOR 1" φ BOLTS	A325
7.7	.43				18	1" HI STRENGTH NUTS	
16.6	.92				18	1" φ x 2 1/4" HI STRENGTH BOLTS	
	17.7	DS-559-5AAB-004	35.4	4F	2	1" x 4 5/16" x 13 1/2" STIFFENER (SHOP)	A36
	1.9	-007	11.4	7F	6	L 3" x 2" x 1/4 x 5 [illegible] LG	
	72.5	-004	72.5	4D	1	1" x 16" x 16" FOOT PLATE	
	[illegible]	-004	34.0	4C	1	5/8" x 12" x 16" BUTT PLATE	
	1013.6		1013.6		1	W14 x 61# x 16'-7 7/32" [illegible]	
2334.2	1167.1	-004	2333.8	4B	2	LEG RIB ASSYS. EA. CONSISTING OF:	
	7.1	-004	7.1	4E	1	L 3" x 3" x 1/2" x 9" LG	
	1.9	-007	22.8	7F	12	L 3 x 2 x 1/4 x 5" LG	
	34.0	-004	68.0	4C	2	5/8 x 12" x 16" BUTT PLATES	
	[illegible]		2061.1		1	W14 x 61# x 34'-[illegible]	
[illegible]	[illegible]	-004	[illegible]	4A	2	ARCH RIB ASSYS. EA. CONSISTING OF:	

TOTAL WT FOR ____ COURSE LESS COLLAR BRACES 6636.7#

MATL. REQ'D PER COURSE OF RIBS

COMMERCIAL ENGINEERING INC.

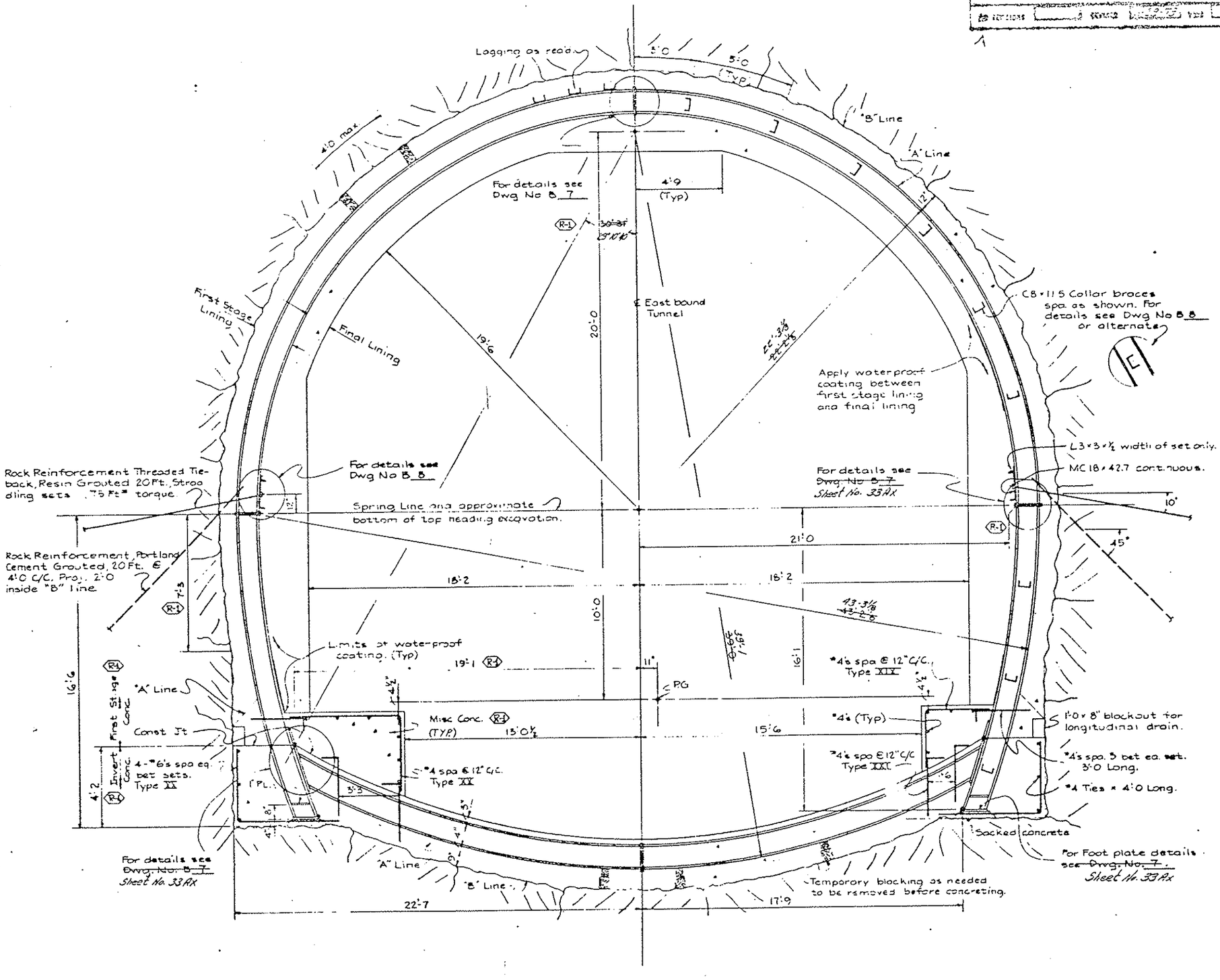
LIGHT TUNNEL SUPPORT

REV	DATE	REVISION			
3	2-4-76	CLIP ANGLE [illegible]			
2	[illegible]	[illegible] WASHERS & VARIOUS CHGS.			
1	11-4-75	WAS 36 WASHERS			

SCALE: AS NOTED

DS-559-5AAB-001

DESIGNED BY	INITIAL	DATE	CHECKED BY	DATE
CHECKED BY	C.D.O.H.	2-75	R.W.O.	5-76
DETAILED BY	B.R.L.	5-75	QUANTITIES BY	J.L.A.	5-75
			CHECKED BY	



Orig. Scale: ⅜" = 1'0

FEDERAL ROAD ADMIN. NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
XXII	COLORADO	I 70 - 5(81)220	33	275

	REVISIONS		
R-1	7-3-75	Rev. Dimen., Quan. & Notes	B.R.L.

See Sheet No. 33Ax for As Placed Steel Dimensions and Weights

NOTES:

1. This support was used:
   Sta 69+62½ to Sta. 71+86½
   Sta. 75+08½ to Sta. 74+58½
2. Steel support - Arch W14 x 95, A572 @ 4'0 C/C
   Invert and Leg W14 x 95, A36 @ 4'0 C/C
3. Concrete:

First stage lining	Class T-1
Invert	Class T-2
Final lining (Seg 562 thru Seg. 565 and Seg 570 thru Seg. 572)	Class T-2
All other concrete	Class T-2(Misc)

4. The first stage lining in the sidewall shall be placed within 100 Ft of the bench face and the time period between excavation at a given station and the placing of first stage lining at that station shall not exceed 20 calender days. The contractor shall temporarily move first stage lining operations to the immediate area of the bench face if ground conditions require, or as directed.
5. For reinforcing steel bending diagrams see Dwg. No. B. 8.

SUMMARY OF QUANTITES - MED. HORSESHOE

	Item	Description	Unit	Final Total
R-1	211	Tunnel Excavation (Class A)	Cu Yd	23,570
	211	Rock Reinforcement, Portland Cement Grouted (12 Foot)	Ea.	285
	211	Rock Reinforcement, Portland Cement Grouted (20 Foot)	Ea.	189
	211	Rock Reinforcement, Threaded Tieback, Resin Grouted (20 Foot)	Ea.	379
	509	Structural Steel (Misc)	Ton	69.83
①	509	Structural Steel (W 14 x 95)	Ton	672.26
	515	Waterproof Coating	Sq Yd	3,671.
R-1	601	Concrete, Class T-1, (First Stage Lining)	Cu Yd	294.30
R-1	601	Concrete Class T-2, (Final Lining)	Cu Yd	2,146.23
R-1	601	Concrete, Class T-2, (Invert)	Cu Yd	1,867.16
R-1	601	Concrete, Class T-2, (Misc)	Cu Yd	469.68
	602	Reinforcing Steel	Ton	110.71

① ~~Includes 315 Tons of A572 Steel.~~

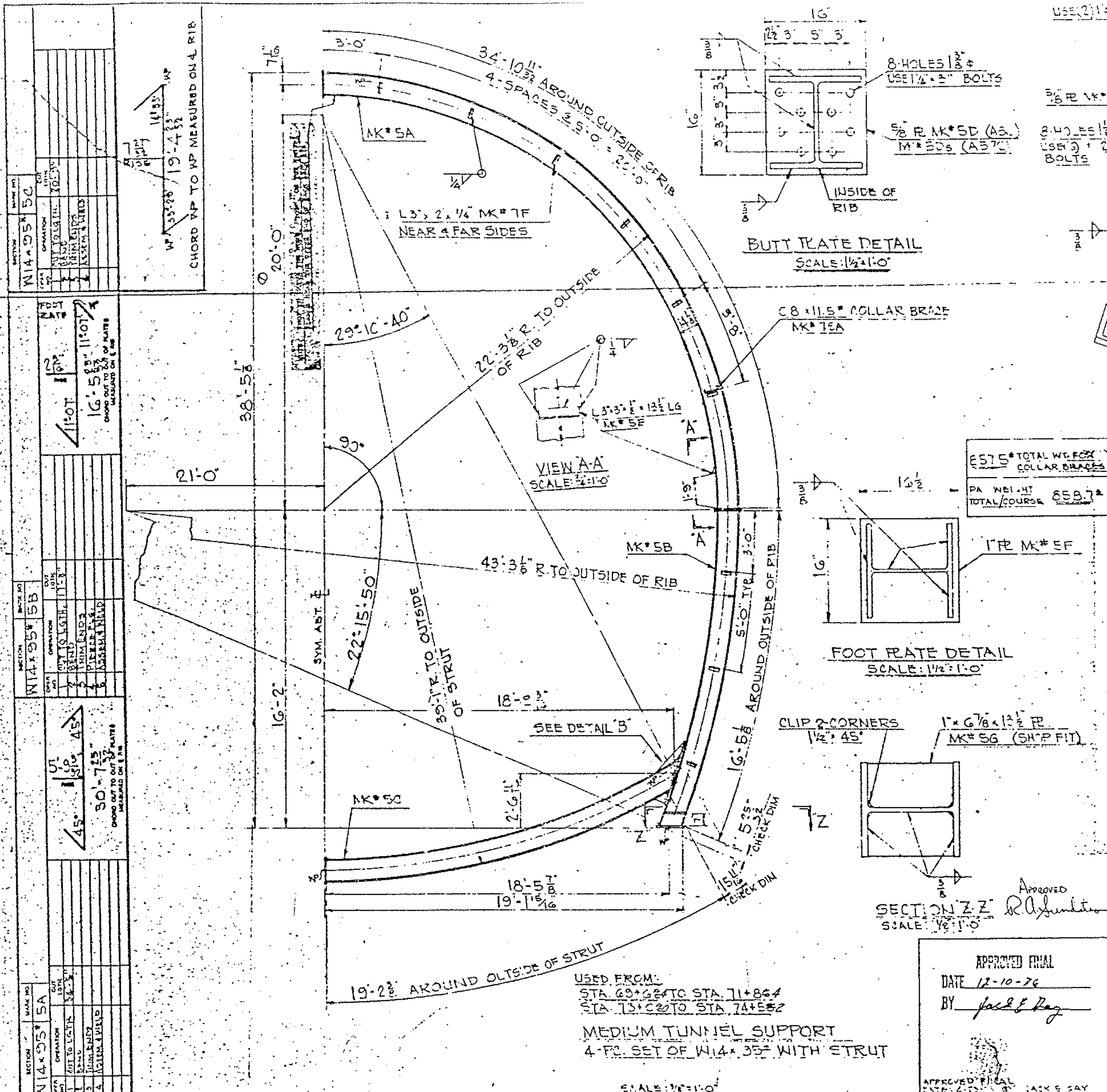
DIVISION OF HIGHWAYS

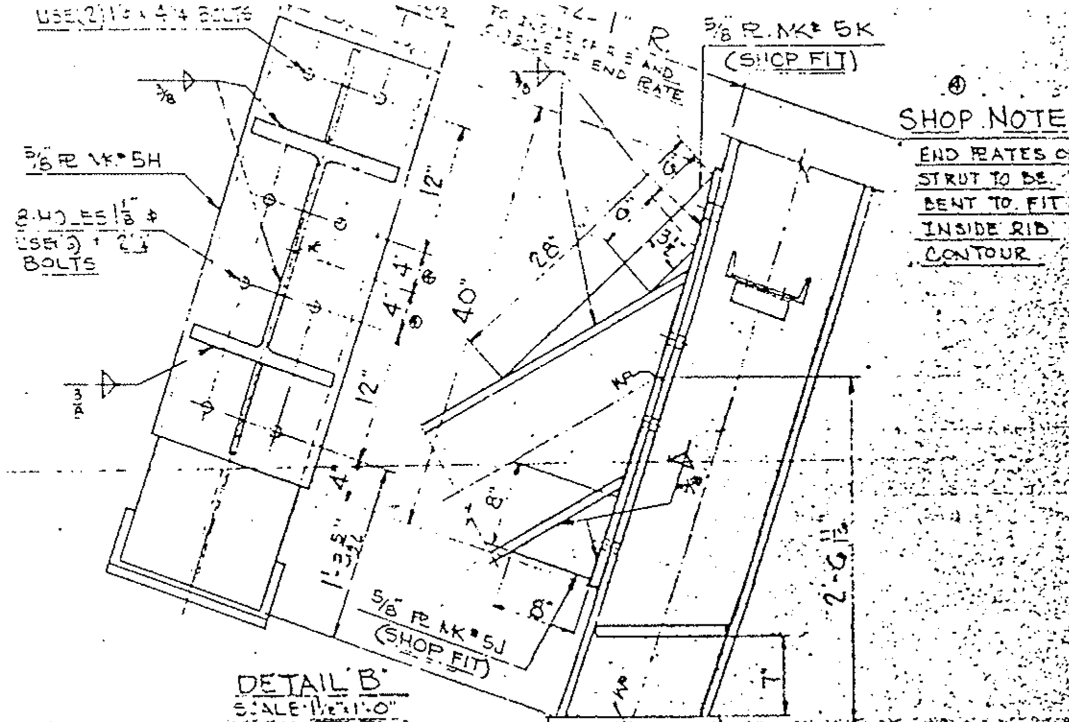
MEDIUM TUNNEL SUPPORT

HORSESHOE TYPE

Designed	C.D.O.H.	Structure Numbers	F-15-X
Detailed	B.R.Lara		
Drawing Number	B 5	of 60	Drawings

Approved _____ (Preliminary Stage Only)





ES7.5# TOTAL WT. FOR COLLAR BRACES

PA WEIGHT TOTAL/COURSE 858.7#

TOTAL WT	UNIT WT	DRAWING NO		TOTAL WT PER COURSE	MARK NO.	NO. REQ'D	DESCRIPTION	MAT'L SPEC
14.4	.10			14.4		144	STD. FLAT WASHER FOR 3/4" BOLT	A307
10.1	.14					72	3/4" SQ. T.L. NUTS	
26.6	.37			37.9		72	3/4" x 2" SQ. HD. T.L. BOLTS	
806.4	44.8	DS-559-5AAD-007		806.4	7SA	18	C8 x 11.5# COLLAR BRACE	A36
1.9	.12			1.9		16	LOAD INDICATOR WASHER FOR 1" BOLT	A325
1.6	.10					16	HARDENED STEEL WASHER FOR 1" BOLT	
6.9	.43			18.7		16	1" HI STRENGTH NUTS	
5.4	1.36					4	1" x 4 1/2" HI STRENGTH BOLTS	
11.0	.92					12	1" x 2 3/4" HI STRENGTH BOLTS	
						④		
4.2	.13			4.2		32	LOAD INDICATOR WASHER FOR 1 1/4" BOLT	
4.5	.14					32	HARDENED STEEL WASHER FOR 1 1/4" BOLT	
25.3	.79			67.8		32	1 1/4" HI STRENGTH NUTS	
53.8	1.68					32	1 1/4" x 3" HI STRENGTH BOLT	
	10.6	DS-559-5AAB-005		10.5	5K	1	5/8" x 3 1/2" x GUSSET PL (SHOP FIT)	A36
	6.3			6.2	5J	1	5/8" x 8" x 8" GUSSET PL (SHOP FIT)	
	113.3			113.3	5H	1	5/8" x 16" x 40" BUTT PLATE	
	45.3			45.3	5D	1	5/8" x 16" x 16" BUTT PLATE	
	1557.1			1549.5		1	W14 x 55# x 19'-6 5/16" NNA	
4065.8	2032.9			4045.6	5C	2	STRUT ASSYS. EA. CONSISTING OF:	
	26.3	-005		26.0	5G	2	1" x 6 7/8" x 13 1/2" STIFF PL (SHOP FIT)	
	1.9	-007		1.9	7F	6	L 3" x 2" x 1/4" x 5 1/2" LG.	
	74.8	-005		74.8	5F	1	1" x 16" x 16 1/2" FOOT PLATE	
	45.3			45.3	5D	1	5/8" x 16" x 16" BUTT PLATE	
	1562.1			1561.4		1	W14 x 55# x 16'-5 5/16" NNA	
3492.4	1746.2			3489.6	5B	2	LEG RIB ASSYS. EA. CONSISTING OF:	
	10.6	-005		10.6	5E	1	L 5" x 3" x 1/2" x 13 1/2" LG.	A36
	1.9	-007		1.9	7F	2	L 3" x 2" x 1/4" x 5 1/2" LG.	A36
	45.3	-005		45.3	5Ds	2	5/8" x 16" x 16" BUTT PLATES	[illegible]
	3224.4			3211.7		1	W14 x 55# x 35'-11 1/2" NNA	[illegible]
[illegible]	[illegible]	-005		6671.4	5A	2	ARCH RIB ASSYS. EA. CONSISTING OF:	

TOTAL WT. PER COURSE: 14,303.4

TOTAL WT. FOR 1 COURSE LESS COLLAR BRACES: 14,302.0#

MAT'L. REQ'D. PER COURSE OF RIBS

REV. SYM	DATE	REVISION	D.R. NO.	CHK. BY	CK. BY
⑥	[illegible]	[illegible] 1" x 2 3/4" BOLTS SEE DETAIL "B"	2481	JJS	KW
⑤	[illegible]	[illegible] PER MARKED PRINT	2305	JJS	KW
4	[illegible]	[illegible] STRUT END PLATE	[illegible]	[illegible]	JJS
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	JJS	KW
1	[illegible]	[illegible]		JJS	KW

COMMERCIAL SHEARING, INC. YOUNGSTOWN, OHIO U.S.A.

MEDIUM TUNNEL SUPPORT

EISENHOWER MEMORIAL TUNNEL

2ND BORE PROJ. NO. I 70-3 (50) 220 — COLO.

PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

DATE 12-11-78 | DR. BY JJS | CH. BY RJA | SCALE AS NOTED

DS-559-5AAB-XXI

DWG. NO. DS-559-5AAB-005

APPROVED FINAL

DATE 12-10-76

BY Jack E. Ray

Approved R. A. Sunkton

APPROVED FINAL DATE: 12-10-76 JACK E. RAY

SAME DATE SIGNED ON APPROVAL STAMP

QUOTE ITEM 2 BID ITEM 51

REF. DWG NO 85

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3 (50) 220	33AX	273

RECEIVED D.O.H.

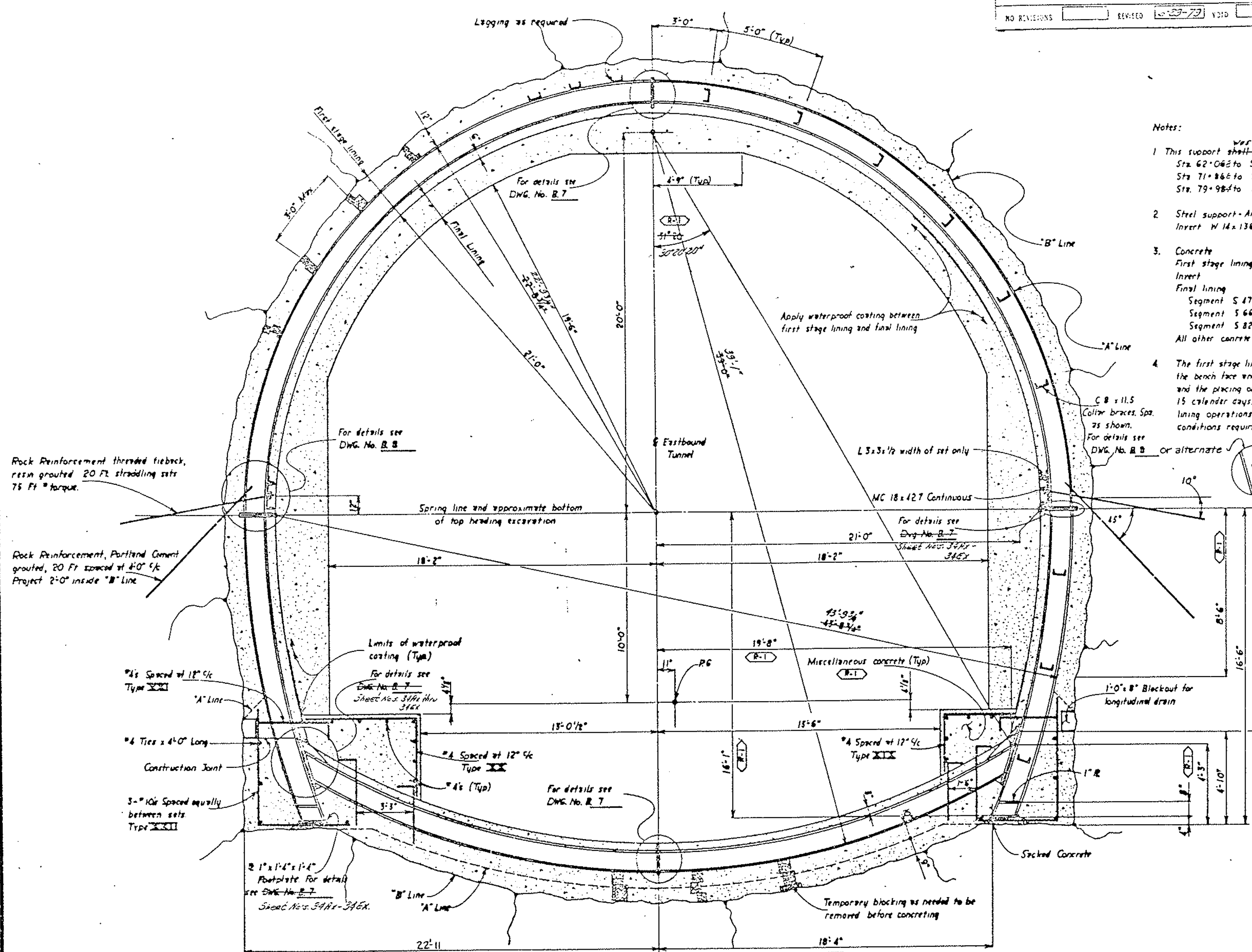
NO REVISIONS | REVISED 6-23-79 | VOID

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	34	273

AS CONSTRUCTED
NO REVISIONS ☐ REVISED 10-23-79 VOID ☐

REVISIONS		
7-3-75	Fix Dimen, Quant. and Notes	RJS

See Sheet No's. 34Ex thru 34Ex for As Placed Steel Weights and Dimensions



Notes:

1. This support ~~shall be~~ was used:
   Sta. 62+06 to Sta. 65+480
   Sta. 71+86 to Sta. ~~73+02~~ 72+96
   Sta. 79+98 to Sta. 82+530

2. Steel support - Arch and Sideleg W 14 x 136, A 572 Grade 55 Spaced at 4'-0" c/c
   Invert W 14 x 136, A 36 Spaced at 4'-0" c/c

3. Concrete
   First stage lining — Class T 3
   Invert — Class T 4
   Final lining
   Segment S 47 thru S 53 — Class T 4
   Segment S 66 thru S 69 — Class T 4
   Segment S 82 thru S 87 — Class T 4
   All other concrete — Class T 2 (Miscellaneous)

4. The first stage lining in the sidewall shall be placed with in 200 Ft of the bench face and the time period between excavation at a given station and the placing of first stage lining at that station shall not exceed 15 calender days. The Contractor shall temporarily move first stage lining operations to the immediate area of the bench face if ground conditions require, or as directed.

Final

Summary of Quantities - Heavy Horseshoe			
Item	Description	Unit	Total
211	Tunnel Excavation (Class A)	Cu. Yd	45,760
211	Rock Reinforcement, Portland Cement Grouted (12 Foot)	Ea	531
211	Rock Reinforcement, Portland Cement Grouted (20 Foot)	Ea	340
211	Rock Reinforcement, Threaded Tieback, Resin Grouted (20 Foot)	Ea	768
509	Structural Steel (Misc)	Ton	6.54
509	Structural Steel (W 14 x 136) ①	Ton	1,835.76
515	Waterproof Coating	Sq. Yd	6,823.62
601	Concrete, Class T 2, (Misc.)	Cu Yd	657.53
601	Concrete, Class T 3 (First Stage Lining	Cu Yd	6,744.30
601	Concrete, Class T 4 (Invert)	Cu Yd	4,136.12
601	Concrete, Class T 4 (Final Lining)	Cu Yd	5115.29
602	Reinforcing Steel	Ton	43

~~① includes 1268 Tons A 572 Steel~~

Notes:
For reinforcing steel bending diagrams see DWG. No. B 8

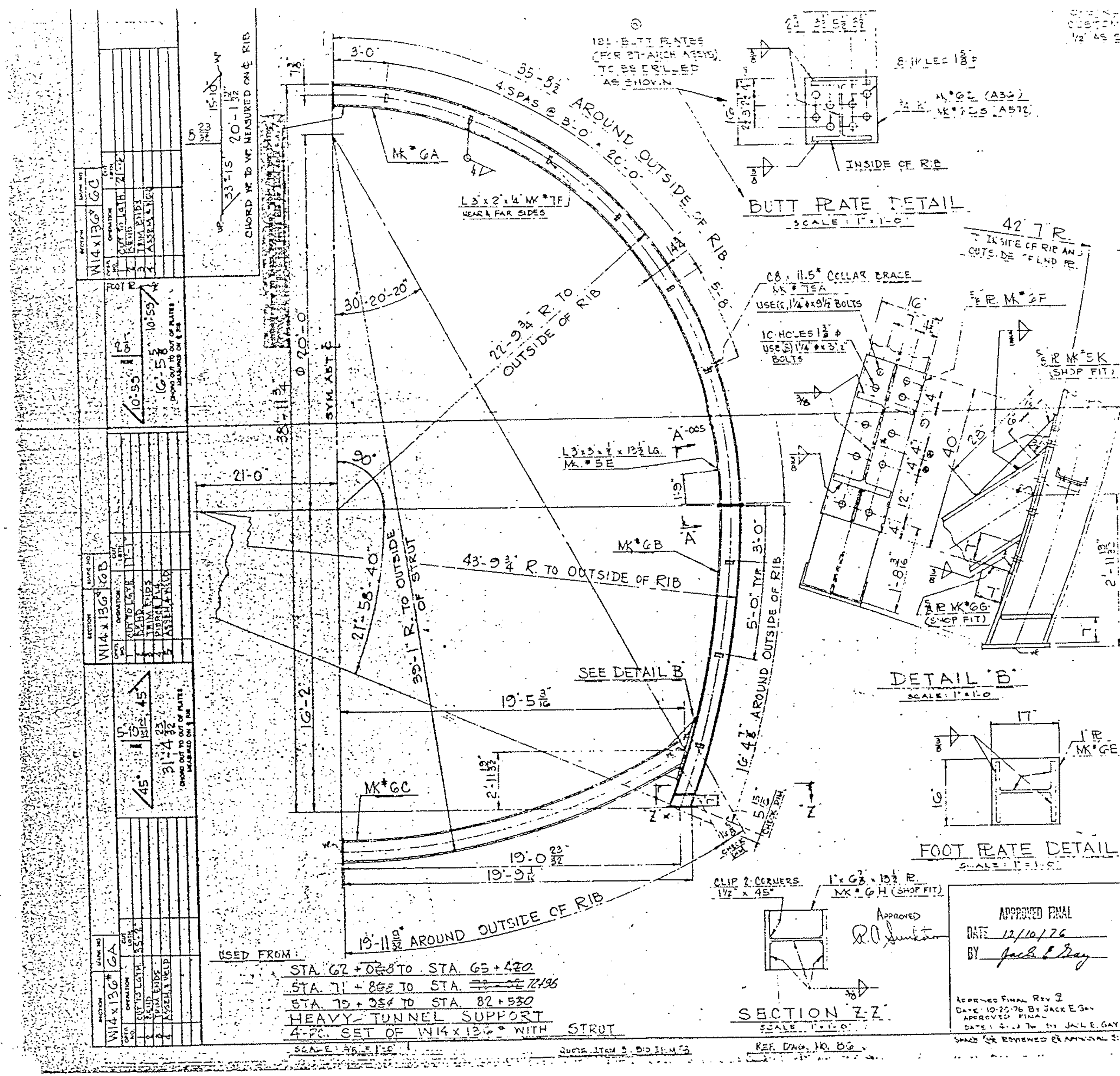
Initial	Date	
Designed by C.D.C.H.	2-73	Checked by RVG 3-73
Checked by RJS	8-73	Quantities by JLA 4-73
Detailed by RJS	8-73	

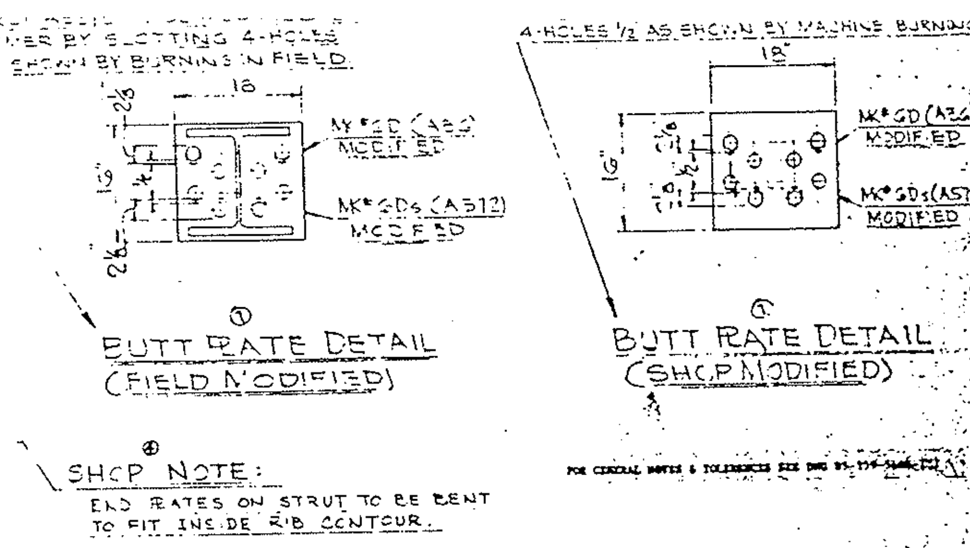
Original scale: ⅜" = 1'-0"

DIVISION OF HIGHWAYS

Heavy Tunnel Support Horseshoe Type

Designer C.D.C.H. — Structure F-13-X
Detailer R. Steinhauser — Number
Drawing Number B 6 of 60 Drawings





TOTAL WT	UNIT WT	DRAWING NO.	TOTAL/PAY WEIGHT	MARK NO.	NO. REQ'D	DESCRIPTION	MAT'L SPEC.
14.4	.10		14.4		144	STD. FLAT WASHERS FOR ¾ φ BOLT	A307
10.1	.14				72	¾ SQ. T.L. NUTS	
27.8	.37		37.9		72	¾ φ x 2" SQ HD T.L. BOLTS	
30 2.4 41.5		D5-559-5AAB-007	806.4	7SA	18	C8 x 11.5# COLLAR BRACES	A36
TOTAL WT FOR COLLAR BRACES 857.5#		PAY WEIGHT TOTAL/COURSE 858.7#					
2.6	.13		2.6		20	LOAD INDICATOR WASHER FOR 1¼ BOLT	A325
2.8	.14				20	HARDENED STEEL WASHER FOR 1¼ BOLT	
15.8	.79				20	1¼ HI STRENGTH NUTS	
15.8	3.94		45.2		4	1¼ φ x 9½ HI STRENGTH BOLTS	
23.4	1.94				16	1¼ φ x 3½ HI. STRENGTH BOLTS	
6.7	.21				32	HARDENED STEEL WASHERS FOR 1½ BOLTS	
41.9	1.31		135.4		32	1½ HI. STRENGTH NUTS	
91.2	2.85				32	1½ φ x 3½ HI STRENGTH BOLTS	
	10.6	D5-559-5AAB-005	10.5	5K	1	⅝ x 3½ x 28 GUSSET PL (SHOP FIT)	A36
	5.0	-005	4.8	6G	1	⅝ x 7 x 7 GUSSET PL. (SHOP FIT)	
	133	-006	113.3	6F	1	⅝ x 16 x 40 BUTT PLATE	
	61.2	-006	61.2	6D	1	¾ x 16 x 18 BUTT PLATE	
	2761.9		2750.1		1	W14 x 136# x 20'-3 11/16 NNA.	
5903.5	2951.7	-006	5879.8	6C	2	STRUT ASSYS. EA CONSISTING OF:	
	26.3	-006	26.0	6H	2	1" x 6⅛ x 13½ STIFF. PL. (SHOP FIT)	A572 GRADE 55
	1.9	-007	1.9	7F	6	L3 x 2 x ¼ x 5½ LG.	A36
	77.1	-006	77.1	6E	1	1" x 16 x 17 FOOT PLATE	A572 GRADE 55
	61.2	-006	61.2	6Ds	1	¾ x 16 x 18 BUTT PLATE	
	2227		2232.4		1	W14 x 136# x 16'-5 NNA.	A572 GRADE 55
4570.0	2285	-006	4568.2	6B	2	LEG RIB ASSYS. EA CONSISTING OF:	
	10.6	-005	10.6	5E	1	L3 x 3 x ½ x 13½ LG.	A36
	1.9	-007	1.9	7F	12	L3 x 2 x ¼ x 5½ LG.	A36
	61.2	-006	61.2	6Ds	2	¾ x 16 x 18 BUTT PLATES	A572 GRADE 55
	4756		4707.3		1	W14 x 136# x 34'-8½ NNA.	A572 GRADE 55
9762.2	4881.1	-006	9726.2	6A	2	ARCH RIB ASSYS. EA. CONSISTING OF:	

TOTAL WT FOR 1 COURSE LESS COLLAR BRACES 20742.2#

MAT'L REQ'D. PER COURSE OF RIBS

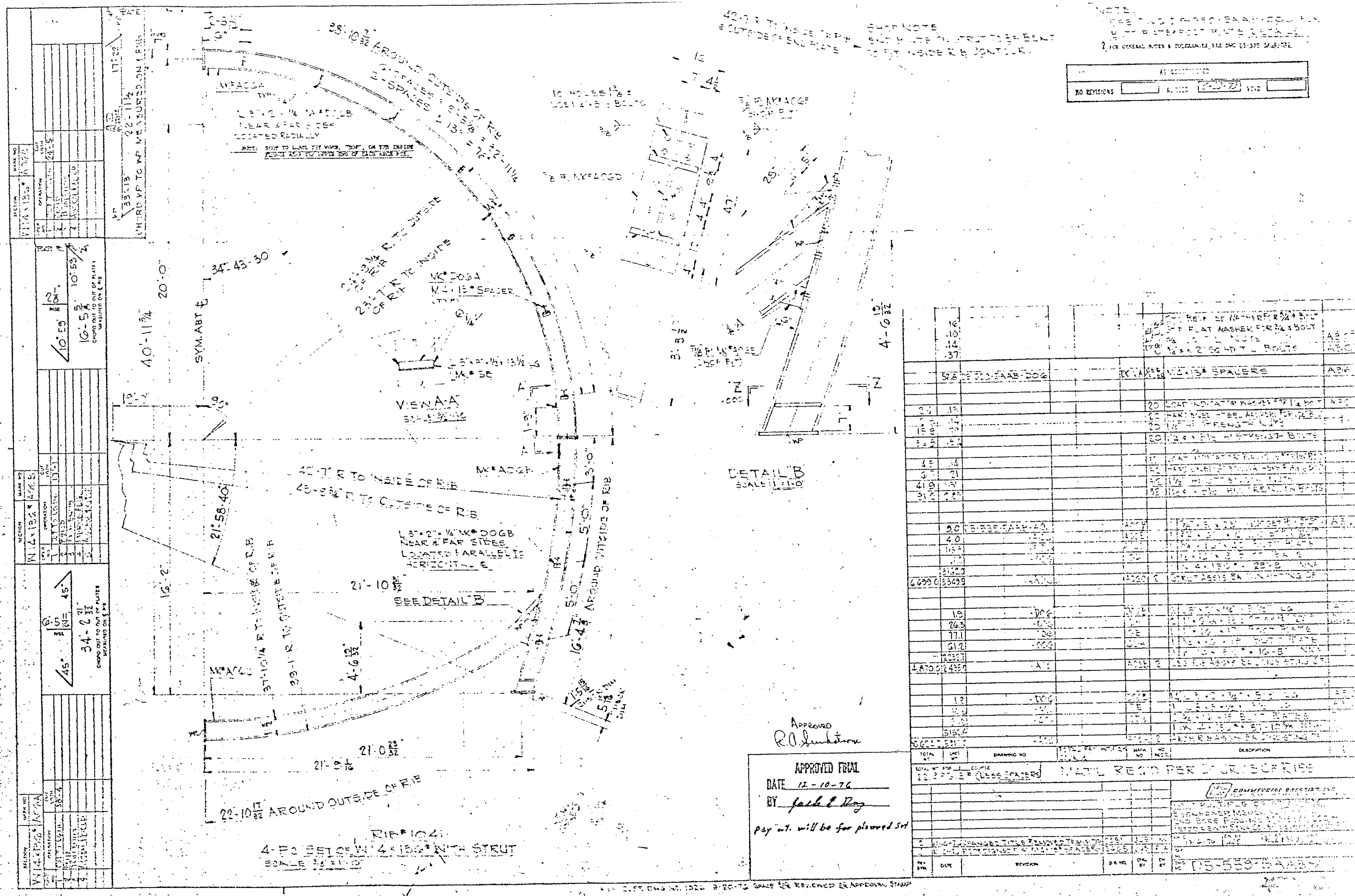
COMMERCIAL SHEARING, INC.

HEAVY TUNNEL SUPPORT
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. No. I 70-4 (81) 220
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

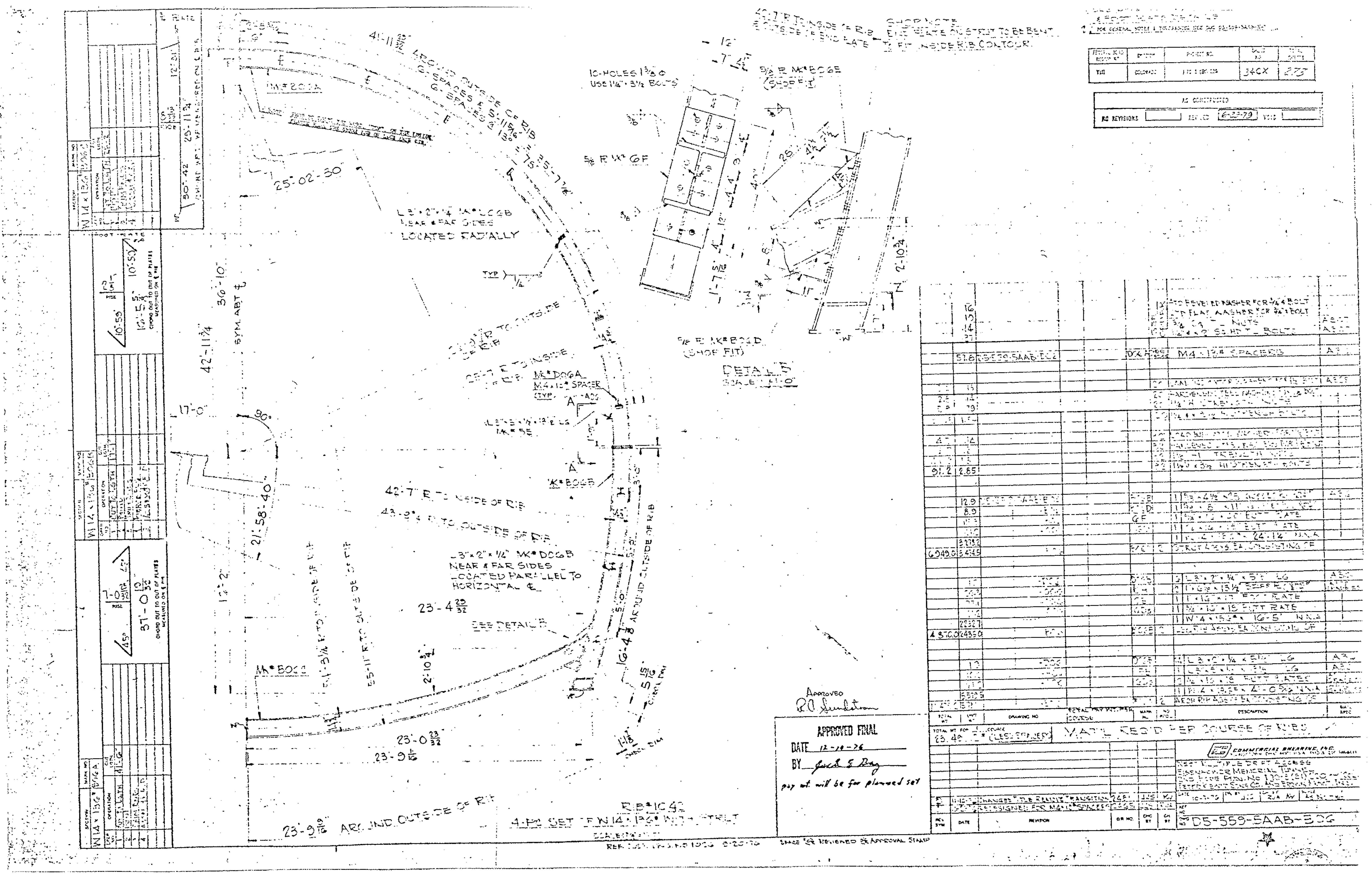
D5-559-5AAB-006

FEDERAL ROAD REGION NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-4 (81) 220	34AX	223

NO REVISIONS 6-29-79



SHOP NOTE
VIEW A-A
SEE DETAIL "B"
DETAIL "B"
SYM. ABT ℄
20'-0"
40'-11 3/4
21'-10 3/32
21'-0 23/32
21'-9 1/16
22'-10 17/32 AROUND OUTSIDE OF RIB
42'-7" R TO INSIDE OF RIB
45'-9 3/4" R TO OUTSIDE OF RIB
L 3"x2"x1/4" MK# DOGB NEAR & FAR SIDES LOCATED PARALLEL TO HORIZONTAL ℄
MK# ACGC
NO REVISIONS
Approved
APPROVED FINAL
DATE 12-10-76
BY Jack E Day
pay wt. will be for planned set
RIB #1041
4-Pc SET OF W14x13.2# WITH STRUT



SHOP NOTE
END PLATE ON STRUT TO BE BENT TO FIT INSIDE RIB CONTOUR.
AS CONSTRUCTED
NO REVISIONS
REVISED 6-23-79
41'-11 23/32 AROUND OUTSIDE OF RIB
6 SPACES @ 5'-11 5/8
6 SPACES @ 13 5/8
25°-02'-30"
L3"x2"x1/4" MK* DOGB NEAR & FAR SIDES LOCATED RADIALLY
36'-10" SYM. ABT ℄
42'-11 3/4
17'-0"
90°
21°-58'-40"
42'-7" R. TO INSIDE OF RIB
43'-2 3/4 R. TO OUTSIDE OF RIB
L3"x2"x1/4" MK* DOGB NEAR & FAR SIDES LOCATED PARALLEL TO HORIZONTAL ℄
23'-4 23/32
SEE DETAIL B
MK* BOGB
MK* DOGA M4x13* SPACER (TYP)
16'-4 3/8 AROUND OUTSIDE OF RIB
23'-0 23/32
23'-9 1/16
23'-9 19/32 AROUND OUTSIDE OF RIB
RIB* 1C42
4-PC SET OF W14x 176* WITH STRUT
10-HOLES 1 3/16 ⌀ USE 1 1/8" x 3 1/2 BOLTS
5/8 R MK* BOGE (SHOP FIT)
5/8 R 14" GF
5/8 R MK* BOGD (SHOP FIT)
DETAIL "B" SCALE 1"=1'-0"
W14 x 176*
MAT'L REQ'D PER COURSE OF RIBS
DESCRIPTION
DRAWING NO
TOTAL WT
MARK NO
Approved RC Sunderland
APPROVED FINAL
DATE 12-10-76
BY Jack S Day
pay wt. will be for planned set
SPACE FOR REVIEWED & APPROVAL STAMP
COMMERCIAL SHEARING, INC.
KEST MULTIPLE DRIFT ACCESS
EISENHOWER MEMORIAL TUNNEL
D5-559-5AAB-B06

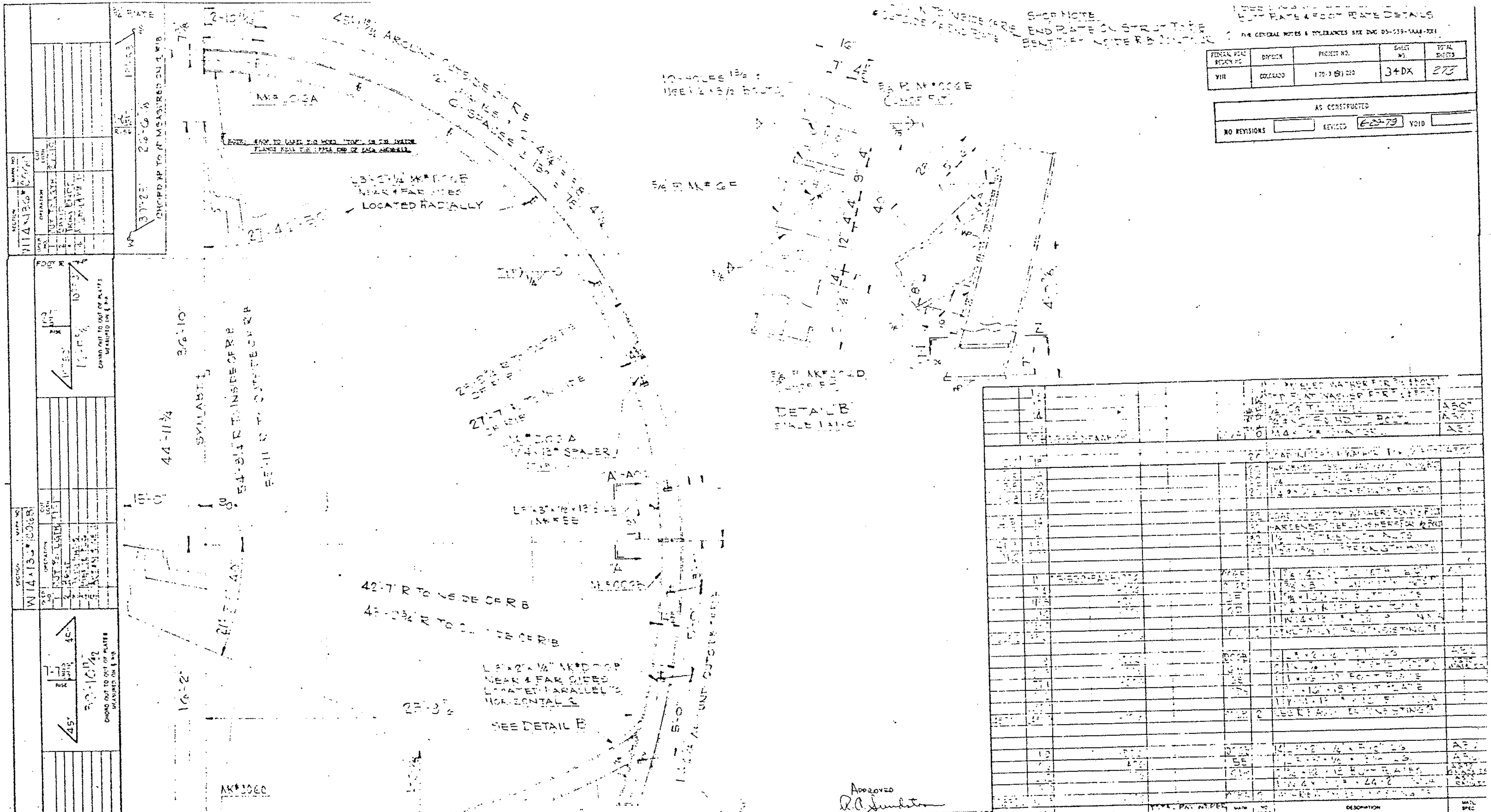
BUTT PLATE & FOOT PLATE DETAILS

FOR GENERAL NOTES & TOLERANCES SEE DWG D5-559-5AAB-XXX

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3 (51) 220	34DX	273

AS CONSTRUCTED

NO REVISIONS ☐ REVISED 6-22-79 VOID ☐



Approved
R.C. Sundston

APPROVED FINAL
DATE 12-10-76
BY Jack E. Fay
pay wt. will be for planned set

SPACE FOR REVIEWED OR APPROVAL STAMP

COMMERCIAL SHEARING, INC.

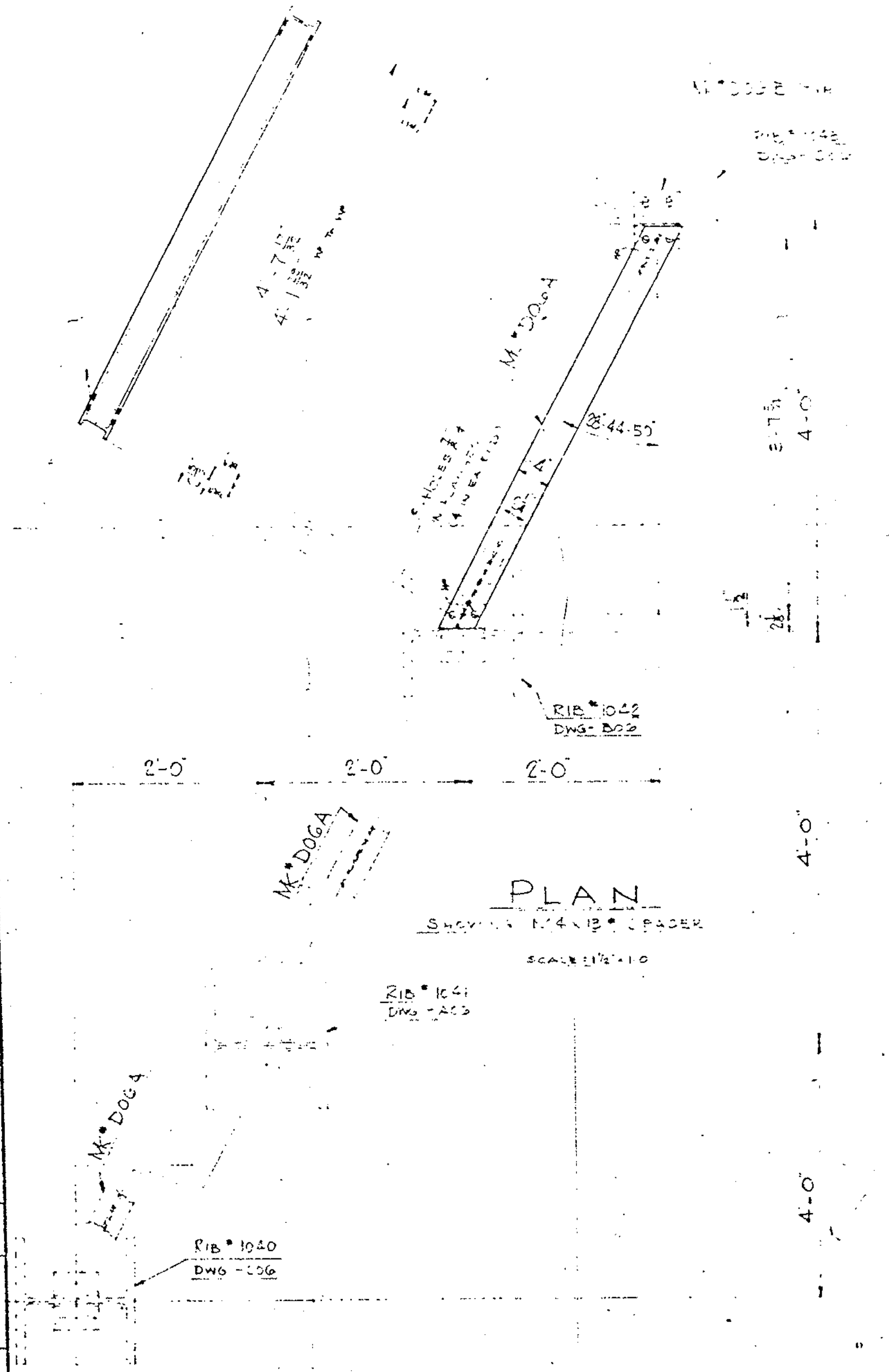
DWG NO. D5-559-5AAB-COC

FOR GENERAL NOTES & TOLERANCES SEE DWG D5-559-5AAB-C01

VIII		81	34Ex	273

AS CONSTRUCTED

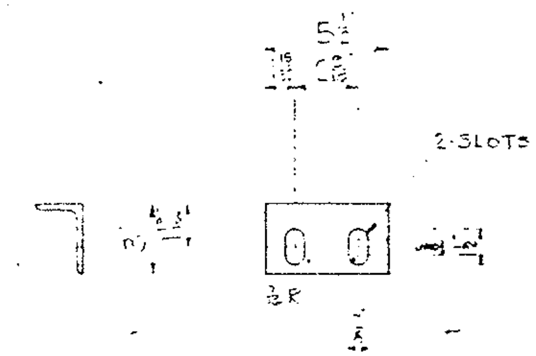
NO REVISIONS [ ] REVISED [6-29-79] VOID [ ]



PLAN

SHOWING M4x13# SPACER

SCALE 1 1/2"=1-0



L3 x 2 x 1/4 DETAIL MK# DOGB

SCALE: 3"=1'-0"

SECTION	MARK NO	OPER NO	OPERATION	CUT LGTH
M4 x 13#	DOGA	1	CUT TO LGTH	4-7 15/32
		2	TRIM ENDS	
		3	PIERCE FLGS	

Approved R.A. Sundstrom

APPROVED FINAL
DATE 1/18/77
BY Jack E. Gay

APPROVED PRELIMINARY
DATE 2-10-76 BY JACK E. GAY
PAYMENT WILL BE PER PLANNED C.B.

SPACE FOR REVIEWED & APPROVAL STAMP

TOTAL WT	UNIT WT	DRAWING NO	TOTAL PAY WT PER COURSE	MARK NO	NO REQ'D	DESCRIPTION	MATL SPEC
9	.14				4	STD BEVELED WASHERS FOR 3/4 BOLTS	
4	.10				4	STD. FLAT WASHERS FOR 3/4 BOLTS	
6	.12				4	3/4 SQ T.L. NUTS	
5	.37				4	3/4 x 2 SQ HD. T.L. BOLTS	
		D5-559-5AAB-D06		DOGB		L3 x 2 x 1/4 x 0'-5 1/2 N.N.A.	A36
57.8	57.5	D5-559-5AAB-D06		DOGA	1	M4 x 13# x 4-5 ... N.N.A.	A36

TOTAL WT FOR ____ COURSE

MAT'L REQ'D PER SPACER

REV SYM	DATE	REVISION	D.A. NO.	CHG BY	CH BY
		MK# DOGB WAS 2-REQ'D	2505	JJS	RJA
		REMOVED USED ON TRANSITION RIBS	2451	JJS	KV

COMMERCIAL SHEARING, INC.

M4x13# SPACER DETAIL
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-5(81)220 — COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

DATE 10-2-75 | DR BY RJA | CH BY KFV | SCALE AS NOTED

DWG NO D5-559-5AAB-D06

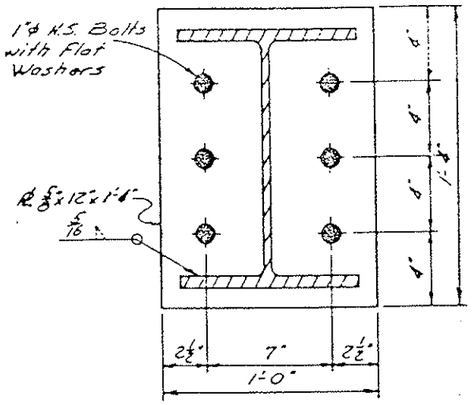
CUST. REF DWG. # 1026

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	FTD-3(81) 220	35	273

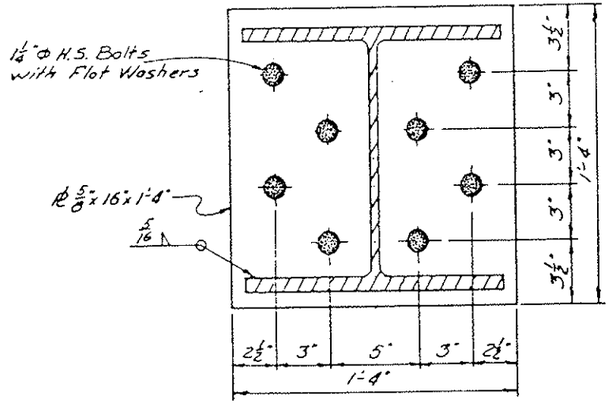
REVISIONS			
K-L	7-3-79	Rev Weld Size	BRL

AS CONSTRUCTED
NO REVISIONS ☐ REVISED ☐ VOID 6-29-79

See Sheets No. 32Ax. 33Ax. and 34Ax for Revised Dimensions

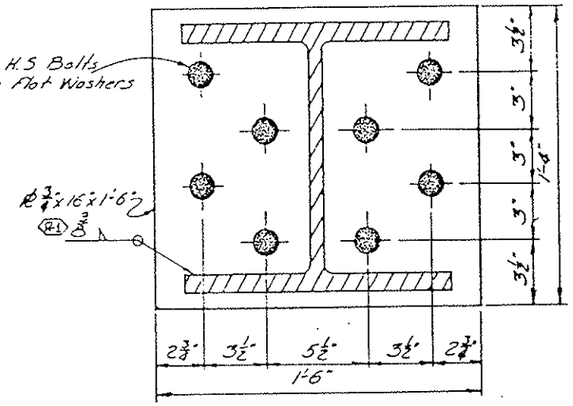


BUTTPLATE DETAIL
Arch & Leg - W14x61 Horseshoe Type



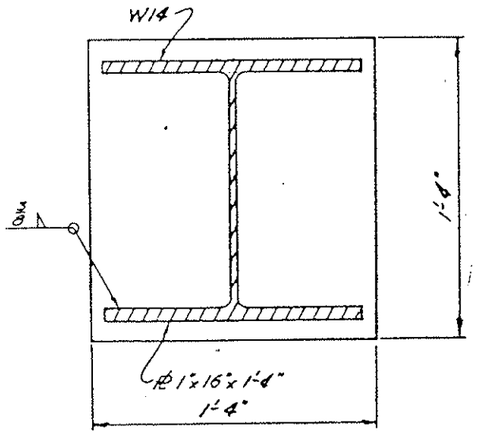
Note: Arch is A-572

BUTTPLATE DETAIL
Arch, Leg & Invert - W14x95 Horseshoe Type

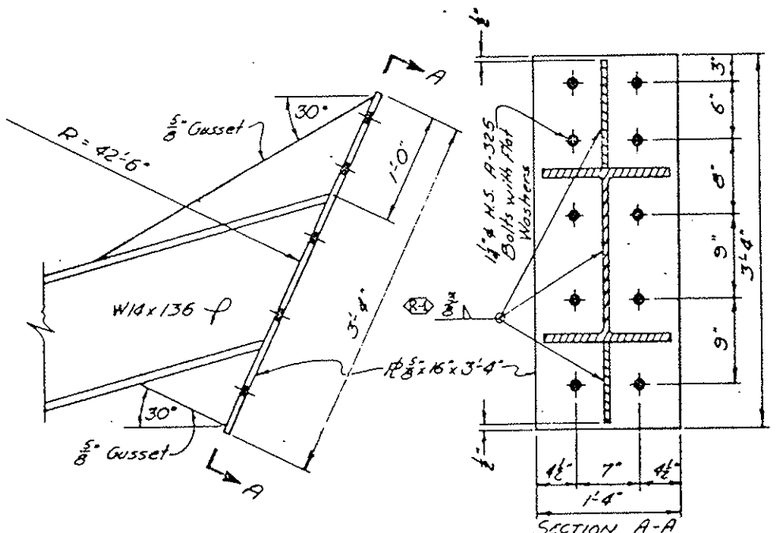


Note: Arch & Leg are A-572

BUTTPLATE DETAIL
Arch, Leg & Invert - W14x136 Horseshoe Type

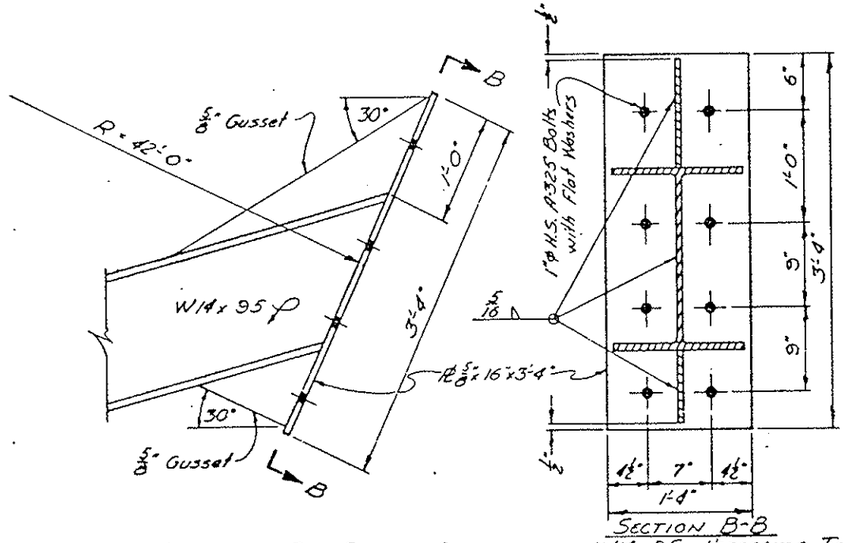


TYPICAL FOOT PLATE



SECTION A-A

INVERT BUTTPLATE FOR SIDELEG CONNECTION - W14x136 HORSESHOE TYPE



SECTION B-B

INVERT BUTTPLATE FOR SIDELEG CONNECTION - W14x95 HORSESHOE TYPE

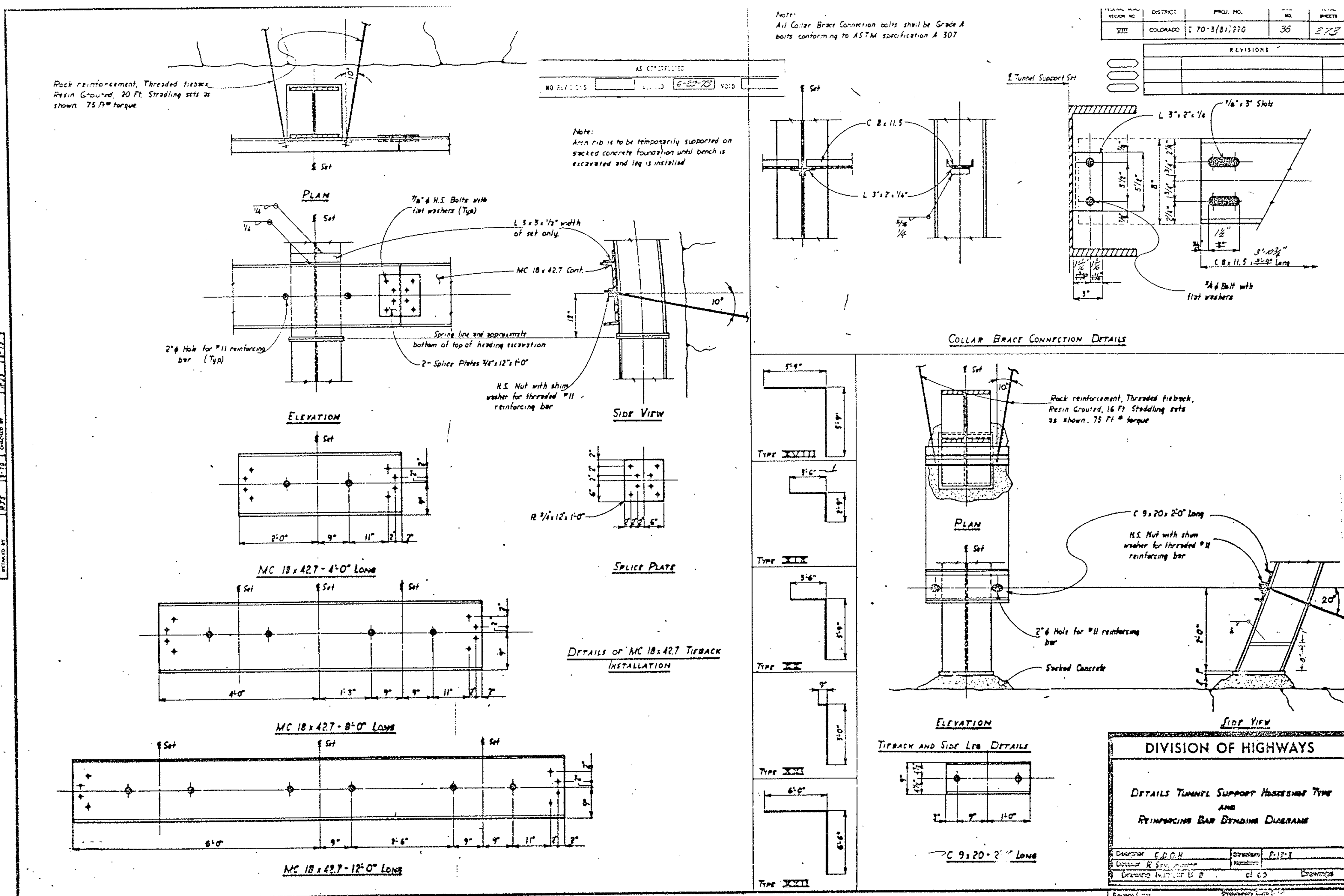
	INITIAL	DATE
DESIGNED BY	CDOH	6-74
CHECKED BY		
QUANTITIES BY		
DETAILED BY	MEPO	3-75
CHECKED BY		

DIVISION OF HIGHWAYS

HORSESHOE TYPE
TUNNEL SUPPORT
DETAILS

Designer	CDOH	Structure Numbers	F-13-X
Detailer	M Pulver		
Drawing Number	B 7	of 60	Drawings

Revision Dates (Transmittal Letter Dates)



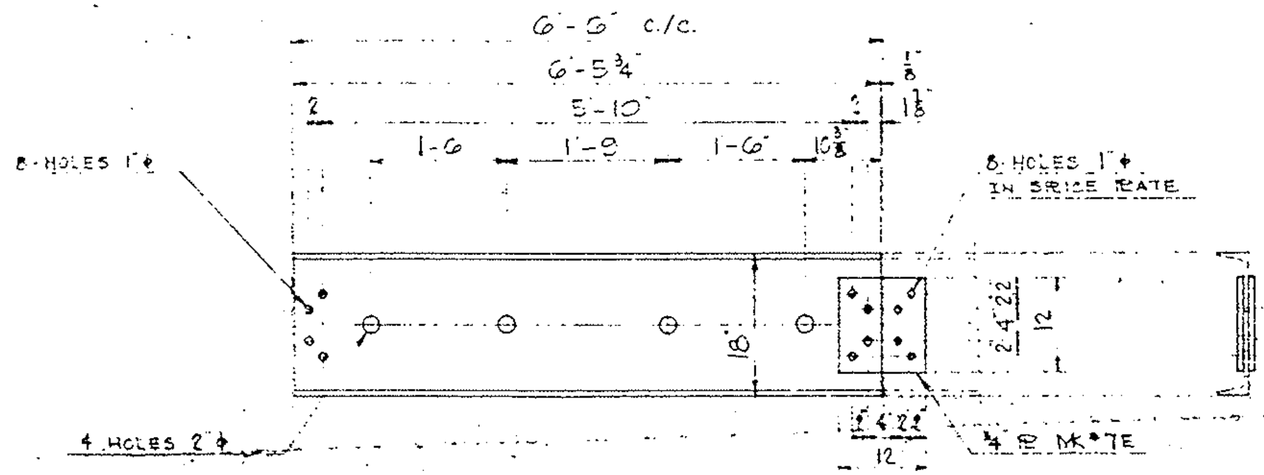
Note:
All Collar Brace Connection bolts shall be Grade A bolts conforming to ASTM specification A 307
XVIII
COLORADO
I 70-3(81)220
36
REVISIONS
AS CONSTRUCTED
Rock reinforcement, Threaded tieback, Resin Grouted, 20 Ft. Stradling sets as shown. 75 Ft # torque
℄ Set
PLAN
Note:
Arch rib is to be temporarily supported on sacked concrete foundation until bench is excavated and leg is installed
7/8" ϕ H.S. Bolts with flat washers (Typ)
L 3 x 3 x 1/2" width of set only
MC 18 x 42.7 Cont.
10°
Spring line and approximate bottom of top of heading excavation
2" ϕ Hole for #11 reinforcing bar (Typ)
2 - Splice Plates 3/4" x 12" x 1'-0"
H.S. Nut with shim washer for threaded #11 reinforcing bar
ELEVATION
SIDE VIEW
MC 18 x 42.7 - 4'-0" Long
R 3/4 x 12" x 1'-0"
SPLICE PLATE
DETAILS OF MC 18 x 42.7 TIEBACK INSTALLATION
MC 18 x 42.7 - 8'-0" Long
MC 18 x 42.7 - 12'-0" Long
℄ Tunnel Support Set
C 8 x 11.5
L 3" x 2" x 1/4"
L 3" x 2" x 1/4
7/8" x 3" Slots
C 8 x 11.5 Long
3/4 ϕ Bolt with flat washers
COLLAR BRACE CONNECTION DETAILS
TYPE XVIII
TYPE XIX
TYPE XX
TYPE XXI
TYPE XXII
Rock reinforcement, Threaded tieback, Resin Grouted, 16 Ft. Stradling sets as shown. 75 Ft # torque
C 9 x 20 x 2'-0" Long
H.S. Nut with shim washer for threaded #11 reinforcing bar
2" ϕ Hole for #11 reinforcing bar
Sacked Concrete
20°
ELEVATION
SIDE VIEW
TIEBACK AND SIDE LEG DETAILS
C 9 x 20 - 2'-0" Long
DIVISION OF HIGHWAYS
DETAILS TUNNEL SUPPORT HORSESHOE TYPE AND REINFORCING BAR BENDING DIAGRAMS

FOR GENERAL NOTES & TOLERANCES SEE DWG D5-559-5AAB-XX3

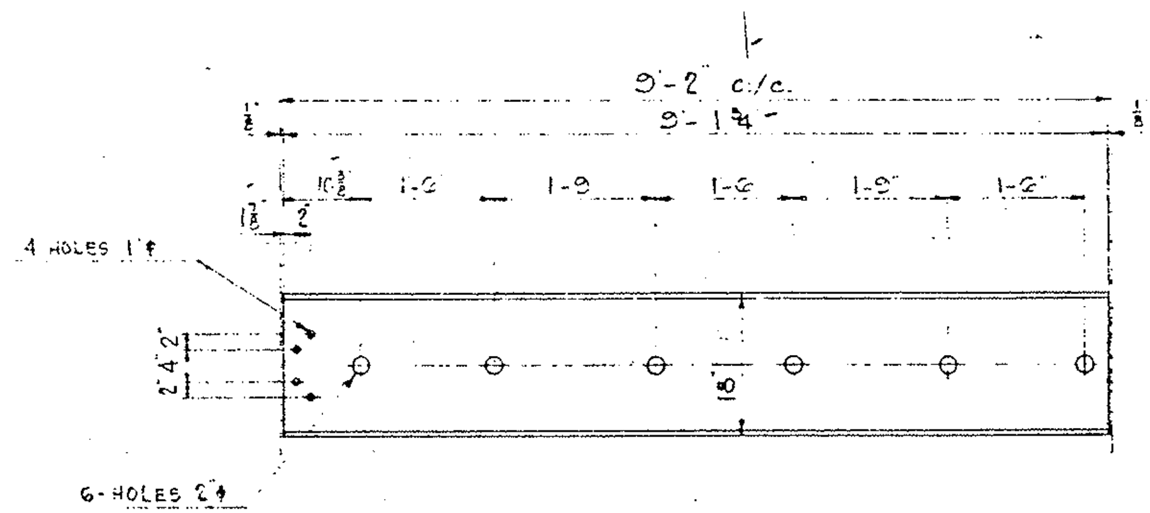
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL
VIII	COLORADO	I 70-3 (6) 229	36HX	273

AS CONSTRUCTED

NO REVISIONS [ ] REVISED [6-29-79] VOID [ ]



MC 18 x 42.7# MK# A07A



MC 18 x 42.7# MK# A07B

SECTION	MARK NO.	CUT LGTH	OPERATION
MC 18 x 42.7#	A07A	6'-5¾	1 CUT TO LGTH
	A07B	9'-1¾	2 PIERCE WEB

TOTAL WT	UNIT WT	DRAWING NO	PART NO	MARK NO	NO REQ'D	DESCRIPTION	MAT'L SPEC.
3905	3905	D5-559-5AAB-A07		A07B	1	MC 18 x 42.7# x 9'-1¾" N.N.A.	A36
MAT'L. REQ'D. PER TIEBACK MK# A07B							
.6	.07				8	HARDENED STEEL WASHERS FOR ⅞ H.S. BOLTS	A325
2.4	.30				8	⅞ HI. STRENGTH NUTS	
6.2	.77				8	⅞⌀ x 3¼ HI STRENGTH BOLTS	
61.2	30.6	D5-559-5AAB-A07		7E	2	¾" x 12" x 12" SPLICE PLATES	A36
276.7	276.7			A07A	1	MC 18 x 42.7# x 6'-5¾ N.N.A.	

TOTAL WT. FOR ____ COURSE — MAT'L. REQ'D. PER TIEBACK MK# A07A

REV SYM	DATE	REVISION	D.R. NO	CHG BY	CK BY
1	3-7-76	MK# A07B WAS 9'-1 C.C. & 5 HOLES 1"⌀ & 6 HOLES 2"⌀	2305	RJA	W.S.

APPROVED FINAL
DATE 4/16/76
BY Jack E. Day

COMMERCIAL SHEARING, INC. YOUNGSTOWN, OHIO 44501 U.S.A.

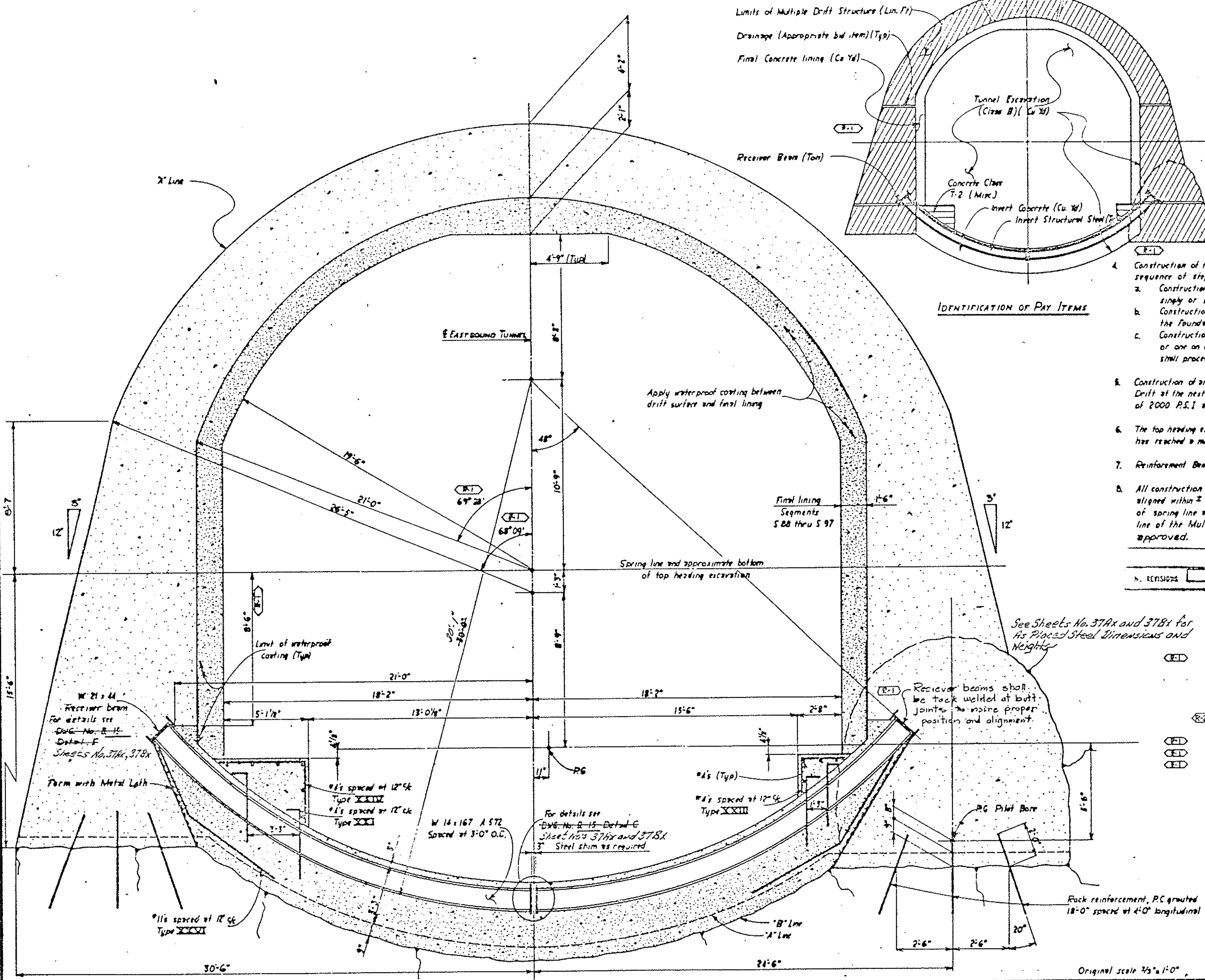
TIEBACK CHANNEL DETAILS
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO I 70-3(81)220 ~ COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

DATE 3-9-76 | DR. BY RJA | CK. BY KW | SCALE 1" = 1'-0"

DWG NO D5-559-5AAB-A07

Federal Road Region No.	District	Proj. No.	Sheet No.	Total Sheets
VIII	COLORADO	I 70-3(81)220	87	273

	Revisions		
R-1	7-3-75	Rev. Dimen., Quant., and Notes	BTS



Notes:

1. Construction of the multiple drift structure was by the multiple drift method.
2. No drift shall be greater than 12 Ft in width or greater than 13 Ft in height. The number and locations of drifts shall be such that the minimum dimensions of the multiple structure are accomplished without concrete intruding into the area of the final lining. The support of any individual drift shall be the responsibility of the Contractor.
3. All concrete shall be Class T-4. Except as shown in pay items identification.
4. Construction of the multiple drift structure shall be accomplished in the following sequence of steps.
   a. Construction of the Foundation drifts. These drifts may be constructed singly or simultaneously
   b. Construction of Crown Drift. This Drift may be constructed concurrent with the Foundation Drifts or, upon completion of the Foundation Drifts.
   c. Construction of Intermediate Drifts. These Drifts may be constructed singly or one on each side of the tunnel center line simultaneously. The Drift construction shall proceed from the Foundation Drifts upward to the Crown Drift.
5. Construction of an Intermediate Drifts shall not begin until the concrete placed in the Drift at the next lowest level has reached a minimum compressive strength of 2000 P.S.I as determined from cylinder tests taken during concreting.
6. The top heading excavation shall not begin until all concrete placed in the Drifts has reached a minimum compressive strength of 3000 P.S.I
7. Reinforcement Bending Diagrams are shown on drawing number R 15
8. All construction joints above spring line of the multiple Drift structure shall be aligned within ± 10° of a radial line whose origin is located at the intersection of spring line and centerline of the tunnel and all construction joints below spring line of the Multiple Drift structure shall be horizontal unless otherwise approved.

AS CONSTRUCTED

No. Revisions ______ Revised 6-29-79 Void ______

Summary of Quantities - Multiple Drift			Final
Item No.	Description	Unit	Total
211	Tunnel Excavation (Class B)	Cu Yd	27,241
211	Rock Reinforcement, Portland Cement		
	Grouted (18 Foot)	Ea.	831
211	Multiple Drift Structure	L.F	503
509	Structural Steel (Misc)	Ton	33.26
509	Structural Steel (W 14 x 167)	Ton	716.83
515	Waterproof Coating	Sq Yd	4774.96
601	Concrete, Class T 2 (Misc)	Cu Yd	358.64
601	Concrete, Class T 4 (Invert)	Cu Yd	3662.97
601	Concrete, Class T 4 (Final Lining)	Cu Yd	2,410.48
602	Reinforcing Steel	Ton	39

~~(1) Includes 703 Ton A 572 Steel~~

Original scale 3/8" = 1'-0"

DIVISION OF HIGHWAYS

MULTIPLE-DRIFT TUNNEL SUPPORT
REQUIRED SECTION, BASIS FOR BID

STATION 82+53 TO 87+56

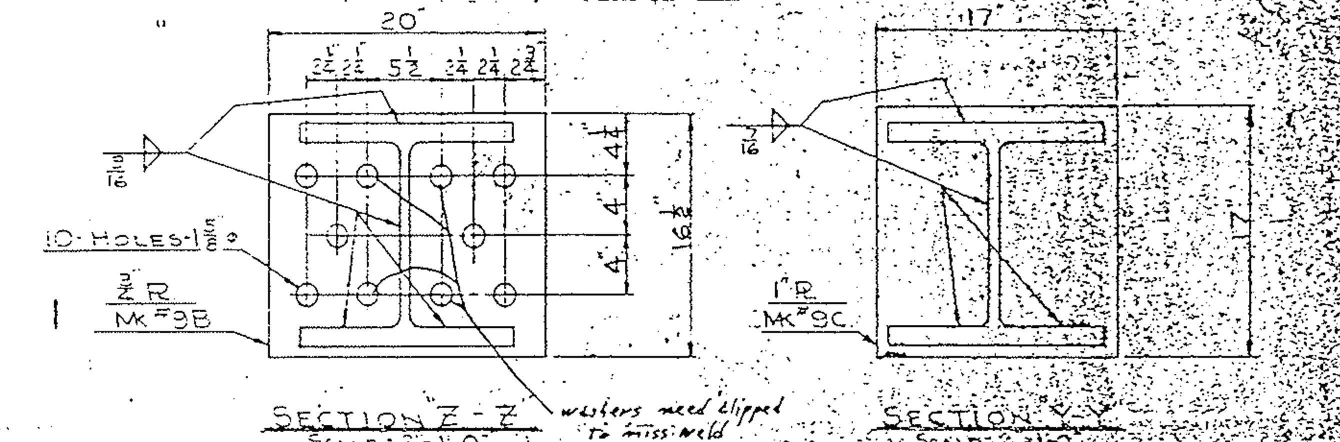
Designer C.D.O.H.		Structure Numbers	F-13-X
Detailer R. Steinhauser			
Drawing Number B 9		of 60	Drawings

Revision Date | (Preliminary Stage Only)

VIII	COLORADO	I 70-5 (61) 220	37AX	272

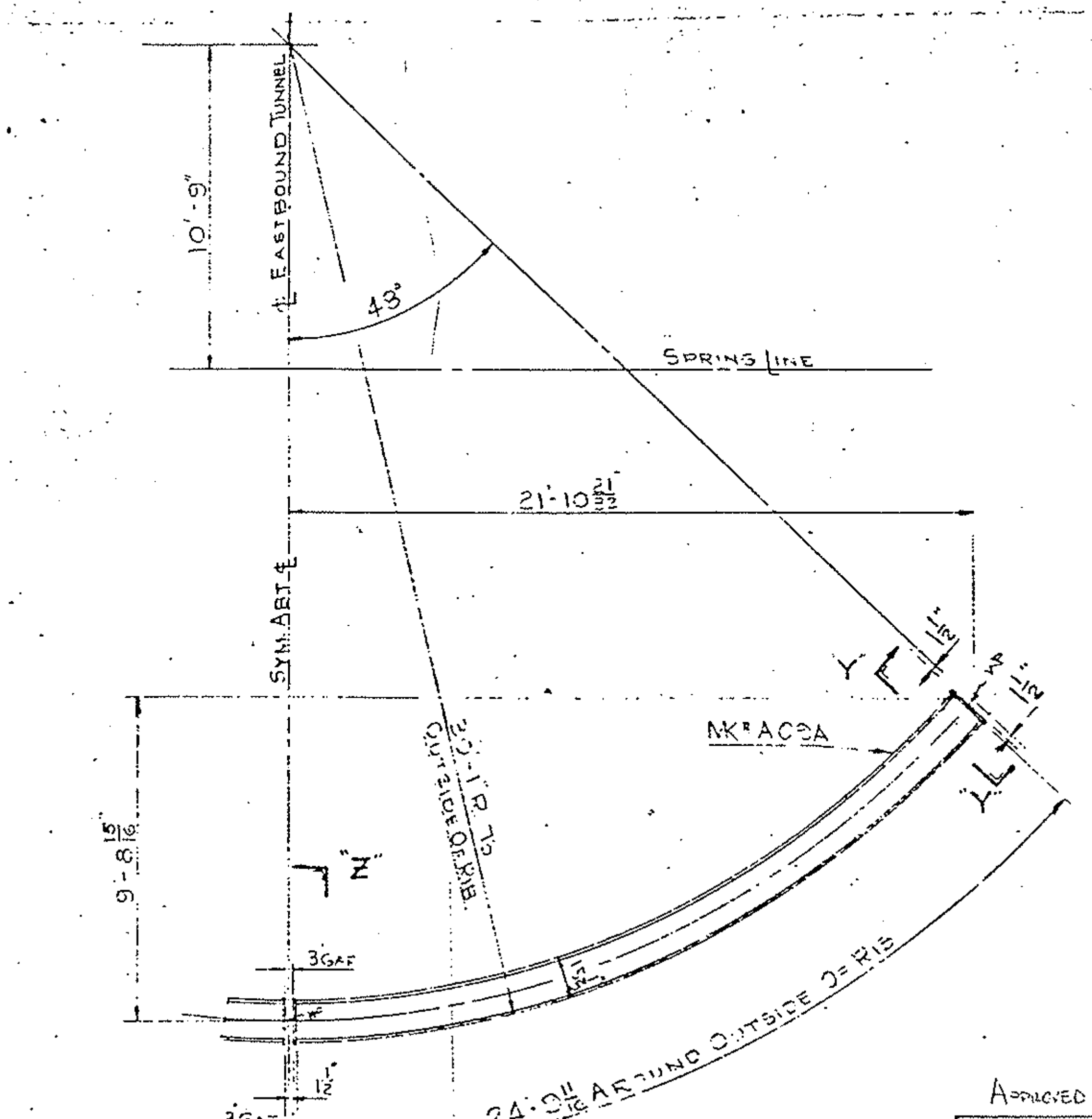
AS CONSTRUCTED

NO REVISIONS | REVISED 6-23-72



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

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



USED FROM
STA 82+53 TO 84+53

MULTIPLE DRIFT TUNNEL SUPPORT
2-PC. SET OF W14×167#
SCALE: 3/8"=1'-0"

Approved R.C. Sunston

APPROVED FINAL
DATE 2/10/78
BY Jack E. Hay

TOTAL WT.	UNIT WT.	DWG NO	TOTAL PAY WT. PER COURSE	MARK NO	NO REQD	DESCRIPTION	MAT. SPEC.
			No load indicator washers				
1.4	.14		(1.4)		10	LOAD INDICATOR WASHERS FOR 1½ BOLTS A325	
2.1	.21				10	HARDENED STEEL WASHERS FOR 1½ BOLTS	
13.1	1.31		42.3		10	1½ HI. STRENGTH NUTS.	
29.7	2.97				10	1½ × 6¾" HI STRENGTH BOLTS	
	51.9	D5-559-5AAB-A09	81.9	9C	1	1" × 17" × 17" END PLATE	
	70.1		70.1	9B	1	1¼ × 16½ × 20" BOTT PLATE	
	4055.0				1	W14×167# × 24'-3⅜"	NHA
8414.0	4207.0			A09A	2	STRUT ASSYS EA CONSISTING OF	

TOTAL WT FOR 1 COURSE
8460 3#

MAT'L REQ'D PER 2-PC SET

COMMERCIAL SHEARING, INC.

MULTIPLE DRIFT TUNNEL SUPPORT
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. No. I 70-5(61)220 COLO.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

DATE 9-12-77 | DR BY JJS | CH BY RJK | SCALE AS NOTED

REF. NO. D5-559-5AAB-XX1

DWG. NO. D5-559-5AAB-A09

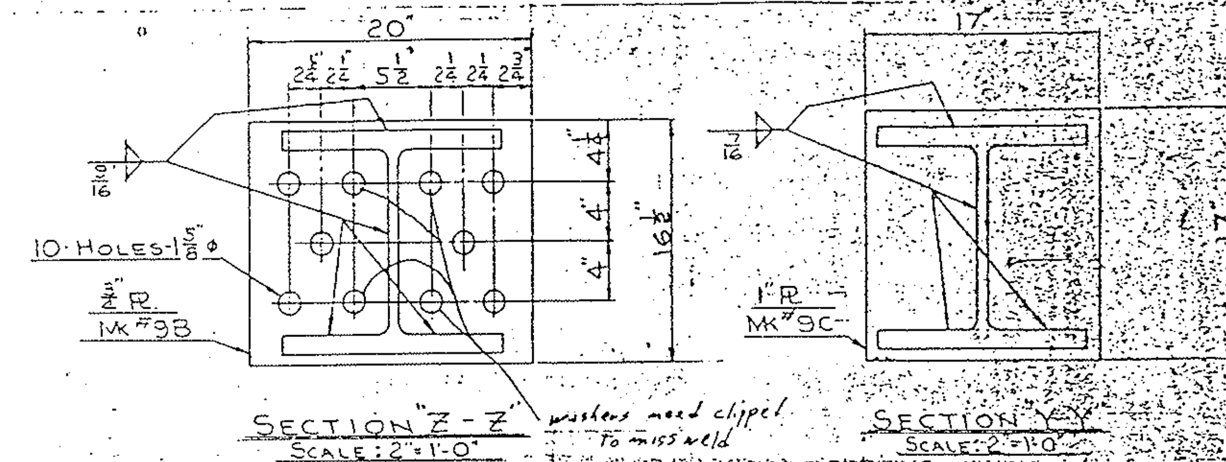
SECTION	OPERATION	MARK NO	CUT LGTH
W14×167#		A09A	24'-3⅜"
	1 CUT LENGTH		
	2 BEND		
	3 TRIM ENDS		
	4 ASSEMBLE		

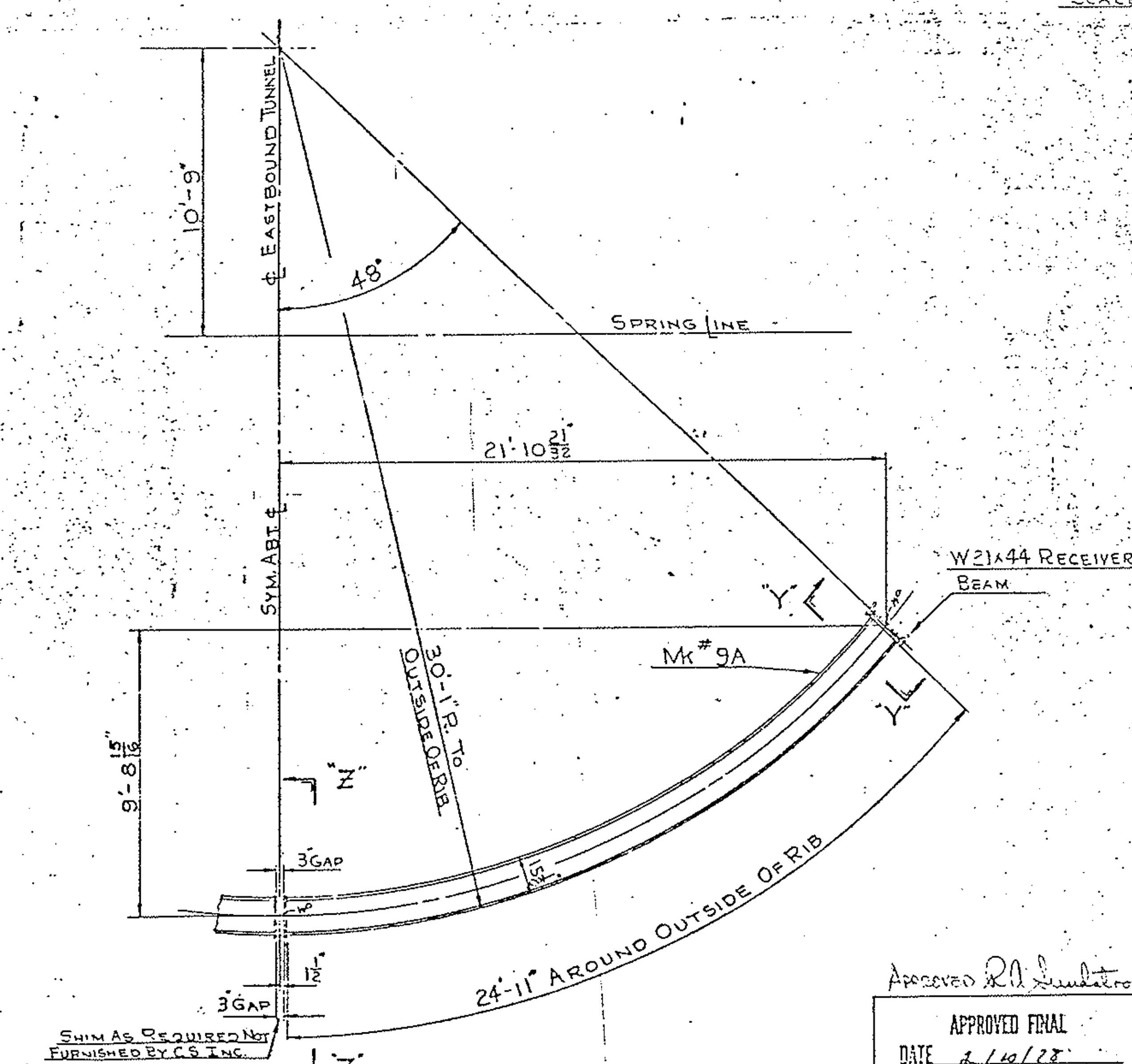
RISE 1'-11" | CHORD WP TO WP MEASURED ON ℄ RIB 23'-11½"

SPACE FOR REVIEWED & APPROVAL STAMP

SAME AS DWG D5-559-5AAB-C09 EXCEPT 1½" SHORTER

QUOTE ITEM 4 BID ITEM 60 — REF. DWGS B5 & B15





Used From
Sta 84+53 To 87+56

Multiple Drift Tunnel Support

2-Pc. Set Of W14×167#

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

Approved R.A. Lundstrom

APPROVED FINAL
DATE 2/10/78
BY Jack E. Gay

APPROVED FINAL
DATE: 5-17-76 BY: JACK E. GAY

Space For Reviewed & Approval Stamp

Total Wt.	Unit Wt.	Drawing No.	Total Pay Wt. Per Course 8470.3	Mark No.	No. Req'd	Description
1.4	.14		(1.4) — No load indicator washers		10	Load Indicator Washers For 1 1/2 Bolts A325
2.1	.21				10	Hardened Steel Washers For 1 1/2 Bolts
13.1	1.31		42.3		10	1 1/2 Hi. Strength Nuts
29.7	2.97				10	1 1/2 φ × 6 3/4 Hi Strength Bolts
	819	05-559-5AAB-009	81.9	9C	1	1" × 17" × 17" End Plate
	701		70.1	9B	1	3/4" × 16 1/2" × 20" Butt Plate
	4072.8		4061.3		1	W14×167# × 24'-4 1/32" NNA
8449.6	4224.9		8426.6	9A	2	Strut Assys Ea Consisting Of

Total Wt. For 1 Course: 8495.9#

Mat'l Req'd Per 2-Pc Set

Rev Sym.	Date	Revision	B.R. No.	Chg. By	Ck. By
3	9-12-77	Was Sta 82+53 To 87+56	2703	RJA	WFV
4	5-6-76	Added Pay Wts. Per Marked Print	2327	JJS	RJA

Commercial Shearing, Inc. Youngstown, Ohio U.S.A.

Multiple Drift Tunnel Support
Eisenhower Memorial Tunnel
2nd Bore Fed. No. I 70-3 (01) 220 Col.
Peter Kiewit Sons Co. And Brown & Root, Inc.

Date 3-30-76 | Dr. By KW | Ck. By RJA | Scale As Noted

B/M No. 05-559-5AAB-XX1
Dwg. No. 05-559-5AAB-009

Section	Mark No.	Cut Lgth.
W14×167#	9A	24'-10"

Oper. No.	Operation
1	Cut To Length
2	Bend
3	Trim Ends
4	Assembly

1'-11" Rise, 23'-11 1/2" Chord WP To WP Measured On ℄ Rib

Chord Cut To Out Of Plates Measured On ℄ Rib

Quote Item #4, Bid Item #60 — Ref. Dwgs B9 & B15

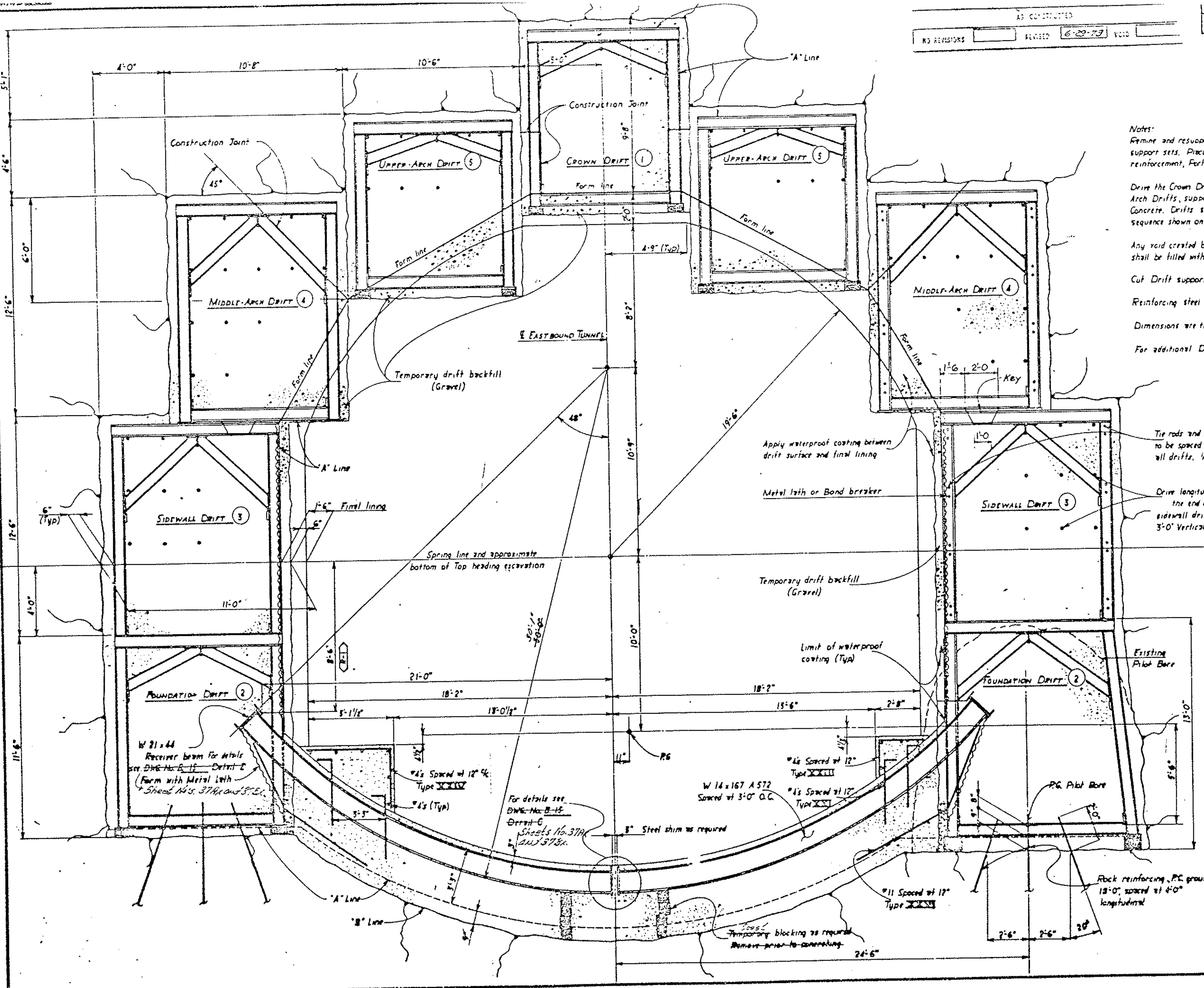
As Constructed

Region No.				
XII	COLORADO	I 70-3(81)220	38	2??

AS CONSTRUCTED

NO REVISIONS | REVISED 6-29-79 | VOID

	REVISIONS		
P-1	7-3-75	Rev. Dimension	PJS



Notes:

Remine and resupport the existing Pilot Bore to accommodate the Foundation Drift support sets. Place receiver beam, form blockout for invert strut, install rock reinforcement, Portland Cement grouted, as per plans, and backfill with Concrete.

Drive the Crown Drift, the North Foundation Drift, Sidewall Drifts, Middle and Upper-Arch Drifts, support, form blockouts, install rock reinforcement and backfill with Concrete. Drifts shall be driven and backfilled with concrete in the numbered (1) sequence shown on the Plans.

Any void created between the surface of the Drift concrete and the Bench material shall be filled with gravel.

Cut Drift support steel where necessary to accommodate final lining.

Reinforcing steel diagrams are shown on DWG. No. B 15

Dimensions are typical unless otherwise shown

For additional Drift details see DWG. No. B 16 & 17

For Additional Drift Information See Sheets No. 38Ax thru 38Dx.

Summary of Quantities for Information Only *		
Description	Unit	Total
Drift Excavation	Cu. Yd.	19,026
Drift Support	Ton	2,103
Drift Concrete	Cu. Yd.	19,?73
Rock Reinforcement Portland Cement Grouted. (18 Foot)	Ea.	66

* Not for Basis of Payment

See Sheets No. 37Ax and 37Bx for As Placed Steel Weights and Dimensions

Original scale: 3/16" = 1'-0"

DIVISION OF HIGHWAYS

MULTIPLE DRIFT TUNNEL SUPPORT
DIVISION'S PROPOSED METHOD OF CONSTRUCTION

STATION 82+53 TO 87+56

Designer: C.D.O.H		Structure Numbers	F-17-Z
Detailer: R. S[illegible]			
Drawing Number B 13		of 60	Drawings

Designed by: C.D.O.H.	Date: 7-73
Checked by: T.L.A.	7-73
Detailed by: R.V.S.	7-73
Quantities by: R.V.S.	7-73
Checked by: T.W.G.	7-73

AS CONSTRUCTED

NO REVISIONS [ ] REVISED [6-29-79] VOID [ ]

38Ax 273

SEEP DRAIN PLACEMENT E - EAST SIDE OF SET W - WEST SIDE OF SET B - CENTERED BETWEEN SETS			
STATION	SET	STATION	SET
82 + 59	2 W	85 + 05	85 W
+ 65	5	+ 14	88
+ 74	8	+ 23	91
+ 83	11	+ 29	93
+ 89	13	+ 38	96
+ 98	16	+ 47	99
83 + 07	19	+ 53	101
+ 13	21	+ 62	104
+ 22	24	+ 71	107
+ 31	27	+ 77	109
+ 37	29	+ 86	112
+ 46	32	+ 95	115
+ 55	35	86 + 01	117
+ 61	37	+ 10	120
+ 70	40	+ 19	123
+ 79	43	+ 25	125
+ 85	45	+ 34	128
+ 94	48	+ 43	131
84 + 03	51	+ 49	133 W
+ 09	53	+ 58	136 E
+ 18	56	+ 67	139 E
+ 27	59	+ 75	141 E
+ 33	61	+ 82	144 W
+ 42	64	+ 91	147 E
+ 51	67	+ 97	149 E
+ 57	69	87 + 06	152 E
+ 66	72	+ 15	155 E
+ 75	75	+ 21	157 E
+ 81	77	+ 30	160 W
+ 90	80	+ 39	162-163 E
+ 99	83 W	+ 45	165 E
		+ 54	168 W

INTERMEDIATE BULKHEADS BOTH DRIFTS	
STATION	SET
87 + 12	154
86 + 49	133 △
85 + 98	116
85 + 41	97
84 + 84	78
84 + 27	59
83 + 70	40
83 + 13	21

△1

HIGH OVERBREAK AREAS TO BE FILLED WITH GROUT BETWEEN SET NOS	
NORTH	SOUTH
12-13	9-10
28-29	18-19
	22-23

△1

GROUT PIPES TO BE INSTALLED FROM HIGH POINT INTO GRAVEL	
SET NO. NORTH	SET NO. SOUTH
~~[illegible]~~	~~10~~
24	~~[illegible]~~
~~[illegible]~~	~~[illegible]~~
45	46
67	68
90	105
106	128
135	
139	

NOTES

1- INSTALL 8 18' #11 CEMENT GROUTED ROCK REINFORCEMENT, LEAVING 3' PROJECTING INTO THE DRIFTS.

2- REMOVE ALL COLLAR BRACES AND TIE RODS EXCEPT THE LOWER INBOARD AND UPPER OUTBOARD.

3- CLEAN MUCK FROM MIDDLE ARCH DRIFT AND PLACE IN UPPER ARCH INVERT.

4- INSTALL SEEP DRAINS PER SCHEDULE. SEEP DRAINS MAY BE EITHER 2" PVC OR 2" STEEL PIPE. FILTER MATERIAL TO BE CLASS-A (¾" CONCRETE AGGREGATE). TOP OF SEEP DRAIN PIPE TO BE COVERED WITH A 6" SQUARE GALV. #4 MESH HARDWARE CLOTH. MINIMUM WIRE DIAMETER = .03 IN.

5- WELD #6 REBAR TO EVERY THIRD SET TO SUPPORT LONGITUDINAL REINFORCEMENT. INSTALL #11 LONGITUDINAL REINF. IN BUNDLES OF 3. START WITH A 20 FT. BAR, A 14 FT BAR AND A 6 FT. BAR FOR THE FIRST BUNDLE. THEN CONTINUE WITH 20 FT. BARS THROUGHOUT THE DRIFT. DO NOT LAP THE BARS AT JOINTS - BUTT THEM.

6- INSTALL #11 HOOK BARS. TIE THEM TO THE LONGITUDINAL BARS AND BAR SUPPORTS.

UPPER CROWN DRIFT HOOKS	2 / POST
LOWER " " "	2 / POST
LOWER MIDDLE ARCH DRIFT HOOKS	2 / POST
UPPER " " " "	4 / BAY

7- INSTALL SLICKLINE SUPPORTS EVERY THIRD SET. USE 2 x 2 x 3/16 ANGLE.

8- INSTALL WALKWAY SUPPORT ANGLES EVERY OTHER SET.

9- PLACE GRAVEL IN INVERT BLOCKOUT.

10- INSTALL VERTICAL REBAR BULKHEADS PER SCHEDULE.

11- ALL MISCELLANEOUS ANGLE BRACING IS 2" x 2" x 3/16 ANGLE.

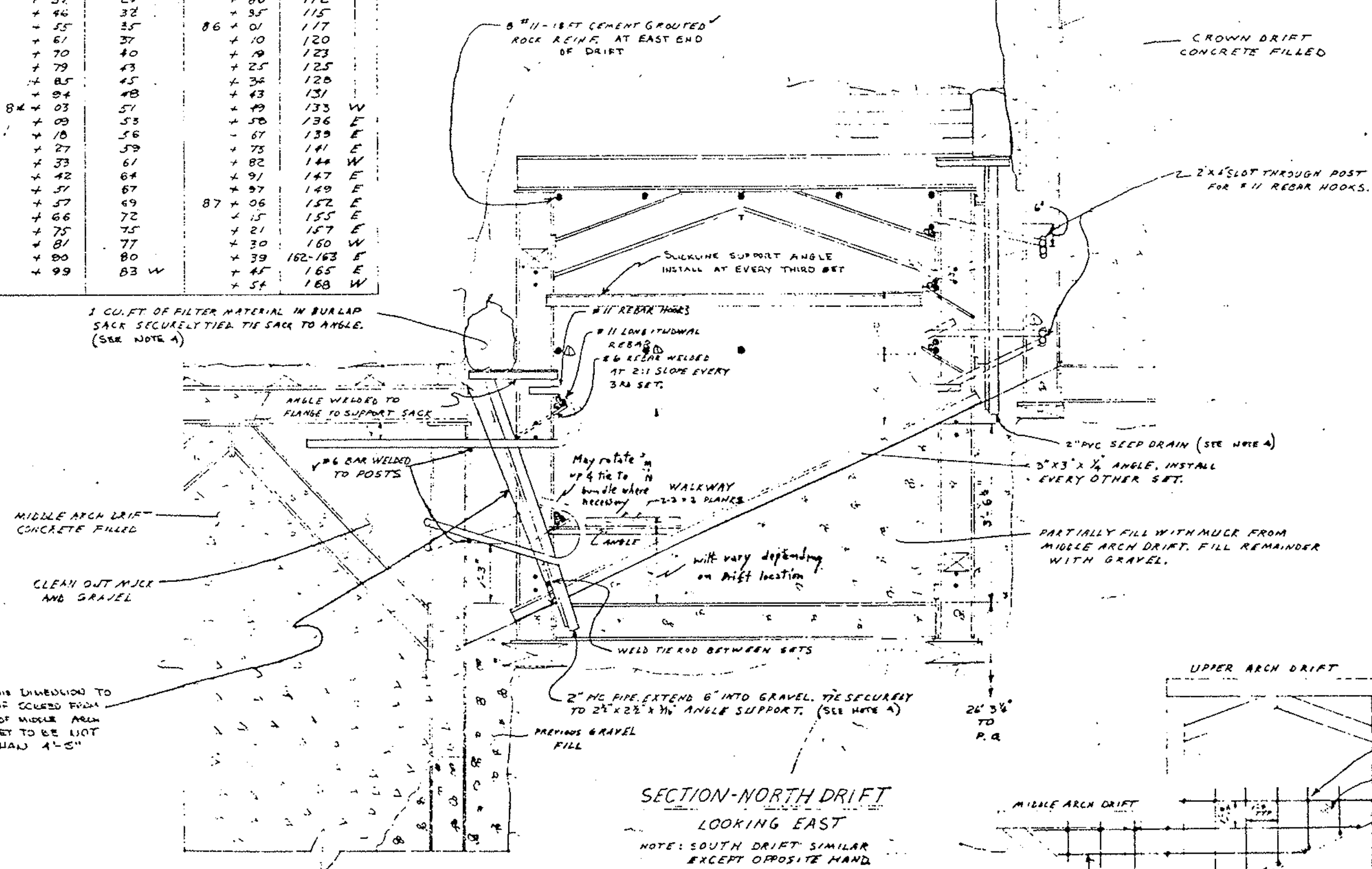
12- BACKFILL DRIFTS WITH T-4 CONCRETE.

13- IF CONCRETE PLACEMENT MUST BE SUSPENDED, INSTALL 6 #11 OR LARGER DOWELS 6 FT. LONG IN THE BULKHEAD. SIMILAR DOWELS WILL BE PLACED IN THE SLOPING JOINT @ 4' C/C OR AS DIRECTED BY THE ENGINEER.

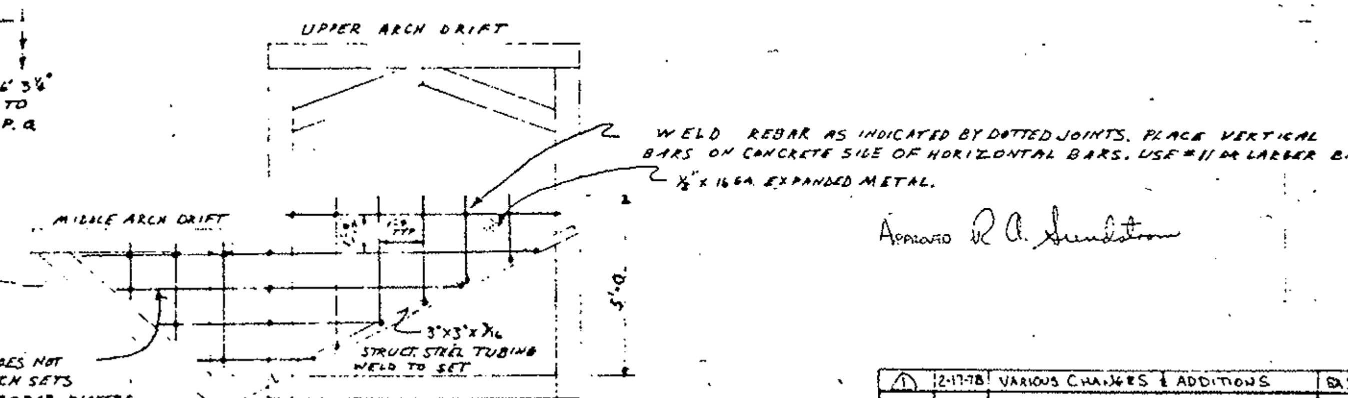
△1 14- 2" GROUT PIPE TO BE INSTALLED IN NORTH DRIFT @ SETS 6 & ~~[illegible]~~ AND IN SOUTH DRIFT @ SET 7 WITH SUPPLY LINES LEADING TO THE WEST PORTAL OF THE DRIFTS. GROUT IN THESE PIPES WILL BE PLACED PRIOR TO THE MAIN TUNNEL TOP HEADING EXCAVATION

△1 15- HIGH OVERBREAK AREA IN NORTH DRIFT BETWEEN SETS 141 & 142 TO BE FILLED WITH CONCRETE. HIGH BULKHEAD TO BE BUILT @ SET 133. CONCRETE TO BE PUMPED INTO OVERBREAK AREA AFTER DRIFT IS POURED TO SET 133.

△1 16- INSTALL 2" GROUT SUPPLY PIPE AND 2" VENT PIPE FROM WEST PORTAL OF DRIFTS TO HIGH OVERBREAK AREAS TO BE FILLED WITH GROUT. GROUT TO BE PUMPED IN THESE LOCATIONS AFTER DRIFTS ARE BACKFILLED WITH CONCRETE.



SECTION-NORTH DRIFT
LOOKING EAST
NOTE: SOUTH DRIFT SIMILAR EXCEPT OPPOSITE HAND
SCALE: 3/8" = 1'-0"



INTERMEDIATE BULKHEAD
SCALE: 3/8" = 1'-0"
SECTION-SOUTH DRIFT LOOKING WEST

APPROVED R. A. Sundstrom

REVIEWED
DATE 3/3/78
BY Jack E. Day

REV. NO	DATE	REVISION	BY
△1	2-17-78	VARIOUS CHANGES & ADDITIONS	BAS

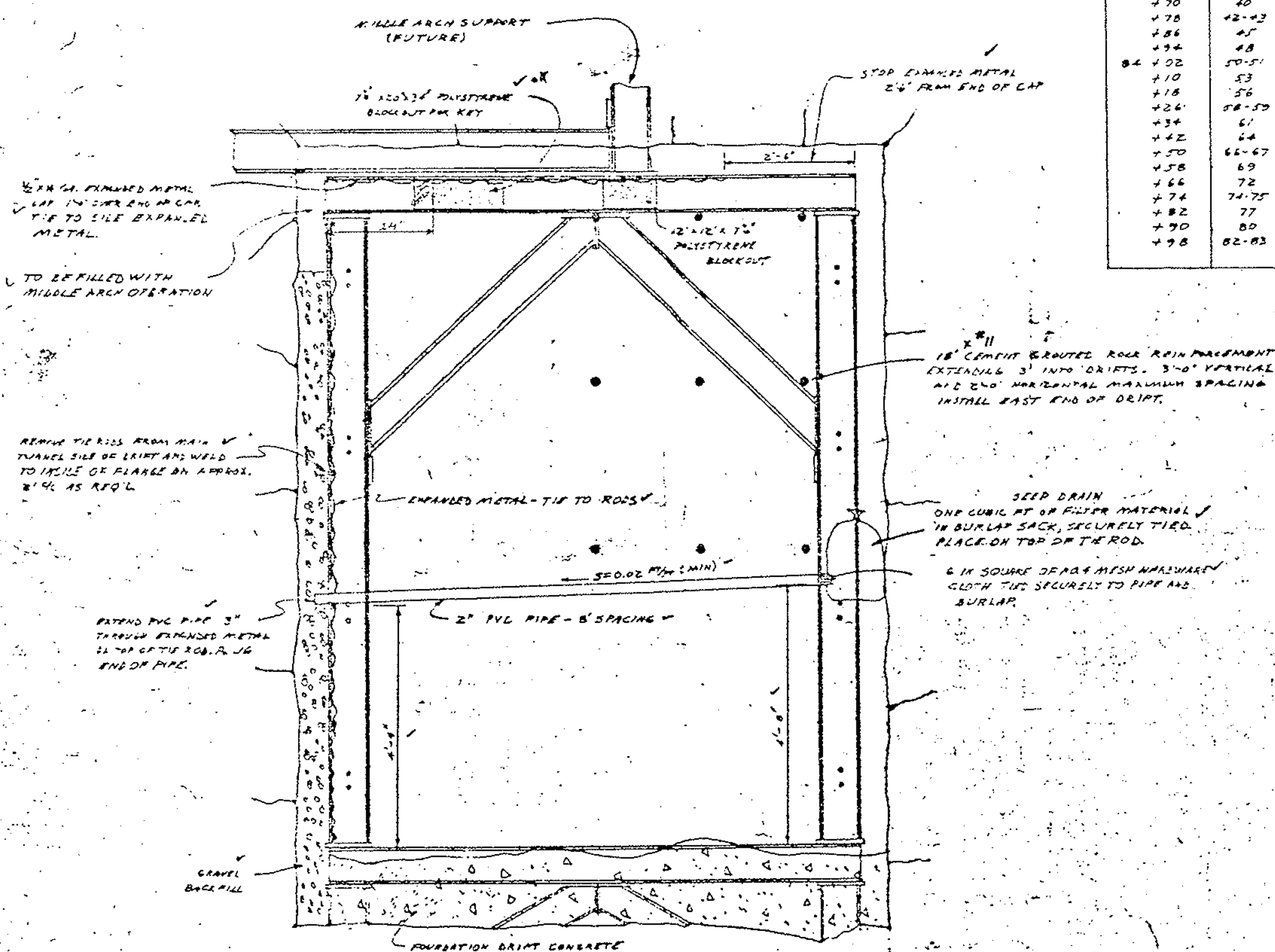
PETER KIEWIT SONS' CO.
and
BROWN & ROOT, INC.

SCALE: | DATE: 2/7/78 | DWN. BY: CWC | APP. BY:

Eisenhower Memorial Tunnel

UPPER ARCH DRIFT CONC. BACKFILL | DRAWING NO. 5068

6-29-79



SECTION NORTH DRIFT

LOOKING WEST

NOTE: SOUTH DRIFT SIMILAR EXCEPT OPPOSITE HAND

SEEP DRAIN PLACEMENT

A - AHEAD SIDE OF SET
B - BEHIND SIDE OF SET
BET - CENTERED BETWEEN SETS

STATION	SET		STATION	SET	
82 + 58	2-3	BET	85 + 06	85	A
+ 66	5	A	+ 14	88	B
+ 74	8	B	+ 22	90-91	BET
+ 82	10 - 11	BET	+ 30	93	A
+ 90	13	A	+ 38	96	B
+ 98	16	B	+ 46	98-99	BET
83 + 06	18 - 19	BET	+ 54	101	A
+ 14	21	A	+ 62	104	B
+ 22	24	B	+ 70	106-107	BET
+ 30	26-27	BET	+ 78	109	A
+ 38	29	A	+ 86	112	B
+ 46	32	B	+ 94	114-115	BET
+ 54	34-35	BET	86 + 02	117	A
+ 62	37	A	+ 10	120	B
+ 70	40	B	+ 18	122-123	BET
+ 78	42-43	BET	+ 26	125	A
+ 86	45	A	+ 34	128	B
+ 94	48	B	+ 42	130-131	BET
84 + 02	50-51	BET	+ 50	133	A
+ 10	53	A	+ 58	136	B
+ 18	56	B	+ 66	138-139	BET
+ 26	58-59	BET	+ 74	141	A
+ 34	61	A	+ 82	144	B
+ 42	64	B	+ 90	146-147	BET
+ 50	66-67	BET	+ 98	149	A
+ 58	69	A	87 + 06	152	B
+ 66	72	B	+ 14	154-155	BET
+ 74	74-75	BET	+ 22	157	A
+ 82	77	A	+ 30	160	B
+ 90	80	B	+ 38	162-163	BET
+ 98	82-83	BET	+ 46	165	A
			+ 54	168	B

NOTES:

1 - INSTALL 18" CEMENT GROUTED ROCK REINFORCEMENT (#11) LEAVING 3" PROJECTING INTO DRIFT.
2 - REMOVE COLLAR BRACES.
3 - REMOVE TIE RODS ON MAIN TUNNEL SIDE OF DRIFT. WELD TIE RODS TO INSIDE OF FLANGE AS SHOWN ON APPROX. 2' C/L SPACING AS REQ'D.
4 - INSTALL EXPANDED METAL - MAIN TUNNEL SIDE ONLY & ...
5 - INSTALL BLOCKOUTS FOR KEY AND BOLT HOLE PROTE...
6 - BACKFILL BEHIND EXPANDED METAL WITH GRAVEL.
7 - INSTALL BURLAP SACK OF FILTER MATERIAL ON TOP OF TIE ROD AS SHOWN. INSTALL 2" PVC PIPE AS SHOWN. TIE OUTLET END TO TIE ROD. PLUG END OF PIPE.
8 - CLEAN INVERT TO FOUNDATION DRIFT CONCRETE.
9 - BACKFILL DRIFT WITH T-4 CONCRETE. PLACEMENT OF CONCRETE WILL BE CONTINUOUS UNTIL COMPLETE.
10 - IF CONCRETE PLACEMENT MUST BE SUSPENDED, A JOINT WILL BE MADE USING A 3 TO 4 FOOT HIGH EXPANDED METAL & REBAR VERTICAL BULKHEAD.
11 - INSTALL 6 - #11 OR LARGER DOWELS 6'-0" LONG IN THE VERTICAL BULKHEAD. SIMILAR DOWELS WILL BE INSTALLED ON THE SLOPING JOINT @ 4'-0" C/C OR AS DIRECTED BY THE ~~[illegible]~~ Engineer.

REVIEWED
DATE 7-28-77
BY Jack E Ray

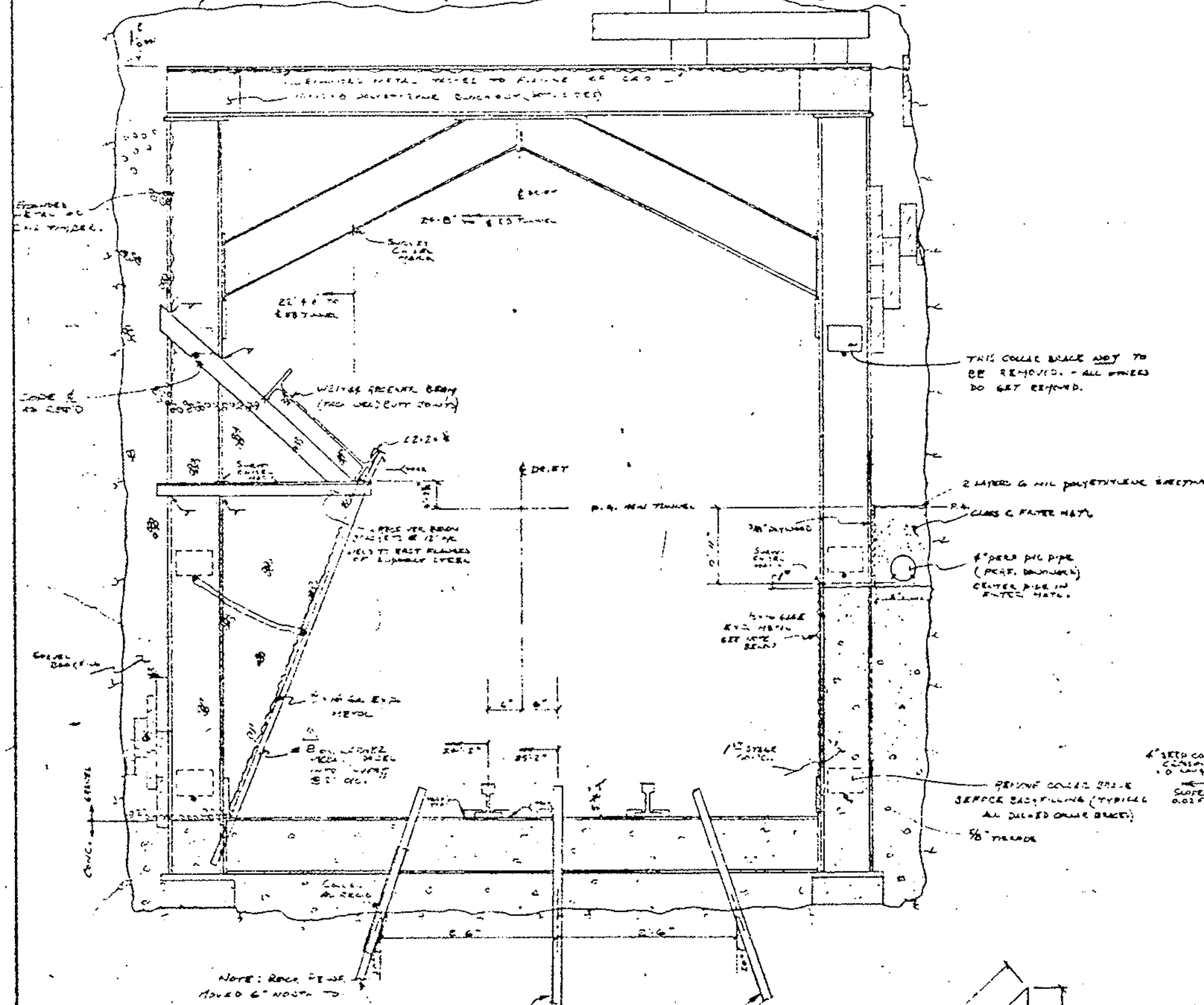
APPROVED R.C. [illegible]

PETER KIEWIT SONS' CO.

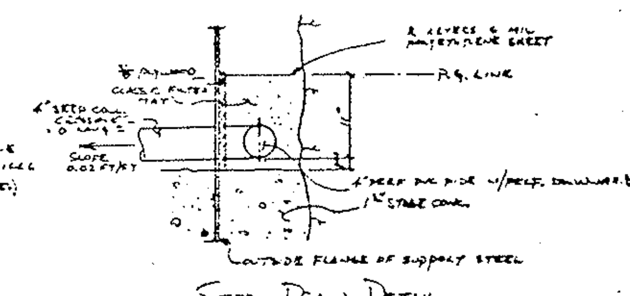
Eisenhower Memorial ...

NOTES:

1- Clean up loose material and timber to sound material.
2- Remove lower two collar braces on north side of drift.
3- Install expanded metal on north leg of ribs.
4- Reset rail as shown.
5- Pour 1st stage invert / north leg concrete as shown.
6- Drill, install / grout rock reinforcement.
7- Install plywood form ⚠
8- Install seep drain with crossover ... and backfill with filter material, covering with plastic sheeting when complete; see detail drawing.
9- Remove all collar braces on south side of drift.
10- Install receiver beam bracket as shown.
11- Install receiver beam, tack welding butt joints / tacking to bracket.
12- Install expanded metal above/behind receiver beam and over top flange of cap as shown.
13- Tack and/or wire expanded metal.
14- Place polystyrene blockout on rib cap, to protect bolt holes in cap.
15- Backfill behind receiver beam and south post with gravel.
16- Backfill drift with 7A concrete in pour lengths as determined in the field. Joints to be made with a 2 to 4 foot high expanded metal vertical bulkhead with the upper part on slope towards the west.
17- Install 6 - #H or ... dowels, 6'-0" ..., in the vertical bulkhead. ... will be installed on the sloping joint @ 4'-0" ... or as directed by the inspector.
18- All sloping joints to be green-cut.



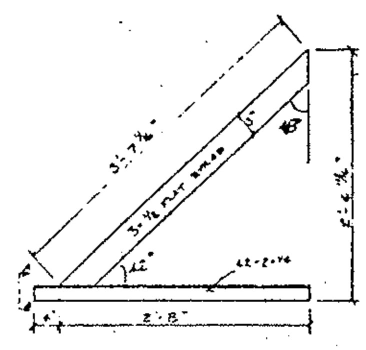
SECTION THRU DRIFT
LOOKING WEST
1" = 1'-0"



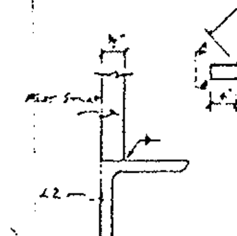
SEEP DRAIN DETAIL
1" = 1'-0"

4" SEEP COLLECTOR CROSSOVER LOCATIONS:
STA. 87+34
85+73
85+55
82+91

NOTE: ALL VERTICAL EXPANDED METAL TO BE WELDED @ 1½" EVERY 6", OR USE TO LASHING.



BRACKET DETAIL



SECTION A-A

REV. NO.	DATE	REVISION
1		ADDED 4" SEEP COLLECTOR CROSSOVER ...

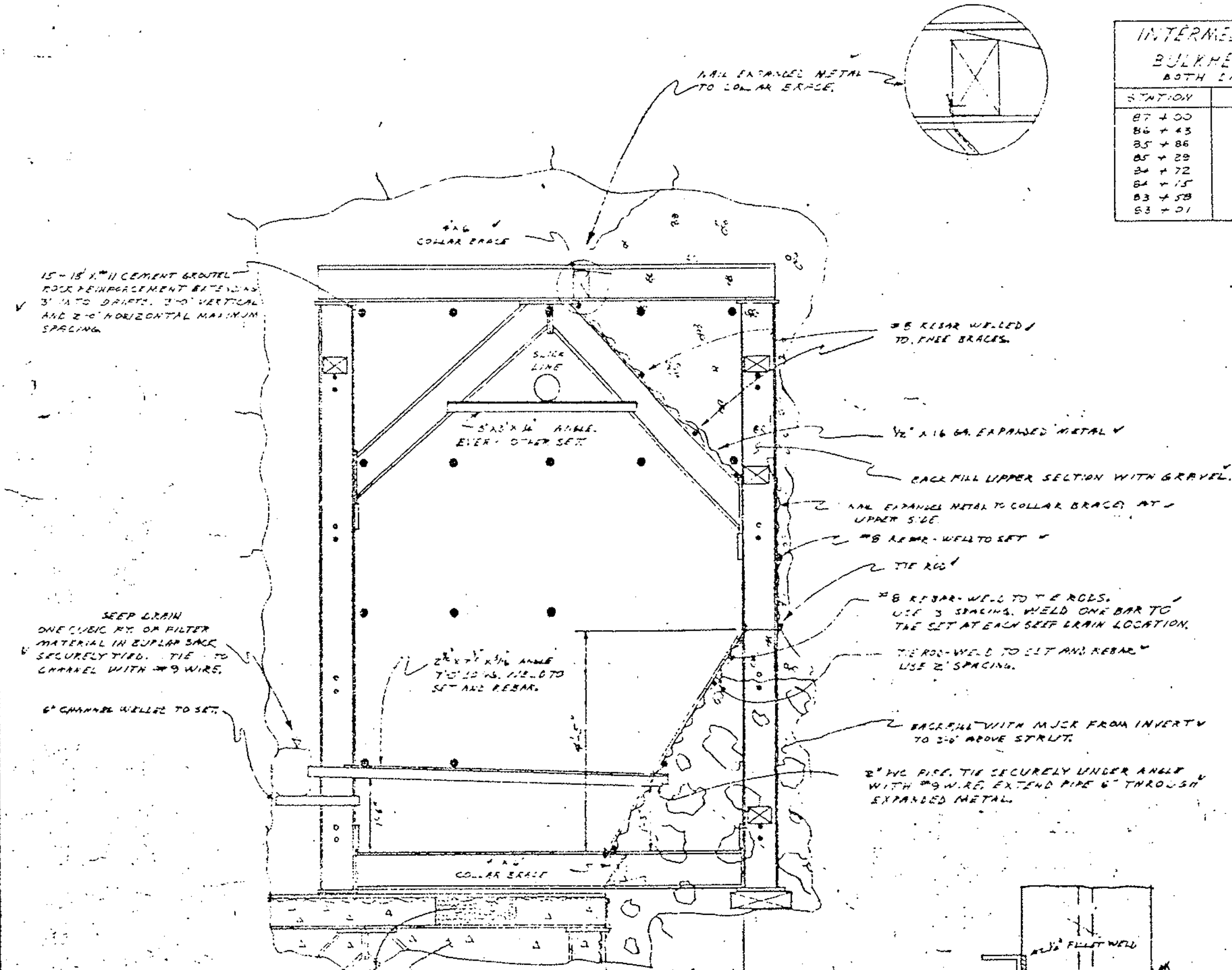
REVIEWED
DATE 3/2/72
BY Jack E. Fay

APPROVED R.O. ...

PETER KIEWIT SONS' CO.
and
BROWN & ROOT INC.

Eisenhower Memorial Tunnel

NORTH END. THRU MULTI-DRIFT



SECTION- NORTH DRIFT

LOOKING EAST

NOTE: SOUTH DRIFT SIMILAR EXCEPT OPPOSITE HAND

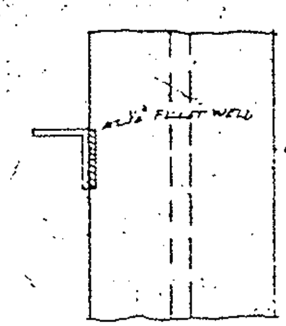
INTERMEDIATE BULKHEADS BOTH DRIFTS	
STATION	SET
87 + 00	150
86 + 43	131
85 + 86	112
85 + 29	93
84 + 72	74
84 + 15	55
83 + 58	36
83 + 01	17

SEEP DRAIN PLACEMENT
E - EAST SIDE OF SET
W - WEST SIDE OF SET
B - CENTERED BETWEEN SETS

STATION	SET	STATION	SET
82 + 59	2 W	85 + 05	85 W
+ 65	5	+ 14	88
+ 74	8	+ 23	91
+ 83	11	+ 29	93
+ 89	13	+ 38	96
+ 98	16	+ 47	99
83 + 07	19	+ 53	101
+ 13	21	+ 62	104
+ 22	24	+ 71	107
+ 31	27	+ 77	109
+ 37	29	+ 86	112
+ 46	32	+ 95	115
+ 55	35	86 + 01	117
+ 61	37	+ 10	120
+ 70	40	+ 19	123
+ 79	43	+ 25	125
+ 85	45	+ 34	128
+ 94	48	+ 43	131
84 + 03	51	+ 49	133 W
+ 09	53	+ 58	136 E
+ 18	56	+ 67	139 E
+ 27	59	+ 73	141 E
+ 33	61	+ 82	144 W
+ 42	64	+ 91	147 E
+ 51	67	+ 97	149 E
+ 57	69	87 + 06	152 E
+ 66	72	+ 15	155 E
+ 75	75	+ 21	157 E
+ 81	77	+ 30	160 W
+ 90	80	+ 38	162-163 B
+ 99	83 W	+ 45	165 E
		+ 54	168 W

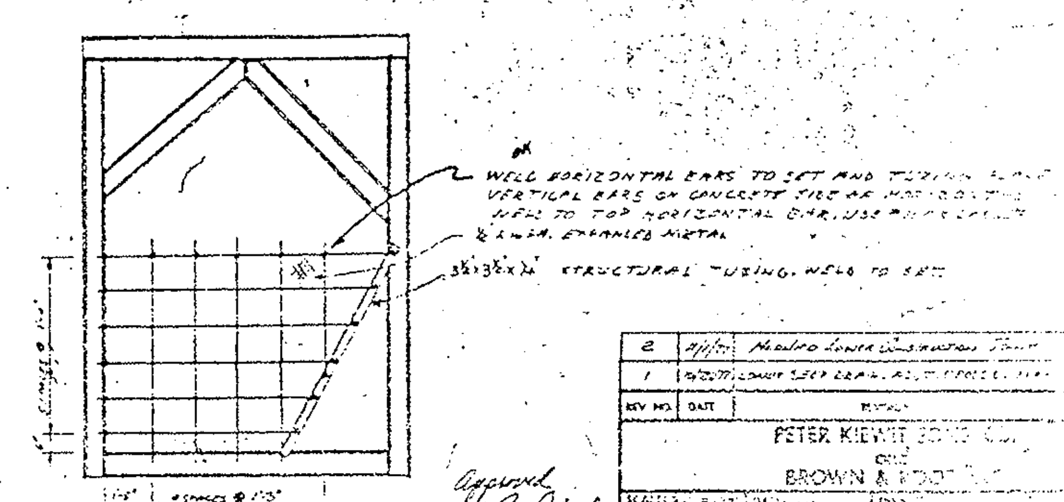
NOTES

1- INSTALL 15 X #11 CEMENT GROUTED ROCK REINFORCEMENT, LEAVING 3' PROJECTING INTO DRIFT.
2- REMOVE THE 4 MIDDLE TIE RODS AND COLLAR BRACES AND THE LOWER OUTBOARD TIE ROD [illegible] LEAVING THE OTHER LOWER AND UPPER ONES IN PLACE.
3- INSTALL REBAR AND TIE RODS FOR LOWER EXPANDED METAL SUPPORT. INSTALL EXPANDED METAL UP 4' AND BACKFILL WITH MUCK FROM THE INVERT [illegible] FOAM BLOCKOUT FROM INVERT.
4- INSTALL REMAINING REBAR AND EXPANDED METAL. BACK FILL WITH GRAVEL.
5- WELD SLICK LINE SUPPORT ANGLES APPROX. 2' BELOW CAP.
6- INSTALL CHANNEL SUPPORT AND BURLAP SACK OF FILTER MATERIAL FOR SEEP DRAIN. INSTALL ANGLE SUPPORT AND PVC PIPE AS PER SCHEDULE.
7- BACKFILL DRIFT WITH THE CONCRETE. PLACEMENT OF CONCRETE WILL BE CONTINUOUS UNTIL COMPLETED.
8- INSTALL 6' REBAR AND EXPANDED METAL VERTICAL BULKHEADS PER SCHEDULE.
9- IF CONCRETE PLACEMENT MUST BE SUSPENDED, INSTALL 16 - #11 GR [illegible] DOWELS 6'-0" LONG IN THE BULKHEAD. SIMILAR DOWELS WILL BE PLACED ON THE SLOPING JOINT @ 4'-0" C/C OR AS DIRECTED BY THE ENGINEER.
10- SEEP DRAIN LOCATIONS COINCIDE WITH THOSE IN THE SIDEWALL DRIFTS.



ANGLE DETAIL

NO SCALE



INTERMEDIATE BULKHEAD

SCALE 3/8" = 1'-0"

REVIEWED
DATE 11-4-77
BY Carl E. [illegible]

Approved H. Ray [illegible]

REV NO.	DATE	
2	[illegible]	[illegible]
1	[illegible]	[illegible]

PETER KIEWIT SONS' CO. and BROWN & ROOT INC.

Eisenhower Memorial Tunnel

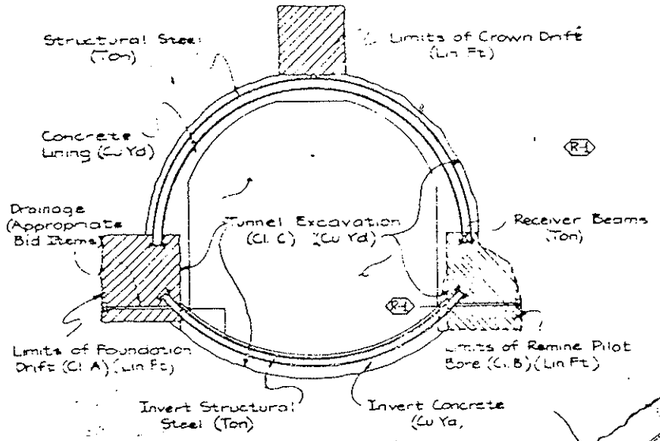
6-29-77

Crown Drift Size	Crown Beam
8'0 × 8'0	2-W14 × 87
9'0 × 9'0	2-W14 × 111
10'0 × 10'0	2-W14 × 136
11'0 × 11'0	2-W14 × 157

FEDERAL AID PROJECT NO.	DISTRICT	PROJECT NO.	SHEET NO.	TOTAL SHEETS
XXX	COLORADO	I70-3(81)220	39	5??

REVISIONS		
R-1	7-3-75 Rev. Dimen., Quan., & Notes	B.R.L.

INITIAL	DATE	DESIGNED BY	CHECKED BY	
C.D.O.H.	2-75			
		QUANTITIES BY	J.L.A.	5-75
L.L.	5-75	DRAWN BY	K.W.G.	5-75
		CHECKED BY		
		DETAILED BY		



Indentification of Pay Items

Details of Longitudinal Spacing of Crown Drift Rock Reinforcement

See Sheet No. 39Rx for Rx Placed Steel Weights and Dimensions

Notes:

1. This support ~~shall be~~ was used:
   Sta 94+~~66~~ to Sta ~~97+06~~ 96+96
   Sta 98+~~56~~ to Sta. ~~101+90~~ 99+18
   ~~Sta 103+44 Sta 103+62 to Sta 104+90~~ 101+30
   ~~Sta 113+42 Sta 107+90 to Sta 108+46~~ 104+56
   Sta. 107+42 to Sta. 108+94
   Sta. 108+88 to Sta. 103+40
2. Steel support – Arch W14×95, A36 @ 4'0 C/C.
   Invert W14×95, A36 @ 4'0 C/C
3. Concrete:

First stage lining	Class T-1
Crown drift	Class T-2
Foundation drift	Class T-2
Invert	Class T-2
Final lining (Seg. S113 thru Seg S115, Seg S121 thru Seg. S125 and Seg. S130 thru Seg. S131)	Class T-4
All other concrete	Class T-2(Misc)

4. Driving of the north foundation drift and crown drift, and reming of Pilot Bore may be done simultaneously.
5. Any voids created between the surface of the drift concrete and the bench material shall be filled with approved material.
6. Top heading excavation shall not begin until all concrete placed in the drifts has reached a minimum compressive strength of 3000 psi.
7. For reinforcing steel banding diagrams see Dwg. No. B 15

Summary of Quantities - Light 3 Drift

Item		Description	Unit	Total
R-1	211	Tunnel Excavation (Class C)	Cu Yd	41,677
	211	Rock Reinforcement, Portland Cement Grouted (12 Foot)	Ea	697
	211	Rock Reinforcement, Portland Cement Grouted, (18 Foot)	Ea.	1005
	211	Rock Reinforcement, Threaded Tieback, Resin Grouted, (20 Foot)	Ea	704
	211	Foundation Drift (Class A)	Lin Ft	700
	211	Crown Drift	Lin Ft	700
	509	Structural Steel (Misc.)	Ton	138.52
	509	Structural Steel (W14×95)	Ton	1042.6
	515	Waterproof Coating	Sq Yd	7460.3
R-1	601	Concrete, Class T-1, (First Stage Lining)	Cu Yd	4661.97
R-2	601	Concrete, Class T-2, (Invert)	Cu Yd	1861.9
R-3	601	Concrete, Class T-2, (Misc.)	Cu Yd	462.7
R-4	601	Concrete, Class T-4, (Final Lining)	Cu Yd	2,324.36
	602	Reinforcing Steel	Ton	9

DIVISION OF HIGHWAYS

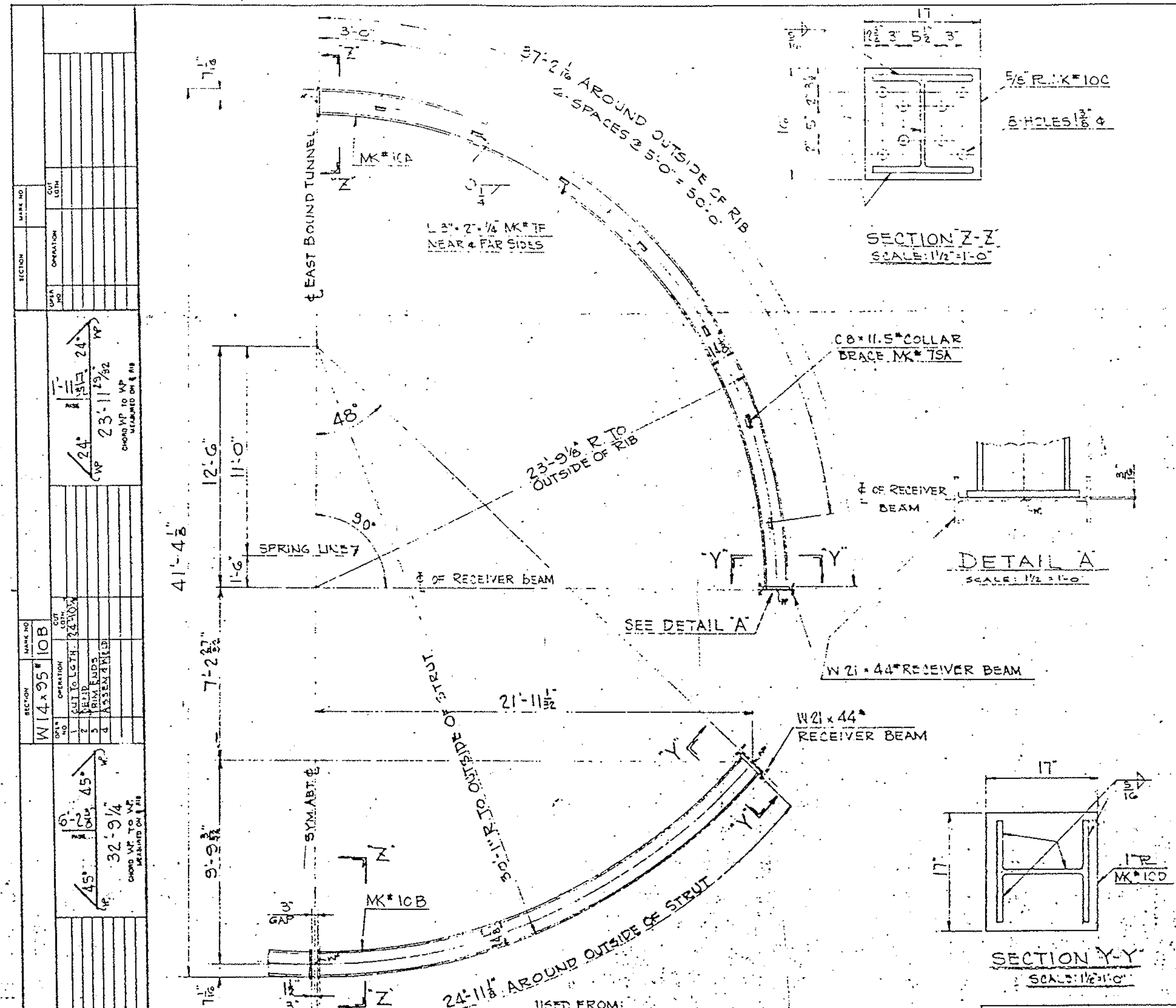
Light Tunnel Support 3 Drift Type Required Section, Basis for Bid

Designed C.D.O.H.	Structure Numbers	F-15-X
Detailed E R Lane		
Drawing Number B 11	of 60	Drawings

Revision Dates (Preliminary Surge Only)

TIC	COLORADO	I 70-3 (57) 220	39AX	273

AS CONSTRUCTED
NO REVISIONS ☐ REVISED 6-29-78 VOID ☐



USED FROM:
STA. 94+66 TO STA. 96+66
STA. 96+66 TO STA. 97+72
STA. 100+76 TO STA. 101+44
STA. 101+83 TO STA. 103+46
STA. 101+44 TO STA. 103+44
STA. 103+29 TO STA. 107+42

LIGHT TUNNEL SUPPORT 3-DRIFT TYPE
2-PC. SET OF W14 × 95# WITH STRUT
SCALE: 3/8"=1'-0"

QUOTE ITEM E.S BID ITEM 57
REF. DWG. NO. B11

APPROVED FINAL
DATE 3/26/77
BY Jack E. Day

APPROVED FINAL
DATE: 8-26-76 BY: JACK E. GAY

Approved, H. Guy Poulain Jr.

TOTAL WT.	UNIT WT.	DRAWING NO.	TOTAL PAY WT.	MARK NO.	NO. REQ'D.	DESCRIPTION	MAT'L SPEC.
11.2	.10		11.2		112	STD. FLAT WASHERS FOR ¾ Φ BOLT	A307
7.8	.14				56	¾" SQ. T.L. NUTS	
20.7	.37		28.5		56	¾" × 2" SQ. HD. T.L. BOLTS	
627.2	44.8	D5-559-5AAB-007	627.2	7SA	14	C 8 × 11.5# COLLAR BRACES	A36
TOTAL WT. FOR COLLAR BRACES 666.9#			TOTAL PAY WT. FOR COLLAR BRACES 664.9#				
2.1	.13		2.1		16	LOAD INDICATOR WASHERS FOR 1¼ Φ BOLT	A325
2.2	.14				16	HARDENED STEEL WASHERS FOR 1¼ Φ BOLT	
12.6	.79		33.9		16	1¼" HI STRENGTH NUTS	
28.2	1.76				16	1¼" Φ × 3¼" HI STRENGTH BOLTS	
	81.9	D5-559-5AAB-010	81.9	10D	1	1" × 17" × 17" END PLATE	A36
	48.2		48.2	10C	1	⅝" × 16" × 17" BUTT PLATE	
	2321.1		2314.6		1	W 14 × 95# × 24'-5 3/16" NNA	
4902.4	2451.2		4885.4	10B	2	STRUT ASSYS. EA. CONSISTING OF	
	19	-007	26.6	1F	14	L 3" × 2" × ½" × 5½" LG	
	81.9	-010	81.9	10D	1	1" × 17" × 17" FOOT PLATE	
	48.2		48.2	10C	1	⅝" × 16" × 17" BUTT PLATE	
	3446.8		3431.2		1	W 14 × 95# × 36'-3" NNA	
7201.0	3600.5		7175.3	10A	2	ARCH RIB ASSYS. EA. CONSISTING OF	

TOTAL PAY WT. PER COURSE 12,101.2#

TOTAL WT. FOR 1 COURSE LESS COLLAR BRACES 12,148.5#

MATL. REQD. PER COURSE OF RIBS

COMMERCIAL SHEARING, INC.

LIGHT TUNNEL SUPPORT 3 DRIFT TYPE
EISENHOWER MEMORIAL TUNNEL
2ND. BORE PROJ. No. I 70-3 (61) 220 — COLO.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

REV. SYM.	DATE	REVISION	D.R. NO.	CHG. BY	CK. BY
②	3-16-77	ROTATED CLIP ANGLES ON MK# 10A	2575	WFY	
①	5-26-76	ADDED DETAIL "A" ; PAY WTS	2347	RJA	JJS

DATE 3-29-76 | DR. BY | CK. BY | SCALE AS NOTED

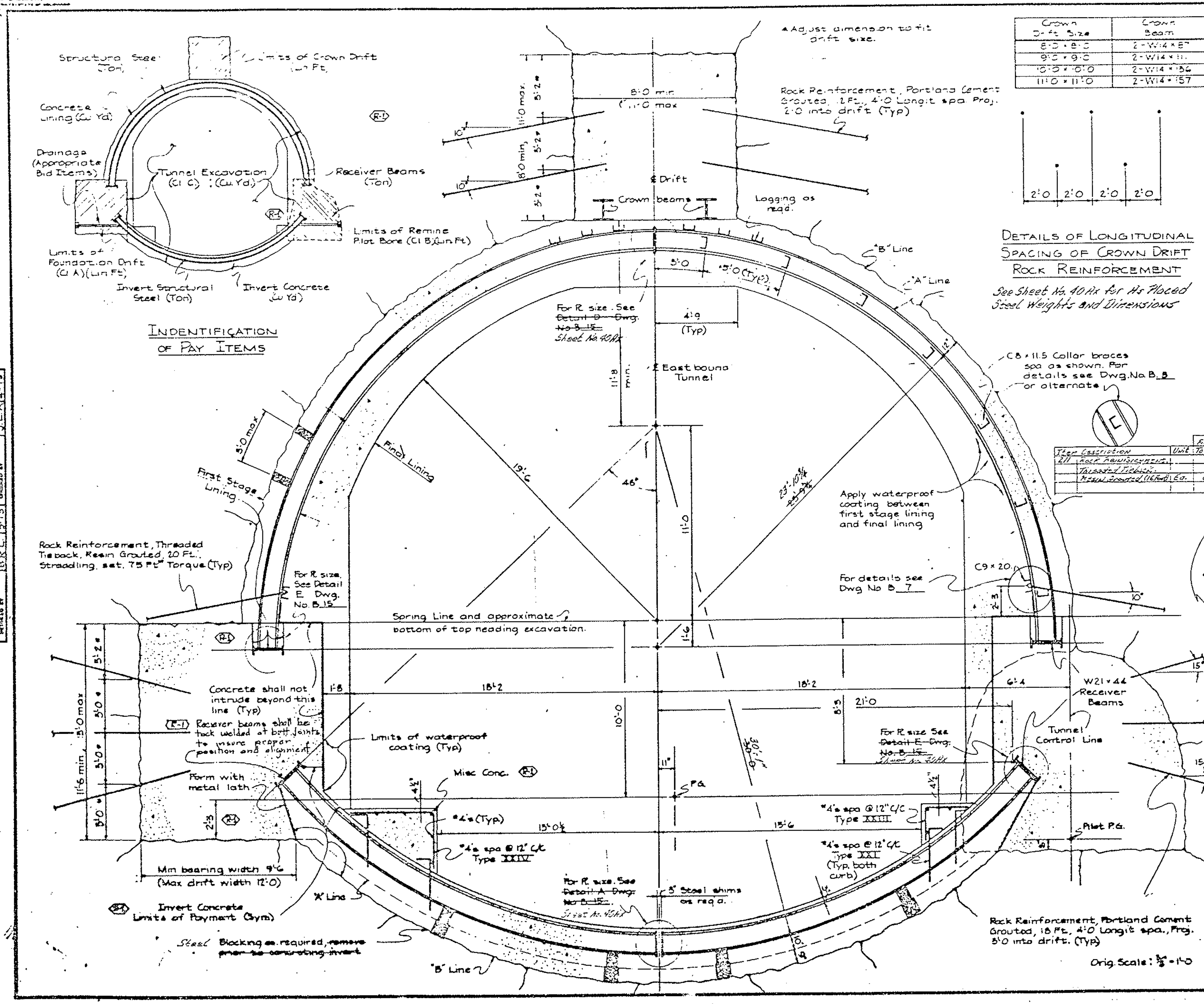
REF. NO. D5-559-5AAB-XX1
DWG. NO. D5-559-5AAB-010

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VI	COLORADO	I70-3(81)220	40	273

	REVISIONS	
R-1 7-3-75	Rev. Dimen., Quan., & Notes	B.R.L.

AS CONSTRUCTED — NO REVISIONS [ ] REVISED 6-29-79 VOID [ ]

Crown Drift Size	Crown Beam
8'-0 × 8'-0	2 - W14 × 87
9'-0 × 9'-0	2 - W14 × 111
10'-0 × 10'-0	2 - W14 × 136
11'-0 × 11'-0	2 - W14 × 157



NOTES:

1. This support was used:
   - Sta 87 + 56 to Sta 94 + 62
   - Sta. 96+50 to Sta 98 + 38
   - Sta. 99+22 to Sta 100+14
   - Sta. 101+34 to Sta. 103+12
   - Sta. 104+50 to Sta 107+40
   - Sta. 108+48 to Sta. 1?+84
2. Steel support – Arch W14 × 211, A572 @ 4'-0 C/C. Invert W14 × 150, A36 @ 4'-0 C/C.
3. Concrete:

First stage lining	Class T-3
Crown drift	Class T-2
Foundation drift	Class T-4
Invert	Class T-2
Final lining: Seg S98 thru Seg S112; Seg. S116 thru Seg S120; Seg S126 thru Seg. S129; Seg S132 thru Seg. S141	Class T-4
All other concrete	Class T-2 (Misc)

4. Driving of the north foundation drift and crown drift, and remining of Pilot Bore may be done simultaneously.
5. Any voids created between the surface of the drift concrete and the bench material shall be filled with approved material.
6. Top heading excavation shall not begin until all concrete placed in the drifts has reached a minimum compressive strength of 3000 psi.
7. For reinforcing steel bending diagrams see Dwg No B 16.

Item	Description	Unit	Final Total
211	Rock Reinforcement, Threaded Tieback, Resin Grouted (16 Ft)	Ea.	67

SUMMARY OF QUANTITIES – HEAVY 3 DRIFT

Item	Descriptions	Unit	Final Total
211	Tunnel Excavation (Class C)	Cu Yd	55,954
211	Rock Reinforcement, Portland Cement Grouted, (12 Foot)	Ea.	1,468
211	Rock Reinforcement, Portland Cement Grouted, (18 Foot)	Ea.	2,121
211	Rock Reinforcement, Threaded Tieback, Resin Grouted, (20 Foot)	Ea.	1,491
211	Foundation Drift (Class A)	Lin Ft	1,496
211	Crown Drift	Lin Ft	1,486
509	Structural Steel (Misc)	Ton	272.94
509	Structural Steel (W14 × 150)	Ton	1,466.65
509	Structural Steel (W14 × 211)	Ton	2,929.37
515	Waterproof Coating	Sq Yd	15,170.57
601	Concrete, Class T-2, (Invert)	Cu Yd	3,351.32
601	Concrete, Class T-2, (Misc)	Cu Yd	952.12
601	Concrete, Class T-3, (First Stage Lining)	Cu Yd	3098.32
601	Concrete, Class T-4 (Final Lining)	Cu Yd	11,424.59
602	Reinforcing Steel	Ton	19

~~Includes 3,901 Tons of A572 Steel.~~

DIVISION OF HIGHWAYS

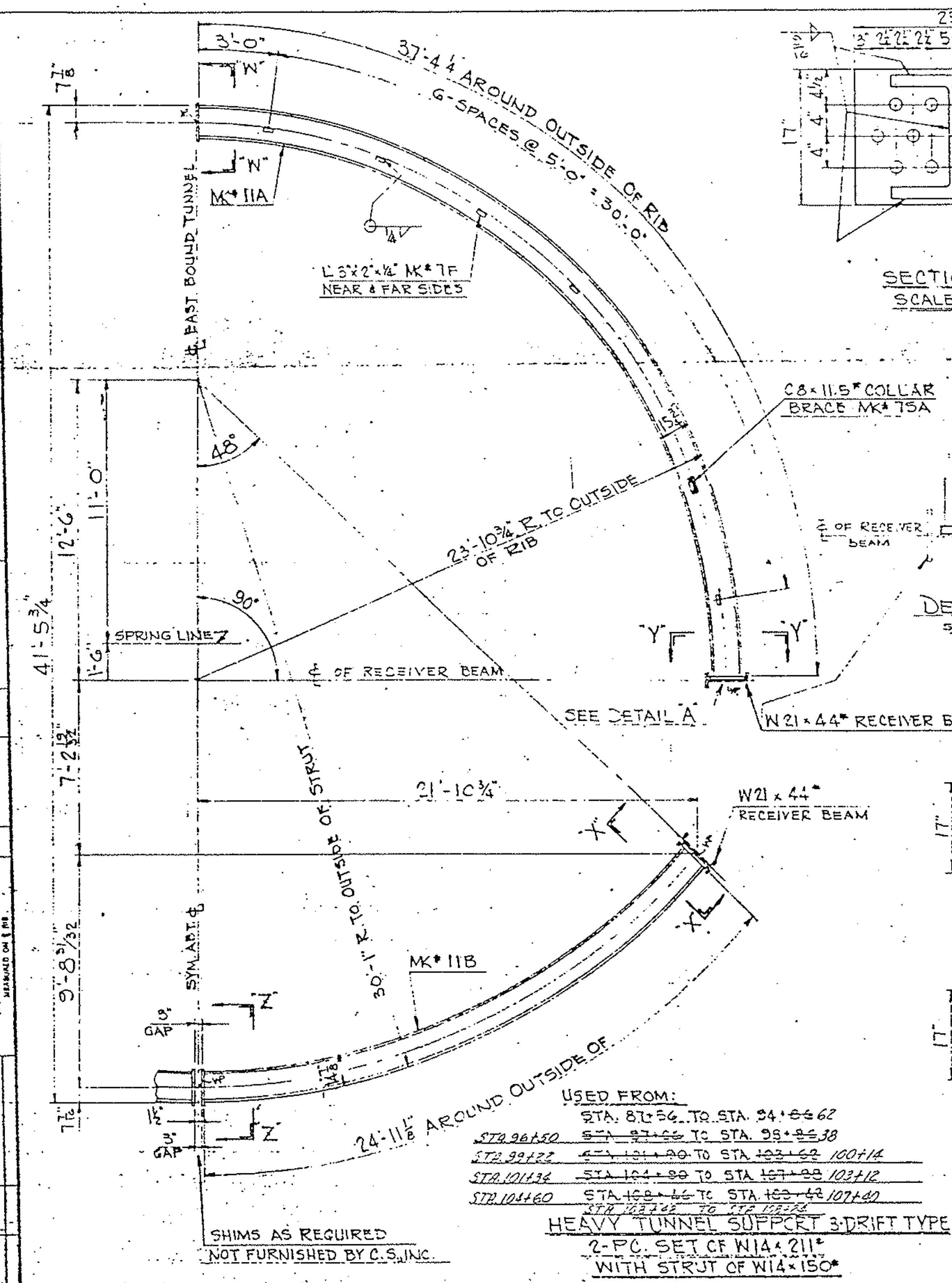
HEAVY TUNNEL SUPPORT 3 DRIFT TYPE REQUIRED SECTION, BASIS FOR BID

Designer: C.D.O.H.
Drawing No. B 12

AS CONSTRUCTED

NO REVISIONS ☐ REVISED 6-29-73 VOID ☐

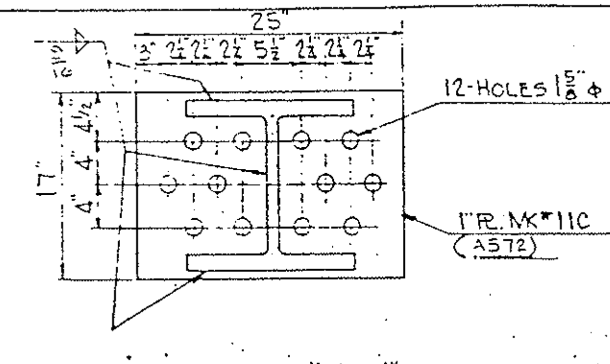
SECTION	MARK NO	OPERATION	CUT LGTH
W14×211#	11A	1 CUT TO LGTH. 2 BEND 3 TRIM ENDS 4 ASSEM & WELD	36'-3"
W14×150#	11B	1 CUT TO LGTH. 2 BEND 3 TRIM ENDS 4 ASSEM & WELD	24'-10"



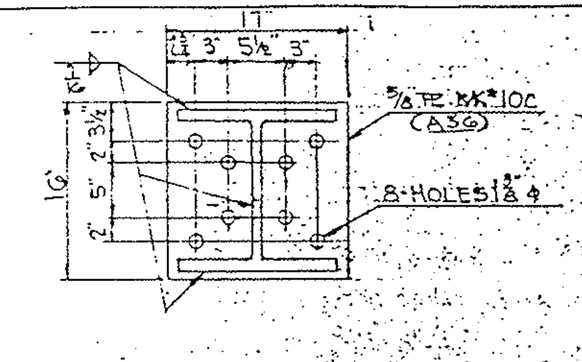
USED FROM:
STA. 87+54 TO STA. ~~94+84~~ 94+62
STA. 96+50 ~~STA. 97+66~~ TO STA. 99+~~36~~ 38
STA. 99+22 ~~STA. 101+30~~ TO STA. ~~103+62~~ 100+14
STA. 101+34 ~~STA. 104+30~~ TO STA. ~~107+00~~ 103+12
STA. 104+60 STA. ~~108+66~~ TO STA. ~~109+42~~ 107+60

HEAVY TUNNEL SUPPORT 3-DRIFT TYPE
2-PC. SET OF W14×211#
WITH STRUT OF W14×150#

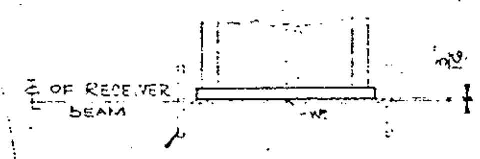
SCALE: ⅜"=1'-0"



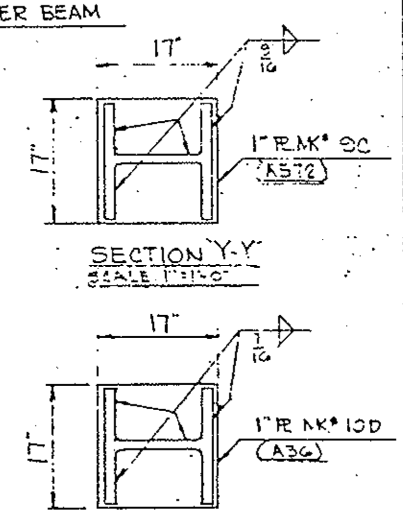
SECTION "W-W"
SCALE: 1½"=1'-0"



SECTION "Z-Z"
SCALE: 1½"=1'-0"



DETAIL "A"
SCALE: 1½"=1'-0"



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

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

Approved, H. Ray Poulsen Jr.

TOTAL WT.	UNIT WT.	DRAWING NO	TOTAL PAY WT. PER COURSE 23,374.8	MARK NO	NO. REQ'D	DESCRIPTION	MAT'L SPEC.
11.2	.10		11.2		112	STD. FLAT WASHERS FOR ¾" ϕ BOLT	A307
7.8	.14				56	¾" SQ. T.L. NUTS	
20.7	.37		29.5		56	¾"×2" SQ. HD. T.L. BOLTS	
627.2	44.8	D5-559-5AAB-007	227.2	75A	14	C8×11.5# COLLAR BRACES	A36
TOTAL WT. FOR COLLAR BRACES 666.9#			TOTAL PAY WT. FOR COLLAR BRACES 667.9#				
2.5	.21				12	HARDENED STEEL WASHERS FOR 1½" ϕ BOLTS	A325
15.7	1.31		50.8		12	1½" HI STRENGTH NUTS	
38.5	3.21				12	1½" ϕ × 4¼" HI STRENGTH BOLTS	
1.0	.13		1.0		8	LOAD INDICATOR WASHERS FOR 1¼" ϕ BOLTS	
1.1	.14				8	HARDENED STEEL WASHERS FOR 1¼" ϕ BOLTS	
6.3	.79		17.0		8	1¼" HI STRENGTH NUTS	
14.1	1.76				8	1¼" ϕ × 3¼" HI STRENGTH BOLTS	
	81.9	D5-559-5AAB-011	81.9	10D	1	1"×17"×7" END PLATE	A36
	45.2		45.2	10C	1	⅝"×16"×17" BUTT PLATE	
	3666.9		3650.8		1	W14×150#×24'-4⅛" NNA	
7582.0	3791.0		3750.9	11B	2	STRUT ASSYS. EA. CONSISTING OF:	
	1.9	-007	26.6	7F	14	L 3"×2"×¼"×5½" LG.	A36
	81.9	-011	81.9	9C	1	1"×17"×17" FOOT PLATE	A572 GRADE 50
	120.4		120.4	11C	1	1"×17"×25" BUTT PLATE	
	7641.1		7643.2		1	W14×211#×36'-3⅞" NNA	
15,750.0	7875.0		7872.1	11A	2	ARCH RIB ASSYS. EA. CONSISTING OF:	

TOTAL WT. FOR 1 COURSE LESS COLLAR BRACES 23,447.2#

MAT'L. REQ'D. PER COURSE OF RIBS

REV. SYM.	DATE	REVISION	D.R. NO.	CHG. BY	CK. BY
3	3-14-77	ROTATED CLIP ANGLES ON WEB 90°	2573	WFV	KW
2	3-5-76	Removed 1½" Load ind. washers fr. ¾ ϕ Bolts	2431	WFV	RJA
1	5-25-76	ADDED DETAIL A & PAY WTS	2347	RJA	JJS

COMMERCIAL SHEARING, INC. YOUNGSTOWN, OHIO 44501 U.S.A.

HEAVY TUNNEL SUPPORT 3 DRIFT TYPE
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-3(51)220 - Col.
PETER KIEWIT SONS CO. AND EGAN & LIST, INC.

DATE 3-30-76 | DR. BY JJS | CK. BY KW | SCALE AS NOTED

REF. NO. D5-559-5AAB-XX1

DWG. NO. D5-559-5AAB-011

APPROVED FINAL
DATE 3/26/77
BY Jack E. Gay

Approved Final
Date: 8-26-76 By: Jack E. Gay

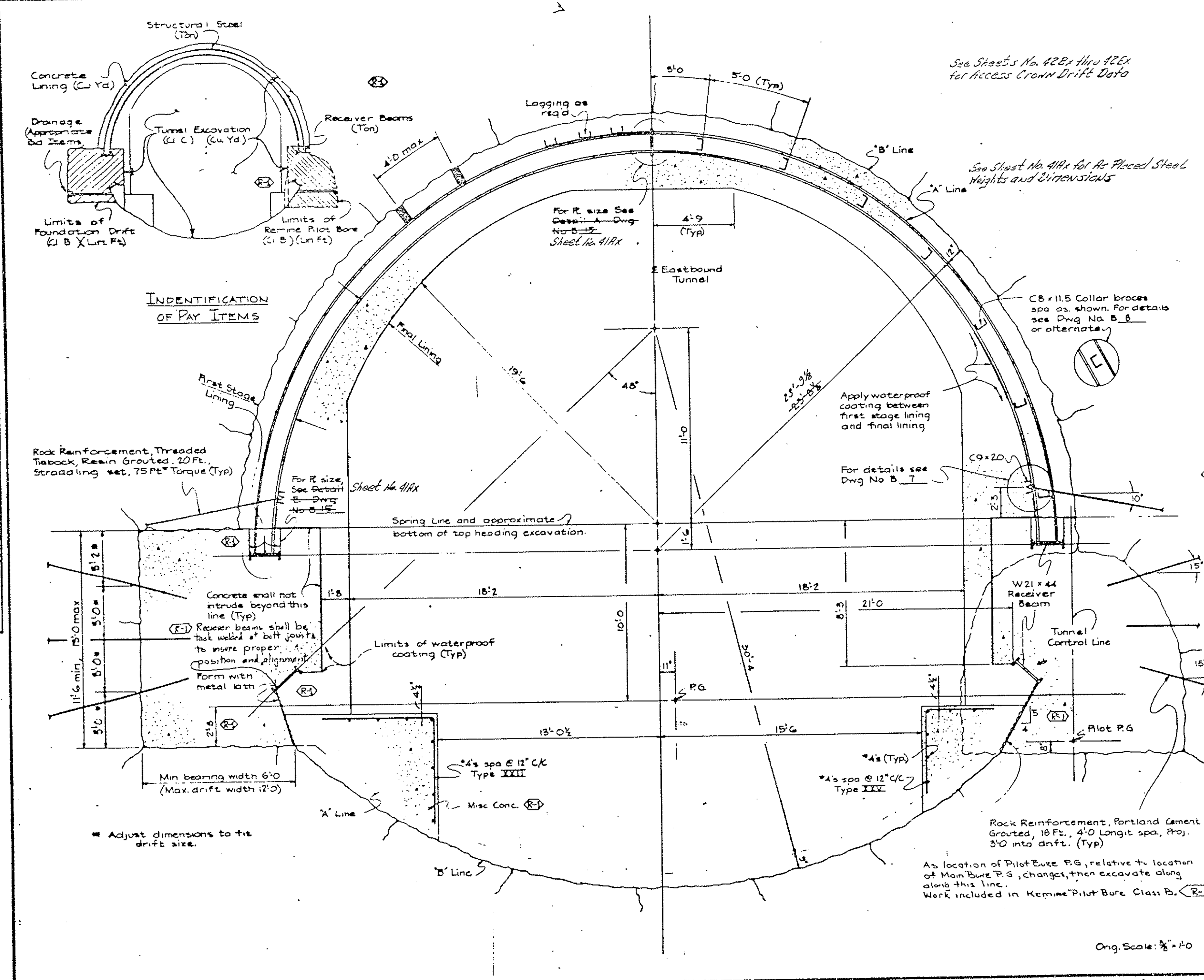
SPACE FOR REVIEWED & APPROVAL STAMP

QUOTE ITEM# G BID ITEM# 614.53 REF. DWG. NO. 512

Federal Aid Project No.	District	Proj. No.	Sh.	Sheets
XX	Colorado	I70-5(81)220	41	373

Revisions			
R-1	7-8-76	Rev. Dimen., Quan., & Notes	B.R.L.

AS CONSTRUCTED — NO REVISIONS: [ ] REVISED: 6-29-79 VOID: [ ]



NOTES:

1. This support shall be used:
   Sta. 109+42 to Sta 118+50
2. Steel support - Arch W14×95, A36 @ 4'-0 C/C
3. Concrete:
   - First stage lining — Class T-1
   - Foundation drifts — Class T-2
   - Final lining Seg 5142 thru Seg 5150 — Class T-2
   - All other concrete — Class T-2 (Misc)
4. Driving of the north foundation drift and remining of the Pilot Bore may be done simultaneously.
5. Any voids created between the surface of the drift concrete and the bench material shall be filled with approved material.
6. Top heading excavation shall not begin until all concrete placed in the drifts has reached a minimum compressive strength of 3000 psi.
7. For reinforcing steel bending diagrams see Dwg. No. B 15

Final

SUMMARY OF QUANTITIES - LIGHT 2 DRIFT

Item	Description	Unit	Total
211	Tunnel Excavation (Class C) (R-1)	Cu Yd	53,455
211	Rock Reinforcement, Portland Cement Grouted, (12 Foot) Access Crown Drift	Ea.	162
211	Rock Reinforcement, Portland Cement Grouted, (16 Foot)	Ea.	4,311
211	Rock Reinforcement, Threaded Tieback, Resin Grouted, (20 Foot)	Ea.	902
211	Foundation Drift (Class B)	Lin Ft	908
509	Structural Steel (Misc)	Ton	166.70
509	Structural Steel (W14×95)	Ton	216.50
515	Waterproof Coating	Sq Yd	9,026.92
601	Concrete, Class T-1, (First Stage Lining) (R-1)	Cu Yd	5,276.12
601	Concrete, Class T-2, (Final Lining) (R-1)	Cu Yd	6,032.72
601	Concrete, Class T-2, (Misc) (R-1)	Cu Yd	1,868.66
602	Reinforcing Steel	Ton	11.02

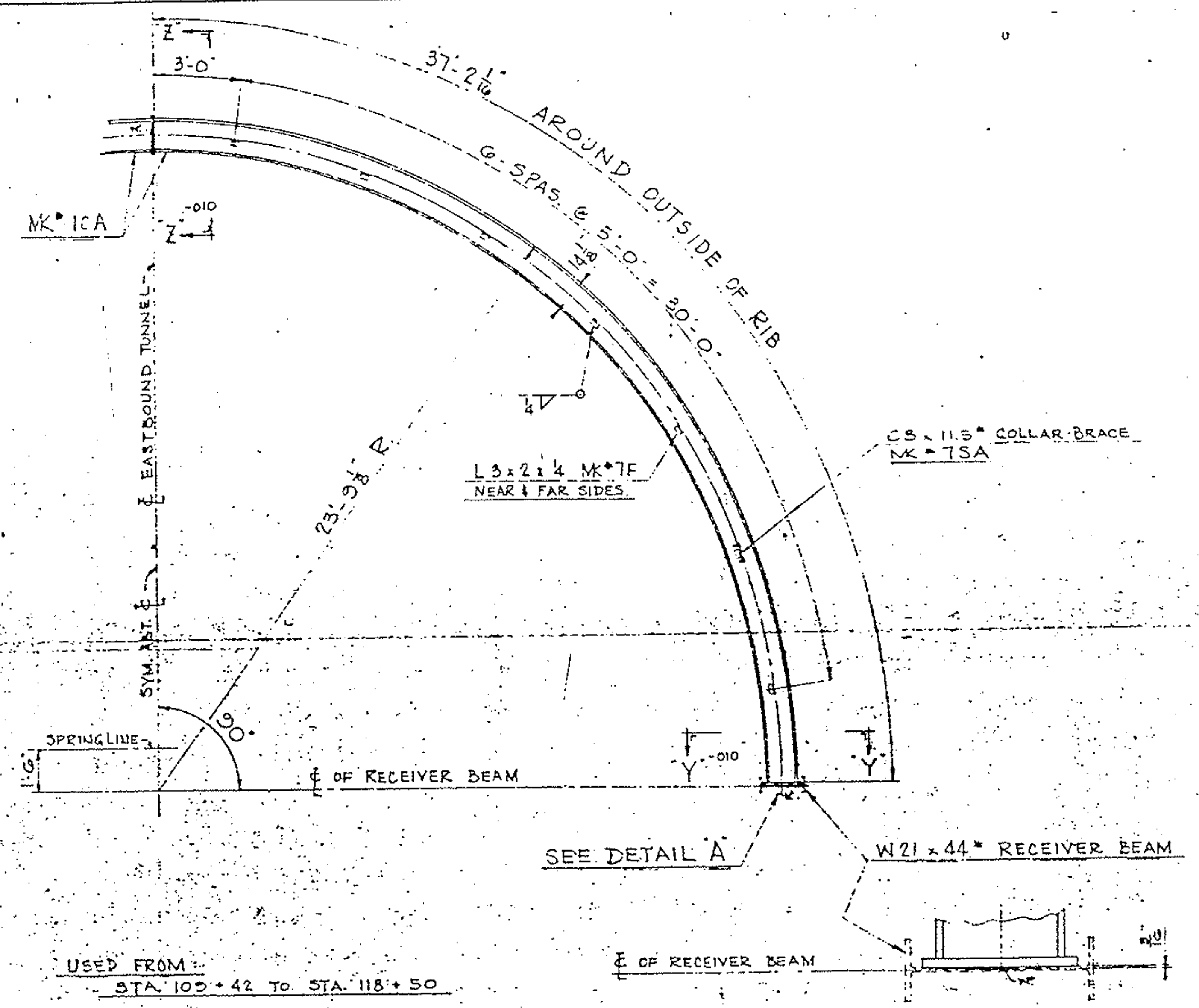
DIVISION OF HIGHWAYS

LIGHT TUNNEL SUPPORT
2 DRIFT TYPE
REQUIRED SECTION,
BASIS FOR BID

Designer: C.D.O.H. — Structure Numbers: F-15-X
Detailer: B R Lere
Drawing Number B 15 of 60 Drawings

AS CONSTRUCTED

NO REVISIONS 6-23-79 REVISED VOID



USED FROM STA. 105 + 42 TO STA. 118 + 50

LIGHT TUNNEL SUPPORT
2 DRIFT TYPE
2 PC. SET OF W14 x 95*

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

DETAIL "A"

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

Approved H Roy [illegible] Jr.

TOTAL WT	UNIT WT	DRAWING NO.	TOTAL PAY WT. PER COURSE	MARK NO.	NO. REQ'D	DESCRIPTION	MAT'L SPEC.
11.2	.10		11.2		112	STD. FLAT WASHERS FOR 3/4" ϕ BOLTS	A307
7.8	.14				56	3/4" SQ. T.L. NUTS	
20.7	.37		29.5		56	3/4" ϕ x 2" SQ. HD. T.L. BOLTS	
627.2	44.8	DS-559-5AAB-007	627.2	7SA	14	C5 x 11.5* COLLAR BRACES	A36
TOTAL WT. PER COLLAR BRACES 666.9*			TOTAL PAY WT. FOR COLLAR BRACES 667.9*				
1.0	.13		1.0		8	LOAD INDICATOR WASHERS FOR 1 1/4" ϕ BOLTS	A325
1.1	.14				8	HARDENED STEEL WASHERS FOR 1 1/4" BOLTS	
6.3	.79		17.0		8	1 1/4" HI. STRENGTH NUTS	
14.1	1.76				8	1 1/4" ϕ x 3 1/4" HI. STRENGTH BOLTS	
	1.9	DS-559-5AAB-007	26.6	7F	14	L3 x 2 x 1/4 x 0'-5 1/2" LG.	A36
	81.9	-010	81.9	10D	1	1" x 17" x 17" FOOT PLATE	
	48.2	-010	48.2	10C	1	1 5/8" x 16" x 17" BUTT PLATE	
	3443.8		3451.2		1	W14 x 95.* x 36'-3" -N.N.A.	
7201.0	3600.5	-012	3557.9	10A	2	ARCH RIB ASSYS. EA. CONSISTING OF:	

TOTAL PAY WT. PER COURSE 7193.8*

TOTAL WT. FOR 1 COURSE LESS COLLAR BRACES 7,223.5*

MAT'L. REQ'D. PER COURSE OF RIBS

REV. SYM.	DATE	REVISION	D.R. NO.	CHK. BY	OK. BY
(C)	3-16-77	ROTATED CLIP ANGLE ON WEB 90°	2579	KW	[illegible]
(B)	5-25-76	ADDED DETAIL "A" & PAY WTS. [illegible]	2347	RJA	JJS

COMMERCIAL SHEARING, INC.

LIGHT TUNNEL SUPPORT, 2 DRIFT TYPE

EISENHOWER MEMORIAL TUNNEL

2ND BORE PROJ. NO. I 70-3(51)220 [illegible]

PETER KIEWIT SONS CO. [illegible] INC.

DATE 3-25-76 DR. BY RJA CH. BY JJS SCALE AS NOTED

REF. NO. DS-559-5AAB-XX1

DWG. NO. DS-559-5AAB-012

APPROVED FINAL

DATE 3/26/77

BY Jack E. Gay

APPROVED FINAL: DATE: 8-26-76 BY: JACK E. GAY

SPACE FOR REVIEWED & APPROVAL STAMP

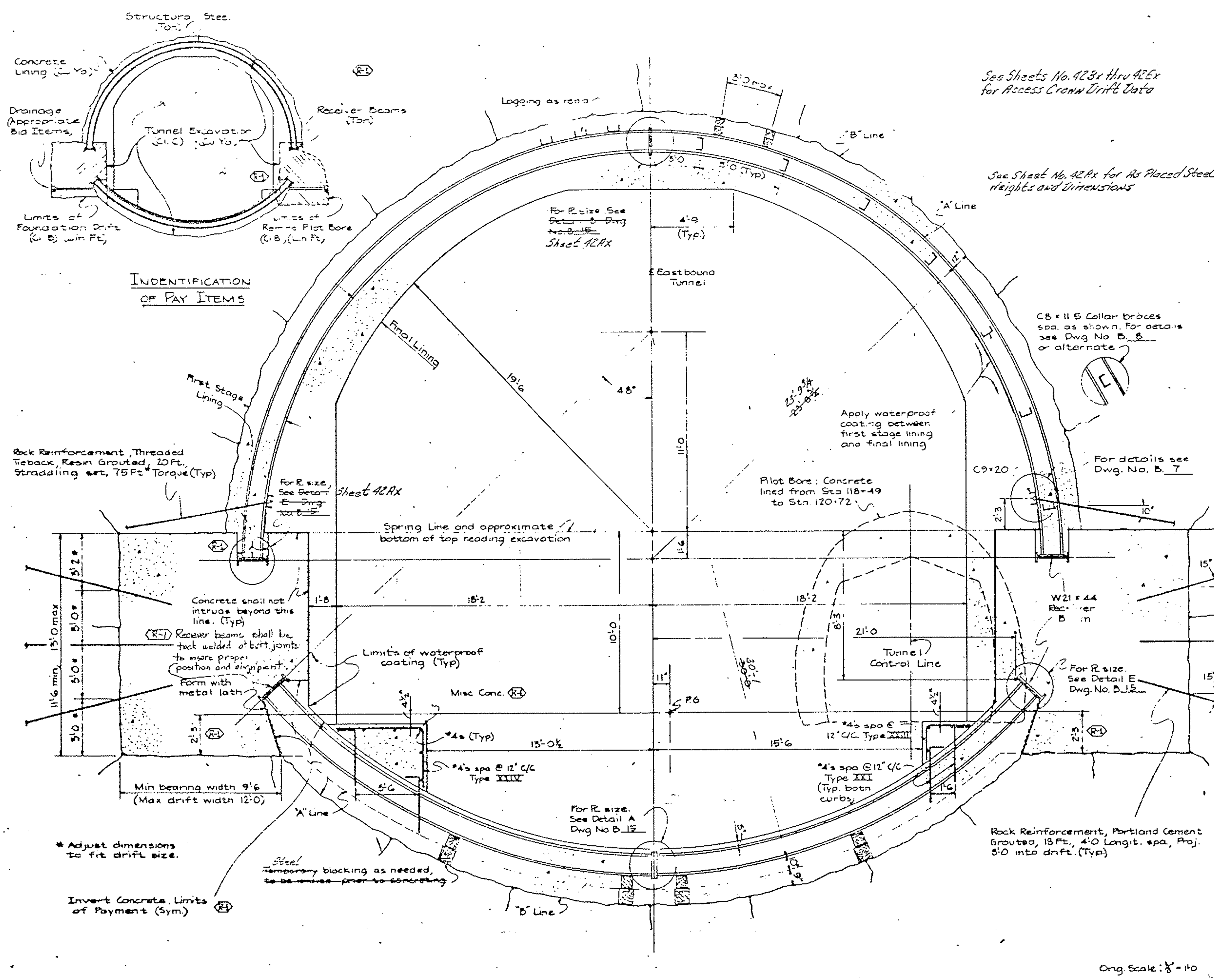
QUOTE ITEM #7 BID ITEM 31 REF. DWG.# 3

W14 x 95* 10A

Federal Road Region No.	District	Proj. No.	Sheet No.	Total Sheets
VIII	Colorado	I70-3(61)220	42	273

	REVISIONS		
R-1	7-3-75	Rev. Dimen., Quan. & Notes	BRL

AS CONSTRUCTED — No Revisions / Revised 6-29-73 / Void



NOTES:

1. This support ~~shall be~~ was used:
   Sta 118+50 to Sta. 120+22
2. Steel support - Arch W14×136, A572, Grade 55 @ 3'0 C/C
   Invert W14×95, A36 @ 4'0 C/C
3. Concrete:

First stage lining	Class T-1
Foundation drifts	Class T-2
Invert	Class T-2
Final lining Seg 5159 thru Seg 5162	Class T-2
All other concrete	Class T-2(Misc)

4. Driving of the north foundation drift and remining of the Pilot Bore may be done simultaneously.
5. Any voids created between the surface of the drift concrete and the bench material shall be filled with approved material.
6. Top heading excavation shall not begin until all concrete placed in the drifts has reached a minimum compressive strength of 3000 psi.
7. For reinforcing steel bending diagrams see Dwg No. B 15.

SUMMARY OF QUANTITIES - HEAVY 2 DRIFT

Item	Descriptions	Unit	Total
211	Tunnel Excavation (Class C)	Cu Yd	10,287
211	Rock Reinforcement, Portland Cement Grouted, (18 Foot)	Ea.	267
211	Rock Reinforcement, Threaded Tieback, Resin Grouted (20 Foot)	Ea	230
211	Foundation Drift (Class B)	Lin Ft	172
509	Structural Steel (Misc)	Ton	51.87
509	Structural Steel (W14×95)	Ton	107.96
509 (1)	Structural Steel (W14×136)	Ton	296.5
515	Waterproof Coating	Sq Yd	1159.22
601	Concrete, Class T-1, (First Stage Lining)	Cu Yd	1043.70
601	Concrete, Class T-2, (Final Lining)	Cu Yd	1345.70
601	Concrete, Class T-2, (Invert)	Cu Yd	948.92
601	Concrete, Class T-2, (Misc)	Cu Yd	165.34
602	Reinforcing Steel	Ton	2

~~(1) Includes 290 Tons of A572 Steel.~~

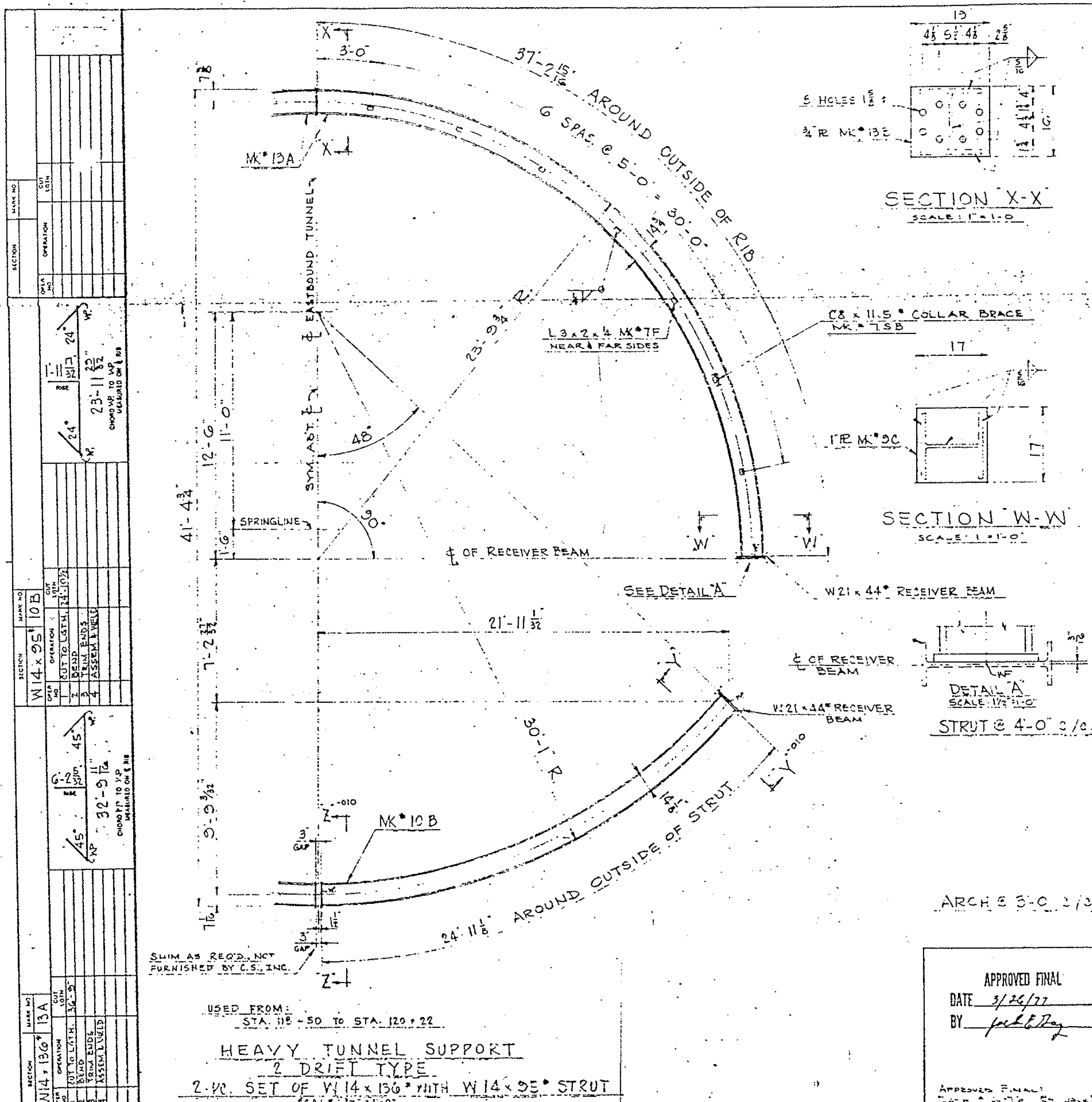
DIVISION OF HIGHWAYS

HEAVY TUNNEL SUPPORT
2 DRIFT TYPE
REQUIRED SECTION,
BASIS FOR BID

Designer C.D.O.H. — Structure Numbers F-15-X
Detailer S.R. Lane
Drawing Number B 14 of 60 Drawings

Region No.	Division	Project	No.	Sheets
VIII	COLORADO	I 70-3(51)220	42AX	273

AS CONSTRUCTED — NO REVISIONS [ ] REVISED 6-23-79 VOID [ ]



STRUT @ 4'-0" c/c.

ARCH @ 5'-0" c/c.

Approved, H. Roy Poulson Jr.

TOTAL WT.	UNIT WT.	DRAWING NO.	TOTAL PAY WT.	MARK NO.	NO. REQ'D	DESCRIPTION	MAT'L SPEC.
11.2	.10		11.2		112	STD. FLAT WASHERS FOR 3/4 φ BOLTS	A307
7.8	.14				56	3/4" SQ. T.L. NUTS	
20.7	.37		29.5		56	3/4 φ x 2" SQ. HD. T.L. BOLTS	
466.2	33.3	DS-559-5AAB-007	466.2	7SB	14	C8 x 11.5# COLLAR BRACES	A36
TOTAL WT. FOR COLLAR BRACES 505.9#			TOTAL PAY WT. FOR COLLAR BRACES 506.9#				
1.0	.13		1.0		8	LOAD INDICATOR WASHERS FOR 1 1/4" BOLTS	A325
1.1	.14				8	HARDENED STEEL WASHERS FOR 1 1/4" BOLTS	
6.3	.79		17.0		8	1 1/4" HI. STRENGTH NUTS	
14.1	1.76				8	1 1/4 φ x 3 1/4" HI STRENGTH BOLTS	
1.7	.21				8	HARDENED STEEL WASHERS FOR 1 1/2" BOLTS	A325
10.5	1.31		35.6		8	1 1/2" HI. STRENGTH NUTS	
23.8	2.97				8	1 1/2" φ x 3 3/4" HI. STRENGTH BOLTS	
	81.9	DS-559-5AAB-010	81.9	10D	1	1" x 17" x 17" END PLATE	A36
	48.2	-010	48.2	10C	1	5/8" x 16 x 17" BUTT PLATE	
	2321.1		2314.1		1	W14 x 95# x 24'-5 5/16" N.N.A.	
4902.4	2451.2	-013	4889.4	10B	2	STRUT ASSYS. EA. CONSISTING OF:	
	1.9	-007	26.6	7F	14	L3 x 2 x 1/4 x 0'-5 1/2" LG.	A36
	81.9	-013	81.9	9C	1	1" x 17" x 17" FOOT PLATE	A572 GRADE 50
	64.6	-013	64.6	13B	1	3/4" x 16 x 19" BUTT PLATE	
	4938.3		4916.1		1	W14 x 136# x 36'-3 3/8" N.N.A.	
10212.6	5107.3	-013	10178.4	13A	2	ARCH RIB ASSYS. EA. CONSISTING OF:	
			TOTAL PAY WT. PER COURSE 15,119.6				

TOTAL WT. FOR 1 COURSE LESS COLLAR BRACES 15,175.7#

MAT'L. REQ'D. PER COURSE OF RIBS

REV. SYM.	DATE	REVISION	DA NO.	CHG. BY	CK. BY
3	3-16-77	ROTATED CLIP ANGLE, WAS 9C	2572	KW	
2	9-8-76	[illegible]	2431	WFU	RJA
1	6-25-76	ADDED DETAIL "A" & PAY WTS.	1347	JJS	RJA

COMMERCIAL SHEARING, INC. YOUNGSTOWN, OHIO 44501 U.S.A.

HEAVY TUNNEL SUPPORT 2 DRIFT TYPE
EISENHOWER MEMORIAL TUNNEL
2ND BORE FED. No. I 70-3(51)220 — COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

DATE 3-29-76 | DR. BY RJA | CH. BY JJS | SCALE AS NOTED

REF. NO. DS-559-5AAB-XX1

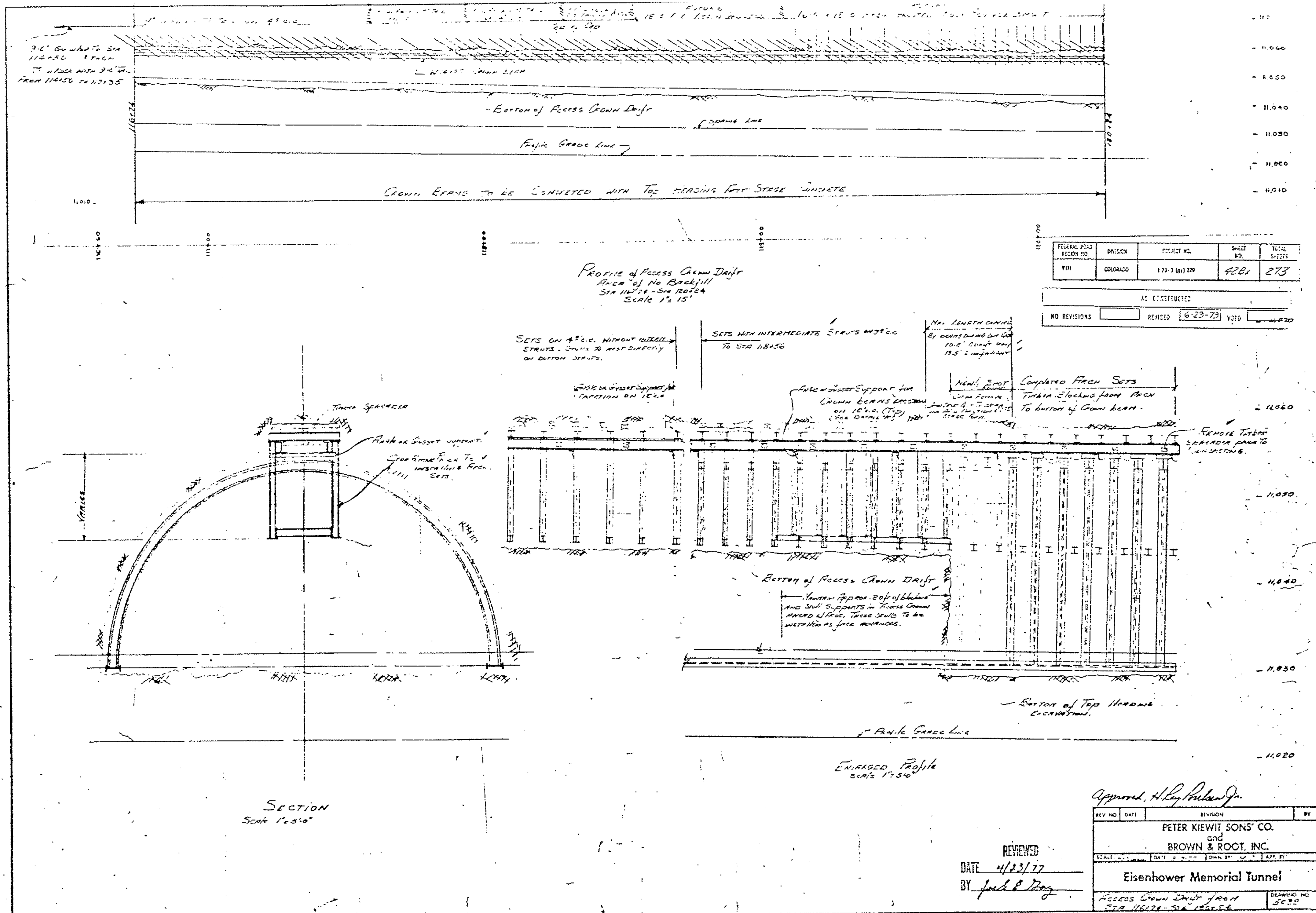
DWG. NO. DS-559-5AAB-013

APPROVED FINAL
DATE 3/26/77
BY Jack E. Gay

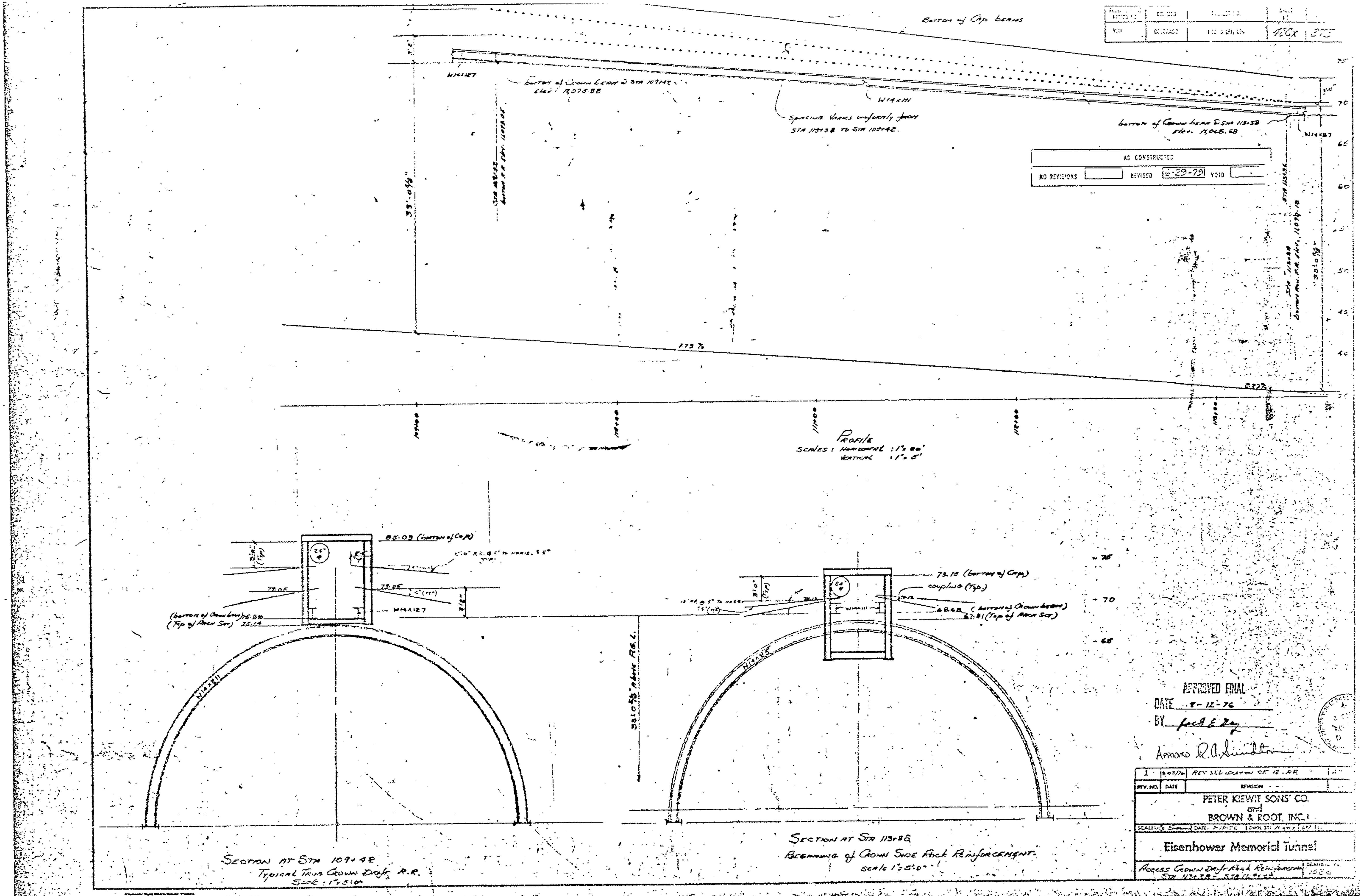
Approved Final: [illegible] By Jack E. Gay

Space for Reviewed or Approval Stamp

CUT IS ITEM #519, 313 ITEM 5#157 REF. DWG. # 314



Bottom of Access Crown Drift
Profile Grade Line
Crown Beams to be Concreted with Top Heading First Stage Concrete
Profile of Access Crown Drift
Area of No Backfill
Scale 1" = 15'
Sets on 4' c.c. without intermediate struts
Sets with intermediate struts
Completed Arch Sets
Bottom of Top Heading Excavation
Enlarged Profile
Section
FEDERAL ROAD REGION NO.
DIVISION
PROJECT NO.
SHEET NO.
TOTAL SHEETS
VIII
COLORADO
428x
273
AS CONSTRUCTED
NO REVISIONS
REVISED
6-23-73
VOID
REVIEWED
DATE 4/23/77
BY
REV. NO.
DATE
REVISION
BY
PETER KIEWIT SONS' CO.
and
BROWN & ROOT, INC.
Eisenhower Memorial Tunnel
DRAWING NO.

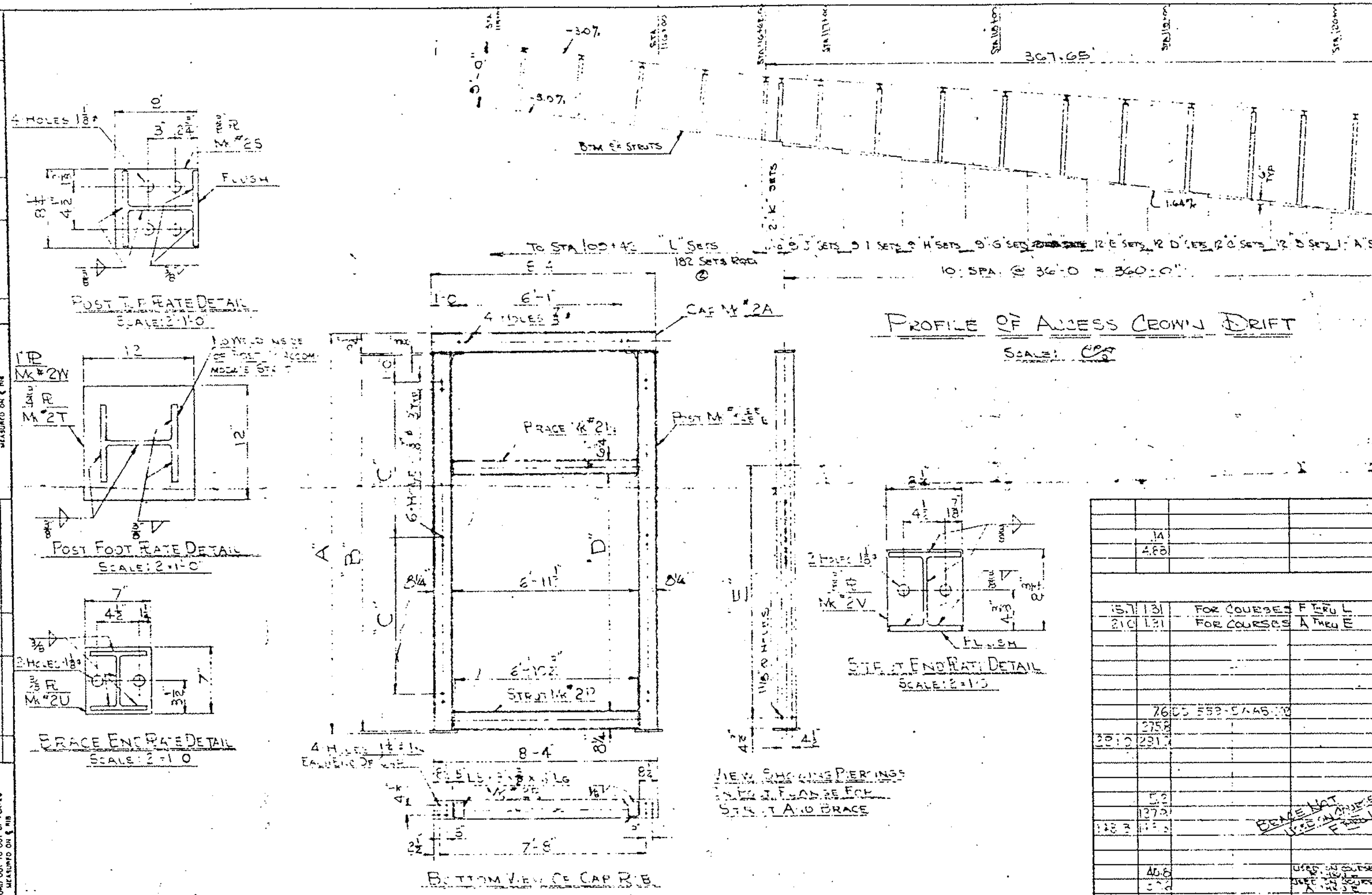


Bottom of Cap beams
AS CONSTRUCTED
NO REVISIONS
REVISED 6-29-79
VOID
W14x127
W14x111
Spacing Varies uniformly from STA 113+38 to STA 109+42.
33'-0 5/8"
Profile
Scales: Horizontal 1" = 80'
Vertical 1" = 8'
85.03 (bottom of Cap)
W14x127
(bottom of Crown beam) 75.84
(Top of Rock Set) 75.14
73.10 (bottom of Cap)
coupling (Typ.)
68.68 (bottom of Crown beam)
67.81 (Top of Rock Set)
33'-0 5/8" Above R.G.L.
Section at Sta 109+42
Typical Thru Crown Drift R.R.
Scale: 1" = 5'-0"
Section at Sta 113+38
Beginning of Crown Side Rock Reinforcement.
Scale 1" = 5'-0"
APPROVED FINAL
DATE 8-12-76
BY
Approved
REV. NO.
DATE
REVISION
PETER KIEWIT SONS' CO.
and
BROWN & ROOT, INC.
Eisenhower Memorial Tunnel

Federal Aid Project No.	Division	[illegible]	
VIII	Colorado	I 70-3 (...)	425x [illegible]

AS CONSTRUCTED

REVISIONS | REVISED 6-23-79



Course	Mark No	A	B	C	D	E		
L	2N	8-1	8-3¾	3-0			331.2	379.9
K	2M	8-2¼	8-4½	3-0			339.4	388.1
J	2L	9-7	8-3⅜	[illegible]			35[illegible]	399.9
I	2K	10-1	9-3⅜	[illegible]			371.2	419.0
H	2J	10-7	9-[illegible]	[illegible]			39[illegible]	432.0
G	2H	11-1	10-[illegible]	[illegible]			411.0	459.0
F	2G	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
E	2F	12-0	11-[illegible]	[illegible]	[illegible]	10"	451.2	[illegible]
D	2E	12-6¼	11-[illegible]	4-0	[illegible]	10"	471.2	503.7
C	2D	13-0¾	12-[illegible]	5-[illegible]	[illegible]	10"	491.2	523.7
B	2C	13-6¼	12-[illegible]	[illegible]	[illegible]	10"	511.2	540.7
A	2B	14-0¾	13-[illegible]	[illegible]	[illegible]	10"	531.2	[illegible]
Course and Set		A	B	C	D	E	Post Rib Assy Wt	

Brace not used on courses F thru L

APPROVED PRINT IN FILE DATED 10-16-75.

Ref: Cust Dwg [illegible] Dated [illegible]

R.A. Sundstrom

FINAL REVIEWED
DATE 4/4/76
BY Jack E Hay

Space for reviewed or approval stamp

Total Wt	Unit Wt	Drawing No	Part No	Mark No	No Reqd	Description	Matl Spec
	.14				16	⅞ Sq. T.L. Nuts (2 Per Tie Rod)	
	4.88				8	¾ × 18 Lg Tie Rods (Each End)	
15.7	1.31	For Courses F Thru L			12	1×3 Hex Hd. T.L. Bolts & Nuts	A307
21.0	1.31	For Courses A Thru E			16	1×3 Hex Hd T.L. Bolts & Nuts	A307
	7.6	DS-559-5AAB-002		2V		2 ⅞ × 8¼ × 9¾ End Plate	A36
	275.8					1 W8×40# × 6'-10¾ NNA	Extens
291.0	291.0			2P	1	Strut Assy Consisting Of:	
	5.2	Brace Not Used on Courses F Thru L		2U		2 ⅜ × 7 × 7 End Plate	A36
	137.9					1 W6×20# × 6'-10¾ NNA	A36
143.3	143.3			2N	1	Brace Assy Consisting Of:	
	40.8	Used on Courses F Thru L		2W		1 1"×12"×12" Foot Plate	A36
	30.6	Used on Courses A Thru E		2T		1 ¾×12×12 Foot Plate	A36
	7.2			2S		1 ¾×5¼×9" Top Plate	A36
See Table						1 W8×40# × "B" NNA	Extens
See Table				See Table	2	Post Rib Assys. Ea Consisting Of:	
	4.3			2S		2 L5×3×⅜ × 6" Lg	A36
	333.3					1 W8×40# × 8'-4" NNA	Extens
343.1	343.1			2A	1	Cap Rib Assy Consisting Of:	

TOTAL WT FOR ____ COURS

MATL. REQD. PER COURSE * (SEE TABLE)

Rev. Sym	Date	Revision	Dr. No	Chk By	Ch By
3	11-14-75	[illegible]	2157	LMF	
2	11-6-75	Deleted "F" Sets & Noted To Fab 182 "L" Sets	2155	JJF	AL
1	[illegible]	[illegible]	2124	[illegible]	

COMMERCIAL SHEARING, INC. YOUNGSTOWN, OHIO

Special Access Crown Drift & Struts, Eisenhower Memorial Tunnel, [illegible]

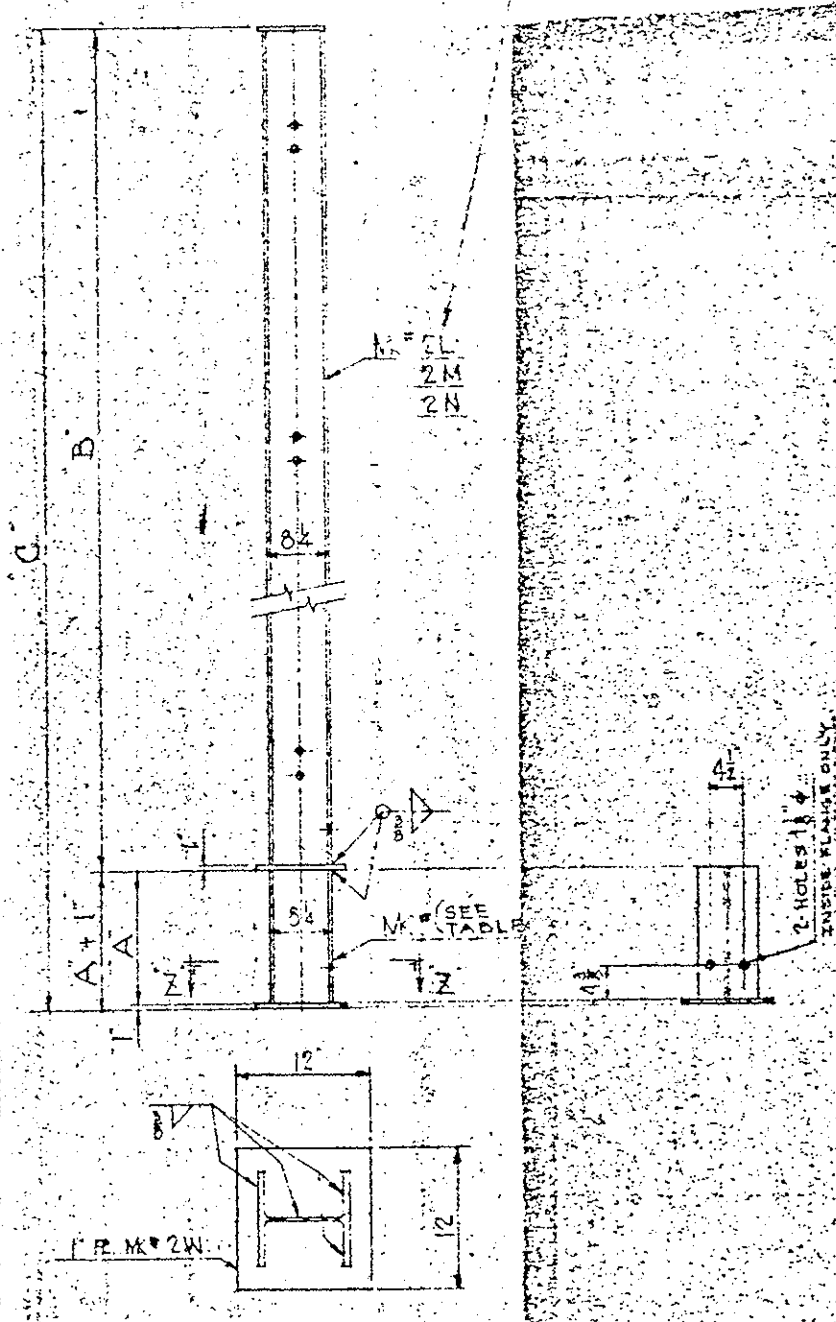
Date 9-12-73 | Dr By KJ | Ch By JJS | Scale 2"=1'-0"

DWG NO. DS-559-5AAB-002

SHOP NOTE:

POST ASSY MK#S SHOWN TO BE RETURNED BY CUSTOMER. SHOP TO WELD STUB TO BOTTOM OF POST USING 5/16 FILLET WELD AS SHOWN. SHOP TO THEN ADD A NEW FOOT PLATE PER SECTION Z-Z.

AFTER ASSY EACH POST TO BE LABELED WITH A NEW POST MK# AS SHOWN IN TABLE BELOW.



SECTION Z-Z

SCALE 1½"=1'-0"

NEW POST ASSY MK#	POST MK# AS RETURNED BY CUST	"C"	"B"			STUB MK#	"A"	STUB UNIT WT.	STUB ASSY UNIT WT.	POST ASSY WT. AS RET'D BY CUSTOMER	NEW POST TOTAL WT.
2N[S]	2N	9-10¼	8-4¾			A02N	4½	55.0	95.8	379.9	475.7
2M[S]	2M	9-10	8-6			A02M	1'-3"	50.0	90.8	388.1	478.9
2L[S]	2L	9-10¼	8-10¾			A02L	0-10½	35.0	75.8	399.9	475.7

TOTAL WT	UNIT WT	DRAWING NO	PART NO	MARK NO.	NO. REQ'D	DESCRIPTION	MAT'L SPEC
	SEE TABLE			SEE TABLE		1 W8 x 40# POST ASSY. AS RET'D BY CUSTOMER	
	40.9			2W		1 1 x 12 x 12 FOOT PLATE	A
	SEE TABLE			SEE TABLE		1 W8 x 40# STUB x "A" LG.	
				SEE TABLE	1	POST ASSY CONSISTING OF:	

TOTAL WT. FOR ______ COURSE

MAT'L REQ'D PER POST ASSY (SEE TABLE)

REVIEWED

DATE 4/4/76

REV SYM.	DATE	REVISION	D.R. NO	CHK. BY	DR BY
		ADDED HOLE FIELD WELD TO STUB FLG		RCA	AL

COMMONWEALTH ASSOCIATES, INC.

YOUNGSTOWN, OHIO

SPECIAL ACCESS ROOM, OUTLETS, SUPERSTRUCTURE
EISENHOWER MEMORIAL TUNNEL
2ND BORE

DR BY RA · CK BY RJD

REF NO. DS-559-5AAB-0024

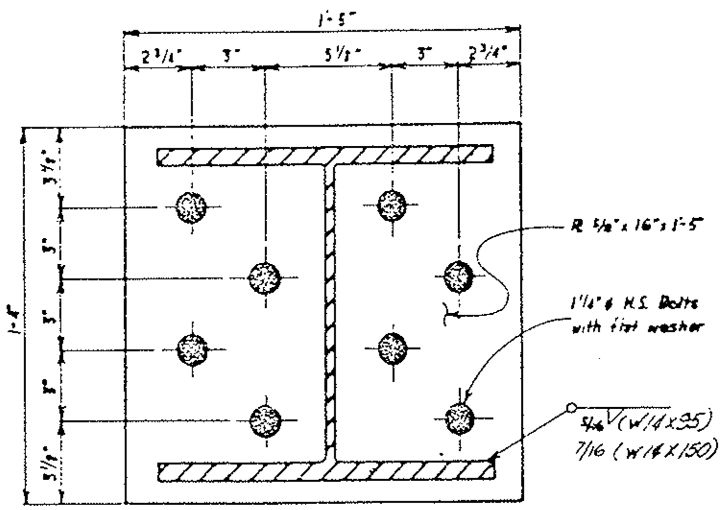
DWG NO. DS-559-5AAB-A02

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	43	275

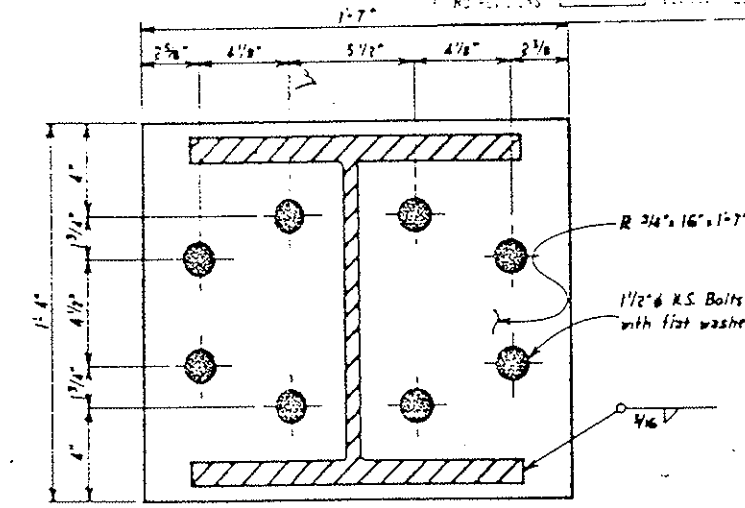
AS CONSTRUCTED

NO REVISIONS | REVISED 6-23-79 | VOID

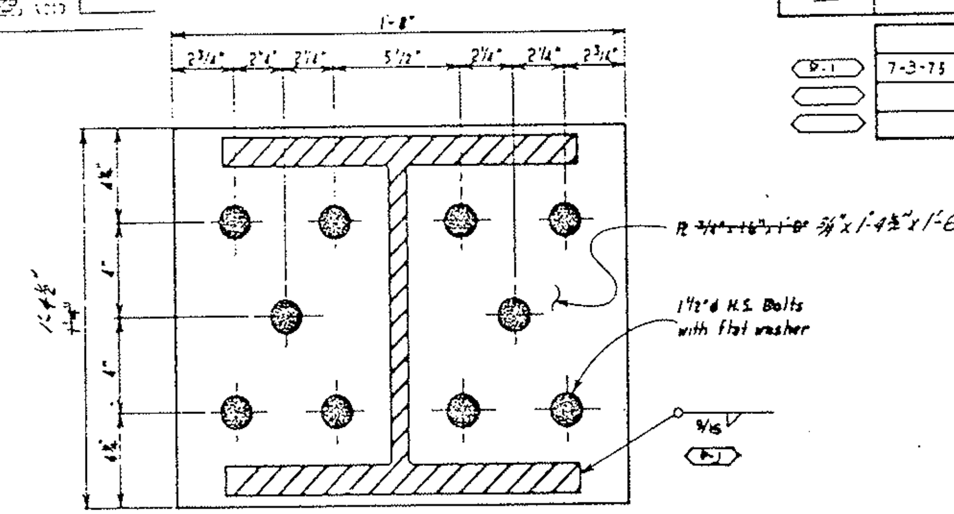
REVISIONS		
7-3-75	Rev. Weld size	RJS



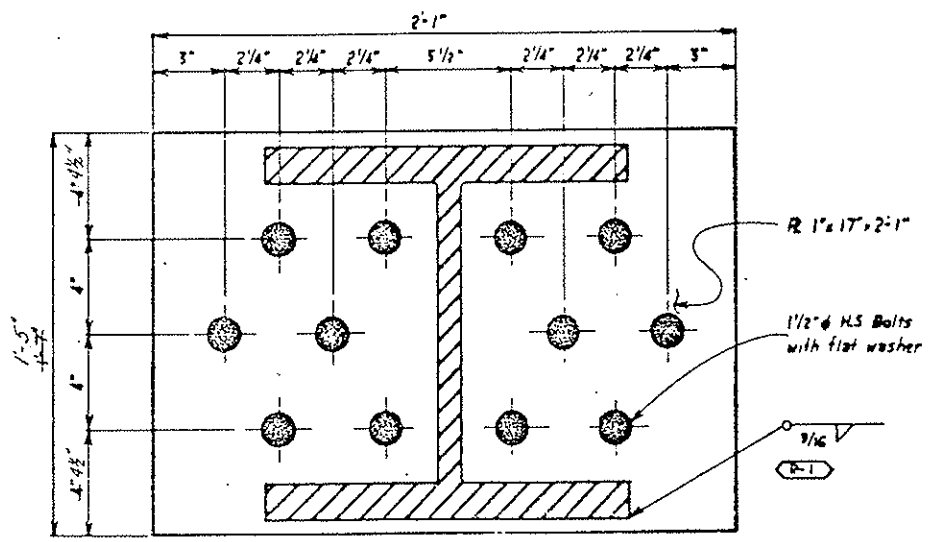
DETAIL "A"



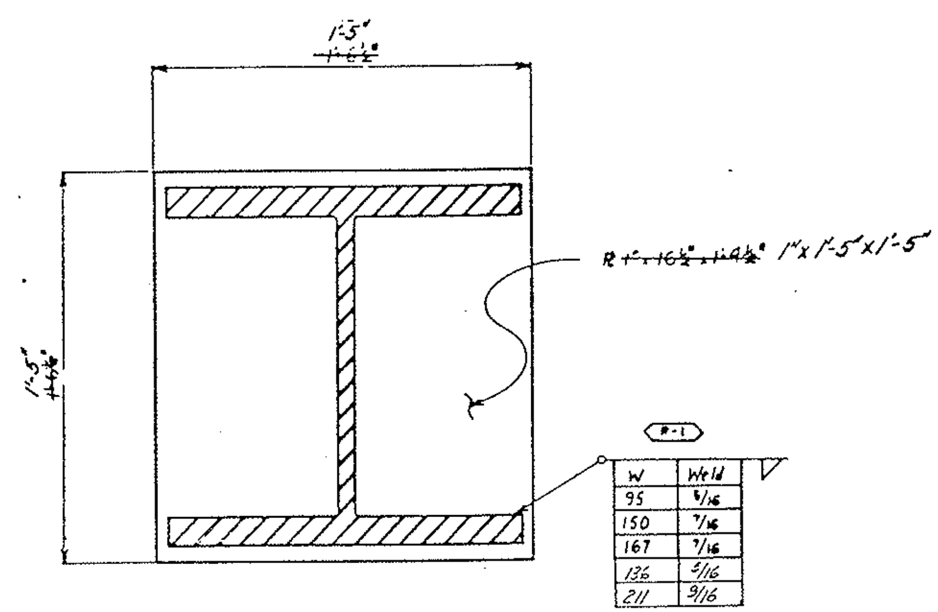
DETAIL "B"



DETAIL "C"

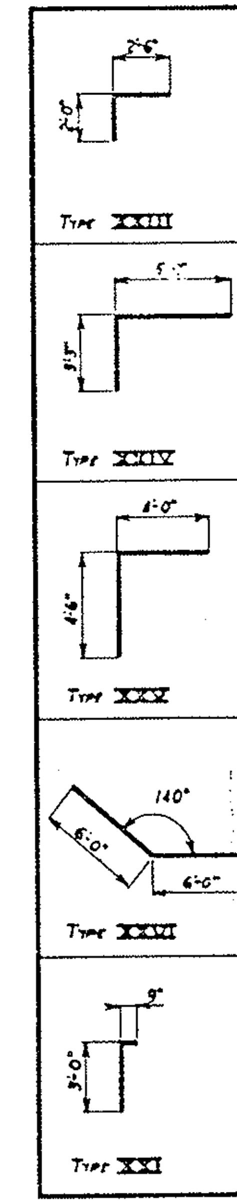


DETAIL "D"



W	Weld
95	5/16
150	7/16
167	7/16
136	5/16
211	9/16

DETAIL "E"



Original scale 3" = 1 Foot

DESIGNED BY	INITIAL C.D.O.H.	DATE 3-75	CHECKED BY	
CHECKED BY			QUANTITIES BY	RWO 4-75
DETAILED BY	RJS	4-75	CHECKED BY	JLA 4-75

DIVISION OF HIGHWAYS

DETAILS
TUNNEL SUPPORT
MULTIPLE DRIFT, 3 DRIFT AND 2 DRIFT TYPES
AND
REINFORCING BAR BENDING DIAGRAMS

Designer C.D.O.H. | Structure Numbers F-13-Y
Detailer R. Steinauwer
Drawing Number B 15 of 60 Drawings

Revision Dates (Preliminary Stage Only)

Federal Road Region No.	District	Proj. No.	Sheet No.	Total Sheets
VIII	COLORADO	I 70-3(81)220	44	273

REVISIONS

AS CONSTRUCTED

NO REVISIONS [ ] REVISED 6-29-73 VOID [ ]

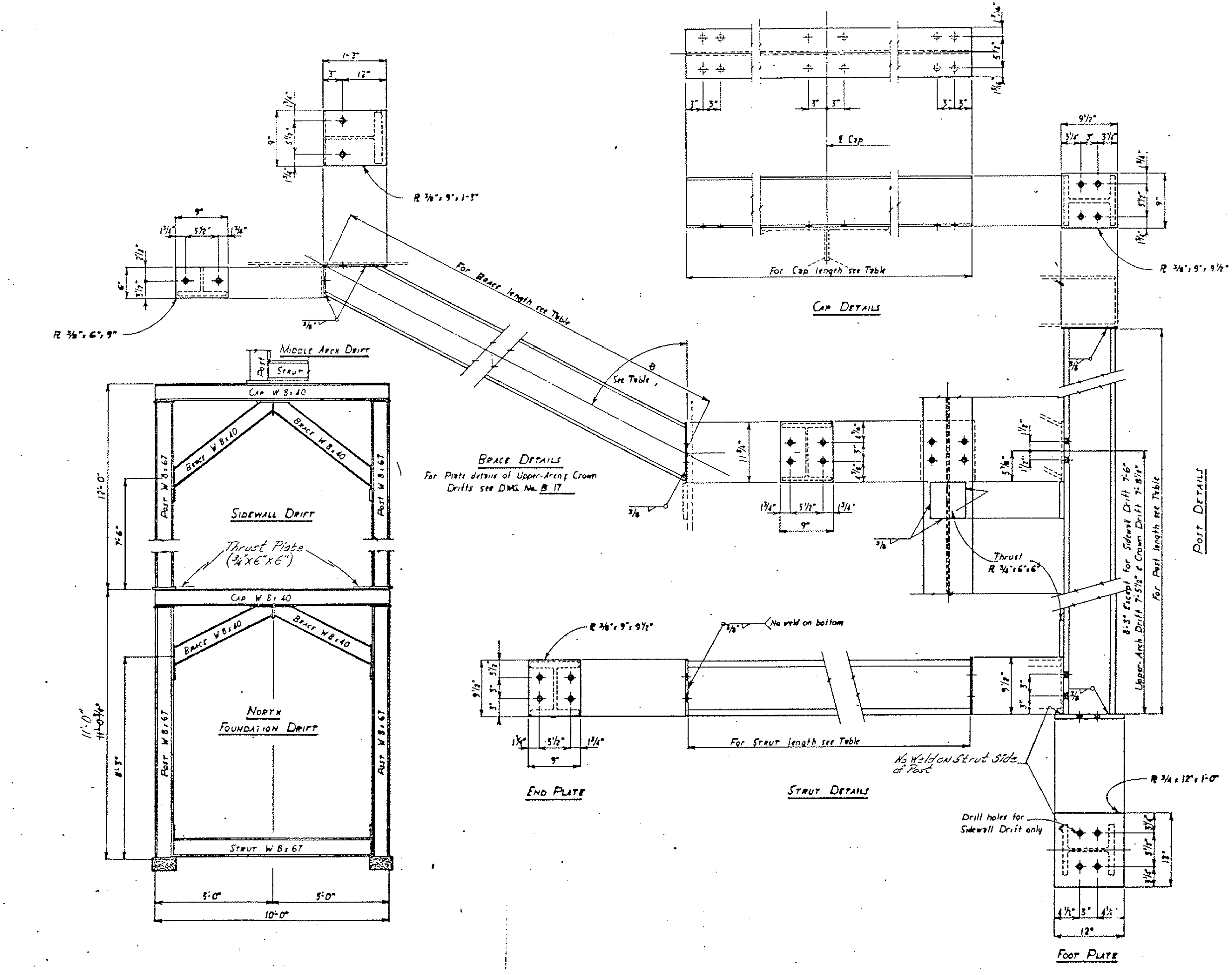


TABLE OF INFORMATION									
Location	Post		Strut		Cap		Brace		Angle
	Size	Length	Size	Length	Size	Length	Size	Length	θ
▽ North Foundation Drift	W 8 x 67	10'-2 7/8"	W 8 x 67	8'-5 1/4"	W 8 x 40	10'-0"	W 8 x 40	4'-7 7/8"	69°-17'-27"
South Foundation Drift	↕	11'-5 5/16"	W 8 x 67	9'-11 3/8"	↕	10'-0"	↕	5'-0 3/4"	51°-06'-38"
Sidewall Drift	↕	11'-3 1/4"	—	—	↕	10'-0"	↕	5'-7 1/2"	45°-01'-30"
Middle-Arch Drift	↕	11'-8 3/8"	W 8 x 67	8'-1 1/4"	↕	9'-8"	W 8 x 40	• 5'-3 3/4"	39°-26'-10"
Upper-Arch Drift	↕	8'-9 7/8"	W 8 x 48	7'-11 1/4"	↕	9'-6"	W 8 x 48	4'-1 7/8"	71°-33'-54"
Crown Drift	.67	9'-1 7/8"	W 8 x 48	7'-3 1/4"	W 8 x 40	9'-0"	W 8 x 48	3'-11 3/16"	69°-17'-11"

▽ For skewed Post Details see ~~DWG. No. B-17~~
• For special case see DWG. No. B 17
All Drift support steel is A 572 Grade 55, Spaced at 5'-0" centers
All Bolts shall be 1" ϕ A-307
All Holes are 1 1/16" ϕ

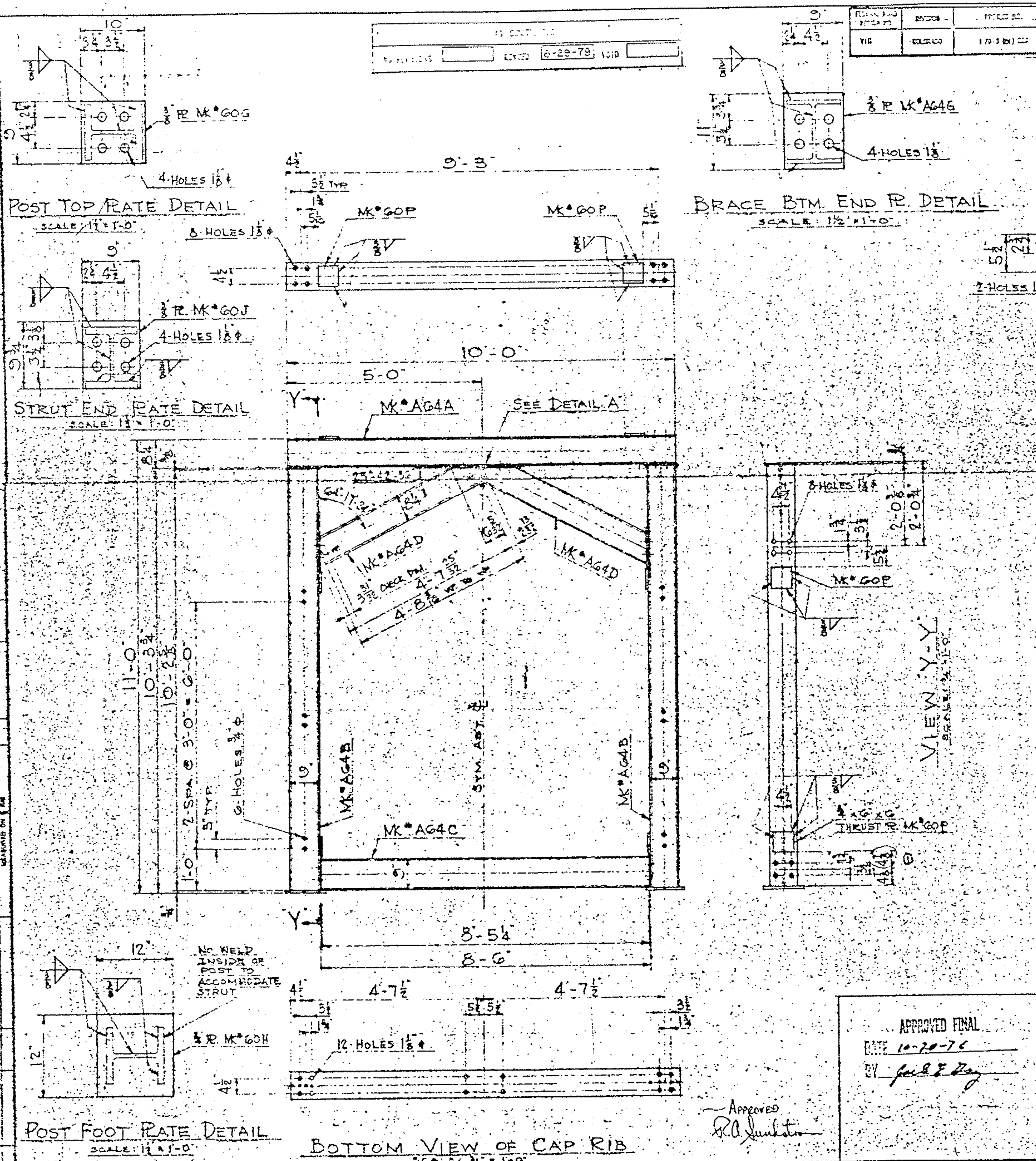
DIVISION OF HIGHWAYS

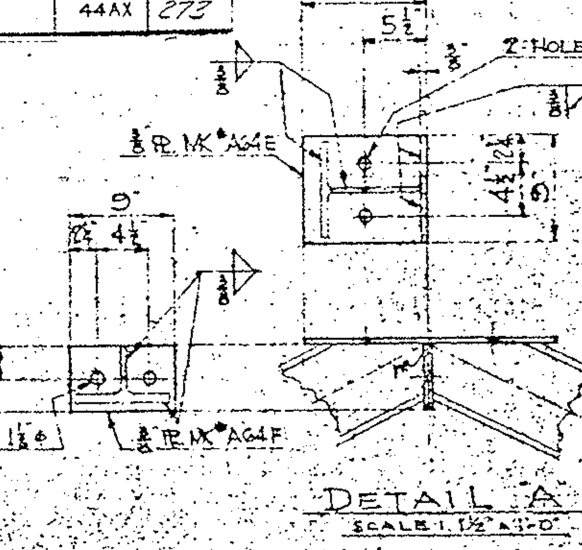
MULTIPLE DRIFT TUNNEL SUPPORT DETAILS

DIVISIONS PROPOSED METHOD OF CONSTRUCTION

Designer	C.D.O.H.	Structure Numbers	F-13-X
Detailer	R. Sinkhauser [?]		
Drawing Number B 16		of 60	Drawings

	Initial	Date
Designed by	C.D.O.H.	3-73
Checked by		
Detailed by	R.S. [?]	1-73
Checked by	RWG	1-73
Quantities by		
Checked by	T.L.A.	1-73





6-29-79

44AX 273

TOTAL WT.	UNIT WT.	DRAWING NO.	TOTAL PAY WT. PER COURSE	MARK NO.	NO. REQ'D	DESCRIPTION
1.2	.10				12	5/8" Sq. T.L. Nuts (2-per rod)
20.5	3.39				6	5/8"φ x 55" Tie Rods ([illegible])
8.4	.28				30	1" Hex. T.L. Nuts
30.9	1.03				30	1"φ x 3" Hex. Hd. T.L. Bolts
	10.5	DS-559-5AAB-A64		A64G		1 3/8" x 9" x 11" Btm. End Plate
	5.3			A64F		1 3/8" x 5½" x 9" End Plate
	10.5			A64E		1 3/8" x 9" x 11" End Plate
	184.0					1 W8 x 40# x 4'-7[illegible] N.N.A.
424.6	212.3			A64D	2	Brace Assys. Ea. Consisting of:
	9.3			G0J		2 3/8" x 9" x 9¼" End Plates
	565.3					1 W8 x 67# x 8'-5¼" N.N.A.
583.9	583.9			A64C	1	Strut Assy. Consisting of:
	7.6			G0P		2 ¾" x 6" x 6" Thrust Plates
	30.6			G0H		1 ¾" x 12" x 12" Foot Plate
	9.6			G0G		1 3/8" x 9" x 10" Top Plate
	654.7					1 W8 x 67# x 10'-2 7/8" N.N.A.
1480.2	740.1			A64B	2	Post Assys. Ea. Consisting of:
	7.6			G0P		2 ¾" x 6" x 6" Thrust Plates
	400.0					1 W8 x 40# x 10'-0" N.N.A.
415.2	415.2			A64A	1	Cap Beam Assy. Consisting of:

TOTAL WT. FOR ____ COURSE

MAT'L. REQ'D. PER COURSE OF RIBS

REV. SYM.	DATE	REVISION	D.R. NO.	CHK. BY	CK. BY
①	3-30-78	Dimension on Post Flg. was 4½"	2421		

COMMERCIAL RESEARCH

NORTH FOUNDATION

EISENHOWER MEMORIAL

DS-559-[illegible]

APPROVED FINAL
DATE 10-20-76
BY [signature]

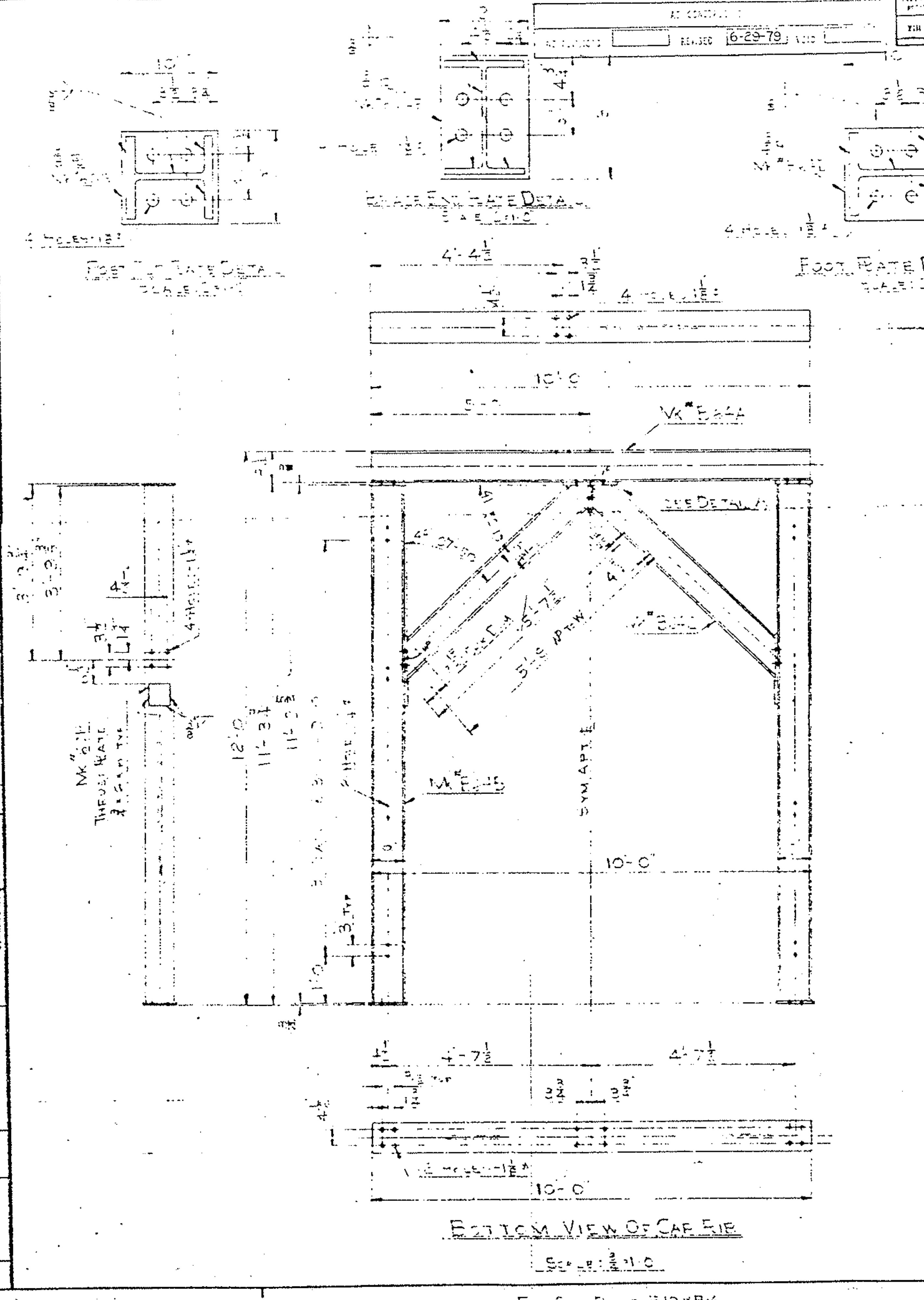
Approved
R.A. [signature]

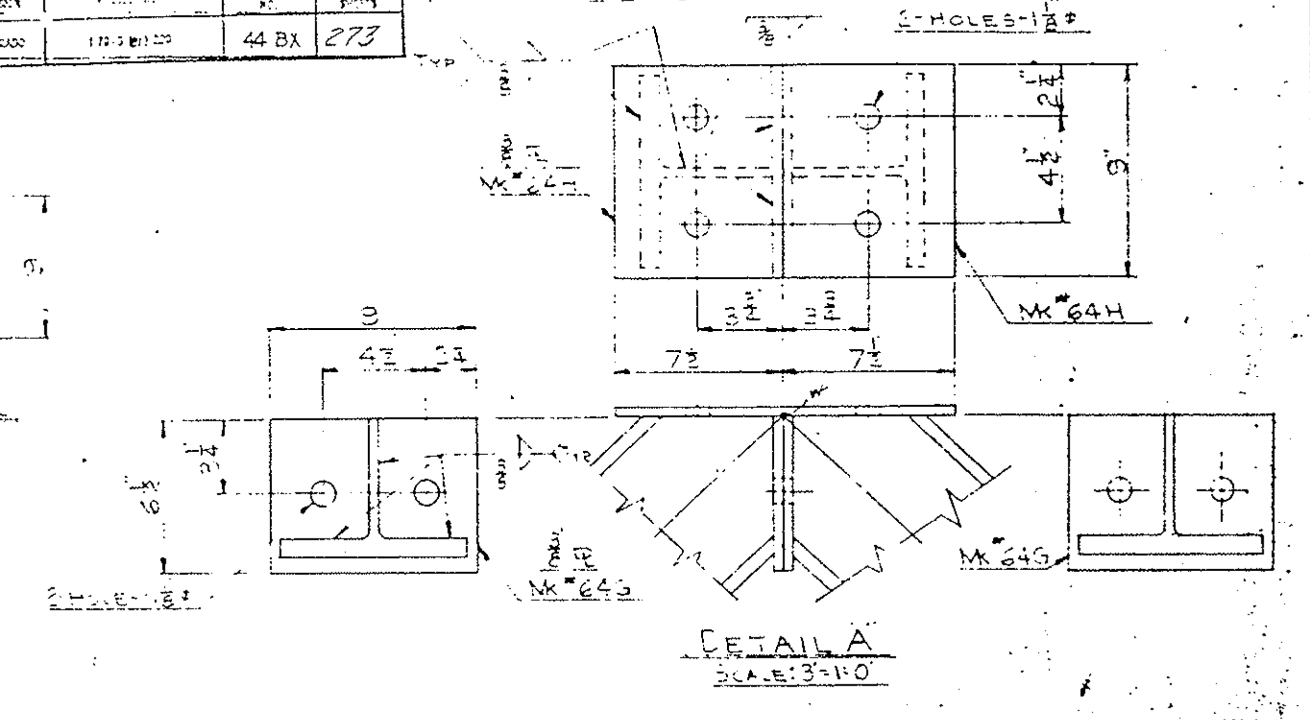
SPACE FOR REVIEWED & APPROVAL STAMP

REF. DWG. DIG

FOR GENERAL NOTES & TOLERANCES SEE DWG D5-559-5AAB-[illegible]

AS CONSTRUCTED	REVISED 6-29-79		44 BX	273





TOTAL WT	UNIT WT	DRAWING NO.		MARK NO.	NO REQ'D	DESCRIPTION	MATL SPEC
[illegible]	10				16	5/8 [illegible] T.L. NUTS (2 PER ROD)	
[illegible]	[illegible]				8	5/8 x 59 LG TIE RODS ([illegible])	
54	[illegible]				50	1 HEX. T.L. NUTS	
50.?	1.0?				50	1 x 3 HEX. HD. T.L. BOLTS	
	72	D5-559-5AAB-B64		64H		1 3/8 x 7 1/2 x 9 END PLATE	A572 GR.C.S.
	[illegible]			64S		1 [illegible] x 6 1/2 x 9 END PLATE	
	[illegible]			B44E		1 3/8 x 9 x 13 END PLATE	
	[illegible]					1 W8 x 40# x 5'-7 1/2 NNA	
[illegible]	[illegible]			B44S	2	BRACE ASSYS. EA. CONSISTING OF	
	181			B44S		1 3/4 x 9 x 10 FOOT PLATE	
	76			60?		1 [illegible] x 2 x 6 THRUST PLATE	
	[illegible]			60?		1 [illegible] x 3 x 10 [illegible] PLATE	
	[illegible]					1 W8 x 67# x 11'-3 1/4 NNA ①	
[illegible]	798?			B44B	2	POST ASSYS. EA. CONSISTING OF	
[illegible]	[illegible]			B44A	1	CAP RIB OF W8 x 40# x 10'-0 NNA	

TOTAL WT FOR ______ COURSE

MAT'L REQ'D PER COURSE OF RIBS

REV. SYM.	DATE	REVISION	S.A. NO.	CHG BY	CK BY
2	1-14-77	B44S WAS W8x67	3521	KW	JJS
1	[illegible]	[illegible] MK# 64S WAS [illegible]	3504	RJA	JJS

COMMERCIAL SHEARING, INC.
YOUNGSTOWN, OHIO 44501 U.S.A. PHONE 216 746-8011

SIDEWALL DRIFT FOR MULTIPLE DRIFT TYPE
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-4 (E) 220 - COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

DATE 7-27-76 | DR BY KW | CK BY [illegible] | SCALE AS NOTED

DWG NO D5-559-5AAB-B64

APPROVED FINAL
DATE 2/11/77
BY Jack E. Gay

APPROVED FINAL DATED 1-6-77 BY JACK E. GAY
APPROVED FINAL DATED 11-20-76 BY JACK E. GAY
APPROVED PRELIMINARY DATED 10-20-76 BY JACK E. GAY

SPACE FOR REVIEWED & APPROVAL STAMP

AS CONSTRUCTED

NO REVISIONS ☐ REVISE ☐ 6-29-73

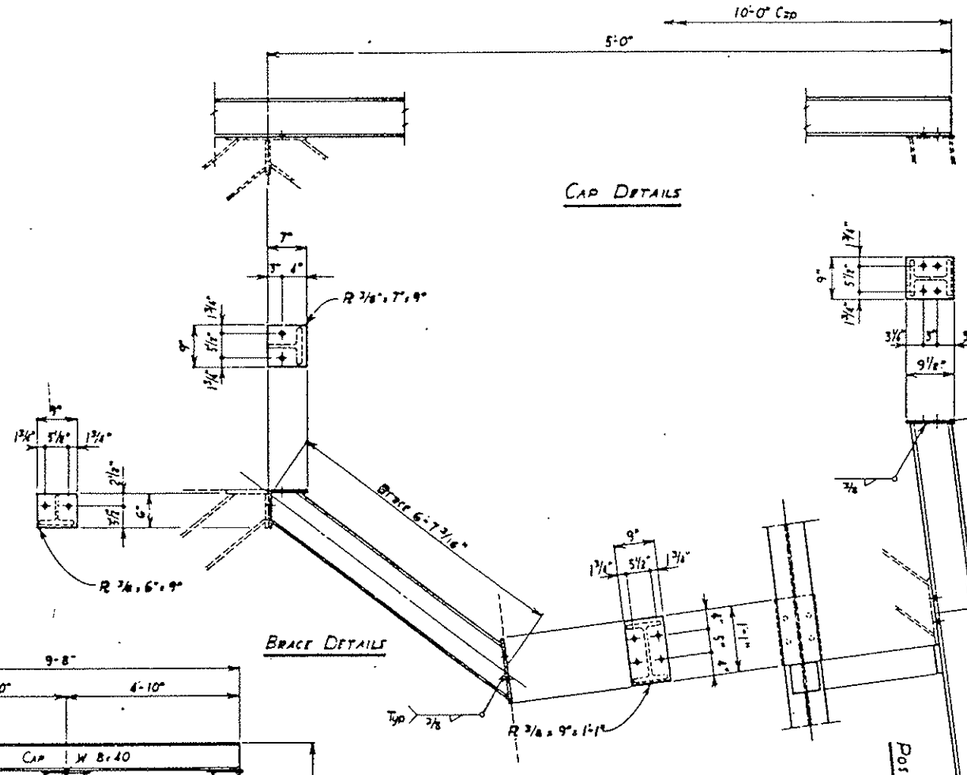
FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-5(81)220	45	275

REVISIONS		

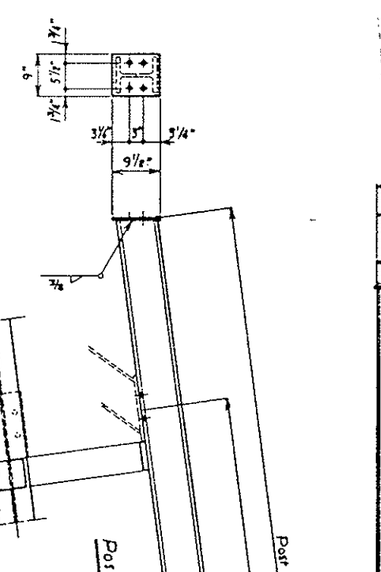
	DATE	CHECKED
DESIGNED BY		
DRAWN BY C.D.O.H.	3-74	QUANTITIES BY
CHECKED BY R.W.S.	4-74	CHECKED BY
DETAILED BY		

Note:
All bolts shall be 1"ø A 307
All holes are 1⅛"ø
For additional details see DWG. No. B 10

Cap Details



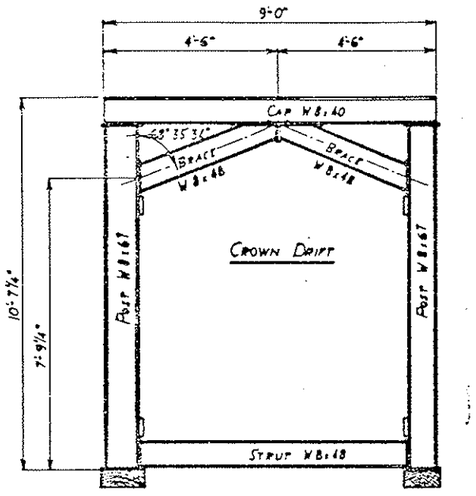
Brace Details

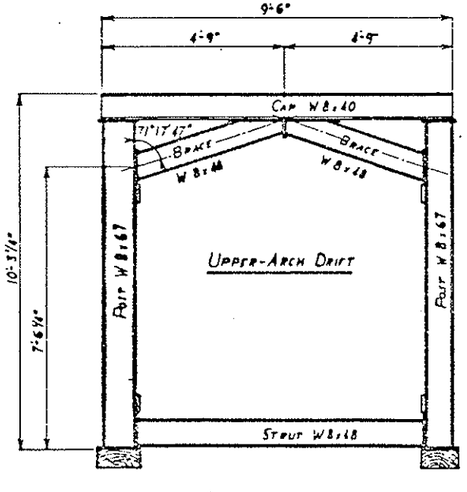


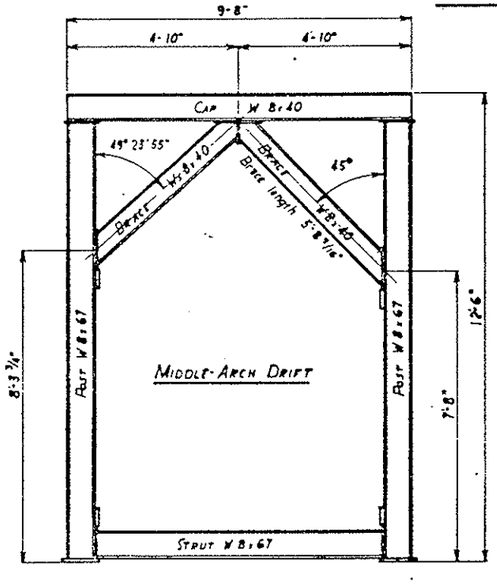
Post Details

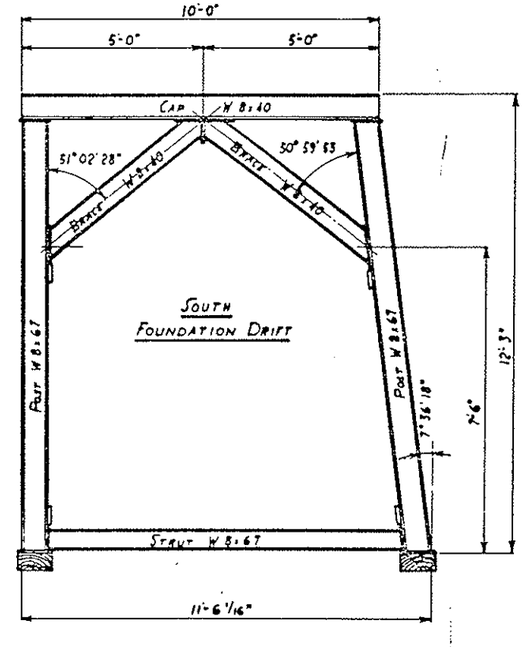
Strut Details

Foot Plate









South Foundation Drift Details

For additional details see DWG. No. B 16

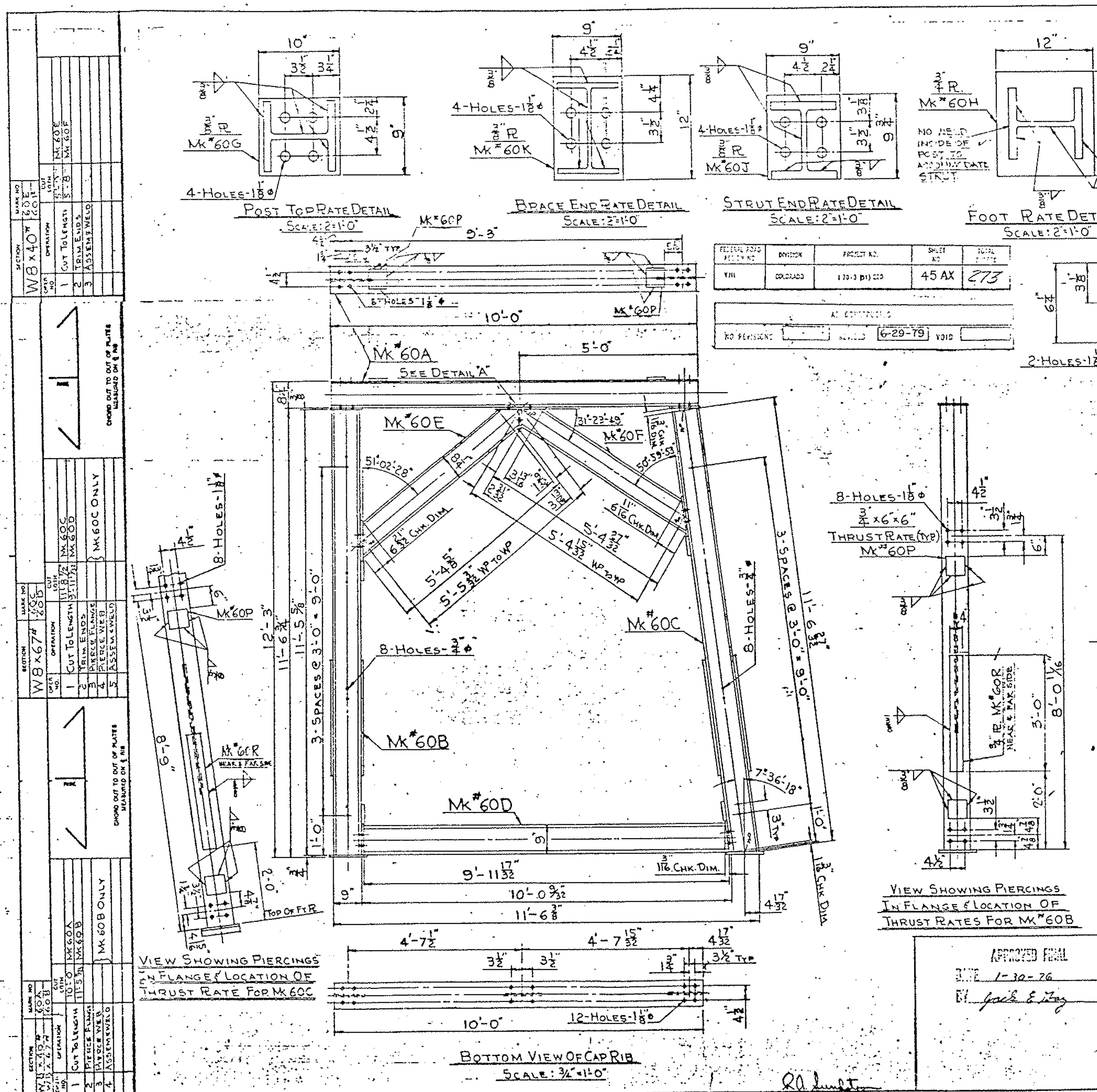
DIVISION OF HIGHWAYS

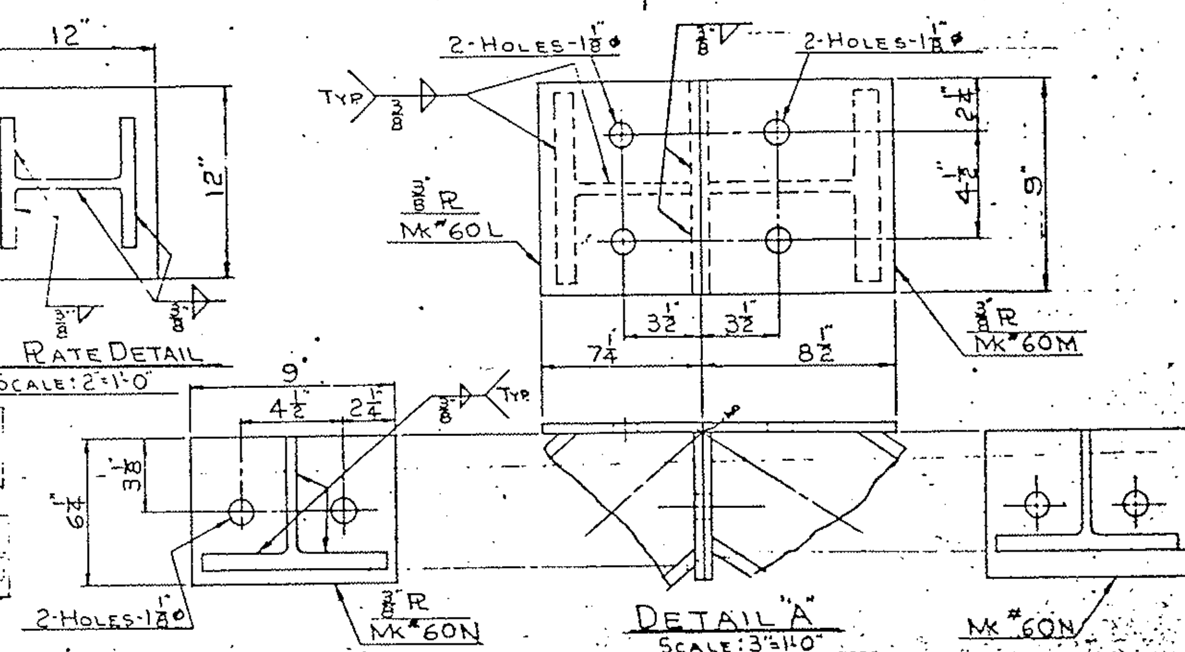
Multiple Drift Tunnel Support Details

Divisions Proposed Method of Construction

Designer C.D.O.H.	Structure Numbers F-15-X
Detailer R. Seylhouwer	
Drawing Number B 17	of 60 Drawings

Revision Dates (Preliminary Stage Only)





Total Wt	Unit Wt	Drawing No.	Part No.	Mark No.	No. Req'd	Description	Mat'l Spec.
1.6	.10				16	5/8" Sq. T.L. Nuts (2-Per Rod)	
27.1	3.39				8	5/8" x 39" Tie Rods (With 5" C.A. Thd Each End)	
8.4	.28				30	1" Hex T.L. Nuts	
30.9	1.03				30	1" x 3" Hex. Hd. T.L. Bolts	
	8.1	DS-559-5AAB-060		60M	1	3/8" x 8 1/2" x 9" End Plate	A572 Grade
	6.0			60N	1	3/8" x 6 1/4" x 9" End Plate	
	11.5			60K	1	3/8" x 9" x 12" End Plate	
	213.5				1	W8x40# x 5'-4 1/16" NNA	
239.1	239.1			60F	1	Brace Assy. Consisting Of	
	6.9			60L	1	3/8" x 7 1/4" x 9" End Plate	
	6.0			60N	1	3/8" x 6 1/4" x 9" End Plate	
	11.5			60K	1	3/8" x 9" x 12" End Plate	
	216.0				1	W8x40# x 5'-4 13/16" NNA	
240.4	240.4			60E	1	Brace Assy. Consisting Of	
	9.3			60J	2	3/8" x 9" x 9 3/4" End Plate	
	664.1				1	W8x67# x 9'-10 15/16" NNA	
682.7	682.7			60D	1	Strut Assy. Consisting Of	
	30.6			60R	2	3/4" x 4" x 36" Plates	
	30.6			60H	1	3/4" x 12" x 12" Foot Plate	
	7.6			60P	2	3/4" x 6" x 6" Thrust Plate	
	9.6			60G	1	3/8" x 9" x 10" Top Plate	
	775.2				1	W8x67# x 11'-6 27/32" NNA	
83[illegible].8	83[illegible].8			60C	1	Post Assy. Consisting Of	
	30.6			60R	2	3/4" x 4" x 36" Plates	
	30.6			60H	1	3/4" x 12" x 12" Foot Plate	
	7.6			60P	2	3/4" x 6" x 6" Thrust Plate	
	9.6			60G	1	3/8" x 9" x 10" Top Plate	
	768.4				1	W8x67# x 11'-5 5/8" NNA	
835.0	835.0			60B	1	Post Assy. Consisting Of	
	~~7.6~~			~~60P~~		~~3/4" x 6" x 6" Thrust Plates~~	
	~~[illegible]~~					~~W8x40# x 10'-0" NNA~~	
415.2	415.2			60A	1	Cap Beam Assy. Consisting Of:	

Total Wt. For ____ Course

Mat'l Req'd Per Course Of Ribs

Rev. Sym.	Date	Revision	E.R. No.	Chk. By	Ck. By
3	1-21-75	Relocated Thrust Pl. on Cap Beam	2205	RJA	JJS
2	1-16-75	Added Pls to Far Side Flg of Posts	2189	RJA	JJS
1	1-12-76	Added Holes & Pls in Cap Bm. Also Pls on Posts	2156	RJA	[illegible]

Approved Final
Date 1-30-76
By Jack E. [illegible]

Received D.D.H.

Commercial Shearing, Inc.
Youngstown, Ohio 44501 U.S.A. Phone 216 746-8011

South Foundation Multiple Drift Type
Eisenhower Memorial Tunnel
2nd Bore Fed. No. I 70-3(81) 220 — Col.
Peter Kiewit Sons Co. and Brown & Root, Inc.

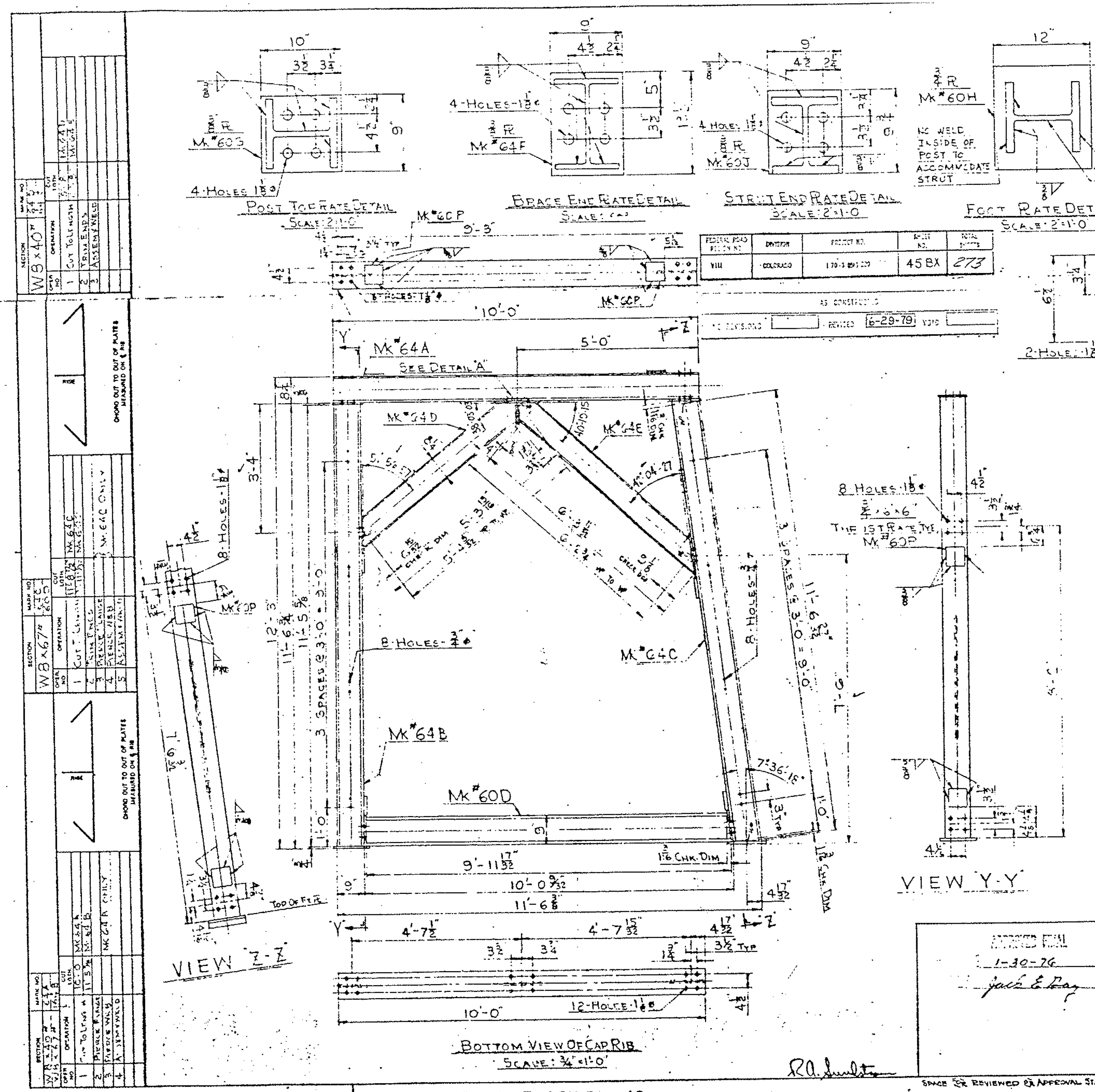
Date 12-9-75 | Dr. By KW | Ch. By JJS | Scale As Noted

Dwg. No. DS-559-5AAB-060

Ref. Cust. Dwg 817 Sheet 45

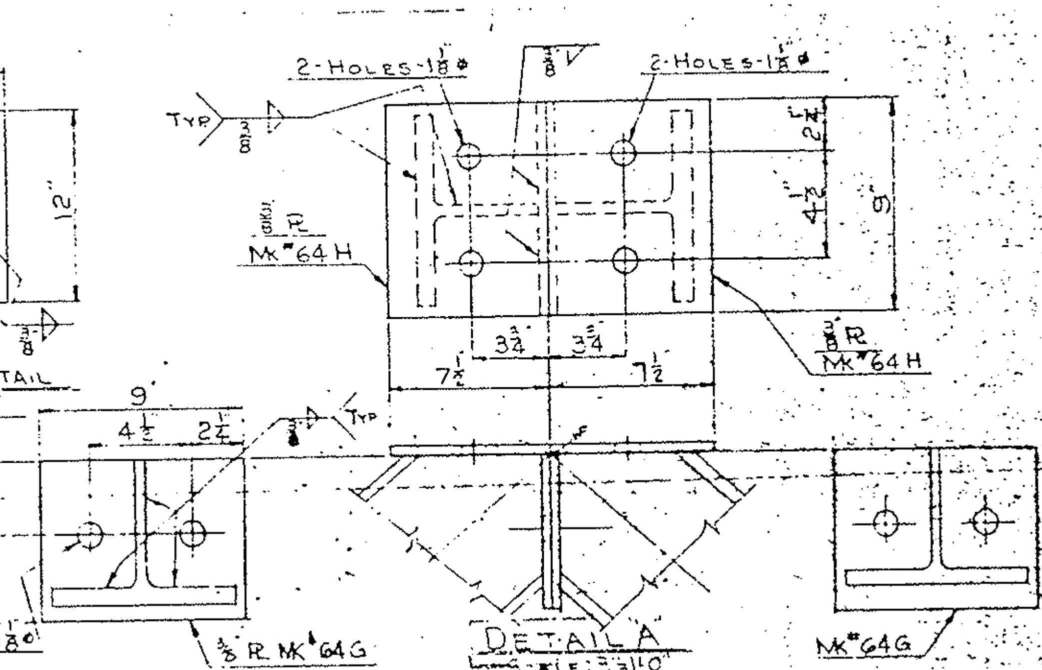
Space for Reviewed & Approval Stamp

Similar to Dwg. [illegible] Except for Bracing



FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3 (81) 220	45 BX	273

AS CONSTRUCTED — REVISED 6-29-79



TOTAL WT	UNIT WT	DRAWING NO	PART NO.	MARK NO	NO REQ'D	DESCRIPTION	MAT'L SPEC
1.6	.10				16	5/8" SQ. T.L. NUTS (2 PER ROD)	
271	33.9				8	5/8" x 39" TIE RODS (WITH 3" THD. EACH END)	
8.4	.28				30	1" HEX. T.L. NUTS	
309	1.03				30	1" x 2" HEX HD T.L. BOLTS	
	7.2	D5-559-5AAB-064		64H	1	3/8" x 7 1/2" x 9" END RATE	A572 GRADE 50
	6.2			64G	1	3/8" x 6 1/2" x 9" END RATE	
	12.[illegible]			64F	1	3/8" x 9" x 13 1/2" END RATE	
	247.5				1	W8x40# x 6'-2 1/4" NNA	
[illegible]	[illegible]			64E	1	BRACE ASSY. CONSISTING OF	
	7.2			64H	1	3/8" x 7 1/2" x 9" END RATE	
	6.2			64G	1	3/8" x 6 1/2" x 9" END RATE	
	12.9			64F	1	3/8" x 9" x 13 1/2" END RATE	
	212.7				1	W8x40# x 5'-3 1/2" NNA	
[illegible]	[illegible]			64D	1	BRACE ASSY. CONSISTING OF	
	9.3			60J	2	3/8" x 9" x 9 3/4" END RATE	
	664.1				1	W8x67# x 9'-10 15/16" NNA	
682.7	682.7			60D	1	STRUT ASSY. CONSISTING OF	
	30.-			60H	1	3/4" x 12" x 12" FOOT RATE	
	7.6			60P	2	3/4" x 6" x 6" THRUST RATE	
	9.6			60G	1	3/8" x 9" x 10" TOP RATE	
	775.2				1	W8x67# x 11'-6 27/32" NNA	
830.2	830.2			64C	1	POST ASSY CONSISTING OF	
	30.6			60H	1	3/4" x 12" x 12" FOOT RATE	
	7.6			60P	2	3/4" x 6" x 6" THRUST RATE	
	9.6			60G	1	3/8" x 9" x 10" TOP RATE	
	765.4				1	W8x67# x 11'-5 5/8" NNA	
822.8	822.8			64B	1	POST ASSY CONSISTING OF	
	~~7.6~~			~~60P~~	~~1~~	~~3/4" x 6" x 6" THRUST RATE~~	
	4[illegible]				1	W8x40# x 10'-0" NNA	
415.2	4.52			64A	1	CAP BEAM ASSY. CONSISTING OF	

TOTAL WT. FOR ______ COURSE

MAT'L REQ'D PER COURSE OF RIBS

REV. SYM	DATE	REVISION	DR NO.	CHG BY	CK BY
1	-21-76	RELOCATED THRUST PL ON CAP BEAM	2203	RJA	JJS

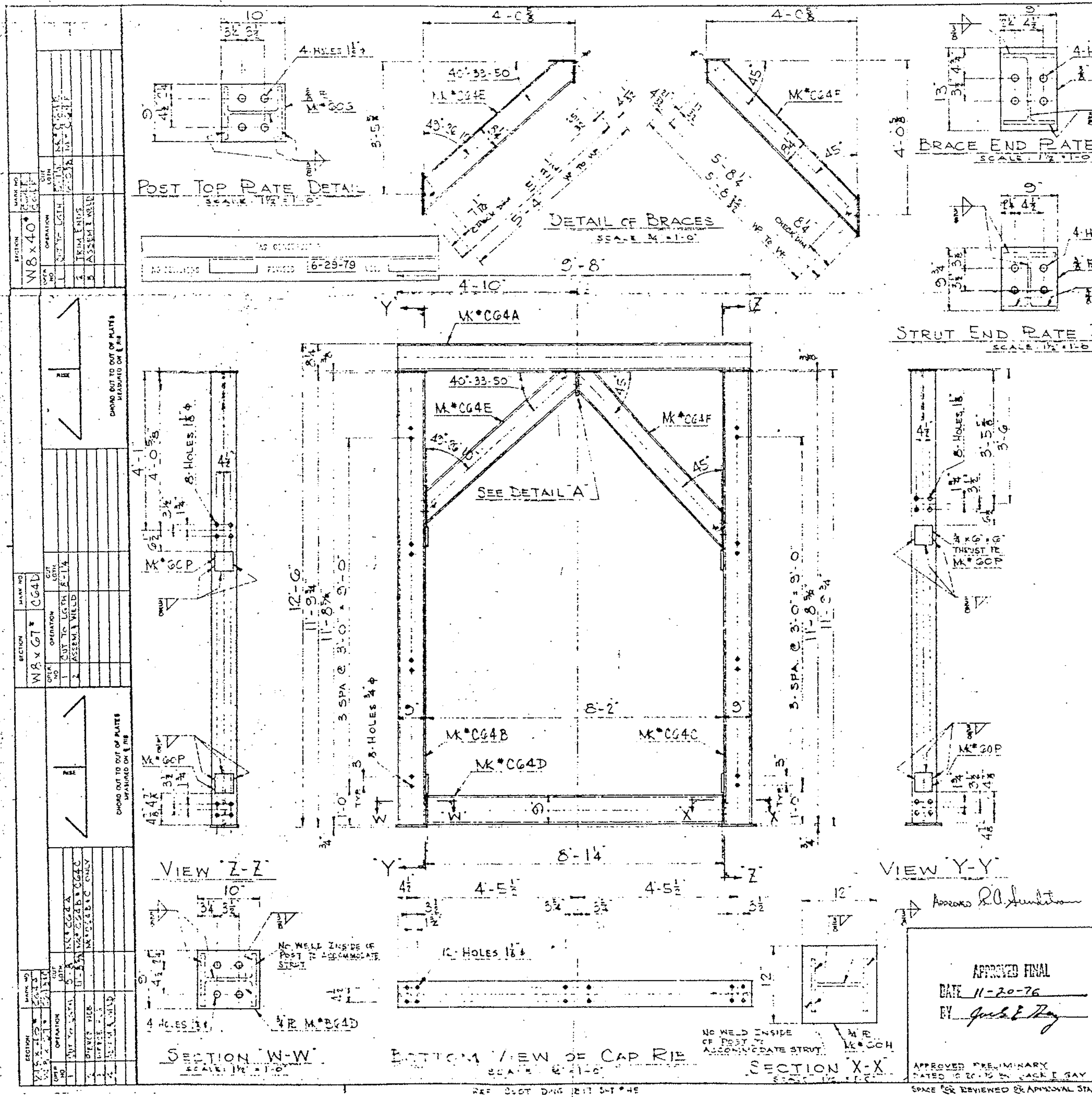
COMMERCIAL SHEARING, INC. YOUNGSTOWN, OHIO

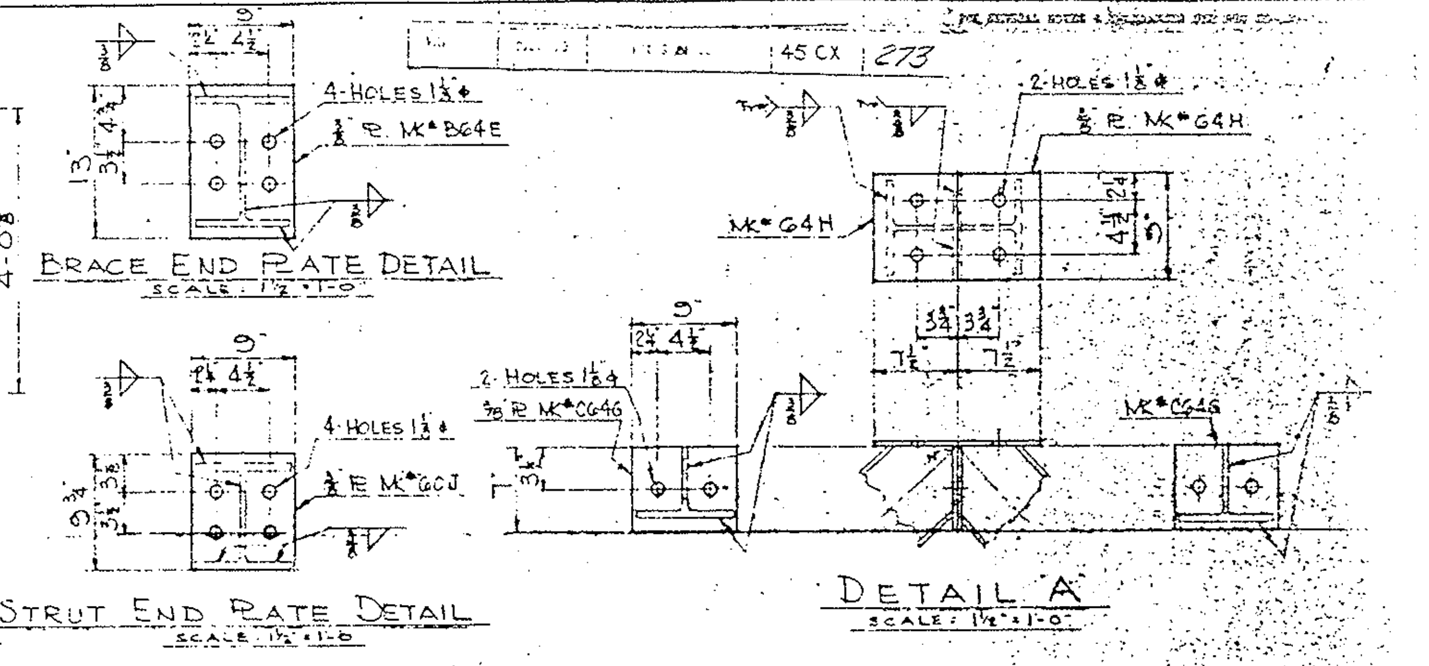
SOUTH FOUNDATION MULTIPLE DRIFT TYPE
EISENHOWER MEMORIAL TUNNEL
2ND BORE FED. NO. I 70-3 (81) 220 — COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

DATE 1-15-76 | DR BY RJA | CK BY JJS | SCALE AS NOTED

DWG NO. D5-559-5AAB-064

SIMILAR TO DWG-060 EXCEPT FOR BRACING





Total Wt	Unit Wt	Drawing No.	Total Pay Wt per Course	Mark No	No. Req'd	Description	Mat'l Spec
16	10				16	⅝" SQ T.L. NUTS (2 PER ROD)	
27.1	3.39				8	⅝"φ x 23" TIE RODS (WITH 5" THD. EA. END)	
9.5	28				34	1" HEX. T.L. NUTS	
35.0	1.03				34	1"φ x 3" HEX HD. T.L. BOLTS	
	12.4	D5-559-5AAB-C64		BC4E		1 ⅜" x 9" x 13" END PLATE	A-36
	6.7			C64G		1 ⅜" x 7" x 9" END PLATE	
	7.2			G4H		1 ⅜" x 7½" x 9" END PLATE	
	227.5					1 W8 x 40# x 5'-8¼" N.N.A.	
253.8	253.8			C64F	1	BRACE ASSY. CONSISTING OF:	
	12.4			BC4E		1 ⅜" x 9" x 13" END PLATE	
	6.7			C64G		1 ⅜" x 7" x 9" END PLATE	
	7.2			G4H		1 ⅜" x 7½" x 9" END PLATE	
	211.7					1 W8 x 40# x 5'-3½" N.N.A.	
238.0	238.0			C64E	1	BRACE ASSY CONSISTING OF:	
	9.3			60J		2 ⅜" x 9" x 9¾" END PLATES	
	543.0					1 W8 x 67# x 8'-1¼" N.N.A.	
561.6	561.6			C64D	1	STRUT ASSY. CONSISTING OF:	
	7.6			60P		2 ¾" x 6" x 6" THRUST PLATES	
	30.6			60H		1 ¾" x 12" x 12" FOOT PLATE	
	9.6			60G		1 ⅜" x 9" x 10" TOP PLATE	
	785.2					1 W8 x 67# x 11'-8⅝" N.N.A.	
840.6	840.6			C64C	1	POST ASSY CONSISTING OF:	
	7.6			60P		2 ¾" x 6" x 6" THRUST PLATES	
	19.1			BG4D		1 ¾" x 9" x 10" FOOT PLATE	
	9.6			60G		1 ⅜" x 9" x 10" TOP PLATE	
	785.2					1 W8 x 67# x 11'-8⅝" N.N.A.	
828.1	828.1			C64B	1	POST ASSY. CONSISTING OF:	
386.7	386.7			C64A	1	CAP RIB OF W8 x 40# x 9'-8" N.N.A.	

TOTAL WT. FOR ____ CO. A&E

MATL. REQ'D. PER COURSE OF RIBS

REV. SYM.	DATE	REVISION	D.R. NO.	CHG. BY	CH. BY

COMMERCIAL SHEARING INC.
YOUNGSTOWN, OHIO

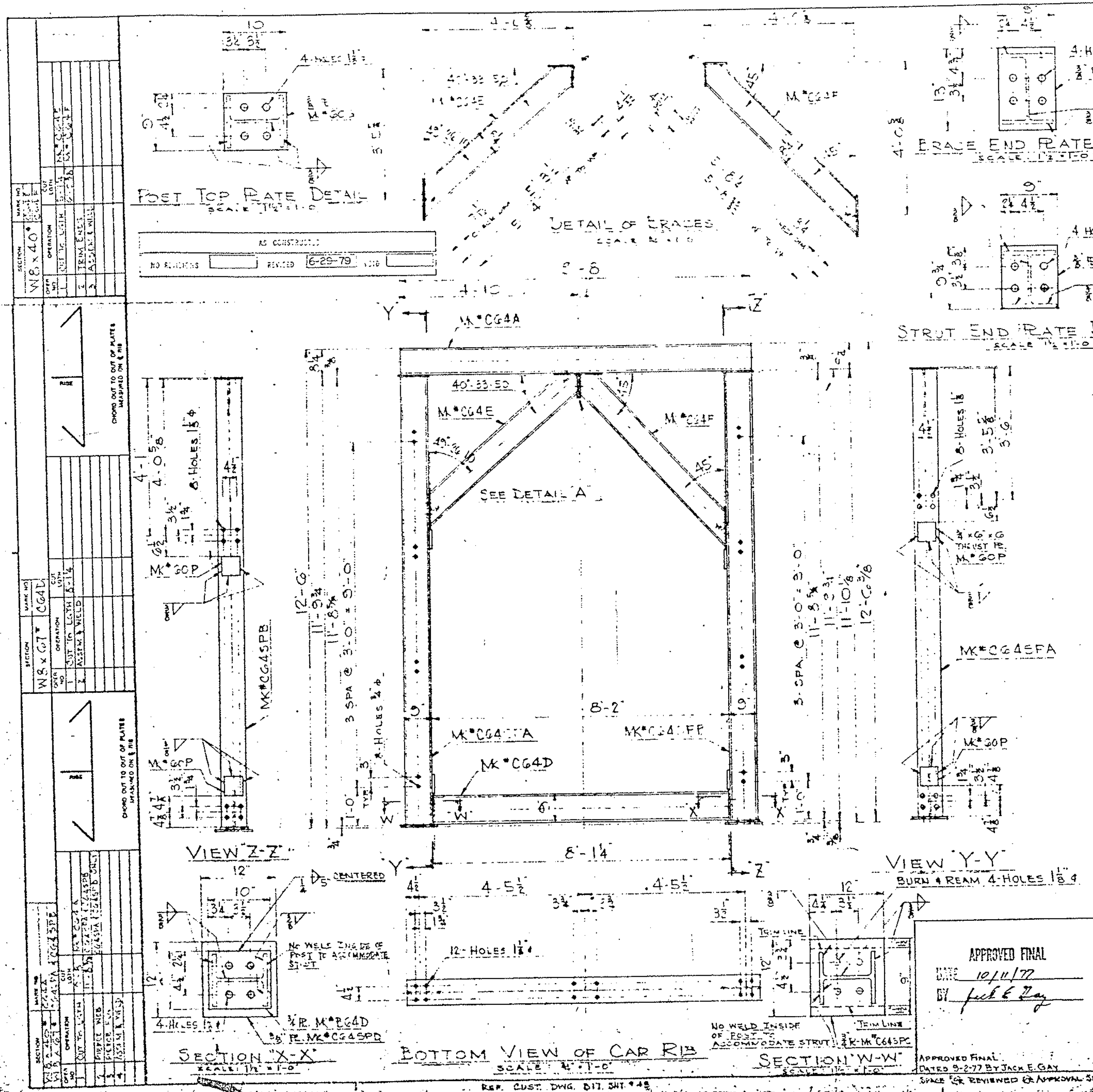
MIDDLE ARCH MULTIPLE DRIFT TYPE
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-3(21)
PETER KIEWIT SONS CO. AND BRINKERHOFF INC.

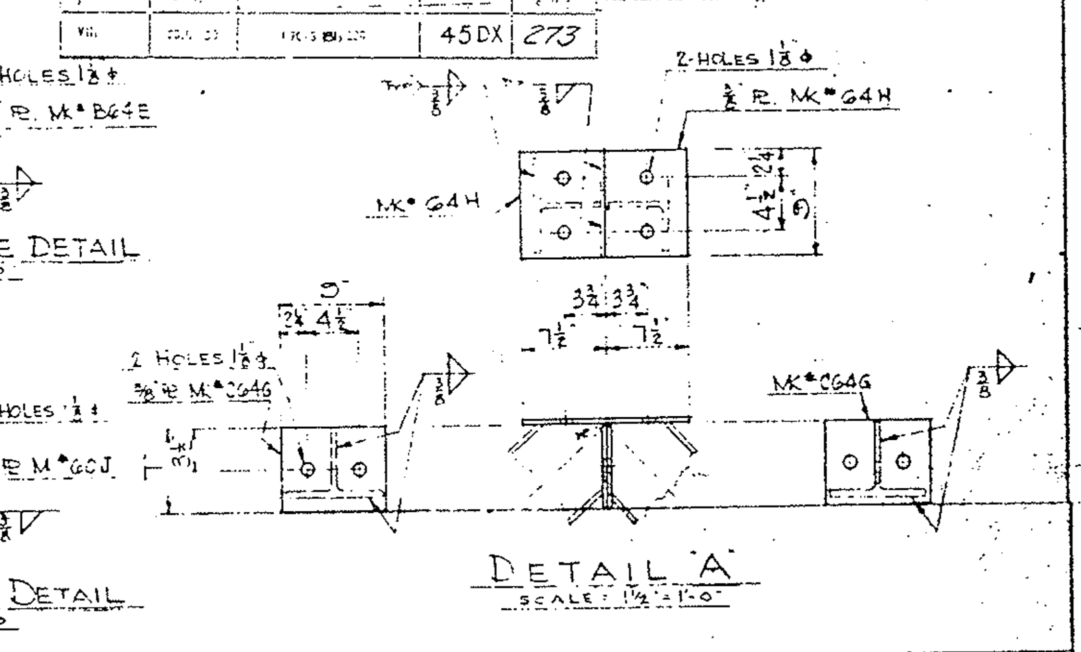
DATE 8-19-76 | DR. BY RJA | CH. BY KW | SCALE AS NOTED

REF. NO.

DWG. NO. D5-559-5AAB-C64

FOR GENERAL NOTES & TOLERANCES SEE DWG D5-559-5AAB-XX1





TOTAL WT.	UNIT WT.	DRAWING NO.	TOTAL PAY WT PER COURSE	MARK NO.	NO. REQ'D	DESCRIPTION	MATL. SPEC.
1.6	.10				16	⅞" SQ. T.L. NUTS (2 PER ROD)	
27.1	3.39				8	⅞ × 32" TIE RODS (WITH 5" EA. THD. EA. END)	
9.5	.25				34	1" HEX T.L. NUTS	
35.0	1.03				34	1 × 5 HEX HD. T.L. BOLTS	
	13.4	D5-559-5AAB-CG4CP		B64E		1 ⅝ × 9 × 13 END PLATE	A572 GRADE 55
	6.7			64J		1 ⅝ × 7 × 9 END PLATE	
	7.2			64H		1 ⅝ × 7½ × 9 END PLATE	
	223.5					1 W8 × 40# × 5-6¼" NNA.	
253.8	253.9			CG4F	1	BRACE ASSY CONSISTING OF:	
	12.4			B64E		1 ⅝ × 9 × 13 END PLATE	
	6.7			64J		1 ⅝ × 7 × 9 END PLATE	
	7.2			64H		1 ⅝ × 7½ × 9 END PLATE	
	211.7					1 W8 × 40# × 5-3½" NNA	
238.0	238.0			CG4E	1	BRACE ASSY CONSISTING OF:	
	9.5			60J		2 ¾ × 9 × 9¾ END PLATES	
	543.0					1 W8 × 67# × 8-1¼" NNA.	
561.6	561.6			CG4D	1	STRUT ASSY CONSISTING OF:	
	15.2			CG4SPD		1 ⅝ × 12" × 12" BASE PLATE	
	7.6			60P		2 ¾ × 6" × 6 THRUST PLATES	
	19.1			64E		1 ¾ × 9" × 10" FOOT PLATE	
	9.6			60G		1 ⅝ × 9" × 10" TOP PLATE	
	785.2					1 W8 × 67# × 11-8⅝" N.N.A.	
844.3	844.3			CG45PB	1	POST ASSY CONSISTING OF:	
	7.6			60P		2 ¾ × 6" × 6" THRUST PLATES	
	30.6			CG45PC		1 ¾ × 12" × 12" FOOT PLATE	
	9.6			60G		1 ⅝ × 9" × 10" TOP PLATE	
	785.2					1 W8 × 67# × 11-8⅝" N.N.A.	
843.6	843.6			CG45FA	1	POST ASSY CONSISTING OF:	
386.7	386.7			CG4A	1	CAP RIB OF W8 × 40# × 9-8" NNA	

TOTAL WT. FOR ____ COURSE

MAT'L. REQ'D. PER COURSE OF RIBS

APPROVED FINAL
DATE 10/11/77
BY Jack E. Gay

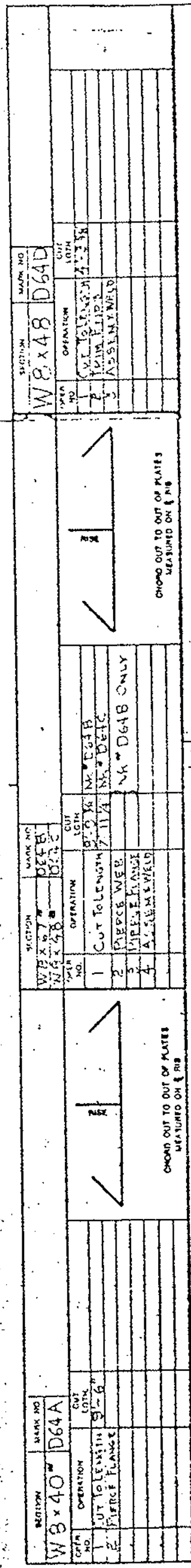
APPROVED FINAL DATED 9-2-77 BY JACK E. GAY
SPACE FOR REVIEWED & APPROVAL STAMP

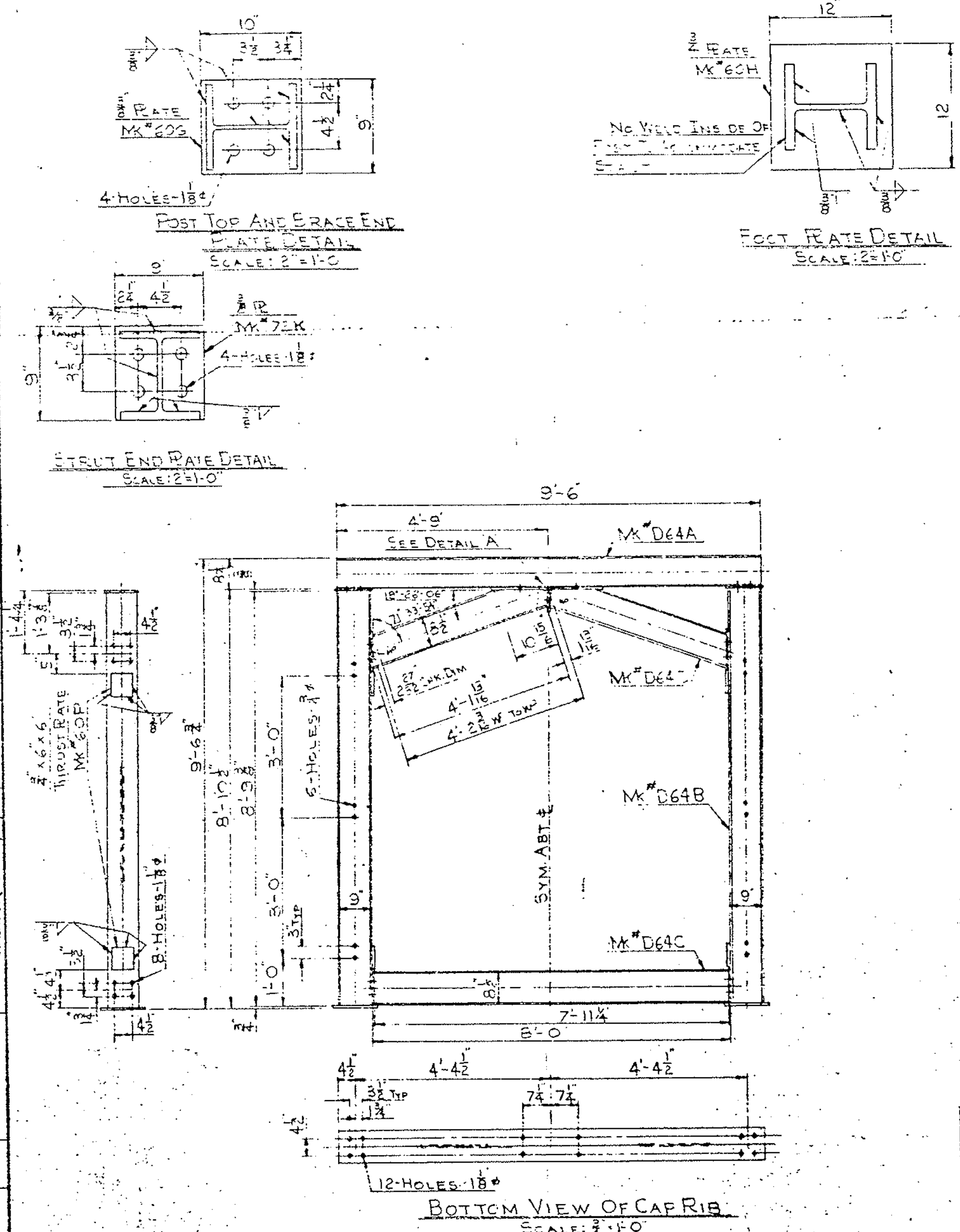
COMMERCIAL SHEARING INC. YOUNGSTOWN OHIO U.S.A.
MIDDLE ARCH, MULTIPLE DRIFT TYPE
EISENHOWER MEMORIAL TUNNEL
2ND. BORE, PROJ. No. I 70-3(51)220 — COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

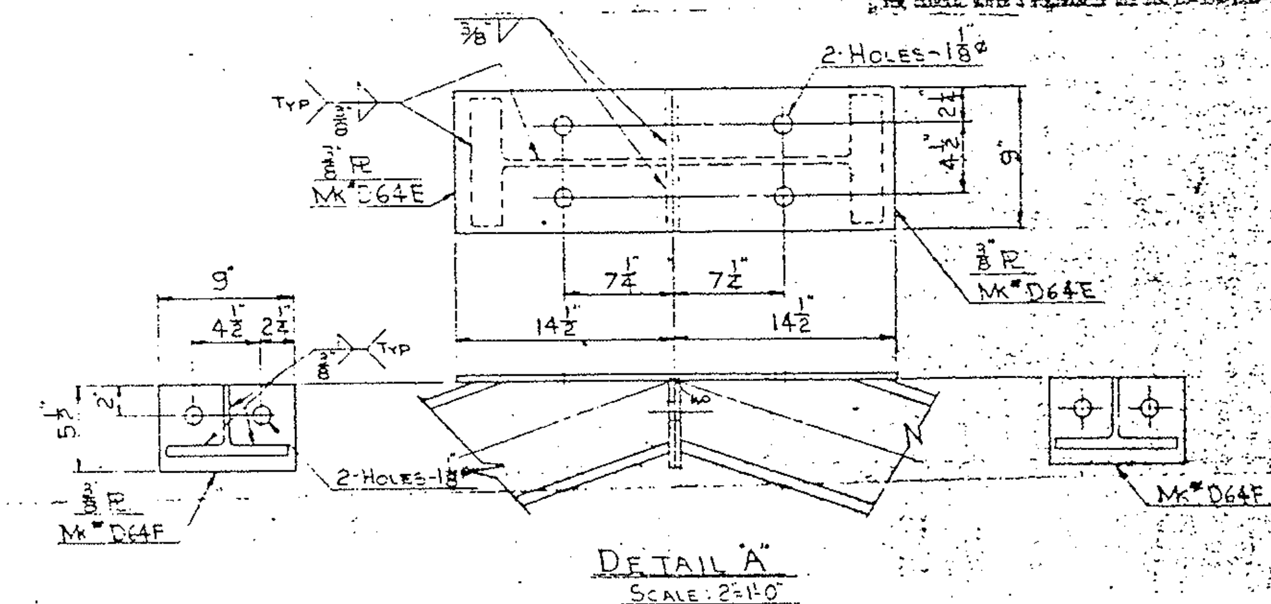
REV. SYM.	DATE	REVISION		DR. NO.	CH'D. BY	OK BY
1	8-27-77	ADDED TRIM LINES TO SECTION "W-W"	2718	KW	WPV	

DATE 6-26-77 · DR. BY JJS · CH. BY KW · SCALE AS NOTED
DWG. NO. D5-559-5AAB-CG45P

SIMILAR TO DWG. - CG4
REF. CUST. DWG. 817, SHT. 48







FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-1 (81) 220	45 EX	273

NO REVISIONS ... ISSUED 6-29-79

TOTAL WT	UNIT WT	DRAWING NO.	TOTAL PAY. WT. PER COURSE	MARK NO.	NO. REQ'D	DESCRIPTION	MAT'L SPEC.
1.2	.10				12	5/8" SQ T.L. NUTS (2 PER ROD)	
20.3	3.39				6	5/8" x 59" Lg. TIE RODS (3" GA. THD EACH END)	
9.4	.39				30	1" HEX T.L. NUTS	
30.9	1.03				30	1" x 3" HEX HD. T.L. BOLTS	
	5.3	D5-559-5AAB-D64		D64F		1 3/8" x 5 1/2" x 9" END PLATE	A572 GRADE 55
	13.9			D64E		1 3/8" x 9" x 14 1/2" END PLATE	
	9.6			60G		1 3/8" x 9" x 10" END PLATE	
	199.3					1 W8 x 48# x 4'-1 13/16 NNA	
456.2	228.1			D64D	2	BRACE ASS'YS. EA. CONSISTING OF	
	8.6			72K		2 3/8" x 9" x 9" END PLATE	
	381.0					1 W8 x 48# x 7'-11 1/4" NNA	
398.2	398.2			D64C	1	STRUT ASS'Y CONSISTING OF	
	7.6			60P		2 3/4" x 6" x 6" THRUST PLATE	
	30.6			60H		1 3/4" x 12" x 12" FOOT PLATE	
	9.6			60G		1 3/8" x 9" x 10" TOP PLATE	
	586.3					1 W8 x 67# x 8'-9 3/8" NNA	
1287.4	643.7			D64B	2	POST RIB ASS'YS EA. CONSISTING OF	
380.0	380.0			D64A	1	CAP RIB OF W8 x 40# x 9'-6" NNA	

TOTAL WT. FOR ______ COURSE

MAT'L. REQ'D PER COURSE OF RIBS

Approved R.A. Sundstrom

APPROVED FINAL
DATE 11-20-76
BY Jack E. Gay

APPROVED PRELIMINARY
DATED 10-20-76 BY JACK E. GAY
SPACE FOR REVIEWED & APPROVAL STAMP

REV SYM.	DATE	REVISION	D.R. NO.	CHK. BY	CK. BY

COMMERCIAL BREAKING, INC. YOUNGSTOWN, OHIO

UPPER ARCH DRIFT - MULTIPLE DRIFT TYPE
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-1 (81) 220 COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT INC.

DATE 9-2-76 DR. BY KW

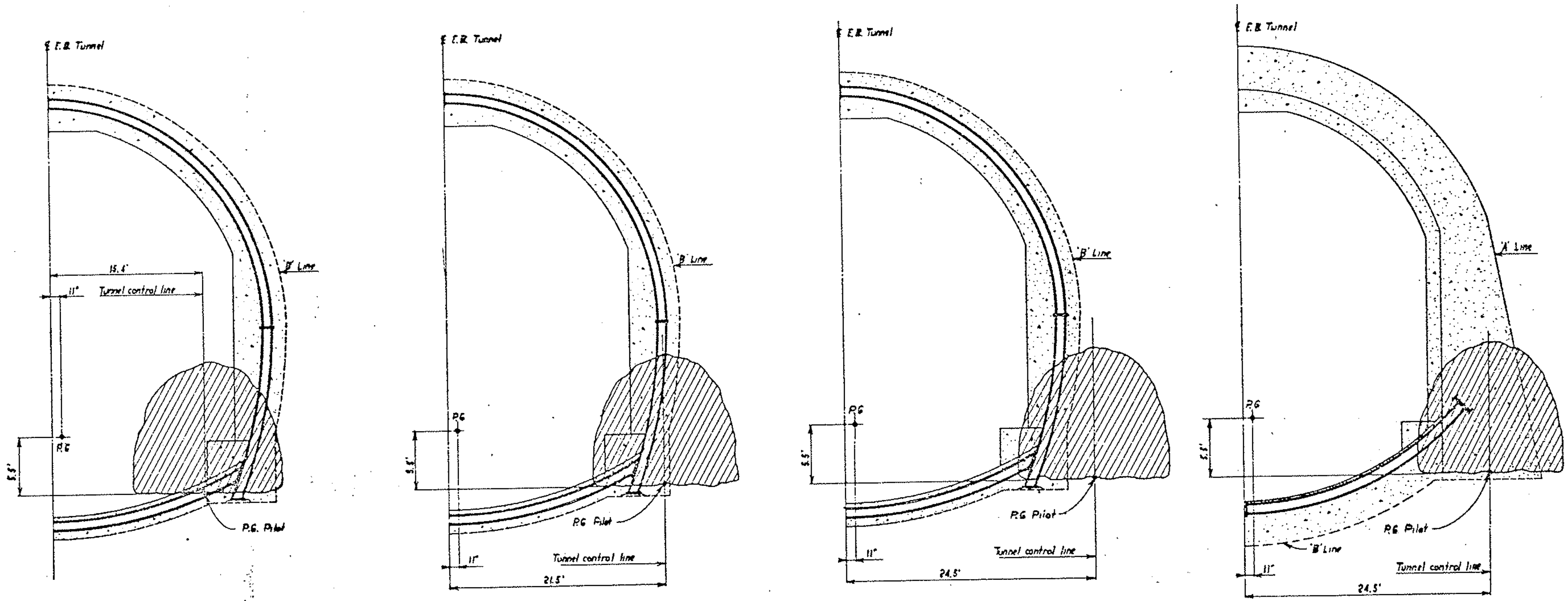
DWG. NO. D5-559-5AAB-D64

Johnson

AS CONSTRUCTED		
NO REVISIONS 6-29-79	REVISED	

REGION NO.	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	50	273

REVISIONS



Station 74+50
South walls of Pilot and Main Bore approx. coincide

Eastbound Tunnel transition to the North from Sta. 72+98 to 74+50

Station 78+20
Tunnel Control Line approximately below Arch Rib

Eastbound Tunnel transition to the North from Sta. 74+50 to 78+20

Station 80+00 to 82+53

Eastbound Tunnel transition to the North from Sta. 78+20 to 80+00

Remine Pilot Bore Class "A" 40+98 to 82+53

Station 82+53 to 87+56

Multiple Drift Support

Note:
The cross-section area of the pilot bore as shown represents approximate configuration

Original scale: 3/16" = 1'-0"

DIVISION OF HIGHWAYS

MAIN BORE, EASTBOUND TUNNEL, LOCATION RELATIVE TO LOCATION OF PILOT BORE

Designer C. D.O.K.		Structure Numbers	F-13-X
Detailer R Seyneuwer			
Drawing Number B 22	of 60	Drawings	

Initial	Date		Initial	Date
DESIGNED BY C.D.O.H.	2-75	CHECKED BY	JLA	3-75
CHECKED BY RJS	3-75	QUANTITIES BY / CHECKED BY	RJS	3-75
DETAILED BY				

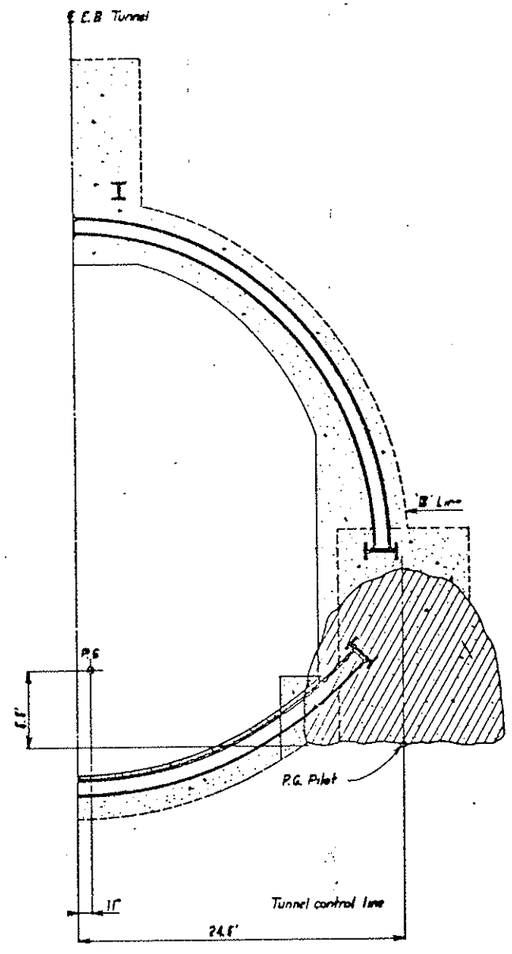
CDOH 4465

AS CONSTRUCTED					
BID ADDITIONS	6-29-79	REVISED	--	VOID	

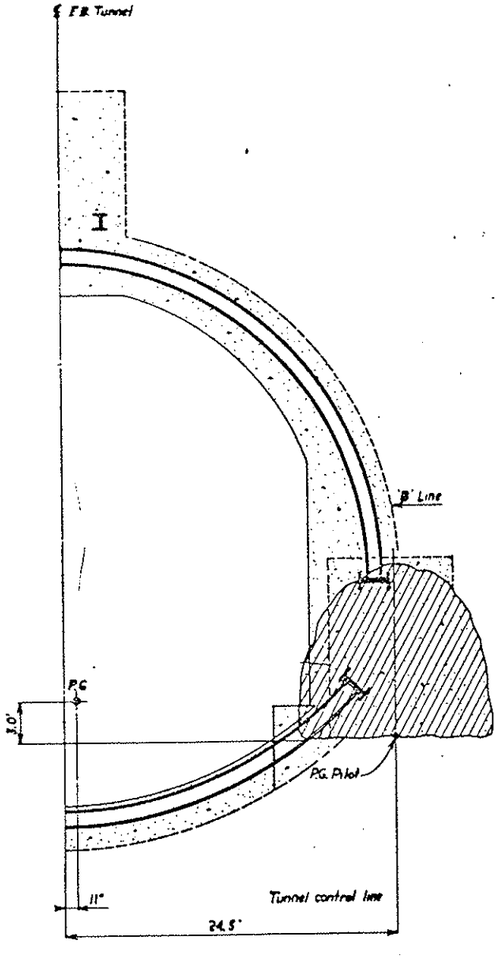
REGION NO.				
VIII	COLORADO	I 70-3(81)220	51	273

REVISIONS		

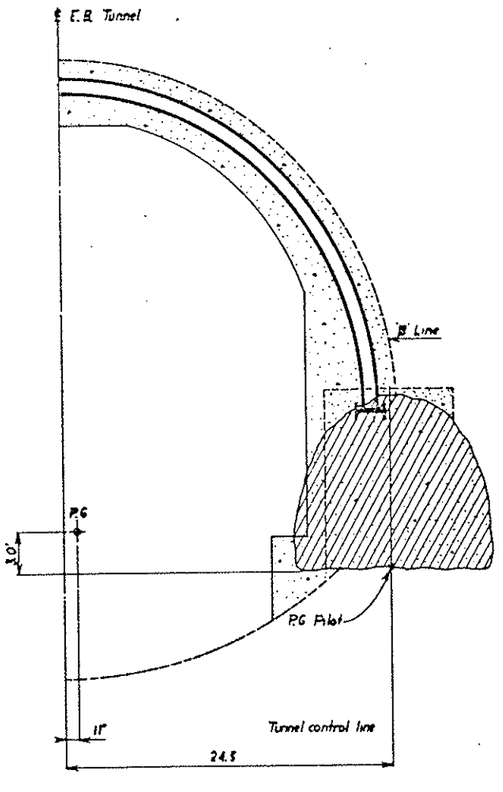
	DATE	
INITIAL		
DESIGNED BY	C.D.O.H	
CHECKED BY	2-75	
QUANTITIES BY	R.V.S	3-75
CHECKED BY	P.S.S	3-75
DETAILED BY		



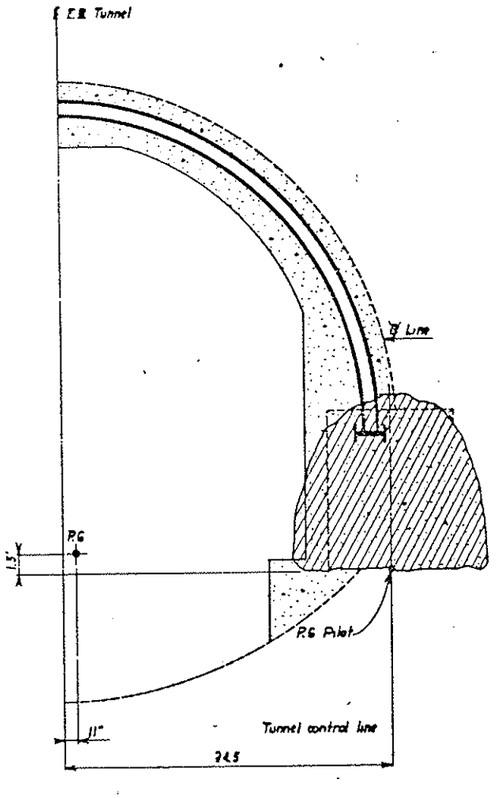
STATION 87+56 to 88+00



STATION 96+00 to 109+42



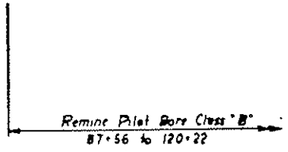
STATION 109+42 to 111+00



STATION 116+00
Last location of Pilot Bore offset = 24.5'

Eastbound Tunnel transition downward from Sta. 88+00 to 96+00

Eastbound Tunnel transitions downward from Sta. 111+00 to 116+00



Note:
The cross-section area of the pilot bore as shown represents approximate configuration

Original scale: 3/16" = 1'-0"

DIVISION OF HIGHWAYS

MAIN BORE, EASTBOUND TUNNEL, LOCATION RELATIVE TO LOCATION OF PILOT BORE

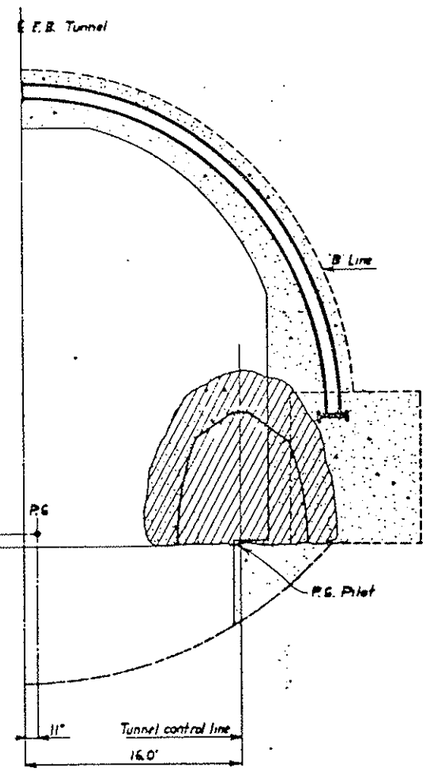
Designer C.D.O.H	Structure Numbers F-17-X
Detailer R. Seylhouner	
Drawing Number B 23	of 60 Drawings

Revision Dates (Preliminary Stage Only)

REGION NO.				
VIII	COLORADO	I 70-3(81)270	52	273

REVISIONS		

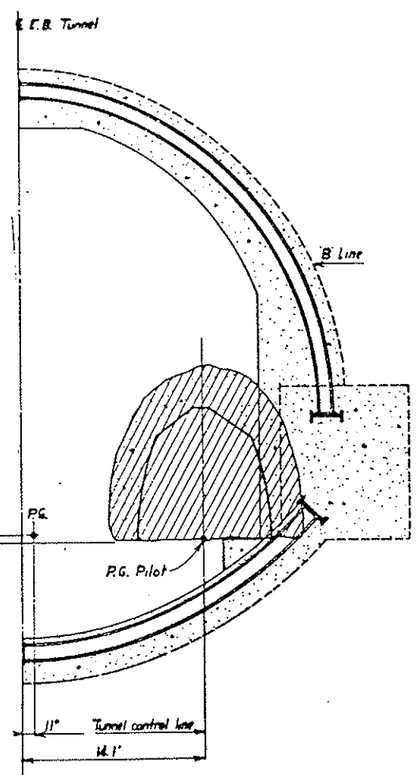
	DESIGNED BY	INITIAL	DATE
	DETAILED BY	C.D.O.H.	3-75
	CHECKED BY	R.J.S.	3-75
	QUANTITIES BY	P.V.G.	3-75
	CHECKED BY	J.L.A.	3-75



STATION 118+49

Beginning of Pilot Bore lining

Eastbound Tunnel transitions downward and southward from Sta. 116+00 to 118+49

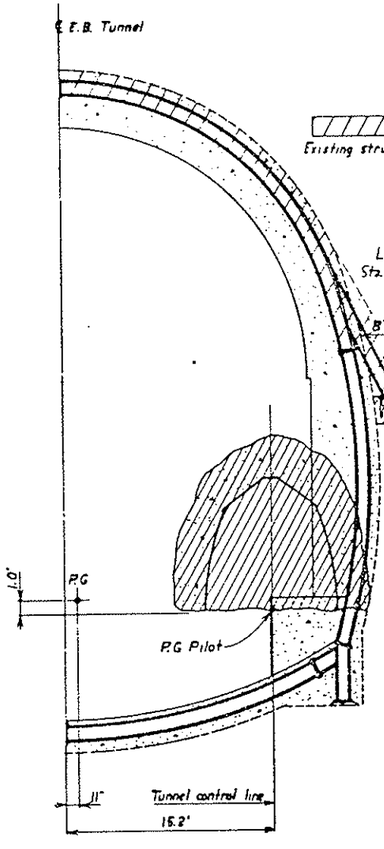


Remine Pilot Bore Class B From Station 87+56 to 120+22

STATION 120+22

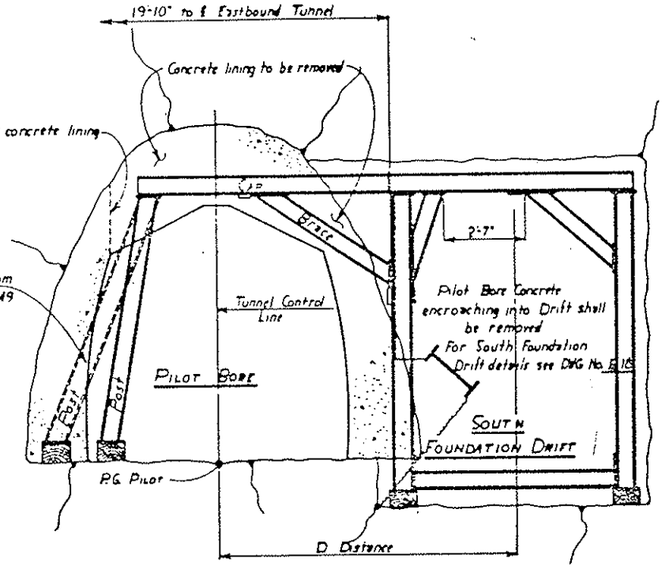
End of Henry Tunnel Support - Two-Drift Type

Eastbound Tunnel remains in approximate constant vertical relation to Pilot Bore, and transitions southward from Sta. 118+49 to 120+22



STATION 120+70

Pilot Bore lining ends at Sta. 120+72



STATION	D DISTANCE	CAP LENGTH	LEG LENGTH	MEMBER SIZE		
				POST	CAP	BRACE
116+00	0	0	0	W 8 x 40	W 8 x 24	None
117+00	2'-0"	3'-0"	8'-9"	↓	↓	None
118+00	6'-6"	5'-9"	8'-6"	↓	↓	None
118+49	8'-6"	8'-0"	8'-3"	W 8 x 40	W 8 x 24	W 8 x 40
118+52	8'-6"	8'-0"	↓	W 8 x 58	W 8 x 24	W 8 x 24
119+50	10'-11"	9'-6"	↓	W 8 x 58	W 8 x 24	W 8 x 24
120+22	10'-7"	9'-6"	8'-3"	W 8 x 58	W 8 x 24	W 8 x 24

From Station 116+00 to 118+49 Steel shall be A-36
From Station 118+52 to 120+22 Steel shall be A-572, Grade 55 Steel
Supports are spaced at 3'-0" c/c

REMINE PILOT BORE STATION 116+00 to 120+22

Original scale 3/16" = 1'-0"

DIVISION OF HIGHWAYS

LOCATION OF EASTBOUND TUNNEL RELATIVE TO PILOT BORE AND DIVISIONS PROPOSED SUPPORT OF SOUTH FOUNDATION DRIFT AND PILOT BORE STATION 116+00 to 120+22

Designer C.D.O.H.	Structure Numbers F-17-X
Detailer R. Stolhower	
Drawing Number B 24 of 60 Drawings	

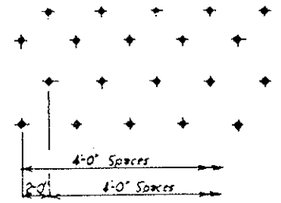
Revision Dates	(Preliminary Stage Only)

REGION NO	AGENCY	PROJECT NO.	SHEET NO.	SHEETS
VIII	COLORADO	I 70-3(81)220	53	273

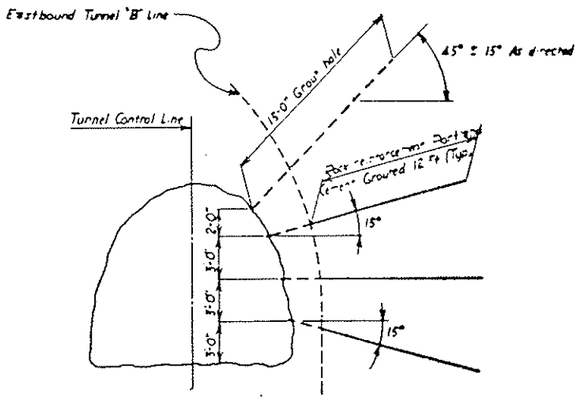
REVISIONS		

DESIGNED BY	INITIAL	DATE
CHECKED BY	C.D.O.H	4-73
DETAILED BY	R.S.	4-73
CHECKED BY		
QUANTITIES BY		
CHECKED BY	T.L.A.	4-73
	R.W.G.	4-73

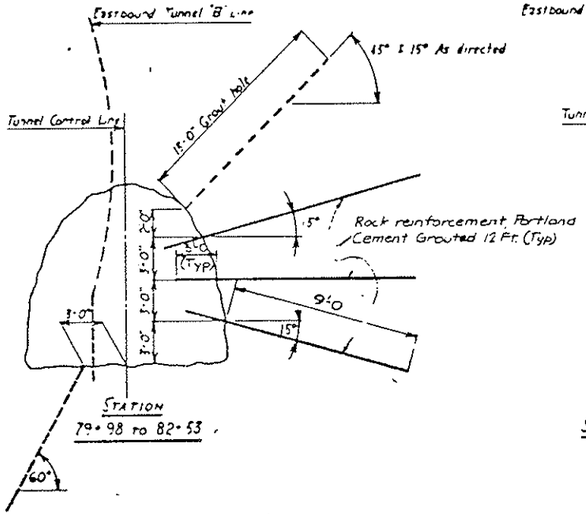
✦ Grout hole
✦ Rock reinforcement



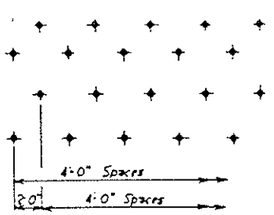
LONGITUDINAL SPACING FROM STA. 40+98 TO 82+53



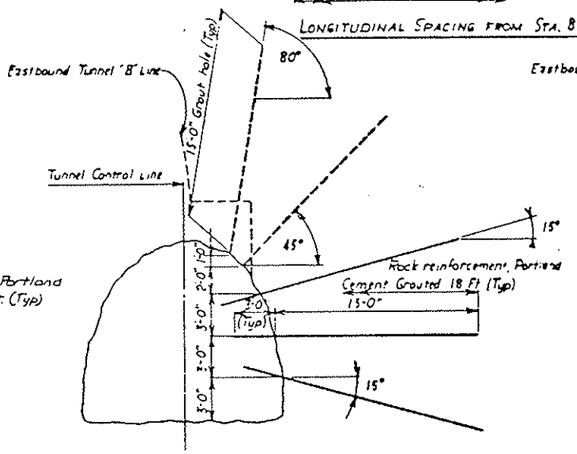
STATION 40+98 TO 79+98



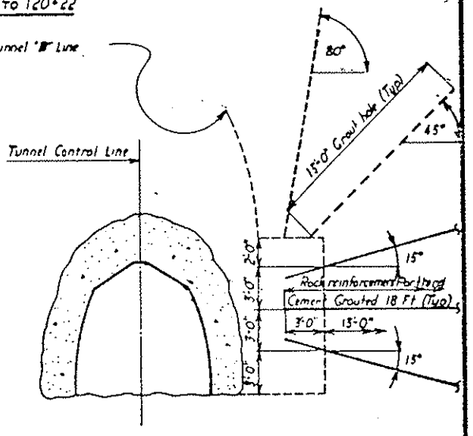
STATION 79+98 TO 82+53



LONGITUDINAL SPACING FROM STA. 87+56 TO 120+22



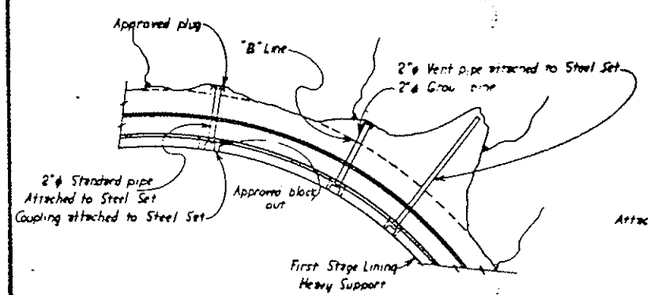
STATION 87+56 TO 117+00



STATION 117+00 TO 120+22

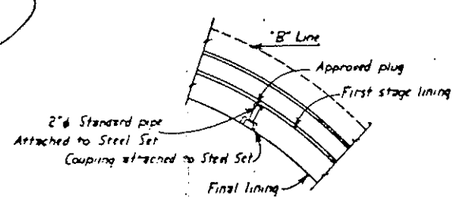
Rock reinforcing and Grout holes are typical for North Foundation Drift Sta. 87+56 to 120+22
Pilot Bore concrete lining from Sta. 113+49 to 120+72

Note:
Maximum grout pressure 30 P.S.I. at collar of hole
2"ϕ Grout pipes shall be provided at the crown, 6" North of ℄ Eastbound in the final lining at 16 Ft ℄s Longitudinal to provide contact grout between final and first stage linings

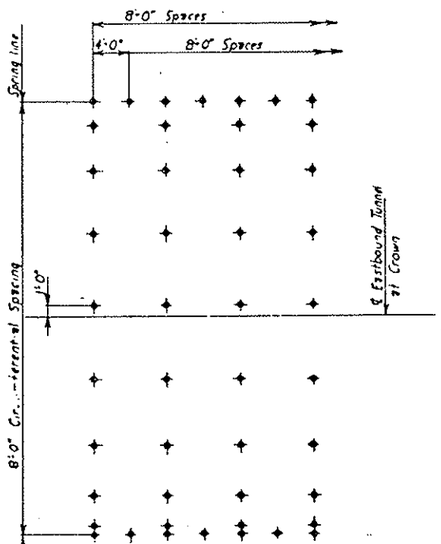


TYPICAL CONTACT GROUT DETAILS

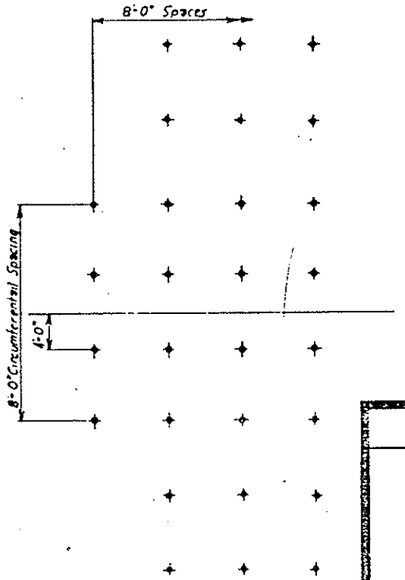
TYPICAL CONTACT GROUT OVERBREAK DETAILS



CONTACT GROUT BETWEEN FIRST AND FINAL LINING



STATION 40+82 TO 82+53 AND ~~109+42 TO 120+22~~



STATION 87+56 TO ~~109+42~~ 120+22

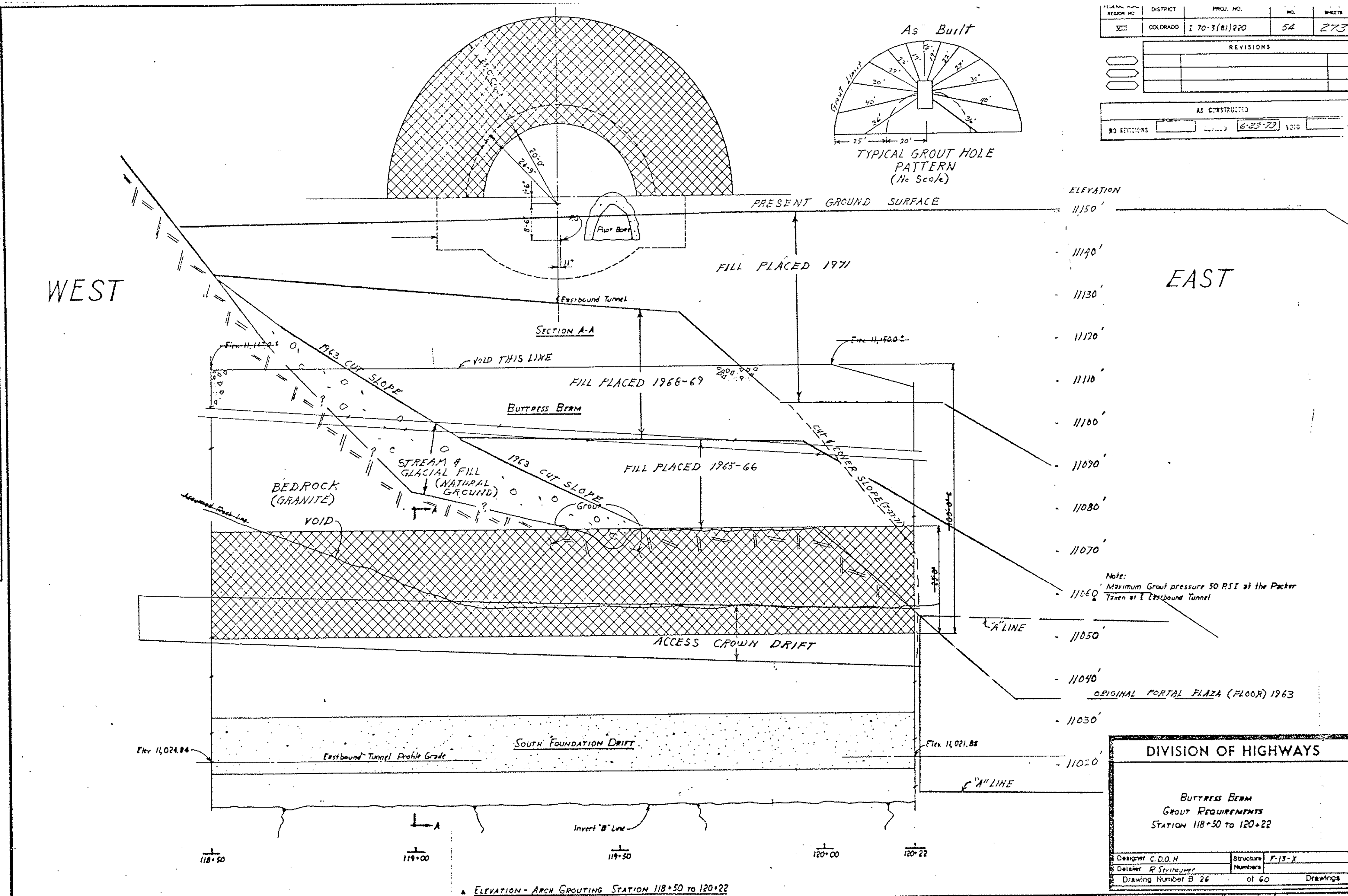
CONTACT GROUT

DIVISION OF HIGHWAYS

PRE-GROUT AND CONTACT GROUT REQUIREMENTS

Designed C.D.O.H	Structure Numbers	F-13-X
Detailed R. Steinhauer		
Drawing Number B 25	of 60	Drawings

Revision Dates (Preliminary Stage Only)



ELEVATION - ARCH GROUTING STATION 118+50 TO 120+22

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	NO.	SHEETS
VIII	COLORADO	I 70-3(81)220	54	273

REVISIONS

AS CONSTRUCTED — NO REVISIONS — 6-23-73

DESIGNED BY	C.D.O.H.	4-73	CHECKED BY R.W.G. 4-73
CHECKED BY			QUANTITIES BY
DETAILED BY	R.J.S.	4-73	CHECKED BY J.L.A. 4-73

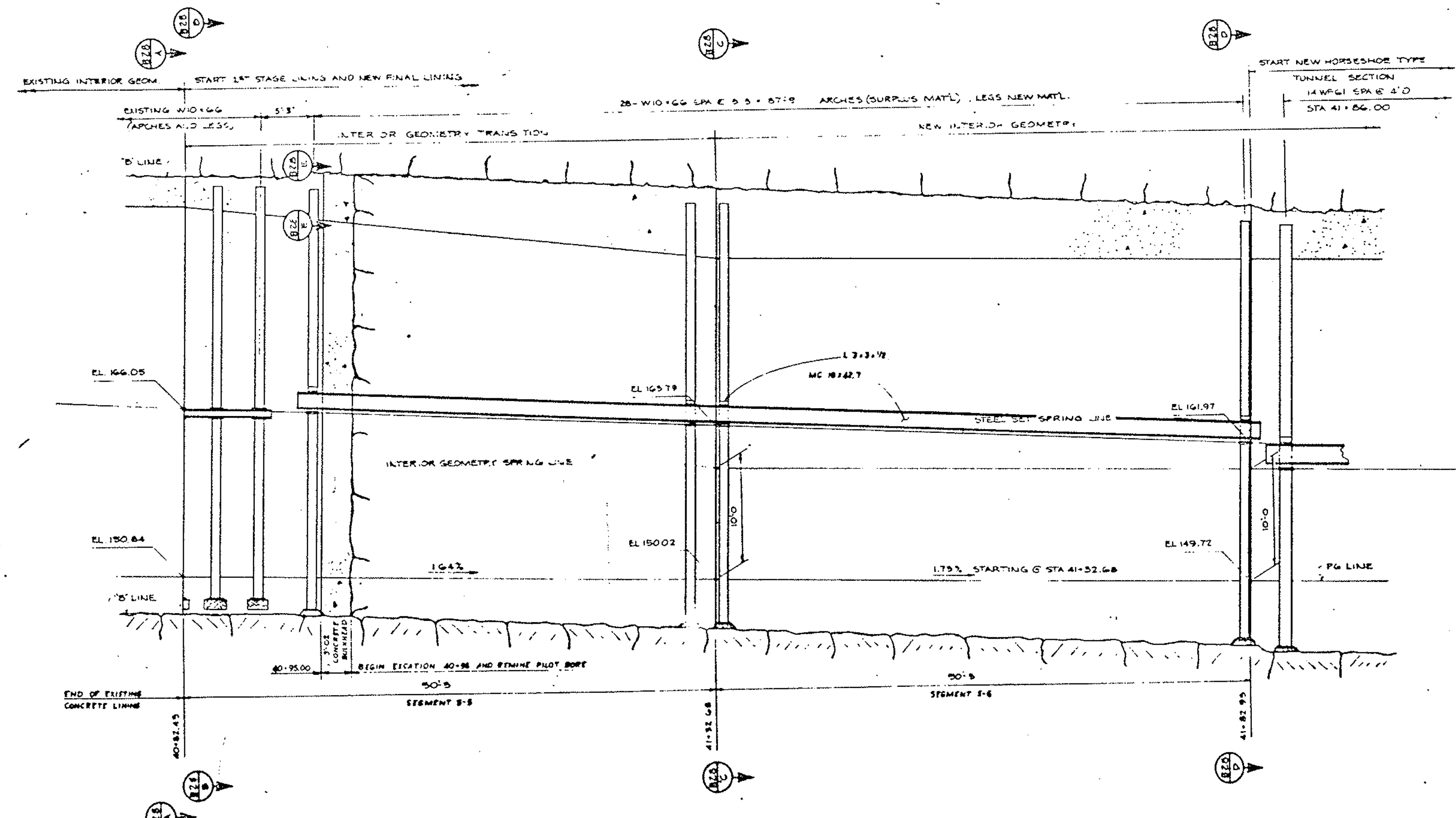
DIVISION OF HIGHWAYS

BUTTRESS BERM
GROUT REQUIREMENTS
STATION 118+50 TO 120+22

Designer C.D.O.H. — Structure Numbers F-13-X
Detailer R. Strickmeyer
Drawing Number B 26 of 60 Drawings

Federal Road Region No.	District	Proj. No.	No.	Sheets
VIII	COLORADO	I70-5(81)220	55	273

REVISIONS



ELEVATION

NOTES:

1. FOR FINAL LINING INTERIOR GEOMETRY SEE DWG NO B_58 & B_59.
2. SURPLUS MATERIAL, ARCH W10×66.

Orig Scale: 3/16" = 1'-0

Designed by	C.O.O.H.	5-74	Checked by	E.H.H.	6-74
Checked by			Quantities by		
Detailed by	B.R.L.	6-74	Checked by	R.M.M.	6-74

AS CONSTRUCTED — NO REVISIONS / REVISED / VOID 6-27-79

DIVISION OF HIGHWAYS

WEST TRANSITION

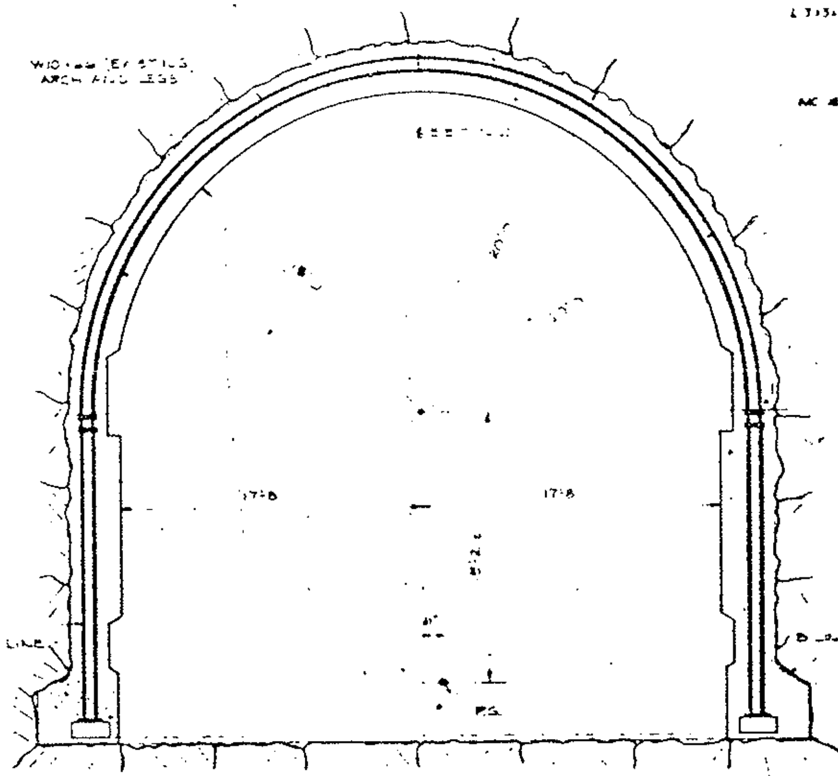
ELEVATION

Designer C.O.O.H	Structure Numbers	F-13-X	
Detailer B R Lere			
Drawing Number B 27	of 60	Drawings	

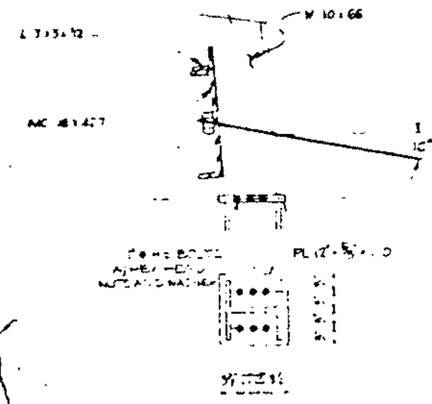
Revision Dates: 6-21-74, 7-19-74 (Preliminary Copy Only)

Federal Road Region No.	District	Proj. No.	Sheet No.	Total Sheets
VIII	COLORADO	270-3,8 (220	56	273

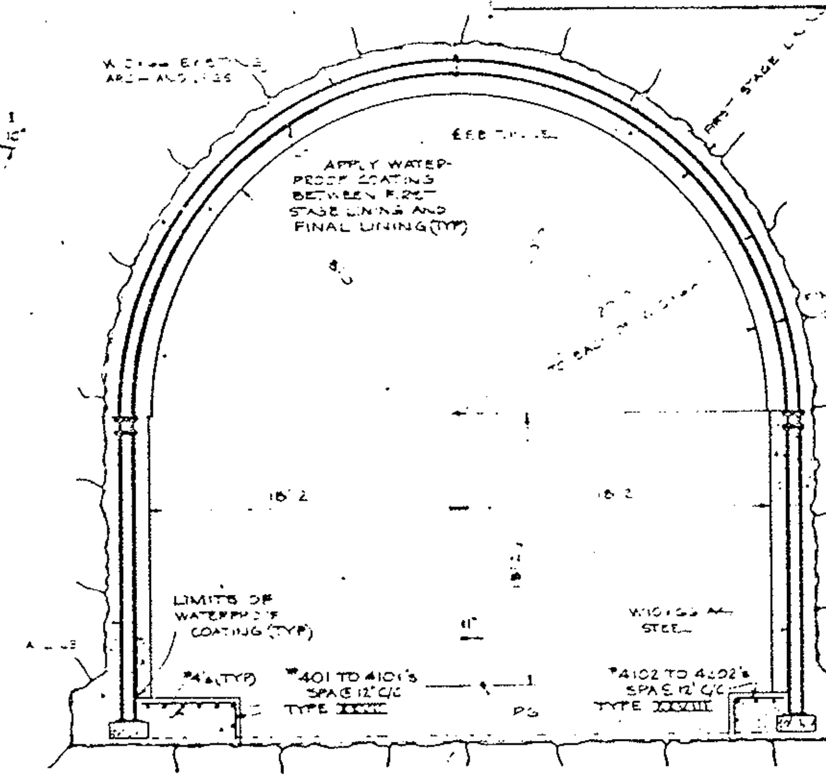
REVISIONS



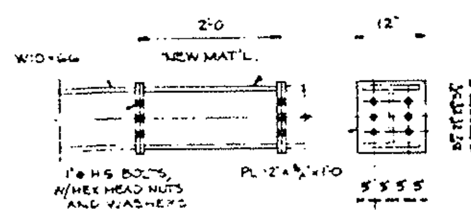
SECTION (B27/A)



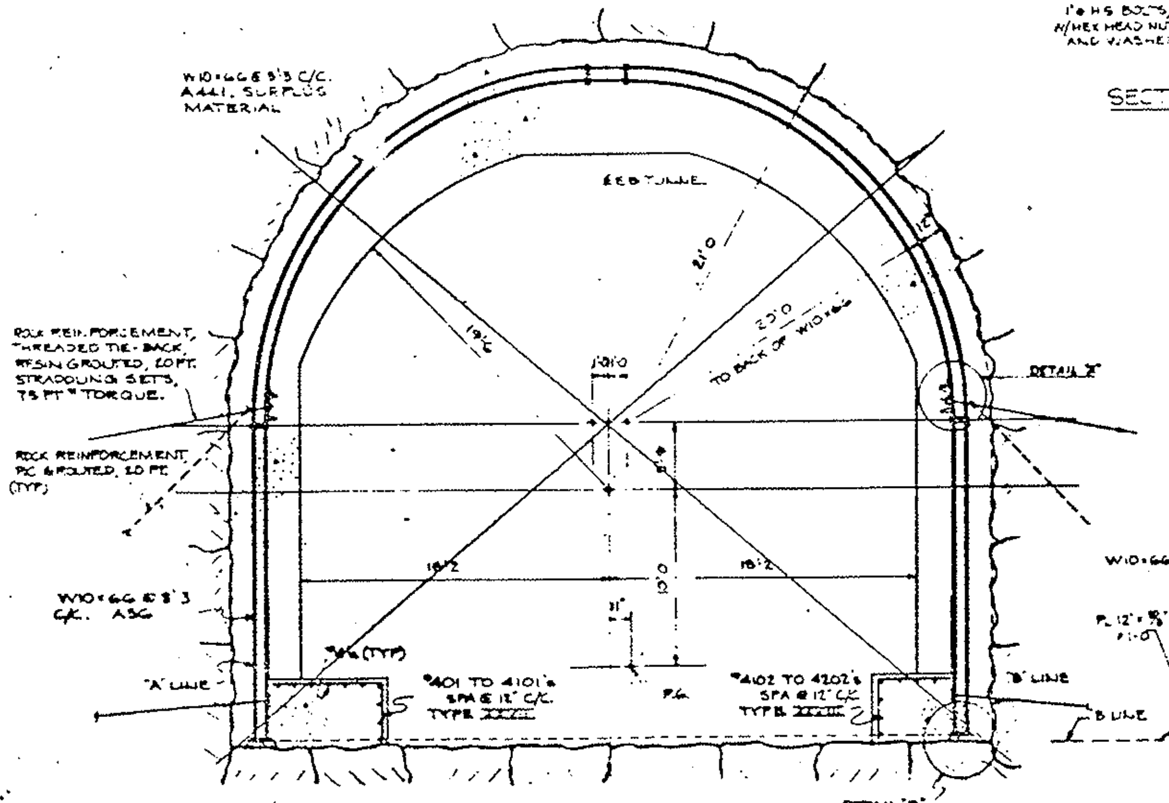
DETAIL "A"



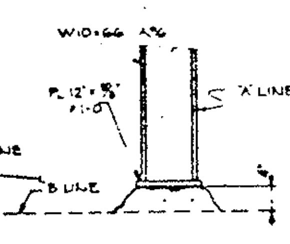
SECTION (B27/B)



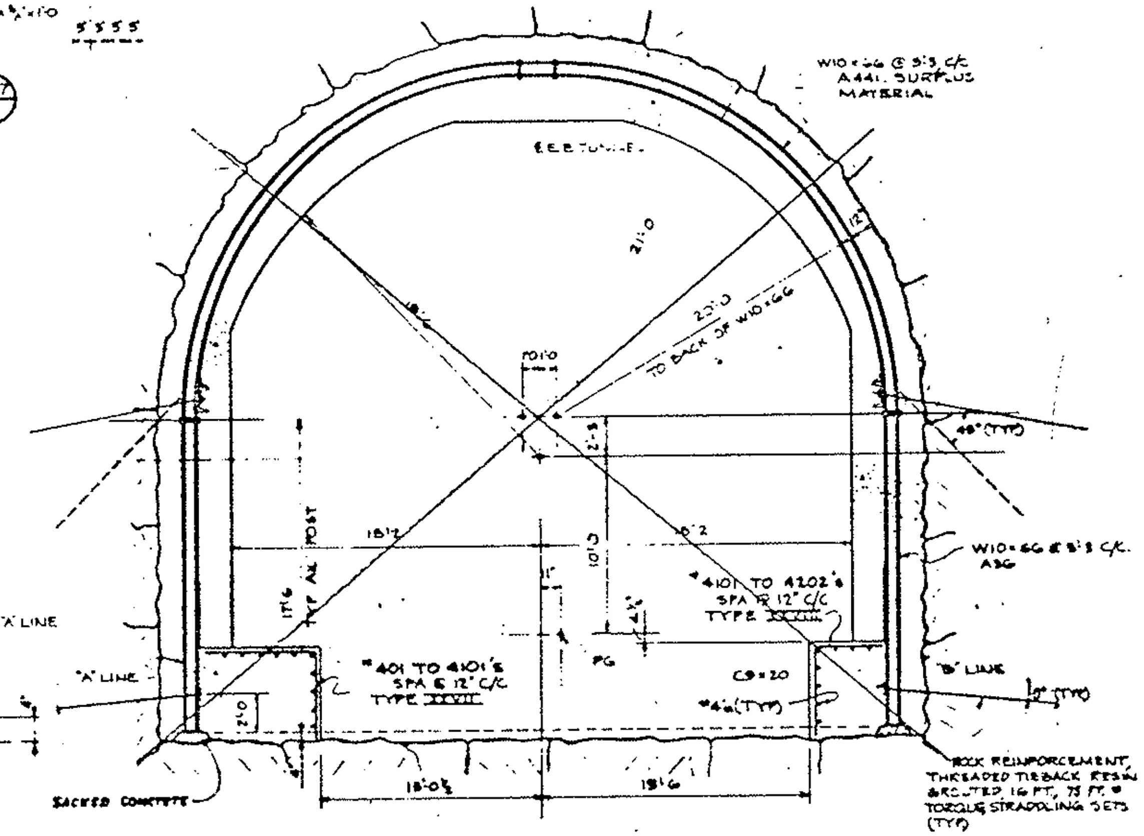
SECTION (B27/E)



SECTION (B27/C)



DETAIL "B"



SECTION (B27/D)

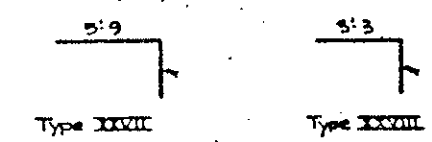
NOTES:

1. ALL FIRST STAGE CONCRETE IS CLASS T-1
2. ALL FINAL LINING CONCRETE IS CLASS T-2.

Final	Summary of Quantities - West Transition			
	Item	Description	Unit	Total
4779	211	Tunnel Excavation, (Class A)	Cu Yd	5280
	211	Rock Reinforcement, Portland		
62		Cement Grouted, (12 Ft)	Ea	63
	211	Rock Reinforcement Portland		
55		Cement Grouted, (20 Ft)	Ea	56
	211	Rock Reinforcement, Threaded		
124		Tieback, Resin Grouted, (16 Ft)	Ea	112
	211	Rock Reinforcement, Threaded		
112		Tieback, Resin Grouted, (20 Ft)	Ea	112
62.53	509	Place Structural Steel	Ton	59
12.42	509	Structural Steel (Misc.)	Ton	16
32.02	509	Structural Steel (W10×66)	Ton	37
1004	515	Waterproof Coating	Sq Yd	1105
	601	Concrete, Class T-1 (First Stage		
552.74		Lining)	Cu Yd	810
656.92	601	Concrete, Class T-2 (Final Lining)	Cu Yd	520
288.49	601	Concrete, Class T-2 (Misc)	Cu Yd	156
10	602	Reinforcing Steel	Ton	10

Bar List - West Transition				
Mark	No. Reqd	Length	Type	ℓ
401		7'-9		2'-0
TO	100	BEI TO	XXVII	BEI TO
4101		10'-3		4'-6
4102		5'-3		2'-0
TO	100	BEI TO	XXVIII	BEI TO
4202		7'-9		4'-6

B.E.I. = By Equal Increments



ORIG SCALE: 3/16" = 1'-0

DIVISION OF HIGHWAYS

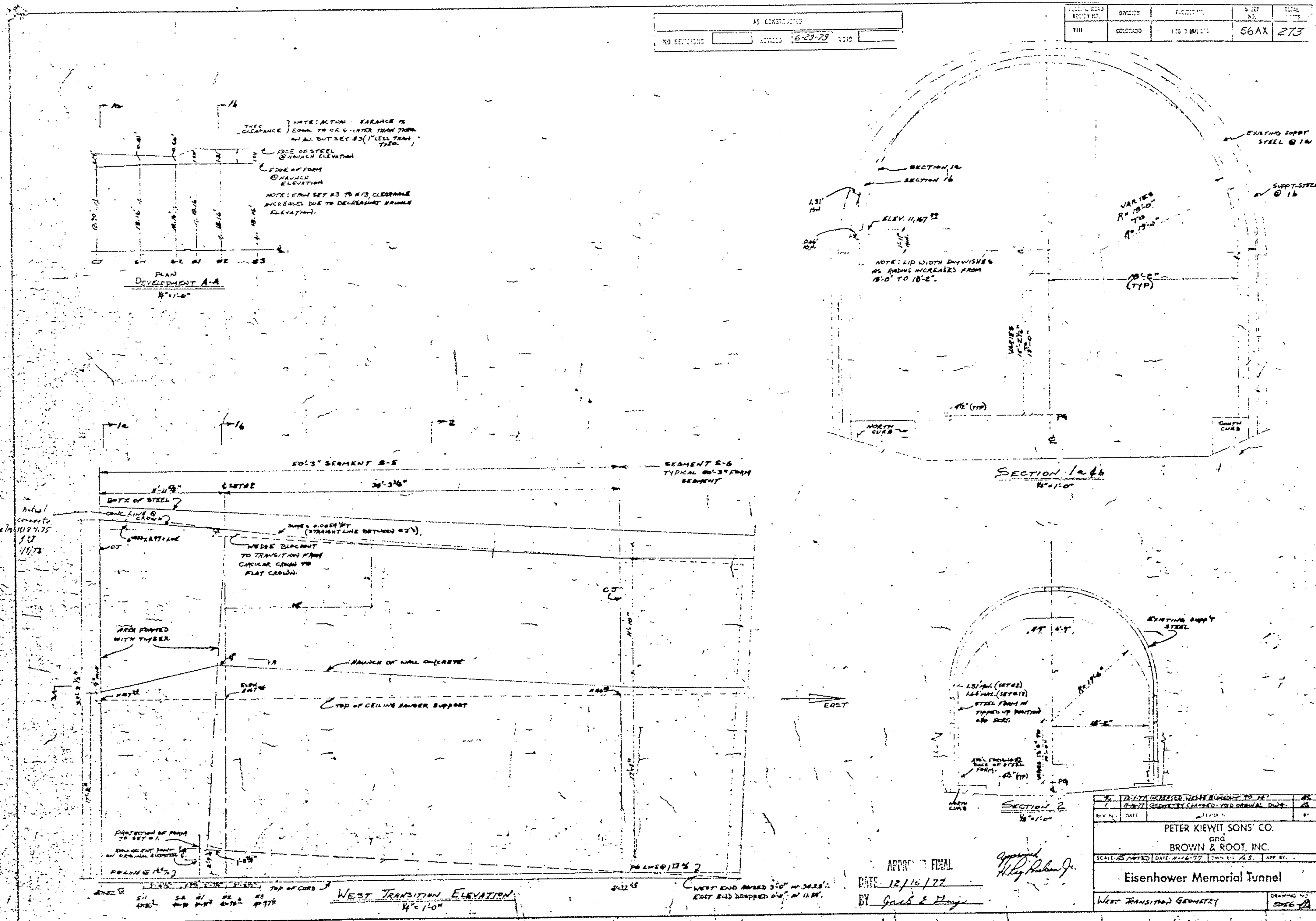
WEST TRANSITION SECTIONS

Designer: C.D.O.H.

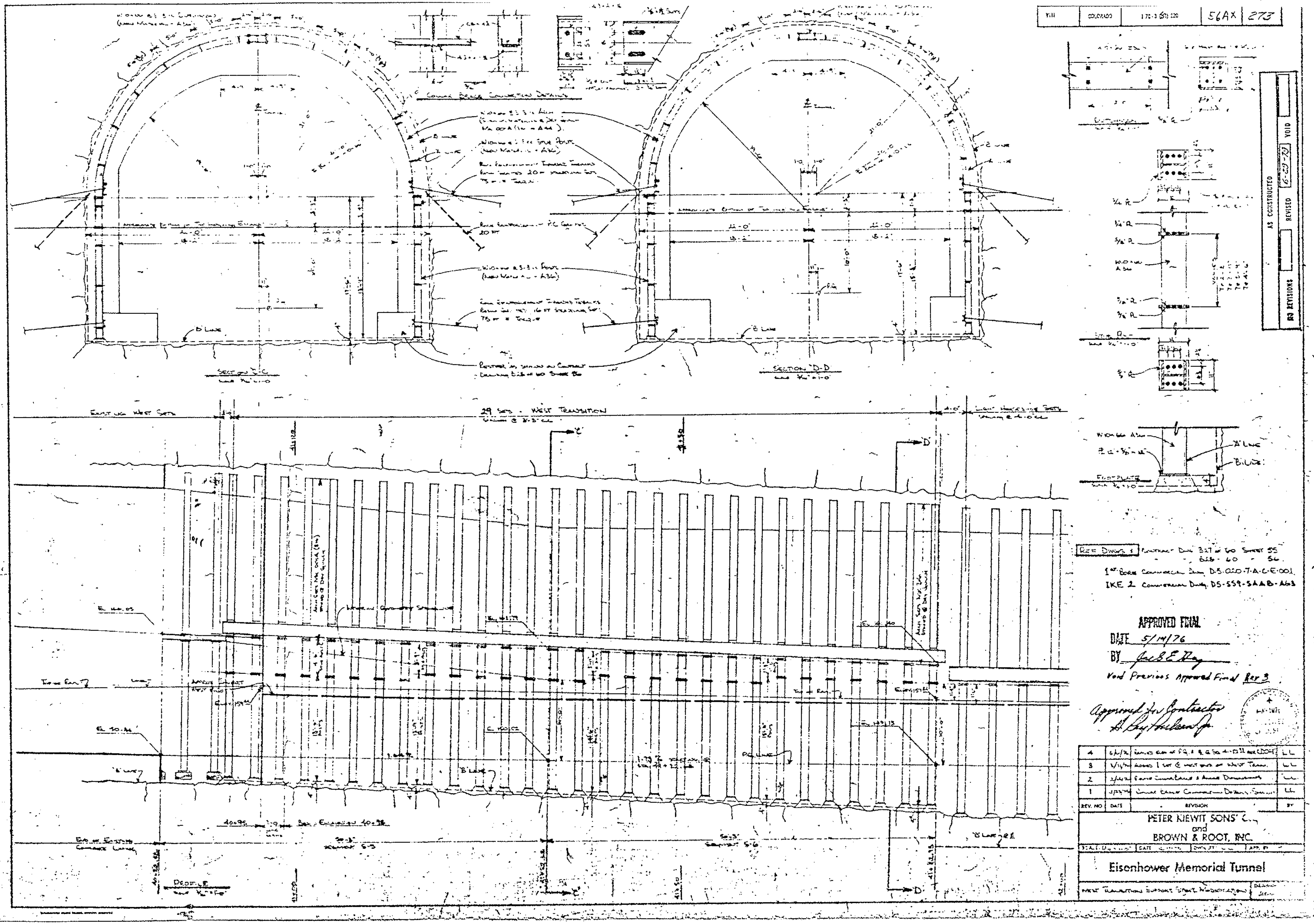
Detailer: B. R. Lane

Structure Number: F-13-X

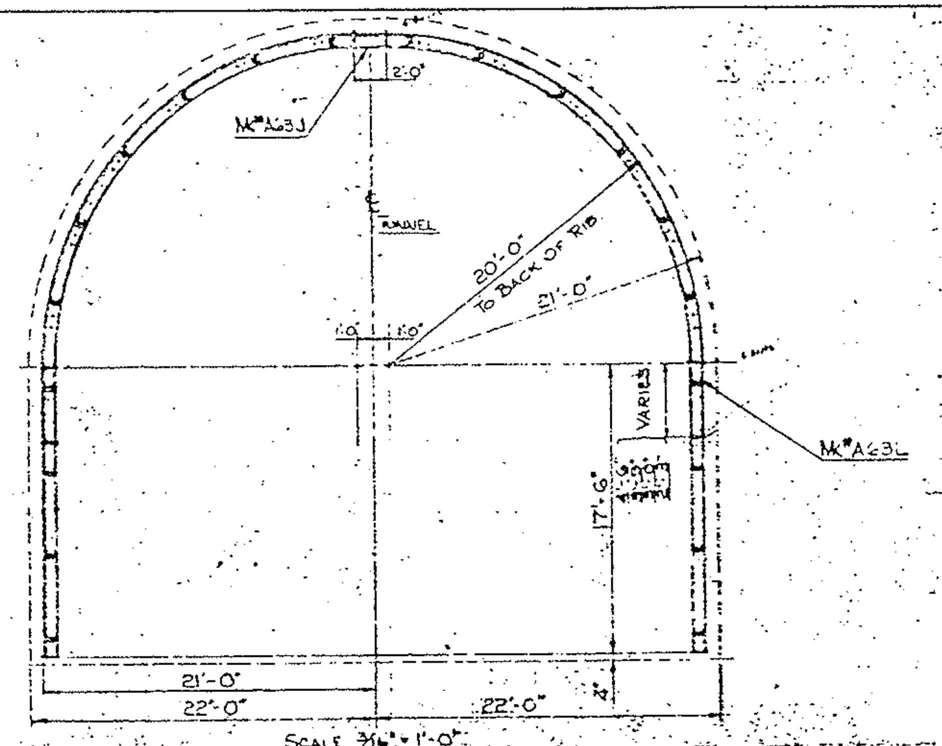
Drawing Number B 28 of 60

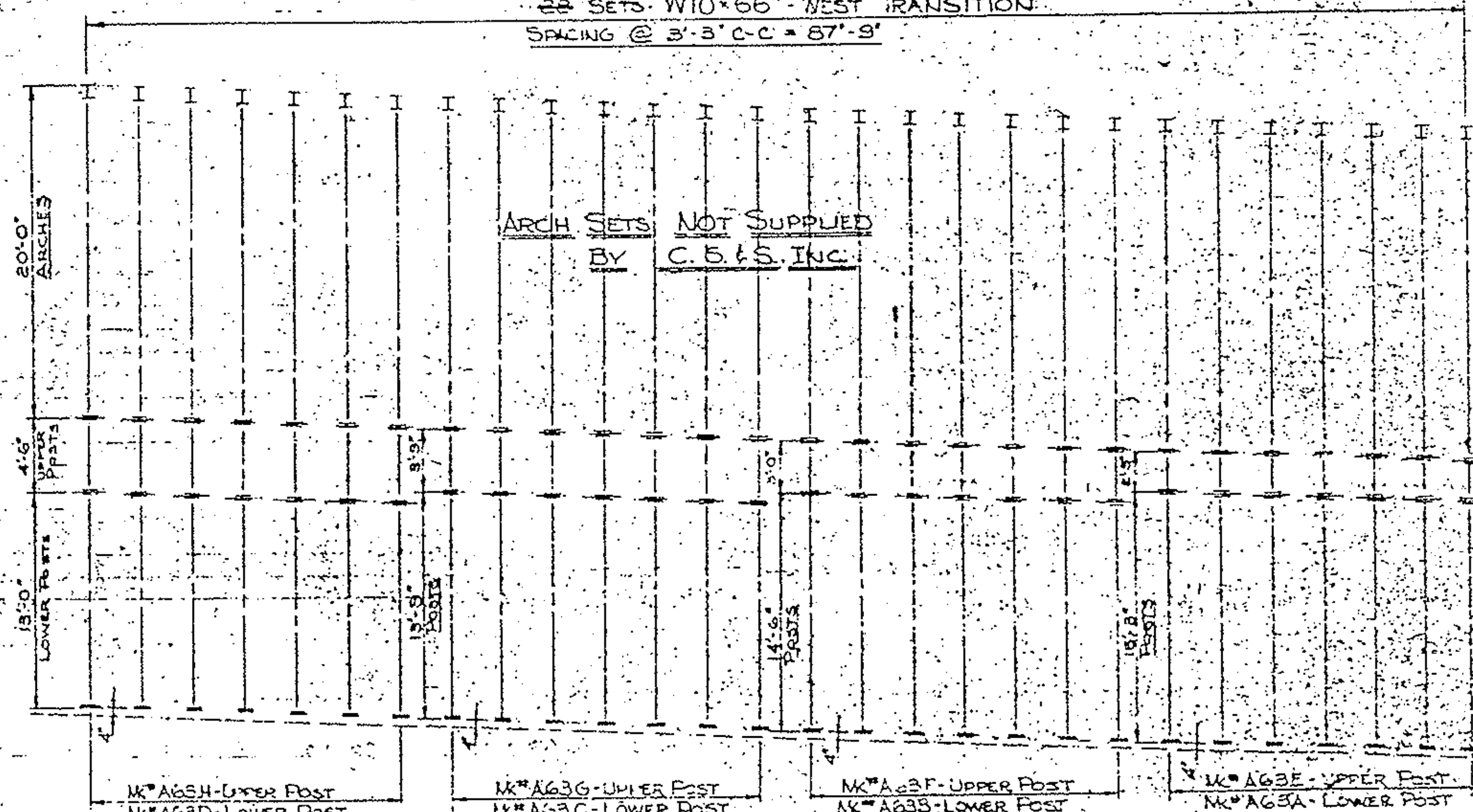


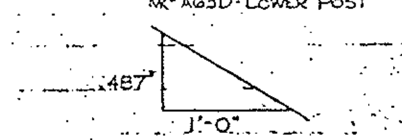
AS CONSTRUCTED
6-29-73
COLORADO
56AX
273
PLAN
DEVELOPMENT A-A
NOTE: LIP WIDTH DIMINISHES AS RADIUS INCREASES FROM 18'-0" TO 18'-2".
SECTION 1a & 1b
50'-3" SEGMENT S-5
SEGMENT S-6 TYPICAL 50'-3" FORM SEGMENT
HAUNCH OF WALL CONCRETE
TOP OF CEILING HANGER SUPPORT
EAST
WEST TRANSITION ELEVATION
SECTION 2
APPROVED FINAL
DATE 12/10/77
PETER KIEWIT SONS' CO.
and
BROWN & ROOT, INC.
DATE 11-16-77
Eisenhower Memorial Tunnel
WEST TRANSITION GEOMETRY


56AX 273
COLORADO
SECTION 'C-C'
SECTION 'D-D'
29 SETS - WEST TRANSITION
'B' LINE
'A' LINE
AS CONSTRUCTED
REVISED
VOID
NO REVISIONS
FOOTPLATE
REF DWGS: CONTRACT DWG 327 of 60 SHEET 55
- 56
1ST BORE CONTRACT DWG D5-020-7-A-C-E-001
IKE 2 CONTRACT DWG D5-559-5AAB-A63
APPROVED FINAL
DATE 5/14/76
BY
Void Previous Approved Final Rev 3
Approved for Contractor
PETER KIEWIT SONS' CO.
and
BROWN & ROOT, INC.
REV. NO
DATE
REVISION
BY
Eisenhower Memorial Tunnel
WEST TRANSITION SUPPORT STEEL MODIFICATIONS

AS CONSTRUCTED







SLOPE OF TRANSITION

SCALE 3/16" = 1'-0"

Note! The weight of one butt plate only per post will be used for payment purposes.

APPROVED FINAL AS NOTED
DATE 3-3-76
BY [signature]

SPACE RESERVED FOR APPROVAL STAMP — SEE SHOP DWG 2053-1

Total Wt.	Unit Wt.	Drawing No.	Pay weight Total	Pay weight Unit	Mark No.	No. Req'd	Description	Matl. Spec.
	.10			.10		AS ORDER	STD. FLAT WASHERS FOR 3/4"ø BOLTS	A307
	.14			.53		AS ORDER	3/4" SQ. T.L. NUTS	
	.37					AS ORDER	3/4"ø × 2" SQ. HD. T.L. BOLTS	
	36.2	D5-559-5AAB-A63	37.1	36.2	A63L	AS ORDER	COLLAR BRACES @ C8×11.5#	A36
			67.2	.12		560	Load indicator washer	
89.6	.10					896	H.S. WASHERS FOR 1"ø BOLTS	A325
385.3	.43		655.2	1.05		896	1" HI STRENGTH NUTS	A325
824.3	.92					896	1"ø × 2 3/4" HI STRENGTH BOLTS	A325
4,824.4	172.3	D5-559-5AAB-A63	4824.4	172.3	A63J	28	DUTCHMAN ASSY @ W10×66# × 2'-0" LG.	A36
4,769.8	340.7		4490.8	323.7	A63H	14	UPPER POST ASSY @ W10×66# × 4'-6" LG.	
4,076.5	291.2		3776.8	271.2	A63G	14	UPPER POST ASSY @ W10×66# × 3'-9" LG.	
3,383.8	241.7		3103.8	221.7	A63F	14	UPPER POST ASSY @ W10×66# × 3'-0" LG.	
2,690.8	192.2		2410.8	172.2	A63E	14	UPPER POST ASSY @ W10×66# × 2'-3" LG.	
12,759.6	911.4		12478.2	891.3	A63D	14	LOWER POST ASSY @ W10×66# × 13'-0" LG.	
13,452.6	960.9		13171.2	940.8	A63C	14	LOWER POST ASSY @ W10×66# × 13'-9" LG.	
14,145.6	1010.4		13864.2	990.3	A63B	14	LOWER POST ASSY @ W10×66# × 14'-6" LG.	
14,838.6	1059.9		14557.2	1039.8	A63A	14	LOWER POST ASSY @ W10×66# × 15'-3" LG.	

TOTAL WT. FOR ______ COURSE.

MATL. REQ'D PER STRUCTURE

Rev. Sym.	Date	Revision	D.R. No.	Chk. By	Ok By
1	3-3-76	[illegible]	2272	KV	RJA

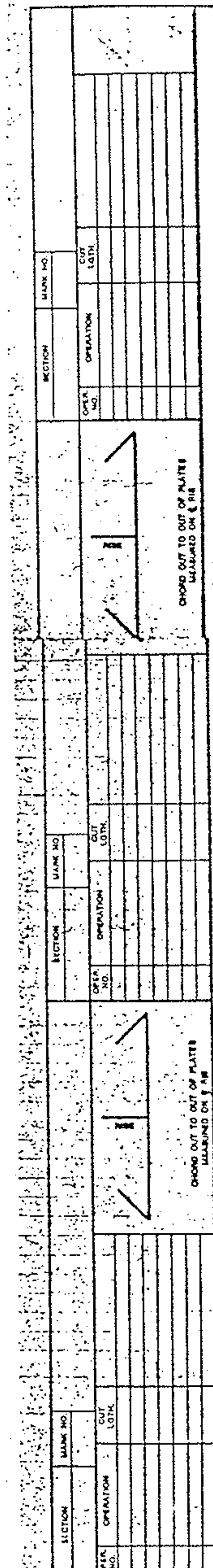
COMMERCIAL SHEARING INC. — YOUNGSTOWN, OHIO [illegible] U.S.A.

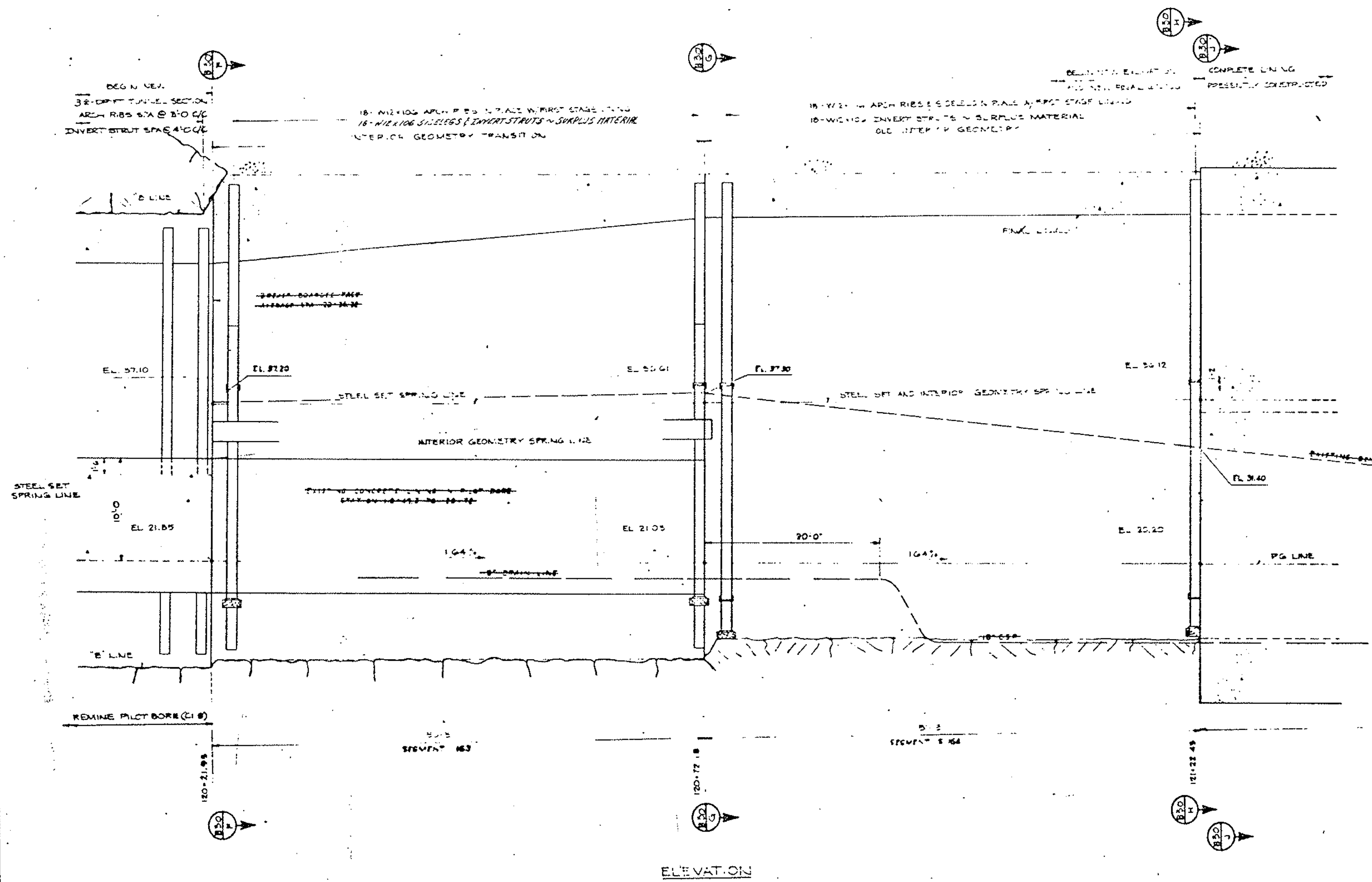
WEST PORTAL TRANSITION
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-3(61)203 — COL.
PETER KIEWIT SONS CO. [illegible] INC.

Date 1-14-76 | Dr. By LMF | Ck. By KV | Scale AS NOTED

Ref. No.

Dwg. No. D5-559-5AAB-063





NOTES:

1. FOR FINAL LINING INTERIOR GEOMETRY SEE DWG NO.

Orig Scale : 3/16" = 1'-0

VIII	COLORADO		57	273

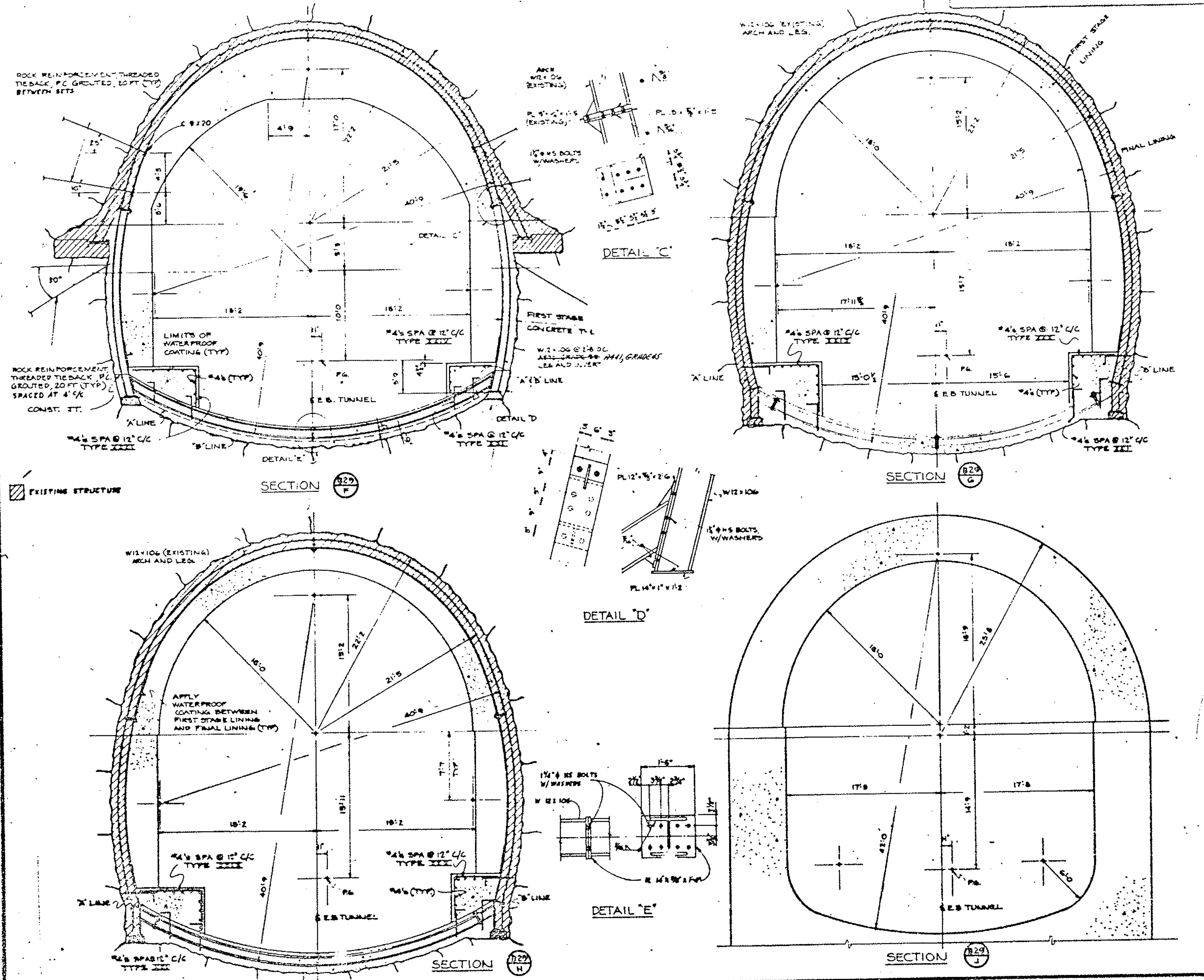
DIVISION OF HIGHWAYS

EAST TRANSITION

ELEVATION

Designer C.D.O.H.
Detailer B.R. Lere
Structure Numbers F-13-X
Drawing Number B 29 of 60 Drawings

REVISIONS



NOTES:

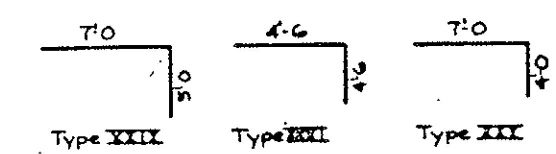
Concrete strength for Section F:

First Stage Lining	T-1
Invert	T-2
Final Lining	T-2
Miscellaneous	T-2

▨ Existing structure

Final	Item	Description	Unit	Total
		SUMMARY OF QUANTITIES - EAST TRANSITION		
3545	211	Tunnel Excavation (Class C)	CuYd	2500
0	211	Rock Reinforcement, Portland Cement Grouted, (18 Ft)	Ea	59
22	211	Rock Reinforcement, Portland Cement Grouted, (20 Ft)	Ea	24
76	211	Rock Reinforcement, Threaded Tieback, Portland Cement Grouted, (20 Ft)	Ea	72
41.34	509	Place Structural Steel	Ton	59
94.80	509	Structural Steel (W12 × 106)	Ton	89
6.52	509	Structural Steel (Misc)	Ton	7
1125	515	Waterproof Coating	SqYd	1125
126.30	601	Concrete, Class T-1, (First Stage Lining)	CuYd	142
1047	601	Concrete, Class T-2, (Final Lining	CuYd	1047
403.08	601	Concrete, Class T-2, (Invert)	CuYd	380
370.41	601	Concrete, Class T-2, (Misc)	CuYd	152
2	602	Reinforcing Steel	Ton	2

~~① Includes 87 Tons of A572 Steel~~

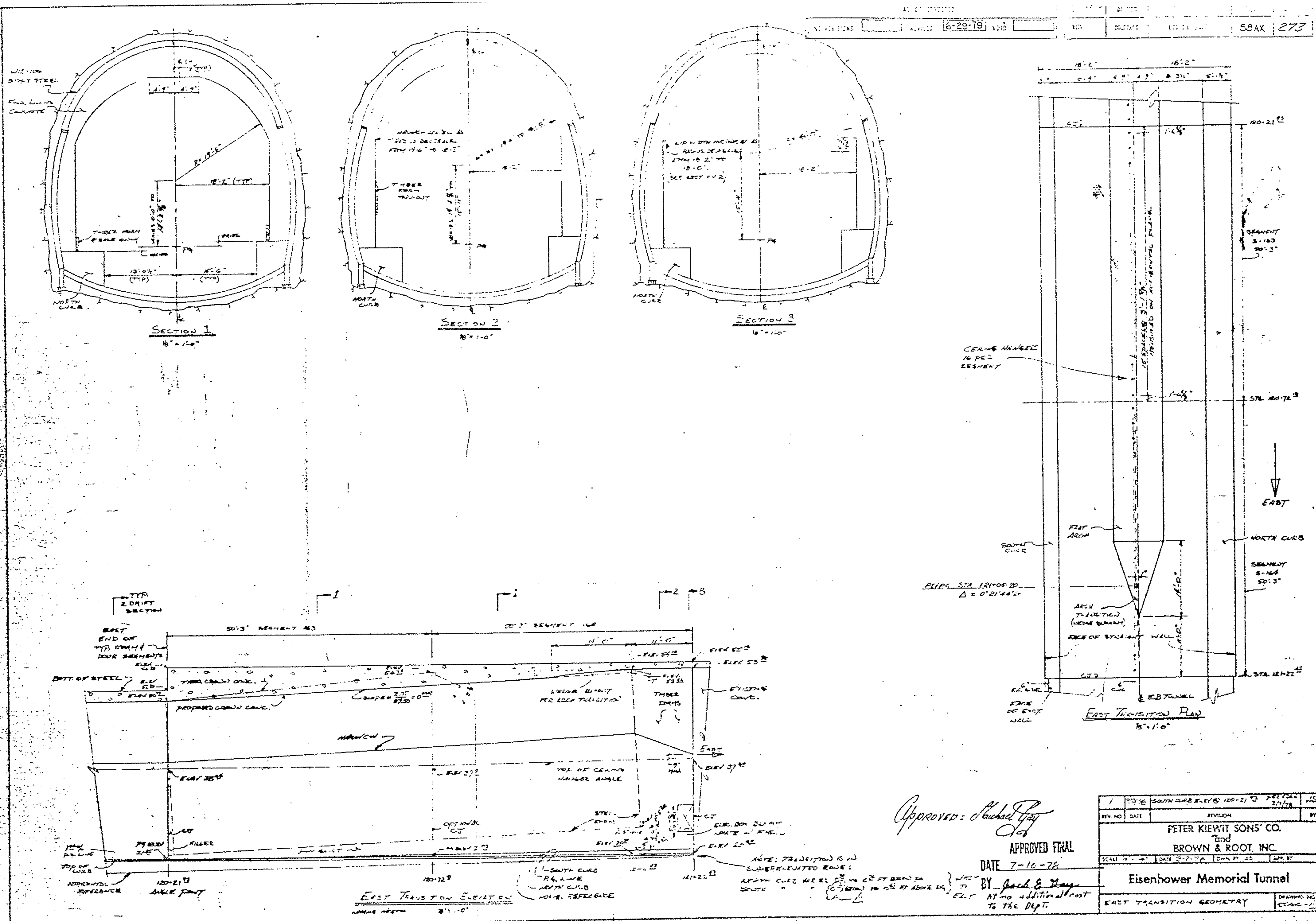


ORIG. SCALE: 3/16" = 1'0

DIVISION OF HIGHWAYS

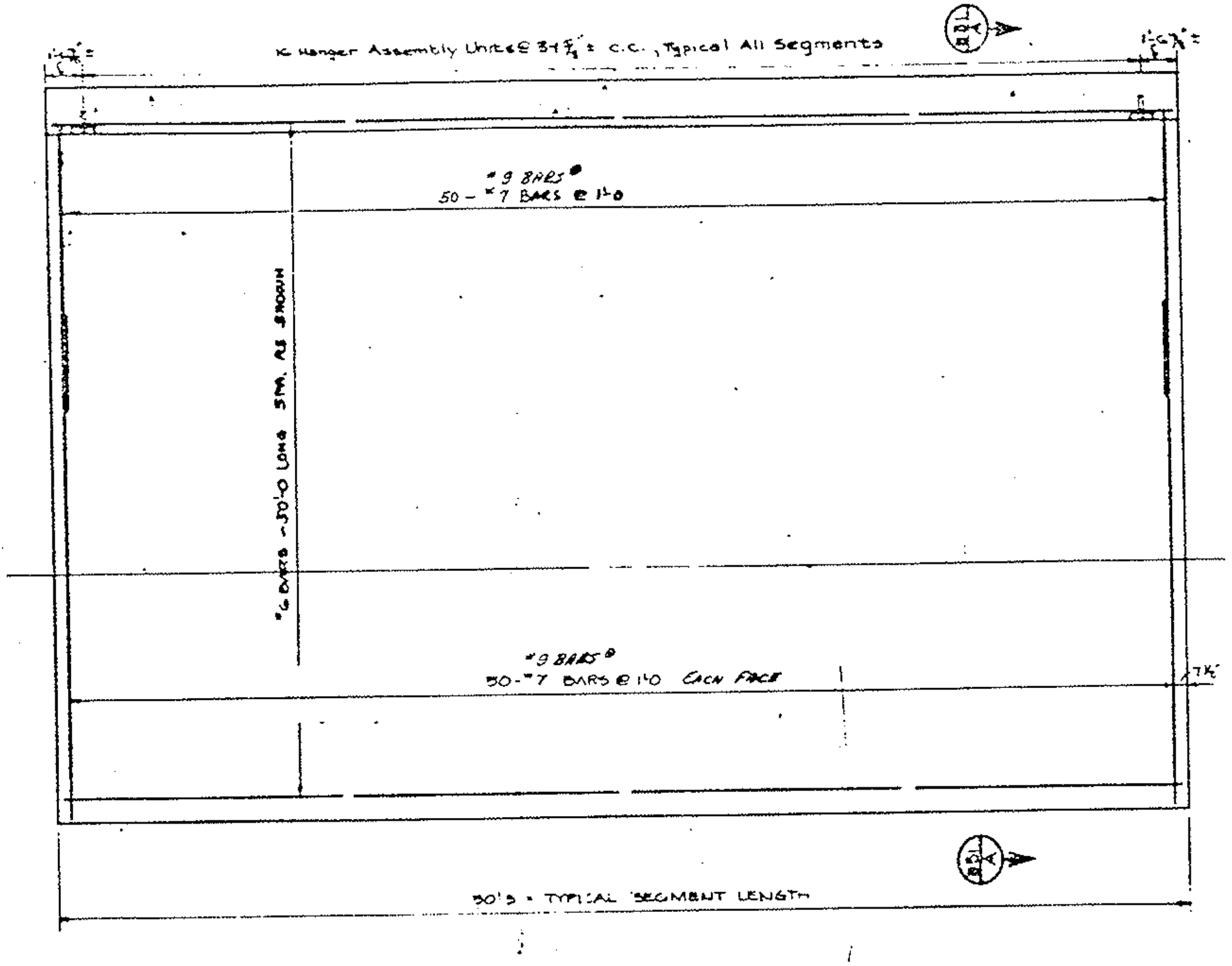
EAST TRANSITION SECTIONS

Designer: CDOH | Drawing: F-15-X
Drafter: R. K. Long
Drawing Number 8 50 of 60

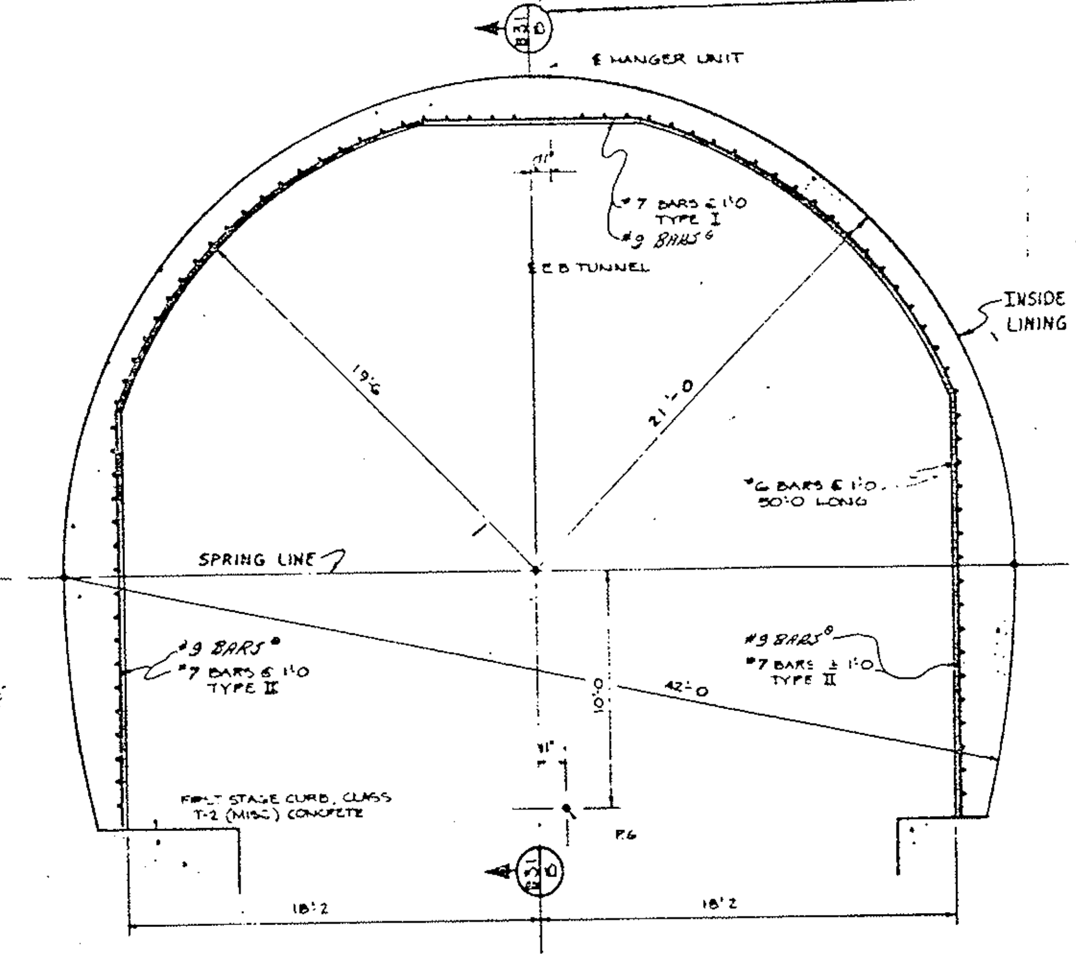

58AX 273
SECTION 1
1/8" = 1'-0"
SECTION 2
SECTION 3
NORTH CURB
EAST TRANSITION PLAN
NORTH CURB
SOUTH CURB
FLAT ARCH
EAST
HAUNCH
PROPOSED CROWN CONC.
EAST TRANSITION ELEVATION
APPROVED FINAL
DATE 7-16-78
BY
At no additional cost to the Dept.
PETER KIEWIT SONS' CO.
and
BROWN & ROOT, INC.
Eisenhower Memorial Tunnel
EAST TRANSITION GEOMETRY

REGION NO.	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I70-5(61)220	59	273

REVISIONS



SECTION B (B31)



SECTION A (B31)

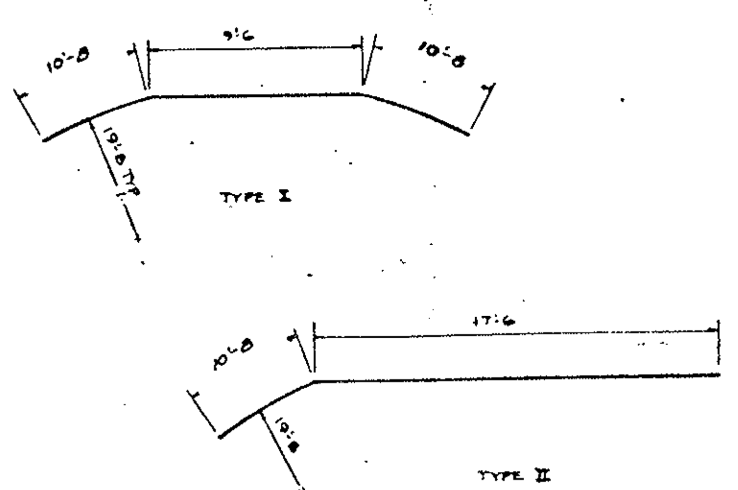
SUMMARY OF REINFORCING STEEL QUANTITIES PER SEGMENT FOR SEGMENTS —
S7 THRU S41
S43 THRU S46
S54 THRU S65
S69 ~~S70~~ THRU S81

BAR TYPE	LENGTH	NUMBER REQD.	TONS
I	30'-10	50	1.576
II	28'-2	100	2.879
LONGITUDINAL	50'-0	80	3.004

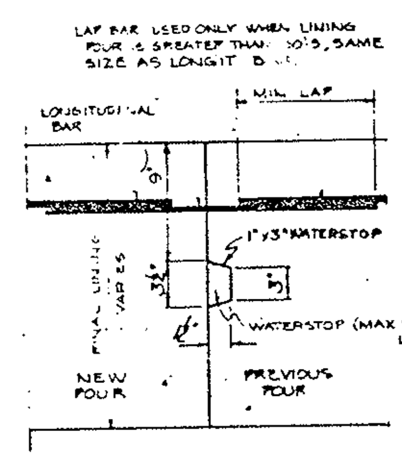
SUMMARY OF REINFORCING STEEL QUANTITIES PER SEGMENT FOR SEGMENTS —
S47 THRU S53
S66 THRU ~~S85~~ 68
S83
S85 THRU S87

BAR TYPE	LENGTH	NUMBER REQD.	TONS
I	30'-10	50	1.576
II	28'-2	100	2.879
LONGITUDINAL	50'-0	80	3.004

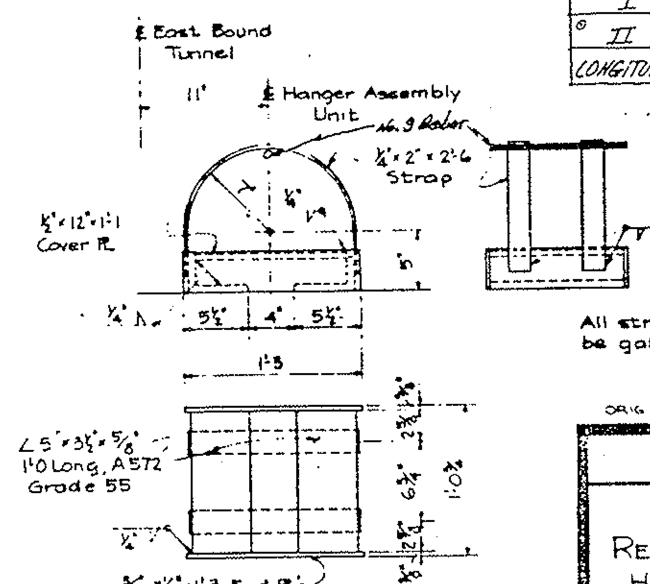
BAR TYPE	LENGTH	NUMBER REQD.	TONS
⊙ I	32.4167	50	2.755
⊙ II	28.9583	100	4.923
LONGITUDINAL	50.00	80	3.004



BENDING DIAGRAMS



TYPICAL CONSTRUCTION JOINT DETAIL



TYPICAL HANGER UNIT FOR DUCT DIVIDER WALL 1 1/2" = 1'-0

All structural steel for hanger unit to be galvanized after fabrication.

ORIG SCALE 1/4" = 1'-0 OR AS NOTED

DIVISION OF HIGHWAYS

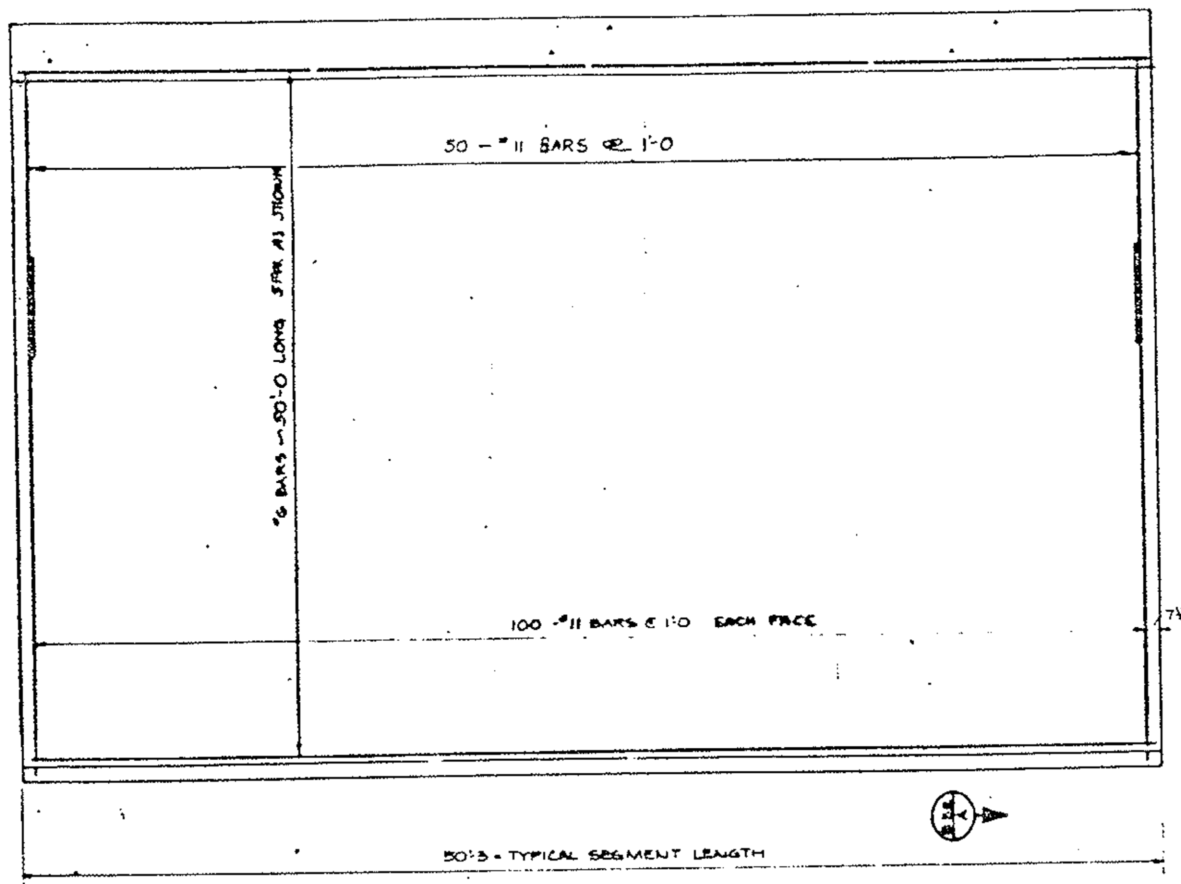
REINFORCEMENT - FINAL LINING
HORSESHOE TUNNEL SUPPORT
TYPICAL MISC. DETAILS

Designer	C.D.O.H.	Structure Numbers	F-15-X
Detailer	B R Lere		
Drawing Number B 51	of 60	Drawings	

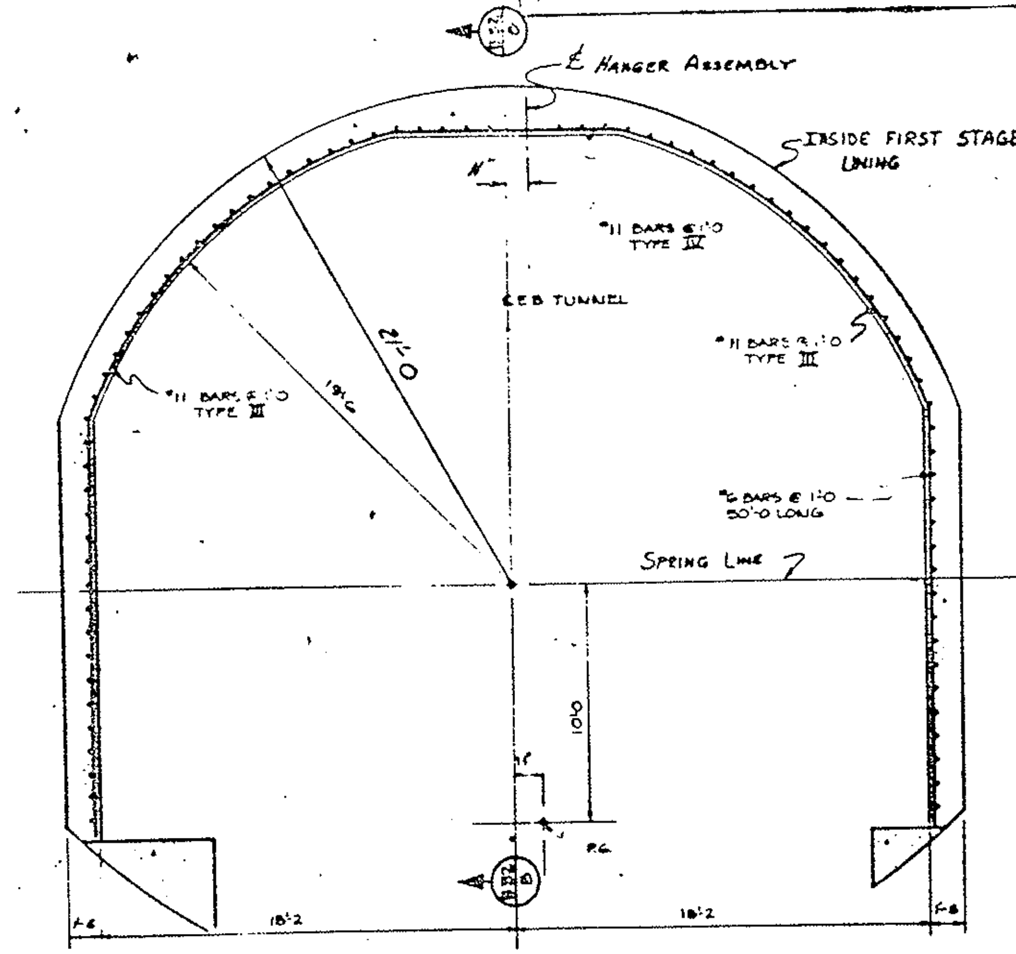
Revision Dates: 4-18-74 11-25-74

DESIGNED BY C.D.O.H.	DATE 1-74	CHECKED BY / QUANTITIES BY M.E.P. 3-74
DETAILED BY B.R.L.	2-74	CHECKED BY R.L.S. 3-74

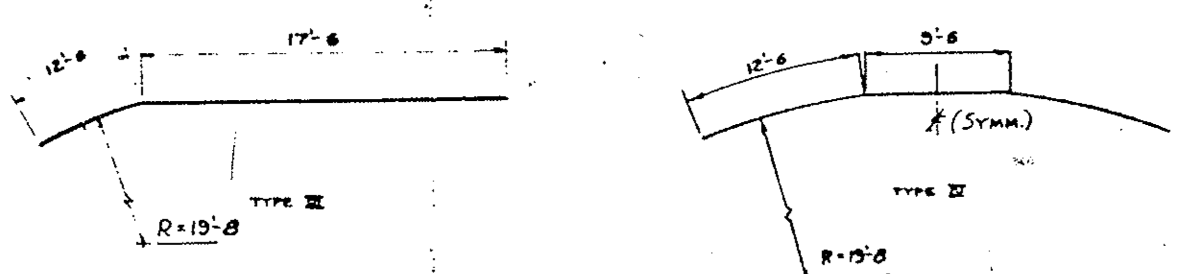
AS CONSTRUCTED — NO REVISIONS — REVISED 6-29-79



SECTION B32/B



SECTION B32/A



BENDING DIAGRAMS

SUMMARY OF REINFORCING STEEL QUANTITIES PER SEGMENT FOR SEGMENTS – S68 THRU S97

BAR TYPE	LENGTH	NUMBER REQD.	TONS
IV	34'-6	50	4.582
III	30'-0	100	7.969
LONGITUDINAL	50'-0	80	3.004

ORIG SCALE: ⅛" = 1'-0

DIVISION OF HIGHWAYS

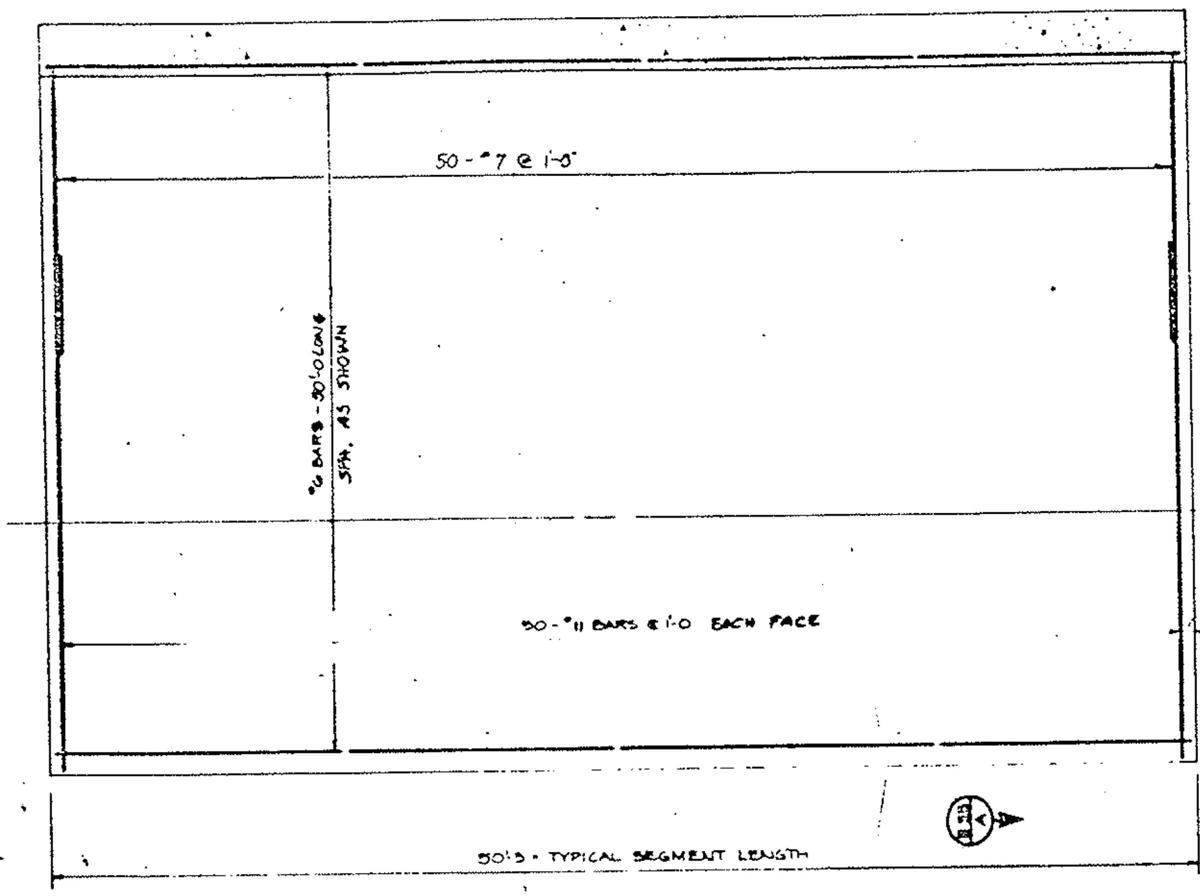
REINFORCEMENT – FINAL LINING MULTIPLE DRIFT TUNNEL SUPPORT

Designer C.D.O.H
Detailer B R Lere
Structure Numbers F-13-X
Drawing Number B 32 of 60 Drawings

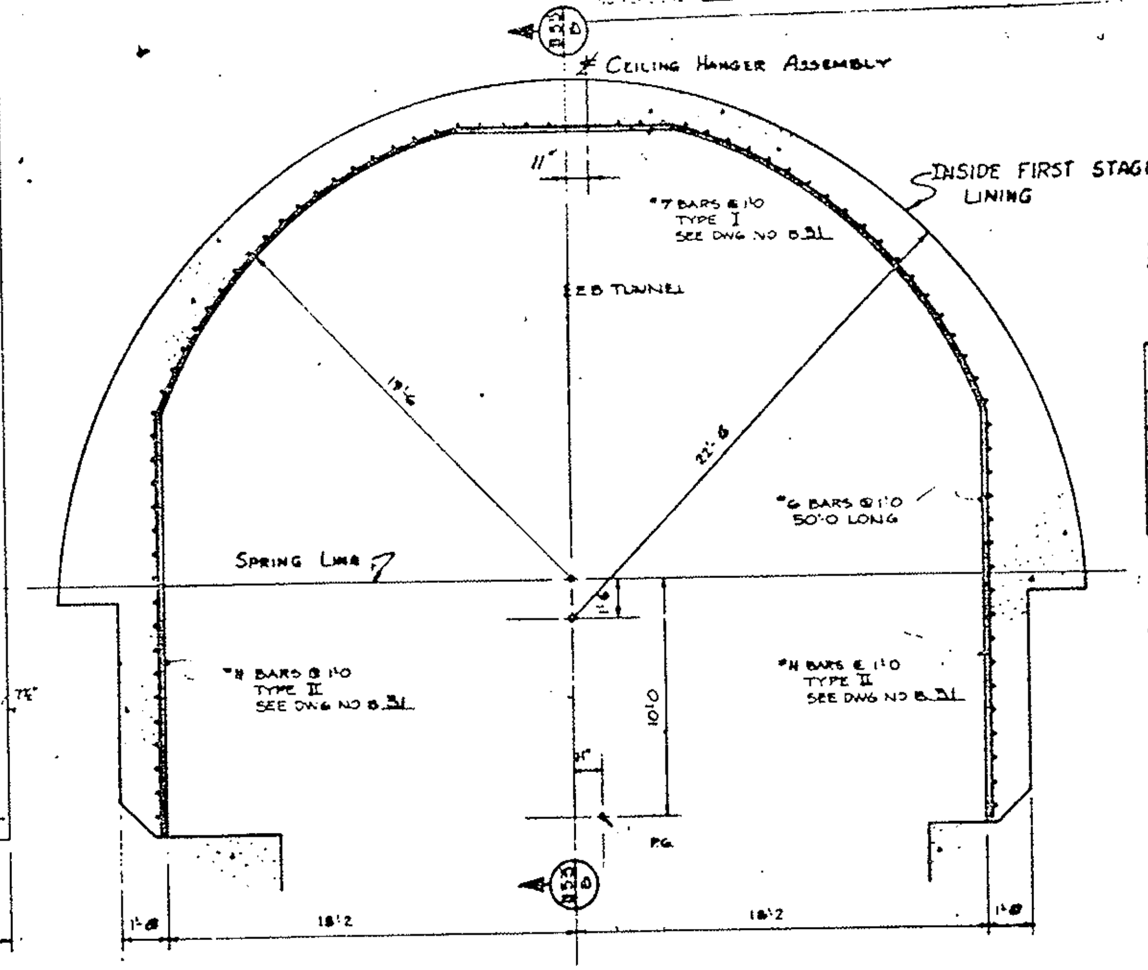
4-18-74 12-12-74

XIII | COLORADO | I70-5(8)220 | 61 | 275

REVISIONS



SECTION B



SECTION A

SUMMARY OF REINFORCING STEEL QUANTITIES PER SEGMENT FOR SEGMENTS —
S98 THRU S125
S127 THRU ~~S162~~ 131
S136 THRU S162

BAR TYPE	LENGTH	NUMBER REQD.	TONS
I	30'-10	50	1.576
II	28'-2	100	7.462
LONGITUDINAL	50'-0	80	3.004

S132 THRU S135

BAR TYPE	LENGTH	NUMBER REQD.	TONS
IV	34'-6	50	4.582
III	30'-0	100	7.969
LONGITUDINAL	50'-0	80	3.004

ORIG. SCALE: ¼" = 1'-0

DIVISION OF HIGHWAYS

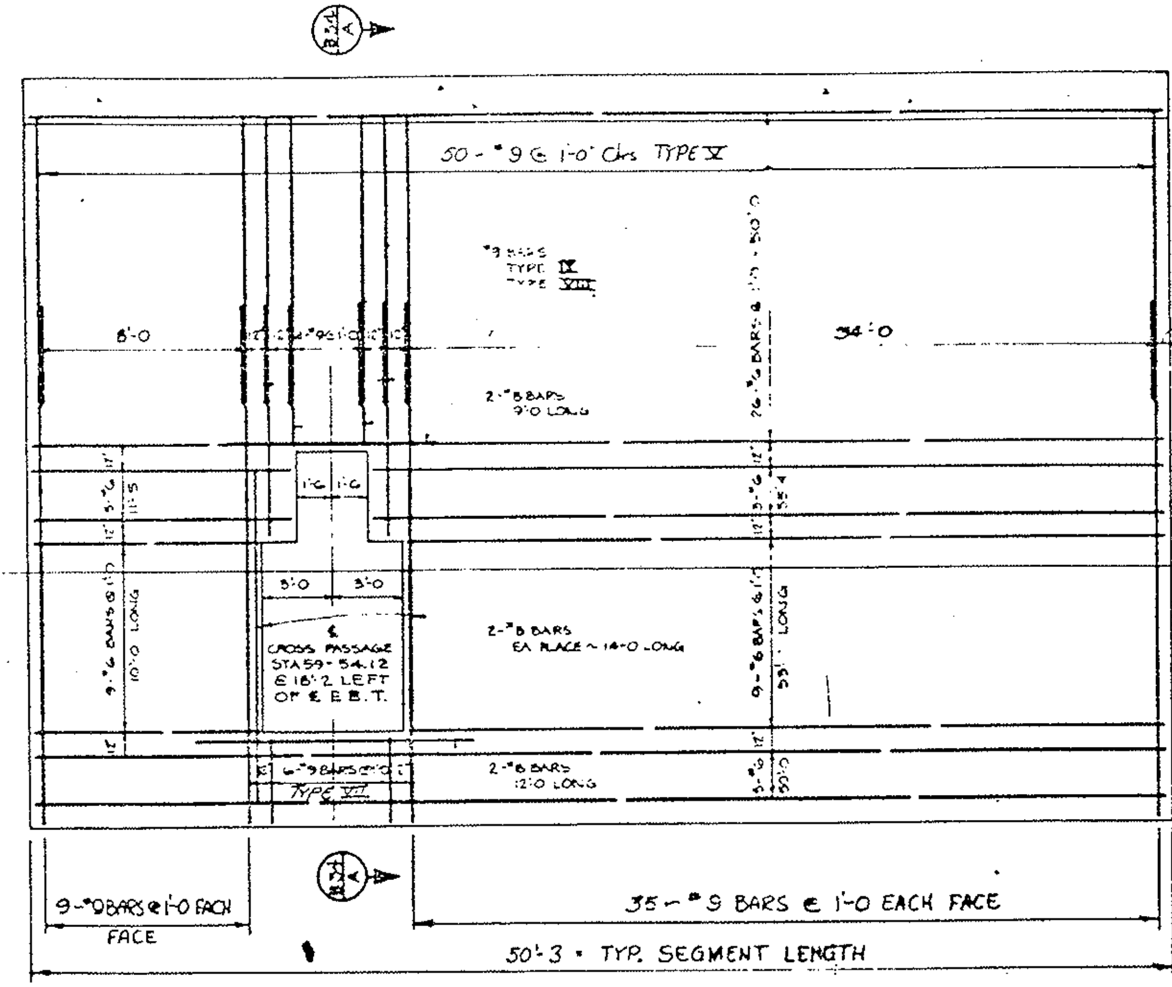
REINFORCEMENT - FINAL LINING
3 DRIFT AND 2 DRIFT
TUNNEL SUPPORT

Designer CDOH | Structure Numbers F-13-X
Detailer B R Lere
Drawing Number B 33 of 60 Drawings

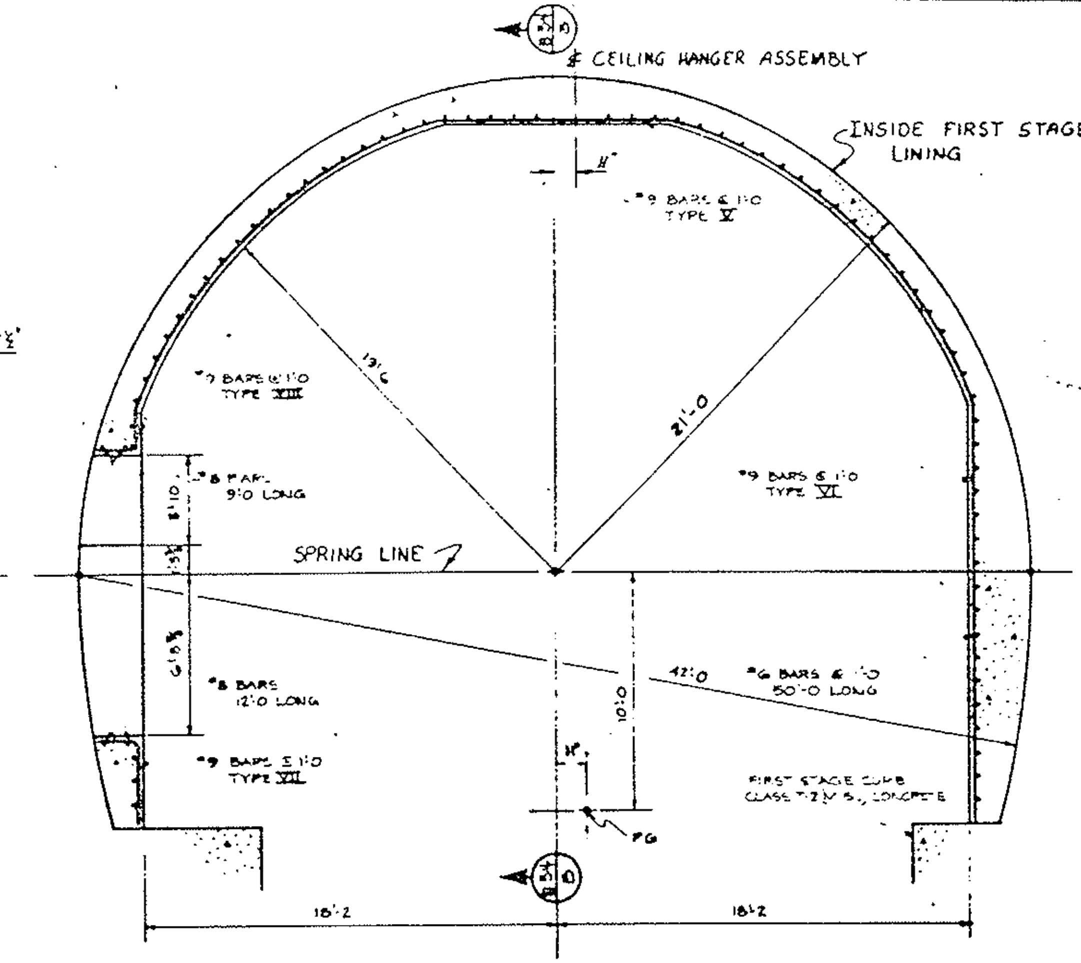
Revision Date 4-18-74 12-12-74

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	[illegible]	62	273

REVISIONS



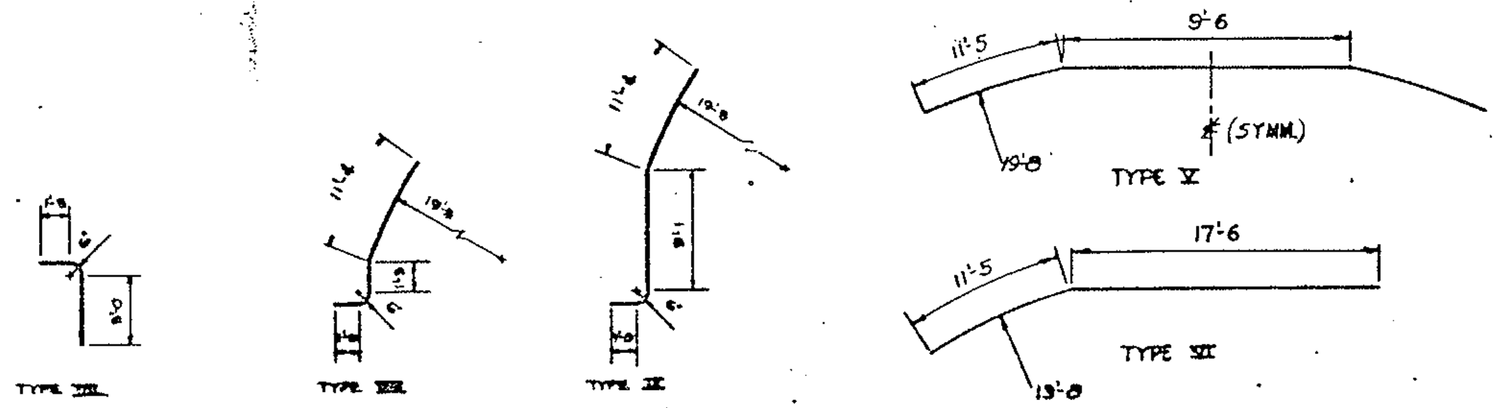
SECTION B



SECTION A

SUMMARY OF REINFORCING STEEL QUANTITIES PER SEGMENT FOR SEGMENT No. 5-42

BAR TYPE	LENGTH	NUMBER REQD.	TONS
V	32'-4	50	2.748
VI	37'-3	93	5.889
VII	5'-1	6	0.052
VIII	14'-5	4	0.098
IX	18'-3	2	0.062
LONGITUDINAL	50'-0	68	2.553
↓	12'-0	2	0.032
	9'-0	2	0.024
	35'-4	3	0.080
	11'-5	3	0.026
	33'-11	9	0.229
↓	10'-0	9	0.068
LONGITUDINAL	14'-0	4	0.075



BENDING DIAGRAMS

ORIG. SCALE: 1/4" = 1'-0

DIVISION OF HIGHWAYS

REINFORCEMENT - FINAL LINING AT WEST CROSS PASSAGE - S42

Designer C.D.O.H.	Structure Number	F-15-X	
Detailer B. K. Lora			
Drawing Number B 5-4	of 60	Drawings	

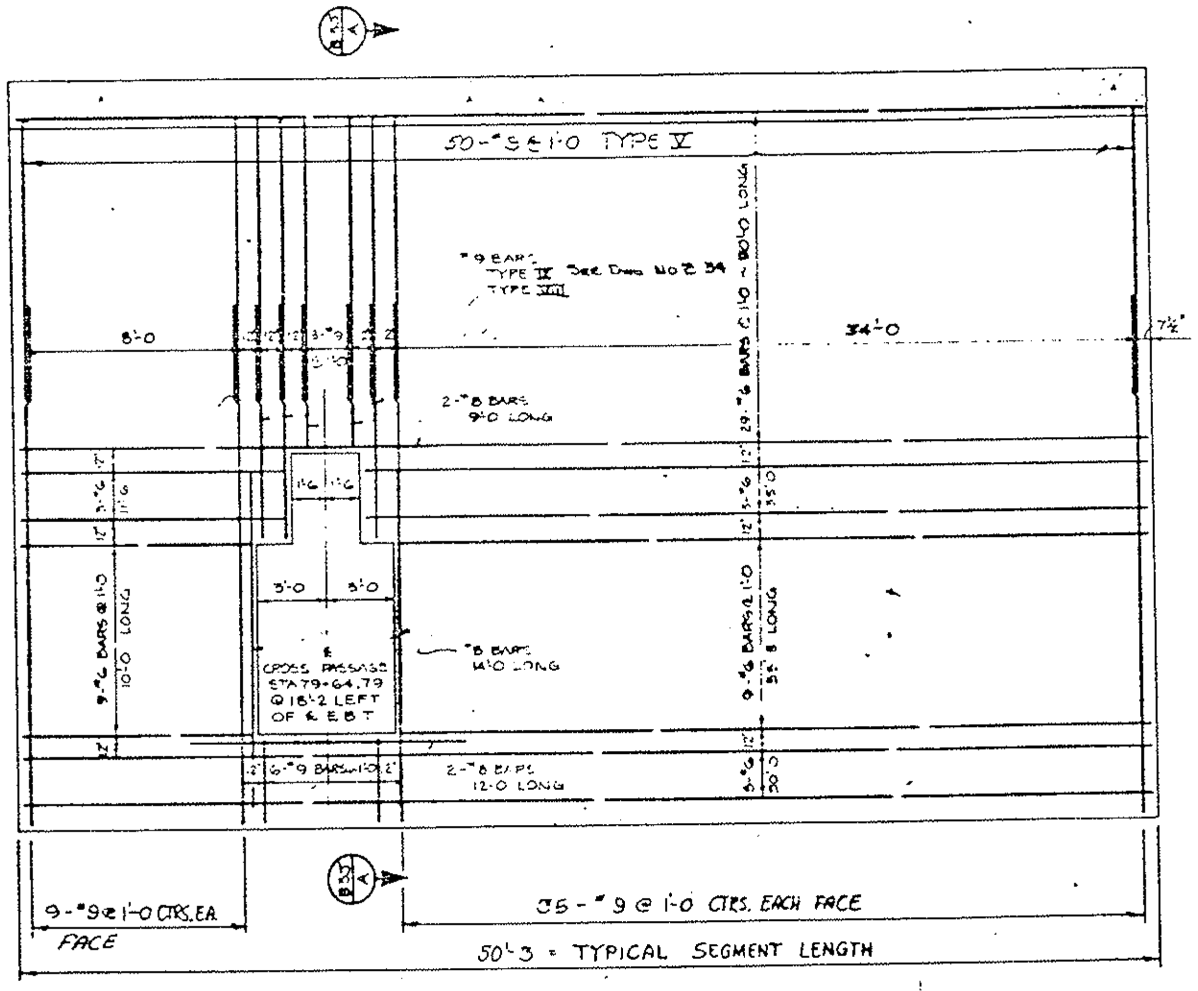
DESIGNED BY	DATE	CHECKED BY	
COOH	2-74	MEP	3-75
CHECKED BY		QUANTITIES BY	
DETAILED BY BRL	1-74	CHECKED BY KJS	3-75

REGION NO	STATE	PROJECT	FED. AID PROJ. NO.	SHEET NO.
XIII	COLORADO	I-70-5(6)220	63	273

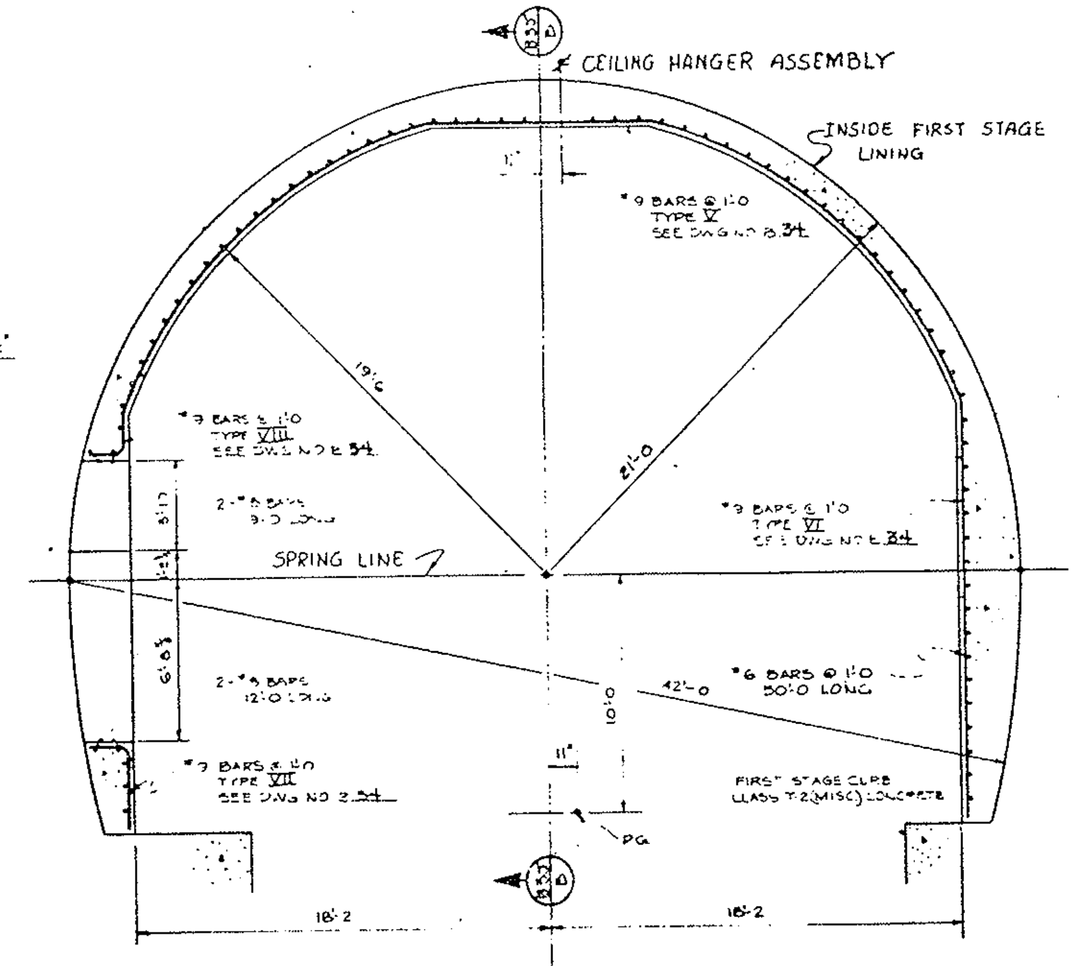
REVISIONS

AS CONSTRUCTED

NO REVISIONS 6-29-79 REVISED VOID



SECTION B 35 / B



SECTION B 35 / A

SUMMARY OF REINFORCING STEEL QUANTITIES PER SEGMENT No. S82

BAR TYPE	LENGTH	NUMBER REQD.	TONS
V	32'-4	50	2.748
VI	37'-3	94	5.353
VII	5'-1	6	0.052
VIII	14'-5	3	0.049
IX	18'-3	3	0.093
LONGITUDINAL	50'-0	68	2.553
	9'-0	2	0.024
	12'-0	2	0.032
	35'-0	3	0.079
	33'-8	9	0.228
	11'-6	3	0.026
	10'-0	9	0.068
LONGITUDINAL	14'-0	4	0.075

SCALE: 1/4" = 1'-0

INITIAL	DATE	
DESIGNED BY CDOH	2-74	CHECKED BY
CHECKED BY		QUANTITIES BY MEP 3-74
DETAILED BY BRL	3-74	CHECKED BY

DIVISION OF HIGHWAYS

REINFORCEMENT - FINAL LINING AT CENTER CROSS PASSAGE - S82

Designer CDOH
Detailer B R Lere
Structure Numbers F-13-X
Drawing Number B 35 of 60 Drawings

Revision Dates (Preliminary Stage Only)
5-1-74 12-12-74

VIII	COLORADO	270-3,6)220	64	273

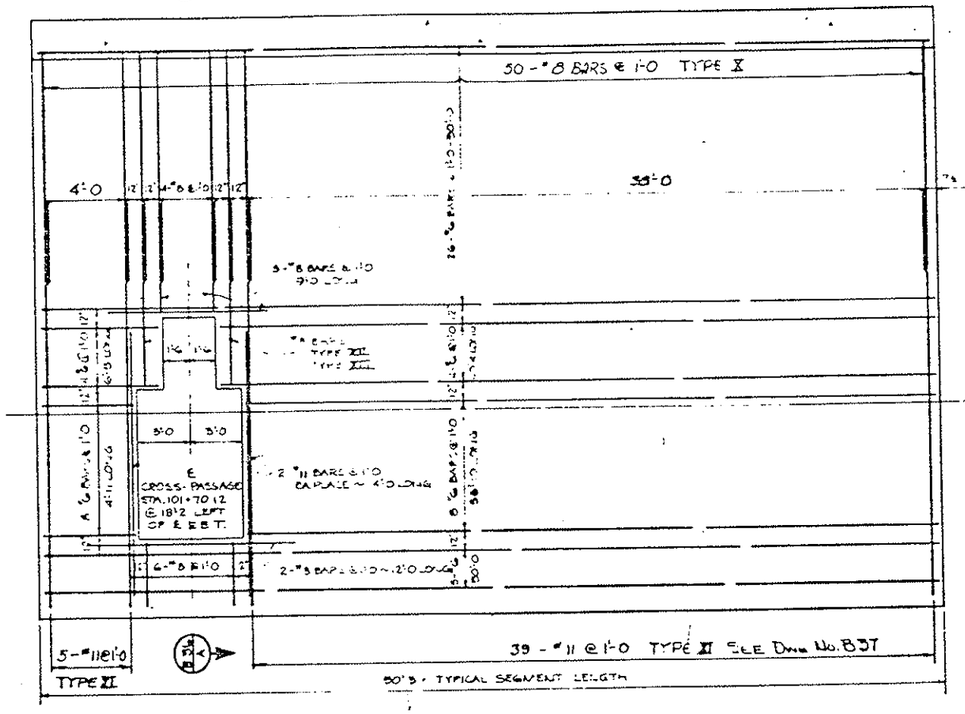
REVISIONS			

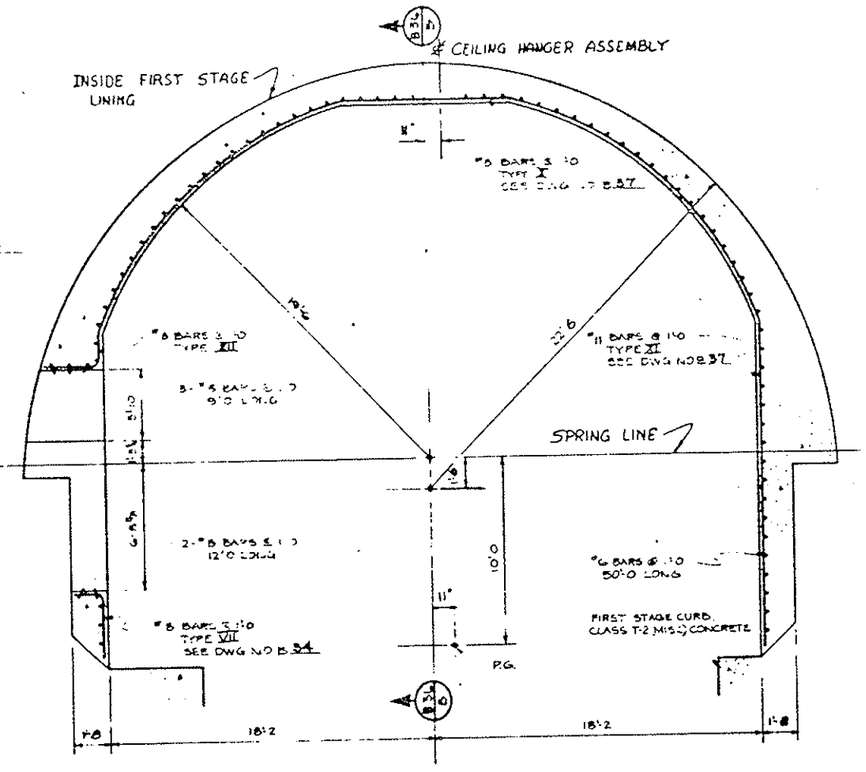
AS CONSTRUCTED

BID OPEN DATE: 6-29-79

SUMMARY OF REINFORCING STEEL QUANTITIES
SEGMENT No. S126

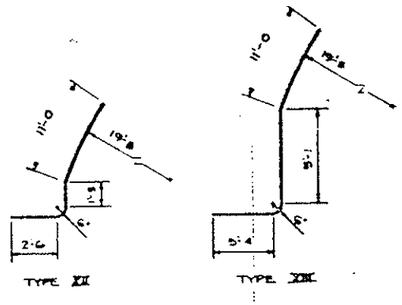
BAR TYPE	LENGTH	NUMBER REQD.	TONS
I	31'-6	50	2.103
XI	28'-6	94	7.117
VIII	5'-1	6	0.041
XII	19'-7	4	0.084
XIII	20'-3	2	0.054
LONGITUDINAL	50'-0	68	2.553
↓	9'-0	3	0.037
↓	12'-0	2	0.032
↓	14'-0	4	0.149
↓	38'-10	8	0.233
↓	40'-4	4	0.121
↓	4'-11	8	0.030
LONGITUDINAL	6'-5	4	0.019





SECTION (B34 B)

SECTION (B34 A)



BENDING DIAGRAMS

ORIG. SCALE: ¼" = 1'-0

DESIGNED BY	INITIAL	DATE
DETAILED BY	CDOH	4-74
CHECKED BY		
ESTIMATED BY	B.R.L.	5-74

CHECKED BY	DATE
QUANTITIES BY	3-77
CHECKED BY	

DIVISION OF HIGHWAYS

REINFORCEMENT - FINAL LINING

AT EAST CROSS PASSAGE - S126

Designer CDOH.		Structure Numbers	F-13-X
Detailer B.R. Lens			
Drawing Number B 56	of 60 Drawings		

Issued Date	(Preliminary Stage Only)					
5-6-74 12-19-77						

REGION NO				
VIII	COLORADO		65	273

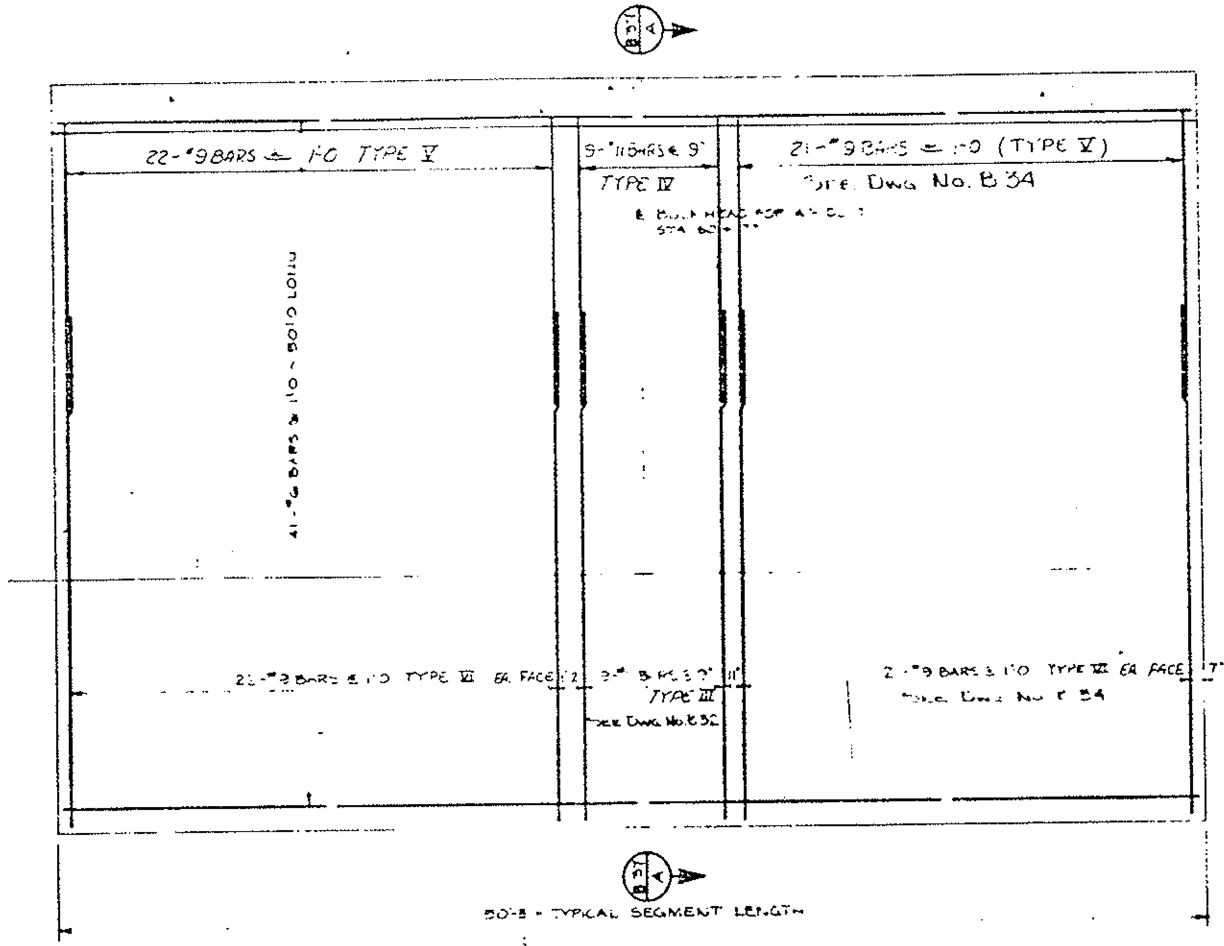
REVISIONS

AS CONSTRUCTED

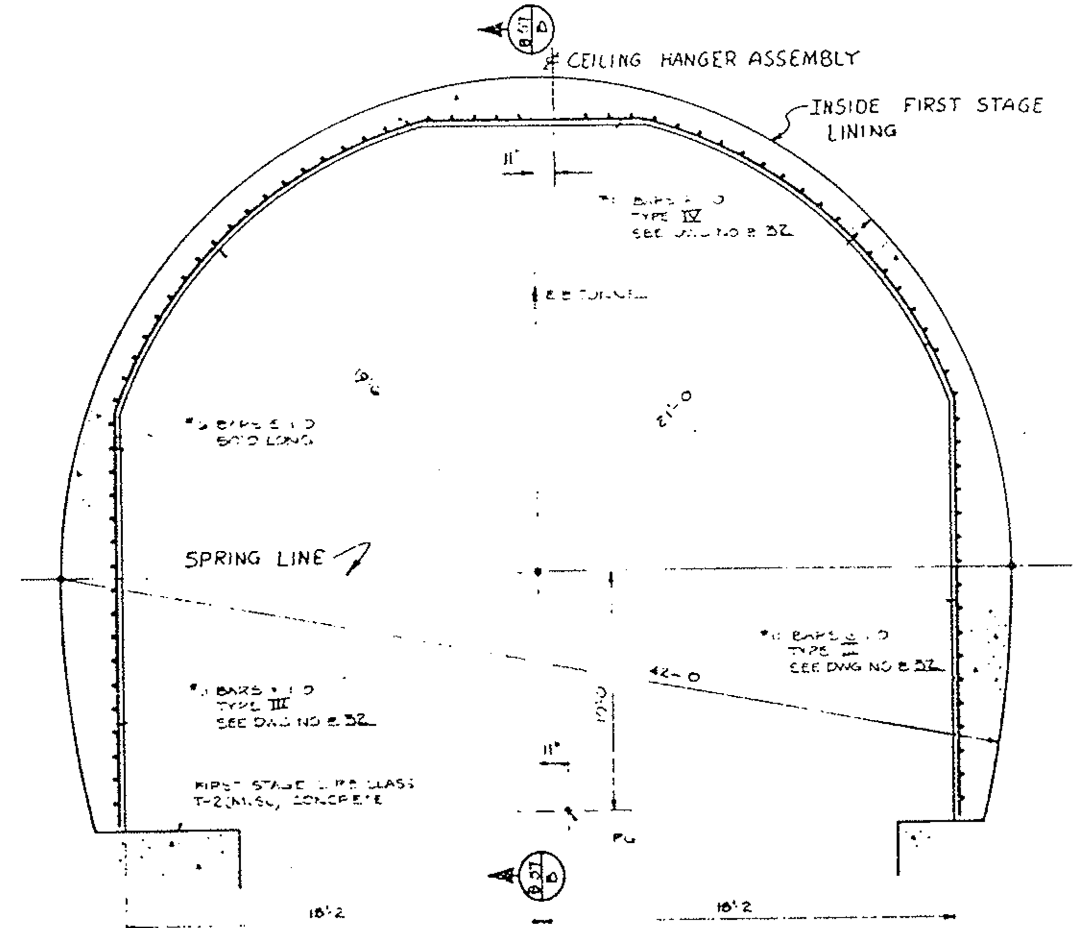
6-29-79

SUMMARY OF REINFORCING STEEL QUANTITIES PER SEGMENT No. 584

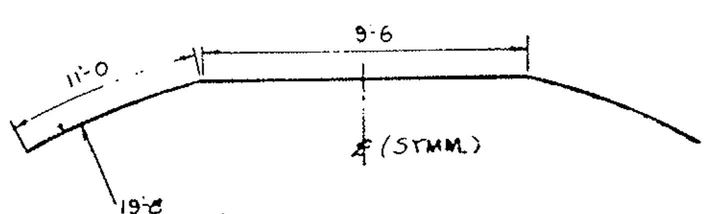
BAR TYPE	LENGTH	NUMBER REQD	TONS
IV	34'-6	9	0.825
III	30'-0	18	1.435
V	32'-4	43	2.364
VI	37'-3	86	5.446
LONGITUDINAL	50'-0	80	3.004



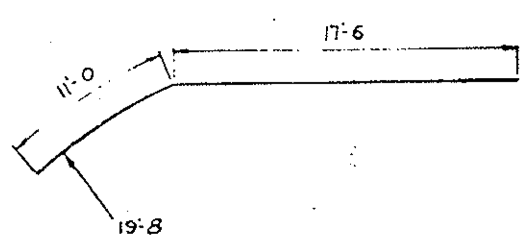
SECTION B-57/B



SECTION B-57/A



TYPE V



TYPE II

SCALE: 1/4" = 1'-0

DESIGNED BY	INITIAL	DATE	CHECKED BY
DESIGNED BY	CDOH	5-74	
CHECKED BY			
DETAILED BY	B.R.L.	6-74	

DIVISION OF HIGHWAYS

REINFORCEMENT - FINAL LINING AT CENTER AIR BULKHEAD - 584

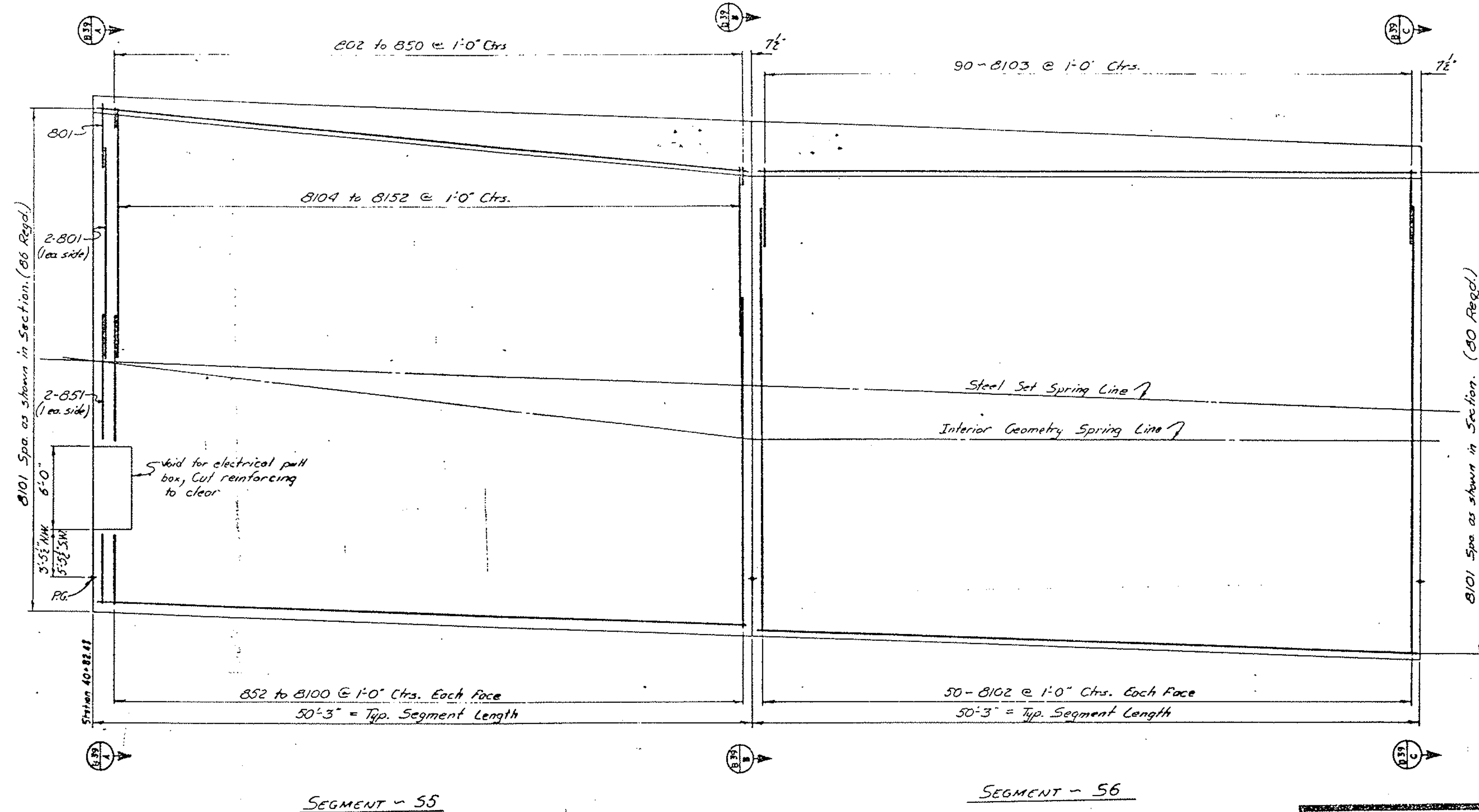
Designer CDOH
Detailer B R Lere
Structure Numbers F-13-X
Drawing Number B 57 of 60 Drawings

Revision Dates 6-5-74 12-12-74

REGION NO.	STATE	PROJECT	NO.	SHEETS
VIII	COLORADO	I 70-3(81)220	66	273

AS CONSTRUCTED 6-29-79

REVISIONS



DIVISION OF HIGHWAYS

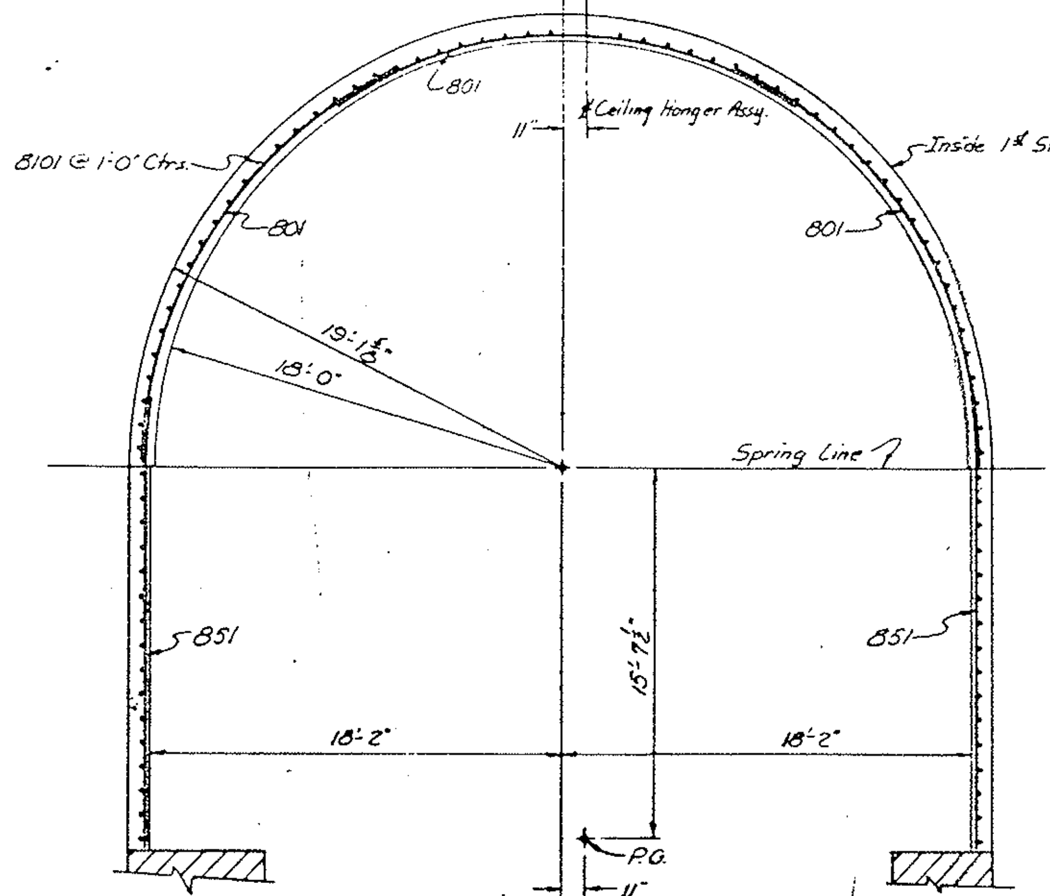
REINFORCEMENT - FINAL LINING
SEGMENTS - S5 & S6
ELEVATION

Designer CDOH
Detailer M. Pulver
Drawing Number B 38 of 60 Drawings
Structure Numbers F-13-X

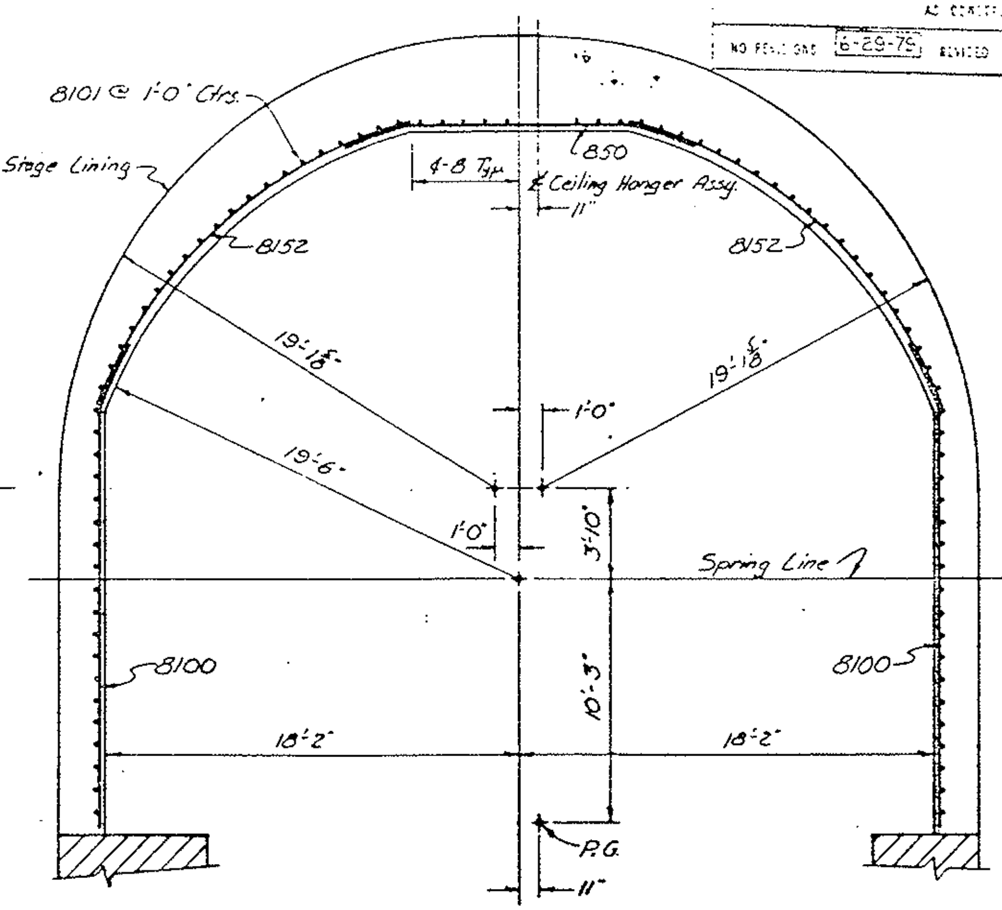
FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I70-3(81)220	67	275

AS CONSTRUCTED — NO REVISIONS 6-29-75 REVISED VOID

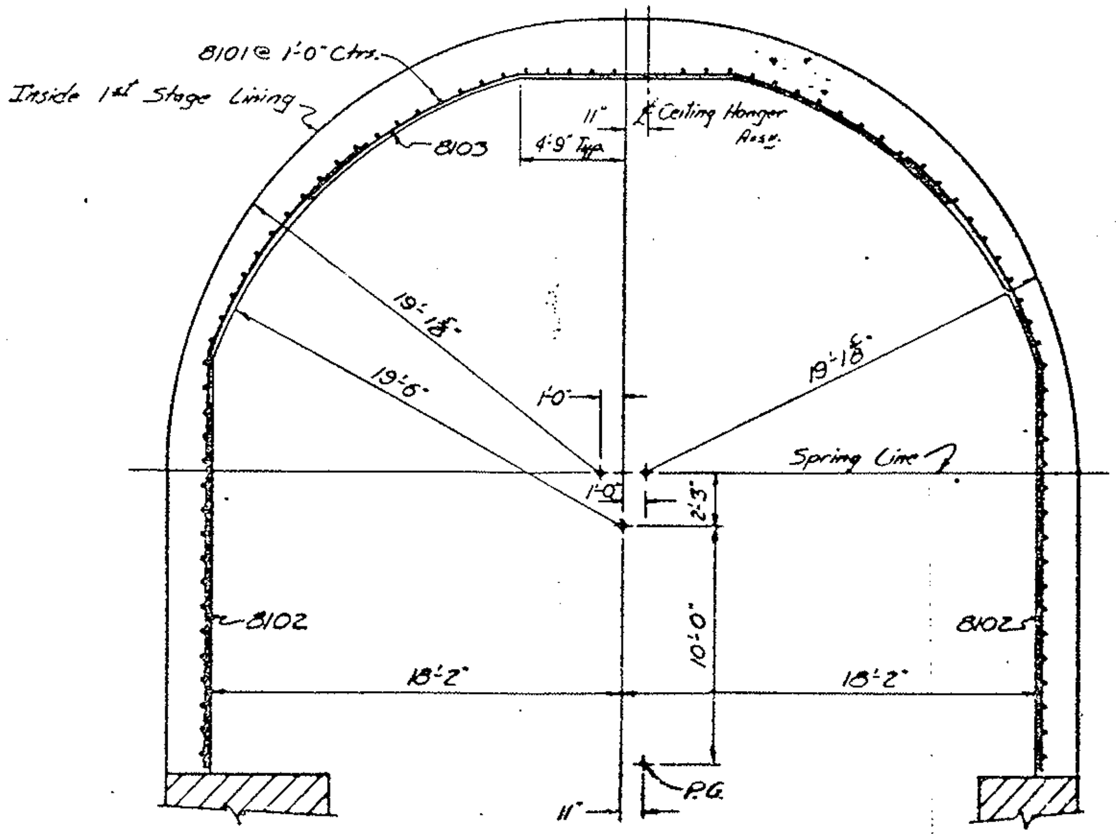
REVISIONS



SECTION (B39/A)
Sta. 40+83



SECTION (B39/B)
Sta. 41+32



SECTION (B39/C)
Sta. 41+82

SUMMARY OF REINFORCING STEEL QUANTITIES FOR SEGMENTS 55 & 56

Mark	No. Reqd	Length	Type	ℓ	r	Tons
801	3	21'-2"	XV		18'-3"	0.0848
802		6'-1"		1"	18'-3	
to	1ea.	to	XIV	B.E.I.	B.E.I.	0.7059
850		15'-6"		9'-6"	19'-9"	
851	2	19'-1"	XVI	16'-1"	18'-3"	0.0510
852		19'-1 1/2"		16'-1 1/2"	18'-3"	
to	2ea.	to	XVI	B.E.I.	B.E.I.	2.6193
8100		20'-11"		17'-11"	19'-9"	
8101	166	50'-0"	Str.			11.0805
8102	100	28'-8"	XI	17'-6"	19'-9"	3.8270
8103	50	31'-6"	XVIII	11'-0"	19'-9"	2.1026
8104		28'-8"			18'-3"	
to	2ea.	to	XV		B.E.I.	3.1181
8152		19'-0"			19'-9"	

For Bending Diagrams See DWG. No. B41

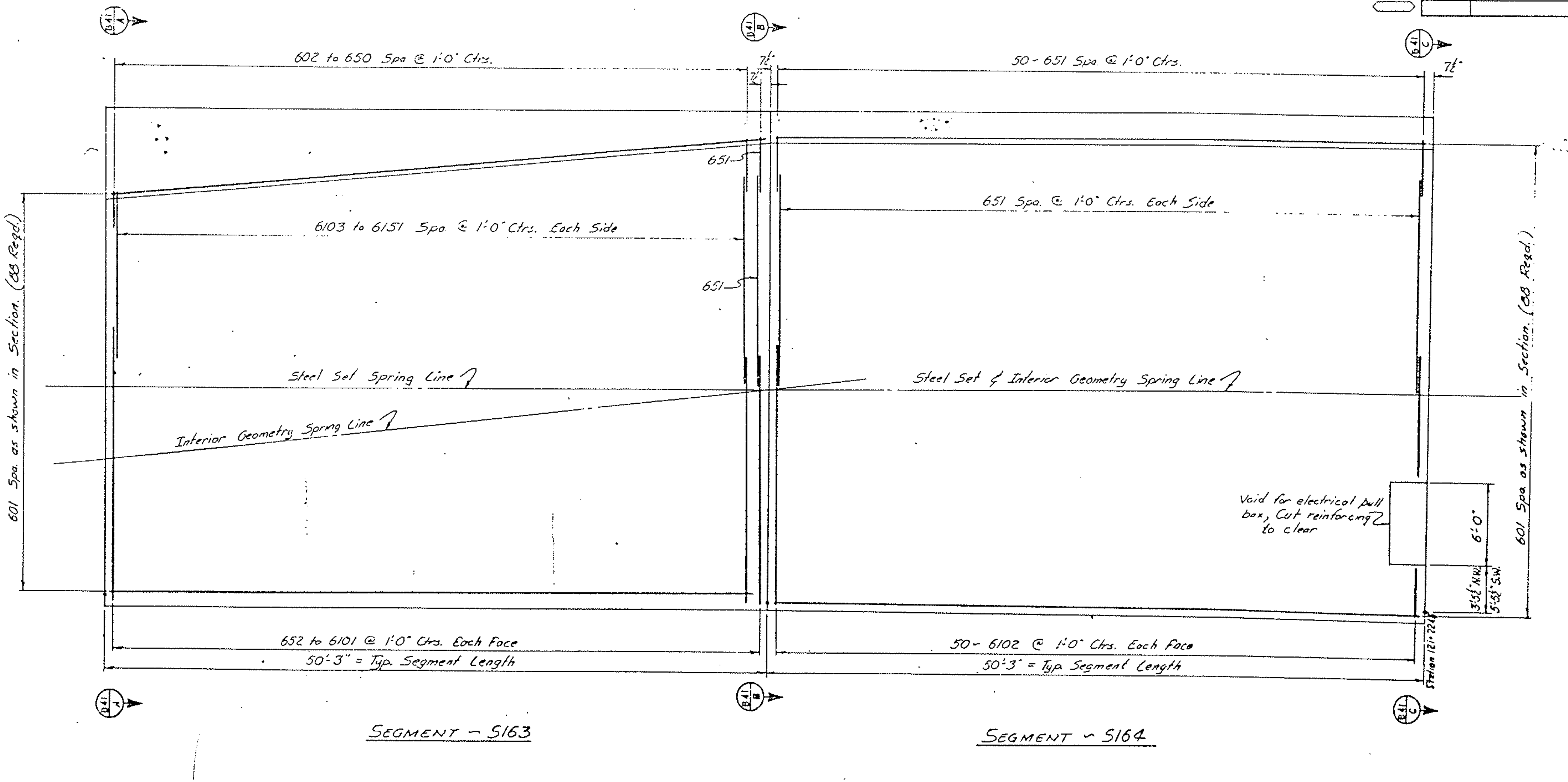
DIVISION OF HIGHWAYS

REINFORCEMENT – FINAL LINING SEGMENTS 55 & 56
SECTIONS

Designer CDOH | Structure F-13-X
Detailer M. Fulyer | Number
Drawing Number B 39 of 60 Drawings

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3 (51) 220	68	273

REVISIONS



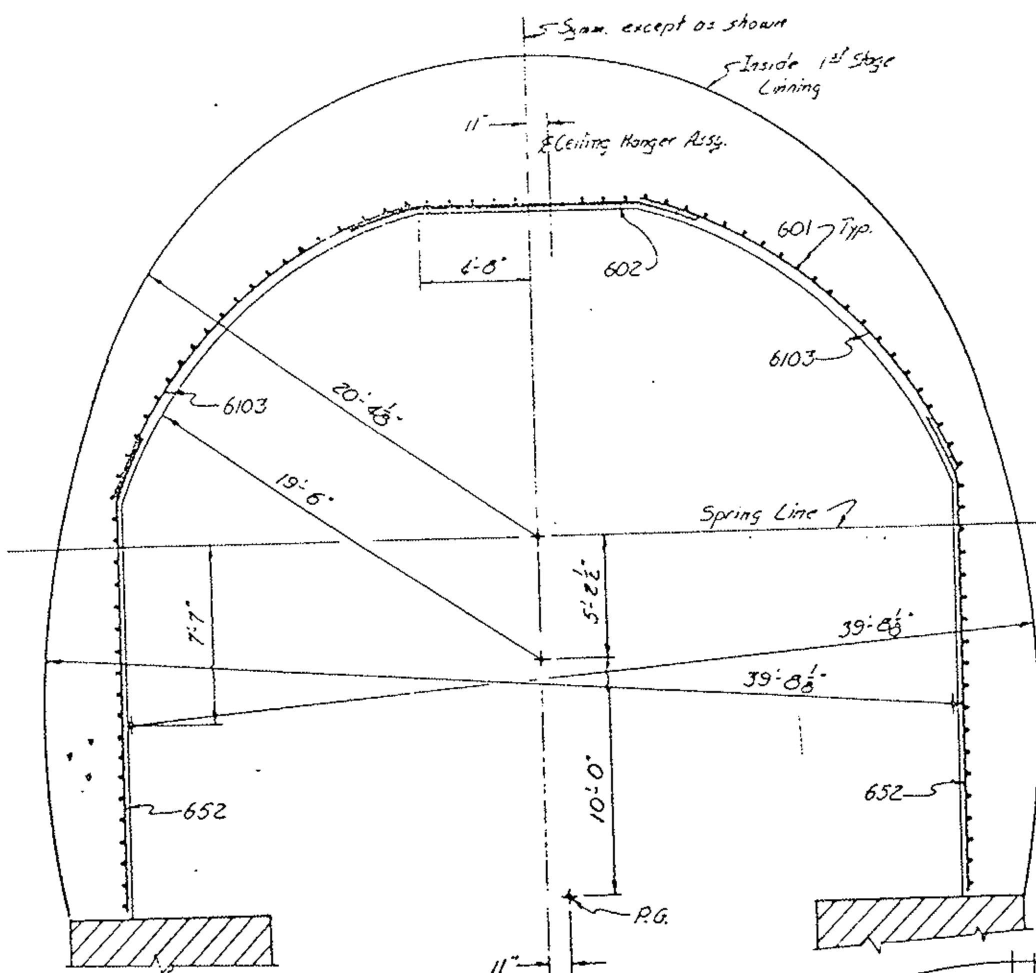
DIVISION OF HIGHWAYS

REINFORCEMENT - FINAL LINING
SEGMENTS S163 & S164
ELEVATION

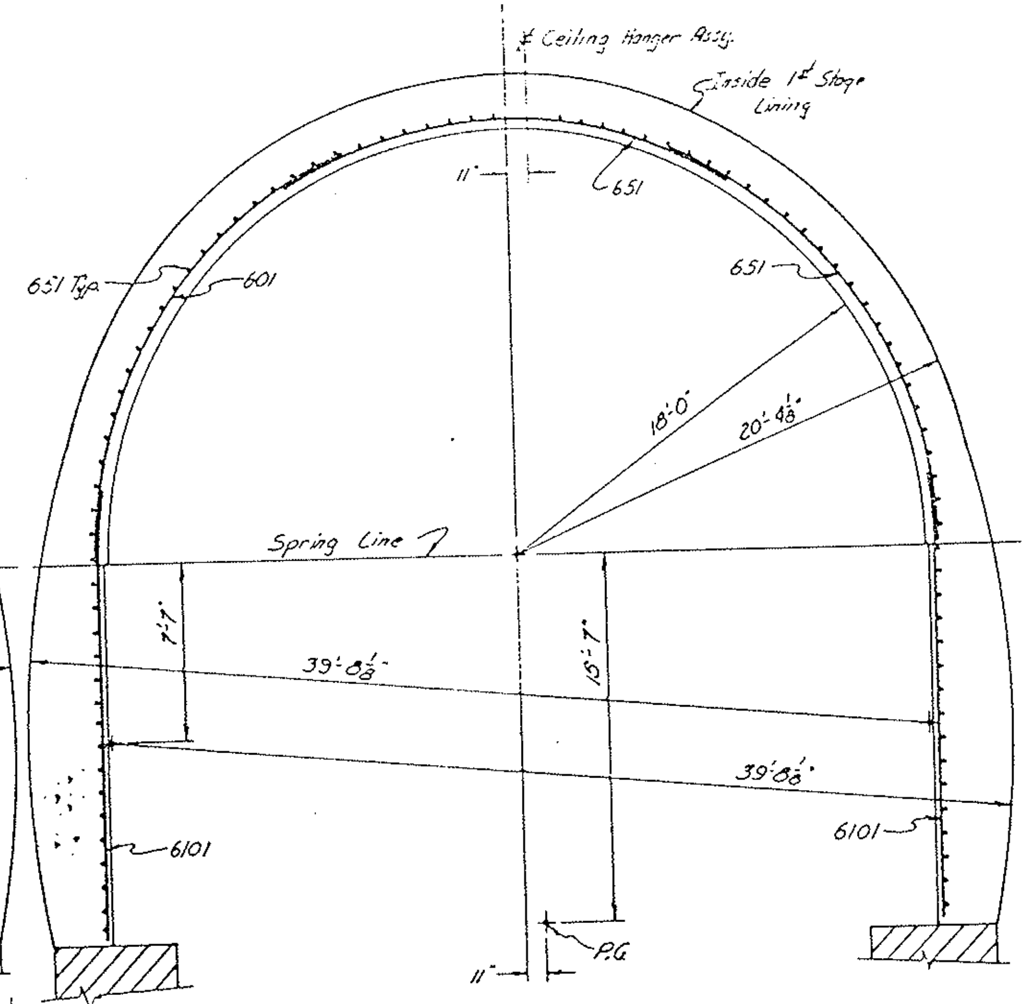
Designer	CDOH	Structure Numbers	F-13-X
Detailer	M. Pulver		
Drawing Number B 45	of 60	Drawings	

	COLORADO	I70-3(61) 220	69	

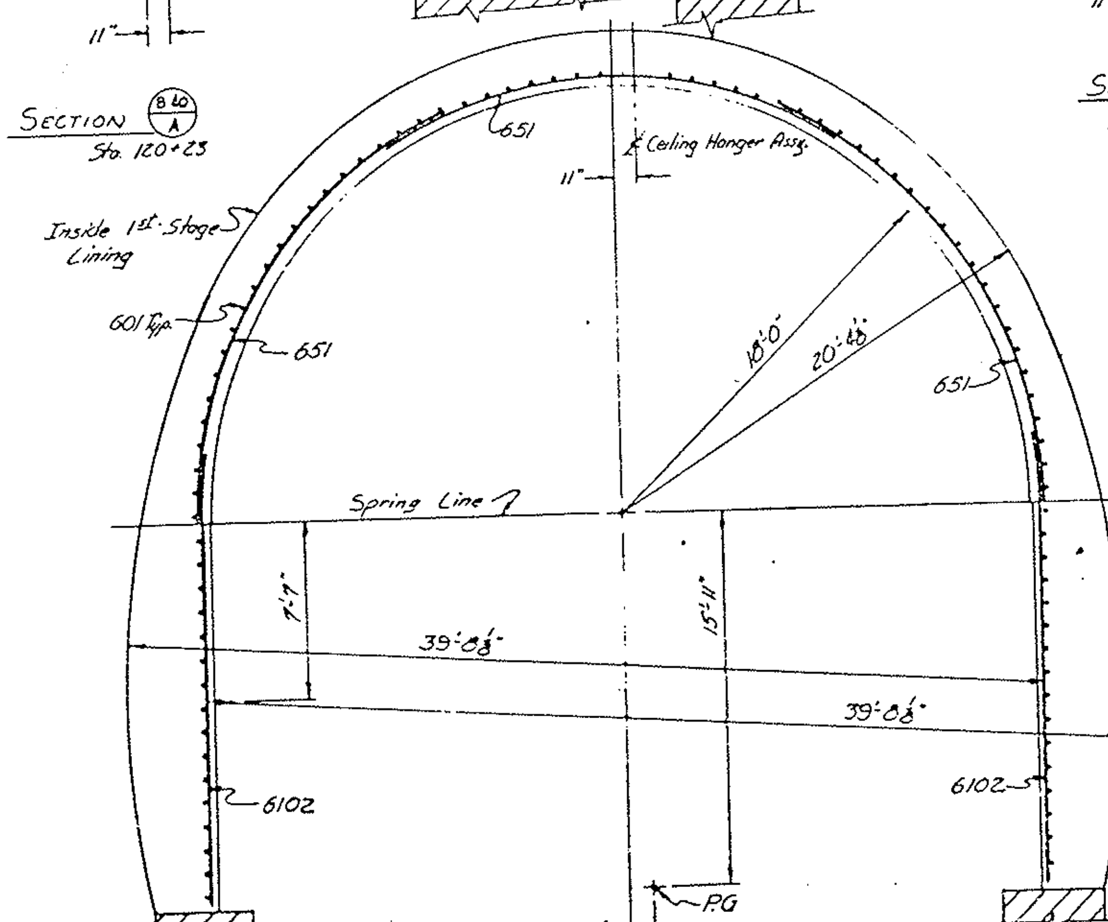
REVISIONS



Section B40/A
Sta. 120+23



Section B40/B
Sta. 120+71

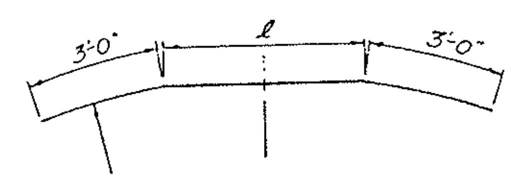


Section B40/C
Sta. 121+22

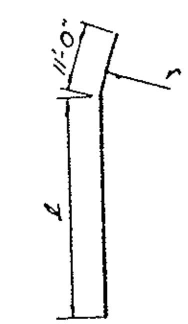
Summary Of Reinforcing Steel Quantities For Segments S163 & S164

Mark	No. Reqd.	Length	Type	l	r	Tons
501	176	50'-0"	Str.			6.6088
602		15'-6"		9'-6"	19'-9"	
to	1 ea.	to	XIV	B.E.I.	B.E.I.	0.3956
650		6'-1"		1"	18'-3"	
651	153	19'-4"	XV		18'-3"	2.2215
652		20'-7½"		17'-7½"	19'-9"	
to	2 ea.	to	XVI	B.E.I.	B.E.I.	1.4511
6101		19'-1"		16'-1"	18'-3"	
6102	100	19'-5"	XVI	16'-5"	18'-3"	1.4582
6103		16'-4"			19'-9"	
to	2 ea	to	XV		B.E.I.	1.5578
6151		26'-0"			18'-3"	

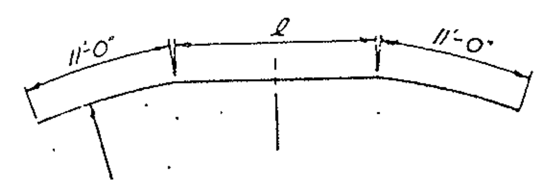
B.E.I. = By Equal Increments.



Type XIV

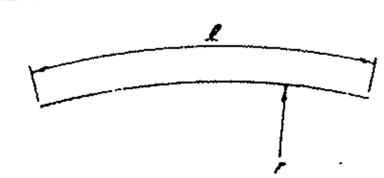


Type XI



Type XVII

Type XVI



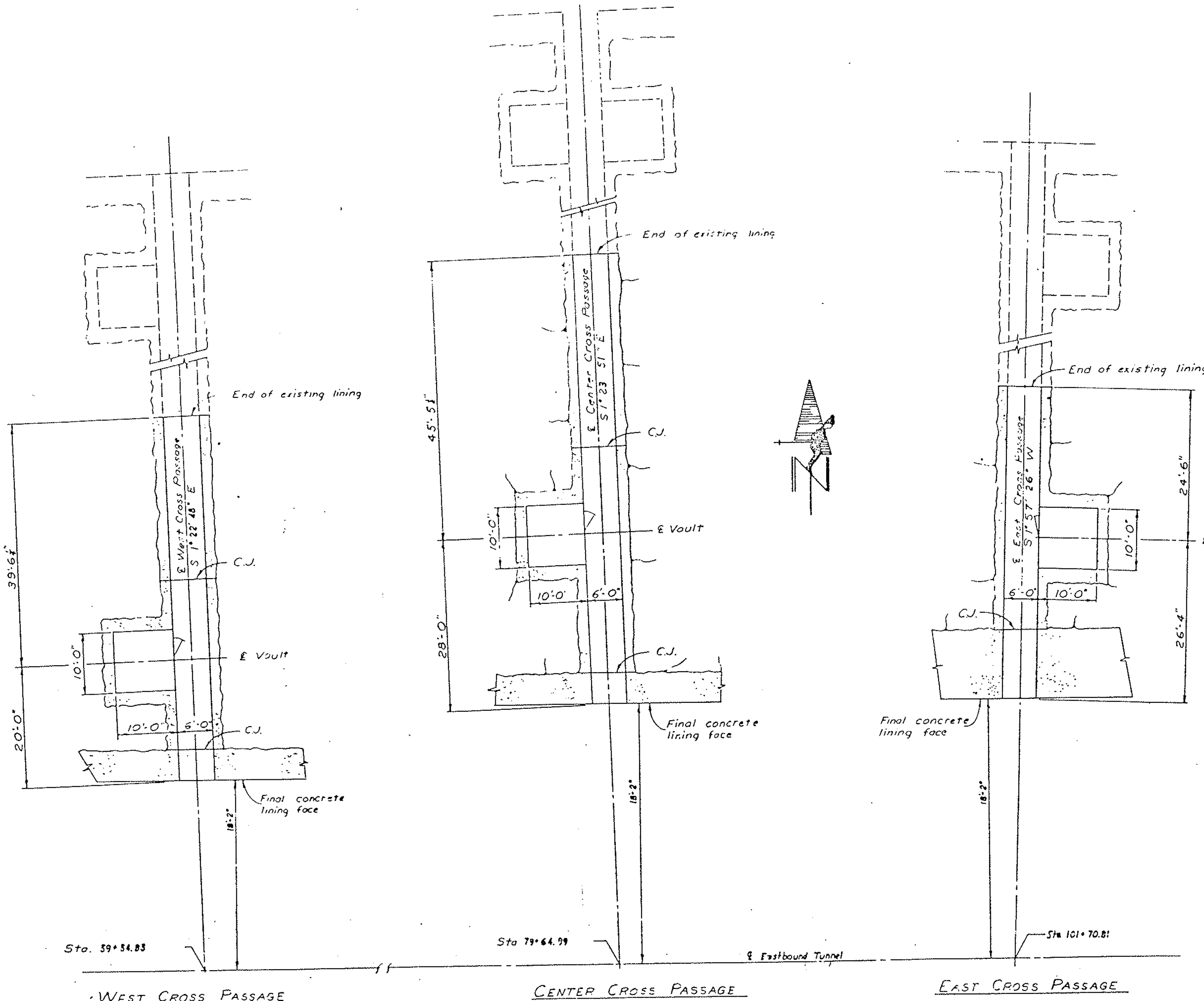
Type XV

Designed by	Checked by	Quantities by	Checked by	Detailed by

DIVISION OF HIGHWAYS

Reinforcement – Final Lining Segments S163 & S164
Sections

Designer: CDOH
Detailer: [illegible]
Structure Number: F-13-X
Drawing Number 6 41 of 69 Drawings



Federal Aid Region No.	District	Proj. No.		Sheets
VIII	Colorado	I 70-3	70	

REVISIONS

6-29-79

Designed by	Initial C.D.O.H.	Date 3-74	Checked by	
Checked by			Quantities by	E.H.H. 6-74
Detailed by	E.H.H.	4-74	Checked by	R.Y.M. 6-74

Work with Dwg. No. B 43
Original Scale: ⅛" = 1'-0"

DIVISION OF HIGHWAYS

CROSS PASSAGE PLANS

Designer C.D.O.H.	Structure Numbers	F-13-X
Detailer E. Hadley		
Drawing Number B 42	of 60	Drawings

Preliminary Stage Only
4-7-74

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(13)225	71	375

REVISIONS		

DATE	CHECKED BY	
5-74	QUANTITIES BY	E.N.H. 6-74
4-74	CHECKED BY	R.M.M. 6-74

INITIAL	DESIGNED BY	CHECKED BY	DETAILED BY
	C.D.O.H.		E. Hadley

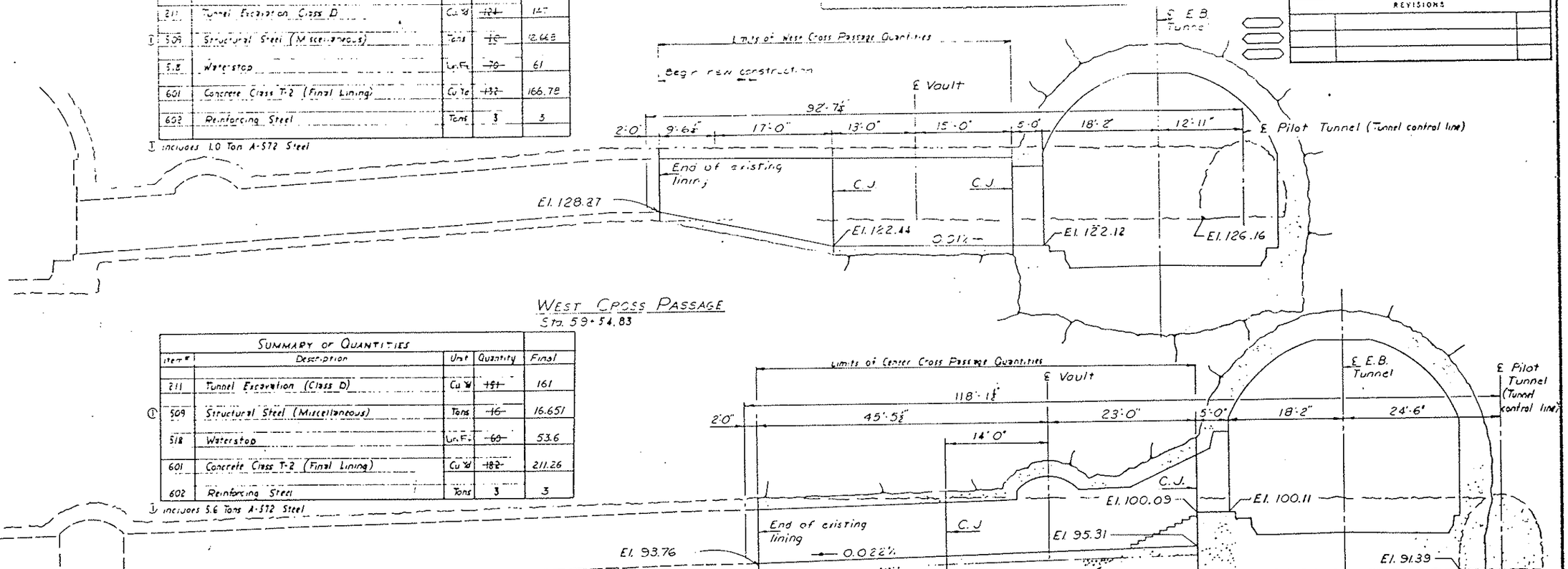
REVISED 6-29-79

WEST CROSS PASSAGE
Sta. 59+54.83

SUMMARY OF QUANTITIES

Item #	Description	Unit	Quantity	Final
211	Tunnel Excavation (Class D)	Cu Yd	~~124~~	147
① 509	Structural Steel (Miscellaneous)	Tons	~~16~~	12.668
518	Waterstop	Lin Ft	~~70~~	61
601	Concrete Class T-2 (Final Lining)	Cu Yd	~~132~~	166.78
602	Reinforcing Steel	Tons	3	3

① Includes 1.0 Ton A-572 Steel



WEST CROSS PASSAGE
Sta. 59+54.83

SUMMARY OF QUANTITIES

Item #	Description	Unit	Quantity	Final
211	Tunnel Excavation (Class D)	Cu Yd	~~151~~	161
① 509	Structural Steel (Miscellaneous)	Tons	~~16~~	16.651
518	Waterstop	Lin Ft	~~60~~	53.6
601	Concrete Class T-2 (Final Lining)	Cu Yd	~~182~~	211.26
602	Reinforcing Steel	Tons	3	3

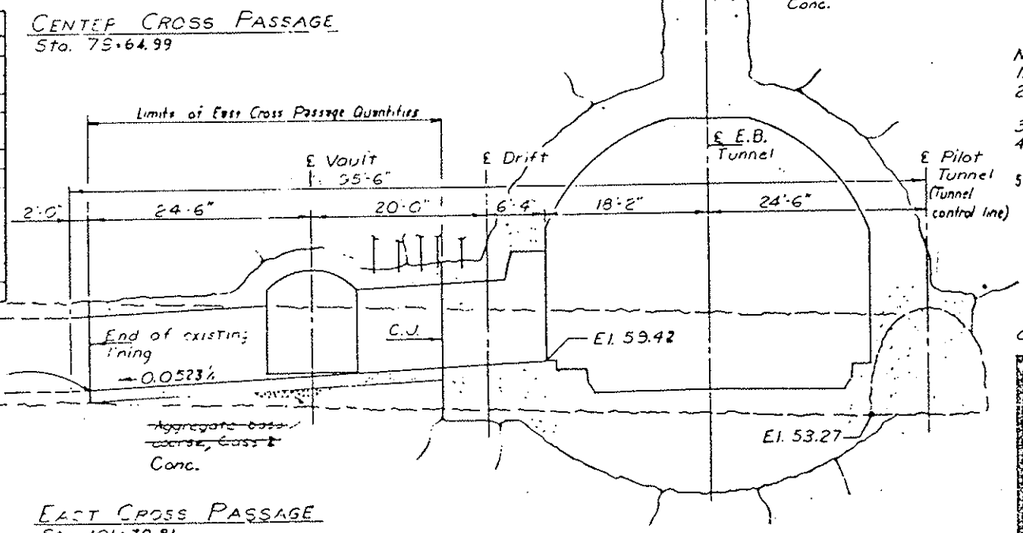
① Includes 5.6 Tons A-572 Steel

CENTER CROSS PASSAGE
Sta. 78+64.99

SUMMARY OF QUANTITIES

Item #	Description	Unit	Quantity
211	Tunnel Excavation (Class D)	Cu Yd	~~177~~ ℄120
211	Rock Reinforcing "Threaded "Hedback, Resin grouted 16 Ft	Ea	~~25~~ ℄12
① 509	Structural Steel (Miscellaneous)	Tons	~~11~~ ℄10.8836
518	Waterstop	Lin Ft	~~65~~ ℄62.5
601	Concrete Class T-2 (Final Lining	Cu Yd	~~116~~ ℄123.7
602	Reinforcing Steel	Tons	2

① Includes 3.5 Tons A-572 Steel



EAST CROSS PASSAGE
Sta. 101+70.81

NOTES:
1. All elevations are plus 11,000 feet.
2. Elevations and dimensions are at center line of cross passage.
3. Existing structure shown: ——— ——— ———
4. C.J. = construction joint. For details, see Dwg. No. B.91
5. Contact grout arch portions of vaults and Cross Passages

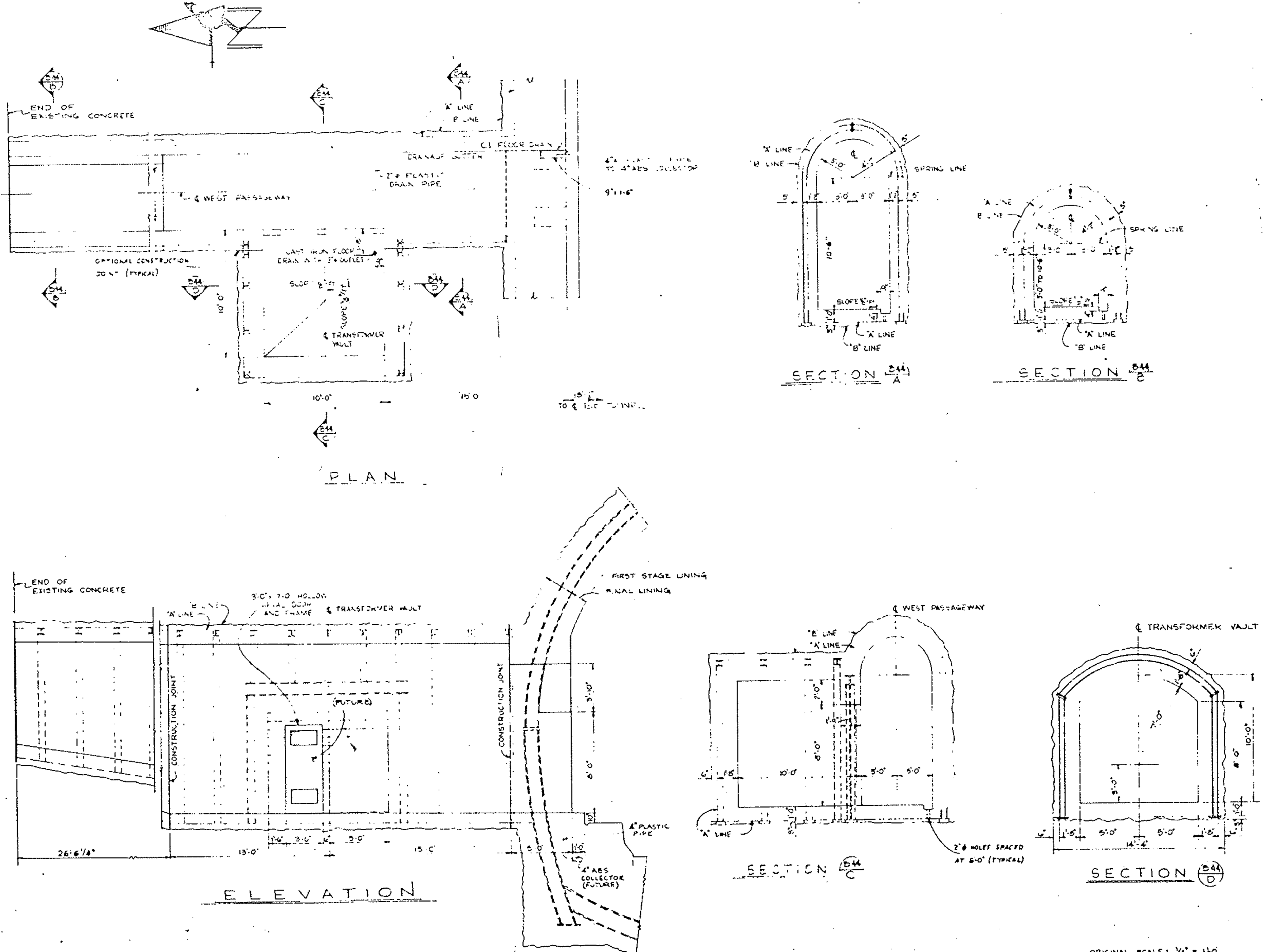
Original Scale : ½" = 1'-0"

DIVISION OF HIGHWAYS.

CROSS PASSAGE ELEVATIONS

Designed	C.D.O.H.	Structure	F-13-X
Detailed	E. Hadley	Numbers	
Drawing Number 8 43		of 60	Drawings

Revision Dates							
6-11-74							



FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO		72	275

REVISIONS

AS CONSTRUCTED 6-29-79

DESIGNED BY	CDOH	2-74
CHECKED BY		
DETAILED BY	RMM	4-74

DIVISION OF HIGHWAYS.

WEST CROSS PASSAGE

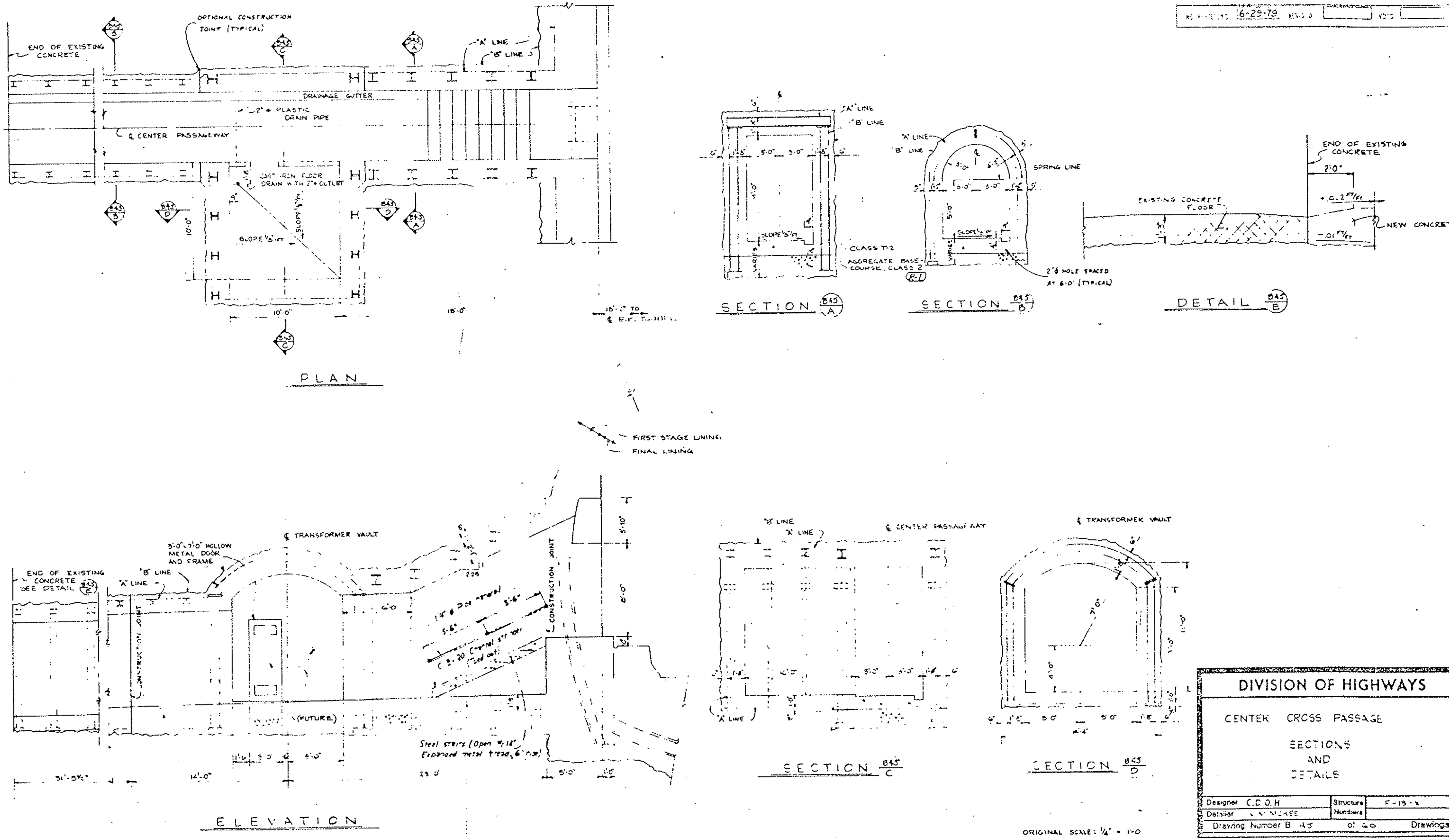
SECTIONS AND DETAILS

Designer	C D O H	Structure Numbers	F-13-X
Detailer	R.M. McKee		
Drawing Number B 44	of 60	Drawings	

XIII	COLORADO	I-70-5(81)293	73	

REVISIONS	
7-3-75 Correct Agg. Class	

AS CONSTRUCTED			
NO REVISIONS	6-29-79	REVISED	VOID



DESIGNED BY	C.D.O.H.		
CHECKED BY	C.A.M.	5-74	
DETAILED BY	R.M.M.	6-74	

DIVISION OF HIGHWAYS

CENTER CROSS PASSAGE

SECTIONS AND DETAILS

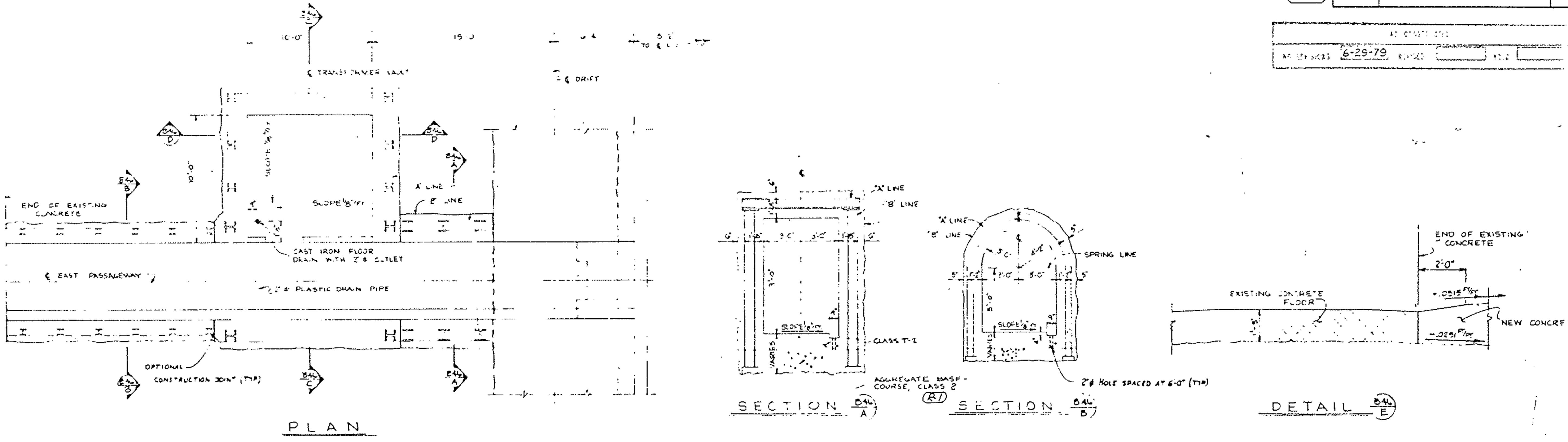
Designer	C.D.O.H	Structure Numbers	F-13-X
Detailer	V. M. MCKEE		
Drawing Number B 45	of 60	Drawings	

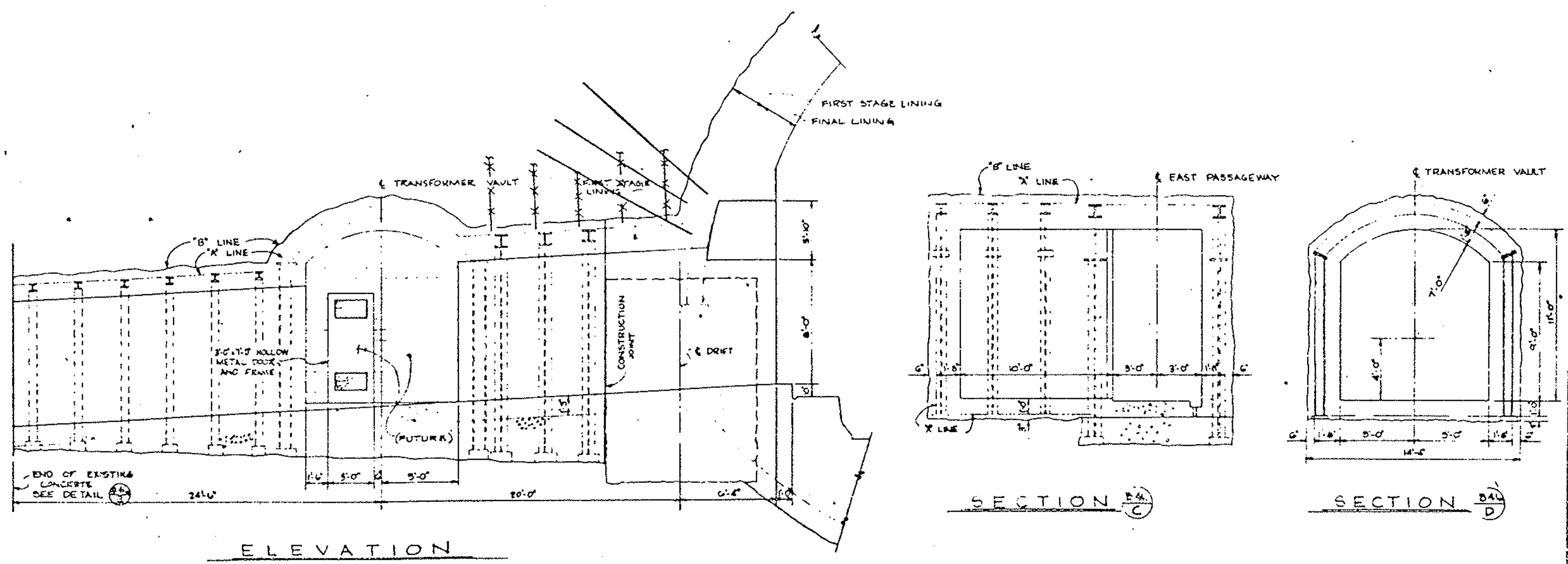
Revision Dates			(Preliminary Stage Only)				
4-15-74	5-7-74	7-30-74					

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	[illegible]	74	273

	REVISIONS		
R-1	7-3-75	Correct Mat'l. Class	T.R.L.

As Constructed 6-29-79





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

DIVISION OF HIGHWAYS

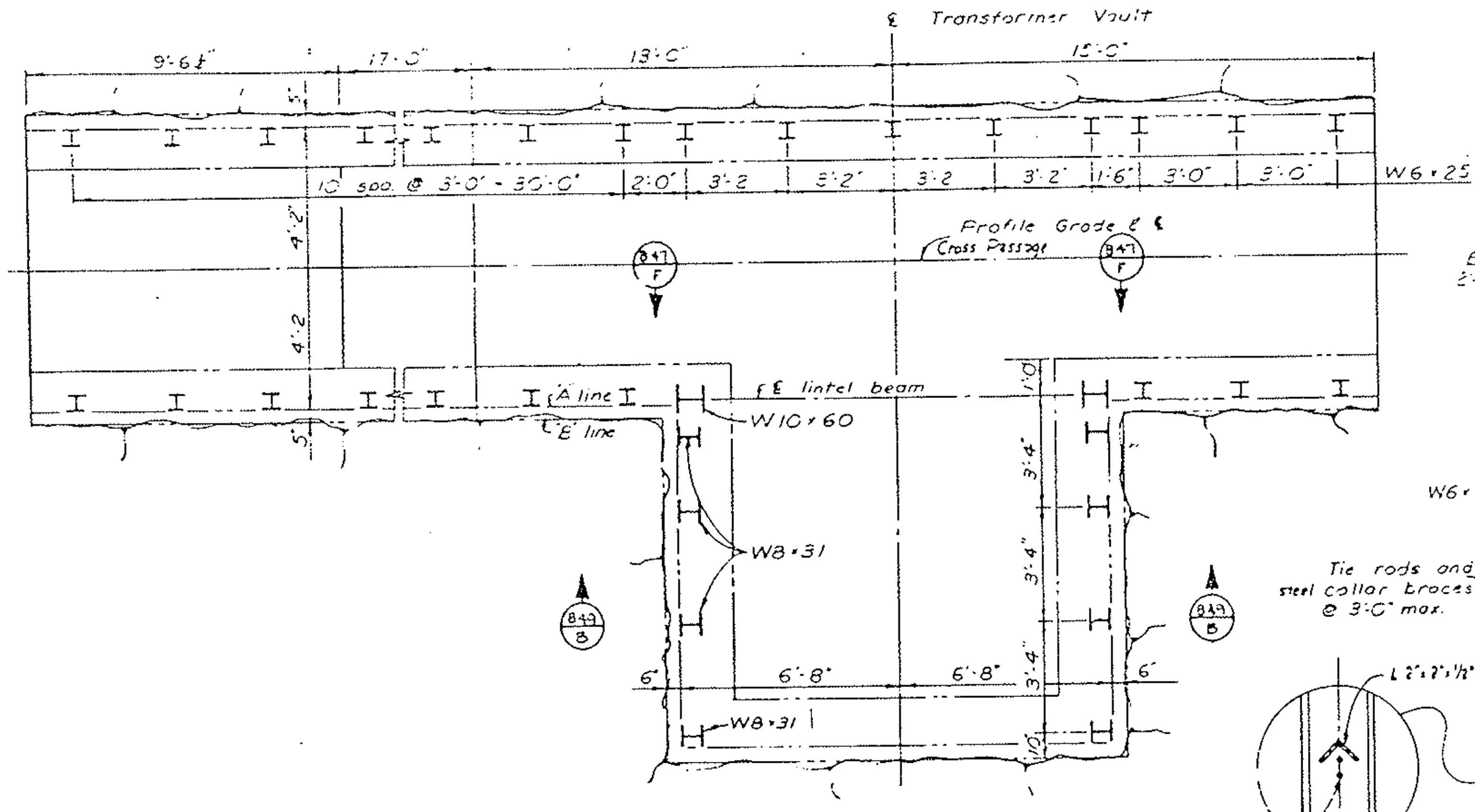
EAST CROSS PASSAGE SECTIONS AND DETAILS

Designer: C.D.O.H.		Structure	F-13-X
Detailer: R.M. McKee		Numbers	
Drawing Number B4	of 60	Drawings	

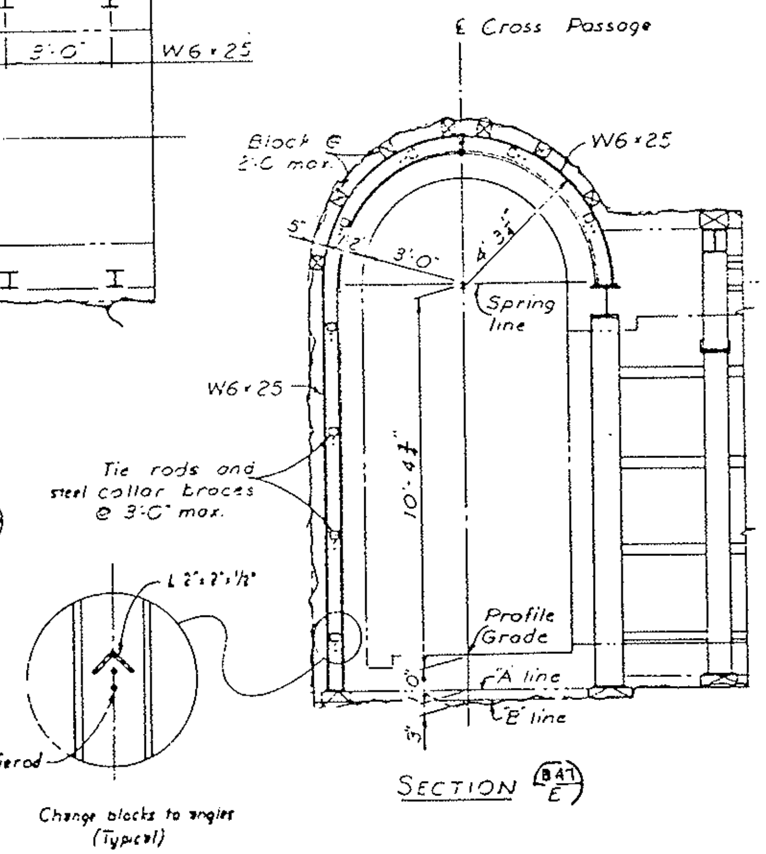
DESIGNED BY	DATE	CHECKED BY
C.D.O.H.	4-74	[illegible]
R.M.M.	4-74	[illegible]

Federal Road Region No.	District	Proj. No.	Sheet No.	Total Sheets
VIII	Colorado	I 70-3(8)122	75	273

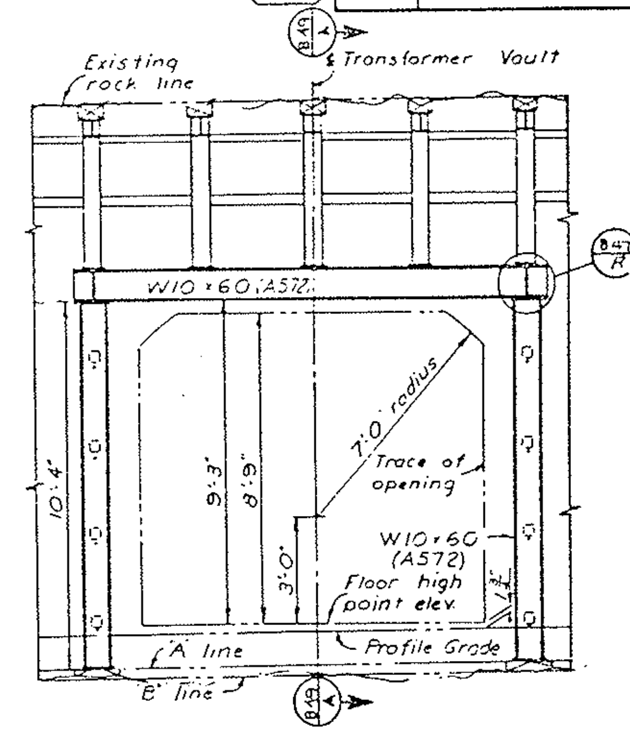
REVISIONS



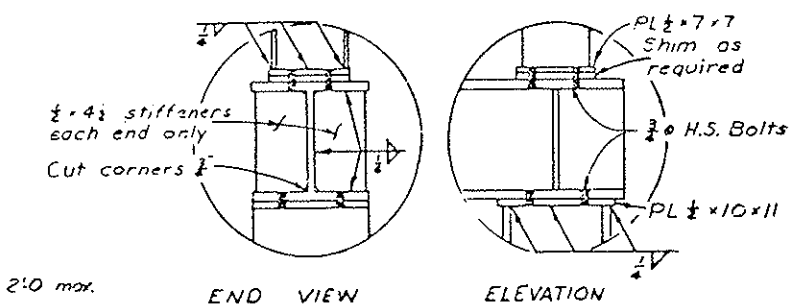
PLAN



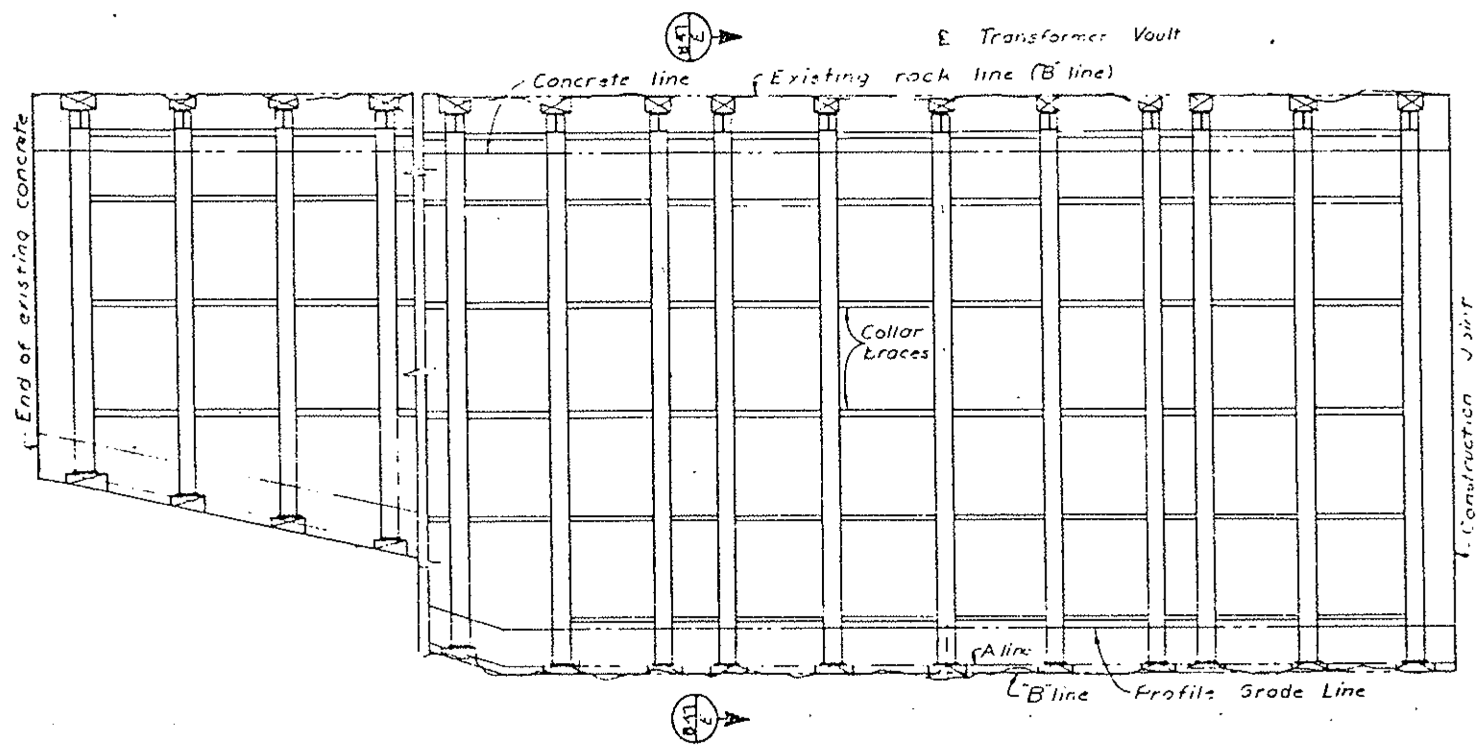
SECTION (B47/E)



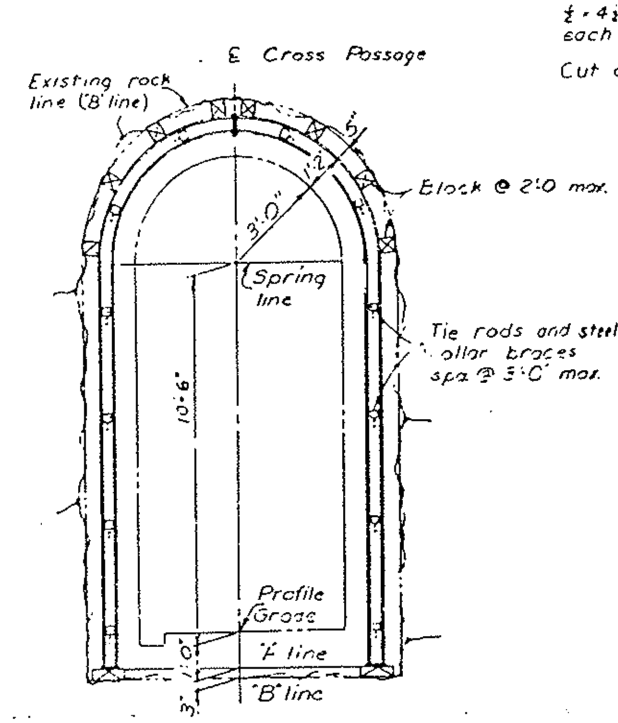
VIEW (B47/F)



DETAIL (B47/R)
1 1/2" = 1'-0"



SECTION AT PROFILE GRADE
West Cross Passage



TYPICAL SECTION

For additional details of Transformer Vault, see Dwg. No. B49.
For additional details of cross passage, see Dwg. No. B48.
Original Scale: 3/8" = 1'-0" or as noted.

DIVISION OF HIGHWAYS

STEEL SUPPORTS
WEST CROSS PASSAGE

Designer C.D.C.H	Structure Numbers F-13-X
Detailer E. Hadley	
Drawing Number B 47	of 60 Drawings

	Initial	Date		
Designed by	CDCH	8-74	Checked by	EHH 6-74
Checked by			Quantities by	
Detailed by	EHH	3-74	Checked by	KMM 6-74

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(8)122	78	273

NO.	REVISIONS		

NO REVISIONS 6-29-79

DESIGNED BY			
CHECKED BY			
DETAILED BY	C.D.O.H.	E.H.H.	5-74
CHECKED BY	E.H.H.	R.M.M.	6-74
QUANTITIES BY			
CHECKED BY	E.H.H.		4-74

℄ Transformer Vault

45'-5½"

23'-0"

Block and pin set leg to rock with 3-Rock Reinforcement, Resin Grouted, Threaded Tie back 8 ft

"B" line

"A" line

℄ Set with tie rod

Profile Grade ℄ Cross Passage

12 spa. 13 sets @ 3'-0" = 36'-0" (W6 x 25)

1'-6" 6'-10" 6'-10" 1'-0" 4 spa @ 3'-6" = 14'-0" (W10x60)

4'-2" 4'-8"

5" 6"

℄ Set with tie rod

Trace of concrete

W8x31

3'-4"

"A" line

"B" line

849 B

6" 6'-8" 6'-8" 6"

W8x31

PLAN

L 2"x2"x⅛"

½"ø Tierod

Change blocks to angles (Typical)

Type V

PL ½ x 7'-0" J

¾ ø H.S. Bolts

1½" = 1'-0"

Blocking @ 2'-0" max.

℄ Cross Passage

Block splice on each side 1" = 1'-0"

Tie rods and steel collar braces @ 3'-0" max. Incl in 509 Struct Steel

3'-0"

℄ Spring line

"A" line

"B" line

5'-0"

Profile Grade

.01½

Varies

W6 x 25 (A36)

SECTION 848 C / 49

Type V

2 PL ⅝ x 2½ x 5⅝

Foot PL ⅝ x 10 x 10

Blocking 1'-0" x 1'-0"

Thickness variable

Existing grade ("B" line)

1" = 1'-0"

⅞ ø H.S. Bolts

PL ½ x 10 x 1'-6"

℄ Cross Passage

Blocking @ 2'-0" max.

W10x60 (A572)

W10x60 (A572)

6" 1'-8" 3'-0" 3'-0" 1'-8" 6"

Varies

Profile Grade

.01½

Varies

SECTION 848 D / 49

2 PL ⅜ x 6 x 8½

Foot PL ⅜ x 12 x 1'-0

Blocking 1'-2 x 1'-2 min

Thickness variable

Existing grade ("B" line)

1" = 1'-0"

℄ Transformer Vault

Collar braces

848 A

848 C

848 D

A line

B line

1¾"ø Bar (A36)

Collar braces

Rock bolts

11'-10"

End of existing lining

Profile Grade

Existing grade

Construction Joint

SECTION AT PROFILE GRADE
Center Cross Passage

Transformer vaults in east and center cross passages are similar except as noted, but opposite hand. For additional details of vaults and tie rod sets, see Drwg No. E 49

Original Scale: ⅜" = 1'-0" or as noted.

DIVISION OF HIGHWAYS

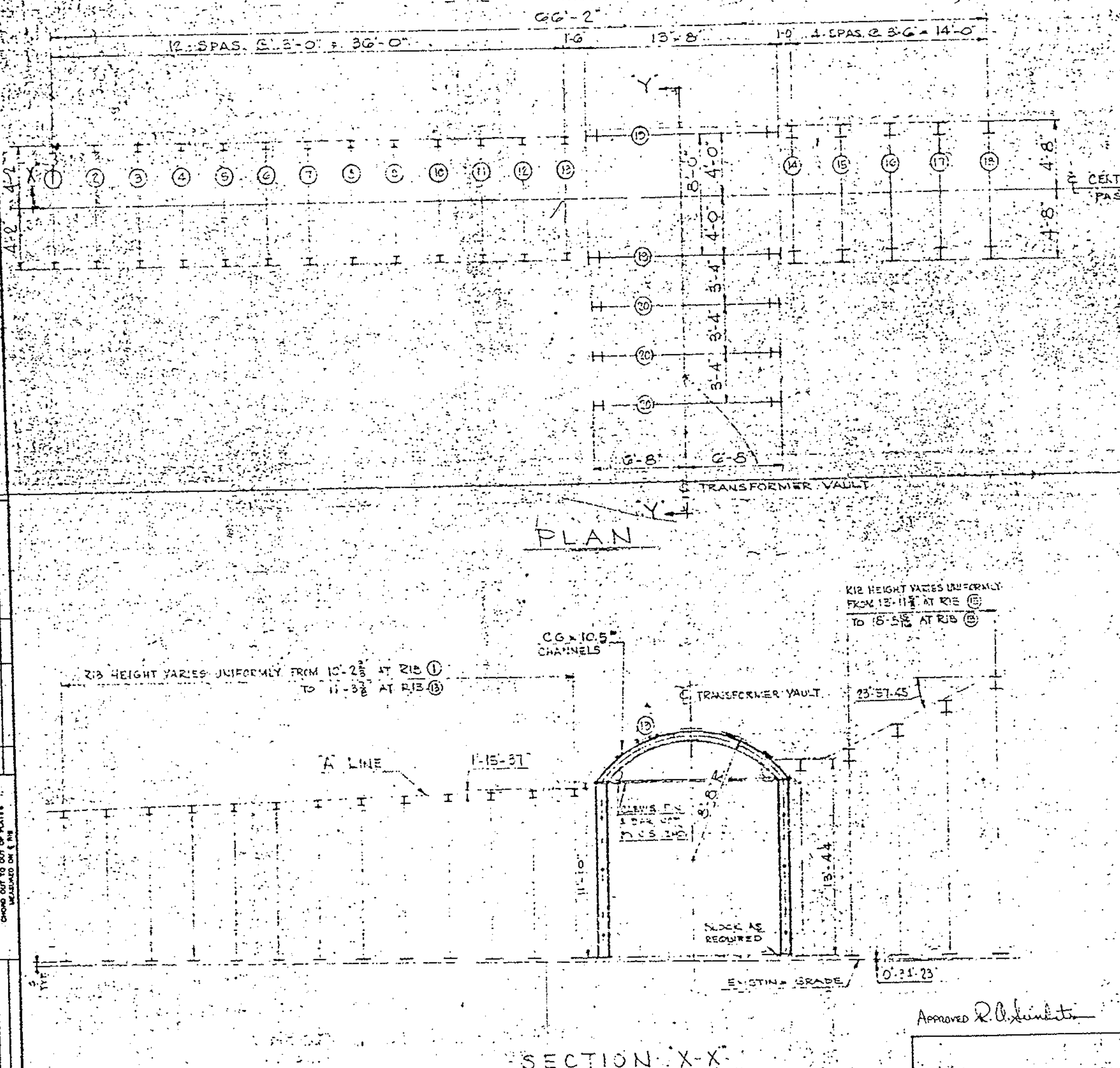
STEEL SUPPORTS
CENTER CROSS PASSAGE

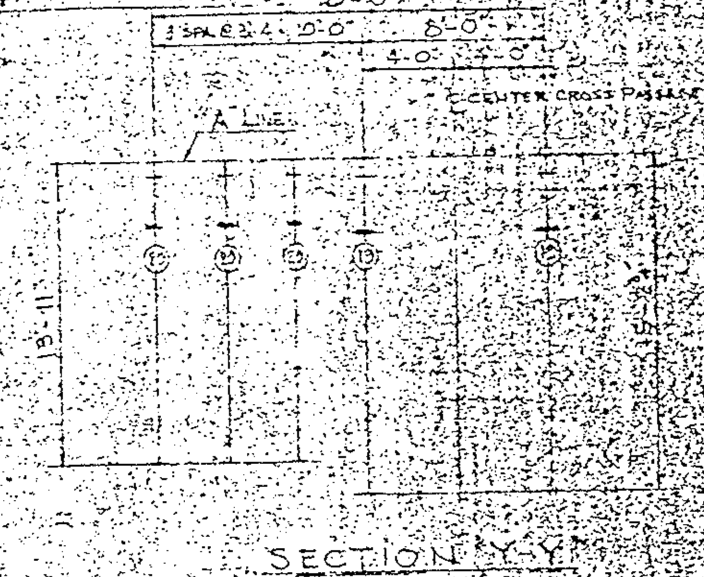
Designer	C.D.O.H.	Structure Numbers	F-13-X
Detailer	E. Hadley		
Drawing Number	B 48	of 60	Drawings

Revision Dates

Preliminary Stage Only

NO REVISIONS | REVISED 4-14-78 | VOID





Approved R. A. [illegible]

TOTAL WT.	UNIT WT.	DRAWING NO.	TOTAL FAT. N° [illegible] COURSE	MARK NO.	NO. REQ'D	DESCRIPTION	MAT'L SPEC.
378.0	94.5	SHIP TO CUT LENGTH (NO OTHER FABRICATION)	378.0		4	C6 x 10.5# x 9'-0" CHANNELS	A36
40.8	.10		40.8		408	5/8" SQ. T.L. NUTS	
106.1	.26		106.1		408	5/8" x 2" SQ. HD. T.L. BOLTS	
228.6	38.1	DS-559-5AAB-Y22	228.6	Y22D	6	L2x2x3/8x7-11 1/2 LG. SPACER	A36
612.0	17.0		612.0	Y22C	36	L2x2x3/8x3-5 3/8 LG. SPACER	
680.4	13.2		680.4	Y22B	42	L2x2x3/8x3-3/8 LG. SPACER	
1764.0	14.7		1764.0	Y22A	120	L2x2x3/8x2-11 1/2 LG. SPACER	A36
5.2	.06		INCLUDED		86	LOAD INDICATOR WASHERS FOR H.S. BOLTS	A325
3.4	.04		IN		86	HARDENED STEEL WASHERS FOR H.S. BOLTS	
16.3	.19		COURSE		86	[illegible] HI. STRENGTH NUTS	
39.6	.46		WEIGHT		86	[illegible] x 2 [illegible] HI. STRENGTH BOLTS	
[illegible]	1217.4	DS-559-5AAB-W22	3651.3	(19)	3	COURSE OF RIBS OF W15x31	
4470.4	2235.2	-V22	4479.8	(18)	2	W14x[illegible]	
2838.4	2838.4	-U22	2837.8	(17)	1	W10x60	
2647.2	2647.2	-T22	2646.6	(16)	1		
2456.6	2456.6	-S22	2456.0	(15)	1		
2265.2	2265.2	-R22	2264.6	(14)	1		
2131.6	2131.6	-P22	2190.9	(14)	1	W10x60	
716.4	716.4	-N22	717.6	(13)	1	W6x25	
711.6	711.6	-M22	712.8	(12)	1		
707.0	707.0	-L22	708.2	(11)	1		
702.4	702.4	-K22	703.6	(10)	1		
697.0	697.0	-J22	698.5	(9)	1		
693.0	693.0	-H22	694.2	(8)	1		
688.0	688.0	-G22	689.2	(7)	1		
683.6	683.6	-F22	684.8	(6)	1		
672.0	672.0	-E22	680.2	(5)	1		
674.0	674.0	-D22	675.2	(4)	1		
669.4	669.4	-C22	670.6	(3)	1		
664.8	664.8	-B22	666.0	(2)	1		
660.2	660.2	-A22	661.4	(1)	1	COURSE OF RIBS OF W6x25	

TOTAL WT. FOR ______ COURSE

MAT'L REQ'D FOR CENTER CROSS PASSAGE

APPROVED FINAL
DATE 1/3/77
BY Jack E. Gay

APPROVED PRELIMINARY
DATE: 11-20-76 BY JACK E GAY
SPACE FOR REVIEWED SL APPROVAL STAMP

REV. SYM.	DATE	REVISION	O.R. NO.	CHK. BY	OK BY
2	1-13-77	VARIOUS CHANGES	2519	JJS	KFY
1	12-8-76	ADDED FAT WTS. VARIOUS CHANGES	2420	KW	JJS

COMMERCIAL SHEARING INC.
YOUNGSTOWN, OHIO [illegible]

CENTER CROSS PASSAGE ERECTION DETAILS
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-3(61)[illegible]
PETER KIEWIT SONS CO. [illegible]

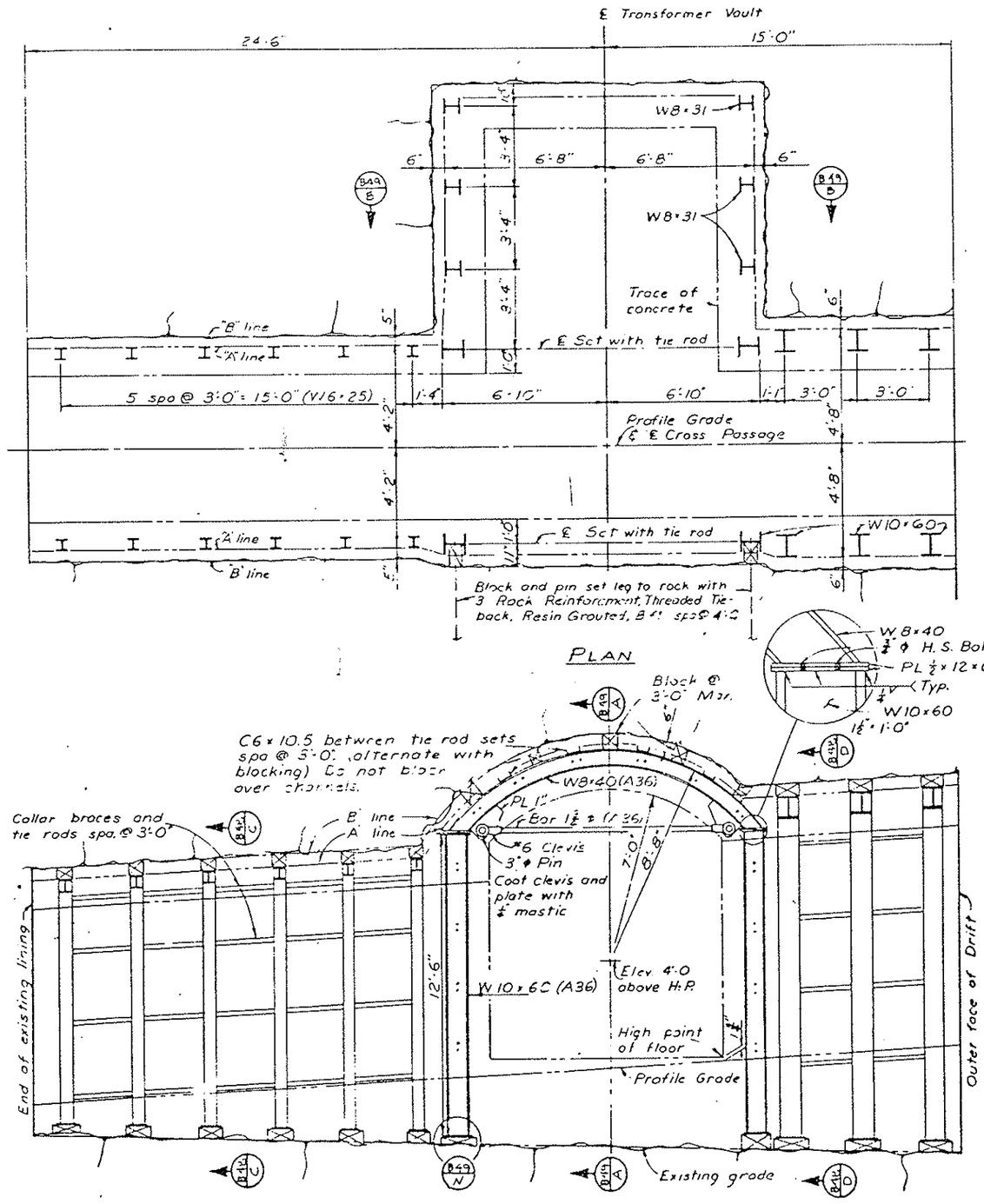
DATE [illegible] DR. BY [illegible] CH. BY KW SCALE [illegible]

DWG. NO. DS-559-5AAB-022

FEDERAL ROAD REGION NO.	DISTRICT	PROJ NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(6)226	77	275

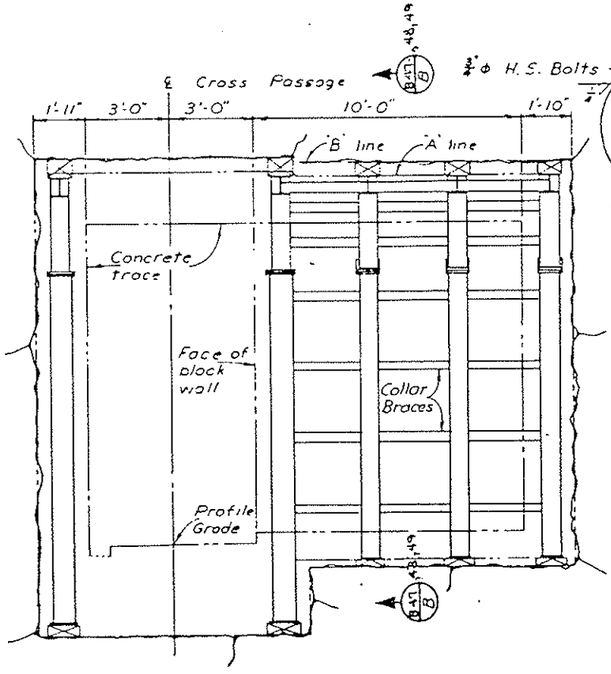
REVISIONS		

	DATE	CHECKED BY
DRAWING BY C.D.O.H.	5-74	E.H.H.
CHECKED BY		QUANTITIES BY W.M.M.
DETAILED BY E.H.H.	4-74	CHECKED BY

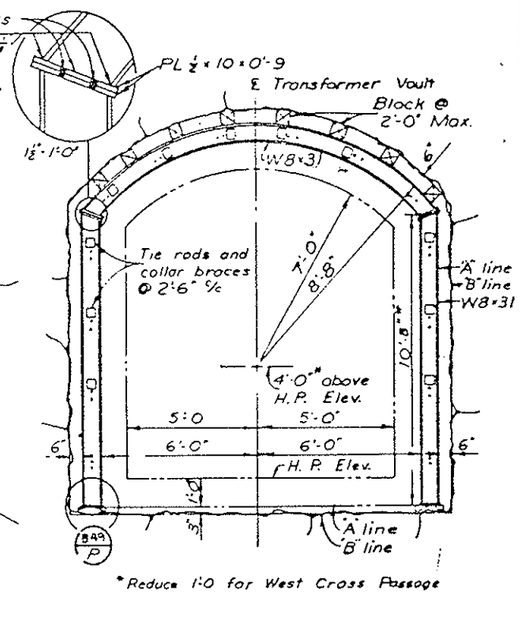


PLAN

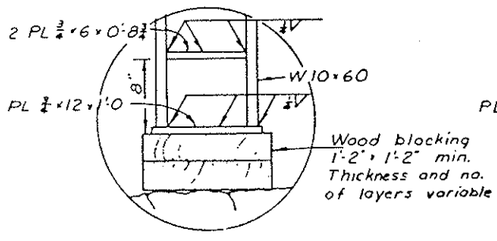
SECTION AT PROFILE GRADE
East Cross Passage



SECTION B44/A 48,49

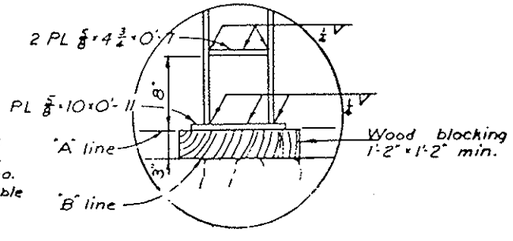


*Reduce 1:0 for West Cross Passage



DETAIL B49/N
1½" = 1'-0"

SECTION B47/B 48,49



DETAIL B49/P
1½" = 1'-0"

Original Scale ⅜" = 1'-0" or as noted

DIVISION OF HIGHWAYS

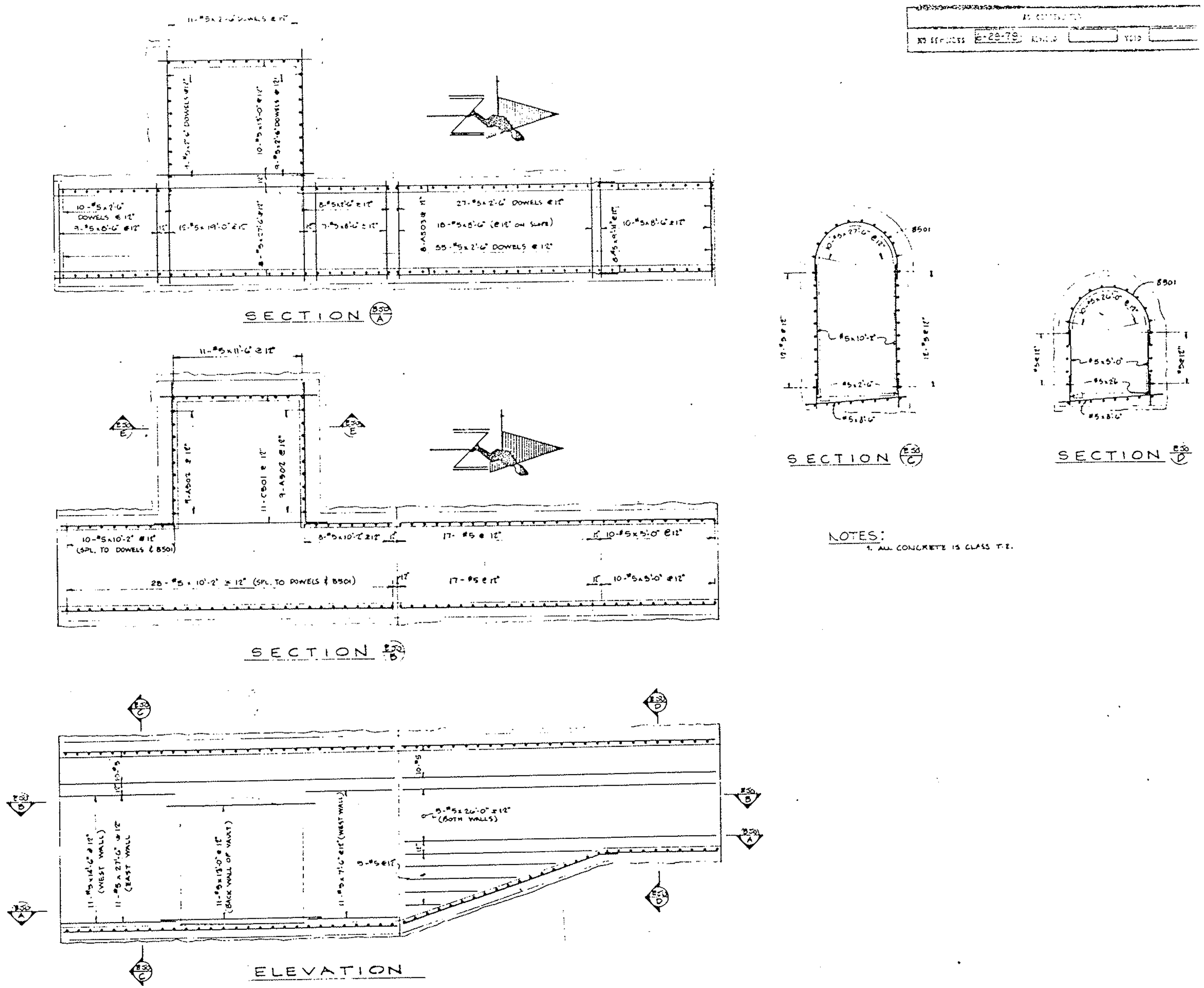
STEEL SUPPORTS EAST CROSS PASSAGE

Designer C.D.O.H.	Structure numbers F-13-X
Detailer E. Hadley	
Drawing Number B 49	of 60 Drawings

Revision Dates (Preliminary Status Only)

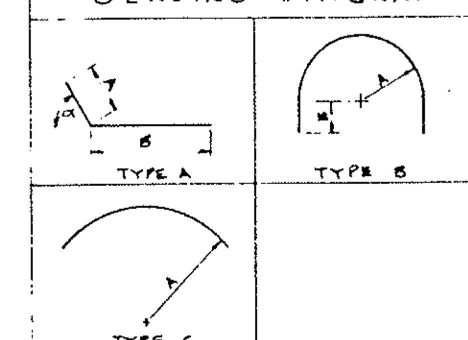
FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
XIII	COLORADO	I 70-3(…)	78	273

REVISIONS



NOTES:
1. ALL CONCRETE IS CLASS T.Z.

BENDING DIAGRAM



BAR MARK	LENGTH	DIMENSIONS A	B	C	α	
A501	12'-6	1'-5	11'-5		90°	
A502	9'-4	1'-3	5'-1		52°	
A503	18'-9	1'-5	17'-6		18°	
B501	12'-9	3'-3"	1'-3			
C501	15'-0	7'-3				

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

DIVISION OF HIGHWAYS

REINFORCEMENT DETAILS
WEST CROSS PASSAGE

Designer C.Q.O.H		Structure Numbers	F-13-X
Detailer R.M. McKEE			
Drawing Number B 50	of 60	Drawings	

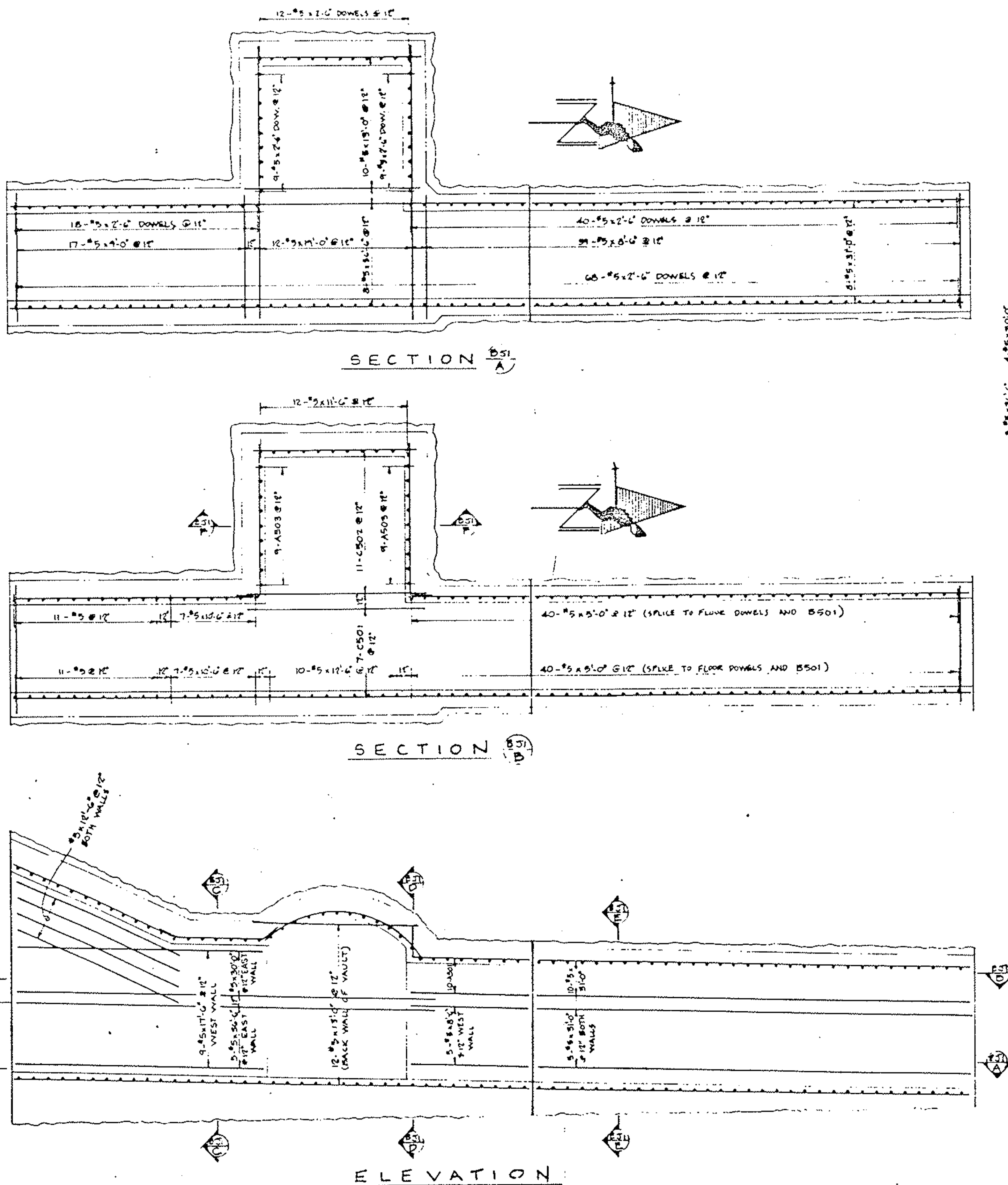
Revision Dates (Preliminary Stage Only)

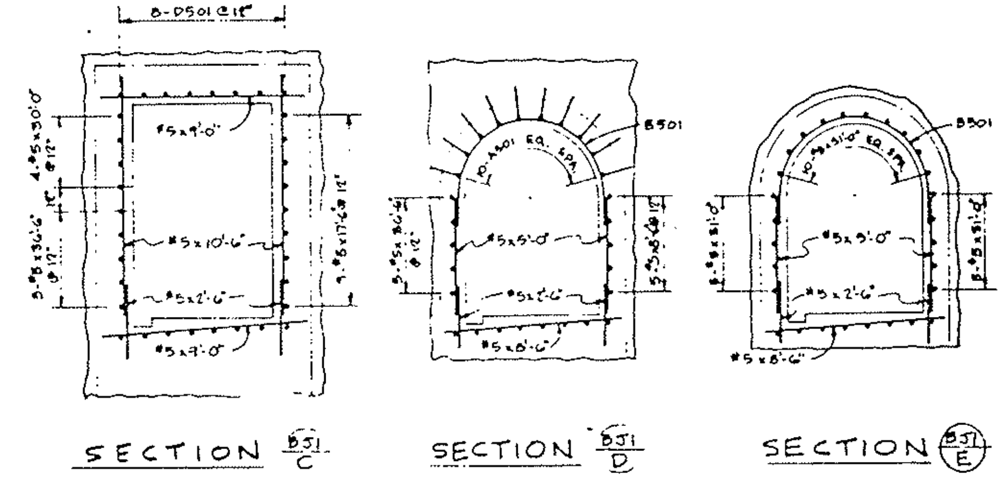
6-30-74	7-30-74

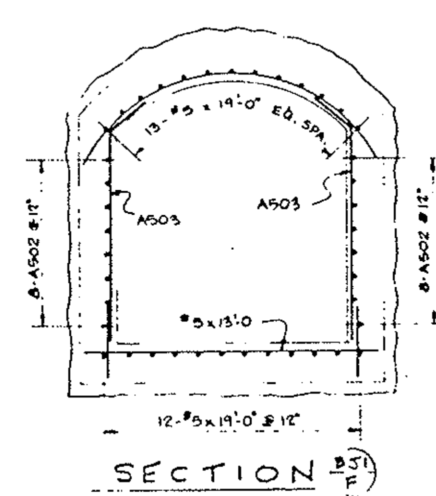
Federal Road Region No.	District	Proj. No.	Sheet No.	Total Sheets
VIII	COLORADO	I70-3(8)226	73	273

REVISIONS

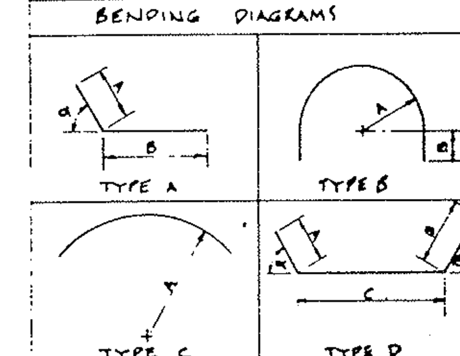
AS CONSTRUCTED 6-29-79







BENDING DIAGRAMS



BAR MARK	LENGTH	DIMENSIONS A	B	C	α	β
A501	9'-9	1'-5"	8'-6"		90°	
A502	12'-6	1'-5	11'-3		90°	
A503	10'-4	1'-5	9'-1		52°	
B501	12'-9	3'-5	1'-5			
C501	10'-5	7'-5				
C502	15'-0	7'-5				
D501	9'-0"	1'-5	1'-5	6'-6	24°	36°

NOTES:
1. ALL CONCRETE IS CLASS T-1.

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

	DATE			
DESIGNED BY	SDOH	5-74	CHECKED BY	EHH 6-74
CHECKED BY			QUANTITIES BY	
DETAILED BY	RMM	6-74	CHECKED BY	RMM 6-74

DIVISION OF HIGHWAYS

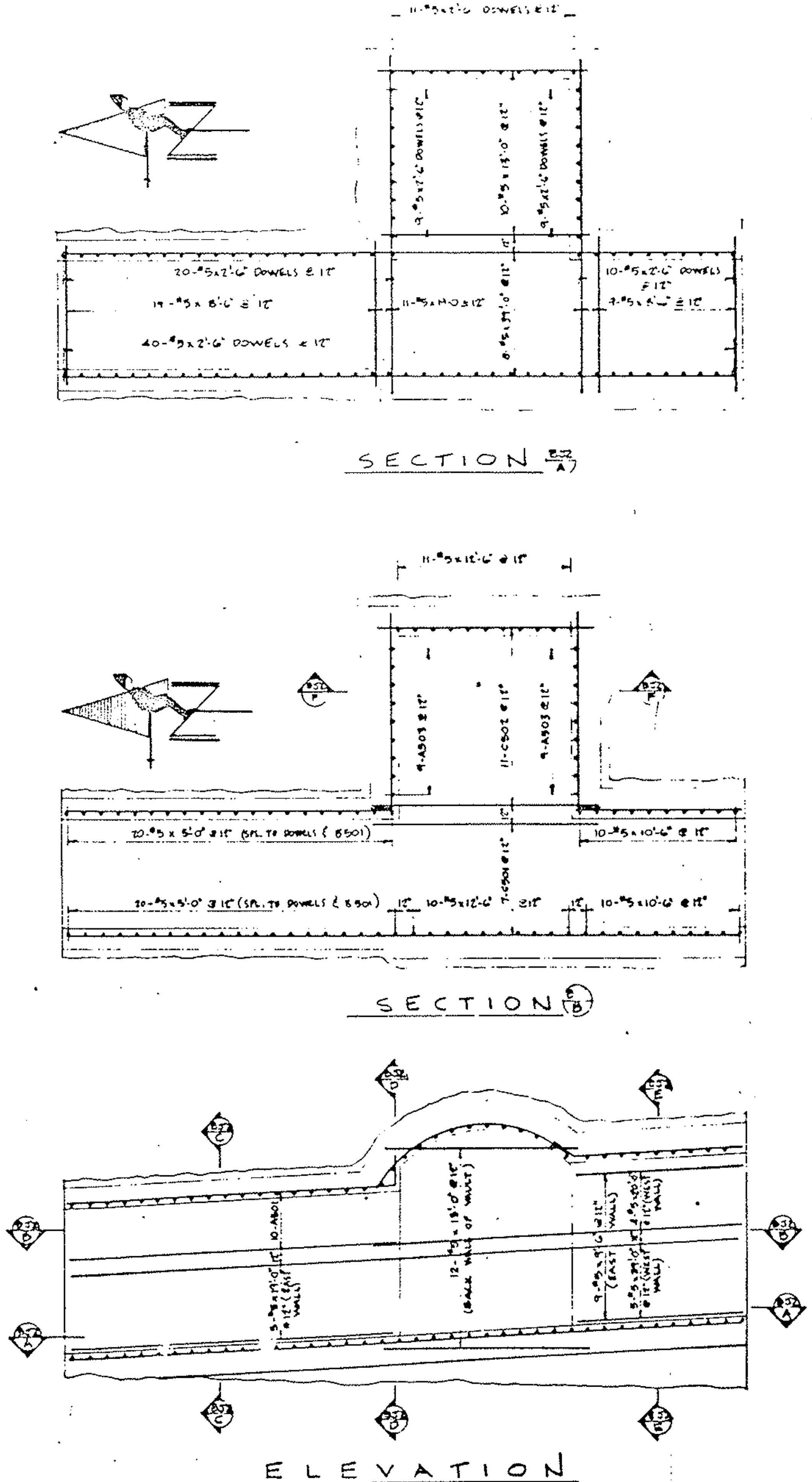
REINFORCEMENT DETAILS CENTER CROSS PASSAGE

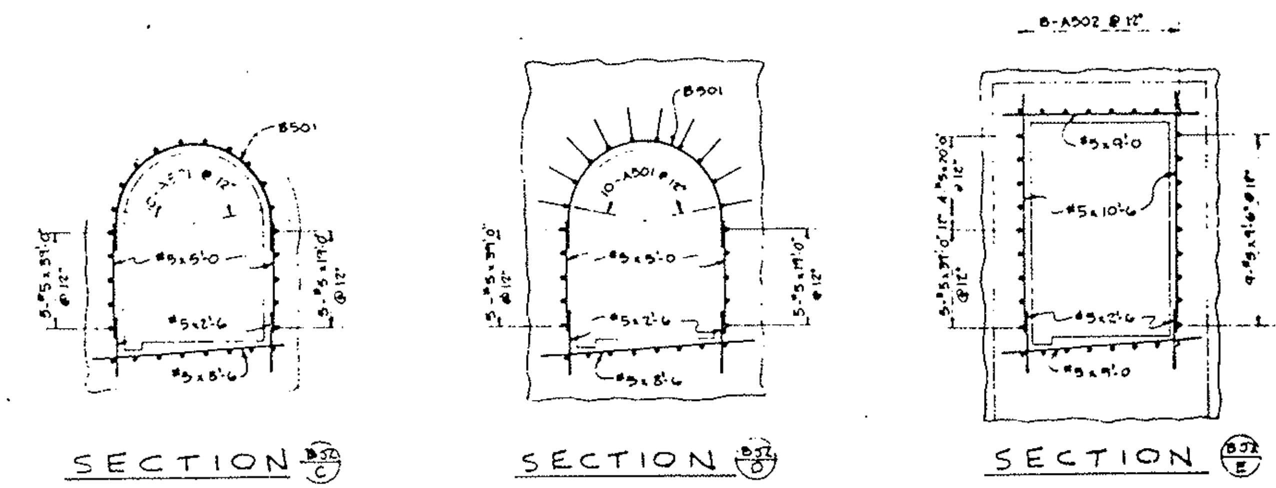
Designer C.DOH
Detailer R.M. McKEE
Structure Numbers F-13-X
Drawing Number B 51 of 60 Drawings

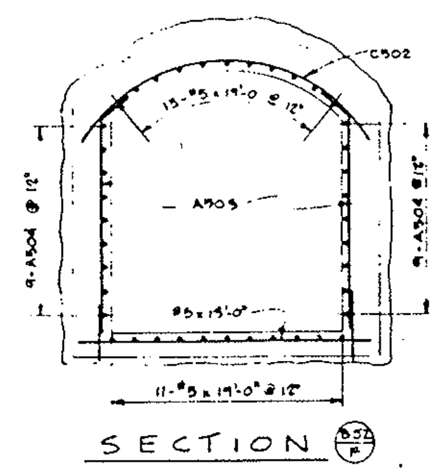
FEDERAL ROAD REGION NO	DISTRICT	PROJ NO	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I70-3(5 [illegible]	80	273

REVISIONS

AS CONST [illegible] — NO REVISIONS 6-29-79 REVISED VOID

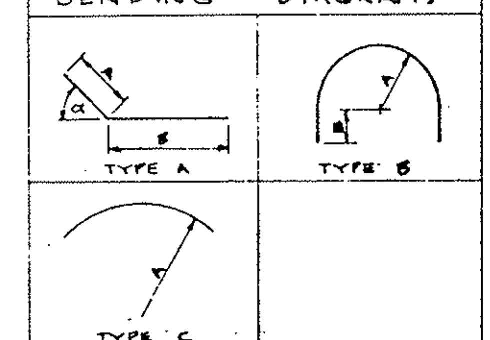






NOTES:
1. ALL CONCRETE IS CLASS T-2

BENDING DIAGRAMS



BAR MARK	LENGTH	DIMENSIONS A	B	C	α	β
A501	20'-8	1'-5	19'-0		90°	
A502	11'-1	1'-3	9'-10		35°	
A503	10'-4	1'-5	9'-1		92°	
A504	12'-6	1'-3	11'-3			
B501	12'-9	3'-5	1'-5			
C501	10'-3	7'-5				
C502	15'-0	7'-5				

DIVISION OF HIGHWAYS

REINFORCEMENT DETAILS
EAST CROSS PASSAGE

Designer	C.D.O.H.	Structure Numbers	F-13-X
Detailer	R.M. McKee		
Drawing Number	[illegible]	of 60	Drawings

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

	INITIAL	DATE			
DESIGNED BY	CDOH	6-74	CHECKED BY	EHH	6-74
CHECKED BY			QUANTITIES BY		
DETAILED BY	RMM	6-74	CHECKED BY	RMM	6-74

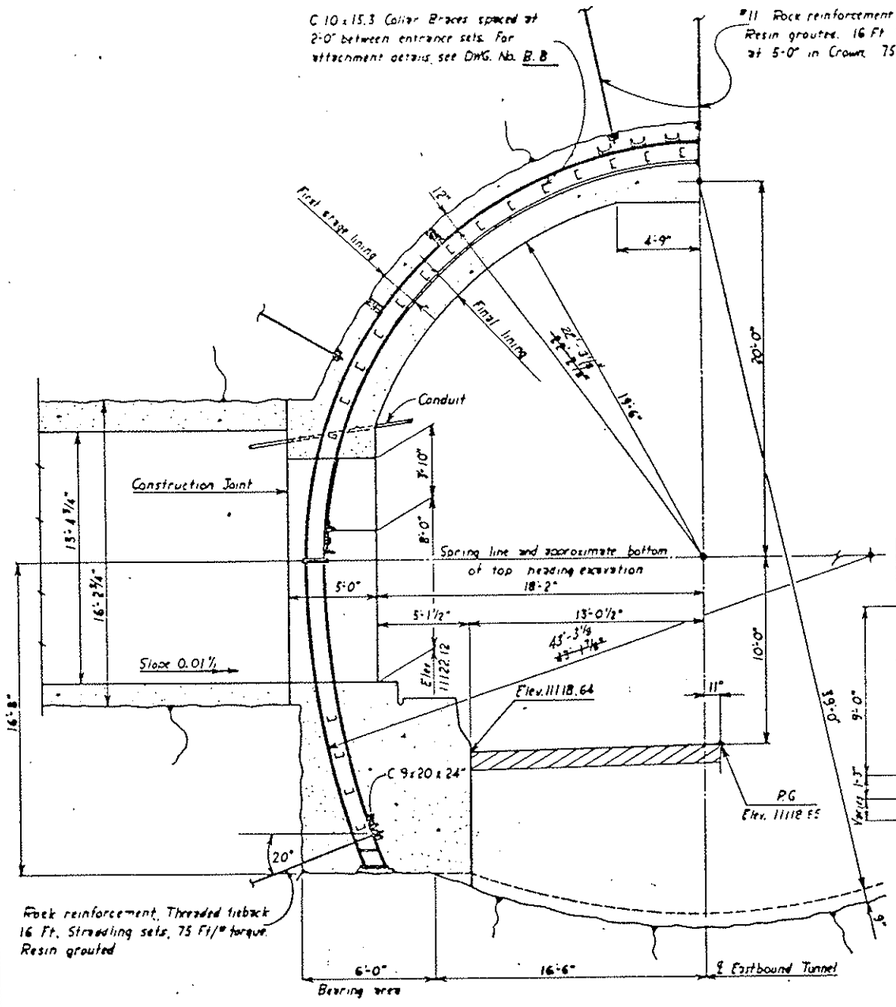
FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	81	273

AS CONSTRUCTED

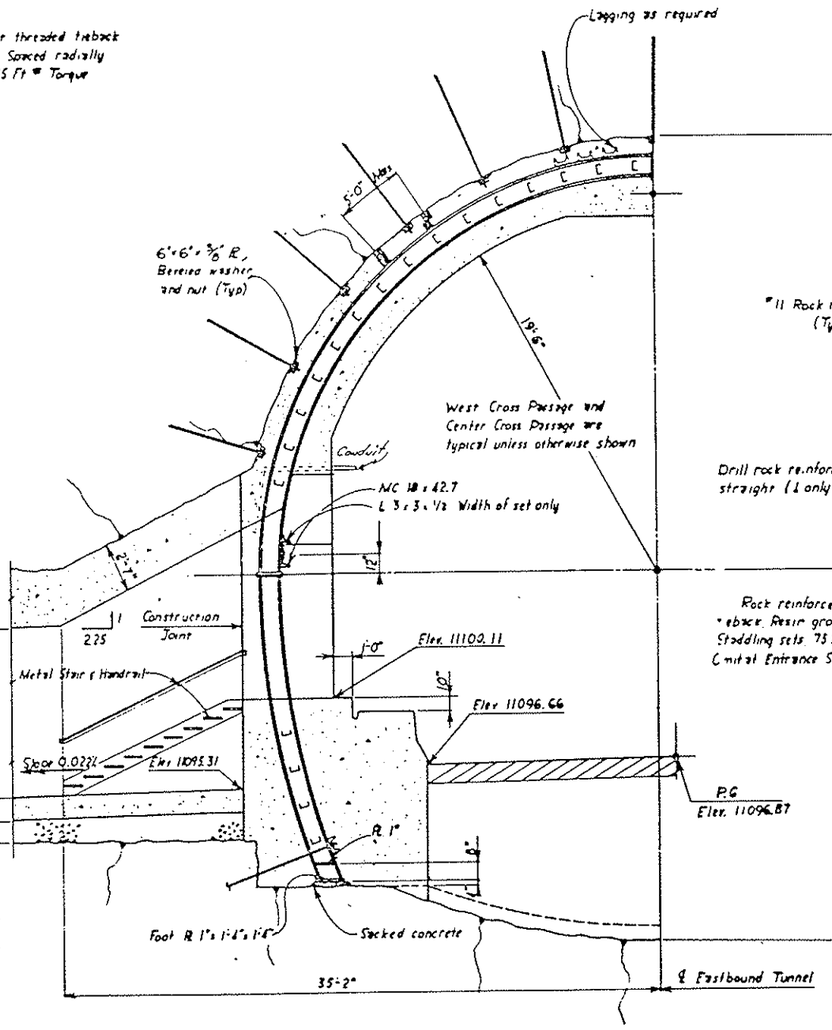
AS REVISIONS — REVISED 6-23-73 — VOID

REVISIONS		

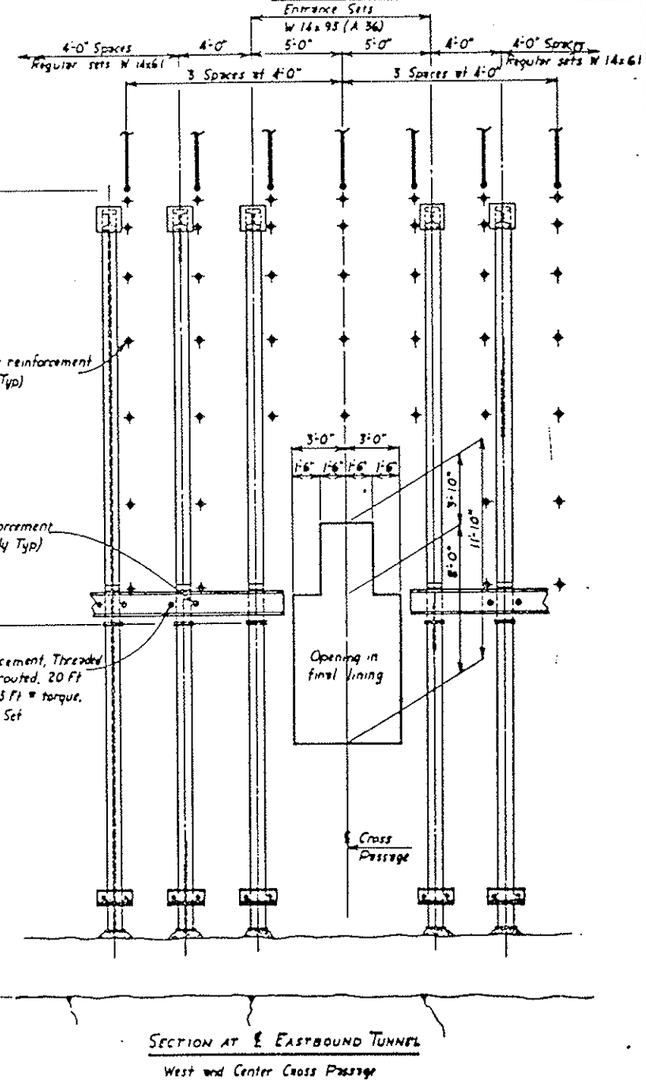
INITIAL	DATE	DESIGNED BY	DATE	CHECKED BY	DATE
C.D.O.H.	4-74			JLA	4-75
		CHICKED BY		QUANTITIES BY	4-75
	3-75	DETAILED BY		CHICKED BY	4-75
R.F.S.					



West Cross Passage Station 59+54.83



Center Cross Passage Station 79+64.99



Section at ℄ Eastbound Tunnel

West and Center Cross Passage

Original scale 1/8" = 1'-0"

DIVISION OF HIGHWAYS

West and Center Cross Passage Entrance to Main Bore

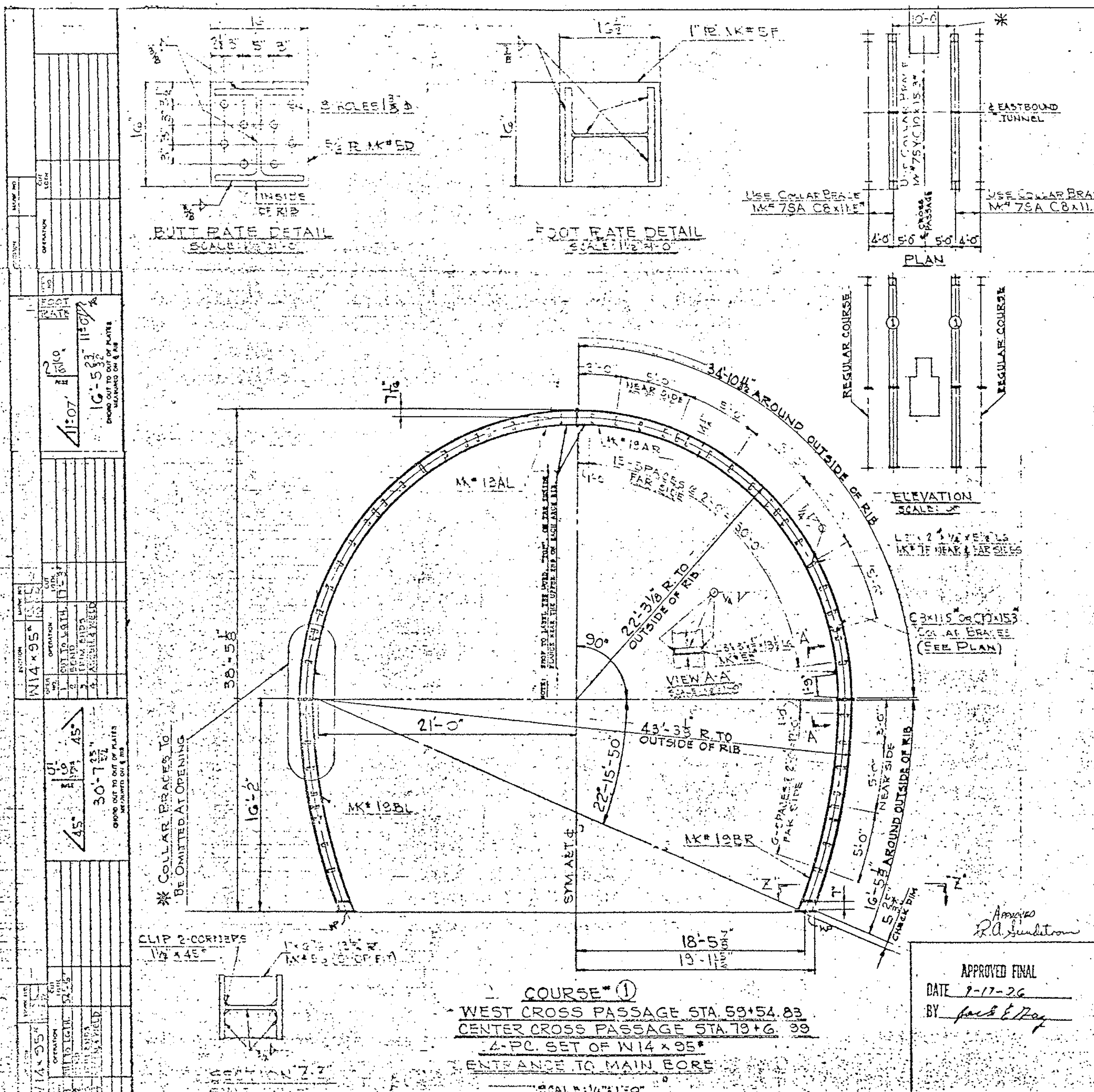
Designer	C D O H	Structure Numbers	F-13-Y
Detailer	R Seymour		
Drawing Number	B 53	of 60	Drawings

Revision Dates (Preliminary Sheet Only)

FOR GENERAL NOTES & TOLERANCES SEE DWG D5-559-5AAB-001

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3 (98) 220	81AX	273

AS CONSTRUCTED — NO REVISIONS [ ] REVISED 6-29-79 VOID [ ]



APPROVED FINAL
DATE 9-17-76
BY Jack E. Ray

TOTAL WT.	UNIT WT.	DRAWING NO.		TOTAL PAY WT. PER COURSE	MARK NO.	NO. REQ'D	DESCRIPTION	MAT'L SPEC.
	.10					4	STD. FLAT WASHERS FOR 3/4" ⌀ BOLT	A307
	.14						3/4" SQ. T.L. NUTS	
	.37						3/4" x 2" SQ. HD. T.L. BOLTS	
	151.4	D5-559-5AAB-007			7SY		C10 x 15.3# COLLAR BRACES	A36
	44.8				7SA		C8 x 11.5# COLLAR BRACES	
3.1	.13			3.1		24	LOAD INDICATOR WASHERS FOR 1 1/4" ⌀ BOLT	A325
3.4	.14					24	HARDENED STEEL WASHERS FOR 1 1/4" ⌀ BOLT	
19.0	.79			80.3		24	1 1/4" HI STRENGTH NUTS	
40.3	1.68					24	1 1/4" ⌀ x 3" HI STRENGTH BOLTS	
	26.3	D5-559-5AAB-019		26.0	5G	2	1" x 6 7/8" x 13 1/2" STIFF. PL (SHOP FIT)	A36
	1.9		-007	1.9	7F	10	L 3" x 2" x 1/4" x 5 1/2" LG	
	74.8		-019	74.6	5F	1	1" x 16" x 16 1/2" FOOT PLATE	
	45.3		-019	45.3	5D	1	5/8" x 16" x 16" BUTT PLATE	
	1567.1			1561.4		1	W14 x 95# x 16'-5 5/16" NNA	
[illegible]	[illegible]		-019	[illegible]	[illegible]		LEG RIB ASSYS. EA. CONSISTING OF:	
	10.6		-019	10.6	5E	1	L 5" x 5" x 1/2" x 13 1/2" LG.	
	1.9		-007	1.9	7F		L 3" x 2" x 1/4" x 5 1/2" LG.	
	45.3		-019	45.3	5D	2	5/8" x 16" x 16" BUTT PLATES	
	3226.1			3211.7		1	W14 x 95# x 33'-11 1/4" NNA	
[illegible]	[illegible]		-019	[illegible]	[illegible]		ARCH RIB ASSYS. EA. CONSISTING OF:	

TOTAL WT. FOR 1 COURSE LESS COLLAR BRACES: 10,2[illegible]

TOTAL PAY WT. PER COURSE: 10,2[illegible]

MAT'L. REQ'D. PER COURSE # 1

REV. SYM.	DATE	REVISION	B.R. NO.	CHG. BY	CK. BY
3	8-27-76	ADDED PAY WTS.	5490	KEV	JS
2	[illegible]	TOTAL WT. WAS 10,2[illegible]	5417	[illegible]	[illegible]
1	5-16-76	[illegible] CHANGES PER [illegible] MARKED PRINT	5412	[illegible]	[illegible]

COMMERCIAL SHEARING, INC.

WEST & CENTER CROSS PASSAGE
EISENHOWER MEMORIAL TUNNEL
2ND BORE FED. NO. I 70-3 (98) 220 ~ COL.
PETER KIEWIT SONS CO. AND BRODERICK CONST. INC.

DR. BY [illegible] CH. BY [illegible] SCALE AS NOTED

D5-559-5AAB-019

REF. DWG 859

SPACE FOR REVIEWED & APPROVAL STAMP

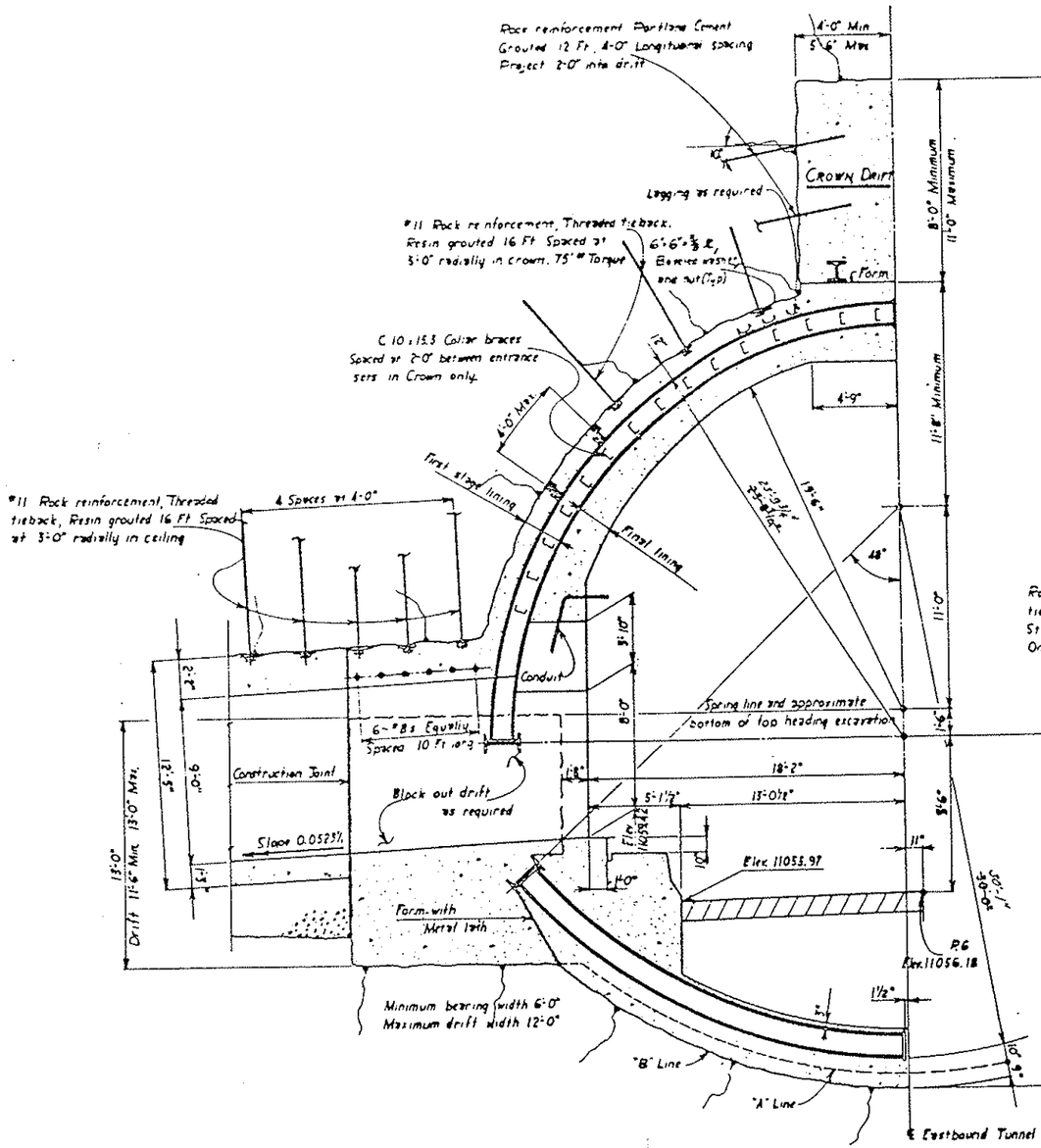
FEDERAL ROAD PROJECT NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	82	273

REVISIONS		

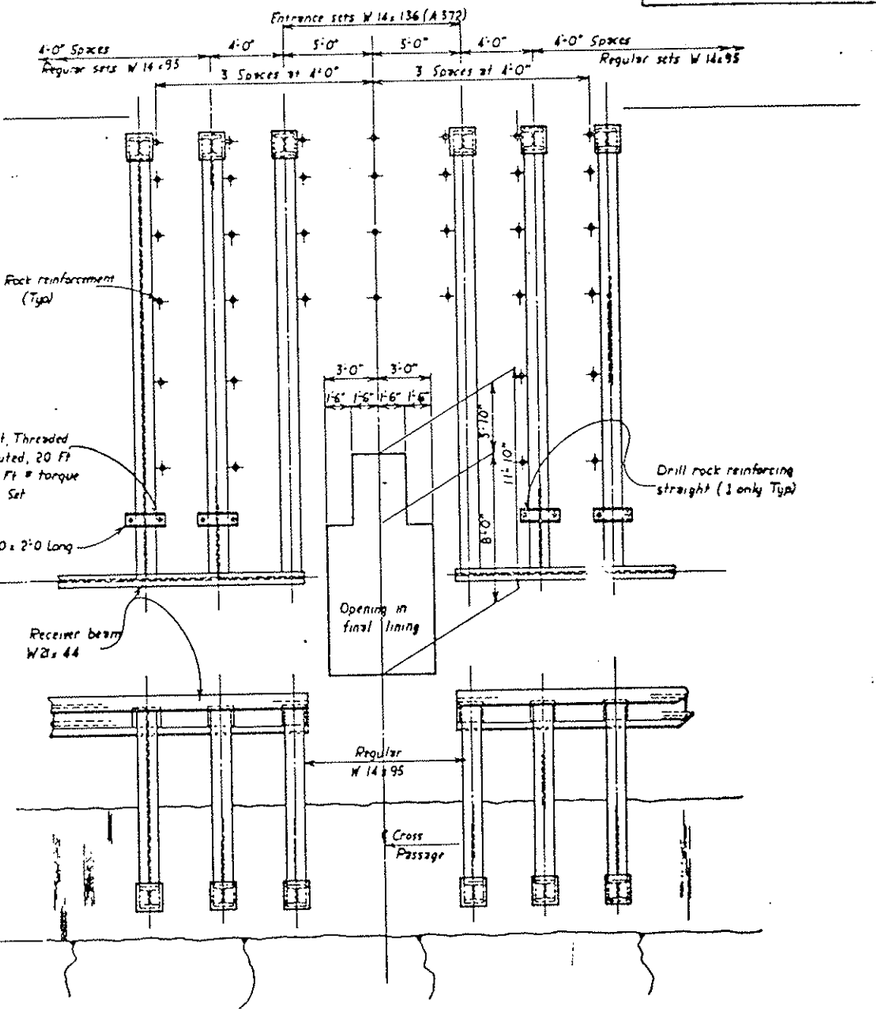
AS CONSTRUCTED

NO REVISIONS | REVISED 6-29-79 | VOID

	DESIGNED BY	CHECKED BY	DATE
INITIAL	C.D.O.H		4-74
	CHECKED BY	QUANTITIES BY	3-75
	DETAILED BY	CHECKED BY	3-75



EAST CROSS PASSAGE - STATION 101+70.81



SECTION AT ℄ EASTBOUND TUNNEL
EAST CROSS CUT PASSAGE

Original scale 1/4" = 1'-0"

DIVISION OF HIGHWAYS

EAST CROSS PASSAGE
ENTRANCE TO
MAIN BORE

Designer C.D.O.H	Structure Numbers F-13-Y
Detailer R. Wyllie	
Drawing Number B 54 of 60	Drawings

Revision Dates	(Preliminary Stage Only)

VIII	COLORADO	[illegible]	82AX	273

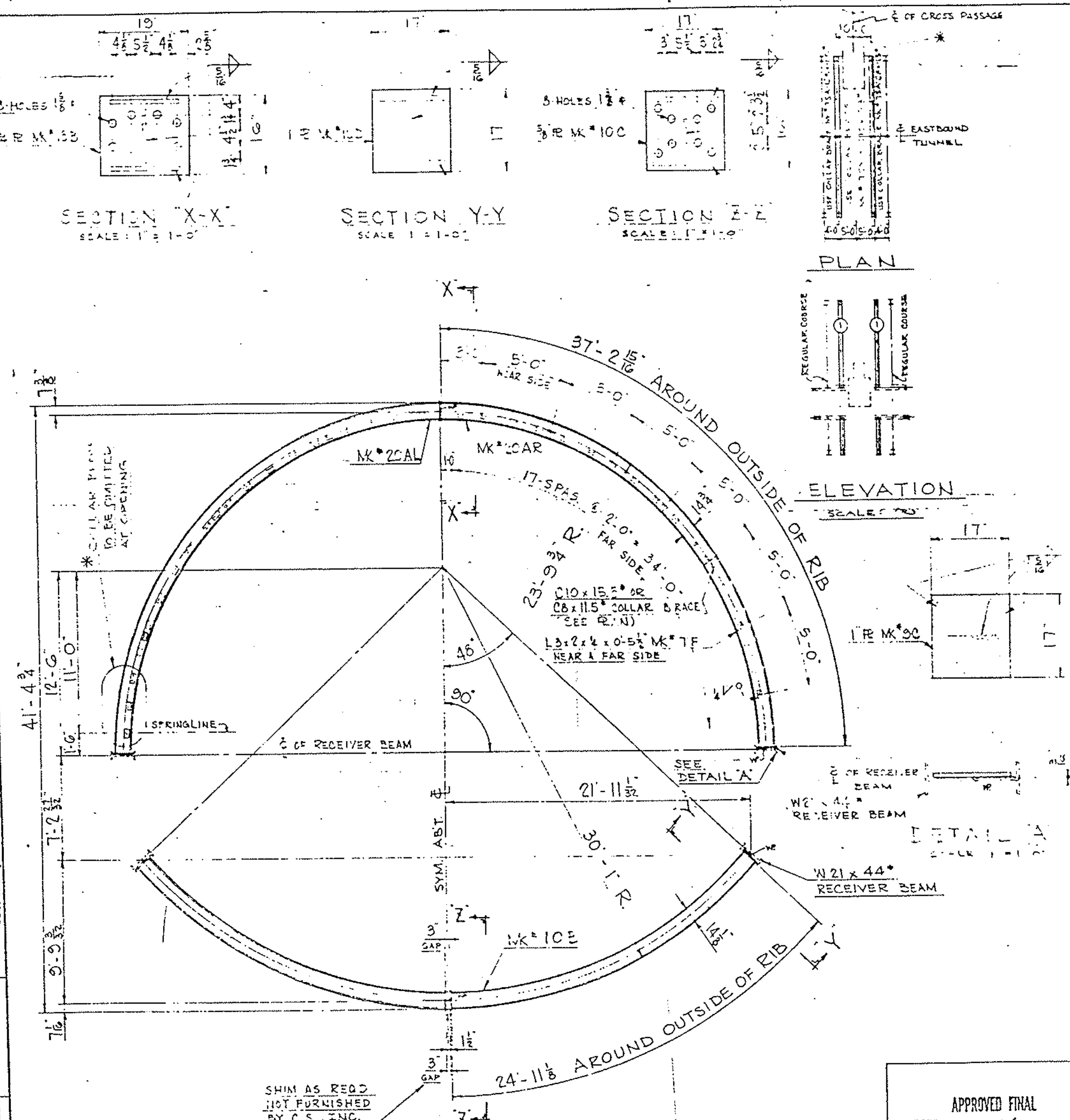
AS CONSTRUCTED

NO REVISIONS ☐ REVISED ☐ VOID ☐

FOR GENERAL NOTES & TOLERANCES SEE DWG D5-559-5AAB-XXX

SECTION	MARK NO	OPER NO	OPERATION	CUT LGTH
W14 x 95#	10B	1	CUT TO LGTH	24'-10 1/2
		2	BEND	
		3	TRIM ENDS	
		4	ASSEM. & WELD	

SECTION	MARK NO	OPER NO	OPERATION	CUT LGTH
W14 x 136#	20AL 20AR	1	CUT TO LGTH.	36'-9
		2	BEND	
		3	TRIM ENDS	
		4	ASSEM. & WELD	



COURSE ①

EAST CROSS PASSAGE STA. 101 + 70.81

2-PC. SET OF W14 x 136# WITH W14 x 95# STRUT

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

Approved, H. Ray Poulsen Jr.

TOTAL WT	UNIT WT	DRAWING NO.	TOTAL PAY WT. PER COURSE 15,165.6	MARK NO	NO REQ'D	DESCRIPTION	MAT'L SPEC.
	.10				1	STD. FLAT WASHERS FOR 3/4"φ BOLTS	A307
	.14				12	3/4" SQ. T.L. NUTS	
	.37				[illegible]	3/4"φ x 2" SQ. HD. T.L. BOLTS	
	51.4	D5-559-5AAB-007		753	[illegible]	C10 x 15.3# COLLAR BRACES	A36
	44.8	D5-559-5AAB-007		754	[illegible]	C8 x 11.5# COLLAR BRACES	A36
1.0	.13		1.0		8	LOAD INDICATOR WASHERS FOR 1 1/4 BOLTS	A325
1.1	.14				8	HARDENED STEEL WASHERS FOR 1 1/4 BOLTS	
6.3	.79		17.04		8	1 1/4" HI. STRENGTH NUTS	
14.1	1.76				8	1 1/4"φ x 3 1/4" HI. STRENGTH BOLTS	
1.7	.21				8	HARDENED STEEL WASHERS FOR 1 1/2 BOLTS	A325
10.5	1.31		[illegible]		8	1 1/2" HI. STRENGTH NUTS	
23.8	2.97				8	1 1/2"φ x 3 3/4" HI. STRENGTH BOLTS	
	31.9	D5-559-5AAB-020	31.9	10D	1	1" x 17" x 17" END PLATE	A36
	48.2		48.2	10C	1	5/8" x 16" x 17" BUTT PLATE	
	2321.1		[illegible]		1	W14 x 95# x 24'-5 3/16" N.N.A.	
4,902.4	2451.2		[illegible]	10B	2	STRUT ASSYS. EA. CONSISTING OF:	
	1.9	-007	47.5	7F	25	L3 x 2 x 1/4 x 0'-5 1/2" LG.	A36
	81.9	-020	[illegible]	9C	1	1" x 17" x 17" FOOT PLATE	A572 GRADE 55
	64.6		64.6	13B	1	3/4 x 16 x 19 BUTT PLATE	
	4934.3		[illegible]		1	W14 x 136# x 36'-3 7/8" N.N.A.	
[illegible]	[illegible]		[illegible]	20AR 20AL	[illegible]	ARCH RIB ASSYS EA. CONSISTING OF:	

TOTAL WT FOR 1 COURSE LESS COLLAR BRACES 15,218.6#

MAT'L. REQ'D. PER COURSE ①

APPROVED FINAL
DATE 3/26/77
BY Jack E. Day

Approved Final Rev. 3 Date 10-20-76 By Jack E. Day

SPACE FOR REVIEWED OR APPROVAL STAMP

COMMERCIAL SHEARING, INC. YOUNGSTOWN, OHIO U.S.A.

EAST CROSS PASSAGE ENTRANCE TO MAIN BORE
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-3 (51) 220 ~ COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

REV SYM	DATE	REVISION	B.R. NO.	CHK. BY	DR. BY
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	JJS
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	HW

DATE 6-2-76 | DR. BY RJA | CH. BY [illegible] | SCALE AS NOTED

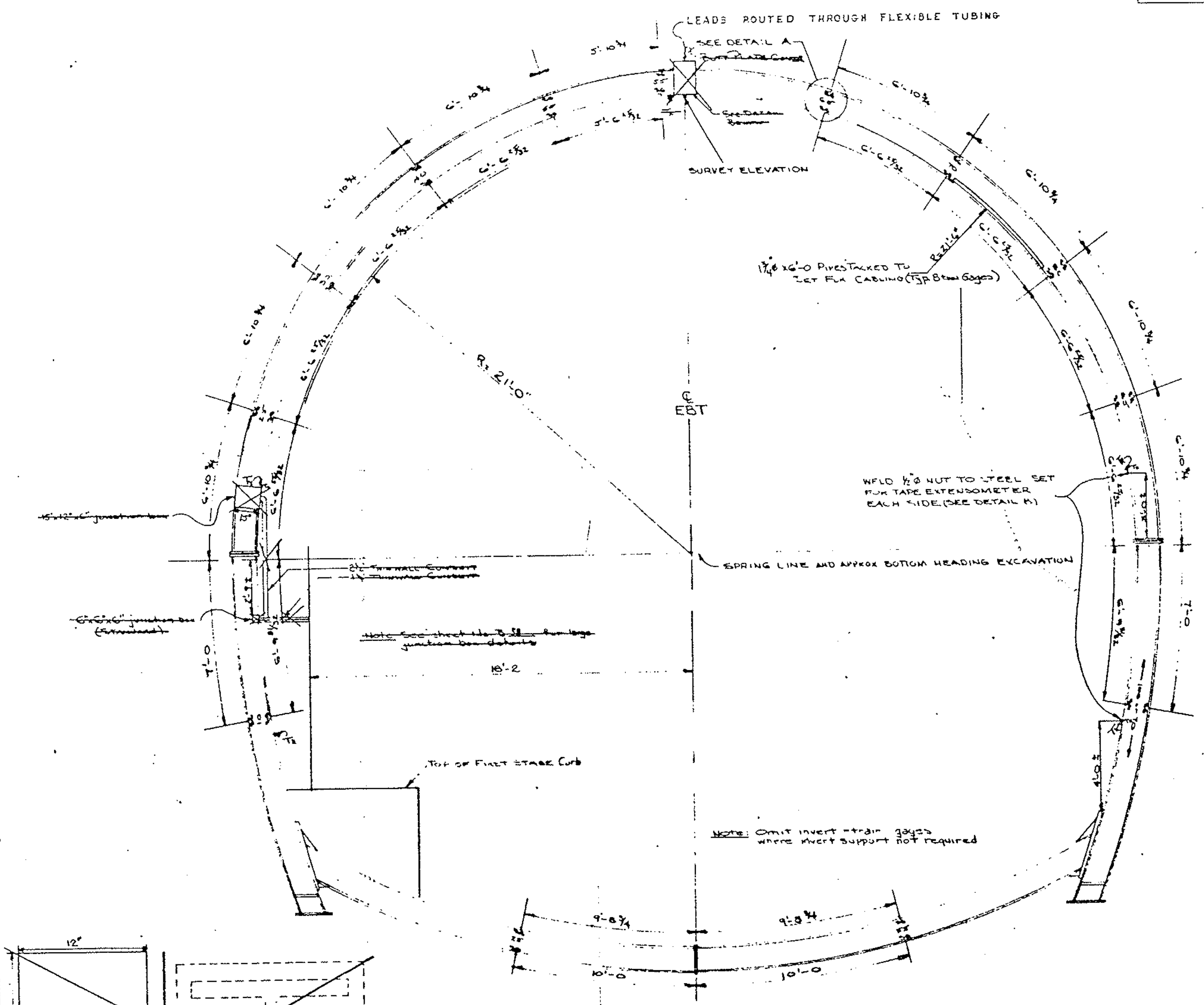
DWG NO D5-559-5AAB-020

REF DWG. 354

Federal Road Region No.	District	Proj. No.	Sheet No.	Total Sheets
XIII	COLORADO	I 70-3(81)220	83	273

AS CONSTRUCTED — NO REVISIONS — REVISED 6-29-73 — VOID

REVISIONS

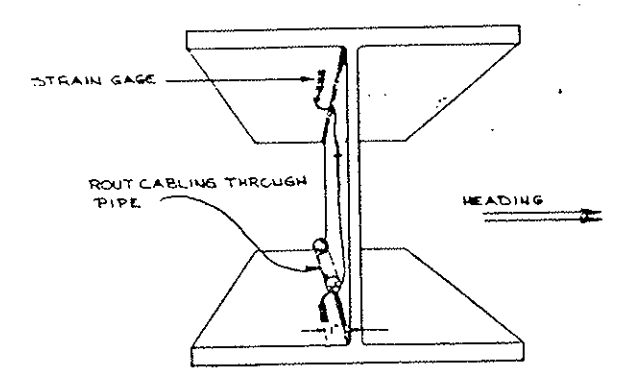


INSTRUMENTATION ARRAY

SCALE: 3/8" = 1'-0

LOCATIONS USED

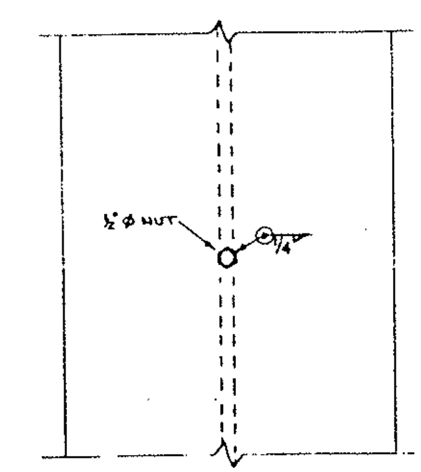
STATION
41 + 60
51 + 98
58 + 94
62 + 48
63 + 04
63 + 60
64 + 00
64 + 52
65 + 08
70 + 20
71 + 04
72 + 40
72 + 44
73 + 48
80 + 90
81 + 50
82 + 46



NOTE: Install gages on side away from heading

DETAIL A

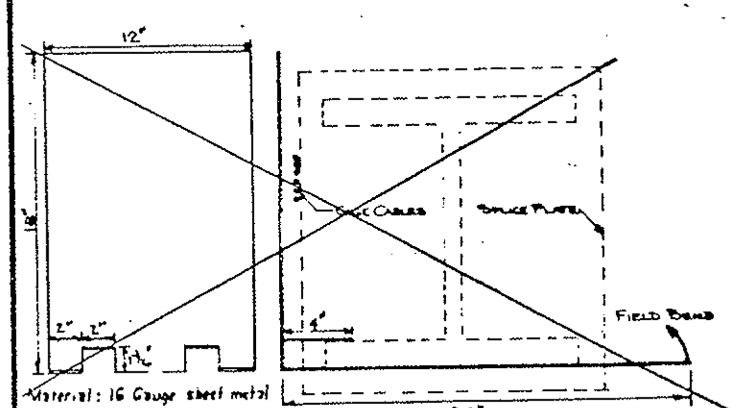
SCALE: 3" = 1'-0



Note: Thread stock into nut before welding to set

DETAIL B

SCALE: 3" = 1'-0



Material: 16 Gauge sheet metal

NOTE: SG — INDICATES STRAIN GAGE
25 — INDICATES CABLE LENGTH
T — INDICATES TAPE EXTENSOMETER POINT

Designed by	Checked by	Initial	Date
Designed by		CDOH	3-74
Checked by			
Detailed by		W.M.	4-73

DIVISION OF HIGHWAYS

INSTRUMENT ARRAY

HORSESHOE TYPE

Designer: CDOH

Detailer: W. MYSTKOWSKI

Structure Number: F-15-X

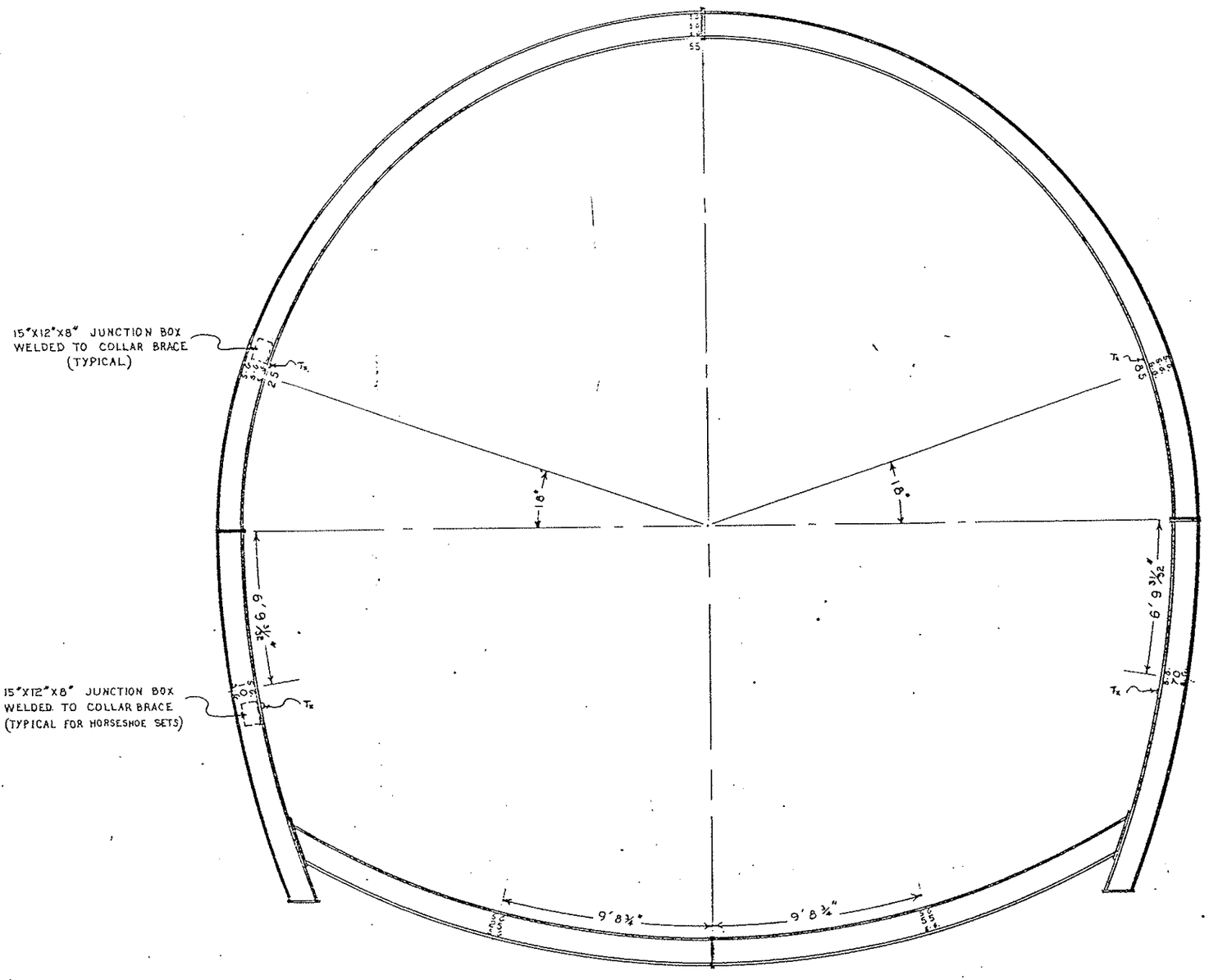
Drawing Number B 55 of 60 Drawings

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	170-3(81)	83AX	273

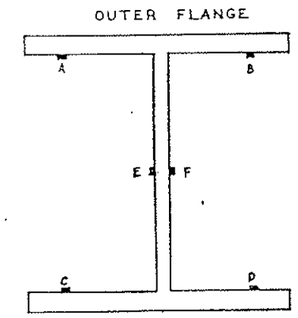
AS CONSTRUCTED

NO REVISIONS ☐ REVISED 6-29-79 VOID ☐

ORIGINAL SCALE 3/8" = 1'0"



ORIGINAL SCALE 3" = 1'0"



DETAIL OF GAGE CONFIGURATION
FOR ARCH ONLY

LOCATION USED

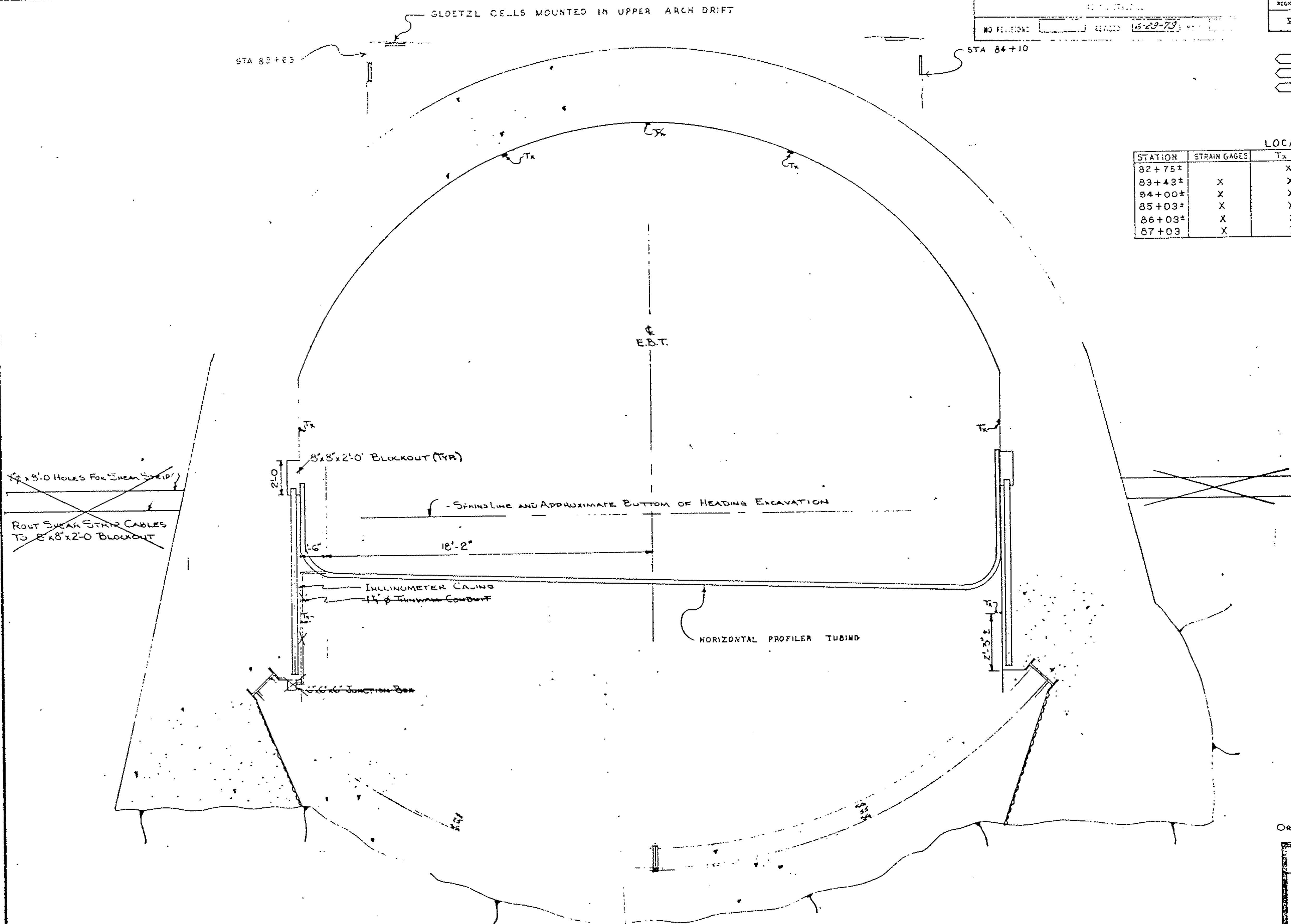
STATION
81+86

INSTRUMENT ARRAY
SET 1027

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I70-3(81)220	84	273

REVISED 6-29-79

REVISIONS



LOCATIONS USED

STATION	STRAIN GAGES	Tx	SLOPE INDICATOR	HORIZONTAL PROFILER
82+75±		X	N & S	X
83+43±	X	X	N	X
84+00±	X	X	N	
85+03±	X	X	N & S	X
86+03±	X	X	N & S	
87+03	X	X		X

DESIGNED BY	C.D.O.H.	3-75	QUANTITIES BY
CHECKED BY			CHECKED BY
DETAILED BY	W.M.	4-75	

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

DIVISION OF HIGHWAYS

INSTRUMENT ARRAY MULTIPLE DRIFT TUNNEL SUPPORT

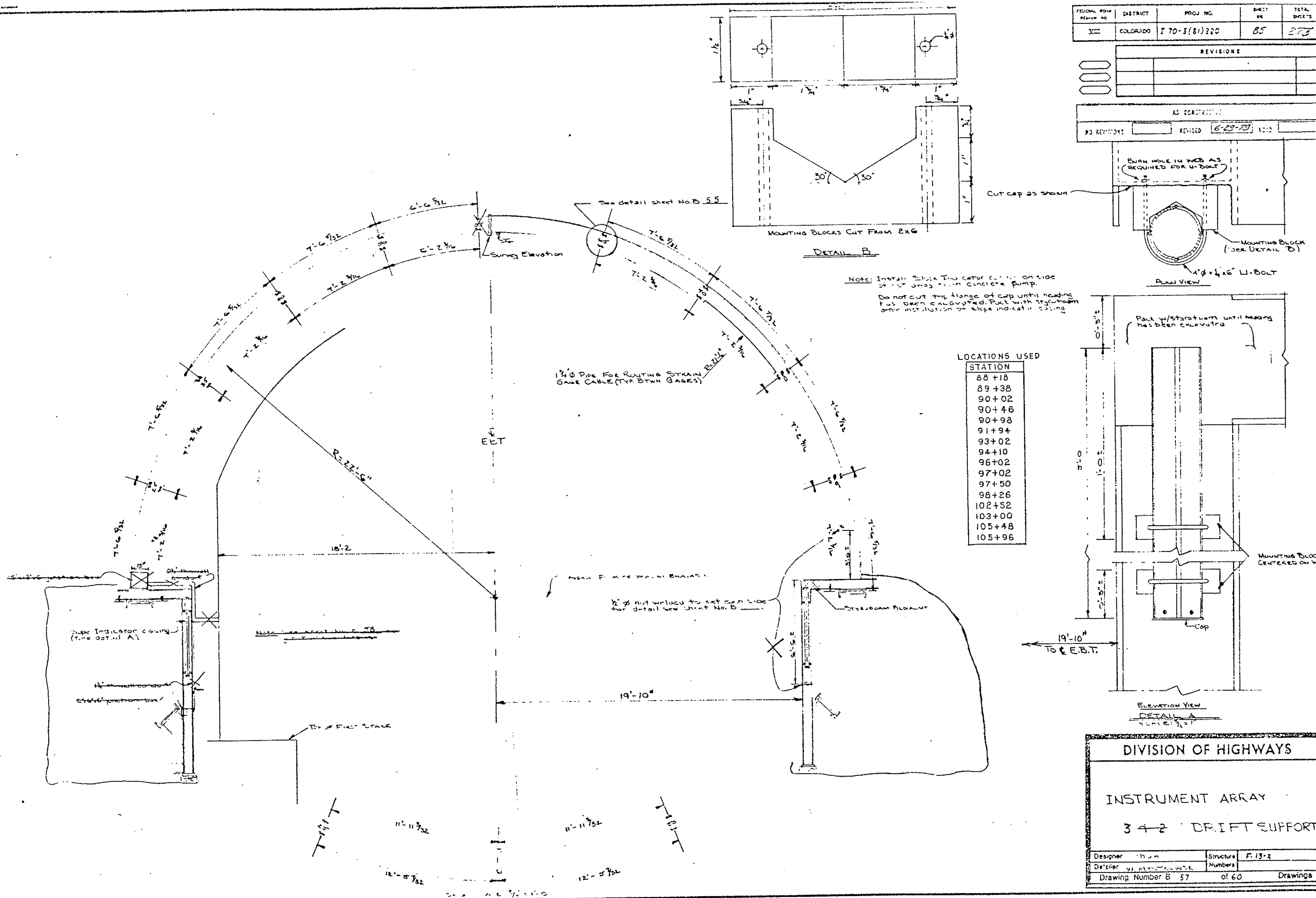
Designer CDOH		Structure Numbers	F-13-X
Detailer W. MYSTKOWSKI			
Drawing Number B 56	of 60	Drawings	

Revision Dates (Preliminary Stage Only)

Federal Road Region No.	District	Proj. No.	Sheet No.	Total Sheets
VIII	Colorado	I 70-3(81)220	85	273

REVISIONS

AS CONSTRUCTED — NO REVISIONS — REVISED 6-29-73 — VOID



LOCATIONS USED

STATION
88 + 18
89 + 38
90 + 02
90 + 46
90 + 98
91 + 94
93 + 02
94 + 10
96 + 02
97 + 02
97 + 50
98 + 26
102 + 52
103 + 00
105 + 48
105 + 96

	Initial	Date
Designed by	C.D.O.H.	3-74
Checked by		
Detailed by	W.M.	1-73

DIVISION OF HIGHWAYS

INSTRUMENT ARRAY

3 ~~4~~ 2 DRIFT SUPPORT

Designer — Structure Numbers F-13-X

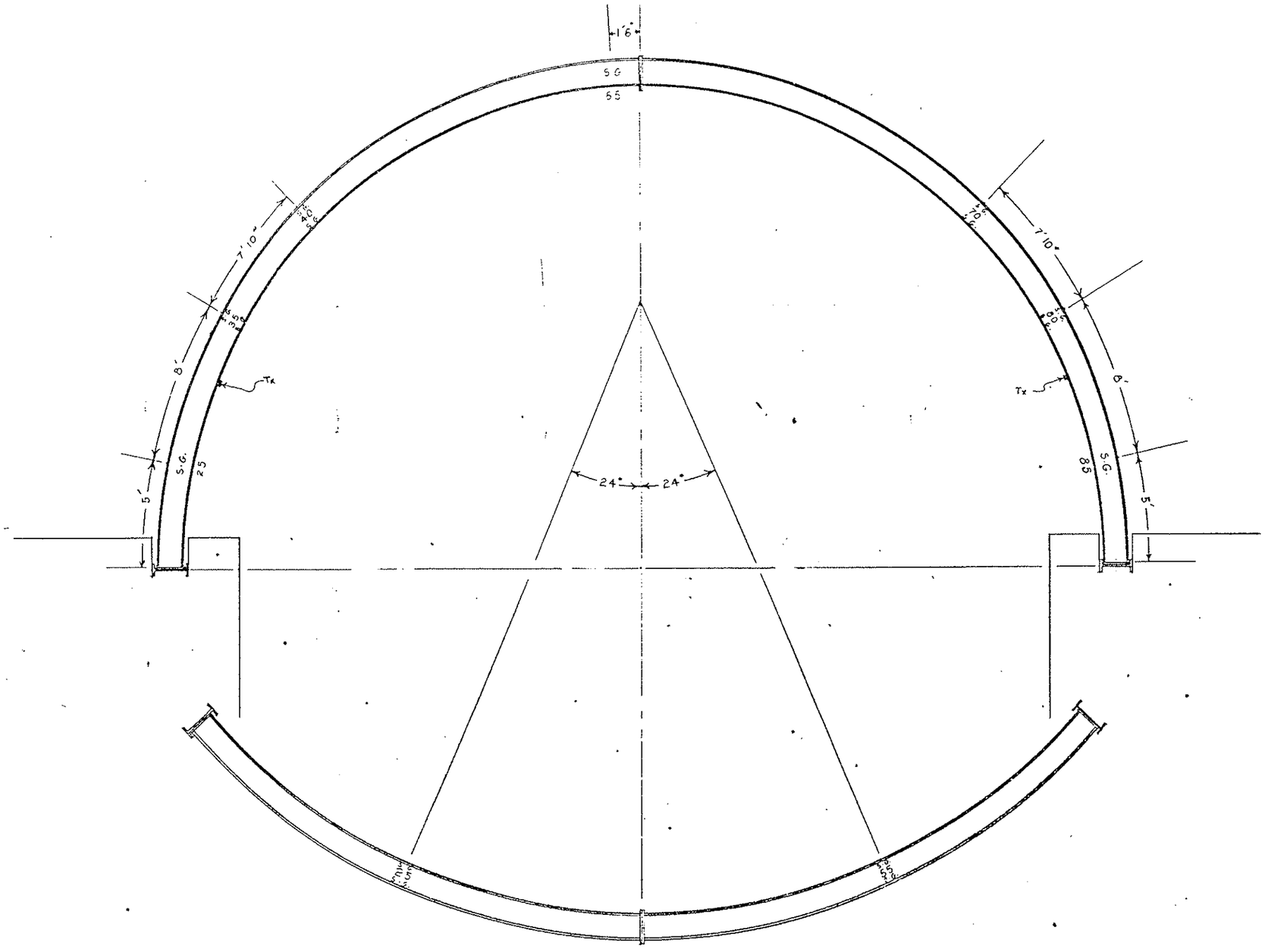
Detailer

Drawing Number B 57 of 60 Drawings

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)	[illegible]	273

AS CONSTRUCTED

NO REVISIONS [ ] REVISED 6-29-77 VOID [ ]



NOTE: GAGES ON ARCH AT 25', 55' & 85' LOCATIONS WERE PLACED ON NEUTRAL AXIS, ONE ON EACH SIDE OF THE WEB.

SEE DETAIL 'A', DRAWING 855 FOR CONFIGURATION OF OTHER GAGES.

LOCATIONS USED

STATIONS
106+36
108+64

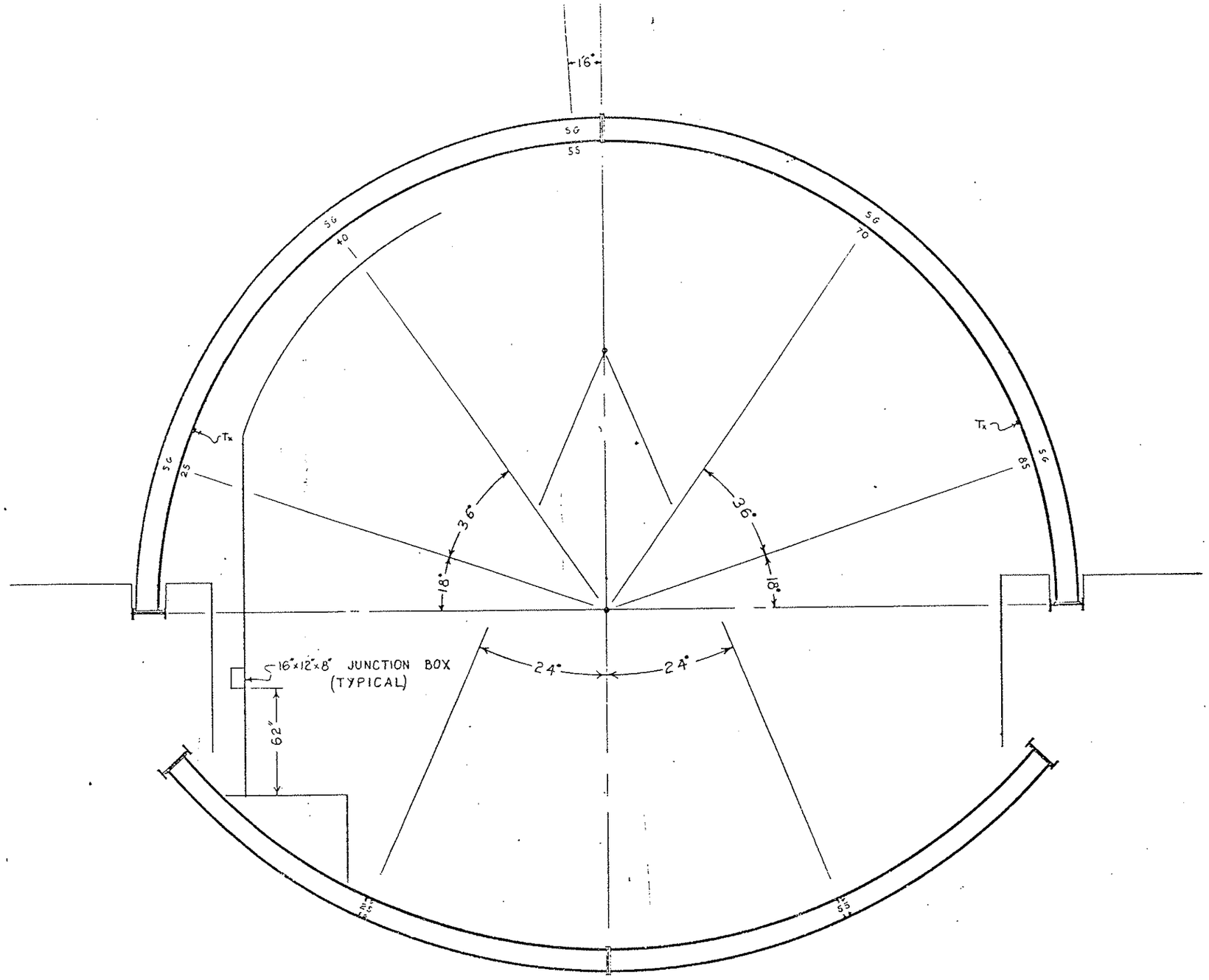
DRIG. SCALE 3/8" = 1'-0"

INSTRUMENT ARRAY
3 DRIFT SUPPORT

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)	551	273

AS CONSTRUCTED

NO REVISIONS ☐ REVISED 6-23-75 VOID ☐



ORIG. SCALE 3/8" = 1'-0"

LOCATIONS USED:

STATION
103 + 84
113 + 88
118 + 77
119 + 59

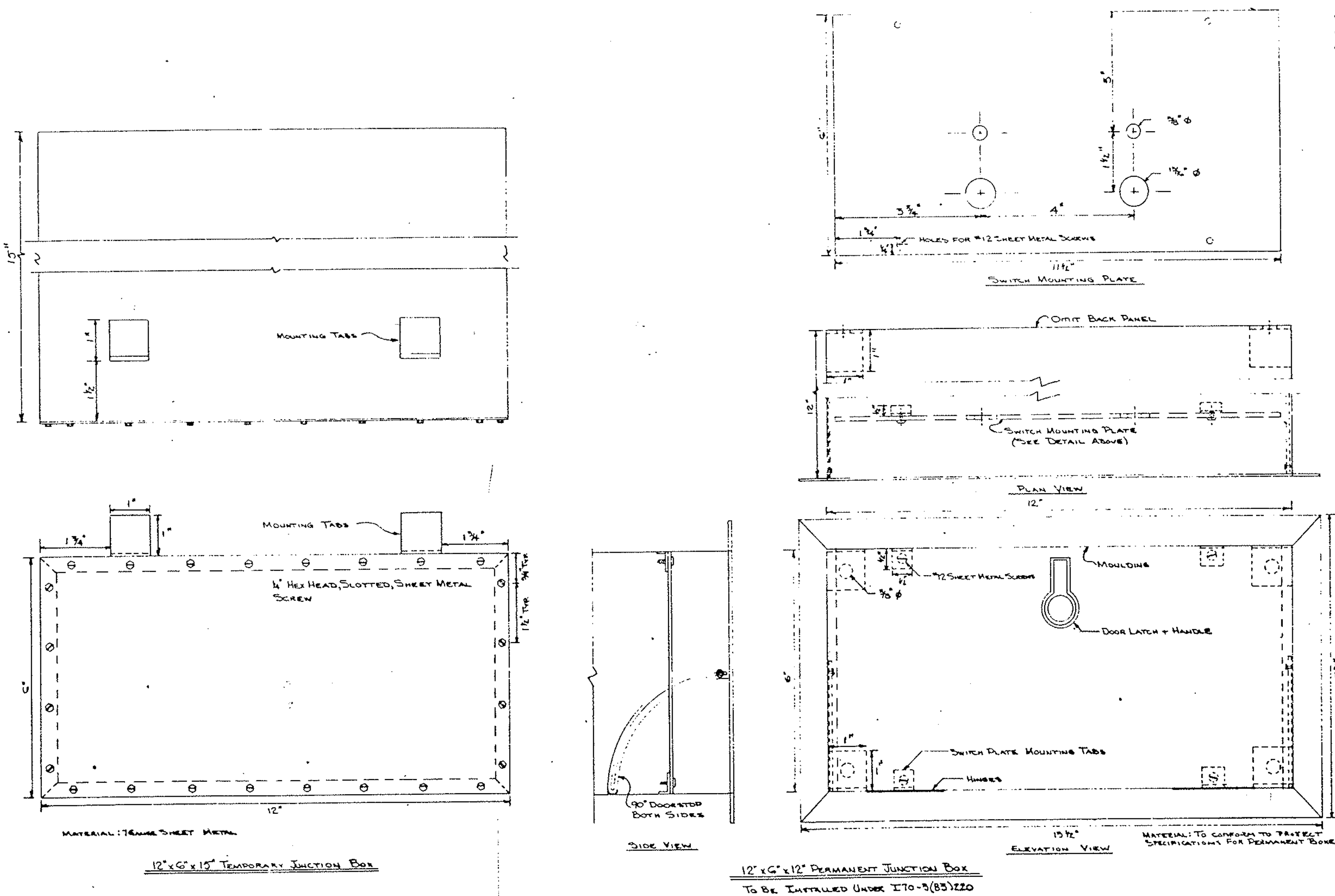
NOTE: GAGES ON ARCH WERE PLACED ON NEUTRAL AXIS, ONE ON EACH SIDE OF THE WEB.

FOR CONFIGURATION OF INVERT GAGES SEE DETAIL 'A' ON DRAWING NUMBER 855

INSTRUMENT ARRAY 3&2 DRIFT SUPPORT

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
XIII	COLORADO	I 70 - 3(81)220	85	273

REVISIONS		



DIVISION OF HIGHWAYS

INSTRUMENTATION JUNCTION BOXES

Designer CDOH		Structure Numbers	
Detailer W. Marmowski			
Drawing Number 3 ... 3	of 60		Drawings

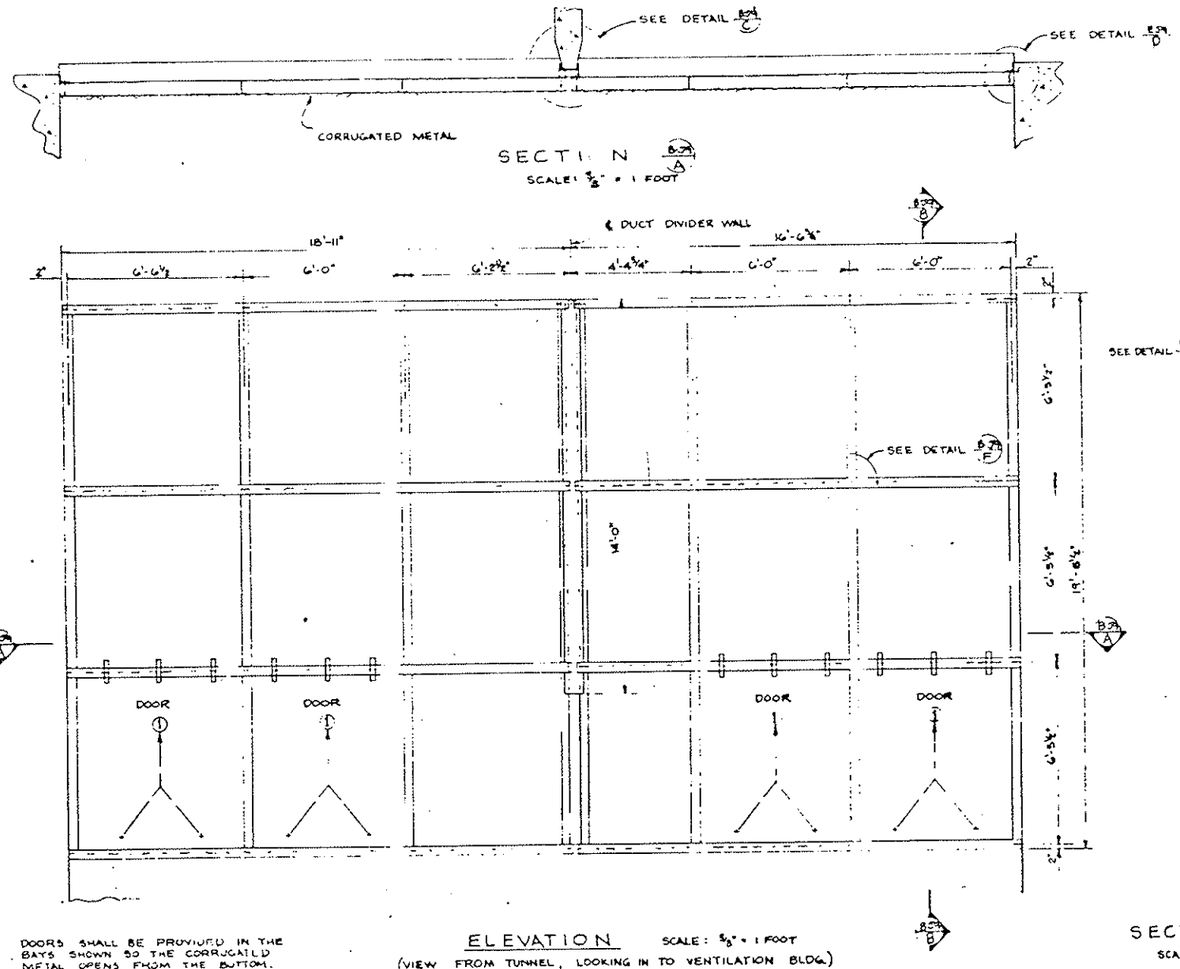
FEDERAL ROAD REGION NO.	DISTRICT	PROJ NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I70-3(81)220	87	275

REVISIONS		

AS CONSTRUCTED

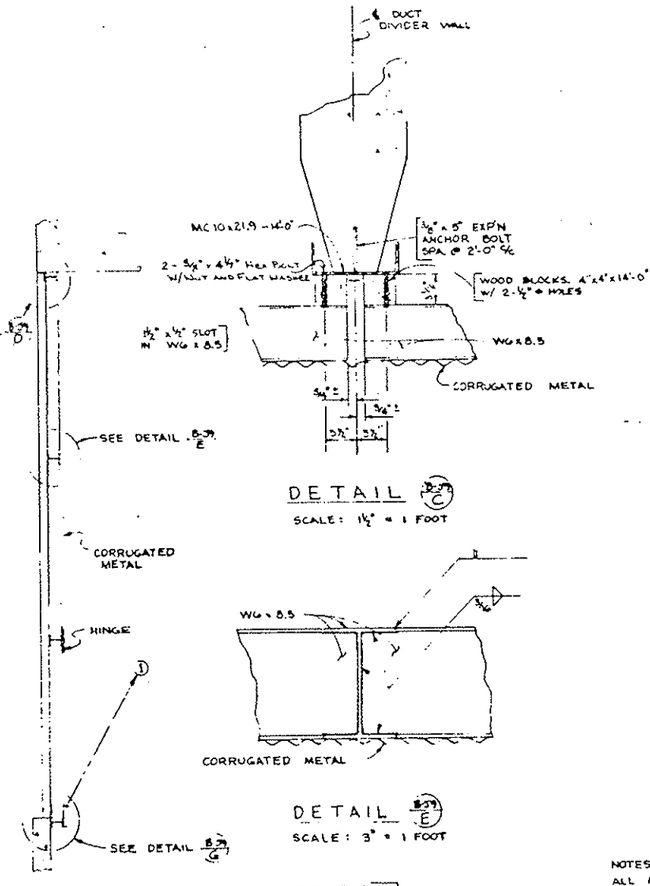
AS DESIGNED 6-29-73 REVISED DATE

DESIGNED BY		DATE
DETAILED BY	COOK	5/74
CHECKED BY		
QUANTITIES BY		10-74
CHECKED BY	MCKEE	



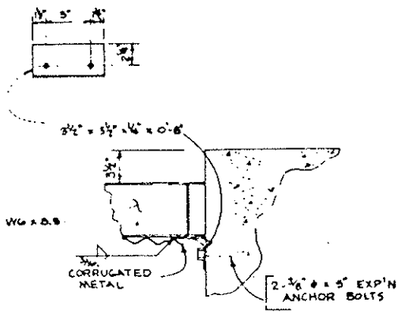
DOORS SHALL BE PROVIDED IN THE BAYS SHOWN SO THE CORRUGATED METAL OPENS FROM THE BOTTOM. 3-3/8" x 2 1/2" x 5" DOUBLE STRAP HINGES SHALL BE PROVIDED. THE DOORS SHALL BE OPENED VIA A PULLEY ATTACHED TO THE TRANSITION CEILING W/ 3/4" x 5" EXP'N ANCHOR BOLTS AS INDICATED BY THE SYMBOL (1).

ELEVATION SCALE: 3/8" = 1 FOOT
(VIEW FROM TUNNEL, LOOKING IN TO VENTILATION BLDG.)



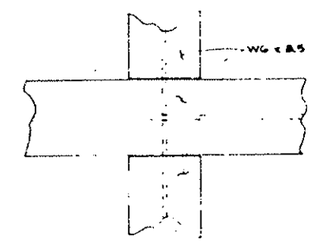
SECTION B-39 B
SCALE: 3/8" = 1 FOOT

DETAIL B-39 C
SCALE: 1 1/2" = 1 FOOT



DETAIL B-39 D
SCALE: 1 1/2" = 1 FOOT

DETAIL B-39 E
SCALE: 3" = 1 FOOT

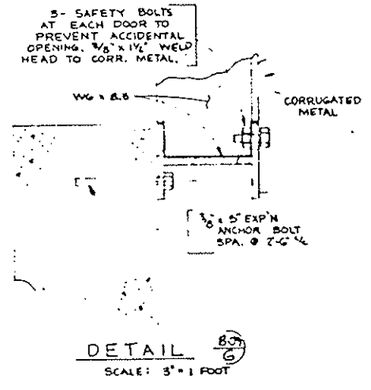


DETAIL B-39 E
SCALE: 3" = 1 FOOT

NOTES:
ALL FRAME MEMBERS SHALL BE WG x 8.5 - A36 STEEL

CORRUGATED METAL SHALL BE 10-GAGE, 6" x 2". THE CORRUGATIONS TO BE PLACE VERTICALLY. PANELS SHALL BE EDGE LAPPED 1 CORRUGATION. PANELS SHALL BE ATTACHED TO THE FRAME IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

ALL WELDS SHALL BE 3/16", E-60 ELECTRODE.



DETAIL B-39 G
SCALE: 3" = 1 FOOT

DIVISION OF HIGHWAYS

BLAST PROTECTION SHIELD FOR VENTILATION BUILDINGS

Designer COOK	Structure Numbers	F-13-X
Detailer R.M. McKEE		
Drawing Number B 39	of 60	Drawings

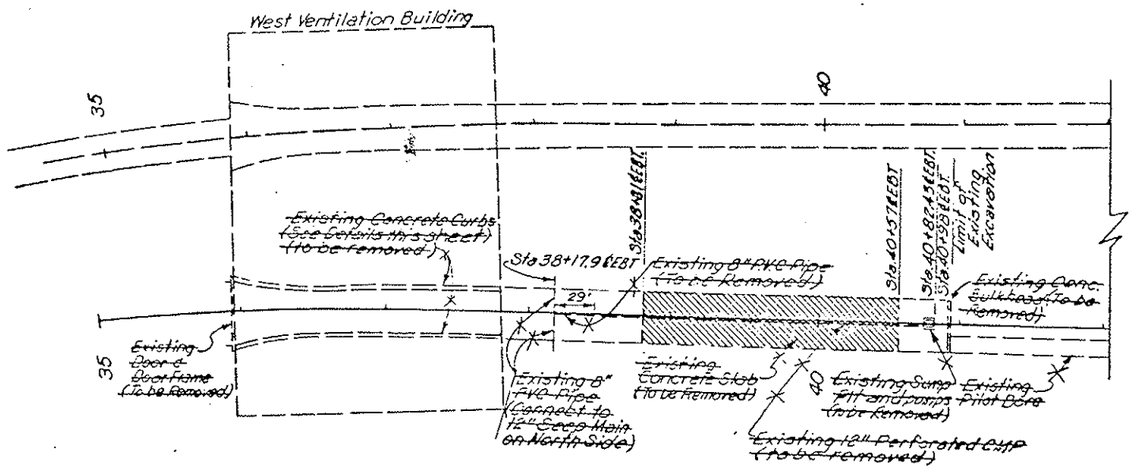
Revision Dates	Preliminary Stage Only:					
9/9/74						

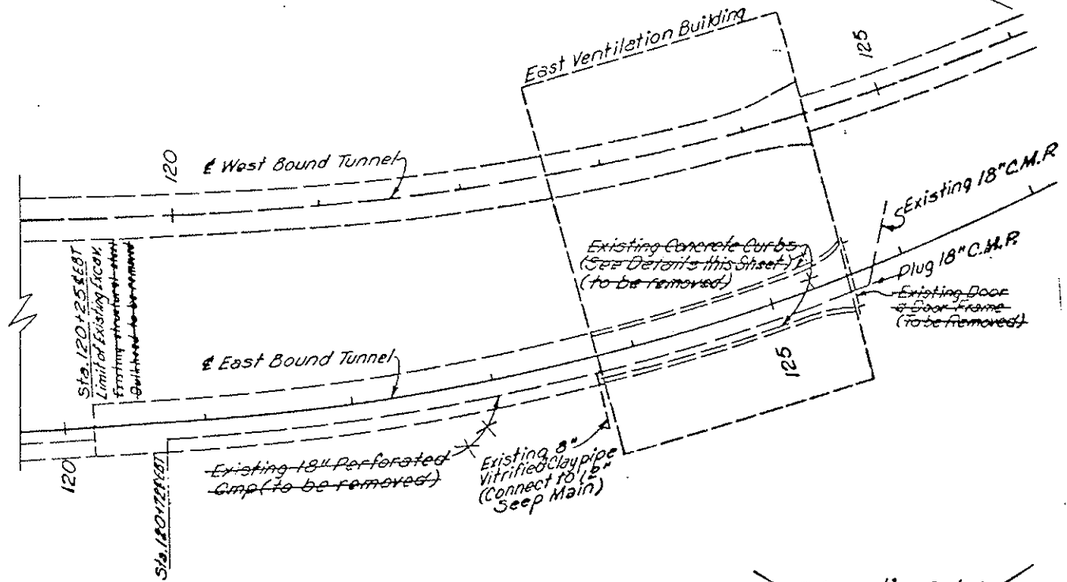
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	88	273

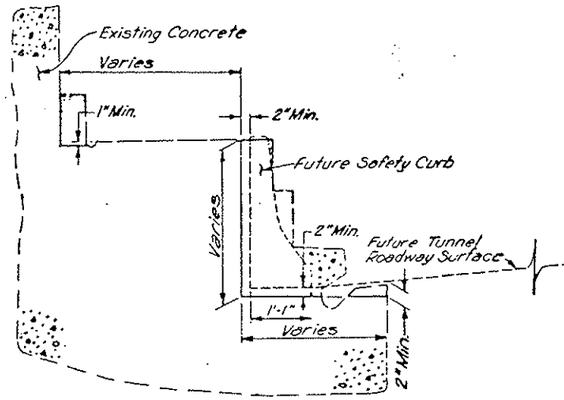
6-29-79

Payment for the Removal of the following obstructions will be made under the Pay Item "Removal of Structures and Obstructions." This Item shall include but not be limited to the following:

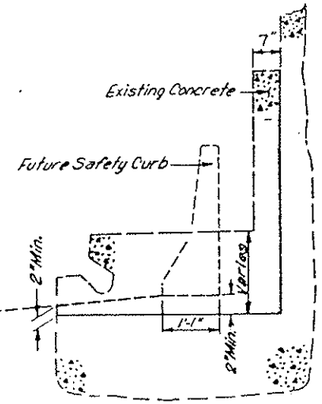
A. Concrete bulkhead and sump at station 40+ in the West Stub Tunnel.
B. Doors and Door Frames at the East and West Portals.
C. Concrete Floor in the West Stub Tunnel.
D. Concrete Curbs, left and right in both ventilation Buildings to the lines shown on the Plans
E. Approximately 800 Lin.Ft. of Pipe.



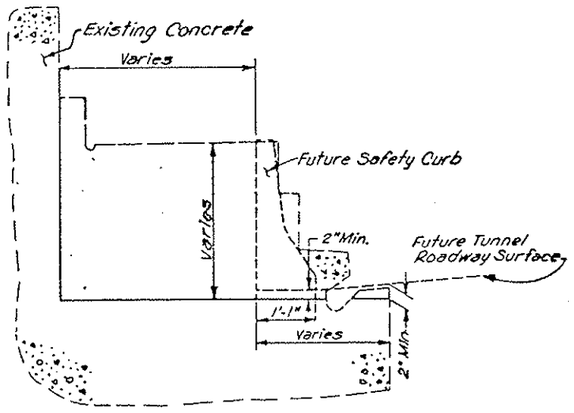




CONCRETE CURB REMOVAL
NORTH SIDE OF TUNNEL
STA. 35+99± to 36+90 AND
124+45 to 125+52±



CONCRETE CURB REMOVAL
SOUTH SIDE OF TUNNEL
STA. 35+99± to 37+79± AND
STA. 123+75± to 125+52±



CONCRETE CURB REMOVAL
NORTH SIDE OF TUNNEL
Sta. 36+90 to 37+79± AND
Sta. 123+75± to 124+45

For Information Only:
The amount of concrete to be removed is estimated to be as follows:

1. Curbs = 200 cy
2. Slab = 95 cy
3. Bulkhead = 140 cy

Approximate Total = 435 Cy

Represents curb concrete Area to be removed.

DIVISION OF HIGHWAYS

DETAILS
REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Designer C.D.O.H	Structure Numbers F-19-X
Detailer J. Hoffmeister	
Drawing Number B 60	of 60 Drawings

(R-1) Correct Item Description 7-3-75 T.A.L.

FEDERAL ROUTE REGION NO.	DIVISION	PROJ. NO.	PROJECT NO.	TOTAL SHEETS
VIII	COLORADO	I 70-5(811)220	89	273

FINAL
SUMMARY OF TUNNEL DRAINAGE QUANTITIES

	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FINAL
	206	Structure Excavation	Cu.Yd.	~~4,263~~	15,045
	206	Structure Backfill (Class 2)	Cu.Yd.	~~16,973~~	8,443
	206	Filter Material (Class C)	Cu.Yd.	~~563~~	1,156
	211	1¼ Inch Drilled Hole	Lin.Ft.	~~102,121~~	126,779
	211	3 Inch Drilled Hole	Lin.Ft.	~~4,960~~	5,448
	211	Steel Pipe For Grouting	Pound	~~106,610~~	128,343
	211	Sheet Metal For Panning	Pound	~~48,000~~	2,980
	304	Aggregate Base Course (Class 2) (Haul)	Ton	~~65,818~~	100,561.94
	604	Inlet Special	Each	~~113~~	113
	604	Manhole Special	Each	~~46~~	46
(R-1)	604	6 Inch Ductile Iron Pipe Sewer	Lin.Ft.	~~1,354~~	1,575
(R-1)	604	12 Inch Ductile Iron Pipe Sewer	Lin.Ft.	~~8,985~~	8,835
(R-1)	604	2 Inch Plastic Pipe Sewer (Polyethylene)	Lin.Ft.	~~94,361~~	95,285
(R-1)	604	2 Inch Plastic Pipe Sewer (Polyvinyl Chloride)	Lin.Ft.	~~4,184~~	3,628
(R-1)	604	4 Inch Plastic Pipe Sewer (Polyvinyl Chloride)	Lin.Ft.	~~20,285~~	20,975
(R-1)	604	12 Inch Plastic Pipe Sewer (Polyvinyl Chloride)	Lin.Ft.	~~17,303~~	17,283
	605	4 Inch Perforated Plastic Pipe (Polyvinyl Chloride)	Lin.Ft.	~~33,632~~	33,441

SUMMARY OF TUNNEL DRAINAGE QUANTITIES

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81) 220	90	273

FINAL
DRAINAGE SYSTEM QUANTITIES

LOCATION	MANHOLE SPECIAL EACH TYPE I	IA	II	III	IV	V	INLET SPECIAL EACH TYPE S	TYPE T	WASTE MAIN LIN. FT. 12" DUCTILE IRON PIPE	INLET SPECIAL COLLECTOR PIPE LIN FT. 6" DUCTILE IRON PIPE	SEEP MAIN LIN. FT. ▲ 12" PLASTIC PIPE	SEEP COLLECTOR & CROSSOVER LIN. FT. ● 4" PLASTIC PIPE	CROSSOVER LIN. FT. ● 2" PLASTIC PIPE	PERFORATED SEEP COLLECTOR LIN. FT. ● 4" PERFORATED PLASTIC PIPE	RADIAL SEEP DRAIN POUND STEEL PIPE FOR GROUTING	RADIAL DRAIN COLLECTOR LIN. FT ● 2" PLASTIC PIPE	DRILLED HOLE LIN FT. 1¼"	3"	SHEET METAL FOR PANNING POUND 22 GAUGE	FILTER MATERIAL CU. YD. CLASS C	STRUCTURE EXCAVATION CU. YD.	STRUCTURE BACKFILL CU. YD. CLASS 2	AGGREGATE BASE COURSE TON CLASS 2
36+44.99 to 125+18.36 (Varied Spacing)	28	1	11	4	1	1																	
36+71.35 to 124+14.85							83	30															
36+46.99 to 125+15.36									~~8585~~ 8835														
36+72.68 to 124+16.18										~~1354~~ 1575													
36+87.50 to 124+37.40 (NS)											8759												
39+56.85 to 124+37.40 (SS)											8481												
Equalizer Pipes											63												
Seep Collectors: 40+83 to 120+21 (N&S Sides)												15,876											
Crossovers: Non-drift Areas (N&S Sides)												700											
Drift Area (N&S Sides)												1,013											
Risers: Invert Areas (N&S Sides)												2,490											
Cleanouts (N&S Sides)												206											
82+54 to 87+62													4,160										
Drains at Cross-Passageways													24										
Under Roadway: 35+75 to 125+50 (N Side)														8,896									
35+75 to 125+15.5 (S Side)														8,862									
Non-Drift Area: 40+83 to 82+53 (N&S)														8,340									
Drift Area, 82+54 to 120+21 (N&S)														7,534									
40+83 to 82+53 and 87+62 to 120+22															128,343 ~~106,610~~								
40+82 to 82+54																49,115							
82+54 to 87+62																5,934							
87+62 to 109+50																26,352							
109+50 to 120+22																12,960							
40+82 to 82+54																	53,832						
87+62 to 109+50																	32,003						
109+50 to 120+22																	15,286						
Panning Area																	1,000						
61+80 to 65+50																		480					
69+30 to 73+50																		540					
80+00 to 109+50																		3700					
118+50 to 120+22																		240					
Panning Areas (as directed)																			~~40,000~~				
40+83 to 120+21																			2,980	~~968~~			
35+75 to 125+50																				1,156	~~4,268~~		
35+75 to 125+50																					13,390	~~10,973~~	
41+82 to 120+72																						8,443	~~65,818~~
																							100,561.94
TOTALS	46						113		~~8,985~~ 8,835	~~1,354~~ 1,575	~~17,303~~ 17,283	~~20,285~~ 20,975	~~4,184~~ 3,628	~~33,632~~ 33,441	~~100,610~~ 124,343	~~94,361~~ 95,285	~~102,121~~ 103,775	~~4,960~~ 5,445	~~48,000~~ 2,980	~~968~~ 1,156	~~4,268~~ 13,390	~~10,973~~ 8,443	~~65,818~~ 100,561.94

▲ PVC } No Pressure Rating Req'd
● PVC }
● PE } 100 Psi

DRAINAGE SYSTEM QUANTITIES

SHEET D-2

FEDERAL AID REGION NO	DIVISION	PROJ. NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(81) 220	91	273

NOTES:

A. 2 INCH STEEL PIPE FOR GROUTING (TO ROCK), NO.1 THROUGH NO.9 SHALL BE INCLUDED THROUGH DAMP AND WET REACHES FOR GROUTING PURPOSES.

B. DRAIN HOLES NO. 4,3,5,7 AND 9 WILL BE USED THROUGH DAMP REACHES OF THE TUNNEL.

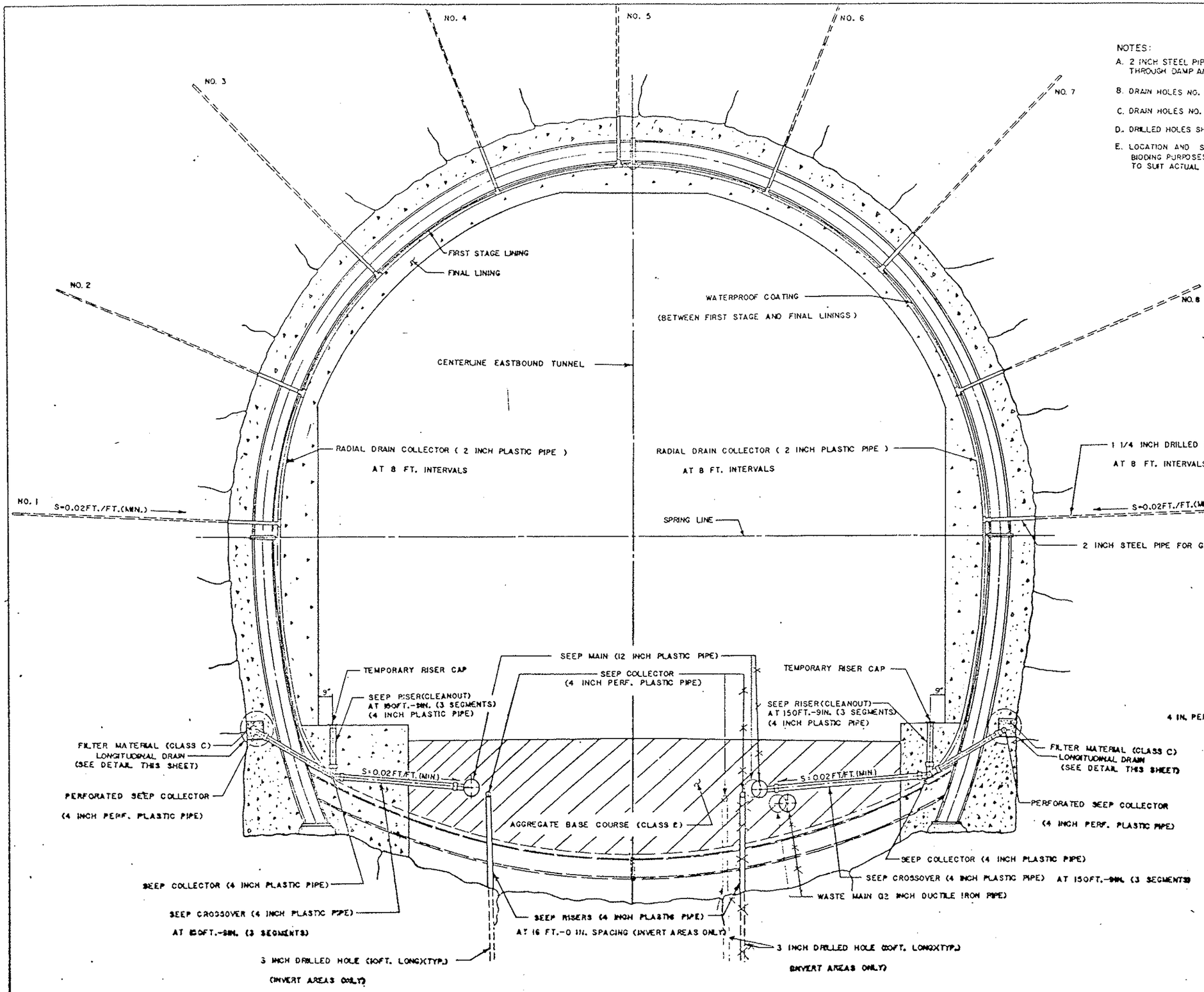
C. DRAIN HOLES NO. 1 THRU NO.9 WILL BE USED THROUGH WET REACHES OF THE TUNNEL.

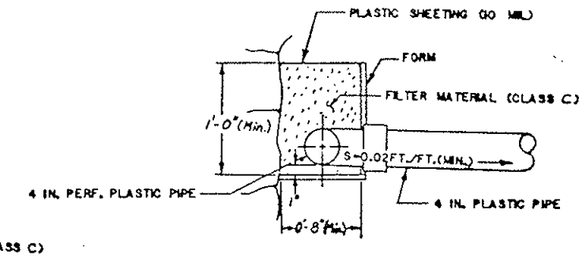
D. DRILLED HOLES SHALL BE MEASURED FROM FACE OF FIRST STAGE LINING.

E. LOCATION AND SPACING OF 1 1/4" DRILLED HOLES AS SHOWN ARE TENTATIVELY SET FOR BIDDING PURPOSES ONLY AND MAY BE MODIFIED IN FIELD, AS DIRECTED BY THE ENGINEER, TO SUIT ACTUAL EXISTING CONDITIONS.

AS CONSTRUCTED

NO REVISIONS ____ REVISED 6-29-77 VOID ____





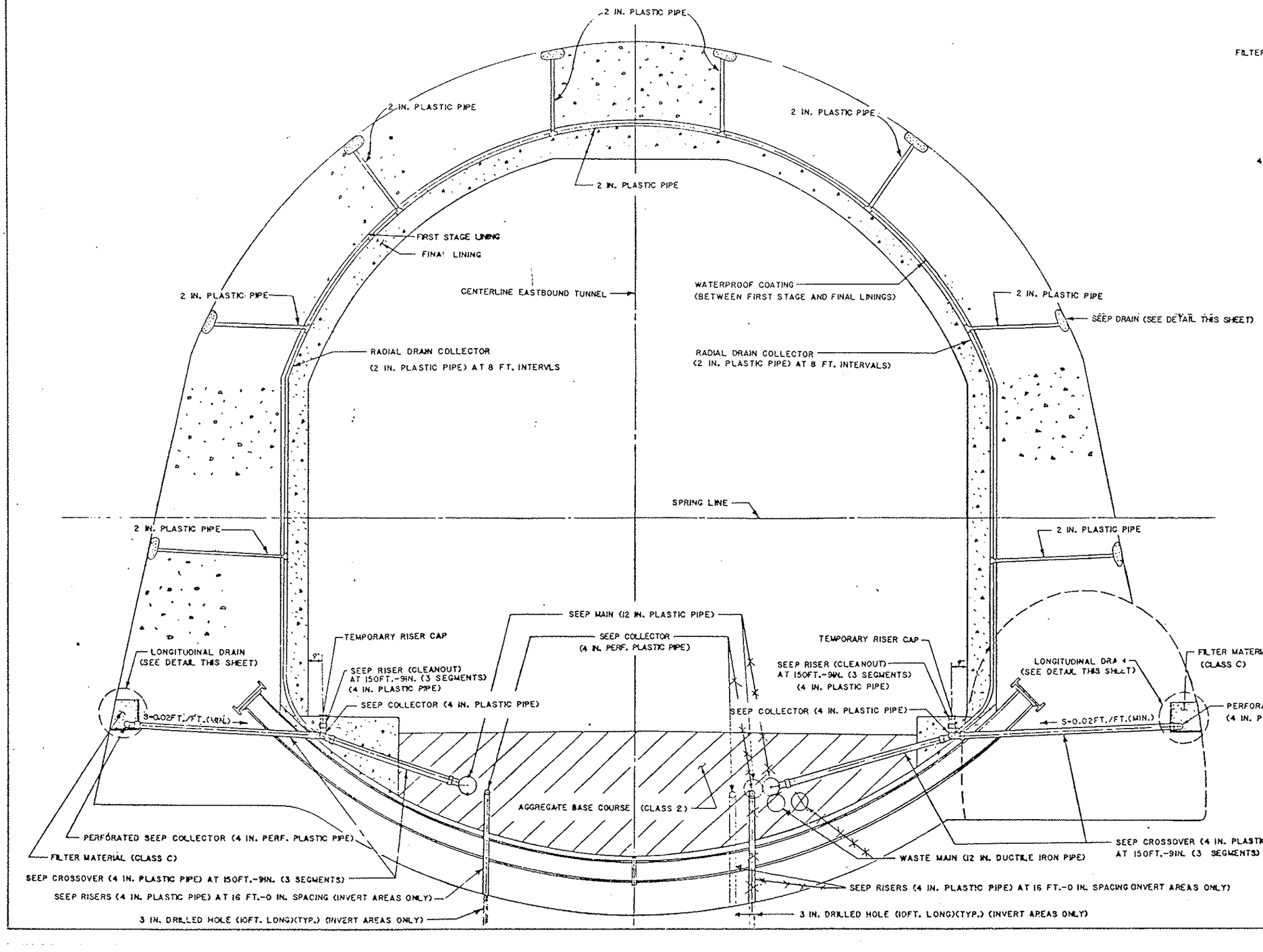
DETAIL OF LONGITUDINAL DRAIN

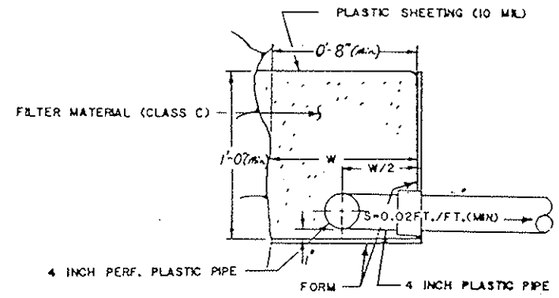
ONE SEGMENT LENGTH = 50 FT.-3 IN.

SEEP DRAINAGE SYSTEM
STA. 40+82 TO 82+54

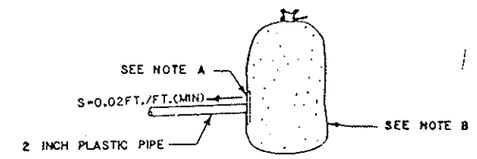
AS CONSTRUCTED					
NO REVISIONS		REVISED	6-23-75	VOID	

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VII	COLORADO	I 70-3(81) 220	92	273





DETAIL OF LONGITUDINAL DRAIN



DETAIL OF SEEP DRAIN

NOTES:

A. 6 IN. SQUARE ALUMINUM OR GALVANIZED STEEL WIRE NO. 4 MESH HARDWARE CLOTH (MIN. WIRE DIAMETER 0.03 IN.) TIED SECURELY TO PIPE AND BURLAP.

B. ONE CUBIC FOOT FILTER MATERIAL (CLASS A) IN A BURLAP SACK, SECURELY TIED.

C. DRILLED HOLES SHALL BE MEASURED FROM FACE OF FIRST STAGE LINING.

D. FLUSH AND CLEAN 2 IN. PLASTIC PIPES BEFORE MAKING FINAL CONNECTIONS.

ONE SEGMENT LENGTH = 50 FT.-3 IN.

SEEP DRAINAGE SYSTEM
MULTIPLE DRIFT SECTION
STA. 82+54 TO 87+62

ORIGINAL SCALE : 3/8" = 1'

SHEET D-4

FEDERAL AID PROJECT NO.	STATE	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	COLORADO	I 70-3(81)220	93	273

NOTES

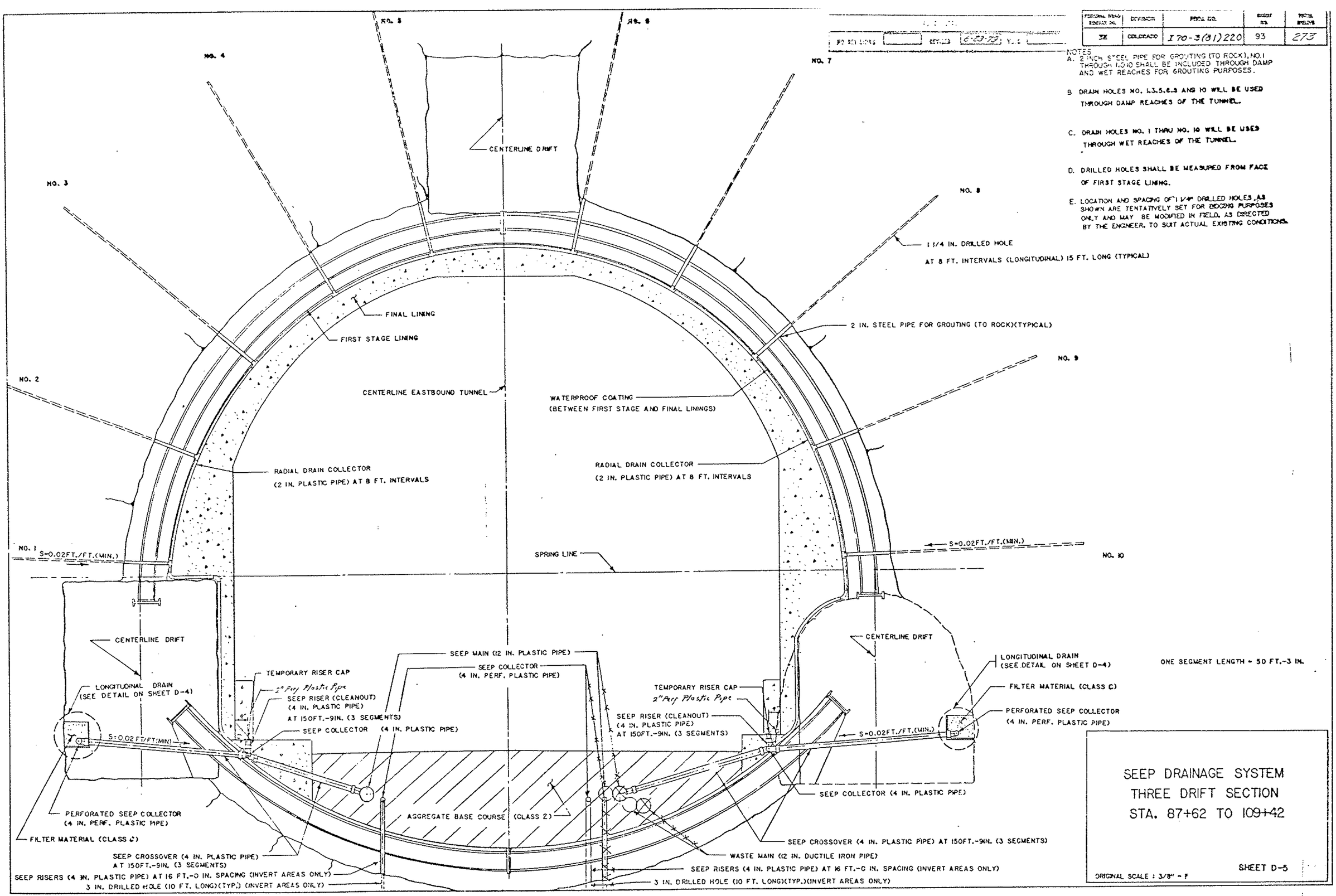
A. 2 INCH STEEL PIPE FOR GROUTING (TO ROCK), NO.1 THROUGH NO.10 SHALL BE INCLUDED THROUGH DAMP AND WET REACHES FOR GROUTING PURPOSES.

B. DRAIN HOLES NO. 1,3,5,6,8 AND 10 WILL BE USED THROUGH DAMP REACHES OF THE TUNNEL.

C. DRAIN HOLES NO. 1 THRU NO. 10 WILL BE USED THROUGH WET REACHES OF THE TUNNEL.

D. DRILLED HOLES SHALL BE MEASURED FROM FACE OF FIRST STAGE LINING.

E. LOCATION AND SPACING OF 1 1/4" DRILLED HOLES, AS SHOWN ARE TENTATIVELY SET FOR BIDDING PURPOSES ONLY AND MAY BE MODIFIED IN FIELD, AS DIRECTED BY THE ENGINEER, TO SUIT ACTUAL EXISTING CONDITIONS.



SEEP DRAINAGE SYSTEM
THREE DRIFT SECTION
STA. 87+62 TO 109+42

SHEET D-5

ORIGINAL SCALE : 3/8" = 1'

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3 (81)220	94	273

NOTES:

A. 2 INCH STEEL PIPE FOR GROUTING (TO ROCK), NO.1 THROUGH NO.9 SHALL BE INCLUDED THROUGH DAMP AND WET REACHES FOR GROUTING PURPOSES.

B. DRAIN HOLES NO. 1,3,5,7 AND 9 WILL BE USED THROUGH DAMP REACHES OF THE TUNNEL.

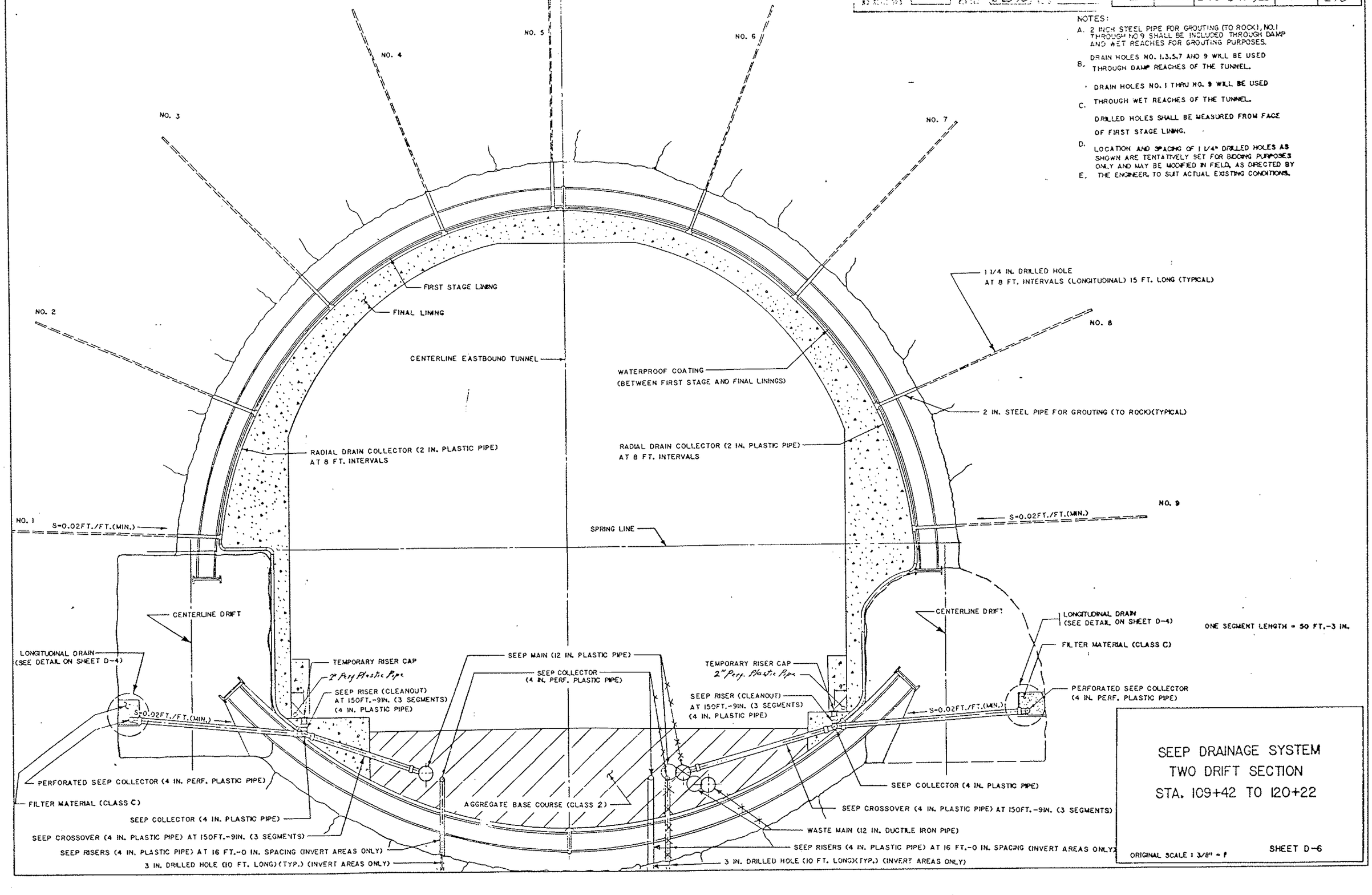
DRAIN HOLES NO. 1 THRU NO. 9 WILL BE USED

C. THROUGH WET REACHES OF THE TUNNEL.

DRILLED HOLES SHALL BE MEASURED FROM FACE OF FIRST STAGE LINING.

D. LOCATION AND SPACING OF 1 1/4" DRILLED HOLES AS SHOWN ARE TENTATIVELY SET FOR BIDDING PURPOSES ONLY AND MAY BE MODIFIED IN FIELD, AS DIRECTED BY

E. THE ENGINEER, TO SUIT ACTUAL EXISTING CONDITIONS.

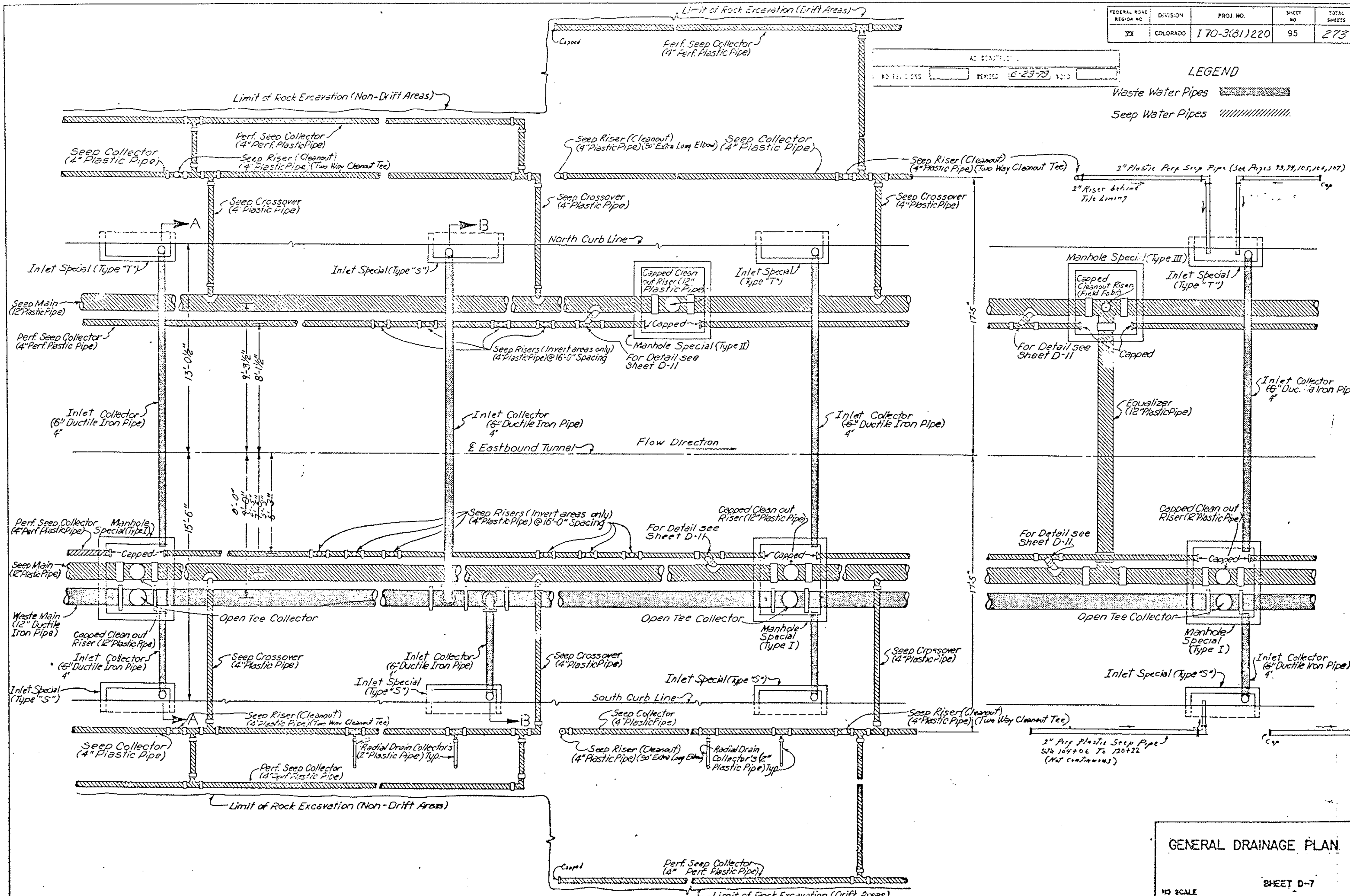


SEEP DRAINAGE SYSTEM
TWO DRIFT SECTION
STA. 109+42 TO 120+22

ORIGINAL SCALE : 3/8" = 1'

SHEET D-6

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
XX	COLORADO	I 70-3(81)220	95	273

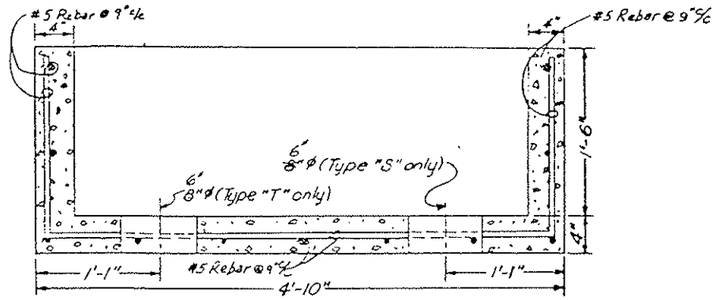


GENERAL DRAINAGE PLAN

SHEET D-7

NO SCALE

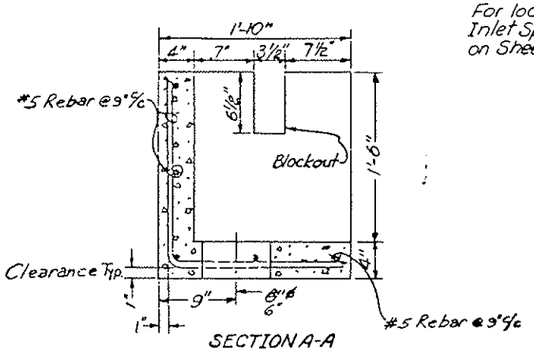
DETAILS OF PRECAST INLET SPECIAL, TYPE "S" & "T"



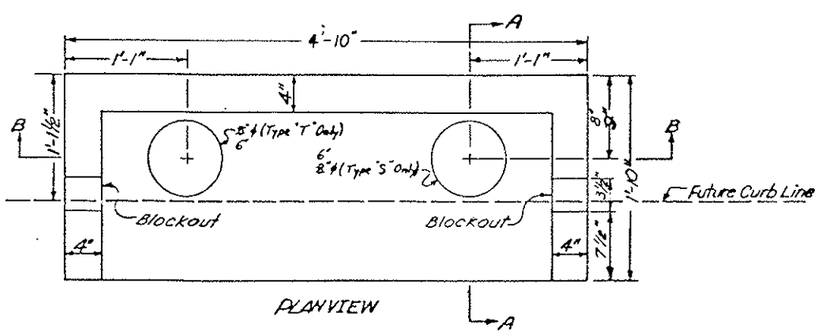
SECTION B-B

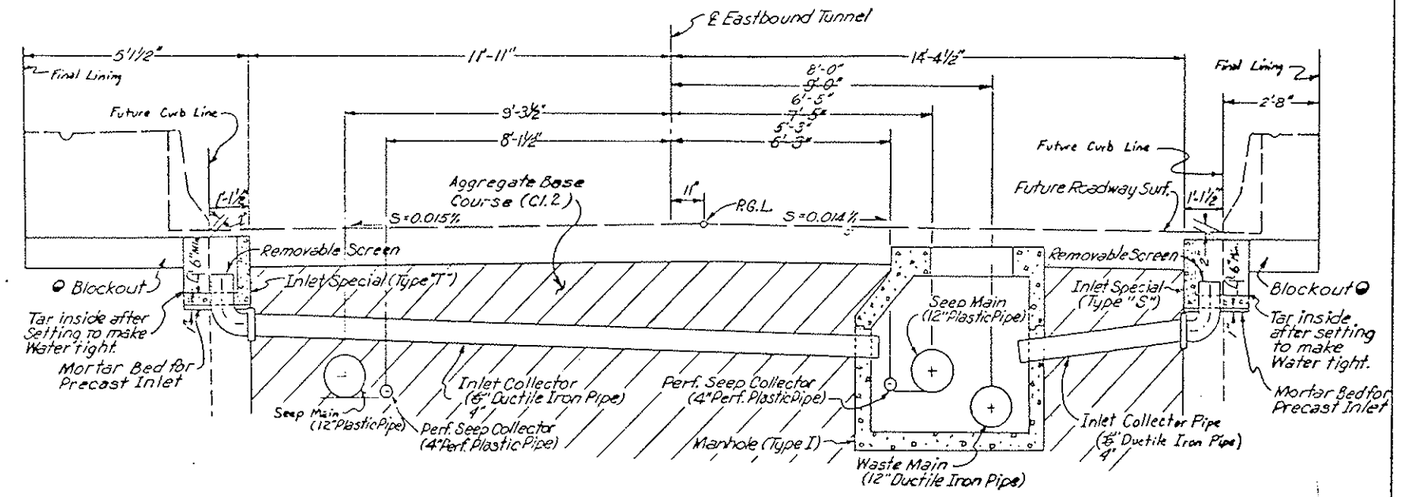
Note: Grout around pipes at Inlet Specials.

For locations of Precast Inlet Specials see Tabulation on Sheet D-9.



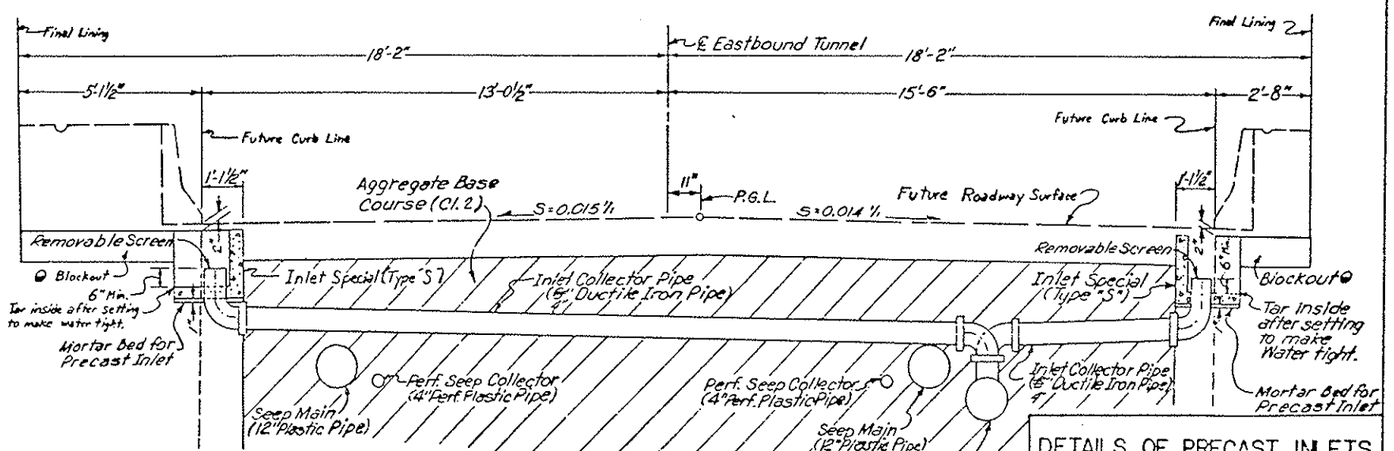
SECTION A-A





SECTION A-A Sheet D-7

● For Details of Blockouts See Sheets D-9 & D-10.



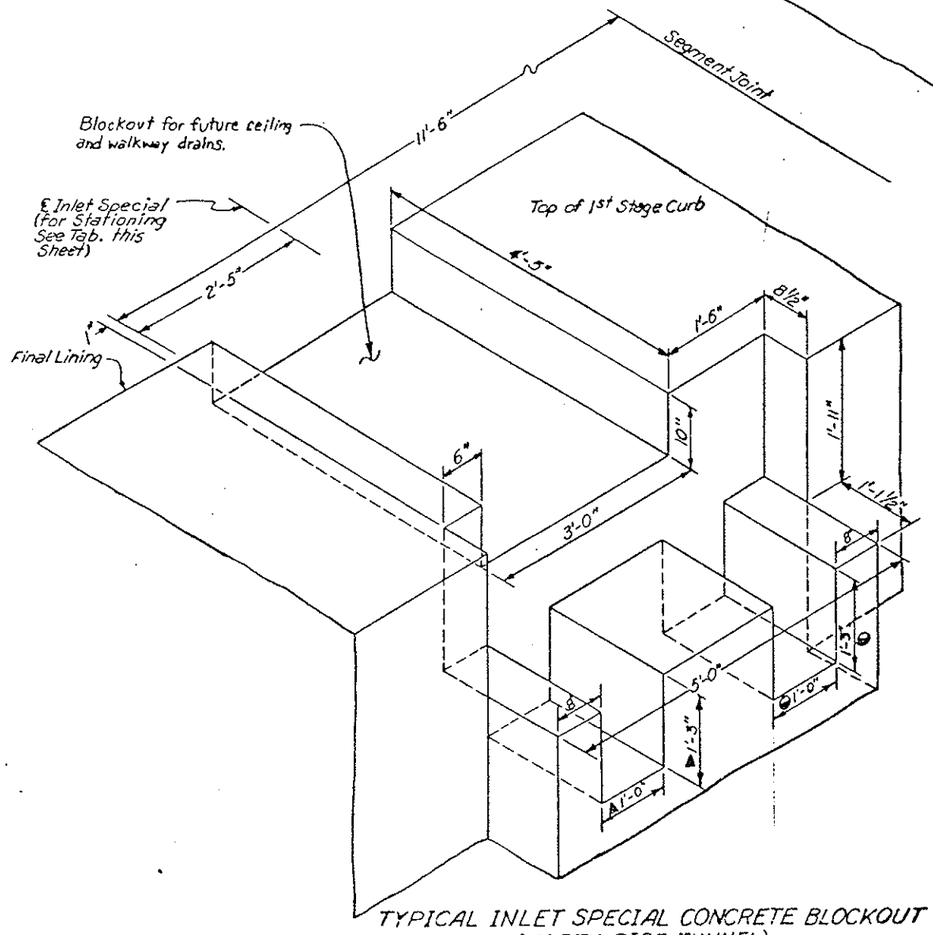
SECTION B-B Sheet D-7

DETAILS OF PRECAST INLETS & INLET DRAINS

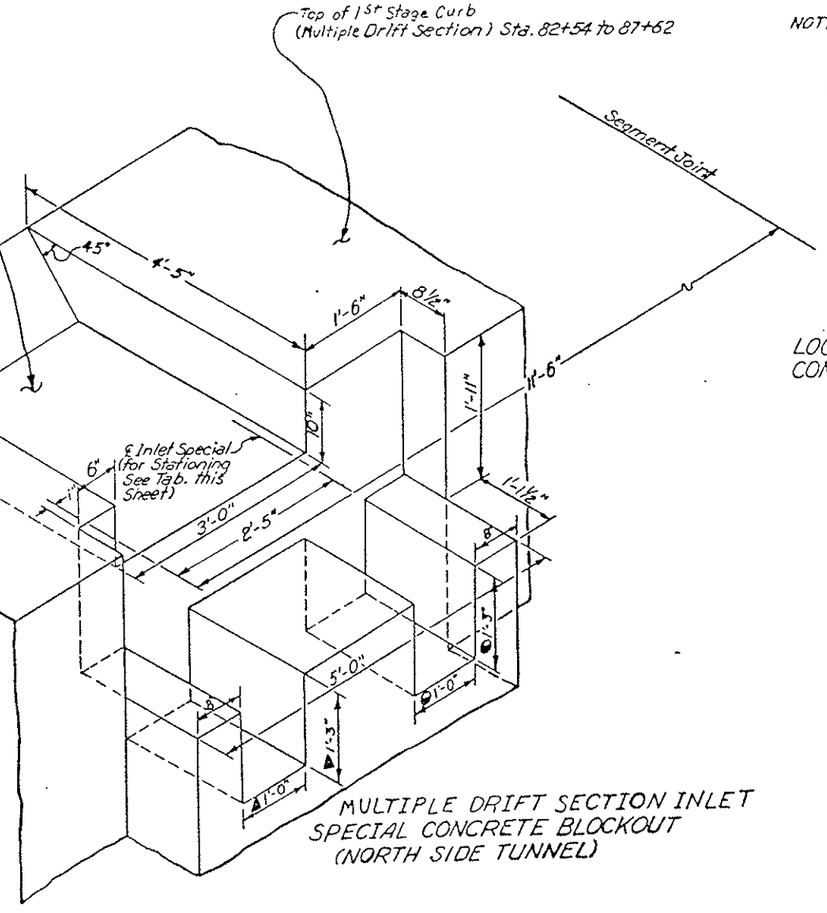
NO SCALE

SHEET D-8

FEDERAL ROAD REGION NO.	DIVISION	PROJ NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	97	273



TYPICAL INLET SPECIAL CONCRETE BLOCKOUT
(NORTH SIDE TUNNEL)



MULTIPLE DRIFT SECTION INLET
SPECIAL CONCRETE BLOCKOUT
(NORTH SIDE TUNNEL)

NOTES:
▲ This slot to be constructed at Inlet Special (Type "S") locations only.
● This slot to be constructed at Inlet Special (Type "T") locations only.

LOCATION OF TYPICAL INLET SPECIAL CONCRETE BLOCKOUTS (North Side Tunnel)

TYPE "S"		TYPE "T"	
SEGMENT NO.	STATION	SEGMENT NO.	STATION
5	41+23.60	2	39+72.85
11	44+25.10	8	42+74.35
17	47+26.60	14	45+75.85
23	50+28.10	20	48+77.35
29	53+29.60	26	51+78.85
35	56+31.10	32	54+80.35
41	59+32.60	38	57+81.85
47	62+34.10	44	60+83.35
53	65+35.60	50	63+84.85
59	68+37.10	56	66+86.35
65	71+38.60	62	69+87.85
71	74+40.10	68	72+89.35
77	77+41.60	74	75+90.85
83	80+43.10	80	78+92.35
101	89+47.60	86	81+93.85
107	92+49.10	98	87+96.85
113	95+50.60	104	90+98.35
119	98+52.10	110	93+99.85
125	101+53.60	116	97+01.35
131	104+55.10	122	100+02.85
137	107+56.60	128	103+04.35
143	110+58.10	134	106+05.85
149	113+59.60	140	109+07.35
155	116+61.10	146	112+08.85
161	119+62.60	152	115+10.35
		158	118+11.85
		164	121+13.35
		167	122+64.10
		East Portal	124+14.85

LOCATION OF MULTIPLE DRIFT SECTION INLET SPECIAL CONCRETE BLOCKOUTS (North Side Tunnel)

TYPE "S"		TYPE "T"	
SEGMENT NO.	STATION	SEGMENT NO.	STATION
89	83+44.60	92	84+95.35
95	86+46.10		

FIRST STAGE CURB BLOCKOUT DETAILS

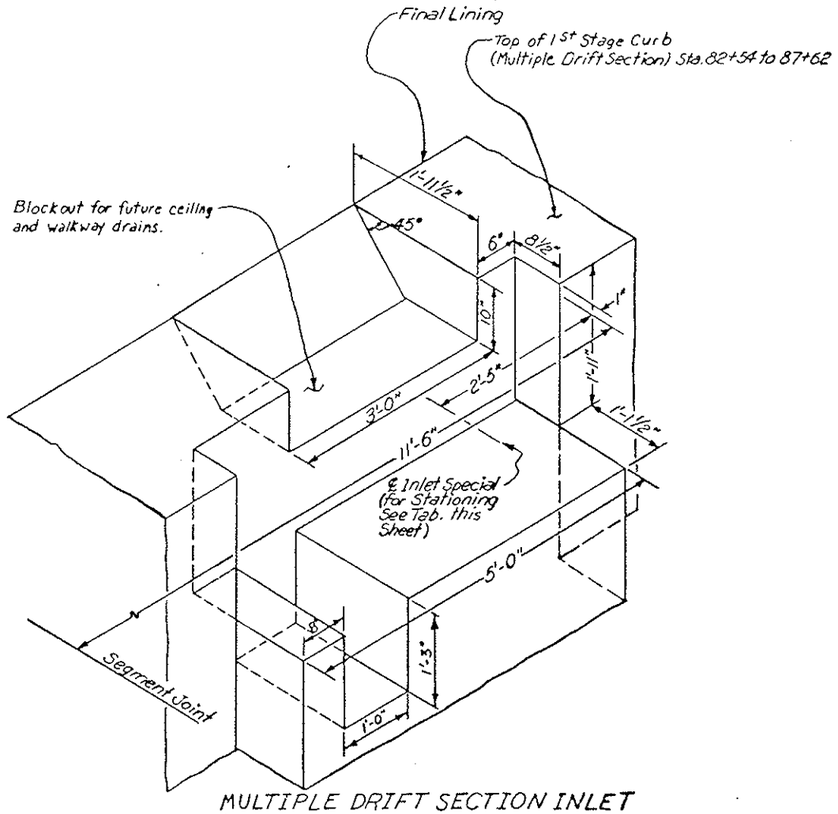
NORTH SIDE OF TUNNEL (LOOKING NORTHEAST)

NO SCALE

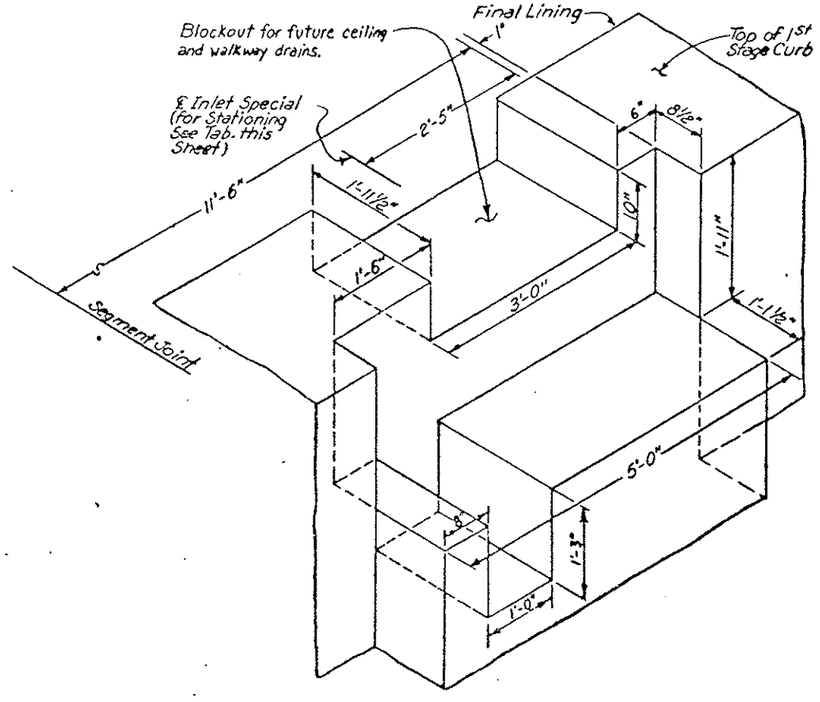
SHEET D-9

AS CONSTRUCTED					
DESIGNED 6-23-72	REVISED		DATE		

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
XX	COLORADO	I 70-3(31)220	98	273



MULTIPLE DRIFT SECTION INLET SPECIAL CONCRETE BLOCKOUT (SOUTH SIDE TUNNEL)



TYPICAL INLET SPECIAL CONCRETE BLOCKOUT (SOUTH SIDE TUNNEL)

LOCATION OF TYPICAL INLET SPECIAL CONCRETE BLOCKOUTS (South Side Tunnel)

TYPE "S"			
SEGMENT NO.	STATION	SEGMENT NO.	STATION
West Portal	35+71.35	77	77+41.60
West Portal	38+22.10	80	78+92.35
2	39+72.85	83	80+43.10
5	41+23.60	86	81+93.85
8	42+74.35	98	87+96.85
11	44+25.10	101	89+47.60
14	45+75.85	104	90+98.35
17	47+26.60	107	92+49.10
20	48+77.35	110	93+99.85
23	50+28.10	113	95+50.60
26	51+78.85	116	97+01.35
29	53+29.60	119	98+52.10
32	54+80.35	122	100+02.85
35	56+31.10	125	101+53.60
38	57+81.85	128	103+04.35
41	59+32.60	131	104+55.10
44	60+83.35	134	106+05.85
47	62+34.10	137	107+56.60
50	63+84.85	140	109+07.35
53	65+35.60	143	110+58.10
56	66+86.35	146	112+08.85
59	68+37.10	149	113+59.60
62	69+87.85	152	115+10.35
65	71+38.60	155	116+61.10
68	72+89.35	158	118+11.85
71	74+40.10	161	119+62.60
74	75+90.85		

LOCATION OF MULTIPLE DRIFT SECTION INLET SPECIAL CONCRETE BLOCKOUTS (South Side Tunnel)

TYPE "S"	
SEGMENT NO.	STATION
89	83+44.60
92	84+95.35
95	86+46.10

INLET SPECIAL
FIRST STAGE CURB BLOCKOUT
DETAILS

SOUTH SIDE OF TUNNEL (LOOKING SOUTHWEST)

NO SCALE

SHEET D-20

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	99	273

AS CONSTRUCTED

6-29-79

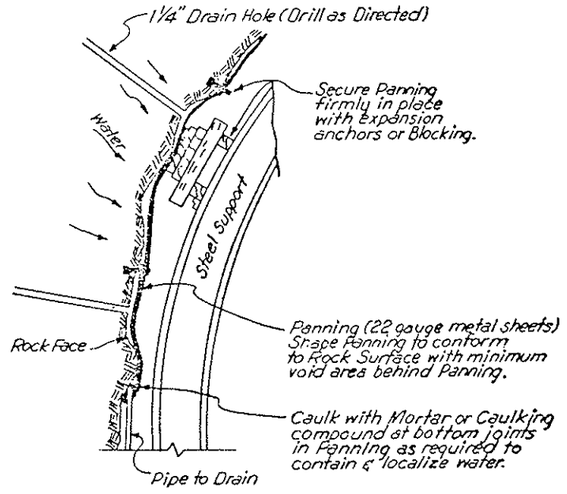
APPROXIMATE IDENTIFICATION OF DAMP & WET REACHES

STA	TO STA	APPROX LENGTH (LF)	DAMP	WET
WEST PORTAL	To 41+00	590		✓
41+00	To 45+30	130	✓	
45+30	To 45+50	20		✓
45+50	To 46+00	50	✓	
46+00	To 48+50	250		✓
48+50	To 48+90	40	✓	
48+90	To 49+10	20		✓
49+10	To 50+30	120	✓	
50+30	To 50+50	20		✓
50+50	To 53+30	280	✓	
53+30	To 53+50	20		✓
53+50	To 60+30	680	✓	
60+30	To 60+80	50		✓
60+80	To 61+20	40	✓	
61+20	To 61+60	40		✓
61+60	To 62+20	60	✓	
62+20	To 65+80	360		✓
65+80	To 66+60	80	✓	
66+60	To 71+20	460		✓
71+20	To 72+50	130	✓	
72+50	To 73+00	50		✓
73+00	To 73+60	60	✓	
73+60	To 74+10	50		✓
74+10	To 74+50	40	✓	
74+50	To 74+80	30		✓
74+80	To 76+10	130	✓	
76+10	To 77+00	90		✓
77+00	To 78+20	120	✓	
78+20	To 78+50	30		✓
78+50	To 79+50	100	✓	
79+50	To 80+80	130		✓
80+80	To 83+50	270	✓	
83+50	To 83+90	40		✓
83+90	To 89+60	570	✓	
89+60	To 90+50	90		✓
90+50	To 92+80	230	✓	
92+80	To 94+10	130		✓
94+10	To 95+10	100	✓	
95+10	To 98+20	310		✓
98+20	To 99+60	140	✓	
99+60	To 100+30	70		✓
100+30	To 101+20	90	✓	
101+20	To 101+30	10		✓
101+30	To 102+70	140	✓	
102+70	To 102+90	20		✓
102+90	To 105+80	290	✓	
105+80	To 109+00	320		✓
109+00	To 111+30	230	✓	
111+30	To 117+00	570		✓
117+00	To 119+00	200	✓	
119+00	To 120+00	100		✓
120+00	To East Portal	340	✓	
TOTALS		8530 L.F.	4660 LF	3870 LF

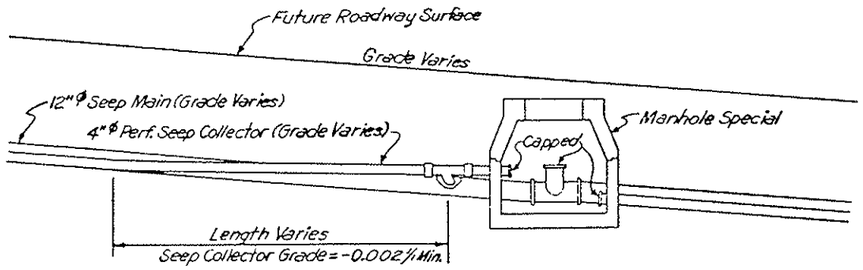
LIMITS OF 3" DRILLED HOLES IN INVERT AREAS

INVERT AREAS
Sta. to Sta.
62+06 to 65+42
69+62 to 74+58
79+98 to 109+42
118+50 to 121+22

DETAILS OF SHEET METAL FOR PANNING



DETAIL OF SEEP COLLECTOR CONNECTION TO SEEP MAIN



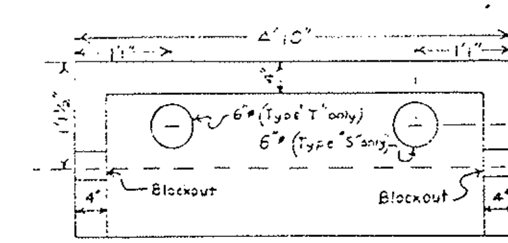
DRAINAGE SYSTEM TABLES, PANNING & SEEP CONNECTION DETAILS

NO SCALE

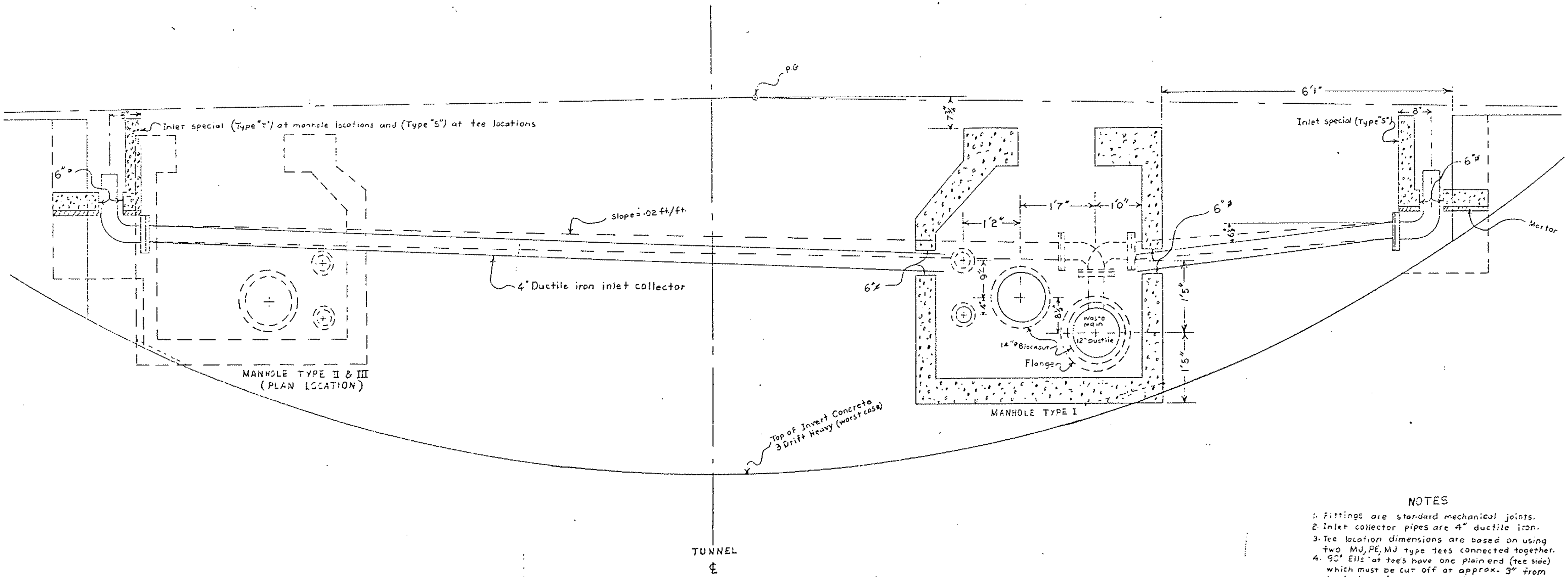
SHEET D-8

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I70-3(6)280	99AX	273

AS CONST — REVISED 6-29-79



PLAN VIEW PRECAST INLET SPECIAL
(TYPE "S" & "T")



NOTES

1. Fittings are standard mechanical joints.
2. Inlet collector pipes are 4" ductile iron.
3. Tee location dimensions are based on using two MJ, PE, MJ type tees connected together.
4. 90° Ells at tee's have one plain end (tee side) which must be cut off at approx. 3" from beginning of bend ~ to fit.
5. Blockouts must be grouted after installing pipe.

CONTRACT MODIFICATION ORDER NO. 15

SEEP & WASTE DRAINAGE REVISED

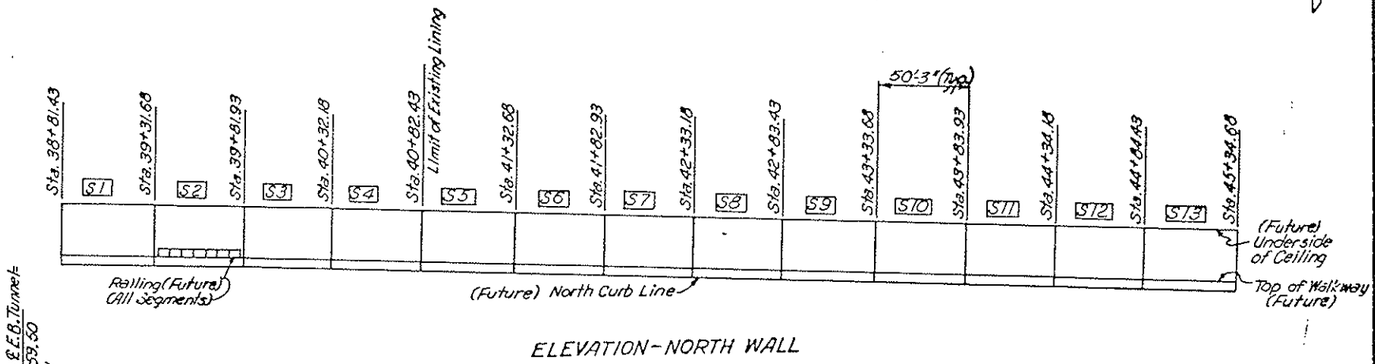
ORIGINAL SCALE 1"=1'

DATE 2-23-77 DRWN & CALC BY [illegible]

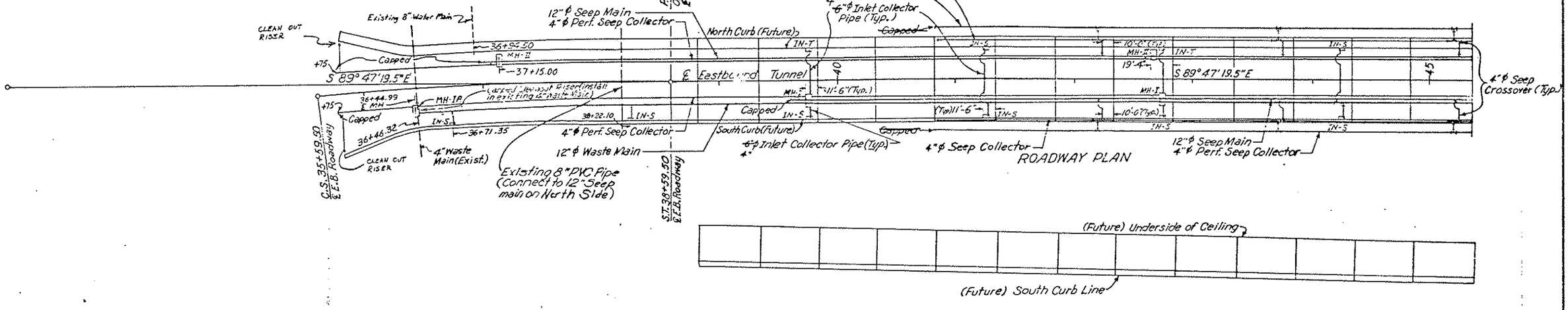
REGION NO.	DIVISION	PROJECT NO.	NO.	SHEETS
VIII	COLORADO	I 70-3(81)220	100	273

AS CONSTRUCTED

NO REVISIONS — ADDED 6-29-79 — VOID



ELEVATION - NORTH WALL



REFLECTED ELEVATION - SOUTH WALL

LEGEND

MH-I	Manhole Special Type I
MH-IA	Manhole Special Type IA
MH-II	Manhole Special Type II
MH-III	Manhole Special Type III (Equalizer)
IN-S	Inlet Special Type S
IN-T	Inlet Special Type T
S-1	Segment No. (Length = 50'-3") (Typ.)

TUNNEL
GENERAL ARRANGEMENTS
WEST PORTAL TO STA. 45+34.68

NO SCALE

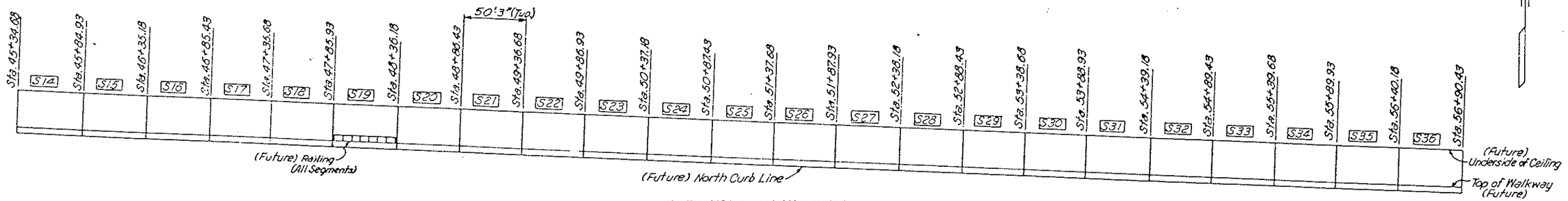
SHEET D-12

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(31)220	101	273

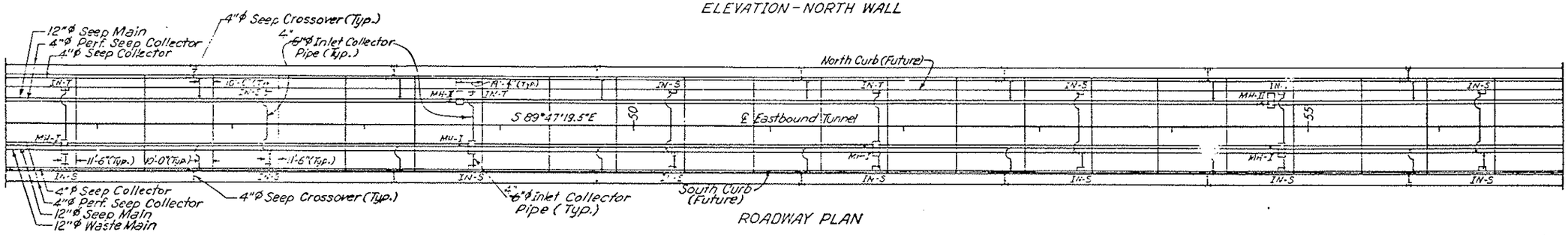
AS CONSTRUCTED

APPROVED 6-29-79 DATE

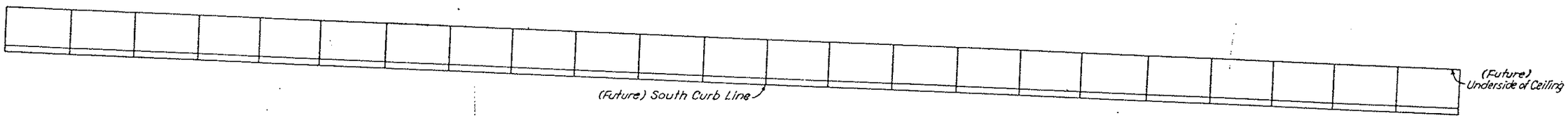
N



ELEVATION - NORTH WALL



ROADWAY PLAN



REFLECTED ELEVATION-SOUTH WALL

LEGEND

MH-I	Manhole Special Type I
MH-II	Manhole Special Type II
MH-III	Manhole Special Type III (Equalizer)
IN-S	Inlet Special Type "S"
IN-T	Inlet Special Type "T"
S14	Segment No. (Length = 50'-3") (Typ.)

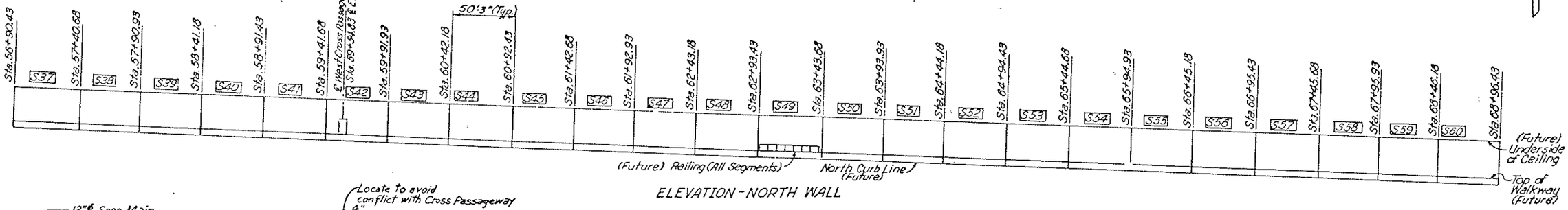
TUNNEL
GENERAL ARRANGEMENTS
STA. 45+34.68 TO STA. 56+90.43

NO SCALE

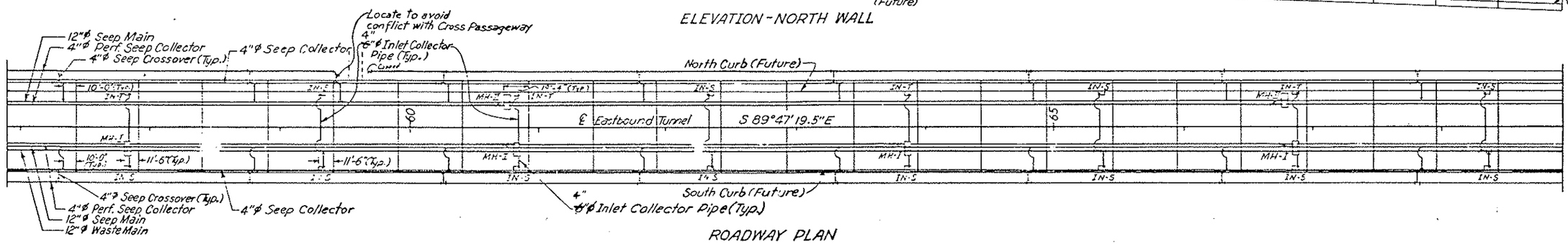
SHEET D-13

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(61)220	102	273

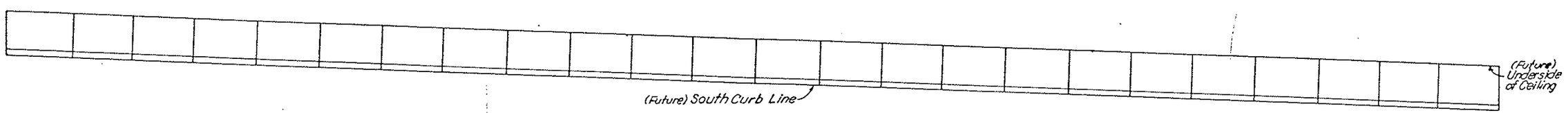
6-20-79



ELEVATION - NORTH WALL



ROADWAY PLAN



REFLECTED ELEVATION - SOUTH WALL

LEGEND

- MH-I, MH-II, MH-III — Manhole Special Type I / Manhole Special Type II / Manhole Special Type III (Equalizer)
- IN-S, IN-T — Inlet Special Type "S" / Inlet Special Type "T"
- S37 — Segment No. (Length = 50'-3") (Typ.)

TUNNEL
GENERAL ARRANGEMENTS
STA. 56+90.43 TO STA. 68+96.43

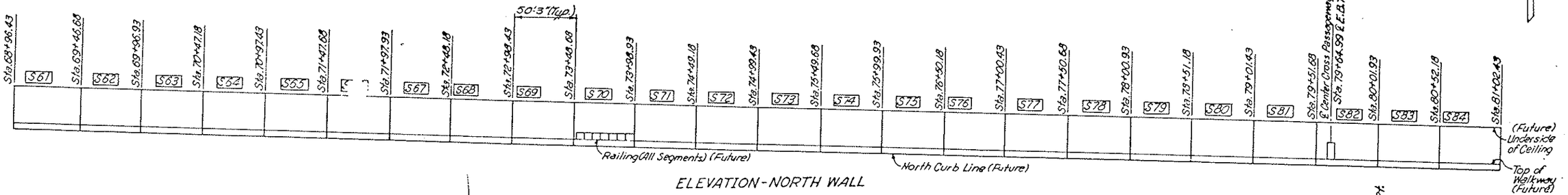
NO SCALE

SHEET D-14

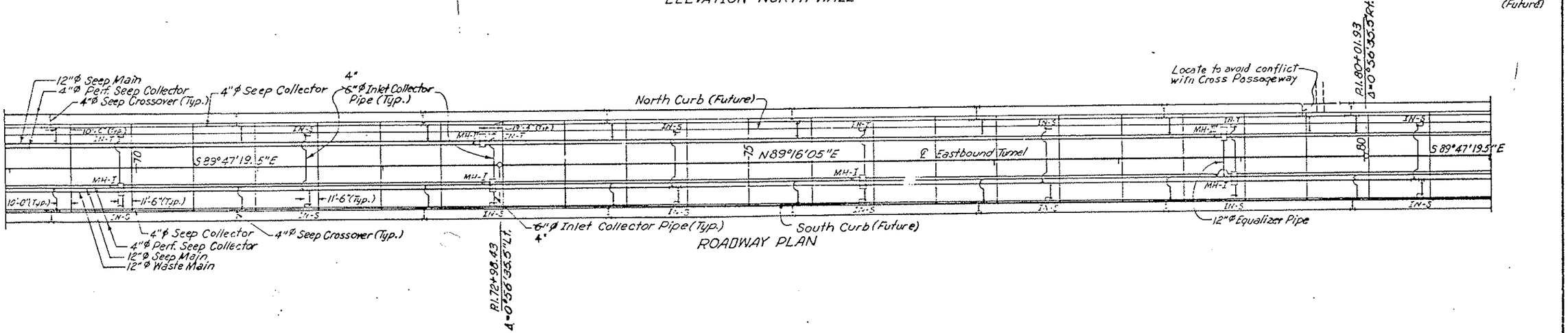
FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
XVI	COLORADO	I 70-3(31)220	103	273

AS CONSTRUCTED

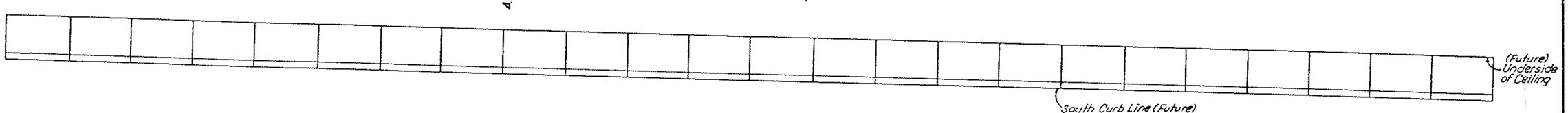
NO REVISIONS | REVISED 6-29-79 | YOLO



ELEVATION-NORTH WALL



ROADWAY PLAN



REFLECTED ELEVATION-SOUTH WALL

LEGEND

MH-I	Manhole Special Type I
MH-II	Manhole Special Type II
MH-III	Manhole Special Type III (Equalizer)
IN-S	Inlet Special Type S
IN-T	Inlet Special Type T
S61	Segment No. (Length = 50'-3") (Typ)

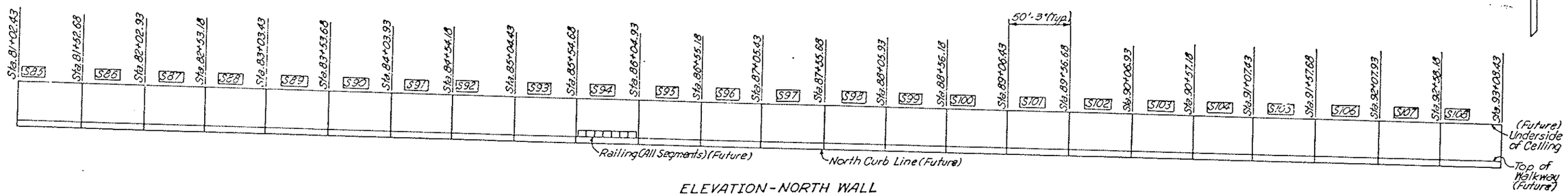
TUNNEL
GENERAL ARRANGEMENTS
STA. 68+96.43 TO STA. 81+02.43

NO SCALE

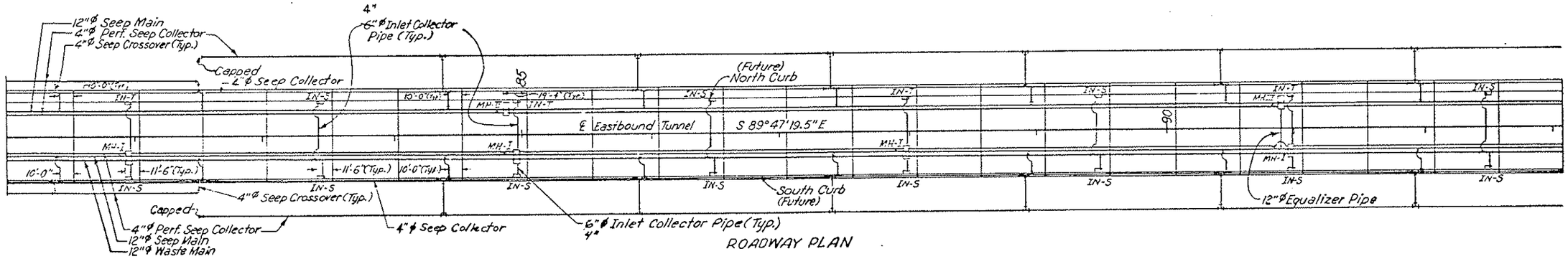
SHEET D-15

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
XII	COLORADO	I 70-3(81)220	104	275

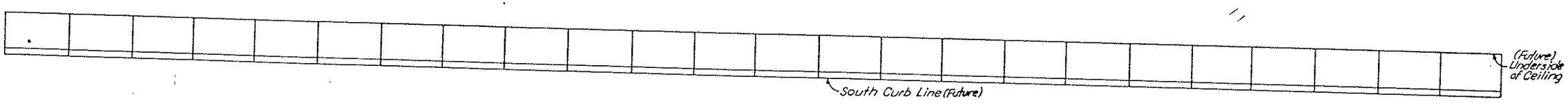
AS CONSTRUCTED
NO REVISIONS | REVISED 6-20-79 | VOID



ELEVATION - NORTH WALL



ROADWAY PLAN



REFLECTED ELEVATION - SOUTH WALL

LEGEND

- MH-I Manhole Special Type I
- MH-II Manhole Special Type II
- MH-III Manhole Special Type III (Equalizer)
- IN-S Inlet Special Type S
- IN-T Inlet Special Type T
- S85 Segment No. (Length = 50'-3") (Typ.)

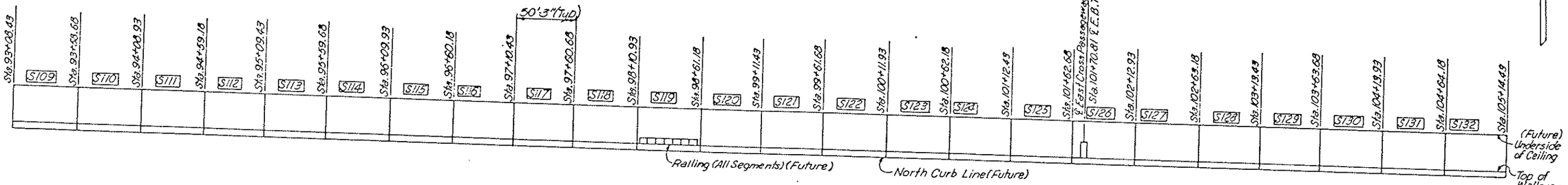
TUNNEL
GENERAL ARRANGEMENTS
STA. 81+02.43 TO STA. 93+08.43

NO SCALE

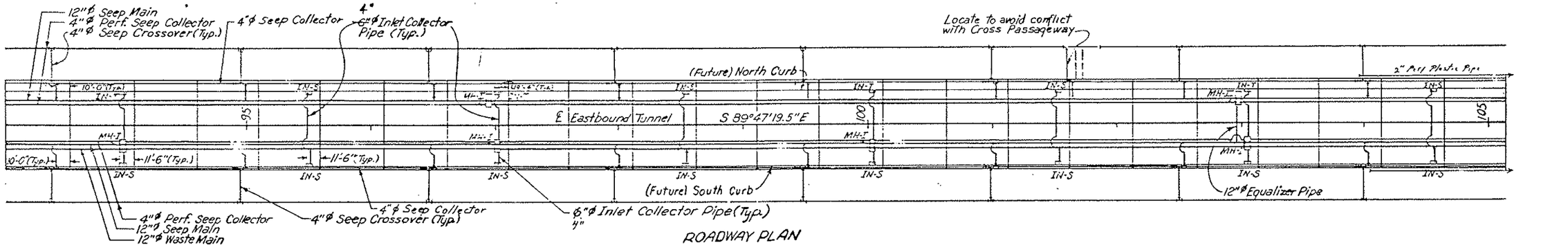
SHEET D-05

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	105	273

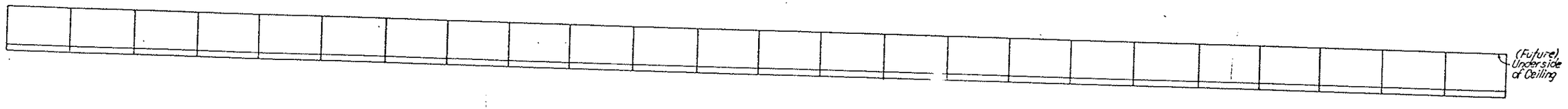
6-29-79



ELEVATION - NORTH WALL



ROADWAY PLAN



REFLECTED ELEVATION - SOUTH WALL

LEGEND

MH-I	Manhole Special (Type I)
MH-II	Manhole Special (Type II)
MH-III	Manhole Special (Type III) (Equalizer)
IN-S	Inlet Special Type S
IN-T	Inlet Special Type T
S109	Segment No. (Length = 50'-3") (Typ.)

TUNNEL
GENERAL ARRANGEMENTS
STA. 93+08.43 TO STA. 105+14.43

NO SCALE

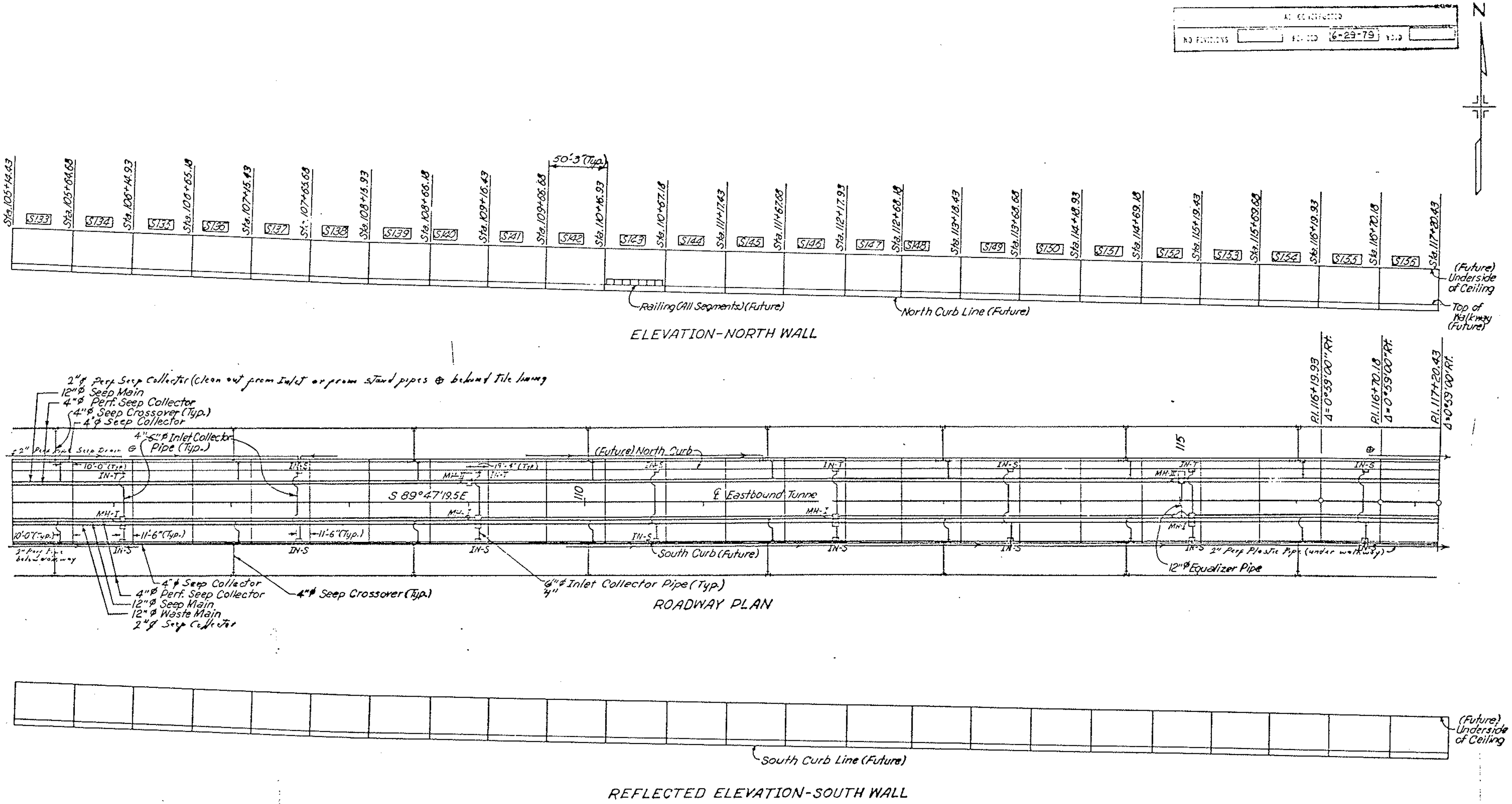
SHEET D-17

STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS · STATE OF COLORADO
D O H FORM 126
JULY 1968

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	106	273

AS CONSTRUCTED

NO REVISIONS [ ] REVISED 6-29-79 VOID [ ]



LEGEND

- MH-I Manhole Special (Type I)
- MH-II Manhole Special (Type II)
- MH-III Manhole Special (Type III) (Equalizer)
- IN-S Inlet Special, Type S
- IN-T Inlet Special, Type T
- S133 Segment No. (Length=50'-3") (Typ.)

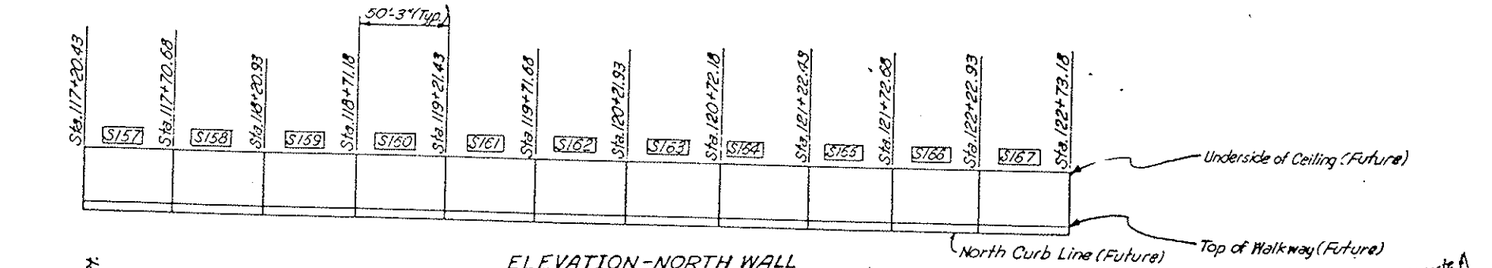
TUNNEL
GENERAL ARRANGEMENTS
STA. 105+14.43 TO STA. 117+20.43

NO SCALE

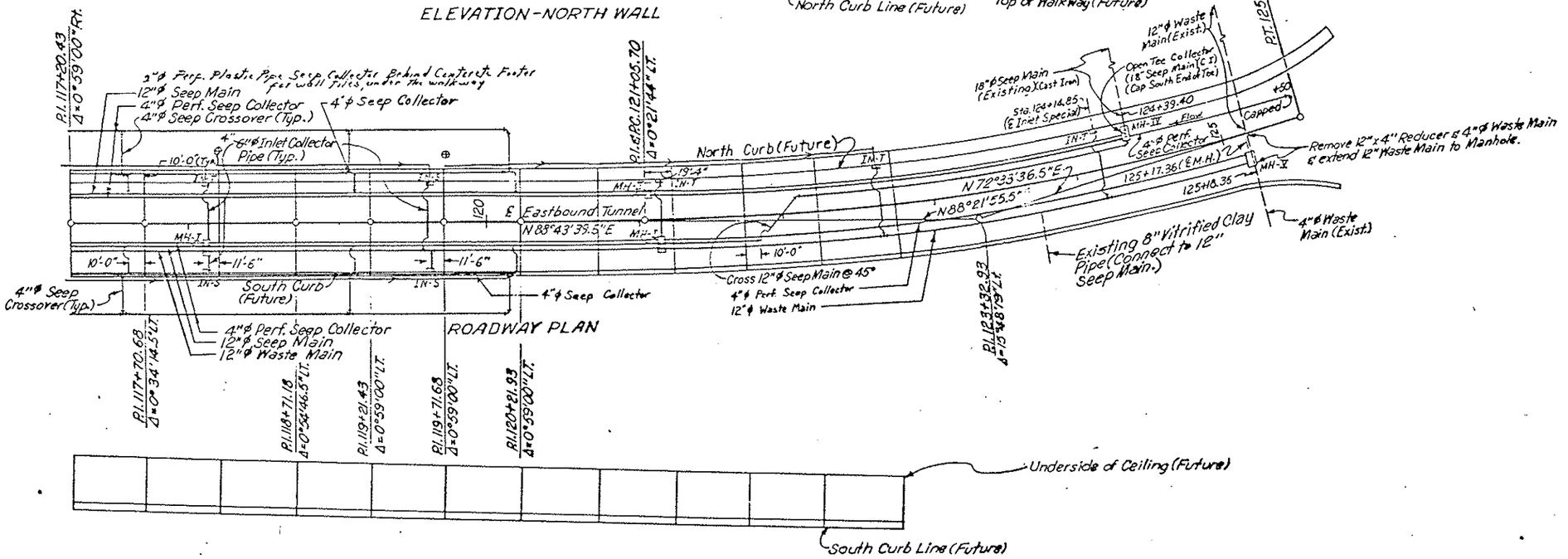
SHEET D-18

FEDERAL AID REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	107	273

	AS CONSTRUCTED		
NO REVISIONS		6-29-79	INITIALS



ELEVATION - NORTH WALL



REFLECTED ELEVATION - SOUTH WALL

LEGEND

- MH-I Manhole Special (Type I)
- MH-II Manhole Special (Type II)
- MH-III Manhole Special (Type III) (Equalizer)
- MH-U Manhole Special (Type II)
- MH-V Manhole Special (Type V)
- IN-S Inlet Special Type 'S'
- IN-T Inlet Special Type 'T'
- S157 Segment No. (Length = 50'-3") (Typ.)

TUNNEL
GENERAL ARRANGEMENTS
STA. 117+20.43 TO EAST PORTAL

1" = 10' SCALE

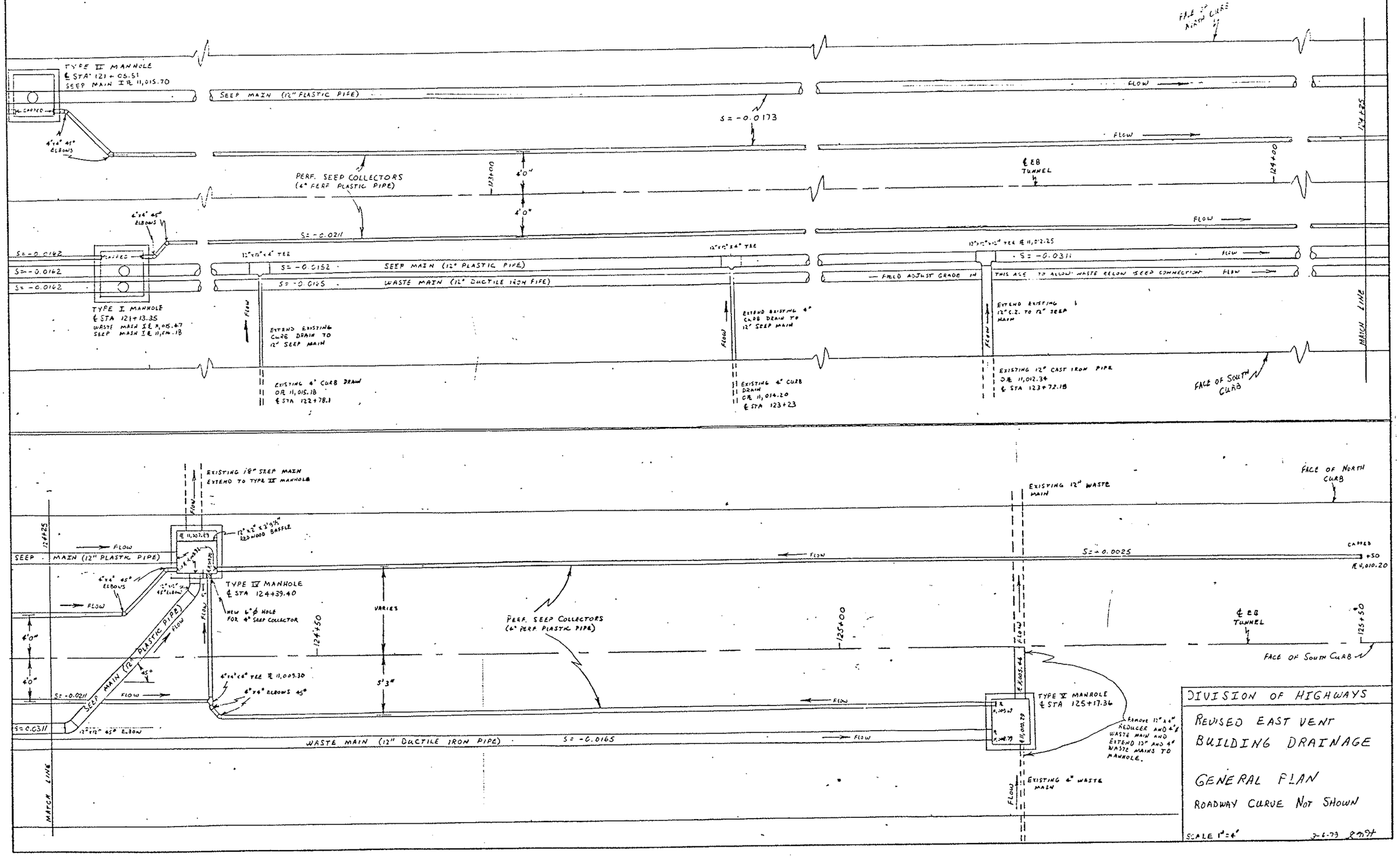
SHEET D-12

DIVISION OF HIGHWAYS, STATE OF COLORADO
C.D.H. FORM NO. 126
REV. FEB., 1977

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(31)213	07 AX	273

AS CONSTRUCTED

NO REVISIONS ☐ REVISED 6-25-79 VOID ☐



DIVISION OF HIGHWAYS

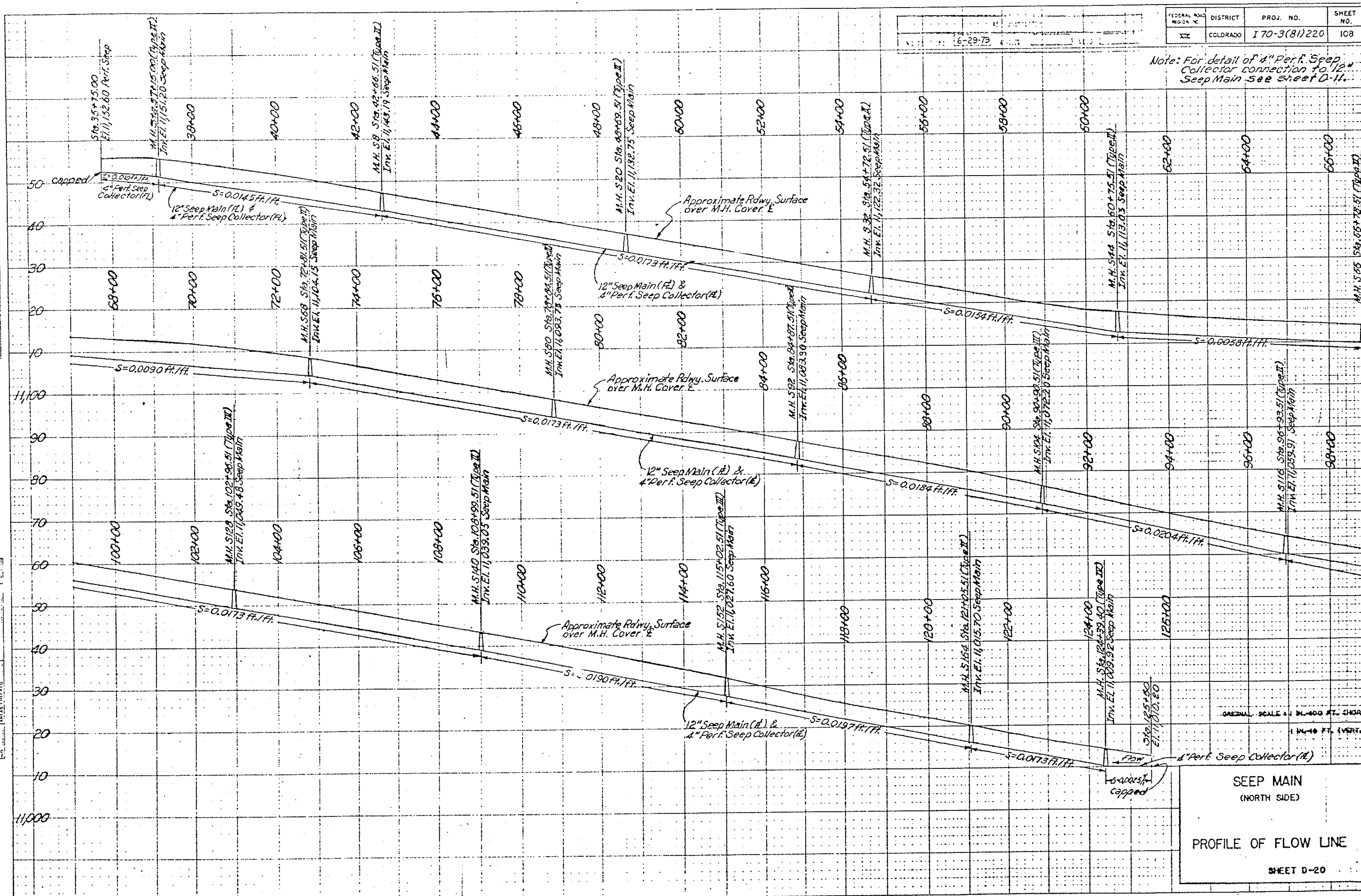
REVISED EAST VENT BUILDING DRAINAGE

GENERAL PLAN

ROADWAY CURVE NOT SHOWN

SCALE 1"=4'

7-6-79 RMH



FEDERAL ROAD REGION NO. | DISTRICT | PROJ. NO. | SHEET NO.
XIX | COLORADO | I 70-3(81)220 | 108
6-29-73
Note: For detail of 4" Perf. Seep Collector connection to 12" Seep Main see Sheet D-11.
Sta. 35+75.00 El. 11,153.60 Perf. Seep
capped
4" Perf. Seep Collector (FL)
12" Seep Main (FL) & 4" Perf. Seep Collector (FL)
S=0.0145 ft./ft.
S=0.0173 ft./ft.
S=0.0154 ft./ft.
S=0.0058 ft./ft.
Approximate Rdwy. Surface over M.H. Cover ℄
M.H. S20 Sta. 48+69.51 (Type II) Inv. El. 11,132.75 Seep Main
M.H. S44 Sta. 60+75.51 (Type II) Inv. El. 11,113.03 Seep Main
12" Seep Main (℄) & 4" Perf. Seep Collector (℄)
S=0.0090 ft./ft.
S=0.0184 ft./ft.
S=0.0204 ft./ft.
M.H. S68 Sta. 72+81.51 (Type II) Inv. El. 11,104.15 Seep Main
M.H. S92 Sta. 84+87.51 (Type II) Inv. El. 11,083.30 Seep Main
M.H. S116 Sta. 96+93.51 (Type II) Inv. El. 11,059.91 Seep Main
S=0.0173 ft./ft.
S=0.0190 ft./ft.
S=0.0197 ft./ft.
S=0.0173 ft./ft.
M.H. S128 Sta. 102+96.51 (Type III) Inv. El. 11,049.48 Seep Main
M.H. S140 Sta. 108+99.51 (Type III) Inv. El. 11,039.05 Seep Main
M.H. S152 Sta. 115+02.51 (Type III) Inv. El. 11,027.60 Seep Main
M.H. S164 Sta. 121+05.51 (Type II) Inv. El. 11,015.70 Seep Main
Sta. 125+80 El. 11,010.20
4" Perf. Seep Collector (℄)
Flow
capped
ORIGINAL SCALE 1 IN.=400 FT. (HOR.)
1 IN.=40 FT. (VERT.)
SEEP MAIN
(NORTH SIDE)
PROFILE OF FLOW LINE
SHEET D-20

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.
VIII	COLORADO	I 70-3(81)220	109

NOTE: For detail of 4" Perf. Seep Collector connection to 12" Seep Main, see Sheet D-11.

WASTE & SEEP MAINS
(SOUTH SIDE)

PROFILE OF FLOW LINES

SHEET D-21

ORIGINAL SURVEY — NOTE BOOK — DATE — SUBMITTED — PLOTTED — CHECKED — AREA CHECKED — AREA

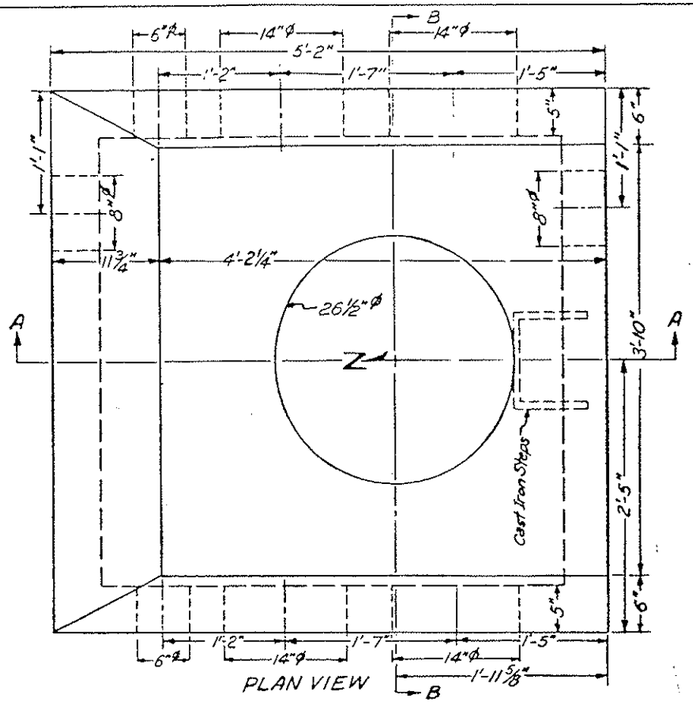
FINAL SURVEY — NOTE BOOK — DATE — SUBMITTED — PLOTTED — CHECKED — AREA CHECKED — AREA

DETAILS OF MANHOLE SPECIAL (TYPE I)

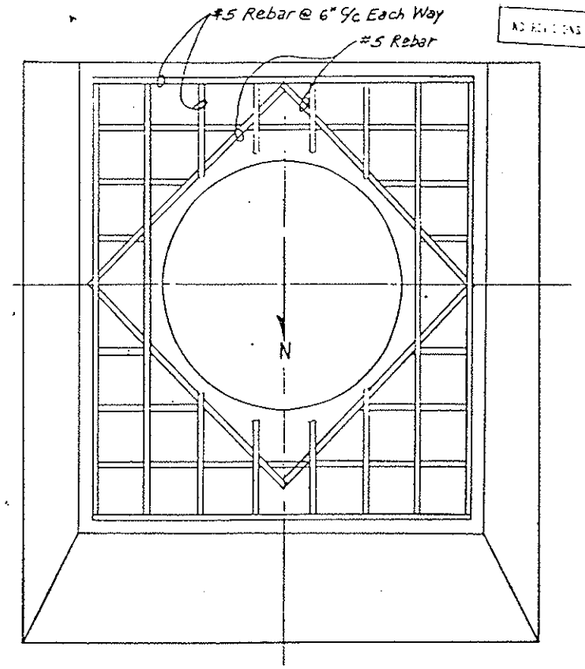
FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(61)220	110	273

AS CONSTRUCTED
NO REVISIONS — REVISED 4-29-75

NOTE:
▲ This hole is located on west Wall of Manhole (See Plan View) and is shown here for information only. (SECTION A-A)
Ø Indicates circular hole.



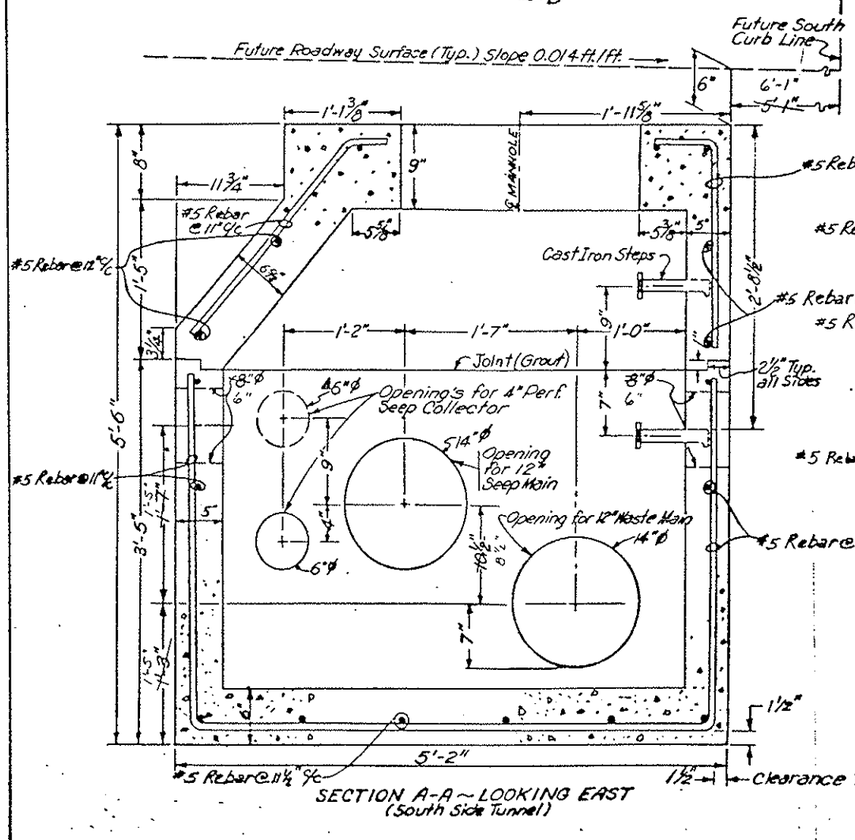
PLAN VIEW



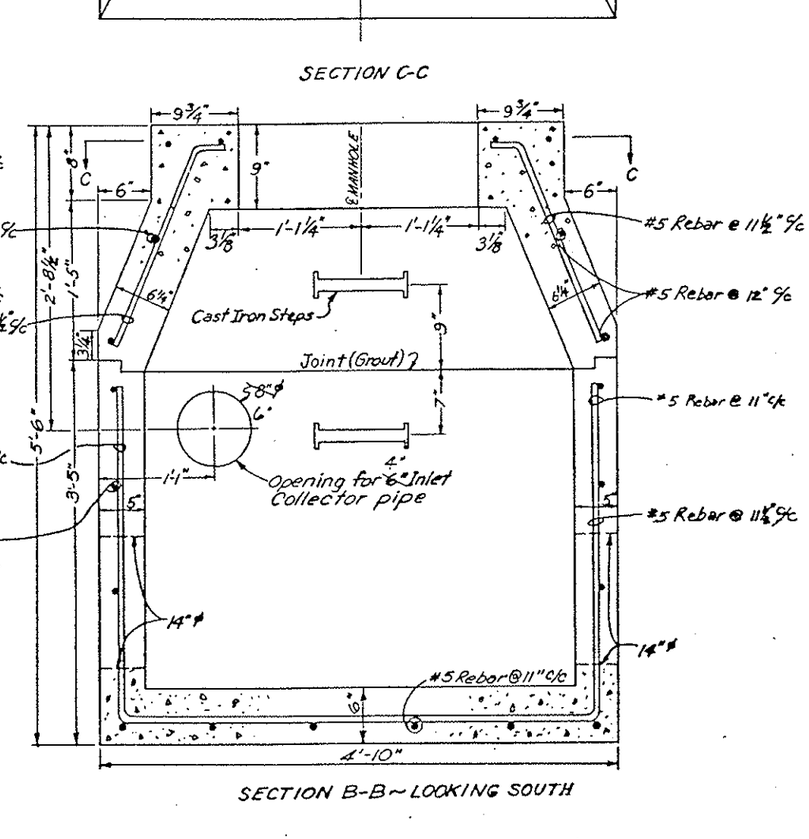
SECTION C-C

Locations of Manhole Special (Type I) (South Side Tunnel)

SEGMENT No	STATION
2	39+71.85
8	42+74.35
14	45+75.85
20	48+77.35
26	51+78.85
32	54+80.35
38	57+81.85
44	60+83.35
50	63+84.85
56	66+86.35
62	69+87.85
68	72+89.35
74	75+90.85
80	78+92.35
86	81+93.85
92	84+95.35
98	87+96.85
104	90+98.35
110	93+99.85
116	97+01.35
122	100+02.85
128	103+04.35
134	106+05.85
140	109+07.35
146	112+08.85
152	115+10.35
158	118+11.85
164	121+13.35



SECTION A-A ~ LOOKING EAST
(South Side Tunnel)



SECTION B-B ~ LOOKING SOUTH

GENERAL NOTES

For detail of Cast Iron Steps see Standard M-604-D

Grout around pipes at Manhole Specials.

Precast Manholes shall conform to ASTM Designation C478.

Cast in place Manholes shall be Class A, B or D Concrete.

The Contractor shall make the approved adjustments, that are necessary to assure that the surfaces of the Concreted invert strut do not interfere with the proper location of Manholes. Any work that is required to achieve the approved adjustments will not be paid for separately, but shall be included in the work.

MANHOLE SPECIAL TYPE I DETAILS

NO SCALE — SHEET D-22

...SION OF HIGHWAYS STATE OF COLORADO
...H. FORM NO. 128
... MARCH 1974

DETAILS OF MANHOLE SPECIAL (TYPE IA)

(Sta. 36+44.99 South Side)

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	111	273

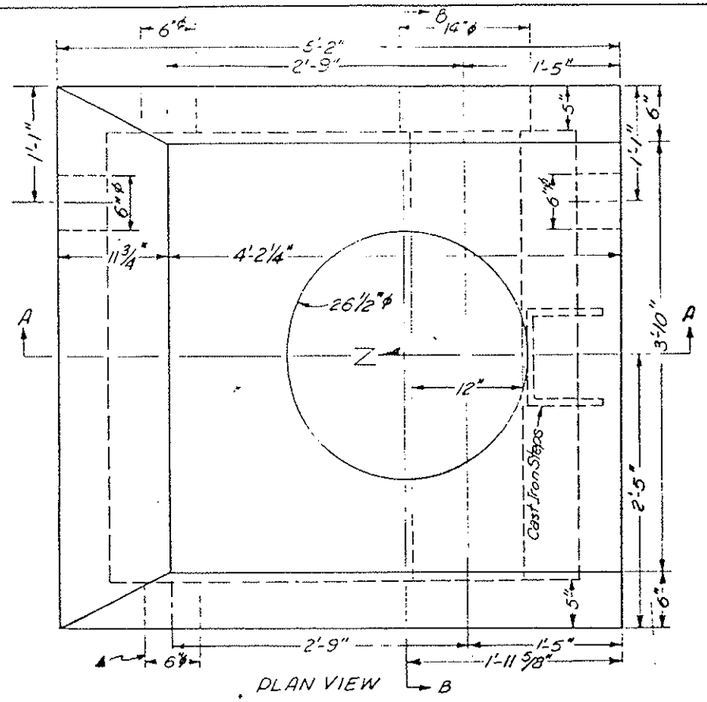
Notes:

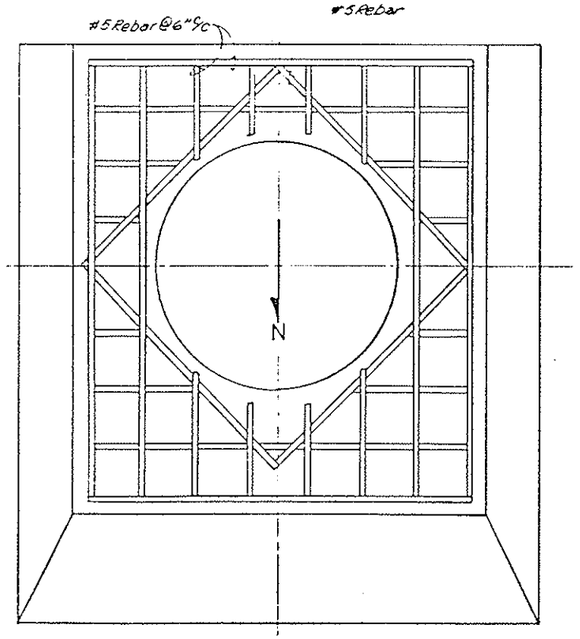
▲ This hole same elevation as 6" hole on east side. See Section A-A for placement.

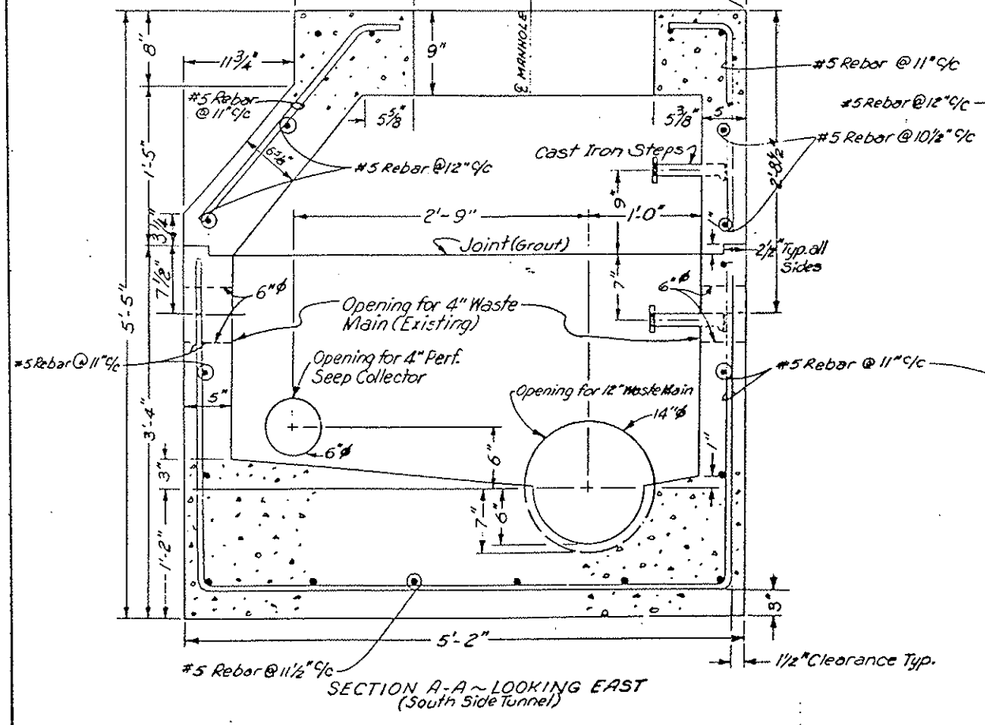
ϕ Indicates circular hole.

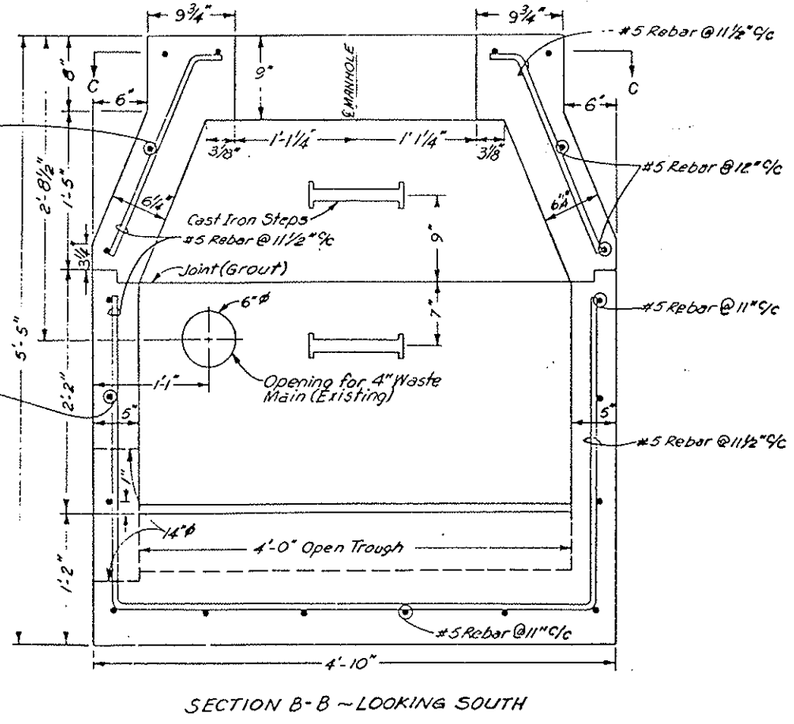
AS CONSTRUCTED

NO REVISIONS | REVISED 6-29-79 | VOID









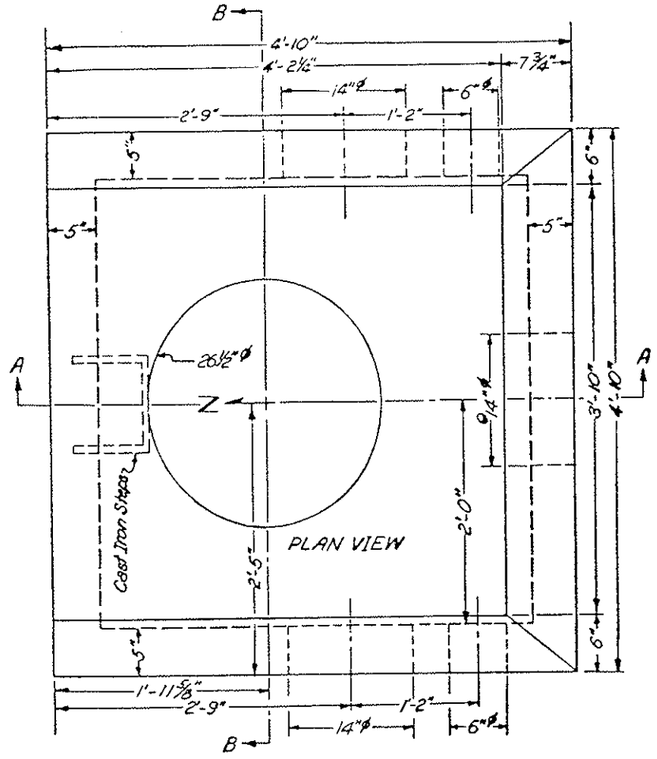
MANHOLE SPECIAL TYPE I-A DETAILS

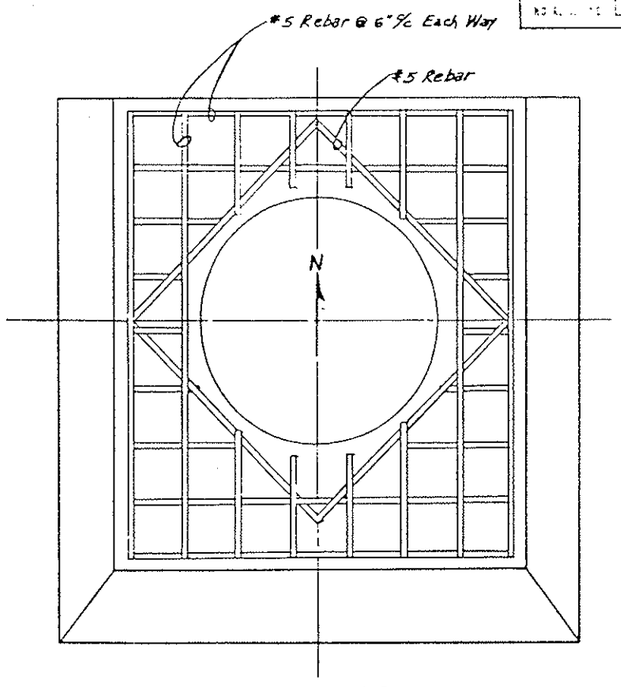
NO SCALE SHEET D-23

DETAILS OF MANHOLE SPECIAL (TYPE II & III)

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81) 220	112	273

6-29-79





SECTION C-C

NOTES:

▲ This hole is located on West Wall of Manhole (See Plan View) and is shown here for information only. (SECTION A-A)

Ø Opening in Manhole Special (Type III) only. (Segments 80, ~~104, 128~~ and 152)

● Delete this step in Manhole Special (Type III) (Segments 80, ~~104, 128~~ and 152)

ϕ Indicates circular hole.

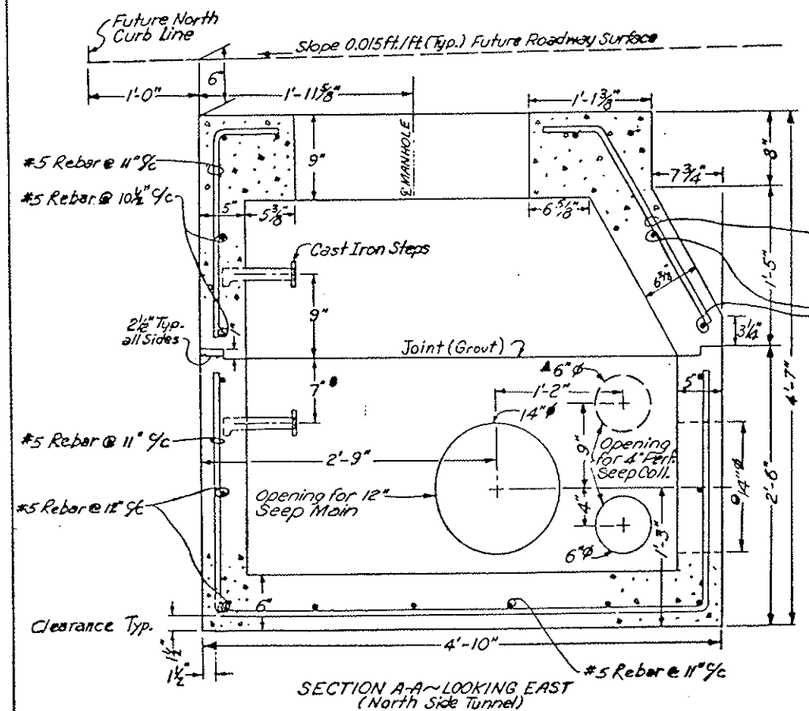
Locations of Manhole Special (Type II & III) (North Side Tunnel)

Type II

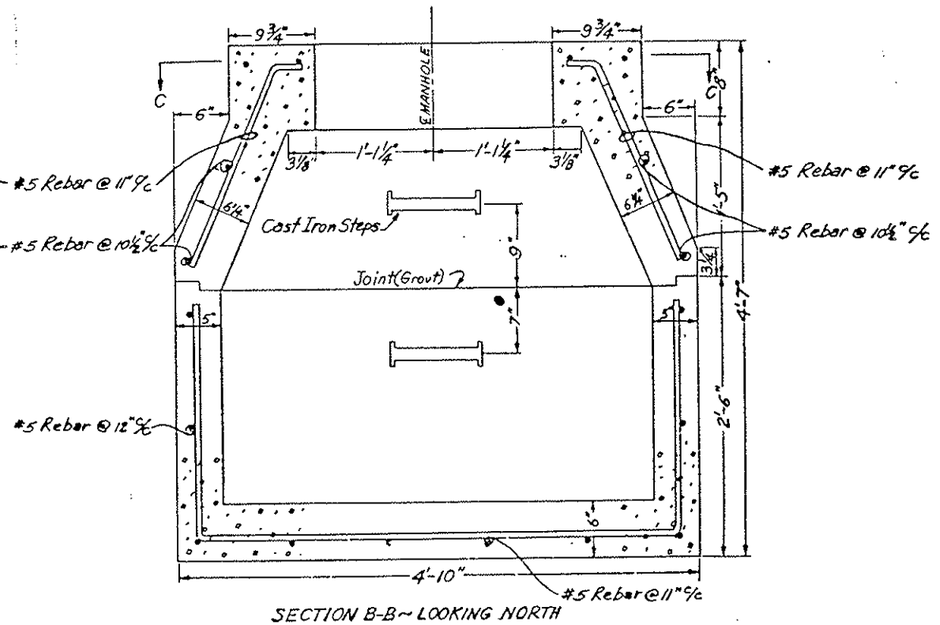
SEGMENT #	STATION
—	37+15.00
B	42+66.51
20	48+69.51
32	54+72.51
44	60+75.51
56	66+78.51
68	72+81.51
~~92~~	~~84+87.51~~
~~116~~	~~96+93.51~~
~~140~~	~~108+99.51~~
164	121+05.51

Type III

SEGMENT #	STATION
80	78+84.51
~~104~~	~~90+90.51~~
~~128~~	~~102+96.51~~
152	115+02.51



SECTION A-A ~ LOOKING EAST
(North Side Tunnel)



SECTION B-B ~ LOOKING NORTH

MANHOLE SPECIAL TYPE II&III DETAILS

NO SCALE

SHEET D-24

©DETAILS OF MANHOLE SPECIAL(TYPE IIA & IIIA).

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
XX	COLORADO	I70-3(211)220	112Ax	273

AS CONSTRUCTED
NO REVISIONS ____ REVISED 6-29-72 NOTE ____

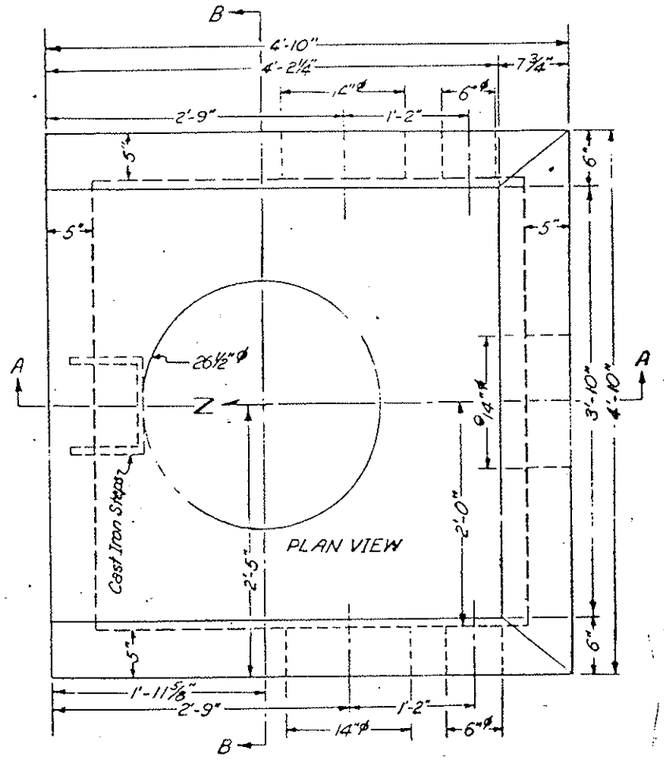
NOTES:

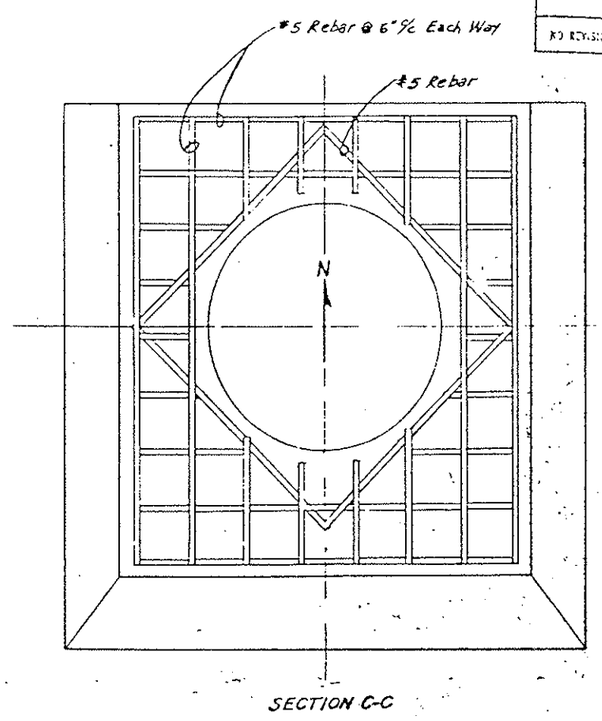
▲ This hole is located on West Wall of Manhole (See Plan View) and is shown here for information only. (SECTION A-A)

① ● Opening in Manhole Special (Type IIIA) only. (Segments 104 and 128).

① ● Delete this step in Manhole Special (Type IIIA) (Segments 104 and 128).

ϕ Indicates circular hole.





SECTION C-C

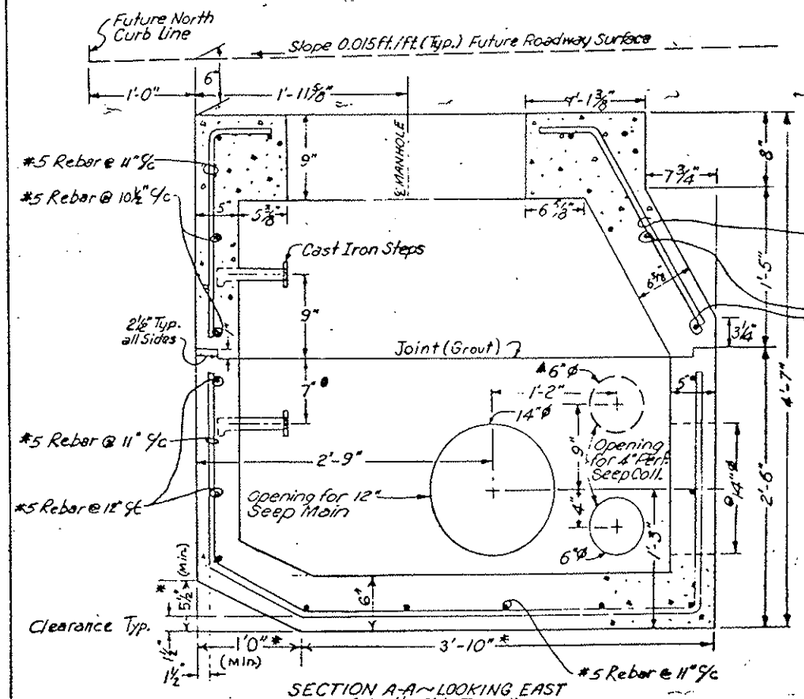
① Locations of Manhole Special (Type IIA & IIIA) (NORTH SIDE TUNNEL)

Type IIA

SEGMENT No.	STATION
	37+..
	"
	"
	"
	"
	"
	"
92	84+87.51
116	96+93.51
140	108+99.51

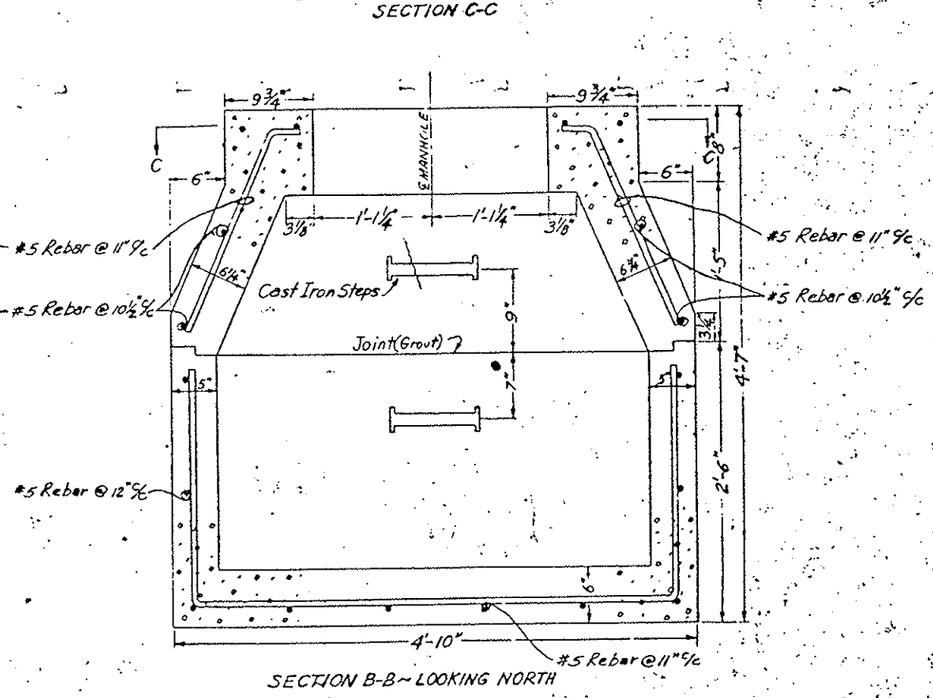
Type IIIA

SEGMENT No.	STATION
	"
104	90+96.51
128	102+96.51



SECTION A-A~LOOKING EAST
(North Side Tunnel)

① * These dimensions will clear invert if invert concrete is at or below Plan elevation.



SECTION B-B~LOOKING NORTH

©Revised 3-31-77

©MANHOLE SPECIAL TYPE IIA & IIIA DETAILS

NO SCALE

SHEET D-24A

DETAILS OF MANHOLE SPECIAL (TYPE IV)

(Sta. 124+39.40 North Side)

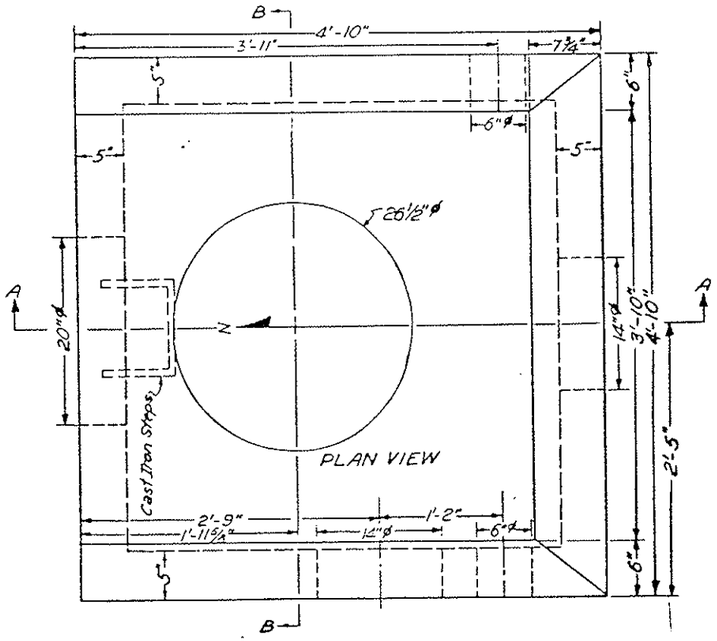
FEDERAL ROAD REGION NO	DIVISION	PROJ. NO	SHEET NO.	TOTAL SHEETS
VI	COLORADO	I70-3(81)220	113	273

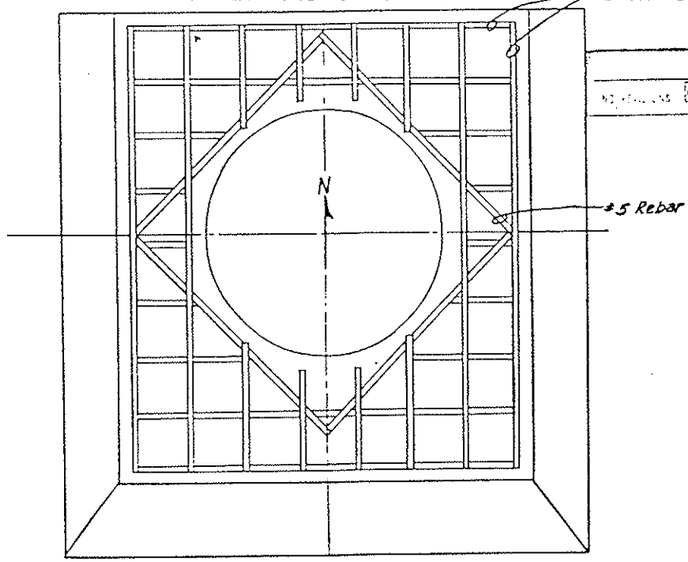
NOTES:

▲ This hole is located on West Wall of Manhole (See Plan View) and is shown here for information only. (SECTION A-A)

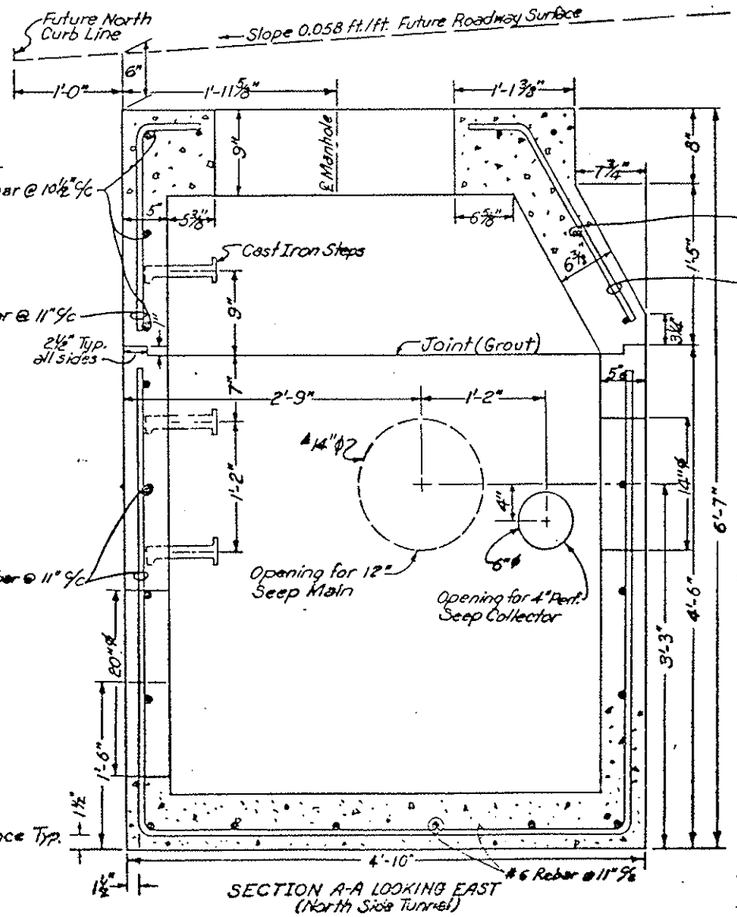
● This hole is located on South Wall of Manhole (See Plan View) and is shown here for information only. (SECTION B-B)

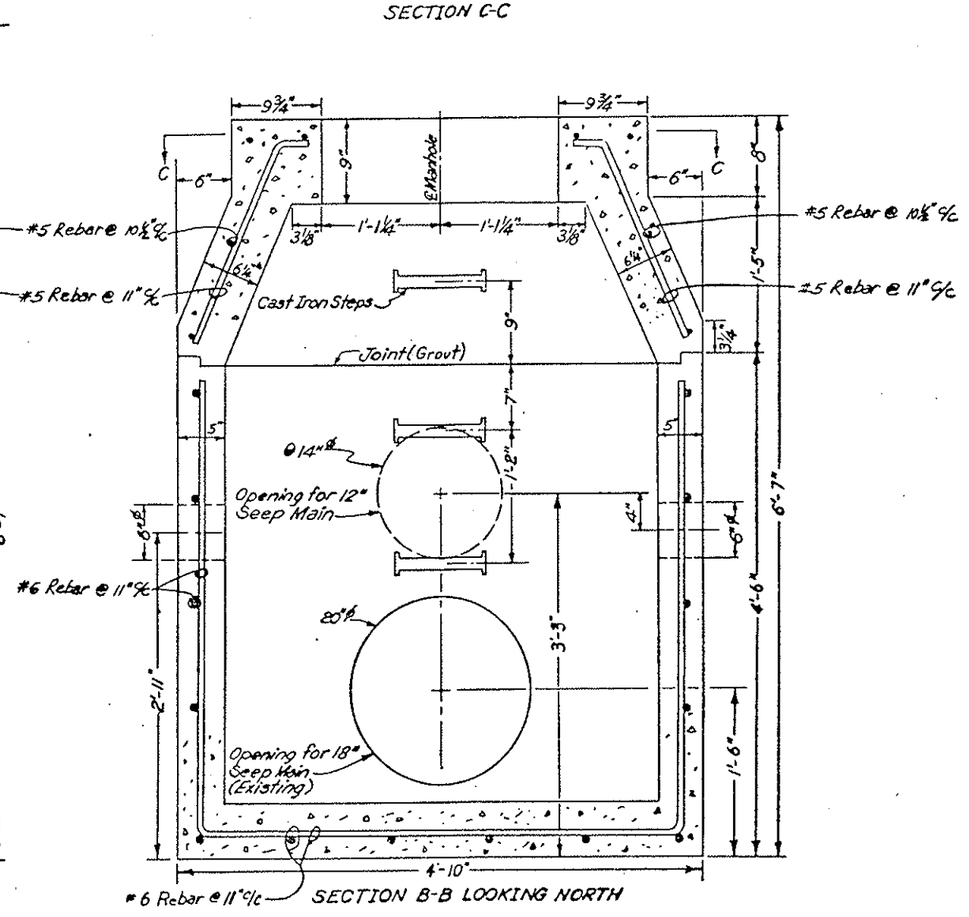
ϕ Indicates circular hole.





SECTION C-C





MANHOLE SPECIAL TYPE IV DETAILS

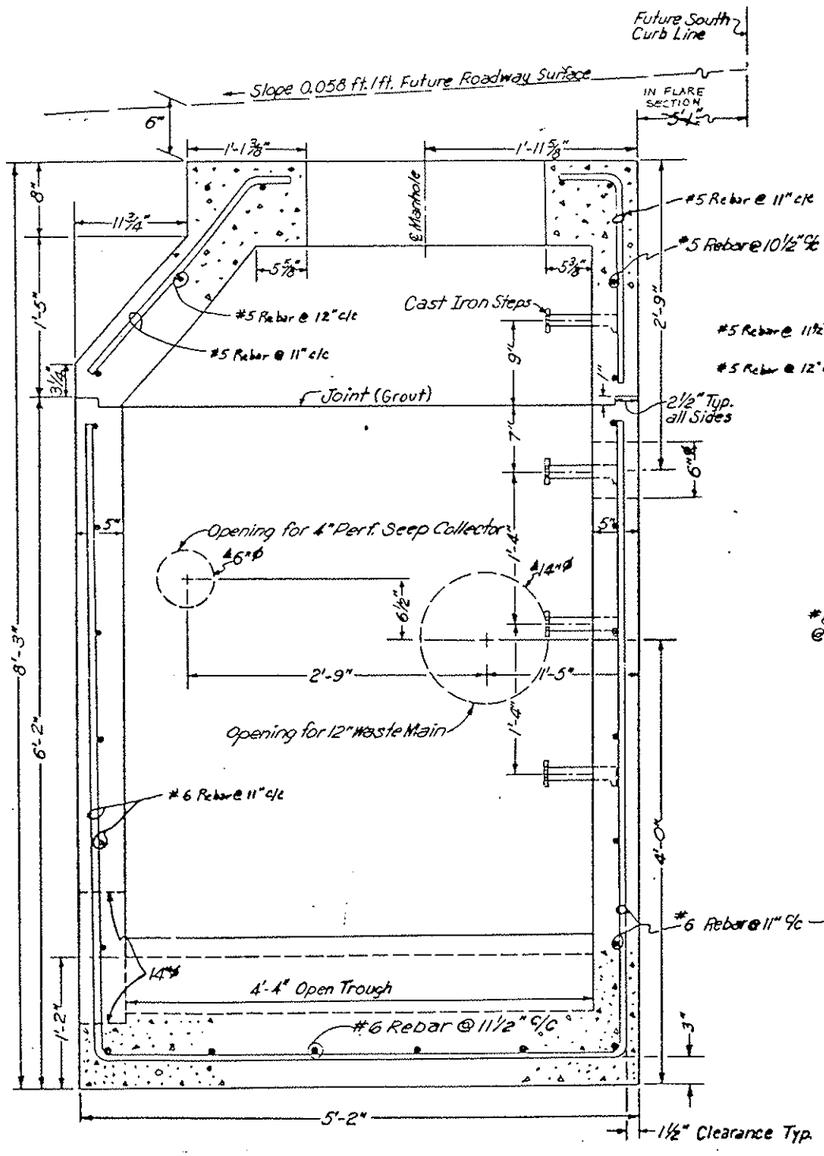
NO SCALE

SHEET D-25

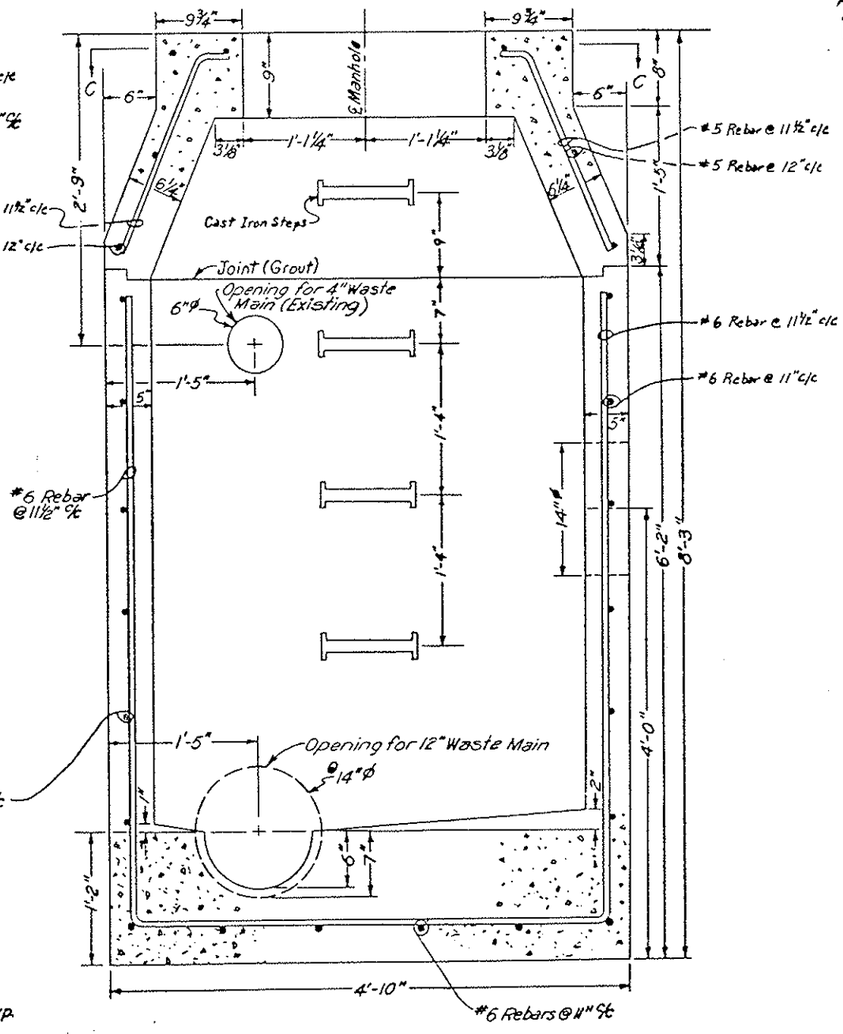
DETAILS OF MANHOLE SPECIAL (TYPE V)
(Sta. 125+17.36 South Side)

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	114	273

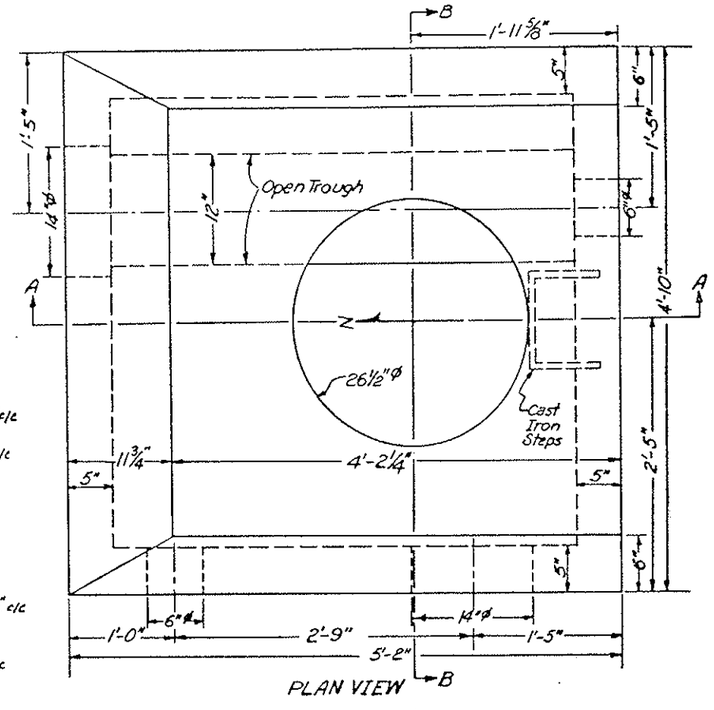
NOTES:
▲ This hole is located on West Wall of Manhole (See Plan View) and is shown here for information only. (SECTION A-A)
● This hole is located on North Wall of Manhole (See Plan View) and is shown here for information only. (SECTION B-B)
ϕ Indicates circular hole.



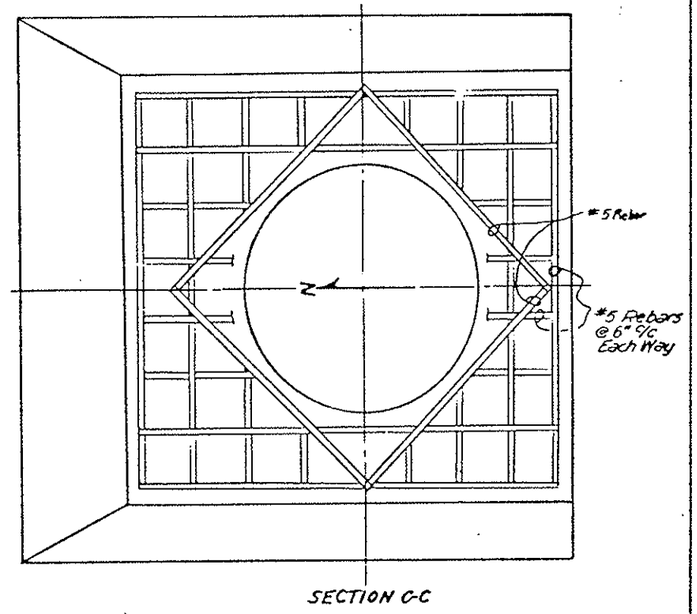
SECTION A-A LOOKING EAST



SECTION B-B LOOKING SOUTH



PLAN VIEW



SECTION C-C

MANHOLE SPECIAL TYPE V
DETAILS

NO SCALE

SHEET D-26

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I70-3(81)220	115	273

AS CONSTRUCTED

AS SHOWN ____ REVISED 6-29-79 ETC. ____

FINAL SUMMARY OF ROADWAY QUANTITIES

Item No.	Description	Unit		West Approach (Summit County)	Final West Approach (Summit County)	East Approach (Clear Creek County)	Final East Approach (Clear Creek County)	Roadway Totals	Final
201	Clearing and Grubbing	L.S.		0.5		0.5		1	1
202	Removal of Structure	Each		1		1		2	2
202	Removal of Asphalt Mat	Sq.Yd.				25		25	79
203	Unclassified Excavation (Haul)	Cu.Yd.		33,200	66,733	40,800	51,298	74,000	138,031
203	Dozing	Hour		100	109	100	109	200	218
203	Dozing (Landscaping)	Hour		50	15.5	50	52.5	100	68
206	Structure Excavation	Cu.Yd.		740	3,204	120	629	860	3,833
206	Structure Backfill (Class 1)	Cu.Yd.		95	1,463	0	677	95	2,140
206	Structure Backfill (Class 2)	Cu.Yd.		1010	331	140	0	1,150	331
207	Topsoil (Haul)	Cu.Yd.		1,300	0	3,100	5,500	4,400	5,500
210	Adjust Structure	Each		8	8	3	1	11	9
212	Seeding	LB		51	126	111	274	162	400
213	Fertilizing	Acre		2.5	3.1	5.5	6.9	8.0	10
213	Mulching	Ton		5	6.2	11	13.8	16	20
213	Soil Retention Blanket (Jute)	Sq.Yd.		11,670	14,633	27,170	34,069	38,840	48,702
304	Aggregate Base Course (Class 2) (Haul)	Ton		10	27.1	10	30.5	20	57.6
506	Riprap	Cu.Yd.		5	274			5	274
507	Concrete Slope and Ditch Paving (Reinforced)	Cu.Yd.		17.8	9.9	7.0	11	24.8	20.9
507	Grouted Rubble Slope and Ditch Paving	Cu.Yd.		18	268.48	54	54	72	322.48
521	Pedestrian Overpass	Each		1	1	1	1	2	2
601	Concrete Class A (Miscellaneous)	Cu.Yd.		12	28.89	12	32.46	24	61.35
603	18 Inch Corrugated Steel Pipe	Lin.Ft.		88	136	48	102	136	238
603	24 Inch Corrugated Steel Pipe	Lin.Ft.		898	1,087.5	552	754.5	1,450	1,842
603	60 Inch Corrugated Steel Pipe	Lin.Ft.		320	320	0	230	320	550
603	66 Inch Corrugated Steel Pipe	Lin.Ft.		714	743			714	743
603	24 Inch Steel End Section	Each				2	2	2	2
603	60 Inch Steel End Section	Each		1	1			1	1
603	66 Inch Steel End Section	Each		1	1			1	1
604	Inlet Type C (5 Foot)	Each		8	7	5	11	13	18
604	Inlet Grating and Frame Type C	Each		8	2	2	1	10	3
605	6 Inch Non-Perforated Corrugated Steel Pipe	Lin.Ft.		16	0			16	0
607	End Post (Chain Link)	Each		8	15	10	15	18	30
607	Corner and Line Brace Post (Chain Link)	Each		8	14	4	17	12	31
607	Fence Chain Link (Industrial)	Lin.Ft.		1,980	2,355	2050	1,901	4030	4,256
607	20 Foot Gate Double Driveway	Each		2	5	3	4	5	9
614	Flagging	Hour		8,000	5,996.75	8,000	5,996.75	16,000	11,993.5
620	Janitorial Service	Month		38	28			38	28
	Note: Power Poles to be relocated by Public Service Co. under Project No. I 70-3(78)								

SUMMARY OF ROADWAY QUANTITIES SHEET AR-1

THE STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS – STATE OF COLORADO
DOH Form No. 113 (M/yr)
REV. SEPT 1972

FOR WORK ORDER

FINAL SUMMARY OF ~~APPROXIMATE~~ QUANTITIES

AS CONSTRUCTED			FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO	SHEET NO	TOTAL SHEETS
NO REVISIONS	REVISED 6-23-7[illegible]	VOID	[illegible]	COLORADO	I70-3(81)220	115Ax	273

INDEX: BOOK	PAGE	SHEET	CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	* FINAL C.M.O.18 TOTALS
			202	Removal of Structure	Each	0
			202	Removal of Delineator	Each	35
			202	Removal of Ground Sign	Each	4
			202	Plug Structure	Each	1
			203	Embankment Material (Complete in Place)	Cu. Yd.	63,545
			206	Structure Excavation	Cu. Yd.	237
			206	Structure Backfill (Class 1)	Cu. Yd.	27
			209	Wetting	M. Gal.	253.4
			210	Reset Ground Sign	Each	4
			210	Adjust Structure	Each	0
			306	Aggregate Base Course (Class 6)(Haul)	Ton	9821.9
			403	Hot Bituminous Pavement (Grading E)(Haul and Asphalt)	Ton	7898.15
			411	Emulsified Asphalt (CSS-1H)	Gal.	1184.5
			411	Liquid Asphaltic Material (MC-70)	Gal.	4319
			507	Concrete Slope and Ditch Paving (Reinforced)	Cu. Yd.	0
			507	Grouted Rubble Slope and Ditch Paving	Cu. Yd.	848
			603	18 inch Corrugated Steel Pipe	Lin. Ft.	0
			603	24 inch Corrugated Steel Pipe	Lin. Ft.	0
			604	Inlet Type C (5 Foot)	Each	0
			604	Inlet Type C (10 Foot)	Each	2

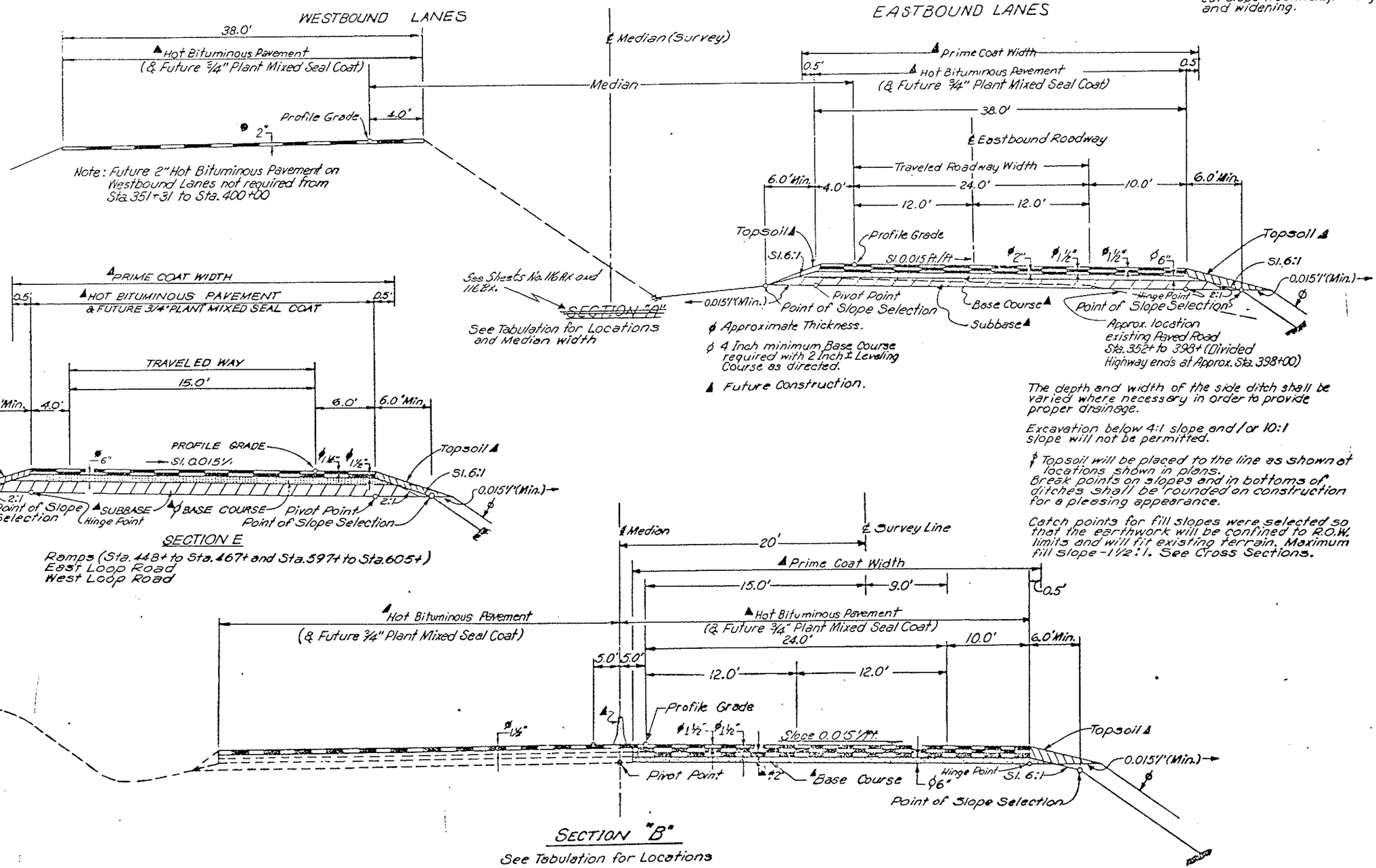
* Quantities paid under C.M.O. 18 only.

TYPICAL SECTIONS

NO REVISIONS	DATE: 6-23-70	BY:

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	116	273

NOTE: See Standard for details of cut slope treatment, flaring and widening.



TYPICAL SECTIONS
SHEET AR-2

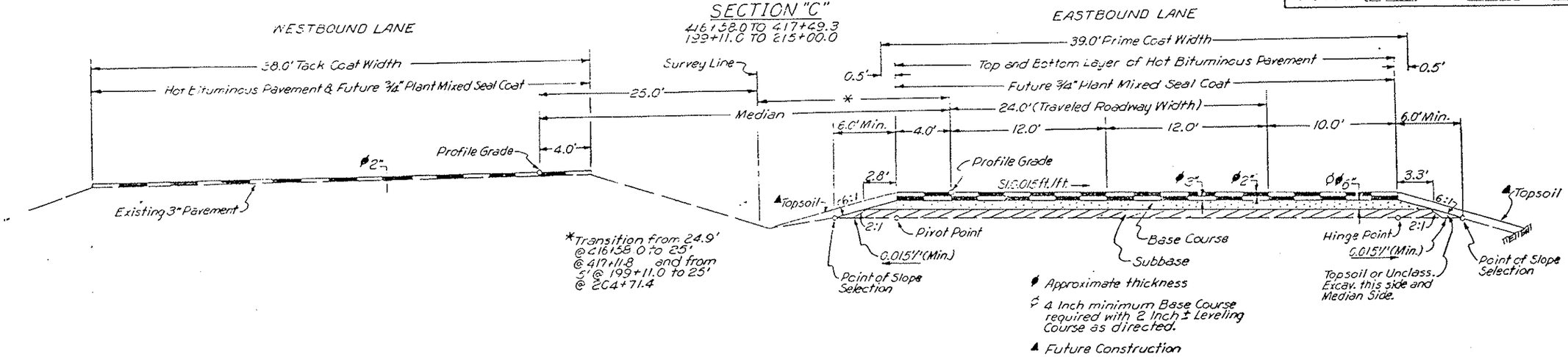
TYPICAL SECTIONS

FOR WORK ORDER #15

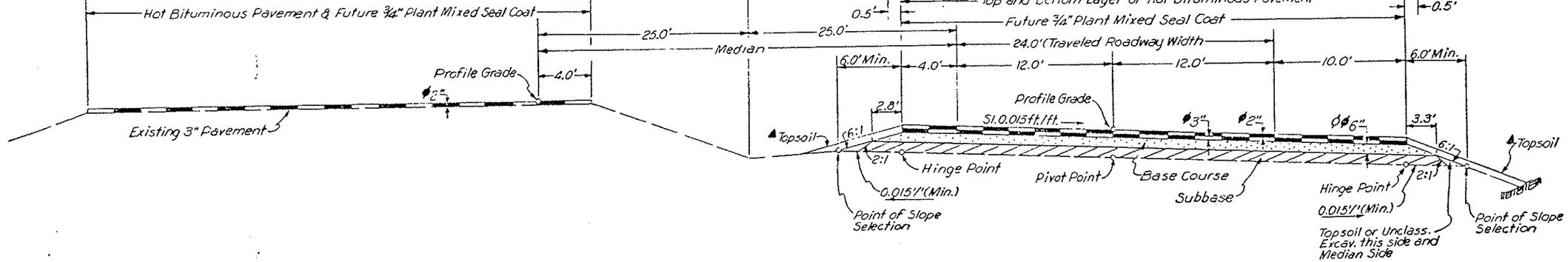
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	31	273

NO. REVISIONS | DATE: 6-27-73

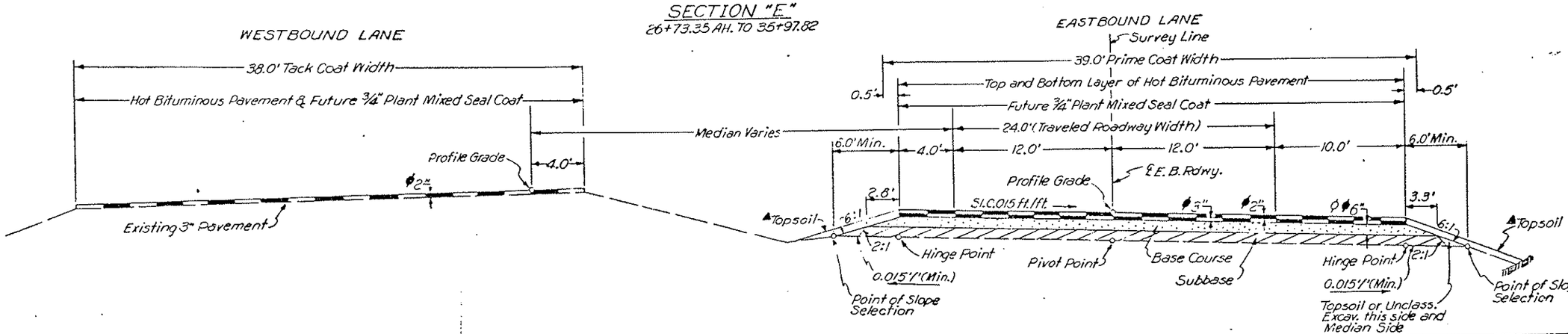
SECTION "C"
416+58.0 TO 417+49.3
199+11.0 TO 215+00.0



SECTION "D"
417+49.3 TO 419+72.66 BK. =
26+73.35 AH.



SECTION "E"
26+73.35 AH. TO 35+97.82



TYPICAL SECTIONS

FOR WORK ORDER 18

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	[illegible]	275

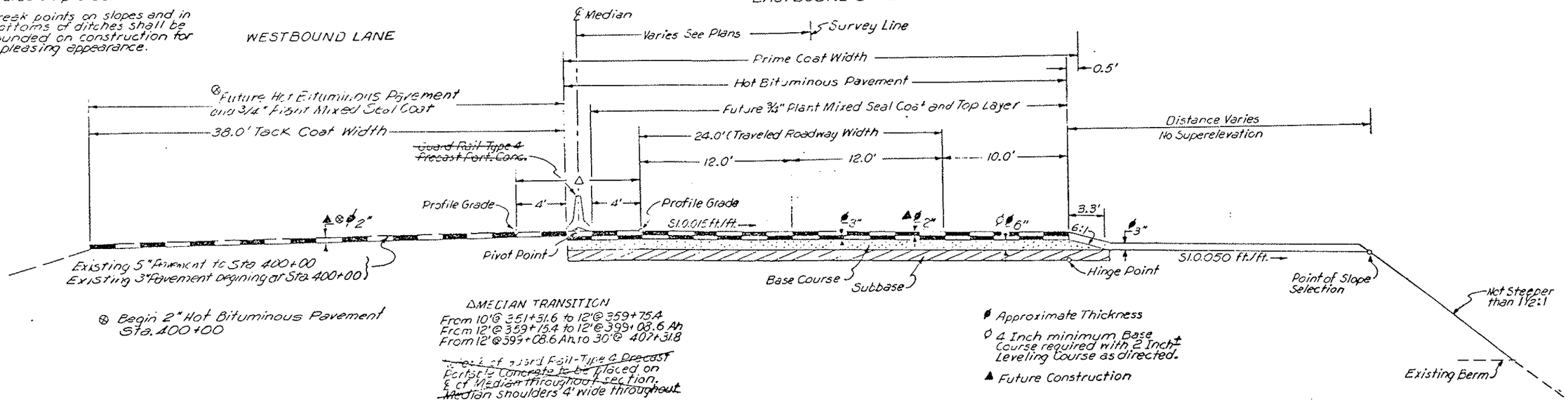
See standards for details of cut slope treatment, flaring and widening.

Excavation below 6:1 and/or 10:1 slope will not be permitted.

Earth slopes shall be disced or roughened by other approved methods for mulching or erosion protection.

Break points on slopes and in bottoms of ditches shall be rounded on construction for a pleasing appearance.

SECTION "A"
351+31.6 TO 407+318



MEDIAN TRANSITION
From 10'@ 351+31.6 to 12'@ 359+75.4
From 12'@ 359+75.4 to 12'@ 399+08.6 Ah
From 12'@ 399+08.6 Ah to 30'@ 407+31.8

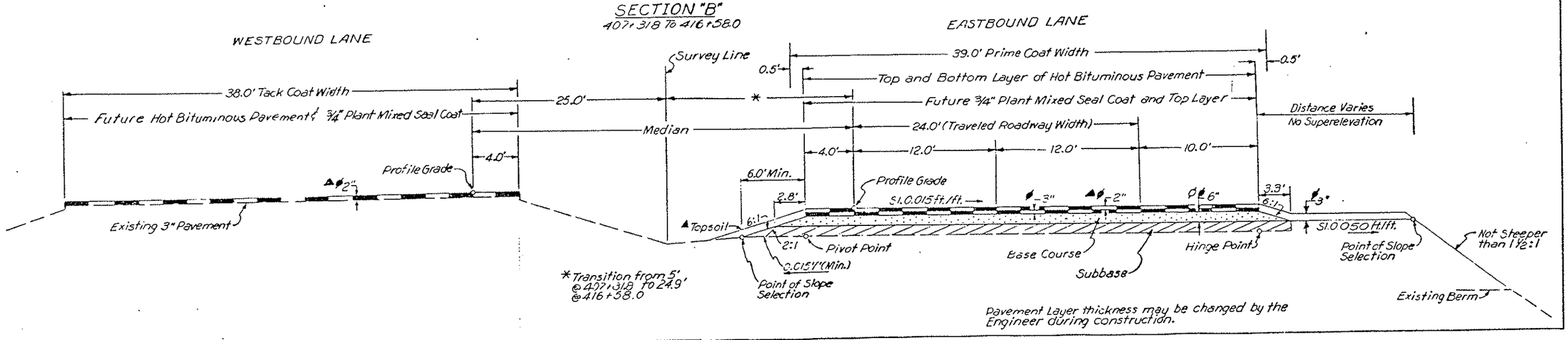
~~Use of raised Rail-Type 4 Precast Portable Concrete to be placed on ℄ of Median throughout section. Median Shoulders 4' wide throughout~~

Approximate Thickness

◊ 4 Inch minimum Base Course required with 2 Inch± Leveling Course as directed.

▲ Future Construction

SECTION "B"
407+31.8 TO 416+58.0



* Transition from 5' @ 407+31.8 To 24.9' @ 416+58.0

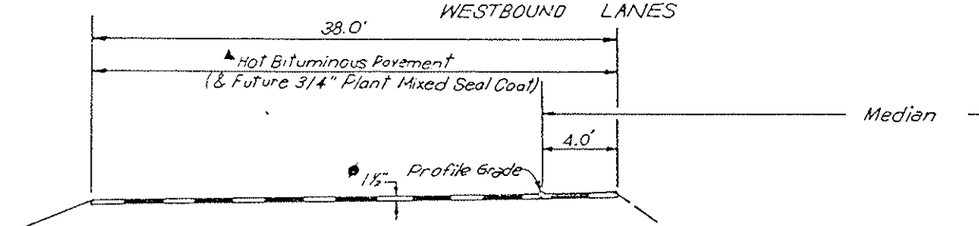
Pavement Layer thickness may be changed by the Engineer during construction.

TYPICAL SECTIONS

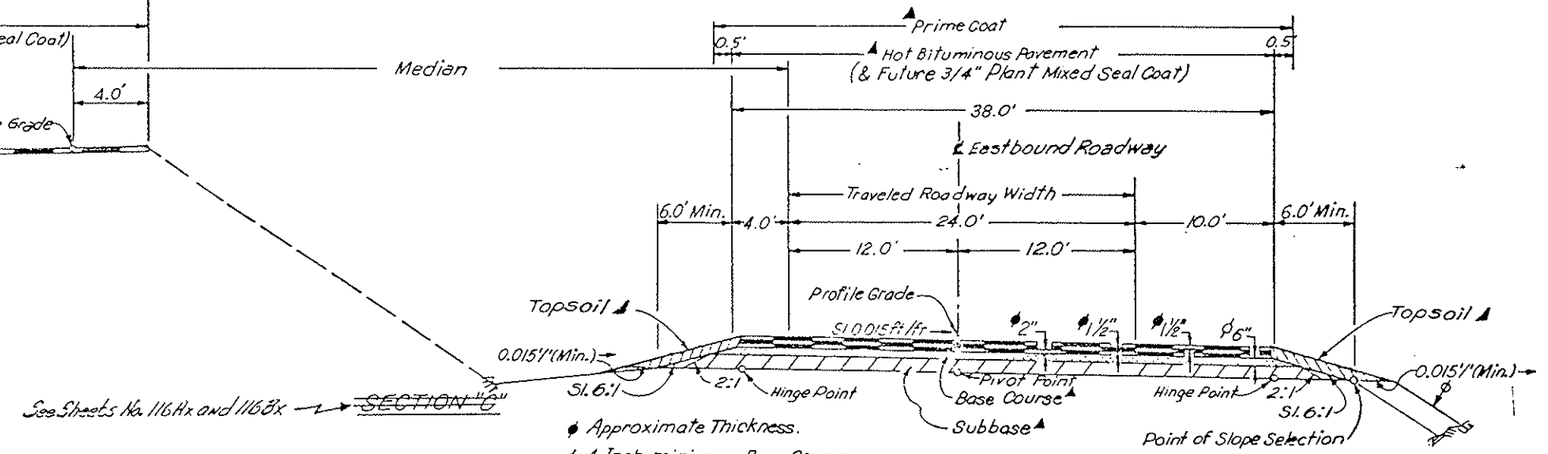
FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VII	COLORADO	I 70-3(61)220	117	273

NO. PENDING | REVISED 6-29-73

WESTBOUND LANES



EASTBOUND LANES



See Sheets No. 116Ax and 116Bx → ~~SECTION "C"~~

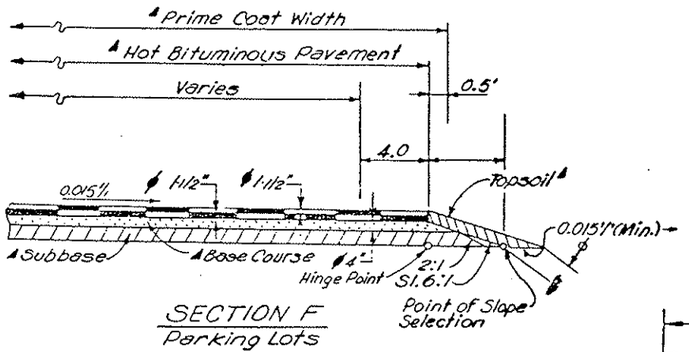
See Tabulation for Location

ϕ Approximate Thickness.

ϕ 4 Inch minimum Base Course required with 2 Inch ± Leveling Course as directed.

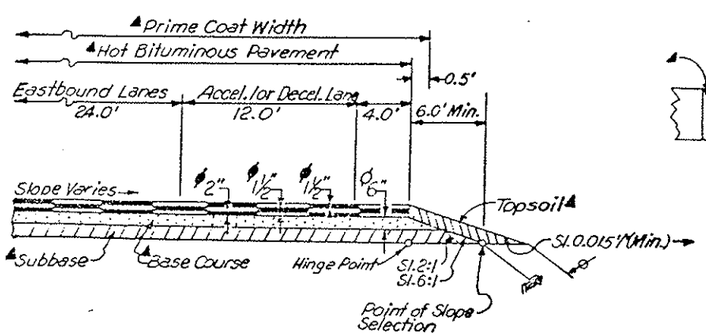
▲ Future Construction

* Curb to curb width varies at portals, see Sheet A-10

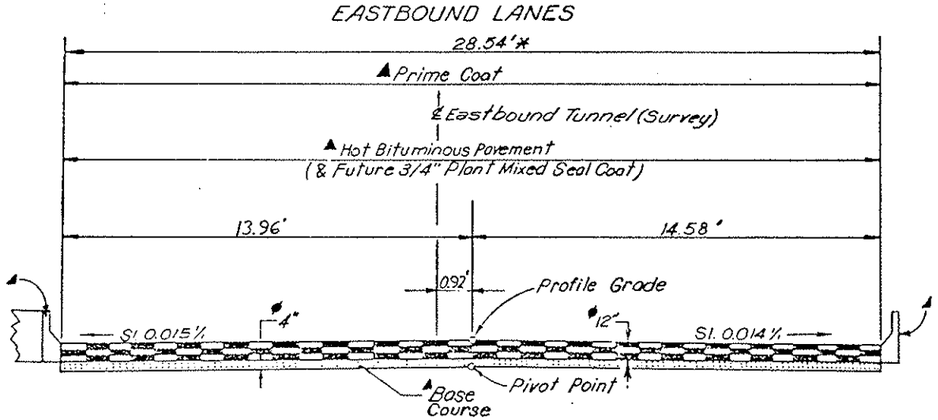


SECTION F
Parking Lots

ACCEL. AND DECEL. LANE
(See Plans for Locations)



EASTBOUND LANES



SECTION "D"

See Tabulation for Location

TABULATION OF TYPICAL SECTIONS

LOCATION	TYPICAL SECTION	MEDIAN WIDTH
351+31.6 to 359+75.4	A	Varies
359+75.4 to 388+91.6	A	42'
388+91.6 to 398+85.9	A	Varies
398+85.9 to 417+49.3	A	50'
417+49.3 to 27+63.0	C	50'
27+63.0 to 35+97.8	C	Varies
35+97.8 to 125+57.3	D	(Tunnel)
125+57.3 to 149+17.3	A	Varies
149+17.3 to 193+65.8	B	10'
193+65.8 to 204+71.4	A	Varies
204+71.4 to 215+00	A	50'

TYPICAL SECTIONS
SHEET AR-3

DEPT. OF HIGHWAYS, STATE OF COLORADO

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
IX	COLORADO	I 70-3(81)220	118	275

GENERAL NOTES FOR APPROACH ROADS

Depth of Moisture-Density Control for this Project shall be as follows:

- Full depth of embankments from Sta. 171± to Sta. 176±
- Full depth of those embankments that are less than 4 feet in height.
- Bases of Cuts 1 Foot
- Bases of Fills 4 feet or less in Height, 1 Foot

Excavation required for Compaction of bases of cuts and fills will be considered as subsidiary to that operation and will not be paid for separately.

The minimum thickness of Topsoil shall be 4 inches.

Earth slopes shall be disced or roughened by other approved methods for mulching or erosion protection.

It is estimated that 16,000 Hours of Flagging for controlling traffic will be required for this project.

West Approach = 8,000 Hours
East Approach = 8,000 Hours

Flexible conduits on this project with helical corrugations, joined by dimpled connecting bands, shall use a sealing compound or gasket with the connecting band.

It is estimated that 38 months of janitorial service in the Division's Field Facility will be required.

It is estimated dozing required for this project will be:

	Dozing	Dozing (Landscaping)
West Approach	100 hours	50 hours
East Approach	100 hours	50 hours

Seeding Fertilizing with Commercial Fertilizer and Mulching for approximately 8 acres will be required on slopes constructed on this project as directed. The following types and rates shall be used.

Botanical Name	Common Name	Percent Purity	Percent Germination	Rate Pls/Acre
Festuca ovina duriuscula	Hard Fescue	95.0	84	14
Agropyron intermedium	Intermediate Wheatgrass	90.1	90	8
Bromus inermis	Smooth brome	98.4	89	8
Agropyron smithii	Western Wheatgrass	86.1	90	6
Trifolium hybridum	Alsike Clover	99.3	80	2
Phleum pratense	Timothy	99.8	90	2

Fertilizer: 50#/acre available N-slow Release: 100#/acre P_2O_5

It is estimated that the following quantities are required for this project:

Location	Acreage	Seeding (lbs)	Mulching (Tons)
409+50 to 35+00 (West Approach Road)	2.5	51	5
137+ to 197+ (East Approach Road)	5.5	111	11

Additional Landscaping will be done on future Construction.

INDEX		
Book	Page	Sheet

FINAL ~~SUMMARY~~ OF EARTHWORK QUANTITIES

	West Approach Cu.Yd.	East Approach Cu.Yd.	Total Cu.Yd.
UNCLASSIFIED EXCAV. (HAUL)			
Roadway (From Electronic Computer)	~~3,026~~	~~32,478~~ 35,?13	~~35,504~~
For Topsoil (See Erosion Control Tab.)	~~1,300~~	~~3,025~~	~~4,325~~ 11,556
For Topsoil (Move Stockpile at West Approach)	~~5,000~~ 5,279		~~5,000~~ 5,279
From Stockpile (See Footnote for Tunnel Excav. Disposal)	~~18,945~~		~~18,945~~ 23,344
Loop Roads	~~4,850~~ 13,621	~~5,180~~ 5,319	~~10,030~~ 18,840
~~Total for Pay Quantity~~	~~33,121~~	~~40,683~~	~~73,804~~
TUNNEL EXCAVATION (For information only)			
Gross Volume of Tunnel to be Excavated			522,525
Less Pilot Bore Volume to be deducted			-15,292
Total Net Quantity to be Excavated from Tunnel			507,233
TUNNEL EXCAVATION DISPOSAL			
⊕ Roadway Embankment	~~⊕167,663~~	~~291,061~~	~~458,724~~
Loop Roads		~~1,644~~	~~1,644~~
Structure Quantities as Embank.	~~55~~	~~20~~	~~75~~
Estimated for Leveling Dry Gulch Pit Area		~~46,790~~	~~46,790~~
Total	~~167,718~~	~~339,515~~	~~507,233~~

ROADWAY AND TUNNEL BALANCE

(For information only)

	West Approach Cu.Yd.	East Approach Cu.Yd.	Total Cu.Yd.
EXCAVATION X FACTOR (1.0)			
Tunnel Excav. – For Rdwy. Embank.	167,663	291,061	458,724
Tunnel Excav. – For Loop Roads		1,644	1,644
Tunnel Excav. – For Structure Quants. as Embank.	55	20	75
Tunnel Excav. – For Leveling Dry Gulch Pit Area		46,790	46,790
Roadway (From Electronic Computer	3,026	32,478	35,504
Loop Roads (From X-Sections)	4,850	5,180	10,030
Total	175,594	377,173	552,767
EMBANKMENT NET			
Roadway (From Electronic Computer)	170,950	323,539	494,489
Loop Roads	4,589	6,824	11,413
Structure Quantities as Embank.	55	20	75
Estimated for Leveling Dry Gulch Pit Area		46,790	46,790
Total	175,594	377,173	552,767

⊕ ~~18,945 Cu. Yds. of West Appr. quantity to be Stockpiled as directed and used for Embank. at Sta. 365+ to 398+ when directed.~~

AS CONSTRUCTED
NO REVISIONS [ ] REVISED [6-29-79] VOID [ ]

GENERAL ROADWAY NOTES
EARTHWORK SUMMARY

SHEET AR-4

THE STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS - STATE OF COLORADO
FORM D.O.H. 125 (MYLAR)
REV. SEPT 1972

FINAL STRUCTURE QUANTITIES

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
VIII	COLORADO	I 70-3 (61) 220	119

Location (Index: Book / Page / Sheet)	Unclassified Excavation, Cubic Yard (Emb.)	Structure Excavation, Cubic Yard	Structure Excavation, Cubic Yard	Structure Backfill, Cubic Yard CL 2	Structure Backfill, Cubic Yard CL 1	[illegible]	[illegible]	Slope Rundown Length, Lin. Ft.	Inlet Grating & Frame Type C, Each	Inlet Type C 5 Foot, EA.	Inlet Type C 5 Foot, "H"	Concrete Class "A" Cubic Yard, Misc.	Concrete Class "A" Cubic Yard, Wall	Reinforcing Steel, Ton	Corrugated Steel Pipe Linear Feet 18"	24"	60"	66"	"H" Over Culv. Ft.	Reinf. Concrete Slope and Ditch Paving, Cubic Yard	Steel End Section Each 24"	60"	66"	Miscellaneous
352+ See Sh. 119Ax	=								1											1.1				1-ADJUST STRUCTURE, 36 CU.YDS. GROUTED RUBBLE SLOPE & DITCH PAVING
358+ See Sh. 119Ax	=								+											1.1				1-ADJUST STRUCTURE
369+ See Sh. 119Ax	=								+	1					24					1.1				1-ADJUST STRUCTURE
376+ See Sh. 119Ax	=								+											1.1				1-ADJUST STRUCTURE
381+ See Sh. 119Ax	=								+											1.1				1-ADJUST STRUCTURE
388+ See Sh. 119Ax	=								+	1	5.0				24					1.1				1-ADJUST STRUCTURE
393+00 397+00	5	7		15				⊕30		+	2.5					62			+	1.1 1.1				18 CU. YDS. GROUTED RUBBLE SLOPE & DITCH PAVING
414+10			47				52									82								
403+ See Sh. 119Ax	5	2	2	4			4		+							20			4	1.1				1- ADJUST STRUCTURE
409+ TO 35+	⊕															208 60			6	1.1				1- ADJUST STRUCTURE, 33.59 CU.YDS. GROUTED RUBBLE SLOPE & DITCH PAVING
411+ See Sh. 113Ax	5	7	120	14			30		1															
411+ TO 417+		286 2 2	671	416 5 5			725									186 ●20 ●20		●540 550	6 2 2				1	274.1 5 CU.YD. RIPRAP
415+84 417+00	5 5	27 19 22	27 41	14 10 24			29 35			+ +	2.5 2.5					43 33.5 72 ●50 ●113			1.5 2 9	1.1 1.3				
30+ TO 32+		55 0	218	133 17		101	137									40 ●70		164 161 42	6 1					1-REMOVAL OF STRUCTURE
34+10																								1-PEDESTRIAN OVERPASS
35+		230	404	220	95	230	97										320		1			1		27.1 10 TON ABC (Class 2)
35+83 TO 35+97												28.89 12												
415+62 408+ (Spillway)			63				54									144								20.7 CU.YDS. GROUTED RUBBLE SLOPE & DITCH PAVING
LOOP ROAD																								
29+85 M.L.	●	5		11						+	2.5					48			+	1.1				
0+70		16		34						+	2.5					149			1	1.1				
0+00 TO 23+17.2	⊕																							
6+95	⊕	5	21	11			25			1	3.0 2.5				46	48			1	1.1				22.23 - CU.YDS GROUTED RUBBLE SLOPE & DITCH PAVING
12+09 11+12 14+50 13+70 TO 14+	⊕	5 5 15	18 164	10 5 32			18 69			2 + +	2.5 2.5 2.5 2.5				40	130 58 ●90			1 1 1	1.1 1.1 1.1				Lin. Ft. 6 Inch Non-Perforated Corrugated Steel Pipe
14+55	●																							
18+05	●	5		10											48				1					
21+75 22+05		5	105	10			66			1 1	5.0 5.0					32 136			1	1.1 1.1				
SUB-TOTAL WEST APPROACH	55	732	1314	1010	95	331	443		8.2	87		28.53 12			136 56	1291.5 890	320	743 714		17.83.9		1	1	

⊕ FOR INFORMATION ONLY
$ INCLUDED IN EARTHWORK QUANTITIES
2 REQUIRES 45° ELBOW
⊕ REQUIRES SIDE CONNECTION INTO A 60" OR 66" C.S.P.
$ REQUIRES SIDE CONNECTION TO 24" C.S.P.
‡ REQUIRES 28° ELBOW

STRUCTURE QUANTITIES
SHEET AR-5

THE STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS STATE OF COLORADO
DOH FORM NO. 122 (MYLAR)
REV MARCH 1976

FINAL STRUCTURE QUANTITIES

AS CONSTRUCTED
AS REVISIONS [ ] REVISED [ ] [ ] TO [ ]

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
XXIII	COLORADO	I 70-3(81)220	113Fx

INDEX BOOK	INDEX PAGE	INDEX SHEET	LOCATION	UNCLASSIFIED EXCAVATION CUBIC YARD EXB	STRUCTURE EXCAVATION CUBIC YARD	STRUCTURE BACKFILL CUBIC YARD	SLOPE RUNDOWN LENGTH LIN. FT.	AGGREGATE BASE COURSE SURFACING CLASS __ TON	HOT BITUMINOUS PAVEMENT GRADING __ TON	ADJUST STRUCTURE EACH	INLET TYPE C EACH 5 FEET	INLET TYPE C EACH 10 FEET	CORRUGATED STEEL PIPE LINEAR FEET 18"	CORRUGATED STEEL PIPE LINEAR FEET 24"	"H" OVER CULV FT	CONCRETE SLOPE & DITCH PAVING (REINF.) CUBIC YARD 4"	MISCELLANEOUS
			~~3461~~ ~~348+50~~														2- Removal of Ground Signs Rt. & Lt.
			348+50 to 400+														35- Removal of Delineator Rt. & Lt.
			352+		~~539~~ 530		335										276- Cu. Yd. Grouted Rubble Slope & Ditch Paving
			358+75.4							+							
			363+77														1- Plug Structure
			369+71		~~2~~ 7	~~4~~ 7				+	+		~~22~~		8.0	~~11~~	
			376+							+							
			381+							+							
			385+00														~~Removal of~~ Reset 1- Ground Sign @ Sta. 338+1
			386+26														~~Removal of~~ Reset 1- Ground Sign @ Sta. 339+50
			387+00														~~Removal of~~ Reset 1- Ground Sign @ Sta 340+00
			388+		~~2~~ 7	~~4~~ 8				+	+		~~22~~		8.0	1.1	
			394+00		~~364~~ 364		230										213- Cu. Yd. Grouted Rubble Slope & Ditch Paving
			394+60														12- Removal of Ground Sign
			399+		~~330~~ 390	~~12~~	235 ~~60~~				1					1.1	219 ~~56~~ - Cu. Yd. Grouted Rubble Slope and Ditch Paving
			401+50														1- Removal of Ground Sign
			403+		~~115~~ 95		60			+	1						~~56~~ 28 - Cu. Yd. Grouted Rubble Slope and Ditch Paving
			~~407+50~~		~~9~~	~~17~~	~~60~~				+			~~80~~	~~3~~	~~1.3~~	~~36- Cu. Yd. Grouted Rubble Slope and Ditch Paving~~
			411+	▲5	~~10~~ 142	~~21~~	~~60~~							~~90~~	1	~~11~~	~~1- Removal of Structure~~ ~~35~~ 64 - Cu. Yd. Grouted Rubble Slope and Ditch Paving
			PROJECT TOTALS		~~23~~ *1535	~~46~~	27			~~2~~	~~8~~	~~2~~	~~11~~	~~20~~		~~2522~~	

● For Information only. ▲ Included in Embankment Material (Complete in place)

* 1535 Cu. Yds. added under C.M.O. 18 paid @ Bid Price.
* 237 Cu. Yds. added under C.M.O. 18 paid @ Negotiated Price.

THE STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS - STATE OF COLORADO
FORM DOH 125 (MYLAR)
REV. SEPT 1970

FINAL STRUCTURE QUANTITIES

Date: 6-29-79

Region No.	Division	Project No.	No.
III	COLORADO	I 70-3 (31) 320	120

Index: Book	Index: Page	Index: Sheet	Location	Unclassified Excavation (Cubic Yard): Excav.	Unclassified Excavation (Cubic Yard): Emb.	Unclassified Excavation (Cubic Yard): Ditch	Structure Excavation (Cubic Yard)	Structure Excavation (Cubic Yard)	Structure Backfill (Cubic Yard): CL.2	Structure Backfill (Cubic Yard): CL.1	Filter Material Backfill	Filter Material Backfill	Slope Rundown Length (Lin. Ft.)	Inlet Grating & Frame Type C (Each)	Inlet Type C 5 Foot: Ea.	Inlet Type C 5 Foot: "H"	Concrete Class "A" (Cubic Yard): Misc.	Concrete Class "A" (Cubic Yard): Wall	Reinforcing Steel (Ton)	Corrugated Steel Pipe (Linear Feet): 18"	24"	60"	66"	"H" Over Culv. (Ft.)	Reinf. Concrete Slope and Ditch Paving (Cubic Yard)	Steel End Section (Each): 24"	60"	66"	Miscellaneous
			LOOP ROAD																										
			316+15 TO 340+27		⊕																								1-REMOVAL OF STRUCTURE
			~~319+50~~ 320+50		⊕		~~5~~	28	~~10~~			21								48									
			328+		⊕																								~~72~~ ~~25~~ SQ.YD. REMOVAL OF ASPHALT MAT ~~16~~ TONS ABC(CLASS 2) 30.5
			MAINLINE																										
			125+57 TO 125+71														32.46 ~~12~~												
			127+ TO 146+		⊕									~~1~~											~~1.1~~				~~1-ADJUST STRUCTURE~~
			133+00		~~5~~																								
			130+					F.F.				235										230							1-PEDESTRIAN OVERPASS
			135+																										
			131+15					21				18			1	2.5				48	~~62~~			1	~~1.3~~				
			~~143+50~~				~~3+~~		~~13~~						~~1~~	~~2.5~~					76								37.93 Cu.Yds Grouted Rubble Slope & Ditch Paving
			141+00					65				37			1	2.5													
			146+ TO 166+		⊕															6	8								~~1-ADJUST STRUCTURE~~
			147+93					13				11			1	3.0													
			~~147+00~~																		48 ~~44~~			10		1			
			156+17				~~5~~	23	~~11~~			25									6				1.1				
			159+ (459+Ramp)					12				9			1	5.0					~~72~~			1	~~1.1~~				
			~~162+00~~		~~5~~		~~8~~		~~17~~						~~1~~	~~5.0~~													
			163+ (463+Ramp)					42				32			1	3.0					72				1.1				~~21.33 CU.YDS. GROUTED RUBBLE SLOPE & DITCH PAVING~~ ~~54~~ CU.YDS. GROUTED RUBBLE SLOPE & DITCH PAVING 39.26
			171+~~59~~ 10				~~3+~~	84	~~13~~			61	~~99~~		1 1	~~2.5~~ 3.0 3.0					~~62~~ 110			1	1.1				
			165+20																										
			167+00					13				9									20				1.1				
			170+70																						1.1				
			185+50					15				14			1	5.0					16				1.1				
			186+					12				10			1	3.0					10				1.1				
			198+10					12				12			~~1~~	~~3.0~~					40			2	~~1.3~~	~~1~~			
			~~200+75~~				~~7~~		~~15~~												~~64~~								
			202+50					47				42			1	5.0					65				1.1	1			91.85 CU.YDS. GROUTED RUBBLE SLOPE & DITCH PAVING
			203+63					59				66									117								
			195+ TO 207+		⊕																								
			207+ TO 212+		⊕																								
			~~206+50~~		~~5~~		~~5~~	170	~~22~~			67			1	5.0 ~~2.5~~					162 ~~110~~			1	1.1				
																					20 ~~66~~			1					
			208+00				~~7~~	7	~~10~~			8									~~72~~			1					
			~~209+20~~				~~8~~		~~17~~																				
			215+00		~~5~~			5						1											1.1 1.1				1-ADJUST STRUCTURE
SUBTOTAL			EAST APPROACH		~~20~~		~~117~~	625	~~134~~			677		~~2~~ 1	11 5		32.46 ~~12~~			102 ~~48~~	770 552	230			~~7.0~~ 11.0	2			
			PROJECT TOTALS		~~75~~		~~849~~	2530	~~1144~~	~~45~~	331	2140		3 ~~10~~	18 ~~13~~		61.55 ~~24~~			222 ~~136~~	1845 ~~1350~~	550 ~~320~~	743 ~~714~~		20.9 ~~24.3~~	2	1	1	

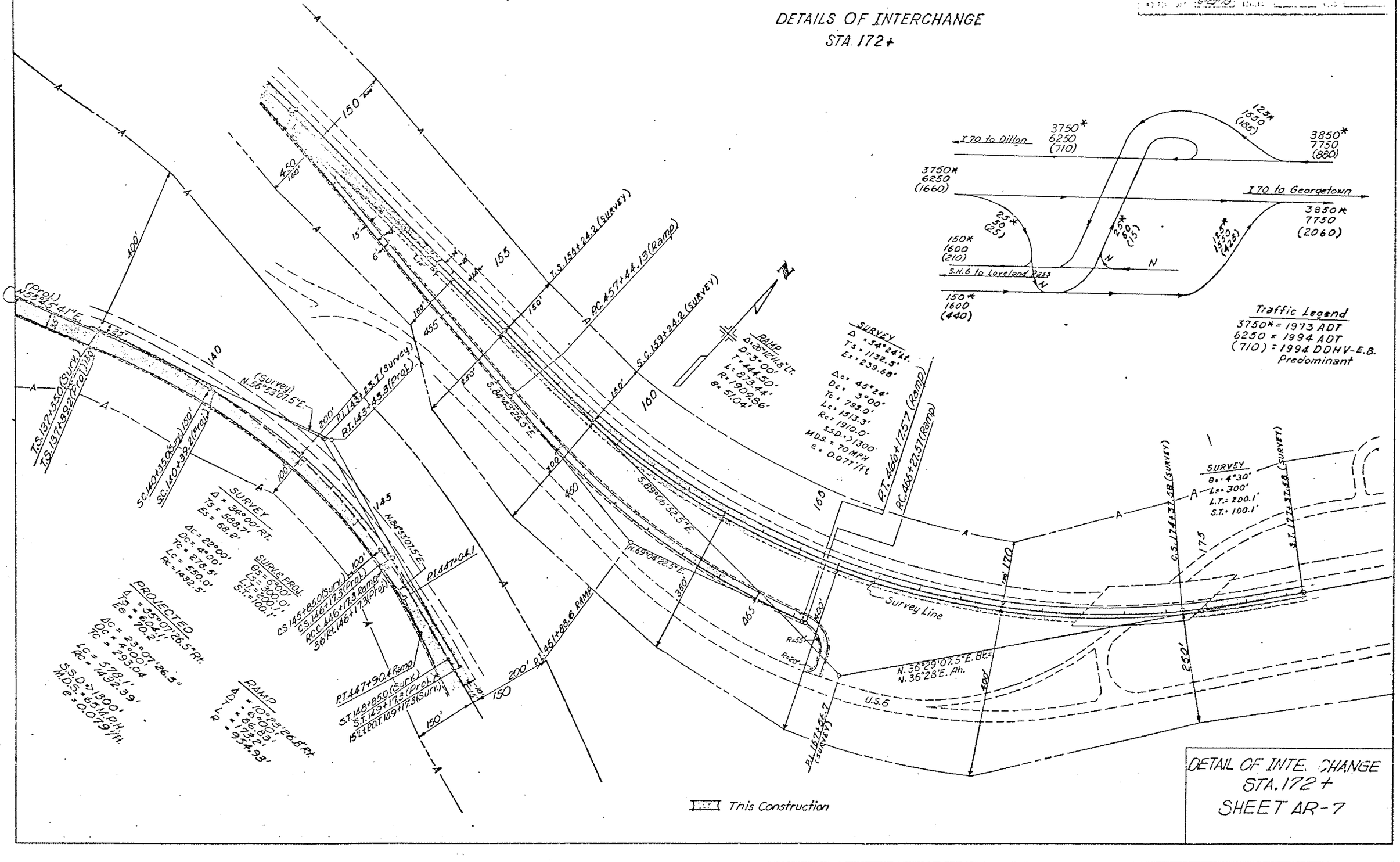
⊘ FOR INFORMATION ONLY
⊕ INCLUDED IN EARTHWORK QUANTITIES

STRUCTURE QUANTITIES
SHEET AR-6

FEDERAL ROAD REGION NO.	DIVISION	PROJ NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	121.	273

6-29-73

DETAILS OF INTERCHANGE
STA. 172+



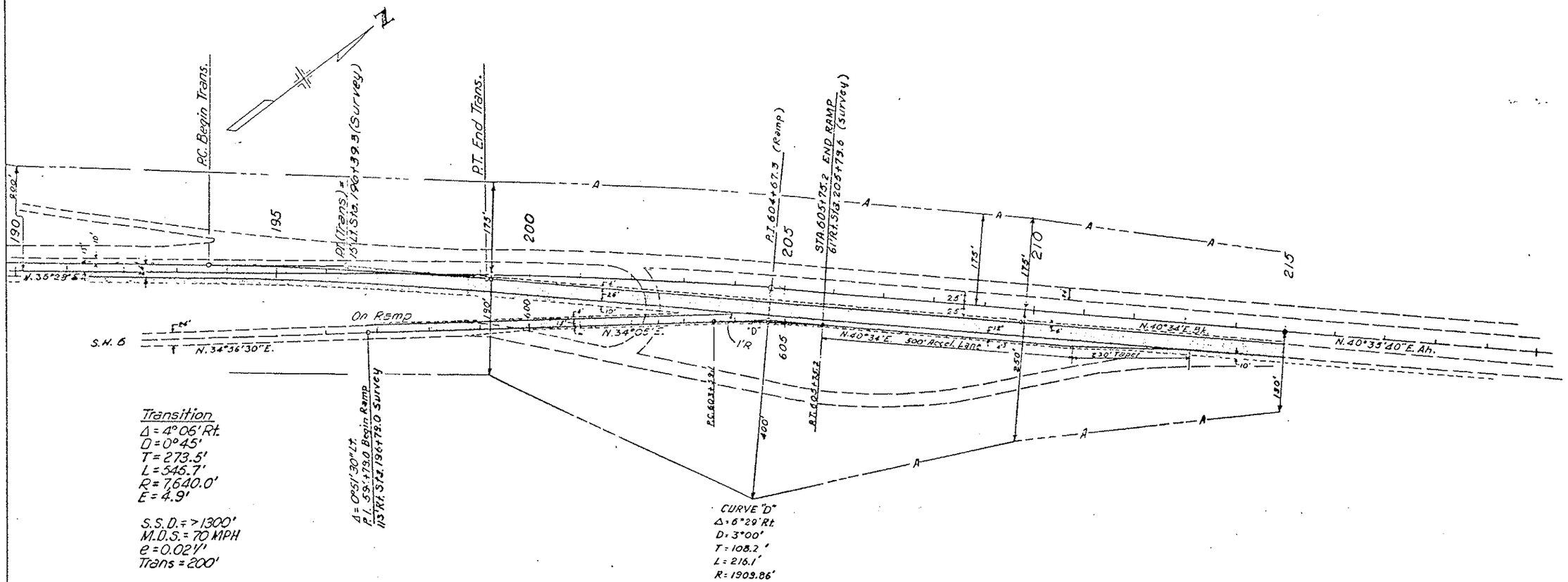
Traffic Legend
3750* = 1973 ADT
6250 = 1994 ADT
(710) = 1994 DDHV-E.B. Predominant

DETAIL OF INTE. CHANGE
STA. 172+
SHEET AR-7

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	122	273

6-29-79

DETAILS OF INTERCHANGE
STA. 172+

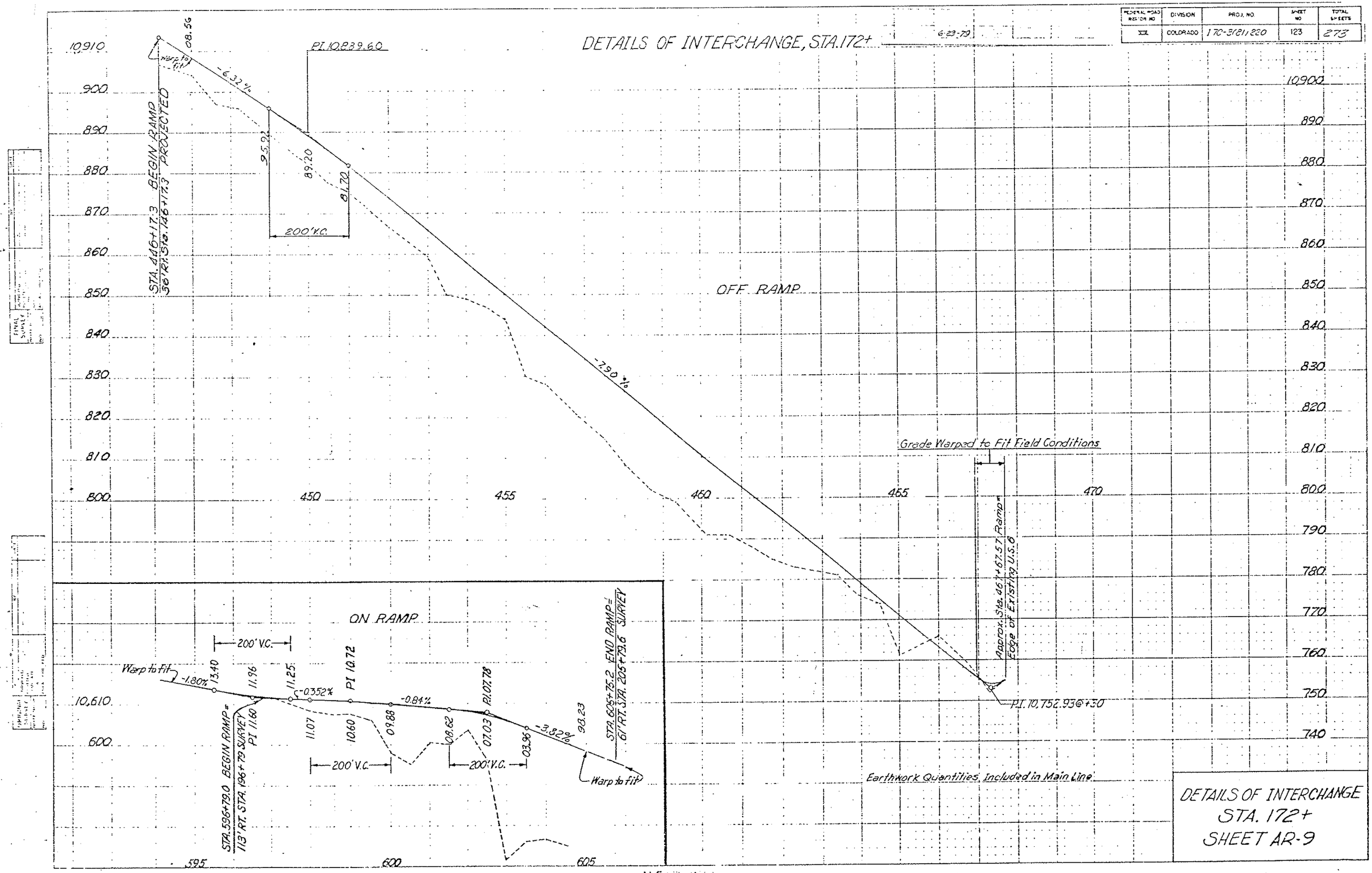


DETAILS OF INTERCHANGE
STA. 172+
SHEET AR-8

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	170-3(81)220	123	273

DETAILS OF INTERCHANGE, STA. 172+

6-23-79



Earthwork Quantities Included in Main Line

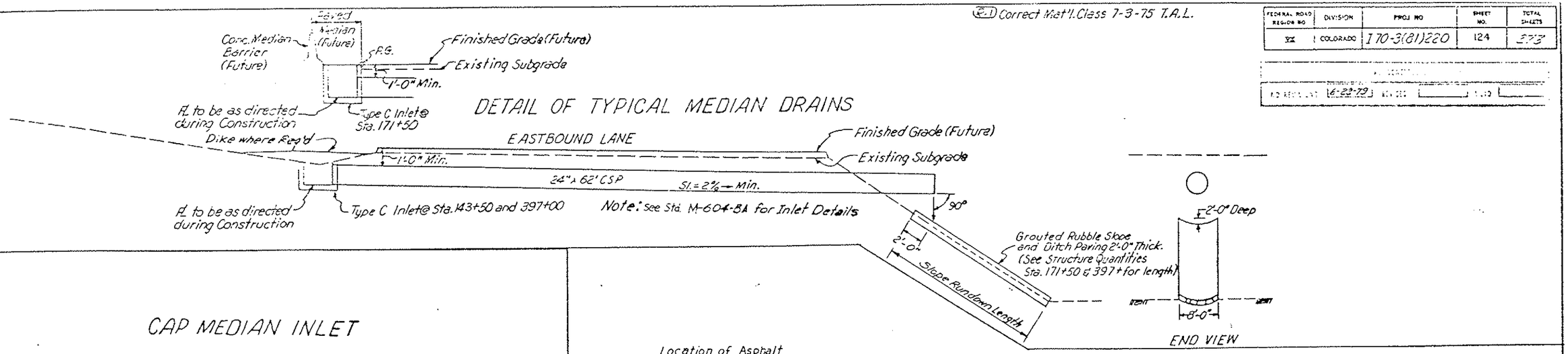
DETAILS OF INTERCHANGE
STA. 172+
SHEET AR-9

(R-1) Correct Mat'l. Class 7-3-75 T.A.L.

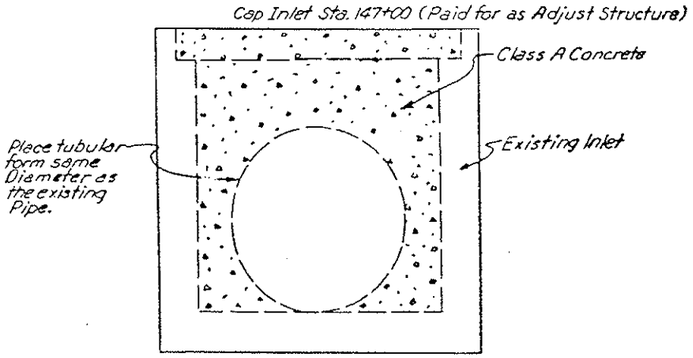
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VX	COLORADO	I 70-3(81)220	124	273

6-22-79

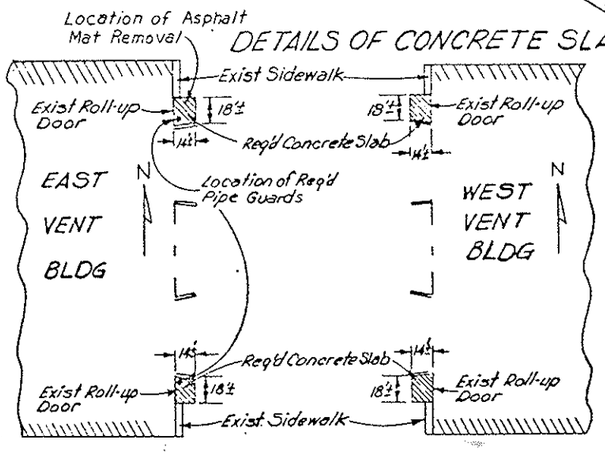
DETAIL OF TYPICAL MEDIAN DRAINS

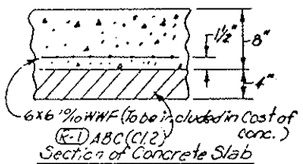


CAP MEDIAN INLET

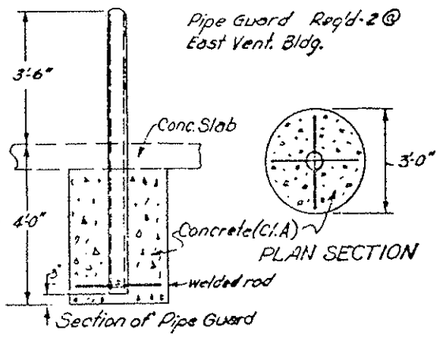


DETAILS OF CONCRETE SLABS AND PIPE GUARDS AT PORTALS



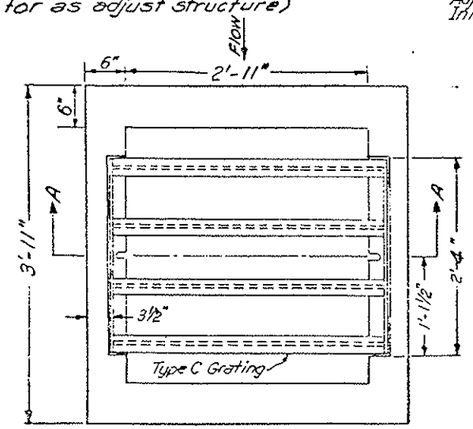


Pipe Guard Reqd-2 @ East Vent. Bldg.

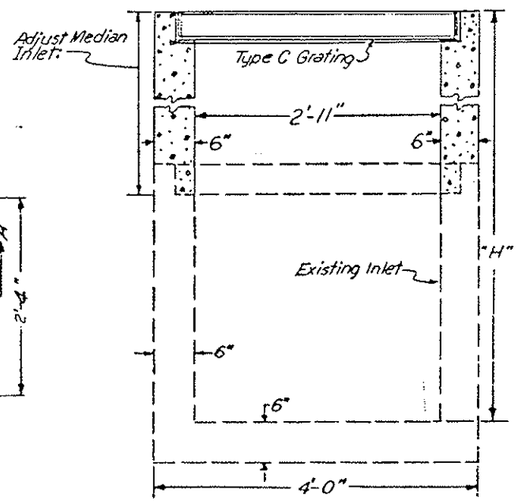


Note: The Pipe Guard will be supplied by the Division. The cost of Installing the Guards will not be paid for seperately but will be included in the work. Installation shall be as directed.

DETAIL OF ADJUST MEDIAN INLET
(Paid for as adjust structure)



PLAN VIEW



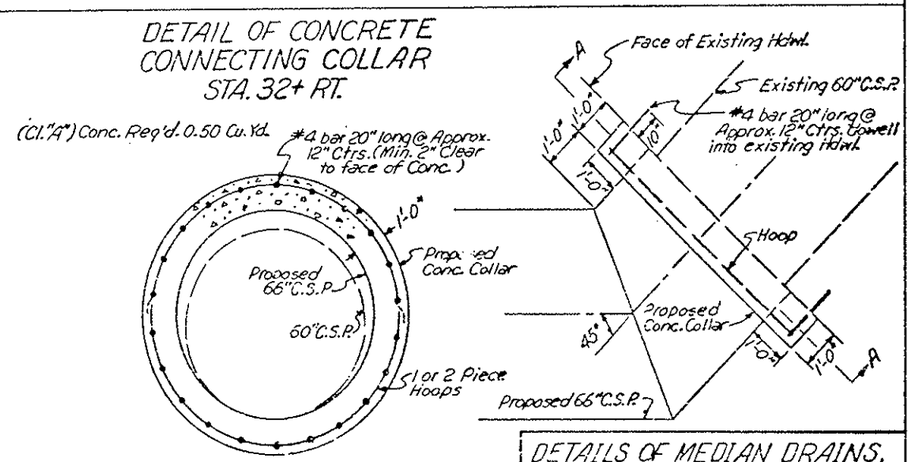
SECTION A-A

Adjust Structure shall include:

1. Adding Concrete to the proper "H"
2. Furnishing Grating fastener and forming Recess.
3. Providing Structure Excav. and Structure Backfill as necessary.

Inlet Grating & Frame, Slope & Ditch Paving and Dike Embankment will be paid for under appropriate Bid Items. (See Std. M-604-BA for Details)

DETAIL OF CONCRETE CONNECTING COLLAR STA. 32+ RT.



SECTION A-A

DETAILS OF MEDIAN DRAINS, CAP INLET, ADJUST INLET, CONC. SLABS & PIPE GUARDS AND CONC. CONNECT. COLLAR

SHEET AR-10

TOPSOIL & RETENTION BLANKET

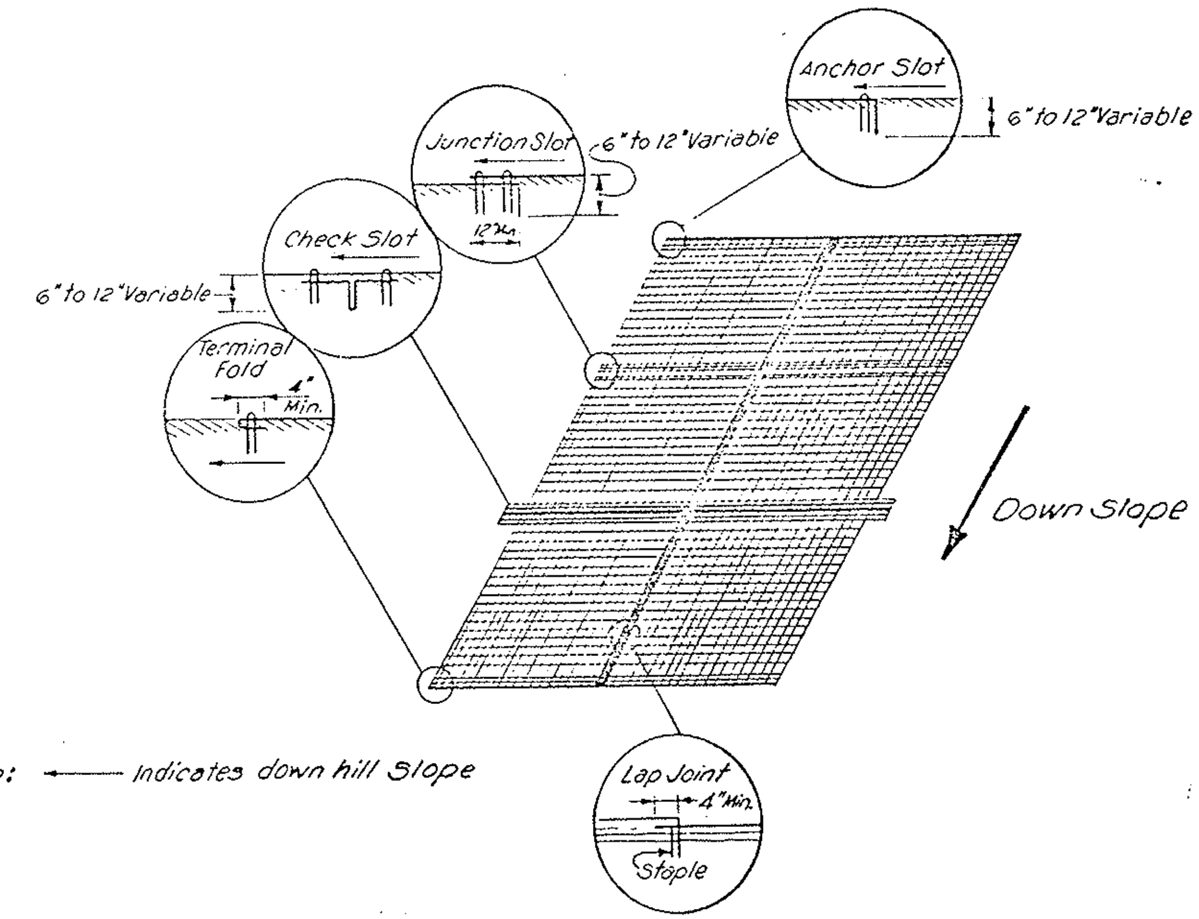
Location	Side	Soil Retention Blanket Sq. rds.		Topsoil Cu. Yd.
409+50 to 35+00	Rt	11,670		1,300
Sub-Total West Approach		11,670		1,300
137+25 to 139+75 151+50 to 171+50 173+00 to 197+00	Rt. Rt. Rt.	1,390 17,780 8,000		155 1,980 890
Sub-Total East Approach		27,170		3,025
Project Totals		38,840		4,325

This Topsoil to be obtained Rt. of On Ramp opposite ML Sta 196+ to 215+

FINAL TOPSOIL & RETENTION BLANKET

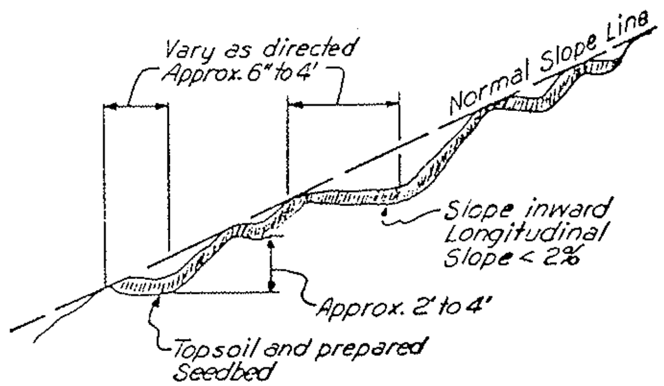
LOCATION	SIDE	SOIL RETENTION BLANKET SQ. YDS.	TOPSOIL CU. YDS.
ROAD TO WATER TANK	RT.	3,304.9	
SUBTOTAL W. APPROACH		3,304.9	
[illegible] to 455+00 RAMP	RT.	11,000.0	
[illegible] RAMP	RT.	4,266.7	
[illegible] to 191+50	RT.	10,113.0	
[illegible] to 202+00	RT.	14,517.7	
N. SIDE E. VENT. BLDG.		5,200.0	
SUB TOTAL E. APPROACH		45,397.4	
PROJECT TOTALS		48,702.0	11,858

SOIL RETENTION BLANKET JOINT DETAILS



Note: ←—— Indicates down hill Slope

INFORMAL BENCHING
(To be installed as directed)



Description of Joints and Slots

Anchor Slot - Buried upper edge of Blanket.

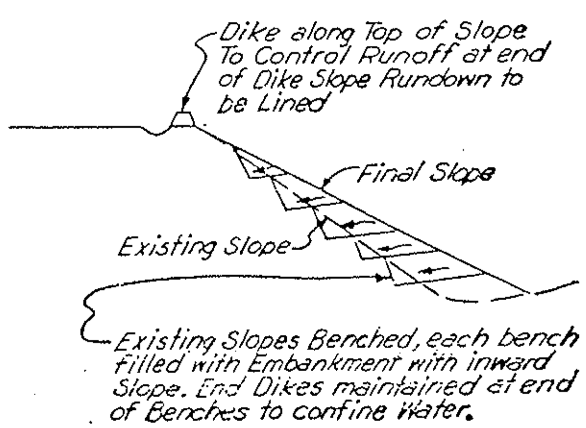
Junction Slot - Joint between upper and lower pieces. Upper pieces overlapping buried end of lower piece.

Check Slot - Extra piece of blanket folded lengthwise and buried perpendicular to the slope. Continuous upper piece overlaying the unfolded portion remaining above ground.

Terminal fold - Bottom edge of blanket, folded under and stapled.

Lap Joint - Overlap joint between two rolls, running down the slope.

SLOPE EROSION CONTROL



DETAILS OF SLOPE EROSION CONTROL, SOIL RETENTION BLANKET, TOPSOIL TABULATION & BENCHING
SHEET AR-11

(X-1) Add Totals 7-3-75 T.A.L.

FEDERAL AID PROJECT NO.	DIVISION	PROJ. NO	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	170-3(81)220	126	223

APPROVED 6-29-79

(X-1) FENCING TABULATION

LOCATION	SIDE	FINAL	* FENCE CHAIN LINK (INDUSTRIAL) LIN. FT.	FINAL	20 FOOT GATE DOUBLE DRIVEWAY EACH
414+90 to 414+98	Rt.	21	~~60~~		
415+00	Rt.			1	1
415+02 to ~~35+30~~ 33+	Rt.	1185	~~1400~~		
~~35+60~~ 33+	Rt.				1
~~35+55 to 35+90~~ 33+ to 34+	Rt.	60	~~85~~	1	
~~37+10 to 38+60~~	Lt.		~~335~~		
34+ to 35+	Rt.	184		1	
31+ to 36+	Lt.	905		1	
Sub Total West Approach		2355	~~1930~~	5	2
123+					
125+57 to ~~130+80~~	Lt.	1818	~~1340~~		
126+00	Lt.			1	1
130+ → 131+75	Lt.			1	1
138+20	X	42	~~60~~	1	1
~~125+50 to 131+75~~ 138+	Lt.	41	~~650~~		
Sub Total East Approach		1901	~~2,050~~	4	3
Project Totals		4256	~~4,030~~	9	5

Location of Fence and Gates is shown on work and storage Area sheets. Fencing is to define work areas.

~~It is estimated that~~ 31 ~~will be~~ was Corner and Line Brace Post (Chain Link) and ~~18~~ 30 End Post (Chain Link) required as follows.

	End Post	Corner and Line Brace Post
West Appr.	~~8~~ 15	~~6~~ 14
East Appr.	~~10~~ 15	~~4~~ 17

*Tension Wire Type

FENCING TABULATION

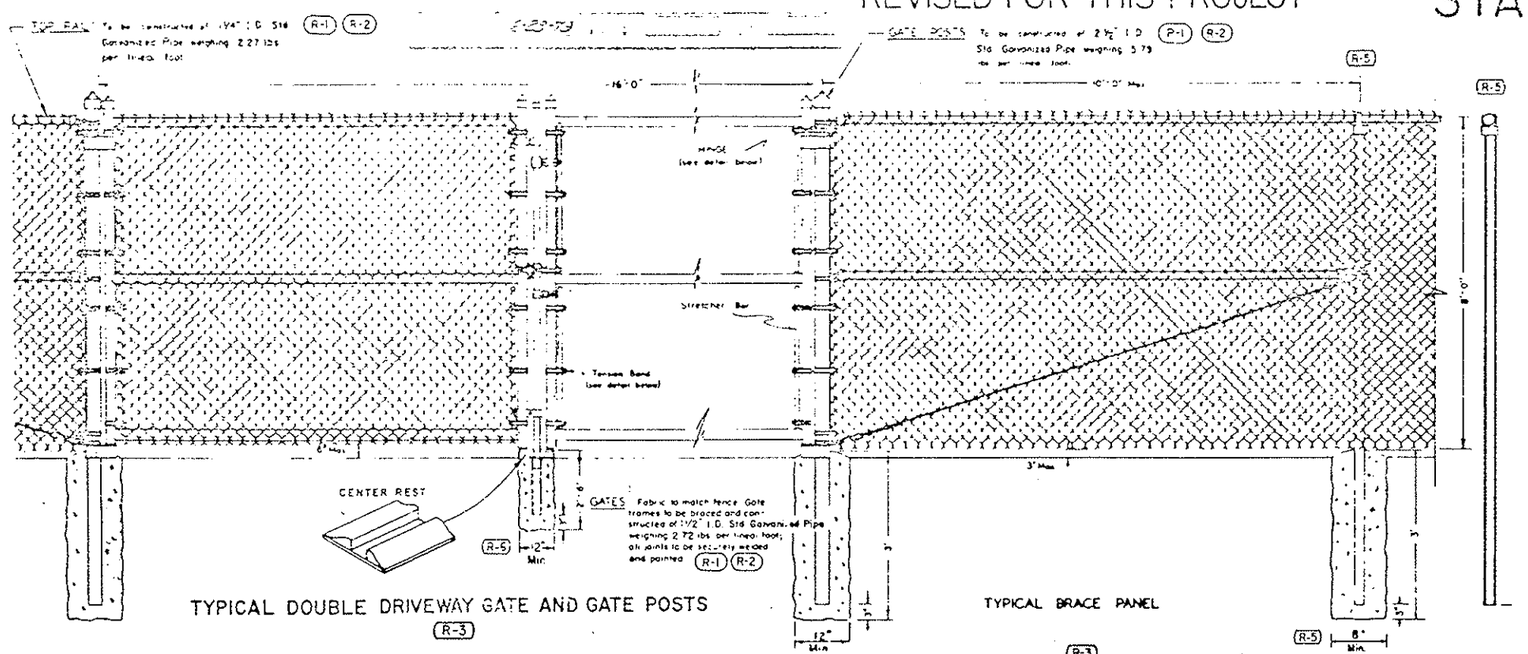
AR-12

REVISED FOR THIS PROJECT

STANDARD M-607-B

(JULY 1, 1965)
(SHEET 1 OF 2)

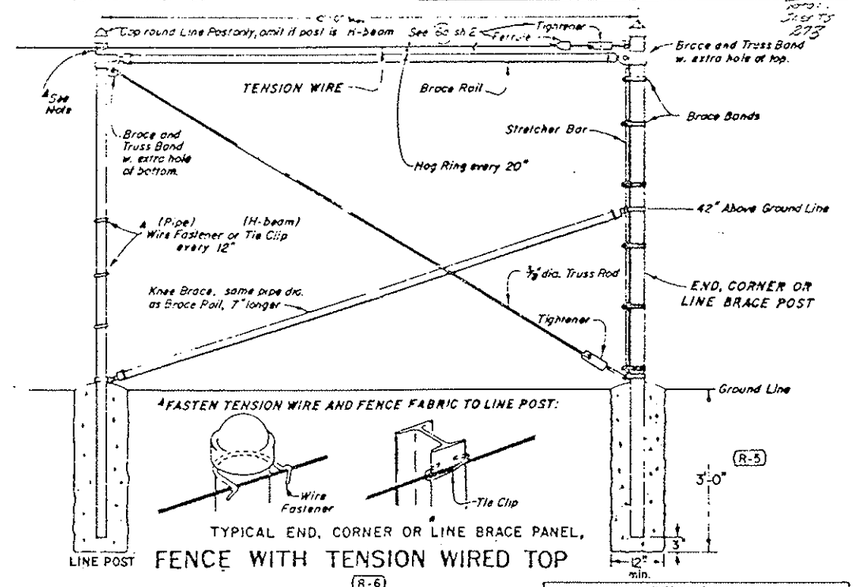
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
VIII	COLORADO	I 70-3(81)220	127



TYPICAL DOUBLE DRIVEWAY GATE AND GATE POSTS
(R-3)

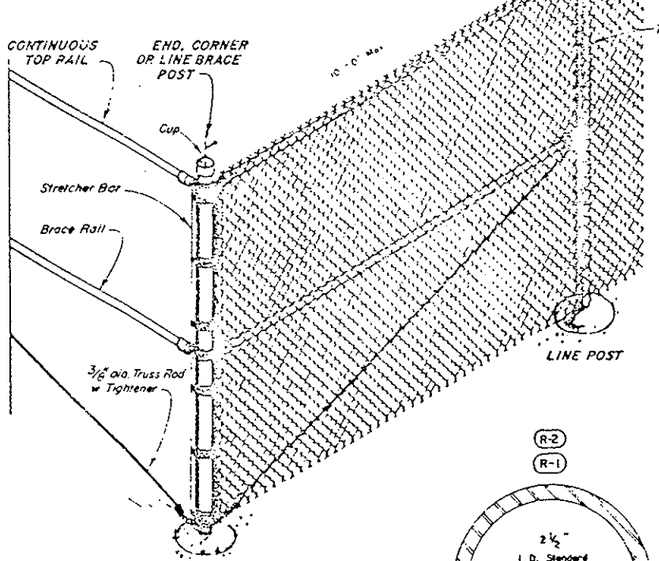
TYPICAL BRACE PANEL
(R-3)

TYPICAL LINE POST
(R-5)

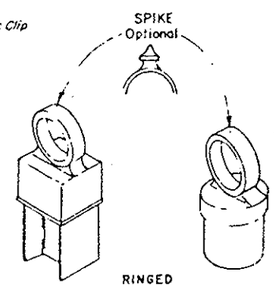


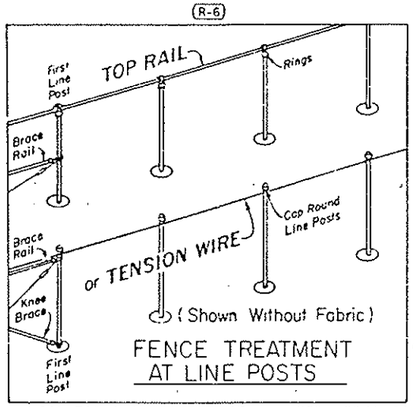
TYPICAL END, CORNER OR LINE BRACE PANEL,
FENCE WITH TENSION WIRED TOP
(R-6)

REVISION			
(R-1)	3-28-66	Pipe, Fence height & Gen'l. Notes	M.R.H.
(R-2)	4-7-66	Pipe diameters clarified	M.R.H.
(R-3)	2-6-67	Delete spec No's.; add Gen Notes	M.R.H.
(R-4)	7-24-68	Dept. Name	M.R.H.
(R-5)	7-13-70	Post Intles & tops, Line brace Gnotes	M.R.H.
(R-6)	12-11-70	Add details for tension wire	M.R.H.
(R-7)	4-20-71	Conc. in Con. Note.	M.R.H.



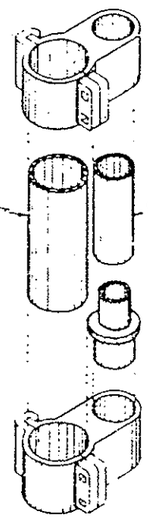
TYPICAL END, CORNER OR LINE BRACE PANEL
for
FENCE WITH RAILED TOP
(R-6)





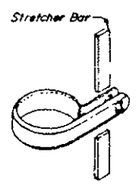
TYPICAL FOR CHAIN LINK FENCE and ALTERNATE (Sh. 2)

*Note: Line Brace Panel shall be used in fence at intervals of not more than 400 feet. (R-6)

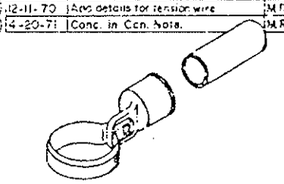


HINGE ASSEMBLY

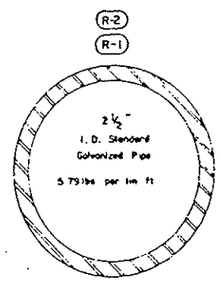
BRACE & TRUSS BAND
(R-6)



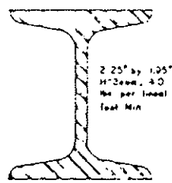
TENSION BAND



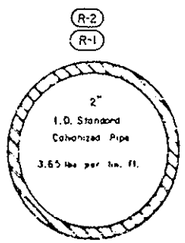
BRACE BAND & RAIL END



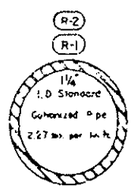
END, CORNER AND LINE BRACE POSTS
(R-5)



ALTERNATE LINE POST
(R-5)



LINE POST
(R-5)



BRACE RAIL & TOP RAIL

(R-7) GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the Project.

Weights of pipe as shown are nominal for the diameter designated. Pipe for posts shall conform to ASTM Designation A 120, Series 40.

Alternate equivalent standard fittings, gates, posts, and rails other than as shown may be used subject to approval by the Engineer.

Chain Link Fabric shall be No 9 gage wire securely fastened to all Line Posts, Rails and Braces with No 7 (B&S) gage aluminum wire and/or No 12 1/2 (W&M) gage galvanized steel wire spaced at a minimum of 6 per 10 feet horizontally and one per foot vertically. Suitable attachment bands shall be used on all gate posts, End Posts, Braces, and stretcher bars.

Chain Link Fabric for use on rock slopes or in conjunction with rock bolts shall be No 6 gage wire.

Maximum Line Post spacing shall be 10' (c to c).

Concrete shall be Class A, B or D.

Lightweight aggregate conforming to ASTM C 330 will be allowed in concrete.

Concrete footings shall have crowned tops.

Topsoil or tension wire shall be used as shown on the plans.

Tension wire shall be continuous between end or corner post and line brace post. A turnbuckle or other approved tightening device shall be used for each continuous span of tension wire. (P-4)

Tension wire shall be 7 gage galvanized coil spring steel, or approved equal.

Termination of fence at bridges or other structures shall be as shown on the plans.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

CHAIN LINK FENCE

AR-13

Designed by: V.L.A.	Approved by: C.C. Chan
Made by: E.L.H.	Staff Design Engr.
Checked by:	Date: July 1, 1965

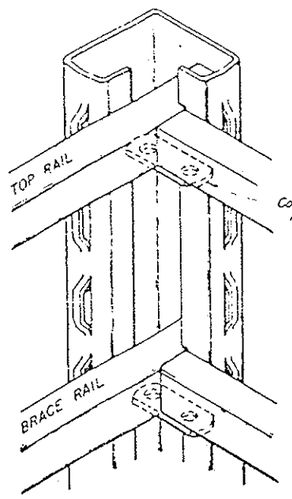
REVISED FOR THIS PROJECT

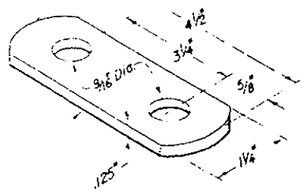
STANDARD M-607-B

(SHEET 2)
(JULY 13, 1970)

VIII	I 70-3(81)220	128	273

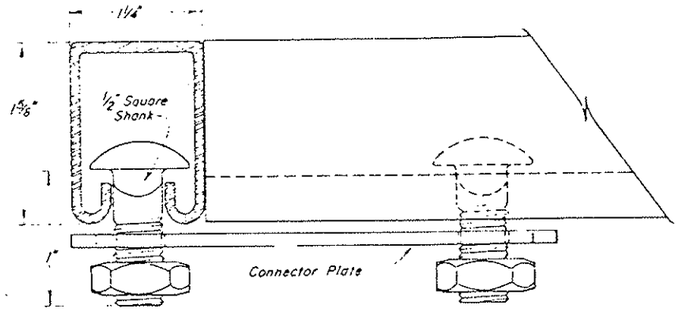
REVISIONS		
R-5	7-13-70 Entire sheet	M.R.H.
R-6	12-- -70 Add details 6a and 13	M.R.H.
R-7	4-20-71 Line brace table Tension wire clamp	M.R.H.





CORNER POST TREATMENT ①

CONNECTOR PLATE ②



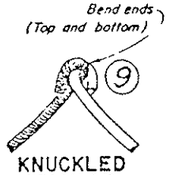
RAIL (Showing Corner Assembly)

14 GAGE ROLL FORMED STEEL, 20' LENGTHS, 1.35 LB. PER LIN. FT.

③

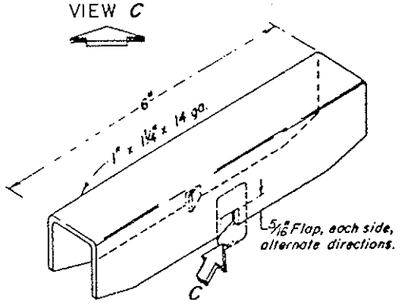
BARBED SELVAGE

VIEW C



KNUCKLED SELVAGE

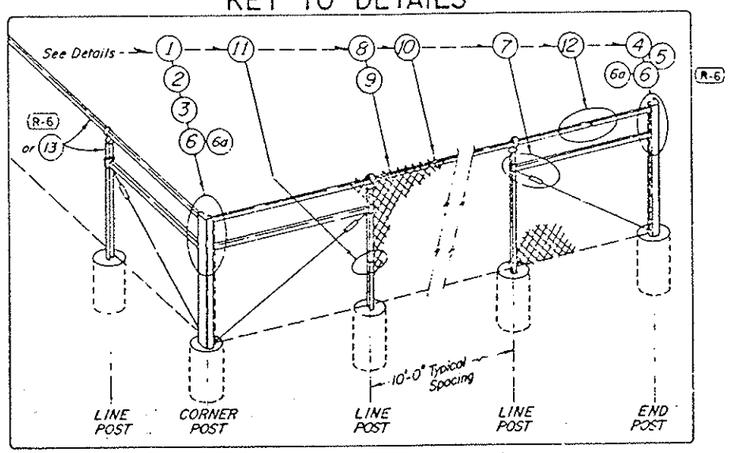
Alternate, use only when called for on plans.

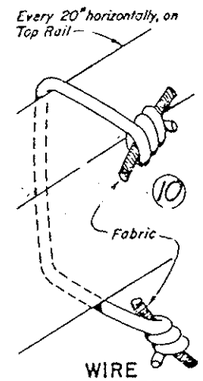


RAIL SPLICE INSERT

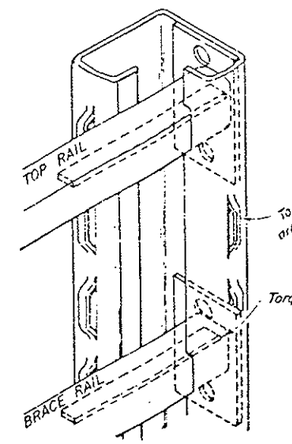
⑫

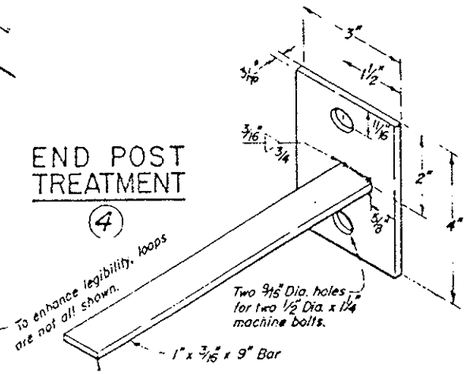
KEY TO DETAILS





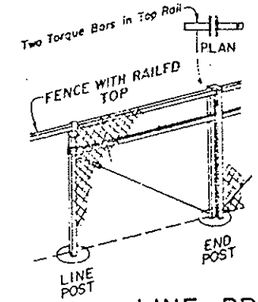
WIRE FASTENER

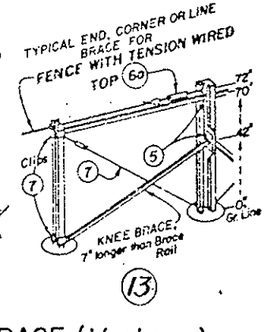




TORQUE BAR

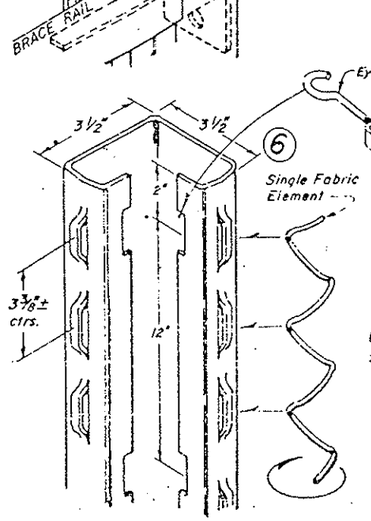
⑤

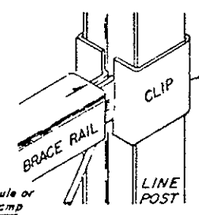




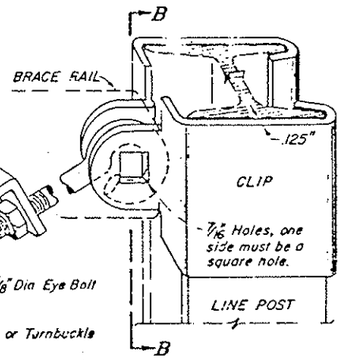
LINE BRACE (½ shown)

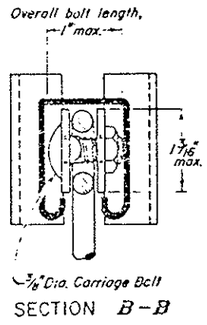
400 FT. INTERVALS R-6 R-7





6a Tension Wire (℄ Knee Brace) R-6
ALTERNATE FOR TOP RAIL





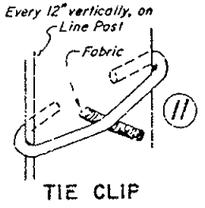
SECTION B-B

END POST OR CORNER POST

10 GAGE ROLL FORMED STEEL, 5.14 LB. PER LINEAR FOOT

⑦

TYPICAL BRACING



TIE CLIP

WIRE WORK

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

CHAIN LINK FENCE

(ALTERNATE)

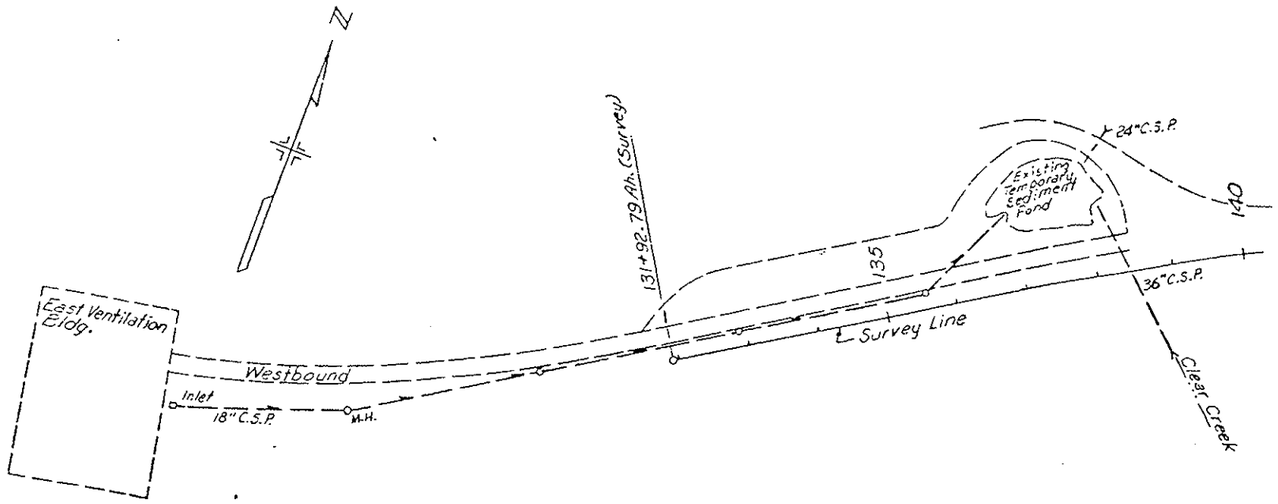
AR-14

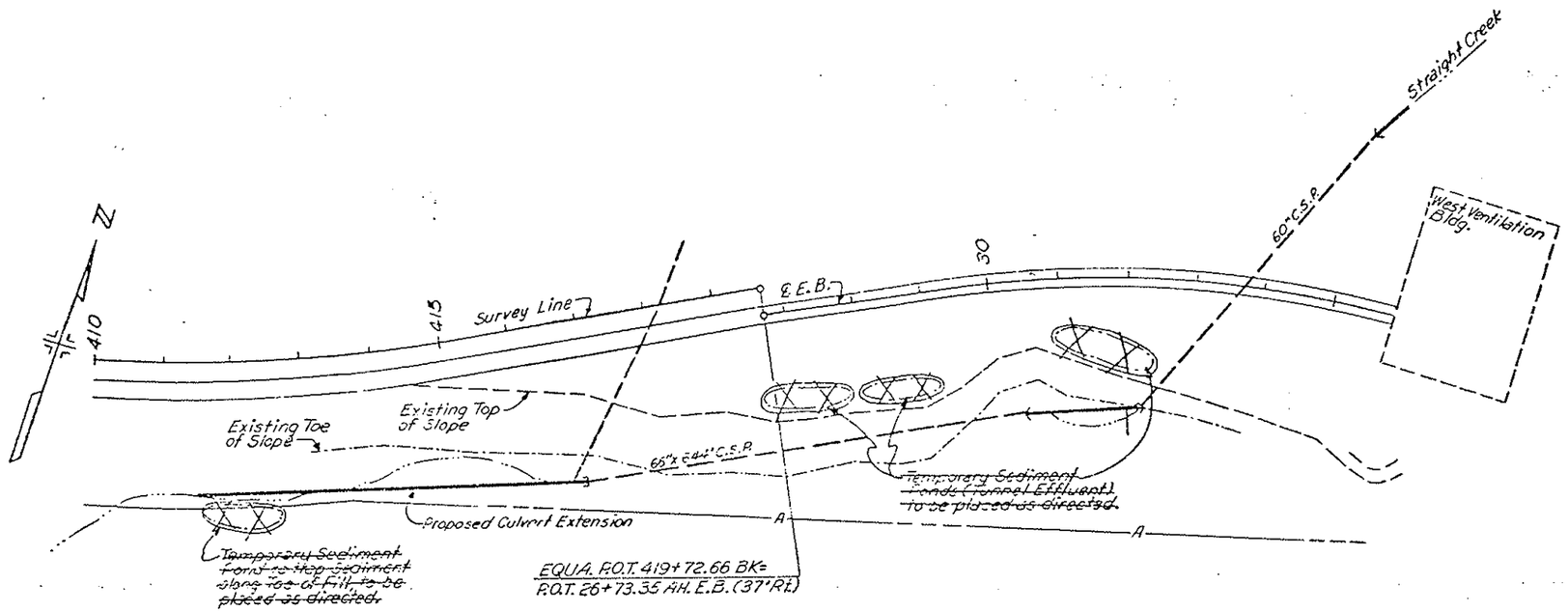
Designed by	M.R.H.	Approved by	[illegible]
Made by	J.R.B.	Staff Design Engineer	
Checked by	R.S.M.	Date:	July 13, 1970

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	I 70-3(61)220	129	213

6-23-79

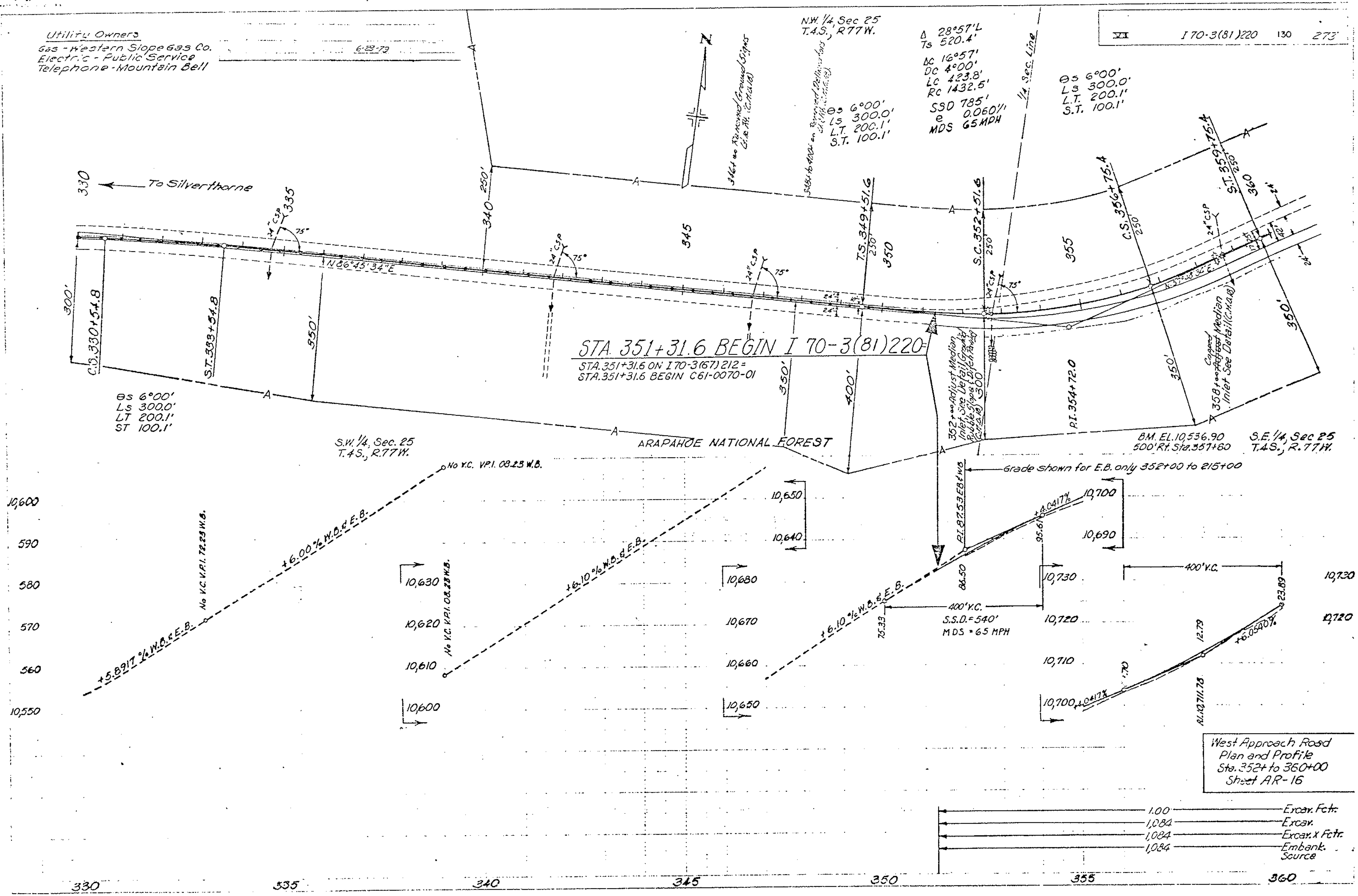
WATER POLLUTION CONTROL

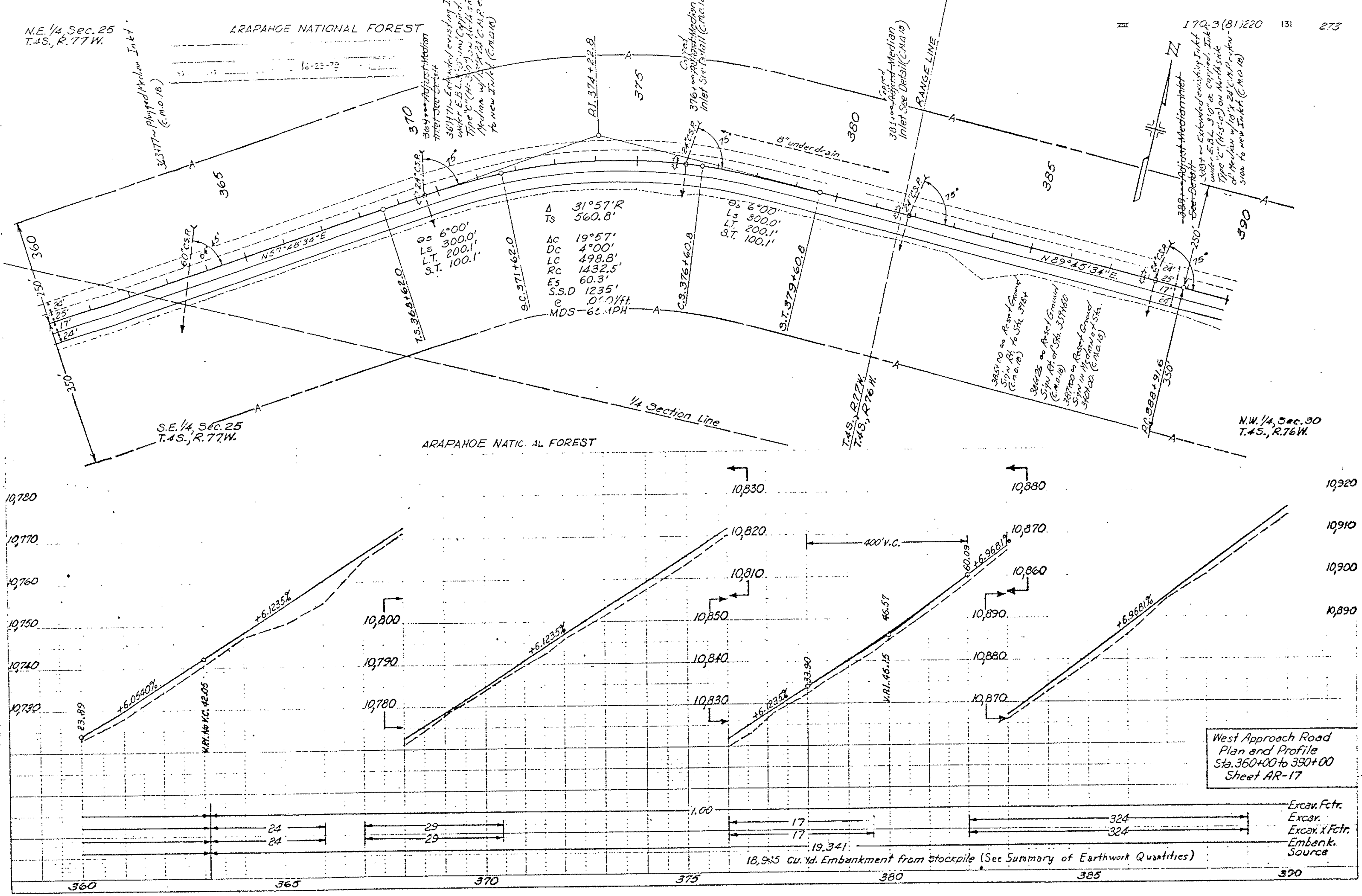




WATER POLLUTION CONTROL

AR-15


Utility Owners
Gas - Western Slope Gas Co.
Electric - Public Service
Telephone - Mountain Bell
6-22-79
N.W. 1/4 Sec 25
T.4S., R77W.
Δ 28°57'L
Ts 520.4'
Δc 16°57'
Dc 4°00'
Lc 423.8'
Rc 1432.5'
SSD 785'
e 0.060'/'
MDS 65 MPH
1/4 Sec. Line
Θs 6°00'
Ls 300.0'
L.T. 200.1'
S.T. 100.1'
To Silverthorne
N86°45'34"E
STA. 351+31.6 BEGIN I 70-3(81)220
STA. 351+31.6 ON I 70-3(67) 212 =
STA. 351+31.6 BEGIN C61-0070-01
C.S. 330+54.8
S.T. 333+54.8
T.S. 349+51.6
S.C. 352+51.6
C.S. 356+75.4
S.T. 359+75.4
P.I. 354+72.0
24" CSP
ARAPAHOE NATIONAL FOREST
S.W. 1/4, Sec. 25
T.4S., R.77W.
B.M. EL. 10,536.90
500' Rt. Sta. 357+60
S.E. 1/4, Sec 25
T.4S., R.77W.
Grade shown for E.B. only 352+00 to 215+00
No V.C. V.P.I. 08.23 W.B.
No V.C. V.P.I. 72.23 W.B.
+5.8917% W.B. & E.B.
+6.00% W.B. & E.B.
+6.10% W.B. & E.B.
+4.0417%
+6.0540%
400' V.C.
S.S.D. = 540'
MDS = 65 MPH
P.I. 87.53 E.B. & W.B.
P.I. 10,711.78
West Approach Road
Plan and Profile
Sta. 352+ to 360+00
Sheet AR-16
1.00 Excav. Fctr.
1,084 Excav.
1,084 Excav. x Fctr.
1,084 Embank. Source
330
335
340
345
350
355
360



West Approach Road
Plan and Profile
Sta. 360+00 to 390+00
Sheet AR-17

ARAPAHOE NATIONAL FOREST

N.W. 1/4 Sec. 30 T.4S., R.76W.

N.E. 1/4 Sec. 30 T.4S., R.76W.

N89°45'31"E

P.I. 393+90.0

P.I. 398+85.9

P.I. 407+83.4

S80°12'41"E

Δ 10°01'45" Rt.
D 1°00'31.4"
T 498.4'
L 994.3'
R 5680.1'
E 21.8'
S.SD 1235.0'
e 0.028'/'
MDS 70 MPH

Δ 37°40'39"L
Ts 932.5
Δc 30°10'39"
Dc 2°30'
Lc 1207.1'
Rc 2292.0'
Es 131.5'
S.S.D. 997.0'
e 0.060'/'
M.S.D. 70 M.P.H.

Ø S 3°45'
L.S. 300.0'
S.T. 200.0'
L.T. 100.0'

Ø S 3°45'
L.S. 300.0'
S.T. 200.0'

N.62°06'40" E. 6k. Ahd.
N.62°20'05" E. Rh.

STA. 400+00 ON I70-3(81)220 = STA. 400+00 END I70-3(67)212

EQUATION

B.M. El. 10,818.07
Brass Cap in Conc.
340' Rt. Sta. 398+00

B.M. El. 10,841.69
Brass Cap in Conc.
500' Rt. Sta. 401+00

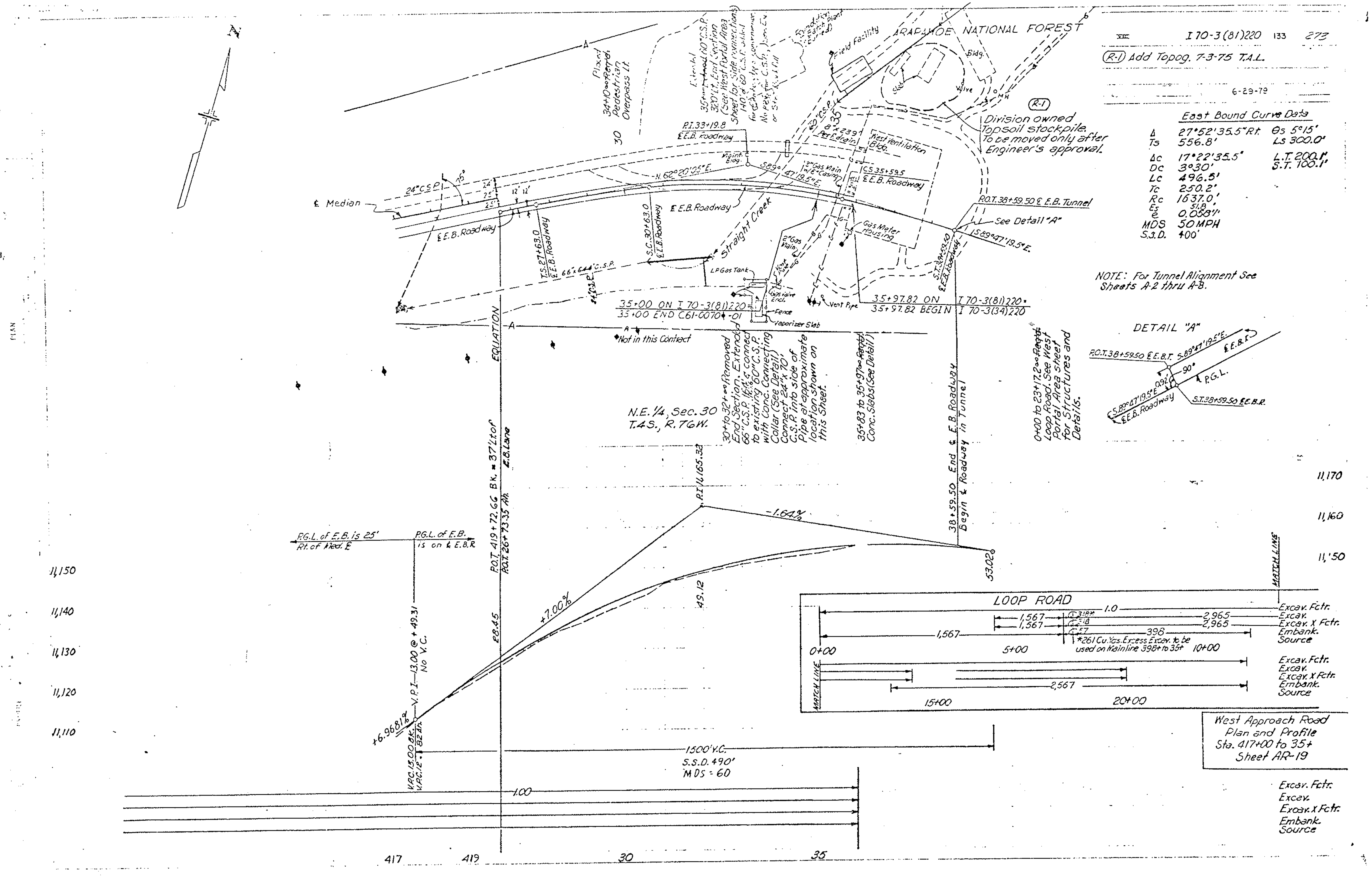
B.M. El. 10,974.80
Brass Cap in Conc.
400' Rt. Sta. 406+80

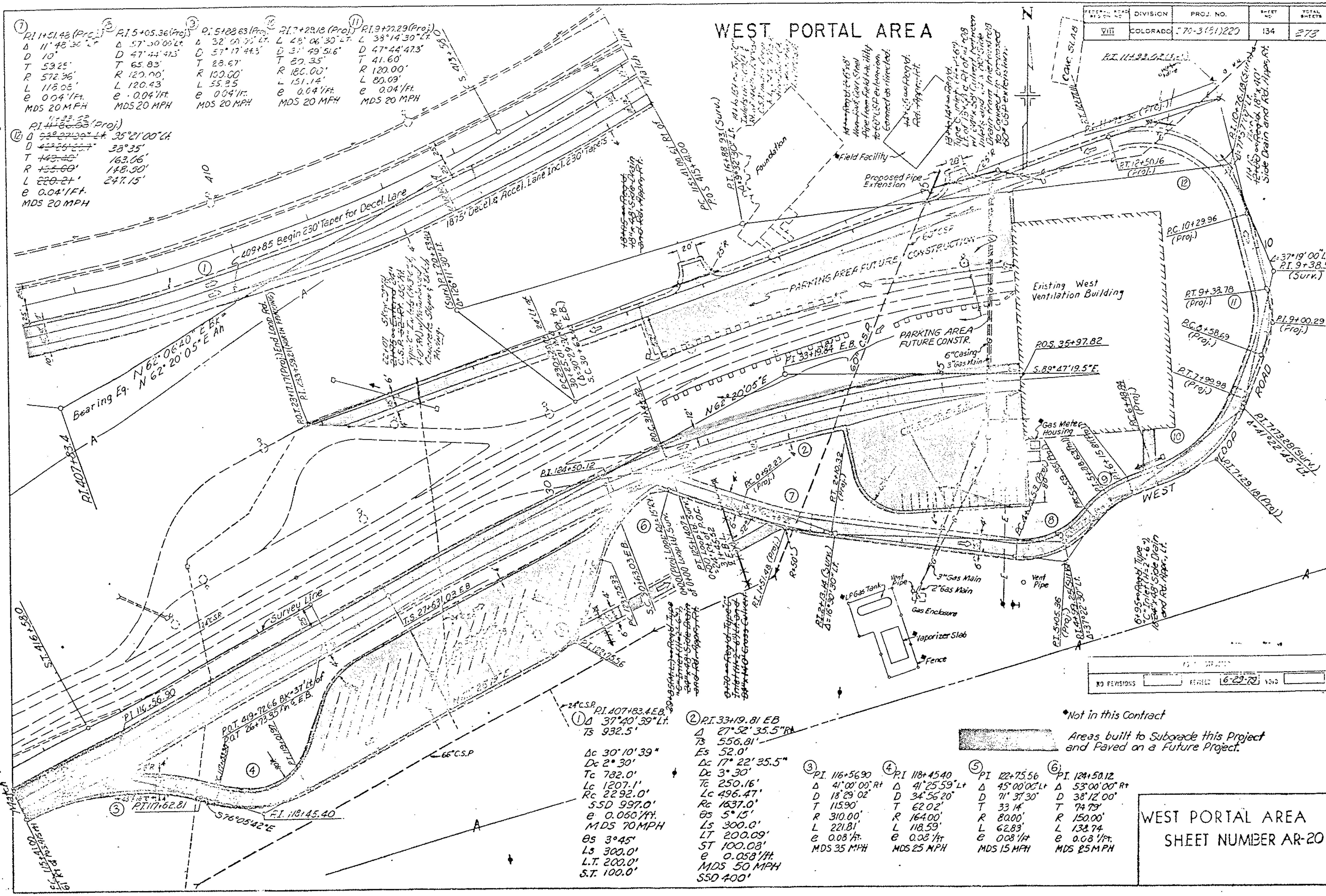
West Approach Road
Plan and Profile
Sta. 390+00 to 417+00
Sheet AR-18

148,718 Cu.Yd. Embankment from Tunnel Excavation & 261 Cu.Yd. from West Loop Road

1.00	1.00	1.00	Excav. Fctr.
2	1,545	1,545	Excav.
2	1,546	1,546	Excav. x Fctr.
	150,525	150,525	Embank. Source

390 395 400 405 410 415 417


I 70-3(81)220 133 273
R-1 Add Topog. 7-3-75 T.A.L.
6-29-79
ARAPAHOE NATIONAL FOREST
Field Facility
Bldg.
Valve
Division owned Topsoil stockpile. To be moved only after Engineer's approval.
East Bound Curve Data
Δ 27°52'35.5" Rt. θs 5°15'
Ts 556.8' Ls 300.0'
Δc 17°22'35.5" L.T. 200.1'
Dc 3°30' S.T. 100.1'
Lc 496.5'
Tc 250.2'
Rc 1637.0'
Es 51.8
e 0.038'/'
MDS 50 MPH
S.S.D. 400'
NOTE: For Tunnel Alignment See Sheets A-2 thru A-8.
DETAIL "A"
P.O.T. 38+59.50 ₵ E.B.T. S.89°47'19.5"E.
₵ E.B.T.
90°
P.G.L.
S.T. 38+59.50 ₵ E.B.R.
S.89°47'19.5"E. ₵ E.B. Roadway
Plaza! 34+10 Remove Pedestrian Overpass Lt.
P.I. 33+19.8 ₵ E.B. Roadway
Maint. Bldg.
N.62°20'05"E.
S.89°47'19.5"E.
West Ventilation Bldg.
C.S. 35+59.5 ₵ E.B. Roadway
P.O.T. 38+59.50 ₵ E.B. Tunnel
See Detail "A"
S.89°47'19.5"E.
24" C.S.P.
75°
₵ Median
₵ E.B. Roadway
T.S. 27+63.0 ₵ E.B. Roadway
S.C. 30+63.0 ₵ E.B. Roadway
66" & 64" C.S.P.
Straight Creek
LP Gas Tank
Gas Meter Housing
Gas Valve Encl.
Vent Pipe
Fence
Vaporizer Slab
S.T. 38+59.50 ₵ E.B. Roadway
35+00 ON I 70-3(81)220
35+00 END C61-0070-01
35+97.82 ON I 70-3(81)220
35+97.82 BEGIN I 70-3(34)220
Not in this Contract
EQUATION
P.O.T. 419+72.66 Bk. = 37' Lt. of
P.O.T. 26+73.35 Ah. E.B. Lane
N.E. 1/4, Sec. 30
T.4S., R.76W.
35+83 to 35+97 Remove Conc. Slabs (See Detail)
38+59.50 End ₵ E.B. Roadway Begin ₵ Roadway in Tunnel
0+00 to 23+17.2 Remove Loop Road. See West Portal Area sheet for Structures and Details.
P.G.L. of E.B. is 25' Rt. of Med. ₵
P.G.L. of E.B. is on ₵ E.B.R.
P.I. 11,165.32
-1.64%
+7.00%
V.P.I. -13.00 @ +49.31 No V.C.
+6.9681%
V.P.C. 15.00 Bk.
V.P.C. 12.82 Ah.
28.45
45.12
53.02
1500' V.C.
S.S.D. 490'
MDS = 60
11,170
11,160
11,150
11,140
11,130
11,120
11,110
LOOP ROAD
Excav. Fctr.
Excav.
Excav. X Fctr.
Embank.
Source
1.0
1,567
2,965
398
*261 Cu. Yds. Excess Excav. to be used on Mainline 398+ to 35+
0+00
5+00
10+00
15+00
20+00
2,567
MATCH LINE
1.00
417
419
30
35
West Approach Road
Plan and Profile
Sta. 417+00 to 35+
Sheet AR-19



WEST PORTAL AREA
FEDERAL ROAD REGION NO.
DIVISION
PROJ. NO.
SHEET NO.
TOTAL SHEETS
VIII
COLORADO
I 70-3(51)220
134
273
P.I. 1+51.48 (Proj.)
Δ 11°48'30" Lt.
D 10°
T 59.25'
R 572.96'
L 118.08'
e 0.04'/Ft.
MDS 20 MPH
P.I. 5+05.36 (Proj.)
Δ 57°30'00" Lt.
D 47°44'47.3"
T 65.83'
R 120.00'
L 120.43'
e 0.04'/Ft.
MDS 20 MPH
P.I. 11+23.52 (Proj.)
Δ 35°21'00" Lt.
D 38°35'
T 163.06'
R 148.50'
L 247.15'
e 0.04'/Ft.
MDS 20 MPH
409+85 Begin 230' Taper for Decel. Lane
1875' Decel. & Accel. Lane Incl. 230' Tapers
Bearing Eq. N 62°06'40" E Bk. N 62°20'05" E Ah
P.I. 407+83.4
Field Facility
Foundation
Proposed Pipe Extension
PARKING AREA FUTURE CONSTRUCTION
PARKING AREA FUTURE CONSTR.
Existing West Ventilation Building
P.O.S. 35+97.82
S 89°47'19.5" E
N 62°20'05" E
P.I. 33+19.84 E.B.
P.C. 10+29.96 (Proj.)
Δ 37°19'00" Lt.
P.I. 9+38.98 (Surv.)
P.T. 9+38.78 (Proj.)
P.I. 9+00.29 (Proj.)
P.C. 8+58.69 (Proj.)
P.T. 7+99.98 (Proj.)
P.T. 12+50.16 (Proj.)
P.I. 7+73.28 (Surv.)
P.T. 7+29.18 (Proj.)
WEST LOOP ROAD
Gas Meter Housing
6" Casing
3" Gas Main
2" Gas Main
Vent Pipe
LP Gas Tank
Gas Enclosure
Vaporizer Slab
Fence
P.I. 124+50.12
P.I. 122+75.56
P.I. 116+56.90
P.I. 117+62.81
P.I. 118+45.40
S 76°05'42" E
T.S. 27+63.03 E.B.
Survey Line
Match Line
24" C.S.P.
66" C.S.P.
NO REVISIONS
REVISED 6-29-72
VOID
*Not in this Contract
Areas built to Subgrade this Project and Paved on a Future Project.
① P.I. 407+83.4 E.B.
Δ 37°40'39" Lt.
Ts 932.5'
Δc 30°10'39"
Dc 2°30'
Tc 782.0'
Lc 1207.1'
Rc 2292.0'
SSD 997.0'
e 0.060'/Ft.
MDS 70 MPH
θs 3°45'
Ls 300.0'
L.T. 200.0'
S.T. 100.0'
② P.I. 33+19.81 EB
Δ 27°52'35.5" Rt
Ts 556.81'
Es 52.0'
Δc 17°22'35.5"
Dc 3°30'
Tc 250.16'
Lc 496.47'
Rc 1637.0'
θs 5°15'
Ls 300.0'
LT 200.09'
ST 100.08'
e 0.058'/Ft.
MDS 50 MPH
SSD 400'
③ P.I. 116+56.90
Δ 41°00'00" Rt
D 18°29'02"
T 115.90'
R 310.00'
L 221.81'
e 0.08'/Ft.
MDS 35 MPH
④ P.I. 118+45.40
Δ 41°25'59" Lt
D 34°56'20"
T 62.02'
R 164.00'
L 118.59'
e 0.08'/Ft.
MDS 25 MPH
⑤ P.I. 122+75.56
Δ 45°00'00" Lt
D 71°37'30"
T 33.14'
R 80.00'
L 62.83'
e 0.08'/Ft.
MDS 15 MPH
⑥ P.I. 124+50.12
Δ 53°00'00" Rt
D 38°12'00"
T 74.79'
R 150.00'
L 138.74
e 0.08'/Ft.
MDS 25 MPH
WEST PORTAL AREA
SHEET NUMBER AR-20

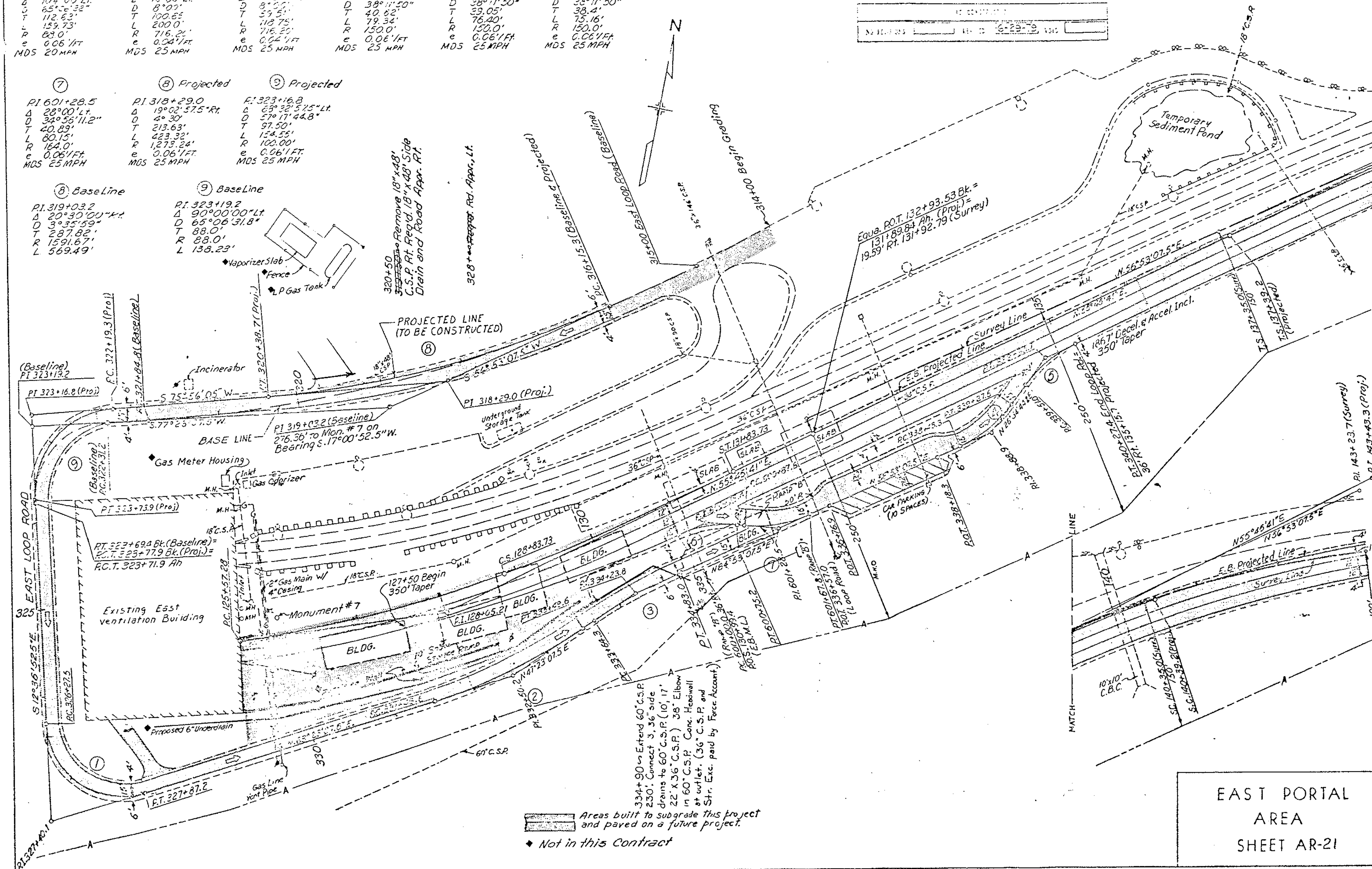
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3(81)220	135	273

EAST PORTAL AREA

	①	②	③	④	⑤	⑥
P.I.	327+40.1	332+50.2	334+23.8	338+88.9	339+90.1	600+38.4
Δ	104°00' Lt.	16°00' Lt.	[illegible] Rt.	30°18'23.3" Lt.	29°10'56.8" Rt.	28°42'31.4" Rt.
D	65°06'32"	8°00'	8°00'	38°11'50"	38°11'50"	38°11'50"
T	112.63'	100.65	59.5[illegible]'	40.62'	39.05'	38.4'
L	159.73'	200.0'	118.75'	79.34'	76.40'	75.16'
R	88.0'	716.20'	716.20'	150.0'	150.0'	150.0'
e	0.06'/FT	0.04'/FT.	0.04'/FT	0.06'/FT	0.06'/Ft.	0.06'/Ft.
MDS	20 MPH	25 MPH	25 MPH	25 MPH	25 MPH	25 MPH

	⑦	⑧ Projected	⑨ Projected
P.I.	601+28.5	318+29.0	323+16.8
Δ	28°00' Lt.	19°02'57.5" Rt.	88°32'57.5" Lt.
D	34°56'11.2"	4°30'	57°17'44.8"
T	40.89'	213.63'	97.50'
L	80.15'	423.32'	154.55'
R	164.0'	1,273.24'	100.00'
e	0.06'/Ft.	0.06'/FT.	0.06'/FT.
MDS	25 MPH	25 MPH	25 MPH

	⑧ BaseLine	⑨ BaseLine
P.I.	319+03.2	323+19.2
Δ	20°30'00" Rt.	90°00'00" Lt.
D	3°35'59"	65°06'31.8"
T	287.82'	88.0'
R	1591.67'	88.0'
L	569.49'	138.23'

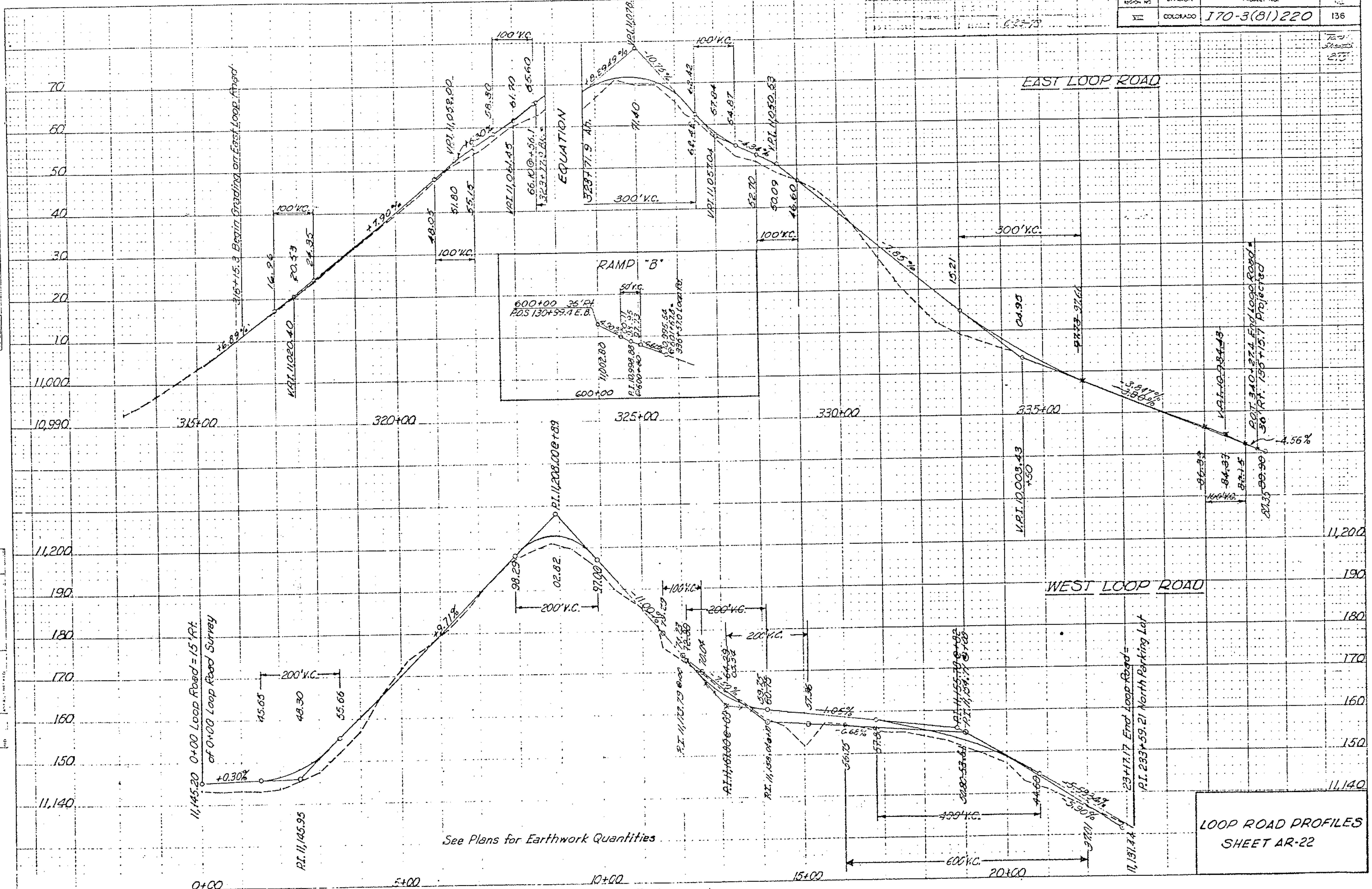


Areas built to subgrade this project and paved on a future project.

◆ Not in this Contract

EAST PORTAL AREA
SHEET AR-21

DIVISION	PROJECT NO.	SHEET NO.
COLORADO	I70-3(81)220	136

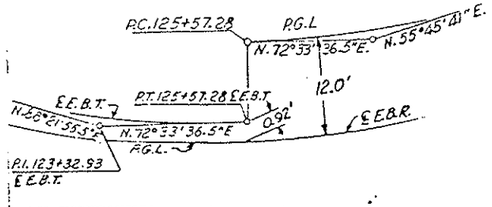


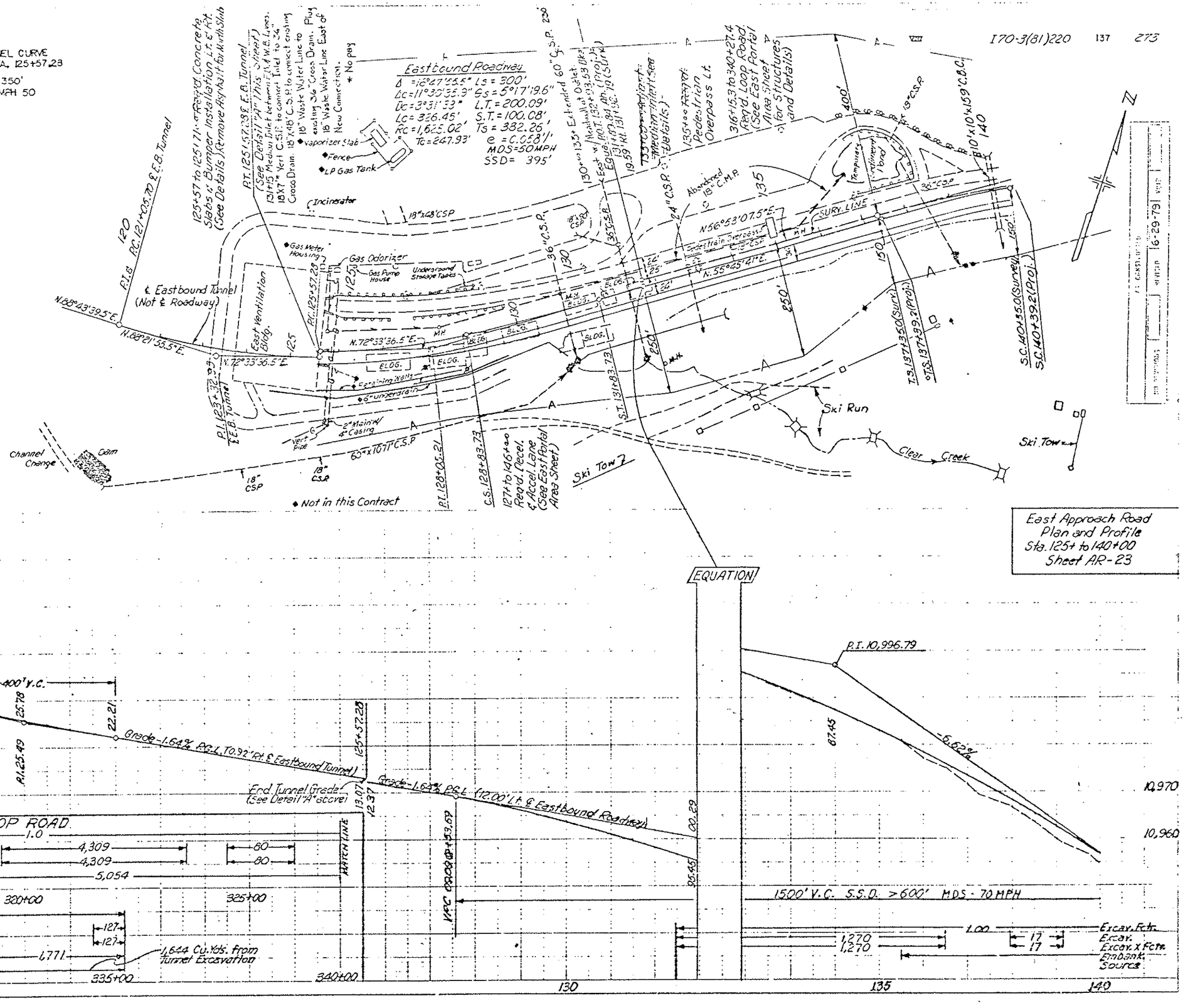
EASTBOUND TUNNEL CURVE
STA. 124+06.70 TO STA. 125+57.28
SSD = ~~335~~ 350'
MDS = ~~45~~ MPH 50

NOTE: For Tunnel Alignment See Sheets A-2 thru A-8

PLAN

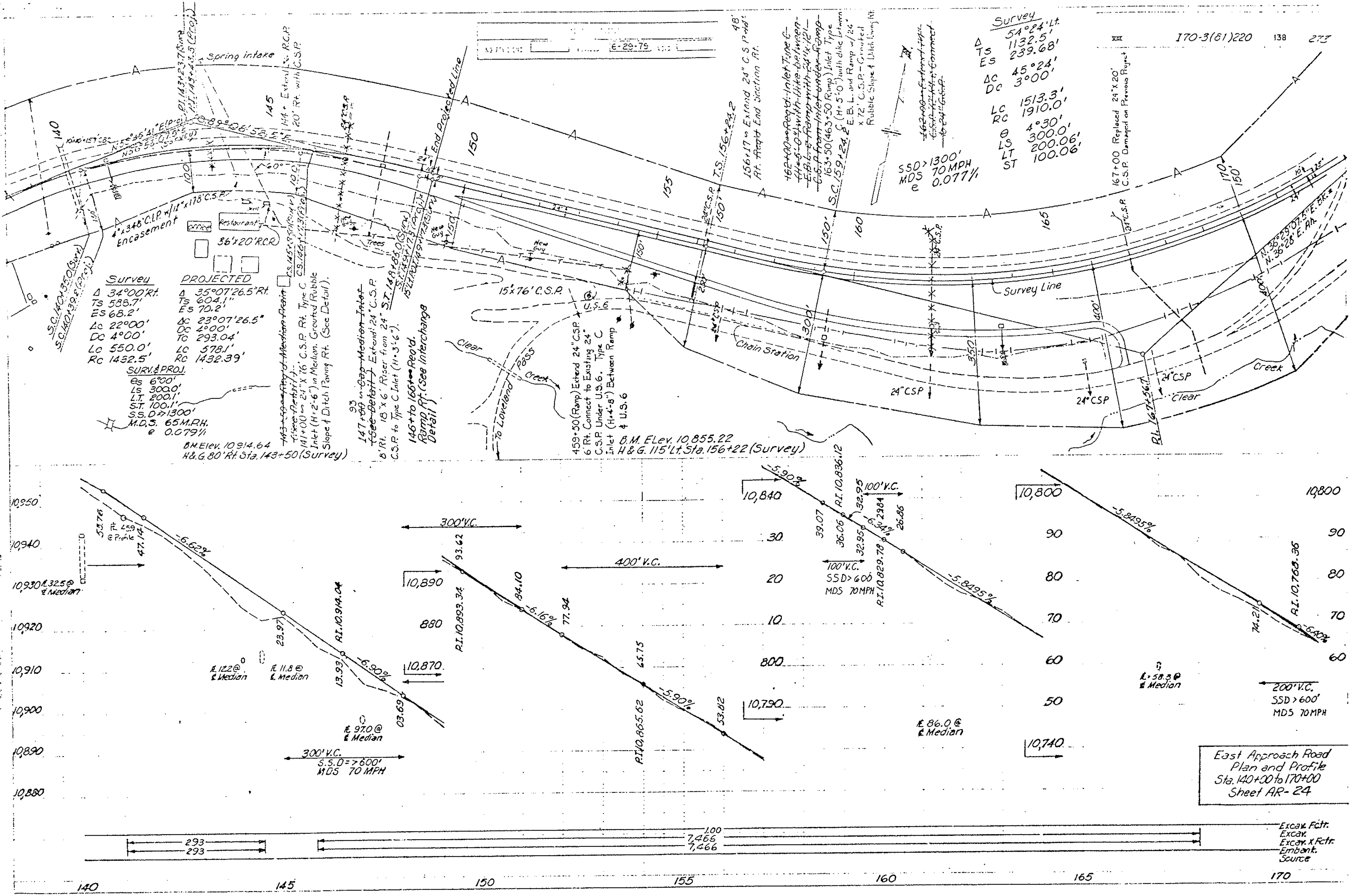
DETAIL "A"



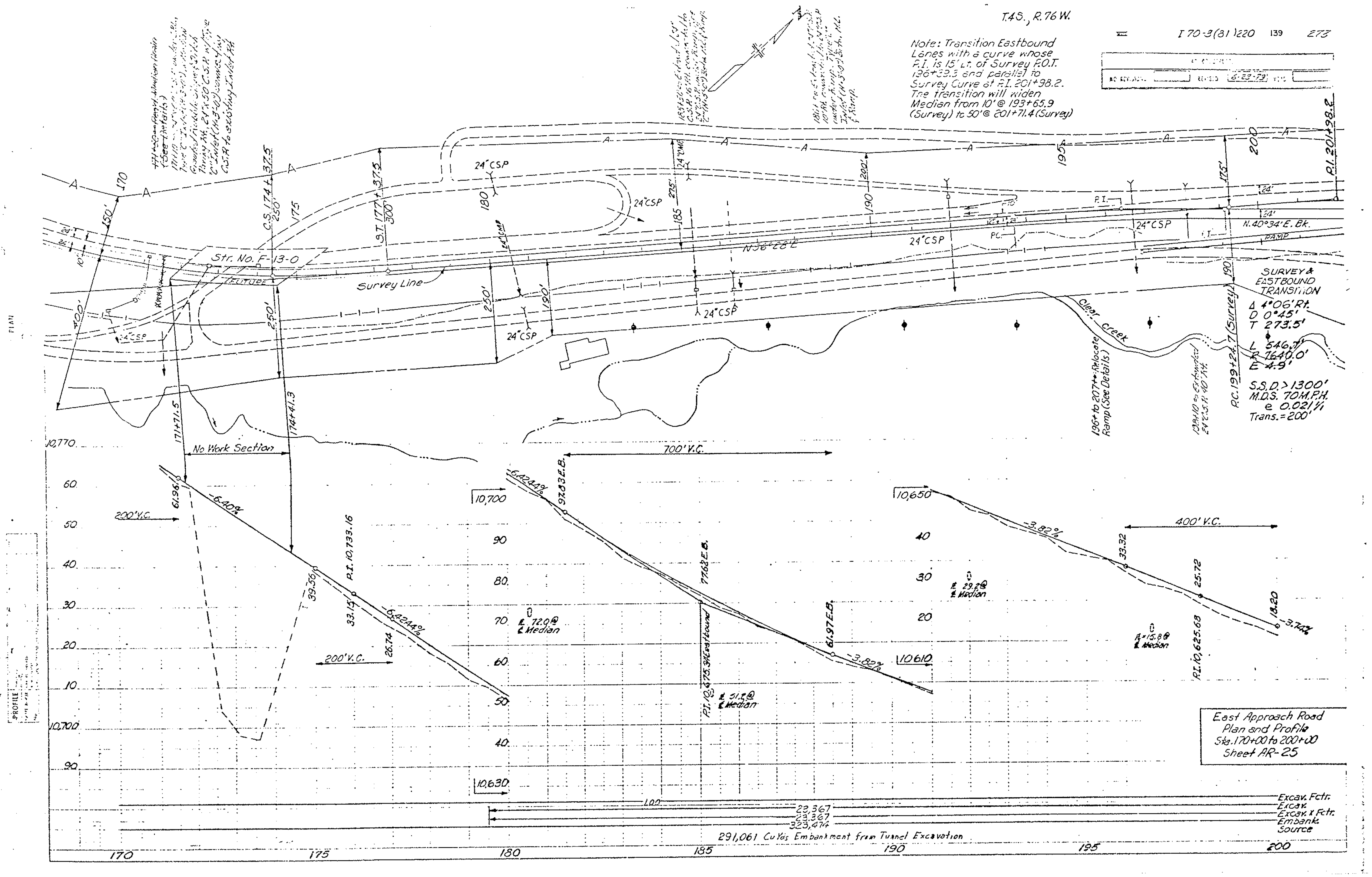


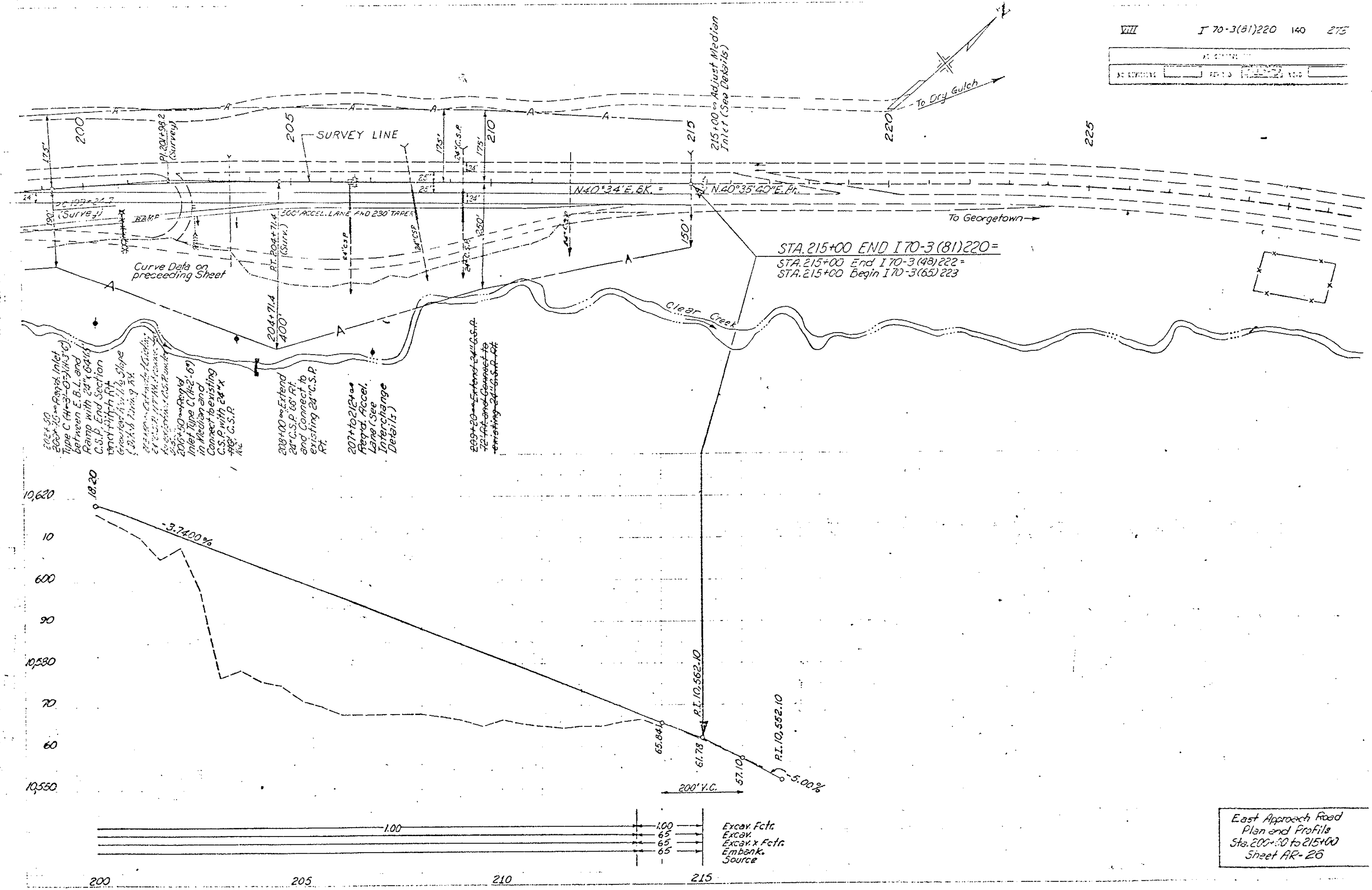
East Approach Road
Plan and Profile
Sta. 125+ to 140+00
Sheet AR-23

PROFILE



Survey
Δ 54°24' Lt.
Ts 1132.5'
Es 239.68'
Δc 45°24'
Dc 3°00'
Lc 1513.3'
Rc 1910.0'
θ 4°30'
LS 300.0'
LT 200.06'
ST 100.06'
SSD>1300'
MDS 70 MPH
e 0.077'/'
Spring intake
End Projected Line
T.S. 156+24.2
S.C. 159+24.2
Survey Line
Chain Station
Creek
Clear Creek
To Loveland Pass
U.S. 6
Office
Restaurant
36'x20' R.C.R.
15'x76' C.S.P.
Encasement
Survey
Δ 34°00' Rt.
Ts 585.7'
ES 68.2'
Δc 22°00'
Dc 4°00'
Lc 550.0'
Rc 1432.5'
PROJECTED
Δ 35°07'26.5" Rt.
Ts 604.1"
Es 70.2'
Δc 23°07'26.5"
Dc 4°00'
Tc 293.04'
Lc 578.1'
Rc 1432.39'
SURV. & PROJ.
es 6°00'
Ls 300.0'
LT 200.1'
ST 100.1'
S.S.D.>1300'
M.D.S. 65 M.P.H.
e 0.079'/'
B.M. Elev. 10,914.64
H&G 80' Rt. Sta. 143+50 (Survey)
B.M. ELev. 10,855.22
H&G 115' Lt. Sta. 156+22 (Survey)
146+to 166+00 Req'd. Ramp Rt. (See Interchange Detail)
156+17 = Extend 24" C.S.P. Rt. Req'd End Section Rt.
163+50 (463+50 Ramp) Inlet Type C (H=5'0") with dike between E.B.L. and Ramp w/24" x 72' C.S.P. - Grouted Rubble Slope & Ditch Paving Rt.
167+00 Replaced 24"x20' C.S.P. Damaged on Previous Project
459+50 (Ramp) Extend 24" C.S.P. 6' Rt. Connect to Existing 24" C.S.P. Under U.S. 6. Type C Inlet (H=4'-8") Between Ramp & U.S. 6
141+00 = 24"x16' C.S.P. Rt. Type C Inlet (H=2'-6") in Median. Grouted Rubble Slope & Ditch Paving Rt. (See Detail)
147+00 = Extend 24" C.S.P. 8' Rt. 18"x6' Riser from 24" C.S.P. to Type C Inlet (H=3'6")
24" CSP
-6.62%
-6.90%
-6.16%
-5.90%
-6.34%
-5.8495%
-6.40%
P.I. 10,914.04
P.I. 10,893.34
P.I. 10,865.62
P.I. 10,836.12
P.I. 10,829.78
P.I. 10,768.36
300' V.C.
400' V.C.
100' V.C.
200' V.C.
S.S.D.=>600'
MDS 70 MPH
SSD>600
£ 32.5 @ £ Median
£ 12.2 @ £ Median
£ 11.8 @ £ Median
£ 97.0 @ £ Median
£ 86.0 @ £ Median
£ 58.5 @ £ Median
Excav. Fctr.
Excav.
Excav. x Fctr.
Embank.
Source
1.00
7,466
293
140
145
150
155
160
165
170
East Approach Road
Plan and Profile
Sta. 140+00 to 170+00
Sheet AR-24


T.4S., R.76 W.
I 70-3(81)220 139 273
Note: Transition Eastbound Lanes with a curve whose P.I. is 15' Lt. of Survey P.O.T. 196+39.3 and parallel to Survey Curve at P.I. 201+98.2. The transition will widen Median from 10' @ 193+65.9 (Survey) to 50' @ 201+71.4 (Survey)
Str. No. F-13-0
FUTURE
Survey Line
N.56°28'E
N.40°34'E. Bk.
RAMP
Clear Creek
24" CSP
C.S. 174+37.5
S.T. 177+37.5
P.I. 201+98.2
P.C. 199+24.7 (Survey)
SURVEY & EASTBOUND TRANSITION
Δ 4°06' Rt.
D 0°45'
T 273.5'
L 546.7'
R 7640.0'
E 4.9'
S.S.D. > 1300'
M.D.S. 70 M.P.H.
e 0.021'/'
Trans. = 200'
196+ to 207+± Relocate Ramp (See Details)
171+71.5
174+41.3
No Work Section
700' V.C.
200' V.C.
400' V.C.
-6.40%
-6.4244%
-3.82%
-3.74%
P.I. 10,733.16
P.T. 10,475.3 Eastbound
P.I. 10,625.68
East Approach Road
Plan and Profile
Sta. 170+00 to 200+00
Sheet AR-25
1.00
23,367
23,367
323,474
291,061 Cu Yds Embankment from Tunnel Excavation
Excav. Fctr.
Excav.
Excav. x Fctr.
Embank.
Source
170
175
180
185
190
195
200



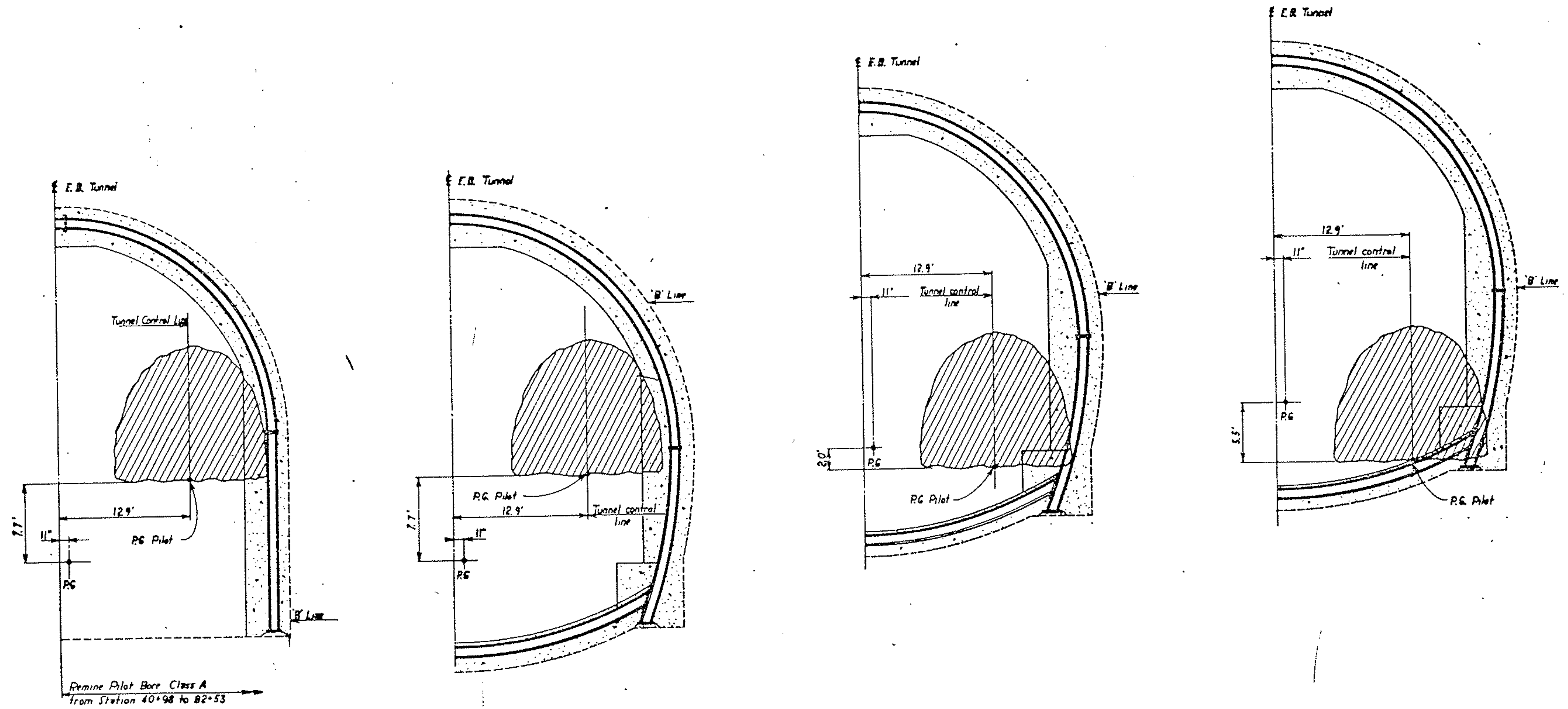
East Approach Road Plan and Profils Sta. 200+00 to 215+00 Sheet AR-26

Federal Region No.	District	Project No.	No.	Sheets
VIII	COLORADO	I 70-3(81)220	49	273

AS CONSTRUCTED — 6-29-73

REVISIONS

	Initial	Date			
Designed by	C.D.O.H	2-73	Checked by		
Checked by	R.J.S	3/73	Quantities by	JLA	3-73
Detailed by			Checked by	RWG	3-73



STATION 40+98

STATION 41+81 TO 58+50

STATION 68+07±

Top of Pilot Bore approx. at spring line

STATION 72+98

Original scale: 3/16" = 1'-0"

Eastbound Tunnel remains constant from Sta. 40+98 to 41+81

Eastbound Tunnel transition upward from Sta. 58+50 to 68+07±

Eastbound Tunnel transitions upward from Sta. 68+07± to 72+98

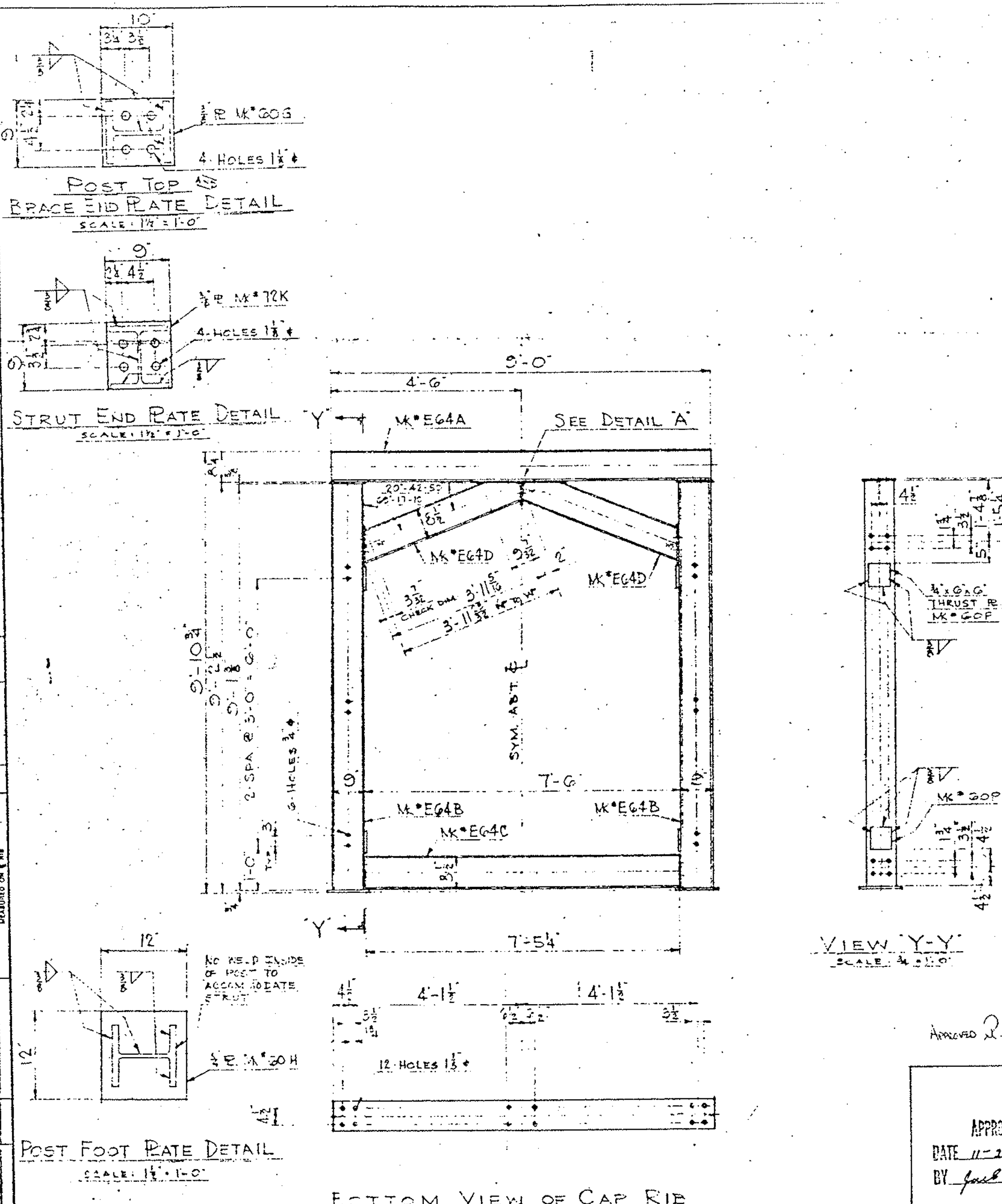
Note:
The cross-section area of the pilot bore as shown represents approximate configuration.

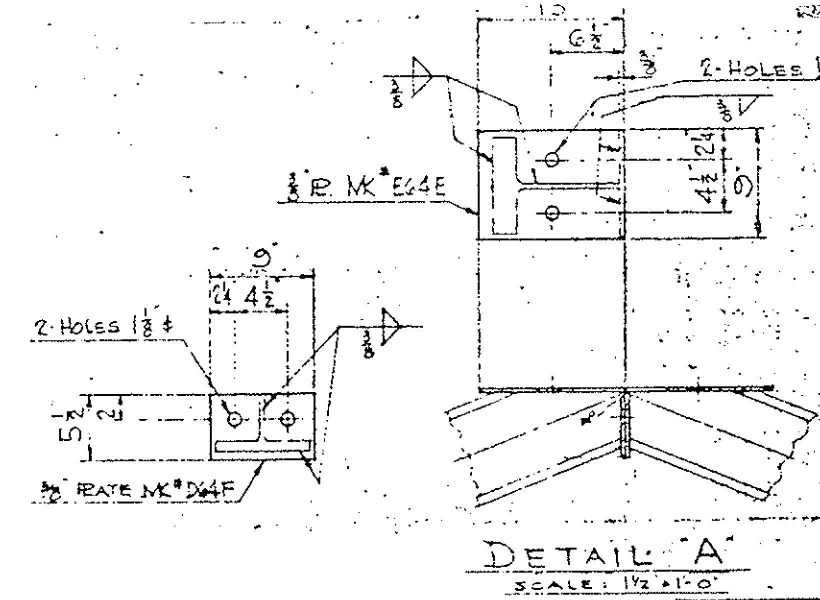
DIVISION OF HIGHWAYS

MAIN BORE, EASTBOUND TUNNEL, LOCATION RELATIVE TO LOCATION OF PILOT BORE

Designer	C.D.O.H	Structure Numbers	F-13-X
Detailer	R. Seulheuwer		
Drawing Number B 21	of 60	Drawings	

Revision Dates (Preliminary Stage Only)





	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
YIR	COLORADO	I 70-3 (50) 2??	45 FX	273

AS CONSTRUCTED

NO REVISIONS [ ] REVISED [6-29-79] VOID [ ]

TOTAL WT	UNIT WT	DRAWING NO.	TOTAL PAY WT PER COURSE	MARK NO	NO REQ'D	DESCRIPTION	MAT'L SPEC
1.2	.10				12	⅝ Sq. T.L. NUTS (2 PER ROD)	
20.3	3.38				6	⅝ ϕ x 39 TIE RODS WITH 3 C.A. THD. EA. END	
8.4	.28				30	1" HEX. T.L. NUTS	
30.9	1.03				30	1"ϕ x 3" HEX. HD. T.L. BOLTS	
	9.6	D5-559-5AAB-E64		60G	1	⅜" x 9 x 10" END PLATE	A572 GRADE 50
	5.3			D64F	1	⅜" x 5½" x 9 END PLATE	
	12.4			E64E	1	⅜" x 9" x 13" END PLATE	
	189.5				1	W8 x 48# x 3'-11⅞" N.N.A.	
433.6	216.8			E64D	2	BRACE ASSYS. EA CONSISTING OF:	
	8.6			72K	2	⅜" x 9" x 9 END PLATE	
	357.0				1	W8 x 48# x 7'-5¼" N.N.A.	
374.2	374.2			E64C	1	STRUT ASSY. CONSISTING OF:	
	7.6			60P	2	¾" x 6" x 6" THRUST PLATES	
	30.6			60H	1	¾ x 12" x 12 FOOT PLATE	
	9.6			60G	1	⅜" x 9 x 10" TOP PLATE	
	610.7				1	W8 x 67# x 9'-1⅞" N.N.A.	
1330.2	665.1			E64B	2	POST ASSYS. EA CONSISTING OF:	
	7.6			30P	2	¾" x 6" x 6" THRUST PLATES	
	360.0				1	W8 x 40# x 9'-0" N.N.A.	
375.2	375.2			E64A	1	CAP BEAM ASSY CONSISTING OF:	

TOTAL WT. FOR ______ COURSE

MAT'L. REQ'D. PER COURSE OF RIBS

APPROVED R.O. [signature]

APPROVED FINAL
DATE 11-20-76
BY [signature]

APPROVED PRELIMINARY DATED 10-2?-76 BY JACK E. ?AY
ABOVE ??? REVIEWED ?? APPROVAL STAMP

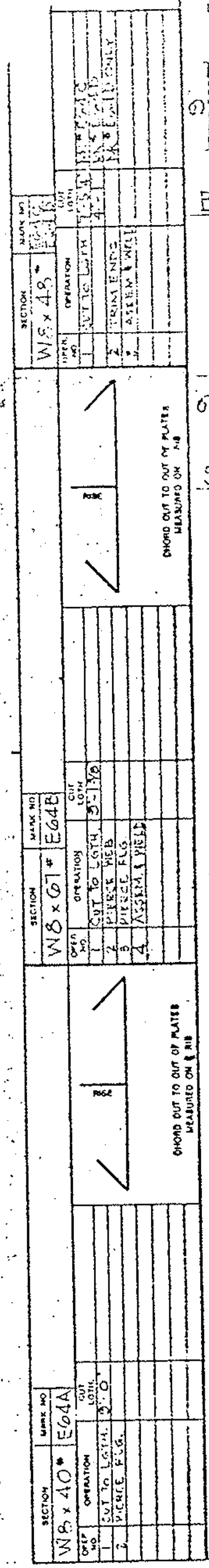
COMMERCIAL SHEARING, INC.
YOUNGSTOWN, OHIO 44501 U.S.A. PHONE 216 746-8011

CROWN DRIFT - MULTIPLE DRIFT TYPE
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-3 (21) 20 — COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

DATE 3-31-76 | DR. BY RJA | CK. BY | SCALE AS NOTED

DWG. NO. D5-559-5AAB-E64

REV SYM	DATE	REVISION	DR NO	CHG BY	CH BY



REGION NO.	DISTRICT	PROJ. NO.	NO.	SHEETS
VIII	COLORADO	I70-3(81)220	46	273

REVISIONS

R-1	7-3-75	Rev. Block out	BRL

AS CONSTRUCTED — NO REVISIONS — REVISED 6-29-79 — VOID

North Foundation Drift

	Cap	Post	Brace	Invert
Light Support	W8×24	W8×40	W8×40	W8×24
Heavy Support	W8×24 A572	W8×58 A572	W8×24 A572	W8×31 A572

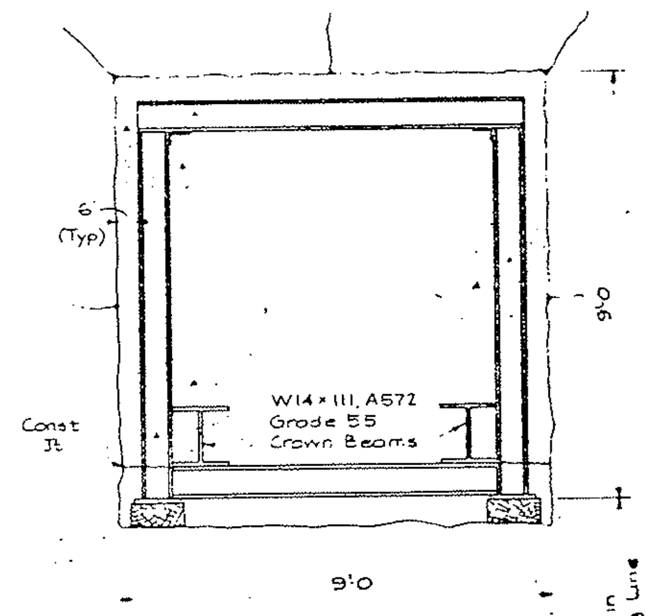
Light Support used:
- Sta 94+86 to Sta 97+06
- Sta 98+86 to Sta 101+90
- Sta 103+62 to Sta 104+90
- Sta 107+98 to Sta 108+46
- Sta 109+42 to Sta 118+50

Heavy Support used:
- Sta 87+56 to Sta 94+86
- Sta 97+06 to Sta 98+86
- Sta 101+90 to Sta 103+62
- Sta 104+90 to Sta 107+98
- Sta 108+46 to Sta 109+42
- Sta 118+50 to Sta 120+22

Summary of Quantities for Information Only ⊕

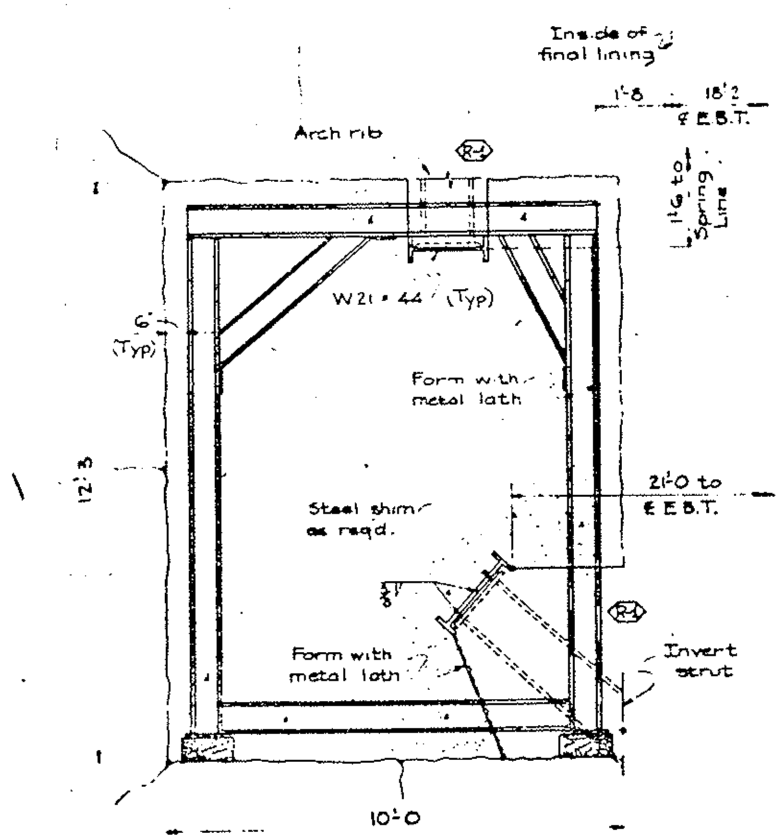
Descriptions	Unit	Total
Excavation	Cu Yd	14,518
Concrete Class T-4	Cu Yd	8,076
Concrete Class T-4	Cu Yd	6,742
Drift Support Steel	Ton	907

⊕ Not for Basis of Payment



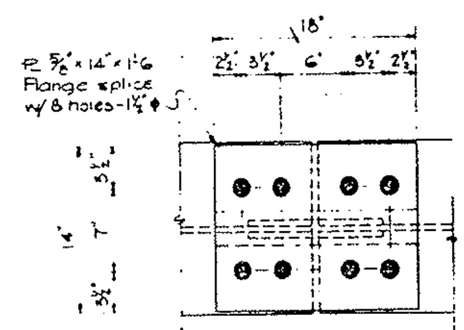
CROWN DRIFT

All drift support steel spaced at 3'0 C/C.

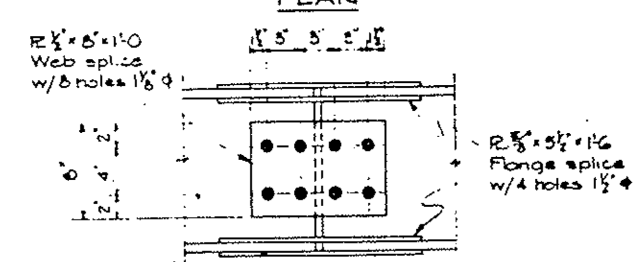


NORTH FOUNDATION DRIFT

All drift support steel spaced at 3'0 C/C.



PLAN



ELEVATION

SPLICE DETAIL ~ CROWN BEAMS

Crown Drift:

	Cap	Post	Invert
Light Support	W8×40 A572	W8×24 A572	W8×24
Heavy Support	W8×67 A572	W8×40 A572	W8×24 A572

Light Support used:
- Sta. 94+86 to Sta. 97+06
- Sta. 98+86 to Sta. 101+90
- Sta 103+62 to Sta 104+90
- Sta 107+98 to Sta 108+46

Heavy Support used:
- Sta. 87+56 to Sta 94+86
- Sta. 97+06 to Sta 98+86
- Sta. 101+90 to Sta 103+62
- Sta 104+90 to Sta. 107+98
- Sta 108+46 to Sta 109+42

Summary of Quantities for Information Only ⊕

Descriptions	Unit	Total
Excavation	Cu Yd	6558
Concrete Class T-C	Cu Yd	6558
Drift Support Steel	Ton	427
Crown Beams	Ton	364

⊕ Not for Basis of Payment.

Note: See Dwg. No. B_19 for drift structural details.

DIVISION OF HIGHWAYS

DRIFT DETAILS FOR TUNNEL SUPPORT 3 DRIFT AND 2 DRIFT, DIVISIONS PROPOSED METHOD OF CONSTRUCTION

Designer C.D.O.H.	Structure Numbers F-13-X
Detailer B.R. Lere	
Drawing Number B 18	of 60 Drawings

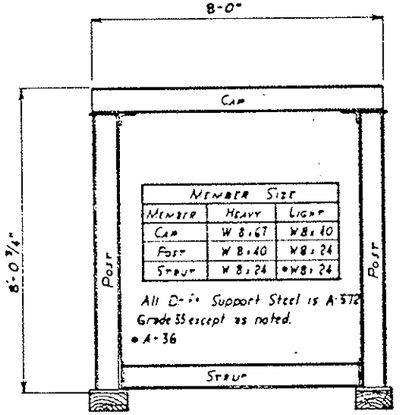
Designed by C.D.O.H.	2-75	Approved by	
Checked by		Quantities by	J.L.A. 4-76
Detailed by B.R.L.	6-76	Checked by	R.W.G. 4-76

AS CONSTRUCTED		
NO REVISIONS	REVISED	VB:A 12-22-77

FEDERAL ROAD REGION NO	DISTRICT	PROJ NO	NO	SHEETS
	COLORADO	F 70-3(81)220	47	273

REVISIONS		

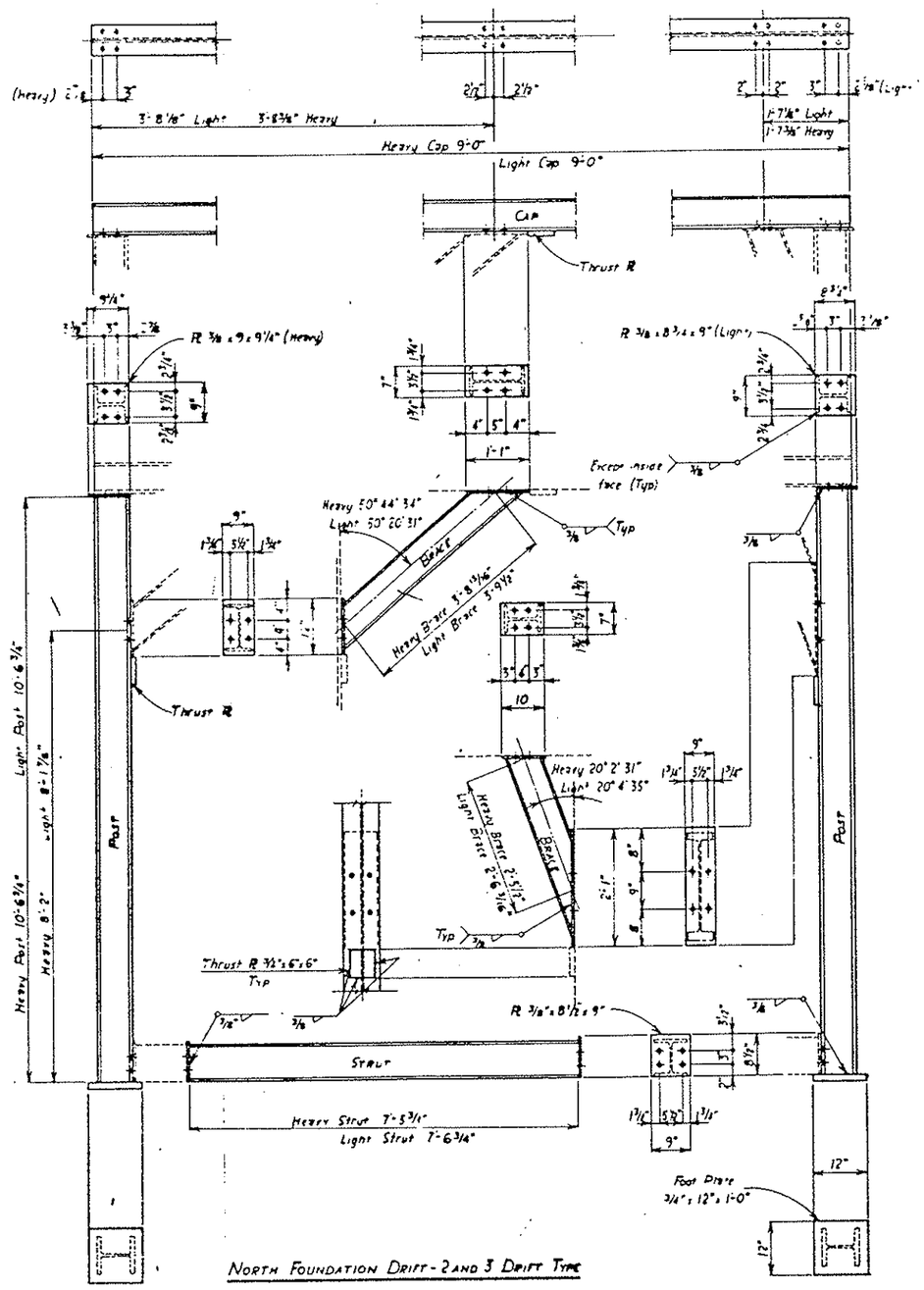
INITIAL	DATE	
DESIGNED BY	C.D.O.H	4-75
CHECKED BY	C.D.O.H	4-75
QUANTITIES BY	R.T.S	4-75
CHECKED BY	R.V.G	4-75
DETAILED BY	R.T.S	T.L.A.



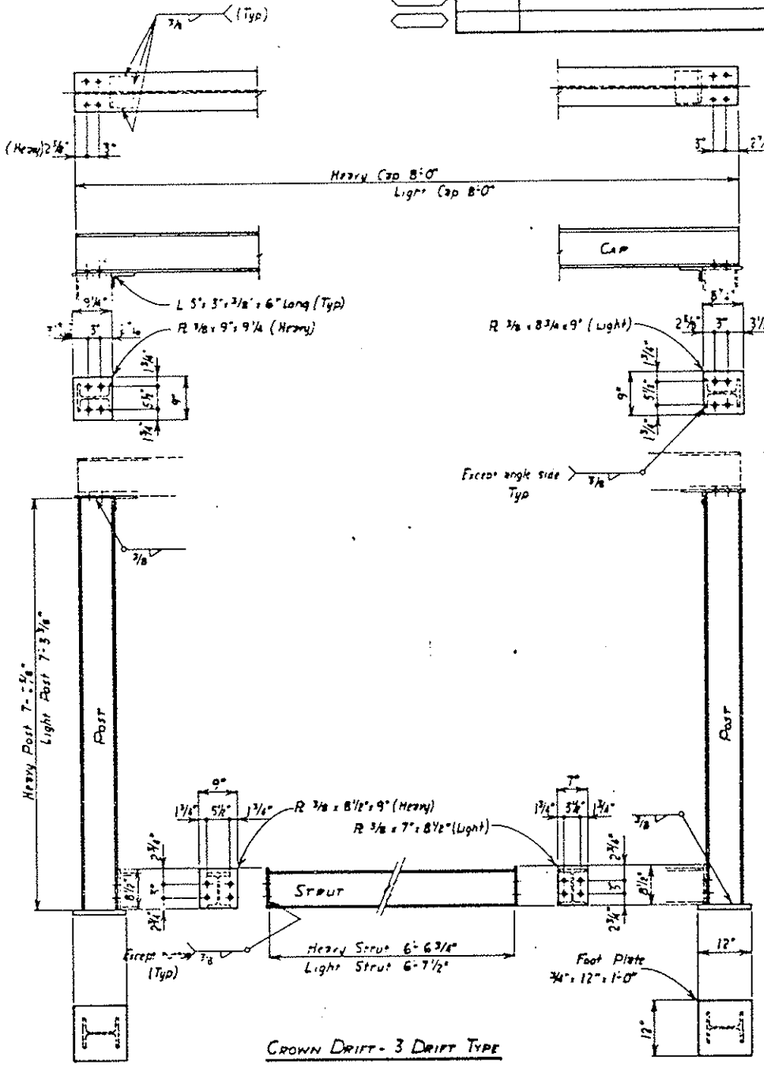
Member	Size	
	Heavy	Light
Cap	W 8 x 67	W8 x 40
Post	W 8 x 40	W8 x 24
Strut	W 8 x 24	*W8 x 24

All D-i's Support Steel is A-572 Grade 55 except as noted.
* A-36

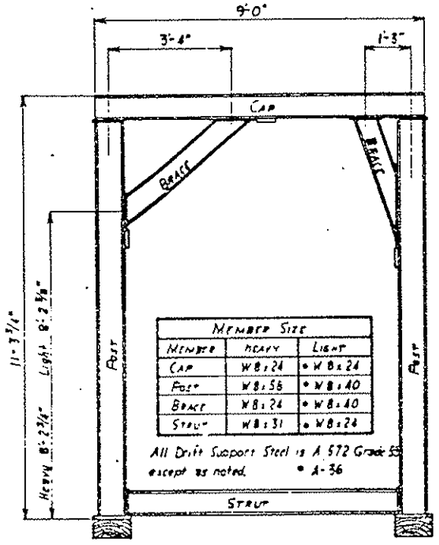
Crown Drift - 3 Drift Type



North Foundation Drift - 2 and 3 Drift Type



Crown Drift - 3 Drift Type



Member	Size	
	Heavy	Light
Cap	W8 x 24	* W8 x 24
Post	W8 x 58	* W8 x 40
Brace	W8 x 24	* W8 x 40
Strut	W8 x 31	* W8 x 24

All Drift Support Steel is A 572 Grade 55 except as noted. * A-36

North Foundation Drift - 2 and 3 Drift Type

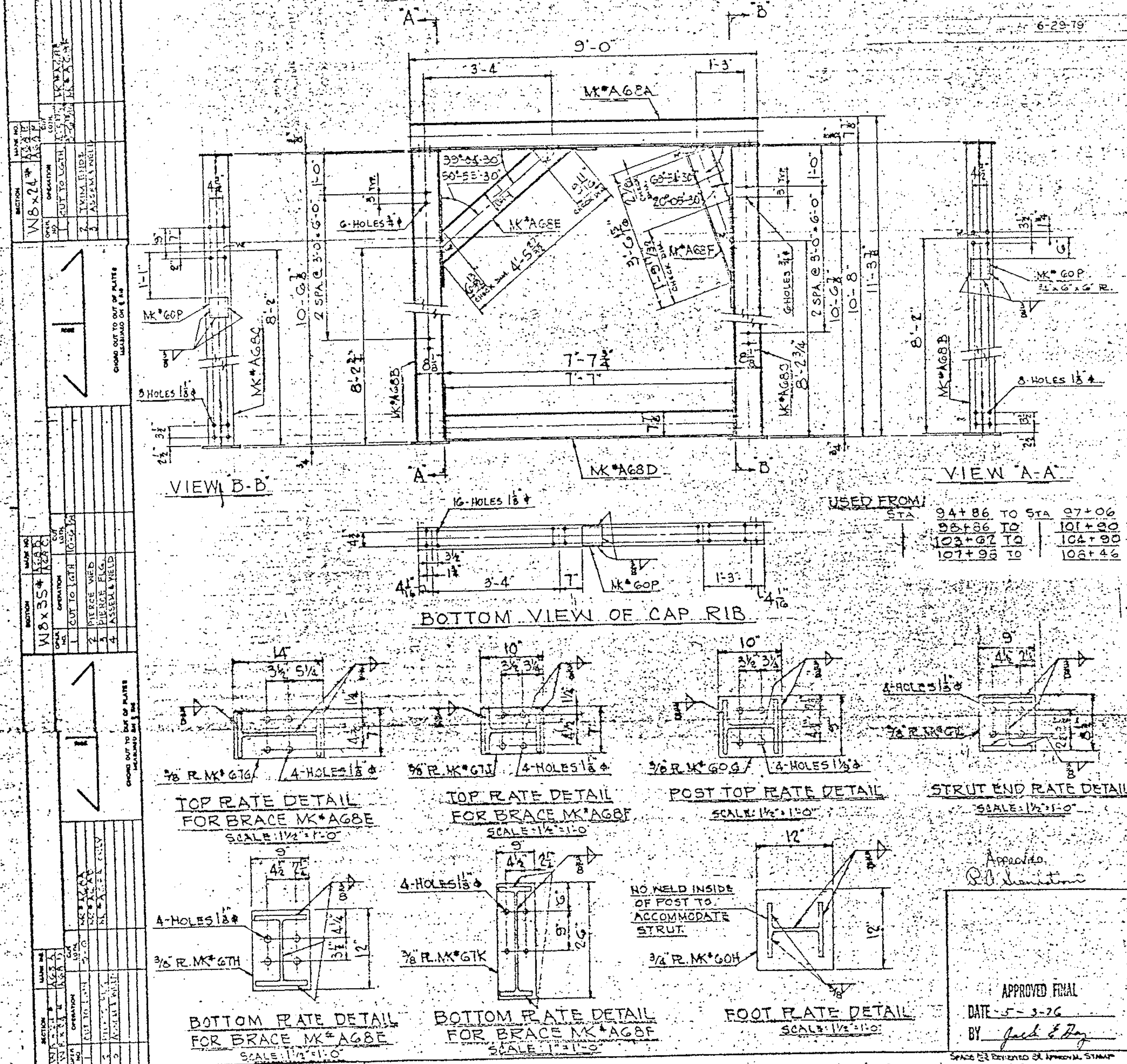
Notes:
All bolts shall be ¾" A-307
All holes are 1⅛" ϕ

DIVISION OF HIGHWAYS

DETAILS
CROWN DRIFT - 3 DRIFT TYPE
AND
NORTH FOUNDATION DRIFT - 3 DRIFT AND 2 DRIFT TYPES
DIVISIONS PROPOSED METHOD OF CONSTRUCTION

Designed C.D.O.H	Structure Numbers	F-13-X
Detailed R Seulhouwer		
Drawing Number B 19	of 60	Drawings

Revision Dates	(Preliminary Stage Only)						



MAT'L REQ'D PER COURSE (LIGHT TYPE)

TOTAL WT.	UNIT WT.	DRAWING NO.	PART NO.	MARK NO.	NO. REQ'D	DESCRIPTION
1.2	.10				12	5/8" SQ. T.L. NUTS (2-PER ROD)
26.8	4.43				6	5/8" ⌀ x 51" TIE RODS WITH 3" THD. EA. END
9.0	.28				32	1" HEX. T.L. NUTS
33.0	1.03				32	1" x 3" HEX. HD. T.L. BOLTS
	24.9	D5-559-5AAB-A68		67K	1	3/8" x 9" x 26" BOTTOM END PLATE
	7.4			67J	1	3/8" x 7" x 10" TOP END PLATE
	61.5				1	W8x24 # x 2'-6 3/4" N.N.A.
93.8	93.8			A68F	1	BRACE ASSY. CONSISTING OF:
	11.5			67H	1	3/8" x 9" x 12" BOTTOM END PLATE
	10.4			67G	1	3/8" x 7" x 14" TOP END PLATE
	91.6				1	W8x24 # x 3'-9 13/16" N.N.A.
113.5	113.5			A68E	1	BRACE ASSY. CONSISTING OF:
	8.1			67L	2	3/8" x 8 1/2" x 9" END PLATES
	182.0				1	W8x24 # x 7'-7" N.N.A.
198.2	198.2			A68D	1	STRUT ASSY. CONSISTING OF:
	7.6			60P	1	3/4" x 6" x 6" THRUST PLATE
	30.6			60H	1	3/4" x 12" x 12" FOOT PLATE
1	9.6			60G	1	3/8" x 9" x 10" TOP PLATE
	370.1				1	W8x35 # x 10'-6 1/5" N.N.A.
417.9	417.9			A68C	1	POST ASSY. CONSISTING OF:
	7.6			60P	1	3/4" x 6" x 6" THRUST PLATE
	30.6			60H	1	3/4" x 12" x 12 FOOT PLATE
	9.6			60G	1	3/8" x 9" x 10 TOP PLATE
	370.1				1	W8x35 # x 10-6 1/5 N.N.A.
417.9	417.9			A68B	1	POST ASSY. CONSISTING OF:
	7.6			60P	1	3/4" x 6" x 6" THRUST PLATE
	216.0				1	W8x24 # x 9'-0" N.N.A.
223.6	223.6			A68A	1	CAP RIB ASSY. CONSISTING OF:

TOTAL WT. FOR ______ COURSE

REV. SYM.	DATE	REVISION	D.E. NO.	CHG. BY	CK. BY
(1)	4-21-76	ADDED STA. AND CHANGED STA.	2316	YW	JJS

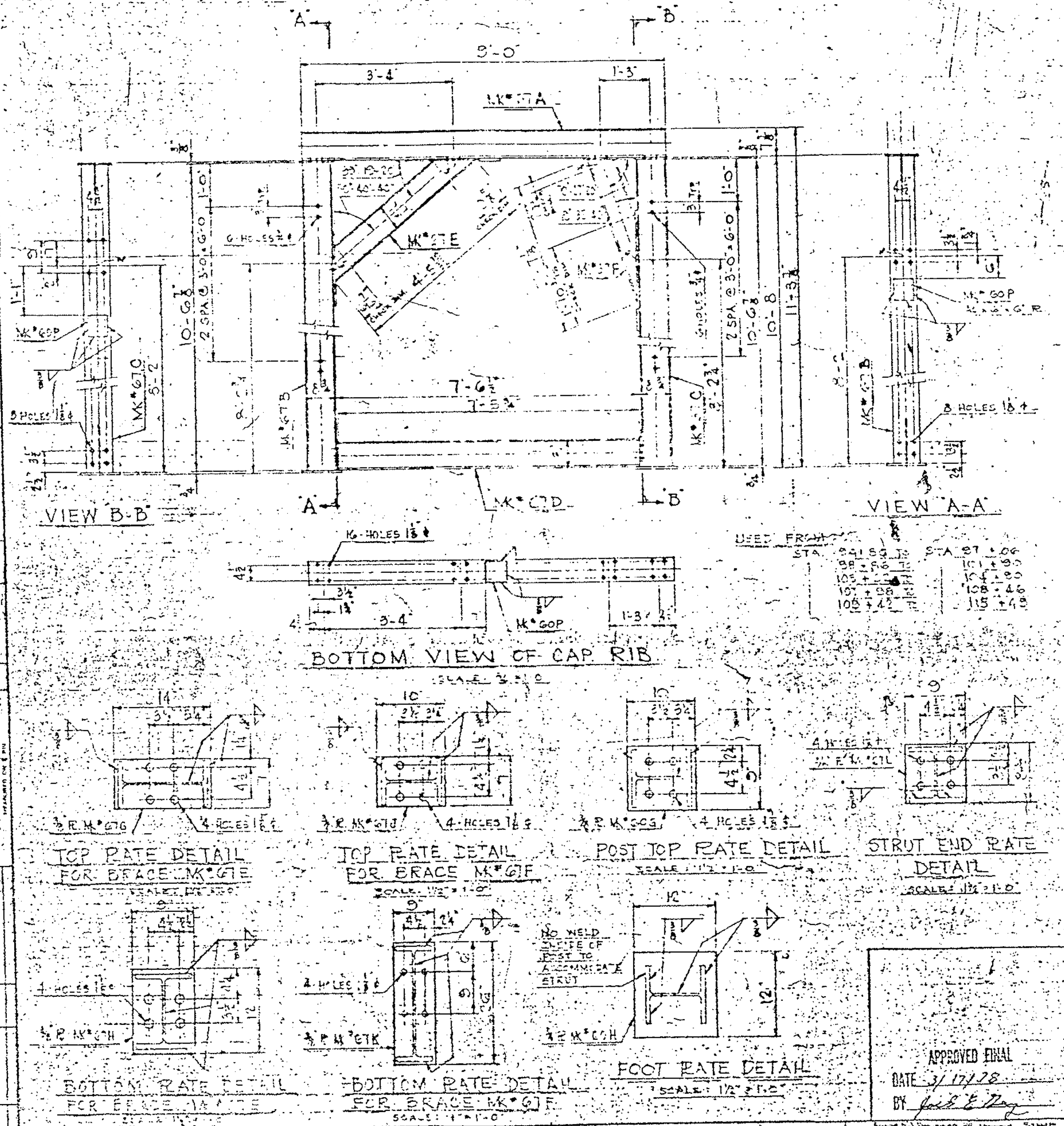
COMMERCIAL SHEARING, INC.

EISENHOWER MEMORIAL TUNNEL

DATE 3-15-76 | DR. BY JJS | SCALE AS NOTED

DWG. NO. D5-559-5AAB-A68

47BX	273	
	6-29-79	



APPROVED FINAL
DATE 3/17/78
BY [signature]

TOTAL WT.	UNIT WT.	DRAWING NO.	PART NO.	MARK NO.	NO. REQ'D	DESCRIPTION	MAT'L SPEC.
1.2	.10				12	5/8 SQ. ... NUTS (2 PER ROD)	
26.5	4.4				6	... TIE RODS ...	
9.0	.28				32	... HEX ... NUTS	
23.0	1.35				32	... x 3 HEX HD ... BOLTS	
	28.5	D5-523-5AAB-020		67 K	1	... BOTTOM END PLATE	
	9.4			67 J	1	... x 10 TOP END PLATE	
	57.3				1	... N.N.A.	
93.6	93.6			67 F	1	BRACE ASSY. CONSISTING OF:	
	11.5			67 H	1	... x 9 x 12 BOTTOM END PLATE	
	10.4			67 G	1	... x 14 TOP END PLATE	
	93.1				1	... x 3'-5 3/16 N.N.A.	
113.0	113.0			67 E	1	BRACE ASSY. CONSISTING OF:	
	8.1			67 L	2	3/8 x 8 1/2" x 9" END PLATES	
	40.0				1	W5 x 21# x 7'-5 3/4 N.N.A.	
248.1	248.1			67 D	1	STRUT ASSY. CONSISTING OF:	
	7.6			60 P	1	3/4 x 6" x 6" THRUST PLATE	
	30.6			60 H	1	3/4 x 12 x 12" FOOT PLATE	
	9.6			60 G	1	3/4 x 9 x 10" TOP PLATE	
	613.2				1	W8 x 58# x 10'-6 7/8 N.N.A.	
661.0	661.0			67 C	1	POST ASSY CONSISTING OF:	
	7.6			60 P	1	3/4 x 6 x 6 THRUST PLATE	
	30.6			60 H	1	3/4 x 12 x 12 FOOT PLATE	
	9.6			60 G	1	3/4 x 9 x 10 TOP PLATE	
	613.2				1	W8 x 58# x 10-6 7/8 N.N.A.	
661.0	661.0			67 B	1	POST ASSY CONSISTING OF:	
	7.6			60 P	1	3/4 x 6 x 6 THRUST PLATE	
	216.0				1	W8 x 24# x 9'-0" N.N.A.	
223.6	223.6			67 A	1	CAP RIB ASSY CONSISTING OF:	

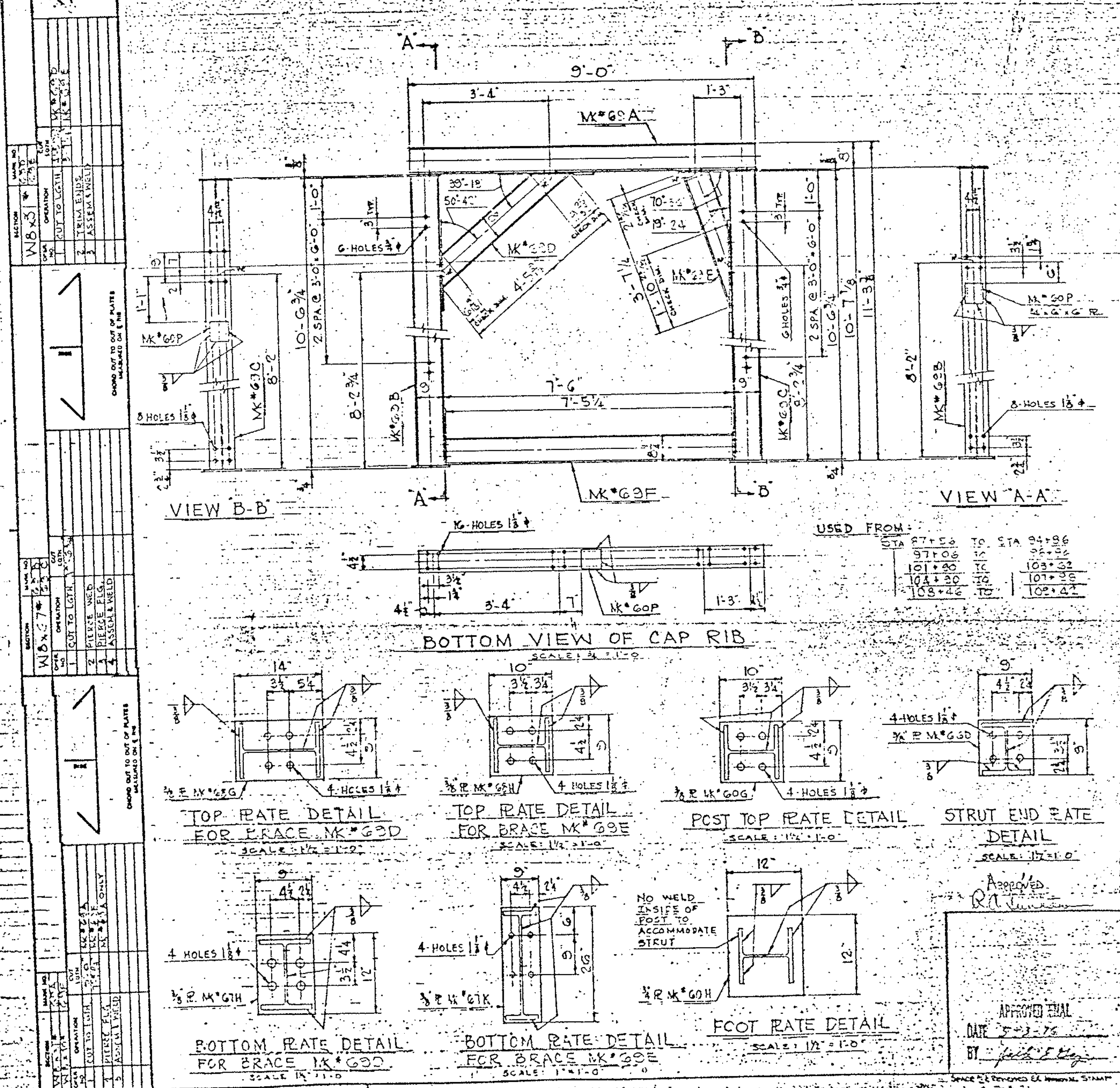
TOTAL WT. FOR ____ COURSE

MAT'L. REQ'D. PER COURSE (LIGHT TYPE)

COMMERCIAL SHEARING, INC.

[illegible]
EISENHOWER MEMORIAL TUNNEL
[illegible]
PETER KIEWIT SONS' CO. [illegible]

D5-523-5AAB-005



TOTAL WT	UNIT WT	DRAWING NO.	PART NO.	MARK NO.	NO. REQ'D	DESCRIPTION
1.2	.10				12	⅝" SQ. T.L. NUTS (2-PER ROD)
26.6	4.43				6	⅝" φ x 51" TIE RODS WITH 3" 9.A. THD EA. END
9.0	.28				32	1" HEX. T.L. NUTS
33.0	1.03				32	1" x 3" HEX. HD. T.L. BOLTS
	24.9	D5-55 AAB-069		67K		1 ⅜" x 9" x 26" BOTTOM END PLATE
	9.6			68H		1 ⅜" x 9" x 10" TOP END PLATE
	78.7					1 W8x31* x 2'-6 15/32" N.N.A.
113.2	113.2			69E	1	BRACE ASSY. CONSISTING OF:
	11.5			67H		1 ⅜" x 9" x 12" BOTTOM END PLATE
	13.4			68G		1 ⅜" x 9" x 14" TOP END PLATE
	117.3					1 W8x31* x 3'-9 13/32" N.N.A.
142.2	142.2			69D	1	BRACE ASSY. CONSISTING OF:
	8.6			66D		2 ⅜" x 9" x 9" END PLATES
	297.5					1 W8x40* x 7'-5½" N.N.A.
314.7	314.7			69F	1	STRUT ASSY. CONSISTING OF:
	7.6			60P		1 ¾" x 6" x 6" THRUST PLATE
	30.6			60H		1 ¾" x 12" x 12" FOOT PLATE
	9.6			60G		1 ⅜" x 9" x 10" TOP PLATE
	707.7					1 W8x67* x 10'-6¾" N.N.A.
755.5	755.5			69C	1	POST ASSY CONSISTING OF:
	7.6			60P		1 ¾" x 6" x 6" THRUST PLATE
	30.6			60H		1 ¾" x 12" x 12 FOOT PLATE
	9.6			60G		1 ⅜" x 9" x 10" TOP PLATE
	707.7					1 W8x67* x 10'-6¾" N.N.A.
755.5	755.5			69B	1	POST ASSY CONSISTING OF:
	7.6			60P		1 ¾" x 6" x 6" THRUST PLATE
	279.6					1 W8x31* x 9'-0" N.N.A.
286.2	286.2			69A	1	CAP RIB ASSY CONSISTING OF

TOTAL WT. FOR ____ COURSE

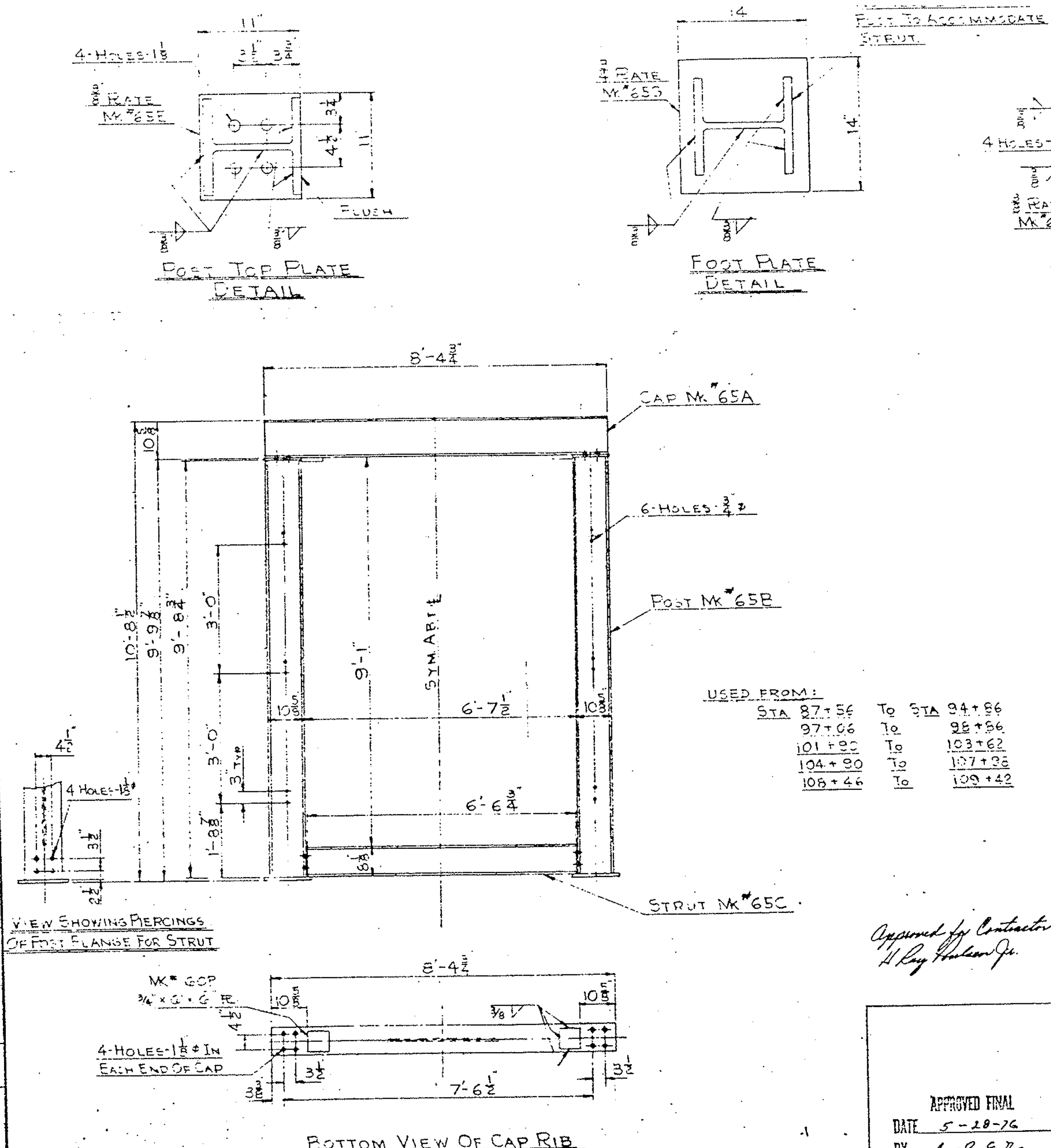
MAT'L REQ'D. PER COURSE (HEAVY TYPE

COMMERCIAL SHEARING INC.

EISENHOWER MEMORIAL TUNNEL

D5-55[illegible] AAB-069

47 CX 273



USED FROM:

STA 87+56	TO	STA 94+86
97+06	TO	98+56
101+90	TO	103+62
104+90	TO	107+36
108+46	TO	109+42

Approved for Contractor
H Roy Poulson Jr.

APPROVED FINAL
DATE 5-28-76
BY Jacob E. Day

SPACE FOR REVIEWED OR APPROVAL STAMP

REF DWGS B19 & B18

TOTAL WT	UNIT WT	DRAWING NO	PART NO	MARK NO	NO REQ'D	DESCRIPTION	MAT'L SPEC.
1.2	.10				12	5/8 SQ. T.L. NUTS	
26.6	4.43				6	5/8" x 51" TIE RODS (3" EA. THD EACH END)	AISI M1020
4.6	.28				16	1" HEX T.L. NUTS	
16.5	1.03				16	1" x 3 HEX HD. T.L. NUTS	
	8	D5-559-5AAB-065		65F		2 5/8 x 8 1/2 x 9" END PLATE	A572 GR. 50
	229.7					1 W8 x 35# x 6'-6 3/4 NNA	
245.9	245.9			65C	1	STRUT ASSY CONSISTING OF	
	41.6			65D		1 3/4 x 14 x 14 FOOT PLATE	
	12.9			65E		1 3/4 x 11 x 11" POST TOP PLATE	
	749.1					1 W10 x 77# x 9'-8 3/4 NNA	
1607.2	803.6			65B	2	POST ASSYS EA. CONSISTING OF	
	7.2			60P		2 3/4 x 6 x 6 THRUST PLATE	
	646.5					1 W10 x 77 x 8'-4 3/4 NNA	
[illegible]	[illegible]			65A	1	CAP RIB CONSISTING OF	

TOTAL WT. FOR ____ COURSE

MAT'L. REQ'D. PER COURSE OF RIBS

REV SYM	DATE	REVISION	D.R. NO.	CHG. BY	CK. BY
3	5-10-76	MK # 60P WAS L 5 x 3 1/2 x 6" LG	2351	JJS	KW
2	4-21-76	REVISED AND ADD STA PER CUT DWGS B19 & B18	2316	KW	JJS
1	3-17-76	REDESIGNED TEN NOTED [illegible]	2251	KW	JJS

COMMERCIAL SHEARING, INC.
YOUNGSTOWN, OHIO 44501 U.S.A.

CROWN DRIFT 8" DRIFT TYPE HEAVY
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-3 (61) 220 — COL.
PETER KIEWIT SONS CO. AND BROWN & ROOT INC.

DATE 1-21-76 DR BY JJS CH BY KW SCALE 3/4" = 1'-0"

DWG NO. D5-559-5AAB-065

47 DX 273
6-29-79

MAY 1975 RECEIVED D.O.H.

FOR GENERAL NOTES & TOLERANCES SEE DWG D5-559-5AA5-[illegible]

[illegible]	[illegible]	[illegible]	47 EX	273

AS CONSTRUCTED — REVISED 6-29-79

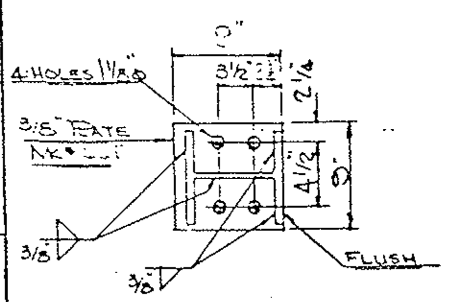
SECTION	MARK NO	OPER NO	OPERATION	CUT LGTH
W8x24#	66C	1	CUT TO LGTH	[illegible]
		2	ASSEM & WELD	

CHORD OUT TO OUT OF PLATES MEASURED ON ℄ RIB

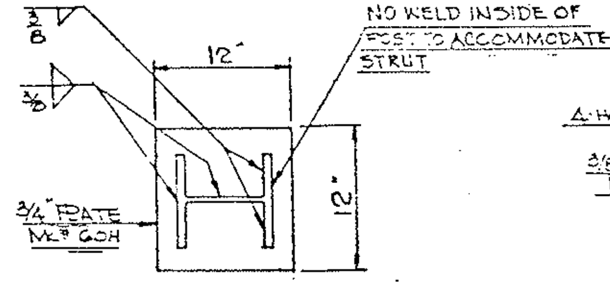
SECTION	MARK NO	OPER NO	OPERATION	CUT LGTH
W8x42#	66B	1	CUT TO LGTH	[illegible]
		2	PIERCE WEB	
		3	PIERCE FLG.	
		4	ASSEM & WELD	

CHORD OUT TO OUT OF PLATES MEASURED ON ℄ RIB

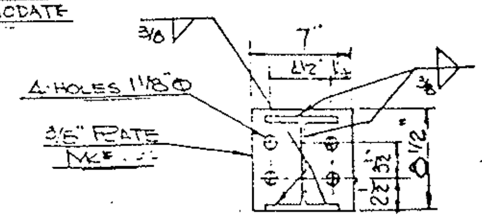
SECTION	MARK NO	OPER NO	OPERATION	CUT LGTH
W8x58#	66A	1	CUT TO LGTH	8'-0"
		2	PIERCE FLG	
		3	ASSEM & WELD	



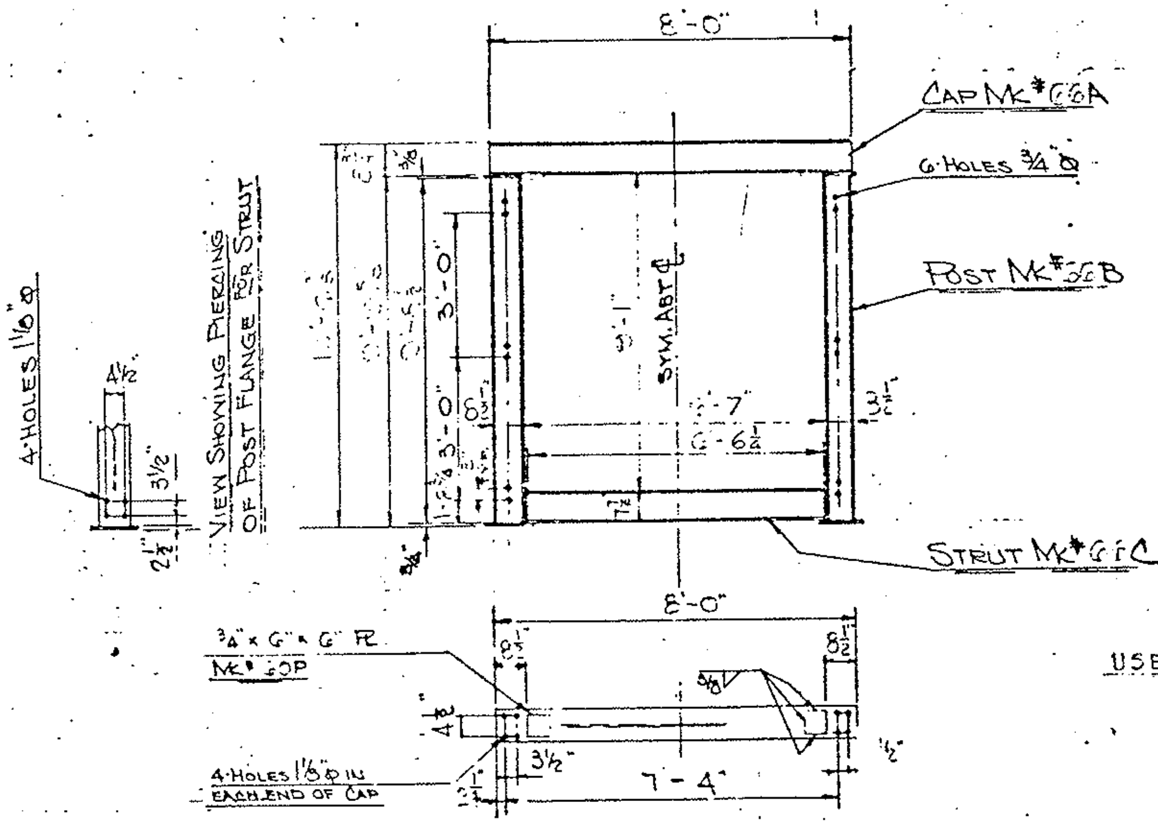
POST TOP PLATE DETAIL



FOOT PLATE DETAIL



STRUT END PLATE DETAIL



BOTTOM VIEW OF CAP RIB

USED FROM:

STA [illegible]	TO	STA 9[illegible]+96
95+36	TO	101+[illegible]
103+62	TO	104+90
107+98	TO	108+46

APPROVED: R. A. Sundstrom

TOTAL WT.	UNIT WT.	DRAWING NO.	PART NO.	MARK NO.	NO. REQ'D	DESCRIPTION	MAT. SPEC.
1.2	.1[illegible]				12	5/8 SQ. T.L. NUTS	
26.6	4.43				6	5/8 x 51" TIE RODS WITH 3" QA THD. EACH END	AISI M1020
4.6	.28				16	1" HEX T.L. NUTS	
16.5	1.03				16	1 x 3" HEX HD. T.L. BOLTS	
	[illegible]	[illegible]		[illegible]		2 3/8 x 7" x 8 1/2" END PLATE	A572 GRADE 55
	156.5					1 W8x24# x 6'-6 1/4" NNA	
163.1	163.1			66C	1	STRUT ASSY CONSISTING OF:	
	30.6			60H		1 3/4 x 12" x 12" FOOT PLATE	A572 GRADE 55
	8.[illegible]			[illegible]		1 3/8 x 9" x 9" POST TOP PLATE	
	[illegible].60					1 W8x43# x [illegible]-[illegible] 1/2" NNA	
[illegible]	[illegible]			66B	2	POST ASSYS EA. CONSISTS OF:	
	[illegible]			60P		2 3/4 x 6" x 6" THRUST PLATE	A572 GRADE 55
	[illegible]					1 W8x58# x 8'-0" NNA	
479.2	479.2			66A	1	CAP RIB CONSISTING OF:	

TOTAL WT. FOR ____ COURSE — MATL. REQ'D PER COURSE OF RIBS

APPROVED FINAL
DATE 6-1-76
BY Jack E. Gay

REV SYM	DATE	REVISION	D.C.N.	CHG. BY	CK. BY
5	[illegible]	MK# 60P [illegible] NY# 255	2540	JJS	KV
4	[illegible]	[illegible] STA PER [illegible]	2316	KV	JJS
3	[illegible]	[illegible] A36	2293	JJS	KV
2	[illegible]-76	[illegible]	[illegible]	KV	JJS
1	[illegible]	[illegible]	[illegible]	JJS	KLA

COMMERCIAL SHEARING, INC. YOUNGSTOWN, OHIO 44501 U.S.A.

CROWN SECT. [illegible] TYPE LIGHT
EISENHOWER MEMORIAL TUNNEL
2ND BORE PROJ. NO. I 70-[illegible](81)2[illegible] — COLO.
PETER KIEWIT SONS CO. [illegible] ERSTON & [illegible] INC.

DATE 1-21-76 | DR. BY JJS | CK. BY KV | SCALE [illegible]

DWG. NO. D5-559-5AA5-[illegible]

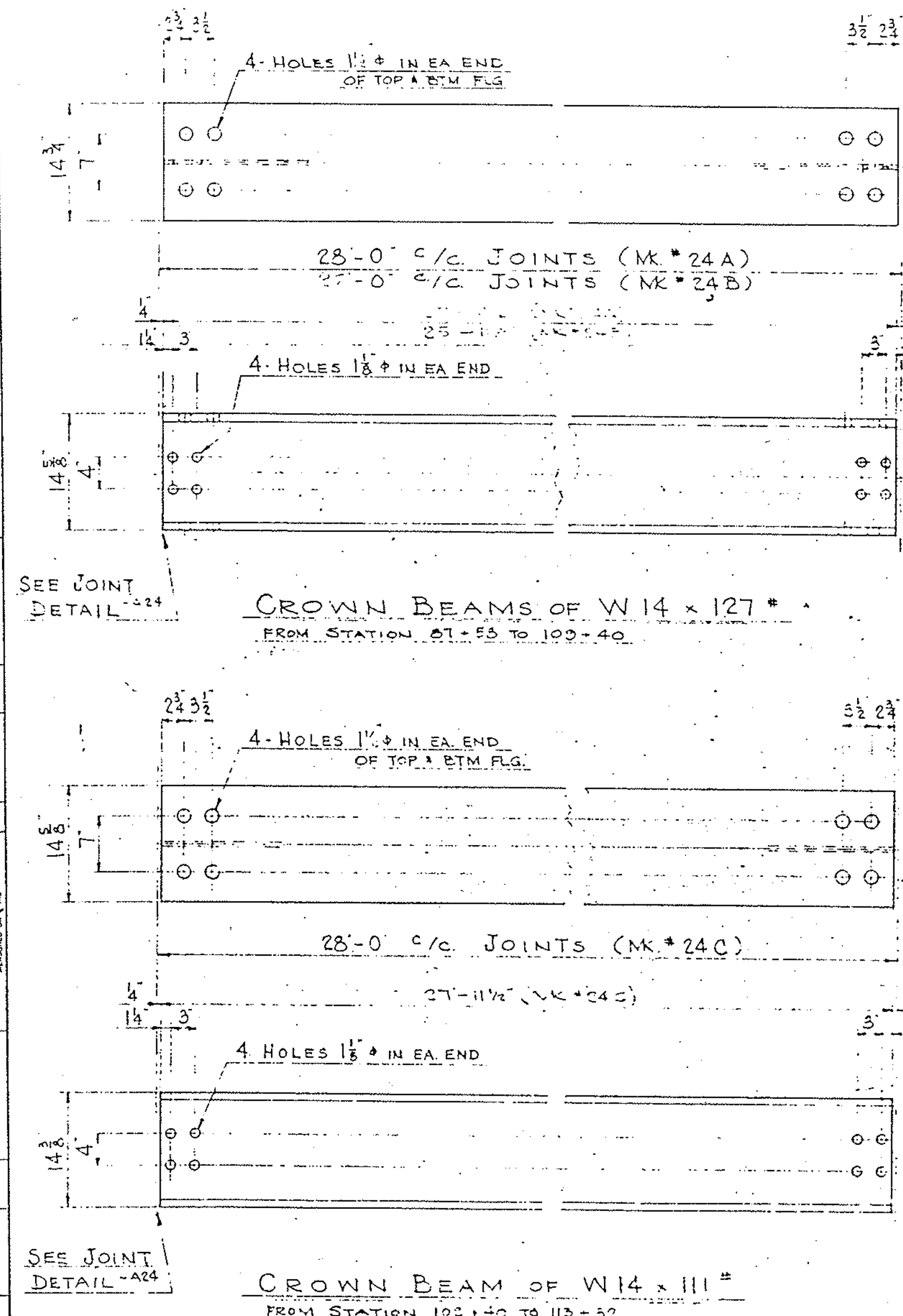
SPACE [illegible] RESERVED FOR APPROVAL STAMP

AS CONSTRUCTED

NO REVISIONS 6-29-79 REVISED ____ VOID ____

SECTION	MARK NO	OPER NO	OPERATION	CUT LGTH
W14 x 111#	24C	1	CUT TO LGTH	27'-11½" MK # 24C
		2	PIERCE WEB	
		3	PIERCE FLGS	
W14 x 127#	24A 24B	1	CUT TO LGTH	27'-11½" MK # 24A, 25'-11½" MK # 24B
		2	PIERCE WEB	
		3	PIERCE FLGS	

CHORD OUT TO OUT OF PLATES MEASURED ON ⊄ RISE

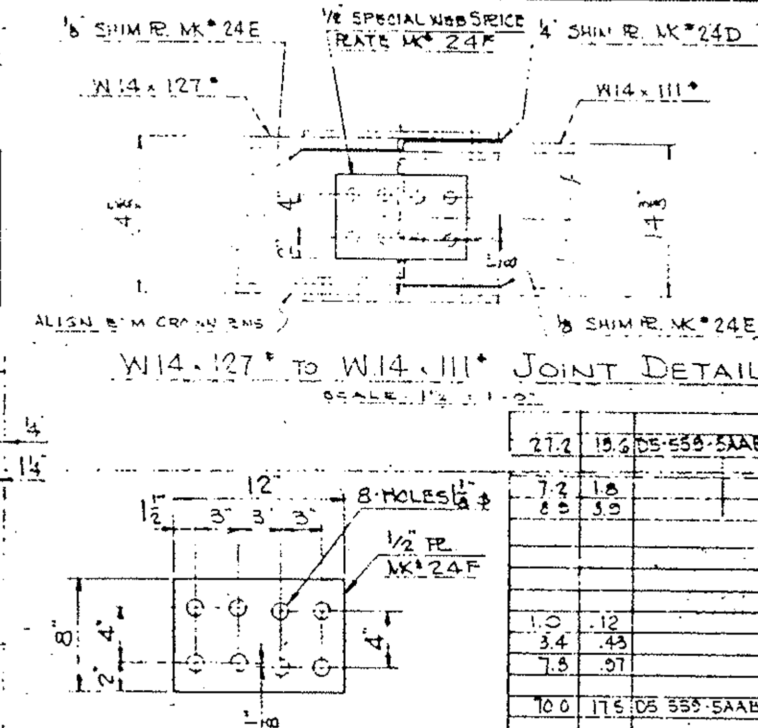


CROWN BEAMS OF W14 x 127#

FROM STATION 87+53 TO 109+40

CROWN BEAM OF W14 x 111#

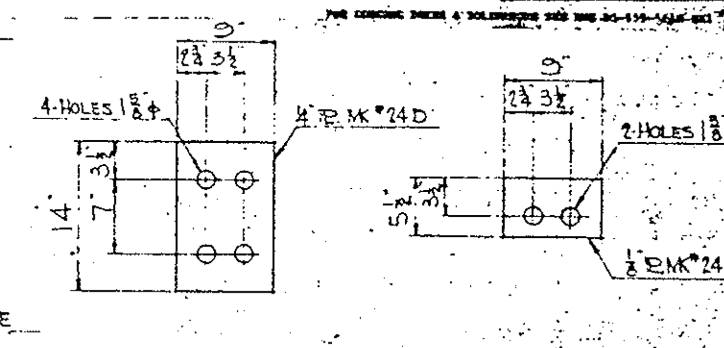
FROM STATION 109+40 TO 113+52



W14 x 127# TO W14 x 111# JOINT DETAIL

SPECIAL WEB SPLICE PLATE DETAIL

SCALE: 2" = 1'-0"



SHIM PLATE DETAILS

SCALE: 1½" = 1'-0"

TOTAL WT	UNIT WT.	DRAWING NO	TOTAL PAY WT PER COL KSR	MARK NO.	NO. REQD	DESCRIPTION	MATL SPEC
27.2	13.6	D5-559-5AAB-024		24F	2	½" x 8" x 12" SPECIAL WEB SPLICE PLS.	ASTM GRADE 50
7.2	1.8	-024		24E	4	⅛ x 5¼" x 9" SHIM PLATES	A441 OR G
8.9	3.9	-024		24D	1	¼ x 9" x 14" SHIM PLATE	A36
						SHIMS & SPECIAL WEB SPLICE PLATE REQD. PER W14 x 127# TO W14 x 111# JOINT	
1.0	.12				8	LOAD INDICATOR WASHERS FOR 1" BOLTS	A325
3.4	.43				8	1" HEX. HI. STRENGTH NUTS	
7.8	.97				8	1"⌀ x 3" HEX. HD. HI. STRENGTH BOLTS	
70.0	17.5	D5 559-5AAB A24		A24E	4	⅝ x 5½ x 18" FLANGE SPLICE PLATES	ASTM GRADE 50
27.2	13.6			A24D	2	½ x 8" x 12" WEB SPLICE PLATES	
89.2	44.6	A24		A24C	2	⅝ x 14" x 18" FLANGE SPLICE PLATES	
3,103.4	3,034	-024		24C	1	CROWN BEAM OF W14 x 111# x 27'-11½" MAX	
						MAT'L. REQ'D. PER CROWN BEAM MK # 24C	
1.0	.12				8	LOAD INDICATOR WASHERS FOR 1" BOLTS	A325
3.4	.43				8	1" HEX. HI STRENGTH NUTS	
7.8	.97				8	1"⌀ x 3" HEX HD. HI STRENGTH BOLTS	
70.0	17.5	D5-559-5AAB-A24		A24E	4	⅝ x 5½ x 18" FLANGE SPLICE PLATES	ASTM GRADE 50
27.2	13.6	-A24		A24D	2	½" x 8" x 12" WEB SPLICE PLATES	
89.2	44.6	-A24		A24C	2	⅝ x 14" x 18" FLANGE SPLICE PLATES	
3,20[illegible]	3,2[illegible]	-024		24B	1	CROWN BEAM OF W14 x 127# x 25'-11½" MAX	
						MAT'L. REQ'D. PER CROWN BEAM MK # 24B	
1.0	.12				8	LOAD INDICATOR WASHERS FOR 1" BOLTS	A325
3.4	.43				8	1" HEX. HI. STRENGTH NUTS	
7.8	.97				8	1"⌀ x 3" HEX HD. HI. STRENGTH BOLTS	
70.0	17.5	D5-559-5AAB-A24		A24E	4	⅝ x 5½ x 18" FLANGE SPLICE PLATES	ASTM GRADE 50
27.2	13.6			A24D	2	½ x 8" x 12" WEB SP[illegible] PLATES	
89.2	44.6	-A24		A24C	2	⅝ x 14" x 18" FLANGE SPLICE PLATES	
3,550.7	3,550.7	-024		24A	1	CROWN BEAM OF W14 x 127# x 27'-11½" MAX	
						MAT'L. REQ'D. PER CROWN BEAM MK # 24A	

TOTAL WT. FOR ______ COURSE

REV. SYM	DATE	REVISION	D.R. NO.	CHG. BY	CK BY
5	3-2-77	MK # 24F WAS A36	2566	JJS	RJA
4	2-3-77	ADDED MK # 24F, MK # 24E WAS A36	2548	JJS	RJA
3	1-12-77	[illegible]	2520	RJA	KW
2	[illegible]	[illegible]	2453	[illegible]	JJS
1	[illegible]	[illegible]	2324	[illegible]	RJA

COMMERCIAL SHEARING, INC. YOUNGSTOWN, OHIO U.S.A.

CROWN BEAM DETAILS OF W14 x 111# & W14 x 127#

EISENHOWER MEMORIAL TUNNEL

2ND BORE PROJ. No. I70-3(50)220 ~ COL.

PETER KIEWIT SONS CO. AND BROWN & ROOT, INC.

DATE 7-14-76 | DR. BY RJA | CK. BY WFV | SCALE 1½" = 1'-0"

REF. NO. D5-559-5AAB-A24

DWG. NO. D5-559-5AAB-024

Approved: R.A. Sundstrom

APPROVED FINAL

DATE 3/27/77

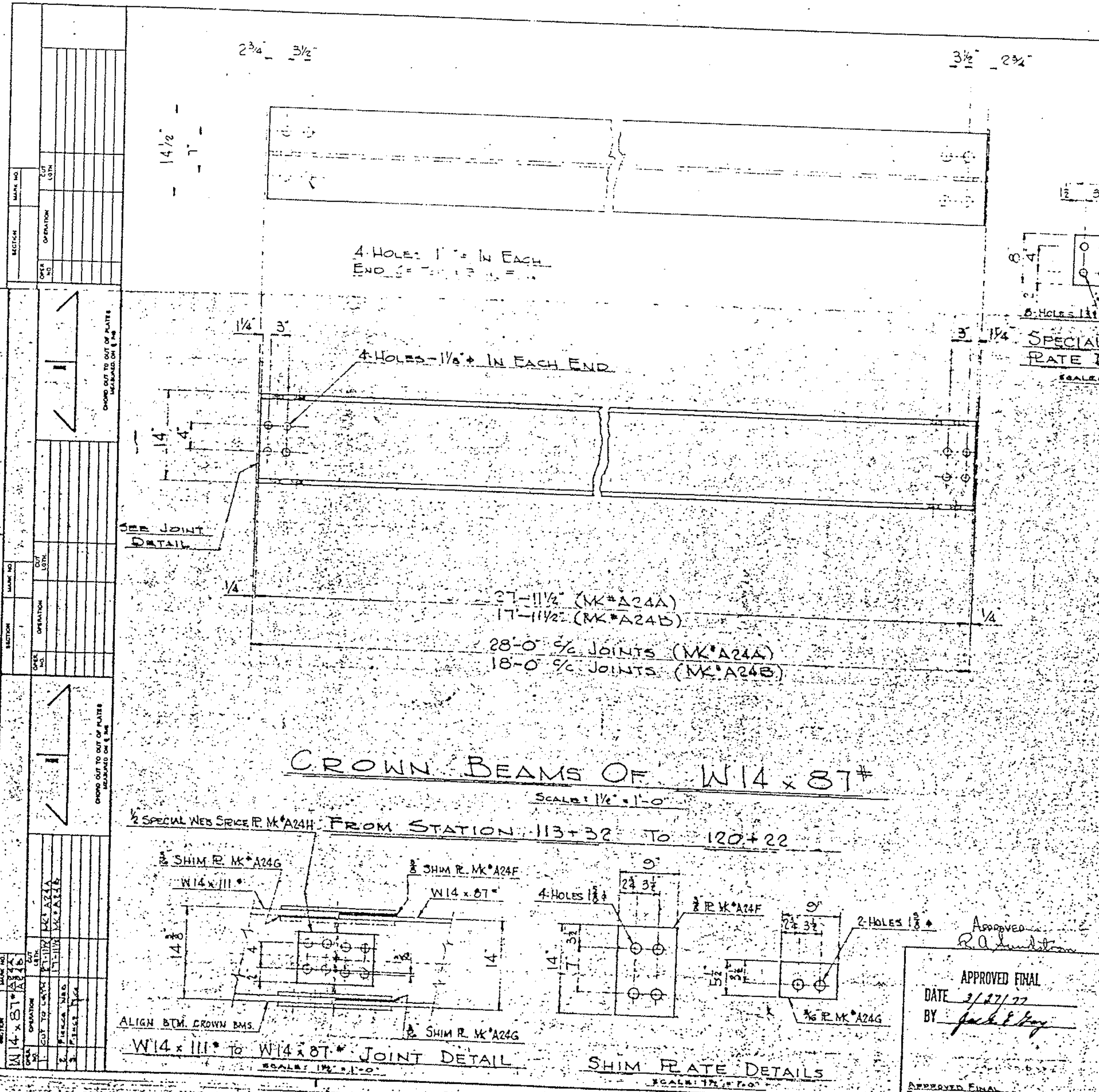
BY Jack E Day

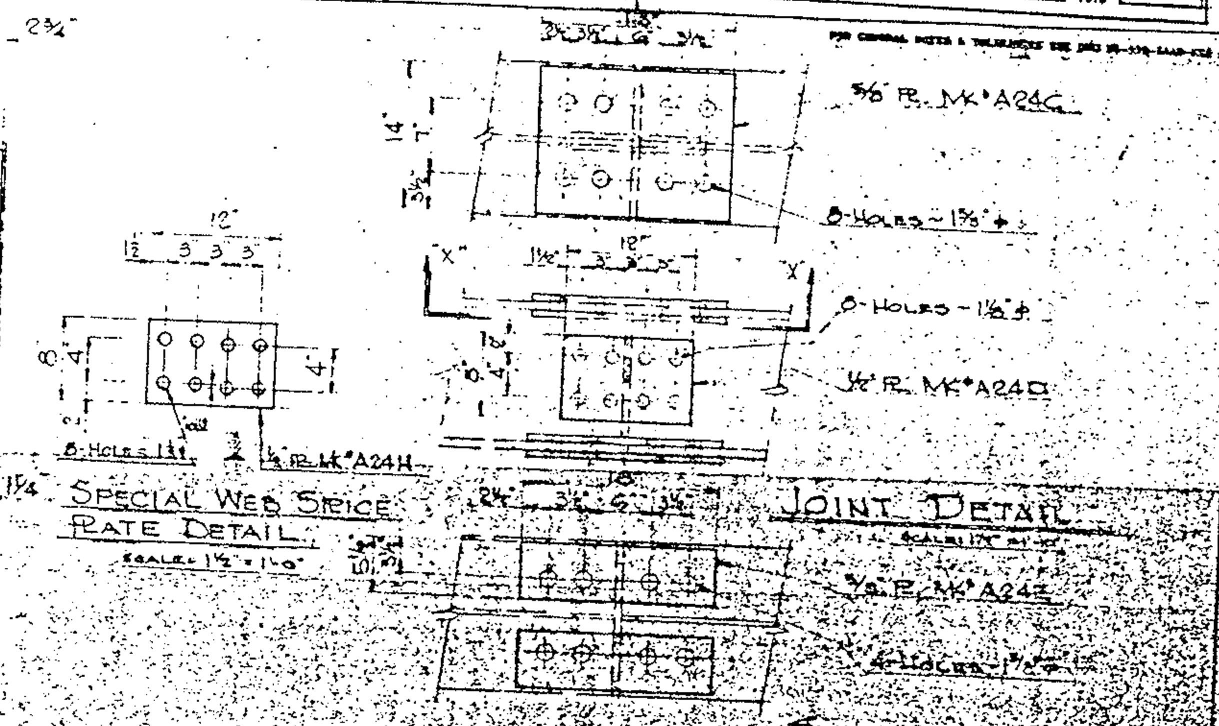
SPACE FOR REVIEWED & APPROVAL STAMP

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	I 70-3 (80) 220	476x	273

AS CONSTRUCTED

REVISIONS 6-29-79 | REVISED | VOID





Approved
R.A. Lundstrom

APPROVED FINAL
DATE 3/27/77
BY Jack E. Gay

APPROVED FINAL
DATE 3-27-77 BY JACK E. GAY
SPACE FOR REVIEWED & APPROVAL STAMP

TOTAL WT.	UNIT WT.	DRAWING NO.	TOTAL PAY WT PER COURSE	MARK NO.	NO. REQ'D.	DESCRIPTION	MAT'L SPEC.
27.2	13.6	DS-559-5AAB-A24		A24H	2	½" x 8" x 12" SPECIAL WEB SPLICE PLATES	A572 GRADE 50
10.4	2.6			A24G	4	3/16 x 5½" x 9" SHIM PLATES	A36
13.4	13.4			A24F	1	⅜" x 9" x 14" SHIM PLATE	
SHIMS & SPECIAL WEB SPLICE PL. REQ'D. PER W14 x 111# TO W14 x 87# JOINT							
1.0	.12				8	LOAD INDICATOR WASHER FOR 1" BOLTS	A325
3.4	.43				8	1" HEX. HI. STRENGTH NUTS	
7.8	.97				8	1" x 3" HEX HD. HI. STRENGTH BOLTS	
70.0	17.5	DS-559-5AAB-A24		A24E	4	⅝" x 5½" x 18" FLG. SPLICE PL'S.	A572 GRADE 50
27.2	13.6			A24D	2	½" x 8" x 12" WEB SPLICE PL'S.	
89.2	44.6			A24C	2	⅝" x 14" x 18" FLG. SPLICE PL'S.	
1562.4	1562.4			A24B	1	CROWN BEAM OF W14 x 87#, 17'-11½" LONG	

MAT'L REQ'D PER CROWN BEAM MK# A24B

TOTAL WT.	UNIT WT.	DRAWING NO.	TOTAL PAY WT PER COURSE	MARK NO.	NO. REQ'D.	DESCRIPTION	MAT'L SPEC.
1.0	.12				8	LOAD INDICATOR WASHER FOR 1" BOLTS	A325
3.4	.43				8	1" HEX. HI. STRENGTH NUTS	
7.8	.97				8	1" x 3" HEX HD. HI. STRENGTH BOLTS	
70.0	17.5	DS-559-5AAB-A24		A24E	4	⅝" x 5½" x 18" FLG. SPLICE PL'S.	A572 GRADE 50
27.2	13.6			A24D	2	½" x 8" x 12" WEB SPLICE PL'S.	
89.2	44.6			A24C	2	⅝" x 14" x 18" FLG. SPLICE PL'S.	
2432.4	2432.4			A24A	1	CROWN BEAM OF W14 x 87#, 27'-11½" LONG	

TOTAL WT. FOR ____ COURSE

MAT'L REQ'D PER CROWN BEAM MK# A24A

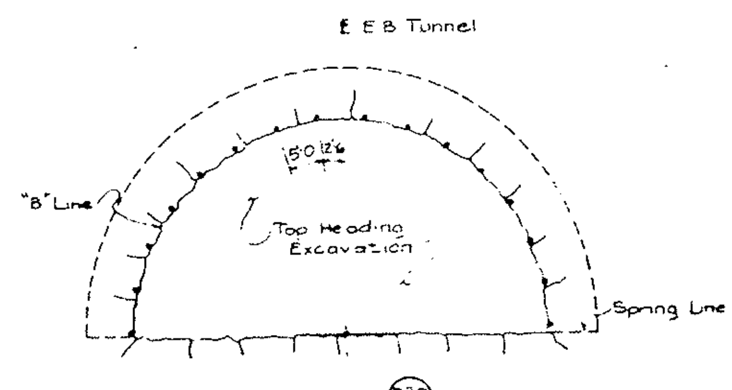
REV. SYM.	DATE	REVISION	S.R. NO.	DWN. BY	CK. BY
5	3-2-77	MK# A24H WAS A3G	2566	JJS	RJA
4	2-3-77	ADDED WEB SPLICE PLATE MK# A24H	2543	RJA	JJS
3	1-19-77	ADDED W14 x 111# TO W14 x 87# JOINT DETAIL & SHIM PLATE DETAILS	2520	RJA	KV
2	9-13-76	[illegible]	2438	WFV	JJS
1	7-[illegible]-76	ADDED LOAD INDICATOR WASHERS & 1" x 3" BOLTS [illegible]	2374	WFV	RJA

COMMONWEALTH ENGINEERING, INC.
YOUNGSTOWN, OHIO

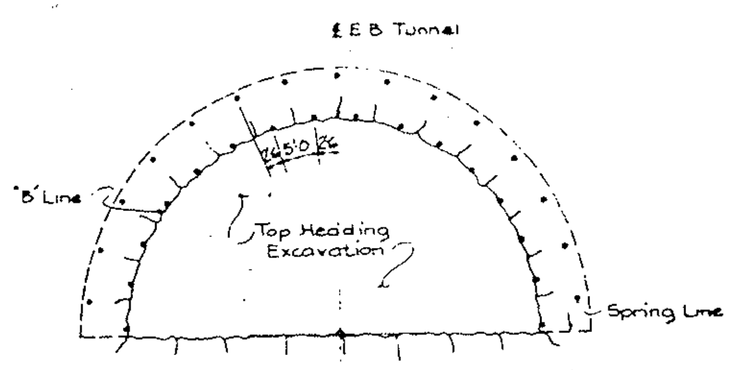
CROWN BEAMS OF W14 x 87#
EISENHOWER MEMORIAL TUNNEL
2ND BORE - TUNNEL I 70-3(80)220 - COL.
PETER KIEWIT SONS CO. [illegible] BROWN & ROOT, INC.

DATE 7-14-76 | DR. BY WFV | CK. BY RJA | SCALE 1½" = 1'-0"

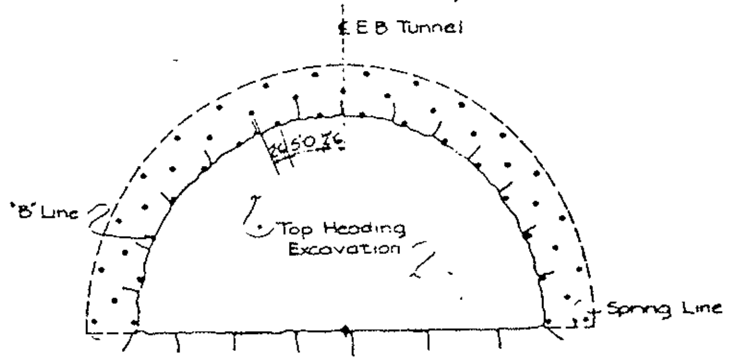
DWG. NO. DS-559-5AAB-A24



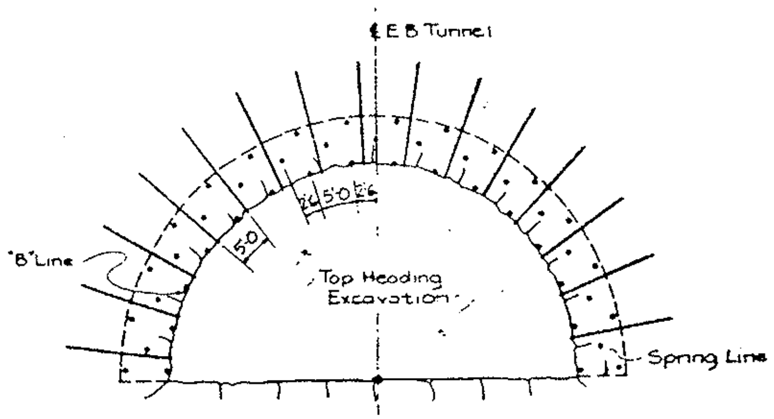
SECTION (B20/A)



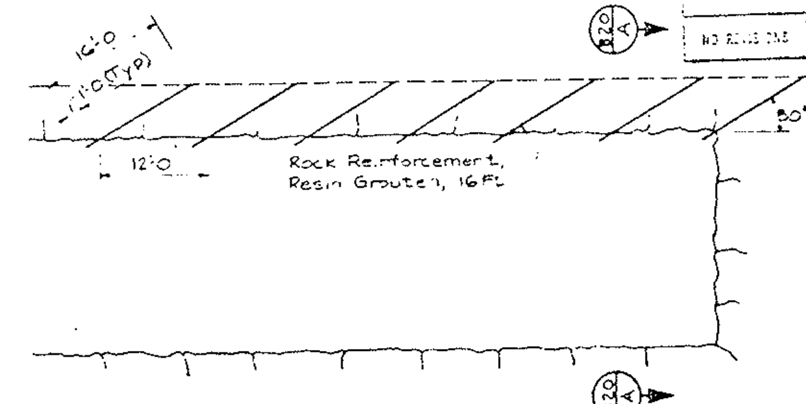
SECTION (B20/B)



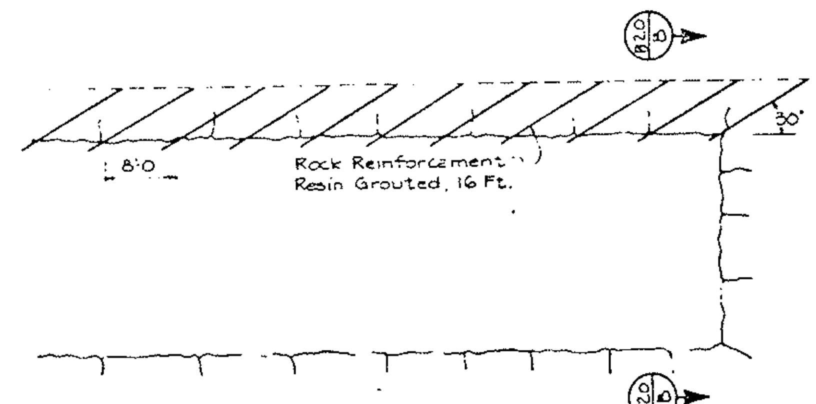
SECTION (B20/C)



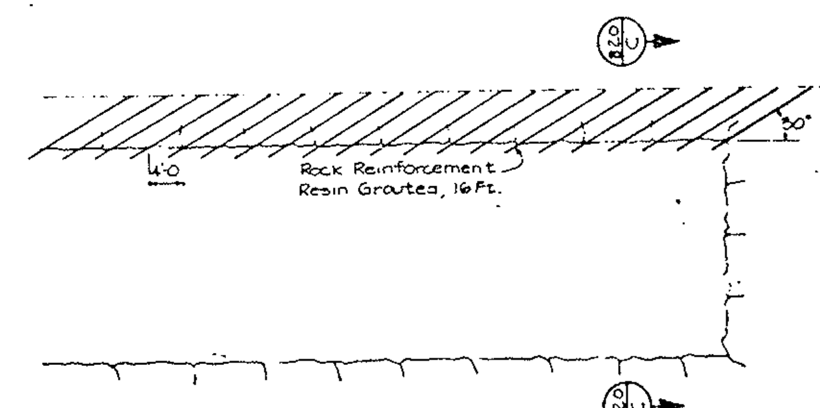
SECTION (B20/D)



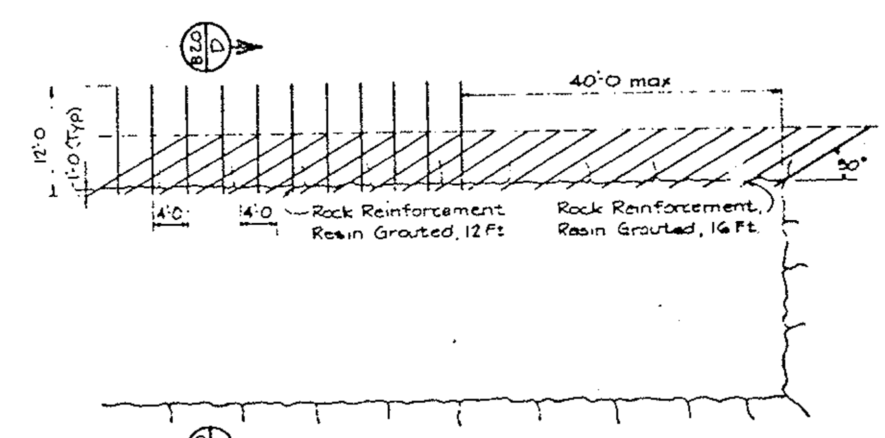
TYPE 1



TYPE 2



TYPE 3



TYPE 4

Federal Road Region No.	District	Proj. No.	Sheet No.	Total Sheets
XIII	COLORADO	I70-3(81)220	48	273

REVISIONS

NOTES:

1. Resin grouted rock reinforcement types shall be located along the length of the east bound tunnel in accordance with the following table:
See Sheet No. 48A for Final Summary

Stations	Type	No Required 16'	12'
Sta 40+98 to Sta 41+30	3	100	
Sta 41+30 to Sta. 41+43	1	25	
Sta 41+43 to Sta. 41+82	3	125	
Sta 62+06 to Sta 63+86	4	653	653
Sta 63+86 to Sta 64+15	3	116	
Sta 64+15 to Sta 65+15	4	363	363
Sta 65+15 to Sta 65+42	3	116	
Sta 69+62 to Sta 71+40	3	653	
Sta 71+40 to Sta 71+85	2	87	
Sta. 71+85 to Sta. 72+90	4	392	377
Sta 72+90 to Sta 74+58	3	624	
Sta 79+98 to Sta 80+77	3	290	
Sta 80+77 to Sta 81+85	4	392	392
Sta 81+85 to Sta 82+50	3	247	
Sta 87+56 to Sta 88+70	4	378	364
Sta. 88+70 to Sta 89+10	2	66	
Sta. 89+10 to Sta 92+00	4	950	936
Sta 92+00 to Sta 92+80	3	260	
Sta. 92+80 to Sta 94+87	4	676	676
Sta 94+87 to Sta 97+10	3	728	
Sta 97+10 to Sta. 98+75	4	546	534
Sta 98+75 to Sta. 99+55	2	130	
Sta 99+55 to Sta 101+45	3	624	
Sta 101+45 to Sta 101+95	2	92	
Sta 101+95 to Sta. 103+52	4	520	508
Sta 103+52 to Sta 103+60	1	14	
Sta 103+60 to Sta 104+35	3	248	
Sta 104+35 to Sta 104+84	2	92	
Sta 104+84 to Sta 107+85	4	988	976
Sta. 107+85 to Sta. 108+50	1	78	
Sta 108+50 to Sta 109+35	4	284	274
Sta 109+35 to Sta 110+20	1	125	
Sta 110+20 to Sta 110+95	3	295	
Sta 110+95 to Sta 111+33	2	78	
Sta 111+33 to Sta 113+35	3	791	
Sta 113+35 to Sta 113+75	1	62	
Sta 113+75 to Sta 117+60	3	1504	
Sta 117+60 to Sta 117+95	1	47	
Sta 117+95 to Sta 119+10	3	450	
Sta 119+10 to Sta 120+22	4	450	434

Sum (Rock Reinforcement Quanitites) = 14,659 6,487
Bid Quanitity (Sum + 10% Sum) = 16,125 7,136

2. From Sta 87+56 to Sta 109+42 the patterns shown shall be interrupted, 5'0 ± on both sides of the centerline of tunnel by the presence of the crown drift.
3. All rock reinforcement shall be No 11, Grade 60.
4. Rock reinforcement installed in advance of the face shall be in place at least one hour prior to advancing the face.
5. Radial rock reinforcement must be installed so that it does not lag more than 40 Ft. behind the heading face.

Orig Scale: 3/8" = 1'-0

DIVISION OF HIGHWAYS

ROCK REINFORCEMENT

TOP HEADING

Designer	CDOH	Structure Numbers	F-13-X
Detailer	B R Lare		
Drawing Number B 20	of 60	Drawings	

Revision Dates (Preliminary Stage Only)

	Initial	Date	Checked by	
Designed by	C.D.O.H.	5-74	W.M.	4-75
Checked by				
Detailed by	B.R.L.	7-74	R.J.S.	4-75

DIVISION OF HIGHWAYS, STATE OF COLORADO
C. D. H. FORM NO. 126
REV. FEB., 1977

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	SHEETS
VIII	COLORADO	I 70-3(6)220	48A1	273

AS CONSTRUCTED

NO REVISIONS ☐ REVISED 8-29-75 VOID ☐

FINAL SUMMARY OF ROCK REINFORCEMENT
RESIN GROUTED NO. 11 REBAR

STATIONING	TYPE	NUMBER IN PLACE 16 FT.	NUMBER IN PLACE 12 FT.
STA. 40+94 TO STA. 41+26	3	101	
STA. 41+32 TO STA. 41+41	1	40	
STA. 41+53 TO STA. 41+81	3	97	
STA. 45+38 TO STA. 45+45	FORM 105	14	
STA. 57+84 TO STA. 57+97	FORM 105	11	
STA. 62+08 TO STA. 63+86	4	746	649
STA. 63+90 TO STA. 64+10	3	88	
STA. 64+14 TO STA. 65+14	4	516	362
STA. 67+77 TO STA. 67+89	3	57	
STA. 69+62 TO STA. 71+22	3	561	
STA. 71+30 TO STA. 71+62	2	55	
STA. 71+70 TO STA. 71+86	3	120	
STA. 71+90 TO STA. 72+90	4	399	366
STA. 72+94 TO STA. 74+46	2	298	
STA. 79+92 TO STA. 80+72	3	293	
STA. 80+76 TO STA. 81+84	4	648	414
STA. 81+88 TO STA. 82+44	3	239	
STA. 82+53 LT.	SIDE WALL DRIFT		9
STA. 87+64 TO STA. 89+72	4	798	724
STA. 89+76 TO STA. 90+48	3	335	
STA. 90+52 TO STA. 91+40	4	389	292
STA. 91+44 TO STA. 92+28	3	311	
STA. 92+32 TO STA. 94+32	4	1058	690
STA. 94+36 TO STA. 96+48	3	481	
STA. 96+52 TO STA. 98+40	4	769	614
STA. 98+48 TO STA. 99+72	2	269	
STA. 99+76 TO STA. 100+12	4	148	114
STA. 100+16 TO STA. 101+32	3	307	
STA. 101+36 TO STA. 101+56	4	66	68
STA. 101+60 TO STA. 101+82	3	68	
STA. 101+86 TO STA. 102+02	4	61	61
STA. 102+06 TO STA. 104+46	3	431	
STA. 104+50 TO STA. 107+38	4	996	844
STA. 107+42 TO STA. 108+42	1	108	
STA. 108+46 TO STA. 108+78	4	111	97
STA. 108+82 TO STA. 108+94	3	41	
STA. 109+02 TO STA. 110+10	1	107	
STA. 110+14 TO STA. 111+54	3	352	
STA. 111+58 TO STA. 112+10	2	95	
STA. 112+18 TO STA. 113+18	3	251	
STA. 113+30 TO STA. 113+70	2	59	
STA. 113+78 TO STA. 117+34	3	1127	
STA. 117+46 TO STA. 118+02	2	90	
STA. 118+10 TO STA. 118+46	3	120	
STA. 118+53 TO STA. 119+07	2	156	
STA. 119+10 TO STA. 120+20	4	804	357
ACCESS CROWN DRIFT		136	