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PLAN AND PROFILE SHEET (ARVADA STREET)
CROSS SECTIONS.
W.O. NO. 14276

COLORADO
DEPARTMENT OF HIGHWAYS
PLAN AND PROFILE OF PROPOSED
FEDERAL AID PROJECT NO. I 092-2(5)
STATE HIGHWAY NO. I
EL PASO COUNTY

SCALES
ON PLAN, 1 IN = 100 FT
ON PROFILE 1 IN = 100 FT HORIZONTAL
1 IN = 10 FT VERTICAL
GRADE LINE ON PROFILE IS SHOWN AS GRADE OF FINISHED ROAD
GROSS LENGTH OF PROJECT } 10,735.3 Feet = 2.033 Miles
NET LENGTH OF PROJECT

C = COMMERCIAL
NC = NON-COMMERCIAL
ACCESS DENIED BY DEED — OUTSIDE R.O.W. LINE — 24' C — 16' NC
CONTROL OF ACCESS LINE
VIRGIN CONTROL OF ACCESS

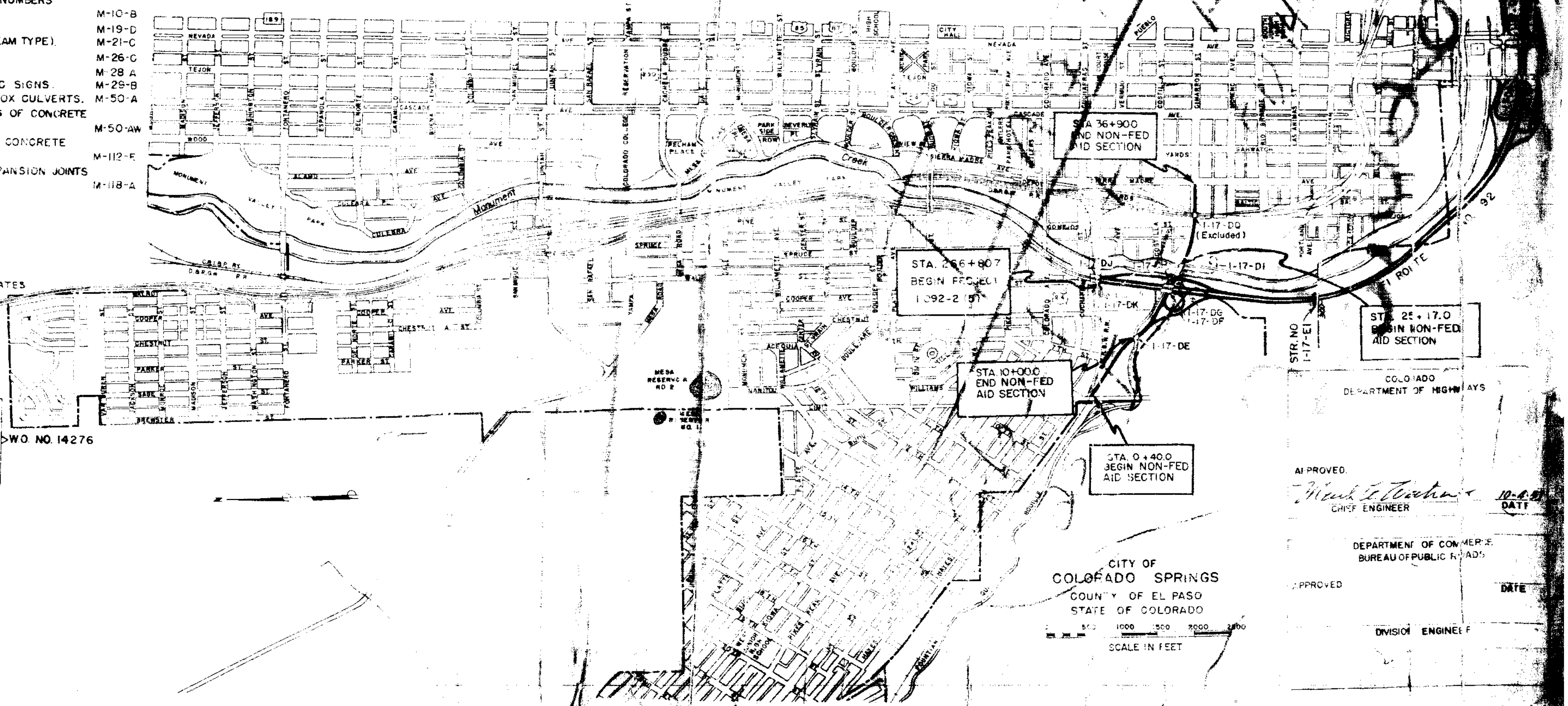
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.
9	COLORADO	I 092-2(5)

REV. BEG STA - 11-13-57 - E.E.O.
Rev. Index 2-28-58 C.L.K.
REV. 1-28-59, ADDED ACCESS, E.E.O.

CONVENTIONAL SIGNS

CENTER LINE (PLAN SHEET / TITLE SHEET)
RIGHT OF WAY LINE (R.O.W. MARKER)
COUNTY LINE
TOWNSHIP OR RANGE LINE
LAND LINES (SECTION LINE / 1/4 SECTION LINE / 1/16 SECTION LINE)
RAILROAD (TITLE SHEET / PLAN SHEET)
BARBED WIRE FENCE
COMBINATION WIRE FENCE
SNOW FENCE
TELEPHONE & TELEGRAPH LINES
POWER LINE
DETOUR
PRESENT ROAD (PLAN SHEETS)

NOTE TO BIDDERS:
It is recommended that bidders on this project go over the plan details with one of the field representatives of this Department, listed on page 10 of the Special Provisions.



COLORADO
DEPARTMENT OF HIGHWAYS

APPROVED.
CHIEF ENGINEER — DATE 10-4-57

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

APPROVED — DATE

DIVISION ENGINEER

TYPICAL SECTIONS

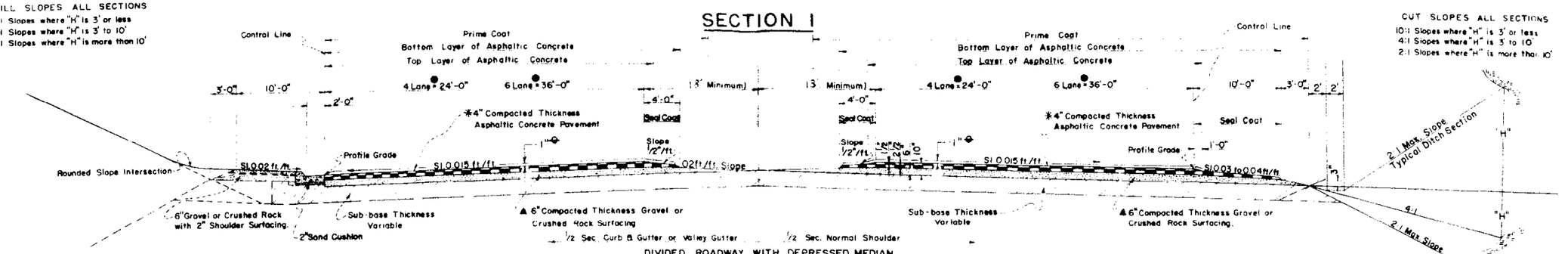
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	COLO.	I 092-2(1)		

Rev. Sect To Show Future Overlay, E.L.O. 1-18-61

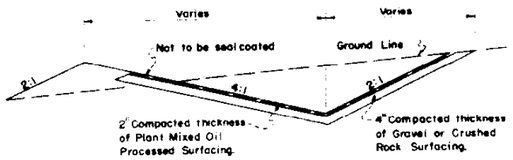
FILL SLOPES ALL SECTIONS
10:1 Slopes where "H" is 3' or less
4:1 Slopes where "H" is 3' to 10'
2:1 Slopes where "H" is more than 10'

CUT SLOPES ALL SECTIONS
10:1 Slopes where "H" is 3' or less
4:1 Slopes where "H" is 3' to 10'
2:1 Slopes where "H" is more than 10'

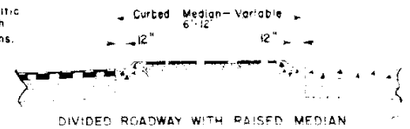
SECTION 1



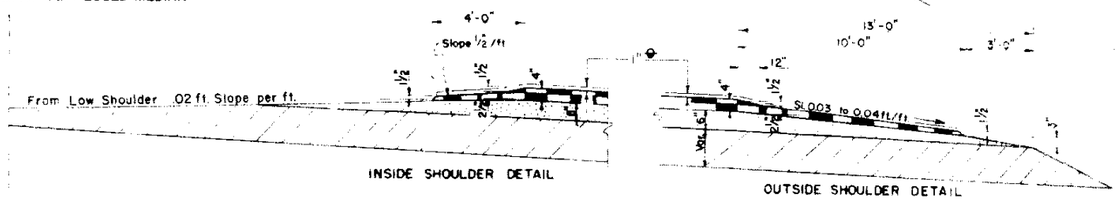
TYPICAL SECTION — INTERCEPTING DITCHES



Raised Median shall have 1" Compacted Thickness Asphaltic Surfacing over tamped earth fill where called for on Plans.

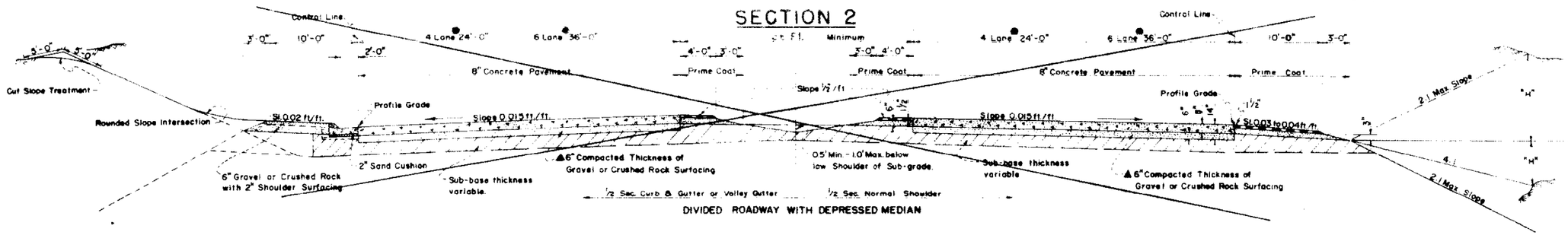


DIVIDED ROADWAY WITH RAISED MEDIAN
(CIMARRON ST.)

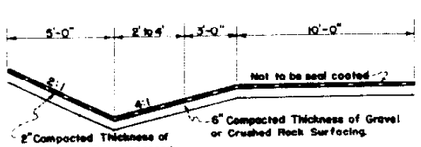


(ASPHALTIC CONCRETE PAVEMENT)

SECTION 2



TYPICAL SECTION FOR ROADWAY DITCH PAVING



NOTE: Ditches to be oiled where called for on plans or as directed by the Engineer.

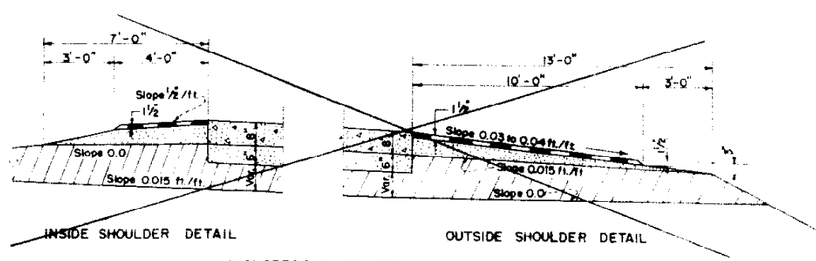
● Where speed change lanes are required the pavement shall be widened 12' outside of control line. Concrete gutter and shoulder to be constructed in same relation to either widened or standard pavement.

1" Asphaltic Concrete Pavement Future Overlay

▲ 6" Compacted Thickness of Gravel or Crushed Rock Surfacing to be placed in Two 3" Courses.

* Projects using a mat of 4" thickness shall be laid in two Courses.
Bottom Course of 2½"
Top Course of 1½"

Note: Bottom 2½" Layer of Asphaltic Concrete Pavement to be "Leveling Course" and Top 1½" Layer to be "Surface Type B"



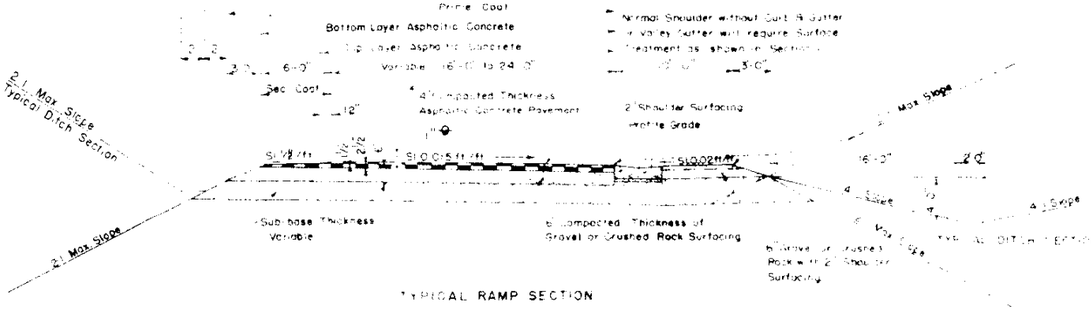
(CONCRETE PAVEMENT)

TYPICAL SECTIONS

FED. ROAD NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	OS2 [illegible]		

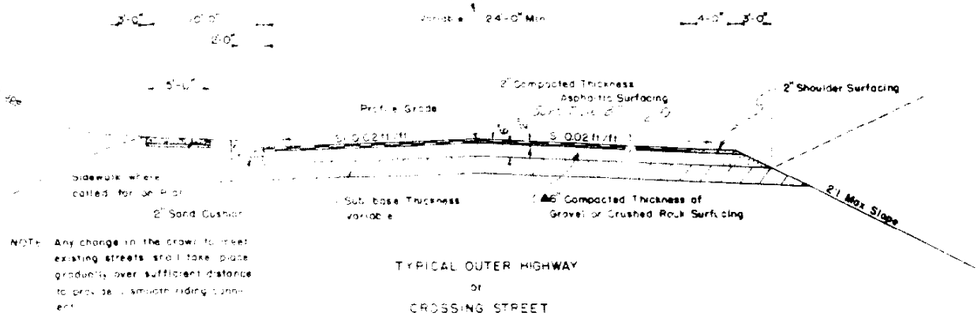
RR. Shall To Show Future Overlay, E.F.G. - 6-61

SECTION 3



TYPICAL RAMP SECTION

SECTION 4



NOTE: Any change in the crown of street existing streets shall take place gradually over sufficient distance to provide a smooth riding connect

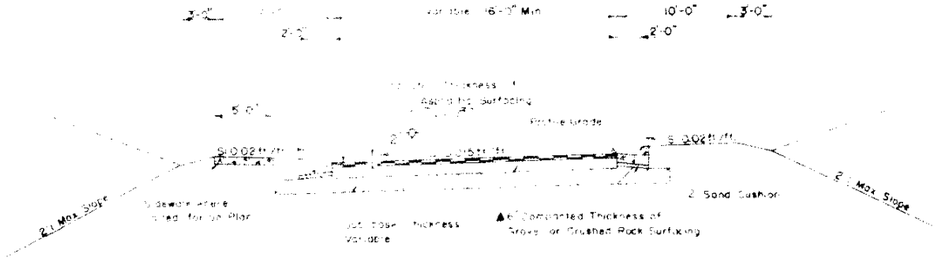
TYPICAL OUTER HIGHWAY
or
CROSSING STREET

▲ 6" Compacted Thickness of Gravel or Crushed Rock Surfacing to be Placed in Two 3" Course

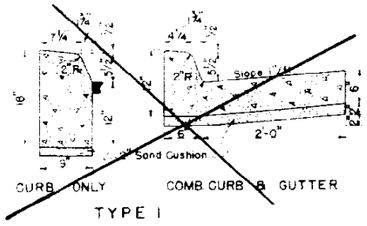
Asphaltic Concrete Pavement
Asphaltic Concrete Pavement - Future Overlay

DETAILS OF SHOULDER ROLL

SECTION 5

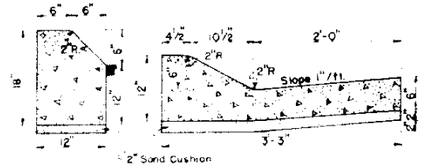


TYPICAL OUTER HIGHWAY
(ONE WAY)



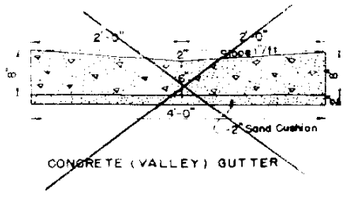
CURB ONLY COMB. CURB & GUTTER

TYPE 1

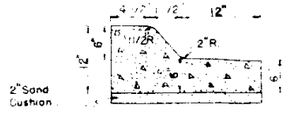


CURB ONLY COMB. CURB & GUTTER

TYPE 2

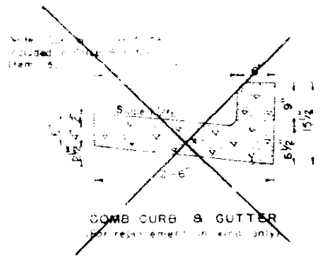


CONCRETE (VALLEY) GUTTER



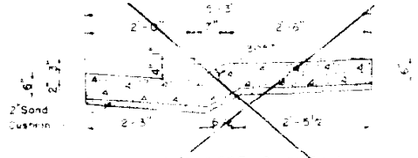
COMB. CURB & GUTTER

TYPE 3



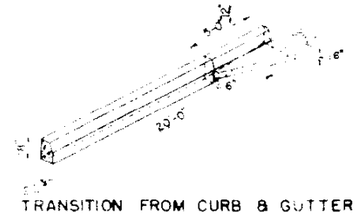
COMB. CURB & GUTTER

(For use only to match existing Curb & Gutter only unless called for on Plan)

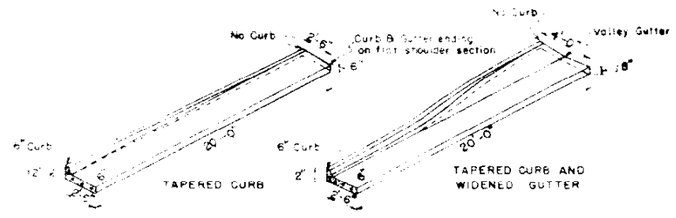


COMB. CURB, GUTTER, & SIDEWALK

(For use only to match existing Curb & Gutter only unless called for on Plan)



TRANSITION FROM CURB & GUTTER TO BARRIER CURB



CURB TRANSITION DETAIL

Curb Side Slope and Gutter Slope but shall be tapered to zero height over Distance of 20'-0" as shown above

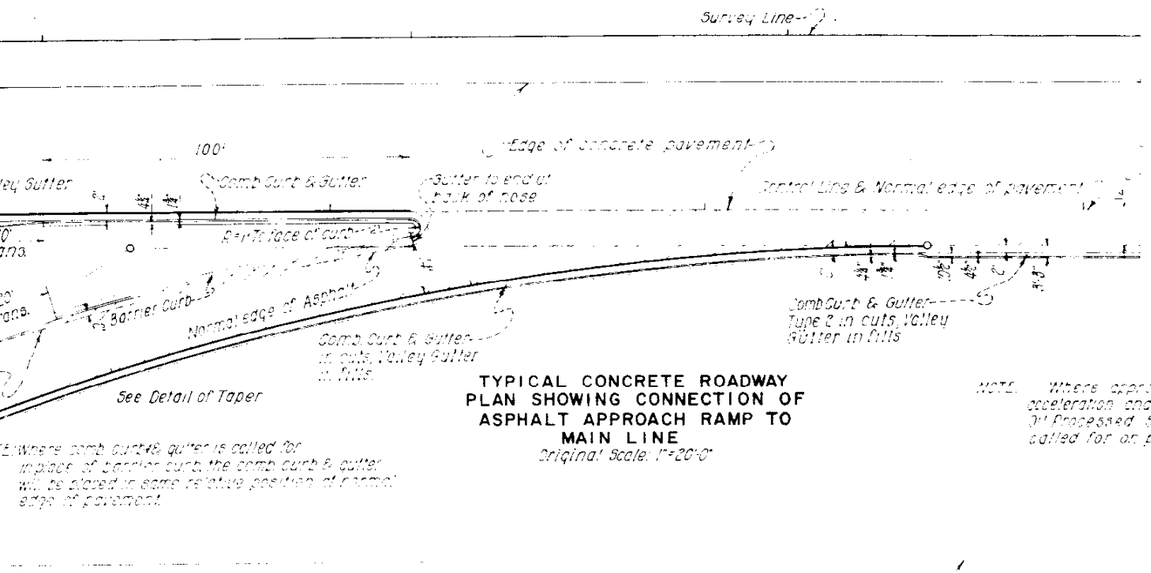
On the inside of Superelevated Curves the Gutter shall have the same slope as the Pavement

All Transitions are to be calculated and paid for as Concrete Combination Curb and Gutter

FED ROAD DIVISION NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO	1092-2(5)	4	

TYPICAL RAMP DETAILS

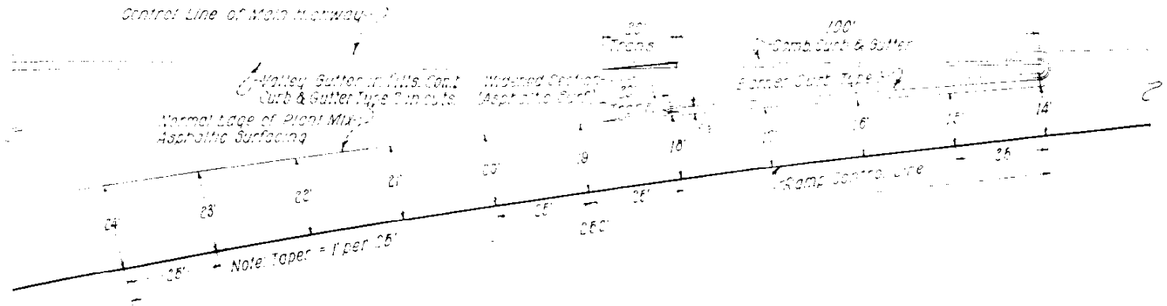
SHOWING CURB & GUTTER DETAIL



TYPICAL CONCRETE ROADWAY PLAN SHOWING CONNECTION OF ASPHALT APPROACH RAMP TO MAIN LINE

Original Scale: 1"=20'0"

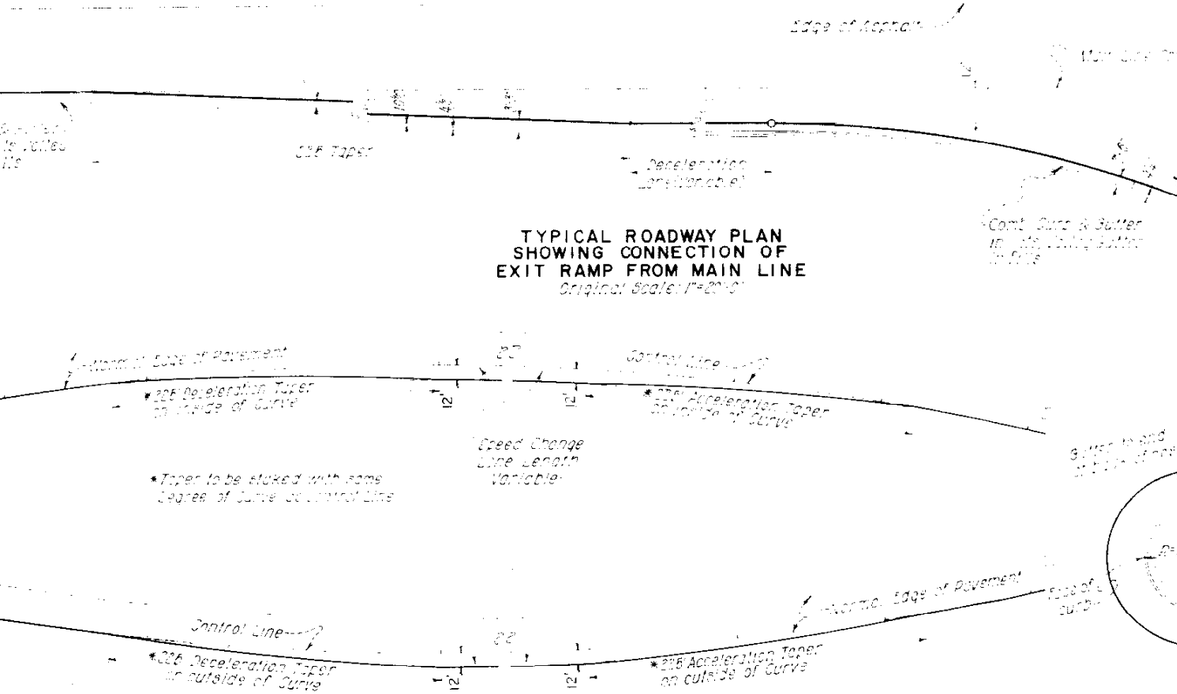
*Where comb curb & gutter is called for in place of barrier curb the comb curb & gutter will be placed in same relative position as normal edge of pavement



NOTE: Where approach or exit ramps connect with concrete pavement, acceleration and deceleration lanes will be constructed with Plant Mix Oil processed Surfacing to meet edge of Concrete Pavement as called for on plans

TYPICAL TAPERED SECTION FOR RAMP APPROACHES

Original Scale: 1"=10'0"

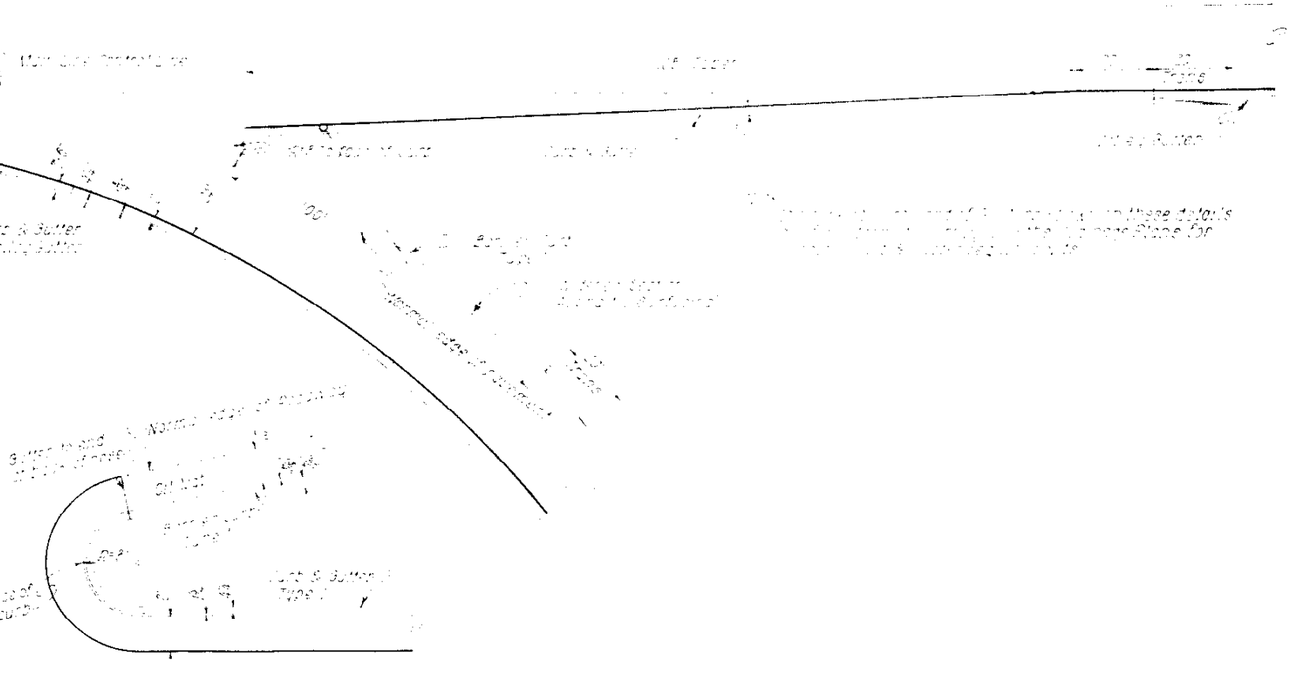


TYPICAL ROADWAY PLAN SHOWING CONNECTION OF EXIT RAMP FROM MAIN LINE

Original Scale: 1"=20'0"

DETAIL OF TAPER LOCATED ON CURVE

Original Scale: 1"=50'0"



DETAIL OF NOSE CURB

Original Scale: 1"=4'0"

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)	5	

REV. BEG. STA. – 11-13-57 – E.E.O.

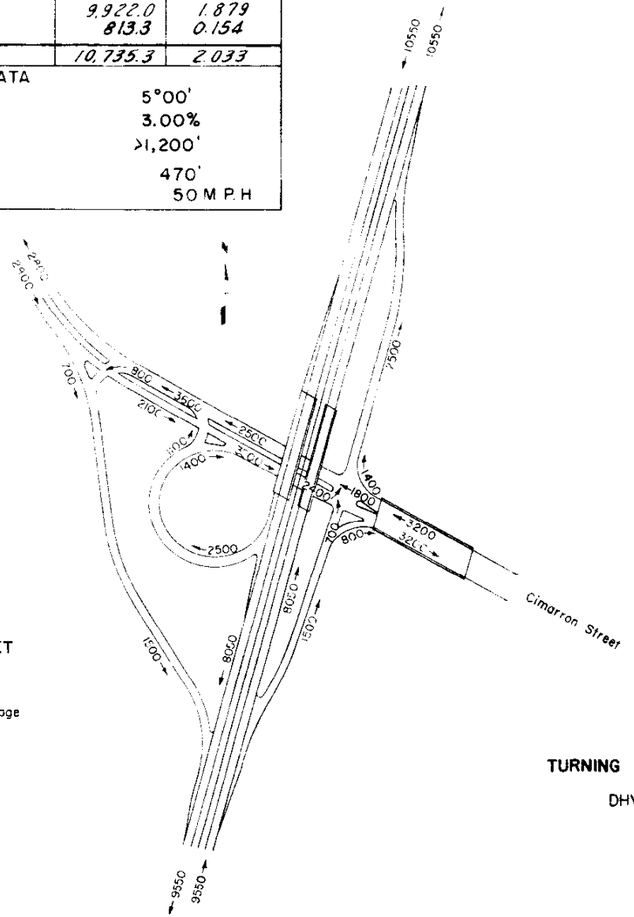
TABULATION OF LENGTH & DESIGN DATA

STATION	ROADWAY LIN. FT.	BRIDGE LIN. FT.	
266+80.7 Begin I 092-2(5)			
274+47.3	766.6		
I-17-OF & OG		302.3	
277+49.6			
296+85.0	1,935.4		
I-17-EI DBL. 14'x10' C.B.C.		31.0	
297+16.0			
309+48.6 Bk = 309+21.0 Ah.	1,232.6		
343+10.7	3,389.7		
I-17-DA & DB		167.0	
344+77.7			
348+13.3	335.6		
351+00 Begin IN 002-2(42)		286.7	
351+26.3		26.3	
373+88.4 End I 092-2(5) = Sta. 373+88.4 on IN 002-2(42)	2,262.1		
	9,922.0	813.3	

SUMMARY	LIN. FT.	MILES
Roadway	9,922.0	1.879
Bridges	813.3	0.154
Total Length	10,735.3	2.033

DESIGN DATA

Maximum Degree of Curve	5°00'
Maximum Grade	3.00%
Minimum N.F.S.D. — Horizontal	>1,200'
Minimum N.F.S.D. — Vertical	470'
Maximum Design Speed	50 M.P.H.



CIMARRON STREET INTERCHANGE

3200 = 1975 Annual Average

TURNING MOVEMENTS

DHV 1975

GENERAL NOTES

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

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

~~All concrete used on this project shall be "Air Entrained Concrete" Class "A".~~

All curves are to be superelevated and widened as provided by the standard Superelevation sheet included with the plans.

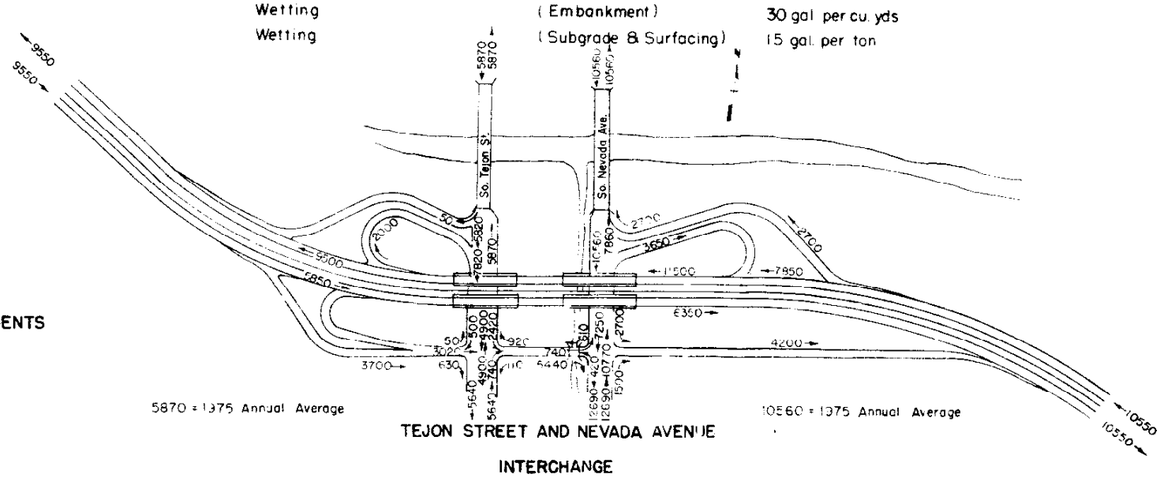
For preliminary plan quantities of asphaltic road materials, asphaltic concrete pavement, asphalt & stone screenings, the following rates of application were used

Prime Coat (over concrete) R.C.	at	.10 gal. per sq. yd.
Prime Coat (over other areas) M.C.	at	.40 gal. per sq. yd.
Asphaltic Concrete Pavement	at	110.00 lbs. per sq. yd. per 1" thickness
Asphalt ([illegible] - 100 penetration)	at	6.50 lbs. per sq. yd. per 1" thickness
Seal Coat R.C.	at	.25 gal. per sq. yd.
Stone Screenings (type I)	at	25.00 lbs. per sq. yd.

Rate of application and grade of oil shall be as determined by the engineer at the time of application.

Rolling Quantities estimated as follows.

Rolling with Flat Wheeled Roller (Oil Mat)	50 tons per hour per unit
~~Rolling with Flat Wheeled Roller (Top Embankment)~~	~~2350 sq. yds. per hour per unit~~
Rolling with Flat Wheeled Roller (Surfacing)	360 tons per hour per unit
Rolling with Rubber Tired Roller (Oil Mat)	500 tons per hour
Rolling with Rubber Tired Roller (~~Subgrade &~~ Surfacing)	240 tons per hour
Wetting (Embankment)	30 gal. per cu. yds.
Wetting (Subgrade & Surfacing)	15 gal. per ton



5870 = 1975 Annual Average

10560 = 1975 Annual Average

TEJON STREET AND NEVADA AVENUE INTERCHANGE

FEDERAL ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	I 092-2(51)	6	

REV 10-18-57 E.E.O.
Rev. 2-5-59. Added Work Orders, W.C.J.

SUMMARY OF APPROXIMATE QUANTITIES

ITEM NO.	ITEM	UNIT	ROADWAY	STRUCTURES I-17-DG I-17-DF	STRUCTURE I-17-DI	STRUCTURE I-17-DH	STRUCTURE I-17-DE	STRUCTURE I-17-EI	STRUCT. I-17-M W.O. Nº 14123 Non Fed. Aid	STRUCTURES I-17-DA I-17-DB	STRUCTURES I-17-DC I-17-DD	ARVADA STREET W.O. Nº 14276 Non Fed. Aid	ROADWAY NON-FEDERAL AID	PROJECT TOTAL	PROJECT TOTAL INCLUDING WORK ORDERS
10a	Clearing and Grubbing Entire Project	Lump Sum	•									•	•	•	•
11	Removal of Portions of Bridge	Lump Sum							•						•
11a	Removal of Obstructions	Lump Sum	•										•		•
11b	Adjust Manhole Ring and Cover	Each	2									3	1	3	6
*11c	Removal of 4 Structures	Lump Sum										•			•
12bx	Removing & Rebuilding Guard Fence	Lin. Ft.	120											120	120
12	Removing Fence	Lin. Ft.										600			600
13c	Unclassified Excavation	Cu.Yd.	1,254,200									1000	119,800	1,374,000	1,375,000
14e	Unclassified Structural Excavation	Cu.Yd.						170						170	170
14f	Rock Excavation (Str.)	Cu.Yd.			80									80	80
14g	Common Excavation (Str.)	Cu.Yd		766	970	230	280		194	350	679			3,275	3,469
16ax	Structure Backfill (Class 1)	Cu.Yd.		650	750	130	250	5	144	250	380			2425	2,569
16c	Mechanical Tamping	Hour		105	110	25	50	75		50	80			495	495
17c	Rolling with Flat Wheeled Roller (Tandem)	Hour	490									20	30	520	540
17d	Rolling with Flat Wheeled Roller (Three(3) Wheel)	Hour	70										10	80	80
17e	Rolling with Rubber Tired Roller (One (1) Unit)	Hour	340									30	40	380	410
17ex	Rolling with Rubber Tired Roller (Two(2) Unit)	Hour	70										10	80	80
17h	Furnishing Flat Wheeled Roller (Tandem)	Each	1.5										0.5	2	2
17i	Furnishing Flat Wheeled Roller (Three (3) Wheel)	Each	0.9										0.1	1	1
17j	Furnishing Rubber Tired Roller (One (1) Unit)	Each	0.9										0.1	1	1
17jx	Furnishing Rubber Tired Roller (Two (2) Unit)	Each	0.9										0.1	1	1
17k	Wetting	M Gal	42,060									140	4,120	4,130	46,320
17v	Compaction	Cu.Yd.	1,329,000									3000	129,000	1,455,000	1,461,000
18a	Station Yard Overhaul	Sta Yd	13,578,500									400	1,295,500	14,874,000	14,874,400
18b	Yard Mile Overhaul	Yd. Mi	659,550										61,350	720,900	720,900
23ax	Sub-Base Material (Class 1)	Ton	102,310										11,390	113,700	113,700
26cx	Gravel or Crushed Rock Surfacing (Grading C)	Ton	44,850									1400	5,150	50,000	51,400
30x	Asphaltic Road Material MC (Prime)	Gal.	63,900									2,400	3,300	65,200	69,600
30y	Asphaltic Road Material RC	Gal.	6,900	250	260	45	80			115	310		350	8,310	8,310
31c	Stone Screenings (Type 1)	Ton	345										25	370	370
32x	Plant Mixed Asphaltic Processed Shoulder Roll	Lin. Ft.	5,250											5,250	5,250
37ax	Concrete Pavement (Driveway)	Sq. Yd										210			210
34bx	Asphaltic Concrete Pavement (Leveling Course)	Ton	15,120										850	15,970	15,970
34dx	Asphaltic Concrete Pavement (Surface Type B)	Ton	9,070	270	285	50	90			125	230	680	510	10,630	11,310
37c	Sand Cushion	Cu.Yd.	330										30	360	360
42b	Treated Bridge Timber	M ft bm		0.7	0.7	0.4	0.6		0.2	0.9	0.9			4.2	4.4
46a	Class "A" Concrete	Cu.Yd.		1,014	1,277	308	542	517	94	825	1,441			5,964	5,958
46pa	Prestressed Concrete Beams (30' to 34'-11")	Each		14										14	14
46pb	Prestressed Concrete Beams (35' to 39'-11")	Each				15	20		5					35	40
46pc	Prestressed Concrete Beams (40' to 44'-11")	Each				1	10							11	11
46pd	Prestressed Concrete Beams (45' to 49'-11")	Each				1								1	1
46pe	Prestressed Concrete Beams (50' to 54'-11")	Each		70										70	70
46pf	Prestressed Concrete Beams (55' to 59'-11")	Each									40			40	40
46pi	Prestressed Concrete Beams (70' to 74'-11")	Each			56					10				66	66
47	Reinforcing Steel	Lb.		199,700	222,600	38,950	55,300	48,400	8,475	133,800	290,700			989,450	997,925
48	Structural Steel	Lb		63,950	48,300	10,850	11,400		1,765	28,750	72,250			235,500	237,265
60x	Drilling Holes to Facilitate Pile Driving	Lin. Ft.					80			608	576			1,264	1,264
61av	Steel Piling (10BP42) or Steel Pipe Piling (10¾ O.D. x 0.179" Th)	Lin. Ft.				315	1,570			3,168	880			5,933	5,933
61aw	Steel Piling (12BP53) or Steel Pipe Piling (12¾ O.D. x 0.179" Th)	Lin. Ft.		1,664							3,696			5,360	5,360
65m	Concrete Slope and Ditch Paving (Wire Mesh)	Cu. Yd.								122	56			178	178
67a	Riprap	Cu. Yd.	8,700											8,700	8,700
75c	Metal Plate Guard Fence (Beam Type)	Lin. Ft.	2,475						75					2,475	2,550
76x	Barrier Fence with Metal Posts	Lin. Ft.	9,500											9,500	9,500
78a	Chain Link Wire Mesh Fence	Lin. Ft.	10,465									600	1,620	12,085	12,685
80c	Sheet Copper (32oz.)	Lb.		52	16					191	760			1,019	1,019
84a	Concrete Curb (Type II)	Lin. Ft	8,516											8,516	8,516
84cx	Concrete Combination Curb and Gutter (Type III)	Lin. Ft.	2,009										1,940	3,949	3,949
84dx	Concrete Combination Curb and Gutter (Type II)	Lin. Ft.	14,226									2,577		14,226	16,803
84b	Concrete Gutter (4')	Lin. Ft.										76			76

CONTINUED ON SHEET NO. 7

FEDERAL ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	I 092-2(5)	7	

Rev. IC-18-FT, Non-Fed. Aid, J.C.R.
Rev. 2-5-59, Work Orders, W.L.J.

SUMMARY OF APPROXIMATE QUANTITIES

ITEM NO.	ITEM	UNIT	ROADWAY	STRUCTURES I-17-DG I-17-DF	STRUCTURE I-17-DI	STRUCTURE I-17-DH	STRUCTURE I-17-DE	STRUCTURE I-17-EI	STRUCT. I-17-M W.O. № 14123 Non Fed Aid	STRUCTURES I-17-DA I-17-DB	STRUCTURES I-17-DC I-17-DD	ARVADA STREET W.O. № 14276 Non Fed Aid	ROADWAY NON-FEDERAL AID	PROJECT TOTAL	PROJECT TOTAL INCLUDING WORK ORDERS
89c	Drain Pipe (Concrete Floor)(4"x 2'-3")	Each			8									8	8
90b	Electrical Conduit with Junction Boxes (1½")	Lin. Ft.		678	600	120	255			672	1,038			3,363	3,363
92	Timber Guard Posts	Each	370											370	370
110vb	3" Gate Valve and Valve Box	Each	21											21	21
110ve	6" Gate Valve and Valve Box	Each	1											1	1
110vx	1½" Angle Valve and Valve Box	Each	14											14	14
113xb	3" Cast Iron Water Pipe	Lin. Ft.	1,252											1,252	1,252
113xe	6" Cast Iron Water Pipe	Lin. Ft.	2,230											2,230	2,230
130a(3)	Drop Inlets (Type 1A) 3 ft. Deep	Each	1											1	1
130a(4)	Drop Inlets (Type 1A) 4 ft. Deep	Each	1										1	2	2
130m(3)	Drop Inlets (Type 4C) 3 ft. Deep	Each	3											3	3
130m(4)	Drop Inlets (Type 4C) 4 ft. Deep	Each	46									1	1	47	48
130m(5)	Drop Inlets (Type 4C) 5 ft. Deep	Each	7											7	7
132cxf	15" Reinforced Concrete Pipe Sewer	Lin. Ft.	3,276									198	60	3,336	3,534
132cxg	18" Reinforced Concrete Pipe Sewer	Lin. Ft.	698											698	698
132cxi	24" Reinforced Concrete Pipe Sewer	Lin. Ft.	738											738	738
132cxk	30" Reinforced Concrete Pipe Sewer	Lin. Ft.	780										460	1,240	1,240
132cxl	36" Reinforced Concrete Pipe Sewer	Lin. Ft.										9		9	9
132ma(8)	Manholes (Type 1A) 8 ft. Deep	Each	3											3	3
132ma(10)	Manholes (Type 1A) 10 ft. Deep	Each											3	3	3
132ma(15)	Manholes (Type 1A) 15 ft. Deep	Each											1	1	1
132vf	15" Vitrified Pipe Sewer	Lin. Ft.	1,070										966	2,036	2,036
132vi	24" Vitrified Pipe Sewer	Lin. Ft.	426											426	426
152ax	Flared End Sections for 15" Reinf. Conc. Culvert Pipe	Each	24										1	25	25
152bx	Flared End Sections for 18" Reinf. Conc. Culvert Pipe	Each	10											10	10
152cx	Flared End Sections for 24" Reinf. Conc. Culvert Pipe	Each	9											9	9
152dx	Flared End Sections for 30" Reinf. Conc. Culvert Pipe	Each	8										1	9	9
	FORCE ACCOUNT														
	Install 2-6" Water Meters and Vaults	Lump Sum	•											•	•
	STATE FURNISHED MATERIAL														
	15,000 L Mercury Vapor Luminaires with 30' Poles	Each	179											179	179
	4,000 L Incandescent Luminaires	Each	24											24	24
	NON-FEDERAL AID														
	Royalty on Borrow Material From Pits 1 and 2 Used on Federal Aid Portion	Cu. Yds.											600,000	600,000	600,000

* Shown as 11a on W.O. 14276

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.
9	COLORADO	I 092-2(5)	8

TABULATION OF SURFACING

LOCATION	STATION	STATION	LENGTH	● SUB-BASE MATERIAL (CLASS 1)		BASE COURSE GRAVEL SURFACING GRADING C		ASPHALTIC CONCRETE PAVEMENT		PRIME COAT MC		SEAL COAT RC		STONE SCREENINGS (TYPE 1)		2" SAND CUSHION	
				CU. FT.	TONS	CU. FT.	TONS	CU. FT.	TONS	SQ. YDS.	GALS.	SQ. YDS.	GALS.	SQ. YDS.	TONS	CU. FT.	CU. YDS
MAIN ROADWAY, RT. LANE																	
FLARE SECTION	267+04	267+58.70 BK.	54.70	1,956.13	132.04	1,051.00	70.94	437.60	32.05	165.74	66.31	--	--		--	27.35	4.01
FLARE SECTION	267+36.05 AH.	267+74	307.95	1,414.55	95.48	757.87	51.16	303.60	22.24	114.98	45.99	--	--		--	18.97	.70
CURBED SECTION	267+74	272+00	426.00	20,164.00	1,361.07	8,892.75	600.26	3,718.60	272.39	1,988.00	795.20	189.33	47.33		2.4	213.00	7.89
TAPERED RAMP	272+00	273+64	164.00	8,746.67	590.40	3,915.50	264.30	1,759.57	128.89	874.67	349.87	72.89	18.22		0.9	82.00	3.04
TAPERED FLARE	273+64	274+25	61.00	2,525.83	170.50	1,344.25	90.74	777.98	56.99	246.53	98.61	--	--		--	30.50	1.13
WIDENED SECTION	274+25	274+34	9.00	399.00	26.93	211.50	14.28	123.56	9.05	39.33	15.73	--	--		--	4.50	0.17
RAMP WITH FLARE	277+42	278+22	80.00	3,734.17	252.06	1,973.75	133.22	1,160.83	85.03	370.43	148.17	--	--		--	40.00	1.48
RAMP SECTION	278+22	279+04	82.00	4,428.00	298.89	2,183.25	147.37	1,189.00	87.09	492.00	196.80	127.56	31.89		1.6	--	--
TAPERED RAMP	279+04	281+29	225.00	12,000.00	810.00	5,371.88	362.60	241.00	17.65	1,200.00	480.00	-	--		--	112.50	4.17
NORMAL WITH CURB	281+29	283+38	209.00	9,892.67	667.75	4,362.88	294.49	1,824.38	133.64	975.33	390.13	--	--		--	104.50	3.87
WIDENED SECTION	283+38	284+10	72.00	3,888.00	262.44	1,917.00	129.40	1,044.00	76.47	432.00	172.80	112.00	28.00		1.4	--	--
RAMP WIDENING	284+10	287+94	384.00	22,784.00	1,537.92	10,320.00	696.60	4,887.97	358.04	2,304.00	921.60	170.66	42.67		2.1	192.00	7.11
RAMP TAPER	287+94	290+19	225.00	12,000.00	810.00	5,371.88	362.60	2,414.05	176.83	1,200.00	480.00	100.00	25.00		1.3	112.50	4.17
STANDARD SECTION	290+19	309+89.56 BK.	1,970.56	110,351.36	7,448.72	40,642.80	2,743.39	20,690.88	1,515.61	12,042.31	4,816.92	3,065.30	766.33		38.3	--	--
STANDARD SECTION WITH EQUATION	309+21 AH.	328+80	1,959.00	109,704.00	7,405.02	40,404.38	2,727.30	20,569.50	1,506.72	11,971.66	4,788.66	3,047.33	761.83		38.1	--	--
CURB TAPER	328+80	329+00	20.00	1,140.00	76.95	412.50	27.84	212.66	15.58	122.22	48.89	29.00	7.25		0.4	--	--
RAMP TAPER	329+00	331+25	225.00	12,000.00	810.00	5,371.88	362.60	2,414.05	176.83	1,200.00	480.00	100.00	25.00		1.3	112.50	4.17
RAMP SECTION	331+25	332+75	150.00	8,900.00	600.75	4,031.25	272.11	1,909.37	139.86	900.00	360.00	66.67	16.67		0.8	75.00	2.77
WIDENED SECTION	332+75	334+18.8	143.80	7,765.20	524.15	3,828.68	258.44	2,085.10	152.73	862.80	345.12	223.69	55.92		2.6	--	--
RAMP TAPER	334+18.8	336+43	224.20	11,882.60	802.08	5,464.88	368.88	2,554.94	187.15	1,245.55	498.22	99.64	24.91		1.2	37.30	1.38
CURBED AREA	336+43	337+08	65.00	3,055.00	206.21	1,389.38	93.78	610.73	44.74	317.78	127.11	28.89	7.22		0.4	10.83	0.40
WIDENED SECTION	337+08	337+50	42.00	2,268.00	153.09	1,118.25	75.48	609.00	44.61	252.00	100.80	65.33	16.33		0.9	--	--
RAMP SECTION	337+50	341+58	40.80	24,072.00	1,624.86	11,169.00	753.91	5,465.49	400.35	2,538.67	1,015.47	181.33	45.33		2.2	68.00	2.52
RAMP TAPER	341+58	341+78.18 BK.	20.18	1,076.27	72.65	481.80	32.52	216.51	15.86	107.63	43.05	[illegible]	2.24		[illegible]	10.09	0.37
RAMP TAPER	341+46.31 AH.	342+35	88.69	4,730.13	319.28	2,117.47	142.93	951.56	69.70	473.01	189.20	39.42	9.86		0.5	44.25	1.64
TAPERED FLARE	342+35	343+10	75.00	3,062.55	206.72	1,631.25	110.11	942.18	69.01	298.33	119.33	--	--		--	37.5	1.39
FLARE WITH CURB	344+79	345+54	75.00	2,612.50	176.34	1,406.25	94.92	662.50	48.53	248.08	99.23	--	--		--	37.50	1.39
CURBED SECTION	345+54	347+39.38	185.38	8,774.65	592.25	3,869.81	261.21	1,618.20	118.53	665.11	266.04	82.39	20.60		1.0	92.69	3.43
FLARE WITH CURB	347+39.38	348+14.38	75.00	2,612.50	176.34	1,406.25	94.92	662.50	48.53	248.08	99.23	--	--		--	37.50	1.39
FLARE	351+27.38	352+02.38	75.00	3,262.50	220.22	1,303.13	87.96	792.25	58.03	329.16	131.66	--	--		--	--	--
STANDARD SECTION	352+02.38	369+50	1,747.62	97,866.72	6,606.00	36,044.66	2,433.01	18,350.01	1,344.14	10,679.90	4,271.96	2,718.52	679.63		34.0	--	--
CURBED SECTION	369+50	370+50	100.0	4,733.33	319.50	2,087.50	140.91	872.91	63.94	466.67	186.67	44.44	11.11		0.6	50.00	1.85
WIDENED SECTION	370+50	373+68.64	318.64	17,200.56	1,161.44	8,483.79	572.66	4,620.28	338.44	1,511.84	604.74	495.66	123.92		5.2	--	--
SUB-TOTAL (RIGHT LANE, MAIN LINE)			10,267.72		36,518.09		14,672.84		7,815.25		22,993.51		2,767.26		175.6		57.45
MAIN ROADWAY, LT. LANE																	
FLARE WITH RAMP	266+40	267+13.41 BK.	73.41	2,561.09	172.87	1,378.43	93.04	649.78	47.60	243.26	97.30	--	--		--	36.71	1.36
FLARE WITH RAMP	267+36.05 AH.	267+43.00	6.95	224.72	15.17	121.63	8.21	55.60	4.07	21.06	8.42	--	--		--	3.48	0.13
WIDENED SECTION	267+43.00	268+40.0	97.00	5,238.00	353.57	2,582.63	174.33	1,406.50	103.03	582.00	232.8	150.89	37.72		1.9	--	--
CURBED SECTION	268+40.0	273+73.0	533.00	25,228.66	1,702.93	11,126.38	751.03	4,652.61	340.80	2,487.33	994.93	236.89	59.22		3.0	266.50	9.87
FLARE SECTION	273+73.0	274+52.0	79.0	2,741.83	185.07	1,476.25	99.65	694.50	50.87	260.20	104.08	--	--		--	39.50	1.46
CURBED FLARE SECTION	277+59.0	278+30.0	71.00	2,483.17	167.61	1,336.25	90.20	630.50	46.18	235.96	94.38	--	--		--	35.5	1.31
CURBED SECTION	278+30.0	279+49.0	119.00	5,632.67	380.21	2,484.13	167.68	1,038.76	76.09	555.33	222.13	52.89	13.22		0.7	59.50	2.20
RAMP TAPER	279+49.0	281+70.0	221.00	11,786.67	795.60	5,276.36	356.16	2,371.13	173.69	1,178.67	471.47	98.22	24.56		1.2	110.50	4.09
WIDENED SECTION	281+70.0	284+00	230.00	12,420.00	838.35	6,123.75	413.35	3,335.00	244.29	1,380.00	552.00	357.78	88.45		4.4	--	--
RAMP SECTION	284+00	285+50	150.00	8,900.00	600.75	4,031.25	272.11	1,909.37	139.86	900.00	360.00	66.67	16.67		0.8	75.00	2.78
RAMP TAPER	285+50	287+75	225.00	12,000.00	810.00	5,371.88	362.60	2,414.05	176.83	1,200.00	480.00	100.00	25.00		1.3	112.50	4.17
CURBED TAPER	287+75	287+95	20.00	1,140.00	76.95	412.5	27.84	212.66	15.58	122.22	48.89	29.00	7.25		0.4	--	--
STANDARD SECTION	287+95	309+07.06 BK.	2,112.06	118,275.36	7,983.59	43,561.24	2,940.30	22,176.63	1,624.43	12,907.03	5,162.81	3,285.43	821.35		41.1	--	--
STANDARD SECTION	309+21.00 AH.	325+03	1,582.00	88,592.00	5,979.96	32,628.75	2,202.44	16,611.00	1,216.76	9,667.78	3,867.11	2,460.88	615.22		30.8	--	--
CURBED TAPER	325+03	325+23	20.00	1,140.00	76.95	412.5	27.84	212.66	15.58	122.22	48.89	29.00	7.25		0.4	--	--
RAMP TAPER	325+23	327+48.0	225.00	12,000.00	810.00	5,371.88	362.60	2,414.05	176.83	1,200.00	480.00	100.00	25.00		1.3	112.50	4.17
CURBED RAMP	327+48.0	331+00	352.00	20,865.33	1,409.76	9,460.00	638.55	4,480.64	328.21	2,112.00	844.80	156.44	39.11		2.0	176.00	6.52
WIDENED SECTION	331+00	331+98	90.00	5,292.00	357.21	2,609.25	176.12	1,421.00	104.09	588.00	235.20	152.44	38.11		1.9	--	--
CURBED SECTION	331+98	335+40	342.00	16,188.00	1,092.69	7,139.25	481.90	2,985.35	218.68	1,596.00	638.40	152.00	38.00		1.5	171.00	6.33
RAMP TAPER	335+40	337+65	225.00	12,000.00	810.00	5,371.88	362.60	2,414.05	176.83	1,200.00	480.00	100.00	25.00		1.3	112.59	4.17
WIDENED SECTION	337+65	338+64.48	99.48	5,371.92	362.60	2,648.66	178.78	1,442.46	105.66	596.88	238.75	154.75	38.69		1.9	--	--

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.
9	COLORADO	I 092-2(5)	9

REVISED QUANTITIES 4-22-58 E.E.O.

TABULATION OF SURFACING

LOCATION	STATION	STATION	LENGTH	● SUB-BASE MATERIAL (CLASS 1)		BASE COURSE GRAVEL SURFACING GRADING C		ASPHALTIC CONCRETE PAVEMENT		PRIME COAT MC		SEAL COAT RC		STONE SCREENINGS (TYPE 1)		2" SAND CUSHION	
				CU. FT.	TONS	CU. FT.	TONS	CU. FT.	TONS	SQ. YDS.	GALS.	SQ. YDS.	GALS.	SQ. YDS.	TONS	CU. FT.	CU. YDS.
MAIN ROADWAY, LT. LANE (CONTD.)																	
RAMP SECTION	338+64.48	340+14.48	150.00	8,900.00	600.75	4,031.25	272.11	1,909.37	139.86	900.00	360.00	66.67	16.67		0.8	75.00	2.78
RAMP TAPER	340+14.48	341+14.48 BK.	100.00	5,333.33	360.00	2,387.50	161.16	1,072.91	78.59	533.33	213.33	44.44	11.11		0.6	50.00	1.85
RAMP TAPER	341+46.31 AH.	342+39.48	93.17	4,969.07	335.41	2,224.43	150.15	999.63	73.22	490.91	198.76	41.41	10.35		0.5	46.59	1.73
CURBED FLARE	342+39.48	343+10.00	60.52	2,507.43	169.25	1,334.41	90.08	772.35	56.57	244.75	97.90	--	--		--	30.26	1.12
CURBED FLARE	344+79.00	345+54.00	75.00	2,612.50	176.34	1,406.25	94.92	662.50	48.53	246.06	99.23	--	--		--	37.50	1.39
CURBED SECTION	345+54.00	347+37.22	183.22	8,672.41	585.39	3,824.72	258.17	1,599.35	117.15	855.03	342.01	81.43	20.36		1.0	91.61	3.39
CURBED FLARE	347+37.22	348+12.22	75.00	2,612.50	176.34	1,406.25	94.92	662.50	48.53	248.08	99.23	--	--		--	37.50	1.39
FLARE RAMP TAPER	351+25.22	352+00.22	75.00	3,062.50	206.72	1,631.25	101.99	942.18	69.01	298.33	119.33	--	--		--	37.50	1.39
RAMP TAPER	352+00.22	352+87.00	86.78	4,628.27	312.41	2,071.87	139.85	931.07	68.20	462.83	185.13	38.57	9.65		0.5	43.39	1.61
RAMP SECTION	352+87.00	356+99.00	412.00	24,445.33	1,650.06	11,072.50	747.39	5,244.39	384.15	2,472.00	988.80	183.11	45.78		2.3	206.00	7.63
WIDENED SECTION	356+99.00	357+37.00	38.00	2,052.00	138.51	1,013.65	68.42	551.00	40.36	228.00	91.20	59.11	14.78		0.7	--	--
CURBED SECTION	357+37.00	358+85.00	148.00	7,005.33	472.86	3,089.50	208.54	1,291.91	94.63	690.67	276.27	65.78	16.45		0.8	74.00	2.74
RAMP TAPER	358+85.00	361+10.00	225.00	11,925.00	804.94	5,484.38	370.20	2,564.06	187.82	1,250.00	500.00	100.00	25.00		1.3	37.50	1.39
WIDENED SECTION	361+10.00	362+25.00	115.00	6,210.00	419.18	3,061.88	206.68	1,667.50	122.14	690.00	276.00	178.89	44.72		2.2	--	--
RAMP SECTION	362+25.00	363+75.00	150.00	8,850.00	597.38	4,106.25	277.17	2,009.37	147.19	933.33	373.33	66.67	16.47		0.8	25.00	0.93
RAMP TAPER	363+75.00	366+00.00	225.00	11,925.00	804.94	5,484.38	370.20	2,564.06	187.82	1,250.00	500.00	100.00	25.00		1.3	37.50	1.39
SUB-TOTAL (LEFT LANE, MAIN LINE)			9,092.59		32,792.32		13,799.36		7,249.73		20,362.80		2,176.16		109.1		79.29
CIMARRON ST. NE #1 RAMP	0+00	3+77.82	937.17	VARIABLE	1,901.21	VARIABLE	977.29	VARIABLE	489.10	VARIABLE	1,361.27	VARIABLE	161.67		8.1	VARIABLE	18.86
CIMARRON ST. SE #1 RAMP	0+00	7+24.56	849.56	VARIABLE	1,716.68	VARIABLE	939.15	VARIABLE	484.87	VARIABLE	1,112.84	VARIABLE	78.33		3.9	VARIABLE	11.85
CIMARRON ST. SW #1 RAMP	0+00	11+84.52	1,184.52	VARIABLE	3,011.33	VARIABLE	1,430.43	VARIABLE	721.90	VARIABLE	1,887.50	VARIABLE	327.38		16.4	VARIABLE	9.73
CIMARRON ST. SW #2 RAMP	0+00	7+46.13	746.13	VARIABLE	1,676.20	VARIABLE	658.45	VARIABLE	392.26	VARIABLE	1,079.33	VARIABLE	101.39		5.1	VARIABLE	11.78
TEJON ST. NW #1 RAMP	0+80	13+51.88	1,271.38	VARIABLE	3,179.13	VARIABLE	1,618.08	VARIABLE	818.63	VARIABLE	2,033.96	VARIABLE	218.07		10.2	VARIABLE	15.80
TEJON ST. NW #2 RAMP	0+00	9+54.39	954.39	VARIABLE	2,059.73	VARIABLE	1,084.54	VARIABLE	530.55	VARIABLE	1,291.54	VARIABLE	47.22		2.4	VARIABLE	20.82
TEJON ST. SW #1 RAMP	0+00	6+50	650	VARIABLE	1,950	VARIABLE	952	VARIABLE	492	VARIABLE	779	VARIABLE	185	VARIABLE	1.0	VARIABLE	2.06
~~TEJON ST. SW #2 RAMP~~	~~0+00~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
NEVADA ST. NE #1 RAMP	0+00	13+44.88	1,344.88	VARIABLE	3,399.69	VARIABLE	1,689.89	VARIABLE	840.55	VARIABLE	2,169.05	VARIABLE	260.10		13.0	VARIABLE	14.04
NEVADA ST. NE #2 RAMP	0+00	10+14.18	1,014.18	VARIABLE	2,714.18	VARIABLE	1,217.49	VARIABLE	586.73	VARIABLE	1,442.11	VARIABLE	36.11		1.8	VARIABLE	23.74
CIMARRON ST. RT. LANE	10+00	25+11	1,520.66	VARIABLE	3,002.76	VARIABLE	1,656.57	VARIABLE	1,097.45	VARIABLE	1,517.20	VARIABLE	71.58		3.6	VARIABLE	20.82
CIMARRON ST. LT. LANE	10+00	25+11	1,494.47	VARIABLE	3,778.53	VARIABLE	1,797.02	VARIABLE	1,173.12	VARIABLE	2,271.82	VARIABLE	168.00		8.4	VARIABLE	17.17
TEJON ST.			295	VARIABLE	40.5	VARIABLE	20.30	VARIABLE	281.44	VARIABLE	343.90	--	--		--	VARIABLE	.93
NEVADA ST.			260	VARIABLE	89.1	VARIABLE	44.60	VARIABLE	317.53	VARIABLE	388.50	--	--		--	VARIABLE	.63
OUTER HIGHWAY (WALNUT ST.)	261+	268+	270	14,040	947.70	6,345.00	428.29	1,980	145.04	1,320.00	528.00	--	--		--		
SUB-TOTAL (RAMPS & CROSSING STREETS)			13,790.63		31,840.44		15,711.26		8,870.48		19,498.31		1,813.61		82.5		178.48
TOTAL			33,150.94		101,150.85		44,383.46		23,935.46		62,874.70		6,757.03		330.2		315.22
NON-FEDERAL AID																	
CIMARRON ST. RT. LANE	00+40	10+00	960	VARIABLE	2,929.93	VARIABLE	1,335.37	VARIABLE	678.05	VARIABLE	1,644.44	VARIABLE	167.87		8.4	VARIABLE	12.43
CIMARRON ST. RT. LANE	25+11	37+00	1,200.16	VARIABLE	2,794.75	VARIABLE	1,240.24		--		--		--		--		--
CIMARRON ST. LT. LANE	00+40	10+00	960	VARIABLE	2,929.58	VARIABLE	1,335.19	VARIABLE	678.84	VARIABLE	1,644.44	VARIABLE	277.77		13.9	VARIABLE	12.43
CIMARRON ST. LT. LANE	25+11	37+00	1,177.84	VARIABLE	2,730.96	VARIABLE	1,211.75		--		--		--		--		--
TOTAL, NON-FEDERAL AID			4,298.00		11,385.22		5,122.57		1,357.69		3,288.88		445.64		22.3		24.86
BRIDGES, MAIN ROADWAY, RT. LANE																	
CIMARRON BRIDGE (STR. NO. 1-17-DF)	274+34	277+42	308.00	--	--	--	--	2,156.00	157.93	1,437.33	143.73 ✦	--	--		--	--	--
TEJON BRIDGE (STR. NO. 1-17-DB)	343+10	344+79	169.00	--	--	--	--	845.00	61.90	563.33	56.33 ✦	--	--		--	--	--
NEVADA ST. BRIDGE (STR. NO. 1-17-DC)	348+14.38	351+27.38	313.00	--	--	--	--	1,565.00	114.64	1,043.33	104.33 ✦	--	--		--	--	--
BRIDGES, MAIN ROADWAY, LT. LANE																	
CIMARRON BRIDGE (STR. NO. 1-17-DG)	274+52.0	277+59.0	307.00	--	--	--	--	1,535.00	112.44	1,023.33	102.33 ✦	--	--		--	--	--
TEJON BRIDGE (STR. NO. 1-17-DA)	343+10.0	344+79.0	169.00	--	--	--	--	845.00	61.90	563.33	56.33 ✦	--	--		--	--	--
NEVADA ST. BRIDGE (STR. NO. 1-17-DC)	348+12.22	351+25.22	313.00	--	--	--	--	1,565.00	114.64	1,043.33	104.33 ✦	--	--		--	--	--
RAMP-FOUNTAIN CRK (STR. NO. 1-17-DH)	0+64.34	1+90.22	112	--	--	--	--	--	47.00	423.11	42.31 ✦	--	--		--	--	--
CIMARRON ST. (STR. NO. 1-17-DE)	10+00.09	11+25.90	125					--	86.00	778.78	77.78 ✦	--	--		--	--	--
CIMARRON ST. (STR. NO. 1-17-DI)	22+37.15	25+25.15	288	--	--	--	--	--	282.00	2,560.00	256.00 ✦	--	--		--	--	--

● THICKNESS OF SUB-BASE 13" BASED ON DESIGN CURVE "E"

✦ USE RC (PRIME) ON BRIDGE DECKS.

TABULATION OF CURBS AND GUTTERS

LOCATION	STATION	STATION	TYPE 2 CURB & GUTTER	TYPE 2 CURB	TYPE 3 CURB & GUTTER	ASPHALTIC SHOULDER ROLL	CURB, GUTTER & SIDEWALK	4" VALLEY GUTTER	CURB RETURN	REMARKS
			LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	
MAIN LINE, Left Control Line	268+44	274+53	609							
	277+62	281+70	408							
	284+00	287+75	375							
	298+75	324+49				2,574				
	324+49	331+00	651							
	331+98	337+64	566							
	338+70	343+10	440							
	344+79	348+14	335							
	351+24	356+99	575							
	357+41	359+36	195							
	359+36	360+90		154						
	362+25	366+00		375						
Right Control Line	268+40	274+33	593							
	277+40	278+06	66							
	279+10	283+23	413							
	284+08	293+25	917							
	309+75	325+00				1,525				
	329+00	332+75		375						
	334+29	336+54		225						
	~~337+80~~	~~341+80~~		~~400~~						
	~~341+80~~	~~343+10~~	~~130~~							
	344+79	348+16	337							
	351+24	362+75				1,151				
CIMARRON STREET RAMPS										
Northeast No. 1 Rt. Edge	0+00	0+64	64							
Rt. Edge	1+91	3+74	183							
Rt. Edge	3+74	6+96		323						
Rt. Edge	6+96	8+83	187							
Lt. Edge	7+83	8+83		100					3 ♦	
Southeast No. 1 Rt. Edge	0+00	5+00		500						
Rt. Edge	5+00	6+91	191							
Lt. Edge	2+23	6+63	440						15 ◢	
Southwest No. 1 Rt. Edge	0+00	3+19	319							
Rt. Edge	9+42	11+85	243							
Lt. Edge	1+66	2+66		100						
Lt. Edge	10+20	11+20		100					3 ♦	
Southwest No. 2 Rt. Edge	0+00	7+46	746							
Lt. Edge	0+92	1+92		100					15 ♦	
Lt. Edge	5+72	6+72		100						
TEJON STREET RAMPS										
Northwest No. 1 Rt. Edge	1+97	3+97	200							
Rt. Edge	3+97	8+25		428						
Rt. Edge	11+00	13+51	151							
Lt. Edge	0+88	3+97		309					15 ♦	
~~Lt. Edge~~	~~3+97~~	~~6+30~~	233							
Lt. Edge	11+28	12+28		100					3 ♦	
Northwest No. 2 Rt. Edge	0+00	9+55	955							
Lt. Edge	0+80	1+80		100					15 ♦	
Lt. Edge	3+50	9+11		561					3 ♦	
Southwest No. 1 Rt. Edge	0+00	2+25	225							
~~Rt. Edge~~	~~2+82~~	~~13+16~~	~~554~~							
Lt. Edge	1+35	2+35		100					15 ♦	
~~Lt. Edge~~	~~8+66~~	~~9+66~~		~~100~~					~~13~~ ♦	
~~Southwest No. 2 Rt. Edge~~	~~0+00~~	~~9+98~~	~~998~~							
~~Rt. Edge~~	~~5+48~~	~~6+48~~		~~100~~					~~3~~ ♦	
~~Rt. Edge~~	~~8+62~~	~~9+62~~		~~100~~						
NEVADA AVE. RAMPS										
Northeast No. 1 Rt. Edge	0+00	3+52	352							
Rt. Edge	3+52	6+44		292						
Lt. Edge	1+05	2+05		100					15 ♦	
Lt. Edge	5+50	7+93	243							
Lt. Edge	7+93	12+90		497					3 ♦	
Northeast No. 2 Rt. Edge	0+00	10+14	1,014							
Lt. Edge	0+50	7+50		700					15 ♦	
Lt. Edge	8+90	9+90		100					3 ♦	
CIMARRON STREET, Median	11+25	14+70			690				12 ¢	
	15+07	16+79			348				24 ¢	
	17+18	20+79			720				24 ¢	
	21+41	22+29			175				20 ¢	
Island	14+35	14+60		75						
R.C.L.	14+83	17+06		223						
Island	17+45	18+05		185						
R.C.L.	18+50	21+23	273							
Island	21+50	22+50		250						
TEJON STREET, West Side				150						
TEJON STREET, East Side				185						
APPROACH CURBS FOR STRUCTURE	273+73	274+48		150						
	277+75	278+50		150						
	342+35	343+10		150						
	344+75	345+54		150						
	347+42	348+17		150						
	357+20	357+95		150						
FROM CURB RETURN COLUMN			15	126	80					
TOTALS			12,514	7,753	2,003	5,250				
NON-FEDERAL AID										
CIMARRON STREET, Median	0+40	10+00			1,920				20 ¢	
FROM CURB RETURN COLUMN					20					
TOTAL (NON-FEDERAL AID)					1,940					

♦ TYPE 2 CURB.
◢ TYPE 2 CURB AND GUTTER
¢ TYPE 3 CURB AND GUTTER

REVISED QUANTITIES 4-22-58

STATE HIGHWAY REGION NO.	DIVISION	PROJ NO.	SHEET NO.
9	COLORADO	I 092-2(20)	10

EEO

FEDERAL ROAD REGION NO.	DIVISION	PROJ NO	SHEET NO
9	COLORADO	I 092-2(5)	11

REVISED QUANTITIES 4-22-58 EEO

STORM SEWER

INLET OR MANHOLE								STORM SEWER PIPE											REMARKS
NO.	LOCATION	TYPE			H	ELEVATION		LENGTH				F.L. ELEVATIONS		CONCRETE SECTIONS		LINE		% GRADE	
		1A INLET	4-C INLET	~~1-A INLET~~		RIM	INVERT	15"	18"	24"	30"	IN	OUT	7° 30' ± ANGLE	FLARED END	FROM	TO		
	MAINLINE, I 092-2(5)																		
264	STA. 264+00 ℄										272	62.80	61.44		30"-1	264	MN. CR.	0.50	REMOVE PRESENT CULVERTS N. SIDE CUCHARRAS.
270	270+00 ℄		1		4.0	90.58	86.58	370				86.58	86.58			270	274	1.62	
270A	270+00 R.C.L.		1		4.0	90.91	86.91	44					86.91			270A	270	1.0	
270B	270+00 L.C.L.		1		4.0	90.96	86.96	44					86.96			270B	270	1.0	
274	273+70 ℄		1		4.0	84.60	80.60	54				80.60	80.60			274	274A	1.5	
274A	273+70 R.C.L.		1		5.0	84.79	79.79		116				79.94			274A	FT. CR.	1.0	
274B	273+70 L.C.L.		1		3.5	84.94	81.44	44					81.44			274B	274	2.0	
278	278+50 ℄		1		4.0	71.18	67.18	56				67.18	67.18			278	R278B	16.3	
281	281+50 ℄									210		50.00	48.95		24"-1			0.53	CROSS DRAIN
281B	281+50 10' LT. OF L.C.L.		1		4.0	62.36	58.36	54					58.36			281B	FTN. CR.	1.0	
283	283+50 ℄		1		4.0	56.30	52.30	76					52.30			283	FTN. CR.	1.0	
283A	283+00 R.C.L.		1		4.0	58.02	54.02	60				54.02	54.02			283A	283	2.6	
288	287+75 ℄		1		4.0	50.41	46.41	44					46.41			288	288B	1.3	
288A	287+75 R.C.L.		1		3.5	50.76	47.26	56					47.26			288A	288	2.0	
288B	287+75 L.C.L.		1		5.0	50.85	45.85	32					45.85			288B	FTN. CR.	1.0	
293	293+50 ℄		1		4.0	45.57	41.57	62					41.57			293	FTN. CR.	0.9	
293A	293+25 R.C.L.		1		4.0	47.46	43.46	48				43.46	43.46			293A	293	3.9	
298	298+00 ℄		1		4.0	42.38	38.38	60					38.38			298	FTN. CR.	1.0	
303	303+50 ℄		1		4.0	37.96	33.96	50					33.96			303	303B	0.9	
303B	303+50 10' LT. OF L.C.L.		1		3.5	37.0	33.50	14				33.50	33.50		15"-1	303B	OUT		ELEV. AT FLARED END 33.0
305	305+00 ℄									158		31.00	30.50		24"-2			0.31	CROSS DRAIN
308	308+00 ℄		1		4.0	34.68	30.68	50					30.68			308	308B	1.0	
308B	308+00 10' LT. OF L.C.L.		1		4.0	34.19	30.19	16				30.19	30.19		15"-1	308B	OUT	11.8	ELEV. AT FLARED END 28:3
312B	312+00 56' LT. OF L.C.L.										50	25.30	24.00		30"-2	312B	OUT	1.0	TO BE LOCATED IN FIELD TO DRAIN AREA
313	313+00 ℄		1		3.5	30.62	27.32	50					27.82			313	313B	1.6	
313A	313+00 10' RT. OF R.C.L.		1		3.0	30.76	27.76	50					27.76			313A	313	1.0	
313B	313+00 10' LT. OF L.C.L.		1		4.0	30.98	26.98	16				26.98	26.98		15"-1	313B	OUT	6.1	ELEV. AT FLARED END 26.0
318	318+00 ℄									204		18.00	16.90		24"-2				CROSS DRAIN
319	319+00 ℄		1		3.5	27.39	23.89	50					23.89			319	319B	1.3	
319A	319+00 10' RT. OF R.C.L.		1		3.0	27.34	24.34	50					24.34			319A	319	1.0	
319B	319+00 10' LT. OF L.C.L.		1		4.0	27.31	23.31	14				23.31	23.31		15"-1	319B	OUT	3.6	ELEV. AT FLARED END 22.8
324	324+00 ℄		1		3.5	24.33	20.83	50					20.83			324	324B	1.2	
324A	324+00 10' RT. OF R.C.L.		1		3.5	25.15	21.65	50								324A	324	1.5	
324B	324+00 10' LT. OF L.C.L.		1		4.0	24.25	20.25	28				20.25	20.25		15"-1	324B	OUT	15.2	ELEV. AT FLARED END 16.0
328	328+00 ℄										172	13.90	13.50		30"-2			0.23	CROSS DRAIN
329	329+00 ℄		1		3.5	21.72	18.22	50					18.22			329	329B	1.0	
329B	329+00 L.C.L.		1		3.5	21.22	17.72	20				17.72	17.72		15"-1	329B	OUT	1.0	ELEV. AT FLARED END 17.52
334	334+18.18 ℄	1			4.0	18.81	14.81	44					14.81			334	334B	1.3	
334B	334+18.18 L.C.L.		1		4.5	18.75	14.25	40				14.25	14.25		15"-1	334B	OUT	8.1	ELEV. AT FLARED END 11.0
337	337+10 ℄		1		4.0	22.14	18.14	90					18.14		15"-1	337	OUT	8.0	ELEV. AT FLARED END 11.0
340	340+10 ℄		1		4.0	29.84	25.84	56					25.84			340	340B	1.5	
340B	340+10 L.C.L.		1		5.0	30.0	25.0	50				25.0	25.0	15"-3	15"-1	340B	OUT	32.0	ELEV. AT FLARED END 09.0
342	342+00 ℄								218			10.30	08.50		18"-2			0.87	CROSS DRAIN
347	347+30 ℄		1		4.0	30.45	26.45	44				26.45	26.45			347	347B	1.0	
347A	347+30 R.C.L.		1		4.0	31.09	27.09	44				27.09				347A	347	1.5	
347B	347+30 L.C.L.		1		5.0	31.09	26.09	110				26.09	26.09		15"-1	347B	CHEY. CR.		
354A	354+00 10' RT. OF R.C.L.		1		3.5	22.53	19.03	50					19.03			354A	354	1.0	
354	354+00 ℄		1		4.0	22.59	18.59	56				18.59	18.59			354	354B	0.6	
354B	354+00 L.C.L.		1		4.5	22.75	18.25	56					18.25	15"-3	15"-1	354B	OUT	32.6	ELEV. AT FLARED END 02.8
357A	357+00 10' RT. OF R.C.L.		1		3.0	11.85	08.85	50					08.85			357A	357	1.4	
357	357+00 ℄		1		4.0	12.08	08.08	56					08.08			357	357B	1.0	
357B	357+00 L.C.L.		1		4.5	12.01	07.51	28				07.51	07.51	15"-3	15"-1	357B	OUT	1.6	ELEV. AT FLARED END 01.0
360A	10' RT. OF R.C.L.		1		3.5	02.90	99.40	50					99.40			360A	360	1.0	
360	360+00 ℄		1		4.0	02.87	98.87	90					98.87		15"-1	360	OUT	1.6	ELEV. AT FLARED END 97.4
362A	362+00										130	89.80	87.00		30"-1	362A	DITCH	2.7	TO EXTEND 30" CROSS DRAIN IN PLACE
	RAMPS																		
R270D	STA. 7+00 NE #1 CIMARRON		1		4.0	84.37	80.37	76					80.37	15"-3		R270D	MON. CR.	33.4	ELEV. AT OUTLET END 55.0
R277A	7+25 SW #2 "		1		4.0	56.35	52.35	38					52.35		15"-1	R277A	OUT	2.2	ELEV. AT FLARED END 51.5
R278A	5+25 SW #2 "							76				52.50	51.50		15"-2			1.3	CROSS DRAIN
R278B	5+75 SE #1 "		1		3.5	55.18	51.68	30				51.68	51.00			R278B	R278D	2.8	
R278D	5+96 SE #1 "		1		4.0	54.74	50.74	10					50.74			R278D	FTN. CR.		
R279A	1+00 SW #2 "		1		4.0	68.62	64.62	54					64.62	15"-3	15"-1	R279A	OUT	35.0	ELEV. AT FLARED END 51.0
R279C	2+00 SW #2 "								54			51.00	50.50		18"-2			0.54	CROSS DRAIN
~~R336A~~	~~9+00 SW #2 TEJON~~								~~94~~			~~11.50~~	~~11.00~~		~~18"-2~~			~~0.84~~	~~CROSS DRAIN~~
R336B	6+50 NW #1 "								27			10.50	10.00		18"-2			0.54	CROSS DRAIN
R337B	2+80 NW #2 "									80		09.50	09.00		24"-2			0.63	CROSS DRAIN
R339B	4+00 NW #2 "		1		4.0	17.94	13.94	34					13.94		15"-1	R339B	OUT	14.5	ELEV. AT FLARED END 09.0
~~R343A~~	~~9+00 SW #2 "~~	~~1~~			~~3.6~~	~~69.70~~	~~66.70~~	~~100~~					~~66.70~~		~~15"-1~~	~~R343A~~	~~OUT~~	~~0.80~~	~~ELEV. AT FLARED END 65.2~~
R343B	9+00 NW #2 "		1		4.0	13.55	09.55	20					09.55		15"-1	R343B	OUT	5.0	ELEV. AT FLARED END 08.5
~~R343C~~	~~9+00 SW #2 "~~							~~36~~				~~07.20~~	~~06.80~~		~~15"-1~~	~~R343C~~	~~R343A~~	~~4.0~~	~~CROSS DRAIN~~
R343C	6+30 NW #2 "										150	08.00*	07.00		30"-2			0.67	CROSS DRAIN
R357D	7+25 NE #2 NEVADA		1		4.0	03.09	99.09	30					99.09		15"-1	R357D	OUT	5.6	ELEV. AT FLARED END 96.5
R356B	6+20 NE #2 "								84			96.00	94.50		18"-2			1.8	CROSS DRAIN
R359B	4+00 NE #1 "									80		94.00	91.50		24"-2			1.7	CROSS DRAIN
	CIMARRON ST.																		
15	STA. 14+70 ℄		1		4.0	60.71	56.71	46					56.71		15"-1	15	OUT	15.5	ELEV. AT FLARED END 49.6
20	20+42.52 ℄		1		4.0	55.43	51.43	102					55.43		15"-1	20	FTN. CR.	4.1	ELEV. AT OUTLET 51.2
	TOTALS	1	56					3150	604	736	780								
	NON-FEDERAL AID																		
	CIMARRON ST																		
9	STA. 9+35 ℄		1		4.0	66.67	62.67	60					62.67		15"-1	9	OUT		ELEV. AT FLARED END 58.0
33B	33+00 70' LT. OF L.C.L.	1			4.0	63.00	59.10				460	59.10	54.30		30"-1	33B	OUT		ELEV. AT FLARED END 54.3
	TOTAL, NON-FEDERAL AID	1	1					60			460								

FLARED END SECTION SUMMARY

ROADWAY:
15" - 24
18" - 10
24" - 9
30" - 8

NON-FEDERAL AID:
15" - 1
30" - 1

* Included in Cost of Reinforced Concrete Pipe Sewer.

SANITARY SEWERS

NO.	LOCATION	M.H. TYPE I-A			H	ELEVATION RIM	ELEVATION INVERT	VITRIFIED SEWER PIPE LENGTH 15"	18"	24"	30"	F.L. ELEVATION IN	F.L. ELEVATION OUT	FLARED END SECTION		LINE FROM	LINE TO	% GRADE	REMARKS
A	STA. 262+30 100' RT. OF R.C.L.							250								A	C		MANHOLE IN PLACE
B	264+40 10' RT. OF R.C.L.																		PLUG MANHOLE
C	264+70 90' RT. OF R.C.L.	1			8.0	APPROX.		450								C	E		
D	267+10 15' LT. OF ℄																		PLUG MANHOLE
E	269+00 85' RT. OF R.C.L.	1			8.0	APPROX.		370								E	H		
F	271+90 5' LT. OF L.C.L.				9.10	53.00	43.90												PLUG MANHOLE
G	271+95 50' LT. OF L.C.L.				7.74	54.30	46.56												PLUG MANHOLE
H	272+65 90' RT. OF R.C.L.	1			8.40	53.40	45.00			420			45.00			H	M	- 0.57	
I	272+70 130' RT. OF R.C.L.				6.90	52.14	45.24												MANHOLE IN PLACE
J	272+80 75' LT. OF L.C.L.				9.38	52.60	43.30												PLUG MANHOLE
K	274+35 90' LT. OF L.C.L.						41.75												PLUG MANHOLE
L	274+75 110' LT. OF L.C.L.				7.52	52.5.	45.00												PLUG MANHOLE
M	275+25 150' LT. OF L.C.L.					52.09	42.56						42.56			M	N		MANHOLE IN PLACE
N	275+70 200' LT. OF L.C.L.					51.31	37.91						37.51			N	O		MANHOLE IN PLACE
	TOTALS	5						1070		420									
	NON-FEDERAL AID																		
O	STA. 26+60 CIMARRON 140' RT.R.C.L.					47.19	36.69									O	P		MANHOLE IN PLACE
P	27+10 " 285' RT.R.C.L.					46.69	36.53									P	OUT		MANHOLE IN PLACE
Q	28+10 " 70' RT.R.C.L.	1			10.14	51.30	41.16									Q	P		
R	28+40 " 20' RT.R.C.L.					50.47	42.67									R	Q		MANHOLE WILL BE COVERED BY FILL
T	30+30 " R.C.L.					50.47	40.70									T	S		MANHOLE IN PLACE
U	30+90 " 50' RT.R.C.L.	1			10.43	60.20	49.67	320					49.67			U	Q	- 2.62	
V	33+55 " 50' RT.R.C.L.	1			14.03	71.00	57.17	300					57.17			V	U	- 2.50	
W	34+50 " ℄					72.50	51.70									W	T		MANHOLE IN PLACE
X	37+25 " ℄	1			9.00	73.57	63.97	380					63.97			X	V	- 2.0	
	TOTALS, NON-FEDERAL AID	4						1000											
	MANHOLE ADJUSTMENT																		
† S	STA. 28+75 CIMARRON 55' LT. L.C.L.		1			57.75	44.72									S	Q		RAISE RING & COVER 9.5'
AA	STA. 7+00 SW-1 16' LT. OF C.L.					48.9	43.4												RAISE RING & COVER
BB	SW-2 55' LT. OF 1+48					47.4	42.2												RAISE RING & COVER

† NON-FEDERAL AID

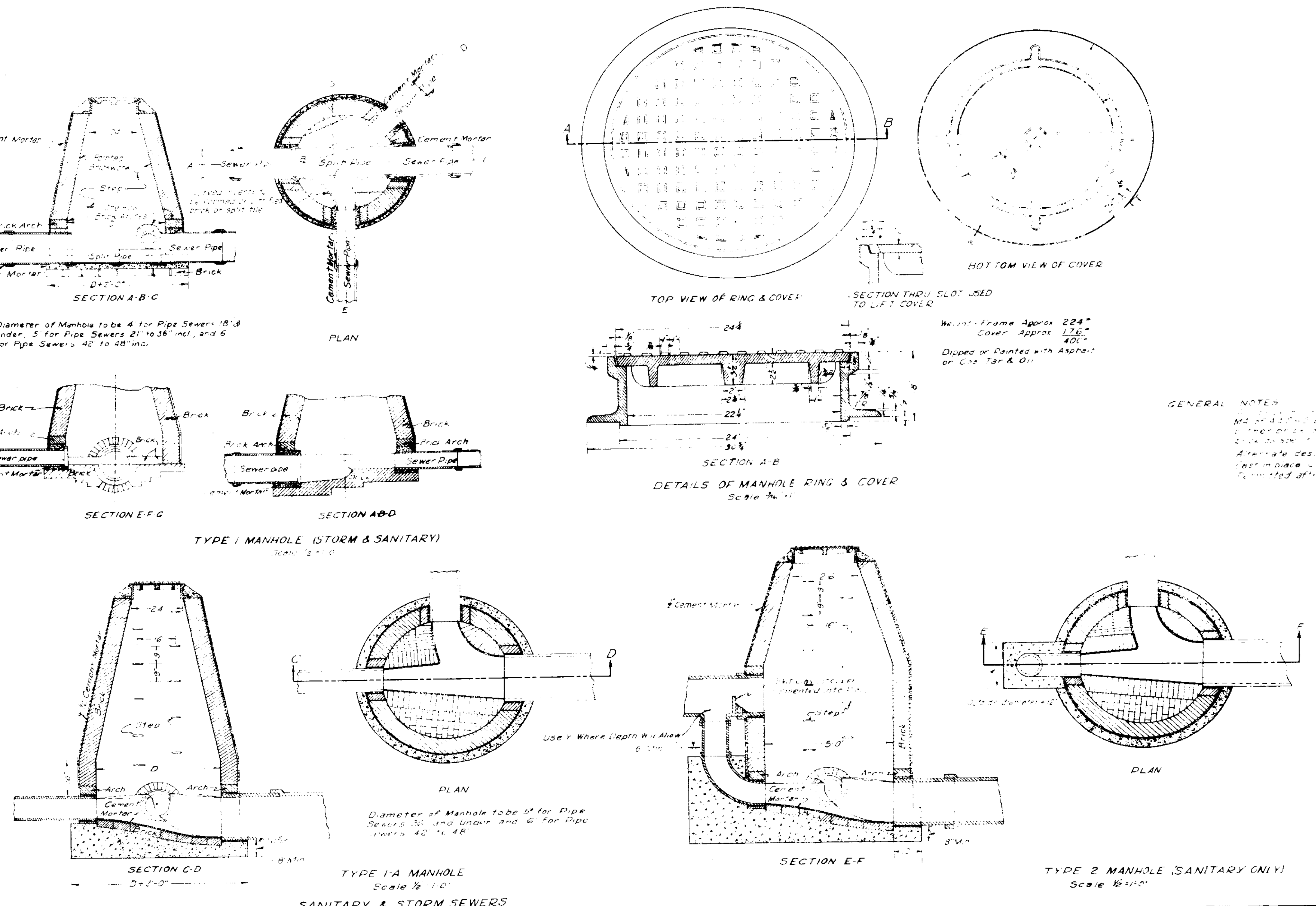
SUMMARY OF EARTHWORK QUANTITIES

	ROADWAY CU. YDS.	NON-FEDERAL AID CU. YDS.	PROJ. TOTALS CU. YDS.
EXCAVATION			
FROM CROSS SECTIONS			
Mainline	5,670	0	5,670
Cimarron St.	8,665	1,675	10,340
Cimarron Ramps	0	0	0
Tejon Ramps	2,174	0	2,174
Nevada Ramps	1,598	0	1,598
BORROW			
Pit No. 1	200,000	0	200,000
Pit No. 2	400,000	0	400,000
Pit Nos 3 & 4	522,175	107,030	629,205
SUB-TOTALS	1,140,082	108,905	1,248,993
ESTIMATED FOR SUBSIDENCE	119,007	10,893	129,900
TOTALS	1,259,089	119,798	1,378,893
EMBANKMENT			
FROM CROSS SECTIONS			
Mainline	778,905	0	778,905
Cimarron St.	51,055	90,754	141,809
Cimarron Ramps	50,788	0	50,788
Tejon Ramps	38,175	0	38,175
Nevada Ramps	29,150	0	29,150
TOTALS	950,073	90,754	1,040,827
EMBANKMENT x FACTOR (1.20 Factor Used)			
Mainline	934,686	0	934,686
Cimarron St.	61,266	108,905	170,171
Cimarron Ramps	60,946	0	60,946
Tejon Ramps	45,810	0	45,810
Nevada Ramps	34,980	0	34,980
TOTALS	1,140,088	108,905	1,246,993
	STA. YDS.	STA. YDS.	STA. YDS.
STATION YARD OVERHAUL			
FROM MASS DIAGRAM	12,343,925	1,177,330	13,521,255
EST. FOR SUBSIDENCE	1,234,393	117,733	1,352,126
TOTALS	13,578,318	1,295,063	14,873,381
	YD. MI.	YD. MI.	YD. MI.
YARD MILE OVERHAUL			
FROM MASS DIAGRAM	599,568	55,754	655,322
EST. FOR SUBSIDENCE	59,957	5,575	65,532
TOTALS	659,525	61,329	720,854

REV. M.H. ADJ. 10-18-67 E.E.G. ALSO EARTHWORK

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO
9	COLORADO	I C92-2(5)	12

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092 - 2(5)	13	



SECTION A-B-C
Diameter of Manhole to be 4' for Pipe Sewers 18" & under, 5' for Pipe Sewers 21" to 36" incl., and 6' for Pipe Sewers 42" to 48" incl.
PLAN
SECTION E-F-G
SECTION A-B-D
TYPE I MANHOLE (STORM & SANITARY)
TOP VIEW OF RING & COVER
SECTION THRU SLOT USED TO LIFT COVER
BOTTOM VIEW OF COVER
Weight: Frame Approx 224#
Cover Approx 176#
400#
Dipped or Painted with Asphalt or Coal Tar & Oil
SECTION A-B
DETAILS OF MANHOLE RING & COVER
SECTION C-D
PLAN
Diameter of Manhole to be 5' for Pipe Sewers 36" and Under and 6' for Pipe Sewers 42" to 48"
TYPE I-A MANHOLE
Scale ½" = 1'-0"
SANITARY & STORM SEWERS
SECTION E-F
PLAN
TYPE 2 MANHOLE (SANITARY ONLY)

GENERAL NOTES

[illegible] requirements of grade M4 of AASHO Designation M 91. Manhole bottoms may be either brick or concrete. [illegible] benches shall be of [illegible]

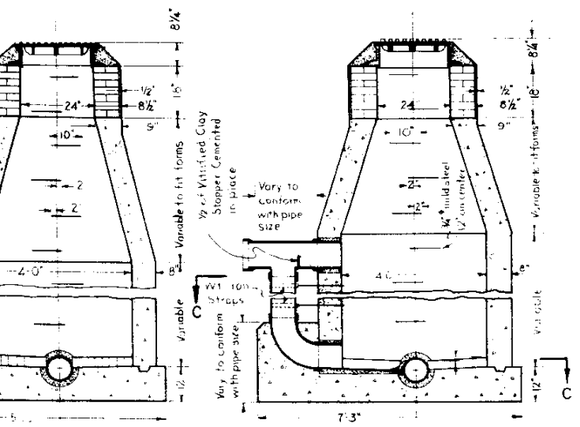
Alternate design for Manholes using Precast Concrete Blocks, Cast in place Concrete, or Precast Concrete Manholes will be permitted after approval of [illegible] by the Department.

COLORADO
DEPARTMENT OF HIGHWAYS

MANHOLE DETAILS
TYPE I, IA, 2

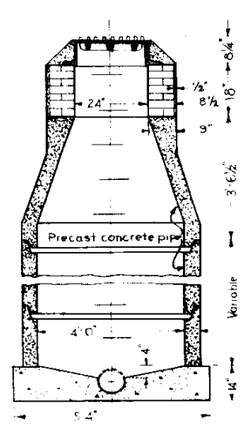
Designed by / Made by / Checked by:	Approved by: / Date:

FED ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEE.
9	COLO.	I 092-2(5)	14	

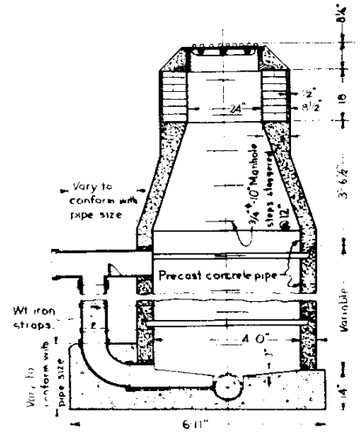


SECTION A-A

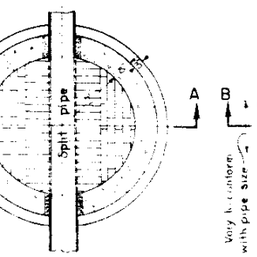
SECTION B-B



SECTION D-D

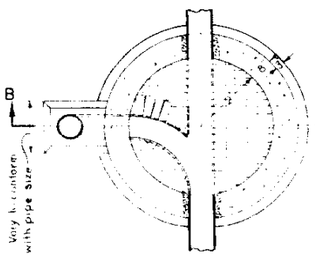


SECTION E-E



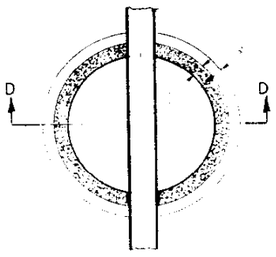
CTIONAL PLAN

TYPE 3



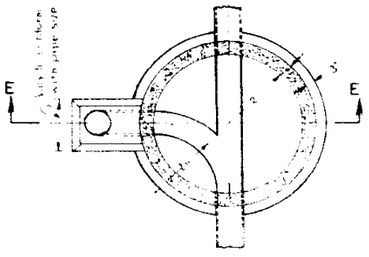
SECTION C-C

TYPE 3A



SECTIONAL PLAN

TYPE 4



SECTIONAL PLAN

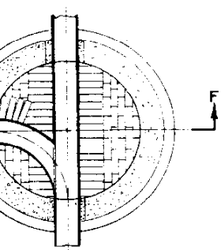
TYPE 4A

SECTION F-F

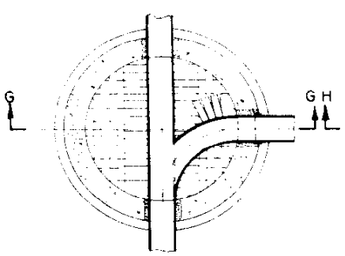
SECTION G-G

SECTION H-H

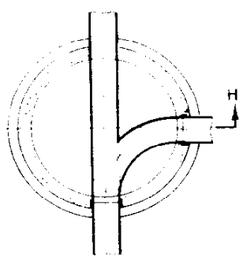
SECTION J-J



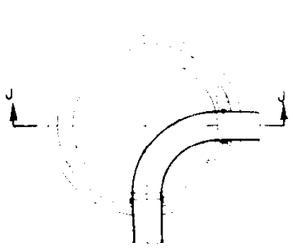
SECTIONAL PLAN
TYPE 3B



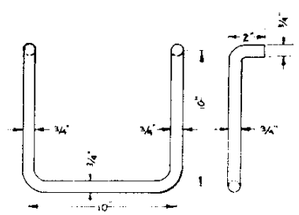
SECTIONAL PLAN
TYPE 3C



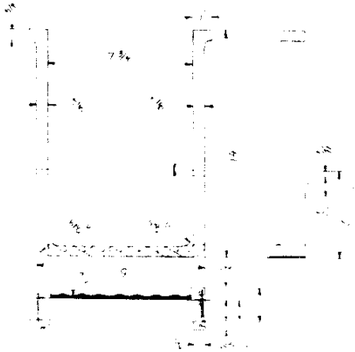
SECTIONAL PLAN
TYPE 4B



SECTIONAL PLAN
TYPE 4C



MILD STEEL STEPS
For Concrete Manholes



CAST IRON STEPS

COLORADO
DEPARTMENT OF HIGHWAYS

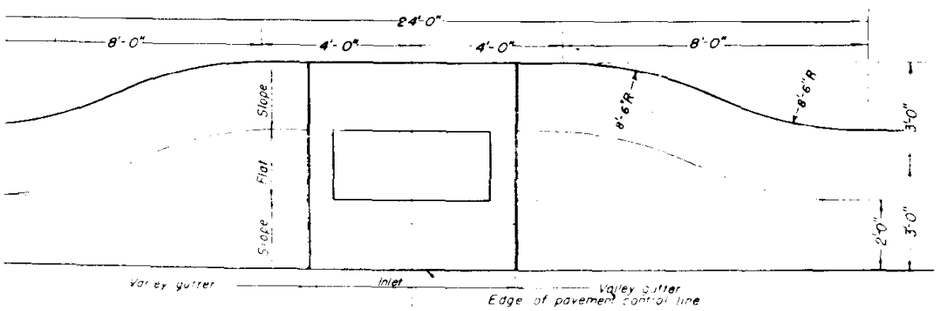
MANHOLE DETAILS

TYPE 3,3A,3B,3C,4,4A,4B,4C

Designed by	Approved by:
Made by	
Checked by	Date:

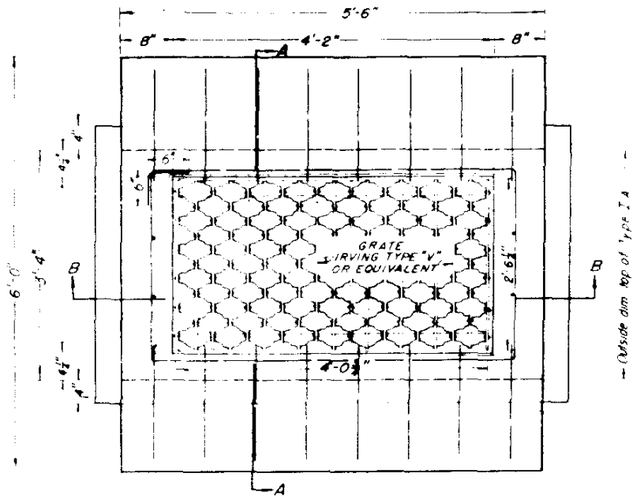
Rev 3-26-52 LLP

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)	15	



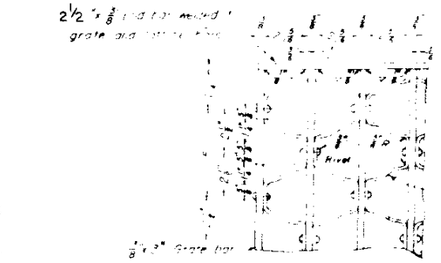
PLAN OF WIDENING OF VALLEY GUTTER AT INLETS

Scale 1" = 1'-0"



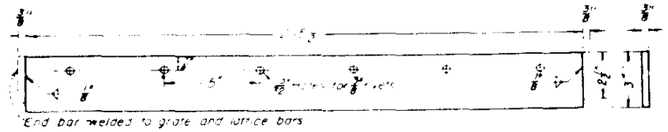
PLAN
DROP INLET TYPE I

Scale 1" = 1'-0"



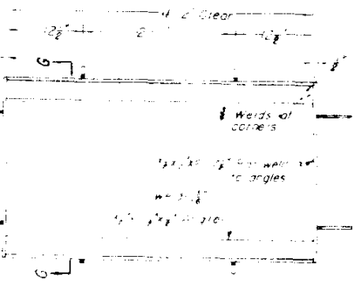
ENLARGED PLAN
CORNER OF GRATE

Scale 3" = 1'-0"



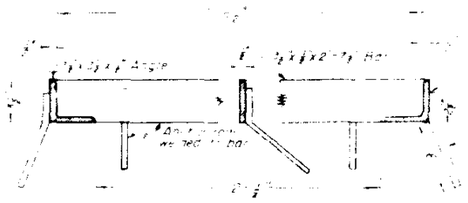
DETAIL
GRATE BAR

Scale 3" = 1'-0"



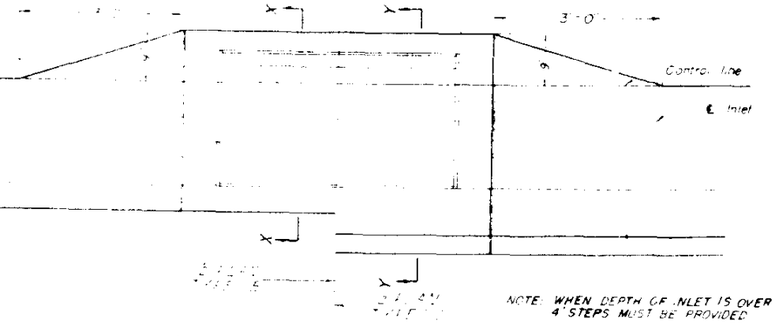
PLAN OF FRAME

Scale 1" = 1'-0"



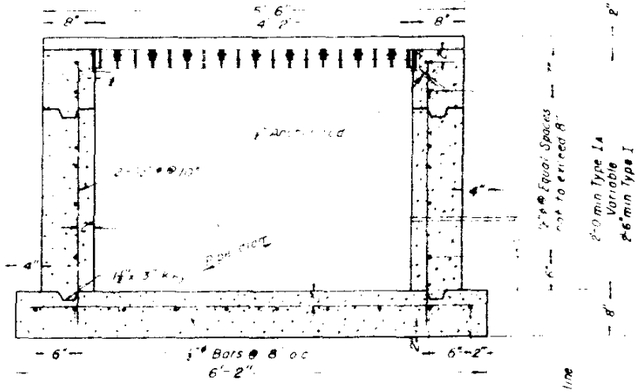
SECTION G-G

Scale 1" = 1'-0"



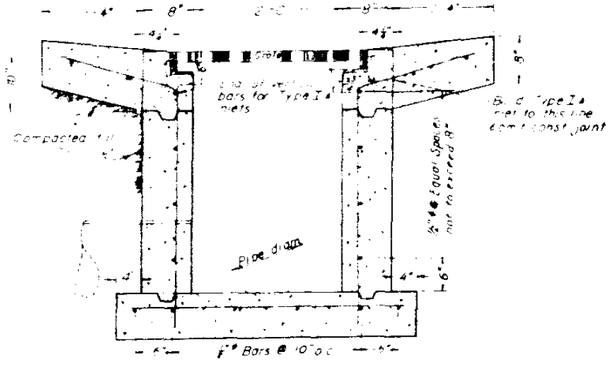
DROP INLETS IN CURB & GUTTER

Scale 1" = 1'-0"



SECTION B-B

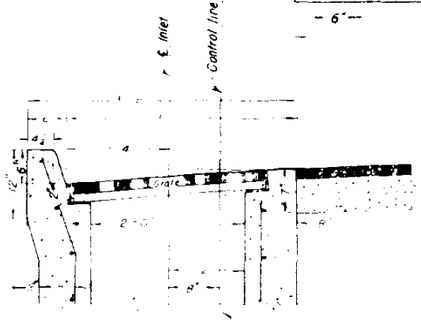
Scale 1" = 1'-0"



SECTION A-A

Scale 1" = 1'-0"

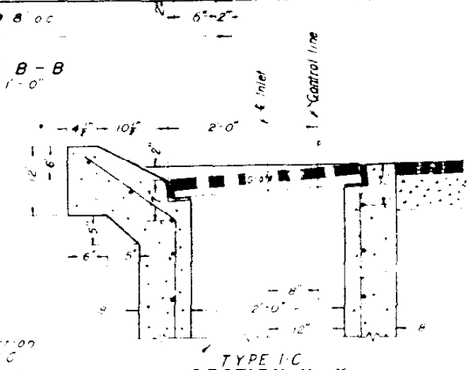
Note: DROP INLET TYPE IA IN MEDIAN STA. 334+ SHOULD BE FABRICATED OPEN BAR TYPE OF DIMENSIONS SHOWN ABOVE



TYPE I-B
SECTION X-X

Scale 1" = 1'-0"

NOTE: Section of Types I-B & I-C same as Type I



TYPE I-C
SECTION Y-Y

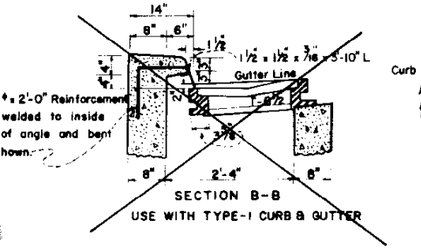
Scale 1" = 1'-0"

COLORADO
DEPARTMENT OF HIGHWAYS

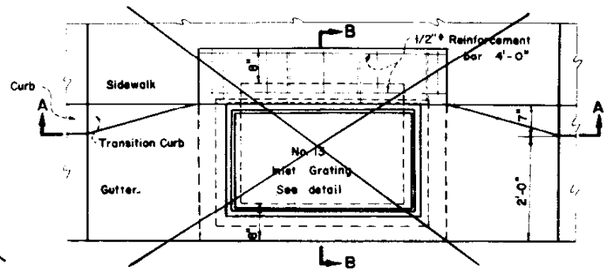
DROP INLET DETAILS

Designed by:	Approved by:
Made by:	
Checked by:	Date:

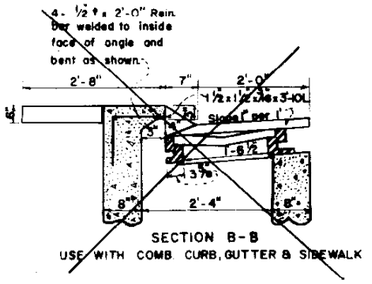
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)	16	



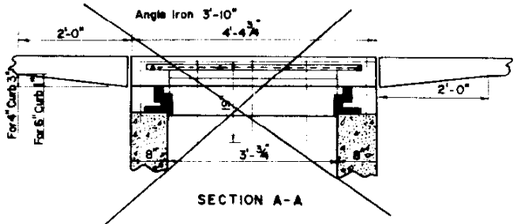
SECTION B-B
USE WITH TYPE-I CURB & GUTTER



PLAN

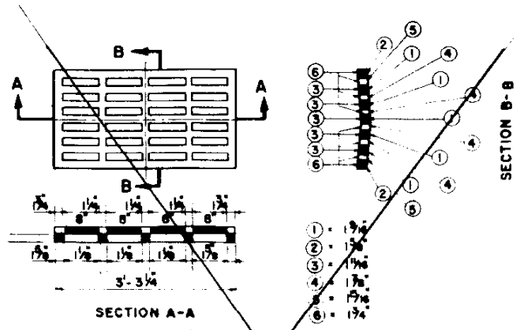


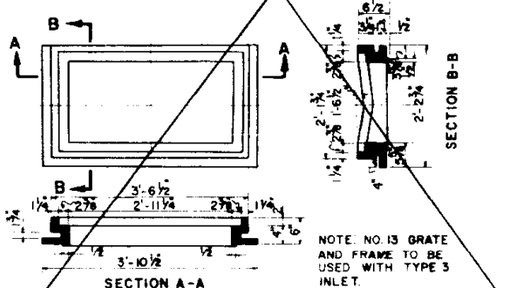
SECTION B-B
USE WITH COMB. CURB, GUTTER & SIDEWALK



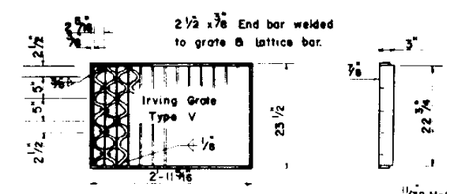
SECTION A-A

STANDARD INLET TYPE - 3





NOTE: NO. 13 GRATE AND FRAME TO BE USED WITH TYPE 3 INLET.

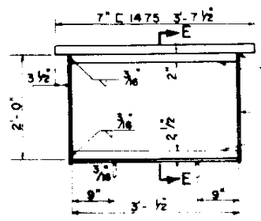


3/8" x 3" Grate bars

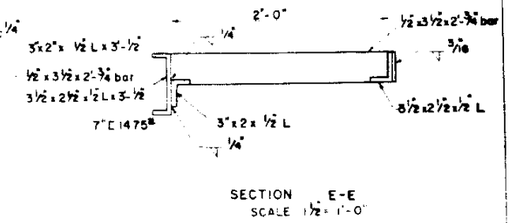
3/16 x 1¾ Lattice bars Riveted to grate bars.

PLAN

NOTE: 3(Three) only, Irving Grate Required. GRATE BAR Cimarron St. Sta 9+35, 33+00, South Tejon & Arvada All others may be Fabricated Open Bar type of dimensions shown above.



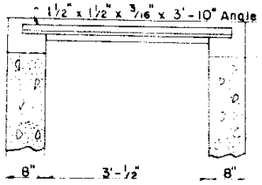
PLAN



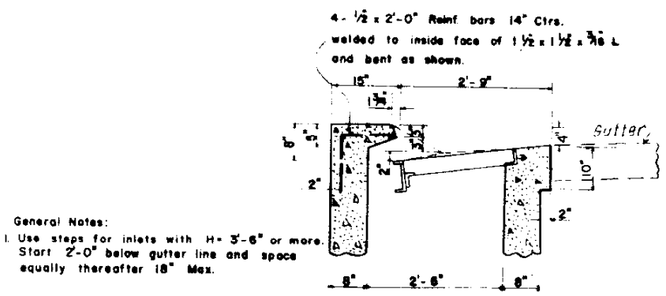
SECTION E-E
SCALE 1½" = 1'-0"

NO. 4 FRAME

NOTE: NO. 4 GRATE AND FRAME TO BE USED WITH TYPE 4-B AND 4-C INLET.

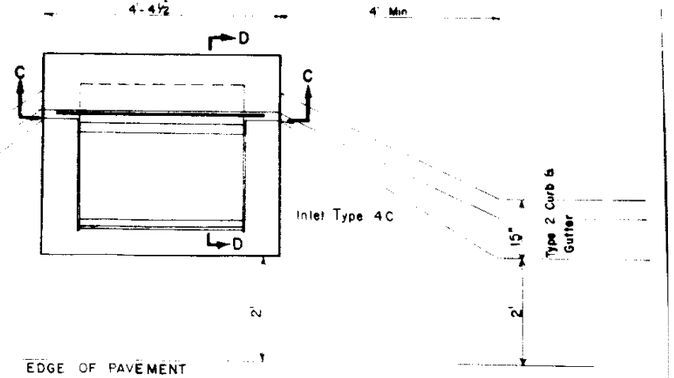


SECTION C-C



SECTION D-D

General Notes:
1. Use steps for inlets with H= 3'-6" or more. Start 2'-0" below gutter line and space equally thereafter 18" Max.



EDGE OF PAVEMENT

PLAN

NOTE: Sta. 9+35 on Cimarron the throat of the inlet will be flush with the Median Curb

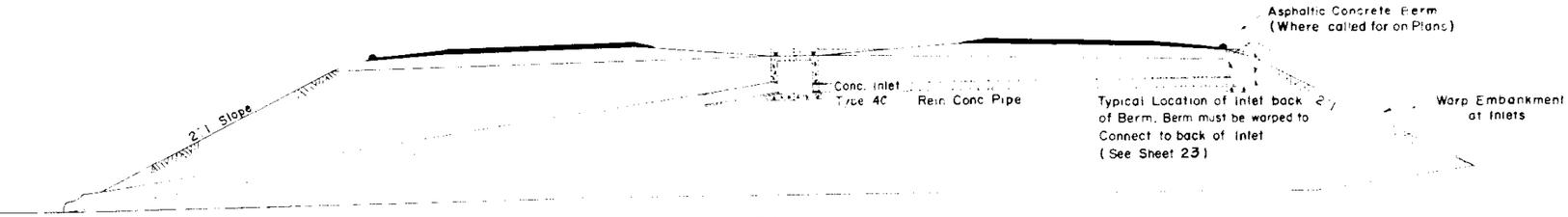
INLET TYPE 4-C

SCALE 3/4" = 1'-0" Unless otherwise noted

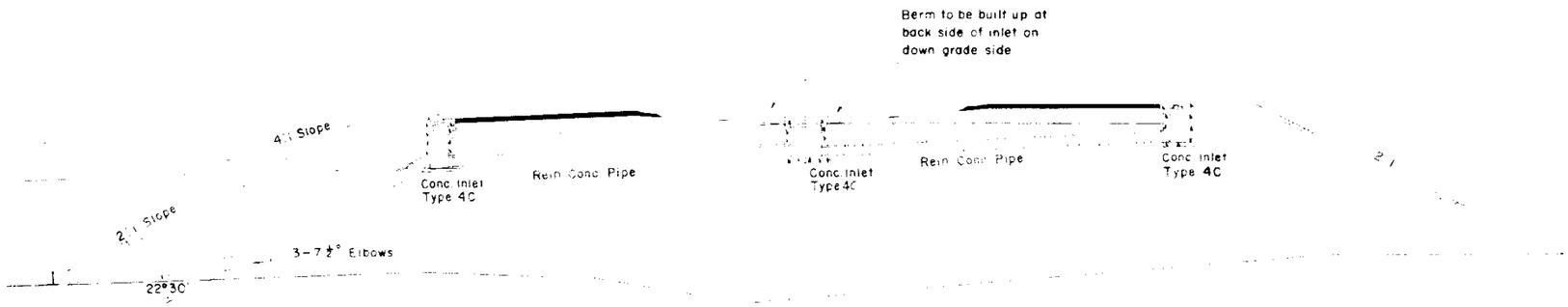
COLORADO
DEPARTMENT OF HIGHWAYS
STANDARD INLET Nº 3
Nº13 INLET GRATING & FRAME
INLETS Nº 4B & 4C
Nº 4 INLET GRATING & FRAME

Designed by:	Approved by:
Made by:	
Checked by:	Date:

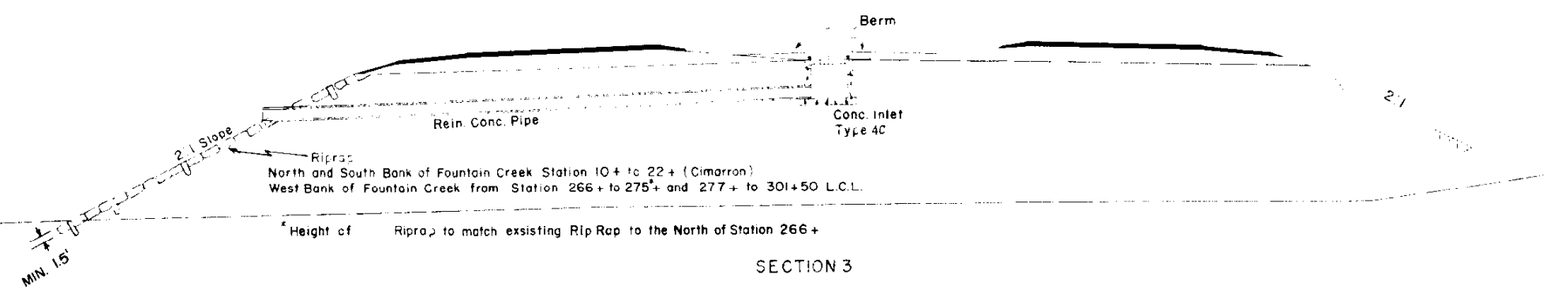
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)	17	



SECTION 1



SECTION 2

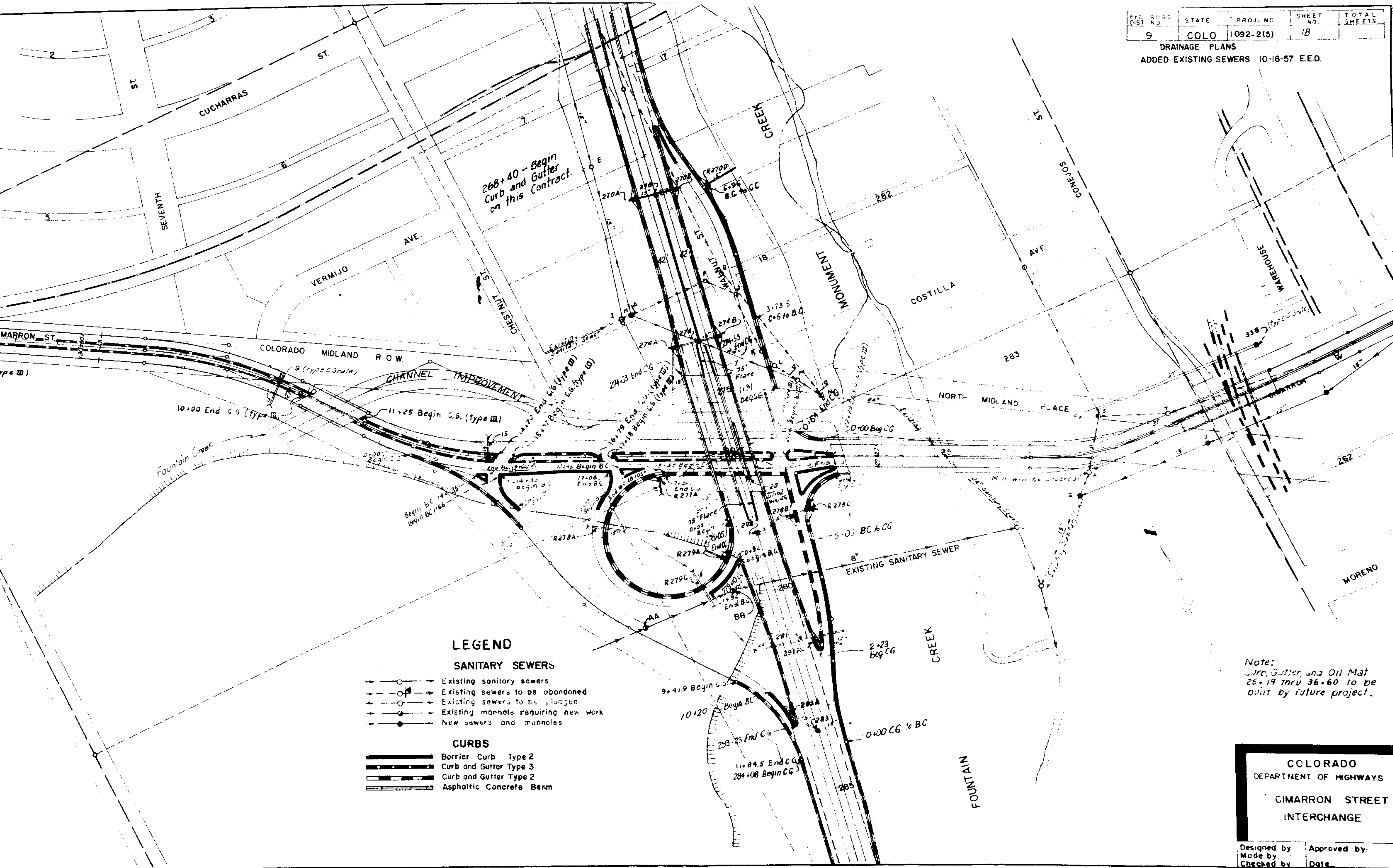


SECTION 3

COLORADO
DEPARTMENT OF HIGHWAYS

TYPICAL LAYOUT
OF DRAINAGE

Designed by: Made by: Checked by:	Approved by: Date:



FED. ROAD DIST. NO. 9
STATE COLO
PROJ. NO 1092-2(5)
SHEET NO. 18
TOTAL SHEETS
DRAINAGE PLANS
ADDED EXISTING SEWERS 10-18-57 E.E.O.
CUCHARRAS ST.
SEVENTH ST.
VERMIJO AVE.
CHESTNUT ST.
268+40 - Begin Curb and Gutter on this Contract.
CIMARRON ST.
COLORADO MIDLAND R.O.W.
CHANNEL IMPROVEMENT
Fountain Creek
WALNUT ST.
MONUMENT CREEK
COSTILLA AVE.
CONEJOS ST.
WAREHOUSE
NORTH MIDLAND PLACE
CIMARRON
MORENO
8" EXISTING SANITARY SEWER
FOUNTAIN CREEK
LEGEND
SANITARY SEWERS
Existing sanitary sewers
Existing sewers to be abandoned
Existing sewers to be plugged
Existing manhole requiring new work
New sewers and manholes
CURBS
Barrier Curb Type 2
Curb and Gutter Type 3
Curb and Gutter Type 2
Asphaltic Concrete Berm
Note: Curb, Gutter, and Oil Mat 25+19 thru 36+60 to be built by future project.
COLORADO DEPARTMENT OF HIGHWAYS
CIMARRON STREET INTERCHANGE
Designed by
Made by
Checked by
Approved by:
Date:

FED. ROAD DIV. NO.	DIST.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092 - 2(5)	19	

DRAINAGE PLANS
ADDED EXISTING SEWERS
10-18-57 E.E.O.

LEGEND
CURBS

- Barrier Curb Type 2
- Curb and Gutter Type 3
- Curb and Gutter Type 2
- Asphaltic Concrete Berm

LEGEND
SANITARY SEWERS

- Existing sanitary sewer
- Existing sewers to be abandoned
- Existing sewer to be plugged
- Existing manhole requiring new work
- New sewers and manholes

Note:
Curb, Gutter, and Oil Mat
25+19 to 36+60 to be built
by future project.

FED. ROAD DIV. NO.	DIST.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)	20	

DRAINAGE PLANS

COSTILLA ST

NOTE: Structure not included in this Contract.

NEJOS ST

WAREHOUSE

DOCK

(Type S Grate, see)

End Sewer Realignment At Manhole X

ST

CIMARRON

SIERRA MADRE

CASCADE ST

SAHWATCH ST

266 267 262 263 264

Note: Curb, Gutter, and Dik Mat to be built by future project.

MORENO AVE

600' VC

600' VC

30 35 40

LEGEND
SANITARY SEWERS

- Existing sanitary sewer
- Existing sewers to be abandoned
- Existing sewer to be plugged
- Existing manhole requiring new work
- New sewers and manholes

LEGEND
CURBS

- Barrier Curb Type 2
- Curb and Gutter Type 3
- Curb and Gutter Type 2
- Asphaltic Concrete Berm

FED ROAD DIST NO.	STATE	PROJ NO	SHEET NO.	TOTAL SHEETS
9	COLO	1092-2(5)	21	

DRAINAGE PLANS
REV. BEG. STA -11-13-57-E.E.O.

M.L. ℄
Δ = 30°51.5'
Ts = 467.11'
Δc = 15°51.5'
Dc = 5°00'
Lc = 317.17'
Rc = 1146.0'
Ls = 300'
θs = 7°30'
Xc = 299.49'
Yc = 13.07'

M.L. ℄
Δ = 42°19.5'
Ts = 554.60'
Dc = 5°30'
Δc = 25°49.5'
Lc = 469.55'
Rc = 1041.62'
Ls = 300'
θs = 8°15'
Xc = 299.38'
Yc = 14.38'

LEGEND
CURBS
- Barrier Curb Type 2
- Curb and Gutter Type 3
- Curb and Gutter Type 2
- Asphaltic Concrete Berm

LEGEND
SANITARY SEWERS
- Existing sanitary sewer
- Existing sewers to be abandoned
- Existing sewer to be plugged
- Existing manhole requiring new work
- New sewers and manholes

STORM SEWERS
- Existing lines, manholes and inlets
- Existing lines to be plugged
- Existing lines to be plugged and /or inlets to be abandoned
- New lines, manholes and inlets
- Water lines

MONUMENT CREEK
FUTURE CONSTRUCTION
Begin Sewer Realignment at Manhole A
℄ STA. 266+80.7
BEGIN PROJECT
1092-2(5)
Outer Highway
Temporary Connection to Colorado Ave
PINE ST
SPRUCE ST
PIKES PEAK AVE
COLORADO AVE
WALNUT ST
CUCHARRAS AVE
VERMIJO AVE
RANGE 66 WEST
RANGE 67 WEST

FUTURE CONSTRUCTION
TEMPORARY CONNECTION TO COLORADO AVE

240 245 250 255 260 265 270
5990 80 70 60 5950 90 80 70 60 5950

FED. ROAD DIV. NO.	DIST.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092 – 2 (5)	22	

DRAINAGE PLANS
ADDED EASEMENT
7-21-58 E.E.O

(R-1) Added Sewer Line 4-15-71, T.E.F.

FOUNTAIN

CREEK

Z

Sta. 297+00
Double Opening Concrete Box
Culvert Type M-M-A

(R-1) CITY OF COLORADO SPRINGS
24" SEWER LINE.

Permanent Easement

R270D · R270B · R270A · R274A · R274 · R275 · R276 · R277A · R278A · R278B · R278C · R278D · R279A · R279C

6+96 B.C. to C.G. · 3+73.5 C.G. to B.C. · 0+00 Begin C.G. · 6+90.6 End C.G. · 5+00 B.C. to C.G. · 6+62.5 End C.G. · 274+63 End C.G. · 277+62 Begin C.G. · 277+40 Begin C.G. · 274+38 End C.G. · 18+50 Begin C.G. · 7+46 End C.G. · 279+10 Begin C.G. · 11+92 End B.C. · 10+20 Begin C.G. · 9+41.9 Begin C.G. · 284+00 = 0+00 C.G. to B.C. · 281+70 End C.G. · 283+93 End C.G. · 284+08.3 Begin C.G. · 11+84.5 End C.G. · 287+75 End C.G. · 293+25 End C.G. · 293A · 288B · 288A · 288 · 283A · 283 · 281B · 281 · 3+19.4 End C.G. · 2+66 End B.C. · 6+32 Begin B.C.

Sta. 288+75 Begin Asph. Conc. Berm

LEGEND
SANITARY SEWERS
- Existing Sanitary Sewers
- Existing Sewers to be abandoned
- Existing Sewer to be plugged
- Existing Manhole requiring new work
- New Sewers and Manholes

LEGEND
CURBS
- Barrier Curb Type 2
- Curb and Gutter Type3
- Curb and Gutter Type2
- Asphaltic Concrete Berm

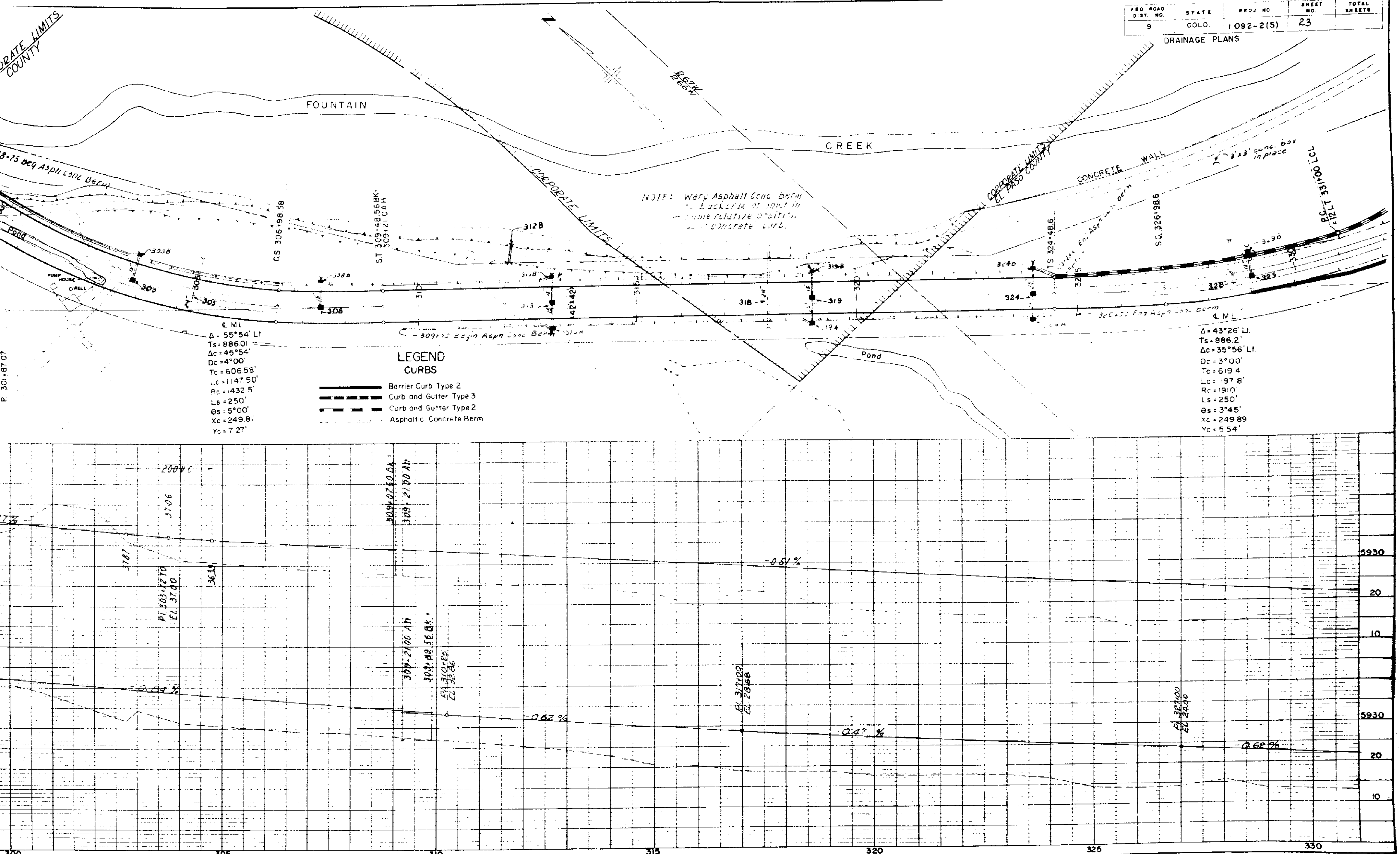
6.00% · 5.92% · 2.00% · 400 VC · 300 VC · 0.87% · 2.00% · 0.51% · 0.84% · 400 VC · 300 VC · 100 VC · Fl. 2911 · Fl. 3020

5950 · 40 · 30 · 5950 · 40

270 · 275 · 280 · 285 · 290 · 295 · 300

FED ROAD DIST. NO.	STATE	PROJ NO.	SHEET NO.	TOTAL SHEETS
9	COLO	I 092-2(5)	23	

DRAINAGE PLANS



CORPORATE LIMITS
COUNTY
FOUNTAIN
CREEK
CORPORATE LIMITS
CORPORATE LIMITS
EL PASO COUNTY
CONCRETE WALL
3'x3' conc. box in place
P.C. 331+00 LCL
12 LT
R67W
R66W
NOTE: Warp Asphalt Conc. Berm to backside of inlet in same relative position as concrete curb.
Pond
Pond
PUMP HOUSE
WELL
C.S. 306+98.58
ST 309+48.56 BK = 309+21.00 AH
TS 324+48.6
S.C. 326+98.6
PI 301+87.07
42x42
-309+75 Begin Asph. Conc. Berm
325+00 End Asph. Conc. Berm
303B
303
305
308B
308
312B
313B
313
318
319
324
324B
328
329
329B
℄ M.L.
Δ = 55°54' Lt
Ts = 886.01'
Δc = 45°54'
Dc = 4°00'
Tc = 606.58'
Lc = 1147.50'
Rc = 1432.5'
Ls = 250'
θs = 5°00'
Xc = 249.81'
Yc = 7.27'
℄ M.L.
Δ = 43°26' Lt
Ts = 886.2'
Δc = 35°56' Lt
Dc = 3°00'
Tc = 619.4'
Lc = 1197.8'
Rc = 1910'
Ls = 250'
θs = 3°45'
Xc = 249.89
Yc = 5.54'
LEGEND
CURBS
Barrier Curb Type 2
Curb and Gutter Type 3
Curb and Gutter Type 2
Asphaltic Concrete Berm
200' VC
37.06
37.87
PI 303+12.10
EL 37.80
36.39
309+27.60 BK
309+21.00 AH
-0.61%
5930
20
10
309+21.00 AH
309+48.56 BK
PI 310+45
EL 32.86
-0.84%
-0.62%
PI 317+00
EL 28.68
-0.47%
PI 327+00
EL 24.00
-0.62%
5930
20
10
300
305
310
315
320
325
330

REVISED RAMPS 4-22-58 E.E.O

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COL.O.	1092-2(5)	24	

DRAINAGE PLANS

FOUNTAIN CREEK

N

Existing 30" Conc. Pipe

To Be Left In Place

Cheyenne Cr.

Suburban Water Co. Main

ARVADA ST.

E. SO. TEJON ST.

E. SO. NEVADA ST.

Sta 351+23.7 Begin Asph. Conc. Berm

LEGEND

CURBS

- Barrier Curb Type 2
- Curb and Gutter Type 3
- Curb and Gutter Type 2
- Asphaltic Concrete Berm

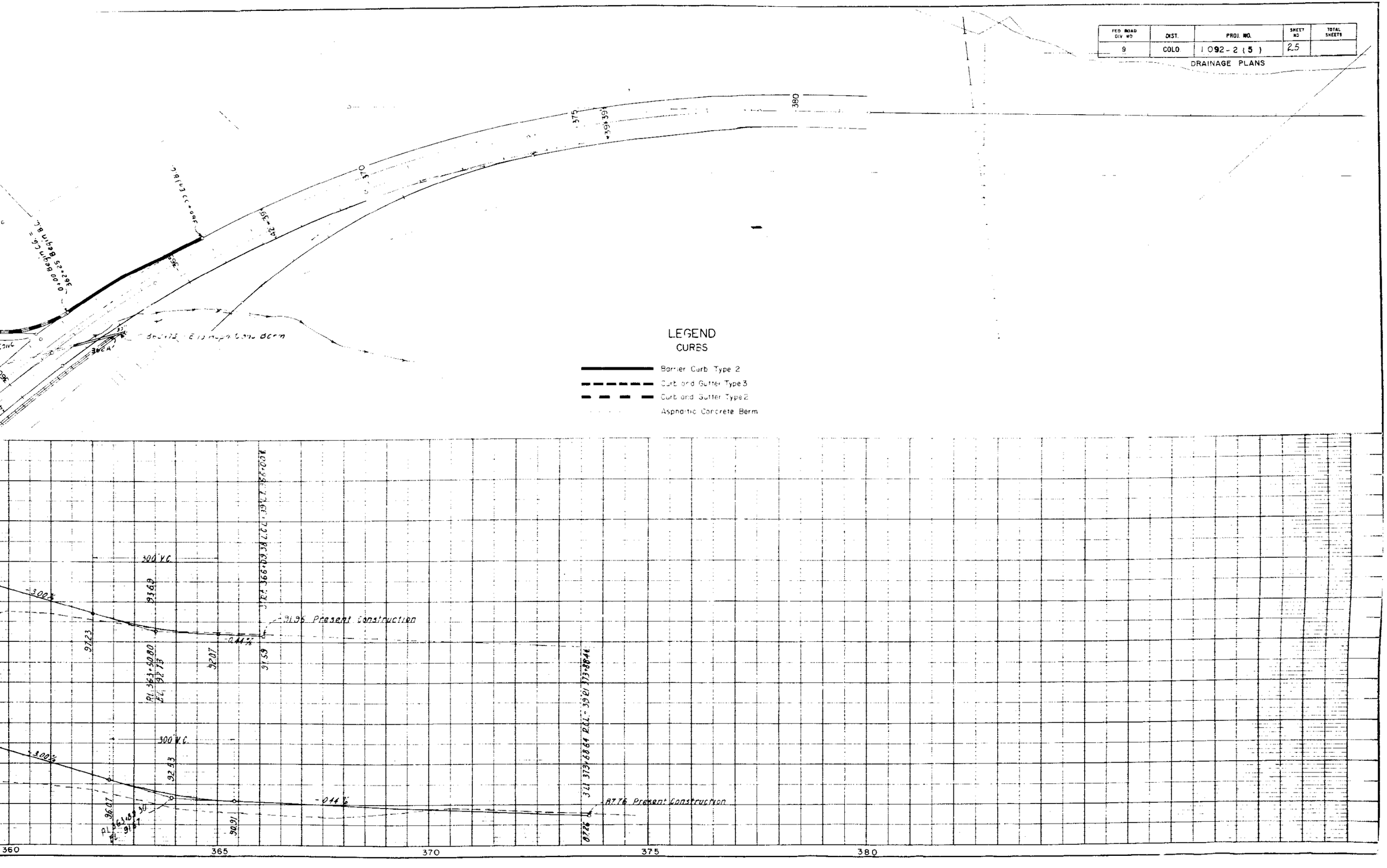
FED. ROAD DIV. NO.	DIST.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	1092-2(5)	25	

DRAINAGE PLANS

LEGEND

CURBS

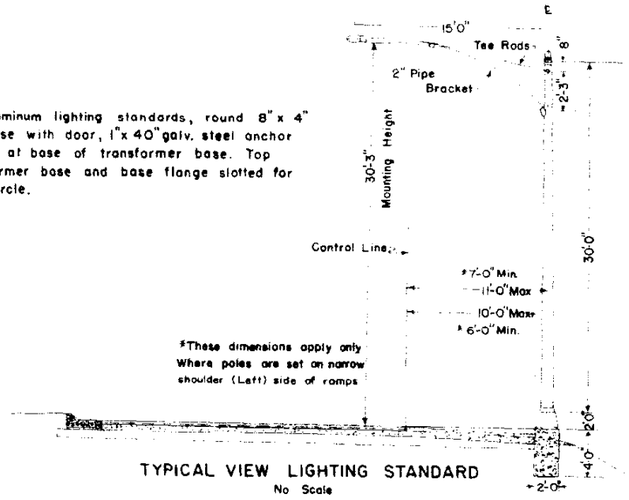
- Barrier Curb Type 2
- Curb and Gutter Type 3
- Curb and Gutter Type 2
- Asphaltic Concrete Berm



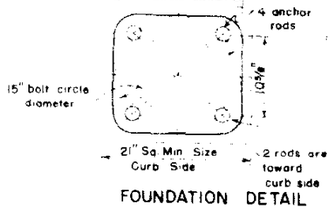
FED ROAD DIV NO	STATE	PROJ NO	SHEET NO	TOTAL SHEETS
9	COLO	I 092-2(5)	26	

REVISED LIGHTING SUMMARY 4-22-58 E.E.O.

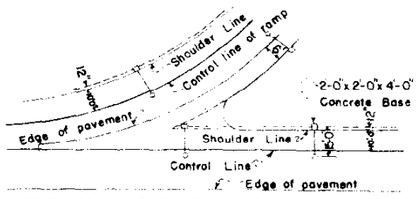
All extruded aluminum lighting standards, round 8" x 4" , transformer base with door, 1"x 40"galv. steel anchor , 15" bolt circle at base of transformer base. Top circle at transformer base and base flange slotted for liameter bolt circle.



TYPICAL VIEW LIGHTING STANDARD
No Scale



FOUNDATION DETAIL



TYPICAL LIGHTING LAYOUT
Spacing varies as shown on Plan Sheets

LEGEND ON PLAN SHEETS			
●	15,000	L	Merc. Vapor
◑	4,000	L	Incandesent

SUMMARY OF LIGHTING REQUIREMENTS *
PROJECT I 092-2(5)

SHEET NUMBER	15,000 L MERC. VAP.	4,000 L INCAND.	30' POLES
28	7	0	7
29	6	0	6
30	56	8	56
31	21	[illegible]	21
32	66	[illegible]	66
33	14	[illegible]	14
TOTAL	170	24	170

* To be done by others

FENCING REQUIREMENTS
PROJECT

LEGEND

Chain Link Wire Mesh (School Fence) ——//——//——
Combination Wire Fence (Barrier) ——x——x——
Metal Plate Guard Fence

Note: Chain link wire mesh fence to be used near Right of Way lines as shown on plans See Std. M-26-C
Barrier fence with Metal Posts, to be used in median, See Sheet No 86

SUMMARY OF FENCING
PROJECT I 092-2(5)

SHEET NO.	CHAIN LINK WIRE FENCE	COMBINATION WIRE FENCE (BARRIER)	REM. & REB. GUARD FENCE	METAL PLATE GUARD FENCE
29	2,280	—	—	—
30	375	250	—	600
31	2,210	2,550	—	1,225
32	3,000	3,000	—	—
33	2,600	2,200	120	650
34	—	1500	—	—
Sub Total	10,465	9,500	120	2,475
PROJECT				
29	1,620	—	—	—
Sub Total	1,620	—	—	—
COMB. TOTAL	12,085	9,500	120	2,475

TIMBER GUARD POSTS

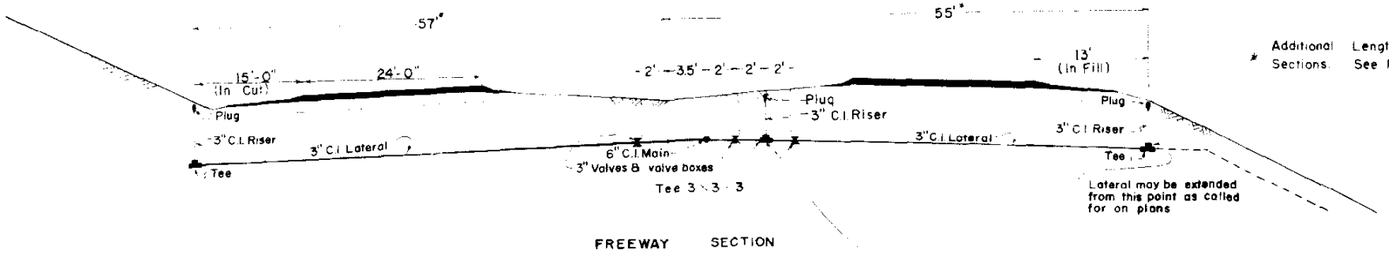
An estimated 370 timber guards posts will be required on this project. Locations will be staked by the engineer at time of construction

COLORADO
DEPARTMENT OF HIGHWAYS
DETAILS OF
LIGHTING & FENCING

Designed by
Made by
Checked by

Approved by
Date

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)	27	*



FREEWAY SECTION

* Additional Length for widened Sections. See Plans

One median 3" C.I. Riser with 3" valve and Valve Box to alternate from right to left of roadway centerline per 3" lateral

Note: No sprinklers to be installed beyond No. 7.

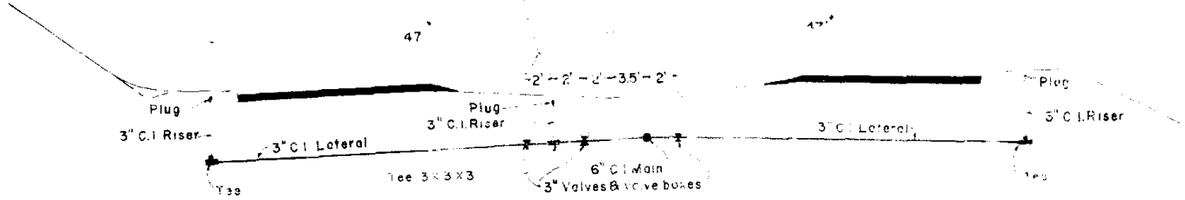
SUMMARY OF MAINS AND PRIMARY LATERALS

PROJECT I 092-2(5)

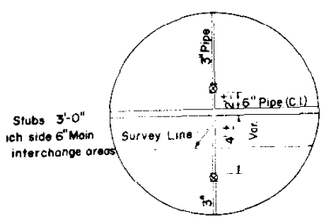
SHEET NUMBER	6" C.I. MAIN	3" C.I. LATERAL	3" C.I. RISER	3" GATE VALVE	6" GATE VALVE	MANUAL DRAIN	6" METER BOX COMP.
30	170	108	9	2	1	2	1
31	2,060	1,065	72	13	0	12	1
~~32~~	~~3,000~~	~~1,100~~	~~90~~	~~30~~	~~0~~	~~20~~	
~~33~~	~~3,700~~	~~2,240~~	~~129~~	~~30~~	~~1~~	~~20~~	
TOTAL	2,230	1,171	81	21	1 *	14	@ 2

* 6" GATE VALVE to be installed on 6" cast iron main for testing purposes as shown on plans or as directed by Engineer at time of construction.

@ *Force Account*

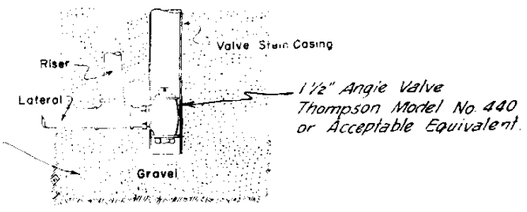


FREEWAY SECTION (With curbs)

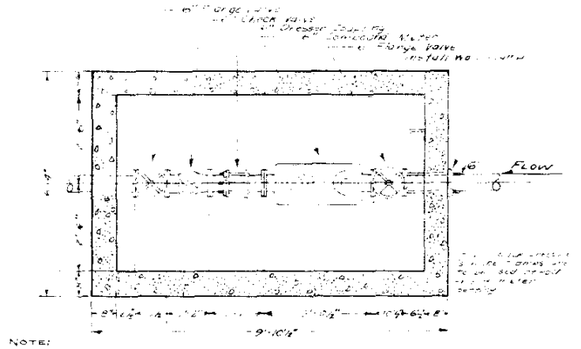


DETAIL A
TYPICAL PIPE DETAIL OF LATERALS

NOTE: Cost of furnishing and placing Gravel backfill around drain valve shall be included in the original contract unit price for item 113x6 Cast iron water pipe



DETAIL B
DRAIN VALVE AT RISER



NOTE:
Pit of vault to be properly reinforced, and not less than 10" thick if vault is in street.

ELEVATION

NOTE:
If street is not to official grade at time of installation of meter, owner must raise or lower meter pit when street is graded.

All settings must be inspected by Meter Dept's before backfilling.

Location of meter to be established by Meter Dept's.

STANDARD SETTING
FOR 6" METER

COLORADO
DEPARTMENT OF HIGHWAYS
DETAILS OF
SPRINKLER MAINS
AND LATERALS

Designed by:	Approved by:
Made by:	
Checked by:	Date

DIST NO	STATE	PROJ NO	SHEET NO	TOTAL SHEETS
9	COLO	1092-2(5)	28	

FENCING, LIGHTING, AND SPRINKLER LATERALS

SEVENTH ST.
CUCHARRAS ST.
VERMIJO AVE
CHESTNUT ST
COLORADO MIDLAND R.O.W.
CHANNEL IMPROVEMENT
MONUMENT CREEK
NORTH MIDLAND PLACE
CONEJOS AVE
WAREHOUSE
MORENO
FOUNTAIN CREEK
6" Meter Box & Comp.
Duplicate sheet 29
Duplicate sheet 30
Chain Link Fence
Guard Fence
Median Fence listed sheet 30

LEGEND

●	15,000L Merc. Vapor	7
⊘	4,000L Incandescent	0

FENCING	SHEET TOTAL
Type of Fence	Lin. Ft.
Proj. 1 092-2(5) Chain Link Wire Mesh	2,280
NON-FEDERAL AID Chain Link Wire Mesh	1,620

Metal Plate Guard Fence (Flexbeam) See Sheet 29,30

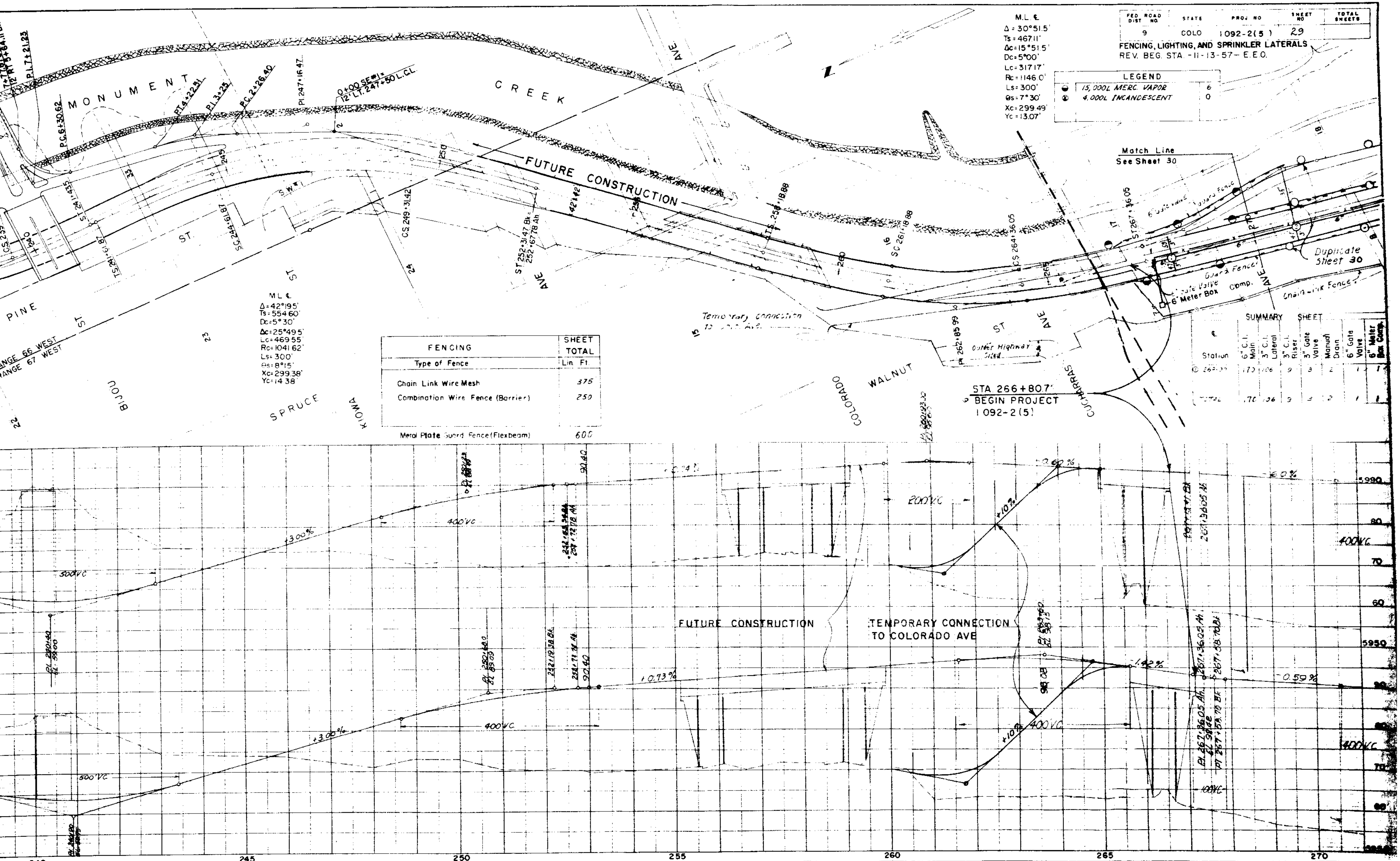
COLORADO
DEPARTMENT OF HIGHWAYS

CIMARRON STREET
INTERCHANGE

Designed by	Approved by
Made by	
Checked by	Date

FED ROAD DIST NO.	STATE	PROJ NO	SHEET NO	TOTAL SHEETS
9	COLO	1092-2(5)	29	

FENCING, LIGHTING, AND SPRINKLER LATERALS
REV. BEG. STA. -11-13-57- E.E.O.



M.L. ℄
Δ = 30°51.5'
Ts = 467.11'
Δc = 15°51.5'
Dc = 5°00'
Lc = 317.17'
Rc = 1146.0'
Ls = 300'
θs = 7°30'
Xc = 299.49'
Yc = 13.07'
M.L. ℄
Δ = 42°19.5'
Ts = 554.60'
Dc = 5°30'
Δc = 25°49.5'
Lc = 469.55'
Rc = 1041.62'
Ls = 300'
θs = 8°15'
Xc = 299.38'
Yc = 14.38'
MONUMENT
CREEK
FUTURE CONSTRUCTION
PINE ST
BIJOU ST
SPRUCE
KIOWA
COLORADO AVE
WALNUT ST
CUCHARRAS AVE
RANGE 66 WEST
RANGE 67 WEST
Match Line
See Sheet 30
Duplicate Sheet 30
Guard Fence
Chain-Link Fence
6" Meter Box Comp.
6" Gate Valve
Temporary connection to Colorado Ave.
STA 266+80.7'
BEGIN PROJECT
I 092-2(5)
FUTURE CONSTRUCTION
TEMPORARY CONNECTION TO COLORADO AVE
+3.00%
+0.93%
+10%
-1.42%
-0.59%
400'VC
500'VC
200'VC
5990
5950
240
245
250
255
260
265
270

LEGEND		
◒	15,000L MERC. VAPOR	6
⊗	4,000L INCANDESCENT	0

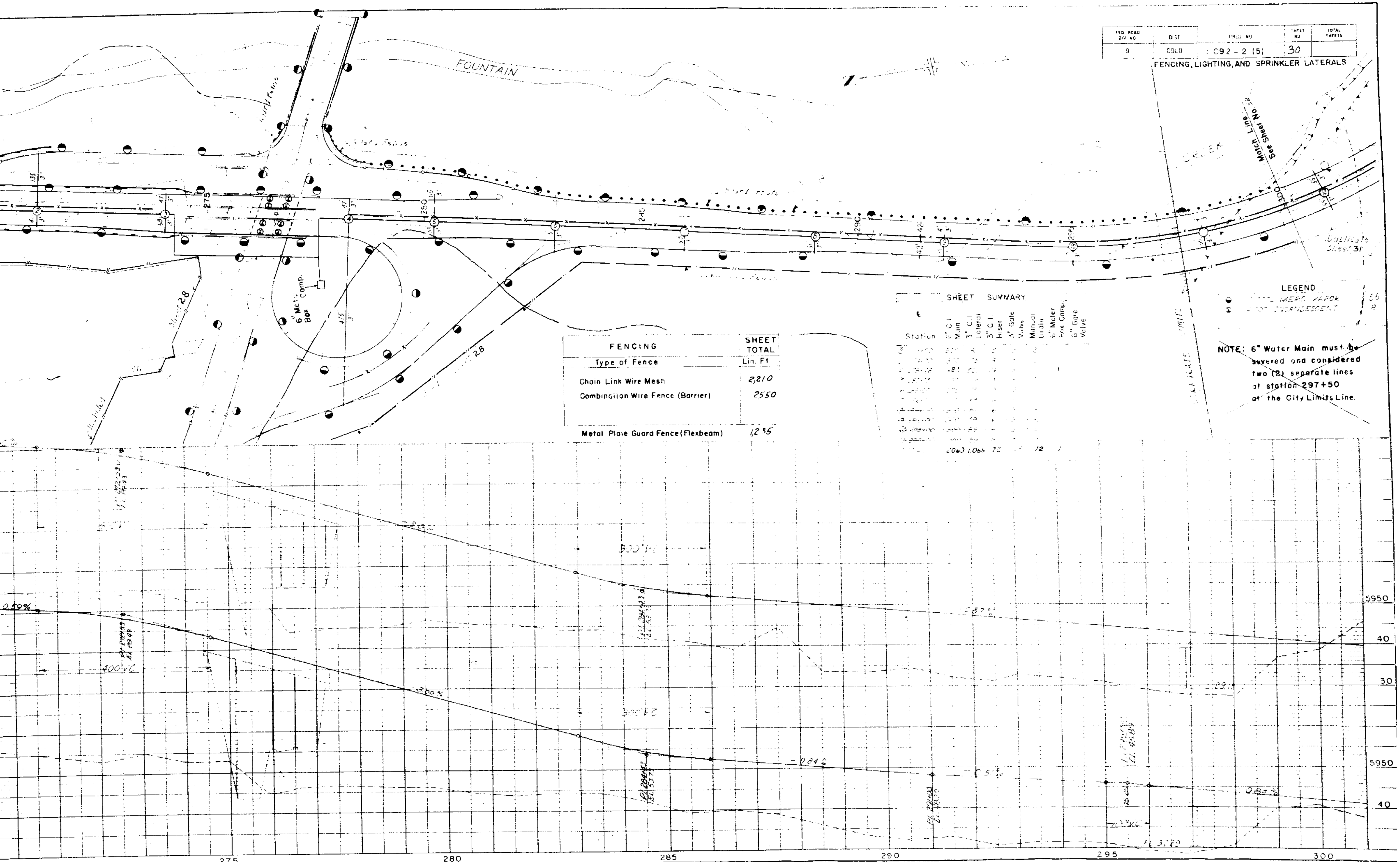
FENCING	SHEET TOTAL
Type of Fence	Lin. Ft.
Chain Link Wire Mesh	375
Combination Wire Fence (Barrier)	250
Metal Plate Guard Fence (Flexbeam)	600

SUMMARY SHEET

℄ Station	6" C.I. Main	3" C.I. Lateral	3" C.I. Riser	3" Gate Valve	Manual Drain	6" Gate Valve	6" Meter Box Comp.
℄ [illegible]	170	106	9	3	2	1	1
TOTAL	170	106	9	3	2	1	1

FED ROAD DIV NO	DIST	PROJ NO	SHEET NO	TOTAL SHEETS
9	COLO	092 - 2 (5)	30	

FENCING, LIGHTING, AND SPRINKLER LATERALS

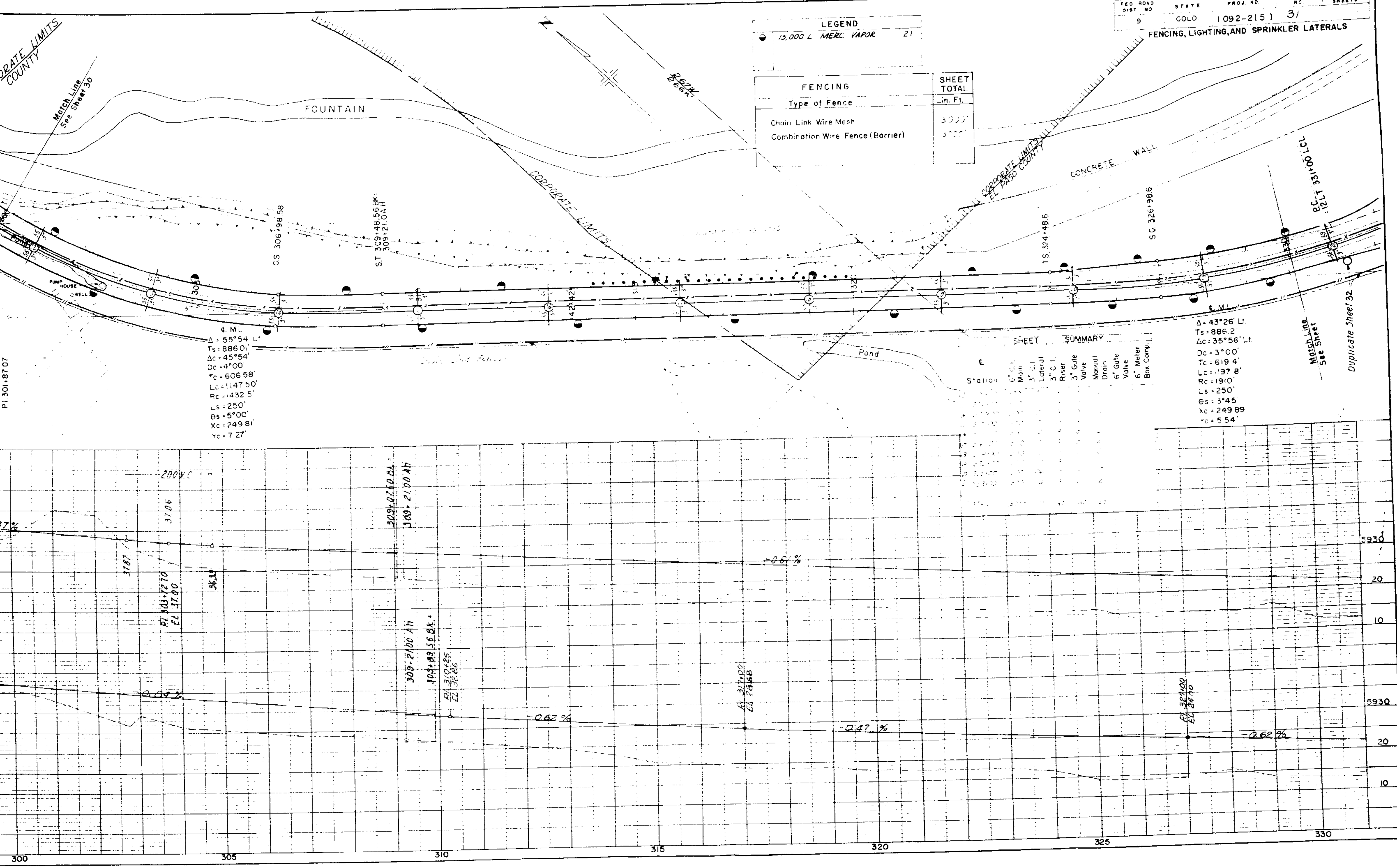


FENCING	SHEET TOTAL
Type of Fence	Lin. Ft
Chain Link Wire Mesh	2,210
Combination Wire Fence (Barrier)	2550
Metal Plate Guard Fence (Flexbeam)	1,235

LEGEND

●	15,000 L. MERC. VAPOR	21

FENCING Type of Fence	SHEET TOTAL Lin. Ft.
Chain Link Wire Mesh	3999'
Combination Wire Fence (Barrier)	3700'



CORPORATE LIMITS
COUNTY
Match Line See Sheet 30
FOUNTAIN
CORPORATE LIMITS
CORPORATE LIMITS EL PASO COUNTY
CONCRETE WALL
CS 306+98.58
S.T. 309+48.56 BK. 309+21.0 AH
TS 324+48.6
S.C. 326+98.6
P.C. 12 LT 331+00 LCL
PUMP HOUSE
WELL
Pond
P.I. 301+87.07
℄ M.L.
Δ = 55°54' Lt
Ts = 886.01'
Δc = 45°54'
Dc = 4°00'
Tc = 606.58'
Lc = 1147.50'
Rc = 1432.5'
Ls = 250'
θs = 5°00'
Xc = 249.81'
Yc = 7.27'
℄ M.L.
Δ = 43°26' Lt
Ts = 886.2'
Δc = 35°56' Lt
Dc = 3°00'
Tc = 619.4'
Lc = 1197.8'
Rc = 1910'
Ls = 250'
θs = 3°45'
Xc = 249.89
Yc = 5.54'
Match Line See Sheet
Duplicate Sheet 32
SHEET SUMMARY
℄ Station
6" C.I. Main
3" C.I. Lateral
3" C.I. Riser
3" Gate Valve
Manual Drain
6" Gate Valve
6" Meter Box Comp.
200' V.C.
37.06
3.87
36.39
P.I. 303+12.70 EL 37.00
309+07.60 Bk.
309+21.00 Ah
-0.61%
309+21.00 Ah
309+48.56 Bk.
P.I. 310+25 EL 32.86
-0.84%
-0.62%
P.I. 317+00 EL 28.68
-0.47%
P.I. 327+00 EL 24.00
-0.62%
5930
20
10
5930
20
10
300
305
310
315
320
325
330

REVISED RAMPS 4-22-58 E.E.O.

FED ROAD DIST NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	1092-2(5)	32	

FENCING, LIGHTING, AND SPRINKLER LATERALS

FENCING	SHEET TOTAL
Type of Fence	Lin. Ft.
Chain Link Wire Mesh	2600
Combination Wire Fence (Barrier)	2200
Metal Plate Guard Fence (Flexbeam)	530
Remove & Rebuild Guard Fence	120

FOUNTAIN CREEK

Duplicate Sheet 31

6" Gate Valve

Guard Fence

Remove and Reset 120' Metal Plate Guard Fence (Flexbeam)

Guard Fence

Chain Link Fence

Chain Link Fence

ARVADA ST.

℄ SO. TEJON ST.

℄ SO. NEVADA ST.

Duplicate Sheet 33

Match Line See Sheet No. 33

SHEET SUMMARY

℄ Station	6" C.I. Main	3" C.I. Lateral	3" C.I. Riser	3" Gate Valve	Manual Drain	6" Gate Valve	6" Meter Box Comp.
331+00	300	115	9	3	2	1	
334+00	300	242	15	3	2		
337+00	300	434	21	3	2		
340+00	300	675	24	3	2		
343+00	300	102	9	3	2		
346+00	300	94	9	3	2		
352+00	300	07	3	3	2		
355+00	300	269	15	3	2		
358+00	300	102	9	3	2		
361+00	300	08	3	3	2		
TOTAL	3300	2248	129	33	23	1	

LEGEND

	15,000 L MERC. VAPOR	66
	4,000 L INCANDESCENT	16

N

400 V.C.

-0.61%

+3.00%

600 V.C.

-0.97%

400 V.C.

-0.62%

+3.00%

600 V.C.

-0.97%

300 V.C.

-3.00%

300 V.C.

-3.00%

5920

10

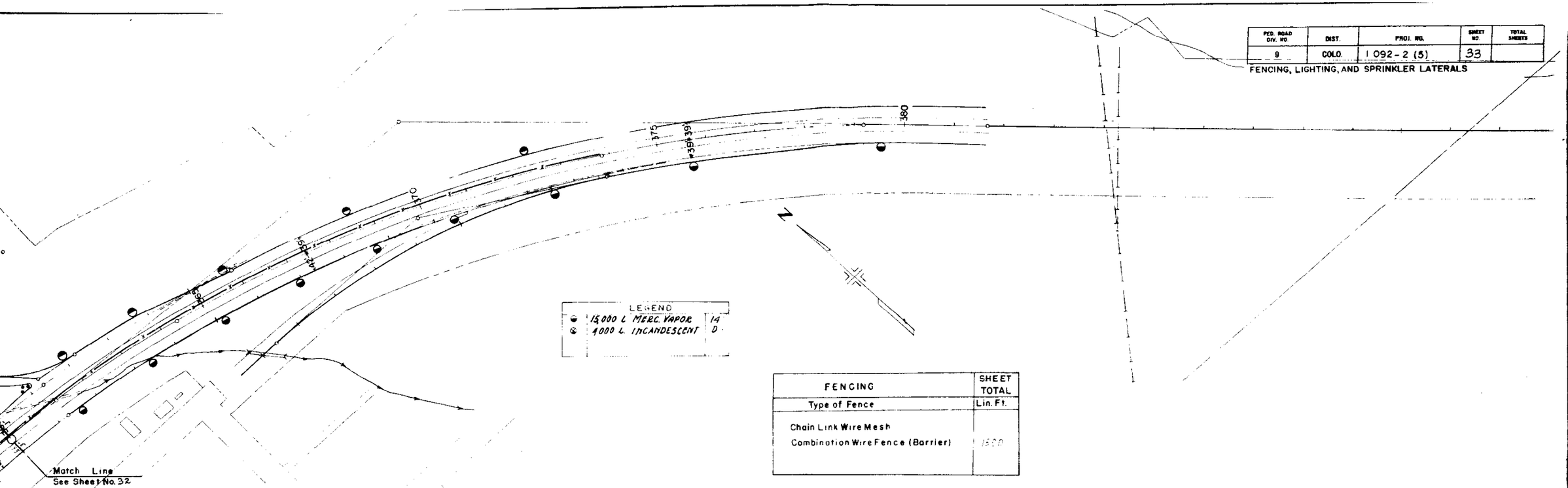
00

5890

330 335 340 345 350 355 360

FED. ROAD DIV. NO.	DIST.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	1092-2(5)	33	

FENCING, LIGHTING, AND SPRINKLER LATERALS



FENCING	SHEET TOTAL
Type of Fence	Lin. Ft.
Chain Link Wire Mesh Combination Wire Fence (Barrier)	1500

DATA REQUIRED TO ACCOMPANY SITUATION PLAN.

GENERAL REMARKS.

Fill out all blanks with care, giving information on all points listed, and supplementary remarks on features not listed. High water and foundation conditions are especially important and should be thoroughly investigated.

PROFILE.

Plot profile of centerline of roadway. Use natural scale, preferably 1″=10′, or multiple of 10′.

At proper locations show section of test pits, noting material encountered, if available at time of survey.

Show present, and if possible, proposed finished grade noting elevations and gradients.

. MAP.

Show present and proposed alignment of bridge and all approaches, as far as affected. Extend Cross sections at least 100-ft. each side of C. L., giving location and elevation of points so that at least 2-foot contours may be accurately plotted. Show edge of water, islands, shoals, other obstructions, and direction of current at high water and at low water. Plot location of test pits, position and pointing of camera for each photo, all buildings, fences, and other features affected. Establish bench marks and give location of same. Reference C. L. and show North point. Give a C. L.-profile of stream-bed for 500 feet up-stream and 500 feet down-stream from center line of survey. Plot proposed structure in soft pencil only. Do not ink.

. REPORT OF EXAMINATION OF BRIDGE-SITE.

Div.________ County________ Route______ Sec.______ Sta.______

Date of survey________ To be built by________

1. Bridge Site________
   Location________
   Sec.____ Twp.____ Range____ Local name________
   Over________ River Creek____
   Distance from nearest shipping point________
2. Source of materials________
   Sand________ Length of haul to site________ miles____
   Gravel________ " " " " "________ "____
   Stone________ " " " " "________ "____
   Falsework Timber________ " " " " "________ "____
   Piling________ " " " " "________ "____
3. Cost Data.—
   Cost of following materials at site________
   Portland Cement________ Per Bbl.
   Sand, coarse and clean________ " Cu. Yd.
   Gravel________ " " "
   Stone________ " " "
   Falsework Timber________ " Ft. B. M.
   Piling________ " Lin. Ft.
   Cost per ton-mile for hauling________
4. Waterway.—
   Drainage area in Sq. Miles (approximate)________
   Character of watershed________
   Elevation of Highest water________ Date________
   Source of information on water elevation________
   Elevation of ordinary high water________
   Elevation of low water________
   Elevation of permanent ground-water________
   Is stream ever dry?________ During what months?________
   Will all flood water pass through recommended structure?________
   Can channel be cleaned to afford more waterway?________
   Is stream-bed cutting or silting up?________
   Is stream stable in its banks?________ Depth of scour?________
   Does stream carry light, medium, or heavy drift?________
   What clearance above high water should be allowed?________
   Is channel change necessary?________
   If channel change is necessary, illustrate location on sketch map.
5. Foundation Data.—
   Character of material________
   Distance from stream-bed to solid foundation________
   Recommended depth of footings________
   Should piles be used?________ What length?________ Pile Shoes?________
6. Old Bridge.—
   If there is no bridge at the present location include here data on nearest bridge over same stream. If possible show location of such bridge or bridges on the map. Photographs if available.
   Type________ Roadway Width________ Number and length of spans________
   Area of waterway provided under old structure________ Sq. Ft., Elev. of Underclearance________
   Has this area proved sufficient at flood times?________ Skew Angle________
   Is it too large?________ Disposition of Existing Structure________
7. Give foundation data on bridges in vicinity. When possible, get pile driving data, logs of borings, etc., for adjoining structures, and where considered advantageous procure plans.
   Sketch profile of Rail Road Crossing if within 1000 ft. of Highway. (Show X-section of entire waterway.)
   Elevation of base of Rail________ Elevation of Rail Road Underclearance________
   Remarks________
8. Recommendations for New Structure.—
   Type________ Width curb to curb________ Number and length of spans________
   What is the least clear span permissible?________
   Are sidewalks desired?________ Lighting conduit?________ Light standards?________
   Angle of Skew recommended________
   Will approaches be desired, or will same be filled?________
   Approximate cost per Cu. Yd. of approach-filling at bridge site?________
   Is it necessary to maintain traffic alongside old structure?________
   If so, how shall it be done?________
   R. R. Siding________ Haul to Bridge Site________ Mi.
   Remarks________

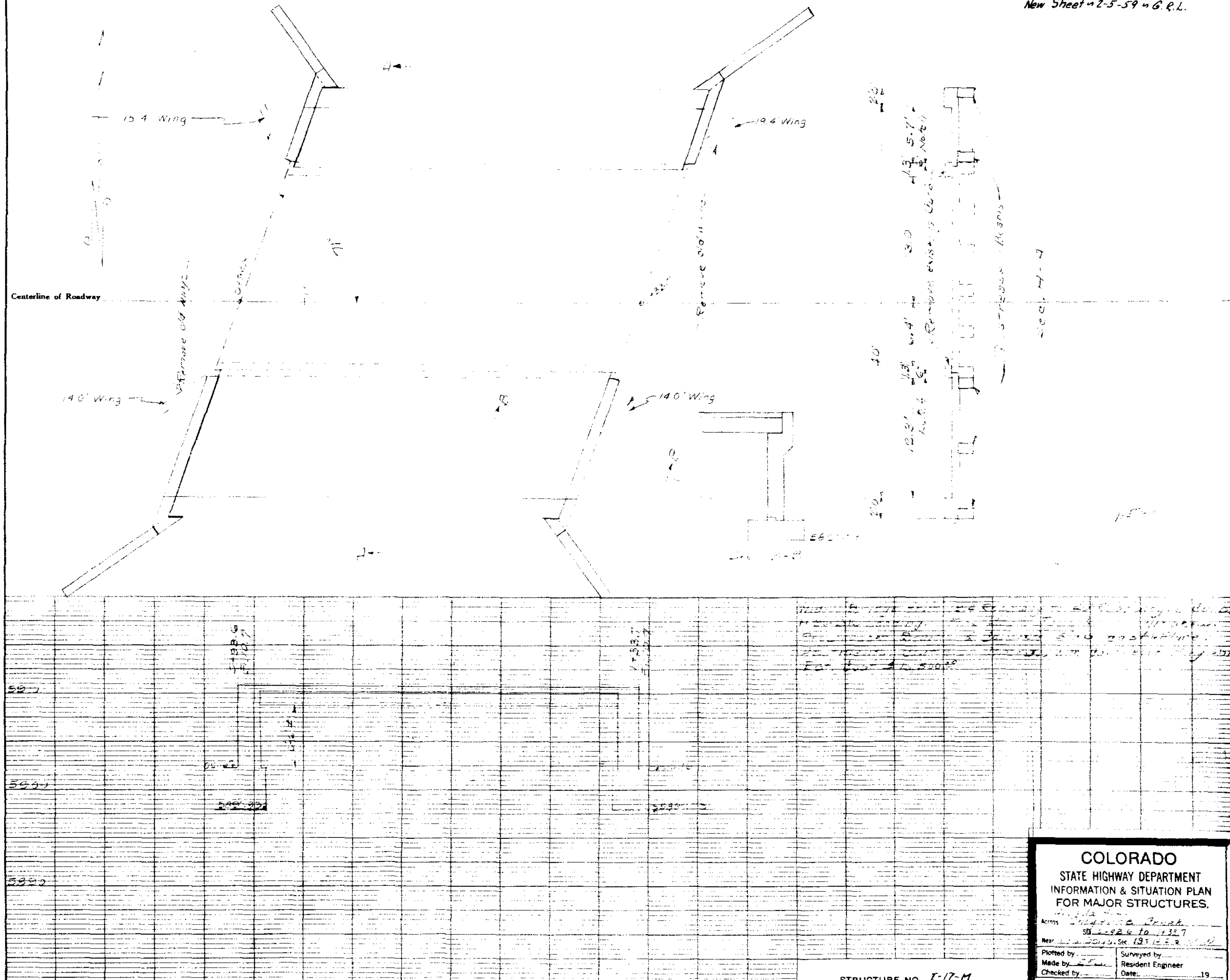
Submitted by________
Engineer.

NOTE.—When bridge is recommended to be left in place, complete structural details shall be procured from the bridge itself or from existing plans of the structure. When possible these plans shall be forwarded with the plans of the project.

WORK ORDER NO. 14123

FED. ROAD REG. NO.	STATE	PROJ. No.	SHEET NO.	TOTAL SHEETS
3	COLO.	I 092-2(5)	33A	

New Sheet ~ 2-5-59 ~ G. R. L.



STRUCTURE NO. I-17-M

COLORADO
STATE HIGHWAY DEPARTMENT
INFORMATION & SITUATION PLAN
FOR MAJOR STRUCTURES.

Across ________
SG ________
Near ________ Sec. 19 T ____ R ____

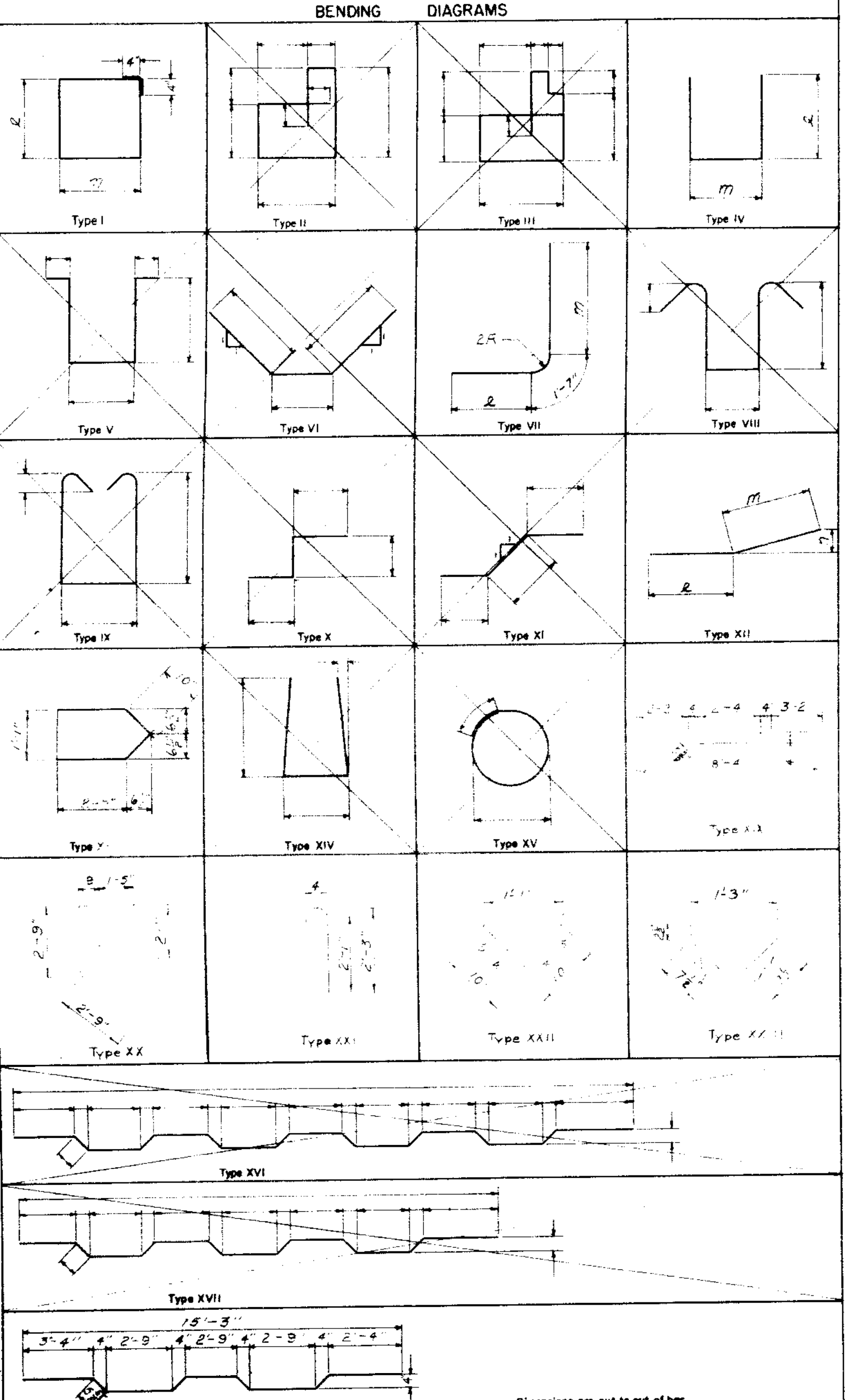
Plotted by________
Made by________
Checked by________

Surveyed by________
Resident Engineer
Date________ 19

FED. ROAD REG. NO	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I-092-2(5)	33B	

New Sheet – 2-5-59 – G.R.L.

BENDING DIAGRAMS



Dimensions are out to out of bar.

BAR LIST SUPERSTRUCTURE

MARK	SIZE	No Req'd	Length	Type	Dimensions l	Dimensions m
401	½" Ø	44	39'-8"	Str		
402		28	3'-10"	I	6"	1'-1"
403		82	3'-8"	IV	1'-0"	1'-8"
404	½" Ø	30	5'-0"	I	5"	1'-9"
501	⅝" Ø	64	15'-3"	Str		
502		64	8'-4"	Str		
503		32	15'-9½"	XVIII		
504	⅝" Ø	32	8'-7¼"	XIX		

BAR SUMMARY

2303 Lin Ft ½ Ø @ 0.668#/Lin Ft = 1538 Lb
2290 Lin Ft ⅝" Ø @ 1.043#/Lin Ft = 2388 Lb
Plus 1% ± for Overrun = 39 Lb
Total = 3965 Lb

BAR LIST ABUTMENT No 1
(North East Corner)

MARK	SIZE	No Req'd	Length	Type	Dimensions l	Dimensions m	Dimensions n
406	½ Ø	18	14'-0"	Str			
407	½" Ø	14	9'-9"	XX			
408	½" Ø	7	15'-8"	XII	13'-8"	2'-[illegible]	1'-2"
510	⅝ Ø	20	3'-8	Str			
601	¾ Ø	31	12'-3"	VI	2'-2	8'-6"	

BAR LIST ABUTMENT No 1
[illegible]

MARK	SIZE	No Req'd	Length	Type	Dimensions l	Dimensions m	Dimensions n
407	½ Ø	[illegible]	[illegible]	XX			
4[illegible]	[illegible]	18	[illegible]	[illegible]			
4[illegible]	½ [illegible]	7	[illegible]	X	6'-6"	[illegible]4"	[illegible]
510	⅝ Ø	[illegible]	[illegible]	Str			
601	¾ Ø	[illegible]	[illegible]-3"	III	[illegible]-2"	8'-6"	

BAR SUMMARY ABUTMENT No 1 (ABUT No 2 Sim[illegible])
(Wing Wall Bar Summary Included in Abut No 2 Bar Summary)

1207 Lin Ft ½ Ø @ 0.668#/Lin Ft = 806 Lb
290 Lin Ft ⅝ Ø @ 1.043#/Lin Ft = 302 Lb
749 Lin Ft ¾ Ø @ 1.502#/Lin Ft = 1125 Lb
Plus 1% ± for Overrun = 22 Lb
Total = 2255 Lb

BAR LIST ABUTMENT No 2
([illegible] Corner)

Mark	Size	No Req'd	Length	Type	Dimensions l	Dimensions m	Dimensions n
40[illegible]	½ Ø	[illegible]	14'-[illegible]	Str			
407	½" Ø	[illegible]	9'-[illegible]	XX			
4[illegible]	½" Ø	7	15'-[illegible]	X[illegible]	13'-8"	1'-4"	1'-1"
510	⅝ Ø	[illegible]	3'-8"	Str			
601	¾ Ø	3[illegible]	12'-3"	III	2'-2"	8'-6"	

BAR LIST ABUTMENT No 2
(South West Corner)

Mark	Size	No Req'd	Length	Type	Dimensions l	Dimensions m	Dimensions n
40[illegible]	½ Ø	[illegible]	9'-9"	XX			
4[illegible]	½ Ø	8	[illegible]-0"	Str			
413	[illegible] Ø	[illegible]	8'-6	X	6'-6"	2'-0"	[illegible]-2"
510	⅝ Ø	[illegible]	3'-8"	Str			
601	¾ Ø	17	[illegible]-3"	[illegible]	2'-2"	8'-6"	

BAR LIST FOR WING WALL
(North East or South West Corner)

Mark	Size	No Req'd	Length	Type	Dimensions l	Dimensions m
420	½ Ø	[illegible]	14'-0	[illegible]		
42[illegible]		[illegible]	2'-[illegible]			
422			[illegible]-0			
423			[illegible]-9			
424			4'-6			
425		[illegible]	[illegible]	Str		
427		3	[illegible]	III	[illegible]	[illegible]-6"
428			[illegible]		[illegible]4"	7'-8"
429			10'-[illegible]		[illegible]4	[illegible]
430			[illegible]-2"		[illegible]4"	8'-[illegible]
431	½ Ø		[illegible]-5"	III	[illegible]4"	8'-6"
515	⅝ Ø	4	5'-7"	[illegible]	[illegible]	3'-0"
516			[illegible]-11"		[illegible]-7"	8'-9
517			12'-[illegible]		1'-7"	9'-0"
518		[illegible]	[illegible]-6"		1'-7"	9'-4"
519			[illegible]-9"	[illegible]	1'-7"	9'-7"
520	⅝ Ø	6	3'-[illegible]	Str		
602	¾ Ø	5	6'-1"	III	1'-2"	3'-4"
603 to 607	¾ Ø	1 each	13'-5" b, 3" to 14'-5"	VII	1'-10"	10'-0" b, 3 to [illegible]-0"

BAR LIST FOR WING WALL
(North West or South East Corner)

Mark	Size	No Req'd	Length	Type	Dimensions l	Dimensions m
440	½ Ø	6	10'-0"	Str		
441		7	8'-6"			
442		1	7'-9"			
443			5'-3			
444			2'-9"	Str		
445			4'-10"	VII	0-9"	2'-6"
446		1	[illegible]-8"		1'-4"	7'-9"
447		1	10'-11"		1'-4"	8'-0"
448		1	11'-4"	III	1'-4"	8'-5"
449	½ Ø	5	3'-0"	Str		
525	⅝" Ø	4	5'-7"	III	1'-0"	3'-0"
526		1	11'-1"		1'-7"	8'-9"
527		1	12'-4"		1'-7"	9'-2"
528		1	12'-9"		1'-7"	9'-7"
529		1	13'-2"	VII	1'-7"	10'-0"
530	⅝ Ø	4	3'-6"	Str		
610	¾ Ø	3	6'-1"	VII	1'-2"	3'-4"
611		1	13'-9"		1'-10"	10'-4"
612		1	14'-2"		1'-10"	10'-9"
613	¾" Ø	1	14'-7"	III	1'-10"	11'-2"

BAR LIST EACH PRESTRESSED BEAM ▲

Mark	Size	No Req'd	Length	Type	Dimensions l	Dimensions m
455	½ Ø	2	38'-[illegible]	Str		
456	½ Ø	6	6'-[illegible]	XXV		
535	⅝ Ø	3[illegible]	4'-8"	XXI		
536	⅝ Ø	32	2'-[illegible]	XXI		
537	⅝ Ø	32	2'-11"	XX		
538	⅝ Ø	6	6'-3"	I	1'-8½"	[illegible]

BAR SUMMARY ONE PRESTRESSED BEAM

125 Lin Ft ½ Ø @ 0.668#/Lin Ft = 84 Lb
396 Lin Ft ⅝ Ø @ 1.043#/Lin Ft = 413 Lb
Plus 1% ± for Overrun = 3 Lb
Total = 500 Lb

▲ Not Included in Bar Summary or Summary of Quantities

STRUCTURE NO. I-17-M

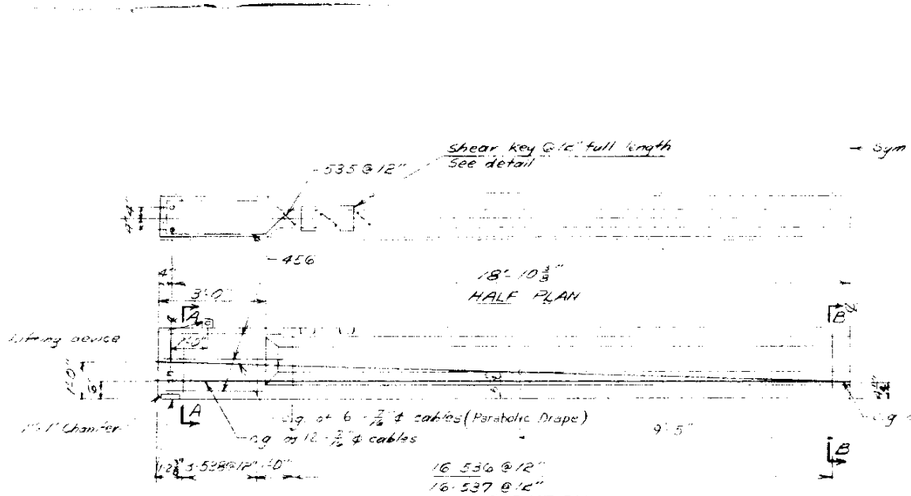
COLORADO
DEPARTMENT OF HIGHWAYS

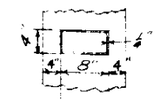
BENDING DIAGRAMS & BAR LIST

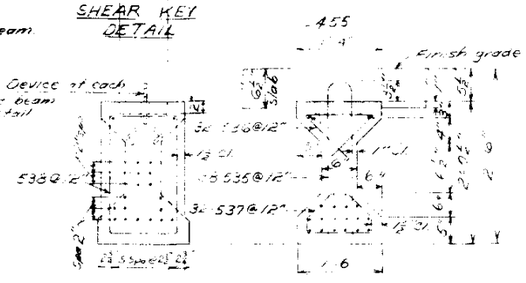
Across Cheyenne Creek
Sta. 0+93 6 to +33 7
Near Colo Springs Sec. 19 T. 4S R. 66W

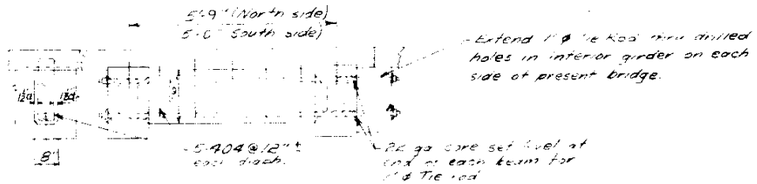
Designed by
Made by J.B.
Checked by

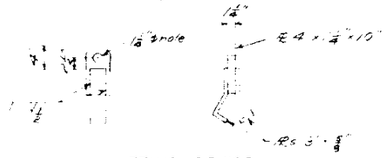
Approved by
Bridge Engineer
Date: 19

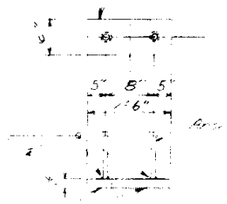


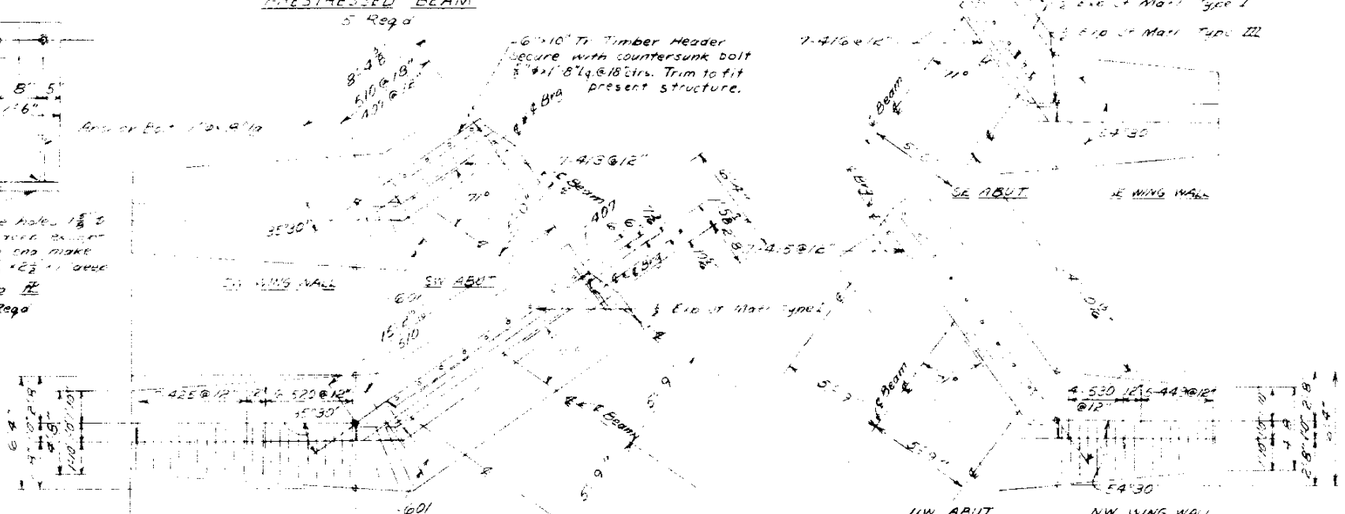












WORK ORDER NO. 14123

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 032-2(5)	33C	

New Sheet ~ 2-5-59 ~ G.R.L.

GENERAL NOTES

Concrete for the precast girders shall have a cylinder strength of 5,000 psi at 28 days. At time of release of prestress the concrete shall have a minimum strength of 4,000 psi. Tops of beams to be rough floated. Remove laitance at time of initial set.

Cast in place concrete shall have a minimum strength of 3,000 psi.

High tensile wire strands for prestressing steel shall have a minimum ultimate strength of 250,000 psi and an elongation at rupture of not less than 3 percent in 10 inches. Prestressing steel to be 18 7/16 ϕ wire strands. A = .136 sq in. and an initial prestress force of 18,900 pounds per strand.

After girders are removed from the forms they must be maintained in an upright position at all times and must be picked up by using the lifting devices at ends of girder.

All work shall be done in accordance with the standard specifications of the Colorado Dept. of Highways applicable to the project.

For remainder of Gen'l Notes see sheet 59 of this project.

SUMMARY OF QUANTITIES FOR ONE PRESTRESSED GIRDER 37'-8¼" LONG - 5 REQ'D

Description	Unit	Total
Class P Concrete	Cu. Yd	3.0
Reinforcing Steel (inc 1% ± Overrun)	Lb	500
Structural Steel (inc ½% ± for Paint)	Lb.	135

NOTE: These quantities not included in Summary of Quantities for Bridge.

STRUCTURE NO. I-17-M

COLORADO DEPARTMENT OF HIGHWAYS

Across Cheyenne Creek
Sta. 0+93.6 to 1+33.7
Near Colo. Springs Sec. 19 T. 4S R. 66W

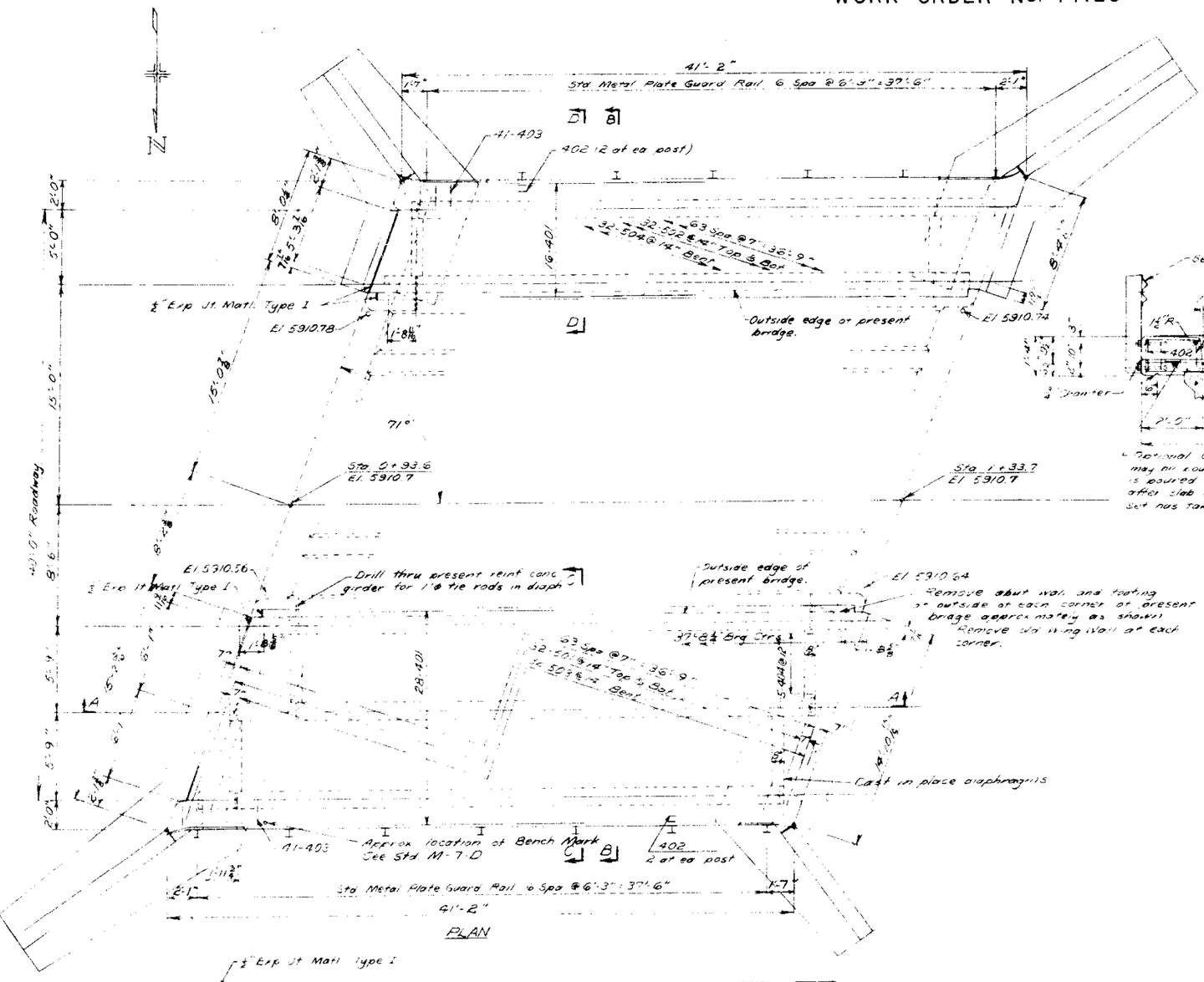
Designed by WWD
Made by CLB
Checked by

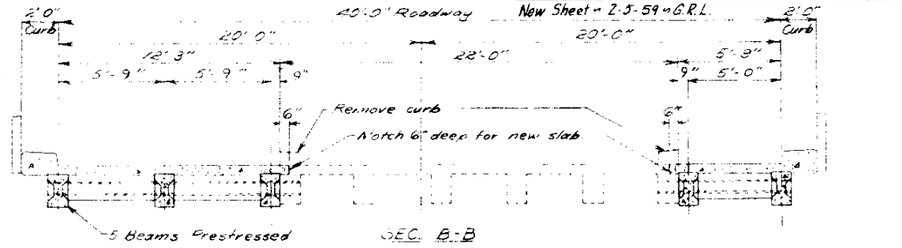
Approved by
Bridge Engineer
Date 19

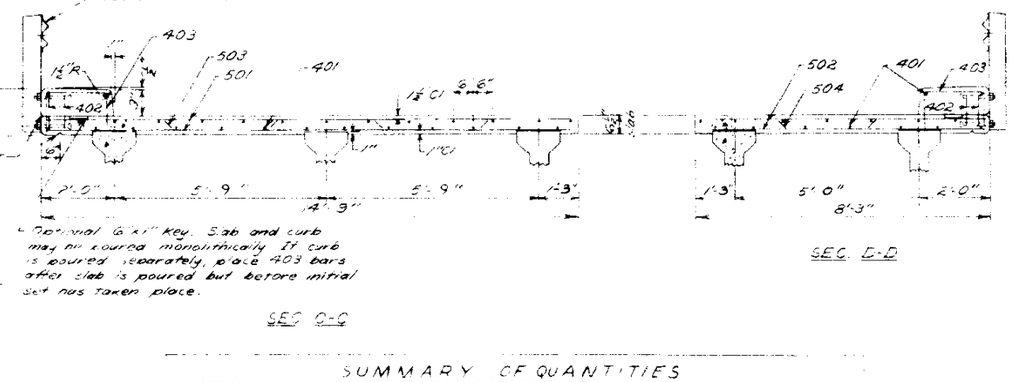
WORK ORDER NO. 14123

FED. ROAD ACT'S. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 092-2(5)	33 D	

New Sheet - 2-3-59 - G.R.L.







Optional 6"x1" key. Slab and curb may be poured monolithically. If curb is poured separately, place 403 bars after slab is poured but before initial set has taken place.

SEC. C-C

SUMMARY OF QUANTITIES

Item		Description	Unit	Super-structure	Abut No. 1	Abut No. 2	Total
11		Removal of Portions of Bridge	Lump Sum				Lump Sum
14		Unclassified Struct Excav - Bridges	Cu Yd		97	97	94
16		Structure Backfill (Class 1)	Cu Yd		70	74	144
18		Station Yard Overhaul	Sta. Yd.				
19		Yard Mile Overhaul	Yd. Mi.				
42		Tr Bridge Timber	Mf Bm		0.096	0.096	0.192
46		Class 'A' Concrete	Cu Yd	238	348	349	935
47		Reinforcing Steel (Inc 1% ± Overrun)	Lb.	3965	2255	2255	8475
48		Structural Steel (Inc ½% ± for Paint)	Lb	1345	260	260	1865
66		Prestressed Conc Girder - 37'-8½"	Each	5			5
75		Metal Plate Guard Rail (Beam Type)	Lin Ft	75			75
①	½	Expn Jt Matl Type I	Sq Ft		15		15
①	½	Expn Jt Matl Type III	Sq Ft		26	26	52

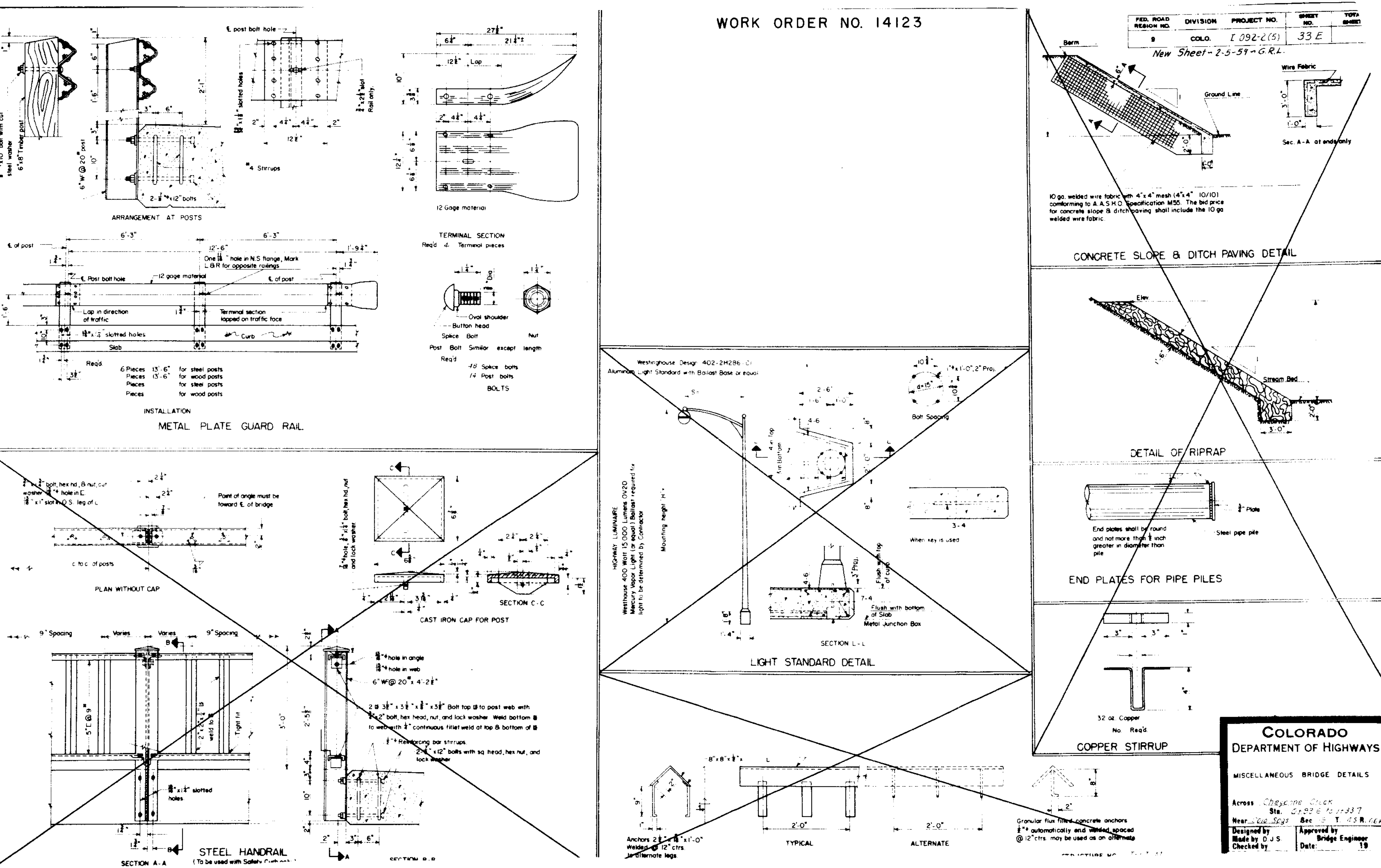
① Expn Jt Matl shall be in accordance to AASHO specification M-153-54 and of the type shown and shall be included in the Bid Price for Item 46.
② Estimated

COLORADO DEPARTMENT OF HIGHWAYS
BRIDGE DIVISION

Area: Cheyenne Creek
Sta. 0+93.6 to 1+33.7
Near Colo. Springs Sec. 19 T. 14S R. 66W

Designed by W.W.D.	Approved by
Made by J.L.B.	Bridge Engineer
Checked by	Date: 19

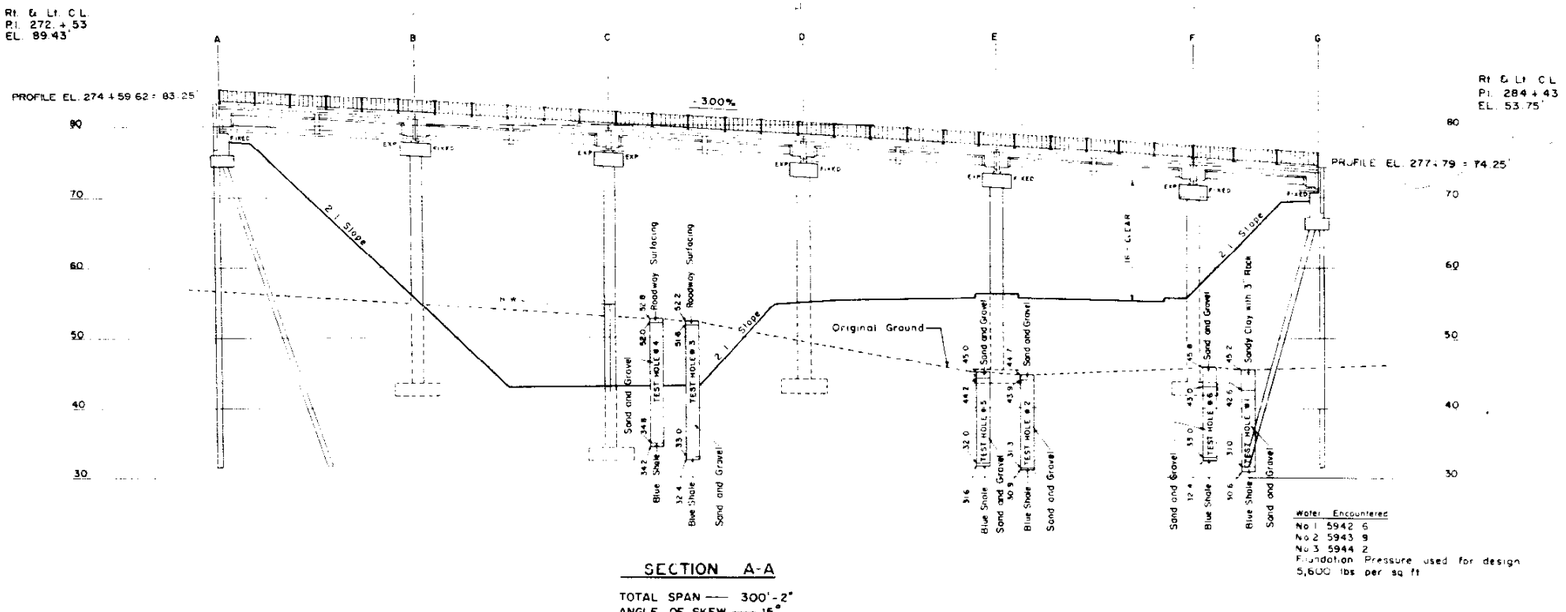
STRUCTURE NO. I-17-M



WORK ORDER NO. 14123
FED. ROAD REGION NO. 9
DIVISION COLO.
PROJECT NO. I 092-2(5)
SHEET NO. 33 E
New Sheet - 2-5-59 - G.R.L.
ARRANGEMENT AT POSTS
#4 Stirrups
12 Gage material
TERMINAL SECTION
Req'd 4 Terminal pieces
INSTALLATION
METAL PLATE GUARD RAIL
Splice Bolt
Post Bolt Similar except length
Nut
Button head
Oval shoulder
48 Splice bolts
14 Post bolts
BOLTS
Slab
Curb
Lap in direction of traffic
Terminal section lapped on traffic face
12 gage material
PLAN WITHOUT CAP
Point of angle must be toward ℄ of bridge
CAST IRON CAP FOR POST
SECTION C-C
SECTION A-A
STEEL HANDRAIL
SECTION B-B
Westinghouse Design 402-2H286-C1
Aluminum Light Standard with Ballast Base or equal
HIGHWAY LUMINAIRE
Mounting height "H"
Bolt Spacing
When key is used
SECTION L-L
Metal Junction Box
LIGHT STANDARD DETAIL
TYPICAL
ALTERNATE
Granular flux filled concrete anchors
CONCRETE SLOPE & DITCH PAVING DETAIL
Berm
Ground Line
Wire Fabric
Sec. A-A at ends only
10 ga. welded wire fabric with 4"x4" mesh (4"x4" 10/10) conforming to A.A.S.H.O. Specification M55. The bid price for concrete slope & ditch paving shall include the 10 ga welded wire fabric.
DETAIL OF RIPRAP
Stream Bed
END PLATES FOR PIPE PILES
Steel pipe pile
End plates shall be round and not more than ⅛ inch greater in diameter than pile
COPPER STIRRUP
32 oz. Copper
No. Req'd
COLORADO
DEPARTMENT OF HIGHWAYS
MISCELLANEOUS BRIDGE DETAILS
Across Cheyenne Creek
Near Colo. Spgs
Designed by
Made by D.J.S.
Checked by
Approved by
Bridge Engineer
Date: 19

FED. ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-215	34	

Rt. & Lt. C.L.
P.I. 272.+53
EL. 89.43'



Water Encountered
No.1 5942.6
No.2 5943.9
No.3 5944.2
Foundation Pressure used for design 5,600 lbs per sq ft

SECTION A-A

TOTAL SPAN — 300'-2"
ANGLE OF SKEW — 15°

PLAN

SCALE 1"=20'-0"

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways as adopted June 1, 1952
The soundings and pile data are shown according to the best information available to the Colorado Department of Highways. If essentially different conditions are encountered, the Bridge Engineer will inspect and determine if redesign is necessary. All piles shall be driven to the penetration shown unless in the opinion of the Engineer such penetration cannot be secured without injury to the piles. All piles shall be driven to minimum computed bearing value of 37 tons.
All concrete surfaces exposed to normal view by highway traffic shall receive Class 1 Surface Finish.

All reinforcing steel shall be intermediate grade deformed bars conforming to A.A.S.H.O. Specifications M31 and M137 (A.S.T.M. designations A15 and A305.) All hooks and bends in bars shall conform to ACI Standard 315.51.
All reinforcing bars shall be tagged with structure number and mark.
All steel railings shall receive one shop coat of zinc chromate and a field coat of tinted aluminum paint followed by a coat of aluminum paint.
Expansion Joint Material shall conform to A.A.S.H.O. specification M-153-54 and of the type shown.

DESIGN SPECIFICATIONS

A.A.S.H.O. Series of 1953 and Bureau of Public Roads, "Design Criteria for Prestressed Concrete Bridges," 1954
Design loading H20-S16-44
Unit Stresses
Class A Concrete, f_c = 3000 psi; f_c = 1200 psi
Reinforcing Steel, f_s = 20,000 psi
Concrete in pretentioned girders
Minimum 28 day cylinder strength - 5000 psi
Minimum cylinder strength at time of release of prestress - 4600 psi
Prestressing Steel
7/16" diameter (A_s = .1089 sq. ins.) wire, stress relieved strand
Minimum tensil strength - 250,000 psi
Maximum initial tension of strand - 175,000 psi
Pile Load
37 tons per pile (12 3/4" diameter steel pile)

N

SUMMARY OF QUANTITIES — STRUCTURE I-17-DF / STRUCTURE I-17-DG

Item	Description of item	Unit	Super Struct	Abut No.A	Pier No.B	Pier No.C	Pier No.D	Pier No.E	Pier No.F	Abut No.G	Total	Super Struct	Abut No.A	Pier No.B	Pier No.C	Pier No.D	Pier No.E	Pier No.F	Abut No.G	Total
1.4f	Rock excavation(struct)	Cuyd	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1.4g	Common excavation (struct)	Cuyd	—	—	60	103	91	35	58	—	437	—	—	113	77	68	27	44	—	329
1.6a	Structural backfill	Cuyd	—	—	133	88	77	24	46	—	368	—	—	100	66	58	19	35	—	278
3.4	Plant mix asphalt surfacing	Tons	140	10	14	9	8	3	5	10	59	8	10	7	6	2	4	8	45	
4.2b	Treated timber header	M.bf	—	0.189	—	—	—	—	—	0.189	0.378	—	0.141	—	—	—	—	—	0.141	0.282
4.6a	Class "A" Concrete	Cuyd	289	37	4	60	39	37	37	37	577	223	28	30	44	29	27	28	28	437
4.6d	Prestress Beam - 53'-4" span	Each	40	—	—	—	—	—	—	—	40	30	—	—	—	—	—	—	—	30
4.6d	Prestress Beam - 33'-6" span	Each	8	—	—	—	—	—	—	—	8	6	—	—	—	—	—	—	—	6
4.7	Reinforcing Steel (+1%)	lbs	64,248	4,530	8,165	14,035	7,805	7,451	7,451	4,530	5,395	45,257	3,452	5,637	10,804	570	5,304	5,304	3,452	84,260
6.1a*	Steel pipe piling (12.75" OD x 0.179)	Lin ft	—	546	—	—	—	—	—	—	996	—	368	—	—	—	—	—	300	668
4.8	Structural Steel - [illegible]	Lbs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	815	815	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8.0c	Sheet copper - 32 oz./sq. ft.	lbs	31	—	—	—	—	—	—	—	31	21	—	—	—	—	—	—	—	21
9.0b	1 1/2" Elect. cond. & Junc. boxes	Linft	345	—	—	—	—	—	—	—	345	333	—	—	—	—	—	—	—	333
*	5/8" expan. joint mat. type III	Sqft	21	—	—	—	—	—	—	—	21	16	—	—	—	—	—	—	—	16

* TO BE INCLUDED IN BID PRICE OF CONCRETE

INDEX OF SHEETS

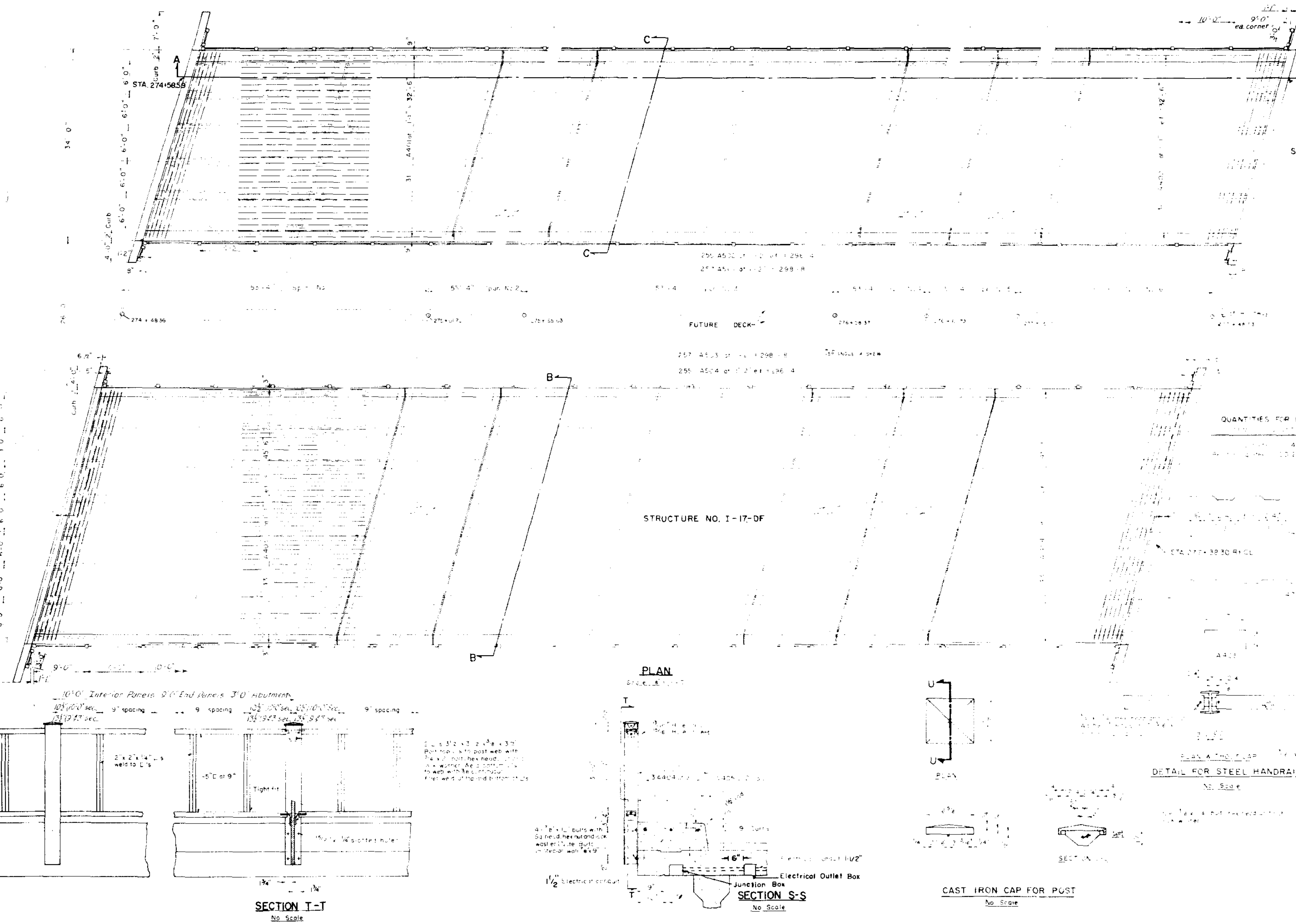
COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY
CIMARRON STREET
BRIDGE No's I-17 DG and DF

GENERAL PLAN and ELEVATION

DATE JUNE - 1957
DRAWING NO. 1 OF 8
McKEE and JO ENGINEERS DENVER, COLORADO

FED ROAD REGION NO.	DIVISION
9	COLO.

PROJ. NO.	SHEET NO.	TOTAL SHEETS
I 092-2(2)	35	



STRUCTURE NO. I-17-DG

BAR LIST FOR BOTH DECKS

STRUCT No.	MARK	SHAPE	LENGTH	No. Reqd
I-17-DF	A 5[illegible]		35'-10½"	257
-DF	A 502		34'-8"	510
-DG	A 5[illegible]		48'-9½"	257
-DG	A 504		47'-1"	510
-DF	A 4[illegible]		27'-3"	620
-DF	A 4[illegible]		33'-0"	62
-DG	A 4[illegible]3		27'-3"	860
-DG	A 404		33'-0"	86
DG	[illegible]		3'-7"	602
-DF	A 405		3'-7"	602

QUANTITIES FOR BOTH DECKS — BAR SUMMARY FOR BOTH DECKS

[illegible]	37082
[illegible]	66185
[illegible]	993
TOTAL	00260

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

CIMARRON STREET
BRIDGE No's I-17 DG and DF

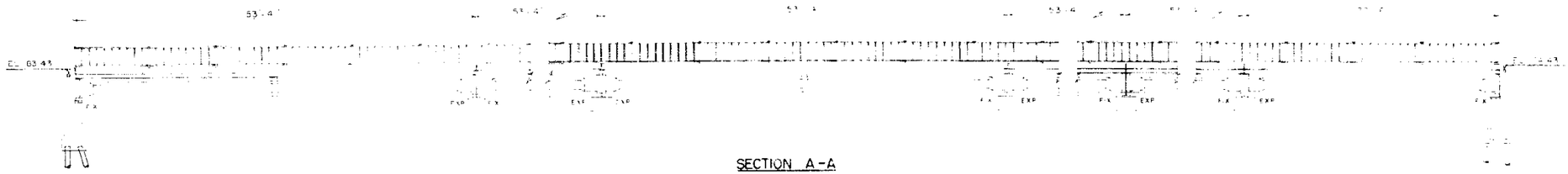
PLAN DETAIL OF CONCRETE DECK SLAB, BEAMS and CURBING

McKEE and CO
ENGINEERS
DENVER, COLORADO

DATE

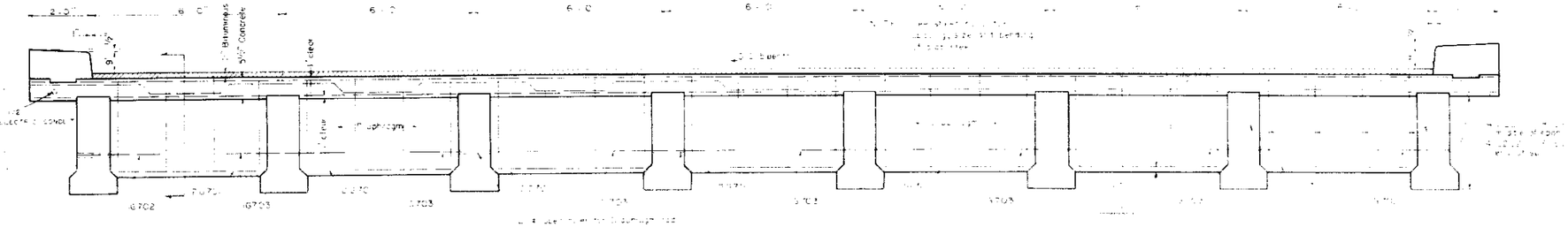
DRAWING NO 2 OF 8

FED. ROAD DESIGN NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 09P 2(5)	36	



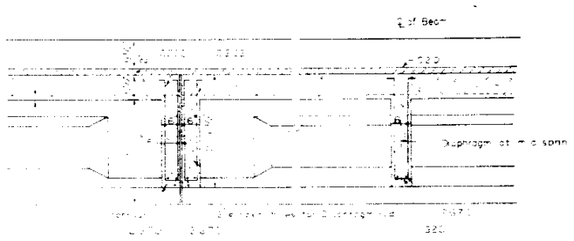
SECTION A-A

Scale 1/8" = 1'-0"



SECTION B-B

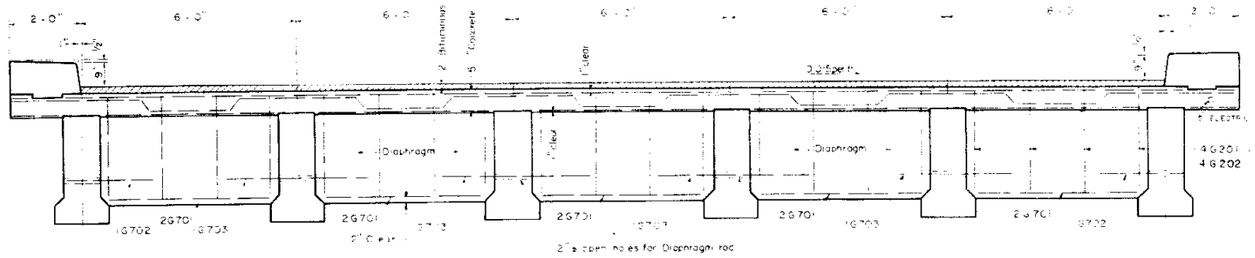
Scale 1/8" = 1'-0"



SEE S-S.

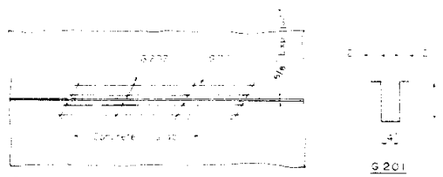
SECTION F-F

Scale 1/8" = 1'-0"



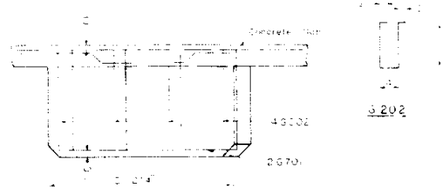
SECTION C-C

Scale 1/8" = 1'-0"



PLAN OF DIAPHRAGM

Scale 1/2" = 1'-0"



ELEVATION OF DIAPHRAGM

Scale 1/2" = 1'-0"

BAR LIST FOR DIAPHRAGMS

MARK	SHAPE	LENGTH	No Req-DF	No Req DG
		1'-0"	170	238
		0'-0"	34	34
		4'-1"	68	102
		5'-1"	20	40
		5'-1"	240	336

BAR SUMMARY FOR DIAPHRAGMS

STRUCTURE NO. I-17-DF	STRUCTURE NO. I-17-DG
1,986 Lnft @ 2.0 @ 0.67 = 332 lbs	2,780 Lnft @ 2.67 = 464 lbs.
751 Lnft @ 7.0 @ 2.044 = 2,353 lbs.	1,604 Lnft @ 7.0 @ 2.044 = 3,279 lbs.
Lap Overlap = 27 lbs	= 37 lbs.
2,712 lbs	3,780 lbs.

CLASS B CONCRETE = 197 cu yds CLASS A CONCRETE = 26.5 cu yds

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

CIMARRON STREET
BRIDGE Nos I-17 DG and DF

SECTION DETAILS OF CONCRETE DECK SLAB, and DIAPHRAGMS for BEAMS

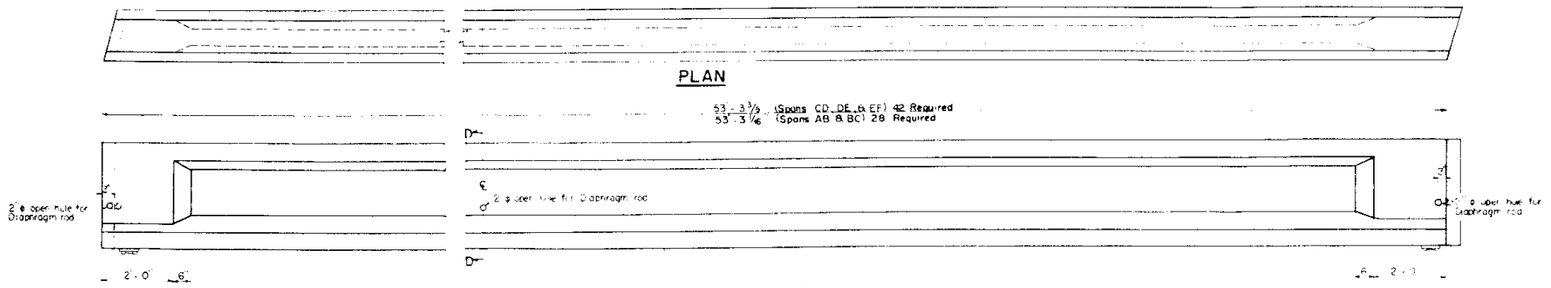
DATE

McKEE and CC ENGINEERS DENVER, COLORADO

DRAWING NO. 3 OF 8

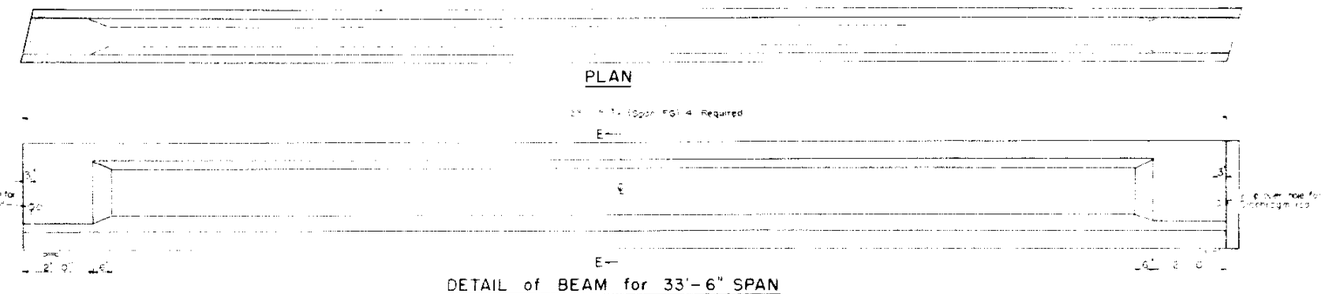
FED. ROAD REGION NO	STATE DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
9	COLO.	I 092-2(5)	37	

NOTE: TOPS OF ALL BEAMS IN CONTACT WITH THE DECK SLAB SHALL BE LEFT ROUGH. CHAMFERS AND CORNERS: ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4" OR ROUNDED TO 3/4" RADIUS.



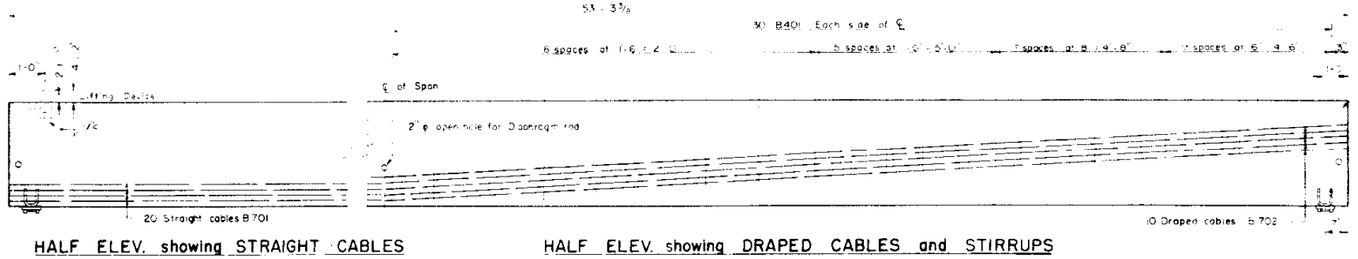
DETAIL of BEAM for 53'-4" SPAN

SCALE 1/2" = 1'-0"



DETAIL of BEAM for 33'-6" SPAN

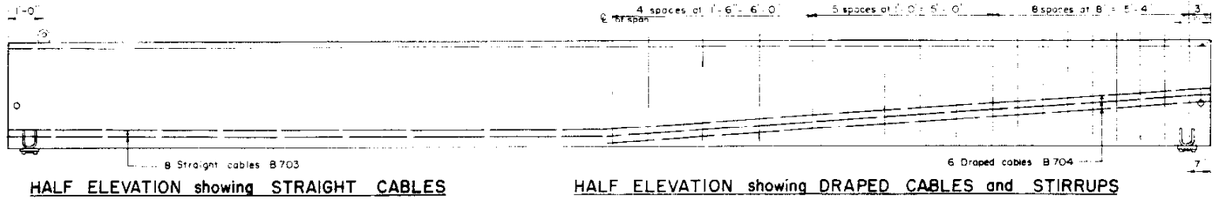
SCALE 1/2" = 1'-0"



HALF ELEV. showing STRAIGHT CABLES

HALF ELEV. showing DRAPED CABLES and STIRRUPS
BEAM for 53'-4" SPAN

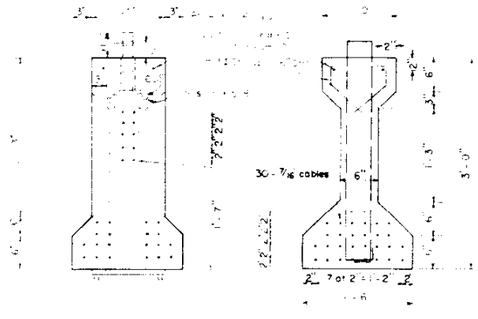
SCALE 1/2" = 1'-0"



HALF ELEVATION showing STRAIGHT CABLES

HALF ELEVATION showing DRAPED CABLES and STIRRUPS
BEAM for 33'-6" SPAN

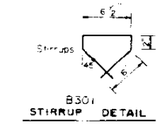
SCALE 1/2" = 1'-0"



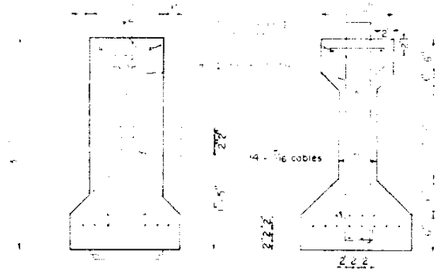
END BLOCK SECTION

SECTION D-D

TOTAL PRESTRESS FORCE EQUALS 537,000 lbs.



B301
STIRRUP DETAIL



END BLOCK SECTION

SECTION E-E

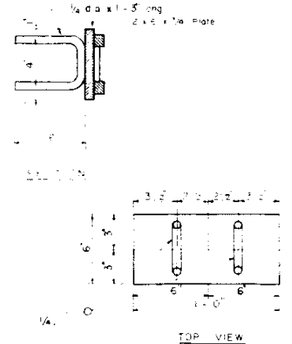
BEAM SECTIONS

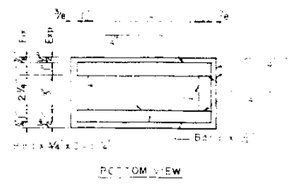
TOTAL PRESTRESS FORCE EQUALS 230,000 lbs.

SUMMARY of QUANTITIES (1) BEAM

33'-6" SPAN				
Item	Length	No. Req.	Total in	Total Wt.
B301	1'-10.5"	21	39 ft	13 lbs.
B401	17'-4"	36	249 ft	67 lbs.
B501	33'-5"	2	67 ft	179 lbs.
B703	33'-6"	8	268 ft	32 lbs.
B704	33'-6"	6	201	69 lbs.
47 Total Rein. Steel per Beam = 35,121 lbs.				
7/16" Cable - 469 in ft at 0.342# = 161 lbs.				
Structural Steel = 91 lbs.				
Concrete (5000 psi) = 33 cu. yd.				

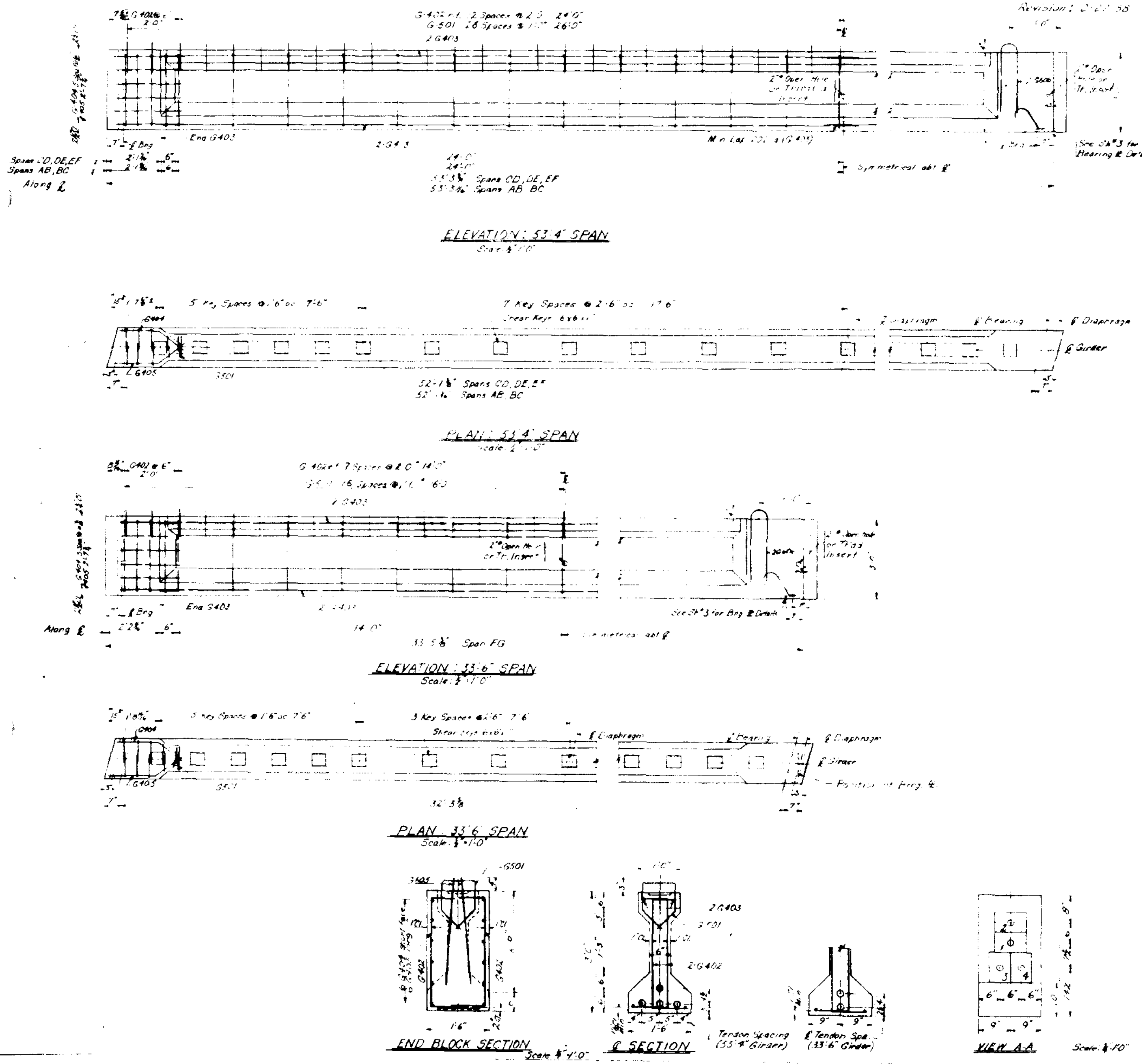
53'-4" SPAN				
B301	1'-10.5"	35	66 ft	25 lbs.
B401	17'-4"	60	440 ft	288 lbs.
B801	53'-4"	2	107 ft	286 lbs.
B701	53'-4"	20	1,069 ft	366 lbs.
B702	53'-6"	10	535 ft	183 lbs.
47 Total Rein. Steel per Beam = 599 lbs.				
7/16" Cable - 1,604 in ft at 0.342# = 549 lbs.				
Structural Steel = 91 lbs.				
Concrete (5000 psi) = 52 cu. yd.				

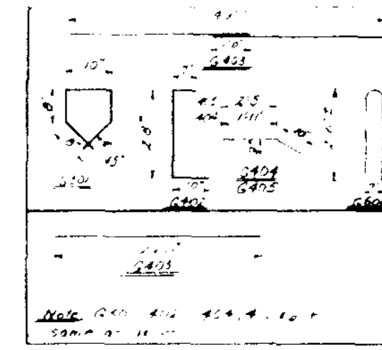


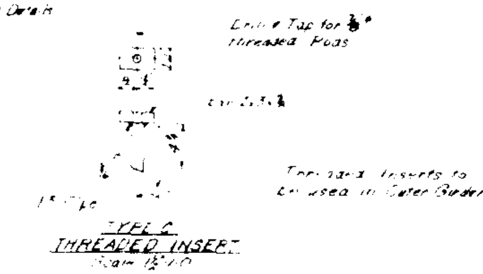


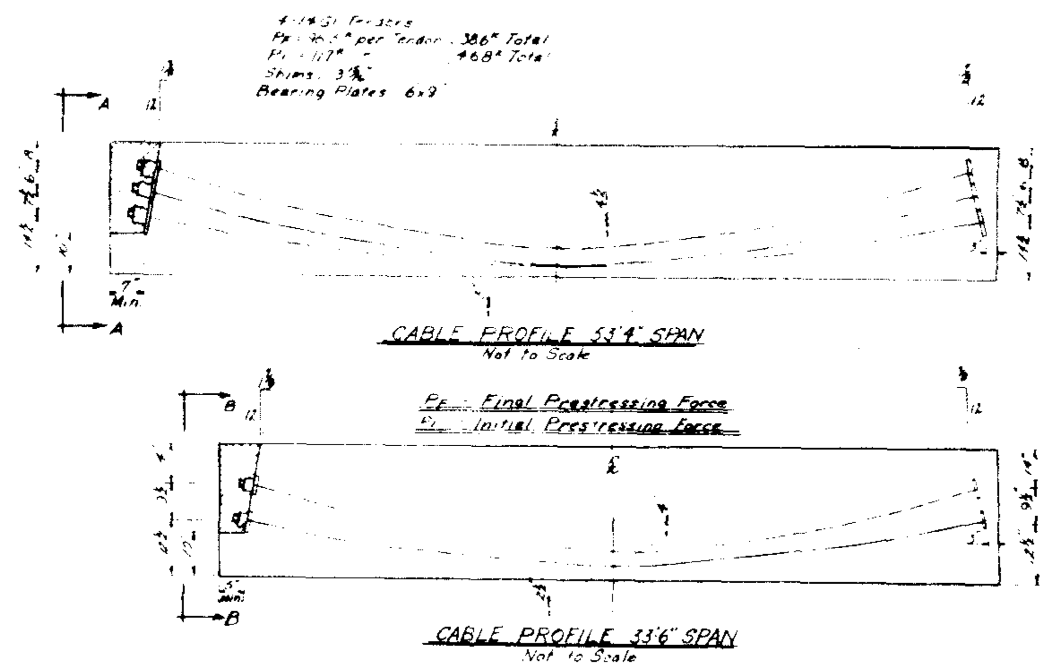
COLORADO STATE HIGHWAY DEPARTMENT COLORADO SPRINGS FREEWAY	
CIMARRON STREET BRIDGE No's 1-17 DG and DF	
DETAIL and SECTIONS of BEAMS	
	DATE
McKEE and CO. ENGINEERS DENVER, COLORADO	DRAWING NO. 4 OF 8

Revision: 2-27-58 New Sheet - MEH









BAR LIST FOR PRESTRESSED GIRDERS

Mark	Type	Length	No. Required per Girder	No. Required Total	Size
53'-4" SPAN (70 REQ'D)					
G501	Bent	3'6"	53	3710	#5
G402	Bent	4'-1"	66	4620	#4
G403	Str.	10'-0"	4	280	#4
G404	Bent	2-9	12	840	#4
G405	Bent	1'-1"	12	840	#4
G606	Bent	5'0"	4	280	#6
33'6" SPAN (14 REQ'D)					
G501	Bent	3'6"	33	462	#5
G402	Bent	4'-1"	46	644	#4
G403	Str.	29'0"	4	56	#4
G404	Bent	2'-9"	12	168	#4
G405	Bent	3'3	12	168	#4
G606	Bent	5-0	4	56	#6

A.S. HORNER CONSTRUCTION CO.
DENVER, COLORADO

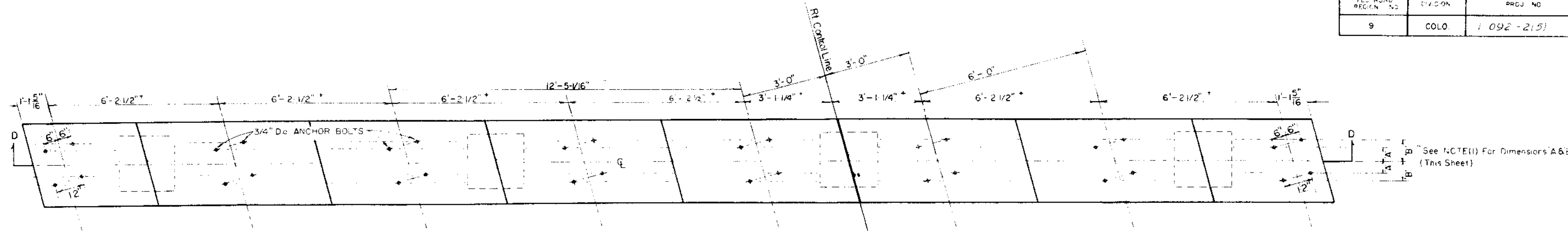
STANDARD GIRDERS

PROJ. NO. 1092-2(5) COLORADO SPRINGS
STRUCTURE NOS. 1-17-DG & DF
CUSTOMER: C.L. HUBNER CONST. CO
ENGINEERS: McKEE & CO.

DESIGNED L.B. / DRAWN L.M. / CHECKED WJM	SCALE as shown / DATE 1-2-58	SHEET NO. 3/a / NO. OF SHS

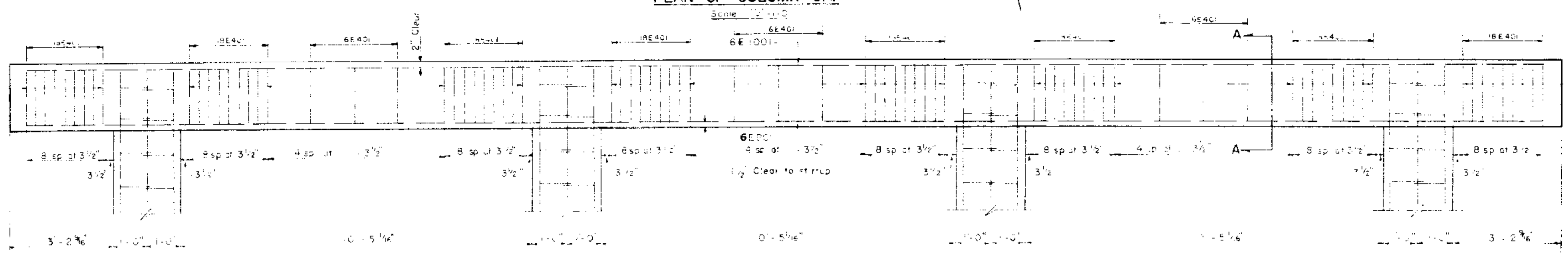
Revised 1-27-58 Added Note (1) R.A.

FED. ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092 - 2(5)	38	

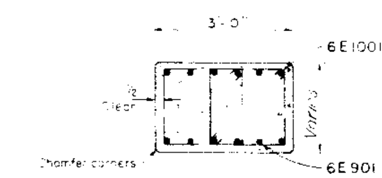


PLAN OF COLUMN CAP

Scale 1/2" = 1'-0"



SECTION D-D OF COLUMN CAP



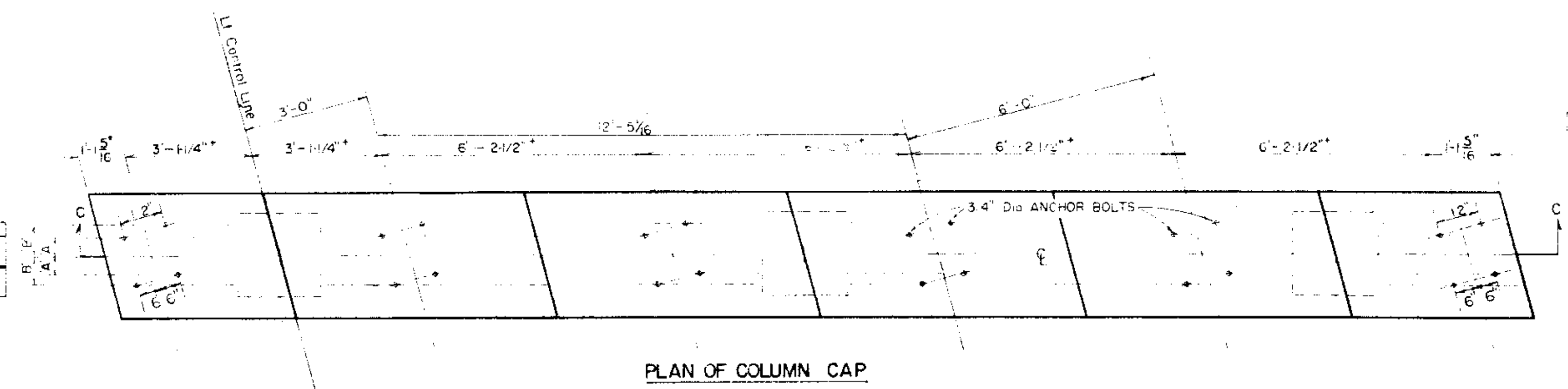
SECTION A-A

Scale 1/2" = 1'-0"

	BAR LIST FOR COLUMN CAP (identical for each pier)				
STRUCTURE NO.	MARK	SHAPE	LENGTH	No. REQD (1) PIER	TOTAL REQD
I-17-DG	E 401		7'-5"	162	810
I-17-DG	E 901		44'-[illegible]	6	30
I-17-DF	E 902		[illegible]-6	4	20
I-17-DG	E 1001		44'-5"	6	30
I-17-DF	E 1002		[illegible]	6	30
I-17-DF	E 401		7'-5"	120	600

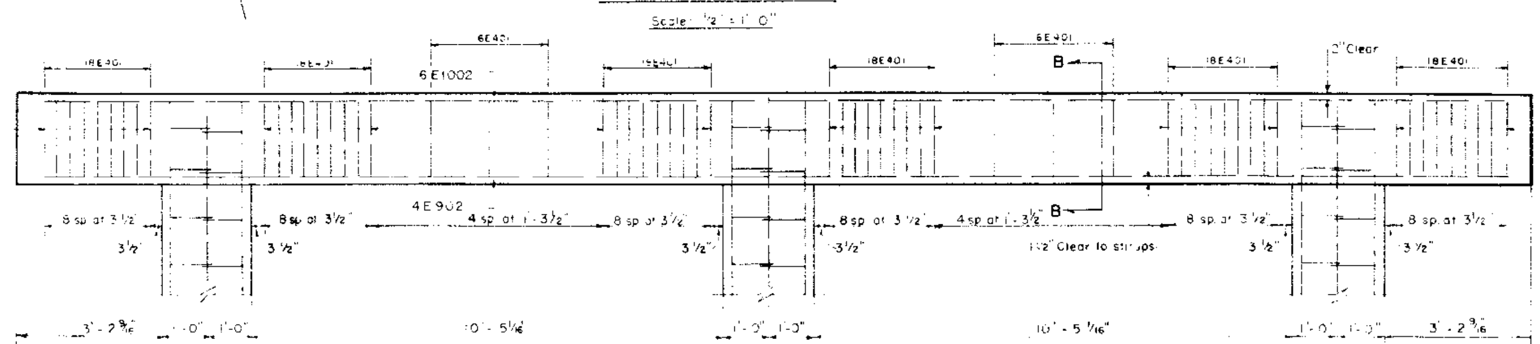
NOTE (1)

DIMENSION	ABUT	PIER
'A' = 0'-5 1/2" 'B' = 0'-8 5/8"		B, D, E, F
'A' = 0'-5 13/16" 'B' = 0'-8 15/16"	A, G	C



PLAN OF COLUMN CAP

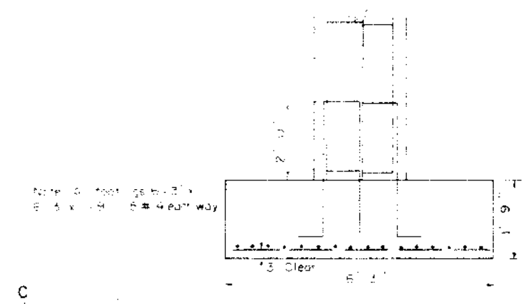
Scale 1/2" = 1'-0"



SECTION C-C OF COLUMN CAP

Scale 1/2" = 1'-0"

(1) For dimensions of Pier see Sheet No. 76a



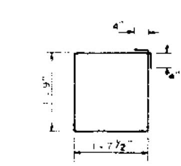
FOOTING DETAIL

Scale 1/2" = 1'-0"

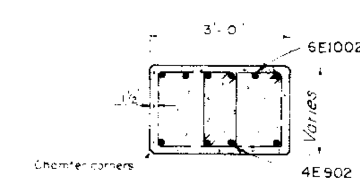
BAR SUMMARY FOR COLUMN CAPS

[illegible] Lin ft #4 668 [illegible] lbs
[illegible] Lin ft #9 3.40 [illegible] lbs
[illegible] Lin ft #10 4.303 [illegible] lbs
[illegible] lbs
23,673 lbs

CLASS A CONCRETE - 87.74 yds
SWEDGED BOLTS - 332 units

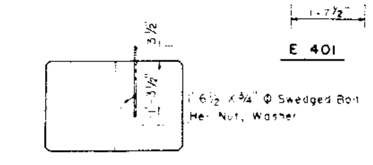


E 401



SECTION B-B

Scale 1/2" = 1'-0"



ANCHOR BOLT SECTION

Scale 1/2" = 1'-0"

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

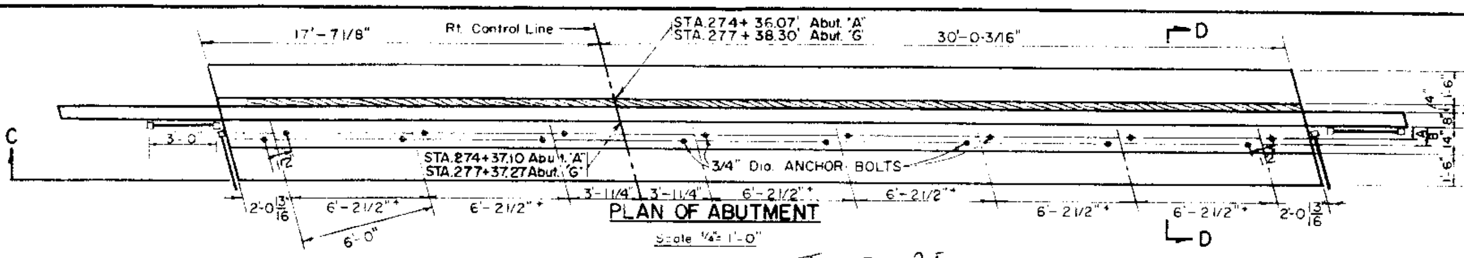
CIMARRON STREET
BRIDGE No's I-17 DG and DF

DETAIL and SECTIONS of COLUMN CAP, COLUMNS and TYPICAL FOOTING

McKEE and CO.
ENGINEERS
DENVER, COLORADO

DATE

DRAWING NO. 5 OF 8

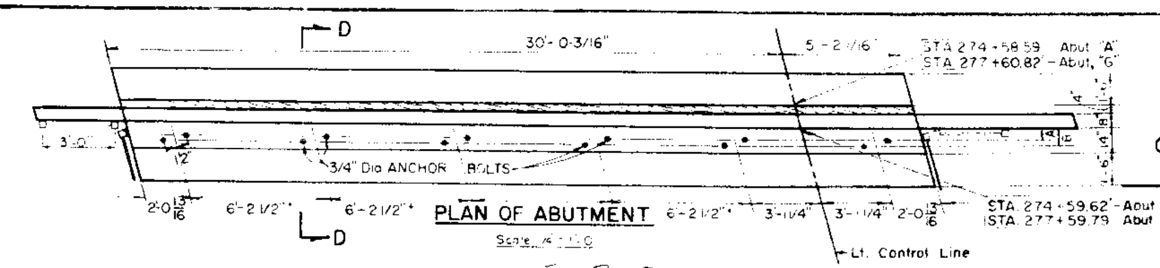


PLAN OF ABUTMENT

Scale 1/4" = 1'-0"

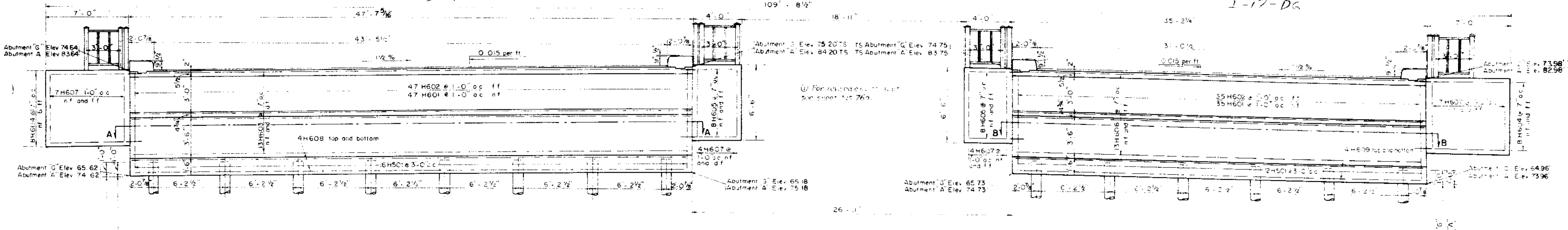
I-17-DF

See NOTE (1), Sheet 5 for Dimension A & B

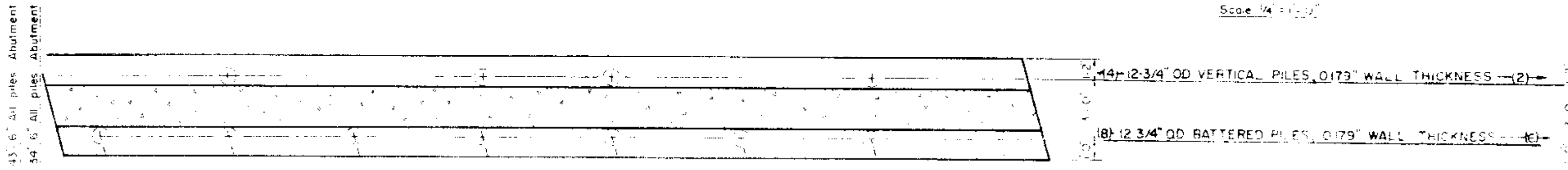


PLAN OF ABUTMENT

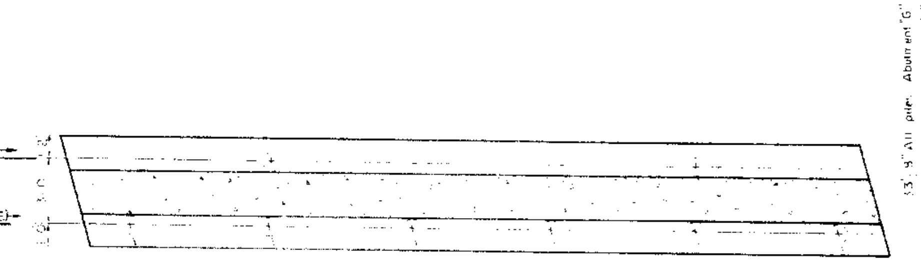
I-17-DG



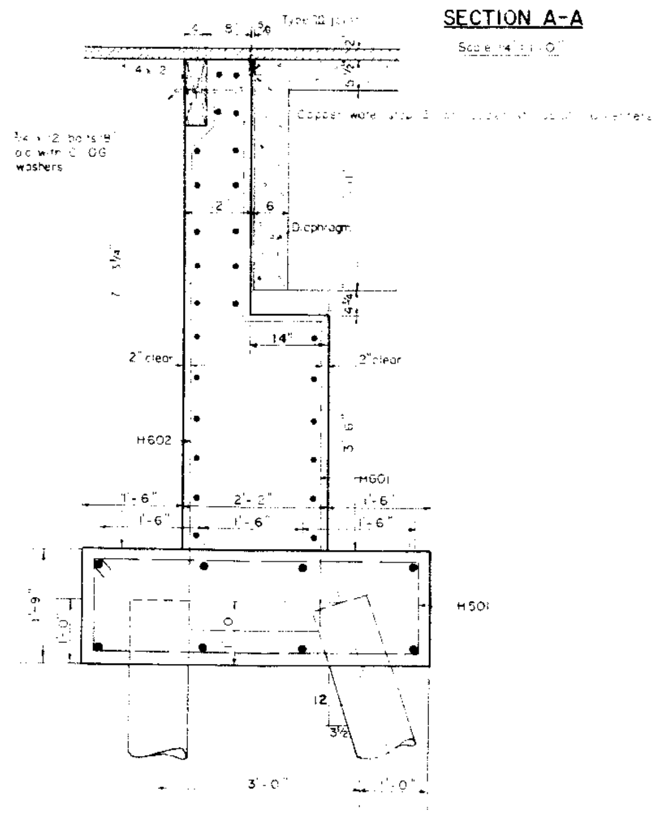
SECTION C-C - ABUTMENT DETAIL A & G



SECTION A-A



SECTION B-B



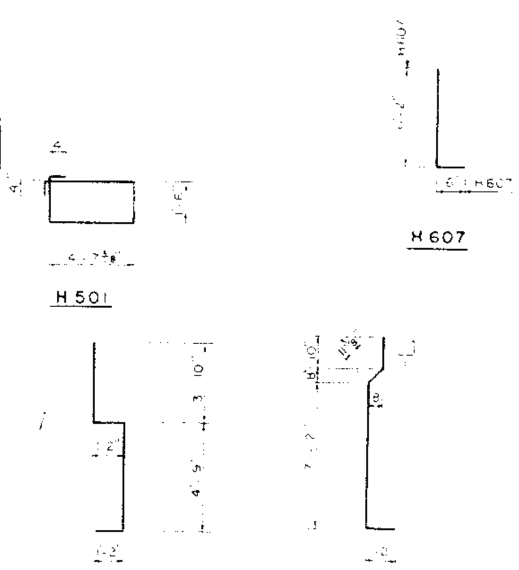
SECTION D-D

Scale 3/4" = 1'-0"

BAR SUMMARY (2 ABUTMENTS)			
723 Lin ft #5	1.043 =	754 Lb	
9942 Lin ft #6	1.502 =	14,933 Lb	
1% Overrun		157 Lb	
		15,964 Lb	
CLASS A CONCRETE		130.1 cu yd	
12 3/4" OD PIPE PILE		1664 Lin ft	

BAR LIST (1 ABUTMENT - BOTH IDENTICAL)

MARK	SHAPE	LENGTH	No REQD - DF	No REQD - DG	TOTAL
H501		[illegible]	[illegible]	[illegible]	28
H601		[illegible]	47	35	82
H602		[illegible]	47	35	82
H603		[illegible]	26	—	26
H604		[illegible]	[illegible]	6	32
H605		[illegible]	[illegible]	6	32
H606		34'-8"	—	26	26
H607		6'-8"	22	22	44
H608		[illegible]	8	—	8
H609		34'-8"	—	8	8



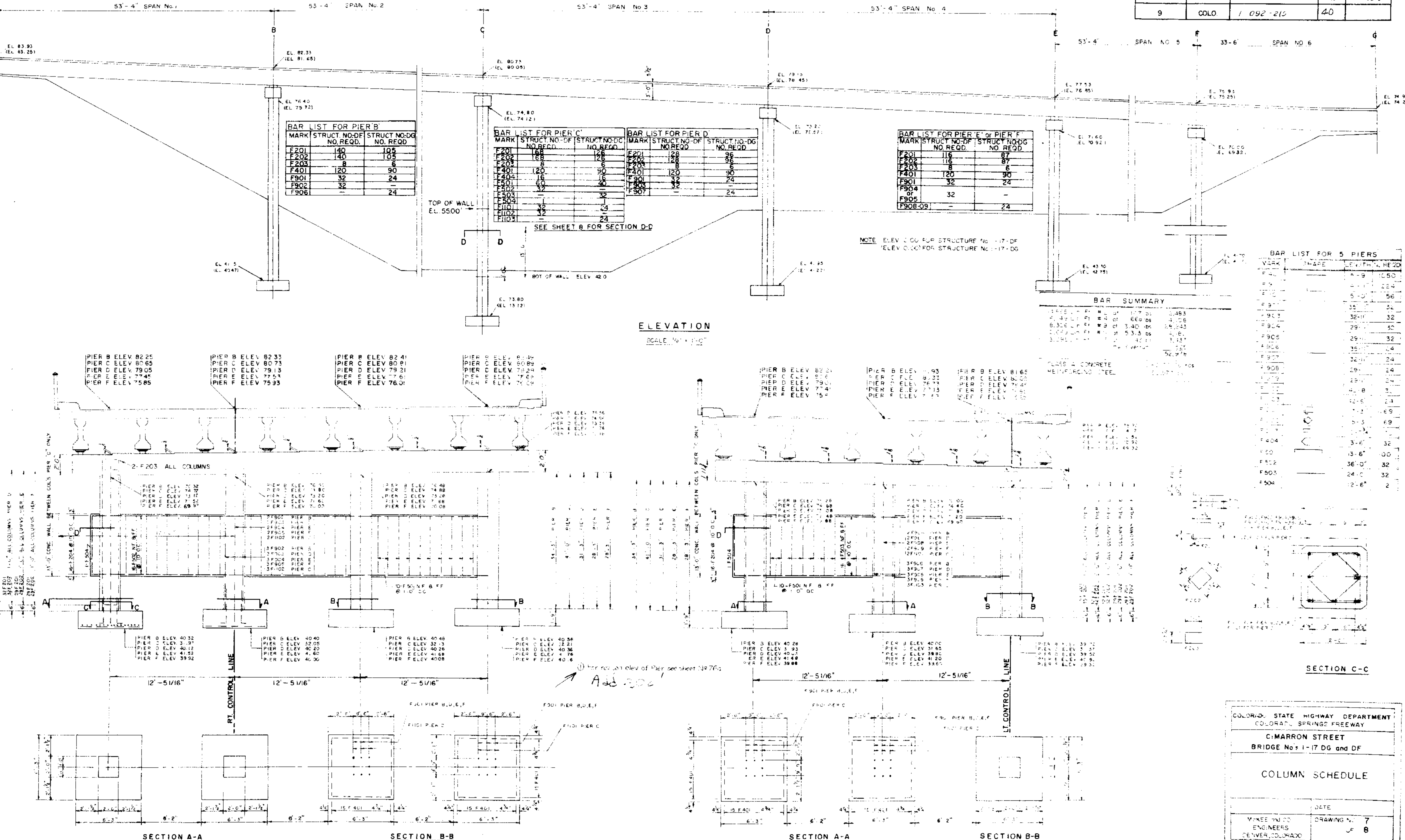
COLORADO STATE HIGHWAY DEPARTMENT COLORADO SPRINGS FREEWAY
CIMARRON STREET BRIDGE No's I-17 DG and DF
DETAIL of ABUTMENTS

McKEE and CO ENGINEERS DENVER, COLORADO	DATE DRAWING NO 6 OF 8

FED. ROAD REGION NO	DIVISION	PROJ. NO	SHEET NO	TOTAL SHEETS
9	COLO	[illegible]	39	

FED. ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO	I 092-2(5)	40	

Revision: changed pier caps from slope to steps 12-18-57 RRA
Revised 2-27-58 Added Note ① RRA



BAR LIST FOR PIER 'B'		
MARK	STRUCT. NO-DF NO. REQD.	STRUCT. NO-DG NO. REQD.
F201	140	105
F202	140	105
F203	8	6
F401	120	90
F901	32	24
F902	32	—
F906	—	24

BAR LIST FOR PIER 'C'		
MARK	STRUCT. NO-DF NO. REQD.	STRUCT. NO-DG NO. REQD.
F201	168	126
F202	168	126
F203	8	6
F401	120	90
F404	16	16
F501	60	40
F502	32	—
F503	—	32
F504	1	1
F1101	32	24
F1102	32	—
F1103	—	24

BAR LIST FOR PIER 'D'		
MARK	STRUCT. NO-DF NO. REQD.	STRUCT. NO-DG NO. REQD.
F201	128	96
F202	128	96
F203	8	6
F401	120	90
F901	32	24
F903	32	—
F907	—	24

BAR LIST FOR PIER 'E' or PIER 'F'		
MARK	STRUCT. NO-DF NO. REQD.	STRUCT. NO-DG NO. REQD.
F201	116	87
F202	116	87
F203	8	6
F401	120	90
F901	32	24
F904 or F905	32	—
F908-09	—	24

NOTE: ELEV. 0.00 FOR STRUCTURE No. I-17-DF
(ELEV. 0.00) FOR STRUCTURE No. I-17-DG

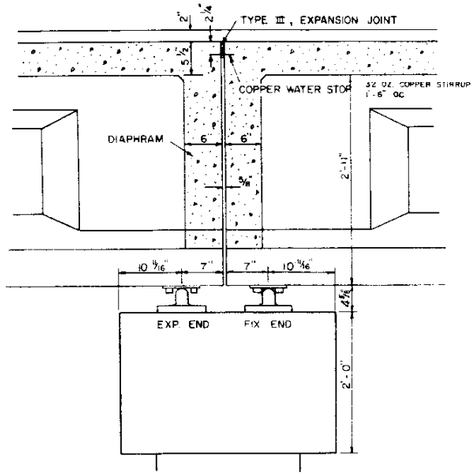
COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

CIMARRON STREET
BRIDGE No's I-17 DG and DF

COLUMN SCHEDULE

McKEE and CO.
ENGINEERS
DENVER, COLORADO

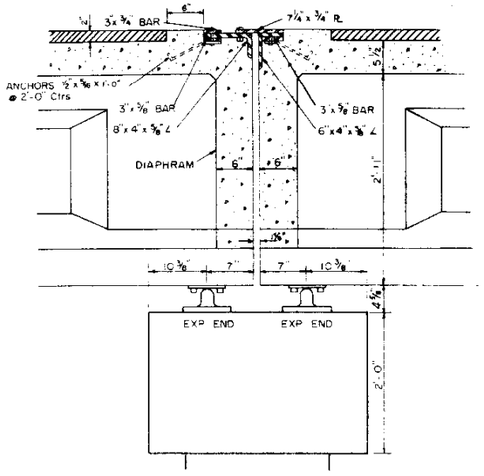
DATE
DRAWING No. 7 of 8



EXPANSION JOINT DETAIL

FOR PIERS WITH ONE FIXED END & ONE FREE END

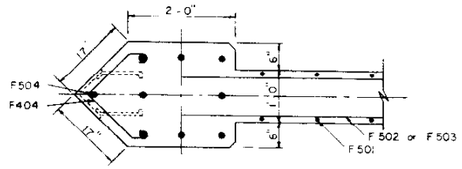
SCALE 1" = 1'-0"



EXPANSION JOINT DETAIL

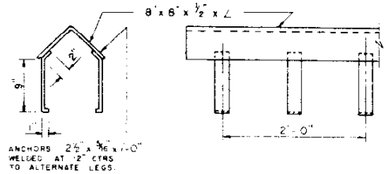
FOR PIERS WITH ENDS FREE

SCALE 1" = 1'-0"



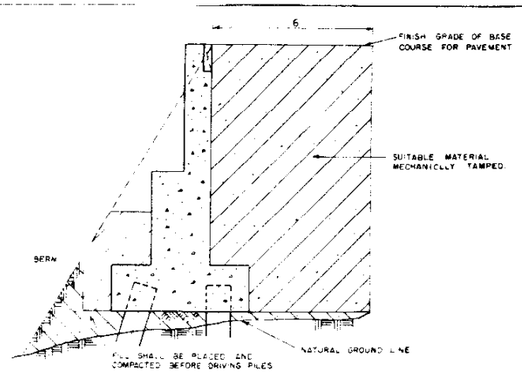
SECTION D-D

SCALE 3/8" = 1'-0"



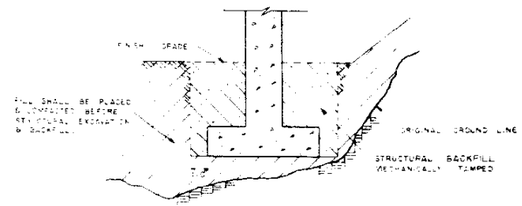
PIER NOSE ANGLE

SCALE 1" = 1'-0"



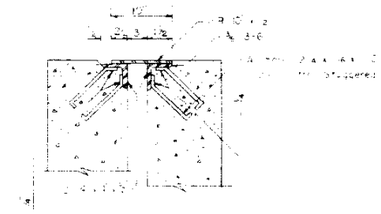
ABUTMENT TAMPING DIAGRAM

SCALE 3/8" = 1'-0"



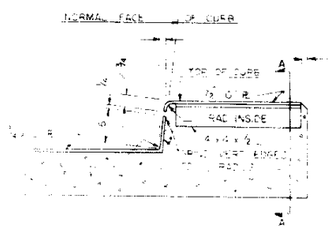
PIER TAMPING DIAGRAM

SCALE 3/8" = 1'-0"

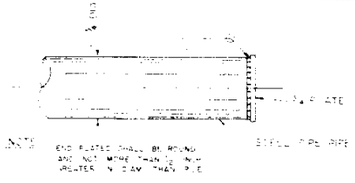


EXP'N DEVICE - CURBS

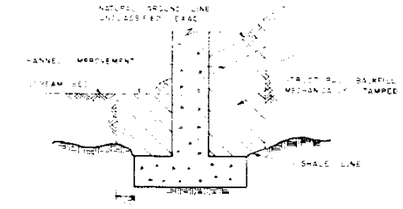
SECTION A-A



EXP'N DEVICE AT CURB

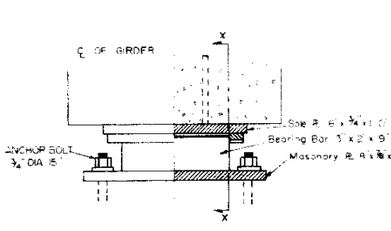


END PLATES FOR PIPE PILES

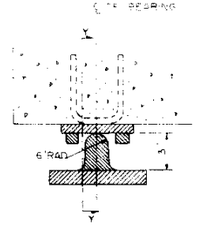


PIER TAMPING DIAGRAM

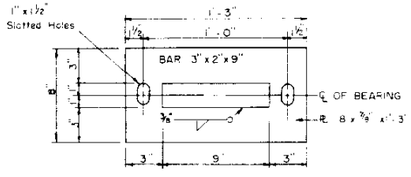
SCALE 1" = 1'-0"



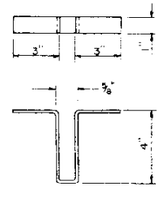
HALF END ELEV HALF-SECTION Y-Y



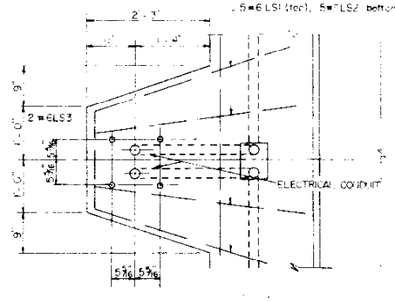
SECTION X-X

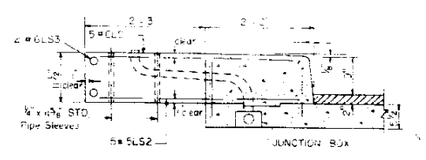


DETAILS OF BEARING



COPPER STIRRUP DETAIL





NOTE THE CONTRACTOR IS CAUTIONED TO CHECK SPACING AND LOCATION OF BOLT HOLES IN STANDARD BEFORE SETTING ANCHOR BOLTS

LIGHT STANDARD DETAIL

SCALE 3/4" = 1'-0"

FED. ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	[illegible]	41	

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

CIMARRON STREET
BRIDGE Nos. 1-17 DG and DF

DETAILS

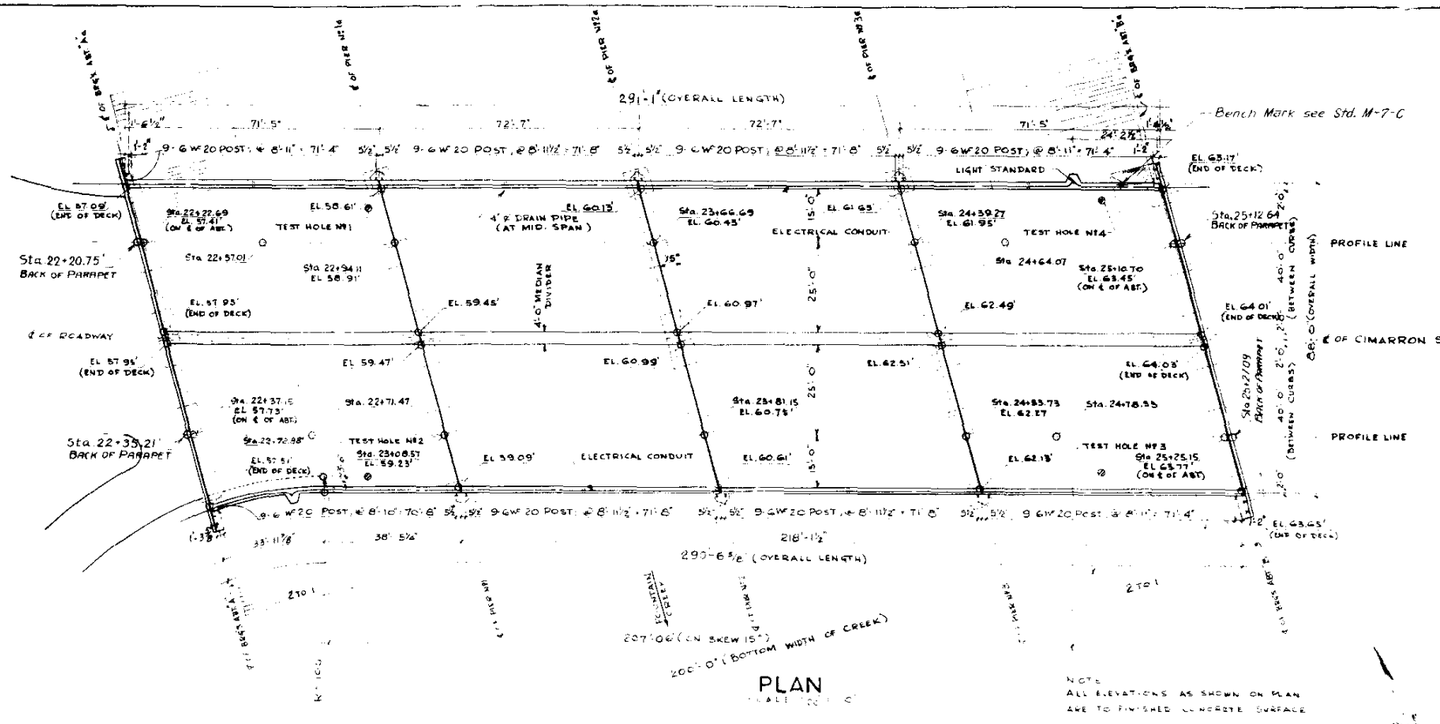
DATE

McKEE and DOD ENGINEERS DENVER, COLORADO

DRAWING NO. 8 OF 8

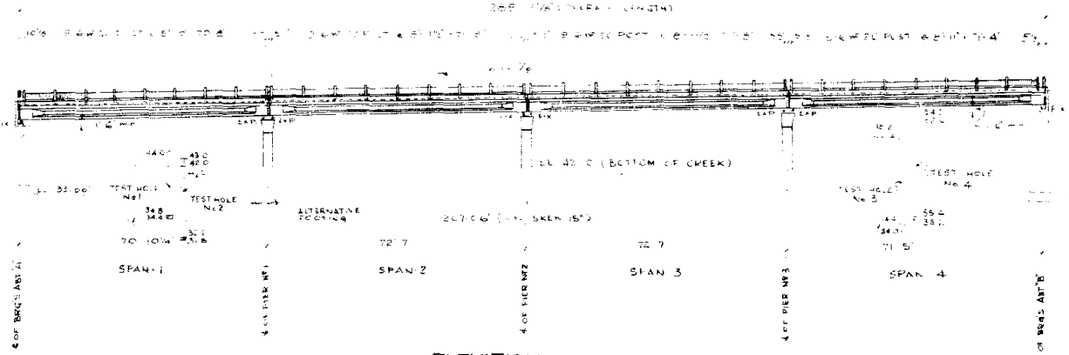
(Changed Sta. on Plan. L.B.
Revision 10-18-57 Summary of Quants

FED. ROAD DIV. NO.	DISTRICT	PROJECT NO.	SHEET NO.
9	COLO.	I 092-2(5)	42



PLAN

NOTE
ALL ELEVATIONS AS SHOWN ON PLAN ARE TO FINISHED CONCRETE SURFACE

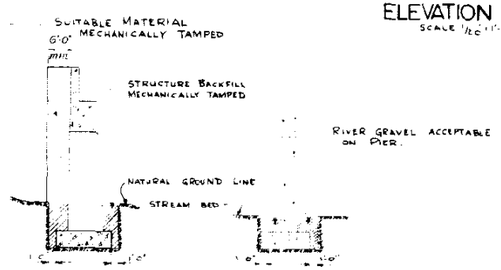


ELEVATION (FRONT VIEW SHOWN ONLY)

SCALE 1/8" = 1'-0"

FREEWAY GRADE DATA

LEGEND
- FINE SAND
- SAND AND GRAVEL
- ASH AND CINDER
- BLUE SHALE



ALL MATERIAL THAT IS TO BE MECHANICALLY TAMPED SHALL BE PLACED IN HORIZONTAL LAYERS NOT MORE THAN 6 INCHES IN DEPTH AND TAMPED BEFORE THE NEXT LAYER IS PLACED.

STRUCTURE BACKFILL AND MECHANICAL TAMPING DIAGRAM.

DESIGN SPECIFICATIONS

1953 A.A.S.H.O. WITH 1953 AND 1954 AMENDMENTS
LIVE LOAD H20-S16-44
f'_c = 20000 P.S.I.
WEIGHT OF EARTH 120 LBS PER CU. FT.
EQUIVALENT FLUID PRESSURE: 30 LBS PER CU. FT.
MAX. ALLOWABLE SOIL PRESSURE: 10 TONS PER SQ. FT.

SUMMARY OF QUANTITIES

ITEM NO.	ITEM	UNIT	SUPER-STR.	4-ABTS.	6-PIERS	TOTAL
14f	ROCK EXCAVATION (STR.)	CU. YD.	—	48	30	78
14g	COMMON EXCAVATION (STR.)	CU. YD.	—	668	300	968
16a ①	STRUCTURE BACKFILL (CLASS 1)	CU. YD.	—	553	195	748
16c	MECHANICAL TAMPING	HR.	—	80	30	110
~~46a~~	~~PLAN MIXED "A" CONCRETE~~	~~CU. YD.~~	—	—	—	—
46c	CLASS "A" CONCRETE	CU. YD.	623	2304	363	1216
46e ②	PRESTRESSED CONCRETE GIRDER	NUMBER	56	—	—	56
47	REINFORCING STEEL (+1% OVERRUN)	LBS.	144,700	40,045	37,500	222,545
48 ④	STRUCTURAL STEEL (+5% FOR PAINT)	LBS.	32,915	4,427	11,010	48,252
80c	SHEET COPPER (32 oz. PER SQ. FT.)	LBS.	16	—	—	16
90b	ELECTRICAL CONDUIT WITH JUNCTION BOXES (1/4")	LIN. FT.	600	—	—	600
*	12" EXP. JT. MATL. TYPE III, (4" EXP. JT. MATL. TYPE III	SQ. FT.	93	191	—	284
89a ③	Drain Pipe (Conc. Floor) (4"x 2'-3")	Each	8	—	—	8
42b	TREATED BRIDGE TIMBER	FT. B.M.	—	0.02	—	0.02

SUMMARY OF QUANTITIES - REFERENCE NOTES

① - STONE BACKFILL INCLUDED.
② - PRESTRESSING STEEL WITH ANCHORS AND REINFORCING STEEL INCLUDED WITH BID PRICE FOR GIRDERS.
④ - INCLUDES STEEL RAILING, PLATES, ANCHOR BOLTS, ANCHOR BA[illegible] AND BEARINGS.
③ - INCLUDED WITH BID PRICE FOR CLASS "A" CONCRETE.
NOTE ITEM 47 DOES NOT INCLUDE PRESTRESSING STEEL, AND REINFORCING STEEL FOR GIRDERS

GENERAL NOTES

1. ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS, ADOPTED JUNE , 1952
2. SPACING AND DEPTH OF FOOTINGS SHOWN ACCORDING TO THE BEST AVAILABLE DATA. IF ESSENTIALLY DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY
3. ALL CONCRETE SHALL BE CLASS "A" AND AIR ENTRAINED AS SPECIFIED, EXCEPT OTHERWISE NOTED FOR PRESTRESSED GIRDERS
4. CHAMFER ALL EXPOSED CORNERS ¾", EXCEPT AS NOTED
5. ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE DEFORMED BARS CONFORMING TO A.A.S.H.O. SPECIFICATIONS M31 AND M31(A.S.T.M. DESIGNATIONS A15 AND A305).
6. ALL REINFORCING BARS SHALL BE TAGGED WITH THE STRUCTURE NUMBER AND MARK.
7. ALL DIMENSIONS ON BAR DETAILS ARE OUT TO OUT
8. ALL HOOKS AND BENDS IN BARS SHALL CONFORM TO A.C.I. STANDARD 315-51.
2 MINIMUM CLEAR TO STEEL, EXCEPT AS NOTED
9. ALL STRUCTURAL STEEL SHALL RECEIVE ONE SHOP COAT OF ZINC CHROMATE AND TWO FIELD COATS OF ALUMINUM PAINT.
10. WHEN EXCAVATING FOR FOOTINGS THE FINAL ONE FOOT IN DEPTH SHALL BE DONE BY HAND LABOR METHODS.
11. CURB AND MEDIAN DIVIDER ROUNDED 1'-0" RADIUS AT THE END.
12. ALL CONCRETE SURFACES EXPOSED TO NORMAL VIEW BY HIGHWAY TRAFFIC SHALL RECEIVE CLASS "2" SURFACE FINISH.
13. EXPANSION JOINT MATERIAL SHALL BE ACCORDING TO A.A.S.H.O. SPECIFICATION M-153-54 AND OF FILLER TYPE SHOWN.

INDEX OF SHEETS

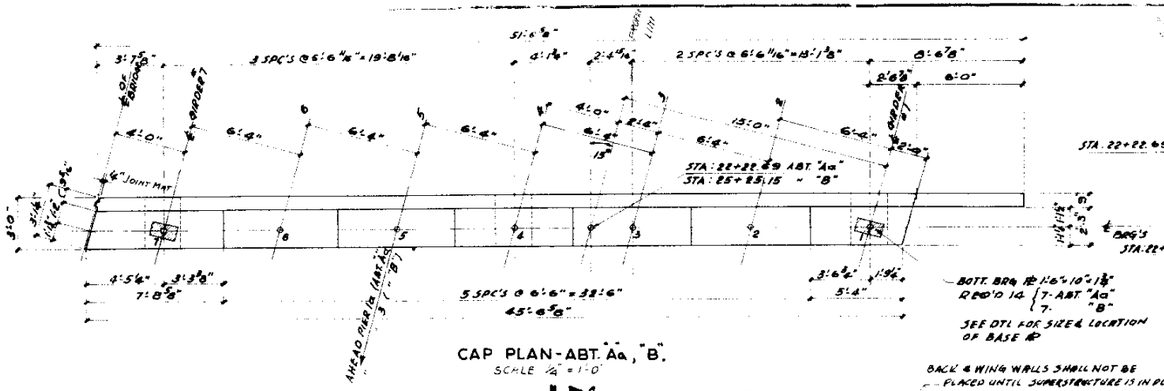
COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

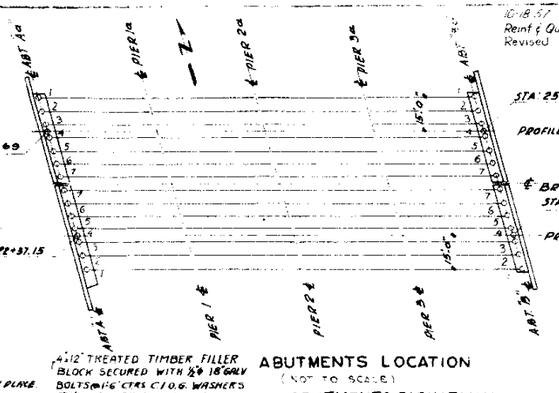
CIMARRON INTERCHANGE
FOUNTAIN CREEK
STRUCTURE I-17-D1

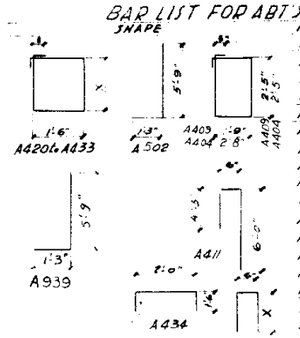
GENERAL PLAN AND ELEVATION

L. BODUROFF & ASSOCIATE
CONSULTING ENGINEER
DENVER -- COLORADO
4-15-58

DESIGNED J.N.	SCALE AS NOTED	SHEET NO. 1
DRAWN J.N.	DATE 4-5-57	NO. OF SHEETS 6
CHECKED L.B.		







10-18-57 Revised Abut Dimensions About Reinf & Quantities L B
Revised 2-27-58 Added Note ① RKA

FED. ROAD DIV. Nº	DISTRICT	PROJECT Nº	SHEET Nº
9	COLO.	I 092-2(5)	43

CAP PLAN-ABT. Aa, "B".

SCALE 1/4" = 1'-0"

ABUTMENTS LOCATION

(NOT TO SCALE)

4"×12" TREATED TIMBER FILLER BLOCK SECURED WITH 1/2"φ 18" GALV BOLTS @ 16" CTRS C/O.G. WASHERS CTSK INTO FILLER BLOCK.

ABUTMENTS ELEVATIONS (BOTT OF GROUT)

ABT	POINT 1	2	3	4	5	6	7
A	53.05	53.11	53.17	53.23	53.29	53.35	53.41
B	59.09	59.15	59.21	59.27	59.33	59.39	59.45
Aa	52.57	52.70	52.83	52.96	53.09	53.22	53.35
Ba	58.61	58.74	58.87	59.00	59.13	59.26	59.39

① For revised elev of Abut see sheet Nº 76a.

BACK & WING WALLS SHALL NOT BE PLACED UNTIL SUPERSTRUCTURE IS IN PLACE.

1 1/8"φ HOLES FOR 3/4"φ×12" BOLTS W 5/8 H. HEX NUT & WASHER

ELEVATION OF ABT "Aa","B"

SCALE 1/4" = 1'-0"

NOTE
MAX SOIL PRESSURE 10 K.S.F.

Note:
THE BASE OF THE FOOTING MAY BE ORDERED BY THE ENGINEER TO BE 1'-0" HIGHER OR 2'-0" LOWER WITHOUT ALTERATIONS IN DESIGN IF NECESSARY TO PROVIDE A PROPER FOUNDATION.

SECTION 2-2

REINFORCEMENT OF CAP NOT SHOWN, SEE SECT 3-3 OR 4-4

SECTION 3-3

SECTION 4-4

SECTION 1-1

SCALE 1/4" = 1'-0"

SECTION 5-5

BASE PLATE LOCATION

BAR LIST FOR ABT'S "Aa" AND "B"

MARK	TYPE	X	LENGTH	# REQ'D	SIZE
A801	STR	–	7'-6"	114	#8
A502	BENT	–	7'-0"	42	#5
A503	STR	For "B"	23'-6"	21	#5
A504	"	"Aa"	16'-11"	21	#5
A405	"	–	6'-0"	16	#4
A1006	"		45'-0"	26	#10
A1007	"		19'-0"	16	#10
A908	"	Aa	16'-11"	18	#9
A409	BENT		8'-5"	52	#4
A410	STR		24'-6"	16	
A411	BENT		10'-9"	92	
A412	STR	–	27'-6"	16	
A413	BENT	7'-8"	14'-4"	2	
A414	"	6'-4"	13'-0"	2	
A415	"	5'-8"	11'-8"	2	
A416	"	5'-0"	10'-4"	2	
A417	"	4'-4"	9'-0"	2	
A418	"	3'-8"	7'-8"	2	
A419	STR	–	5'-6"	8	
A420	BENT	2'-6	8'-1"	6	
A421	"	2'-7	8'-4"	6	
A422	"	2'-9	8'-7"	6	
A423	"	2'-10	8'-10	6	
A424	"	3'-0	9'-1"	6	
A425	"	3'-1	9'-4"	6	
A426	"	3'-3	9'-7"	6	
A427	"	3'-4	9'-10"	6	
A428	"	3'-6	10'-1"	6	
A429	"	3'-7	10'-4"	6	
A430	"	3'-9	10'-7"	3	
A431	"	3'-10	10'-10"	3	
A432	"	4'-0	11'-1"	3	
A433	"	4'-1	11'-4"	3	
A434	"	–	5'-0"	68	
A435	STR	–	33'-6"	4	#4
A636	STR	–	7'-6"	60	#6
A637	STR	–	9'-0"	48	#6
A838	STR	–	9'-0	90	#8
A939	BENT	–	7'-0"	36	#9
A940	STR "B"		23'-6	18	#9

BAR SUMMARY ABTS "Aa" AND "B"

			TOTAL	ABT "Aa"	ABT "B"
2120	2215.8	#4 @ .0668	2920	1416	1504
502	541	#5 @ 1.043	1193	524	669
441	441	#6 @ 1.502	1324	662	662
833	833	#8 @ 2.670	4448	2224	2224
431	549	#9 @ 3.400	3332	1465	1867
737	737	#10 @ 4.303	6342	3171	3171
1% OVERRUN			196	93	103
TOTAL			19755	9555	10200

QUANTITIES FOR ABT "Aa" & "B"

ITEM		QUANTITIES ABT "Aa"	ABT "B"	TOTAL	UNIT
REINFORCEMENT		9555	10200	19755	lbs.
COMMON EXCAVATION (STR)		115	193	308	Cu. Yd.
ROCK " "		12	12	24	"
CLASS A CONCRETE	FOOTINGS	21.0	21.0	42.0	"
	COLUMNS	11.4	18.0	29.4	"
	BEAM & BACK WALL	22.0	21.0	43.0	"
STRUCTURAL BACKFILL CLASS I		92.0	164.0	256.0	"
MECH TAMPING		13.0	24.0	37.0	Hrs
14- BRG ℙ, FIX 1'-6"×10"×1 3/4"		625	625	1,250	lbs.
14- BASE ℙ, 2'-2"×1'-5"×1/2"		335	335	670	"
56-3/4"φ SWEDGED ANCH B ×1'-6" lg		72	72	144	"
6-3/8"φ×12" BOLTS, ATTACHINGS FOR HR.		28	28	56	"
4×12 TIMBER FILLER		45.5	45.5	91	Lin Ft
60-1/2"φ 18" BOLTS		40.0	40.0	80	lbs.

FOR GENERAL NOTES, SEE SHEET No 1.

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

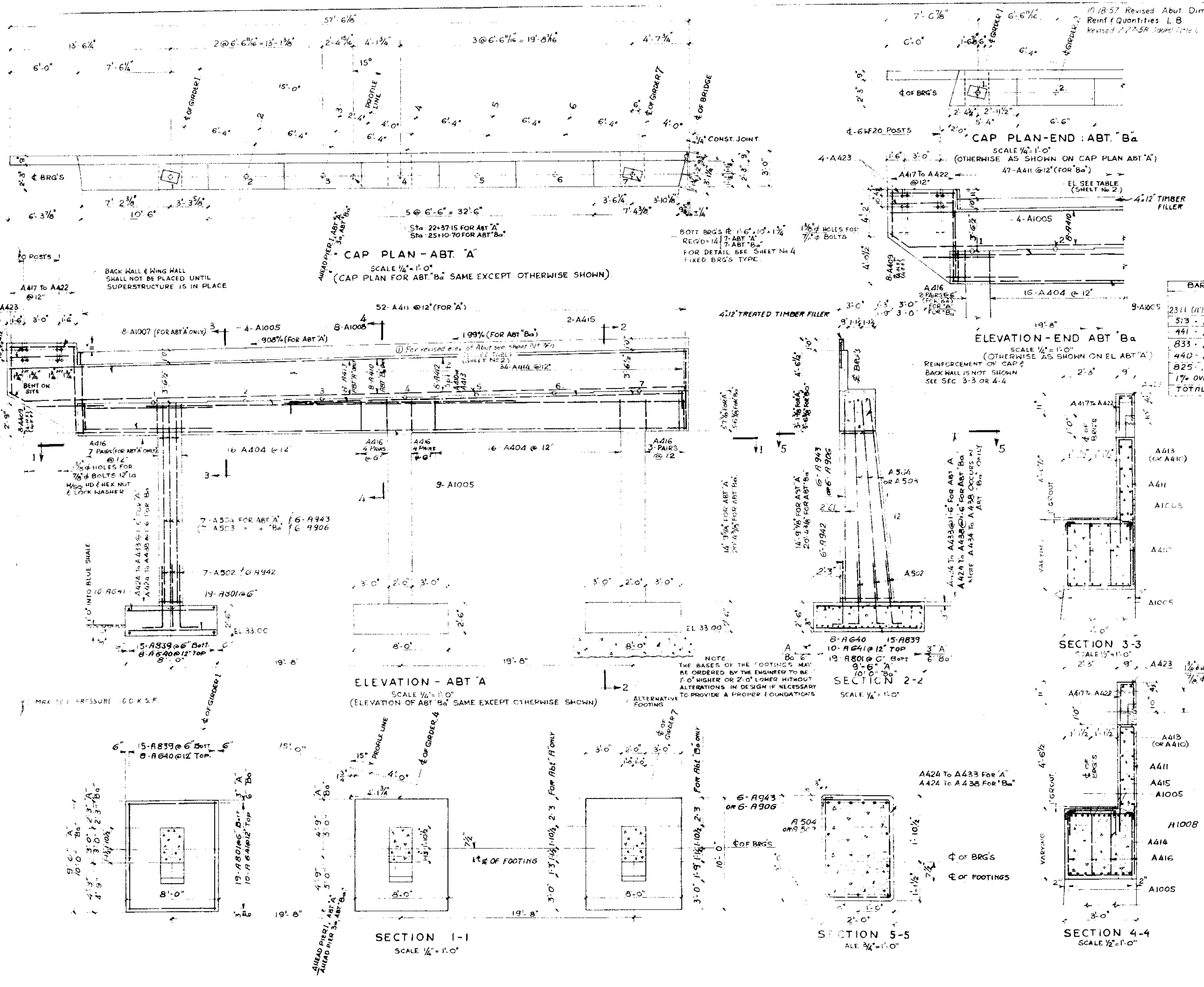
CIMARRON INTERCHANGE
FOUNTAIN CREEK
STRUCTURE I-17-DI
ABUTMENT "Aa","B"

L [illegible] & ASSOCIATE
CONSULTING ENGINEER

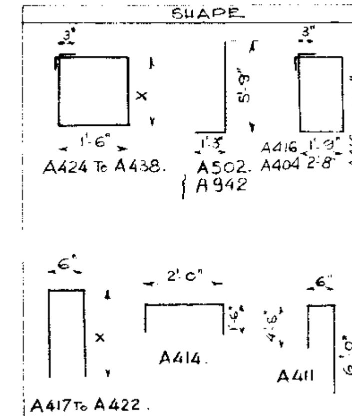
DESIGNED	SCALE: AS NOTED	SHEET No. 2
DRAWN	DATE [illegible]	No. of SHEETS 6
CHECKED		

10 18 57 Revised Abut. Dimensions, Abut Reinf & Quantities L.B.
Revised 2-27-58 [illegible]

FED. ROAD DIV No.	DISTRICT	PROJECT No.	SHEET No.
9	COLO	I 092-2(5)	44



BAR LIST FOR ABT "A", "Ba"



MARK	TYPE	X	LENGTH	No. Req'd	SIZE
A801	STR	-	7'-6	114	#8
A502	BENT	-	7'-0"	42	#5
A503	STR ABT "Ba" ONLY	-	23'-0"	21	#5
A504	STR ABT "A" ONLY	-	17'-5"	21	#5
A1005	STR	-	45'-0"	26	#10
A906	STR	ABT Ba	23-0	18	#9
A1007	STR ABT "A" ONLY	-	11'-0"	8	#10
A1008	STR	-	19'-0"	16	#10
A409	STR	-	6'-0"	16	#4
A410	STR ABT "Ba" ONLY	-	27'-8"	8	
A411	BENT	-	10'-3"	52 "A" 47 "Ba"	
A412	STR	-	23'-9"	16	
A413	STR ABT "A" ONLY	-	33'-7"	8	
A414	BENT	-	5'-0"	68	
A415	STR	-	33'-6"	4	
A416	BENT	-	8'-5"	36 "A" 26 "Ba"	
A417		7'-0"	14'-4"	2	
A418		6'-4"	13'-0"	2	
A419		5'-8"	11'-8"	2	
A420		5'-0"	10'-4"	2	
A421		4'-4"	9'-0"	2	
A422	BENT	3'-8"	7'-8"	2	
A423	STR	-	5-6"	8	
A424	BENT	2'-6"	8'-1"	6	
A425		2'-7½"	8'-4"	6	
A426		2'-9"	8'-7"	6	
A427		2'-10½"	8'-10"	6	
A428		3'-0"	9'-1"	6	
A429		3'-1½"	9'-4"	6	
A430		3'-3"	9'-7"	6	
A431		3'-4½"	9'-10"	6	
A432		3'-6"	10'-1"	6	
A433		3'-7½"	10'-4"	6	
A434		3'-9"	10'-7"	3	
A435		3'-10½"	10'-10"	3	
A436		4'-0"	11'-1"	3	
A437		4'-1½"	11'-4"	3	
A438	BENT	4'-3"	11'-7"	3	#4
A839	STR	-	9'-0"	30	#8
A640	STR	-	9'-0"	46	#6
A641	STR	-	7'-6	60	#6
A942	BENT	-	7'-0	36	#9
A943	STR	ABT A	17'-5"	18	#9
A404	Bent	-	10'-8	32 "A" 32 "Ba"	#4

BAR SUMMARY ABT "A" AND "Ba"	TOTAL	ABT "A"	ABT "Ba"
2311 (A), 2292 (Ba) Lin Ft #4 @ 0.668	3075	1544	1531
513 ", 630 " #5 @ 1.043	1192	535	657
441 ", 441 " #6 @ 1.502	1324	662	662
833 ", 833 " #8 @ 2.670	4448	2224	2224
440 ", 540 " #9 @ 3.400	3332	1496	1836
825 ", 737 " #10 @ 4.303	6722	3550	3172
1% OVERRUN	198	99	99
TOTAL	20290	10110	10180

QUANTITIES FOR ABT A AND Ba

ITEM		QUANTITIES ABT "A"	QUANTITIES ABT "Ba"	TOTAL	UNIT
REINFORCEMENT		10110	10180	20290	LBS
COMMON EXCAVATION (STR)		115.0	245.0	360.0	CU YD
ROCK EXCAVATION (STR)		12.0	12.0	24.0	CU YD
CLASS "A" CONCRETE	FOOTINGS	21.0	21.0	42.0	"
	COLUMNS	11.8	17.6	29.4	"
	BEAM & BACK WALL	23.0	21.6	44.6	"
STRUCTURAL BACK FILL CLASS I		89.0	208.0	297.0	"
MECK TAMPING		13.0	30.0	43.0	HR
14-BEARING PL FIXED (1'-6"×10"×1¾")		625	625	1250	LBS
14-BASE PL (2'2"×1'1"×½")		335	335	670	"
56-¾"φ SWEDGED ANCHOR BOLTS (1'-6" Lg)		72	72	144	"
16-⅞"×12" BOLTS (AT WINGS)		28	28	56	"
4"×12" TIMBER FILLER		51.5	45.5	97	Lin Ft
65-½"φ 18" BOLTS		47.0	40.0	87	lbs

NOTE: FOR LOCATION OF ABT "A" & "Ba" AND BASE PLATE SEE SHEET No 2

FOR GENERAL NOTES, SEE SHEET No 1.

COLORADO DEPARTMENT OF HIGHWAY
COLORADO SPRINGS FREEWAY

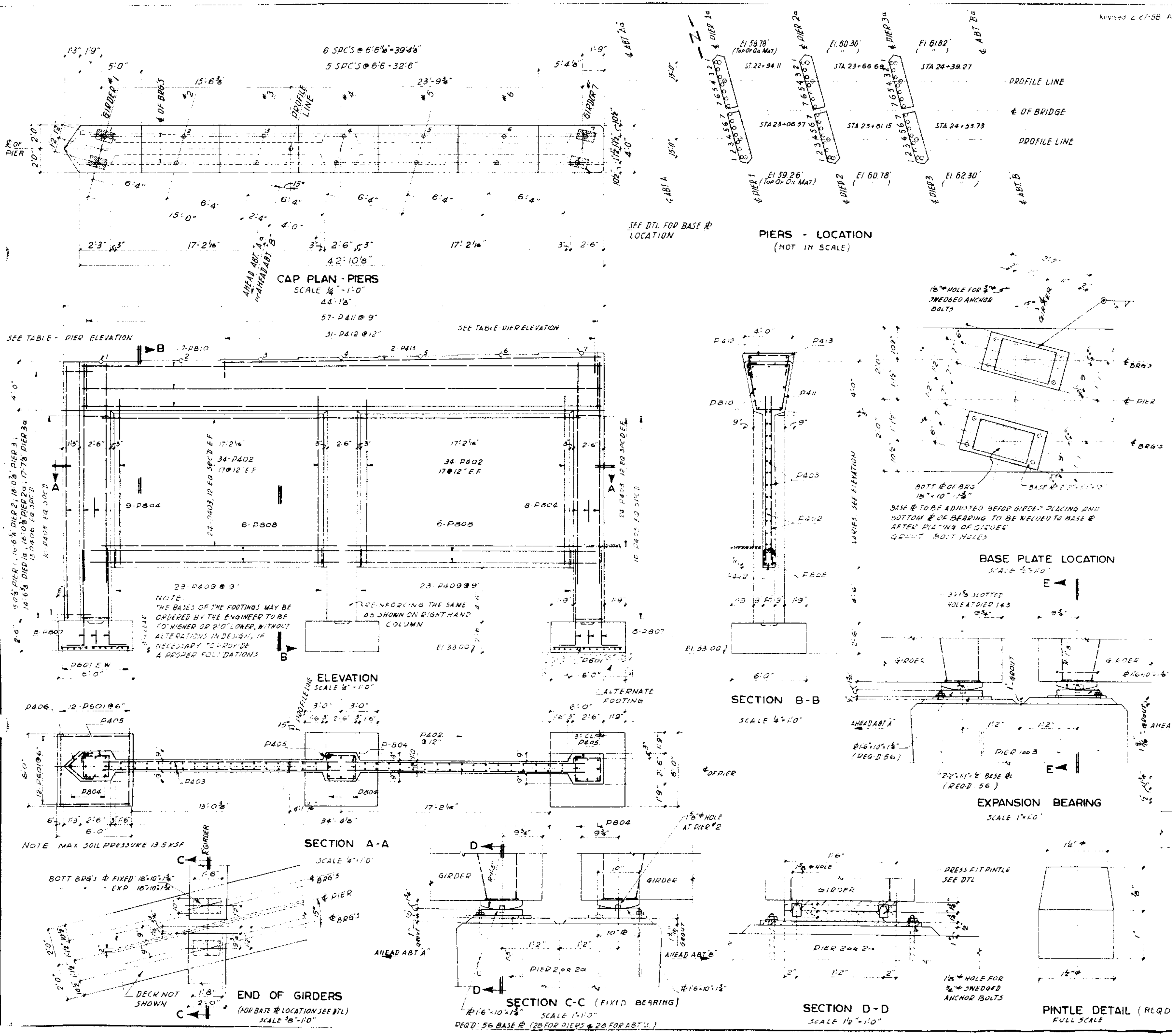
CIMARRON INTERCHANGE
FOUNTAIN CREEK
STRUCTURE I-17-DI
ABUTMENT "A", "Ba"

L. BODUROFF & ASSOCIATE
CONSULTING ENGINEER

DESIGNED [illegible]	SCALE AS NOTED	SHEET No 3
DRAWN J	DATE 4 5 57	No OF SHEETS 6
CHECKED N.N.		

Revised [illegible] Added Note [illegible] RKA

FEDERAL DIV. Nº	DISTRICT	PROJECT Nº	SHEET Nº
9	COLO.	I 092-2(5)	45



CAP PLAN - PIERS
SCALE ¼" = 1'-0"

PIERS - LOCATION
(NOT IN SCALE)

ELEVATION
SCALE ¼" = 1'-0"

SECTION B-B
SCALE ¼" = 1'-0"

SECTION A-A
SCALE ¼" = 1'-0"

BASE PLATE LOCATION

EXPANSION BEARING
SCALE 1" = 1'-0"

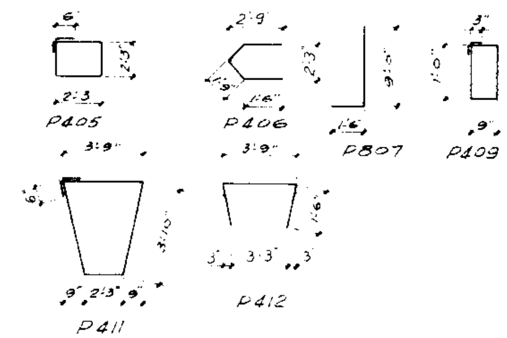
END OF GIRDERS
(FOR BASE ℗ LOCATION SEE DTL)
SCALE ⅜" = 1'-0"

SECTION C-C (FIXED BEARING)
SCALE 1" = 1'-0"
REQ'D: 56 BASE ℗ (28 FOR PIERS & 28 FOR ABT'S)

SECTION D-D
SCALE 1½" = 1'-0"

PINTLE DETAIL (REQ'D - 168 PIERS, 56 ABT'S)
FULL SCALE

BAR LIST FOR 6 PIERS



MARK	TYPE	LENGHT	Nº REQ'D	SIZE
P601	STR	5'-6"	432	#6
P402	"	13'-6"	408	#4
P403	"	13'-0"	288	#4
P804	"	18'-3"	150	#8
P405	BENT	9'-6"	180	#4
P406	"	6'-4"	78	#4
P807	"	10'-5"	144	#8
P808	STR	20'-6"	72	#8
P409	BENT	3'-9"	276	#4
P810	STR	22'-6"	42	#8
P411	BENT	14'-3"	342	#4
P412	"	6'-9"	186	#4
P413	STR	31'-0"	12	#4

PIER ELEVATIONS (TOP OF CONCRETE)

PIER	POINT 1	2	3	4	5	6	7
1	54.53	54.59	54.65	54.71	54.77	54.83	54.89
2	56.05	56.11	56.17	56.23	56.29	56.35	56.4[illegible]
3	57.57	57.63	57.69	57.75	57.81	57.87	57.93
1a	54.05	54.18	54.31	54.44	54.57	54.70	54.83
2a	55.57	55.70	55.83	55.96	56.09	56.22	56.35
3a	57.09	57.22	57.35	57.48	57.61	57.74	57.8[illegible]

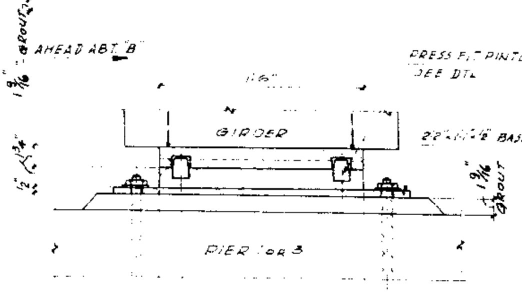
① For revised [illegible] see sheet Nº 76a

BAR SUMMARY FOR 6 PIERS

20 720 LIN FT #4 @ .668# = 13 840 lbs
2 376 " #6 @ 1.502 " = 3 568 "
7 499 " #8 @ 2.67 " = 20 022 "
1% OVERRUN = 370 "
TOTAL 6 PIERS = 37 800 "
" 1 " = 6 300 "

QUANTITIES FOR 6 PIERS

ITEM	PIER 1	2	3	1a	2a	3a	TOTAL	UNIT
REINFORCING BARS	6 300	6 300	[illegible]	6 300	6 300	6 300	37 800	lbs
[illegible] EXCAVATION [illegible]	50	50	50	50	50	50	300	Cu Yd
ROCK	5	5	5	5	5	5	30	"
CLASS "A" FOOTINGS	10	10	10	10	10	10	60	"
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
CONCRETE BEAM	[illegible]	[illegible]	[illegible]	23.5	23.5	23.5	365	
STRUCTURAL BACKFILL [illegible]	32.5	32.5	32.5	32.5	32.5	32.5	195	"
MECH. TAMPING	5	5	5	5	5	5	30	HR
28 BEAR ℗ [illegible]		[illegible]	–	–	1 250	–	2 500	lbs
84 - BASE ℗ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	"
56 BRG ℗ - EXP [illegible]	894	–	894	894	–	894	3576	
336 - ¾" ⌀ [illegible] SWEDGED A.B.	143	143	143	143	143	143	858	"



SECTION E-E
SCALE 1½" = 1'-0"

FOR GENERAL NOTES, SEE SHEET Nº 1

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

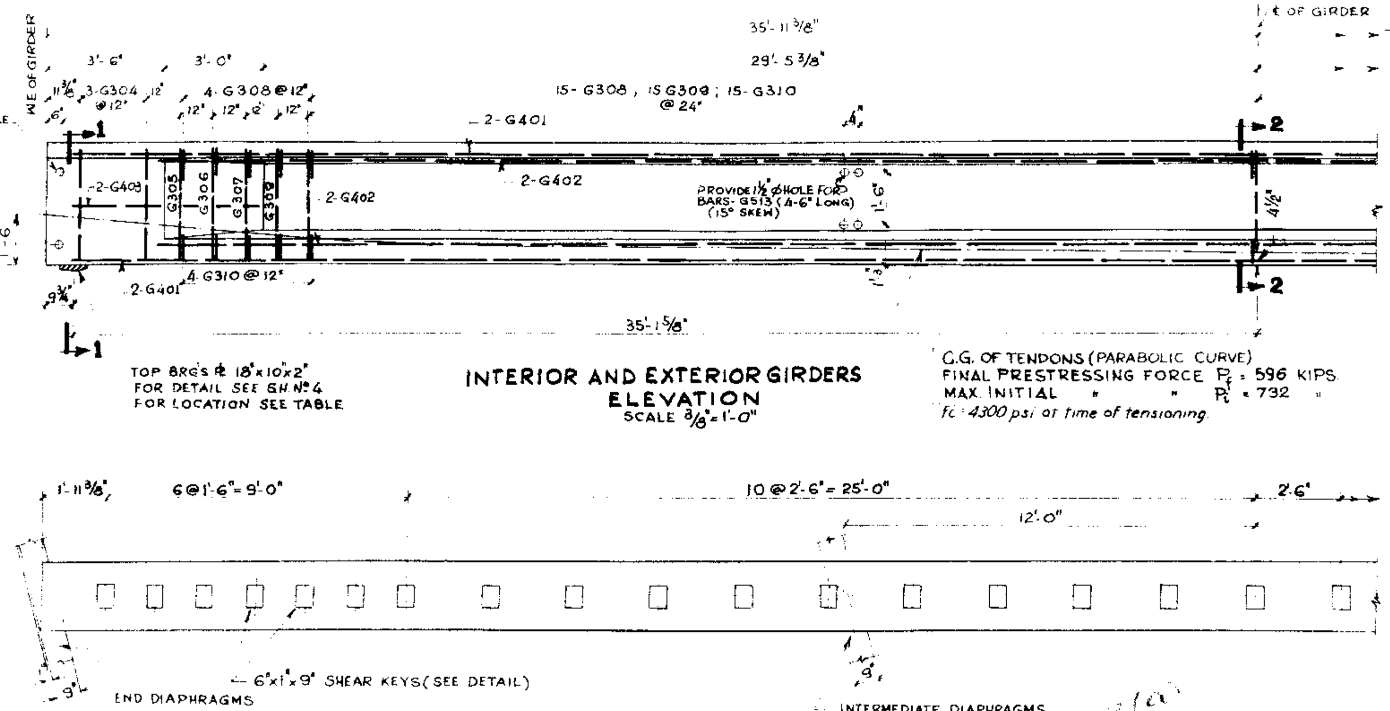
CIMARRON INTERCHANGE
FOUNTAIN CREEK
STRUCTURE I-17-DI
PIERS

L. HODUROFF & ASSOCIATE
CONSULTING ENGINEER

DESIGNED: J.N.	SCALE: AS NOTED	SHEET Nº 4
DRAWN: N.M.D.		
CHECKED: N.N.	DATE: 4-5-57	Nº OF SHEETS 6

Revision 10-18-57 Prestressing Forces L.B.
Revised 2-27-58 Added Note ① F.C.

FED. ROAD DIV. No.	DISTRICT	PROJECT No.	SHEET No.
9	COLO	I 092-2(5)	46



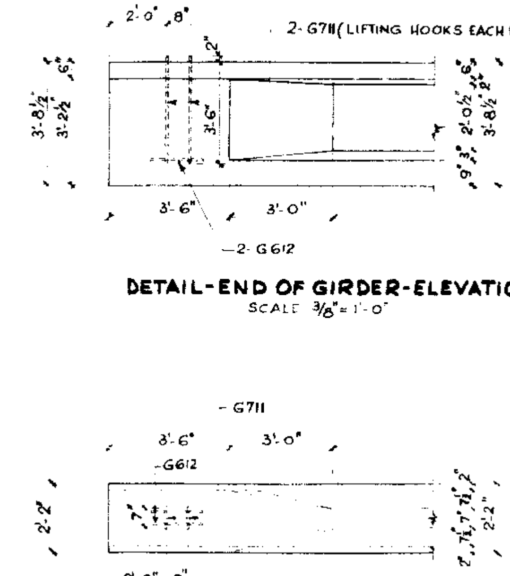
TOP BRG'S ℞ 18"x10"x2"
FOR DETAIL SEE SH. No. 4
FOR LOCATION SEE TABLE

INTERIOR AND EXTERIOR GIRDERS ELEVATION
SCALE 3/8" = 1'-0"

C.G. OF TENDONS (PARABOLIC CURVE)
FINAL PRESTRESSING FORCE P_f = 596 KIPS
MAX. INITIAL " " P_i = 732 "
f_c = 4300 psi at time of tensioning

INTERIOR AND EXTERIOR GIRDERS PLAN
SCALE 3/8" = 1'-0"

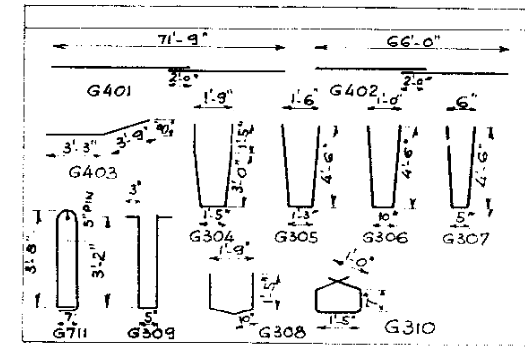
① NOTE: FOR DETAIL OF STD GIRDER SEE SHEET No. 63a.



DETAIL - END OF GIRDER - ELEVATION
SCALE 3/8" = 1'-0"

PLAN - END OF GIRDER
SCALE 3/8" = 1'-0"

BAR LIST FOR PRESTRESSED GIRDERS (ALL DIMENSIONS OUT TO OUT)



MARK	TYPE	LENGTH	No. REQ'D	SIZE
G401	STR.	73'-9"	224	#4
G402	"	68'-0"	224	#4
G403	BENT	7'-0"	224	#4
G304	"	10'-1"	336	#3
G305	"	10'-1"	112	#3
G306	"	9'-8"	112	#3
G307	"	9'-3"	112	#3
G308	"	4'-6"	2072	#3
G309	"	7'-0"	1624	#3
G310	"	4'-3"	2072	#3
G711	"	8'-6"	224	#7
G612	STR.	2'-0"	224	#6
G513	"	4'-6"	672	#5

BAR SUMMARY FOR 56 GIRDERS

36,136 LIN FT #3 @ .376# LIN FT	= 13,587 LBS
33,320 " #4 @ .668 "	= 22,258 "
3,024 " #5 @ 1.043 "	= 3,154 "
448 " #6 @ 1.502 "	= 673 "
1,904 " #7 @ 2.044 "	= 3,892 "
1% OVERRUN	= 436 "
TOTAL	= 44,000 "

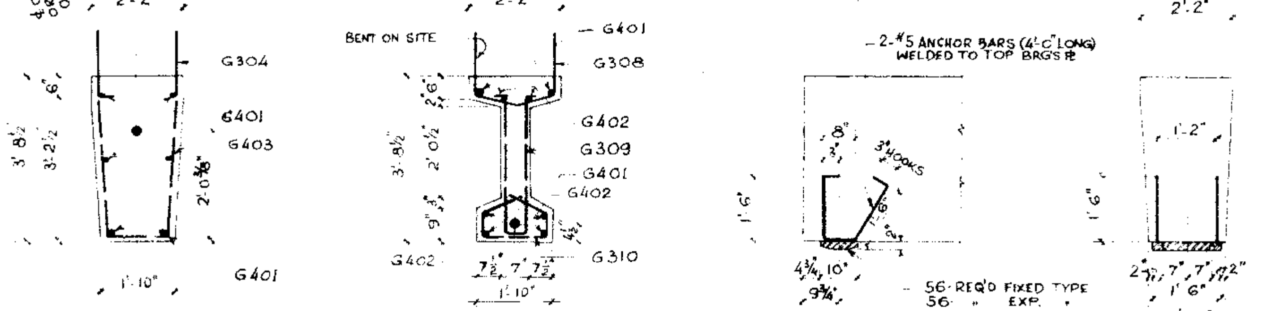
Ex. 6.2.D 629

LOCATION OF TOP BEARING PLATES	GIRDER SPAN 1 W.E.	1 E.E.	2 W.E.	2 E.E.	3 W.E.	3 E.E.	4 W.E.	4 E.E.	TOTAL
No. REQ'D - FIXED	14			14	14			14	56
No. REQ'D - EXP.		14	14	--	--	14	14	--	56

W.E. - DENOTES WESTEND OF GIRDER
E.E. " EASTEND "

QUANTITIES FOR 56 GIRDERS

ITEM	QUANTITIES	UNIT
CONCRETE CLASS "P"	690	CU. YD.
REINFORCING STEEL + 1% OVERRUN	44000	LBS
56 - TOP BEARING ℞ - FIXED	5026	"
56 - " " " - EXP.	5026	"
112 - #5 ANCHOR BARS 4'-0" LONG	467	"



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

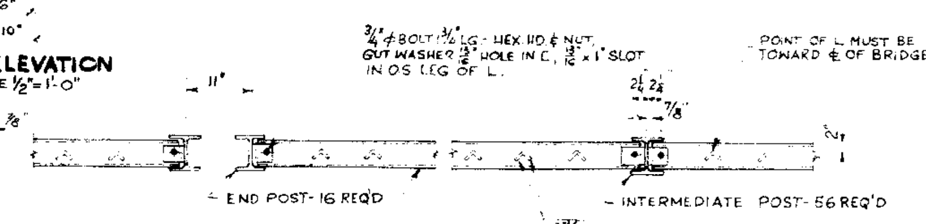
SECTION 2-2
SCALE 1/2" = 1'-0"

ELEVATION END OF GIRDER
SCALE 1/2" = 1'-0"

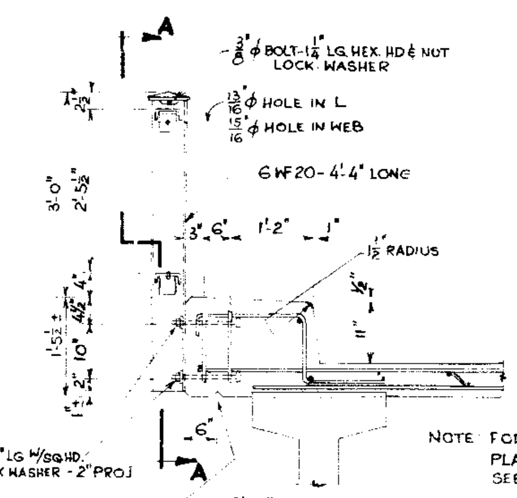
SIDE ELEVATION
SCALE 1/2" = 1'-0"

NOTES
1. CONCRETE FOR THE PRECAST GIRDERS TO BE 5,000#/□" CYLINDER STRENGTH AT 28 DAYS, f_c = 4300#/□" AT TIME OF TENSION
2. HIGH TENSILE STEEL FOR PRESTRESSING UNITS TO HAVE MIN. ULTIMATE STRENGTH OF 220,000#/□" AND MIN. ELONGATION AT BREAKING POINT OF 4% ON 10" LONG TESTING WIRE
3. THE WATER-CEMENT RATIO OF THE CONCRETE FOR GIRDERS TO BE MAX. 0.5 AND SLUMP NOT MORE THAN 3"
4. ALL EXPOSED SURFACES OF BEARING PLATES ALUMINUM SPRAYED

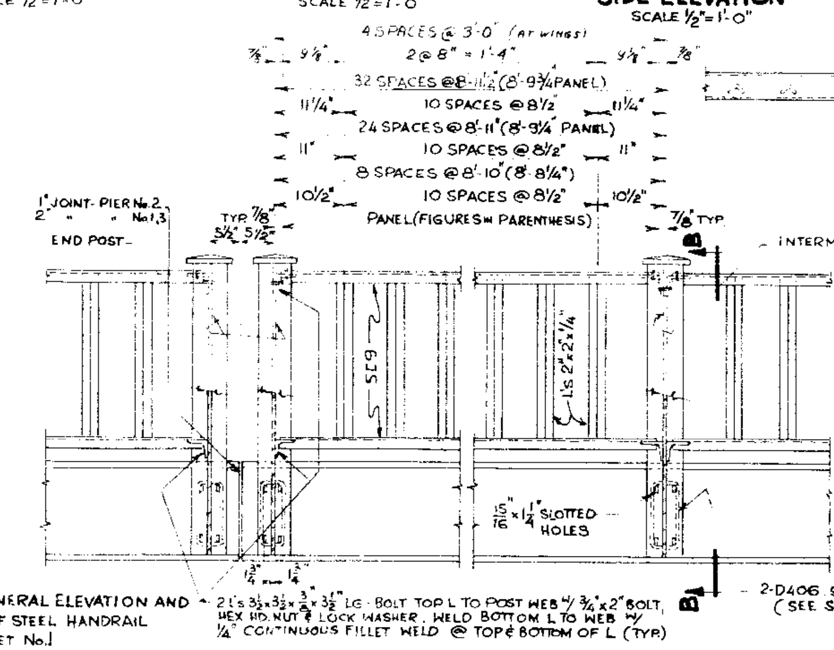
NOTE.
DETAILS FOR EXTERIOR GIRDERS AND INTERIOR GIRDERS ARE ALIKE EXCEPT FOR SPECIAL TREATMENT REQUIRED ON THE OUTSIDE FACE OF EXTERIOR GIRDERS. HOLES FOR G513 BARS SHOULD BE GROUTED AFTER PLACING OF BARS



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



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



NOTE: FOR GENERAL ELEVATION AND PLAN OF STEEL HANDRAIL SEE SHEET No. 1

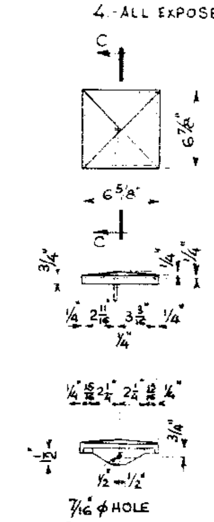
STEEL HANDRAIL

2 L's 3 1/2 x 3 1/2 x 3/8 x 3 1/2" LG. - BOLT TOP L TO POST WEB 3/4" x 2" BOLT, HEX. HD. NUT & LOCK WASHER. WELD BOTTOM L TO WEB W/ 1/4" CONTINUOUS FILLET WELD @ TOP & BOTTOM OF L (TYP.)

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

QUANTITIES FOR STEEL RAILING

ITEM	QUANTITIES	UNIT
80 - 6 WF20 POSTS, 4'-4" LONG	6950	LBS.
64 - 5 C9, 8'-9 3/4" LONG	5075	"
48 - 5 C9, 8'-9 1/4" LONG	3775	"
16 - 5 C9, 8'-8 1/4" LONG	1252	"
716 - L 2"x2"x1/4", 2'-5" LONG	5510	"
272 - L 3 1/2"x3 1/2"x3/8", 3 1/2" LONG	674	"
80 - CAST IRON CAPS	422	"
8 - 5 C9, 2'-10 1/4"	206	"
PLUS 1/2% PAINT	120	"
TOTAL	23984	"



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

CAST IRON CAP FOR POST
72 - REQ'D.

FOR GENERAL NOTES, SEE SHEET No. 1.

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

CIMARRON INTERCHANGE
FOUNTAIN CREEK
STRUCTURE I-17-DI

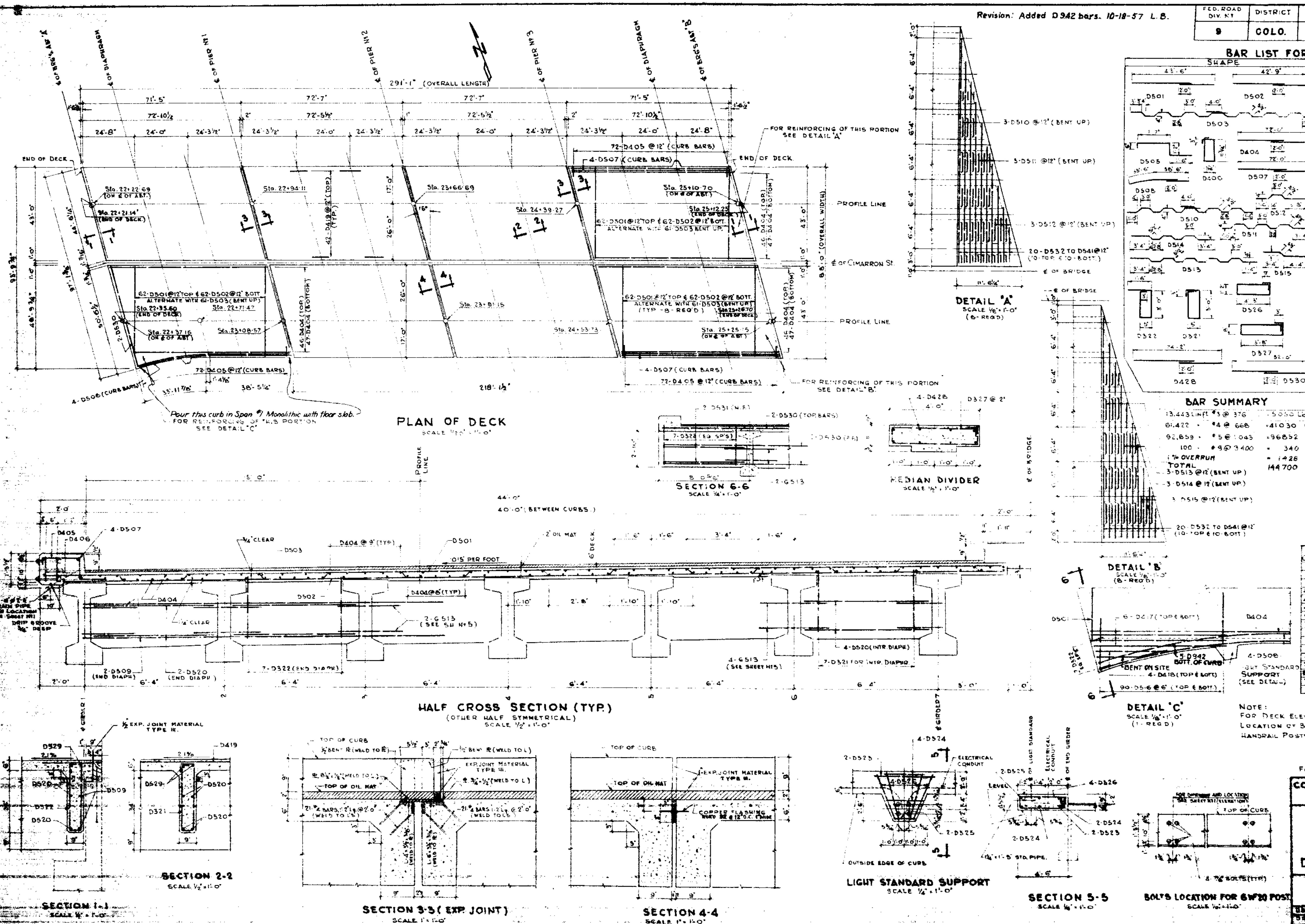
GIRDERS AND HANDRAIL

L. BODUROFF & ASSOCIATE
CONSULTING ENGINEER

DESIGNED: J.N.	SCALE: AS NOTED	SHEET No. 5
DRAWN: J.N.		
CHECKED: N.N.	DATE: 4-5-57	No. OF SHEETS 6

Revision: Added D942 bars. 10-18-57 L.B.

FED. ROAD DIV. Nº	DISTRICT	PROJECT Nº	SHEET Nº
9	COLO.	I 092-2(5)	47



BAR LIST FOR DECK

MARK	TYPE	LENGTH	[illegible]	SIZE
D501	STR.	45'-6"	496	#5
D502	"	44'-9"	496	#5
D503	BENT	49'-8½"	488	#5
D404	STR.	74'-0"	744	#4
D505	BENT	4'-6"	576	#5
D406	"	3'-0"	144	#4
D507	STR.	74'-0"	26	#5
D508	BENT	74'-9"	4	#5
D509	STR.	42'-6"	30	#5
D510	BENT	37'-7"	24	#8
D511	"	21'-5"	24	#5
D512	"	8'-7"	24	#5
D513	"	31'-5½"	24	#5
D514	"	20'-3½"	24	#5
D515	"	8'-1½"	24	#5
D516	STR.	9'-0"	96	#5
D417	"	24'-0"	6	#4
D418	"	14'-0"	4	#4
D419	"	5'-0"	672	#4
D520	"	5'-6"	768	#5
D321	BENT	7'-0"	672	#3
D322	"	9'-0"	679	#3
D523	STR.	5'-6"	4	#5
D524	"	3'-6"	8	#5
D525	"	2'-0"	4	#5
D526	BENT	11'-0"	8	#5
D327	"	9'-0"	292	#3
D428	STR.	74'-2"	32	#4
D529	"	44'-0"	62	#5
D530	"	52'-6"	4	#5
D531	"	7'-6"	2	#5
D532	"	40'-6⅝"	32	#5
D533	"	36'-9	32	#5
D534	"	32'-8⅝"	32	#5
D535	"	29'-2¼"	32	#5
D536	"	25'-5⅝"	32	#5
D537	"	21'-8"	32	#5
D538	"	17'-10⅝"	32	#5
D539	"	14'-1¼"	32	#5
D540	"	10'-3⅝"	32	#5
D541	"	6'-6"	32	#5
D942	"	20'-0"	5	#9

BAR SUMMARY

13,443 Lin.Ft.	#3 @ 376	= 5050 Lbs.	
61,422 "	#4 @ 668	= 41030 "	
92,859 "	#5 @ 1.043	= 96852 "	
100 "	#9 @ 3.400	= 340	
1% OVERRUN		= 1428	
TOTAL		144700	

QUANTITIES FOR DECK

ITEM	[illegible]
Class "A" Concrete, incl. [illegible]	[illegible]
Reinforcing Steel (1% Overrun)	[illegible]
[illegible] Bolts	779
352-#4 Anchor Bars, 1'-2" Long	274
4 ℞ 5⅝"×½"×41'-4"	[illegible]
4 ℞ ¾"×⅜"×(41'-4" & 2'-8")	[illegible]
4 ℞ 5¾"×½"×2'-11"	[illegible]
4 ℞ 8½"×½"×2'-11"	[illegible]
2 ℞ 8½"×½"×6'-0" (Median Divider)	174
2 ℞ 5½"×½"×6'-0"	[illegible]
2 ℞ 5½"×½"×6'-0"	[illegible]
4 L 4"×3½"×5⁄16"×41'-4"	[illegible]
4 L 6"×3½"×⅝"×41'-4"	[illegible]
Sheet Copper (32 oz. per sq. ft.) [illegible]	[illegible]
Electrical Conduit [illegible]	[illegible]
288-1¼"×1'-5" Standard Pipe	[illegible]
8-4"×2'-5" Drain Pipe	[illegible]

NOTE:
FOR DECK ELEVATIONS & LOCATION OF BOLTS FOR HANDRAIL POSTS, SEE SHEET Nº1.

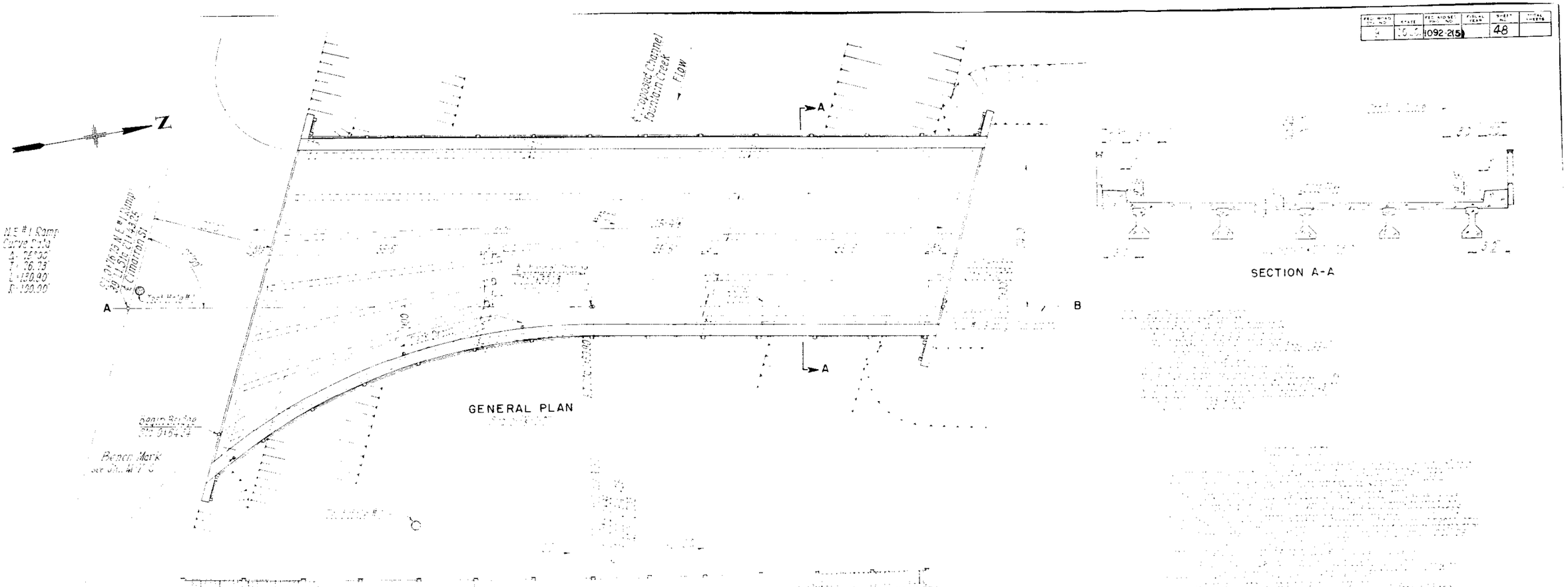
FOR GENERAL NOTES, SEE SHEET [illegible]

COLORADO DE[illegible]
COLORADO SPRINGS [illegible]

CIMARRON INT[illegible]
FOUNTAIN C[illegible]
STRUCTURE [illegible]
DECK PLAN AND [illegible]

L. BODUROFF [illegible]
CONSULTING [illegible]

DESIGNED: [illegible]
DRAWN: [illegible]
CHECKED: [illegible]



FED. ROAD DIV. NO.	STATE	FED. AID SEC. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	COLO.	I092-2(5)		48	

GENERAL PLAN

ELEVATION

SECTION A-A

EXCAVATION AND BACKFILL DIAGRAMS

⑥ Railing and Deck Drains

④ Includes [illegible] for Paint

SUMMARY OF QUANTITIES

[illegible]	ITEM	QUANTITY	UNIT
[illegible]	Structure Excavation [illegible]	[illegible]	[illegible]
[illegible]	Structure Backfill [illegible]	[illegible]	[illegible]
[illegible]	Mechanical Tamping	[illegible]	[illegible]
[illegible]	Treated Bridge Timber	[illegible]	Ft. bm
[illegible]	Class A Concrete	[illegible]	[illegible]
[illegible]	Reinforcing Steel [illegible]	[illegible]	[illegible]
⑤ [illegible]	Structural Steel ~~Railing~~ ⑥	[illegible]	[illegible]
[illegible]	[illegible] (1½)	[illegible]	[illegible]
[illegible]	Steel Pipe* Piling	[illegible]	[illegible]
	Prestressed Concrete Beams		
46pb	35'-0" long	① [illegible]	Beam
46pb	35'-10" to 36'-6"	② 4	Beam
46pb	37'-4" and 39'-4"	③ 2	Beam
46pc	41'-8" and 44'-4"	④ 2	Beam
~~84a~~	~~Deck Drains~~	~~3~~	~~Each~~

* 10¾" O.D. 0.179" wall thickness. Fill with concrete after driving. 10 B.P. 42 may be used as an alternate.

① [illegible] Beams A, 4 Beams B, See Sheet 4.
② [illegible] " C, 1 " D, 1 Beam E.
③ 1 " F and 1 Beam G.
④ 1 " H " 1 " J.

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

FOUNTAIN CREEK N.E. No.1 RAMP

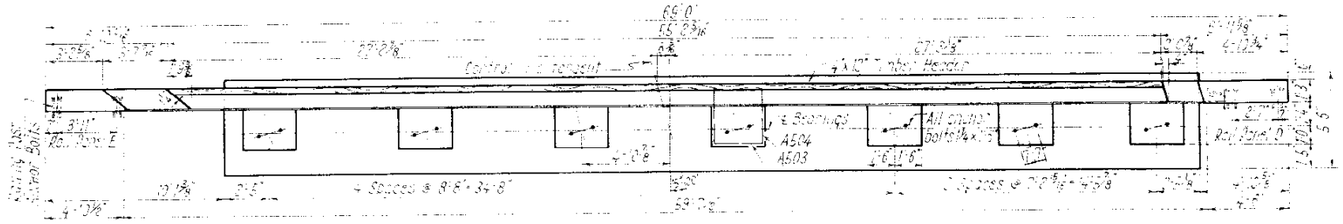
GENERAL PLAN AND ELEVATION

Leo M. Keller

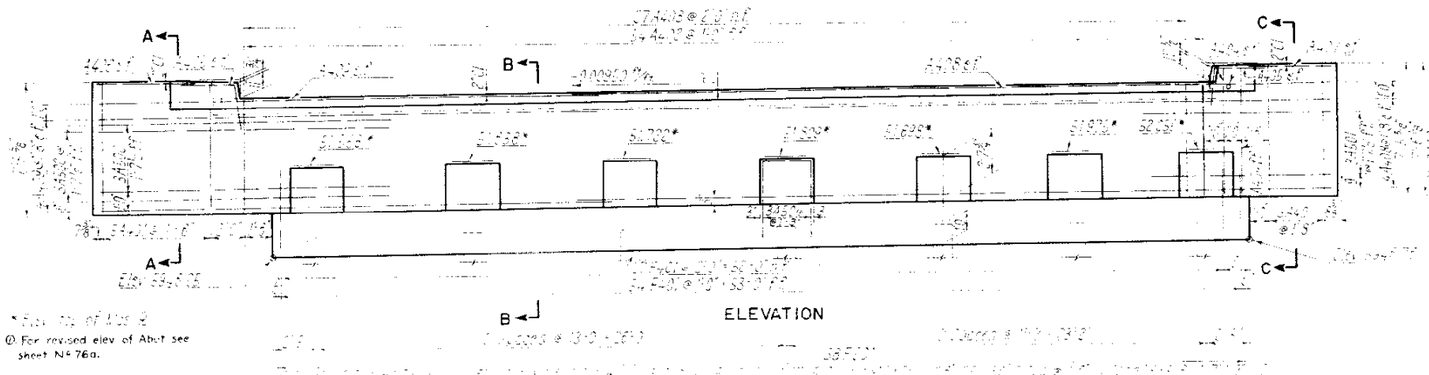
CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS
DENVER, COLORADO

Revised 8-27-58 Added Note ① R.R.A.

		092-216	49		

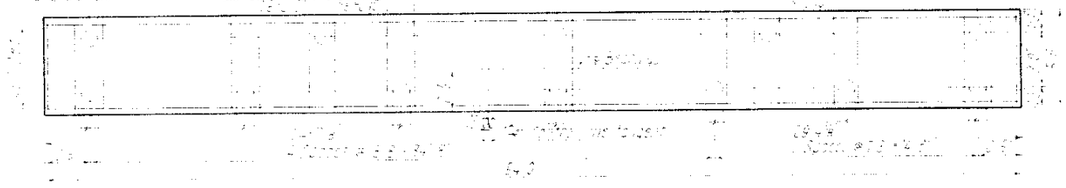


TOP PLAN

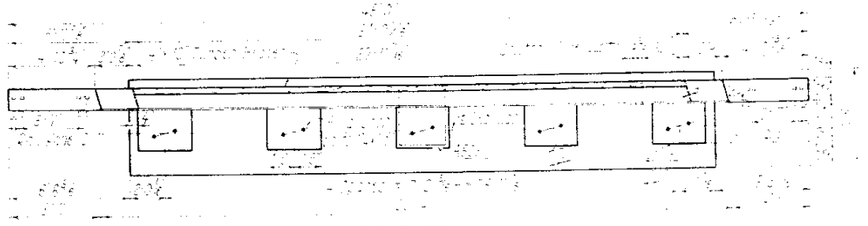


ELEVATION

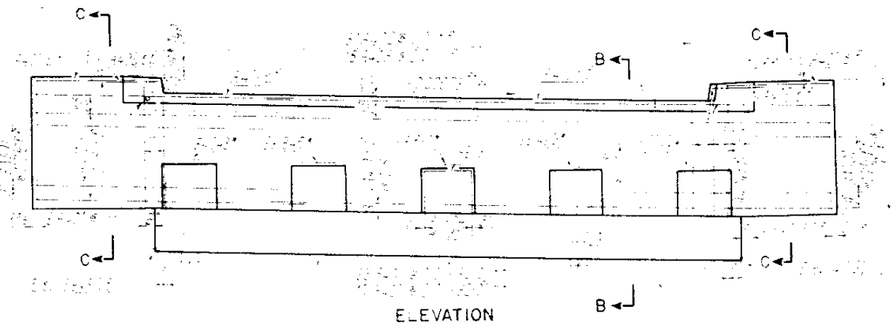
① For revised elev of Abut see sheet No 76a.



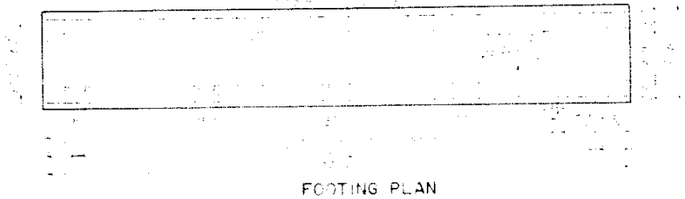
FOOTING PLAN
SOUTH ABUTMENT



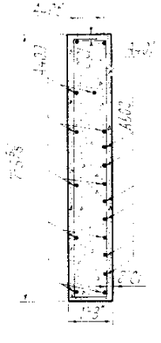
TOP PLAN



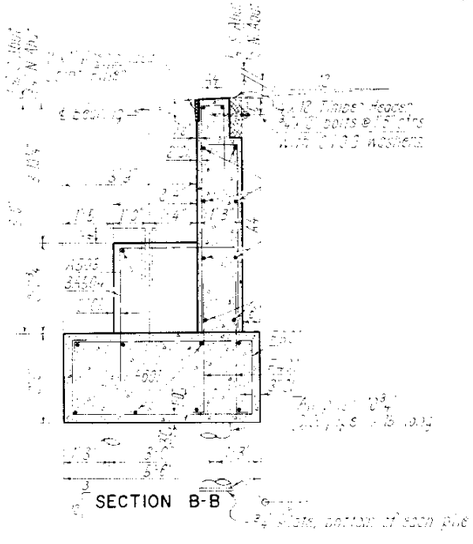
ELEVATION



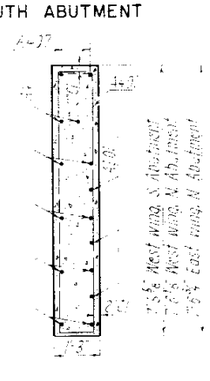
FOOTING PLAN
NORTH ABUTMENT



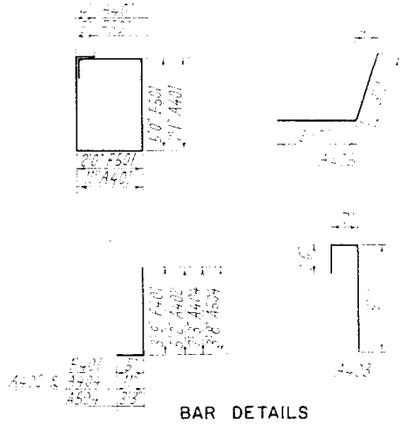
SECTION A-A



SECTION B-B



SECTION C-C



BAR DETAILS

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

FOUNTAIN CREEK N.E. #1 RAMP

ABUTMENTS

CLIFFORD JOHNSON & ASSOCIATES
ENGINEERS

Revised 2-27-58 Added Note ① RRA

			092-215		50

PLAN

ELEVATION

SECTION C-C

SECTION A-A
SOUTH PIER

PLAN

ELEVATION

SECTION B-B
NORTH PIER

PLAN WITHOUT CAP

RAILING LOCATION PLAN

ELEVATION

SECTION G-G

CAST IRON CAP FOR POST

SECTION D-D

SECTION H-H
RAILING AND DECK DRAINS

SECTION E-E

SECTION F-F

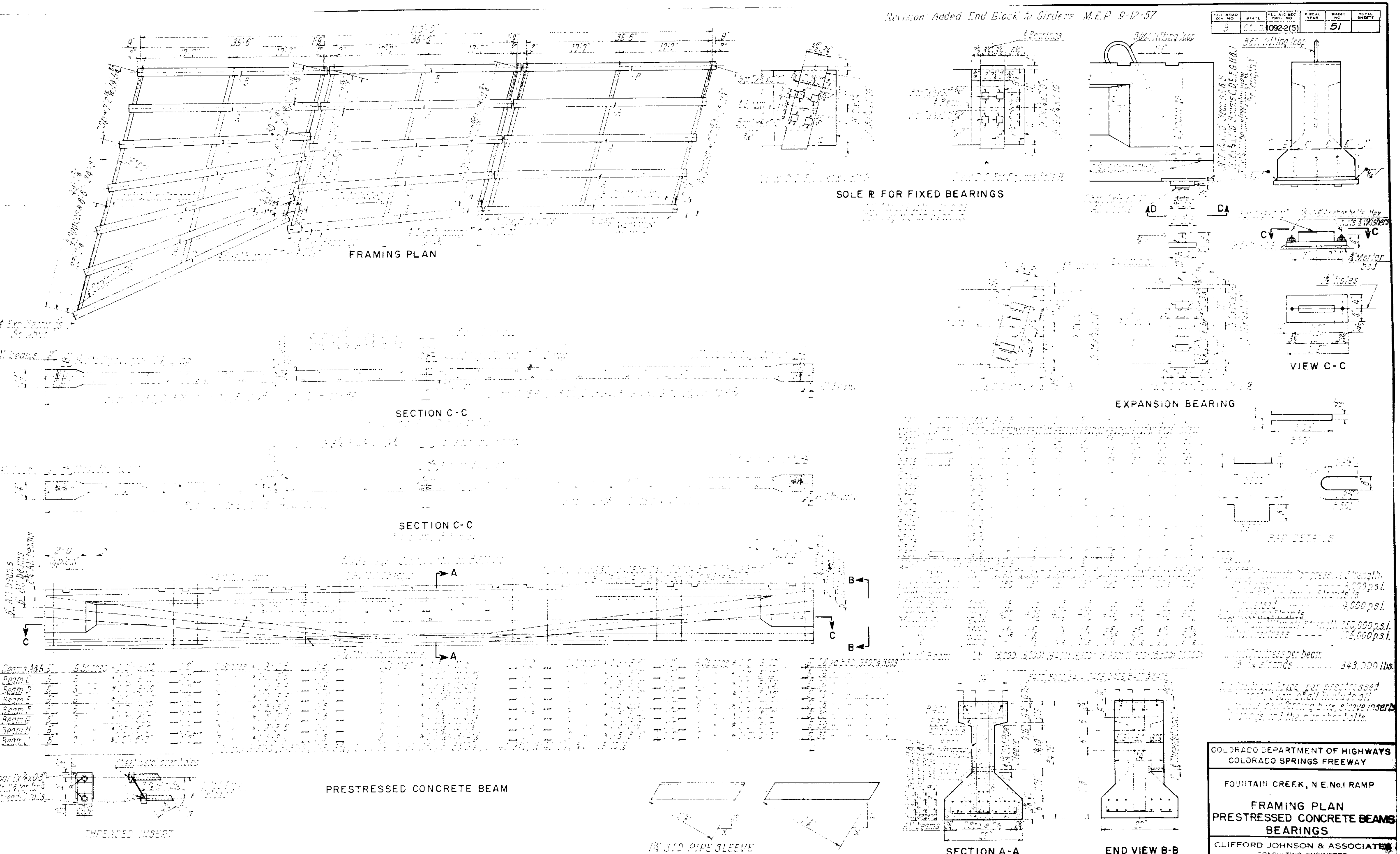
DETAILS

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

FOUNTAIN CREEK, N.E. No. 1 RAMP

PIERS
RAILINGS

CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS



COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

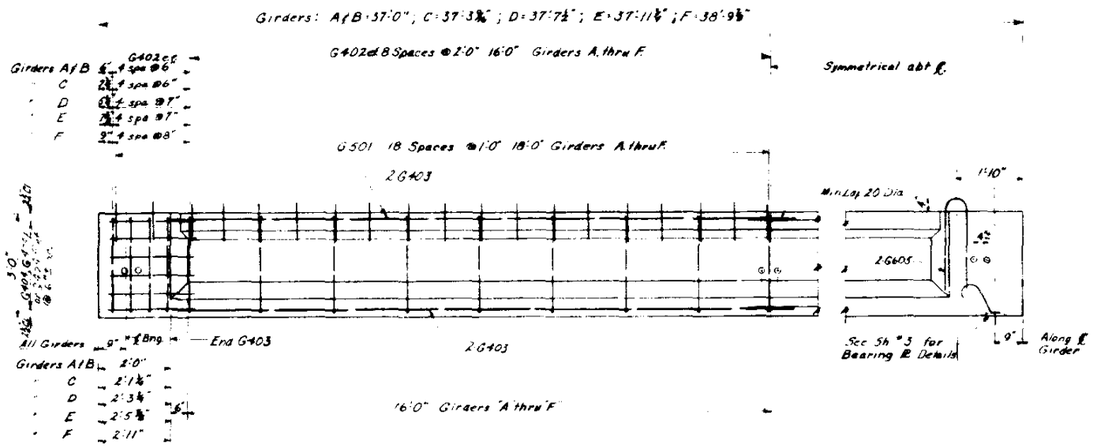
FOUNTAIN CREEK, N.E. No.1 RAMP

FRAMING PLAN
PRESTRESSED CONCRETE BEAMS
BEARINGS

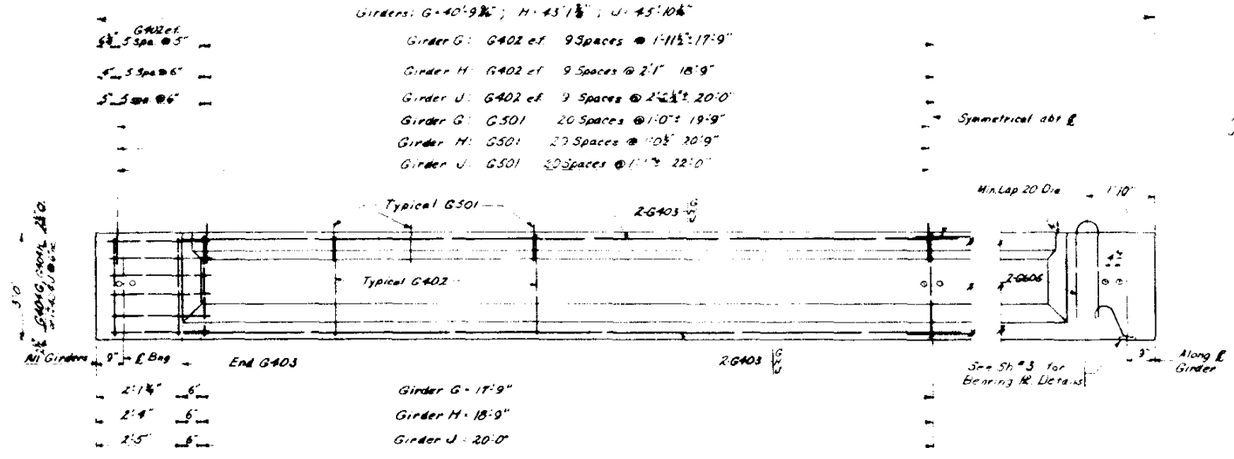
CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS
DENVER COLORADO

FED. ROAD DEN. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)"	S/a	

Revision: 2-27-58 New Sheet - M.E.R.

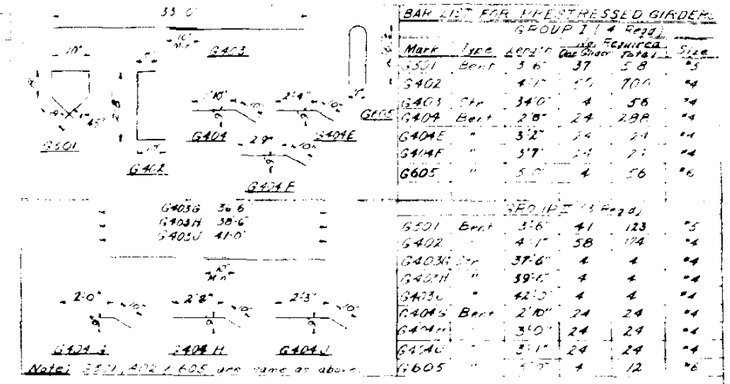


GROUP I
ELEVATION - GIRDERS A thru F
Scale: ½" = 1'0"



GROUP II
ELEVATION - GIRDERS G, H & J
Scale: ½" = 1'0"

GROUP I	
GIRDER	NO. REQ'D
A	5
B	4
C	2
D	1
E	1
F	1
GROUP II	
G	1
H	1
J	1



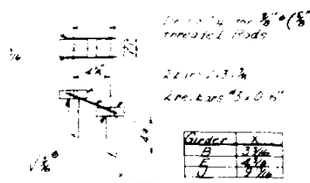
BAR LIST FOR PRESTRESSED GIRDERS

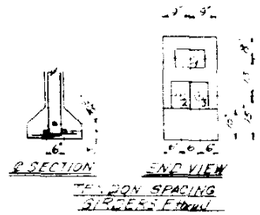
GROUP I (5 Req'd)

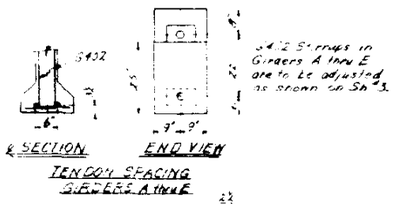
Mark	Type	Length	No. Required Per Girder	Total	Size
G501	Bent	3'6"	37	185	#5
G402	"	4'1"	20	100	#4
G403	Str	34'0"	4	136	#4
G404	Bent	2'8"	24	288	#4
G404E	"	3'2"	24	24	#4
G404F	"	3'7"	24	24	#4
G605	"	5'0"	4	56	#6

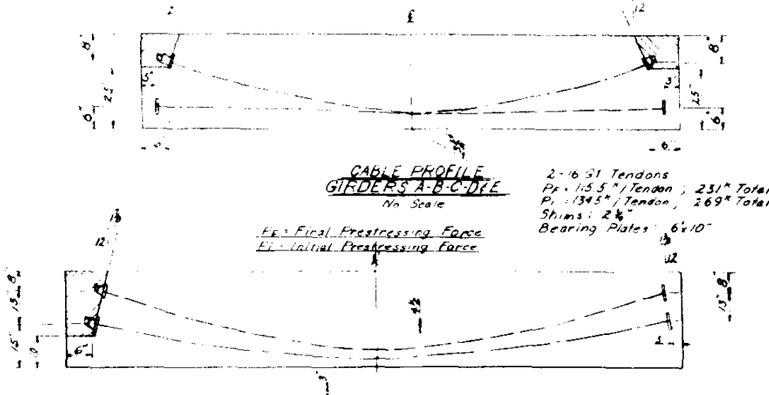
GROUP II (3 Req'd)

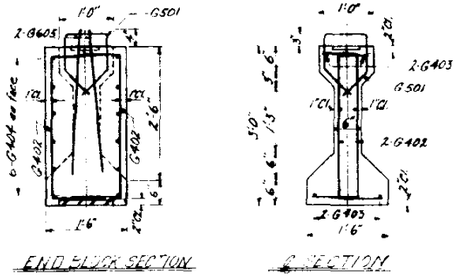
Mark	Type	Length	No. Required Per Girder	Total	Size
G501	Bent	3'6"	41	123	#5
G402	"	4'1"	58	174	#4
G403G	Str	37'6"	4	4	#4
G403H	"	39'6"	4	4	#4
G403J	"	42'0"	4	4	#4
G404G	Bent	2'10"	24	24	#4
G404H	"	3'0"	24	24	#4
G404J	"	3'1"	24	24	#4
G605	"	5'0"	4	12	#6

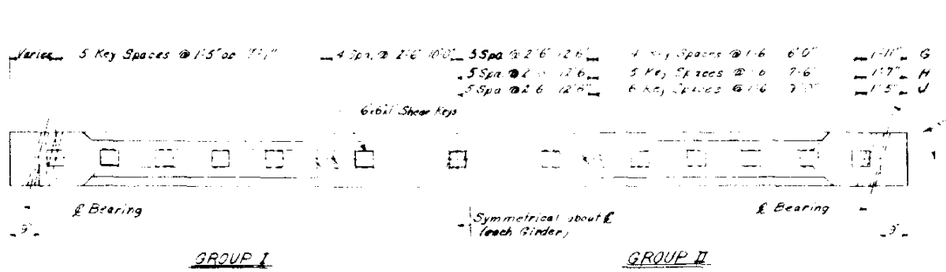










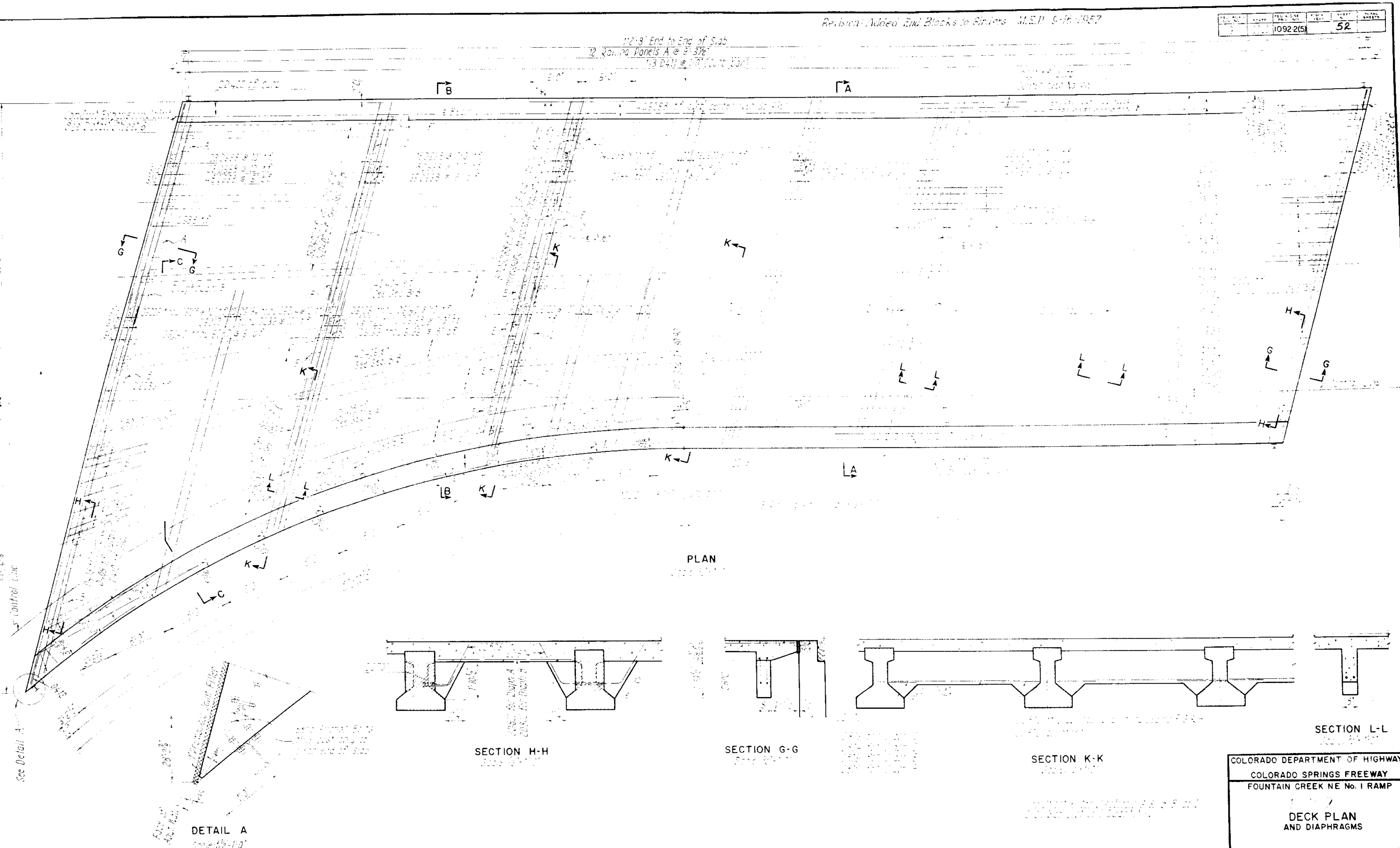


GIRDER →	F	G	H	J
Tendons	3 | 2 @ 1	3 | 1 @ 1	3 | 1 @ 1	3 | 1 @ 0
Pf / Tendon	83"	93"	102"	109"
Pf Total	249"	279"	306"	327"
Pi / Tendon	96"	108"	120"	129"
Pi Total	288"	324"	360"	387"
Shims	2⅛	2¾	2⅞	3¼
Bearing Plates	5x9½	6x9	6x10	6x10

A. S. HORNER CONSTRUCTION CO.
DENVER, COLORADO

STANDARD GIRDERS

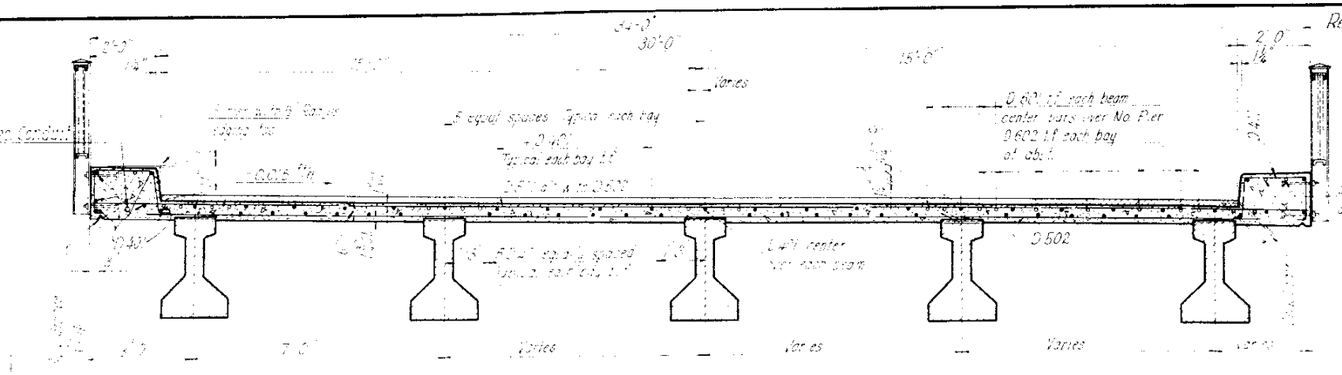
PROJ. NO 1092-2(5) COLORADO SPRINGS
STRUCTURE NO. 1-17-CH
CUSTOMER: C. L. HUBNER CONST. CO.
ENGINEERS: C. JOHNSON & ASSOCIATES
DESIGNED L.B. SCALE as shown SHEET NO. S/a
DRAWN L.M.
CHECKED M.M. DATE 1-7-58 NO. OF SH'S.

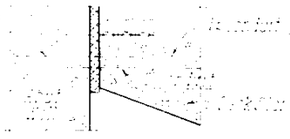


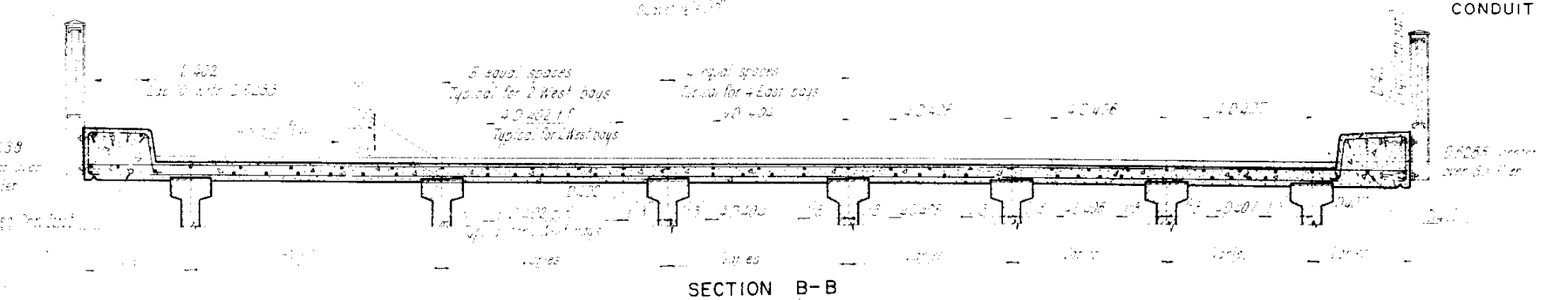
COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY
FOUNTAIN CREEK NE No. 1 RAMP

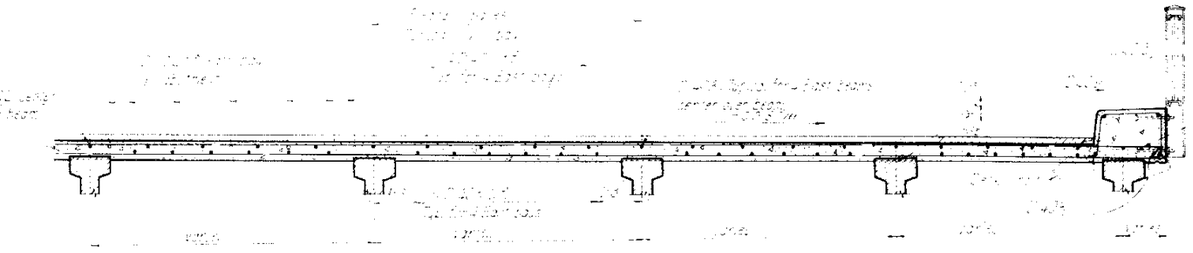
DECK PLAN
AND DIAPHRAGMS

CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS









FED. ROAD DIV. NO.	STATE	FED. AID SEC. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)		53	

Revision: Added End Blocks to Girders M.E.D. 9-[illegible]-67

SECTION A-A

CONDUIT EXPANSION JOINT

SECTION B-B

SECTION C-C

BAR LIST

MARK	SHAPE	LENGTH	No. REQD
D 401		35'-9"	114
D 402		33'-4"	29
D 403		25'-0"	47
D 404		11'-0"	8
D 405		13'-0"	9
D 406	———	15'-6"	8
D 407		18'-0"	11
D 408		23'-6"	2
D 409		23'-0"	2
D 410		17'-0"	[illegible]
D 411	⊓	4'-8"	235
D 412		5'-[illegible]	[illegible]
D 501		34'-9"	66
D 502		[illegible]	12
D 5[illegible] Thru D 5[illegible]		[illegible] to [illegible]	each
D 537		32'-9"	
D 538		20'-0"	[illegible]
D 539 Thru D 565		37'-3" to [illegible]	each
D 566 Thru [illegible]		34'-6" to [illegible]	each
[illegible]		16'-6"	[illegible]
[illegible]		[illegible]-9"	[illegible]
[illegible] Thru [illegible]	———	18'-0" to [illegible]	each
[illegible]		[illegible]	[illegible]
D 601		[illegible]	24
D 602	———	[illegible]	70
D 603		3'-2"	3
D 604		[illegible]	6
D 605	———	3'-2"	14
*D 701		[illegible]	8
*D 702	———	2'-3"	28
D 801		6'-0"	12
D 802		7'-0"	8
D 803	———	6'-4	40
D 804		7'-4"	6
D 805		4'-6"	44
D 806		5'-4"	10

BAR DETAILS

[illegible]	#[illegible]	[illegible]
[illegible]	#[illegible]	[illegible] .9651
[illegible]	#6 [illegible]	[illegible] 272
[illegible]	#7 [illegible] 044	[illegible] 63
[illegible]	#8 [illegible] 570	[illegible] 807
[illegible] Overrun		282
Total		28,481 lbs

ITEM	UNIT	QUANTITY
Class 4 Concrete	Cu Yd	109.3
Reinforcing Steel	Lb	28,481

INCIDENTAL ITEMS: to be included in contract price for Class 4 Concrete
Premolded Joint Filler
[illegible]
[illegible]

* These bars may be made from plain mild steel rods. Thread one end 2" See Bar Details.

[?] Vary this dimension if and as necessary to compensate for beam camber and for dead load deflection.

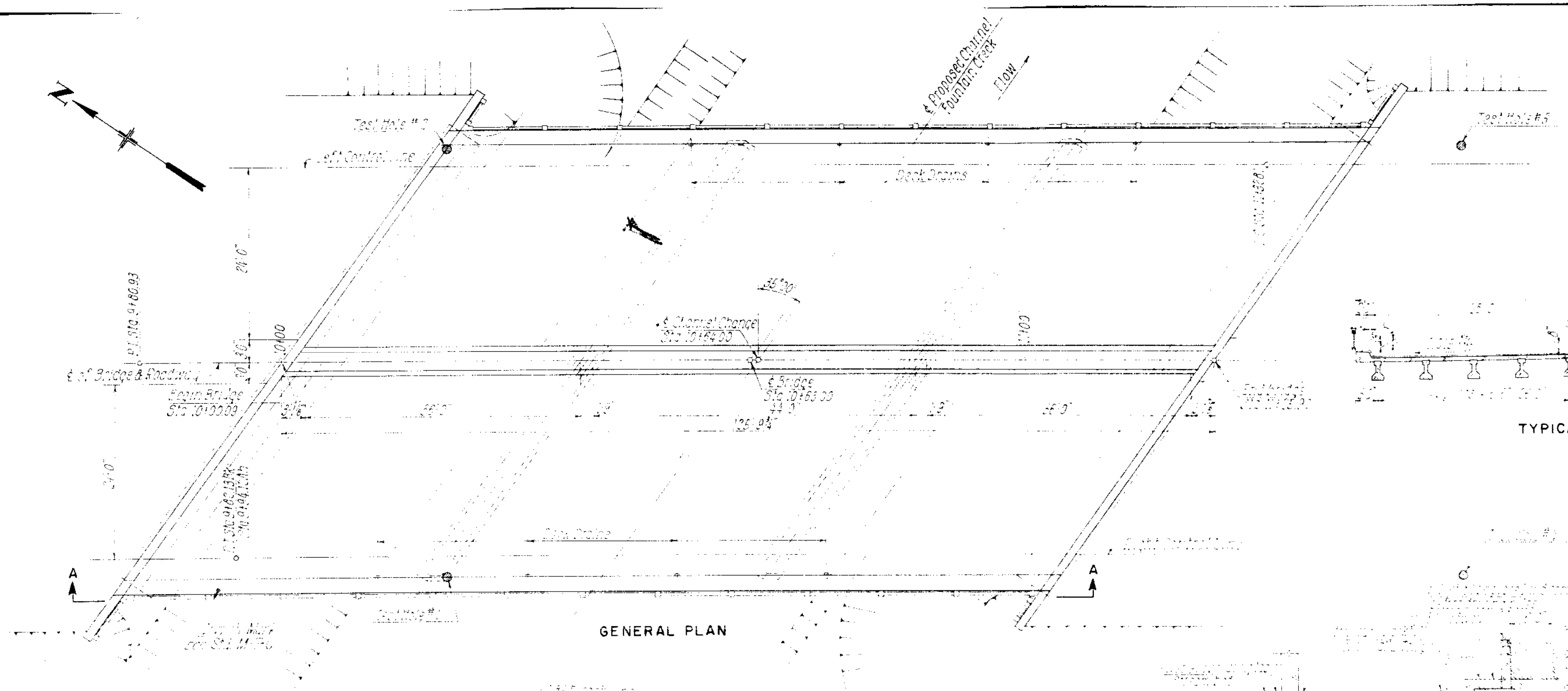
	Beams	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Theoretical camber of beam when supported on its bearings		+[illegible]	+0.2[illegible]	+0.2[illegible]	+0.36"	+0.43"	+0.48"
Theoretical [illegible]		+0.09	+0.09"	+0.1[illegible]	+0.23	+0.23"	+0.35"
Theoretical net camber of slab in relation to beam		—	—	—	+0.13"	+0.20"	[illegible]

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY
FOUNTAIN CREEK, NE NO. I RAMP

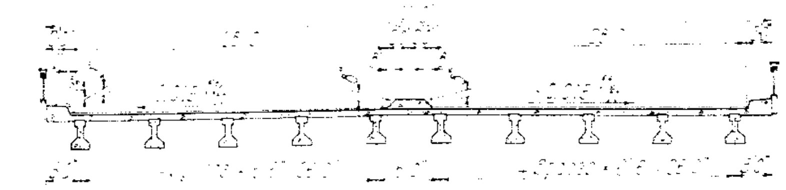
DECK SECTIONS

CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS
DENVER COLORADO

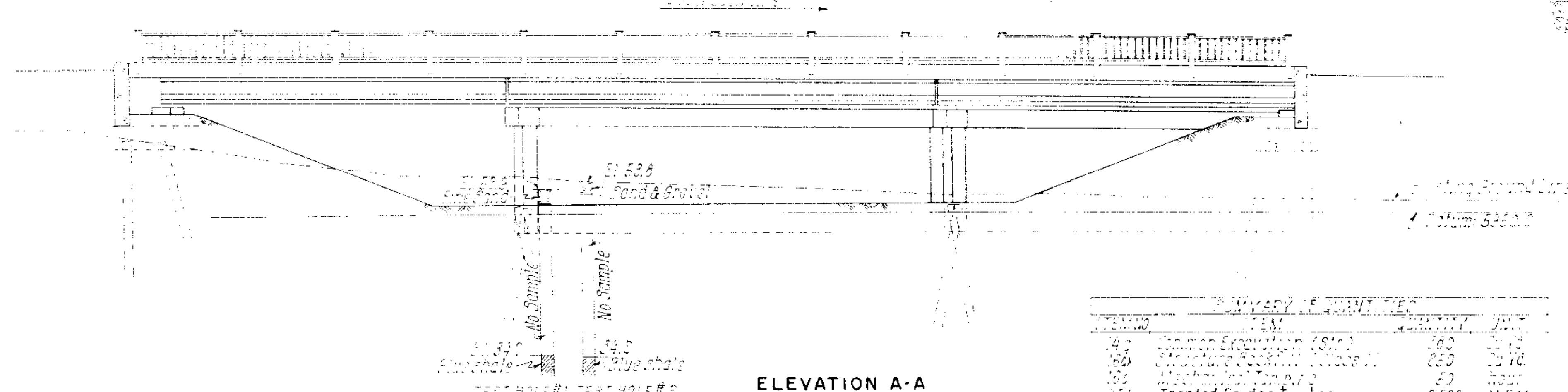
FED. ROAD DIV. NO.	STATE	FED. AID SEC. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	COLO.	1092-2(5)		54	



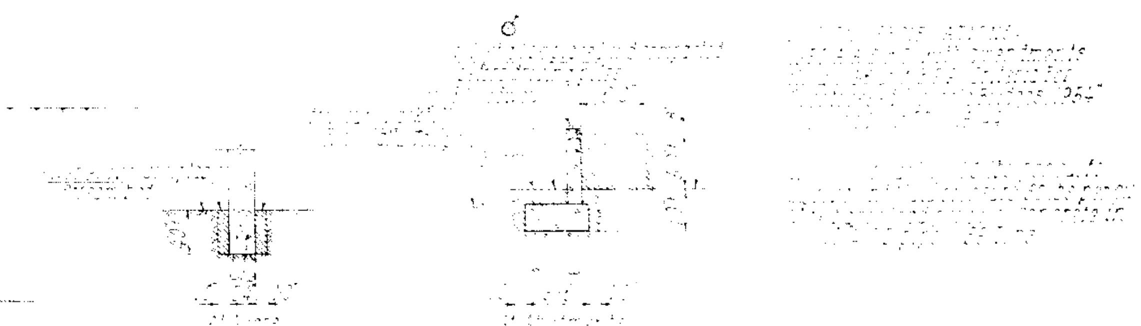
GENERAL PLAN



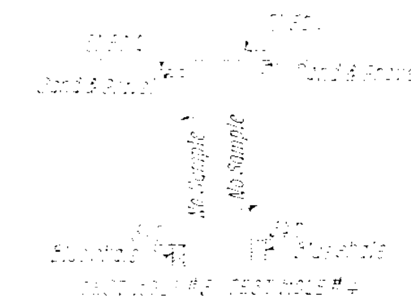
TYPICAL SECTION



ELEVATION A-A



EXCAVATION AND BACKFILL DIAGRAMS



GENERAL NOTES

All work shall be done according to the Standard Specifications of the Colorado Department of Highways, adopted June 1, 1952. See Special Provisions for prestressed concrete beams.

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

All concrete, except in the prestressed concrete beams, shall be Class "A" and air entrained as specified.

Chamfer all exposed corners ¾" except as noted.

All concrete surfaces exposed to normal view by highway traffic shall receive Class I surface finish.

Holes for piles shall not be drilled until definitely determined by the Engineer that the piles cannot be driven without them.

All reinforcing shall be intermediate grade deformed bars conforming to A.A.S.H.O. Specifications M31 and M137, ASTM Designations A15 and A305.

All reinforcing bars shall be tagged with the structure number and mark.

All dimensions on bar details are out to out.

All hooks and bends in bars shall conform to A.C.I. Standard 315-51.

Main bars shall not be spliced except where specified on the plans.

Clear distance from surface to reinforcing bars: 3" in footings & pier shafts, 2" in walls & caps, 1" in deck slabs & curbs unless otherwise noted.

All steel railings and deck drains shall receive one shop coat of zinc chromate and two field coats of aluminum paint.

SUMMARY OF QUANTITIES

ITEM NO.	ITEM	QUANTITY	UNIT
[illegible]	Common Excavation (Str.)	260	Cu. Yd.
[illegible]	Structure Backfill (Class 1)	250	Cu. Yd.
[illegible]	Mechanical Tamping	50	Hour
[illegible]	Treated Bridge Timber	2.686	M.F.B.M.
[illegible]	Class A Concrete	[illegible]	Cu. Yd.
47	Reinforcing Steel (+ % Overrun)	[illegible]	Lb.
Ⓢ 48	Structural Steel ~~(Railing)~~ ◆	[illegible]366	Lb.
60x	Drilling Holes to Facilitate Pile Driving	50	Lin. Ft.
61av	Steel Pipe* Piling	1,520	Lin. Ft.
46pb	Prestressed Conc. Beam 35'0" Lg.	20	Each
46pc	Prestressed Conc. Beam 44'0" Lg.	10	Each
~~89a~~	~~Deck Drains~~	~~6~~	~~Each~~
[illegible]	Elec. Conduit w/ Junction Boxes (½")	[illegible]	Lin. Ft.

* 10¾" O.D., 0.179" Wall thickness. Fill with concrete after driving. 10 BP 42 may be used as an alternate.

◆ Includes ½% ± for Paint.

Ⓢ Railing and Deck Drains

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

CIMARRON STREET BRIDGE
OVER FOUNTAIN CREEK

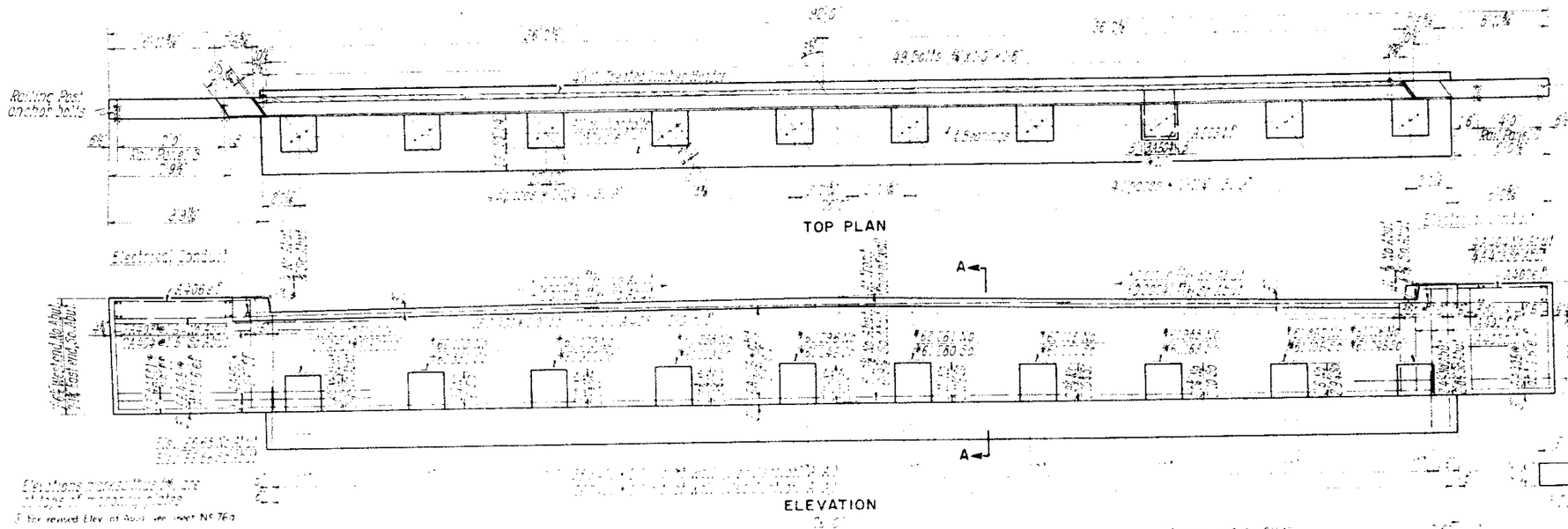
GENERAL PLAN
AND ELEVATION

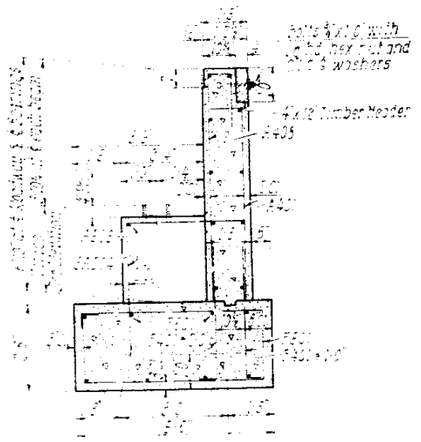
Leo M Keller

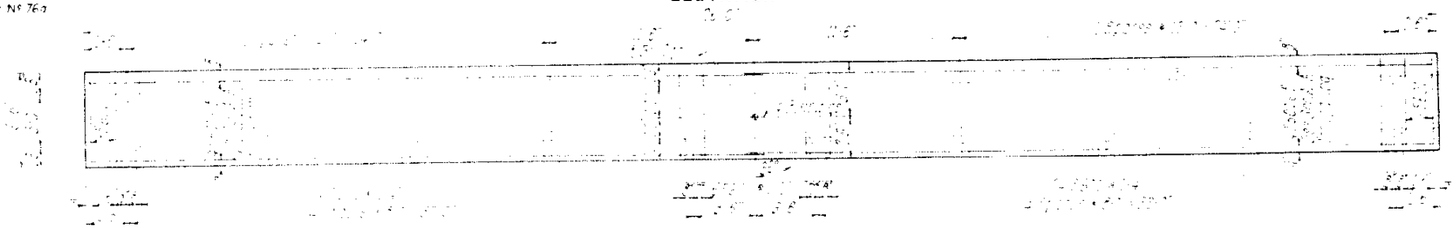
CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS
DENVER, COLORADO

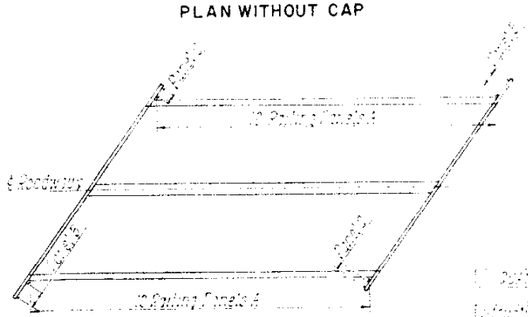
Revised 2-27-58 Added Note ⓒ KRA

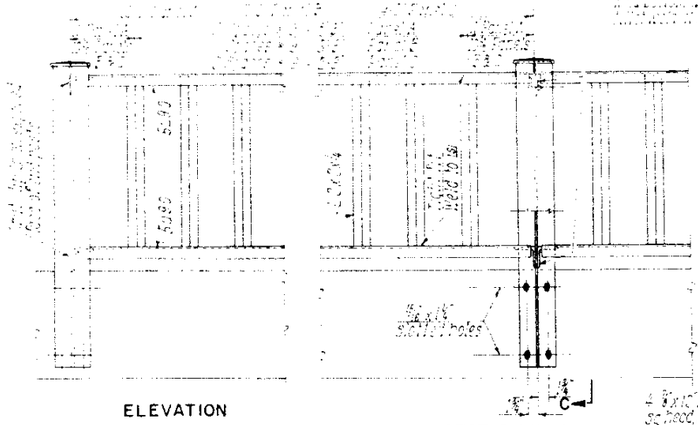
FED. ROAD CIV. NO.	STATE	FED. AID SEC. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	[illegible]	(092-2(5)		55	

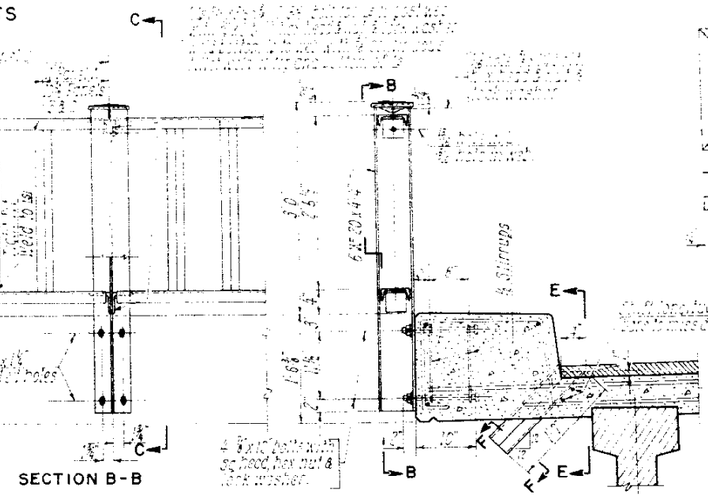


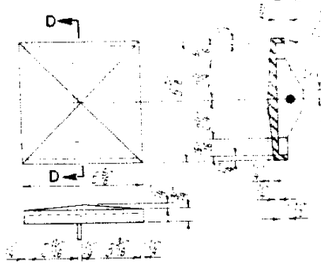


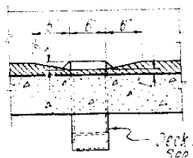


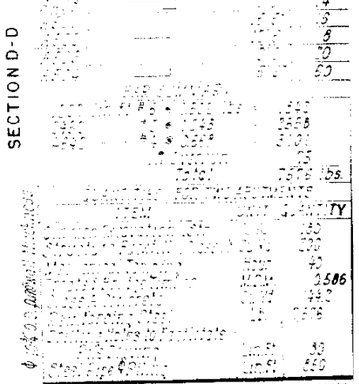










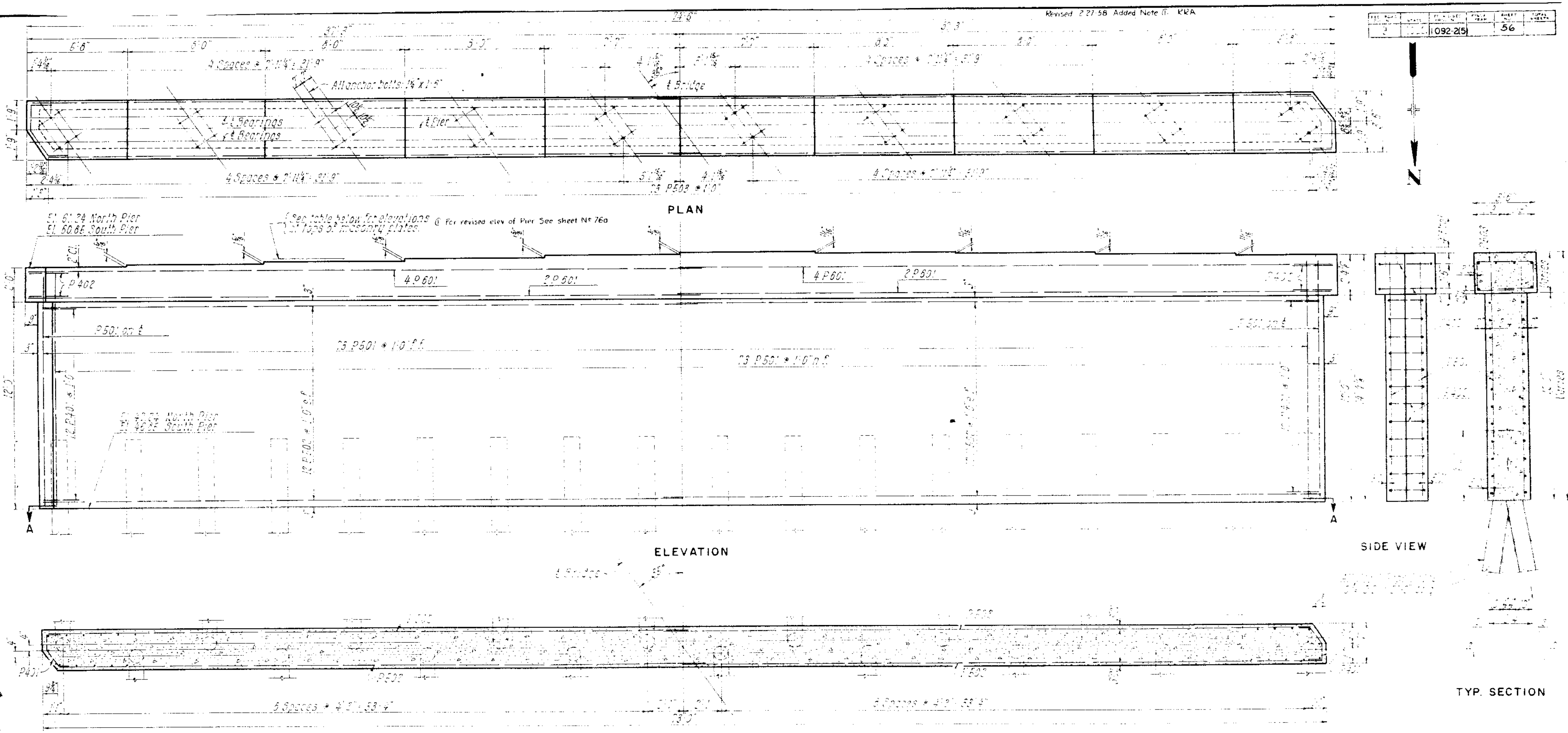


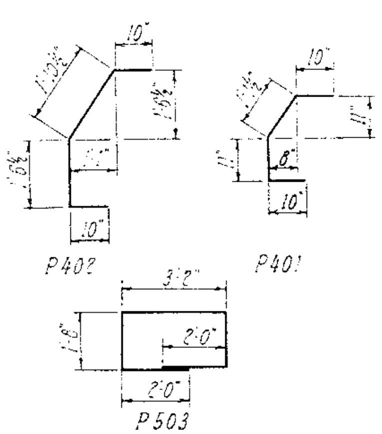
RAILING AND DECK DRAINS

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY
CIMARRON STREET BRIDGE
OVER FOUNTAIN CREEK

ABUTMENTS RAILING DECK DRAINS

CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS
DENVER COLORADO





BAR DETAILS

ELEVATIONS AT TOPS OF MASONRY PLATES										
LOCATION \ BEAM	1 (West)	2	3	4	5	6	7	8	9	10 (East)
North Brg. North Pier	61.755	61.814	61.873	61.932	61.990	61.955	61.819	61.682	61.546	61.410
South Brg. North Pier	61.740	61.799	61.858	61.917	61.975	61.940	61.804	61.667	61.531	61.395
North Brg. South Pier	61.366	61.425	61.484	61.543	61.601	61.566	61.430	61.293	61.157	61.021
South Brg. South Pier	61.351	61.410	61.469	61.528	61.586	61.551	61.415	61.278	61.142	61.006

QUANTITIES - 2 PIERS

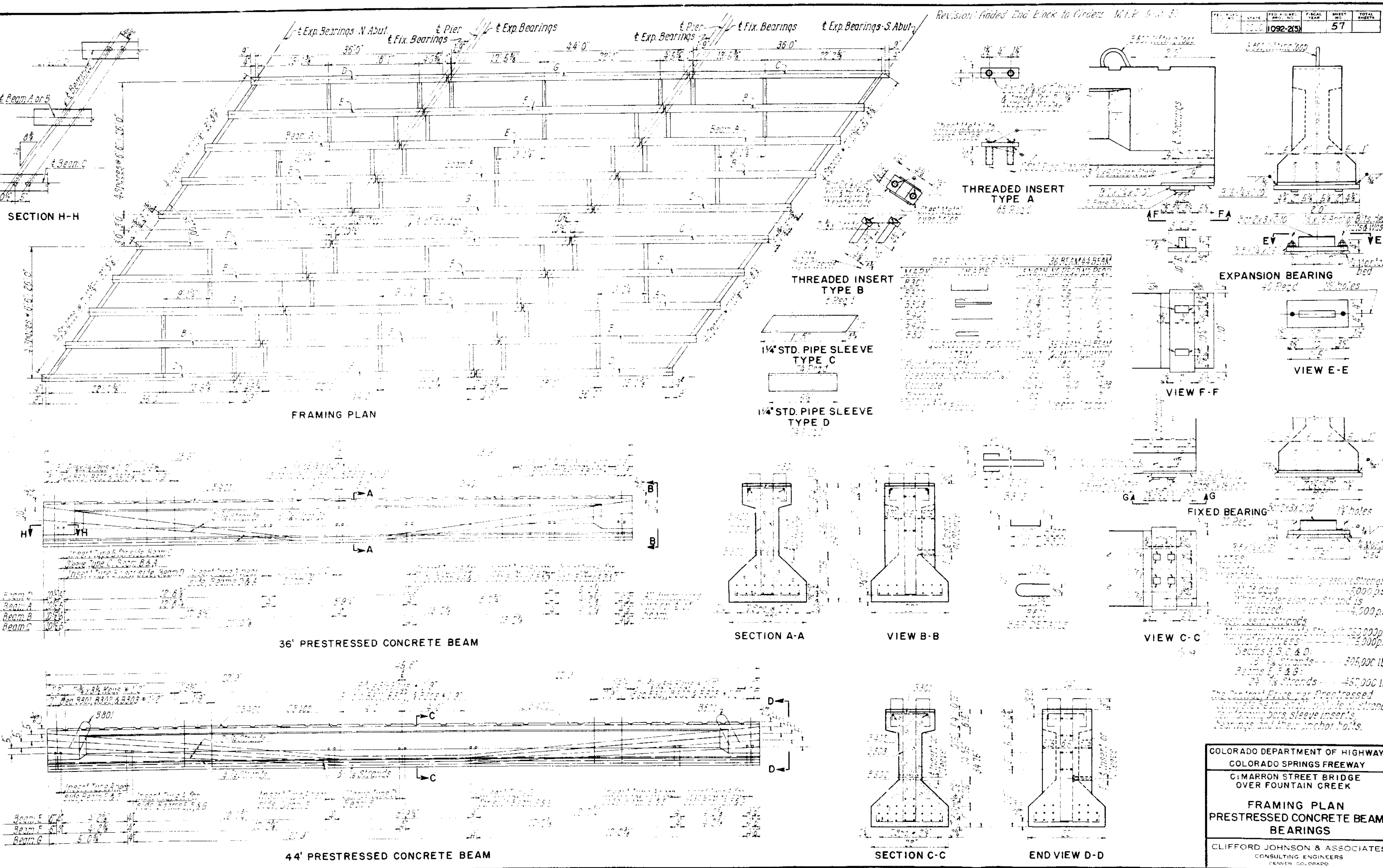
ITEM	QUANTITY	UNIT
Structure Excavation	[illegible]	Cu Yd
Structure Backfill	60	Cu Yd
Mechanical Tamping	10	Hour
Class A Concrete	196	Cu Yd
Reinforcing Steel	10,936	Lb
Steel Pipe* Piling	720	Lin Ft

* 10¾" O.D. 0.179" wall thickness

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY
CIMARRON STREET BRIDGE OVER FOUNTAIN CREEK

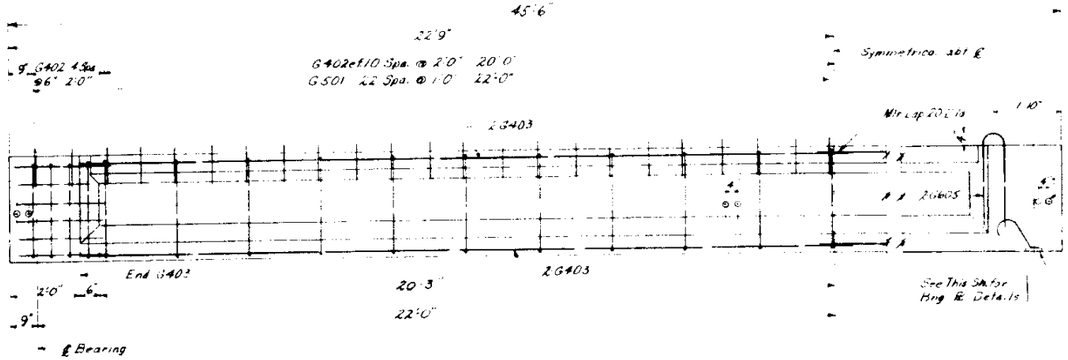
PIERS

CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS
DENVER, COLORADO

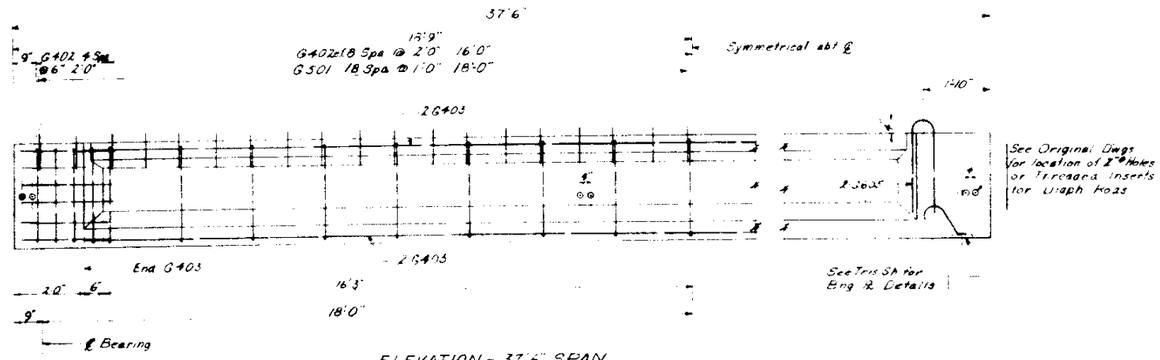

1092-2(5)
57
Exp. Bearings N. Abut.
Pier
Fix. Bearings
Exp. Bearings
Exp. Bearings S. Abut.
SECTION H-H
FRAMING PLAN
THREADED INSERT TYPE A
THREADED INSERT TYPE B
1¼" STD. PIPE SLEEVE TYPE C
1¼" STD. PIPE SLEEVE TYPE D
EXPANSION BEARING
VIEW E-E
VIEW F-F
FIXED BEARING
36' PRESTRESSED CONCRETE BEAM
SECTION A-A
VIEW B-B
VIEW C-C
44' PRESTRESSED CONCRETE BEAM
SECTION C-C
END VIEW D-D
COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY
CIMARRON STREET BRIDGE OVER FOUNTAIN CREEK
FRAMING PLAN
PRESTRESSED CONCRETE BEAMS
BEARINGS
CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS
DENVER, COLORADO

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
8	COLO.	1002-215)	57a	

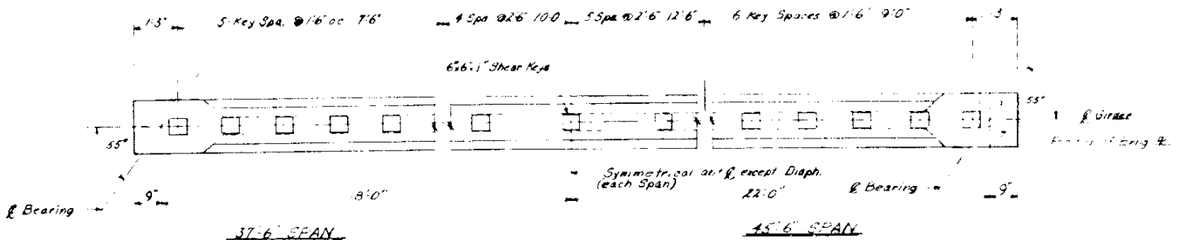
Revision: 3-27-58 New Sheet - M.E.R.



ELEVATION - 45'6" SPAN
Scale: ½"=1'0"



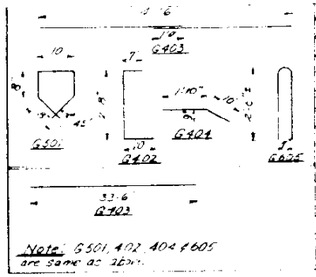
ELEVATION - 37'6" SPAN
Scale: ½"=1'0"



37'6" SPAN

PLAN VIEW
Scale: ½"=1'0"

45'6" SPAN



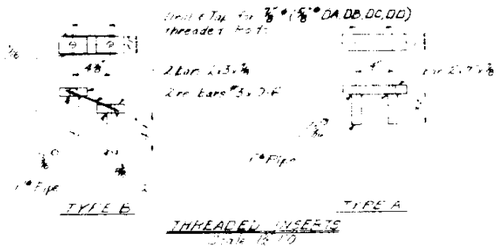
BAR LIST FOR PRESTRESSED GIRDERS

45'6" SPAN (10 PEQC)

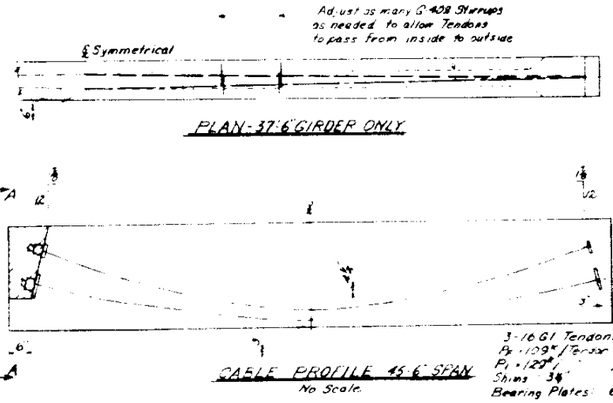
Mark	Type	Length	No. Required Each Girder	Total	Size
G501	Bent	3'6"	45	450	#5
G402	Bent	4'1"	38	380	#4
G403	Str	42'6"	1	40	#4
G404	Bent	2'8"	24	240	#4
G605	Bent	5'"	1	40	#6

37'6" SPAN (20 PEQC)

Mark	Type	Length	No. Required Each Girder	Total	Size
G501	Bent	3'6"	37	740	#5
G402	Bent	4'"	50	1000	#4
G403	Str	33'6"	1	80	#4
G404	Bent	2'8"	24	480	#4
G605	Bent	5'0"	1	80	#6

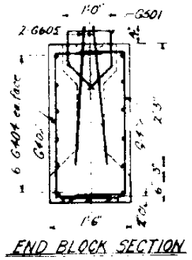


THREADED INSERTS
Scale: 1"=1'0"

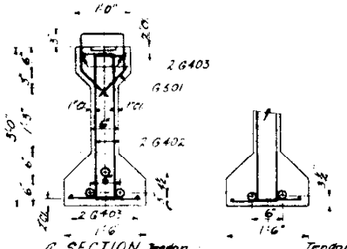


PLAN

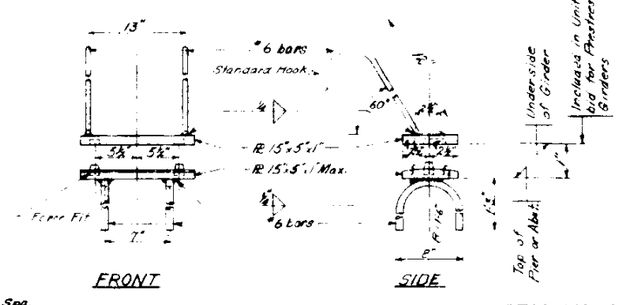
PINTLE
Scale: Actual Size



END BLOCK SECTION
Scale: ½"=1'0"



℄ SECTION Tendon Spa. (45'6" Span)
Tendon Spa. (37'6" Span)



FRONT SIDE

BEARING PLATE DETAILS
Scale: 1½"=1'0"

A.S. HORNER CONSTRUCTION CO.
DENVER, COLORADO

STANDARD GIRDERS
STANDARD BEARING PLATES

PROJ. NO. 1092-2(5) COLORADO SPRINGS
STRUCTURE NO. I-17-CE
CUSTOMER: C.L. HUBNER CONST. CO.
ENGINEERS: C. JOHNSON & ASSOCIATES
DESIGNED LB SCALE as shown SHEET NO. 57a
DRAWN LM
CHECKED WM DATE 1-7-58 NO OF SHS.

** [illegible] dimension "f" and as necessary to compensate for beam camber and for dead load deflection.

Theoretical camber of beam when supported on its bearings

Theoretical camber of slab [illegible] straight line (deflection due to wt. of slab and curb)

Theoretical net camber of slab in relation to beam

FED. ROAD DIV. NO.	STATE	FED. AID SEC. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	COLO	I092-2(5)		58	

BAR LIST

MARK	SHAPE	LENGTH	No. REQ'D.
D401		4'-8"	212
D402		31'-3"	444
D403		4'-1"	106
D501		31'-8"	174
D502		29'-0"	174
D503 thru D515		33'-0" thru 10'-0"	4 each
[illegible]		23'-6" thru 9'-6"	4 each
[illegible]		9'-0"	16
[illegible]		[illegible]-6"	20
[illegible]		6'-0"	8
[illegible]		38'-6"	4
[illegible]		35'-6"	4
[illegible]		5'-0"	112
[illegible]		29'-6"	176
[illegible]		22'-10"	16
D537		16'-3"	16
D538		9'-7"	16
D601		2'-10"	16
D602		[illegible]	24
D603		14'-0"	88
*D701		2'-1"	16
*D702		2'-3"	176
[illegible]		2'-9"	112
[illegible]		2'-3"	24
[illegible]		6'-3"	32

* [illegible] see bar details.

BAR SUMMARY

[illegible]	[illegible],219
[illegible]	20,575
[illegible]	2,185
[illegible]	378
[illegible]	2,526
[illegible]	364
Total	36,747 lbs.

QUANTITIES

ITEM	UNIT	QUANTITY
Class [illegible] Concrete	Cu. Yd.	[illegible]
Reinforcing Steel	Lb.	36,747

INCIDENTAL ITEMS To be included in [illegible] for Class [illegible] Conc.

Preformed Joint Filler [illegible] ft.

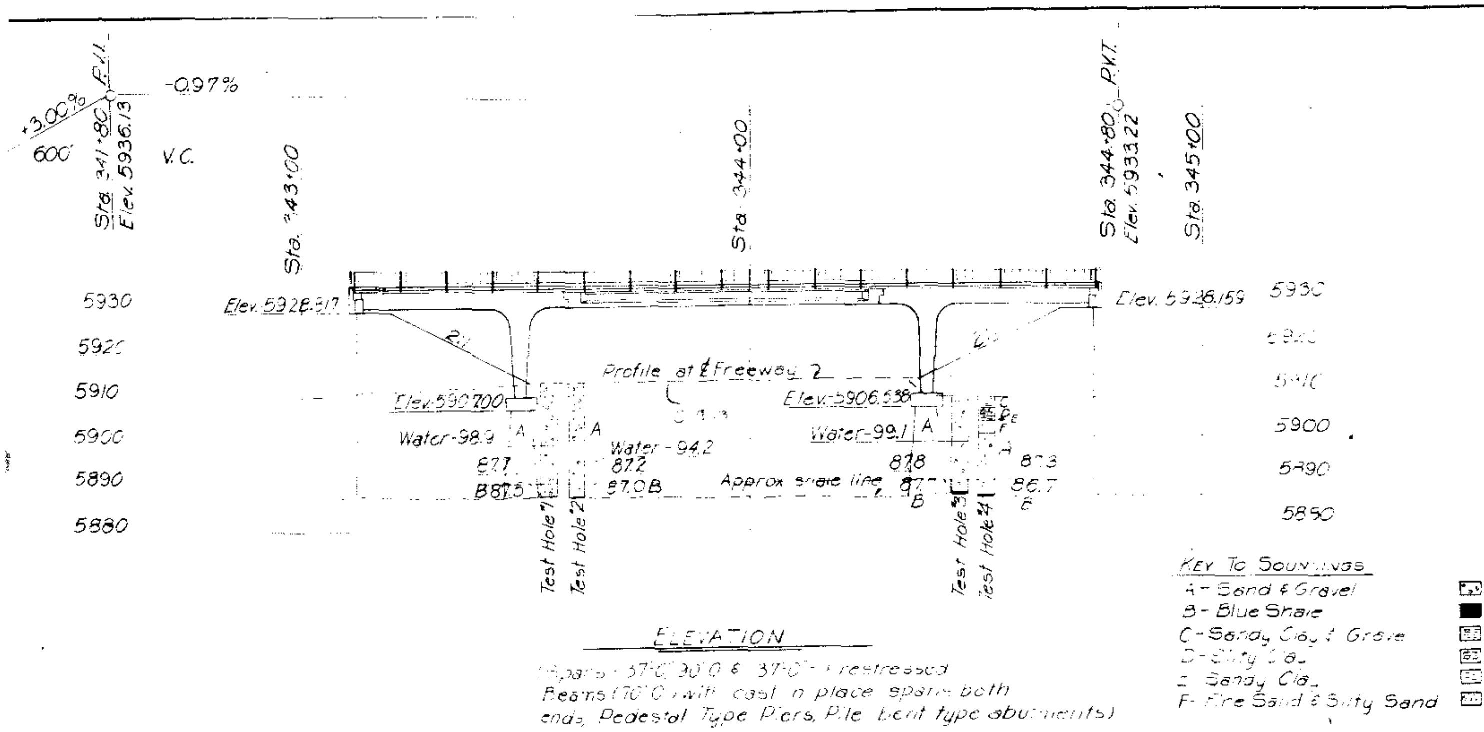
Elastomer [illegible] 25 lin. ft.

COLORADO DEPARTMENT OF HIGHWAYS
COLORADO SPRINGS FREEWAY

CIMARRON STREET BRIDGE
OVER FOUNTAIN CREEK

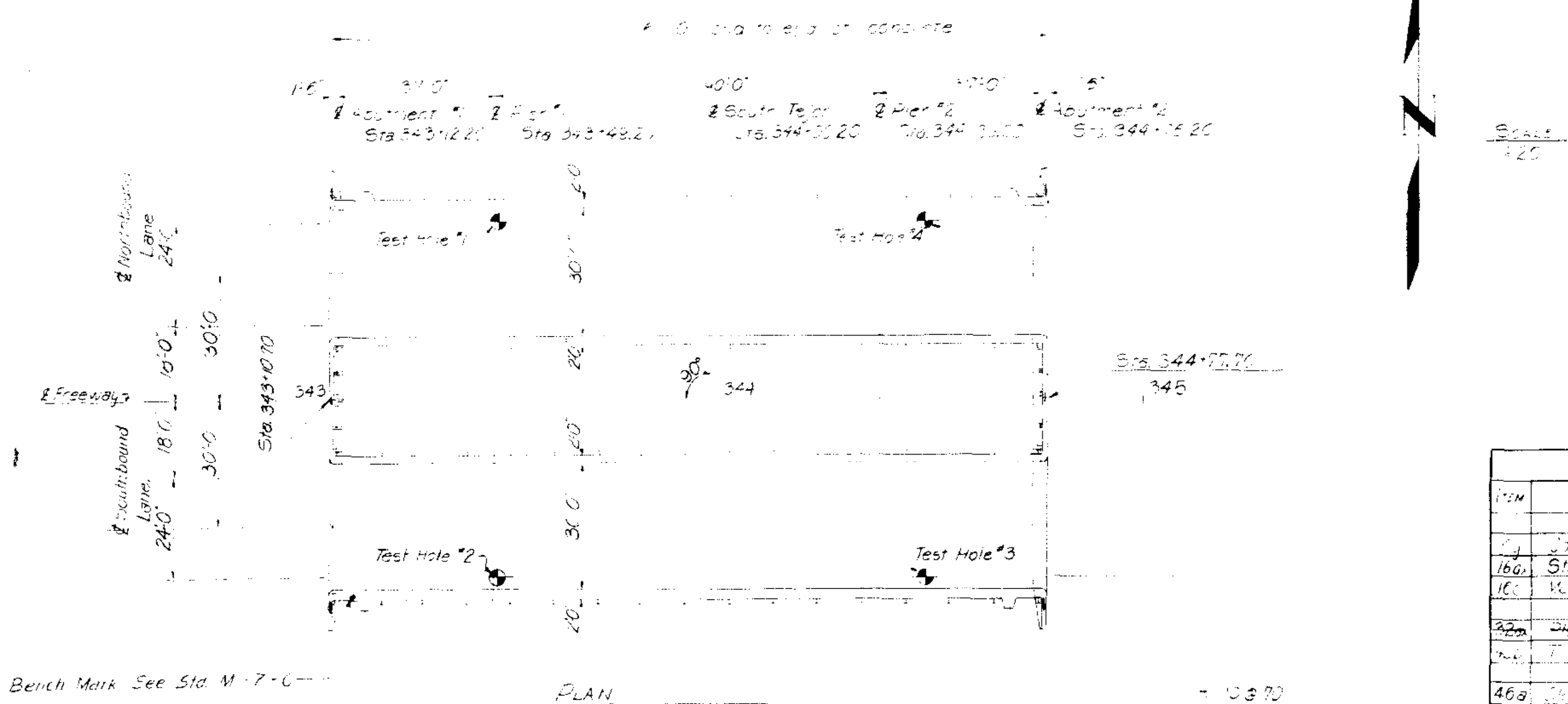
DECK

CLIFFORD JOHNSON & ASSOCIATES
CONSULTING ENGINEERS



ELEVATION

(Spans - 37'0" 30'0" & 37'0" - Prestressed Beams (70'0") with cast in place spans both ends, Pedestal Type Piers, Pile bent type abutments)



PLAN

GENERAL NOTES:

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways as adopted June 1 1952.

The soundings and pile data are shown according to the best information available to the Colorado Department of Highways. If essentially different conditions are encountered, the Bridge Engineer will inspect and determine if redesign is necessary. All piles shall be driven to the penetration shown unless in the opinion of the Engineer such penetration cannot be secured without injury to the piles. All piles shall be driven to minimum computed bearing value of 37 tons.

All concrete shall be air-entrained and shall conform to the unit stresses indicated, as required on each sheet.

All concrete surfaces exposed to view shall receive Class "I" surface finish except the underside of floor slabs and abutment faces between outside girders.

All reinforcing steel shall be intermediate grade deformed bars conforming to A.A.S.H.O. Specifications M.31 and M137 (A.S.T.M. designations A15 and A305). All hooks and bends in bars shall conform to A.C.I. Standard 318-56.

All reinforcing bars shall be tagged with structure number and mark.

All steel railings shall receive one shop coat of zinc chromate and a field coat of tinted aluminum paint followed by a coat of aluminum paint.

Holes for piles shall not be drilled until definitely determined by the Engineer that the piles cannot be driven without them.

All concrete surfaces exposed to normal view by highway traffic shall receive Class I Surface Finish.

Design Specifications:

A.A.S.H.O. Series of 1953 and Bureau of Public Roads, Tentative Design Criteria for Prestressed Bridges, 1954

Design Loading: H20-S16-44

Unit Stresses:

f'c 3000 psi Class A
f'c 5000 psi Prestressed Beams

fs 20000 psi Reinforcing
fs 18000 psi Structural
fs 150000 psi Prestressed Cables
Pile Load 37 tons per pile

INDEX OF SHEETS

Sheet No. 1 General Plan and Elevation
Sheet No. 2 Abutment Details
Sheet No. 3 Pier Details
Sheet No. 4 Cast In Place Girders
Sheet No. 5 Beam Layout and Details
Sheet No. 6 Superstructure Details
Sheet No. 7 Handrail and Bearing Device Details
Sheet No. 8 Lighting and Slope Paving Details

SUMMARY OF QUANTITIES

Item	Description	Unit	Abut. #1	Piers 1&2	Abut. #2	Super.	Total
1j	Common Excavation	Cu. Yds		350			350
16a	Structure Backfill (Class 1)	Cu. Yds	123	—	123	—	246
16c	Mechanical Tamping	Hrs.	12.5	24	12.5	—	49
~~32m~~	~~Plant Mix Asphalt Surfacing~~	~~Tons~~	—			~~125~~	~~125~~
[illegible]	Treated Bridge Timber	M.B.M.	0.444	—	0.444	—	0.888
46a	Class A Concrete	Cu. Yds	52.2	192.7	52.2	527.2	821.3
46pi	Prestressed Concrete Beams	Ea.	—	—	—	10	* 10
47	Reinforcing Steel (Int. Grade)	Lbs	3,368	41,008	3,368	80,039	133,783
48	Structural Steel (Includes 3% for Paint)	Lbs.	1,245	—	1,245	26,210	28,700
6[illegible]	12¾ Steel Pipe Piles, ¼ Thick	Lin. ft.	704	1,760	704	—	3,168
6[illegible]	Drilling holes for Foundation Piling	Lin. ft.	304	—	304	—	608
65m	Concrete Slope Paving	Cu. Yds	61	—	61	—	122
80[illegible]	Sheet Copper (32 oz per sq. ft.)	Lbs	—	—	—	190.2	190.2
90b	Electrical Conduit & Junction Boxes (2")	Lin. ft.	—	—	—	672	572

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

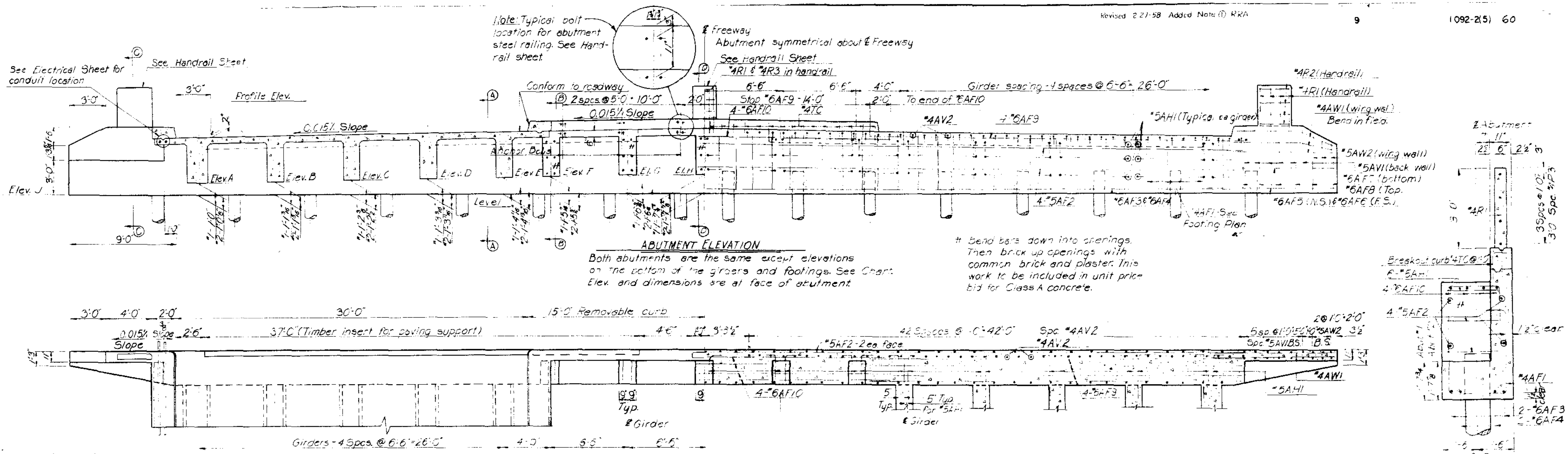
SOUTH TEJON STREET
BRIDGE NO'S I-17-DA & DB

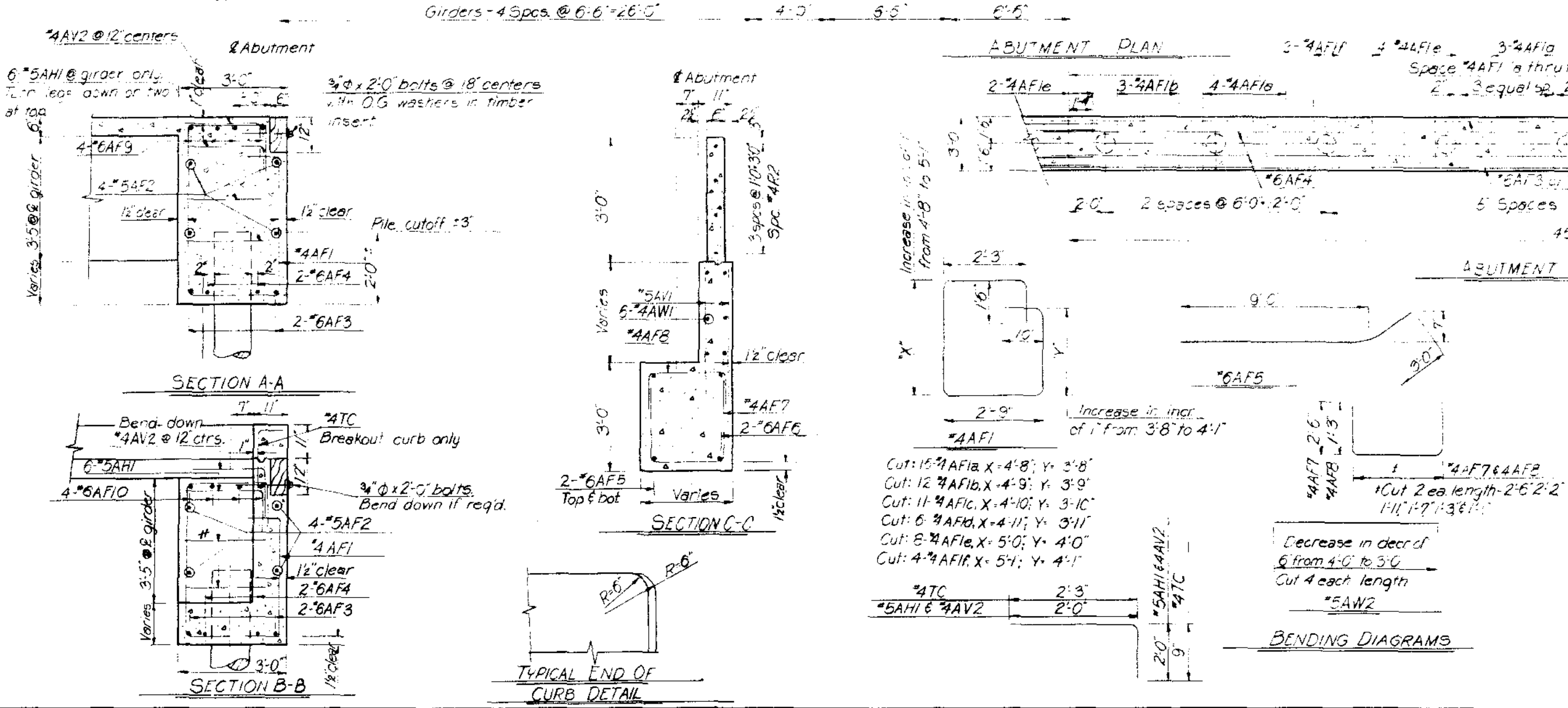
GENERAL PLAN AND ELEVATION

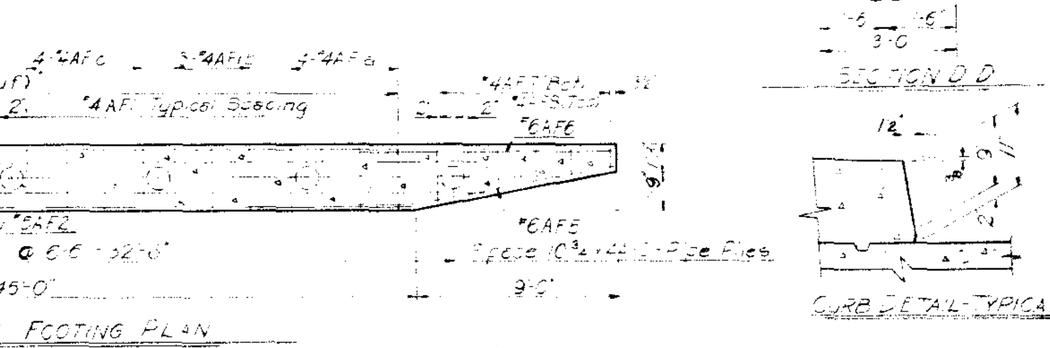
Robert L Koons
ROBERT L. KOONS
CONSULTING ENGINEERS
COLORADO SPRINGS, COLO.

DATE: April 1957

DRAWING NO. 15 B 1


Note: Typical bolt location for abutment steel railing. See Handrail sheet.
See Electrical Sheet for conduit location
See Handrail Sheet
Profile Elev.
0.015% Slope
Conform to roadway
2 spcs @ 5'-0" = 10'-0"
0.015% Slope
℄ Freeway
Abutment symmetrical about ℄ Freeway
See Handrail Sheet
#4R1 & #4R3 in handrail
Stop #6AF9 - 14'-0"
4-#6AF10
Girder spacing - 4 spaces @ 6'-6" = 26'-0"
To end of #6AF10
#4R2 (Handrail)
#4R1 (Handrail)
#4AW1 (wing wall) Bend in field.
#5AH1 (Typical ea girder)
#5AW2 (wing wall)
#5AV1 (back wall)
#6AF7 (bottom)
#6AF8 (Top)
#6AF5 (N.S.) & #6AF6 (F.S.)
Elev. A
Elev. B
Elev. C
Elev. D
Elev. E
Elev. F
Elev. G
Elev. H
Elev. J
Anchor Bolts
Level
ABUTMENT ELEVATION
Both abutments are the same except elevations on the bottom of the girders and footings. See Chart. Elev. and dimensions are at face of abutment.
Bend bars down into openings. Then brick up openings with common brick and plaster. This work to be included in unit price bid for Class A concrete.
15'-0" Removable curb
37'-0" (Timber insert for paving support)
42 Spaces @ 1'-0" = 42'-0"
Girders - 4 Spcs. @ 6'-6" = 26'-0"
℄ Girder
ABUTMENT PLAN
℄ Abutment
Breakout curb #4TC
SECTION D-D


#4AV2 @ 12" centers
℄ Abutment
6-#5AH1 @ girder only. Turn legs down or two at top
3/4"φ x 2'-0" bolts @ 18" centers with O.G. washers in timber insert
Pile cutoff = 3"
SECTION A-A
Bend-down #4AV2 @ 12" ctrs.
#4TC Breakout curb only
3/4"φ x 2'-0" bolts. Bend down if req'd.
SECTION B-B
TYPICAL END OF CURB DETAIL
SECTION C-C
#4AF1
Cut: 15-#4AF1a X = 4'-8"; Y = 3'-8"
Cut: 12-#4AF1b X = 4'-9"; Y = 3'-9"
Cut: 11-#4AF1c X = 4'-10"; Y = 3'-10"
Cut: 6-#4AF1d X = 4'-11"; Y = 3'-11"
Cut: 6-#4AF1e X = 5'-0"; Y = 4'-0"
Cut: 4-#4AF1f X = 5'-1"; Y = 4'-1"
Increase in incr. of 1" from 3'-8" to 4'-1"
#6AF5
#4AF7 & #4AF8
Cut 2 ea length - 2'-6", 2'-2"
Decrease in decr. of 6" from 4'-0" to 3'-0". Cut 4 each length
#5AW2
#4TC
#5AH1 & #4AV2
BENDING DIAGRAMS



Elevation	Abut #1	Abut #2
A	29.819	29.171
B	29.916	29.268
C	30.014	29.366
D	30.112	29.464
E	30.209	29.561
F	30.269	29.621
G	30.366	29.718
H	30.464	29.816
J	28.817	28.159

(1) For revised elev. of Abut. see sheet Nº 76a.

NOTES:

All concrete to be Class A.

All dimensions for reinforcing steel are to ℄ of bars unless otherwise indicated. All dimensions shown in bending diagrams are out to out of bars.

Bevel all edges and miter all corners with a 3/4" triangular molding unless otherwise indicated.

Piles shall be pipe 10 3/4" nominal diameter, minimum wall thickness of 0.279" and shall be filled with Class A concrete after driving. Piles may be filled at the same time the abutment is poured at the contractors option. See note on Pier Sheet.

Abutments 1 and 2 are the same except as noted.

See Handrail Sheet for details.

See Cast in Place Girder Sheet for details of beams to be cast with abutment.

See Electrical Sheet for conduit location and size.

⊙ 32 Piles x 44'-0"
⊗ 32 Holes x 19'-0"

ABUTMENT REINFORCING SCHEDULE (One Abutment Only)

Bar	AF1	AF2	AF3	AF4	AF5	AF6	AF7	AF8	AF9	AF10			AH1		AV1	AV2			AW1	AW2		TC		R1	R2	R3
No. Req'd	57	8	4	4	4	4	12	12	8	8			30		24	86			12	12		30		12	8	4
Size	#4	#5	#6	#6	#6	#6	#4	#4	#6	#6			#5		#5	#4			#4	#5		#4		#4	#4	#4
Length	*	46'-6"	46'-0"	43'-0"	12'-0"	12'-0"	*	*	31'-9"	16'-6"			4'-0"		4'-6"	4'-0"			9'-6"	*		3'-0"		4'-9"	2'-9"	1'-9"
Shape																										

* See Bending Diagram.

BAR WT. SUMMARY (2 Abut.)

#6 - 1724 lin. ft. @ 1.502 = 2589#
#5 - 1764 lin. ft. @ 1.043 = 1840#
#4 - 3352.7 lin. ft. @ 0.668 = 2240#
1% Overrun = 67#
Total = 6736#

(2) ABUTMENT QUANTITIES

Structural Backfill - 246 yd.³
Mechanical Tamping - 25 hr.
Class A Concrete - 164.4 yd.³
Reinforcing Steel - 6736#
Drilling Holes - ⊗ 608 lin. ft.
10 3/4" Steel Pipe Piles - ⊙ 1408 lin. ft.
Structural Steel - 2568#
Timber Header - 0.888 Mft. bm.

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

SOUTH TEJON STREET
BRIDGE NO'S I-17-DA & DB

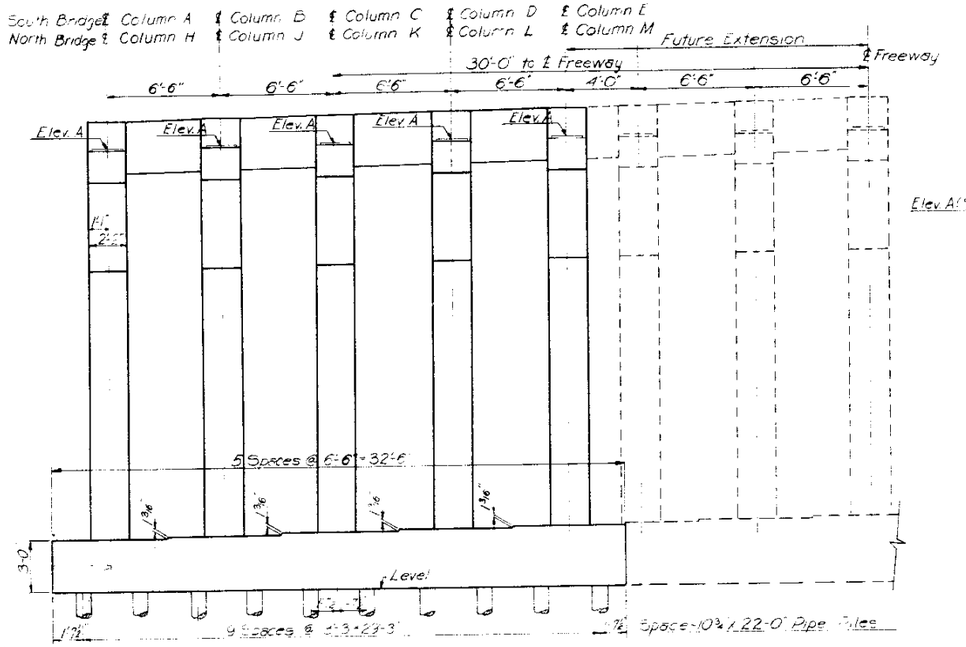
ABUTMENT DETAILS

SCALE: 1/4" = 1'-0"; 2" = 1'-0"   DATE: April 1957

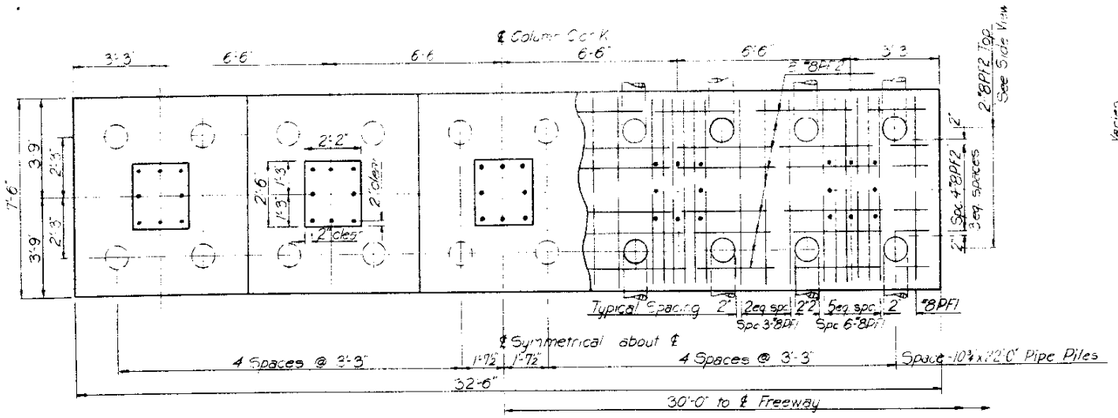
ROBERT L. KOONS
CONSULTING ENGINEERS
COLORADO SPRINGS, COLO.

DRAWING NO. 15 B 2

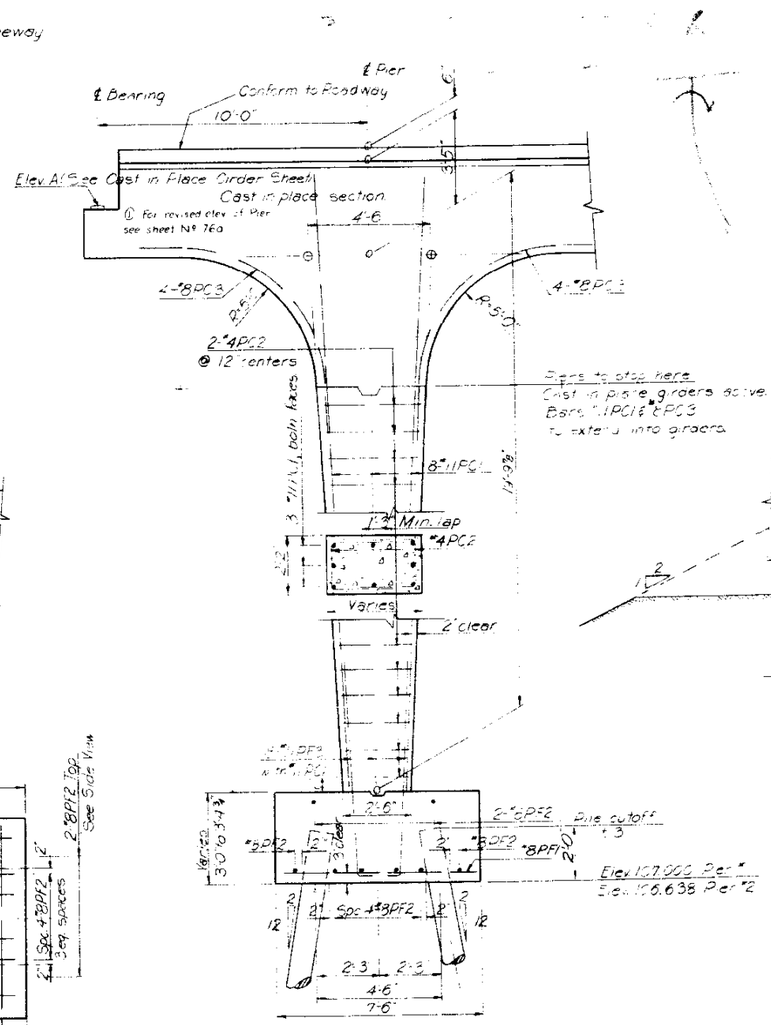
South Bridge ℄ Column A ℄ Column B ℄ Column C ℄ Column D ℄ Column E
North Bridge ℄ Column H ℄ Column J ℄ Column K ℄ Column L ℄ Column M



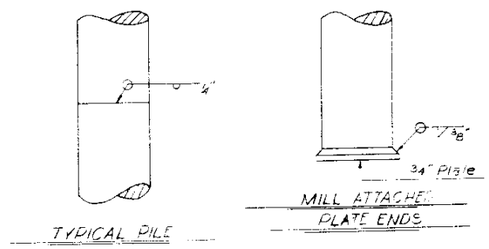
PIER ELEVATION



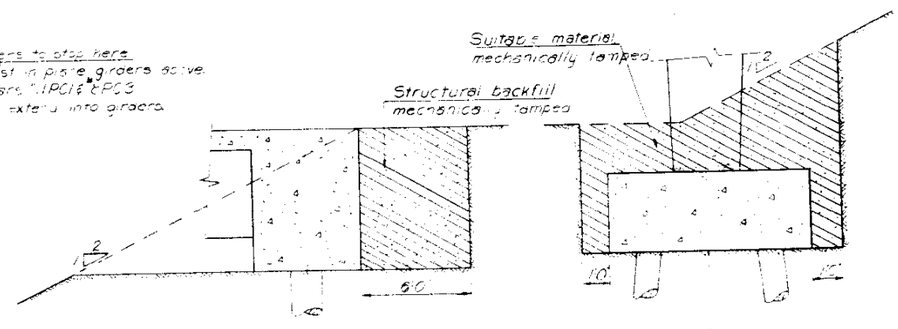
FOOTING PLAN



SIDE VIEW OF PIER SHOWING REINFORCING



PIPE PILE DETAILS



ABUTMENT PIER

STRUCTURAL BACKFILL & MECHANICAL TAMPING DIAGRAMS

Note: Material that is to be mechanically tampen shall be placed in horizontal layers not more than 6 inches in depth and tamped before the next layer is placed.

NOTES:

1. All concrete to be Class A.
2. All dimensions for reinforcing steel are to ℄ of bars unless otherwise noted. All dimensions shown in bending diagrams are out to out of bars.

Bevel all exposed edges and chamfer all corners with a ¾" triangular molding unless otherwise noted.

Piles may be pipe, 10¾" nominal diameter, min. wall thickness of 0.188 inches and shall be filled with Class A concrete after driving. Piles may be filled at the same time the pier footing is poured at the option of the contractor. Cost of pile shall include furnishing, driving, splicing, cutoff and concrete filling.

Design loading H20-S 16-44 AASHO Specifications, 1953
Pile loading - 37 tons per pile.
Unit stresses
fs = 20000 psi
fc = 1200 psi

*80 Piles - 22' Long

PIER REINFORCING SCHEDULE

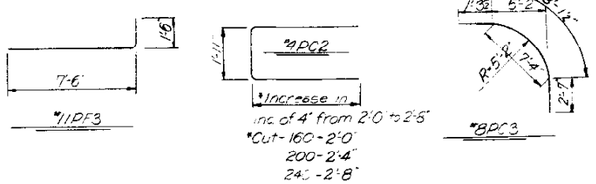
Bar	PC1	PC2	PC3				PF1	PF2	PF3
No Reqd	160	600	160				176	32	160
Size	#11	#4	#8				#8	#8	#11
Length	22'6	*	12'0"				7'0"	32'0"	9'0"
Shape	—	⊏	⌒				—	—	⌐

* See bending diagram

Both Bridges.

BAR WEIGHT SUMMARY

#11 - 5040 lin. ft @ 5.313#/ft. = 26,775
#8 - 4,176 lin ft @ 2.67#/ft = 11,150
#4 - 4003 lin. ft. @ 0.668#/ft = 2674
1% Overrun = 406
Total = 41008#



BENDING DIAGRAMS

SUMMARY PIER QUANTITIES

Structural Excavation -	350 yd.³
Mechanical Tamping -	24 hr.
Class A Concrete -	192.7 yd.³
Reinforcing Steel -	41008#
10¾" Pipe Piles -	1760 lin ft.

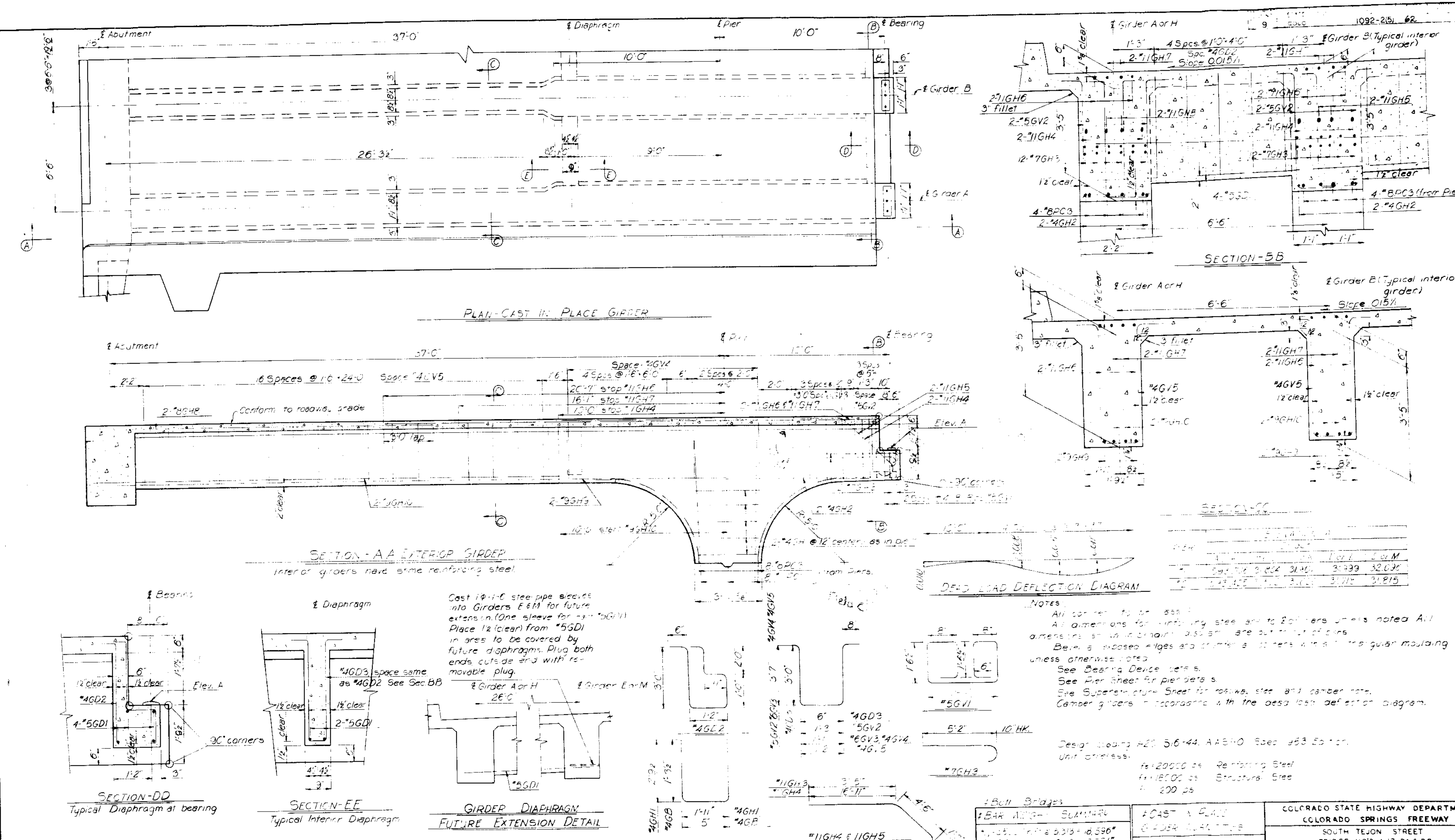
COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY
SOUTH TEJON STREET
BRIDGE NO'S I-17-DA & DB

PIER DETAILS

SCALE: —— DATE: April 1957

ROBERT L. KOONS CONSULTING ENGINEERS COLORADO SPRINGS, COLO.

DRAWING NO. 15 B 3



PLAN - CAST IN PLACE GIRDER
SECTION - AA EXTERIOR GIRDER
Interior girders have same reinforcing steel
SECTION - BB
SECTION - CC
DEAD LOAD DEFLECTION DIAGRAM
SECTION - DD
Typical Diaphragm at bearing
SECTION - EE
Typical Interior Diaphragm
GIRDER DIAPHRAGM
FUTURE EXTENSION DETAIL
BENDING DIAGRAMS
* Does not include #4GB See Bearing Device.
Cast 1'Φ-1'-0" steel pipe sleeves into Girders E & M for future extension. (One sleeve for each #5GDI. Place 1½ (clear) from #5GDI in area to be covered by future diaphragms. Plug both ends outside end with removable plug.
NOTES
See Bearing Device details.
See Pier Sheet for pier details.
Camber girders in accordance with the dead load deflection diagram.
Design Loading H20 S16-44. AASHO Spec. 1953 Edition.
Unit stresses.
fs = 20000 psi Reinforcing Steel
fs = 18000 psi Structural Steel
200 psi

℄ CAST IN PLACE GIRDER REINFORCING SCHEDULE

Bar	GD1	GD2	GD3	GH1	GH2	GH3	GH4	GH5	GH6	GH7	GH8	GH9	GH10	GV1	GV2	GV3	GV4	GV5	#4GB
No. Reqd	24	80	80	200	40	240	40	40	40	40	40	40	40	60	160	80	160	320	80
Size	#5	#4	#4	#4	#4	#7	#11	#11	#11	#11	#8	#9	#9	#5	#5	#6	#4	#4	#4
Length	27'-0"	9'-0"	7'-9"	7'-6"	11'-0"	6'-0"	23'-0"	3'-6"	29'-9"	25'-3"	19'-6"	37'-0"	28'-3"	10'-6"	9'-9"	10'-3"	10'-3"	9'-6"	3'-0"
Shape																			

℄ Both Bridges

℄ BAR WEIGHT SUMMARY

#11-[illegible]	@ 5.313 =	16,596#
#9-2,610	@ 3.40 =	8,874#
#8-750	@ 2.67 =	2,003#
#7-1440	@ 2.044 =	2,943#
#6-820	@ 1.502 =	1,232#
#5-2,838	@ 1.043 =	2,960#
*#4-8,150	@ 0.668 =	5,444#
	1% Overrun	421
	Total =	42,553#

℄ CAST IN PLACE GIRDER QUANTITIES

Class A Concrete [illegible]
Reinforcing Steel = 42,553 lbs.
Structural Steel = [illegible] lbs.

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

SOUTH TEJON STREET
BRIDGE NO.S I-17-DA & DB

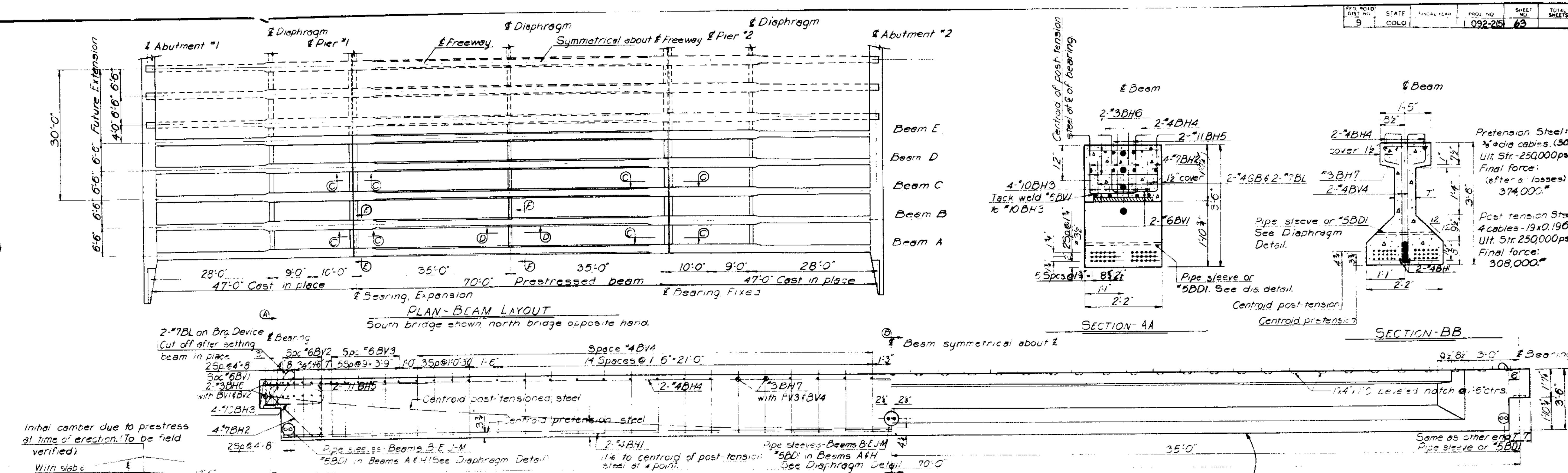
CAST IN PLACE BEAM DETAILS

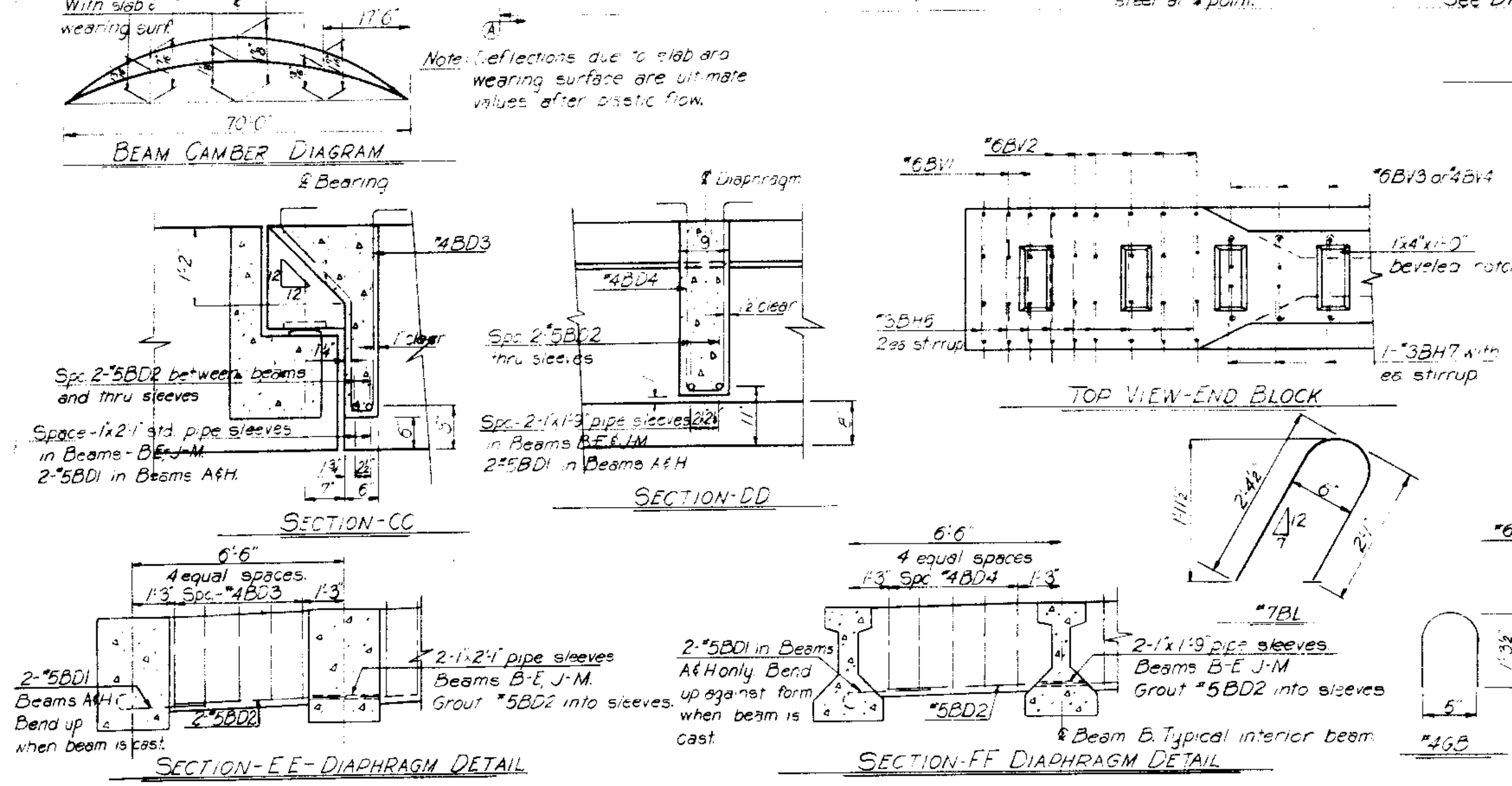
SCALE: ¾" = 1'-0", ⅜" = 1'-0" DATE April, 1957

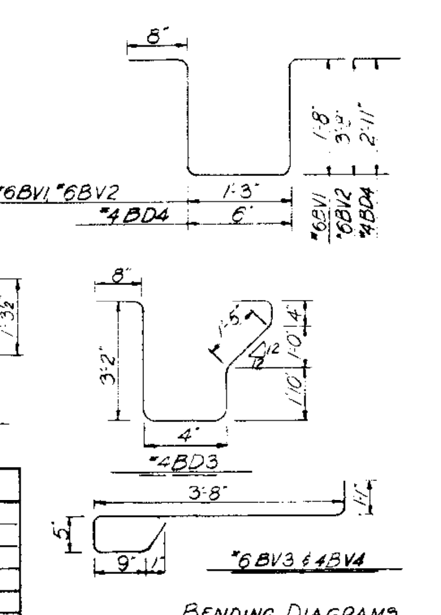
ROBERT L. KOONS
CONSULTING ENGINEERS
COLORADO SPRINGS, COLO.

DRAWING NO. 15 B4

FED. ROAD DIST. NO.	STATE	FISCAL YEAR	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO		I 092-2(5)	63	







Chamfer bottom corners only with 3/4" triangular molding.

Unit Stresses:
Prestressed Beams.
fs 250,000 psi
fs 20,000 psi Reinforcing
fs 18,000 psi Structural
fc 2,000 psi
fc 1200 psi Diaphragms

*Does not include #5BD1

SUMMARY PRESTRESSED BEAM			
Reinforcing Steel (ea. beam)*			
#11 - 36 lin. ft.	@ 5.313 =	191.3#
#10 - 36	@ 4.303	154.9#
#7 - 63	@ 2.044 =	128.8#
#6 - 462	@ 1.502 =	693.9#
#4 - 771	@ 0.668 =	5.5.0#
#3 - 199	@ 0.376 =	74.8#
	1% Overrun =	7.6#
	Total =	[illegible]6.3
Concrete (fc 2000 psi) =		11.93 yd³
Structural Steel (Bearing Plates)		1078#

NOTES:

Design Specification - AASHO 1953 Series and Bureau of Public Roads, Tentative Design Criteria for Prestressed Bridges, 1954.

Concrete in beams to be 5000 psi at 28 days, 4500 psi at time of transfer. Max. size aggregate to be 3/4". All other concrete to be Class A.

Prestressing steel to be high tensile wire strands with a modulus of elasticity of 25,000,000 psi and ultimate strength of 250,000 psi.

End anchorage of post tensioned cables is assumed to be 100% efficient in the above design.

All post tensioned cables to be draped in a parabolic shape. All post-tensioned cables to be grouted as soon as practicable. Provide 3/8" grout tubes with suitable valves and shut-off cocks into each enclosure near the ends. Grout to be pumped into enclosure from one end only under 100 psi pressure until the entire enclosure around the cables is filled and grout flows freely from the exhaust end. Exhaust valve then to be closed and pumping continued until no more grout can be introduced.

Prestressed beams to be supported at the ends only or handled by lifting hooks provided.

Unit price for beams shall include all concrete, reinforcing steel, high-strength steel, bearing devices, pipe sleeves etc. included within the beams.

All dimensions for reinforcing steel are to ℄ of bars unless otherwise noted. All dimensions shown on bending diagrams are out to out of bars.

See Bearing Device details.

Design Loading - H20-S16-44.

PRESTRESSED BEAM REINFORCING SCHEDULE

Bar	BH1	BH2	BH3	BH4	BH5	BH6	BH7		BL		BV1	BV2	BV3	BV4		GB
No. Reqd	40	80	80	40	40	360	500		40		120	240	240	700		40
Size	#4	#7	#10	#4	#11	#3	#3		#7		#6	#6	#6	#4		#4
Length	35'-0	5'6"	4'6"	36'0"	9'0"	2'9"	2'0"		1'9"		6'0	10'0	6'3"	6'3"		3'0"
Shape																

BEAM DIAPHRAGM REINFORCING

Bar	BD1	BD2	BD3	BD4
No. Reqd	12	12	80	40
Size	#5	#5	#4	#4
Length	4'0"	24'-9"	8'3"	7'9"
Shape				

DIAPHRAGM BAR WEIGHT
#5 - 345 lin. ft. @ 1.043 = 360#
#4 - 970 lin. ft. @ 0.668 = 648#
1% Overrun = 10#
Total = 1018#

BEAM DIAPH. QUANTITY
Class A Conc. yd³ = 8.5
Reinforcing Steel - 1018#

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

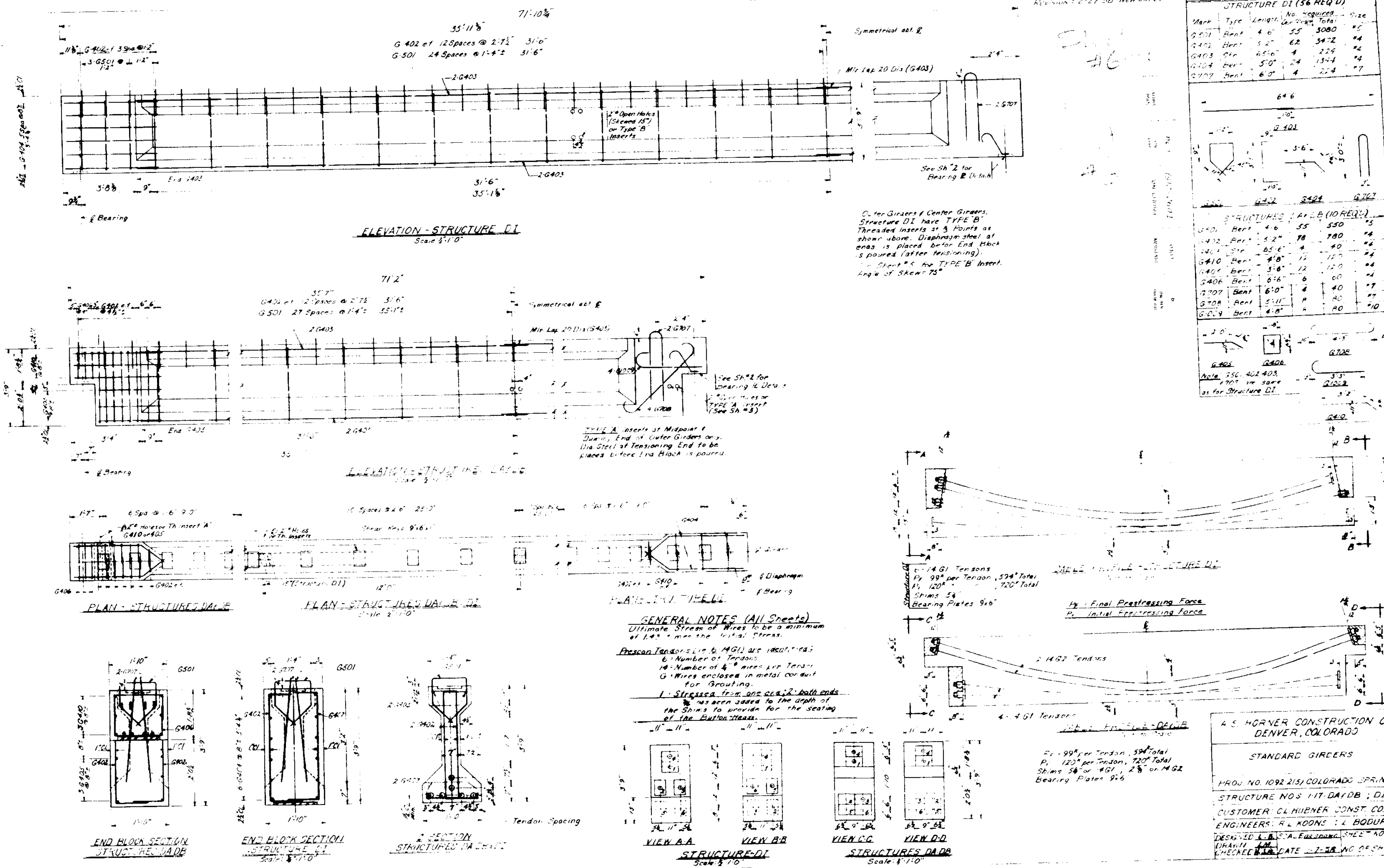
SOUTH TEJON STREET
BRIDGE NO.'S I-17-DA & DB

PRESTRESSED BEAM LAYOUT AND DETAILS

SCALE: —— DATE: April, 1957

ROBERT L. KOONS
CONSULTING ENGINEERS
COLORADO SPRINGS, COLO.

DRAWING NO. 15B5



GENERAL NOTES (All Sheets)

Ultimate Stress of Wires to be a minimum of 1.43 times the Initial Stress.

Prescon Tendons (i.e. 6-14G1) are identified:
6 = Number of Tendons
14 = Number of ¼" Ø wires per Tendon
G = Wires enclosed in metal conduit for Grouting.
1 = Stressed from one end; 2 = both ends

⅛" has been added to the depth of the Shims to provide for the seating of the Button Heads.

BAR LIST FOR PRESTRESSED GIRDERS

STRUCTURE DI (56 REQ'D)

Mark	Type	Length	No. Required Per Girder	No. Required Total	Size
G501	Bent	4'-6"	55	3080	#5
G402	Bent	5'-2"	62	3472	#4
G403	Str	65'-6"	4	224	#4
G404	Bent	5'-0"	24	1344	#4
G707	Bent	6'-0"	4	224	#7

STRUCTURES DA & DB (10 REQ'D)

Mark	Type	Length	No. Required Per Girder	No. Required Total	Size
G501	Bent	4'-6"	55	550	#5
G402	Bent	5'-2"	78	780	#4
G403	Str	65'-6"	4	40	#4
G410	Bent	4'-8"	12	120	#4
G405	Bent	3'-6"	12	120	#4
G406	Bent	6'-6"	6	60	#4
G707	Bent	6'-0"	4	40	#7
G708	Bent	5'-11"	8	80	#7
G1009	Bent	4'-8"	8	80	#10

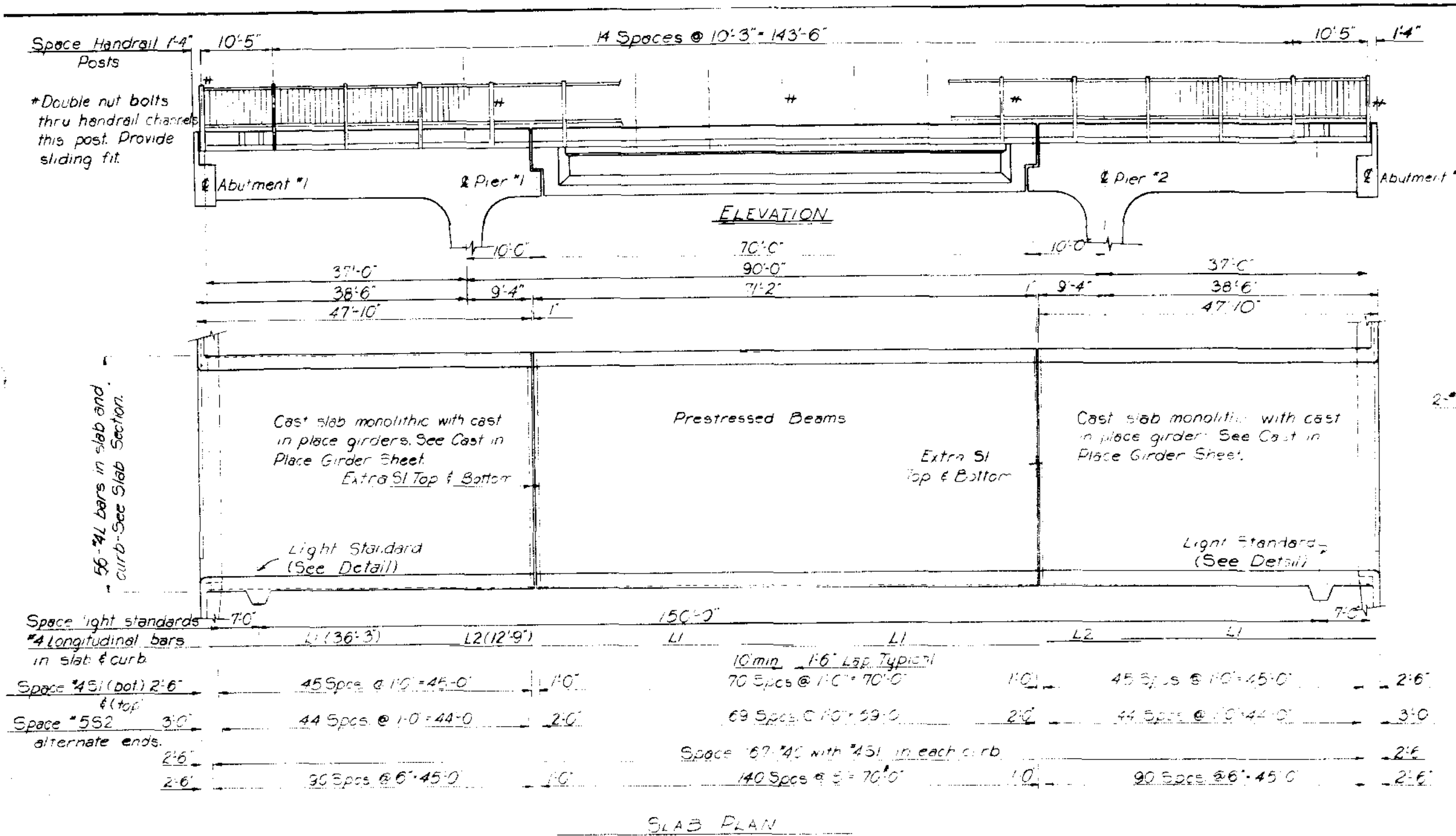
Note: G501, 402, 403 & 707 are same as for Structure DI.

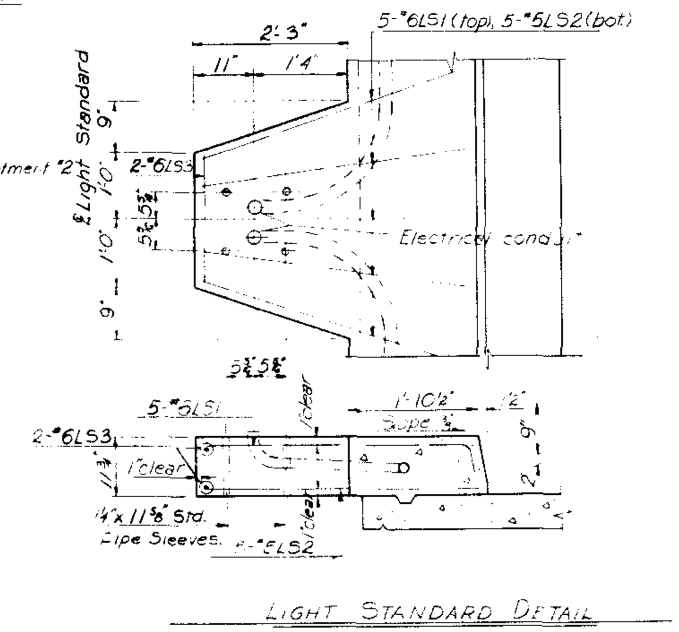
A. S. HORNER CONSTRUCTION CO.
DENVER, COLORADO

STANDARD GIRDERS

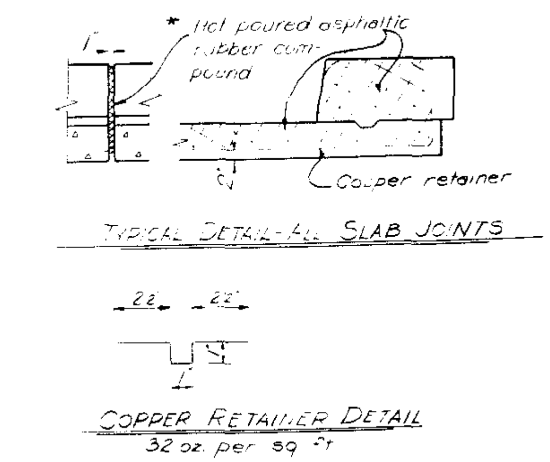
PROJ. NO. 1092-2(5) COLORADO SPRINGS
STRUCTURE NOS. I-17-DA & DB ; DI
CUSTOMER: C.L. HUBNER CONST. CO.
ENGINEERS: R.L. KOONS : L. BODUROFF

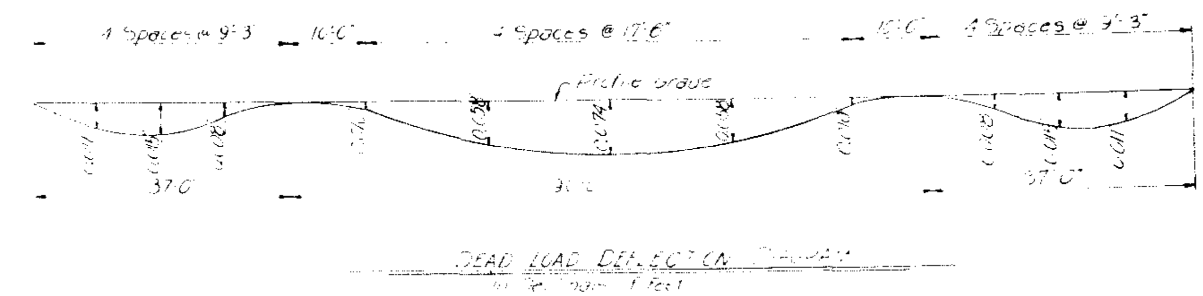
DESIGNED L.B.	SCALE as shown	SHEET NO. 63
DRAWN L.M.		
CHECKED [illegible]	DATE 1-7-58	NO. OF SHS.

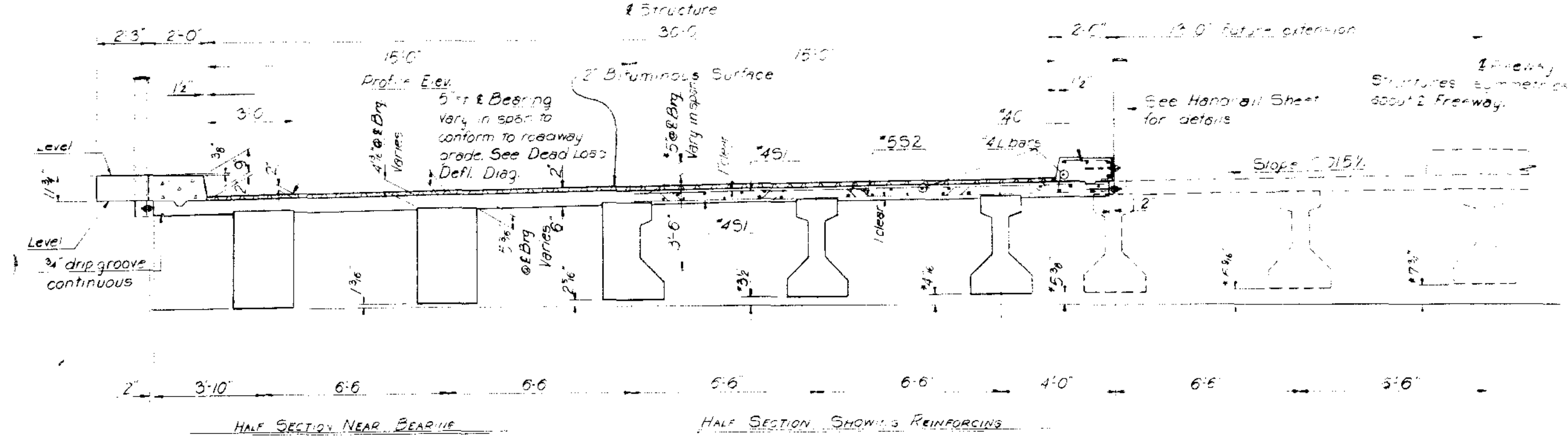




* Shall conform to Federal Specification SS-S-164







SLAB SECTION

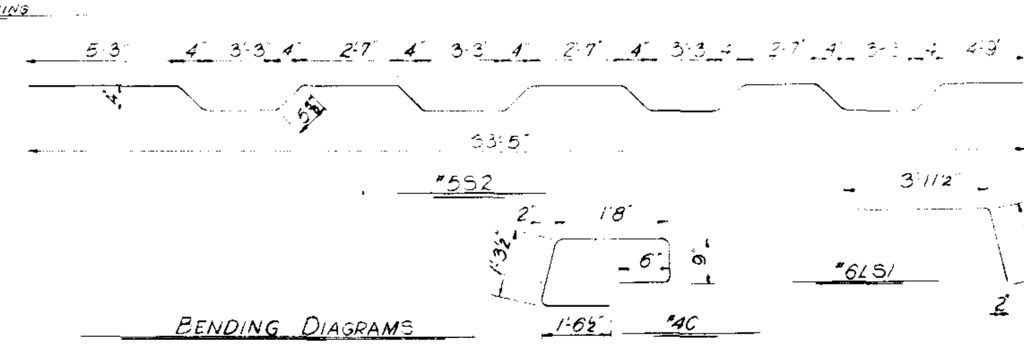
*At Bearing only - See dead load camber diagrams

SLAB REINFORCING SCHEDULE (Both Bridges)															
Bar	C			L1	L2		LS1	LS2	LS3		S1	S2			
No. Reqd	668			448	224		20	20	8		668	320			
Size	#4			#4	#4		#6	#5	#6		#4	#5			
Length	5'-9"			36'-3"	12'-9"		5'-3"	4'-0"	1'-10"		33'-6"	34'-6"			
Shape	⊑			—	—		⌐\	—	—		—	∿∿			

[illegible]	
[illegible]	1,467 [illegible]
[illegible]	42,465 lbs.
[illegible]	21,667 lbs.
[illegible]	[illegible]
[illegible]	62 [illegible]
[illegible] Mix Asphalt	125 ton

‡ BAR WEIGHT SUMMARY	
[illegible]	[illegible]
[illegible] 1243 [illegible]	[illegible]
[illegible] 1668	[illegible]
[illegible]	425
Total	42,468

‡ Both Bridges



NOTES:

All concrete shall be Class A.

All dimensions for reinforcing steel are to ℄ of bars. All dimensions shown in the bending diagrams are out to out of bars.

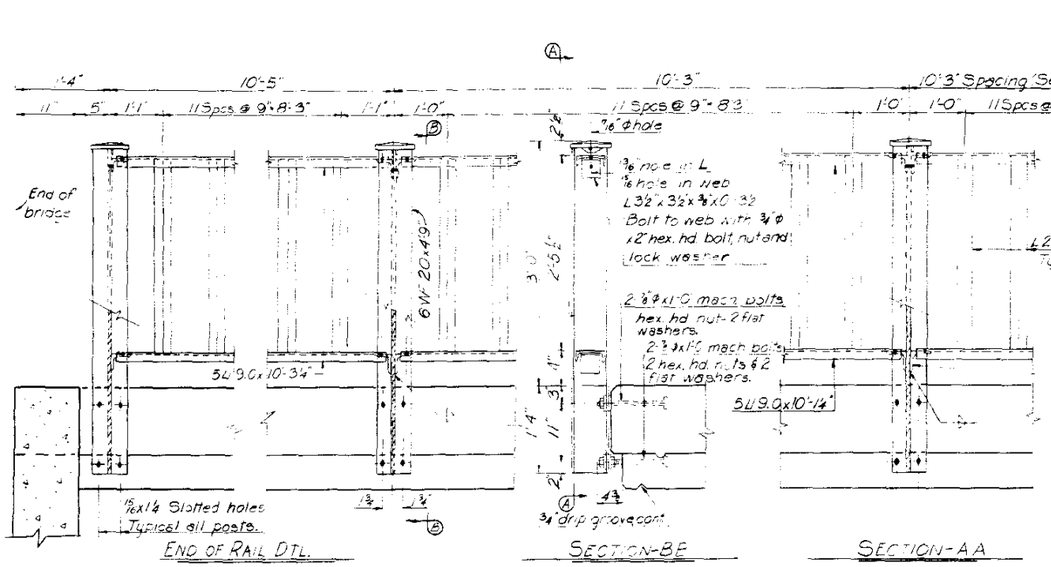
Bevel all exposed edges with a ¾" triangular moulding unless otherwise indicated.

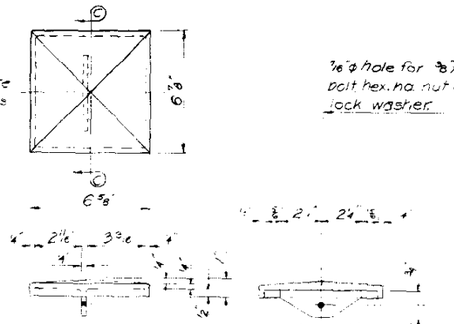
The finished floor shall be constructed to the theoretical grade by increasing or decreasing the slab thickness over the beams by the amounts shown on the dead load deflection diagram and the amount required to maintain the roadway profile vertical curve.

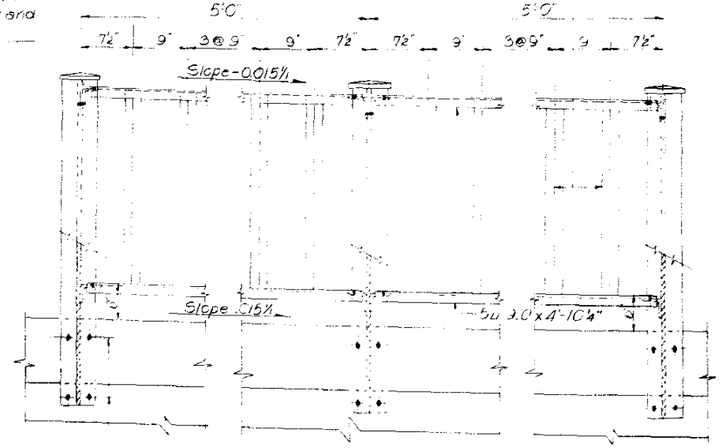
See Lighting Sheet for conduit details.
See [illegible] Sheet for details.

Design Loading H20-S16-44, AASHO Spec. 1953 Ed.
Unit Stresses: fs=20,000 psi
[illegible] = 200 psi

COLORADO STATE HIGHWAY DEPARTMENT COLORADO SPRINGS FREEWAY	
SOUTH TEJON STREET BRIDGE NO.'S I-17-DA & DB	
SUPERSTRUCTURE DETAILS	
SCALE:	DATE: April, 1957
ROBERT L. KOONS CONSULTING ENGINEERS COLORADO SPRINGS, COLO.	DRAWING NO. 15 B 6

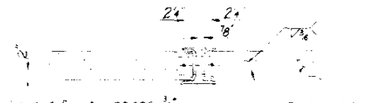






NOTE: All connection of standard handrail to SUPERSTRUCTURE are applicable to the ABUTMENT STEEL RAIL except as shown.

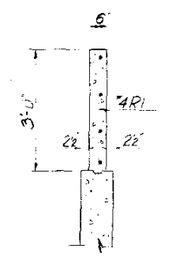
ABUTMENT STEEL RAILING DETAILS
2 Regd - As Shown
2 Regd - Reversed



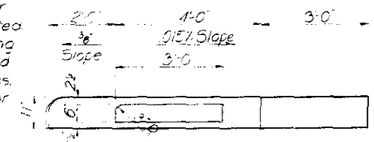
PLAN WITHOUT CAP

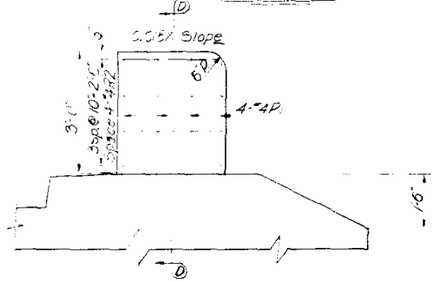
STEEL HANDRAIL DETAILS - SUPERSTRUCTURE

NOTES:
All concrete to be Class A.
Bevel all edges and miter corners with a 1/2" triangular plating unless otherwise noted.
Concrete and Reinforcing Steel quantities are included in the Abutment Quantities. See Abutment Sheet for Quantity Summary.



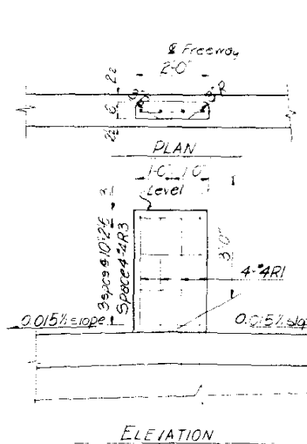
SECTION-DD





INSIDE ELEVATION

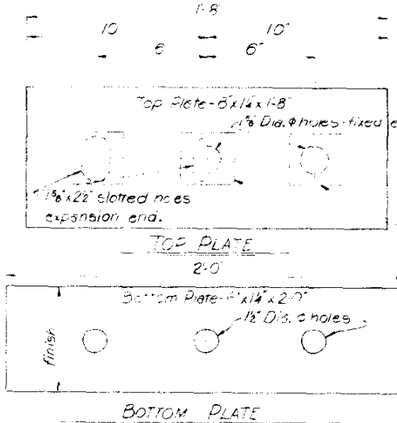
ABUTMENT WINGWALL RAILING DETAIL

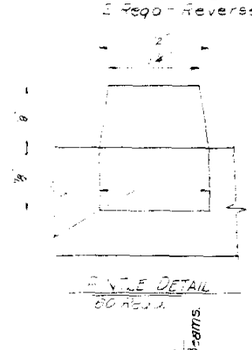


ELEVATION

ABUTMENT CENTER RAILING DETAIL

CONCRETE RAILING DETAILS - ABUTMENTS





Included in unit price bid for Prestressed Beams.

See Prestressed Beams and Cast in Place Girders for location of Bearing Devices and anchor bars. Top plates with lifting hooks, etc. included in price each for beams.

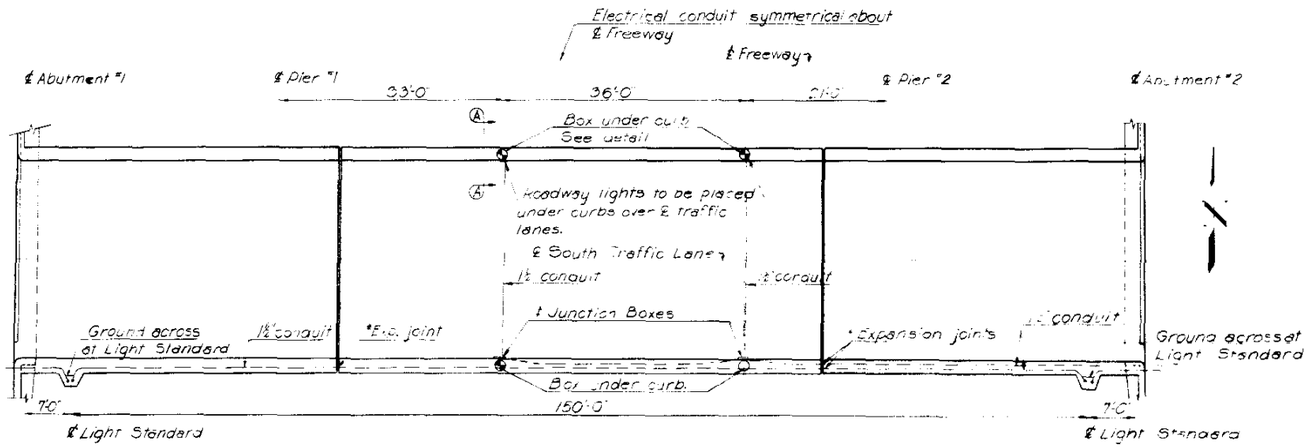
COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY
SOUTH TEJON STREET
BRIDGE NO'S I-17-DA & DB

HANDRAIL AND BEARING DEVICE DETAILS

SCALE: ——— DATE: April 1957

ROBERT L. KOONS CONSULTING ENGINEERS COLORADO SPRINGS, COLO.

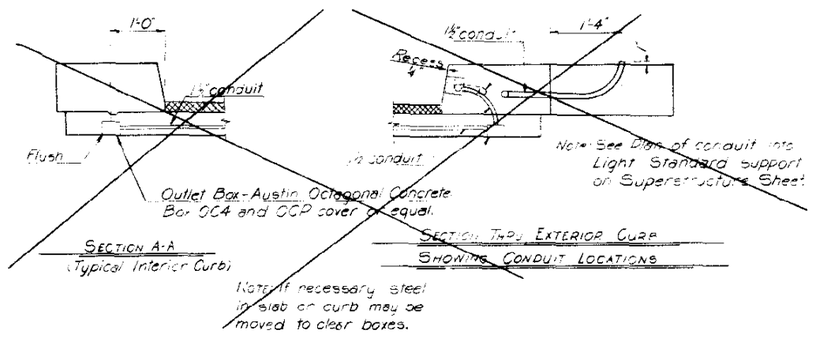
DRAWING NO. 15 B 7



LIGHTING PLAN FOR SOUTH BRIDGE

*Expansion joints to be 1" conduit to be Crouse-Hinds Catalog No. XJ44. or equal.

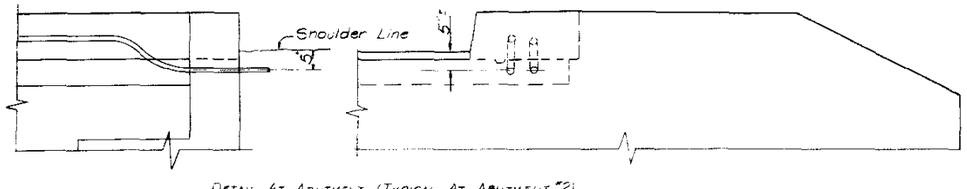
~~℄ Junction Boxes to be Crouse-Hinds Watertight Series ~~ ℄ Junction Conduits or equal.



SECTION A-A (Typical Interior Curb)

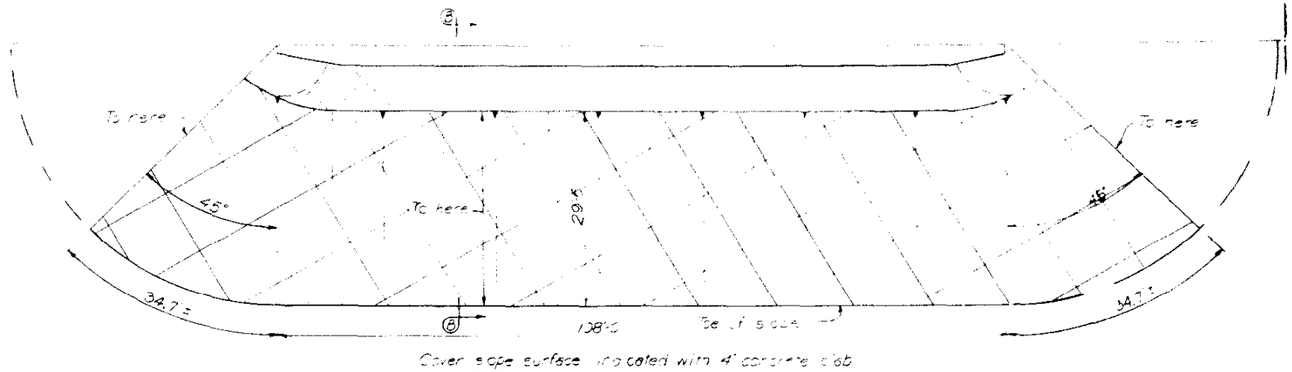
SECTION THRU EXTERIOR CURB SHOWING CONDUIT LOCATIONS

Note: If necessary steel in slab or curb may be moved to clear boxes.

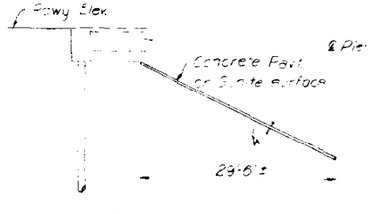


DETAIL AT ABUTMENT - (TYPICAL AT ABUTMENT "2)
Abutment "1 same except only one conduit.

LIGHTING CONDUIT DETAILS



Cover slope surface indicated with 4" concrete slab using 5'x6'-1% mesh and premolded joints into 10'-0" squares. Curbs may be used at the contractors option.



SECTION-B-B

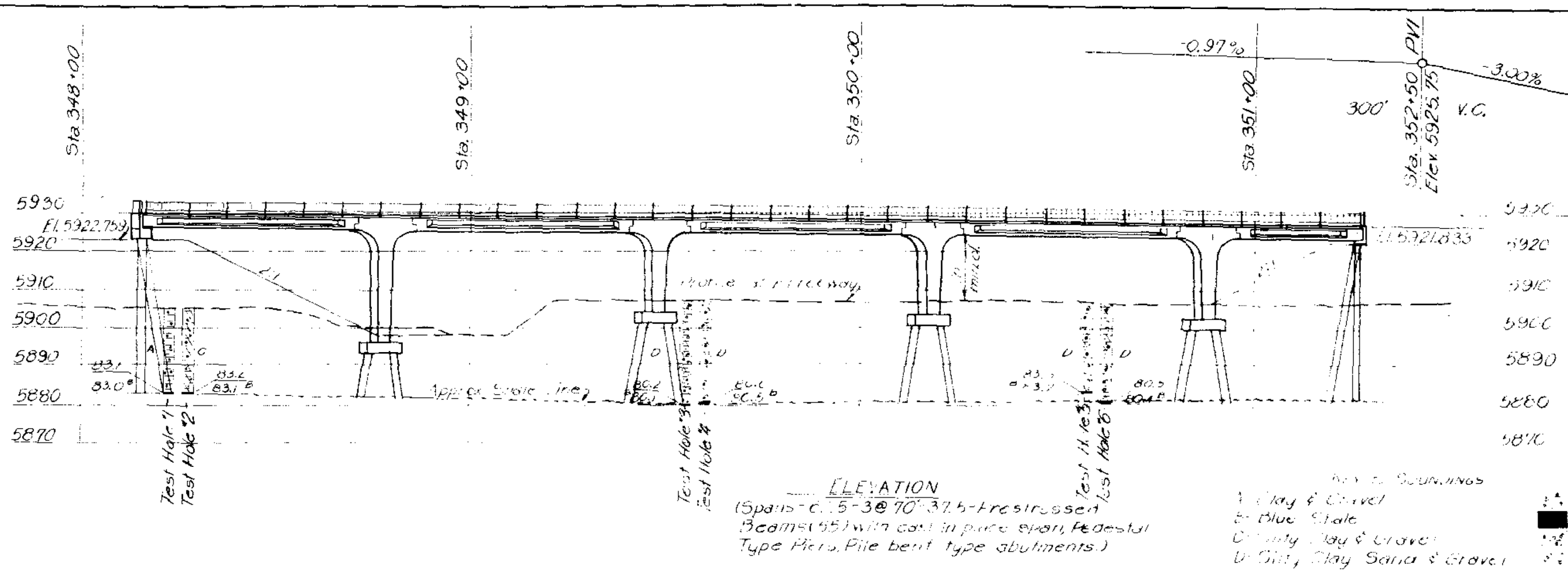
SLOPE PAVEMENT DETAILS
ABUTMENTS 1&2

SUMMARY OF SLOPE PAVING QUANTITIES

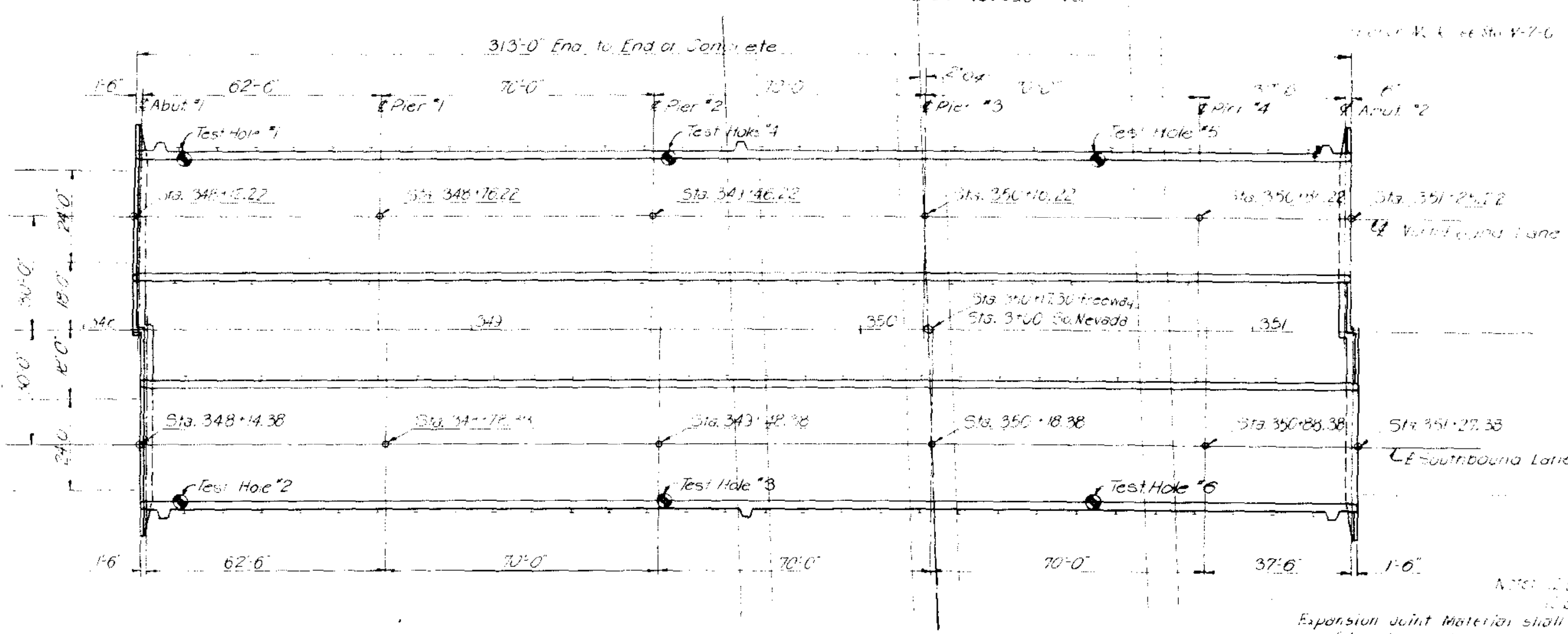
Concrete Paving-22 cu. yds.
Reinforcing Steel- 2076#
(Reinforcing Steel Included in cost of Conc. Slope and Ditch Paving.)

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY
SOUTH TEJON STREET
BRIDGE NO'S I-17-DA & DB
LIGHTING AND SLOPE PAVEMENT DETAILS

SCALE —
DATE: April, 1957
ROBERT L. KOONS CONSULTING ENGINEERS COLORADO SPRINGS, COLO.
DRAWING NO. 1588



ELEVATION
(Spans - 62.5 - 3 @ 70' - 37.5 - Prestressed Beams (55) with cast in place slab, Pedestal Type Piers, Pile bent type abutments)



PLAN

GENERAL NOTES:

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways as adopted June 1, 1952.

The soundings and pile data are shown according to the best information available to the Colorado Department of Highways. If essentially different conditions are encountered the Bridge Engineer will inspect and determine if redesign is necessary. All piles shall be driven to the penetration shown unless in the opinion of the Engineer such penetration cannot be secured without injury to the piles. All piles shall be driven to a minimum computed bearing value of 47 tons for 12¾" diameter and 37 tons for 10¾" diameter.

All concrete shall be air entrained and conform to the unit stresses indicated as required on each sheet.

All concrete surfaces exposed to normal view by highway traffic shall receive Class "I" Surface Finish.

All reinforcing steel shall be intermediate grade deformed bars conforming to A.A.S.H.O. Specifications M31 and M137 (A.S.T.M. designations A15 and A305). All hooks and bends in bars shall conform to A.C.I. Standard 315-51.

All reinforcing bars shall be tagged with structure number and mark.

All steel railings shall receive one shop coat of zinc chromate and a field coat of tinted aluminum paint followed by a coat of aluminum paint.

DESIGN SPECIFICATION:

A.A.S.H.O. Series of 1953 and Bureau of Public Roads, Tentative Design Criteria for Prestressed Bridges, 1954.
Design Loading H-20 S16-44.
Unit Stresses:
fc=1200 psi Class A
fc=2000 psi Prestressed beams (f'c 5000 psi)

fs=20,000 psi Reinforcing
fs=18000 psi Structural
fs=[illegible] psi Prestressed cables

INDEX OF SHEETS

Sheet No. 1 General Plan and Elevation
2 Abutment No. 1 Details
3 Abutment No. 2 Details
4 [illegible] Pier Details
[illegible] Beam Details
[illegible] Prestressed Beam Layout and Details
8 Superstructure Details
9 Handrail Details
10 Lighting and Slope Paving Details

Note: [illegible]

Expansion Joint Material shall be according to A.A.S.H.O. specification M-153-54 and of the type shown.

Holes for piles shall not be drilled until definitely determined by the Engineer that the piles cannot be driven without them.

SUMMARY OF BRIDGE QUANTITIES

Item No.	Description	Unit	Abut 1	Pier 1	Pier 2	Pier 3	Pier 4	Abut 2	Super	Total
14g	Common Excavation (Str.)	Cu. Yds.	—	141	170	188	180	—	—	679
16ax	Structural Backfill (Class 1)	Cu. Yds.	177	77	—	—	—	123		377
16c	Mechanical Tamping	Hrs.	18	7	10	12	12	12	—	71
~~32ax~~	~~Plant Mix Asphalt Surfacing~~	~~Tons~~							~~234~~	~~234~~
12b	Treated Bridge Timber	M.B.M.	0.444	—	—	—	—	0.444	—	0.888
46a	Class A Concrete	Cu. Yds.	54.0	214.0	187.8	138.4	114.4	52.2	620.[illegible]	1441.[illegible]
40pf	Prestressed Concrete Beams	Ea.	—	—	—	—	—	—	40	*40
47	Reinforcing Steel (+1% Overrun)	Lbs.	4517	58,480	50,113	47,551	21,211	3,453	105,286	290,611
48	Structural Steel (Includes ½% ± for Paint)	Lbs.	1,755	1,075	1,075	16,735	—	1,220	50,345	72,205

Item No.	Description	Unit	Abut 1	Pier 1	Pier 2	Pier 3	Pier 4	Abut 2	Super	Total
61aw	12¾" Steel Pipe Piles ⊗	Lin. ft.	672	560	920	840	—	704	—	3696
61av	10¾" Steel Pipe Piles ○	Lin. ft.	—	—	—	—	880	—	—	880
60x	Drilling Holes * to facilitate Pile Driving	Lin. ft.	272	—	—	—	—	304	—	576
65m	Concrete Slope & Ditch Paving	Cu. Yds.	—	—	—	—	—	56	—	56
80c	Sheet Copper (32 oz. per sq. ft.)	Lbs.	—	—	—	—	—	—	760	760
30b	Electrical Conduit & Junction Boxes (1½")	Lin. ft.	—	—	—	—	—	—	1038	1038
‡	1" Premolded Joint Material	Sq. ft.	—	—	—	—	—	—	100	100

○ 40 @ 22'
⊗ 40 @ 14', 40 @ 23', 40 @ 2[illegible]', 16 @ 42', 16 @ 44'
‡ Subsidiary to Class A Concrete

* 16 @ 19' Abut. 2
16 @ 17' Abut. 1
× 40 @ 55'

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

SOUTH NEVADA AVENUE
BRIDGE NO'S 1-17-DC & DD

GENERAL PLAN AND ELEVATION

Robert L. Koons (signature)
ROBERT L. KOONS
CONSULTING ENGINEERS
COLORADO SPRINGS, COLO.

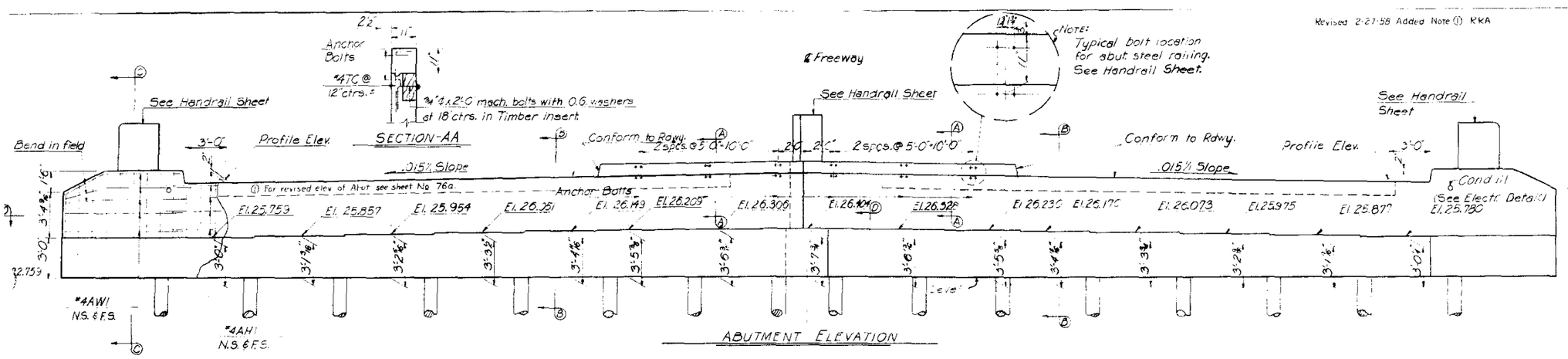
DATE: April, 1957.

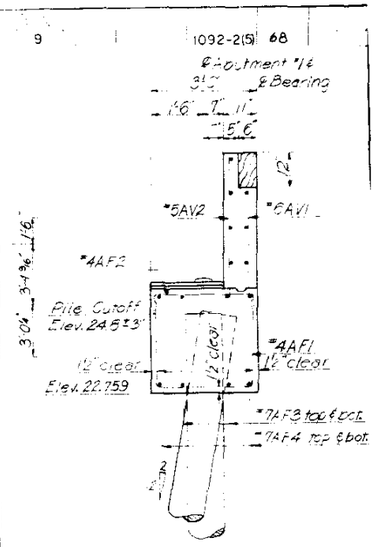
DRAWING NO. 15 A 1

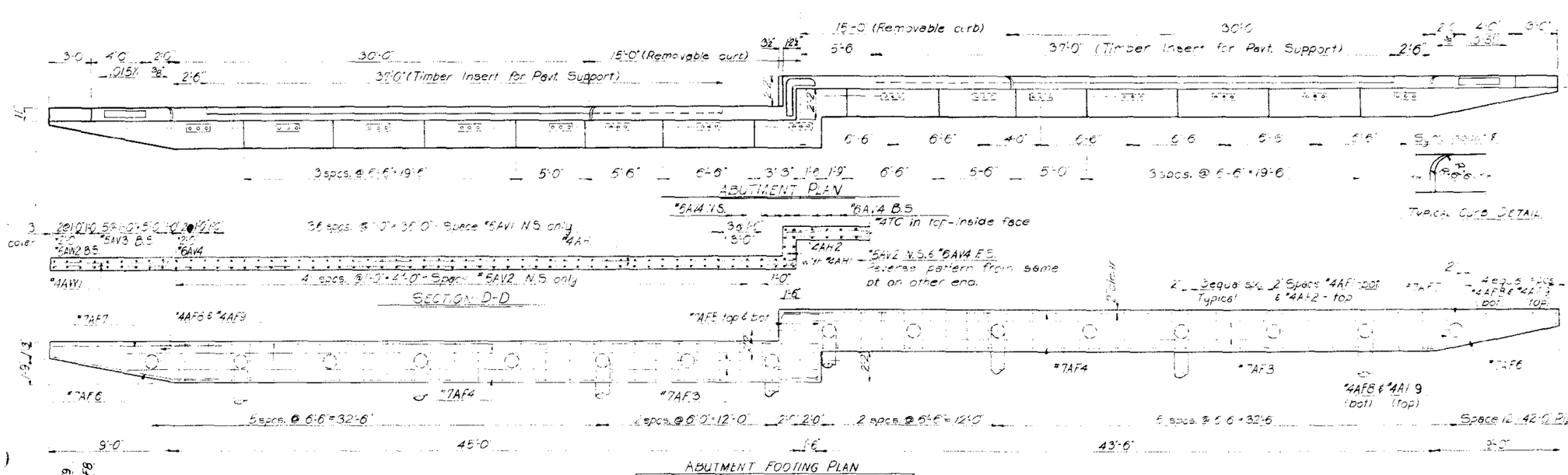
Revised 2-27-58 Added Note (1) RKA

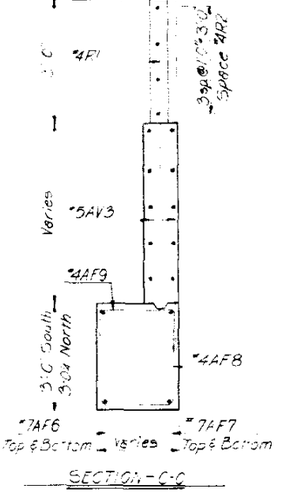
9

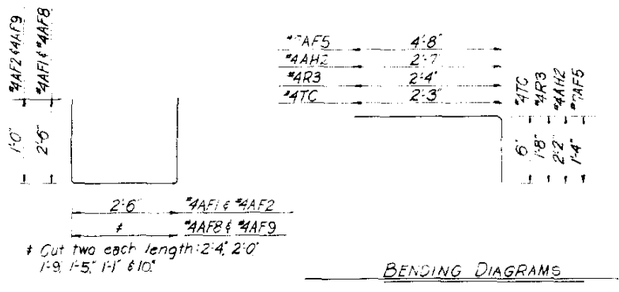
1092-2(5) 68

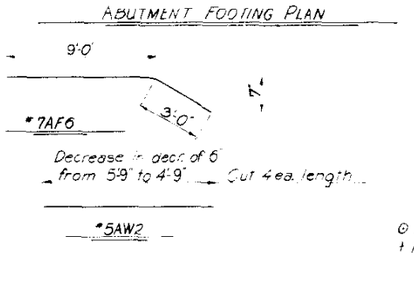












ABUTMENT REINFORCING SCHEDULE

Bar	AF1	AF2	AF3	AF4	AF5	AF6	AF7	AF8	AF9	AH1	AH2	R1	R2	R3	TC	AV1	AV2	AV3	AV4	AW1	AW2
No. Reqd	54	54	8	8	4	4	4	12	12	14	8	13	8	4	46	74	84	20	30	20	12
Size	#4	#4	#7	#7	#7	#7	#7	#4	#4	#4	#4	#4	#4	#4	#4	#6	#5	#5	#6	#4	#5
Length	7'6"	4'6"	50'0"	46'3"	6'0"	12'0"	12'0"	*	*	46'3"	4'9"	4'9"	2'9"	4'0"	2'9"	4'6"	5'6"	6'6"	5'6"	8'9"	*
Shape	⌊	⌊	—	—	⌐	⌒	—	⌊	⌊	—	⌐	—	—		—	—	—	—	—	—	—

* See Bending Diagram

BAR WEIGHT SUMMARY

Bar	Length(ft)	Wt. / Ft.	Wt. Total
#7	890	2.044	1,819
#6	498	1.502	748
#5	655	1.043	683
#4	1,829	0.668	1,222
		1% Overrun =	46
		Total =	4,517

ABUTMENT QUANTITIES

Struct. Backfill	177 C.Y.
Mechanical Tamp	18 hrs.
Class A Concrete	54.0 C.Y.
Reinforcing Steel	4,517 Lbs.
Structural Steel	1,820 Lbs.
℄ Steel Pipe Piles	672 L.F.
† Drilling Holes	272 L.F.
Fr. Timber Header (M)	.444 F.b.m.

NOTES:

All concrete shall be Class A.

All dimensions for reinforcing steel are to ℄ of bars. All dimensions shown in the bending diagrams are out to out of bars.

Bevel all edges and chamfer all corners with a ¾ triangular molding unless otherwise indicated.

Piles shall be pipe 12¾" nominal diameter, minimum wall thickness of .188" and shall be filled with Class A concrete after driving. Piles may be filled at the same time the abutment footing is poured at the contractors option.

See Handrail sheet for details.
See Bearing Device details for location and treatment.

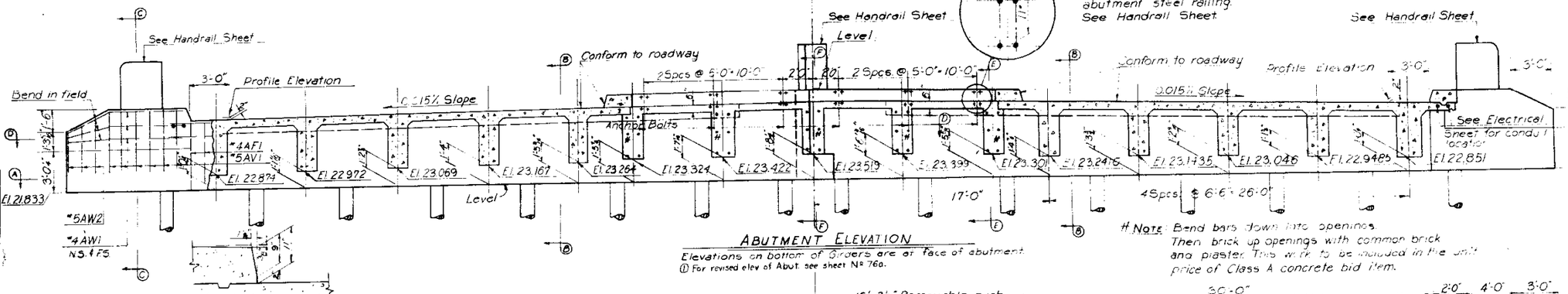
COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY
SOUTH NEVADA AVENUE
BRIDGE NO'S 1-17-DC & DD

ABUTMENT NO. 1 DETAILS

SCALE 4"=1'-0" 2"=1'-0"	DATE April, 1957
ROBERT L. KOONS CONSULTING ENGINEERS COLORADO SPRINGS, COLO.	DRAWING NO 15 A 2

Revised 2-27-58 Added Note ① RRA

1092-2(5) 69

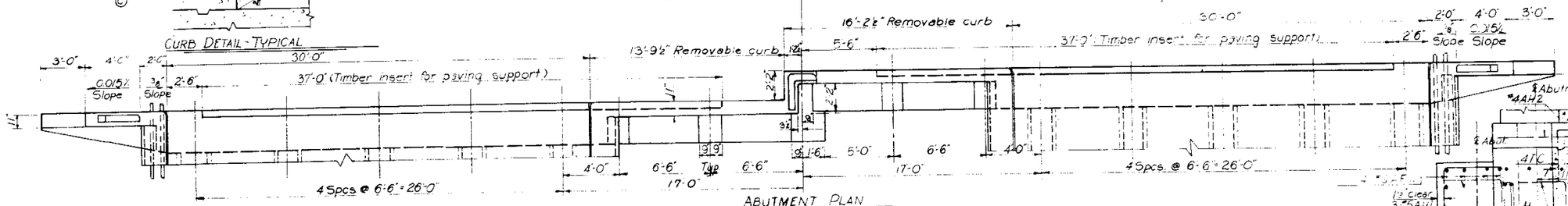


ABUTMENT ELEVATION

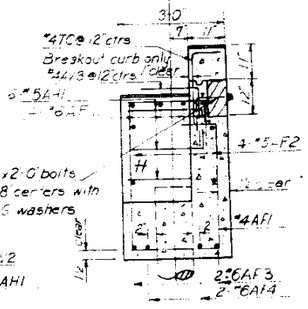
Elevations on bottom of Girders are at face of abutment.
① For revised elev of Abut. see sheet No 76a.

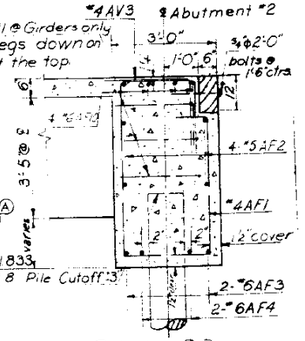
Note: Bend bars down into openings. Then brick up openings with common brick and plaster. This work to be included in the unit price of Class A concrete bid item.

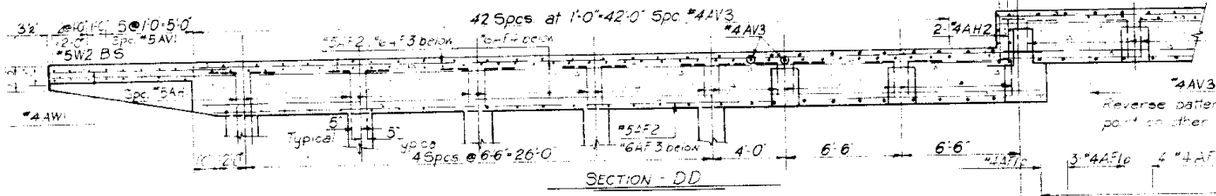
CURB DETAIL - TYPICAL

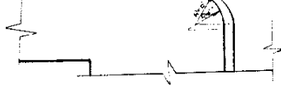


ABUTMENT PLAN

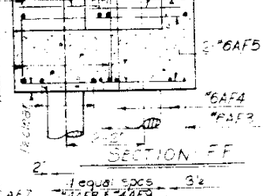


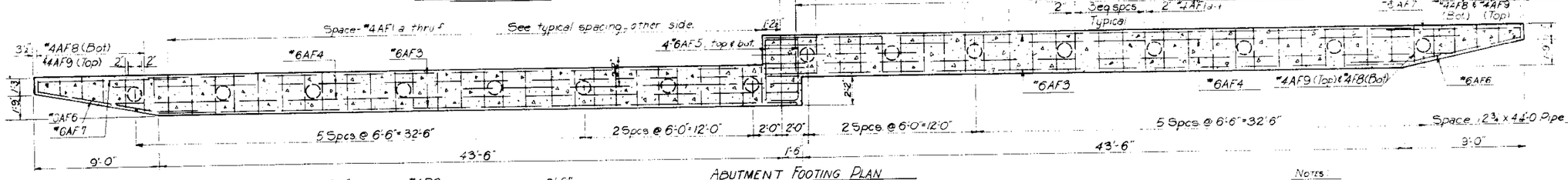






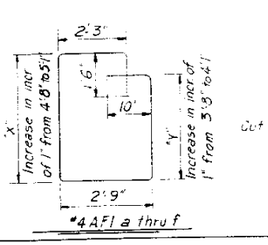
TYPICAL END OF CURB DETAIL

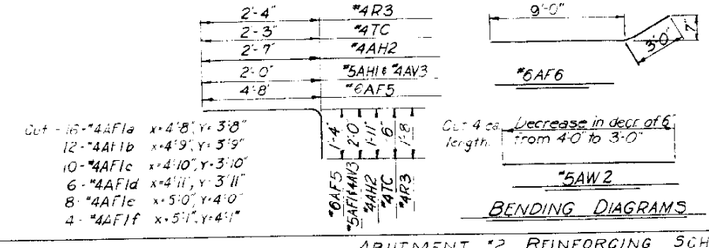


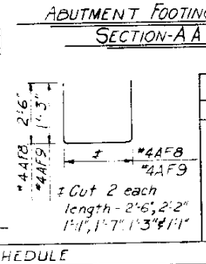


ABUTMENT FOOTING PLAN

SECTION - AA







BENDING DIAGRAMS

BAR WEIGHT SUMMARY

#6 - 89.0 lin ft @ 1.502 #/ft.	1,338	lbs
#5 - 92.20 lin ft @ 1.043 #/ft.	962	lbs
#4 - 1,675.6 lin ft @ 0.668 #/ft.	1,119	lbs
1% Overrun	34	lbs
Total	3,453	lbs

ABUTMENT #2 QUANTITIES

Structural Backfill	23 yds
Mechanical Tamping	12 hrs
Class A Concrete	52 yds
Reinforcing Steel	3,453 lbs
Structural Steel	1,285 lbs
12¾" Steel Pipe Piles °	704 lin ft
Drilling Holes °	304 lin ft
Treated Timber Header	0.444 MFt bm

ABUTMENT #2 REINFORCING SCHEDULE

Bar	AF1	AF2	AF3	AF4	AF5	AF6	AF7	AF8	AF9	AF10	AF11	AH1	AH2	AV1	AV2	AV3	AW1	AW2	TC	R1	R2	R3
No. Reqd	56	8	4	4	4	4	4	12	12	8	8	90	2	24	8	86	12	12	30	13	8	4
Size	#4	#5	#6	#6	#6	#6	#6	#4	#4	#6	#6	#5	#4	#5	#5	#4	#4	#5	#4	#4	#4	#4
Length	*	46'-6"	46'-3"	50'-0"	6'-0"	12'-0"	12'-0"	*	*	31'-9"	16'-6"	4'-0"	4'-6"	4'-6"	5'-0"	4'-0"	9'-6"	*	2'-9"	4'-9"	2'-9"	4'-0"
Shape																						

* See Bending Diagrams.

Notes:

All concrete to be Class A.

All dimensions for reinforcing steel are to ℄ of bars. All dimensions shown in bending diagrams are out to out of bars.

Bevel all edges and miter all corners with a ¾" triangular molding unless otherwise noted.

Piles shall be pipe, 12¾" nominal diameter, minimum wall thickness of .188" and shall be filled with Class A concrete (subsidiary item) after driving. Piles may be filled at the same time the abutment is poured at the contractors option.

See Handrail Sheet for details.

See cast in place girder sheet for details of girders to be cast with abutment.

See Electrical Sheet for conduit location and size.

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

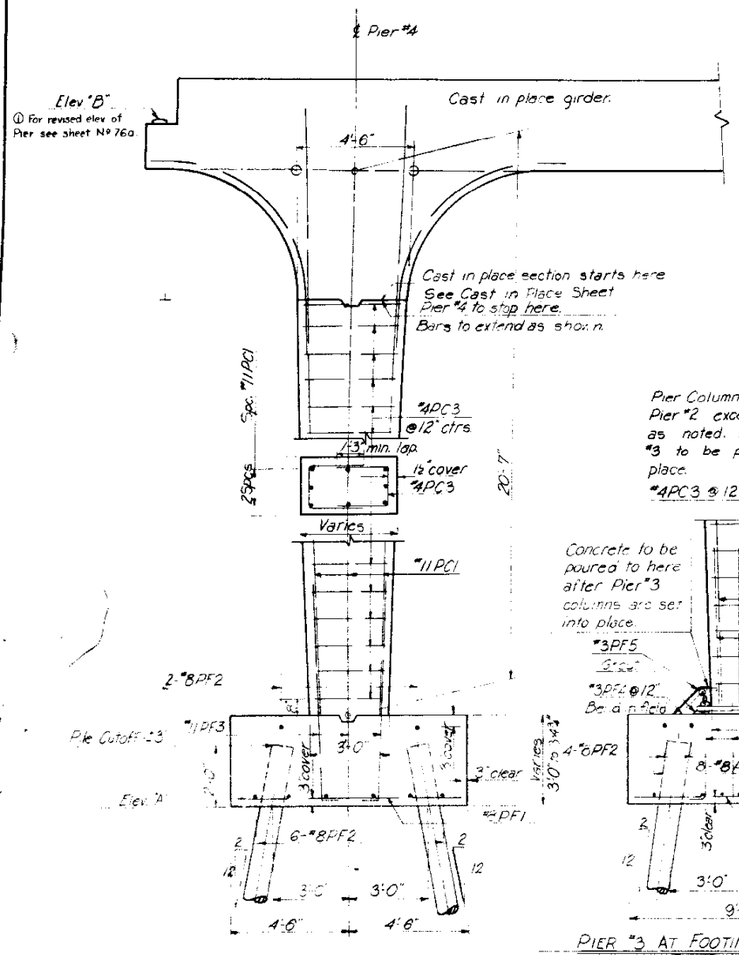
SOUTH NEVADA AVENUE
BRIDGE NO'S I-17-DC & DD

ABUTMENT NO. 2 DETAILS

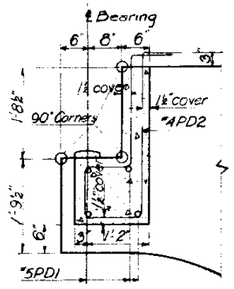
SCALE: 1/4"=1'-0" 2'-1'-0" | DATE: April 1957

ROBERT L. KOONS
CONSULTING ENGINEERS
COLORADO SPRINGS, COLO.

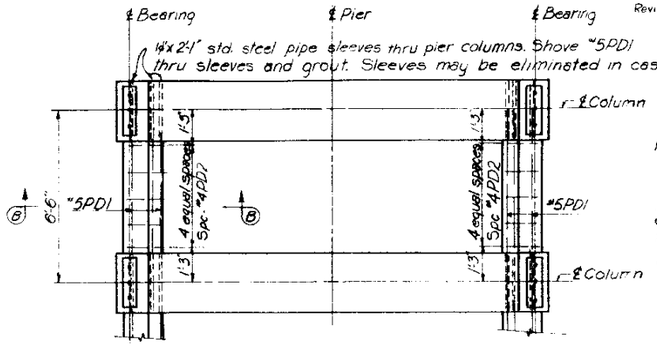
DRAWING NO.
15 A 3



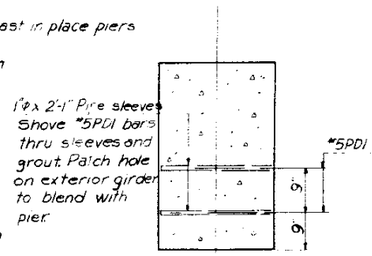
SIDE VIEW - PIER "4



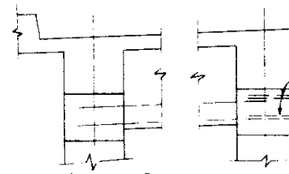
SECTION - BB



PLAN - TYPICAL PIER DIAPHRAGM



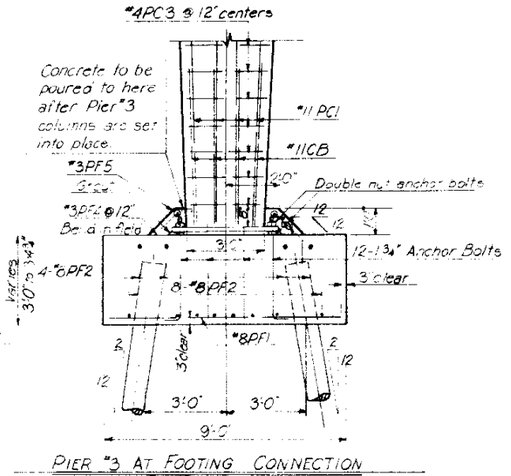
PIPE SLEEVE DETAIL



GIRDER DIAPHRAGM
FUTURE EXTENSION DETAIL

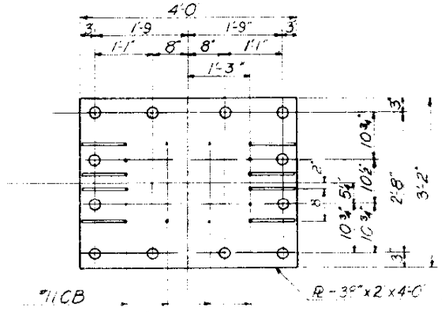
Cast 1'-6" steel pipe sleeves into Pier Columns E & M for future extension (One sleeve for each "5PD1.) Place 1½" clear from "5PD1 in area to be covered by future diaphragms. Plug both ends, outside end with removable plug.

Pier Column on Pier "3 same as Pier "2 except footing connection as noted. Pier Columns of Pier "3 to be pre-cast and set in place.

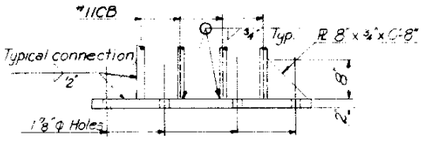


PIER "3 AT FOOTING CONNECTION

Note: Piers "1" & "4 may be precast and set in place in same manner at the option of the contractor

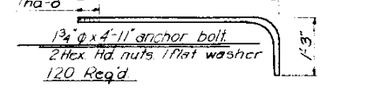


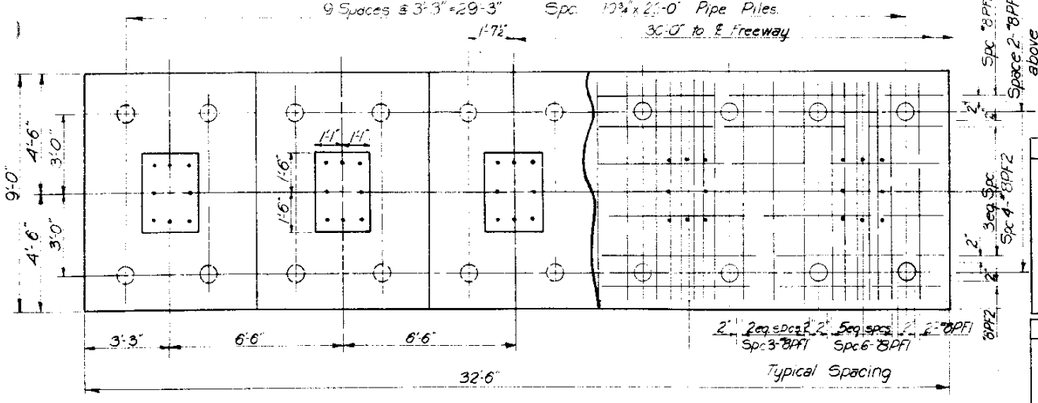
PLAN



ELEVATION

BASE PLATE DETAILS





FOOTING PLAN - PIER "4

QUANTITIES - PIERS 3 & 4 (Both Bridges)

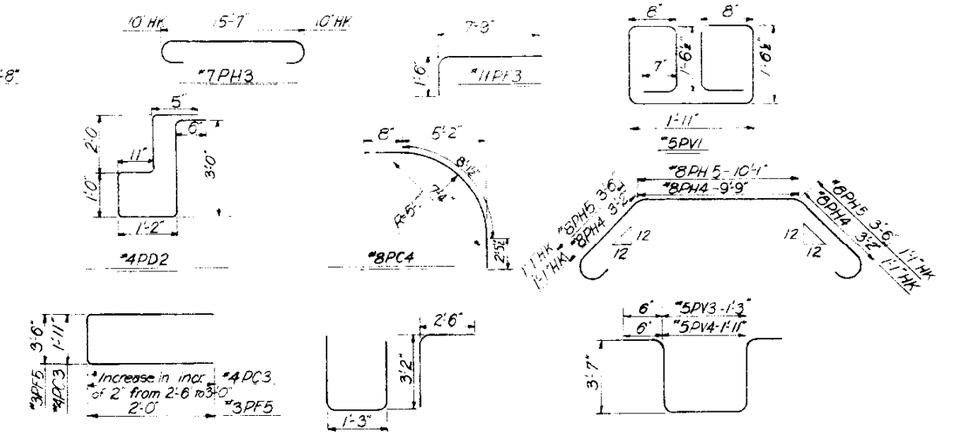
ITEM	Structural Excavation	Mechanical Tamping	Class A Concrete	Reinforcing Steel	Structural Steel	12¾" Steel Pipe Piles	10¾" Steel Pipe Piles
Pier "3	188 cu yds	12 Hr	198.4 cu yds	47,551 lbs	1665.3 lbs	840 lin ft	—
Pier "4	180 cu yds	12 Hr	14.4 cu yds	21,211 lbs	—	—	350 lin ft

BAR WEIGHT SUMMARY, PIER "3

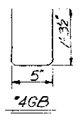
"11 - 4,640	lin ft @ 5.313 #/ft	=	24,652 #
"8 - 4,648	lin ft @ 2.67 #/ft	=	12,410 #
"7 - 1,635	lin ft @ 2.044 #/ft	=	3,342 #
"5 - 3,369	lin ft @ 1.043 #/ft	=	3,514 #
"4 - 4,395	lin ft @ 0.668 #/ft	=	2,936 #
"3 - 600	lin ft @ 0.376 #/ft	=	226 #
	1% Overrun	=	471 #
	Total	=	47,551 #

BAR WEIGHT SUMMARY, PIER "4

"11 - 2,580	lin ft @ 5.313 #/ft	=	13,707 #
"8 - 2,160	lin ft @ 2.67 #/ft	=	5,767 #
"4 - 2,287	lin ft @ 0.668 #/ft	=	1,527 #
	1% Overrun	=	210 #
	Total	=	21,211 #



* Cut: 560 - 2'-6"
560 - 2'-8"
460 - 2'-10"
160 - 3'-0"



BENDING DIAGRAMS

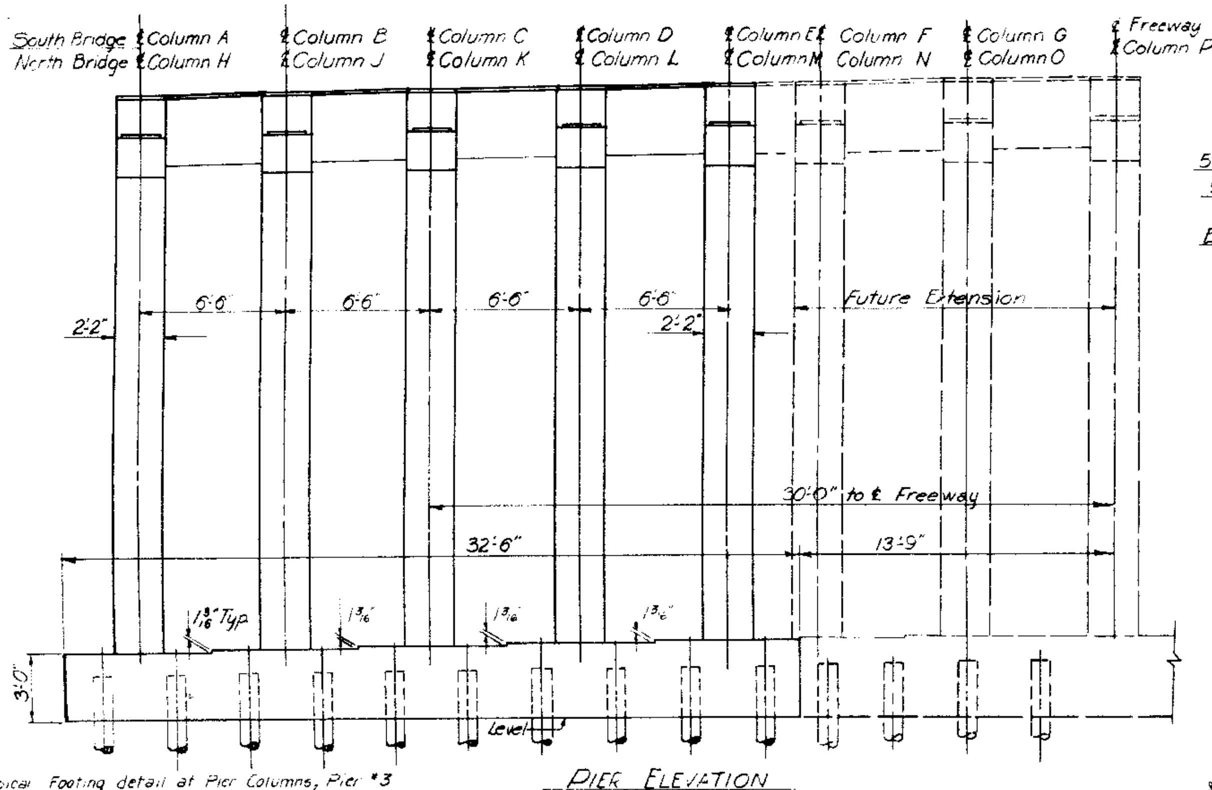
COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

SOUTH NEVADA AVENUE
BRIDGE NO'S I-17-DC & DD

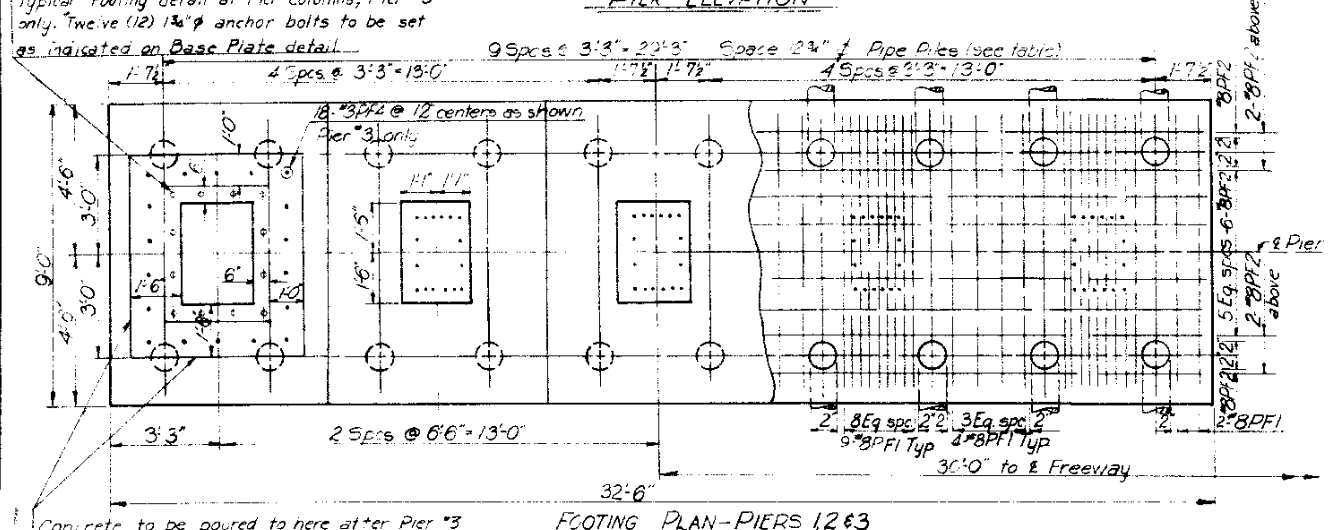
PIER DETAILS

SCALE:	DATE: April 1957
ROBERT L. KOONS CONSULTING ENGINEERS COLORADO SPRINGS, COLO.	DRAWING NO. 15 A 4

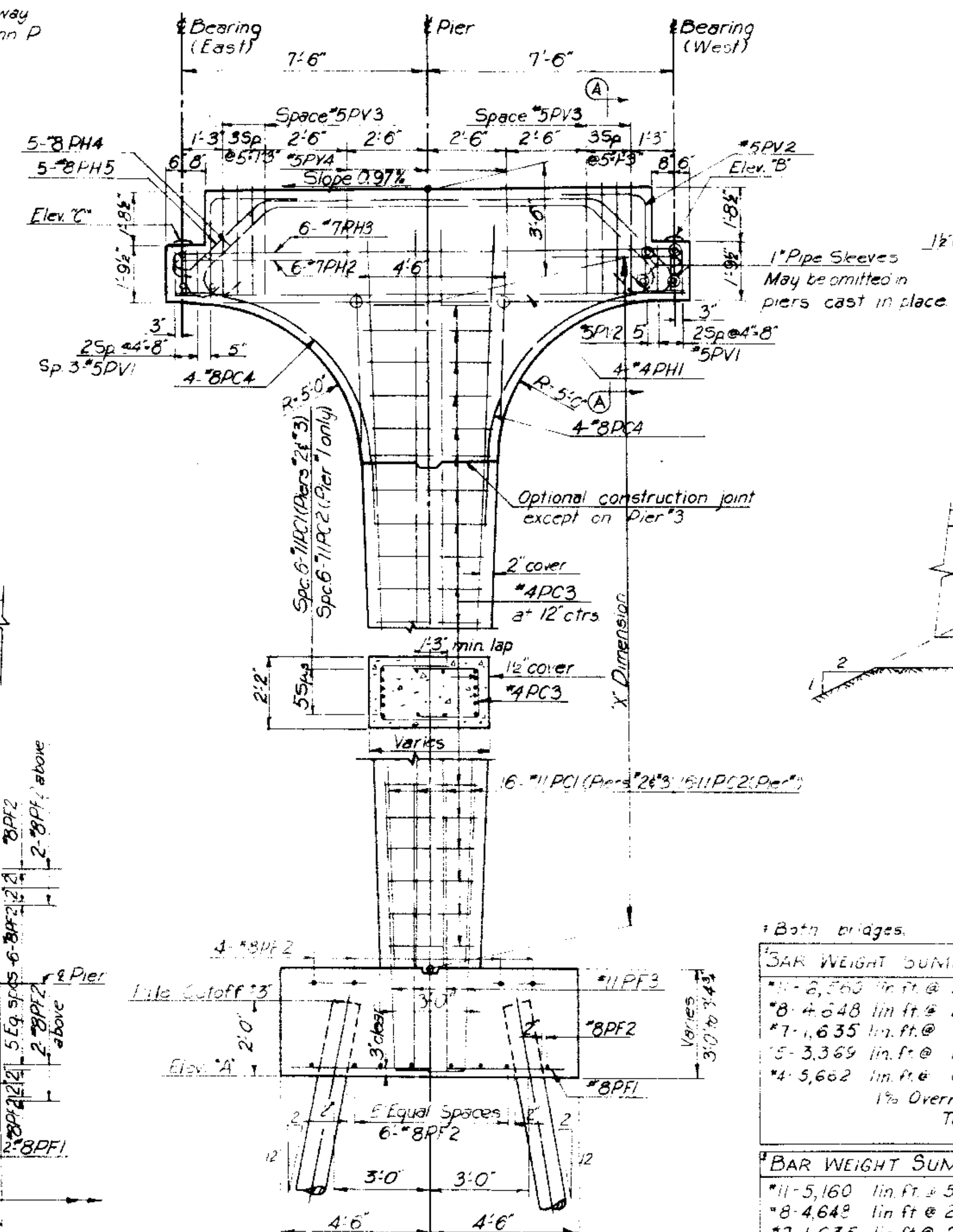
Revised 2-27-58 Added Note ① RRA



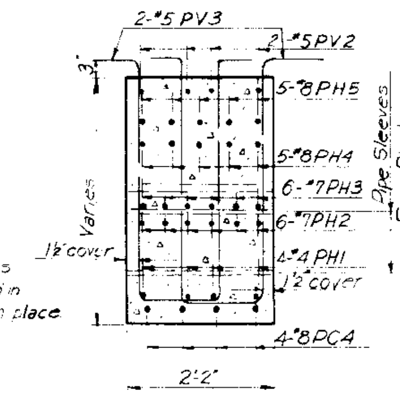
PIER ELEVATION



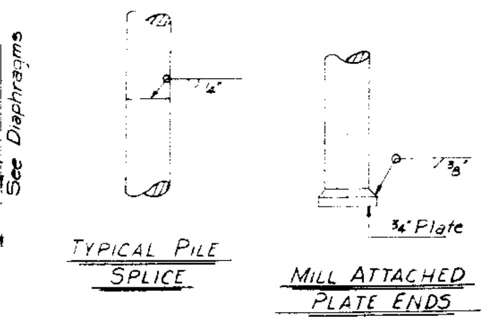
FOOTING PLAN-PIERS 1,2 & 3



SIDE VIEW OF PIERS
SHOWING REINFORCING



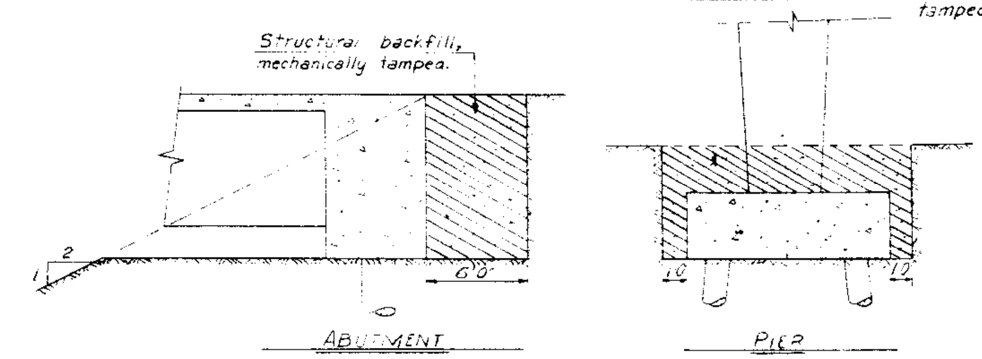
SECTION-AA



TYPICAL PILE SPLICE

MILL ATTACHED PLATE ENDS

PIPE PILE DETAILS



STRUCTURAL BACKFILL AND MECHANICAL TAMPING

Note All material that is to be mechanically tamped shall be placed in horizontal layers not more than 6" in depth and tamped before the next layer is placed.

Pier No.	Dimension 'X'	Elev	A	B	C	D	E	H	J	K	L	M
1	29'-3⅛"	A	93.00	Level				93.021	Level			
		B	127.225	127.323	127.420	127.518	127.615	127.246	127.344	127.441	127.539	127.636
		C	127.079	127.177	127.274	127.372	127.469	127.100	127.198	127.295	127.393	127.490
2	20'-7"	A	101.00	Level				101.021	Level			
		B	126.545	126.643	126.740	126.838	126.935	126.566	126.664	126.761	126.859	126.956
		C	126.401	126.498	126.595	126.693	126.790	126.421	126.519	126.616	126.714	126.811
3	20'-7"	A	100.320	Level				100.342	Level			
		B	125.866	125.964	126.061	126.159	126.256	125.887	125.985	126.082	126.180	126.277
		C	125.721	125.819	125.916	126.014	126.111	125.742	125.840	125.937	126.035	126.132
4	20'-7"	A	99.640	Level				99.662	Level			
		B	125.187	125.285	125.382	125.480	125.577	125.208	125.306	125.403	125.500	125.598

(Columns A–E: Column, South Bridge; Columns H–M: Column, North Bridge)

① For revised elev of Pier see sheet № 76a.

PILE LENGTHS	
Pier #1	40 @ 14'0"
Pier #2	40 @ 23'0"
Pier #3	40 @ 21'0"

‡ Both bridges.

‡BAR WEIGHT SUMMARY, PIER #1
#11 - 2,560 lin ft @ 5.313 = 34,853#
#8 - 4,648 lin ft @ 2.67 = 12,410#
#7 - 1,635 lin ft @ 2.044 = 3,342#
#5 - 3,369 lin ft @ 1.043 = 3,514#
#4 - 5,662 lin ft @ 0.668 = 3,782#
1% Overrun = 579#
Total = 58,480#

‡BAR WEIGHT SUMMARY, PIER #2
#11 - 5,160 lin ft @ 5.313 = 27,415#
#8 - 4,648 lin ft @ 2.67 = 12,410#
#7 - 1,635 lin ft @ 2.044 = 3,342#
#5 - 3,369 lin ft @ 1.043 = 3,514#
#4 - 4,395 lin ft @ 0.668 = 2,936#
1% Overrun = 496#
Total = 50,113#

QUANTITIES - PIERS 1 & 2 (Both Bridges)

ITEM	Structural Excavation	Mechanical Tamping	Class A Concrete	Reinforcing Steel	Structural Steel	12¾" Steel Pipe Piles	Structural Backfill
Pier #1	141 cu yds	7 Hrs.	214.0 cu yd.	58,480#	1,070#	560 lin ft	71 cu yd
Pier #2	170 cu yds	10 Hrs.	187.8 cu yds	50,113#	1070#	920 lin ft	

NOTES

All concrete to be Class A.

All dimensions for reinforcing steel are to ℄ of bars unless noted. All dimensions shown in bending diagrams are out to out of bars.

Bevel all exposed edges and chamfer all corners with a ¾" triangular molding unless otherwise noted.

Piles shall be pipe, 12¾" and 10¾" nominal diameter, minimum wall thickness of 0.88" and shall be filled with Class A concrete after driving. Piles may be filled at the same time the pier footing is poured at the option of the contractor. Cost of piles shall include furnishing, driving, splicing, cutoff and concrete filling.

Pier columns in Pier #3 to be precast and set in place as indicated on plans. Other pier columns may be precast in the same manner at the option of the contractor and at his expense.

See Bearing Device details.

Refer to Dead Load Deflection diagram for camber.

Design Load - H20-S16-44 A.A.S.H.O. Spec 1953

Pile Loading 12¾"φ - 47 tons per pile
10¾"φ - 37 tons per pile.

PIER REINFORCING SCHEDULE (All Piers - Both Bridges)

Bar	CB	PC1	PC2	PC3	PC4	PD1	PD2	PF1	PF2	PF3	PF4	PF5	PH1	PH2	PH3	PH4	PH5	PV1	PV2	PV3	PV4	#3B
No. Req'd.	160	400	160	1740	320	48	240	478	88	400	180	20	120	360	180	150	150	180	120	480	90	280
Size	#11	#11	#11	#4	#8	#5	#4	#8	#8	#11	#3	#3	#4	#7	#7	#8	#8	#5	#5	#5	#5	#4
Length	6'0"	23'0"	31'9"	*	11'3"	26'0"	9'0"	8'6"	32'0"	9'3"	2'6"	7'6"	15'9"	5'0"	17'3	18'3"	19'3"	10'6"	12'7"	9'6"	10'0"	3'0"
Shape																						

* See Bending Diagrams

#4GB bars not included in Reinforcing Summary (See Bearing Device Details)

Unit Stresses
f_s = 20,000 psi Reinforcing
f_s = 18,000 psi Structural
f_c = 1,200 psi

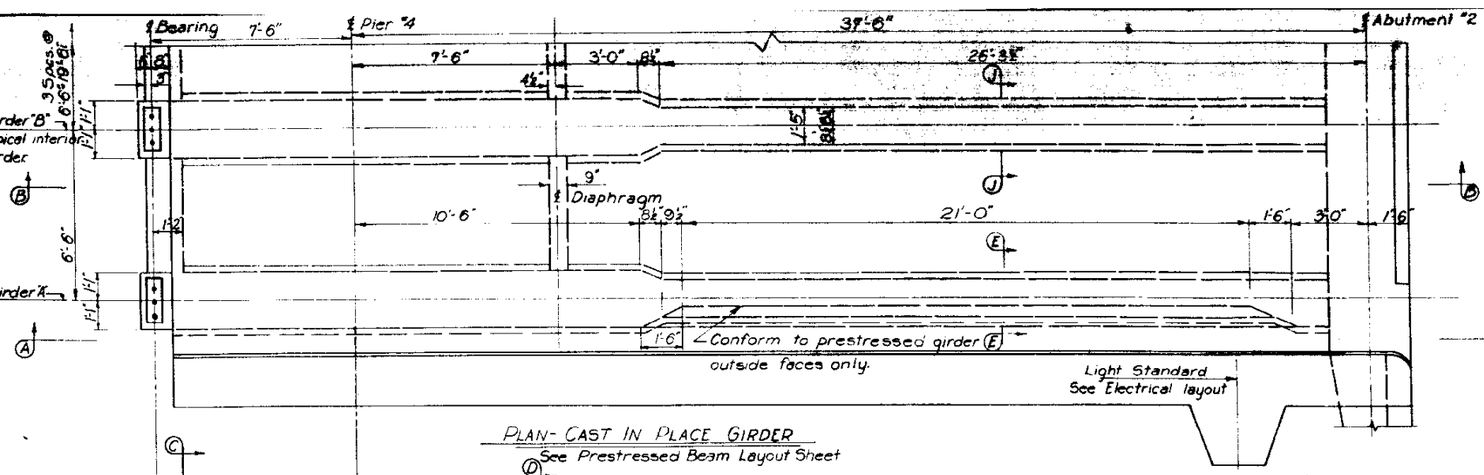
COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

SOUTH NEVADA AVENUE
BRIDGE NO'S 1-17-DC & DD

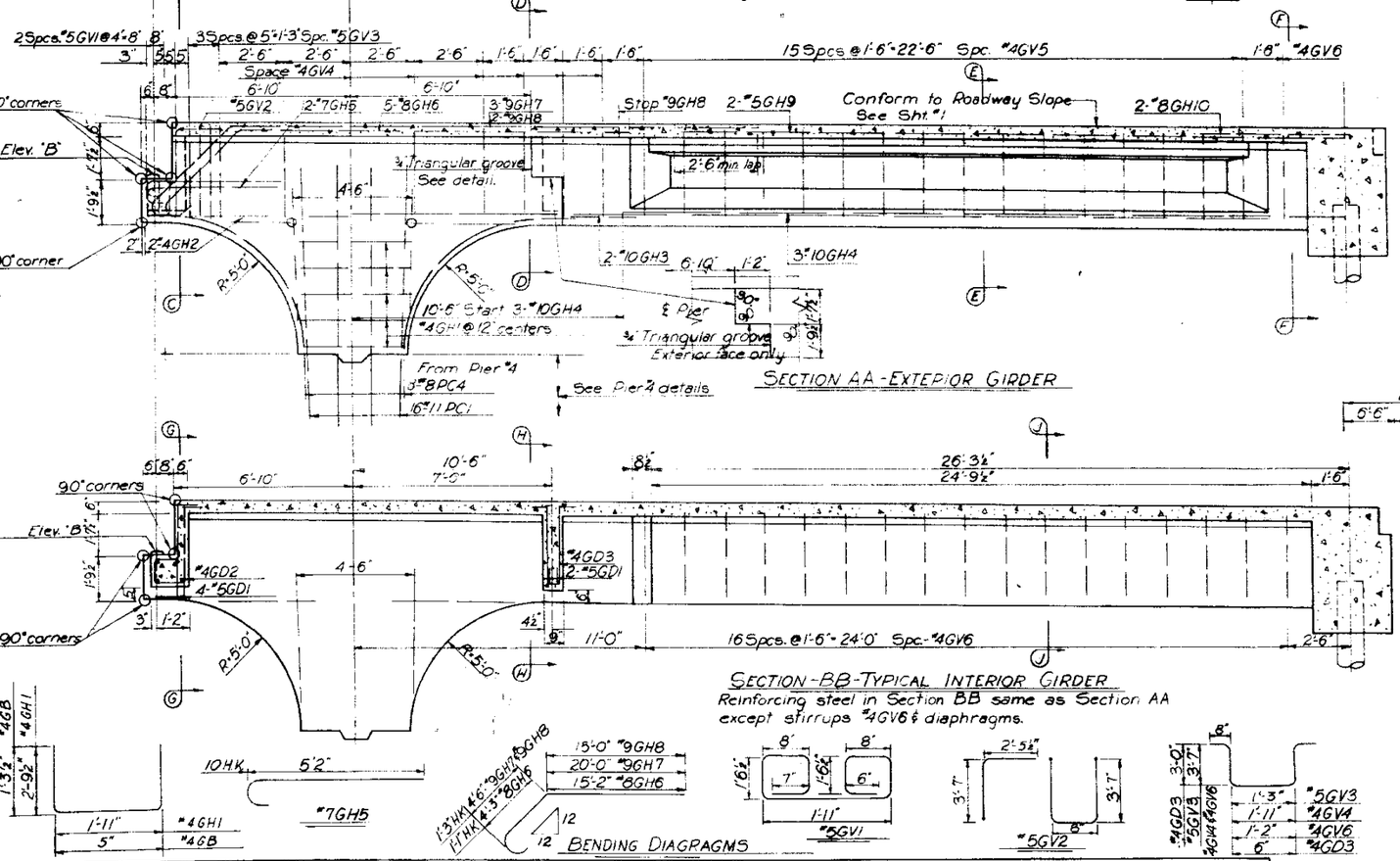
PIER DETAILS

SCALE:
ROBERT L. KOONS
CONSULTING ENGINEERS
COLORADO SPRINGS, COLO.

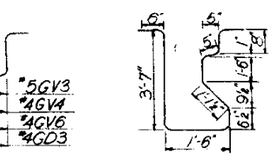
DATE: April 1957
DRAWING NO. 15 A 5

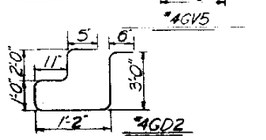


PLAN - CAST IN PLACE GIRDER
See Prestressed Beam Layout Sheet



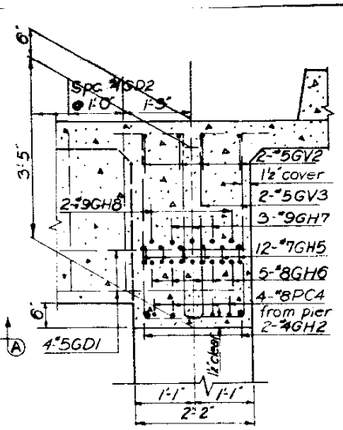
BENDING DIAGRAGMS





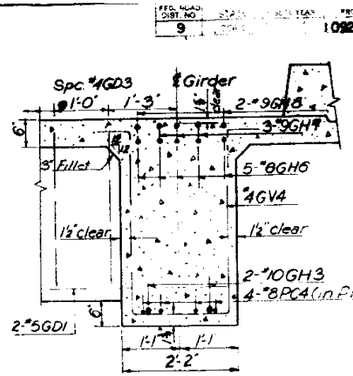
CAST IN PLACE GIRDER REINFORCING SCHEDULE (One Bridge Only)

	GD1	GD2	GD3	GH1	GH2	GH3	GH4	GH5	GH6	GH7	GH8	GH9	GH10	GV1	GV2	GV3	GV4	GV5	GV6	GB
ar	6	20	20	50	10	10	15	60	25	15	10	10	10	15	10	40	35	16	69	40
Reqd	#5	#4	#4	#4	#4	#10	#10	#7	#8	#9	#9	#5	#8	#5	#5	#5	#4	#4	#4	#4
e	27'-6"	9'-0"	7'-9"	7'-6"	6'-0"	37'-6"	27'-0"	6'-0"	20'-6"	25'-9"	20'-9"	25'-0"	5'-0"	10'-6"	12'-9"	9'-9"	10'-3"	10'-6"	9'-6"	3'-0"
ngth																				
ape																				



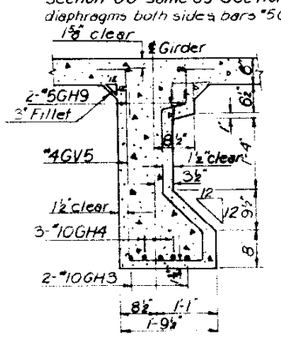
SECTION - CC

Section GG same as Section CC except diaphragms both sides & bars "5GD1 goes thru.

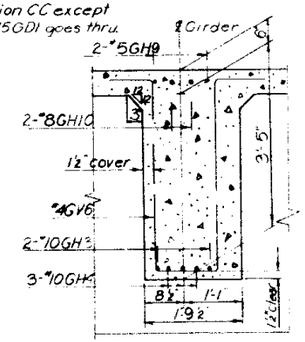


SECTION - DD

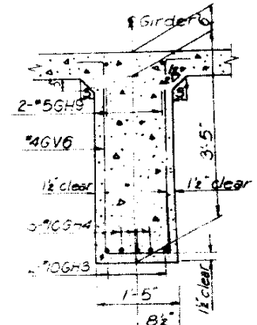
Section HH same as Section DD except diaphragms both sides with bars "5D1 goes thru.



SECTION - EE

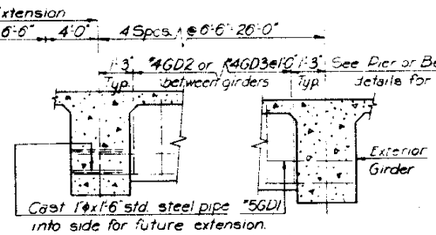


SECTION - FF



SECTION - GG

Extension
6'-6" 6'-6" 4'-0" 4 Spcs. @ 6'-6" = 26'-0"



EXTERIOR GIRDER DIAPHRAGMS

NOTES:

All concrete to be Class A

All dimensions for reinforcing steel are to ℄ of bars unless otherwise noted. All dimensions shown in the bending diagrams are out to out of bars.

Bevel all exposed edges and miter all corners with a ¾" triangular molding unless otherwise noted.

Girders and slab to be poured monolithically as shown.

See Bearing Device details.

See Pier Sheet for Elevation "B" and pier details.

See Superstructure Sheet for roadway steel and camber note.

Camber girders in accordance with dead load deflection diagram on Lighting and Slope Paving Sheet.

Design Loading: H20 S16-44 A.A.S.H.O. Spec. 1953 Edition.

Unit Stresses:
fs = 20000 ps. Reinforcing Steel
fc = 1200 ps.

*Does not include "4GB See Bearing Device *2 Bridges

**BAR WT. SUMMARY

#10	1,560 lin ft @ 4.303 = 6,715#
#9	1,187 lin ft @ 3.40 = 4,038#
#8	1,125 lin ft @ 2.67 = 3,004#
#7	720 lin ft @ 2.044 = 1,472#
#5	2,180 lin ft @ 1.043 = 2,274#
#4	3,904 lin ft @ 0.668 = 2,608#
1% Overrun =	201#
Total =	20,310#

CAST IN PLACE *GIRDER QUANTITIES

Class A Concrete - Cu. Yds. 126.7
Reinforcing Steel - Lbs. 20,310
Structural Steel - Lbs. 535

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

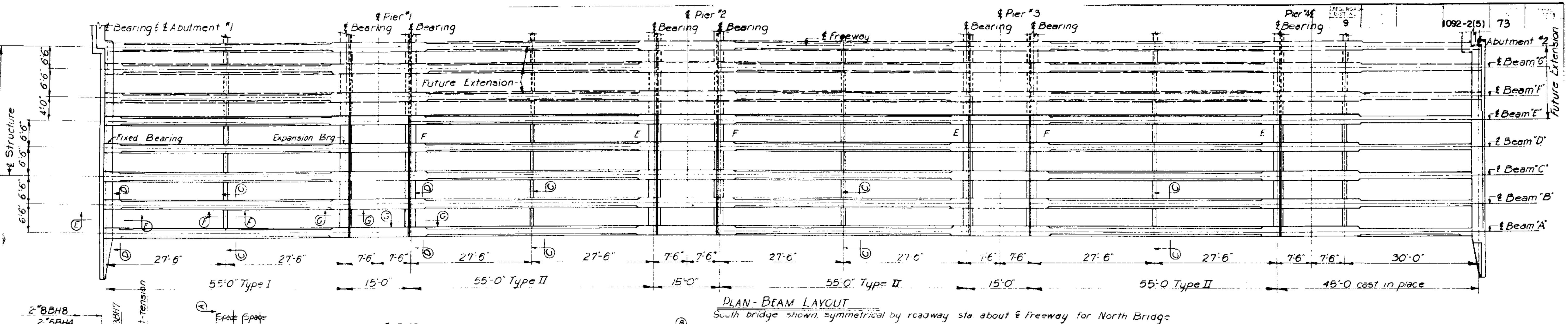
SOUTH NEVADA AVENUE
BRIDGE NO.'S I-17-DC & DB

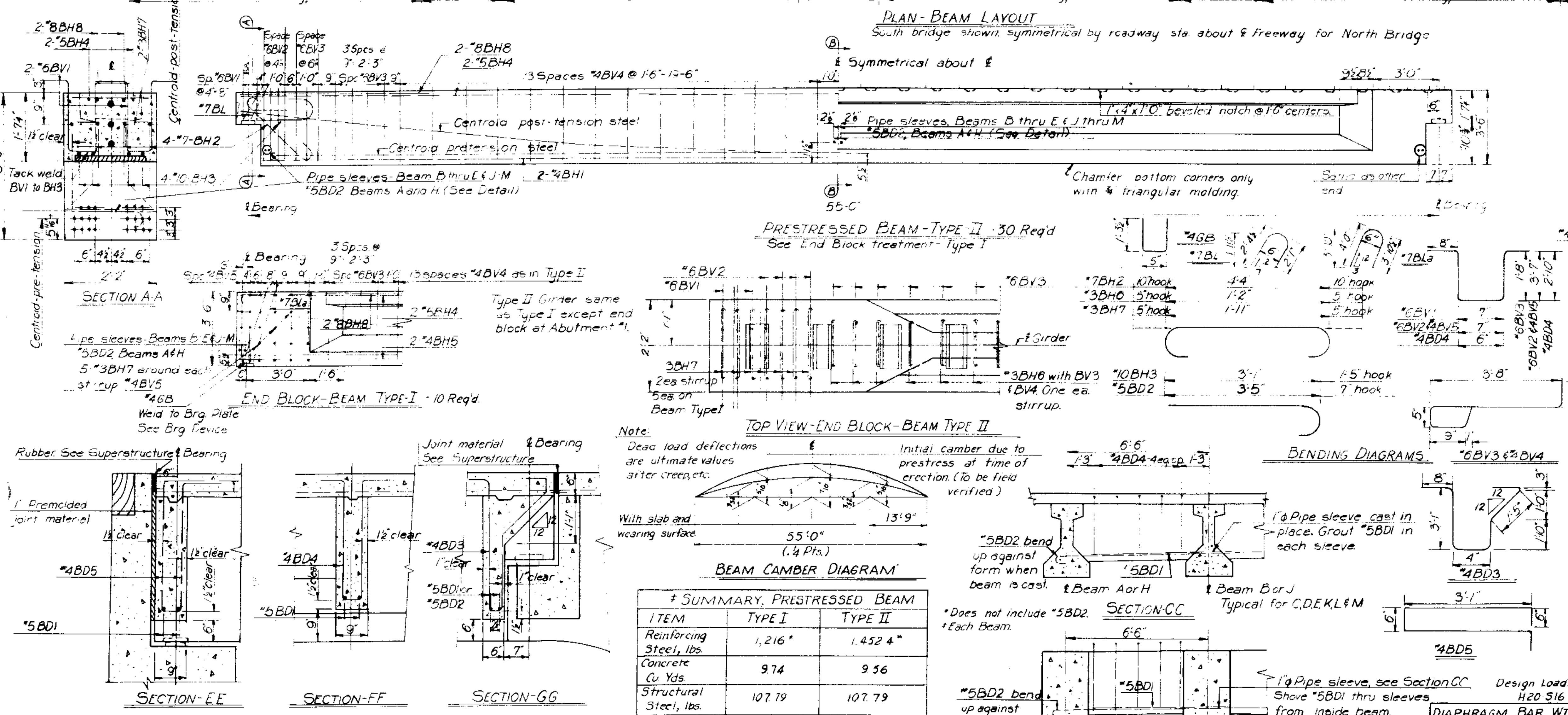
CAST IN PLACE BEAM DETAILS

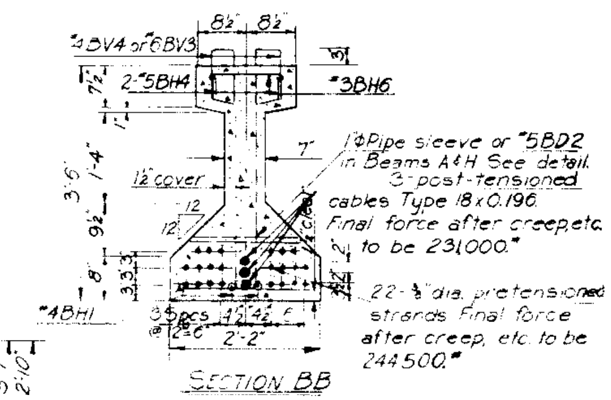
SCALE: 3/8"=1'-0" ¾"=1'-0" | DATE: April 1957

ROBERT L. KOONS CONSULTING ENGINEERS COLORADO SPRINGS, COLO.

DRAWING NO. 15 A 6







NOTES

Design Specifications AASHO 1953 Series and Bureau of Public Roads, Tentative Design Criteria for Prestressed Bridges, 1954.

Concrete in beams to be 5000 psi at 28 days, 4,500 psi at time of transfer. Max size aggregate to be ¾". All other concrete to be Class A.

Prestressing steel to be high-tensile wire strands with a modulus of elasticity of 25,000,000 psi and ultimate strength of 250,000 psi.

All post-tensioned cables to be draped in a parabolic shape. All post-tensioned cables to be grouted as soon as practicable. Provide ⅜" grout tubes with suitable valves and shut-off cocks into each enclosure near the ends. Grout to be pumped into enclosure from one end only under 100 psi pressure until the grout flows freely from exhaust end. Exhaust valve then to be closed and pumping continued until no more grout can be introduced.

Prestressed beams to be supported at the ends only or handled by lifting hooks provided.

Unit price for beams shall include all concrete, reinforcing steel, high-strength steel, bearing devices, pipe sleeves, etc. as shown.

All dimensions for reinforcing steel are to ℄ of bars unless otherwise indicated. All dimensions shown on bending diagrams are out to out of bars.

* SUMMARY, PRESTRESSED BEAM		
ITEM	TYPE I	TYPE II
Reinforcing Steel, lbs.	1,216 *	1,452 *
Concrete Cu. Yds.	9.74	9.56
Structural Steel, lbs.	107.79	107.79

*Does not include #5BD2.
† Each Beam.

PRECAST BEAM REINFORCING SCHEDULE / BEAM DIAPHRAGM REINFORCING

Bar	BH1	BH2	BH3	BH4	BH5	BH6	BH7	BH8	BV1	BV2	BV3	BV4	BV5	GB	BL	BLa	BD1	BD2	BD3	BD4	BD5
No. Req'd.	60	280	280	80	20	1650	1280	160	420	560	1000	2240	120	160	140	20	48	48	280	160	40
Size	#4	#7	#10	#5	#4	#3	#3	#8	#5	#6	#6	#4	#4	#4	#7	#7	#5	#5	#4	#4	#4
Length	53'6"	6'0"	4'6"	56'0"	54'6"	2'0"	2'9"	9'0"	5'3"	9'0"	6'3"	6'3"	9'0"	3'0"	4'9"	8'2"	24'9"	4'0"	8'3"	7'6"	7'6"
Shape																					

Unit Stresses: Prestressed Beams.
f's = 250,000 psi f'c = 2,000 psi
fs = 20,000 psi Reinforcing
fs = 18,000 psi Structural

BEAM DIAPH QUANTITIES		
Class A Concrete	34.0 cu yd	
Reinforcing Steel	4,024 lbs.	

Design Loading H20 S16 44.

DIAPHRAGM BAR WT. SUMMARY

Bar	Length	Wt. #/ft	Wt. Total
#5	1380	1.043	1,439 #
#4	3810	0.668	2,545 #
		1% Overrun	40 #
		Total	4,024 #

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

SOUTH NEVADA AVENUE
BRIDGE NO'S I-17-DC & DD

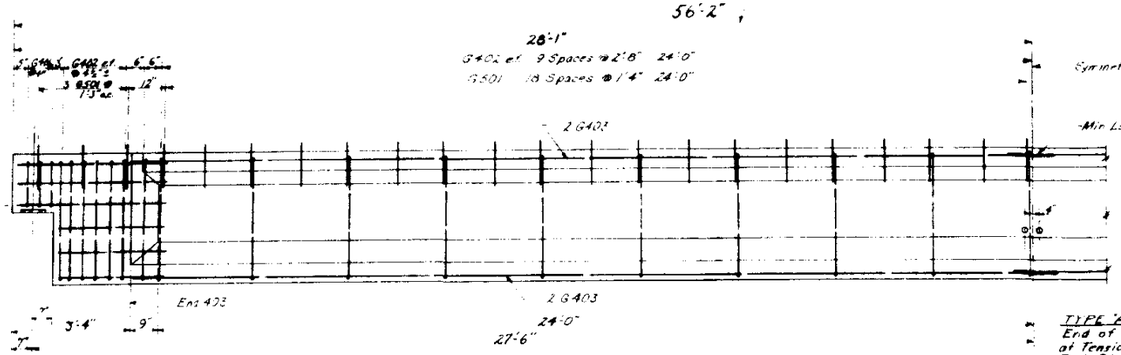
PRESTRESSED BEAM
LAYOUT AND DETAILS

SCALE:
DATE April 1957
ROBERT L. KOONS
CONSULTING ENGINEERS
COLORADO SPRINGS, COLO.
DRAWING NO. 15 A 7

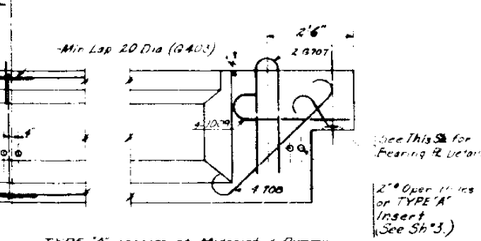
1092-2(5) 73

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)	73a	

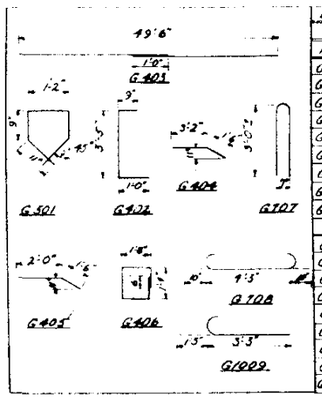
Revision: 2-27-58 New Sheet M.E.R.



"A"
ELEVATION 30 Req'd
Scale: ½"=1'0"



TYPE "A" Inserts at Midpoint of Dummy End of Outer Girders only. Diaph. steel at Tensioning End to be placed before End Block is poured.



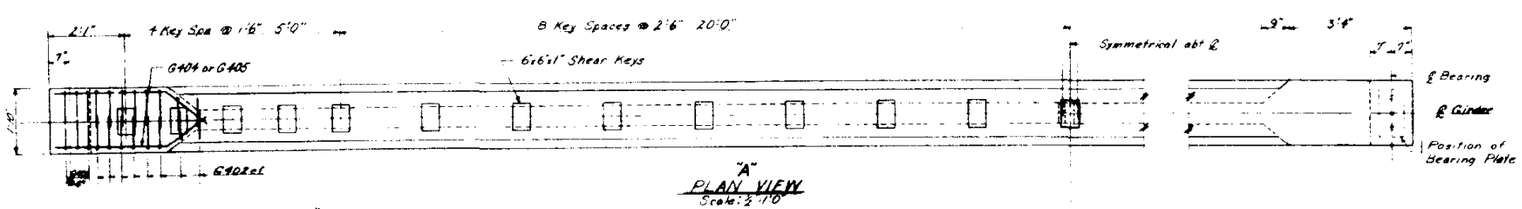
BAR LIST FOR PRESTRESSED GIRDERS

"A" GIRDER (30 Req'd)

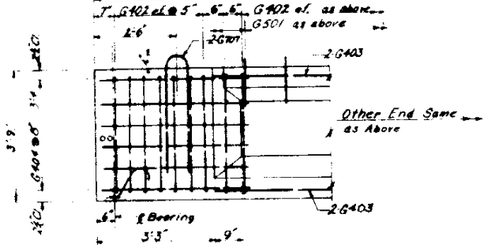
Mark	Type	Length	No.	Weight	Size
G501	Bent	4'-6"	43	1290	#3
G402	"	5'-2"	66	1980	#4
G403	Str	30'-6"	4	120	"
G404	Bent	4'-8"	12	360	"
G405	"	5'-6"	12	360	"
G406	"	6'-6"	6	180	"
G707	"	6'-0"	4	120	#7
G708	"	5'-11"	8	240	#7
G1009	"	4'-8"	8	240	#10

"B" GIRDER (10 Req'd.)

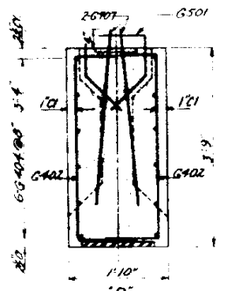
Mark	Type	Length	No.	Weight	Size
G501	Bent	4'-6"	13	130	#5
G402	"	5'-2"	68	680	#4
G403	Str	30'-6"	4	40	"
G404	Bent	4'-8"	18	180	"
G405	"	5'-6"	6	60	"
G406	"	6'-6"	3	30	"
G707	"	6'-0"	4	40	#7
G708	"	5'-11"	4	40	#7
G1009	"	4'-8"	4	40	#10



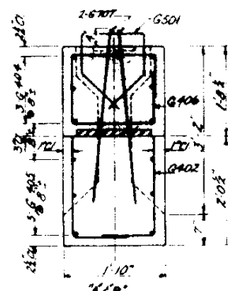
"A"
PLAN VIEW
Scale: ½"=1'0"



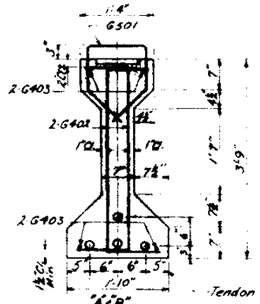
"B"
END BLOCK AT WEST ABUT. ONLY
10 Req'd
Scale: ½"=1'-0"



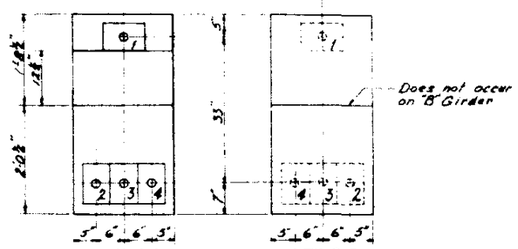
"B"
END BLOCK SECTION AT WEST ABUT.

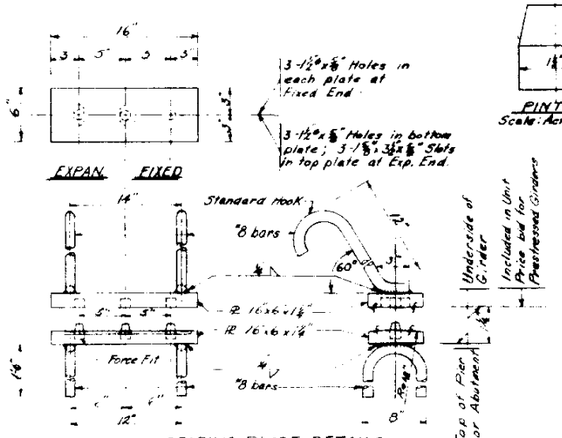


"A" & "B"
END BLOCK SECTION
Scale ½"=1'-0"

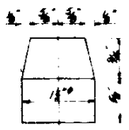


"A" & "B"
℄ SECTION

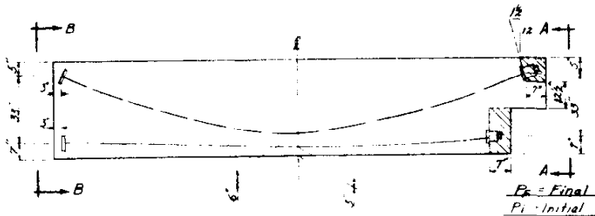




BEARING PLATE DETAILS
Scale: ½"=1'0"



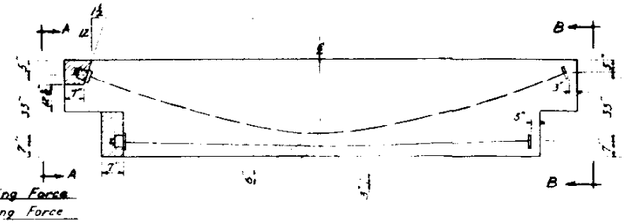
PINTLE
Scale: Actual Size



CABLE PROFILE - WEST SPAN
No Scale

P_F = Final Prestressing Force
P_I = Initial Prestressing Force

4-14 GI Tendons
P_F = 98.5^k per Tendon; 393^k Total
P_I = 115.5^k " " ; 462^k Total
Shims 4"
Bearing Plates 9"x6"



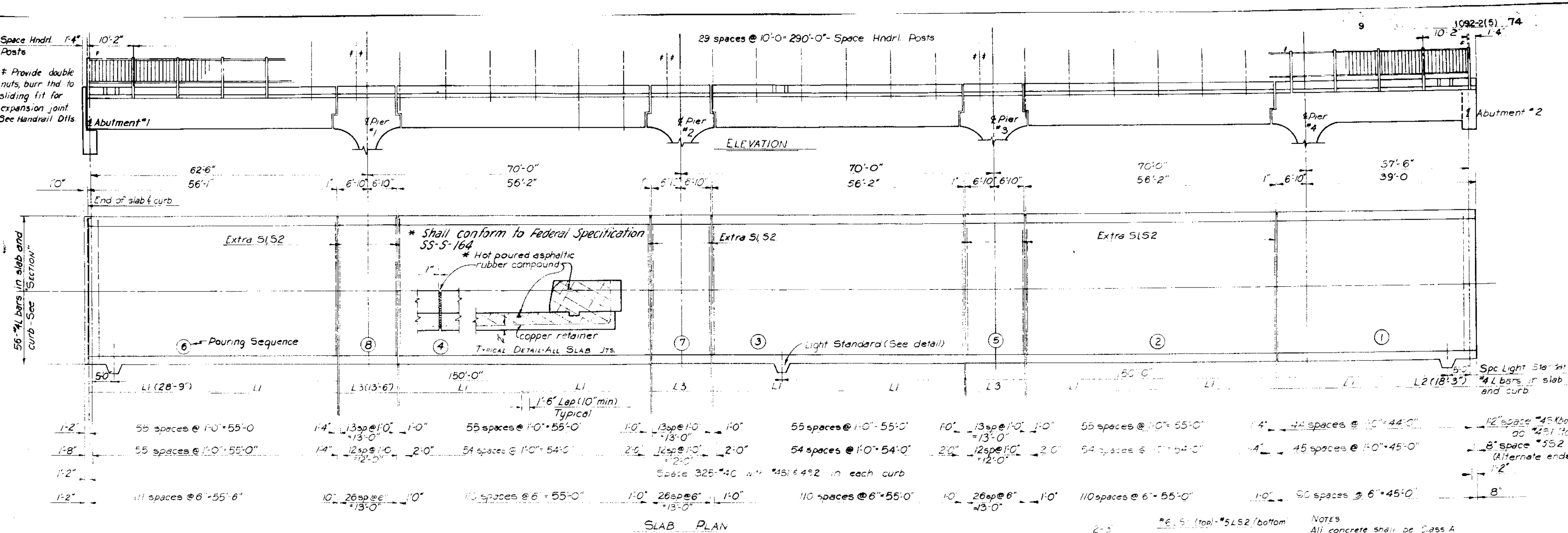
CABLE PROFILE - OTHER SPANS
No Scale

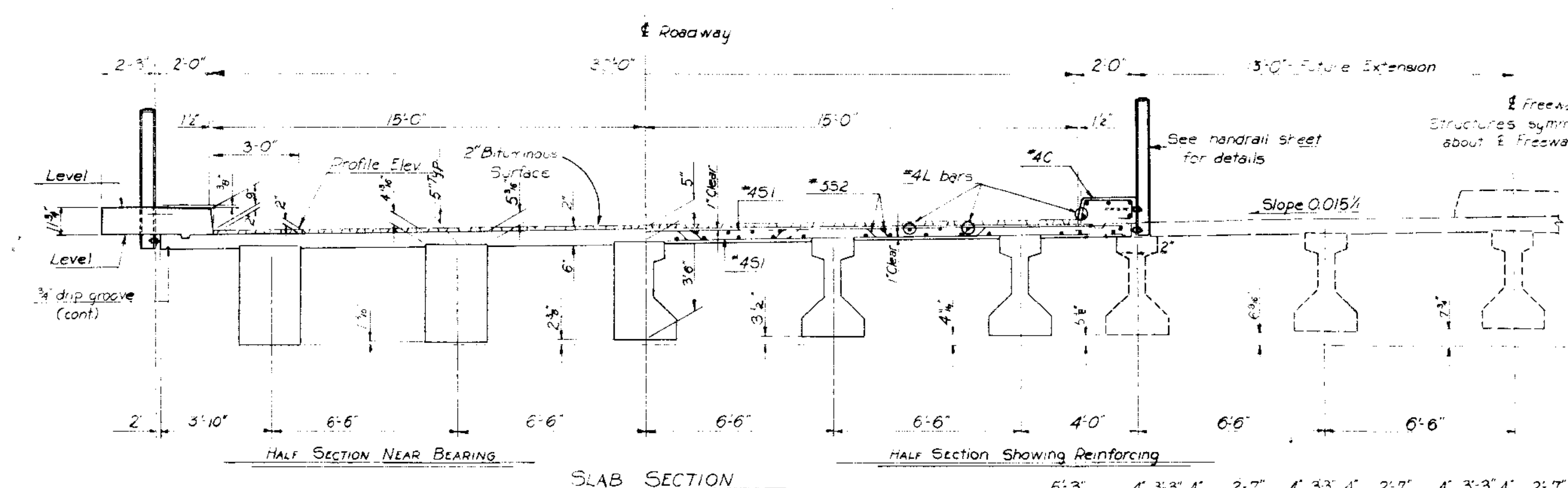
A. S. HORNER CONSTRUCTION CO.
DENVER, COLORADO

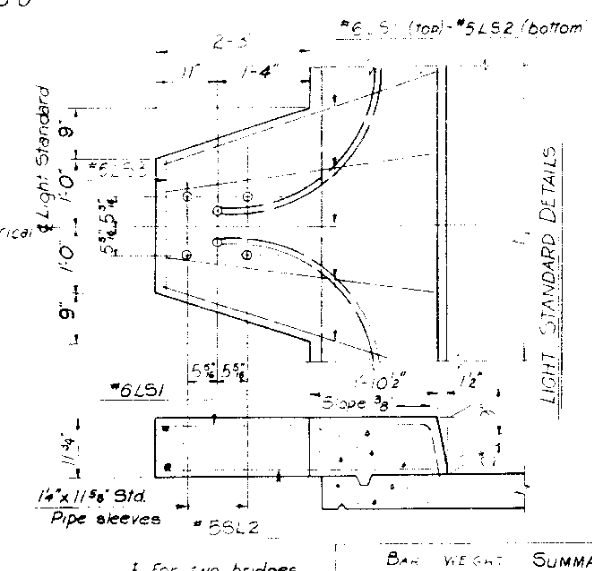
STANDARD GIRDERS
STANDARD BEARING PLATES

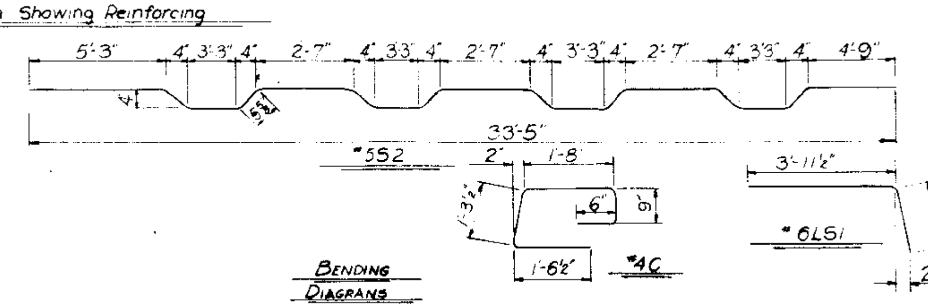
PROJ. NO. 1092-2(5) COLORADO SPRINGS
STRUCTURE NOS. 1-17-DC & DD
CUSTOMER: C.L. HUBNER CONST. CO.
ENGINEERS: R.L. KOONS

DESIGNED LB	SCALE as shown	SHEET NO. 73a
DRAWN LM	DATE 1-7-58	NO. OF SHTS. ___
CHECKED WLM		









SLAB REINFORCING SCHEDULE - ONE BRIDGE ONLY													
Bar	C		L1	L2	L3		LS1	LS2	LS3			S1	S2
No. Req'd	648		504	56	168		15	15	6			648	306
Size	#4		#4	#4	#4		#6	#5	#6			#4	#5
Length	5'-9"		28'-9"	18'-3"	13'-6"		5'-3	4'-0"	1'-9"			33'-6"	34'-6"
Shape													

NOTES

All concrete shall be Class A

All dimensions for reinforcing steel are to ℄ of bars. All dimensions shown in the bending diagrams are out to out of bars.

Slab concrete shall be poured in the sequence shown or other such sequence that the concrete is placed over the piers after the two center spans ahead are poured. All falsework shall be removed before the curb is poured.

Bevel all exposed edges with a 3/4" triangular molding unless otherwise noted.

The finished floor shall be constructed to the theoretical grade by increasing or decreasing the slab thickness over the beams by the amounts shown on the dead load deflection diagram shown on LIGHTING AND SLOPE PAVING SHEET.

See Lighting Sheet for conduit layout.
See Handrail Sheet for details.

Design Loading H20-S16-44 AASHO Specs 1953 Edit.

Unit Stresses:
f_s = 20000 psi Reinforcing
f_s = 18,000 psi Structural
f_c = 1,200 psi

BAR WEIGHT SUMMARY		
#6 - 89.25 lin. ft. @ 1.502 =	134 #
#5 - 10,617 lin. ft. @ 1.043 =	11,074 #
#4 - 43,214 lin. ft. @ .668 =	28,867 #
1% Overrun	401 #
One Bridge Total	40,476 #

# SUPERSTRUCTURE QUANTITIES - TOTAL	
Class A Concrete	459.5 Cu. Yds
Reinforcing Steel	80,952 Lbs.
Structural Steel	50,956 Lbs
Copper Retainer	760 Lbs.
Plant Mix Asphalt	234 Tons
Electrical Conduit	1,038 Lin. Ft.

COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY

SOUTH NEVADA AVENUE
BRIDGE NO'S I-17-DC & DD

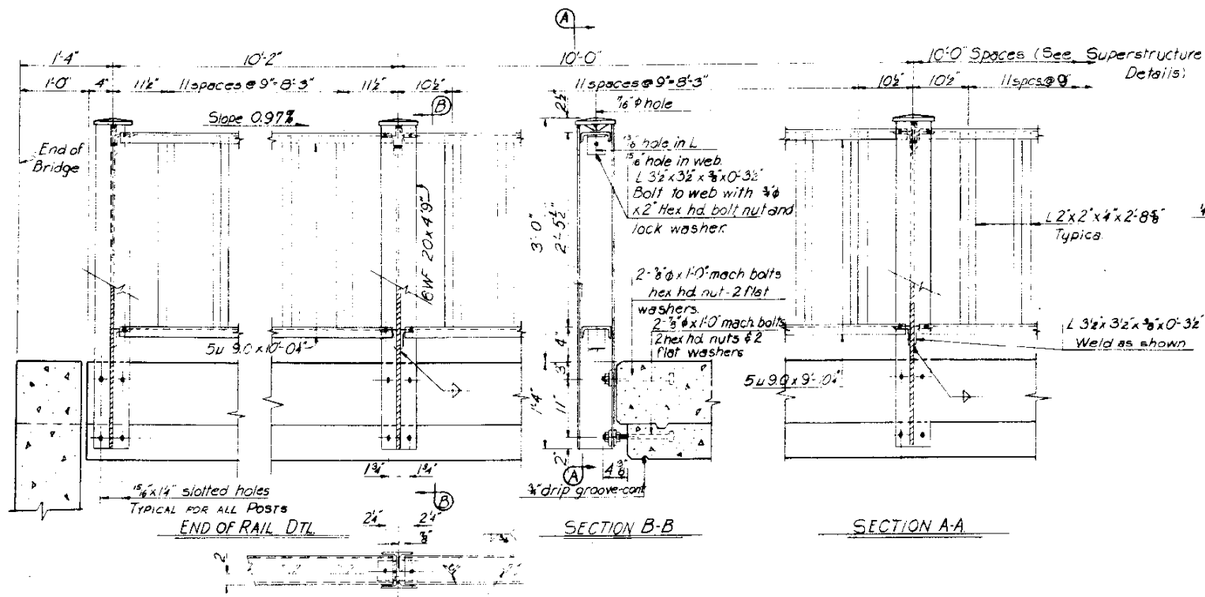
SUPERSTRUCTURE DETAILS

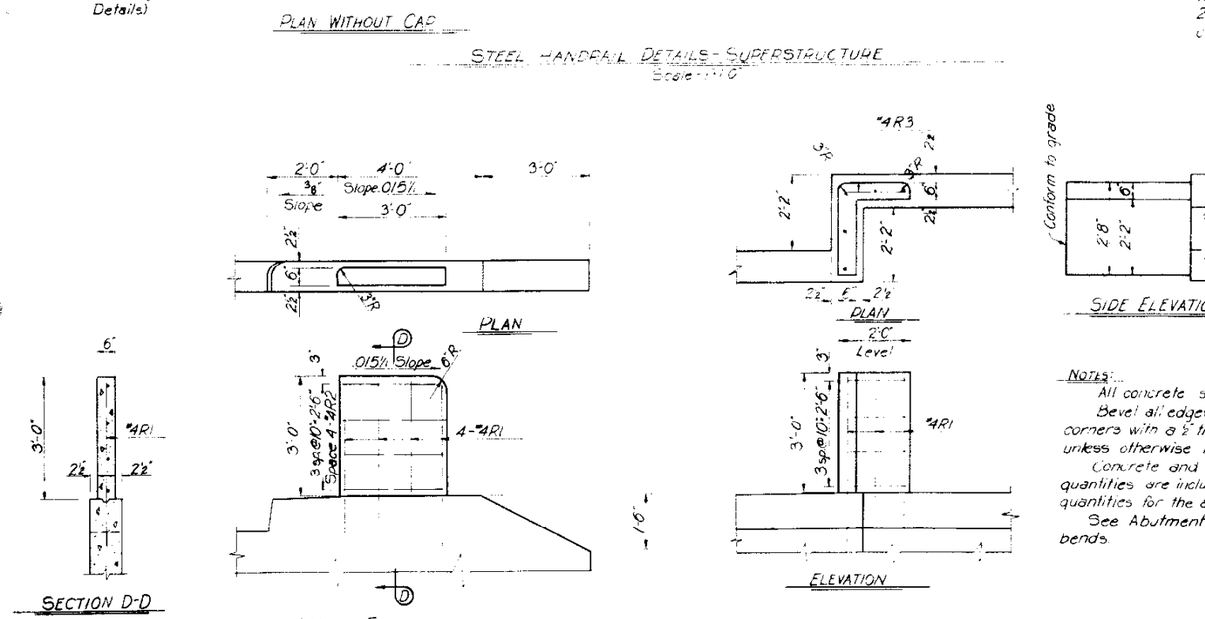
SCALE: ———
DATE: April, 1957.

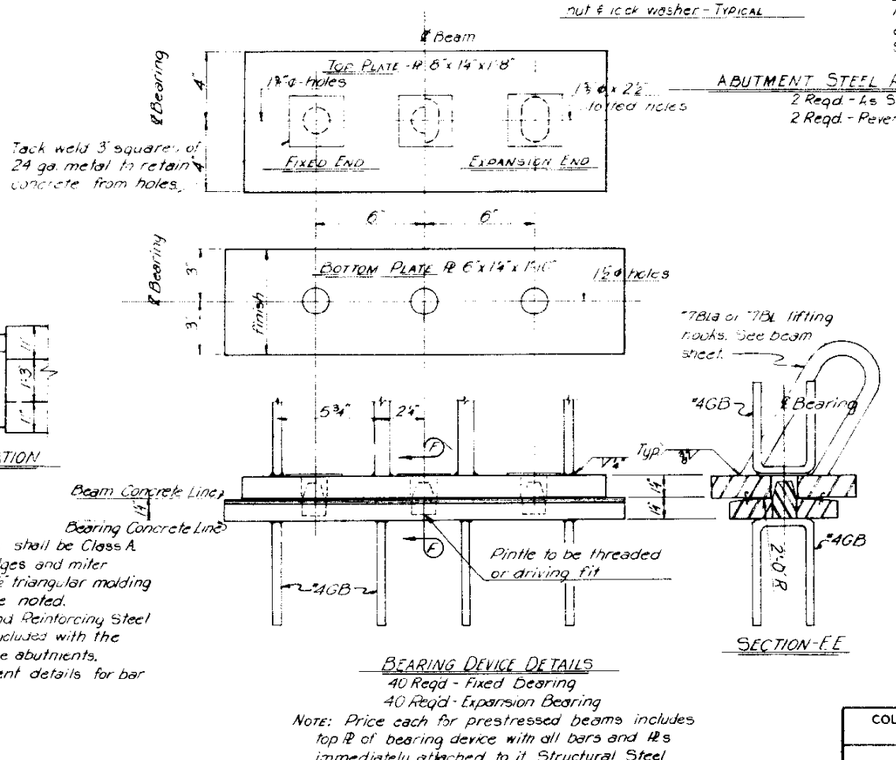
ROBERT L. KOONS
CONSULTING ENGINEERS
COLORADO SPRINGS, COLO.

DRAWING NO. 15 A 8

STEEL WORK DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
2	COLO.	(092-25)	75	



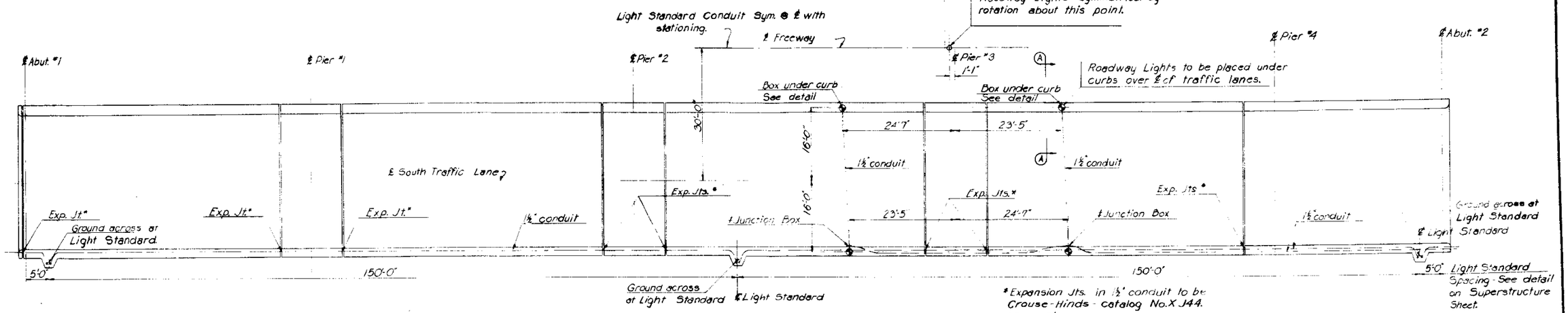




COLORADO STATE HIGHWAY DEPARTMENT
COLORADO SPRINGS FREEWAY
SOUTH NEVADA AVENUE
BRIDGE NO'S I-17-DC & DD

HANDRAIL AND BEARING DEVICE DETAILS

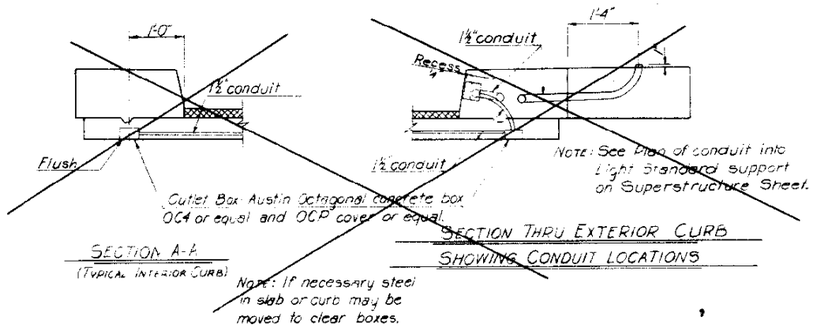
SCALE:	DATE: April, 1957
ROBERT L. KOONS CONSULTING ENGINEERS COLORADO SPRINGS, COLO.	DRAWING NO. 15 A 9



LIGHTING PLAN FOR SOUTH BRIDGE
(North Bridge as noted)

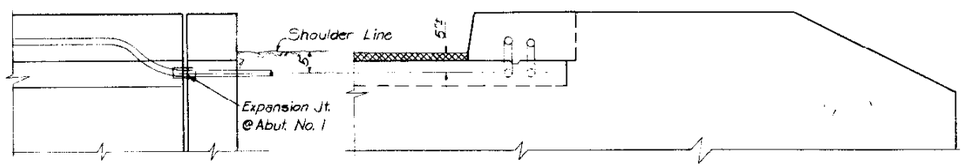
*Expansion Jts. in ½" conduit to be Crouse-Hinds - catalog No. X J44. or equal.

†Junction Boxes ~~to be Crouse-Hinds Watertight Series PKCA-~~ ½" Junction Conduits or equal.



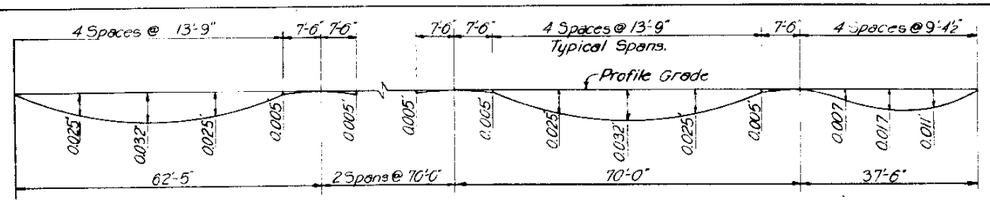
SECTION A-A
(TYPICAL INTERIOR CURB)

SECTION THRU EXTERIOR CURB
SHOWING CONDUIT LOCATIONS

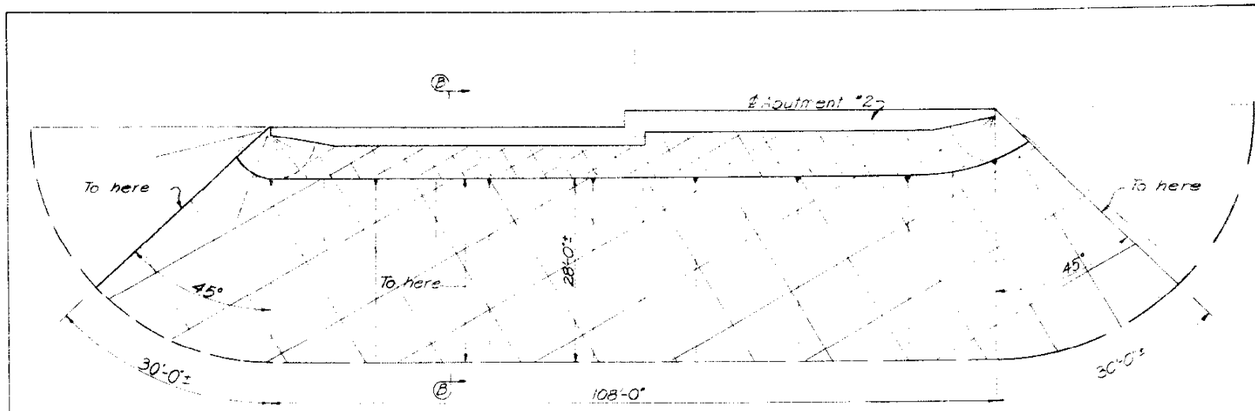


DETAIL AT ABUTMENTS

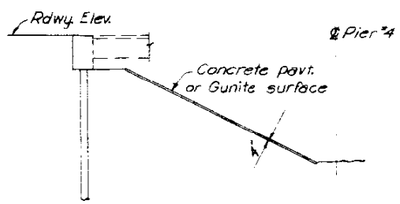
LIGHTING CONDUIT DETAILS



DEAD LOAD DEFLECTION DIAGRAM
In Decimals of Feet



Cover slope surface indicated with 4" concrete slab using 6 x 6 - ¾ mesh and premoulded joints into 10'-0" squares. Gunite may be used at the contractors option.



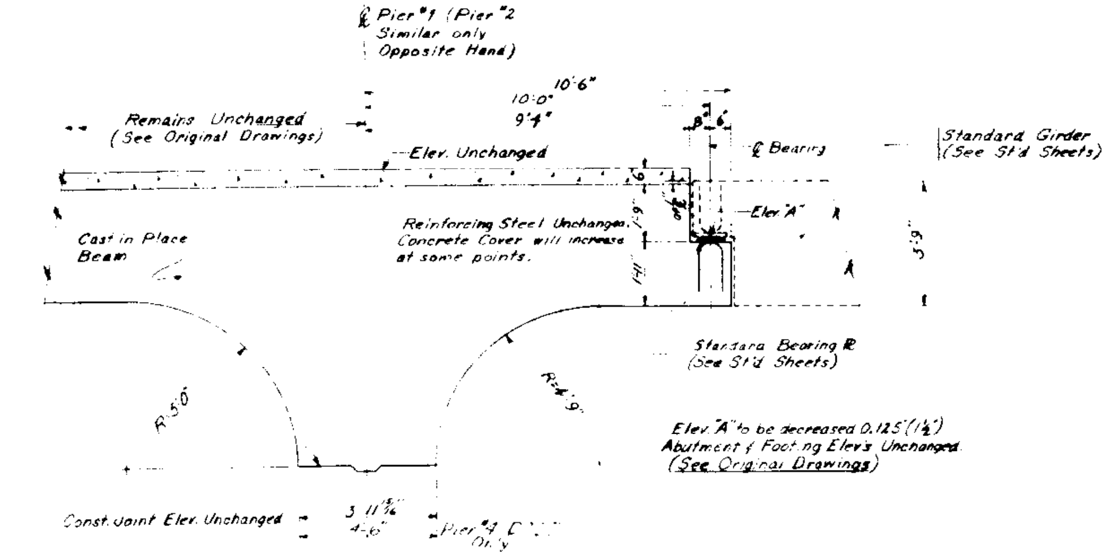
SECTION B-B

SLOPE PAVEMENT DETAILS
ABUTMENT NO. 2 ONLY

SUMMARY OF SLOPE PAVING QUANTITIES	COLORADO STATE HIGHWAY DEPARTMENT COLORADO SPRINGS FREEWAY SOUTH NEVADA AVENUE BRIDGE NO'S I-17-DC & DD
Concrete Paving - 58 cu. yds. Reinforcing Steel - 953 # (Reinforcing Steel Included in cost of Conc. Slope and Ditch Paving)	LIGHTING AND SLOPE PAVEMENT DETAILS
	SCALE: ——— DATE: April, 1957
ROBERT L. KOONS CONSULTING ENGINEERS COLORADO SPRINGS, COLO.	DRAWING NO. 15 A 10

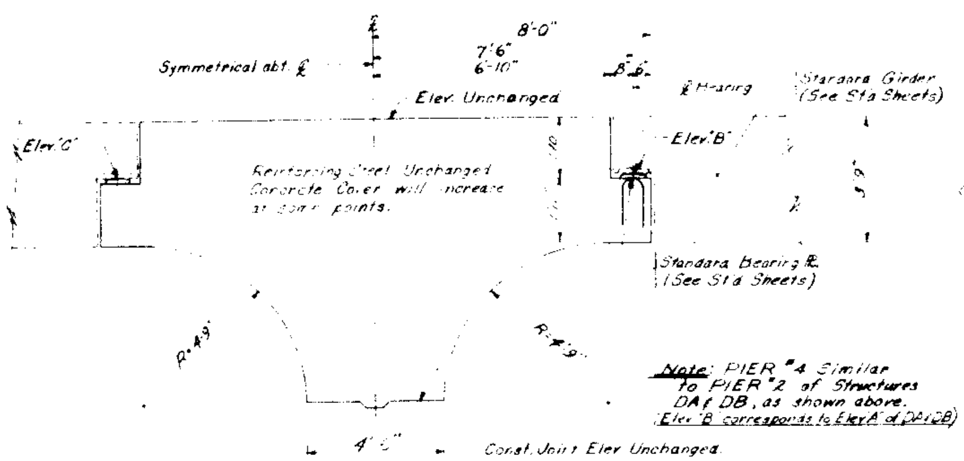
FED. ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	092-2(5)	76a	

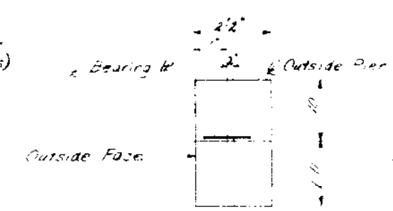
Revised: 2-27-58 New Sheet MER



STRUCTURES DA&DB
PIER REVISIONS
Scale: ⅛"=1'-0"

STRUCTURE NO.	ADJUST ELEVS OF TOP OF PIERS & ABUTMENTS BY AMOUNTS SHOWN BELOW
DG & DF	Plus 0.302' (3⅝")
DI	Plus 0.292' (3½")
DH	Plus 0.333' (4")
DE	Plus 0.333' (4")
DA & DB DC & DD	See Details this sheet





FRONT VIEW

Bearing Plates on Outside Piers of Structures DA DB DC & DD to be moved out 2" as shown so Outside Face of Girder will line up with Outside face of Pier.

STRUCTURES DC & DD
REVISIONS: PIERS 1, 2, 3
Scale ⅛"=1'0"

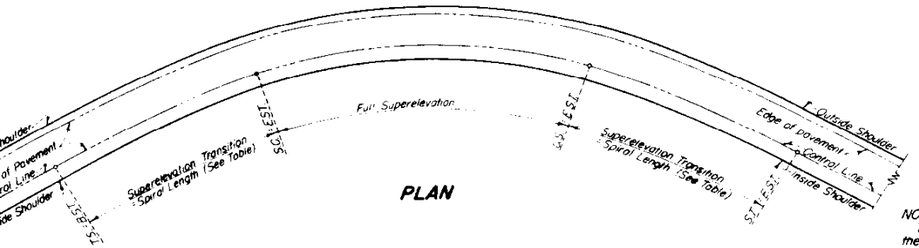
Elevs "B" & "C" to be decreased by 0.125' (1½")
Footing Elevs Unchanged
Abut. #2 Elevs Unchanged.
Abut. #1: Elev. "J" decreased by 0.250' (3")
" Elev's A-H will decrease accordingly
(See Original Dwgs)

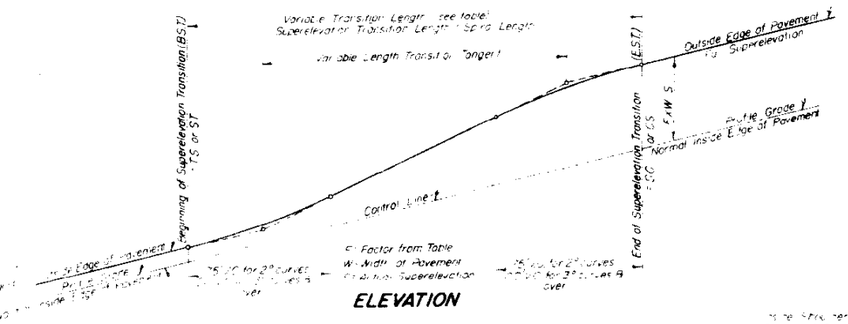
A. S. HORNER CONSTRUCTION CO.
DENVER, COLORADO

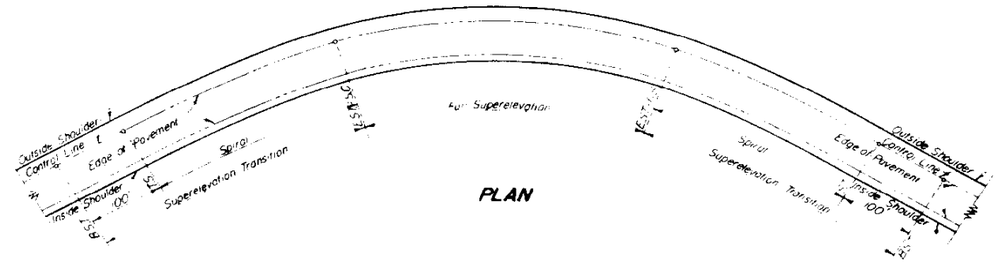
ELEVATION REVISIONS

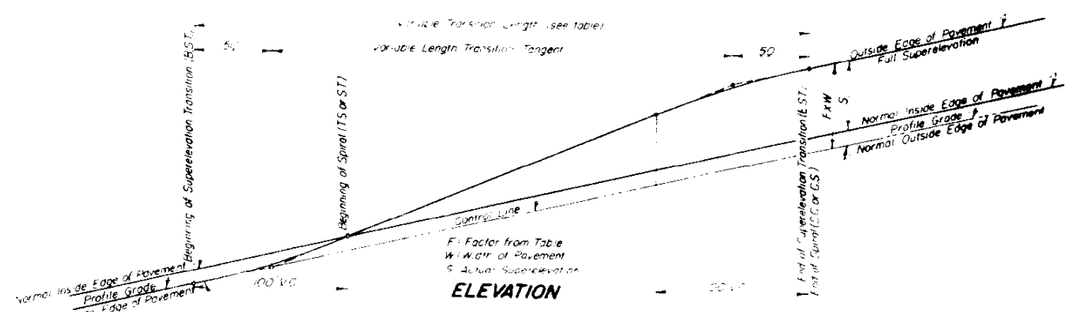
PROJECT NO. 092-2(5) COLORADO SPRINGS
STRUCTURE NO'S. I-25-DA thru DI
CUSTOMER: A. S. HORNER CONST. CO.
ENGINEERS: SEE SH'S 1 thru 5
DESIGNED A.B. SCALE as shown SHEET NO. 6a
DRAWN L.M.
CHECKED HJM DATE 1-7-58 NO. OF SHTS.

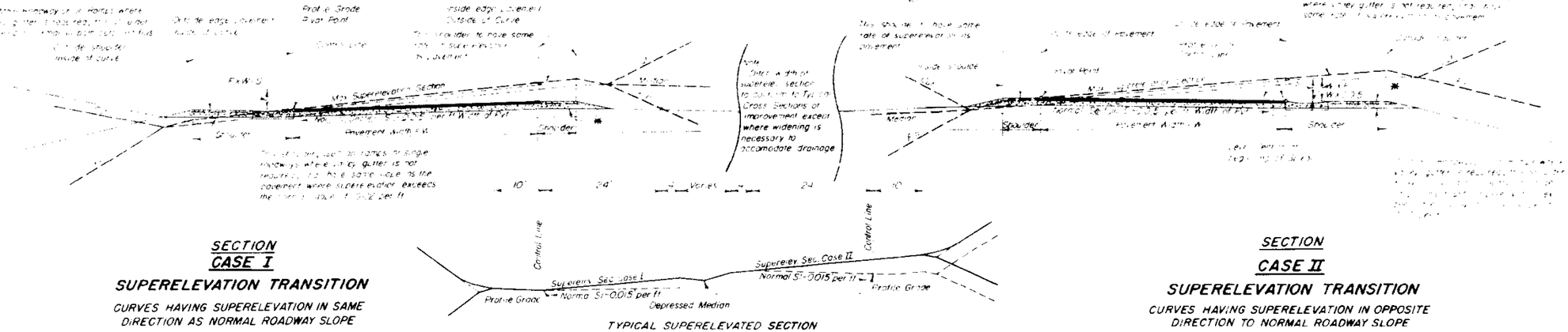
FEDERAL ROAD DIVISION NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	1092-2(5)	77	











NOTE CASE I
The normal roadway slope is approximately equal to the superelevation for a 1° curve. Therefore no superelevation is required for 1° curves.
For curves of over 1° the factors shown in the table for Case I include the normal roadway slope of .001 Ft per Ft., thereby giving values of actual superelevation at any point on the transition.

NOTE CASE II
In order that the opposing slope of the normal roadway be eliminated before entering the horizontal curve, Case II, superelevation transitions shall begin on the tangent one hundred feet(100') from the T.S. and/or ST. of the spiral. Case II superelevation, calculated as indicated in the table, is to be added to the normal low edge of pavement.

NOTE CASE I & II
On curves where no spirals are used the superelevation transition shall be on the tangent approaching each end of the curve. Full superelevation to coincide with the PC or PT. of such curve.

* Shoulders having slopes adverse to or greater than normal pavement slope shall be raised to coincide with the pavement slope at beginning of transition. Raising of shoulder to take place gradually over a distance of not less than 50 ft.

SECTION CASE I

SUPERELEVATION TRANSITION

CURVES HAVING SUPERELEVATION IN SAME DIRECTION AS NORMAL ROADWAY SLOPE

SUPERELEVATION TABLE

DEG. OF CURVE		PROPORTIONAL DISTANCE FROM BEGINNING OF TRANSITION									
CASE I	CASE II	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Max 1.0
		RATE OF SUPERELEVATION (IN FEET) PER FT. WIDTH OF ROADWAY									
	1°	.00060	.00240	.00540	.00960	.01500	.02040	.02460	.02760	.02940	.03000
2°		.01512	.01548	.01608	.01692	.01800	.01909	.01992	.02052	.02088	.02100
	2°	.00073	.00290	.00653	.01162	.01800	.02438	.02947	.03310	.03527	.03600
3°		.01533	.01632	.01797	.02028	.02325	.02622	.02853	.03018	.03117	.03150
	3°	.00097	.00390	.00876	.01558	.02325	.03092	.03774	.04260	.04553	.04650
4°		.01554	.01716	.01986	.02364	.02850	.03336	.03714	.03984	.04146	.04200
	4°	.00127	.00506	.01140	.01984	.02850	.03716	.04560	.05194	.05573	.05700
5°		.01575	.01800	.02175	.02700	.03375	.04050	.04575	.04950	.05175	.05250
	5°	.00160	.00640	.01440	.02408	.03375	.04343	.05310	.06110	.06590	.06750
6°		.01618	.01970	.02556	.03228	.03900	.04572	.05244	.05830	.06182	.06300
	6°	.00194	.00778	.01740	.02820	.03900	.04980	.06060	.07022	.07606	.07800
7°		.01643	.02073	.02787	.03606	.04425	.05244	.06063	.06777	.07207	.07350
	7°	.00205	.00928	.02054	.03240	.04425	.05610	.06795	.07922	.08645	.08850

FACTORS SHOWN IN ABOVE TABLE ARE BASED ON TRANSITION LENGTHS SHOWN AT RIGHT

TYPICAL SUPERELEVATED SECTION OF 4 LANE DIVIDED HIGHWAY

SECTION CASE II

SUPERELEVATION TRANSITION

CURVES HAVING SUPERELEVATION IN OPPOSITE DIRECTION TO NORMAL ROADWAY SLOPE

DEG. OF CURVE	LENGTH OF SPIRAL	LENGTH OF SUPERELEVATION TRANSITION	
		CASE I	CASE II
1 Degree	None	None	200'
2 Degrees	150'	150'	250'
3 Degrees	200'	200'	300'
4 Degrees	250'	250'	350'
5 Degrees	300'	300'	400'
6 Degrees	350'	350'	450'
7 Degrees	350'	350'	450'

FACTORS SHOWN IN TABLE AT LEFT ARE BASED ON THE FOLLOWING TRANSITION LENGTHS

Factors from table x W (Width of pavement in ft.) = Value of Superelev. in ft. to be added to normal low elev. of edge of pavement
See notes on sections above for superelevation of shoulders.

COLORADO
DEPARTMENT OF HIGHWAYS

METHODS FOR SUPERELEVATION OF CURVES

Designed by:	Approved by:
Made by:	
Checked by:	Date:

CASE II SUPERELEVATION

1° CURVE — (TRANS.-200')

CURVE	Proportional distance from beginning of transition: 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Rate of superelevation (in feet) per. ft. width of roadway										
.00	.00000	.00060	.00240	.00540	.00960	.01500	.02040	.02460	.02760	.02940	.03000
.01	.00001	.00073	.00265	.00577	.01009	.01559	.02087	.02495	.02783	.02951	
.02	.00002	.00086	.00290	.00644	.01058	.01618	.02134	.02530	.02806	.02962	
.03	.00005	.00101	.00317	.00653	.01109	.01685	.02179	.02563	.02827	.02971	
.04	.00010	.00118	.00346	.00694	.01162	.01750	.02222	.02594	.02846	.02978	
.05	.00015	.00135	.00375	.00735	.01215	.01785	.02265	.02625	.02865	.02985	
.06	.00022	.00154	.00406	.00778	.01270	.01838	.02306	.02654	.02882	.02990	
.07	.00029	.00173	.00037	.00821	.01325	.01891	.02347	.02683	.02899	.02995	
.08	.00038	.00194	.00470	.00866	.01382	.01942	.02386	.02710	.02914	.02998	
.09	.00049	.00217	.00505	.00913	.01441	.01991	.02423	.02735	.02927	.02999	

2° CURVE — (TRANS.-250')

CURVE	Proportional distance from beginning of transition: 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Rate of superelevation (in feet) per. ft. width of roadway										
.00	.00000	.00073	.00290	.00653	.01162	.01800	.02438	.02947	.03310	.03527	.03600
.01	.00001	.00088	.00340	.00698	.01220	.01866	.02496	.02989	.03338	.03541	
.02	.00003	.00105	.00351	.00743	.01281	.01932	.02552	.03038	.03365	.03551	
.03	.00007	.00123	.00384	.00791	.01342	.01998	.02606	.03059	.03390	.03564	
.04	.00012	.00142	.00418	.00839	.01406	.02064	.02659	.03109	.03414	.03574	
.05	.00018	.00163	.00454	.00889	.01470	.02130	.02711	.03146	.03437	.03582	
.06	.00026	.00186	.00491	.00941	.01536	.02194	.02761	.03182	.03458	.03588	
.07	.00036	.00210	.00529	.00994	.01602	.02257	.02809	.03216	.03477	.03593	
.08	.00046	.00235	.00569	.01048	.01668	.02319	.02857	.03249	.03495	.03597	
.09	.00059	.00262	.00611	.01104	.01734	.02380	.02902	.03280	.03512	.03599	

3° CURVE — (TRANS.-300')

CURVE	Proportional distance from beginning of transition: 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Rate of superelevation (in feet) per. ft. width of roadway										
.00	.00000	.00097	.00390	.00876	.01558	.02325	.03092	.03774	.04260	.04553	.04650
.01	.00001	.00118	.00429	.00936	.01634	.02402	.03167	.03831	.04298	.04571	
.02	.00004	.00140	.00471	.00997	.01711	.02493	.03244	.03837	.04334	.04588	
.03	.00009	.00165	.00515	.01061	.01788	.02555	.03317	.03940	.04369	.04602	
.04	.00016	.00191	.00561	.01126	.01865	.02632	.03388	.03945	.04401	.04615	
.05	.00024	.00219	.00609	.01193	.01941	.02709	.03457	.04041	.04431	.04626	
.06	.00035	.00249	.00658	.01262	.02018	.02785	.03524	.04089	.04459	.04634	
.07	.00048	.00281	.00710	.01333	.02095	.02862	.03590	.04135	.04485	.04641	
.08	.00062	.00316	.00763	.01406	.02172	.02939	.03653	.04179	.04510	.04646	
.09	.00079	.00352	.00819	.01481	.02248	.03016	.03714	.04221	.04532	.04649	

4° CURVE — (TRANS.-350')

CURVE	Proportional distance from beginning of transition: 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Rate of superelevation (in feet) per. ft. width of roadway										
.00	.00000	.00127	.00506	.01140	.01984	.02850	.03716	.04560	.05194	.05573	.05700
.01	.00001	.00153	.00558	.01217	.02070	.02937	.03803	.04635	.05243	.05597	
.02	.00005	.00182	.00613	.01297	.02157	.03023	.03890	.04707	.05290	.05619	
.03	.00011	.00214	.00670	.01379	.02244	.03110	.03976	.04777	.05334	.05638	
.04	.00020	.00248	.00729	.01464	.02330	.03197	.04063	.04844	.05376	.05654	
.05	.00032	.00285	.00791	.01550	.02417	.03283	.04150	.04909	.05415	.05668	
.06	.00046	.00324	.00856	.01637	.02503	.03370	.04236	.04971	.05432	.05680	
.07	.00062	.00366	.00923	.01724	.02590	.03457	.04321	.05030	.05486	.05689	
.08	.00081	.00410	.00993	.01810	.02677	.03543	.04403	.05087	.05518	.05695	
.09	.00103	.00457	.01065	.01897	.02763	.03630	.04483	.05142	.05547	.05699	

5° CURVE — (TRANS.-400')

CURVE	Proportional distance from beginning of transition: 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Rate of superelevation (in feet) per. ft. width of roadway										
.00	.00000	.00160	.00640	.01440	.02408	.03375	.04343	.05310	.06110	.06590	.06750
.01	.00002	.00194	.00706	.01537	.02504	.03472	.04439	.05404	.06172	.06620	
.02	.00006	.00230	.00774	.01634	.02601	.03569	.04536	.05496	.06232	.06648	
.03	.00014	.00270	.00846	.01730	.02697	.03665	.04633	.05584	.06288	.06672	
.04	.00026	.00314	.00922	.01827	.02795	.03762	.04730	.05668	.06340	.06692	
.05	.00040	.00360	.01000	.01924	.02891	.03859	.04826	.05750	.06390	.06710	
.06	.00058	.00410	.01082	.02021	.02988	.03956	.04923	.05828	.06436	.06724	
.07	.00078	.00462	.01166	.02117	.03085	.04052	.05020	.05904	.06480	.06736	
.08	.00102	.00518	.01254	.02214	.03182	.04149	.05117	.05976	.06520	.06744	
.09	.00130	.00578	.01346	.02311	.03278	.04246	.05213	.06044	.06556	.06748	

CASE I SUPERELEVATION

FED. ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTA. SHEETS
	COLO.	1092-2(5)	78	

2° CURVE — (TRANS.-150')

CURVE	Proportional distance from beginning of transition: 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Rate of superelevation (in feet) per. ft. width of roadway										
.00	.01500	.01512	.01548	.01608	.01692	.01800	.01909	.01992	.02052	.02088	.02100
.01	.01500	.01515	.01553	.01615	.01702	.01812	.01918	.01999	.02057	.02090	
.02	.01501	.01517	.01558	.01623	.01712	.01824	.01927	.02006	.02061	.02092	
.03	.01501	.01520	.01564	.01631	.01722	.01835	.01936	.02013	.02065	.02094	
.04	.01502	.01524	.01569	.01639	.01732	.01846	.01945	.02019	.02069	.02096	
.05	.01503	.01527	.01575	.01647	.01743	.01857	.01953	.02025	.02073	.02097	
.06	.01504	.01531	.01581	.01656	.01754	.01868	.01961	.02031	.02077	.02098	
.07	.01506	.01535	.01587	.01664	.01765	.01878	.01969	.02037	.02080	.02099	
.08	.01508	.01539	.01594	.01673	.01777	.01888	.01977	.02042	.02083	.02099	
.09	.01510	.01543	.01601	.01683	.01788	.01902	.01985	.02047	.02086	.02100	

3° CURVE — (TRANS.-200')

CURVE	Proportional distance from beginning of transition: 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Rate of superelevation (in feet) per. ft. width of roadway										
.00	.01500	.01533	.01632	.01797	.02028	.02325	.02622	.02853	.03018	.03117	.03150
.01	.01500	.01540	.01646	.01818	.02055	.02358	.02648	.02872	.03031	.03123	
.02	.01501	.01548	.01660	.01838	.02082	.02390	.02674	.02891	.03043	.03129	
.03	.01503	.01556	.01675	.01859	.02110	.02421	.02698	.02909	.03055	.03134	
.04	.01505	.01565	.01690	.01883	.02135	.02452	.02722	.02927	.03064	.03138	
.05	.01508	.01574	.01706	.01904	.02168	.02482	.02746	.02944	.03076	.03142	
.06	.01512	.01586	.01723	.01928	.02198	.02511	.02767	.02960	.03085	.03145	
.07	.01516	.01595	.01741	.01952	.02229	.02540	.02791	.02975	.03094	.03147	
.08	.01521	.01607	.01759	.01977	.02260	.02568	.02812	.02990	.03103	.03149	
.09	.01527	.01619	.01778	.02002	.02292	.02595	.02833	.03004	.03110	.03150	

4° CURVE — (TRANS.-250')

CURVE	Proportional distance from beginning of transition: 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Rate of superelevation (in feet) per. ft. width of roadway										
.00	.01500	.01556	.01725	.02006	.02400	.02850	.03300	.03694	.03975	.04144	.04200
.01	.01500	.01568	.01748	.02041	.02445	.02895	.03345	.03727	.03997	.04155	
.02	.01502	.01581	.01772	.02076	.02490	.02940	.03388	.03759	.04018	.04164	
.03	.01505	.01595	.01798	.02113	.02535	.02985	.03430	.03790	.04038	.04173	
.04	.01509	.01610	.01824	.02150	.02580	.03030	.03471	.03820	.04056	.04180	
.05	.01514	.01627	.01852	.02189	.02625	.03075	.03511	.03849	.04074	.04186	
.06	.01520	.01644	.01880	.02229	.02670	.03120	.03550	.03876	.04090	.04191	
.07	.01528	.01663	.01910	.02270	.02715	.03165	.03588	.03903	.04105	.04195	
.08	.01536	.01682	.01941	.02312	.02760	.03210	.03624	.03928	.04119	.04198	
.09	.01546	.01703	.01973	.02355	.02805	.03255	.03660	.03952	.04132	.04200	

5° CURVE — (TRANS.-300')

CURVE	Proportional distance from beginning of transition: 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Rate of superelevation (in feet) per. ft. width of roadway										
.00	.01500	.01584	.01837	.02259	.02812	.03374	.03937	.04490	.04912	.05165	.05249
.01	.01501	.01602	.01872	.02310	.02868	.03431	.03993	.04540	.04945	.05181	
.02	.01503	.01621	.01908	.02364	.02975	.03487	.04049	.04588	.04976	.05195	
.03	.01507	.01642	.01946	.02418	.02981	.03543	.04106	.04634	.05005	.05208	
.04	.01513	.01665	.01986	.02475	.03037	.03599	.04162	.04679	.05033	.05219	
.05	.01521	.01690	.02030	.02531	.03093	.03656	.04218	.04719	.05059	.05228	
.06	.01530	.01716	.02070	.02587	.03149	.03712	.04274	.04763	.05084	.05236	
.07	.01541	.01744	.02115	.02643	.03206	.03768	.04330	.04803	.05107	.05242	
.08	.01554	.01773	.02161	.02700	.03262	.03824	.04385	.04841	.05128	.05246	
.09	.01568	.01804	.02209	.02756	.03318	.03881	.04438	.04877	.05147	.05248	

Above tables apply to Valley Highway project only or similar urban projects.

COLORADO
DEPARTMENT OF HIGHWAYS

TABLES FOR SUPERELEVATION OF CURVES

Designed by	Approved by
Made by	
Checked by	Date

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	1092-2(5)	79	

CASE I SUPERELEVATION

6° CURVE	Proportional Rate of superelevation	distance from beginning of transition (in feet)	(TRANS.-350')								
	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
					per ft.	width of roadway					
.00	.01500	.01618	.01970	.02556	.03228	.03900	.04572	.05244	.05830	.06182	.06300
.01	.01501	.01642	.02019	.02623	.03295	.03967	.04639	.05311	.05875	.06205	
.02	.01505	.01669	.02069	.02690	.03362	.04034	.04706	.05378	.05919	.06225	
.03	.01511	.01699	.02122	.02758	.03430	.04102	.04774	.05443	.05960	.06242	
.04	.01519	.01731	.02177	.02825	.03497	.04169	.04841	.05505	.05999	.06258	
.05	.01529	.01765	.02235	.02892	.03564	.04236	.04908	.05565	.06035	.06271	
.06	.01542	.01801	.02295	.02959	.03631	.04303	.04975	.05623	.06070	.06281	
.07	.01558	.01840	.02357	.03026	.03698	.04370	.05042	.05678	.06101	.06289	
.08	.01575	.01881	.02422	.03094	.03766	.04438	.05110	.05731	.06131	.06295	
.09	.01595	.01925	.02489	.03161	.03833	.04505	.05177	.05774	.06158	.06299	

7° CURVE	Proportional Rate of superelevation	distance from beginning of transition (in feet)	(TRANS.-350')								
	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
					per ft.	width of roadway					
.00	.01500	.01643	.02073	.02787	.03606	.04425	.05244	.06063	.06777	.07207	.07350
.01	.01501	.01673	.02132	.02869	.03688	.04507	.05326	.06145	.06833	.07233	
.02	.01506	.01706	.02194	.02951	.03770	.04589	.05408	.06226	.06886	.07258	
.03	.01513	.01742	.02258	.03033	.03852	.04671	.05490	.06305	.06936	.07280	
.04	.01523	.01781	.02326	.03115	.03934	.04753	.05572	.06381	.06983	.07298	
.05	.01536	.01823	.02395	.03197	.04016	.04835	.05654	.06455	.07028	.07314	
.06	.01552	.01867	.02469	.03278	.04097	.04916	.05735	.06524	.07069	.07327	
.07	.01570	.01914	.02545	.03360	.04179	.04998	.05817	.06591	.07108	.07337	
.08	.01592	.01964	.02624	.03442	.04261	.05080	.05899	.06656	.07144	.07344	
.09	.01616	.02017	.02705	.03524	.04343	.05162	.05981	.06718	.07177	.07349	

CASE II SUPERELEVATION

	Proportional Rate of superelevation	distance from beginning of transition (in feet)	(TRANS.-450')								
	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
					per ft.	width of roadway					
.00000	.00194	.00778	.01740	.02820	.03900	.04980	.06060	.07022	.07606	.07800	
.00002	.00235	.00857	.01848	.02928	.04008	.05088	.06168	.07098	.07643		
.00008	.00280	.00941	.01956	.03036	.04116	.05196	.06276	.07170	.07676		
.00018	.00329	.01028	.02064	.03144	.04224	.05304	.06382	.07238	.07705		
.00031	.00382	.01120	.02172	.03252	.04332	.05412	.06486	.07302	.07730		
.00049	.00437	.01215	.02280	.03360	.04440	.05520	.06585	.07363	.07751		
.00070	.00498	.01314	.02388	.03468	.04548	.05628	.06680	.07418	.07770		
.00095	.00562	.01417	.02496	.03576	.04656	.05736	.06772	.07471	.07780		
.00124	.00630	.01524	.02604	.03684	.04764	.05844	.06859	.07520	.07792		
.00157	.00702	.01632	.02712	.03792	.04872	.05952	.06943	.07565	.07798		

	Proportional Rate of superelevation	distance from beginning of transition (in feet)	(TRANS.-450')								
	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
					per ft.	width of roadway					
.00000	.00205	.00928	.02054	.03240	.04425	.05610	.06795	.07922	.08645	.08850	
.00002	.00248	.01026	.02173	.03358	.04543	.05728	.06914	.08017	.08684		
.00008	.00295	.01129	.02291	.03477	.04662	.05847	.07032	.08107	.08719		
.00018	.00352	.01236	.02410	.03595	.04780	.05965	.07151	.08193	.08749		
.00033	.00422	.01347	.02528	.03714	.04898	.06084	.07269	.08276	.08776		
.00051	.00496	.01462	.02647	.03832	.05017	.06203	.07387	.08354	.08799		
.00074	.00574	.01580	.02765	.03951	.05136	.06321	.07503	.08428	.08817		
.00101	.00656	.01699	.02884	.04069	.05254	.06440	.07614	.08497	.08832		
.00131	.00742	.01817	.03002	.04188	.05373	.06558	.07720	.08555	.08842		
.00166	.00833	.01936	.03121	.04306	.05491	.06677	.07823	.08602	.08848		

COLORADO
DEPARTMENT OF HIGHWAYS

TABLES FOR
SUPERELEVATION
OF CURVES

Designed by:
Made by:
Checked by:
Approved by:
Date

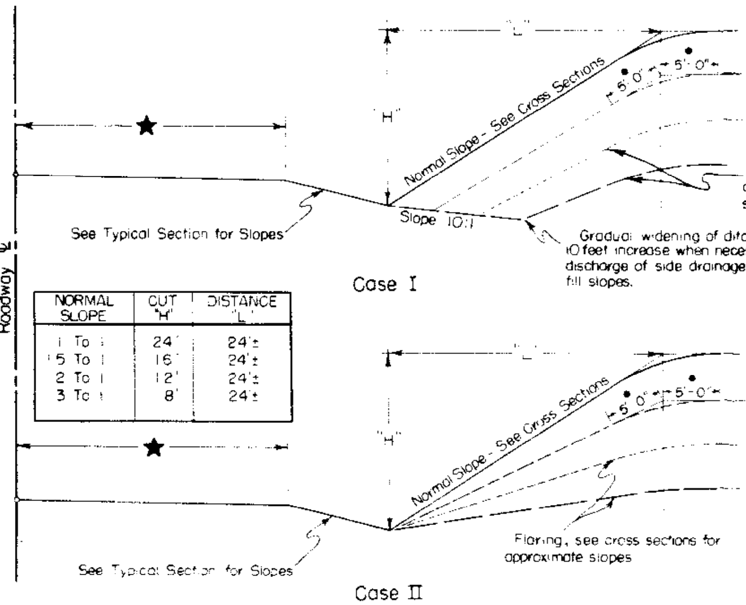
STANDARD SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT & WIDENING AT BRIDGES AND AT CREST OF GRADES

STANDARD M-2-EM

FED. ROAD DIV. NO.	DISTRICT	[redacted]	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5)	80	[redacted]

Rev. 12-9-53, Details of Road Approaches, J.C.R.
Rev. 10-28-55, Widening at Bridge Approaches Note, S.J.M.

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



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

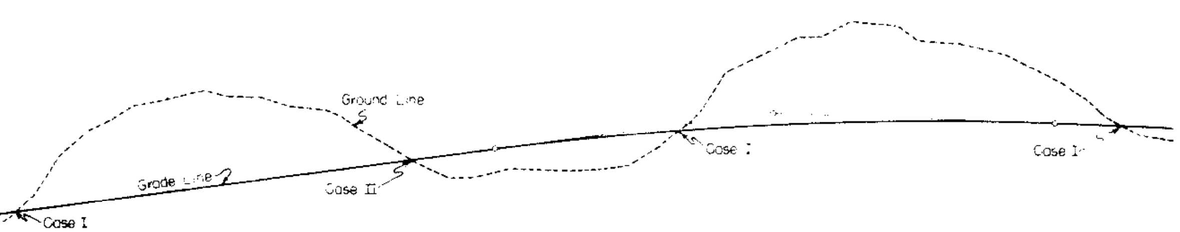
FLARING OF EARTH CUTS: The backslopes at ends of all earth cuts shall be flattened & where necessary the ditch shall be widened gradually to discharge side ditch drainage away from the base of adjacent fill slopes in order to avoid erosion & to improve appearance. The transition of flattened backslopes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

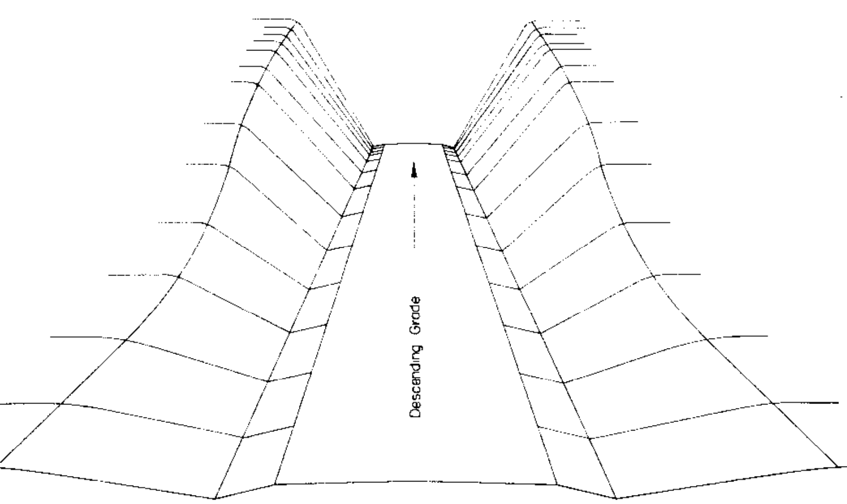
• CUT SLOPE TREATMENT IN EARTH CUTS: The intersection of cut slopes with the existing ground shall be rounded in earth cuts, beginning 5 ft outside the slope stake and extending 5 ft. down the cut slope. Where the cut slope is less than 5 ft. reduce each of the above widths of slope treatment to the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

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

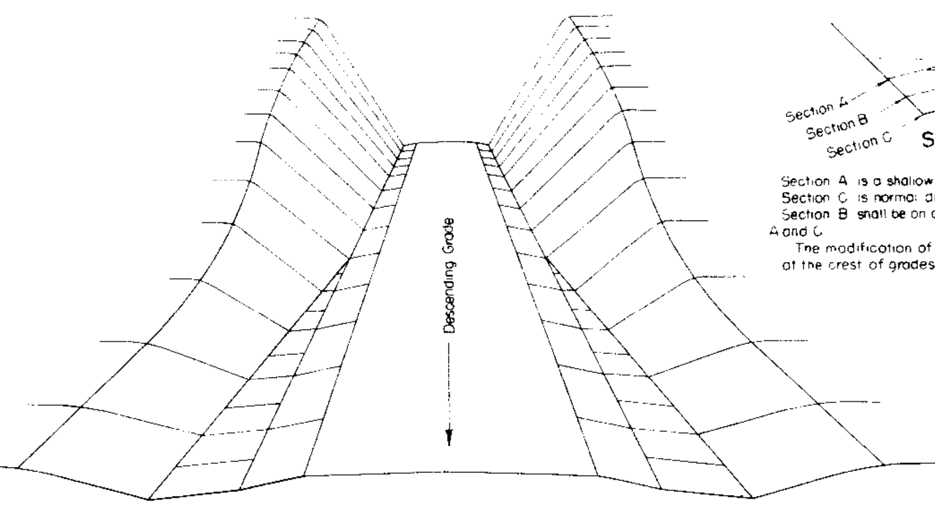
WIDENING TO ACCOMODATE GUARD FENCES: At all locations on the project (except as provided above for bridge approaches) where guard fence is to be constructed the shoulders shall be widened 2 ft. to provide additional lateral support for guard fence posts.

PLAN OF FLARING IN EARTH CUTS



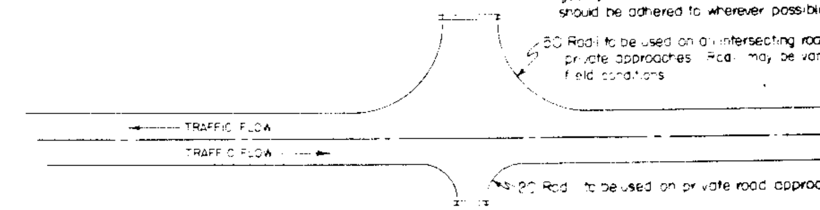


Case II



Case I

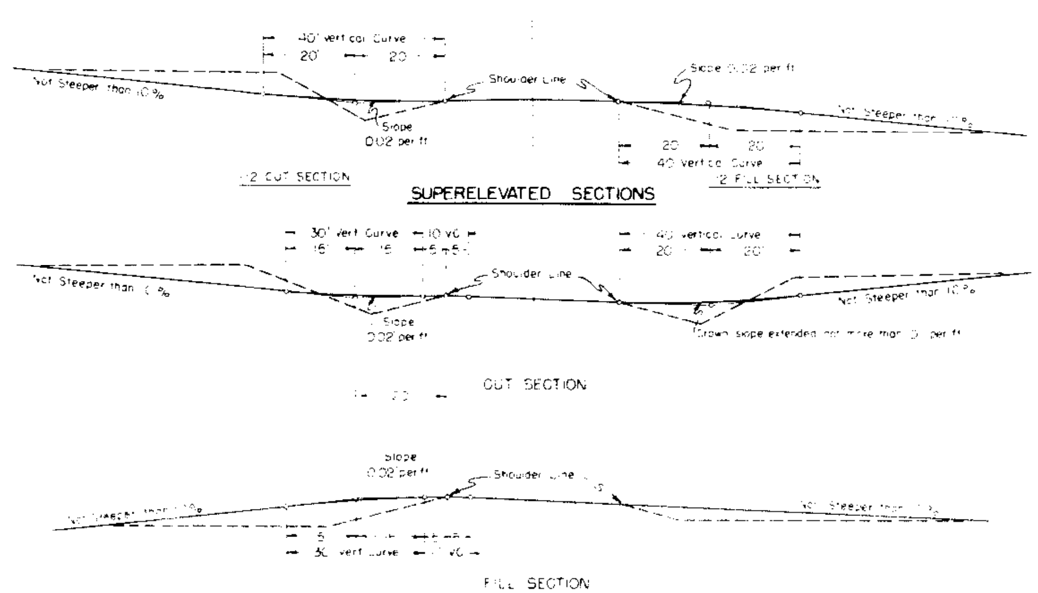
TYPICAL PLANS FOR SIDE APPROACH ROADS



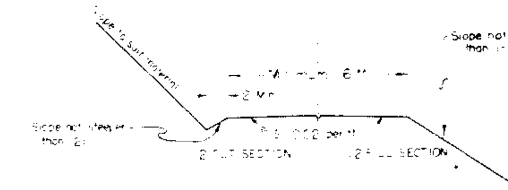
SIDE DRAINS: To be placed at greatest feasible distance from the roadway shoulder consistent with good practice. A minimum of 20 ft. from shoulder should be adhered to wherever possible.

50' Radii to be used on all intersecting roads except private approaches. Radii may be varied to suit field conditions.

20' Rad. to be used on private road approaches.



TYPICAL SECTION FOR APPROACH

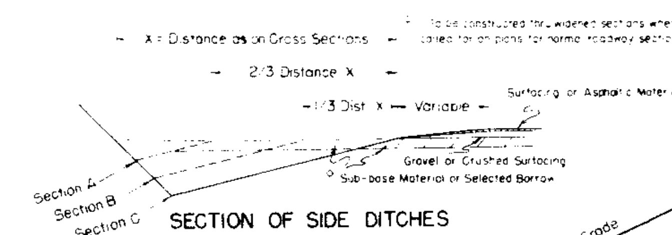


NOTE

ROAD APPROACHES ... conform to the above details unless otherwise ... shown on plans or Special Details. The width of the crowned section should ... and in no case shall the new construction be less than sixteen (16) feet in width.

DETAILS FOR DITCH & WIDENED SHOULDERS AT CREST OF GRADES

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



SECTION OF SIDE DITCHES

Section A is a shallow ditch section.
Section C is normal ditch section.
Section B shall be on a uniform transition between Sections A and C.

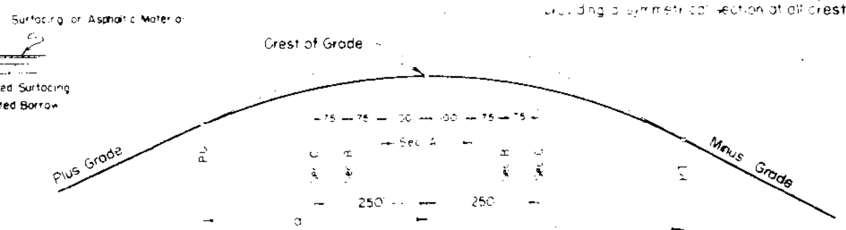
The modification of the ditch indicated shall be used only at the crest of grades from which drainage breaks both ways.

Formula for finding the Crest of Grade

$$= \frac{\text{Plus Grade}}{\text{Algebraic Diff}}$$

NOTE

Where section is in embankment at crest of grade, the shoulders shall be widened an amount equivalent to that used in ditch sections, thus providing a symmetrical section at all crests.



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

GENERAL NOTES

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

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

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

COLORADO DEPARTMENT OF HIGHWAYS

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

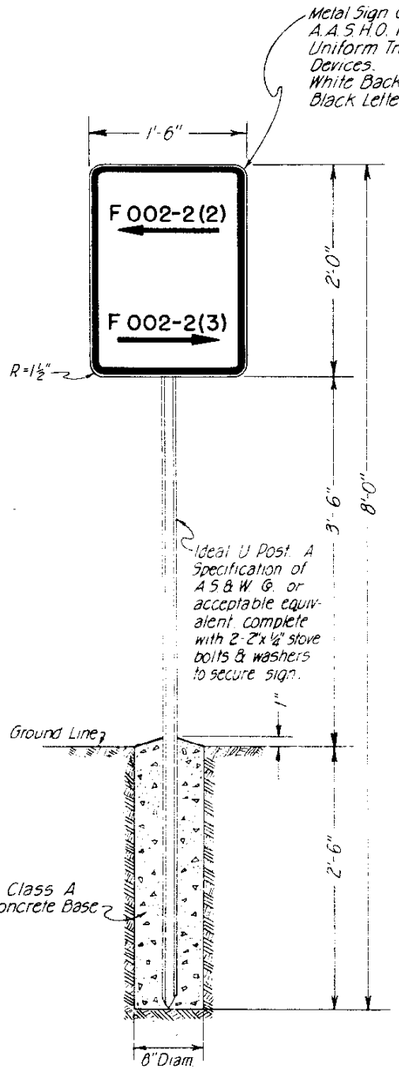
Designed by J.C.R.	Approved by A. Julian
Made by S.J.M. 8-43	
Checked by C.R.S.	Date: November 1, 1953

FEDERAL ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F 002-2(5)	8.1	

STANDARD M-7-C

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

PROJECT MARKER POST



NOTES FOR PROJECT MARKER POSTS

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

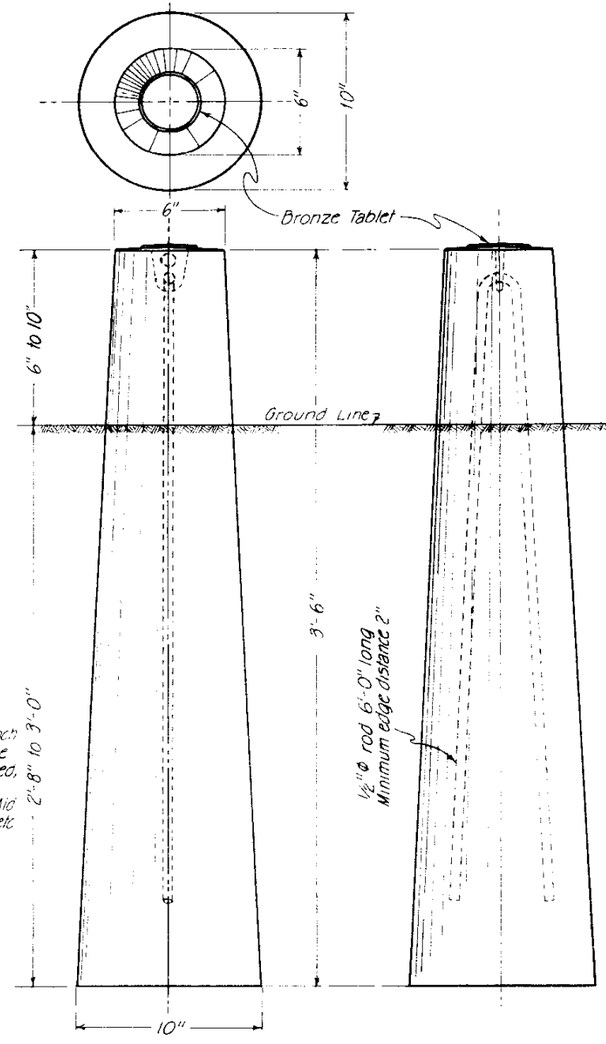
Numbers and arrows shall show the proper numbers and directions of the projects each way from where the post is placed. Post is to be set with sign facing the road at the end of the project, two feet inside the R.O.W. line or at a point amply protected from traffic in such a position that the sign will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

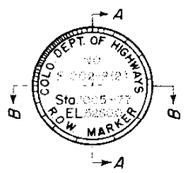
NOTES FOR R.O.W. MARKER POSTS

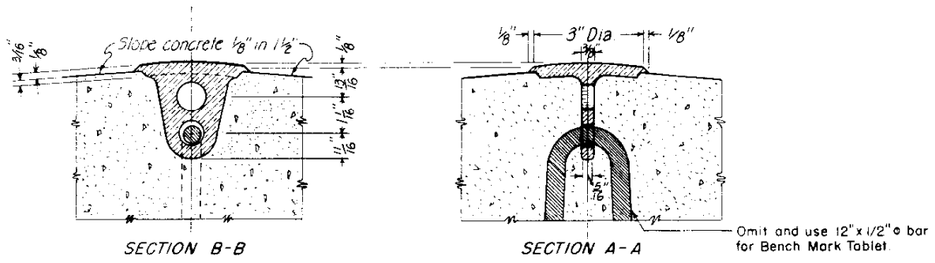
All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the project. Posts shall be made of Class 'A' Concrete. The upper 12 inches of marker posts shall be rubbed free of form marks, and the top surface of the post must be constructed to drain thoroughly.

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

RIGHT OF WAY MARKER POST







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

BENCH MARK

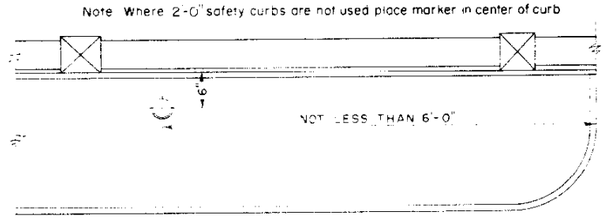
All work shall be done in accordance with Standard Specifications of the Colorado Department of Highways applicable to the project

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

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

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

Note Where 2'-0" safety curbs are not used place marker in center of curb



PLAN

ELEVATION

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

COLORADO DEPARTMENT OF HIGHWAYS

STANDARD

MARKER POSTS AND BENCH MARKS

Designed by R.E.L.	Approved by C. Julian
Made by E.E.O.	
Checked by R.E.L.	Date: Nov. 12, 1953

Rev 12-13-47 J.P.K.
Rev 7-1-49 J.R.E.
Rev 9-14-50 J.E.R.
Rev 7-10-52 T.M.C.
Rev. 10-24-55 W.F.S.

STANDARD M-10-B.

FED. ROAD DIST. NO.	STATE	SHEET NO.	TOTAL SHEETS
3	COLO.	092-26(1) 82	

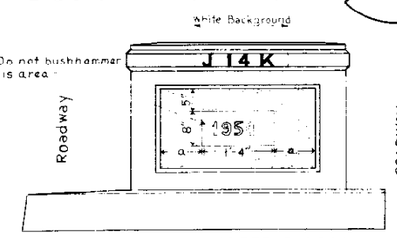
1 2 3 4 5 6 7 8 9 0 .

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

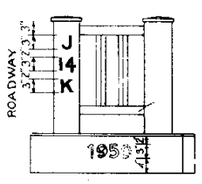
M N O P Q R S T U V W

a f g l J 14 K 1950

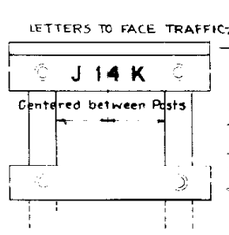
abcdefghijklmnopqrstuvwxyz



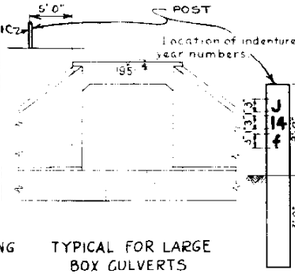
TYPICAL FOR CONCRETE ENDPOST



TYPICAL FOR STEEL HANDRAIL END POST

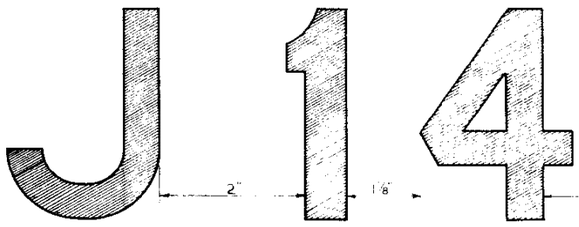


TYPICAL FOR TIMBER WING HANDRAIL

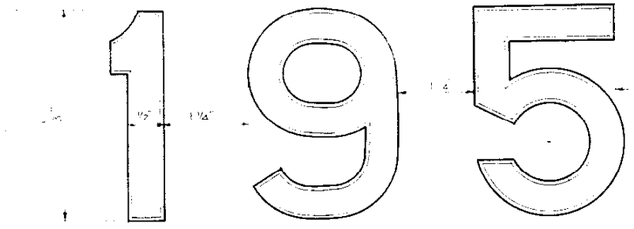


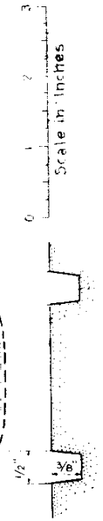
TYPICAL FOR LARGE BOX CULVERTS

SAMPLE BRIDGE NUMBER



SAMPLE YEAR NUMBER





SECTION

General Notes

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

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

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

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

THE YEAR NUMBERS ARE RECESSED IN CONCRETE 3/8" MINIMUM AS SHOWN INTO THE PANEL OF THE ENDPOST ON THE RIGHT HAND SIDE OF EACH BRIDGE END AND INTO THE FACE OF THE DOWNSTREAM HEADWALL OF CULVERTS AS SHOWN ON PLAN DETAILS.

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

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

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

THE CORRECT NUMBER FOR EACH BRIDGE IS SHOWN IN THE LOWER RIGHT HAND CORNER OF THE DETAIL SHEETS FOR THAT BRIDGE.

A PROPER WHITE BACKGROUND RECTANGULAR IN SHAPE AND EXTENDING THREE INCHES BEYOND THE LIMITS OF THE NUMBER SHALL BE PAINTED WITH TWO COATS OF ACCEPTABLE WHITE PAINT, UNLESS AN APPROVED WHITE CONCRETE PAINT IS USED. BEFORE PAINTING, THE SURFACE MUST BE THOROLY DRIED, CLEANED AND PROPERLY SIZED. ON TIMBER HANDRAILS THE WHITE PAINT USED ON THE BRIDGE WILL BE SATISFACTORY.

AFTER THE WHITE BACKGROUND HAS DRIED SUFFICIENTLY, THE CORRECT STRUCTURE NUMBER SHALL BE CAREFULLY STENCILED ON IT WITH TWO COATS OF SECOND FIELD COAT-DARK OR EXTERIOR BLACK PAINT (MAINT.) AS SPECIFIED UNDER ITEM 38 PAINTS AND PAINTING. THE BRACES OF THE STENCILED LETTERS AND FIGURES SHALL BE CAREFULLY FILLED IN BY HAND TO MAKE SOLID FIGURES.

SUFFICIENT TIME BETWEEN SUCCESSIVE COATS SHALL BE ALLOWED TO PERMIT THOROUGH DRYING.

MINOR STRUCTURES WITH CLEAR SPANS 12 TO 20 FEET INCLUSIVE SHALL BE STENCILED WITH STRUCTURE NUMBER THUS: W-18-S ON 4"x4"x6' TIMBER POST TO BE FURNISHED AND PLACED BY THE CONTRACTOR. POST SHALL BE PLACED 4 FT ± OUTSIDE THE ROADWAY SHOULDER. THIS SHALL BE CONSIDERED SUBSIDIARY WORK AND WILL NOT BE PAID FOR AS A SEPARATE ITEM.

STRUCTURE NO

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

Designed by G.H.D.	Approved by R.L. Bailey
Made by W.P.M.	Bridge Engineer
Checked by	Date: June 1, 1948

STANDARD TIMBER GUARD POSTS

FED. ROAD DIVISION NO.	DISTRICT		SHEET NO.	TOTAL SHEETS
9	COLO.	292-2(5)	3	

STANDARD M-19-D

SPECIFICATIONS

(Work By Contractor)

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

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

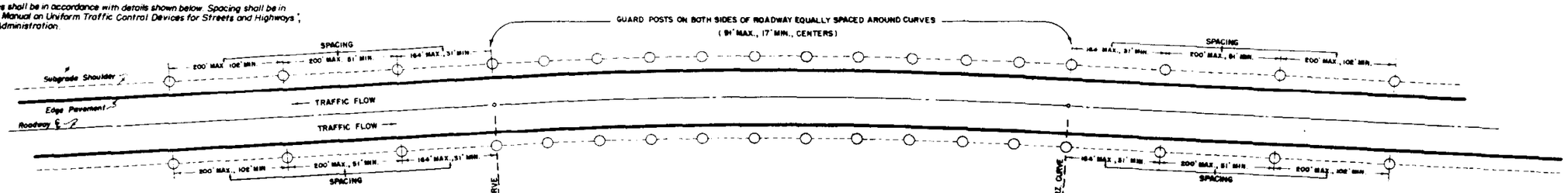
PAINTING - Posts shall be painted with aluminum paint and a black band placed around each post as per details on this sheet. Number of coats and type of paint applied shall be in accordance with specifications

(Work By State Forces)

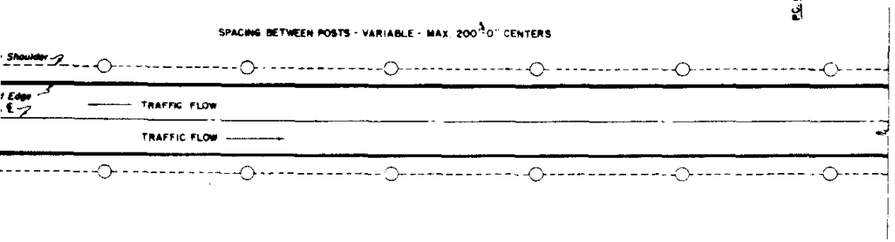
REFLECTIVE SHEETING - In accordance with the details hereon, State Forces will furnish and place the required 2"x 6" smooth surfaced reflective delineators fabricated from 3s - H14 aluminum alloy, minimum thickness 0.025", reflectorized with reflective sheeting strips or other approved reflective materials. Strips shall be suitable for placement around a curved surface.

Typical Installation on Curves

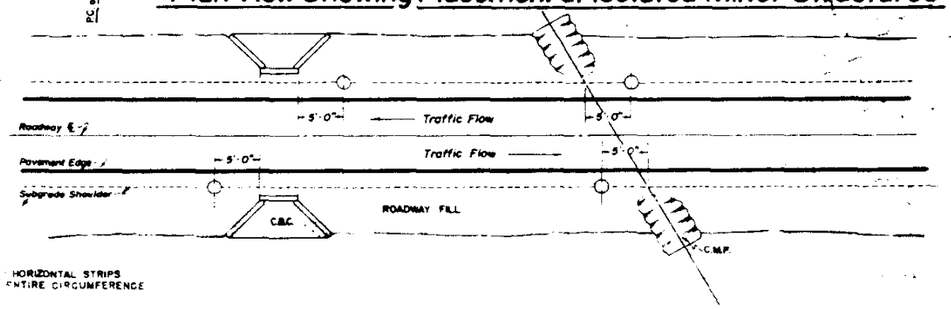
TION of guard posts on curves shall be in accordance with details shown below. Spacing shall be in th Section 157, Table I of "Manual on Uniform Traffic Control Devices for Streets and Highways", 1948 by the Public Roads Administration.



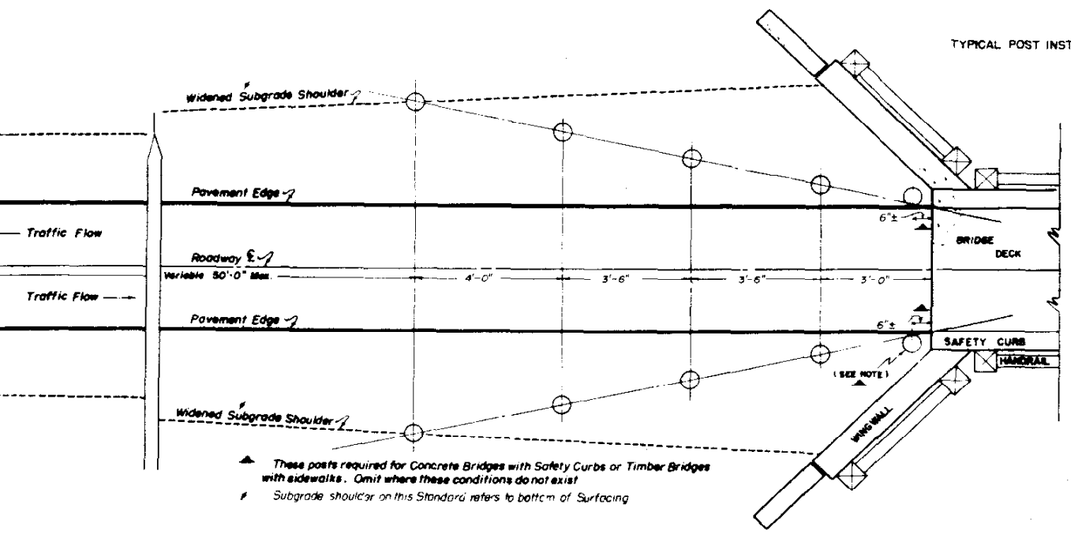
Method of Placement on Tangents



Plan View Showing Placement at Isolated Minor Structures

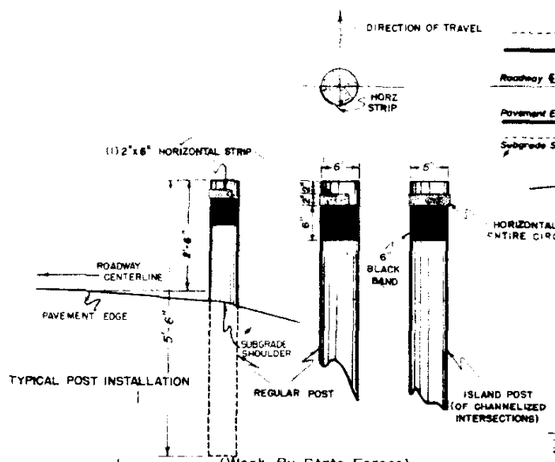


Typical Installation at Bridge Approaches



▲ These posts required for Concrete Bridges with Safety Curbs or Timber Bridges with sidewalks. Omit where these conditions do not exist

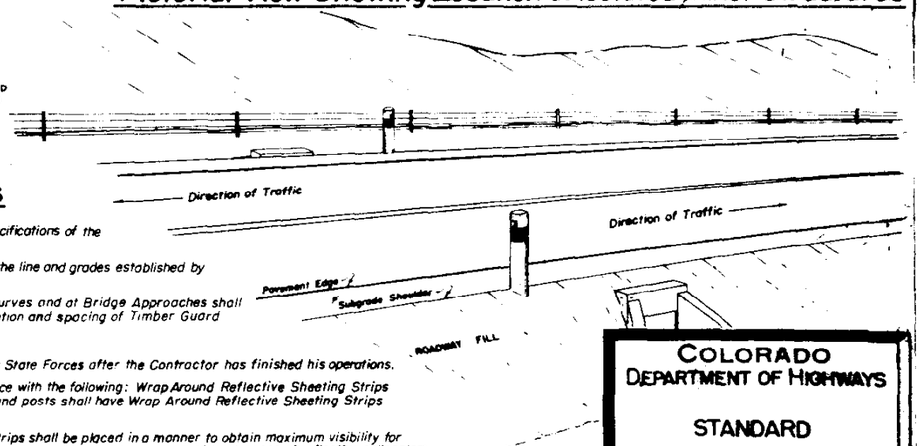
Subgrade shoulder on this Standard refers to bottom of Surfacing



(Work By State Forces)

INSTALLATION DETAILS OF REFLECTORIZED STRIPS

Pictorial View Showing Location at Isolated Minor Structures



GENERAL NOTES

(Work By Contractor)

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

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

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

(Work By State Forces)

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

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

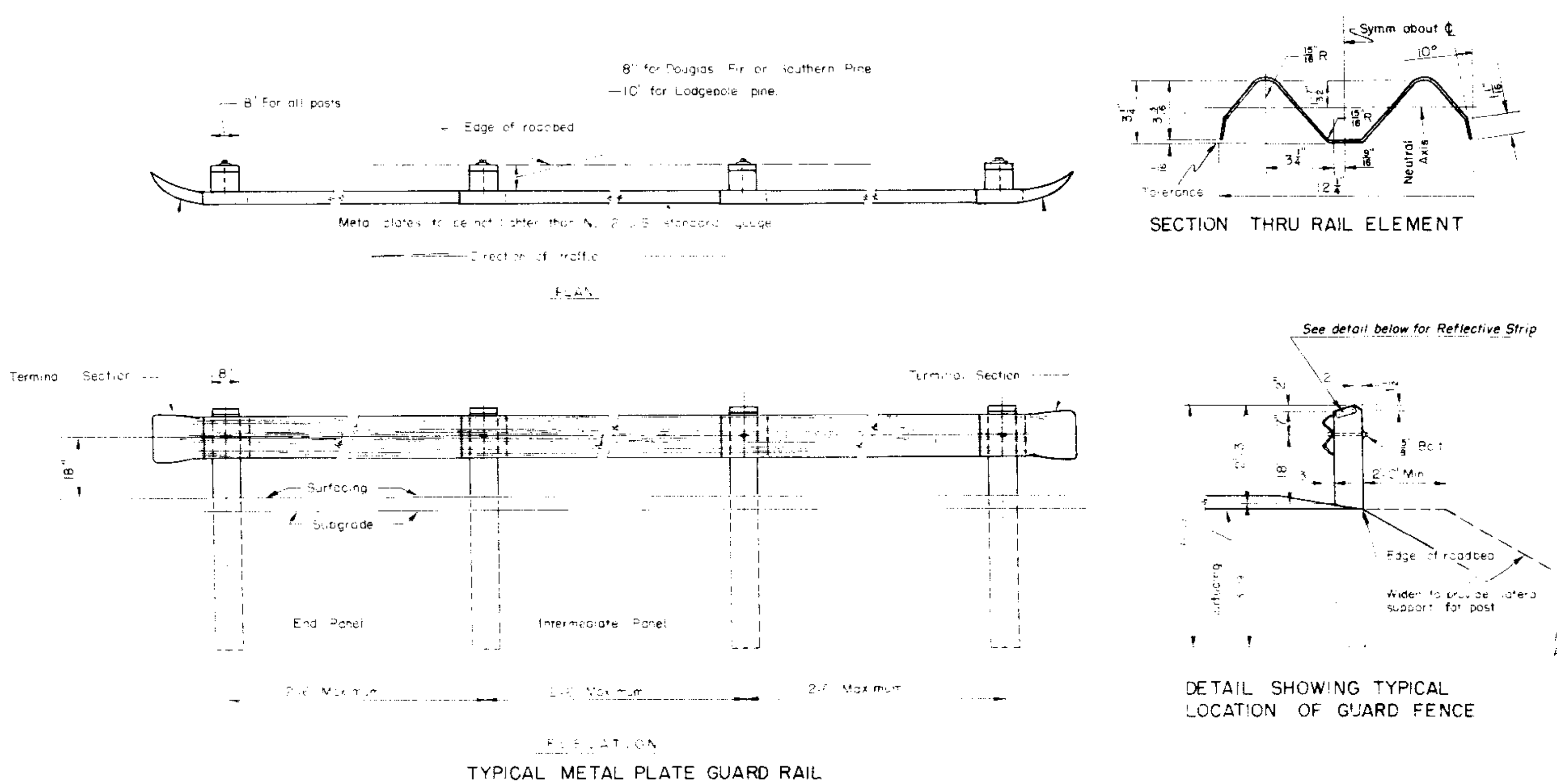
On Divided Highways and Islands, Reflective Sheeting Strips shall be placed in a manner to obtain maximum visibility for the primary direction of travel. In all instances tests shall be made to insure the maximum effectiveness of reflective delineators.

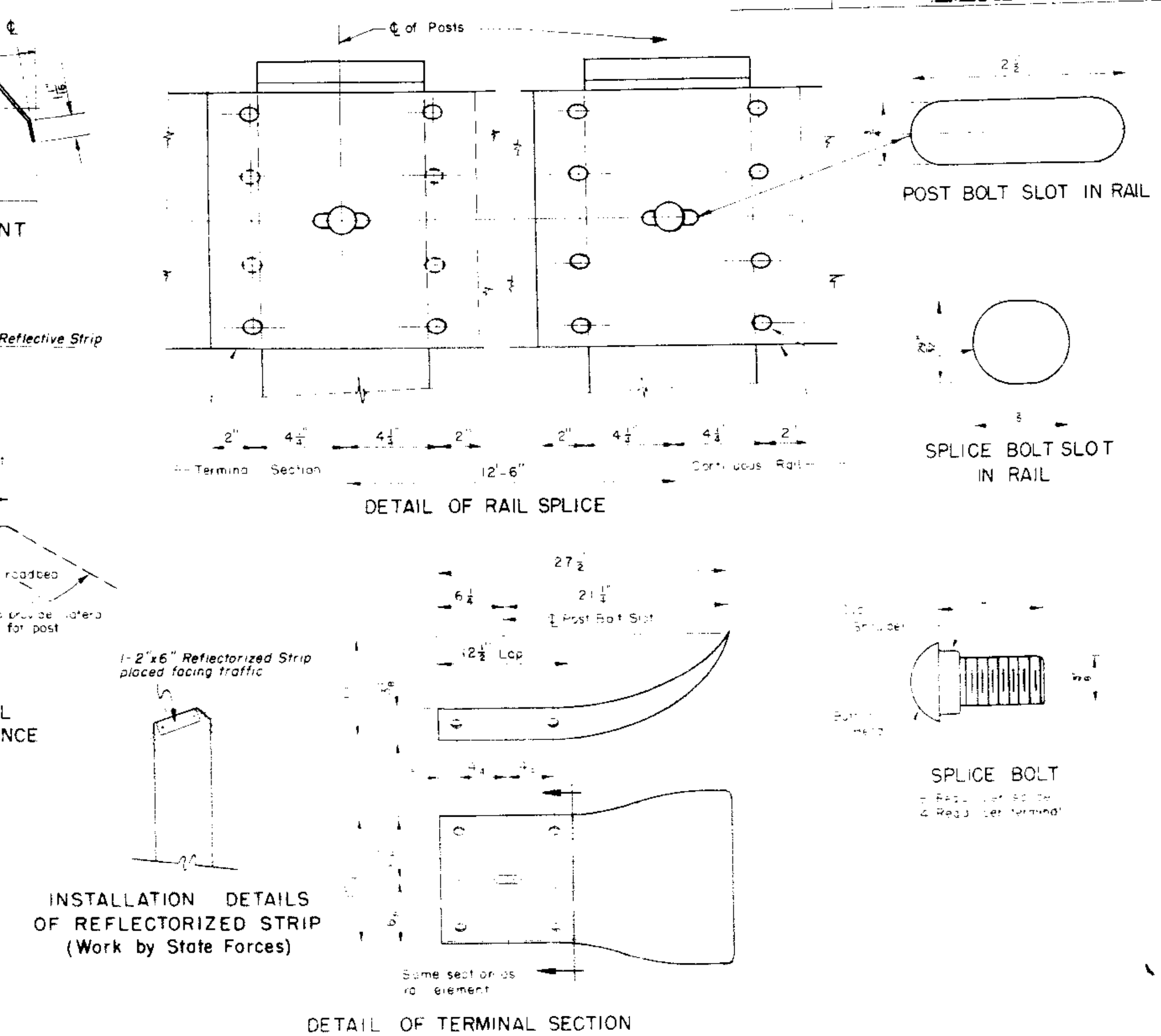
All Traffic Islands shall be marked with Island Posts as indicated hereon

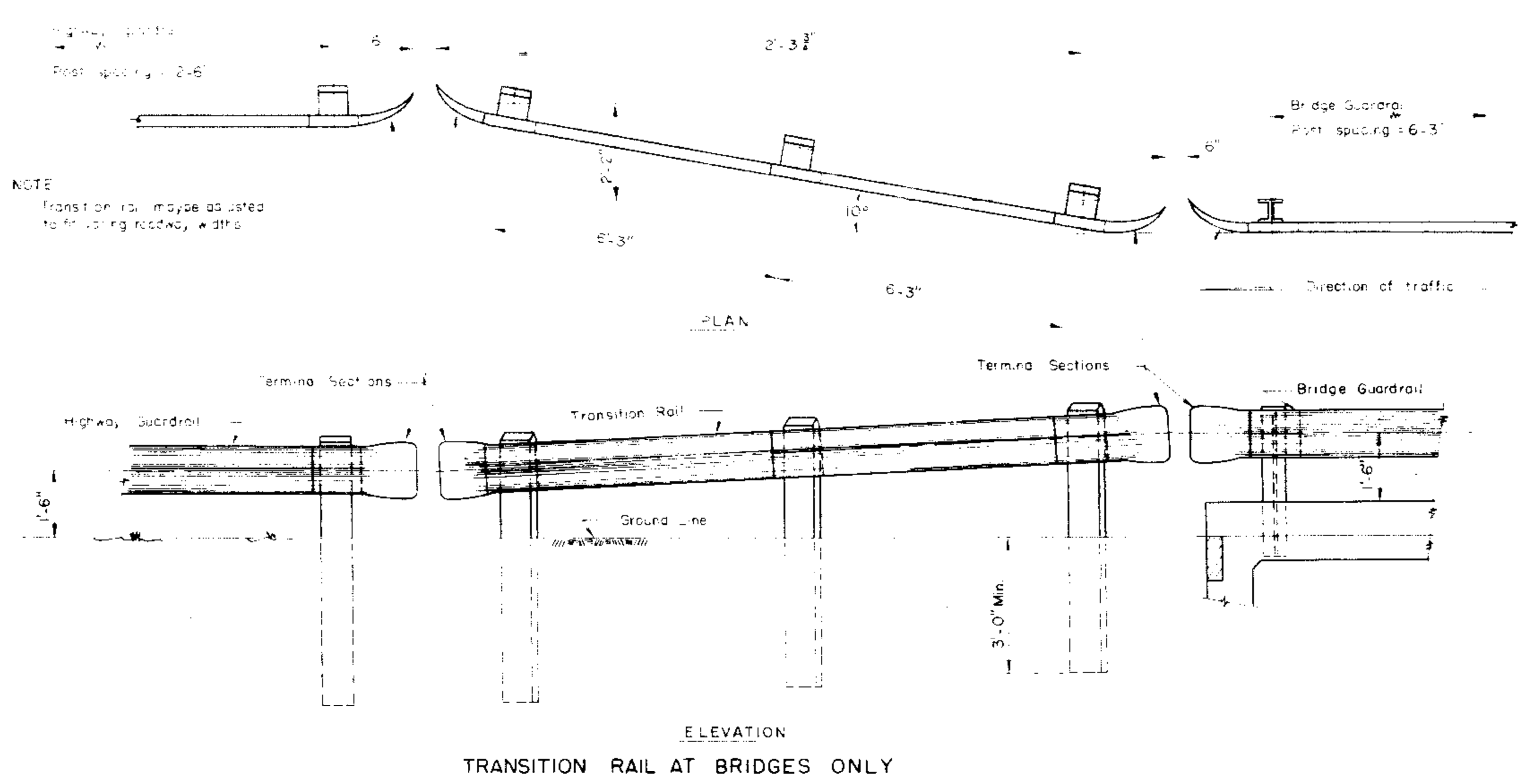
COLORADO
DEPARTMENT OF HIGHWAYS

STANDARD
TIMBER GUARD POSTS

Designed by	Approved by C. Paulsen
Made by	Engineer, Surveys & Plans
Checked by	Date: March 25, 1953







GENERAL NOTES

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

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

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

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

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

Metal plates shall not be galvanized, but shall be painted as provided for in the specifications.

Metal plates shall not be lighter than No. 12 U.S. standard gauge.

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

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

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

(Work by State Forces)

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

COLORADO
DEPARTMENT OF HIGHWAYS
STANDARD
METAL PLATE GUARD FENCE
(BEAM TYPE)

Bridge Engineer
Date: May 15, 1956

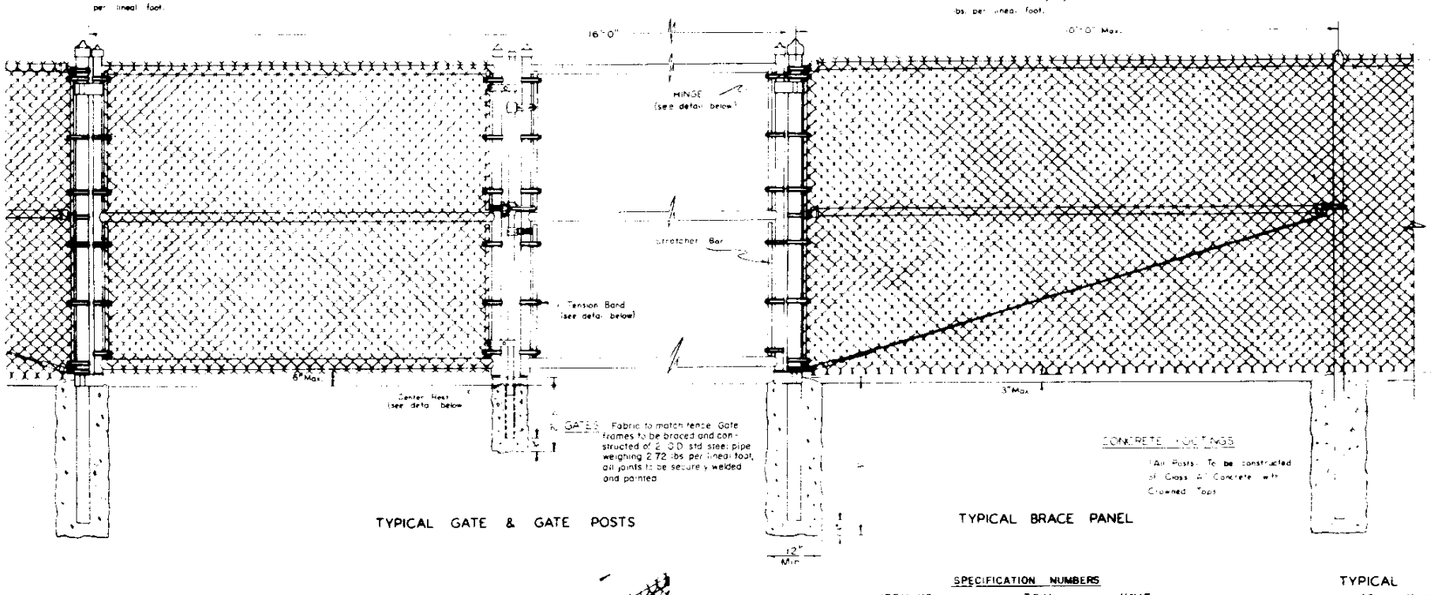
STANDARD M-26-C

FED ROAD DIV NO	DISTRICT		SHEET NO.	TOTAL SHEETS
9	COLO.	4-2267	83	

Rev 2-15-57 E.L.H. Gate Dimension Shown

TOP RAIL To be constructed of 1-5/8" O.D. Std. Steel Pipe weighing 2.27 lbs. per lineal foot.

GATE POSTS To be constructed of 3" O.D. std. steel pipe weighing 5.79 lbs. per lineal foot.



GATES Fabric to match fence. Gate frames to be braced and constructed of 2" O.D. std. steel pipe weighing 2.72 lbs. per lineal foot, all joints to be securely welded and painted

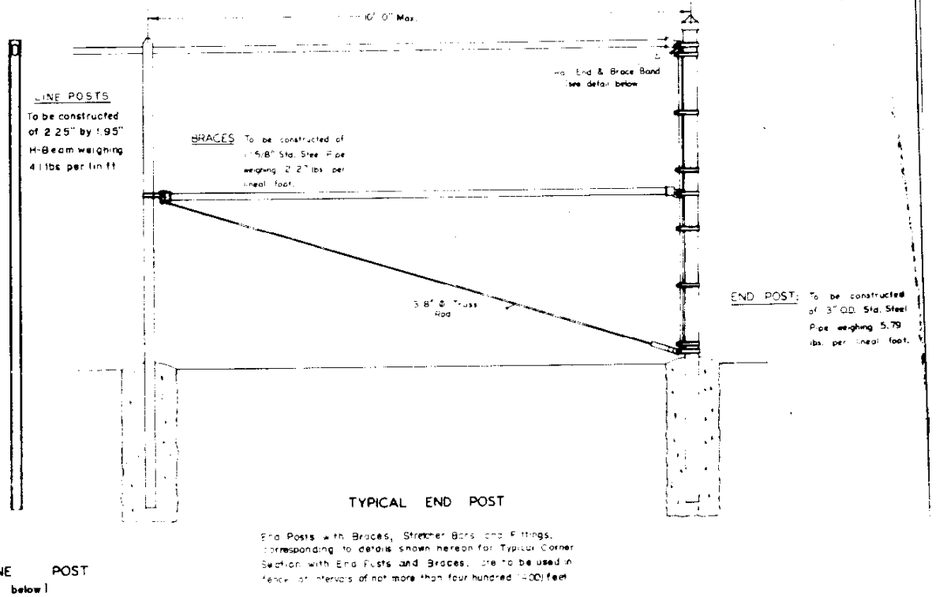
TYPICAL GATE & GATE POSTS

CONCRETE FOOTINGS

All Posts: To be constructed of Class A-1 Concrete with Crowned Top.

TYPICAL BRACE PANEL

LINE POSTS To be constructed of 2.25" by 1.95" H-Beam weighing 4.1 lbs per lin ft



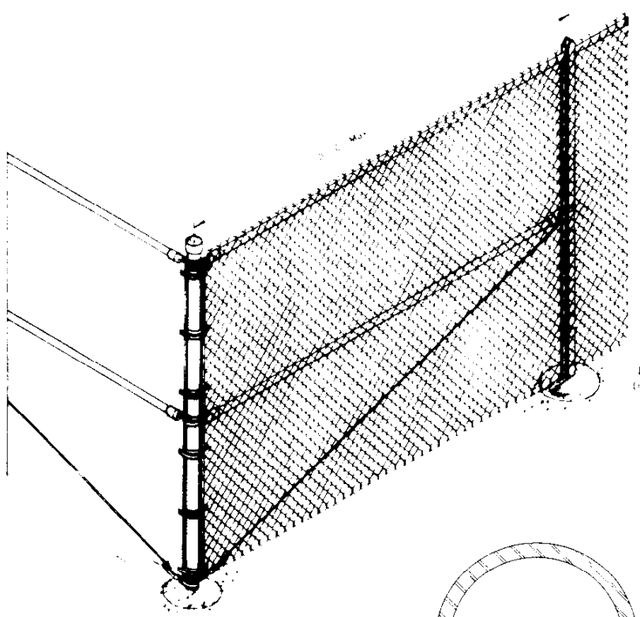
TYPICAL END POST

End Posts with Braces, Stretcher Bars and Fittings, corresponding to details shown hereon for Typical Corner Section with End Posts and Braces, are to be used in fence at intervals of not more than four hundred (400) feet

SPECIFICATION NUMBERS

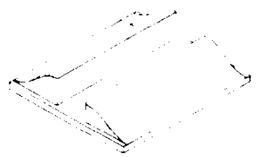
ITEM NO	ITEM	UNIT
78a	Chain Link Wire Mesh Fence	Lin. Ft.
78b	Double Driveway Gates	Each

TYPICAL LINE POST (See alternate below)

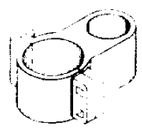


TYPICAL CORNER SECTION WITH POST & BRACES

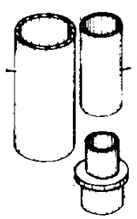
LINE POST TOP (In lieu of punched & painted posts)



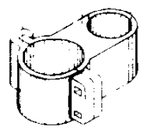
CENTER REST



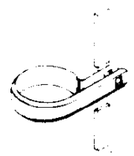
Gate Post



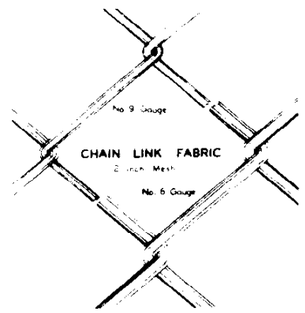
Gate Frame



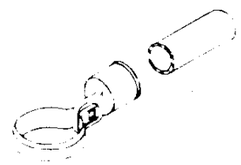
HINGE ASSEMBLY



TENSION BAND



All Fabric shall be No. 9 Gauge with a barbed finish on the top and bottom selvage unless otherwise specified.



BRACE BAND & RAIL END

GENERAL NOTES

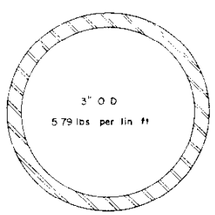
All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to this project.

Weights of Pipe as shown are the minimum allowed for the Nominal Diameters designated.

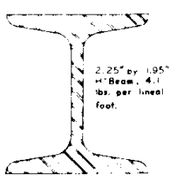
Alternate Equivalent Standard Fittings, Gates, Posts, and Rails of other than sections shown will be acceptable subject to the Engineer's approval.

See plan sheets for location and number of Gates and Length of Fence required.

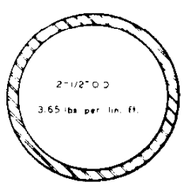
Wire Mesh Fabric shall be securely fastened to all Line Posts, Rails and Braces with No. 7 (B&S) Gauge Aluminum and/or No. 12 1/2 (W&M) Gauge Galvanized Steel Wire and spaced at a minimum of 6 per 10 feet Horizontally & 1 per foot Vertically. Suitable Attachment Bands shall be used on all Gate Posts, End Posts, Braces and Stretcher Bars



TERMINAL POSTS



H-BEAM LINE POST



ALTERNATE LINE POST

BRACE RAIL & TOP RAIL

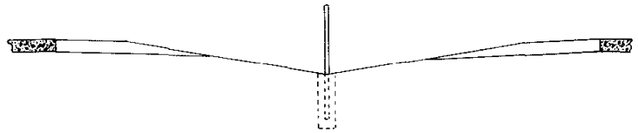
COLORADO DEPARTMENT OF HIGHWAYS

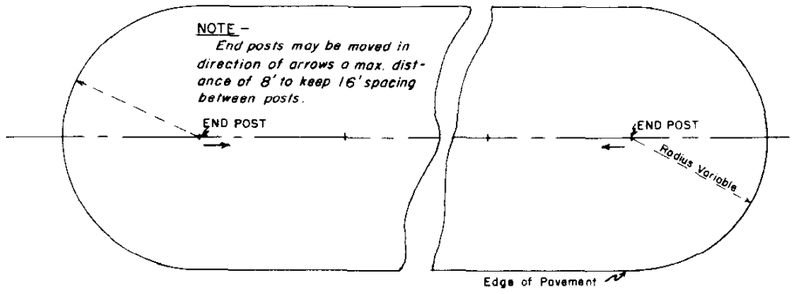
CHAIN LINK WIRE MESH (SCHOOL) FENCE

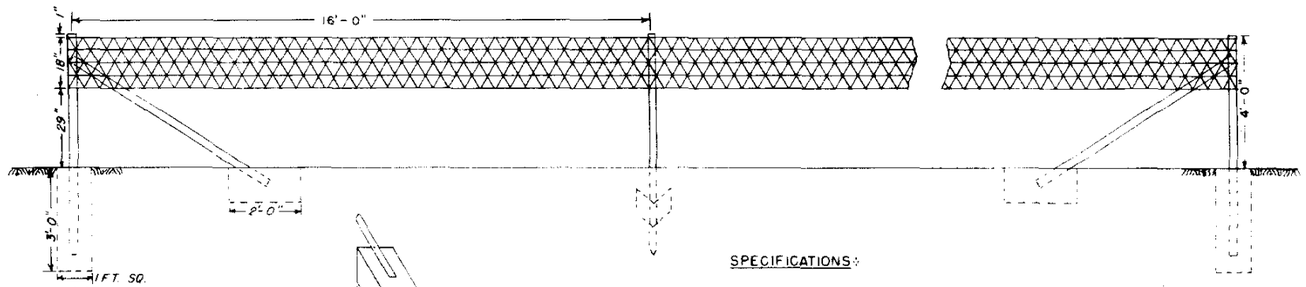
Designed by: V.L.A.	Approved by: E. E. Wilson
Made by: E.L.H.	Design Engineer
Checked by:	Date: 9-1-56

STANDARD M-28-A

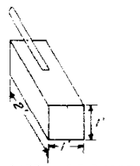
FED. ROAD DIV. NO.	DISTRICT	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(5) 86		





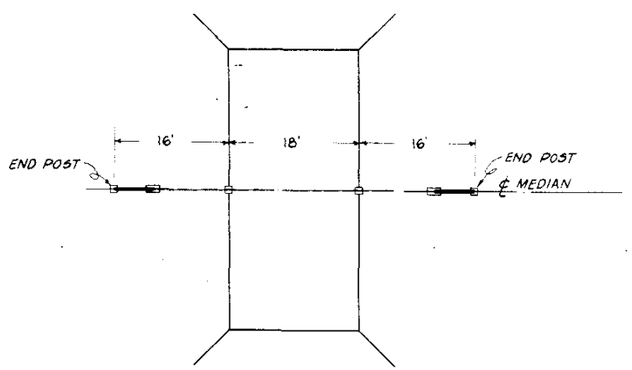


NOTE -
All footings for end posts shall be of Class "A" Concrete and shall have crowned tops
The cost involved shall be included in the bid price for the fence.



SKETCH OF BRACE ANCHOR

LOCATION of BARRIER FENCE AT BOX CULVERTS with NO FILL



SPECIFICATIONS:

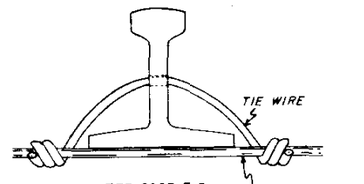
END POSTS -
TYPE - *2-1/2"x 2-1/2"x 1/4" Structural Steel Angles*
WGT. - *4.1 lbs. per lin. ft.*
LENGTH - *6'-6" Min*
NO. OF BRACES - *1*

LINE POSTS -
TYPE - *Structural Steel "Tees"*
WGT. - *1.4 lbs per lin. ft., Min.*
LENGTH - *6'-6" Min.*
ANCHOR - *Securely fastened, with bearing surface sufficient to resist movement of post.*

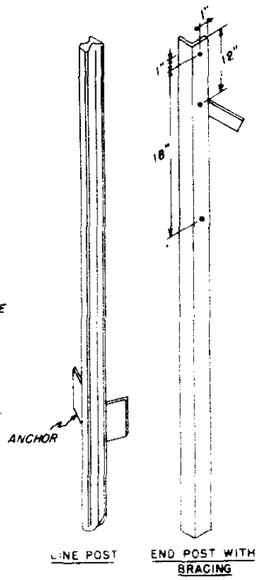
BRACES -
TYPE - *2"x 2"x 1/4" Structural Steel Angles*
WGT. - *3.19 lbs. per lin. ft.*
LENGTH - *Same as end post used*

4"x 4" WIRE MESH FENCE -
WIDTH - *18 inches*
WGT. - *0.41 lbs. per lin. ft. minimum*
HORIZONTAL WIRES - *2 strands No. 12-1/2 Ga.*
CROSS WIRES - *1 strand No. 14 Ga.*
CONSTRUCTION - *Cross wires to be woven with horizontal wires making a one piece fabric.*

TIES -
Min. No. 12-1/2 Ga. Galvanized Wire or acceptable equivalent.
END POSTS - *Each horizontal wire of mesh to be wrapped around post and fastened in addition to two (2) tie wires.*
LINE POSTS - *Min. three (3) ties per post for mesh.*



NOTE -
Holes for tie wires in end posts shall be 1/4" dia. Holes for brace to be 1/2" dia.
Bolt required for bolting brace to end post shall be 1/2" dia. Machine Bolt and shall be galvanized.



General Notes

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

All posts and braces shall be of the types and weights as shown on this sheet or acceptable equivalents. Posts and braces to be of structural steel hot dip galvanized or painted with an approved waterproof asphalt or mineral paint. Holes to be provided in end posts as detailed hereon.

Wire mesh used as shown shall be galvanized.

On curves, fence wire shall be placed on side of post which would prevent tension on fence ties.

COLORADO
DEPARTMENT OF HIGHWAYS

Standard Barrier Fence

Designed by E.E.O.	Approved by C. Julian
Made by E.E.O	Engineer, Surveys & Plans
Checked by	Date 3/29/57

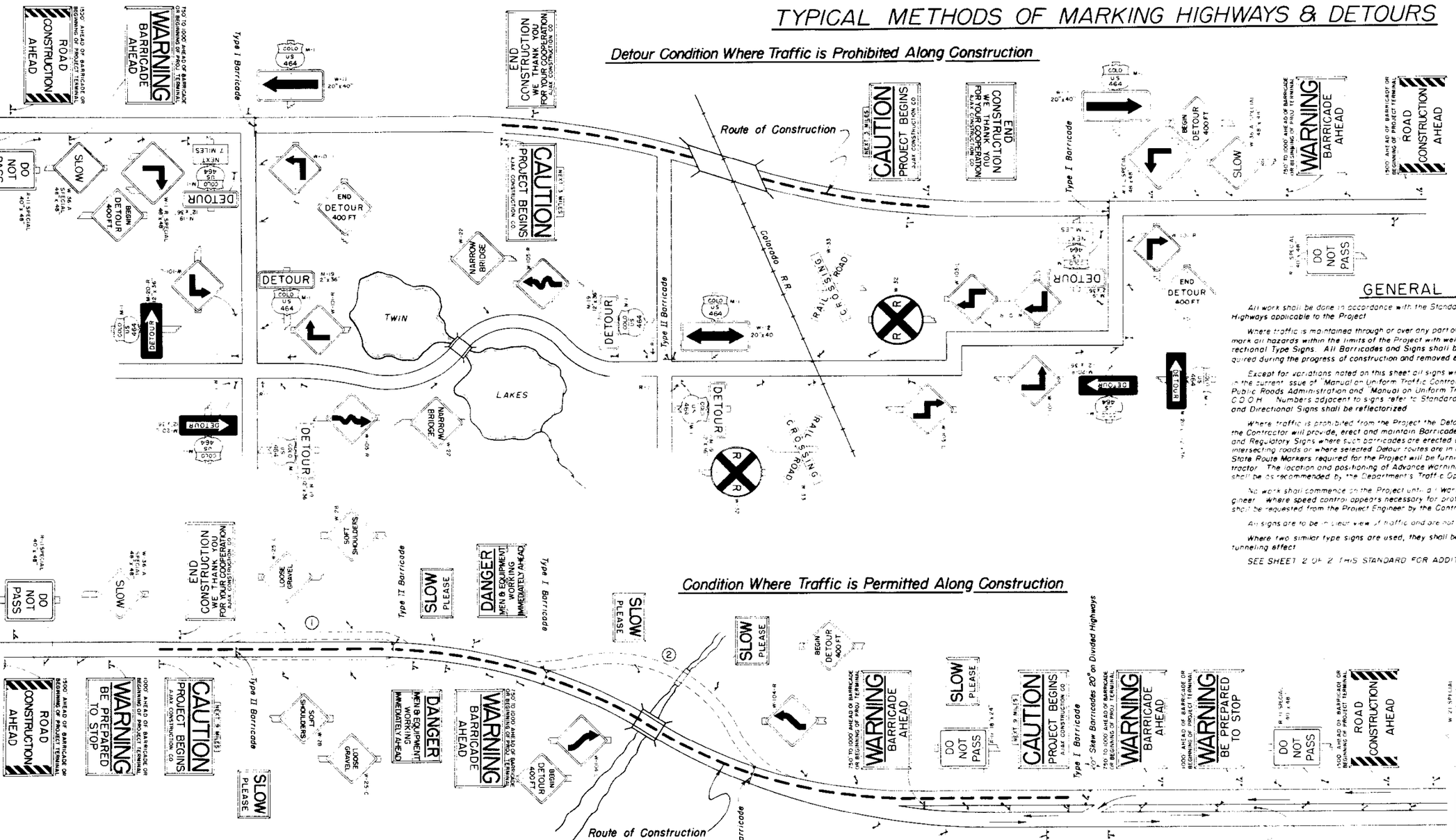
STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

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

FED. ROAD DIV. NO.	DISTRICT	SHEET NO.	TOTAL SHEETS
8	COLO.	Lo 2-2(5)	87

TYPICAL METHODS OF MARKING HIGHWAYS & DETOURS

Detour Condition Where Traffic is Prohibited Along Construction



Condition Where Traffic is Permitted Along Construction

GENERAL NOTES

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

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

Except for variations noted on this sheet all signs will be in conformity with the specification outlined in the current issue of "Manual on Uniform Traffic Control Devices for Streets & Highways" by the U.S. Public Roads Administration and "Manual on Uniform Traffic Control Devices for Streets and Highways," C.D.O.H. Numbers adjacent to signs refer to Standards in the manual. Standard Warning, Regulatory and Directional Signs shall be reflectorized.

Where traffic is prohibited from the Project the Detour will be marked by the Department except that the Contractor will provide, erect and maintain Barricades complete with approved Directional Arrows and Regulatory Signs where such barricades are erected and maintained at the ends of the Project and intersecting roads or where selected Detour routes are in advance of the actual project terminal. U.S. or State Route Markers required for the Project will be furnished by the Department and installed by the Contractor. The location and positioning of Advance Warning Signs, Barricades and Speed Control Signs shall be as recommended by the Department's Traffic Operations Section.

No work shall commence on the Project until all Warning Signs are in place and approved by the Engineer. Where speed control appears necessary for protection of the traveling public, such speed control shall be requested from the Project Engineer by the Contractor.

All signs are to be in clear view of traffic and are not to be obstructed by equipment, weeds or otherwise.

Where two similar type signs are used, they shall be placed approximately 75 feet apart to avoid a tunneling effect.

SEE SHEET 2 OF 2 THIS STANDARD FOR ADDITIONAL NOTES AND DETAILS.

NOTE

Typical examples for marking Projects as shown hereon constitute a minimum of signs required and is subject to alteration to fit actual conditions encountered in the field. Additional markings and any special signs required for the guidance and protection of traffic will be placed as required on the project at the Contractor's expense.

All Signs and Barricades must be maintained in good condition and kept clean and free of dirt at all times to give the appearance of new signing. Contractor's and Engineers' equipment must be parked so that signs and barricades are visible to traffic at all times.

LEGEND

(1) NEW GRADE, TRAFFIC USING SHOULDERS
(2) TRAFFIC USING DETOUR AROUND STRUCTURE

COLORADO
DEPARTMENT OF HIGHWAYS

Standard Roadway Construction Traffic Signs

Designed by JCR	Approved by C. J. Julian
Made by JCR	Engineer, Surveys & Plans
Checked by	Date: July 22, 1955

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

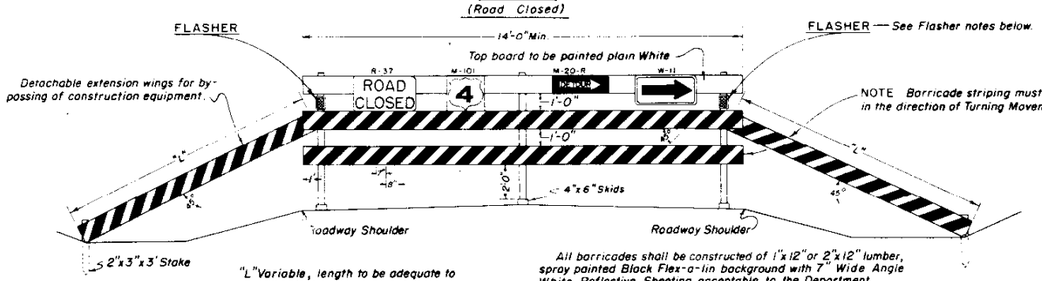
STANDARD M-29-B
(SHEET 2 OF 2 SHEETS)

FED. ROAD DIV. NO. 8 | DISTRICT | COLO. | SHEET NO. 7092-26 | TOTAL SHEETS 88

Rev. 7-10-56, Reflective Materials, L.N.P.

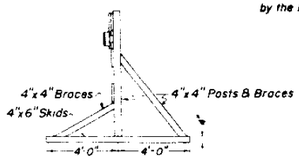
DETAILS OF BARRICADES

Type I
(Road Closed)



"L" Variable, length to be adequate to provide closing of borrow pit and shoulder.

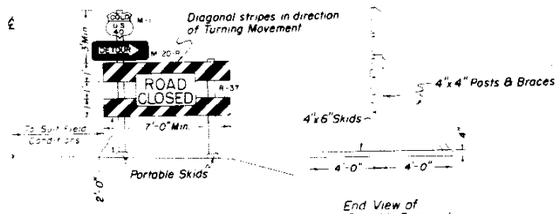
All barricades shall be constructed of 1"x12" or 2"x12" lumber, spray painted Black Flex-a-lin background with 7" Wide Angle White Reflective Sheeting acceptable to the Department.
Boards may be painted on reverse side with opposite slant on reflective stripes for opposite direction use.
Barricades may be either portable as shown or fixed with posts set into the ground.
All skids, braces & posts to be painted White & nailed together with No. 20d nails.
Bases to be weighted where necessary to provide stability.



End View of
Type I Portable Barricade
(Optional)

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

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



End View of
Type II Portable Barricade
(Optional)

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

DETAILS OF CONSTRUCTION SIGNS

SIGN MARKINGS

Construction Signs "A" through and including "G" shall be made of 3/8" Plywood or other material after approval by the Department, and as per details above. Signs shall be reflectorized with reflective sheeting or other reflective materials of types approved by the Department.

CONSTRUCTION SIGN "A" - Wide Angle White background with painted Black lettering. Barricade stripes of 4" Wide Angle White placed over Black painted vertical strips spaced as shown above. This sign is the First advance warning sign and shall be placed 1500 feet ahead of barricade or beginning of project terminal and on both sides of the travelled way in all cases.

CONSTRUCTION SIGN "B" - The word "WARNING" and 1" underline shall be painted White on a 23" strip of Wide Angle Flat Top Red. Balance of lettering painted Black on a 22" strip of Wide Angle White. This sign is the Second advance warning sign and shall be placed 1000 feet ahead of barricade or beginning of project terminal and on both sides of the travelled way on divided highways and singly on two-lane highways.

CONSTRUCTION SIGN "C" - The word "WARNING" and 1" underline shall be painted White on a 23" strip of Wide Angle Flat Top Red. Balance of lettering painted Black on a 22" strip of Wide Angle White. This sign is the Third advance warning sign in cases where barricades are used and shall be placed 750 to 1000 feet ahead of barricade or beginning of project terminal and on both sides of the travelled way on divided highways and singly on two-lane highways.

REVERSE SIDES OF SIGNS "A", "B" and "C" - The word "SLOW" shall be painted Black and superimposed over a Yellow miniature W-36-A background panel. Balance of lettering shall be painted Black on a White background.

CONSTRUCTION SIGN "D" - The word "CAUTION" and 1½" underline shall be painted White on a 24½" strip of Wide Angle Flat Top Red. Balance of lettering painted Black on a 20½" strip of Wide Angle White. This sign will be provided with a detachable 1" material board mounted on back of sign with 2-¼"x2" bolts. This board shall be painted White with Black lettering. (Indicate to the nearest Mile). This sign shall be placed to mark the Beginning of the Project. To be placed singly and may be placed opposite barricade if desirable.

CONSTRUCTION SIGN "E" - The word "DANGER" and 1" underline shall be painted White on a 17½" strip of Wide Angle Flat Top Red. Balance of lettering painted Black on a 27½" strip of Wide Angle White. The sign is of the hinged and fold type to facilitate the closing down of sign when the need is not prevalent. This sign shall be placed 500 feet ahead of the situation on hand.

CONSTRUCTION SIGN "F" - The words "END CONSTRUCTION" and "CONTRACTORS NAME" shall be painted Black on strips 22" and 6½" respectively of Wide Angle White. Balance of lettering shall be painted White on a 16½" strip of Wide Angle Flat Top Red. This sign shall be placed to mark the Ending of the Project. To be placed singly and may be placed opposite barricade if desirable.

CONSTRUCTION SIGN "G" - The words "SLOW" and "PLEASE" shall be painted Black on a background of Wide Angle Yellow. This sign shall be used frequently within the limits of the Project.

All of the preceding signs shall be fastened to 2-4"x4" posts set 4 feet in the ground with a minimum of 3-1"x4" nailing strips on the back. Bottom of sign to be not less than 36" above ground.

FLAGMAN WARNING SIGN "H" - This sign shall be made of Plastic or other light-weight material, painted Red background with White lettering on the "STOP" side and painted Green background with White lettering on the "GO" side. Handle to be grooved on one side to indicate reading of sign to flagman. This sign will be used whenever flagmen are necessary. Sign to be reflectorized if used to stop traffic at night.

DETOUR WARNING SIGN "I" - To be of 3/8" (Minimum) plywood or No 16 (Minimum) gauge metal with Black painted letters on a Wide Angle Yellow background.

CONSTRUCTION SIGN "J" - ¾"x 9" metal slides to be placed between "NEXT" — MILES", spaced so as to accommodate appropriate size numerals. Required numerals to be furnished by the Department and to be installed by the Contractor. Numerals calculated to the nearest Mile.

All material shall be sound and durable. Barricades, signs, symbols and lettering conforming to styles noted hereon will be of good workmanship and well maintained. Uneven lettering will not be accepted.

Flares and Torches shall be of the oil burning type approved by the Department and shall be placed 3 feet to 5 feet ahead of the object to be illuminated. Particular care shall be taken to protect all signs and barricades from smoke and smudge arising from the use thereof.

Flashers used on Type I Barricade shall be of the Battery or Electrical Type. The illuminating element in a flashing amber beacon or signal shall be flashed continuously at a rate between 50 or 60 flashes per minute which will be clearly distinguishable to traffic. The duration in which Flashers will be left in operation will be governed by field conditions and subject to approval by the Engineer.

Alternate methods of processing signs or the substitution of pressure sensitive symbols or other reflecting elements for painted symbols will be permitted only after approval of such methods or materials by the Department.

The Department shall furnish and install the following as required outside the limits of the Project:

1.	"ROAD CONSTRUCTION AHEAD"	Minimum 4
2.	"WARNING BE PREPARED TO STOP"	Minimum 2
3.	"WARNING BARRICADE AHEAD"	As Required
4.	Standard Warning & Directional Signs	As Required

The Contractor shall furnish and install the following as required within the limits of the Project:

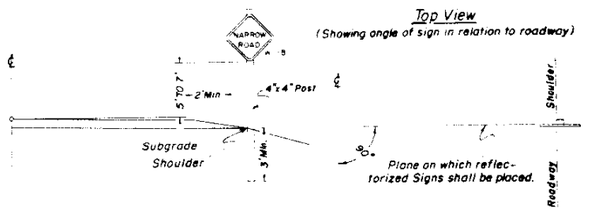
1.	All Barricades	As Required
2.	"CAUTION PROJECT BEGINS"	Minimum 2
3.	"DANGER MEN & EQUIPMENT WORKING IMMEDIATELY AHEAD"	As Required
4.	"END CONSTRUCTION WE THANK YOU FOR YOUR COOPERATION"	Minimum 2
5.	"SLOW PLEASE"	As Required
6.	Standard Warning & Directional Signs	As Required
7.	Approved Directional Arrows & Regulatory Signs for Barricades	As Required
8.	Torches and Flares as follows: Type I Barricade	Minimum 3
	Type II Barricade	Minimum 1
9.	Flashers - Type I Barricade	2 Required

Details of Reflectorized Arrows

MARKINGS - A Wide Angle White Reflectorized Arrow of Reflective Sheeting acceptable to the Department to be placed on a Black background. Letters to be 4" in height.

MARKINGS - A Black Arrow on a Wide Angle Yellow background of Reflective Sheeting acceptable to the Department.

Position of Signs Relative to Roadbed & Hazards



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

COLORADO
DEPARTMENT OF HIGHWAYS

Standard Roadway
Construction Traffic Signs

Designed by J.C.R.	Approved by J. Sullivan
Made by J.C.R.	Engineer, Surveys & Plans
Checked by	Date: July 22, 1955

STANDARD M-50-A

Use in conjunction with Standard M-50-AW

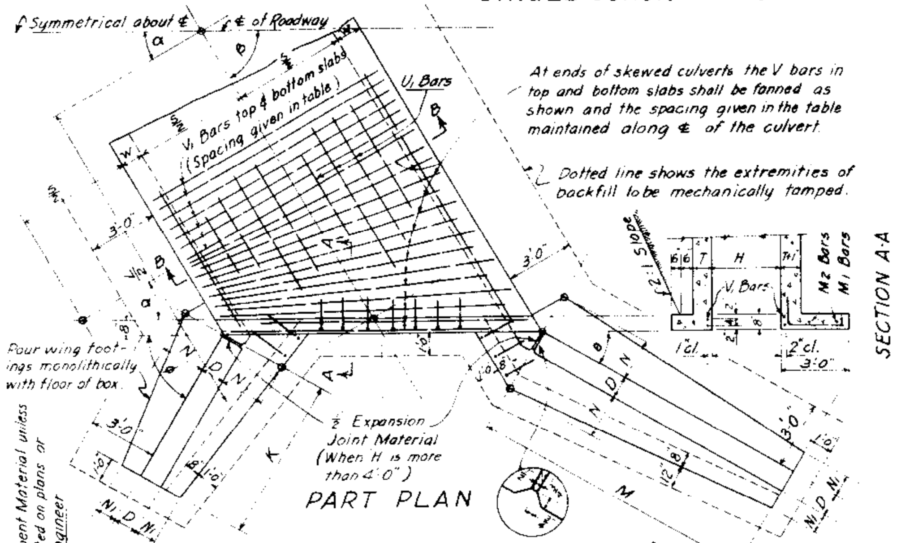
FED. ROAD DIV. NO.	DISTRICT	SHEET NO.	TOTAL SHEETS
9	[redacted]		
	COLO.	1042-2(5)	89

SINGLE CONCRETE BOX CULVERT

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

Height of Fill Allowed	Type	Span S	Height H	Slab T	Wall w	V1 Size	V1 Spa.	W1 Size	W1 Spa.	No. bars required U1	No. bars required M1	One Lin Ft of Box Concrete Cu Yds	One Lin Ft of Box Steel Lbs	Two Headwalls Concrete Cu Yds	Two Headwalls Steel Lbs
35'-0"	2A	2'0"	2'0"	6"	8"	3/4"ϕ	12"	1/2"ϕ	12"	8	8	0.232	17.5	1.30	81
30'0"	3A	3'0"	2'0"	7"	8"	7/8"ϕ	12"	1/2"ϕ	12"	10	8/Cos α	0.299	26.3	1.50	119
			3'0"							12		0.349	29.0	1.65	123
20'0"	4A	4'0"	2'0"	7½"	8"	7/8"ϕ	12"	1/2"ϕ	12"	12	10/Cos α	0.362	31.8	1.75	150
			3'0"							14		0.412	34.6	1.90	154
			4'0"							16		0.461	37.3	2.10	158
16'0"	5A	5'0"	3'0"	8"	8"	3/4"ϕ	8"	1/2"ϕ	8"	16	12/Cos α	0.481	45.3	2.20	153
			4'0"							18		0.530	48.7	2.40	157
			5'0"							20		0.579	52.0	2.60	161
20'0"	5B	5'0"	3'0"	8½"	8"	3/4"ϕ	8"	1/2"ϕ	8"	16	12/Cos α	0.500	45.5	2.20	153
			4'0"							18		0.549	48.8	2.40	157
			5'0"							20		0.598	52.2	2.60	161
14'0"	6A	6'0"	4'0"	8½"	8"	3/4"ϕ	8"	1/2"ϕ	8"	20	14/Cos α	0.605	54.7	2.65	180
			5'0"							22		0.654	58.1	2.85	184
			6'0"							24		0.704	61.4	3.00	188
			7'0"							26		0.753	64.9	3.30	192
20'0"	6B	6'0"	4'0"	10"	8"	7/8"ϕ	8"	5/8"ϕ	8"	20	14/Cos α	0.671	72.4	2.70	223
			5'0"							22		0.720	76.9	2.90	228
			6'0"							24		0.771	81.4	3.10	234
			7'0"							26		0.820	85.9	3.35	239
12'0"	7A	7'0"	4'0"	9"	9"	3/4"ϕ	7"	1/2"ϕ	7"	22	16/Cos α	0.720	68.2	3.05	208
			5'0"							24		0.776	71.9	3.25	212
			6'0"							26		0.832	75.5	3.40	216
			7'0"							28		0.887	79.2	3.70	220
15'0"	7B	7'0"	4'0"	10"	9"	7/8"ϕ	8"	5/8"ϕ	8"	22	16/Cos α	0.772	81.0	3.05	257
			5'0"							24		0.827	85.5	3.25	262
			6'0"							26		0.883	90.0	3.45	268
			7'0"							28		0.938	94.5	3.75	273
20'0"	7C	7'0"	4'0"	11"	9"	7/8"ϕ	7"	5/8"ϕ	7"	22	16/Cos α	0.826	91.1	3.10	257
			5'0"							24		0.881	96.0	3.30	263
			6'0"							26		0.937	101.0	3.50	268
			7'0"							28		0.992	106.0	3.75	274
10'0"	8A	8'0"	4'0"	9½"	10"	3/4"ϕ	7"	1/2"ϕ	7"	24	18/Cos α	0.844	75.8	3.40	235
			5'0"							26		0.905	79.5	3.60	239
			6'0"							28		0.966	83.2	3.80	243
			7'0"							30		1.027	86.8	4.10	247
			8'0"							32		1.089	90.5	4.40	251
16'0"	8B	8'0"	4'0"	11½"	10"	7/8"ϕ	7"	5/8"ϕ	7"	24	18/Cos α	0.963	100.9	3.50	292
			5'0"							26		1.025	105.9	3.70	297
			6'0"							28		1.086	110.8	3.90	303
			7'0"							30		1.148	115.8	4.20	308
			8'0"							32		1.210	120.8	4.45	314
20'0"	8C	8'0"	4'0"	12½"	10"	7/8"ϕ	6"	5/8"ϕ	6"	24	18/Cos α	1.023	115.8	3.55	292
			5'0"							26		1.084	121.4	3.75	298
			6'0"							28		1.146	126.9	3.95	304
			7'0"							30		1.208	132.5	4.25	309
			8'0"							32		1.270	138.1	4.50	315
7'0"	9A	9'0"	5'0"	10"	11"	7/8"ϕ	8"	5/8"ϕ	8"	28	20/Cos α	1.040	102.7	4.00	326
			6'0"							30		1.108	107.1	4.20	331
			7'0"							32		1.176	111.6	4.50	337
			8'0"							34		1.244	116.1	4.80	342
			9'0"							36		1.311	120.7	5.15	348
14'0"	9B	9'0"	5'0"	12"	11"	7/8"ϕ	6"	5/8"ϕ	6"	28	20/Cos α	1.174	131.9	4.10	327
			6'0"							30		1.242	137.5	4.30	333
			7'0"							32		[illegible]	143.[illegible]	4.60	338
			8'0"							34		1.378	148.6	4.90	344
			9'0"							36		1.445	154.2	5.25	349
20'0"	9C	9'0"	5'0"	14"	11"	1"ϕ	7"	3/4"ϕ	7"	28	20/Cos α	1.309	150.4	4.20	401
			6'0"							30		1.377	156.9	4.40	408
			7'0"							32		1.444	163.4	4.70	416
			8'0"							34		1.5[illegible]3	170.0	5.00	423
			9'0"							36		1.58[illegible]	176.6	5.35	430
5'0"	10A	10'0"	6'0"	10½"	12"	7/8"ϕ	8"	1/2"ϕ	8"	32	22/Cos α	1.260	107.7	4.60	355
			7'0"							34		1.334	111.0	4.90	358
			8'0"							36		1.408	114.4	5.20	363
			9'0"							38		1.483	117.8	5.60	367
			10'0"							40		1.558	121.1	5.95	371
10'0"	10B	10'0"	6'0"	12"	12"	7/8"ϕ	7"	5/8"ϕ	7"	32	22/Cos α	1.369	130.4	4.70	367
			7'0"							34		1.443	135.4	5.00	372
			8'0"							36		1.517	140.4	5.30	378
			9'0"							38		1.591	145.3	5.65	383
			10'0"							40		1.665	150.3	6.05	388
16'0"	10C	10'0"	6'0"	14"	12"	1"ϕ	8"	3/4"ϕ	8"	32	22/Cos α	1.518	150.7	4.80	449
			7'0"							34		1.593	156.6	5.10	456
			8'0"							36		1.666	162.5	5.40	464
			9'0"							38		1.741	168.4	5.80	471
			10'0"							40		1.815	174.3	6.15	478
5'0"	11A	11'0"	6'0"	11"	12"	7/8"ϕ	7"	1/2"ϕ	7"	34	24/Cos α	1.367	128.6	4.95	383
			7'0"							36		1.441	132.2	5.25	387
			8'0"							38		1.515	135.9	5.55	391
			9'0"							40		1.589	139.6	5.90	395
			10'0"							42		1.664	143.1	6.25	399
9'0"	11B	11'0"	6'0"	12½"	12"	1"ϕ	8"	5/8"ϕ	8"	34	24/Cos α	1.490	148.3	5.00	467
			7'0"							36		1.564	152.8	5.30	472
			8'0"							38		1.638	157.3	5.65	478
			9'0"							40		1.712	161.8	6.00	483
			10'0"							42		1.783	166.4	6.35	489
13'0"	11C	11'0"	6'0"	14"	12"	7/8"ϕ	6"	5/8"ϕ	6"	34	24/Cos α	1.608	159.5	5.10	396
			7'0"							36		1.682	165.1	5.40	401
			8'0"							38		1.756	170.7	5.70	407
			9'0"							40		1.830	176.2	6.10	412
			10'0"							42		1.904	181.8	6.45	418
5'0"	12A	12'0"	6'0"	12"	12"	7/8"ϕ	7"	1/2"ϕ	7"	36	26/Cos α	1.525	137.4	5.25	411
			7'0"							38		1.599	141.0	5.60	415
			8'0"							40		1.673	144.7	5.90	419
			9'0"							42		1.747	148.4	6.25	423
			10'0"							44		1.821	152.0	6.60	427
10'0"	12B	12'0"	6'0"	14"	12"	1"ϕ	7"	5/8"ϕ	7"	36	26/Cos α	1.697	177.7	5.40	502
			7'0"							38		1.772	182.7	5.70	508
			8'0"							40		1.846	187.7	6.00	513
			9'0"							42		1.920	192.6	6.40	519
			10'0"							44		1.994	197.6	6.70	524
4'0"	13A	13'0"	6'0"	12½"	12"	7/8"ϕ	7"	1/2"ϕ	7"	38	28/Cos α	1.645	146.0	5.60	442
			7'0"							40		1.720	149.7	5.90	446
			8'0"							42		1.794	153.3	6.20	450
			9'0"							44		1.868	157.0	6.55	454
			10'0"							46		1.942	160.7	6.95	458
8'0"	13B	13'0"	6'0"	14"	12"	1"ϕ	7"	5/8"ϕ	7"	38	28/Cos α	1.787	188.4	5.70	538
			7'0"							40		1.861	193.3	6.00	543
			8'0"							42		1.935	198.3	6.30	549
			9'0"							44		2.009	203.3	6.65	555
			10'0"							46		2.083	208.2	7.05	560
4'0"	14A	14'0"	6'0"	13½"	12"	1"ϕ	8"	5/8"ϕ	8"	40	30/Cos α	1.827	177.2	5.95	571
			7'0"							42		1.901	181.7	6.25	577
			8'0"							44		1.975	186.2	6.55	582
			9'0"							46		2.049	190.7	6.95	588
			10'0"							48		2.123	195.2	7.30	593
8'0"	14B	14'0"	6'0"	15"	12"	1"ϕ	7"	5/8"ϕ	7"	40	30/Cos α	1.975	199.5	6.05	572
			7'0"							42		2.049	204.5	6.40	578
			8'0"							44		2.123	209.4	6.70	583
			9'0"							46		2.198	214.4	7.05	589
			10'0"							48		2.270	219.4	7.40	595

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



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

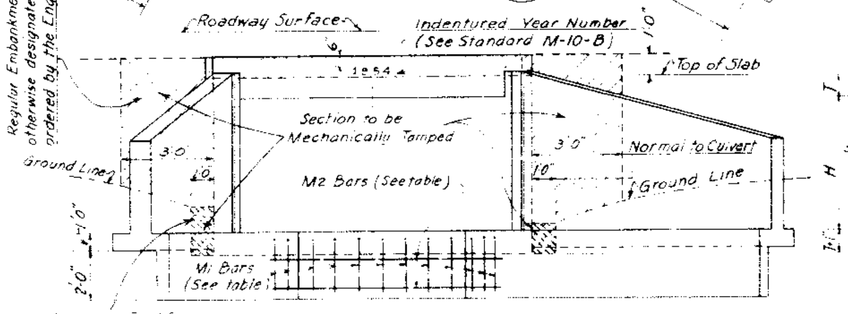
Mark	Size	No. Req'd.	Type	Length
V1	See table	10 + 24L/Spa.	I	S+2w-6"
W1	See table	6 + 24L/Spa.	I	H+2T-5"
U1	1/2"ϕ	See table	I	L+1'0"
M1	1/2"ϕ	See table	II	3'6"
M2	1/2"ϕ	4	I	(S+2w-6")/Cos α

Straight — Type I; Type II (2'6", 1'0")

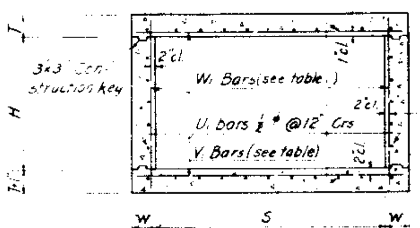
(Bar dimensions are out to out of bar)

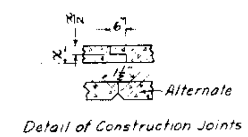
Possible Combinations (Span & Height)

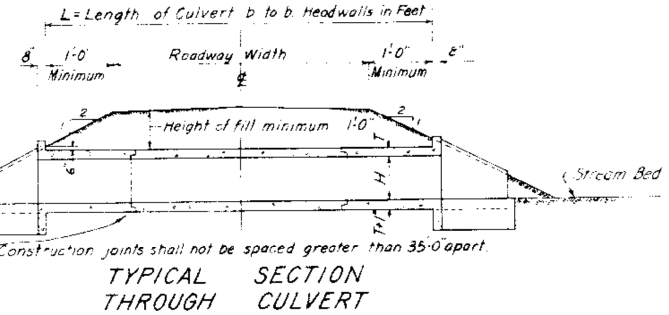
2×2	5×5	9×5	10×7	11×8	11×10
3×2	7×4	8×6	9×8	10×9	14×8
4×2	6×5	7×7	12×6	13×7	13×9
3×3	8×4	9×6	11×7	12×8	12×10
4×3	7×5	8×7	13×6	14×7	14×9
5×3	6×6	10×6	10×8	11×9	13×10
4×4	8×5	9×7	9×9	10×10	14×10
5×4	6×7	8×8	12×7	13×8	
6×4	7×6	11×6	14×6	12×9	



Bar dimensions are to ℄ of bar unless marked cl' (clear).







Note: K, M, N, N1 and D are dimensioned on Standard M-50-AW for the various heights of culverts.

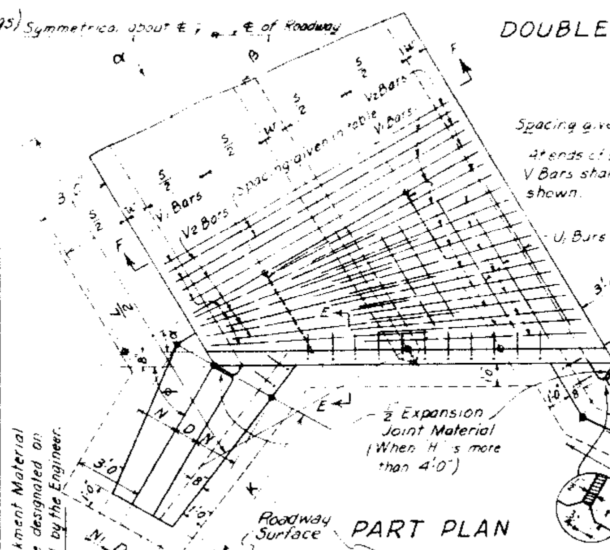
DOUBLE CONCRETE BOX CULVERT

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

Height of Fill allowed	Type	Span S	Height H	Slab T	Wall w	V1	V2	W1 Size	W1 Spac.	No. Bars Required U1	No. Bars Required M1	One Lin Ft of Box Concrete Cu Yds	One Lin Ft of Box Steel Lbs	Two Headwalls Concrete Cu Yds	Two Headwalls Steel Lbs
10'0"	6-6-A	6'0"	3'0"	8½"	8"	1/2"ϕ	5/8"ϕ, 5½" Spa.	1/2"ϕ	12	48	32/Cos α	1.000	112.3	3.85	327
			4'0"						12	52		1.073	117.7	4.60	335
			5'0"						12	56		1.148	123.1	4.85	343
			6'0"						12	60		1.222	128.5	5.05	351
15'0"	6-6-B	6'0"	3'0"	9½"	8"	1/2"ϕ	5/8"ϕ, 5" Spa.	1/2"ϕ	12	48	32/Cos α	1.087	120.3	4.45	329
			4'0"						12	52		1.161	125.7	4.65	337
			5'0"						12	56		1.235	131.[illegible]	4.90	346
			6'0"						8	60		1.309	141.4	5.10	353
20'0"	6-6-C	6'0"	3'0"	10½"	8"	1/2"ϕ	5/8"ϕ, 4½" Spa.	1/2"ϕ	12	48	32/Cos α	1.173	130.0	4.50	331
			4'0"						12	52		1.247	135.4	4.75	339
			5'0"						10	56		1.321	142.5	4.95	347
			6'0"						7	60		1.395	152.4	5.15	355
10'0"	8-8-A	8'0"	3'0"	10"	10"	5/8"ϕ	3/4"ϕ, 6" Spa.	1/2"ϕ	12	60	40/Cos α	1.477	174.4	5.80	506
			4'0"						12	64		1.569	179.8	6.05	514
			5'0"						12	68		1.662	185.2	6.30	522
			6'0"						12	72		1.755	190.6	6.55	531
15'0"	8-8-B	8'0"	3'0"	11"	10"	5/8"ϕ	3/4"ϕ, 5½" Spa.	1/2"ϕ	12	60	40/Cos α	1.592	188.6	5.90	508
			4'0"						12	64		1.684	192.0	6.15	516
			5'0"						12	68		1.777	197.4	6.40	524
			6'0"						8	72		1.869	207.9	6.65	533
20'0"	8-8-C	8'0"	3'0"	12½"	10"	5/8"ϕ	3/4"ϕ, 5" Spa.	1/2"ϕ	12	60	40/Cos α	1.763	202.0	6.00	513
			4'0"						12	64		1.856	207.4	6.30	521
			5'0"						10	68		1.948	214.6	6.55	529
			6'0"						7	72		2.041	225.7	6.75	537
5'0"	10-10-A	10'0"	4'0"	10"	12"	5/8"ϕ	7/8"ϕ, 7" Spa.	5/8"ϕ	15	78	48/Cos α	1.935	228.3	7.40	714
			6'0"						15	86		2.157	239.8	7.95	733
			8'0"						12	94		2.380	255.2	8.70	752
			10'0"						9	102		2.602	275.5	9.55	771
10'0"	10-10-B	10'0"	4'0"	12"	12"	5/8"ϕ	7/8"ϕ, 7" Spa.	5/8"ϕ	15	78	48/Cos α	2.220	231.0	7.65	721
			6'0"						15	86		2.442	242.5	8.20	740
			8'0"						12	94		2.664	258.0	8.90	759
			10'0"						8	102		2.886	282.6	9.75	778
15'0"	10-10-C	10'0"	4'0"	14"	12"	5/8"ϕ	7/8"ϕ, 6" Spa.	5/8"ϕ	15	78	48/Cos α	2.503	260.8	7.85	727
			6'0"						12	86		2.725	275.6	8.40	746
			8'0"						9	94		2.947	295.0	9.15	765
			10'0"						6	102		3.170	325.5	10.00	784
5'0"	12-12-A	12'0"	6'0"	12"	12"	5/8"ϕ	7/8"ϕ, 7" Spa.	5/8"ϕ	15	98	56/Cos α	2.751	278.9	9.35	857
			8'0"						12	106		2.973	294.5	10.05	876
			10'0"						9	114		3.195	315.0	10.90	895
10'0"	12-12-B	12'0"	6'0"	14"	12"	5/8"ϕ	7/8"ϕ, 6" Spa.	5/8"ϕ	15	98	56/Cos α	3.083	313.5	9.60	864
			8'0"						12	106		3.305	329.2	10.30	883
			10'0"						8	114		3.528	354.1	11.15	902
15'0"	12-12-C	12'0"	6'0"	16"	12"	5/8"ϕ	7/8"ϕ, 5" Spa.	5/8"ϕ	12	98	56/Cos α	3.416	365.1	9.85	870
			8'0"						9	106		3.638	384.7	10.55	889
			10'0"						6	114		3.860	415.7	11.40	908
5'0"	14-14-A	14'0"	6'0"	15"	12"	5/8"ϕ	7/8"ϕ, 6" Spa.	5/8"ϕ	15	110	64/Cos α	3.633	356.2	10.95	984
			8'0"						12	118		3.855	372.0	11.60	1003
			10'0"						9	126		4.077	392.9	12.60	1023
10'0"	14-14-B	14'0"	6'0"	16"	12"	5/8"ϕ	7/8"ϕ, 5" Spa.	5/8"ϕ	15	110	64/Cos α	3.824	409.4	11.05	988
			8'0"						12	118		4.046	425.2	11.75	1007
			10'0"						8	126		4.269	450.5	12.65	1026

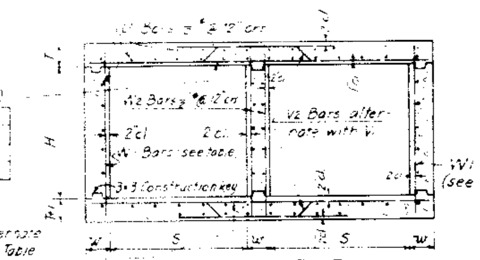
Quantities for one culvert shall be (quantity for one lin. ft. of box times L) plus (quantity for two head walls) plus (quantities for four wings).

Note: This design not to be used when height of fill exceeds the allowed amount tabulated.



Possible Combinations (Span & Height)

6×3	8×3	10×4	12×6	14×6
6×4	8×4	10×6	12×8	14×8
6×5	8×5	10×8	12×10	14×10
6×6	8×6	10×10		



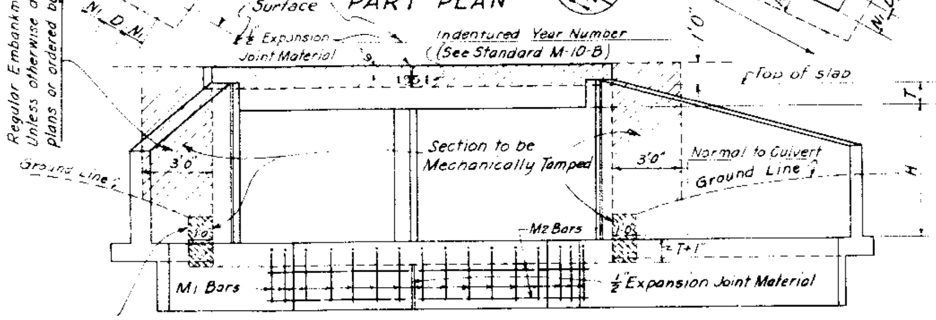
Bar List for Culvert and Two Headwalls (See Standard M-50-AW for Wings)

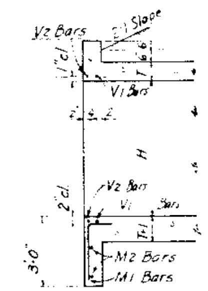
Mark	Size	Number Required	Type	ℓ	Total Length
V1	See Table	24(L+2)/Spacing	I	S+1.5w+4"	ℓ
V2			II	0.75S+4"	2ℓ+m
W1			I	H+2T-4"	ℓ
W2	1/2"ϕ	2(L+2)	I	H+2T-4"	ℓ
U1	1/2"ϕ	See Table	I	L+12"	ℓ
M1	1/2"ϕ	See Table	III		3'6"
M2	1/2"ϕ	8	I	(S+1.5w)/Cos α	ℓ

Type I; Type II (n = T-3", m = 1.41n); Type III (2'6", 1'0")

(Bar dimensions are out to out of bar.)

For General Notes, Loading and Design Data, see Standard M-50-AW.





COLORADO DEPARTMENT OF HIGHWAYS

STANDARD SINGLE AND DOUBLE CONCRETE BOX CULVERTS

(FOR SIZES SEE TABLE OF POSSIBLE COMBINATIONS)

Designed by: WWD	Approved by: [signature]
Made by: WWD	Bridge Engineer
Checked by: TJM	Date: Aug. 30, 1954

STANDARD M-50-AW

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

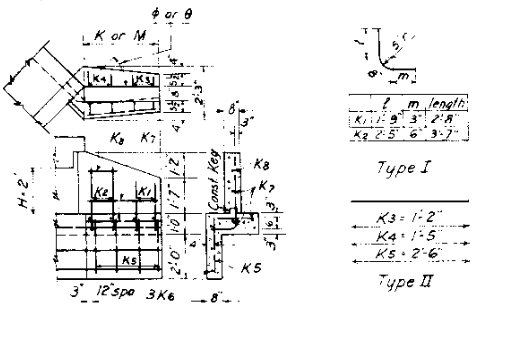
FED. ROAD DIV. NO.	DISTRICT		SHEET NO.	TOTAL SHEETS
9	COLO	[redacted] 7092 215	90	

Rev. 5-2-56, Deleted Finish Note, J.C.R.

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

β	α	φ	θ	H=2'-0" K	H=2'-0" M	H=3'-0" K	H=3'-0" M	H=4'-0" K	H=4'-0" M	H=5'-0" K	H=5'-0" M	H=6'-0" K	H=6'-0" M	H=7'-0" K	H=7'-0" M	H=8'-0" K	H=8'-0" M	H=9'-0" K	H=9'-0" M	H=10'-0" K	H=10'-0" M
45°	45°	67°30'	22°30'	2'-4"	6'-2"	3'-7"	8'-7"	4'-10"	11'-7"	5'-11"	14'-2"	6'-10"	16'-5"	7'-9"	18'-8"	8'-8"	20'-10"	9'-8"	23'-2"	10'-7"	25'-5"
60°	30°	60°	30°	2'-9"	4'-9"	3'-10"	6'-7"	5'-2"	8'-10"	6'-3"	10'-10"	7'-3"	12'-7"	8'-3"	14'-5"	9'-3"	16'-0"	10'-3"	17'-9"	11'-3"	19'-6"
75°	15°	52°30'	37°30'	3'-0"	3'-[illegible]	4'-2"	5'-5"	5'-7"	7'-3"	6'-10"	8'-11"	7'-11"	10'-4"	9'-0"	11'-9"	10'-1"	13'-2"	11'-2"	14'-7"	12'-3"	16'-0"
90°	0°	45°	45°	3'-4"	3'-4"	4'-8"	4'-8"	6'-3"	6'-3"	7'-8"	7'-8"	8'-11"	8'-11"	10'-2"	10'-2"	11'-4"	11'-4"	12'-7"	12'-7"	13'-9"	13'-9"
105°	15°	37°30'	52°30'	3'-11"	3'-0"	5'-5"	4'-2"	7'-3"	5'-7"	8'-11"	6'-10"	10'-4"	7'-11"	11'-9"	9'-0"	13'-2"	10'-1"	14'-7"	11'-2"	16'-0"	12'-3"
120°	30°	30°	60°	4'-9"	2'-9"	6'-7"	3'-10"	8'-10"	5'-2"	10'-10"	6'-3"	12'-7"	7'-3"	14'-5"	8'-3"	16'-0"	9'-3"	17'-9"	10'-3"	19'-6"	11'-3"
135°	45°	22°30'	67°30'	6'-2"	2'-4"	8'-7"	3'-7"	11'-7"	4'-10"	14'-2"	5'-11"	16'-5"	6'-10"	18'-8"	7'-9"	20'-10"	8'-8"	23'-2"	9'-8"	25'-5"	10'-7"

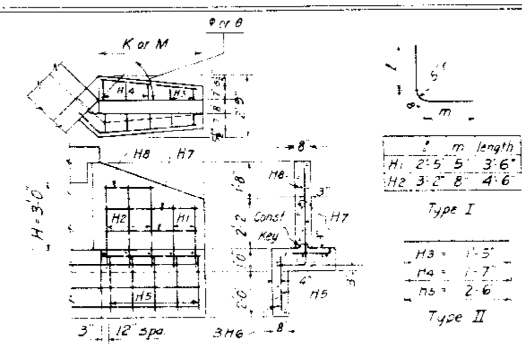
β EQUALS THE ANGLE BETWEEN ℄ OF CULVERT AND ℄ OF ROADWAY. α EQUALS THE ANGLE BETWEEN ℄ OF CULVERT AND A NORMAL TO ℄ OF ROADWAY.
φ AND θ ARE ANGLES BETWEEN THE WINGWALL AND A LINE PARALLEL WITH THE CENTER LINE OF ROADWAY.
EXAMPLE FOR USING THE ABOVE TABLE: SUPPOSE A STREAM MAKES AN ANGLE OF β = 65° WITH THE CENTER LINE OF ROADWAY, THEN, FROM THE TABLE, SELECT THE NEAREST ANGLE β = 60°, THEN α, φ AND θ EQUAL 30°, 60° AND 30° RESPECTIVELY. IF THE DESIRED HEIGHT "H" OF CULVERT IS 8'-0", THEN K AND M WILL BE 9'-3" AND 16'-0". LOCATE THE WING DETAIL WHEN H = 8'-0" ON THIS SHEET.



BAR LIST & QUANTITIES FOR ONE WING WHEN H = 2'-0"

When φ or θ equals	K1 ½"φ Type I	K2 ½"φ Type I	K3 ½"φ Type II	K4 ½"φ Type II	K5 ½"φ Type II	3-K6 ½"φ Type II	3-K7 ½"φ Type II	1-K8 ½"φ Type II	Concrete Cu Yds	Steel Lbs
	Number of bars required					Length of Bars			Quantities for One Wing	
22°30'	4	3	4	3	8	8'-3"	5'-10"	2'-2"	1.07	64
30°	3	2	3	2	6	6'-2"	4'-5"	1'-2"	0.82	47
37°30'	2	2	2	2	6	5'-0"	3'-7"	1'-2"	0.68	40
45°	2	2	2	2	5	4'-4"	3'-0"	1'-2"	0.57	36
52°30'	2	2	2	2	4	4'-0"	2'-8"	1'-2"	0.52	33
60°	2	1	2	1	4	3'-6"	2'-5"	1'-0"	0.48	28
67°30'	2	1	[illegible]	1	4	3'-0"	2'-0"	1'-0"	0.40	26

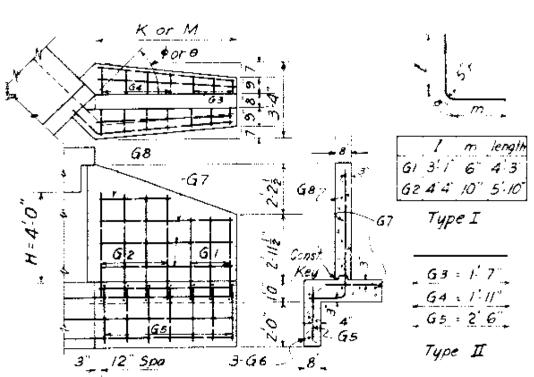
WING DETAIL WHEN H = 2'-0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H = 3'-0"

When φ or θ equals	H1 ½"φ Type I	H2 ½"φ Type I	H3 ½"φ Type II	H4 ½"φ Type II	H5 ½"φ Type II	3-H6 ½"φ Type II	4-H7 ½"φ Type II	1-H8 ½"φ Type II	Concrete Cu Yds	Steel lbs
	Number of Bars Required					Length of Bars			Quantities for One Wing	
22°30'	4	5	4	5	11	[illegible]	[illegible]	4'-2"	1.78	99
30°	3	4	3	4	8	8'-4"	6'-3"	3'-2"	1.36	76
37°30'	3	3	3	3	[illegible]	6'-6"	5'-1"	2'-2"	1.12	63
45°	2	3	2	3	6	5'-10"	4'-4"	2'-2"	0.97	54
52°30'	2	3	2	3	6	5'-4"	3'-10"	2'-2"	0.86	52
60°	2	2	2	2	5	4'-10"	3'-6"	[illegible]-2"	0.79	44
67°30'	2	2	2	2	5	4'-8"	3'-3"	[illegible]-2"	0.74	43

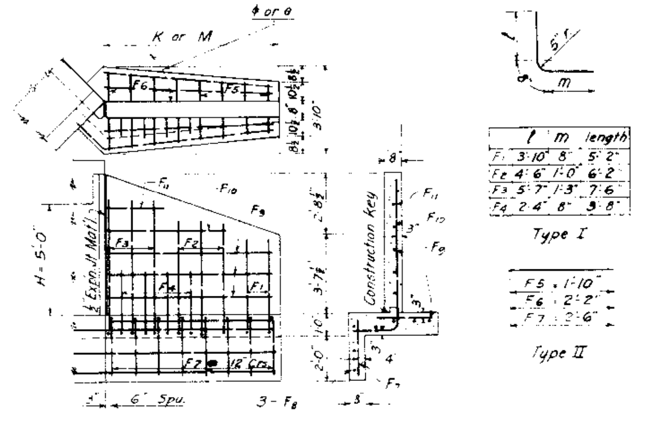
WING DETAIL WHEN H = 3'-0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H = 4'-0"

When φ or θ equals	G1 ½"φ Type I	G2 ½"φ Type I	G3 ½"φ Type II	G4 ½"φ Type II	G5 ½"φ Type II	3-G6 ½"φ Type II	7-G7 ½"φ Type II	1-G8 ½"φ Type II	Concrete Cu Yds	Steel Lbs
	Number of Bars Required					Length of Bars			Quantities for One Wing	
22°30'	6	6	6	6	14	14'-3"	11'-3"	5'-2"	2.89	164
30°	4	5	4	5	11	10'-9"	8'-6"	4'-2"	2.21	125
37°30'	3	4	3	4	9	8'-9"	6'-11"	3'-2"	1.81	101
45°	3	4	3	4	8	7'-8"	5'-11"	3'-2"	1.56	92
52°30'	3	3	3	3	7	6'-9"	5'-3"	2'-2"	1.40	79
60°	3	3	3	3	7	6'-4"	4'-10"	2'-2"	1.29	77
67°30'	2	3	2	3	6	6'-0"	4'-6"	2'-2"	1.21	69

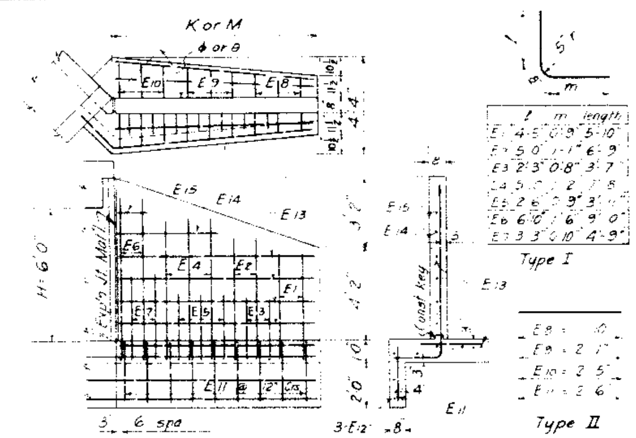
WING DETAIL WHEN H = 4'-0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H = 5'-0"

When φ or θ equals	F1 ½"φ Type I	F2 ½"φ Type I	F3 ½"φ Type I	F4 ½"φ Type I	F5 ½"φ Type II	F6 ½"φ Type II	F7 ½"φ Type II	3-F8 ½"φ Type II	7-F9 ½"φ Type II	1-F10 ½"φ Type II	1-F11 ½"φ Type II	Concrete Cu Yds	Steel Lbs
	Number of bars required							Length of Bars				Quantities One Wing	
22°30'	5	5	5	6	7	8	17	17'-3"	13'-10"	9'-2"	4'-2"	4.06	237
30°	3	4	4	5	5	6	13	13'-3"	10'-6"	7'-2"	3'-2"	3.10	180
37°30'	3	3	3	4	4	5	11	11'-0"	8'-7"	5'-2"	2'-2"	2.55	147
45°	2	3	3	4	4	4	9	9'-6"	7'-4"	5'-2"	2'-2"	2.20	130
52°30'	2	2	3	3	3	4	8	8'-6"	6'-6"	4'-2"	2'-2"	1.96	113
60°	2	[illegible]	3	3	3	4	8	7'-9"	5'-11"	4'-2"	2'-2"	1.79	109
67°30'	2	2	2	3	3	3	7	7'-3"	5'-7"	3'-2"	1'-2"	1.69	97

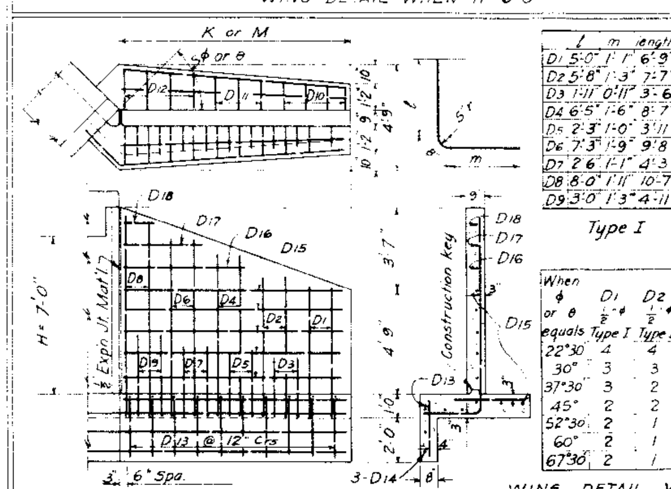
WING DETAIL WHEN H = 5'-0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H = 6'-0"

When φ or θ equals	E1 ½"φ Type I	E2 ½"φ Type I	E3 ½"φ Type I	E4 ½"φ Type I	E5 ½"φ Type I	E6 ½"φ Type I	E7 ⅝"φ Type I	E8 ½"φ Type II	E9 ½"φ Type II	E10 ½"φ Type II	E11 ½"φ Type II	3-E12 ½"φ Type II	3-E13 ½"φ Type II	1-E14 ½"φ Type II	1-E15 ½"φ Type II	Concrete Cu Yds	Steel Lbs
	Number of Bars Required											Length of Bars				Quantities for One Wing	
22°30'	4	4	4	5	4	4	4	5	6	6	20	19'-9"	16'-1"	8'-2"	3'-2"	5.21	317
30°	3	3	3	4	4	3	3	5	4	4	15	15'-0"	12'-3"	6'-2"	2'-2"	3.99	243
37°30'	2	3	3	3	3	3	2	3	4	4	13	12'-6"	10'-0"	5'-2"	2'-2"	3.28	203
45°	2	2	2	3	3	2	2	3	3	3	11	10'-9"	8'-7"	4'-2"	1'-2"	2.83	171
52°30'	1	2	2	3	3	2	2	2	3	3	10	9'-8"	7'-7"	4'-2"	1'-2"	2.51	156
60°	2	2	2	2	2	2	2	2	3	3	9	8'-9"	6'-11"	3'-2"	1'-2"	2.30	145
67°30'	1	2	2	2	2	2	2	2	3	2	8	8'-3"	6'-6"	3'-2"	1'-2"	2.17	134

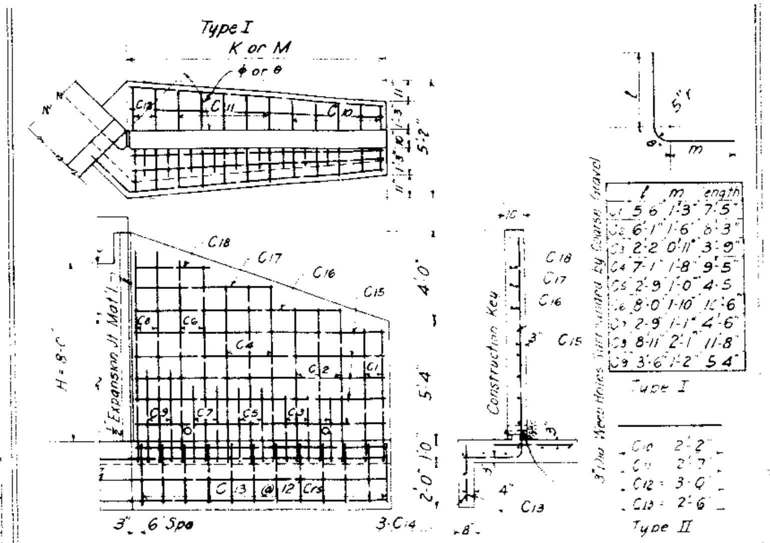
WING DETAIL WHEN H = 6'-0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H = 7'-0"

When φ or θ equals	D1 ½"φ Type I	D2 ½"φ Type I	D3 ½"φ Type I	D4 ½"φ Type I	D5 ½"φ Type I	D6 ⅝"φ Type I	D7 ⅝"φ Type I	D8 ⅝"φ Type I	D9 ⅝"φ Type I	D10 ½"φ Type II	D11 ½"φ Type II	D12 ½"φ Type II	D13 ½"φ Type II	3-D14 ½"φ Type II	10-D15 ½"φ Type II	1-D16 ½"φ Type II	1-D17 ½"φ Type II	1-D18 ½"φ Type II	Concrete Cu Yds	Steel Lbs
	Number of Bars Required													Length of Bars					Quantities for One Wing	
22°30'	4	4	5	4	4	4	3	3	3	6	6	7	22	22'-3"	18'-4"	10'-2"	6'-2"	2'-2"	7.01	436
30°	3	3	4	4	3	3	3	2	2	5	5	5	18	17'-6"	14'-1"	8'-2"	4'-2"	1'-2"	5.42	339
37°30'	3	2	2	3	3	2	2	2	2	4	4	4	14	14'-0"	11'-5"	6'-2"	3'-2"	1'-2"	4.41	267
45°	2	2	2	2	2	2	2	2	2	4	3	4	12	12'-3"	9'-10"	5'-2"	3'-2"	1'-2"	3.82	238
52°30'	2	1	2	2	2	2	2	2	1	3	3	3	11	10'-9"	8'-8"	5'-2"	3'-2"	1'-2"	3.38	212
60°	2	1	2	2	2	2	2	1	1	3	3	3	10	10'-0"	7'-11"	4'-2"	2'-2"	1'-2"	3.10	191
67°30'	2	1	2	2	2	2	2	1	1	2	3	3	9	9'-6"	7'-5"	4'-2"	2'-2"	1'-2"	2.91	184

WING DETAIL WHEN H = 7'-0"



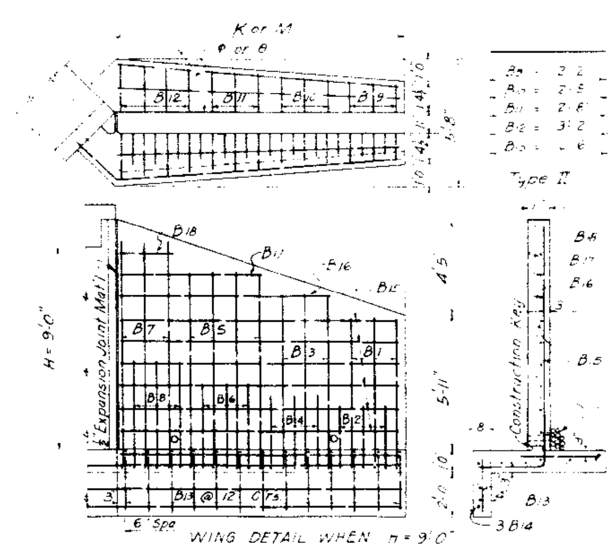
BAR LIST & QUANTITIES FOR ONE WING WHEN H = 8'-0"

When φ or θ equals	C1 ½"φ Type I	C2 ½"φ Type I	C3 ½"φ Type I	C4 ½"φ Type I	C5 ½"φ Type I	C6 ⅝"φ Type I	C7 ⅝"φ Type I	C8 ⅝"φ Type I	C9 ⅝"φ Type I	C10 ½"φ Type II	C11 ½"φ Type II	C12 ⅝"φ Type II	C13 ½"φ Type II	3-C14 ½"φ Type II	10-C15 ½"φ Type II	1-C16 ½"φ Type II	1-C17 ½"φ Type II	1-C18 ½"φ Type II	Concrete Cu Yds	Steel Lbs
	Number of bars required													Length of Bars					Quantities for One Wing	
22°30'	4	4	5	5	4	4	4	4	4	9	9	3	25	24'-3"	20'-6"	[illegible]	[illegible]	7'-2"	9.00	526
30°	3	3	4	4	3	3	3	3	3	7	6	3	19	19'-0"	15'-5"	[illegible]	[illegible]	5'-2"	6.91	402
37°30'	2	3	3	3	3	3	3	2	2	6	5	2	16	16'-[illegible]	12'-[illegible]	[illegible]	7'-2"	4'-2"	5.69	330
45°	2	3	3	3	2	[illegible]	2	2	2	5	5	[illegible]	14	13'-8"	[illegible]	9'-2"	[illegible]	3'-2"	4.89	287
52°30'	2	2	3	2	2	[illegible]	2	2	2	4	4	2	13	12'-[illegible]	[illegible]	[illegible]	[illegible]	3'-2"	4.35	257
60°	1	2	3	2	2	2	2	2	2	4	4	2	12	11'-0"	[illegible]	7'-2"	5'-2"	3'-2"	3.99	242
67°30'	[illegible]	2	2	2	2	2	2	2	2	4	3	2	[illegible]	10'-3"	8'-4"	6'-9"	4'-6"	2'-4"	3.74	228

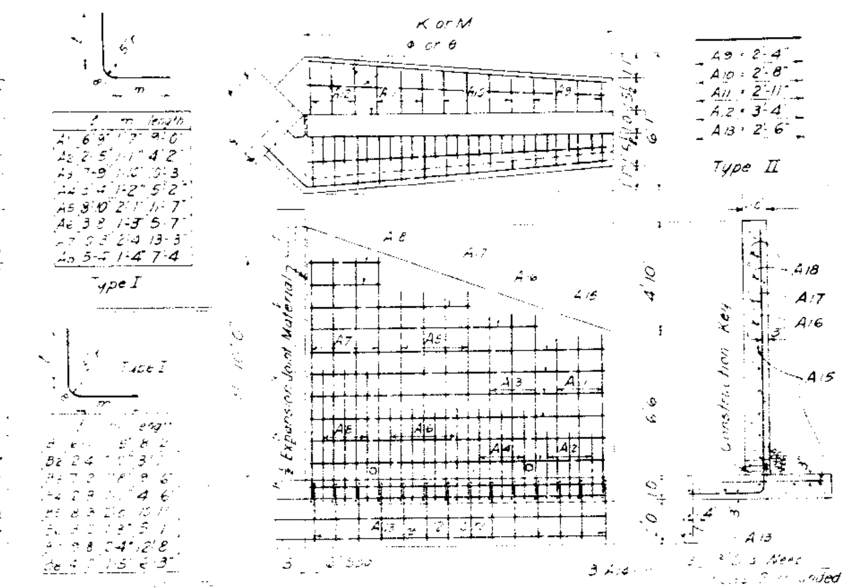
WING DETAIL WHEN H = 8'-0"

BAR LIST & QUANTITIES FOR ONE WING WHEN H = 9'-0"

When φ or θ equals	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	3-B14	1-B15	1-B16	1-B17	1-B18	Concrete Cu Yds	Steel Lbs
	Number of Bars Required													Length of Bars					Quantities for One Wing	
22°30'	5	6	6	6	7	6	5	5	5	5	6	7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	666
30°	4	4	5	4	5	6	4	3	3	4	5	6	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.84	510
37°30'	3	3	4	4	5	4	3	3	3	3	4	5	17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.27	427
45°	3	3	3	3	4	3	3	3	3	3	4	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.28	370
52°30'	3	3	2	3	3	3	3	3	3	3	3	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.57	322
60°	3	3	2	3	3	2	2	3	3	3	3	3	12'-3"	[illegible]	6'-2"	4'-2"	[illegible]	[illegible]	5.11	294
67°30'	3	2	2	3	3	2	2	2	2	3	3	[illegible]	[illegible]	[illegible]	[illegible]	4'-2"	[illegible]	[illegible]	4.82	274



WING DETAIL WHEN H = 9'-0"



BAR LIST & QUANTITIES FOR ONE WING WHEN H = 10'-0"

When φ or θ equals	A1 Type I	A2 Type I	A3 Type I	A4 Type I	A5 ⅝" Type I	A6 ⅝" Type I	A7 ⅝" Type I	A8 ⅞" Type I	A9 ½" Type II	A10 Type II	A11 ⅝" Type II	A12 ⅝" Type II	A13 Type II	3-A14 ½" Type II	A15 Type II	A16 Type II	1-A17 Type II	2-A18 Type II	Concrete Cu Yds	Steel Lbs
	Number of Bars Required													Length of Bars					Quantities for One Wing	
22°30'	[illegible]	[illegible]	5	5	6	[illegible]	7	6	6	[illegible]	5	6	[illegible]	30'-0"	[illegible]	[illegible]	[illegible]	[illegible]	14.35	830
30°	5	4	4	4	5	6	6	5	6	6	4	4	23	23'-0"	19'-[illegible]	14'-2"	10'-2"	5'-2"	11.01	636
37°30'	3	4	4	3	4	5	5	4	4	4	4	4	19	19'-[illegible]	15'-8"	12'-2"	8'-2"	4'-2"	9.13	523
45°	3	3	3	3	4	4	4	3	4	4	3	3	[illegible]	16'-3"	13'-5"	10'-2"	7'-2"	3'-2"	7.76	440
52°30'	3	3	2	3	3	3	4	3	4	3	3	3	14	14'-9"	11'-11"	8'-2"	6'-2"	3'-2"	6.92	394
60°	2	2	3	3	3	3	3	3	3	3	3	3	13	13'-6"	10'-11"	8'-2"	5'-2"	2'-2"	6.35	363
67°30'	2	[illegible]	3	2	3	3	3	3	3	3	3	2	12	[illegible]-10"	10'-3"	8'-2"	5'-2"	2'-2"	5.97	348

WING DETAIL WHEN H = 10'-0"

GENERAL NOTES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS APPLICABLE TO THE PROJECT.
ALL CONCRETE SHALL BE CLASS "A" AND AIR ENTRAINED AS SPECIFIED.

WALLS, FOOTINGS AND FLOOR OF BOX SHALL BE POURED MONOLITHICALLY.
FORMS FOR CONCRETE SURFACES EXPOSED IN THE FINISHED WORK SHALL BE CONSTRUCTED OF SHIPLAP OR TONGUE AND GROOVE LUMBER S4S UNLESS FACED WITH PANEL BOARD.
FOOTINGS IN ROCK SHALL BE POURED OUT TO ROCK AND NOT FORMED.
SOUNDINGS AND DEPTH OF FOOTING SHOWN ARE IN ACCORDANCE WITH THE AVAILABLE DATA AND WHEN DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL [illegible] AND DETERMINE IF REDESIGN IS NECESSARY.
ALL REINFORCING STEEL SHALL CONFORM TO ASTM SPECIFICATION A 305 [illegible] OR THE LATEST REVISION THEREOF AND SHALL BE INTERMEDIATE GRADE STEEL OF A DEFORMED TYPE. EACH BAR SHALL BE TAGGED WITH THE NUMBER DESIGNATION AND THE STATION NUMBER OF THE [illegible]. PRIMARY BARS SHALL NOT BE SPLICED AND SECONDARY BARS WHEN SPLICED SHALL LAP [illegible] DIAMETERS OF THE BAR. DIMENSIONS FOR REINFORCING STEEL NOT SHOWN AS CLEAR SHALL BE TO THE CENTER LINE OF THE BAR. OUT TO OUT DIMENSIONS SHALL BE USED ON BAR BENDING DETAILS.
SUPPORTING SOILS FOR ALL CULVERTS MUST BE COMPOSED OF FIRM AND UNIFORM MATERIAL THROUGHOUT.
HORIZONTAL CONSTRUCTION KEYS ARE NOT REQUIRED WHEN FOOTINGS AND WALLS ARE POURED MONOLITHICALLY.
ALL CONSTRUCTION KEYS SHOWN BETWEEN FOOTINGS AND WALLS ARE 3" X 3".

WHEN EXCAVATING FOR FOOTINGS THE FINAL ONE FOOT IN DEPTH SHALL BE DONE BY HAND LABOR METHODS.

ALL BACKFILLING IN APPROACHES TO AND OVER CULVERTS SHALL BE LAID IN LAYERS NOT EXCEEDING SIX (6) INCHES IN DEPTH. EACH LAYER SHALL BE COMPACTED IN ACCORDANCE WITH THE ILLUSTRATION OF MECHANICAL TAMPING BACKFILL SHOWN ON STANDARD M-50-A. THE CONTRACTORS ATTENTION IS CALLED TO SPECIFICATIONS COVERING MECHANICAL TAMPING. SPECIAL CARE SHALL BE TAKEN TO PREVENT DEFLECTION OF WING WALLS BY WEDGING ACTION.

STEEL WEIGHTS INCLUDE 1% ± FOR OVERRUN.
EXPANSION JOINT MATERIAL IS TO BE INCLUDED IN THE PRICE OF CLASS "A" CONCRETE AND SHALL CONFORM TO AASHO SPECIFICATION M-153-52 TYPE III.
FOR CULVERTS REQUIRED AND GOVERNING DIMENSIONS SEE "LIST OF STRUCTURES".

LOADING DATA

LIVE LOAD: AASHO H20-S16-44
DEAD LOAD: CONCRETE 150 POUNDS PER CUBIC FOOT
EARTH 84 POUNDS PER CUBIC FOOT

DESIGNING DATA

[illegible] THESIS EXCEPT AS NOTED
Reinforcing Steel fs = 20000 lbs per sq in
[illegible] Steel fs = 18000 lbs per sq in
[illegible] = 1000 lbs per sq in
n = 10

COLORADO DEPARTMENT OF HIGHWAYS

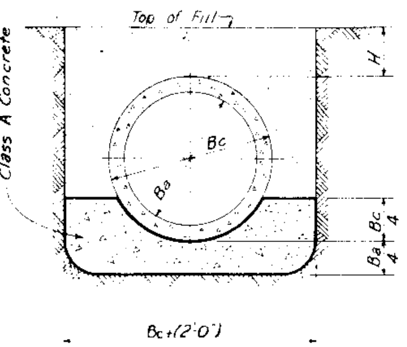
WINGWALLS FOR VARIOUS TYPES OF CONCRETE BOX CULVERTS

Designed by W.W.D.	Approved by [signature]
Made by W.W.D.	Bridge Engineer
Checked by T.J.M.	Date Aug 30, 1954

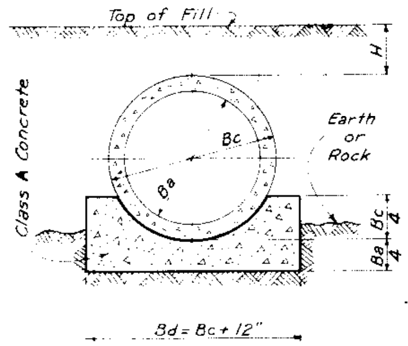
STANDARD M-112-E

FED. ROAD DIV. NO.	DISTRICT	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 092-2(5)	9	

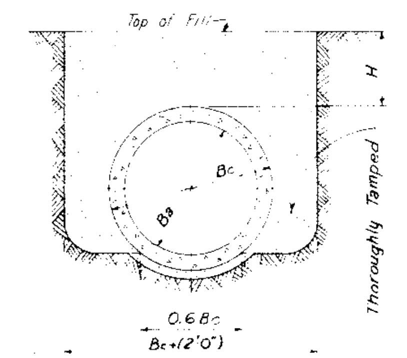
Rev by P.C 7-1-52 Added 84" Pipe
Rev by RT 3-6-56 Backfill & Excavation
Rev by GRL 6-25-57 Minimum Fill



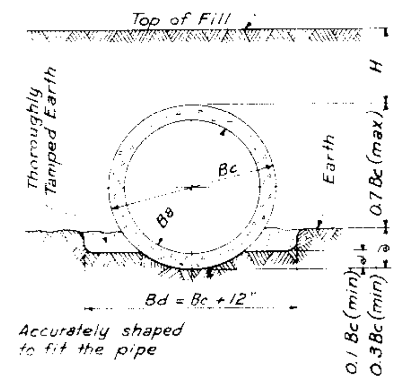
CONCRETE CRADLE BEDDING IN TRENCHES



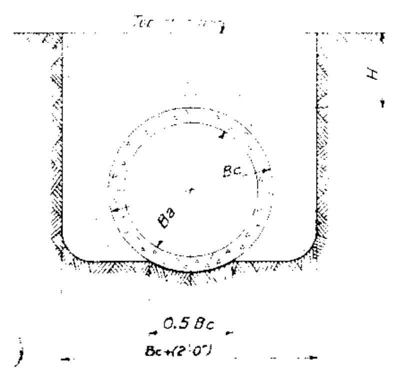
CONCRETE CRADLE BEDDING IN FILLS



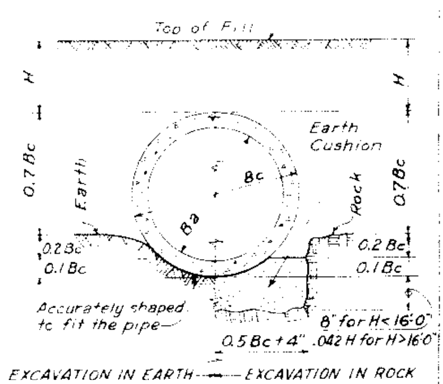
FIRST CLASS BEDDING IN TRENCHES



FIRST CLASS BEDDING IN FILLS

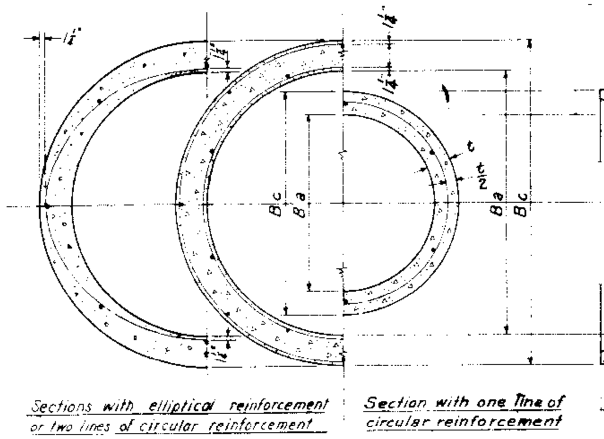


ORDINARY BEDDING IN TRENCHES



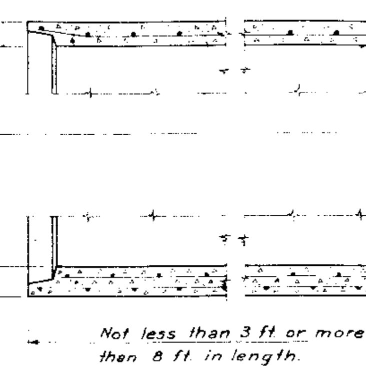
ORDINARY BEDDING IN FILLS

Backfill to conform to the requirements shown under "Structure Backfill and Mechanical Tamping Diagram."



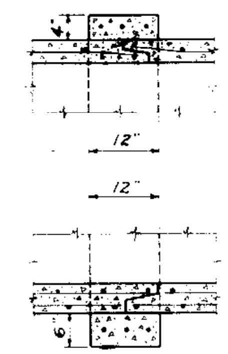
PIPE CROSS SECTIONS

Where two lines of steel are contemplated a single line placed elliptically may be used, and the area of this shall be at least 60 % of the total steel area required for two lines of reinforcement. Pipe with elliptical reinforcing shall have the word "Top" or "Bottom" clearly stenciled on the inside of the pipe at the correct place to indicate the proper position when laid.



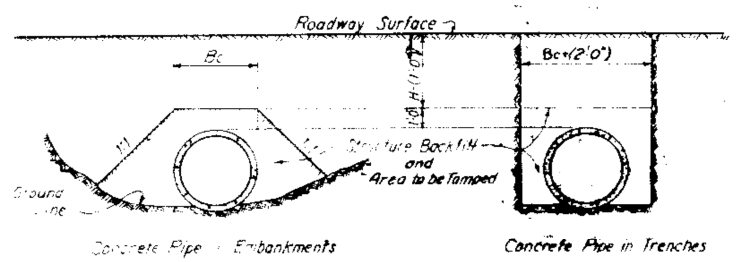
LONGITUDINAL SECTIONS

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



CONCRETE COLLAR

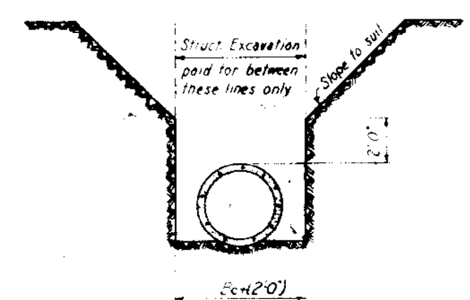
Where the flow line grade of the pipe is 10% or greater, all pipe shall be the bell and spigot type or shall be tongue and groove pipe with concrete collars as detailed above or a type approved in writing by the Engineer.



STRUCTURE BACKFILL AND MECHANICAL TAMPING DIAGRAM

All material that is to be mechanically tamped shall be placed in horizontal layers not more than 6 inches in depth and tamped before the next layer is placed.

Backfill for all types of bedding shall be brought up uniformly on each side of the pipe to maintain equal lateral pressures against the pipe. All Structure Backfill shall conform to the specification for Class 1 Backfill.



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

	Ba Int. Diameter (Inches)	* Bc Ext. Diameter (Inches)	Three Edge Bearing Method: Crack Point (Pounds)	Three Edge Bearing Method: Ultimate Load (Pounds)	Concrete Cradle: Pipe in Trench	Concrete Cradle: Pipe in Fills	First Class: Pipe in Trench	First Class: Pipe in Fills	Ordinary: Pipe in Trench	Ordinary: Pipe in Fills
Standard Strength Reinf. Conc. Culvert Pipe AASHO M 41-49	12	16	2250	3500	No Limit	30	No Limit	19	No Limit	16
	15	19½	2625	4065		28		18		15
	18	23	3000	4500		28		18		15
	24	30	3000	5000		22	44	14	18	12
	30	37	3375	5750		21	25	14	15	12
	36	44	4050	6600	54	21	17	14	14	12
	42	51	4725	7350	47	22	17	14	13	12
	48	58	5400	8000	46	22	17	14	13	12
	54	65	5850	9000	38	22	17	14	12	12
	60	72	6000	10000	32	21	15	14	11	12
	66	79	6300	11000	28	20	15	13	10	12
	72	86	6600	12000	26	20	14	13	15	11
	84	100			24	20	13	13	10	11
Extra Strength Reinf. Conc. Culvert Pipe AASHO M 41-49	24	30	4000	6000	No Limit	29	No Limit	18	No Limit	15
	30	37	5000	7500		30	No Limit	19	48	16
	36	44	6000	9000		30	40	19	22	16
	42	51	7000	10500		31	40	20	22	17
	48	58	8000	12000		31	37	20	23	17
	54	65	9000	13500		32	36	20	23	17
	60	72	9000	15000		29	28	19	20	16
	66	79	9500	16500	128	28	26	19	18	16
	72	86	9900	18000	64	28	24	18	17	16
	84	100			46	28	22	18	16	15
Reinf. Conc. Sewer Pipe AASHO M 87-49	12	16	1800	2700	No Limit	24	No Limit	15	25	18
	15	19½	2000	3000		22	No Limit	14	19	12
	18	23	2200	3300		21	48	13	16	11
	21	26½	2400	3600		20	28	13	14	11
	24	30	2400	3600		18	18	12	12	10
	27	33	2550	3800		18	17	11	11	10
	30	37	2700	4050		17	15	11	10	9
	33	40½	2850	4300	49	17	14	11	10	9
	36	44	3000	4500	22	16	11	11	8	9
	42	51	3200	[illegible]	[illegible]	16	10	10	7	9
	48	58	3400	5100	17	15	9	10	7	9
	54	65	3700	5550	17	15	9	10	7	8
	60	72	4000	6000	16	15	9	10	7	8
	66	79	4350	6350	16	15	9	10	6	8
	72	86	4500	6750	15	15	8	10	6	8
Unreinf. Conc. Sewer Pipe AASHO M 86-49	4	5½	1000		No Limit	35	No Limit	24	No Limit	20
	6	7¼	1100			31		20		17
	8	9½	1300			28		18		15
	10	11¾	1400			25		16	27	13
	12	14	1500			23		14	19	12
	15	17½	1750			21		13	16	11
	18	21	2000			21		13	15	11
	21	24½	2200			20	27	12	14	11
	24	28¼	2400			19	22	12	13	10

Max. depth of fill "H" in ft. for 3 types of bedding.

* Note: External diameter of pipe shown in the table is approximate only, having been determined by using 3000 lbs per sq. in. concrete. If greater strength concrete is used this diameter may be decreased accordingly.

Where a firm foundation is not encountered, due to soft spongy or other unsuitable material all such unsuitable material under the pipe for a width of (2 Ba + Bc) shall be removed and the area backfilled with suitable material approved by the Engineer, and compacted at optimum moisture to a relative density not less than 90% to provide additional support for the pipe.

Where suitable material is encountered in place in the foundation but the relative compaction does not meet the minimum requirements this material shall be removed and recompacted at optimum moisture and to at least 90% relative density.

GENERAL NOTES

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

Reinforced Concrete Culvert Pipe shall conform to A.A.S.H.O. M41-49.
Reinforced Concrete Sewer Pipe shall conform to A.A.S.H.O. M87-49.
Unreinforced Concrete Sewer Pipe shall conform to A.A.S.H.O. M86-49.

The type of Pipe Joint used and the field construction thereof to make the joint reasonably water-tight shall be submitted to the Department for approval.

Unless otherwise noted the type of bedding shall be Ordinary Bedding. When the maximum fill height as noted hereon, for this type of bedding, is exceeded then that type of bedding which is indicated by the allowable fill height shall be used.

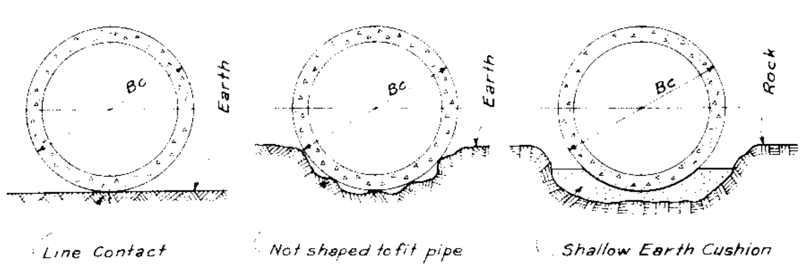
All culverts shall have headwalls or flared end sections if and as shown on the plans in accordance with Department Standards.

For size, type and location of pipe see plan sheets for project.

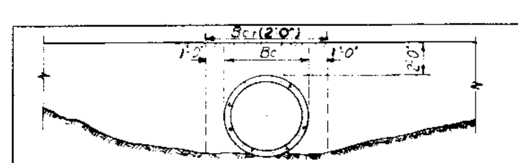
Supporting soils shall be composed of firm and uniform material throughout the entire length of Culvert. The soil shall be accurately shaped to fit the Pipe in accordance with the bedding conditions shown.

The Pipe shall be laid with the Bell or Groove end placed upstream.

Minimum Depth of Fill over Concrete Pipe
Main Roadways 2 Foot
Approach Roadways 1 Foot



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



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

COLORADO
STATE HIGHWAY DEPARTMENT
REINF. CONCRETE CULVERT PIPE
STD. STRENGTH 12", 15", 18", 24", 30", 36", 42", 48", 54", 60", 66", 72", 84"
EXTRA STR. 24", 30", 36", 42", 48", 54", 60", 66", 72", 84"
CONCRETE SEWER PIPE
REINF. 12", 15", 18", 21", 24", 27", 30", 33", 36", 42", 48", 54", 60", 66", 72"
UNREINF. 4", 6", 8", 10", 12", 15", 18", 21", 24"

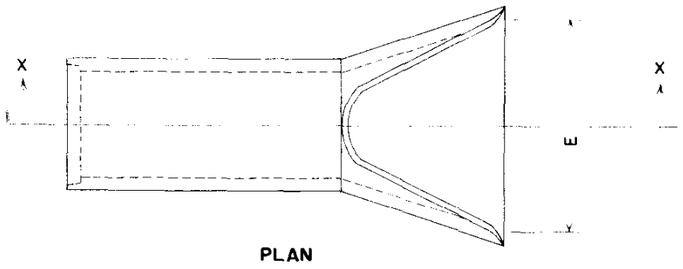
Designed by W.W.D.	Approved by [signature]
Made by W.W.D.	Bridge Engineer
Checked by P.C.	Date: Mar. 17, 1958.

STANDARD M-118-A

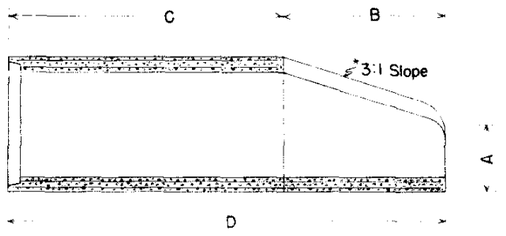
FED. ROAD DIV. NO.	DISTRICT		SHEET NO.	TOTAL SHEETS
9	COLO.	I 092-2(6)	92	

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

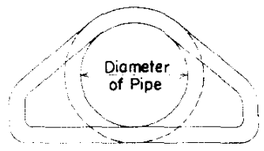
FLARED END SECTION FOR CONCRETE PIPE



PLAN

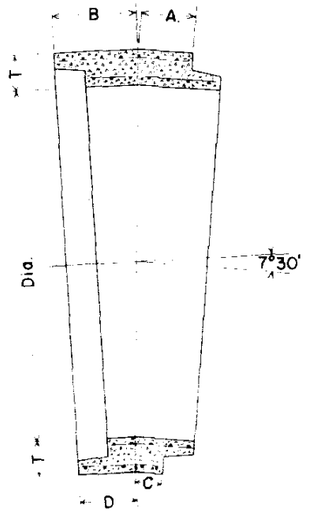


SECTION X-X



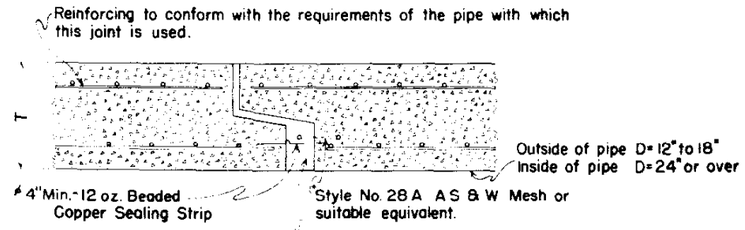
END VIEW

7°30' ANGLE SECTION FOR CONCRETE PIPE



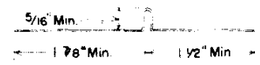
COPPER EXPANSION JOINT FOR CONCRETE PIPE

(WHEN REQUIRED ON PLANS)



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

°COPPER SEALING STRIP



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

DIMENSIONS FOR FLARED END SECTIONS

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

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

DIMENSIONS FOR 7°30' ANGLE SECTIONS

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

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

GENERAL NOTES

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

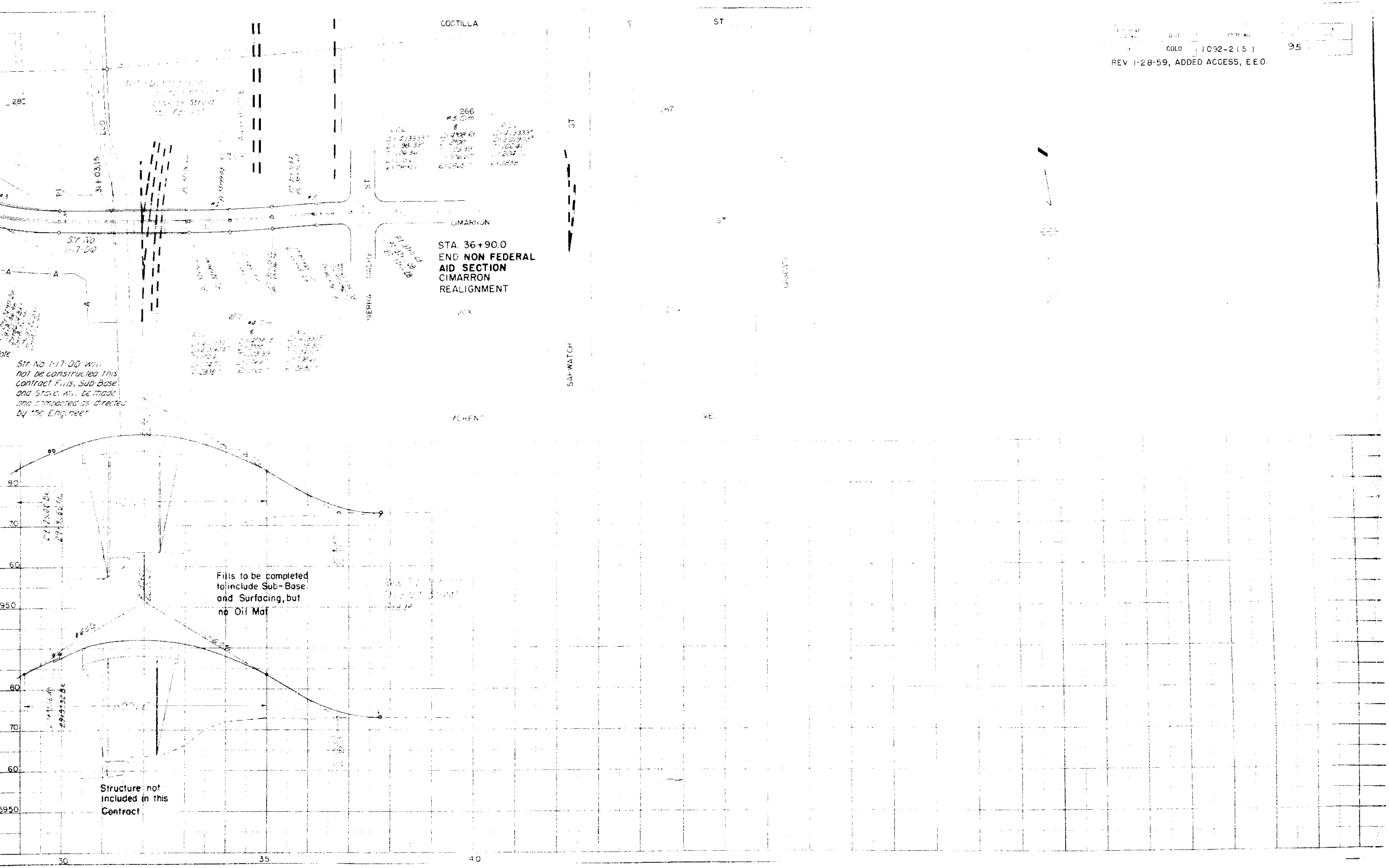
Concrete, wall thickness and reinforcing steel in Flared End Sections and 7°30' Angle Sections must conform with the requirements of the pipe with which they are used.

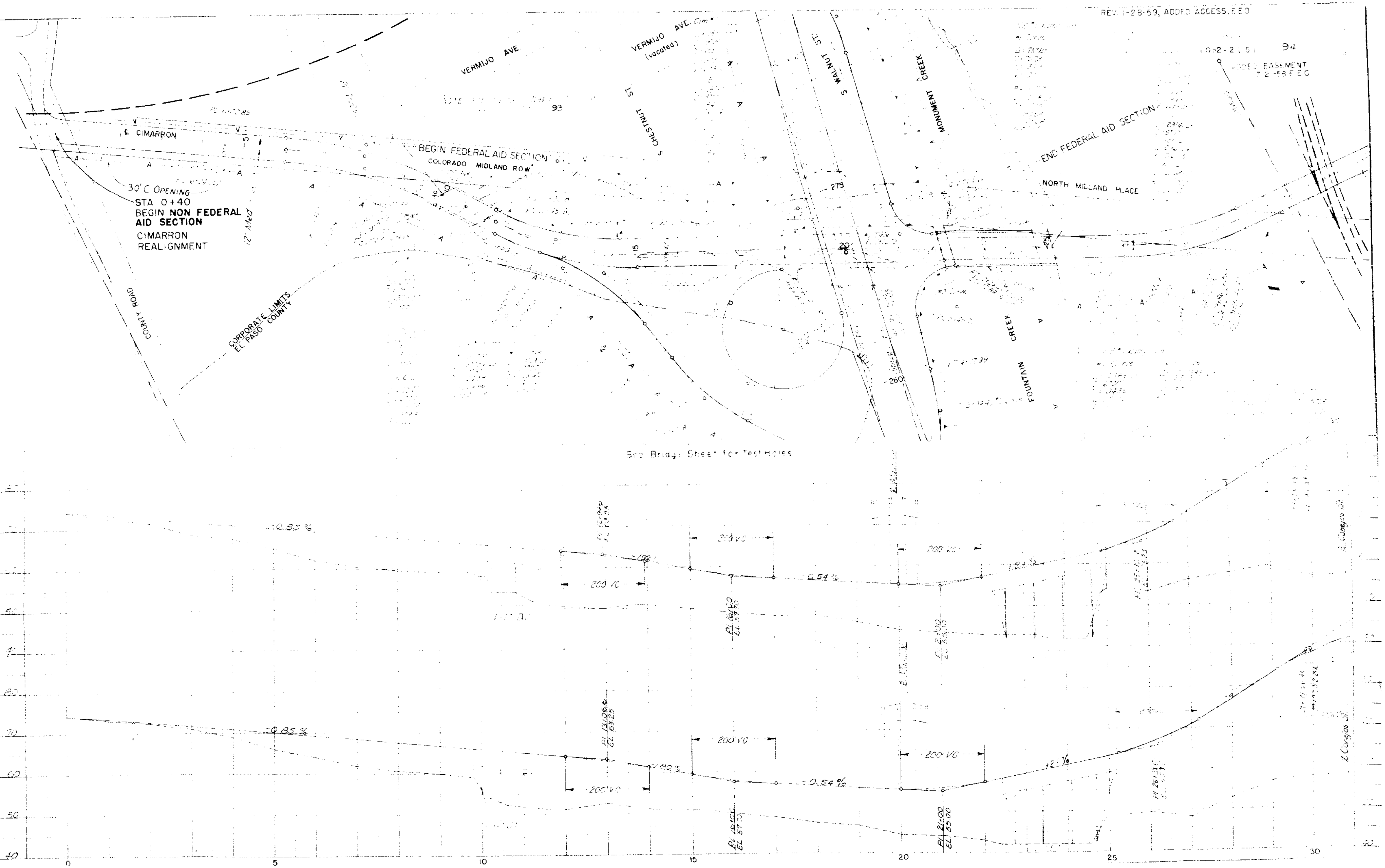
Alternate types of expansion joints may be substituted for the expansion joint shown on this sheet after approval by the Department.

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

COLORADO STATE HIGHWAY DEPARTMENT
STANDARD
FLARED END SECTION
7°30' ANGLE SECTION
AND
COPPER EXPANSION JOINT
FOR
CONCRETE PIPE STRUCTURES

Designed by R S M	Approved by John C. Marshall
Made by J M K	
Checked by R S M	Date: January 14, 1949


COLO 1092-2(5)
95
REV 1-28-59, ADDED ACCESS, E.E.O.
COSTILLA
ST
CIMARRON
SAWATCH
STA. 36+90.0
END NON FEDERAL
AID SECTION
CIMARRON
REALIGNMENT
31+03.15
Str. No. 1-17-DQ Will
not be constructed this
contract. Fills, Sub-Base
and Gravel will be made
and compacted as directed
by the Engineer
Fills to be completed
to include Sub-Base
and Surfacing, but
no Oil Mat
Structure not
included in this
Contract
80
70
60
5950
30
35
40



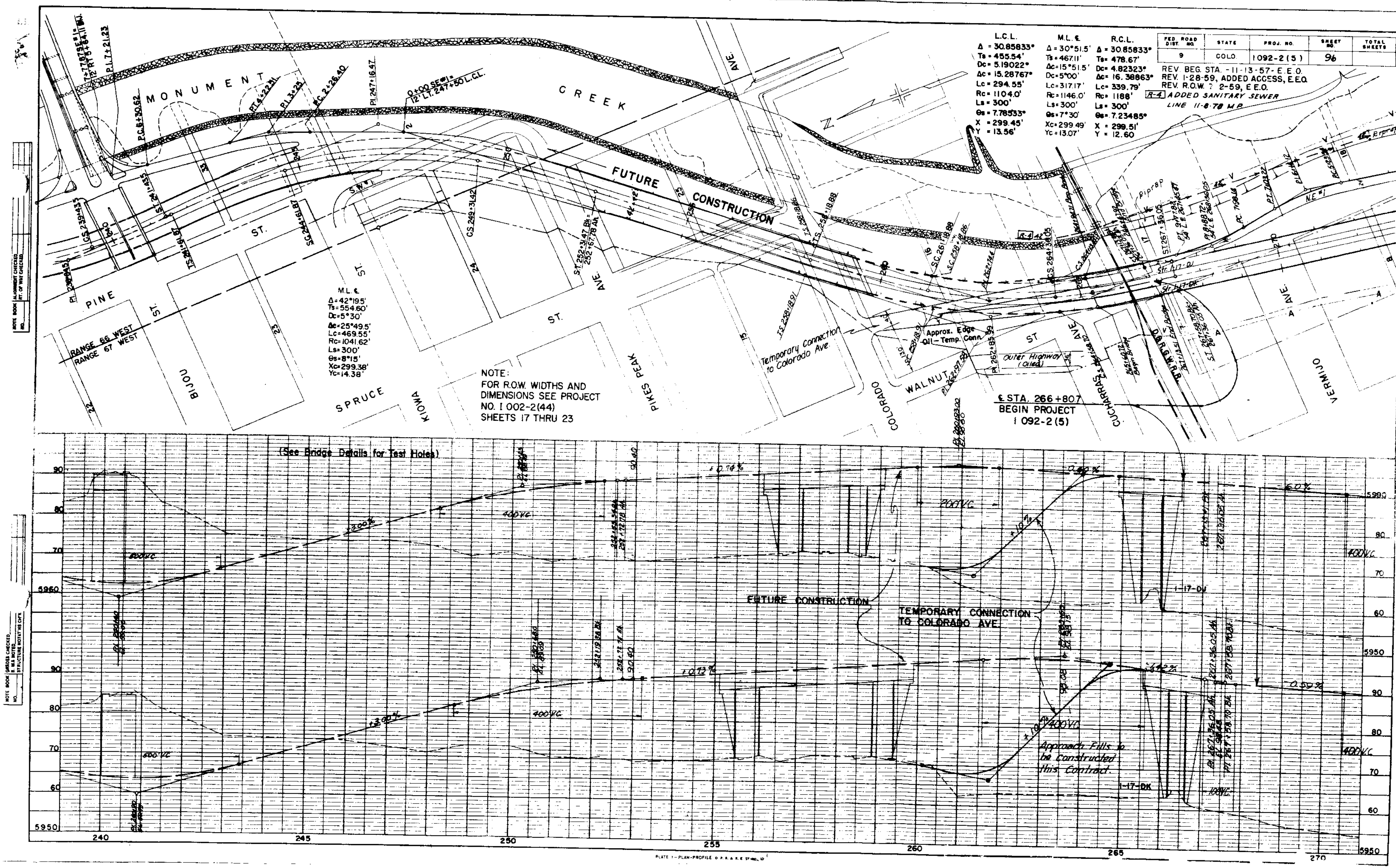
REV. 1-28-59, ADDED ACCESS. E.E.O.
ADDED EASEMENT 7-2-58 E.E.O.
94
93
VERMIJO AVE.
VERMIJO AVE. (vacated)
S. CHESTNUT ST.
S. WALNUT ST.
MONUMENT CREEK
END FEDERAL AID SECTION
NORTH MIDLAND PLACE
℄ CIMARRON
BEGIN FEDERAL AID SECTION
COLORADO MIDLAND ROW
30' C OPENING
STA 0+40
BEGIN NON FEDERAL AID SECTION
CIMARRON REALIGNMENT
COUNTY ROAD
CORPORATE LIMITS
EL PASO COUNTY
FOUNTAIN CREEK
See Bridge Sheet for Test Holes
-0.85 %
200' VC
0.54 %
2.1 %
0
5
10
15
20
25
30

STATE
9 COLO. 1092-2(5) 9
ADDED EASEMENT 7-21-58 E.E.O.
REV 1-28-59, ADDED ACCESS, E.E.O.

CUCHARRAS ST
SEVENTH AVE
VERMIJO
CIMARRON ST.
MIDLAND R.O.W.
30°C. OPENING
30°C. OPENING
STA 0+40
BEGIN NON-FEDERAL AID SECTION
CIMARRON REALIGNMENT
BEGIN FEDERAL AID SECTION
MAIN ST
CREEK
MONUMENT
CONEJOS AVE
NORTH MIDLAND PLACE
END FEDERAL AID SECTION
MANEBOUSE
MORENO
V-FOUNTAIN
CREEK

COLORADO
DEPARTMENT OF HIGHWAYS
CIMARRON STREET
INTERCHANGE

Designed by
Made by
Checked by
Approv
Date



FED. ROAD DIST. NO. 9
STATE COLO.
PROJ. NO. I 092-2(5)
SHEET NO. 96
REV. BEG. STA. - 11-13-57 - E.E.O.
REV. 1-28-59, ADDED ACCESS, E.E.O.
REV. R.O.W. 7-2-59, E.E.O.
R-4 ADDED SANITARY SEWER LINE 11-8-78 M.P.
L.C.L.
Δ = 30.85833°
Ts = 455.54'
Dc = 5.19022°
Δc = 15.28767°
Lc = 294.55'
Rc = 1104.0'
Ls = 300'
θs = 7.78533°
X = 299.45'
Y = 13.56'
M.L. ℄
Δ = 30°51.5'
Ts = 467.11'
Δc = 15°51.5'
Dc = 5°00'
Lc = 317.17'
Rc = 1146.0'
Ls = 300'
θs = 7°30'
Xc = 299.49'
Yc = 13.07'
R.C.L.
Δ = 30.85833°
Ts = 478.67'
Dc = 4.82323°
Δc = 16.38863°
Lc = 339.79'
Rc = 1188'
Ls = 300'
θs = 7.23485°
X = 299.51'
Y = 12.60
M.L. ℄
Δ = 42°19.5'
Ts = 554.60'
Dc = 5°30'
Δc = 25°49.5'
Lc = 469.55'
Rc = 1041.62'
Ls = 300'
θs = 8°15'
Xc = 299.38'
Yc = 14.38'
MONUMENT CREEK
FUTURE CONSTRUCTION
PINE ST.
BIJOU ST.
SPRUCE ST.
KIOWA ST.
PIKES PEAK AVE.
COLORADO AVE.
WALNUT ST.
CUCHARRAS ST.
VERMIJO AVE.
RANGE 66 WEST
RANGE 67 WEST
Temporary Connection to Colorado Ave.
Approx. Edge Oil - Temp. Conn.
Outer Highway (Oiled)
NOTE: FOR R.O.W. WIDTHS AND DIMENSIONS SEE PROJECT NO. I 002-2(44) SHEETS 17 THRU 23
℄ STA. 266+80.7 BEGIN PROJECT I 092-2(5)
(See Bridge Details for Test Holes)
FUTURE CONSTRUCTION
TEMPORARY CONNECTION TO COLORADO AVE.
Approach Fills to be Constructed this Contract.
+3.00%
+0.14%
+0.13%
400 VC
600 VC
200 VC
0.59%
.60%
I-17-DJ
I-17-DK
5950
240
245
250
255
260
265
270
PLATE 1 - PLAN-PROFILE

NO.	DATE	PROJECT	
9	5-60	I 092 - 2 (5)	97

ADDED EASEMENT 7-21-58 E.E.O.
REV. 1-28-59, ADDED ACCESS, E.E.O.
R-3 ADDED SANITARY SEWER LINE
11-8-78 — N.P.

MONUMENT CREEK

FOUNTAIN CREEK

STR. NO. I-17-EF

Double 14 X 10 X 116' C.B.C.
Hd'walls & Wing Walls
TYPE 14-14-A

& Sta. 297+00 90°

L.C.L.	E.M.L.	R.C.L.
Δ = 55.9°	Δ = 55°54' Lt.	Δ = 55.9'
Ts = 863.75'	Ts = 886.01'	Ts = 908.26'
Dc = 4.12082°	Dc = 4°00'	Dc = 3.88606°
Δc = 45.57794°	Δc = 45.9°	Δc = 46.18484°
Lc = 1106.53'	Lc = 1147.5'	Lc = 1188.47'
Rc = 1390.5'	Rc = 1432.5'	Rc = 1474.5'
Ls = 250'	Ls = 250'	Ls = 250'
θs = 5.15103°	θs = 5°00'	θs = 4.85758°
X = 249.80'	X = 249.81'	X = 249.82'
Y = 7.49'	Y = 7.27'	Y = 7.05'

NOTE: For channel change Alignment see Sheet No. 10

See Bridge Sheet for test holes.

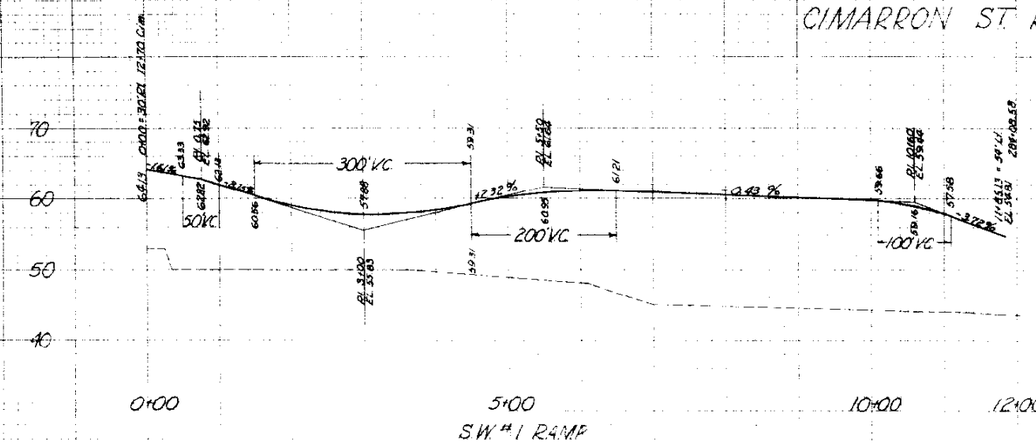
-0.60%
-0.59%
-3.0%
-3.00%
-0.87%
-0.84%
-0.51%
-0.89%
400'VC
300'VC
100'VC
I-17-DF
I-17-DG
f.l. 29.11
f.l. 30.29

5980 70 60 50 80 70 60 5950 5950 40 30 40

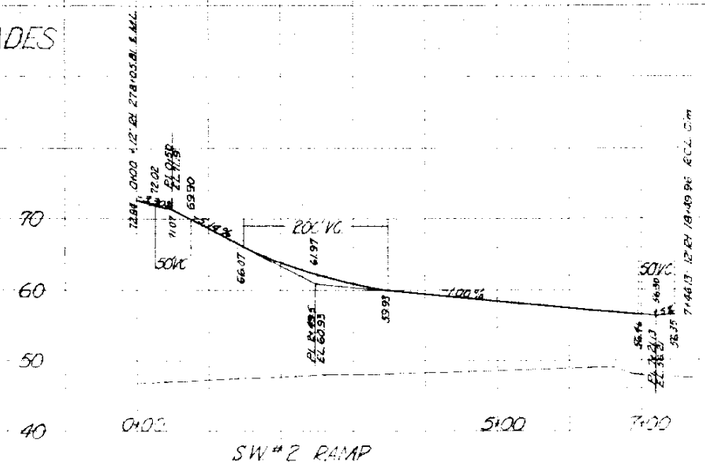
270 275 280 285 290 295 300

FED. DIS	STATE	PROJECT NO.	
9	COLO.	I 092-2(5)	98

CIMARRON ST. RAMP GRADES

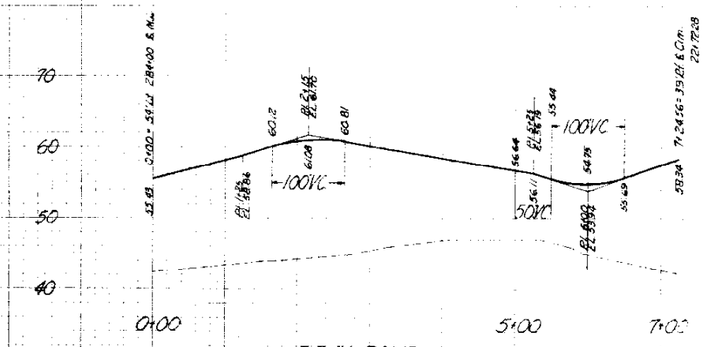


S.W. #1 RAMP



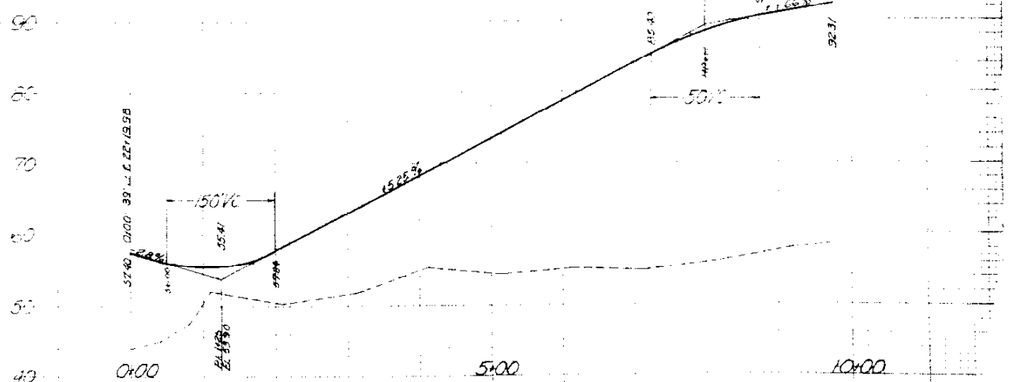
S.W. #2 RAMP

CIMARRON ST. RAMP GRADES (CONT.)



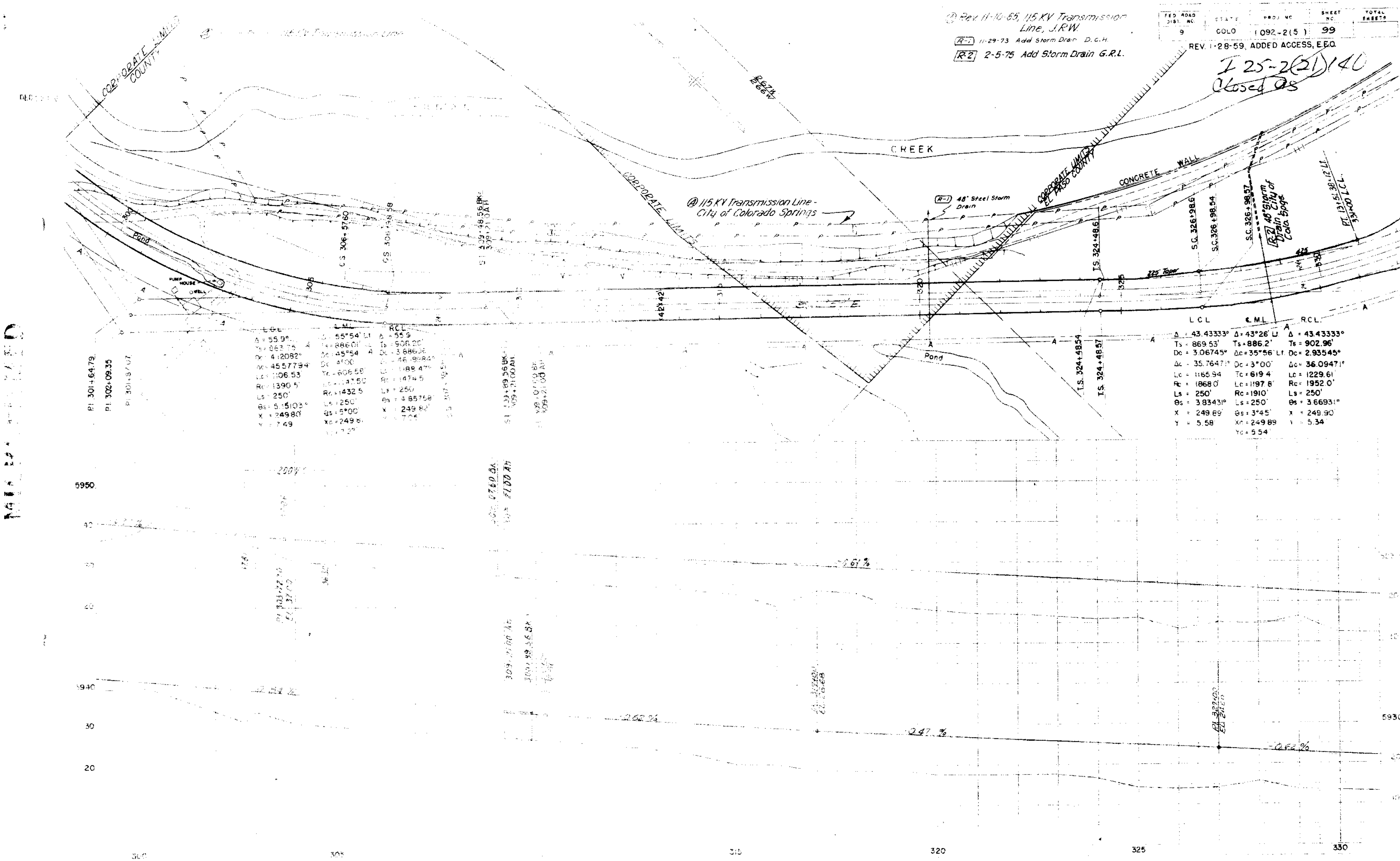
S.E. #1 RAMP

Grade on Tangent from PC to Cimarron Street



N.E. #1 RAMP

Scale 1 inch = 100 ft. Hz
Scale 1 inch = 10 ft. Ver



FED. ROAD DIST. NO.
STATE
PROJ. NO.
SHEET NO.
TOTAL SHEETS
9
COLO
I 092-2(5)
99
REV. 1-28-59, ADDED ACCESS, E.E.Q.
Rev 11-10-65, 115 KV Transmission Line, J.R.W.
R-1 11-29-73 Add Storm Drain D.C.H.
R-2 2-5-75 Add Storm Drain G.R.L.
I 25-2(21)140
Closed Os
CREEK
CONCRETE WALL
CORPORATE LIMITS
COUNTY
EL PASO COUNTY
115 KV Transmission Line - City of Colorado Springs
R-1 48" Steel Storm Drain
R-2 48" Storm Drain City of Colo. Spgs.
Pond
PUMP HOUSE
WELL
225' Taper
S.C. 326+98.6
S.C. 326+98.54
S.C. 326+98.57
T.S. 324+48.6
T.S. 324+48.54
T.S. 324+48.57
P.I. 301+64.79
P.I. 302+09.35
L.C.L.
℄ M.L.
R.C.L.
Δ = 43.43333°
Ts = 869.53'
Dc = 3.06745°
Δc = 35.76471°
Lc = 1165.94
Rc = 1868.0'
Ls = 250'
θs = 3.83431°
X = 249.89'
Y = 5.58
Δ = 43°26' Lt.
Ts = 886.2'
Δc = 35°56' Lt.
Dc = 3°00'
Tc = 619.4
Lc = 1197.8'
Rc = 1910'
Ls = 250'
θs = 3°45'
Xc = 249.89
Yc = 5.54
Δ = 43.43333°
Ts = 902.96'
Dc = 2.93545°
Δc = 36.09471°
Lc = 1229.61
Rc = 1952.0'
Ls = 250'
θs = 3.66931°
X = 249.90
Y = 5.34
-0.61 %
-0.62 %
-0.47 %
-0.60 %
5950
5940
5930
30
20
305
315
320
325
330

REVISED RAMPS 4-22-58 E.E.O.

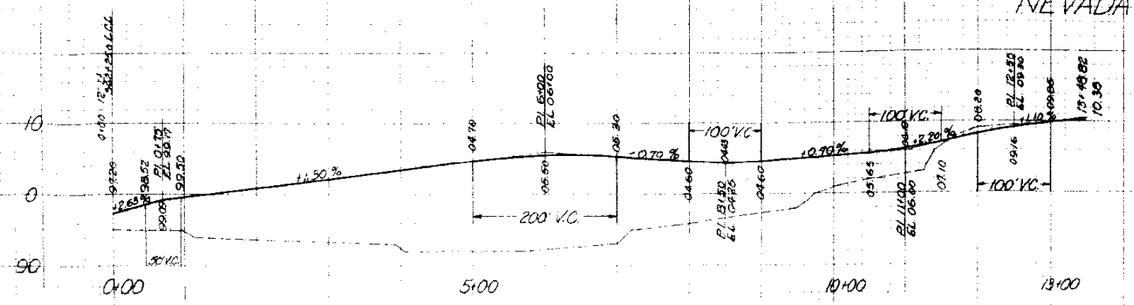
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	1092-2 (5)	100	

REV. 1-28-59, ADDED ACCESS, E.E.O.

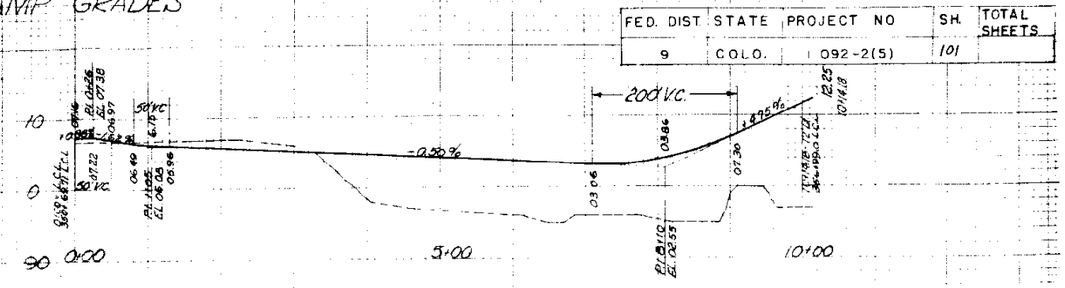
Ⓐ Rev. 11-10-65, 115 KV Transmission Line, J.R.W.

FED. DIST	STATE	PROJECT NO	SH.	TOTAL SHEETS
9	COLO.	I 092-2(5)	101	

NEVADA AVE. RAMP GRADES

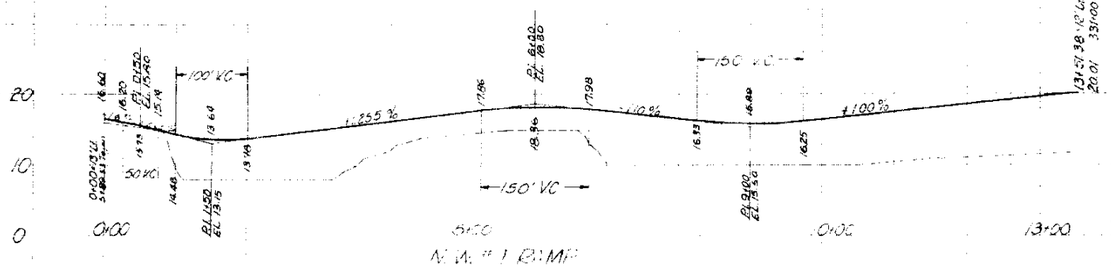


N.E. # 1 RAMP

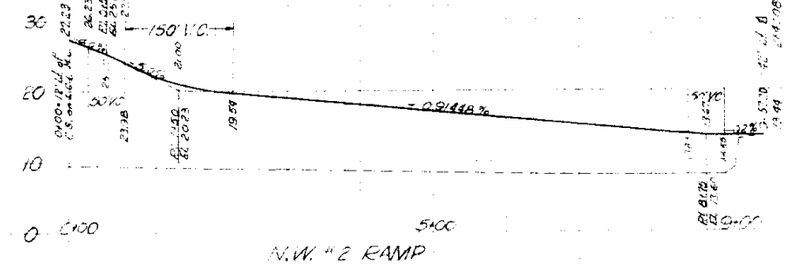


N.E. # 2 RAMP

TEJON ST. RAMP GRADES

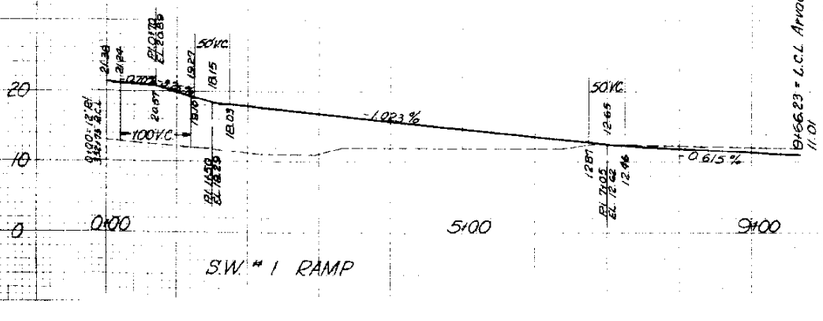


N. W. # 1 RAMP

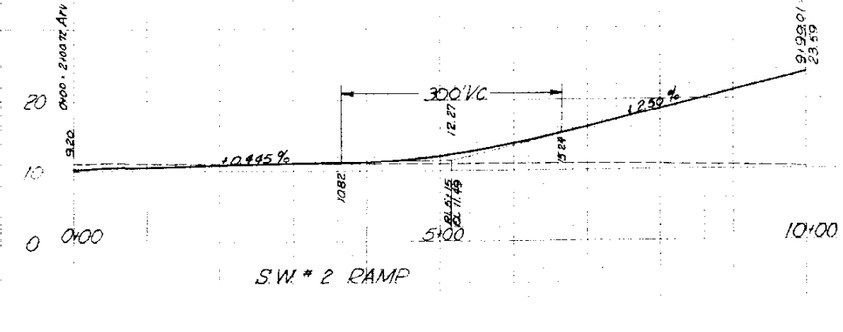


N.W. # 2 RAMP

TEJON ST. RAMP GRADES (CONT.)



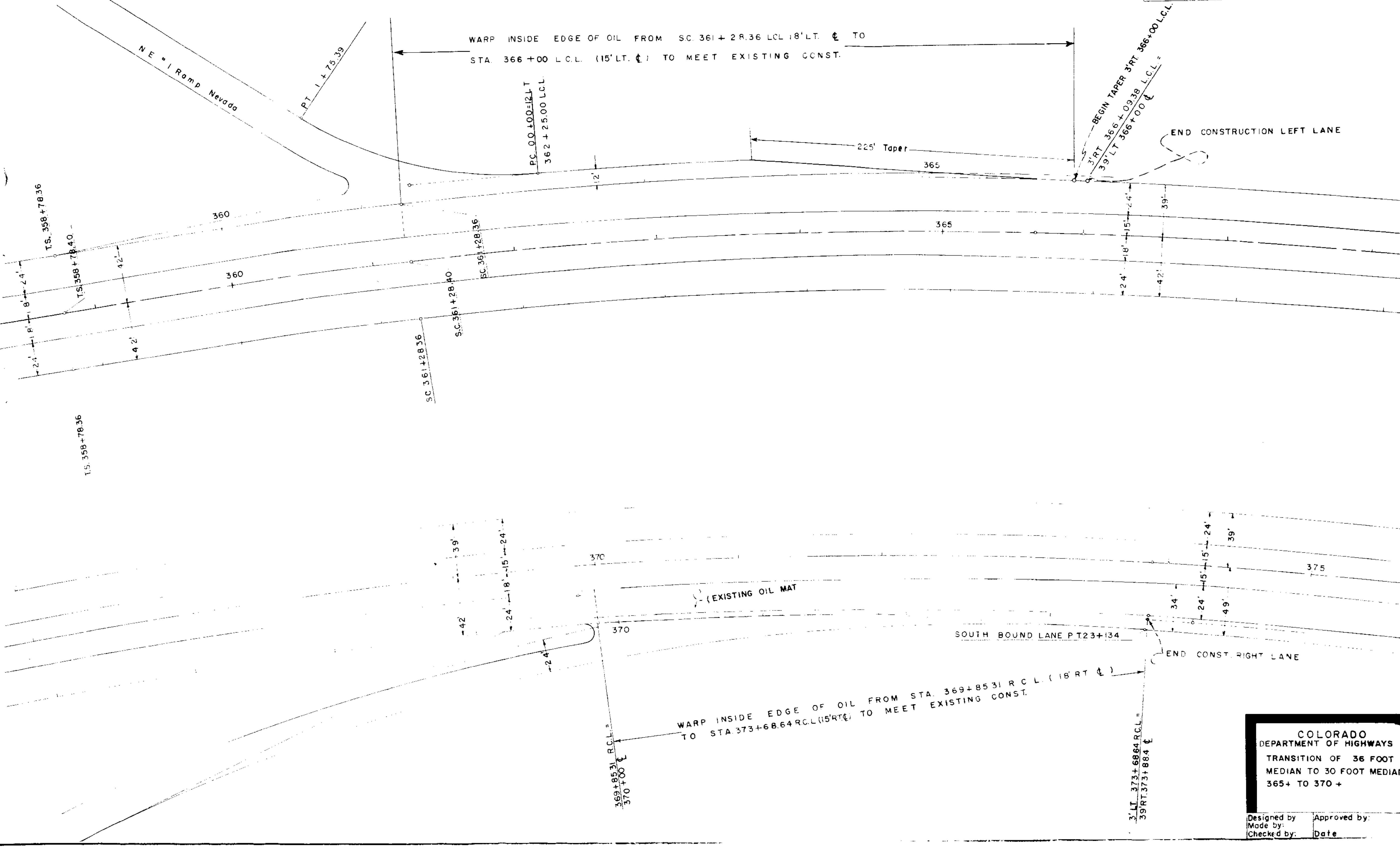
S.W. # 1 RAMP



S.W. # 2 RAMP

Scale 1 inch = 100 ft.
Scale 1 inch = [illegible]

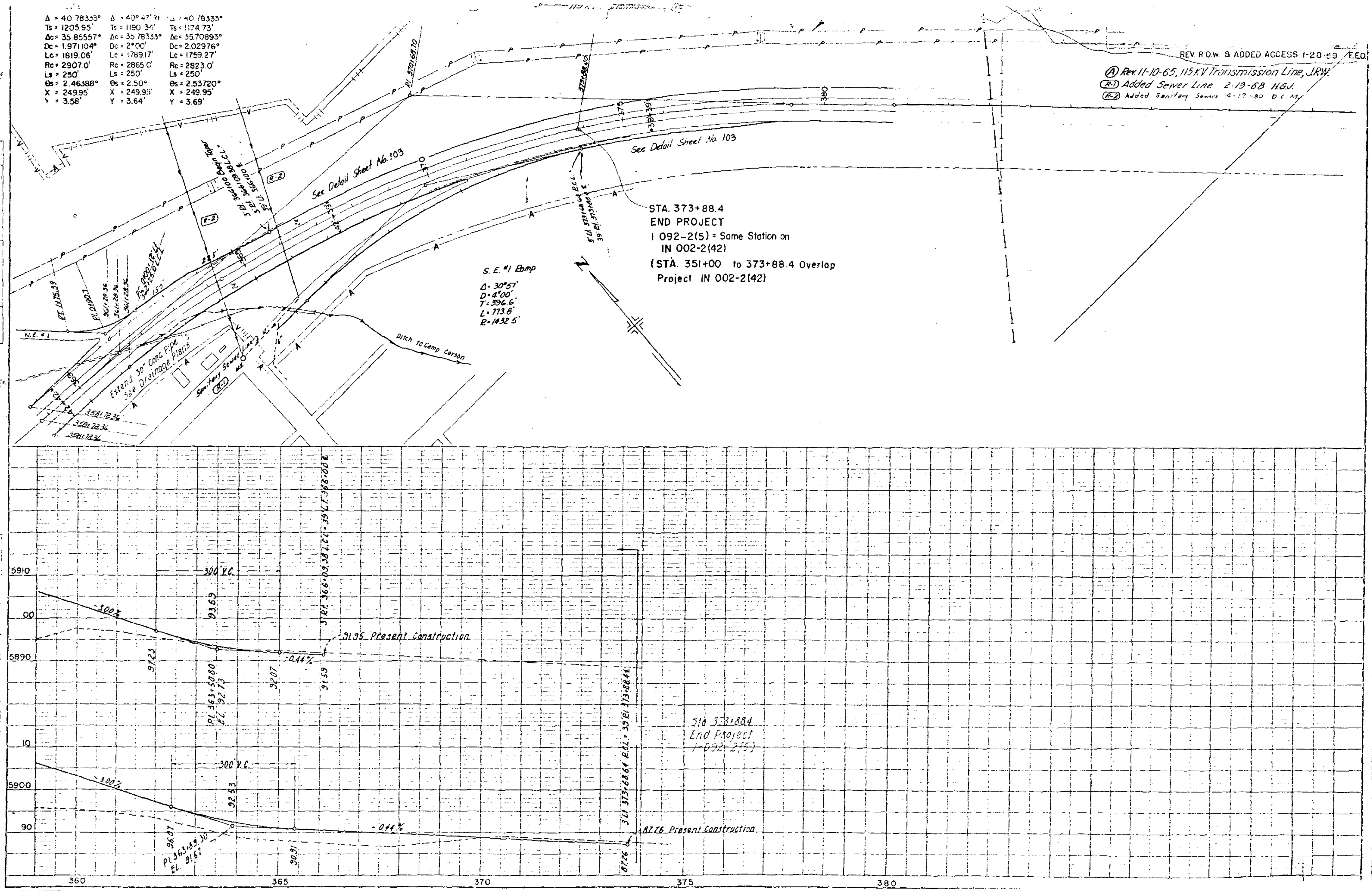
Fed. Road Dist. No.	STATE	PROJECT NO.	Sheet No.	TOTAL SHEETS
9	COLO	1092-2(5)	103	



WARP INSIDE EDGE OF OIL FROM SC. 361+28.36 LCL 18'LT. ℄ TO
STA. 366+00 L.C.L. (15'LT. ℄) TO MEET EXISTING CONST.
NE-1 Ramp Nevada
PT 1+75.39
PC 00+00=12'LT
362+25.00 LCL
225' Taper
365
BEGIN TAPER 3'RT. 366+00 L.C.L.
3'RT 366+09.38 L.C.L. =
39'LT 366+00 ℄
END CONSTRUCTION LEFT LANE
360
T.S. 358+78.36
T.S. 358+78.40
S.C. 361+28.36
S.C. 361+28.40
SC 361+28.36
T.S. 358+78.36
370
375
(EXISTING OIL MAT
SOUTH BOUND LANE P.T.23+134
END CONST. RIGHT LANE
WARP INSIDE EDGE OF OIL FROM STA. 369+85.31 R.C.L. (18'RT ℄)
TO STA.373+68.64 R.C.L.(15'RT℄) TO MEET EXISTING CONST.
369+85.31 R.C.L. =
370+00 ℄
3'LT. 373+68.64 R.C.L. =
39'RT. 373+88.4 ℄

COLORADO
DEPARTMENT OF HIGHWAYS
TRANSITION OF 36 FOOT MEDIAN TO 30 FOOT MEDIAN
365+ TO 370+

Designed by Made by: Checked by:	Approved by: Date



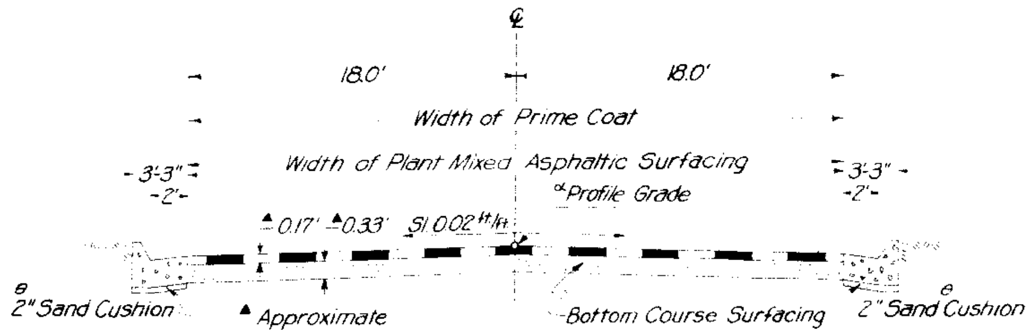
Δ = 40.78333°
Ts = 1205.95'
Δc = 35.85557°
Dc = 1.971104°
Lc = 1819.06'
Rc = 2907.0'
Ls = 250'
θs = 2.46388°
X = 249.95'
Y = 3.58'
Δ = 40°47'Rt
Ts = 1190.36'
Δc = 35.78333°
Dc = 2°00'
Lc = 1789.17'
Rc = 2865.0'
Ls = 250'
θs = 2.50°
X = 249.95'
Y = 3.64'
Δ = 40.78333°
Ts = 1174.73'
Δc = 35.70893°
Dc = 2.02976°
Lc = 1759.27'
Rc = 2823.0'
Ls = 250'
θs = 2.53720°
X = 249.95'
Y = 3.69'
REV. R.O.W. & ADDED ACCESS 1-28-59 E.E.O.
Ⓐ Rev. 11-10-65, 115 KV Transmission Line, J.R.W.
(R-1) Added Sewer Line 2-19-68 H.G.J.
(R-2) Added Sanitary Sewers 4-17-80 D.C.M.
See Detail Sheet No. 103
See Detail Sheet No. 103
STA. 373+88.4
END PROJECT
I 092-2(5) = Same Station on
IN 002-2(42)
(STA. 351+00 to 373+88.4 Overlap
Project IN 002-2(42)
S. E. #1 Ramp
Δ = 30°57'
D = 4°00'
T = 396.6'
L = 773.8'
R = 1432.5'
N
N.E. #1
Extend 30" Conc. Pipe
See Drainage Plans
Sanitary Sewer Line
Ditch to Camp Carson
PLAN
PROFILE
5910
00
5890
10
5900
90
300' V.C.
-3.00%
-0.44%
91.95 Present Construction
87.76 Present Construction
P.I. 363+50.80
EL. 92.73
P.I. 363+89.30
EL. 91.67
Sta. 373+88.4
End Project
I-092-2(5)
360
365
370
375
380

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.
9	COLORADO	I 092-2(5)	103

New Sheet – 2-5-59 – G.R.L.

WORK ORDER NO. 14276

TYPICAL SECTION



Approximate 0.50' compacted thickness of Gravel or Crushed Rock Surfacing shall be placed in separate courses at the following rates per 100 lin ft. of roadway:

Asphaltic Concrete Pavement .... 44 tons

Bottom Course Surfacing .... 80 tons

α Sta. 0+00 to 9+00 the Profile Grade shall be the same as the Existing Grade. Sta 9+00 to 15+23.8 the Profile Grade shall be the thickness of the Bottom Course Surfacing and Asphaltic Concrete above the present grade.

θ Sand Cushion to be used at locations designated by the Engineer.

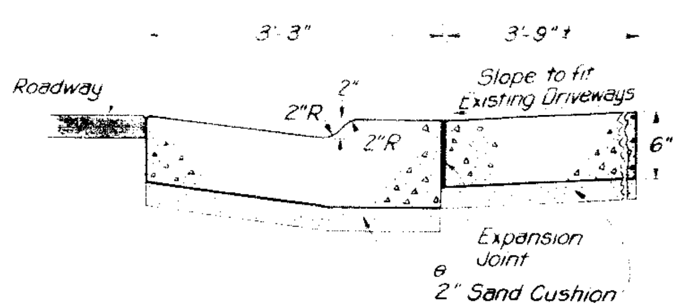
SUMMARY OF EARTHWORK QUANTITIES

EXCAVATION	
From Cross Sections	767
Est. for Subsidence	77
TOTAL	844
EXCAVATION	
From Cross Sections	767
Excess	110
TOTAL	657
EMBANKMENT	
From Cross Sections	548
EMBANKMENT x FACTOR	657
STATION YARD OVERHAUL	
From Mass Diagram	297
Est. for Subsidence	30
TOTAL	327
COMPACTION	
From Unclassified Excavation-Less Excess	734
Base of Cuts and Fills	2198
TOTAL	2932

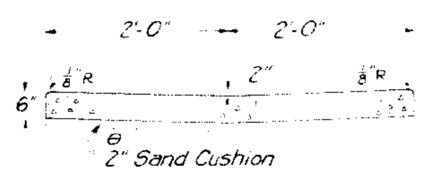
TABULATION OF CURB & GUTTER

STATION TO STATION	SIDE	CURB & GUTTER LIN. FT.	CONCRETE GUTTER(4') LIN. FT.
0+00 to 0+87	Rt.	87	
1+27 to 5+54	Rt.	433	
6+07 to 13+00	Rt.	710	
0+00 to 0+98	Lt.	98	
1+39 to 3+79	Lt.	246	
3+95 to 5+56	Lt.	176	
6+07 to 7+71	Lt.	179	
7+89 to 14+30	Lt.	647	
5+56 to 6+05	Rt.		49
3+81 to 3+93	Lt.		12
7+73 to 7+87	Lt.		14
0+00 to 0+37	Rt.		
1+48 to 1+85	Rt.		
4+41 to 4+92	Rt.		
6+11 to 6+36	Rt.		
6+56 to 6+86	Rt.		
7+09 to 7+39	Rt.		
7+49 to 7+69	Rt.		
0+00 to 0+32	Lt.		
0+75 to 0+98	Lt.		
1+75 to 2+00	Lt.		
2+67 to 2+79	Lt.		
2+84 to 2+96	Lt.		
3+30 to 3+42	Lt.		
4+25 to 4+39	Lt.		
4+82 to 5+35	Lt.		
6+22 to 6+39	Lt.		
7+23 to 7+35	Lt.		
8+91 to 10+07	Lt.		
TOTALS		2576	75

CONCRETE PAVEMENT (DRIVEWAYS)



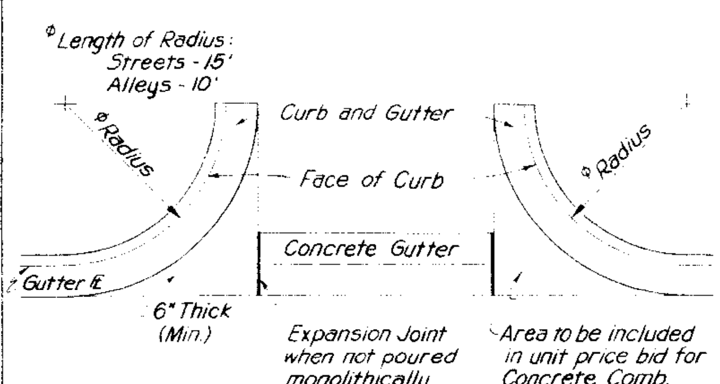
CONCRETE GUTTER



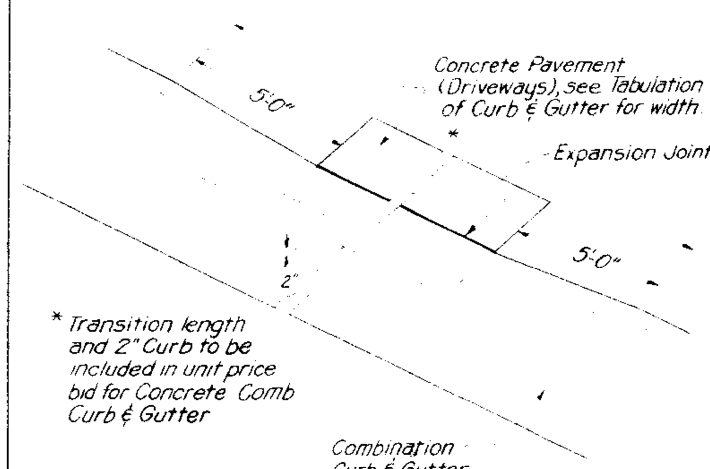
SURFACING PLAN

STATION TO STATION	ASPHALTIC CONCRETE TONS	BOTTOM COURSE TONS
0+00 to 15+23.8	670	
TOTAL	670	
0+00 to 0+93.6		75
BRIDGE		
1+33.7 to 15+23.8		1112
Correcting Irregularities in Sub Grade		119
TOTAL		1306

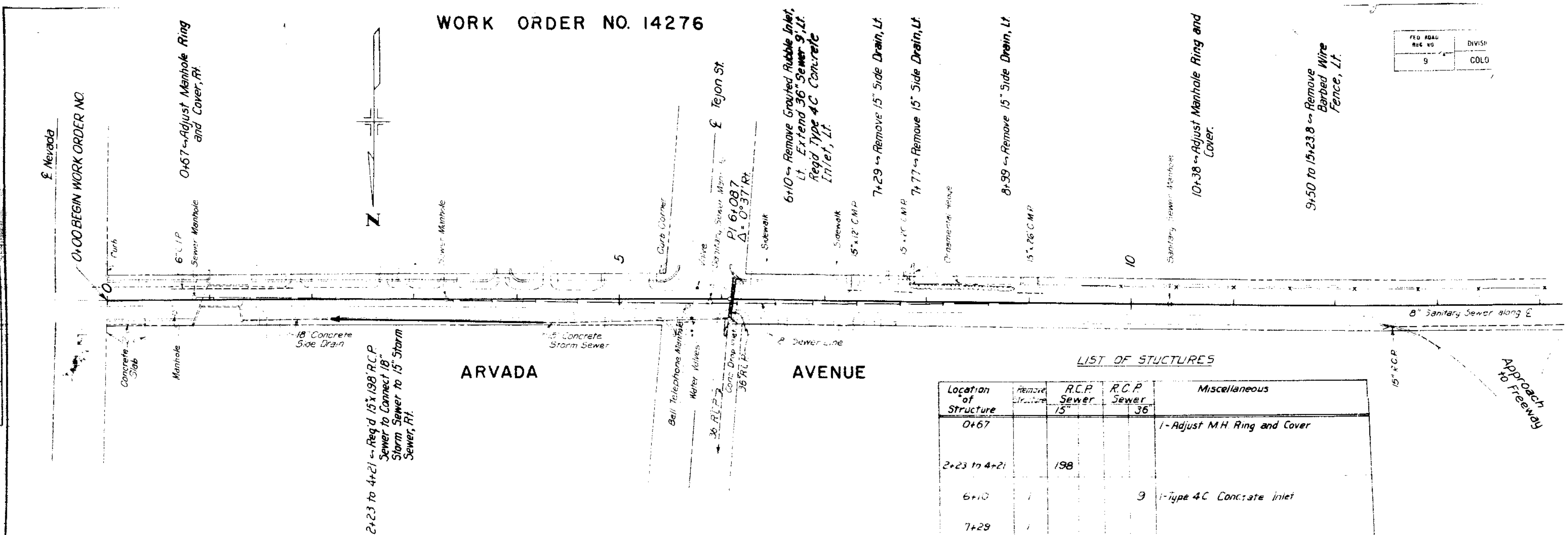
CONSTRUCTION OF CONCRETE GUTTERS AT INTERSECTIONS



DETAIL OF CURB CUT FOR DRIVEWAYS



WORK ORDER NO. 14276



FED. ROAD REG. NO. 9
DIVISI
COLO
N
℄ Nevada
0+00 BEGIN WORK ORDER NO.
0+67 ~ Adjust Manhole Ring and Cover, Rt.
℄ Tejon St.
PI 6+08.7
Δ= 0°37' Rt.
6+10 ~ Remove Grouted Rubble Inlet, Lt. Extend 36" Sewer 9', Lt. Req'd Type 4C Concrete Inlet, Lt.
7+29 ~ Remove 15" Side Drain, Lt.
7+77 ~ Remove 15" Side Drain, Lt.
8+99 ~ Remove 15" Side Drain, Lt.
10+38 ~ Adjust Manhole Ring and Cover.
9+50 to 15+23.8 ~ Remove Barbed Wire Fence, Lt.
2+23 to 4+21 ~ Req'd 15"x 198' R.C.P. Sewer to Connect 18" Storm Sewer to 15" Storm Sewer, Rt.
Sewer Manhole
Curb Corner
Sidewalk
Sanitary Sewer Manhole
5
10
18" Concrete Side Drain
15" Concrete Storm Sewer
8" Sanitary Sewer along ℄
Concrete Slab
Manhole
Bell Telephone Manhole
Water Valves
ARVADA
AVENUE
Approach to Freeway
15" R.C.P.
PLAN

LIST OF STUCTURES

Location of Structure	Remove Structure	R.C.P. Sewer 15"	R.C.P. Sewer 36"	Miscellaneous
0+67				1-Adjust M.H. Ring and Cover
2+23 to 4+21		198		
6+10	1		9	1-Type 4C Concrate Inlet
7+29	1			
7+77	1			
8+99	1			
9+50 to 15+23.8				Remove 574 Lin Ft. of Barbed Wire Fence
10+38				1-Adjust M.H. Ring and Cover
14+88				1-Adjust M.H. Ring and Cover
TOTALS	4	198		9