FED. ROAD DIV. NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	COLO.	U1 002-2(23) UNIT NO.1	1	

Rev. 12-21-51 – Index of Sheets – E.L.K.

2.022301

INDEX OF SHEETS

COLORADO
STATE HIGHWAY DEPARTMENT

PLAN AND PROFILE OF PROPOSED
PROJECT NO. U I 002-2(23)
UNIT No. 1
STATE HIGHWAY NO.185
CITY & COUNTY OF DENVER

ALL SCALES SHOWN ARE
FOR ORIGINAL DRAWINGS

GRADE LINE ON PROFILE IS SHOWN AS GRADE OF FINISHED ROAD

TOTAL LENGTH OF PROJECT NO. U1 002-2(23) = 3490.0 FT = 0.661 MILES
NO ℄ LENGTH INVOLVED IN UNIT NO. 1

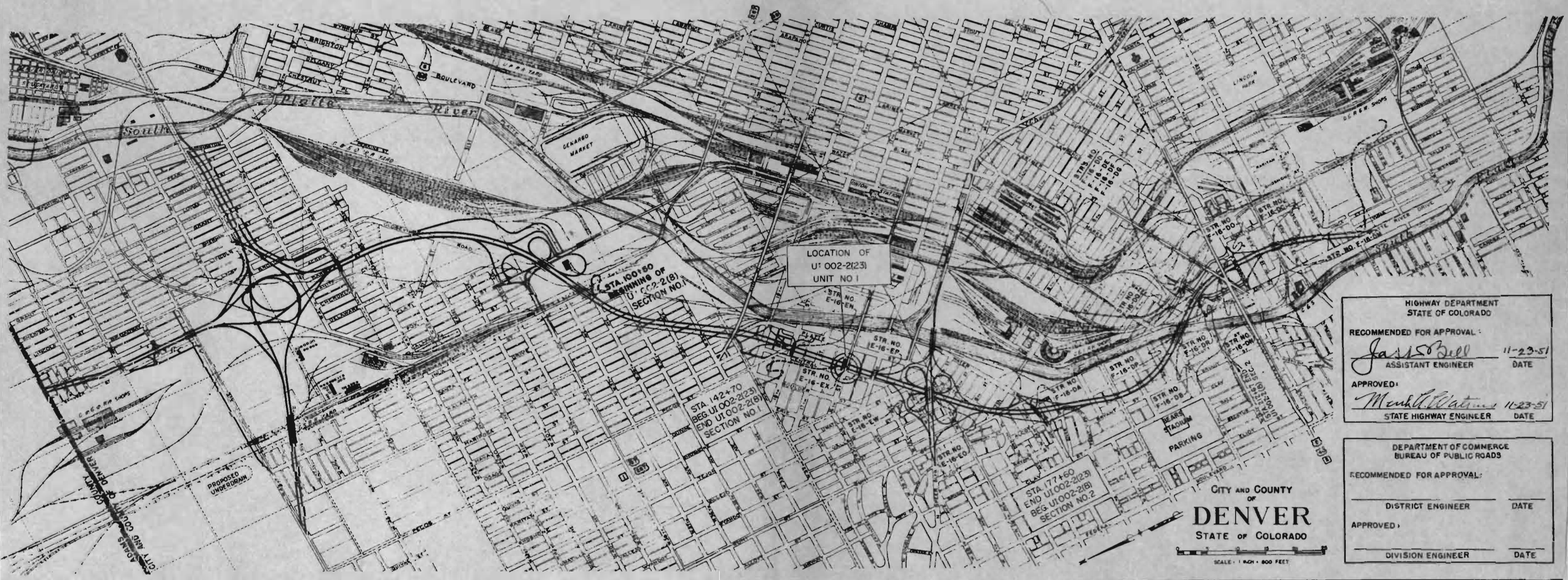
CONVENTIONAL SIGNS

	PLAN SHEETS	TITLE SHEET
CENTER LINE OF SURVEY	100	
RIGHT OF WAY LINE		
SECTION LINE		
ONE-QUARTER SECTION LINE	OR	
ONE-SIXTEENTH SECTION LINE		
PROPERTY LINES & TRACTS		
CITY LIMITS LINE		
RAILROAD TRACKS (℄)		
STREET CAR TRACKS (℄)		

NOTICE TO BIDDERS

IT IS RECOMMENDED THAT BIDDERS ON THE PROJECT GO OVER THE PLAN DETAILS WITH ONE OF THE FOLLOWING FIELD REPRESENTATIVES OF THIS DEPARTMENT.

D.W. ORMSBEE	URBAN ENGINEER	DENVER
FRED K. MERTEN	CONSTRUCTION ENGINEER,	DENVER
W. BOYD WHITE	RESIDENT ENGINEER	DENVER



HIGHWAY DEPARTMENT
STATE OF COLORADO

RECOMMENDED FOR APPROVAL:

James S. Bell — 11-23-51
ASSISTANT ENGINEER — DATE

APPROVED:

Merrill C. Watrous — 11-23-51
STATE HIGHWAY ENGINEER — DATE

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

RECOMMENDED FOR APPROVAL:

DISTRICT ENGINEER — DATE

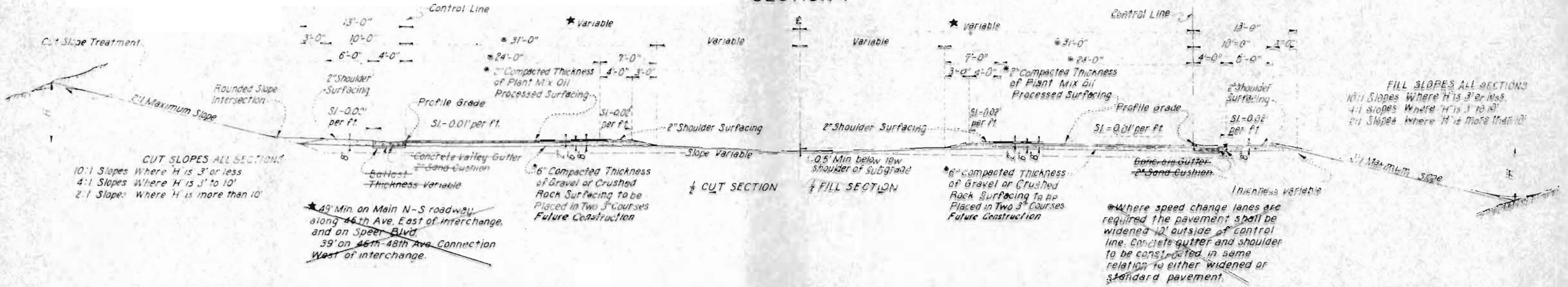
APPROVED:

DIVISION ENGINEER — DATE

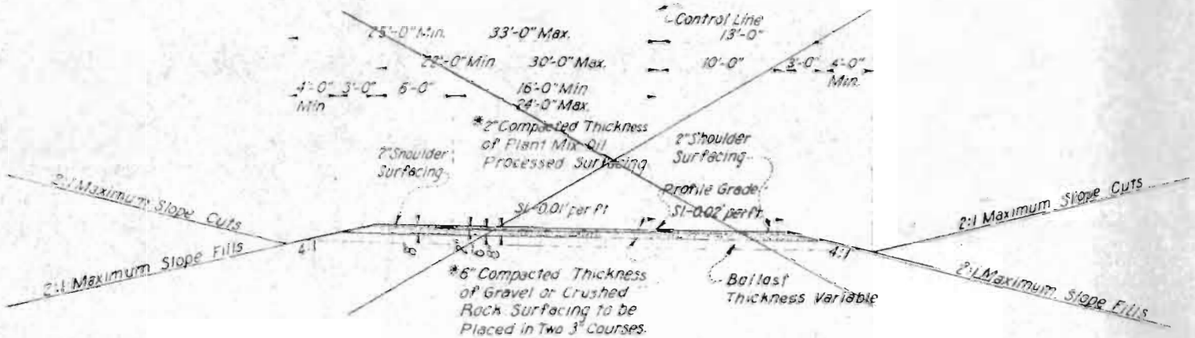
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	COLO.	UI 002-2(23) UNIT NO. 1	2	

TYPICAL SECTIONS

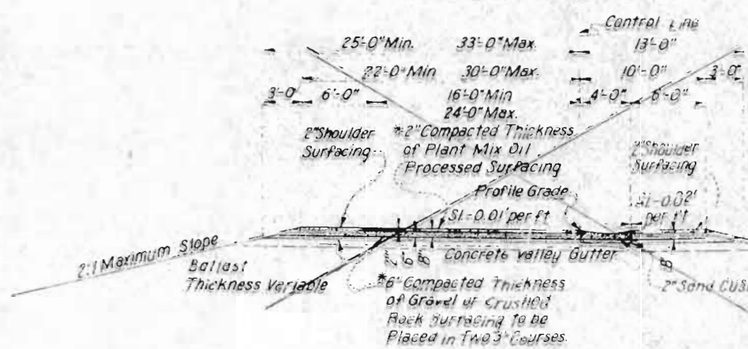
SECTION 1



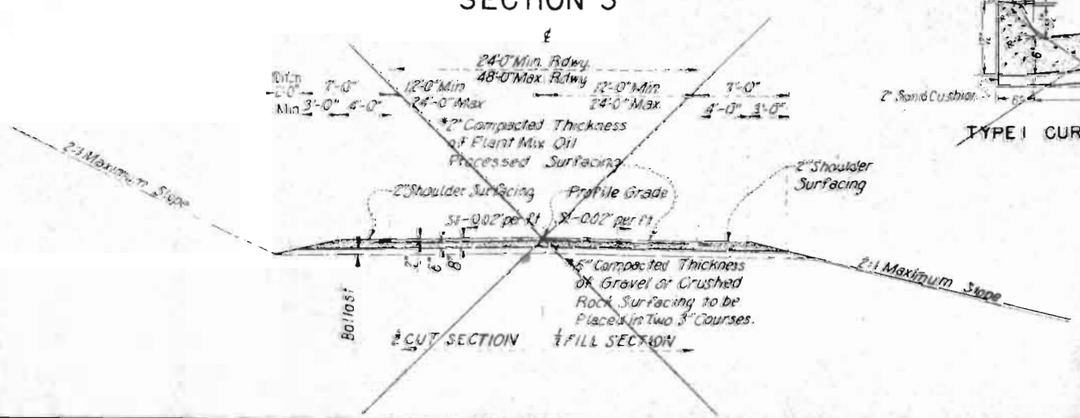
SECTION 2-A

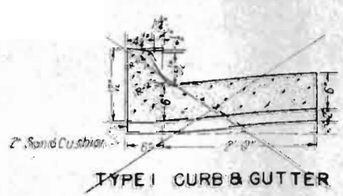


SECTION 2-B

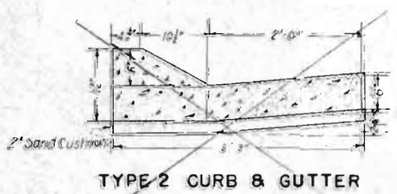


SECTION 3



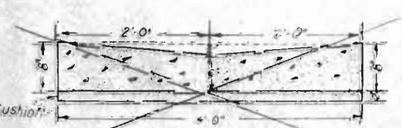


TYPE 1 CURB & GUTTER



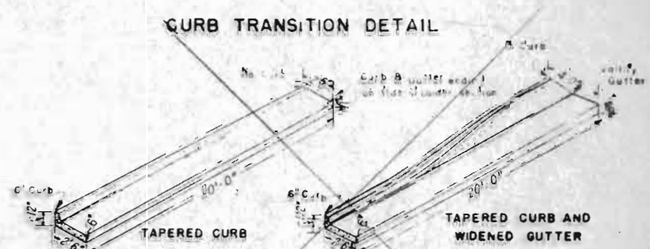
TYPE 2 CURB & GUTTER

To be used on nosing of exit Ramps from Main Highway or Intersecting Streets



DETAIL OF CONCRETE GUTTER

CURB TRANSITION DETAIL



TAPERED CURB

TAPERED CURB AND WIDENED GUTTER

Curbs shall not end abruptly but shall be tapered to Zero height over a distance of 20 ft as shown above.

On High Side of Superelevated Curves the Gutter shall have the same slope as the Pavement.

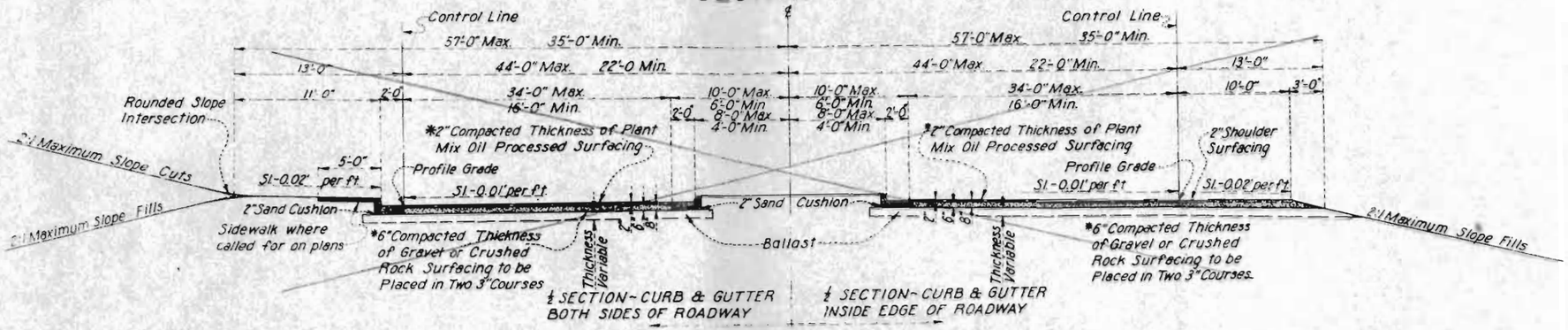
All Transitions are to be included and paid for as Concrete Combination Curb and Gutter.

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
	COLO.	UI 002-2(23) UNIT NO. 1	3	

TYPICAL SECTIONS

SECTION 4

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'

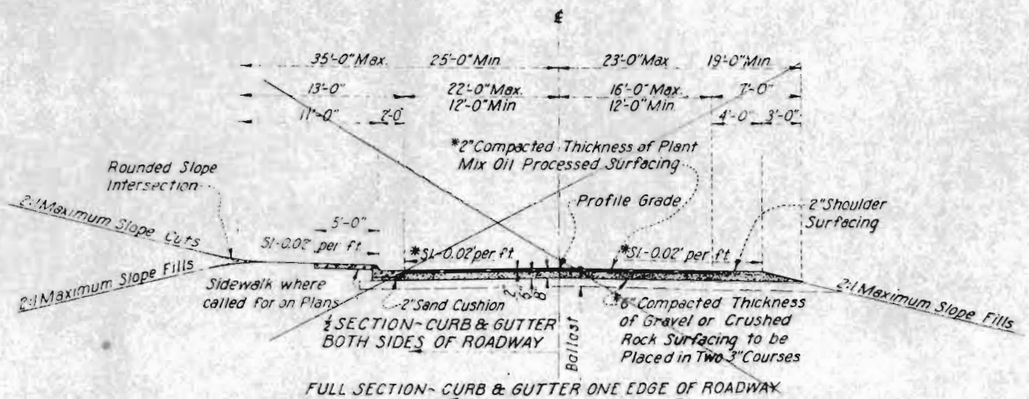


½ SECTION~ CURB & GUTTER BOTH SIDES OF ROADWAY

½ SECTION~ CURB & GUTTER INSIDE EDGE OF ROADWAY

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'

SECTION 5



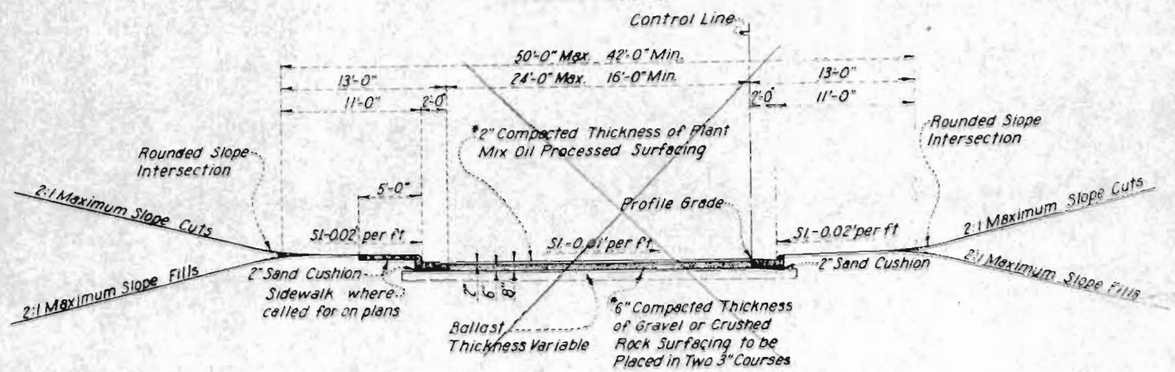
½ SECTION~ CURB & GUTTER BOTH SIDES OF ROADWAY

FULL SECTION~ CURB & GUTTER ONE EDGE OF ROADWAY

*Any change in the crown to meet existing streets shall take place gradually over sufficient distance to provide a smooth riding connection.

*6" Concrete Pavement shall be used in lieu of the 6" thickness of Gravel or Crushed Rock Surfacing and the 2" thickness of Oil Processed Surfacing, at the locations indicated in the Tabulation of Concrete Pavement on Sheet No. 56. Width of concrete pavement shall, in all cases, conform to the pavement width indicated in the Tabulation of Sections on Sheet No. 3. See Sheet No. 4 for details of concrete pavement.

SECTION 6



SECTION 6: As detailed above.
SECTION 6A: Same as Section 6 except that right hand shoulder shall be as indicated on Section 2-A.
SECTION 6B: Same as Section 6 except that right hand shoulder shall be as indicated on Section 2-B.
SECTION 6C: Same as Section 6 except that left hand shoulder shall be as indicated on Section 2-A or 2-B.

TABULATION OF SECTIONS

TYPICAL SECTION NO.	LOCATION	Station to Station		Pavement Width	REMARKS
1	Main Highway	100+50	142+70	2-24	98' Min. distance between control lines
	" "	142+70	177+60	2-24	98' " " " " " "
	Speer Boulevard			2-24	98' " " " " " "

GENERAL NOTES

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

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

All concrete used on this project shall be "Air-Entrained Concrete".

For preliminary plan quantities of asphaltic road materials, plant mixed oil processed surfacing & asphalt the following rates of application were used;

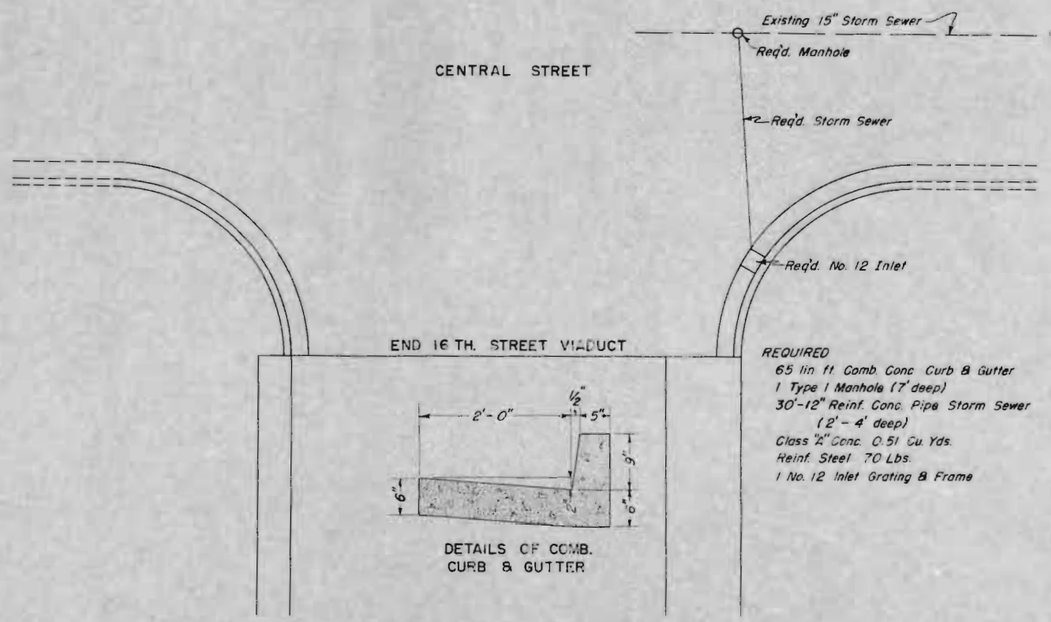
Prime Coat (over concrete) RC	at .15 gal. per Sq. Yd.
Prime Coat (over other areas) MC	at .30 gal. per Sq. Yd.
Plant Mixed Oil Processed Surfacing	at 108 lbs. per Sq. Yd. per 1" thickness
Asphalt (120-150 Penetration)	at 6.5 lbs. per Sq. Yd. per 1" thickness

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

A 2" thickness of Plant Mixed Oil Processed Surfacing shall be placed over the curbed width of the 16th St. Viaduct and on the fill portion of Detour over a 30 ft. width. Plant Mixed Oil Processed Surfacing placed on Detour Trestle shall be 2" thick at edges and crowned to 3" thickness at centerline.

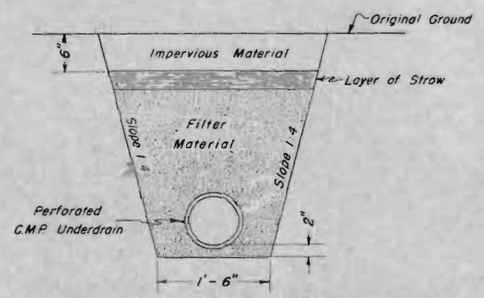
FEDERAL ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	UI 002-2 (23) UNIT NO. 1	4	

Rev. 12-21-51 – Item 47 – E.L.K.



TABULATION OF LENGTH

STATION	ROADWAY LIN. FT.		
Sta. 142+70 Begin UI 002-2(23) End UI 002-2(8) Section No. 1	3490.0		
Sta. 177+60 End UI 002-2(23) Begin UI 002-2(8) Section No. 2			
TOTAL	3490.0		
SUMMARY		LIN. FT.	MILES
Total length of Proj. No. UI 002-2(23)		3490.0	0.661



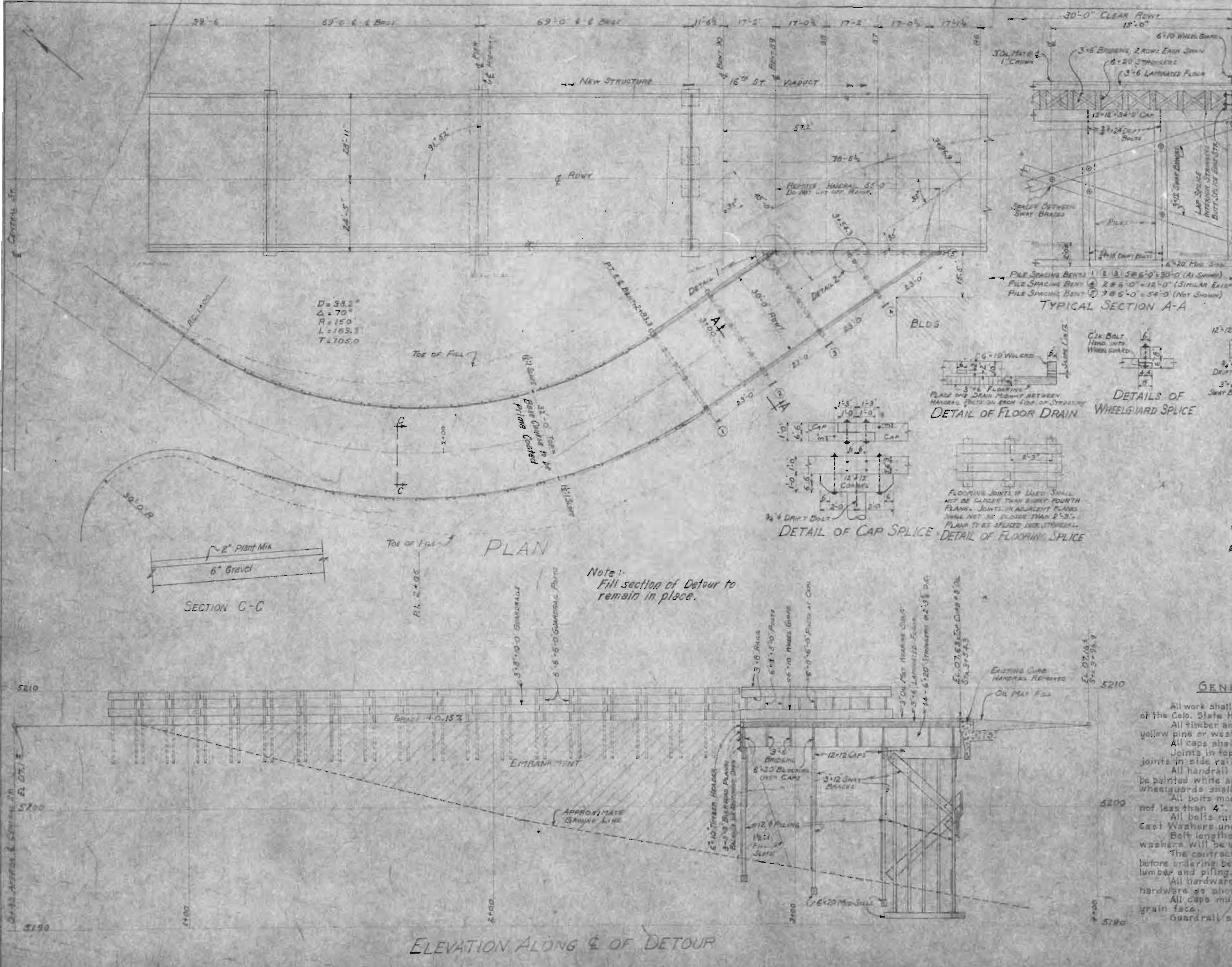
TYPICAL CROSS SECTION OF UNDERDRAIN

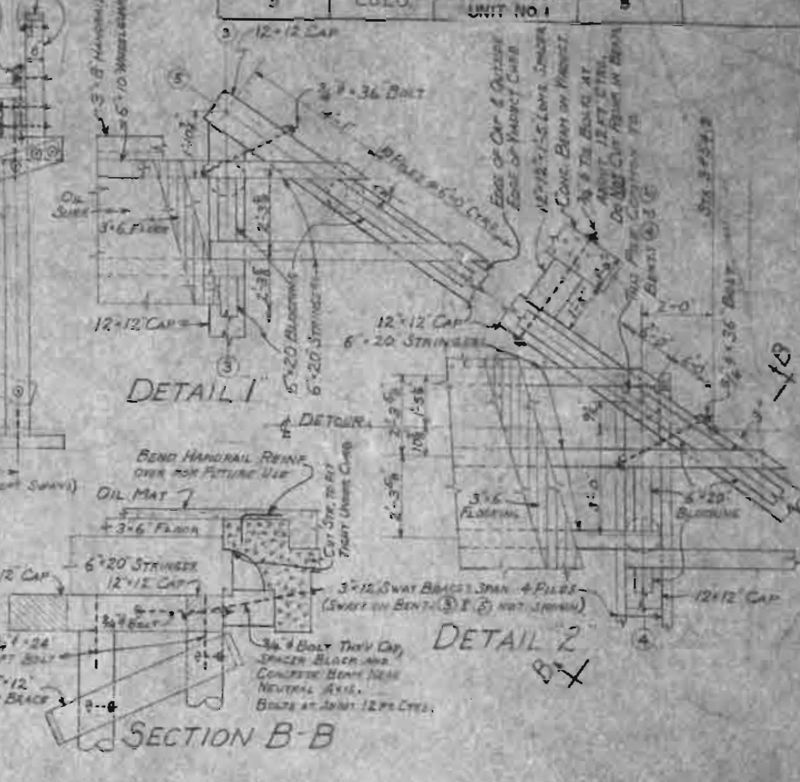
SUMMARY OF APPROXIMATE QUANTITIES

ITEM NO.	ITEM	UNIT	ROADWAY	DETOUR	BRIDGE			PROJECT TOTALS
10a	Clearing and Grubbing Entire Project	Lump Sum	•	•				•
11a	Removal of Portions of Old Structure (16th Street Viaduct)	Lump Sum			•			•
11b	Wrecking of Detour Trestle	Lump Sum		•				•
11x	Removal of Obstructions	Lump Sum	•					•
11d	Transport and Set 8" Trolley Poles	Each			6			6
11c	Remove and Reset Handrail	Lin. Ft.		55	360			415
13c	Unclassified Excavation	Cu. Yd.	12,000					12,000
14a	Dry Rock Excavation (Str.)	Cu. Yd.		10	20			30
14b	Dry Common Excavation (Str.)	Cu. Yd.	5	40	415			460
14c	Wet Rock Excavation (Str.)	Cu. Yd.			10			10
14d	Wet Common Excavation (Str.)	Cu. Yd.			10			10
16a	Structure Backfill (Class 1)	Cu. Yd.	5	40	235			280
16d	Mechanical Tamping	Hour	1	5	24			30
17ax	Rolling with Tamping Roller (2 Unit)	Hour	40	40				80
17b	Rolling with Flat Wheeled Roller	Hour		15	15			30
17c	Rolling with Rubber Tired Roller	Hour		5	5			10
17dx	Furnishing Tamping Roller (2 Unit)	Each	0.5	0.5				1
17e	Furnishing Flat Wheeled Roller	Each		0.5	0.5			1
17f	Furnishing Rubber Tired Roller	Each		0.5	0.5			1
17g	Wetting	M Gal.	40	50				90
18a	Station Yard Overhaul	Sta. Yd.	85,000					85,000
18b	Yard Mile Overhaul	Yd. Mi.	3,000					3,000
26c	Gravel or Crushed Rock Surfacing (Grading C)	Ton		500				500
29c	Asphalt (120-150 Penetration)	Ton		13	7			20
30x	Asphaltic Road Material MC (Prime)	Gal.		500				500
30y	Asphaltic Road Material RC	Gal.		40	260			300
32a	Plant Mixed Oil Processed Surfacing	Ton		223	117			340
42a	Untreated Bridge Timber	M Ft. bm		35.7				35.7
46a	Class "A" Concrete	Cu. Yd.	1		623			624
47x	Reinforcing Steel - Transport and Place	Lb.			43,600			43,600
47y	Transporting, Altering and Placing Reinforcing Steel	Lb.	100		43,900			44,000
48x	Structural Steel - Transport and Erect	Lb.			221,000			221,000
60b	Untreated Timber Piling	Lin. Ft.		367				367
61x	Steel Piling - Transporting and Driving	Lin. Ft.			392			392
71a(8)	8" Perforated Corrugated Metal Pipe Underdrain (8' Trench)	Lin. Ft.	160					160
84c	Concrete Combination Curb and Gutter	Lin. Ft.	70					70
89a	Drain Pipe (Concrete Floor) (3"x 20')	Each			2			2
90b	1¼" Electrical Conduit with Junction Boxes	Lin. Ft.			30			30
132ca	12" Reinforced Concrete Pipe Storm Sewer (2' to 4' deep) ϕ	Lin. Ft.	30					30
132ma	Manholes, Type 1 (7' deep)	Each	1					1
132qa	No. 12 Inlet Grating and Frame	Each	1					1
140	Fireproof Steel Doors	Each			1			1
	FORCE ACCOUNT							
	Rerouting Trolley Coach Lines and Relocating in Final Position (Work by Denver Tramway Corp.)	Lump Sum		•				•
	STATE FURNISHED MATERIAL							
47	Reinforcing Steel	Lb.			43,600			43,600
47	Reinforcing Steel	Lb.	100		43,900			44,000
48	Structural Steel	Lb.			221,000			221,000
61a	Steel Piling (12 BP-53)	Lin. Ft.			392			392

ϕ Depth shown is informational only.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	UI 002-2(23) UNIT NO. 1	5	





Item	Description	Unit	Total
11a	Remove and Reset Handrail	Lin. Ft.	55
14a	Dry Rock Excavation (Str.)	Cu. Yd.	5
14b	Dry Common Excav. (Str.)	Cu. Yd.	40
¢ 29d	Asphalt (120-150 Penetration)	Ton	18
16a	Structure Backfill	Cu. Yd.	40
¢ 32a	Plant Mix Oil Surfacing	Ton	223
42a	Untreated Bridge Timber	Mft. bm.	35.64
60b	Untreated Timber Piling	Lin. Ft.	387
11b	Wrecking of Detour Trestle	Lump Sum	•
*	Hardware	Lbs.	1925
¢ 30x	Asphaltic Road Material MC	Gal.	500
¢ 30y	" " " RC	Gal.	40
16d	Mechanical Tamping	Hour	4

* To be included in Bid Price of Untreated Timber.

¢ Includes Quantity for Detour

General Notes

All work shall be done according to the Specifications of the Colo. State Highway Dept. adopted Jan. 1, 1948.

All timber and piling shall be dense Southern yellow pine or west coast douglas fir.

All caps shall be edged to an even depth.

Joints in top handrail must be staggered with joints in side rail.

All handrail and posts above wheelguards shall be painted white and all handrail posts below the top of wheelguards shall be painted black as specified.

All bolts more than 12" long must be threaded not less than 4".

All bolts must have Std. C.I.O.G. or Malleable Cast Washers under each head and nut.

Bolt lengths are calculated assuming Std. C.I.O.G. Washers will be used.

The contractor is cautioned to check bolt lengths before ordering because of variations in thickness of lumber and piling.

All hardware to be galvanized. Weights of hardware as shown are for ungalvanized material.

All caps must be surfaced on vertical grain face.

Guardrail shall be painted white.

Design Data
Loading H-20-44

COLORADO STATE HIGHWAY DEPARTMENT

DETOUR AT 16TH ST. VIADUCT 30' ROW

DETAILS OF TIMBER STRUCTURE AND EMBANKMENT

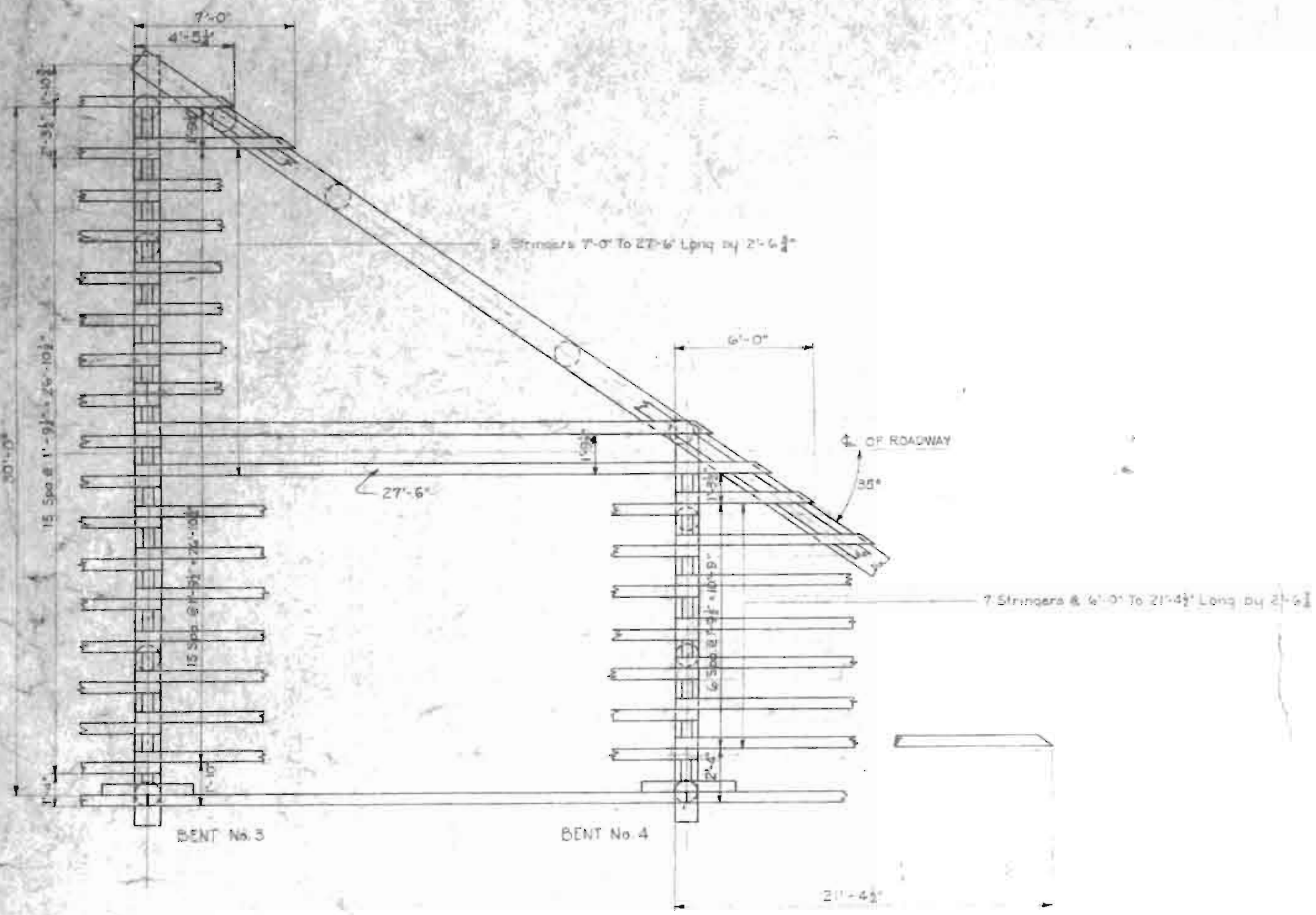
SUMMARY OF QUANTITIES

Approved by G. L. Bailey, Bridge Engineer

Date: June 6, 1951

Rev. As Constructed WO 14665
5-19-52 A.B.H.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	UI 002-2(23) UNIT NO. 1	6	



This Sketch shall apply if Contractor elects to use 6"x18" stringers in lieu of 6"x20" shown in bill of material to the right.

Note: Stringers must not be spliced.

This bill of material to be used as a basis for Payment except if 6"x18" Sills and blocking are substituted for 6"x20". This bill of material Shall be reduced accordingly.

UNTREATED TIMBER

Description	Size	No.	Length	Bd. Ft.
Guardrails on Embankment	3"x8"	72	10'-0"	1440
Guardrail Posts on Embankment	6"x6"	72	6'-0"	1296
Handrails S4S	3"x8"	12	24'-0"	576
Handrail Posts S4S (at Caps)	6"x8"	6	6'-0"	144
Handrail Posts S4S	6"x8"	20	5'-0"	400
Flooring S1S to 3" Hit or Miss	3"x6"	283	31'-0"	13160
Timber Header	6"x10"	1	31'-0"	155
Bulkhead Planks	3"x8"	3	34'-0"	204
Blocking	6"x20"	5	24'-0"	1200
Bridging	3"x6"	21	22'-0"	693
Wheelguards	6"x10"	6	24'-0"	720
Stringers - Outside - End Span	6"x20"	2	23'-6"	470
" " Interm. "	6"x20"	2	23'-0"	460
" " Skew "	6"x20"	2	27'-0"	540
" Inside Span 1, 2 & 5 in Span 3	6"x20"	29	24'-0"	6960
" " " 3 Skewed	6"x20"	1ea. of 7	7'-9" to 27'-6" by 3'-3⅞"	1234
" " " 4 "	6"x20"	1ea. of 5	8'-5" to 21'-11" by 3'-3⅞"	788
Cap Bent ① ② ③	12"x12"	3	34'-0"	1224
Cap Bent ④	12"x12"	1	17'-6"	210
Cap Bent ⑤	12"x12"	1	36'-0"	432
Cap Bent ⑤ (Includes 4' for splice)	12"x12"	1	30'-0"	360
Mud Sill Bents ① ② ③	6"x20"	3	34'-0"	1020
Mud Sill Bent ④	6"x20"	1	18'-0"	180
Mud Sill Bent ⑤	6"x20"	2	30'-0"	600
Sway Braces - Bents ① ② ③	3"x12"	6	36'-0"	648
Sway Braces Bent ④	3"x12"	2	23'-0"	138
Sway Braces Bent ⑤	3"x12"	4	34'-0"	408
Total Bd. Ft.	Untreated	Timber	=	35640
Piling Bent ①	12"ϕ	6	10'-0"	60 Lin. Ft.
Piling Bent ②	12"ϕ	6	11'-0"	66 " "
Piling Bent ③	12"ϕ	6	12'-0"	72 " "
Piling Bent ④ & ⑤	12"ϕ	13	13'-0"	169 " "
Total Lin. Ft.	Piling		=	367

HARDWARE

Location	Item	Size	No. Req'd.	Length	Weight
Bolts and Washers					
Posts to Rails	Bolts	5/8"ϕ	26	10"	28#
Posts to Wheelguards	"	3/4"ϕ	26	14"	53
Posts to Stringers	"	3/4"ϕ	44	16"	101
Wheelguards to Stringers	"	3/4"ϕ	26	38"	131
Posts to Caps to Sway Braces	"	5/8"ϕ	6	23"	13
Posts to Stringers to Stringer Splice	"	3/4"ϕ	8	22"	24
Timber Header to Stringers	Lag Screws	5/8"ϕ	14	16"	22
Cap to Piles	Drift Bolts	3/4"ϕ	31	24"	102
Mud Sill to Piles	Drift Bolts	3/4"ϕ	31	18"	79
Splices to Outside Stringers	Bolts	5/8"ϕ	24	14"	34
Sway Braces to Cap	"	5/8"ϕ	10	17"	17
Sway Braces to Piles	"	5/8"ϕ	68	17"	114
Sway to Filler to Sway at ℄ Bent	"	5/8"ϕ	6	20"	12
Cap to Cap, Bent 3 to 5 & 4 to 5	"	3/4"ϕ	2	36"	10
Cap to Viaduct Conc. Beam	"	3/4"ϕ	4	46"	24
Cap Splice	"	3/4"ϕ	4	14"	8
Cap Splice	"	3/4"ϕ	2	26"	7
Washers Std. C.I.O.G.	Washers	3/4"ϕ	232		250
Washers Std. C.I.O.G.	Washers	5/8"ϕ	294		215
		Total	Bolts &	Washers	1244#

Nails

Location	30d	40d	7" Spikes
2 Nails/Rail/Post, Bridge		5#	
2 Nails/Rail/Post, Embankment Rail		16#	
4 Nails/Stringer Block to Stringer		18#	
4 Nails/Str. Bridging Piece to Str.		37#	
2 Nails/Stringer to Cap		11#	
2 Spikes/Sway Brace/Pile			19#
2 Spikes/Bulkhead Plank/Str.			12#
2 Spikes/Sway Brace to Cap			3#
Floor Plank to Floor Plank 1-40d nail at 12" crs & toenail planks to stringers with 1-30d nail/Str. every other plank	82#	483#	
Totals	82#	565#	34#

COLORADO STATE HIGHWAY DEPARTMENT
DETOUR AT 16TH ST. VIADUCT
30' RDWY.
QUANTITIES

Design by: G.H.W.
Made by: L.W.F.
Check by:
Approved by: [signature] Bridge Engineer
Date: June 4, 1951.

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	U. 002-2(13) UNIT NO. 1	7	

Rev 12-21-51 -- Summary & Notes -- J.C.R.

PLAN

ELEVATION

FOOTING PLAN

LOG OF SOIL TEST HOLES

LIST OF DRAWINGS

SHEET NO.		DESCRIPTION
1 OF 11	(7)	GEN. PLAN & ELEV. & SUMMARY OF QUANTITIES
2 OF 11	(8)	BAR LISTS FOR REINF. STEEL ITEM 47
3 OF 11	(9)	BAR LISTS FOR REINF. STEEL FURNISHED BY STATE.
4 OF 11	(10)	SOUTH PIER
5 OF 11	(11)	CENTER PIER
6 OF 11	(12)	NORTH ABUTMENT DECK
7 OF 11	(13)	NORTH ABUTMENT WALLS AND FOOTING
8 OF 11	(14)	BEAMS AND BEARINGS
9 OF 11	(15)	DECK
10 OF 11	(16)	RECONSTRUCTION AT CUTOFF OF EXISTING STRUCTURE
11 OF 11	(17)	EXPANSION JOINTS

SUMMARY OF QUANTITIES

No.	Item	Unit	No. Abut.	So. Pier	Cen. Pier	Super Struc.	Totals
	Removal of Portion of Old Structure	Lump Sum					Lump Sum
1C	Remove & Reset Handrail	Lin. Ft.					356
✧ 1J	Transport & Set 8" Trolley Poles	Each	2			4	6
14A	Dry Rock Excavation	Cu. Yds.			16		16
14B	Dry Common Excavation	Cu. Yds.	116	50	84		250
14C	Wet Rock Excavation	Cu. Yds.			6		6
14a	Wet Common Excavation	Cu. Yds.			5		5
15	Structure Back Fill	Cu. Yds.	166	40	30		236
16	Mechanical Tamping	Hrs.	17	4	3		24
45a	Class A Concrete	Cu. Yds.	250	55	118	150	623
47A	Reinforcing Steel (Furnished by State)	Lbs.	312 *	6600 *	11,020	12,800	* 13,574
47a	Structural Steel	Lbs.				220970	220970
51a	Steel Piling (12 BP 53)	Lin. Ft.	200	192			392
96	4" Elect. Conduit & Jet Chases	Lin. Ft.				26	26
140	Fireproof Door & Frame	Each	1				1
183a	Drain Pipe (Concrete Floor)	Each				2	2
47J	Transporting, Altering & Placing Reinforcing Steel	Lb.	SEE NOTE "B" THIS SHEET				12,906
47	Reinforcing Steel	Lb.					87,346

Does not include any steel items in connection with concrete & steel handrail.
* Includes all concrete handrail as shown in section 'Z-Z', and railing posts as shown in section 'X-X' and 'Y-Y' and resetting cast iron posts & pipe railing. Includes Approx. 12 Cu Yds concrete
△ 2" Drain Pipes - Includes 4 1-0" & 3" 90° pipe & 2 90° elbows
✧ 8" Trolley poles to be furnished by Thomas, Corp. Denver.

Note "A" 43,540 lbs. Reinf. Steel furnished to Contractor without cost at project site.
Note "B" 43,806 lbs. Reinf. Steel furnished by the State Highway Department without cost to the Contractor, from storage yard, 35th Ave. and Galapago St., Denver, Colo.

SEE NOTE "A" THIS SHEET

Note: Check elevations shown for new structure against controlling elevations on existing structure and adjust top of curb as necessary. Vary height of curb & sidewalk and thickness of asphalt surface if & as necessary to match existing structure.

Design Specifications 1949 A.A.S.H.O.
Existing "ARMCO" Piles
Max. allowable soil pressure.
40 tons per pile and 5 tons per sq. ft. for shale. Pile bearing surface included in unit load.

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY ..... DENVER, COLORADO

SIXTEENTH ST. VIADUCT MODIFICATION

GENERAL PLAN AND ELEVATION

STRUCTURE NO. E-16-EX

CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

DATE | SHEET 1 OF 11 | DWG. NO.

BAR LIST FOR NORTH ABUTMENT

FL JVG

MARK	SIZE	Nº	LENGTH	TYPE	O	A	B	C	J
S4T 7-0	½"	4	7'-0"	STR					
B10S 40-7	1¼"	20	40'-7"	II	38'-3"				
B10S 31-4	1¼"	10	31'-4"	II	29'-0"				
B10S 23-4	1¼"	10	23'-4"	II	21'-0"				
B9S 40-5	1⅛"	4	40'-5"	II	38'3"				
B9S 30-2	1⅛"	2	30'-2"	II	28'0"				
B9S 21-2	1⅛"	2	21'-2"	II	19'-0"				
B6T 39'-7	¾"	12	39'-7"	II	38'-3				
Ba 8T 28-7	1"	16	28'-7"	I	27'-8"				10"
La4T 5'-6	½"	6	5'-6"	III		2'-6	0'-8	2'-6	
Ad9S 48-10	1⅛"	4	48'-10"	XIII		43'-0	3'-8	1'-6	
Ag9S 47-8	1⅛"	2	47'-8"	XIV		39'-11	5'-7"	3'-8	
H4T 15-9	½"	43	15'-9"	XII		5'-0"	2'-5	1'-8	
H4T 8-7	½"	140	8'-7"	XII		2'-11"	1'-2"	0'-11	
H4T 8-3	½"	28	8'-3"	XII		2'-9	1'-2"	0'-11	

BAR LIST FOR CENTER PIER

FL JVG

MARK	SIZE	Nº	LENGTH	TYPE	O	A	B	C
S8T 17-9	1"	48	17'-9"	STR				
S8T 9-9	1"	48	9'-9"	STR				
S4T 7-0	½"	12	7'-0"	STR				
B10S 57-10	1¼"	12	57'-10"	II	55'6			
B9S 24-4	1⅛"	2	24'-4"	II	22'0"			
B10S 14-4	1¼"	6	14'-4"	II	12'0"			
B9S 55-4	1⅛"	4	55'-4"	II	53'6			
B8S 22-2"	1"	4	22'2"	II	20'0"			
B4T 6-6	½"	67	6'-6"	II	5'6			
La9S 58-6	1⅛"	2	58'-6"	III		3'0	53'1"	3'0
Aa4T 11'3	½"	8	11'-3"	XV	8'6	2'9	0'8	2'8
A4T 30-0	½"	4	30'-0"	VI	14'0	8'0	1'11"	7'9"
He4T 13-0	½"	2	13'-0"	XVI			3'-4	3'0"
He4T 12-10	½"	2	12'10	XVI			3'3½	2'11½
He4T 12-9	½"	2	12'-9"	XVI			3'3	2'11½
He4T 12-7	½"	2	12'-7"	XVI			3'-2½	2'11"
He4T 12-6	½"	2	12'6"	XVI			3'-2	2'-11"
He4T 12-4	½"	2	12'-4"	XVI			3'-1½	2'-10½
He2 4T 12-4	½"	2	12'-4"	XVI			2'-8	3'-4"
He4T 12-3	½"	2	12'-3"	XVI			3'-1"	2'-10½
He2 4T 12-3	½"	2	12'-3"	XVI			2'-8	3'-3½
He4T 12-2	½"	2	12'-2"	XVI			2'-8	3'-3"
He4T 12-1	½"	2	12'-1"	XVI			3'0½	2'-10
He2 4T 12-1	½"	2	12'-1"	XVI			2'-8	3'-2½
He4T 12-0	½"	2	12'-0"	XVI			3'0	2'-10"
Heg4T 12-0	½"	2	12'-0"	XVI			2'-8	3'-2"
He4T 11-11	½"	2	11'-11"	XVI			2'11½	2'-10½
He2 4T 11-11	½"	2	11'-11"	XVI			2'-8	3'-1½
He4T 11-10	½"	2	11'-10	XVI			2'-11	2'-10½
He4T 11-9	½"	2	11'-9"	XVI			2'-8	3'-0½
He4T 11-8	½"	2	11'-8"	XVI			2'-8	3'-0"
He4T 11-7	½"	2	11'-7"	XVI			2'11½	2'-11½
He2 4T 11-7	½"	2	11'-7"	XVI			2'-8	2'-11½
He4T 11-6	½"	2	11'-6"	XVI			2'-8	2'-11"
He2 4T 11-6	½"	2	11'-6"	XVI			2'-8	2'-11"
He4T 11-5	½"	2	11'-5"	XVI			2'-8	2'-10½
H4T 15-1	½"	7	15'-1"	XII		4'-8"	2'-8	1'-8"
H4T 14-11	½"	4	14'-11"	XII		4'-7	2'-8	1'-8"
H4T 14-3	½"	4	14'-3"	XII		4'-3	2'-8	1'-8"
H4T 13-7	½"	4	13'-7"	XII		3'-11	2'-8	1'-8"
H4T 13-1	½"	16	13'-1"	XII		3'-8"	2'-8	1'-8"
H4T 6-11	½"	8	6'-11"	XII		0'-8	2'-7"	1'-7½"

BAR LIST FOR SOUTH PIER

FL JVG

MARK	SIZE	Nº	LENGTH	TYPE	O	A	B	C
S8T 17-9	1"	48	17'-9"	STR				
S4T 7'-0	½"	8	7'-0"	STR				
B10S 56-0	1¼"	2	56'-0"	II	53'8			
B10S 24-4	1¼"	2	24'-0"	II	22'0			
B10S 14-8	1¼"	4	14'-8"	II	12'6			
B7T 7-2	⅞"	28	7'-2"	II	5'6			
B6T 54-10	¾"	2	54'-10"	II	53'6			
La10S 58-9	1¼"	2	58'-9"	III		2'-10"	53'-8	2'-10"
L8T 6-6	1"	48	6'-6"	IV	5'-6	1'-3"		
Aa4T 9'0"	½"	8	9'-0"	XV	6'3	2'-9	0'-8	2'-8
A4T 26'-0"	½"	4	26'-0"	VI	14'-0	6'-0"	1'-5"	5'-10
HK4T 6-7	½"	35	6'-7"	XVII				
He4T 13-0	½"	2	13'-0"	XVI			3'0	3'-4
He4T 12'10	½"	2	12'10"	XVI			2'11½	3'-3½
He4T 12-9	½"	2	12'-9"	XVI			2'11½	3'3
He4T 12-7	½"	2	12'-7"	XVI			2'-11	3'2½
He4T 12-6	½"	2	12'-6"	XVI			2'-11	3'-2"
He4T 12-4	½"	2	12'-4"	XVI			2'-10½	3'-1½
He2 4T 12-4	½"	2	12'-4"	XVI			2'-8	3'-4"
He2 4T 12-3	½"	2	12'-3"	XVI			2'-8	3'-3½
He4T 12-2	½"	2	12'-2"	XVI			2'-8	3'-3"
He4T 12-1	½"	2	12'-1"	XVI			2'10½	3'-2½
He4T 12-0	½"	2	12'-0"	XVI			2'-8	3'-2"
He2 4T 12-0	½"	2	12'-0"	XVI			2'-8	3'-2"
He4T 11-11	½"	2	11'-11"	XVI			2'-8	3'-1½
He4T 11-10	½"	2	11'-10"	XVI			2'11½	2'11½
He2 4T 11-10	½"	2	11'-10"	XVI			2'-8	3'-1"
He4T 11-9	½"	2	11'-9"	XVI			2'-8	3'0½
He2 4T 11-9	½"	2	11'-9"	XVI			2'-8	3'-0½
He4T 11-8	½"	2	11'-8"	XVI			2'-8	3'0"
He4T 11-7	½"	2	11'-7"	XVI			2'-9	2'10½
He4T 11-6	½"	2	11'-6"	XVI			2'-8	2'11"
He2 4T 11-7	½"	2	11'-7"	XVI			2'-8	2'11½
He 4T 11-5	½"	2	11'-5"	XVI			2'-8	2'-10½
H4T 15'-1	½"	7	15'-1"	XII		4'-8"	2'-8	1'-8"
H4T 14-11	½"	4	14'-11"	XII		4'-7	2'-8	1'-8"
H4T 14-3	½"	4	14'-3"	XII		4'-3	2'-8	1'-8"
H4T 13-7	½"	4	13'-7"	XII		3'-11	2'-8	1'-8"
H4T 13-1	½"	16	13'-1"	XII		3'-8"	2'-8	1'-8"
H4T 6-11	½"	8	6'-11"	XII		0'-8	2'-7"	1'-7½"

BAR LIST FOR SUPERSTRUCTURE

FL JVG

MARK	SIZE	Nº	LENGTH	TYPE	O	A	B	C	J
S4T 37-6	½"	32	37'-6"	STR					
S4T 22-2	½"	8	22'-2"	STR					
S4T 6-0	½"	2	6'-0"	STR					
S4T 4-0	½"	32	4'-0"	STR					
S4T 2-6	½"	18	2'-6"	STR					
S4T 2-4	½"	16	2'-4"	STR					
B8T 24-4	1"	2	24'-4"	II	22'6				
B8T 23-6	1"	2	23'-6"	II	21'8				
B8T 14-2	1"	6	14'-2"	II	12'4				
B8T 10-5	1"	1	10'-5"	II	8'7"				
B8T 9-5	1"	1	9'-5"	II	7'8				
Ba8T 9-6	1"	2	9'-6"	I	8'7"				10"
Ba8T 8-7	1"	2	8'-7"	I	7'8				10"
Ba5T 32-8	⅝"	10	32'-8"	I	32'7"				5"
Ba5T 15-3	⅝"	148	15'-3"	I	14'8				5"
La4T 5-1	½"	276	5'-1"	III		2'-5	0'-5	2'-5	
E5T 7-2	⅜"	8	7'-2"	XVIII	3'0				
A5T 18-7	⅜"	73	18'-7"	XIX			16'11"	1'-4	
A5T 18-2	⅜"	75	18'-2"	XIX			16'6	1'-4	
H4T 10-9	½"	24	10'-9"	XII		0'-8"	4'-6"	2'-7"	
H3T 3-9	⅜"	48	3'-9"	XII		0'-10"	0'-10	1'-9"	
HR4T 3-8	½"	43	3'-8"	XX					
T5T 25-5	⅝"	75	25'-5"	IX	23'1"	3'-5"			
T5T 26-3	⅝"	75	26'-3"	IX	24'3	4'-3"			
S6T 8-0	¾"	2	8'-0"	STR					

BAR SUMMARY FOR NORTH ABUTMENT

2171 LIN. FT. ½" BARS @ 0.668 LBS. PER LIN. FT. = 1450 LBS.
475 " " ¾" " @ 1.502 " " " " = 714 "
458 " " 1" " @ 2.670 " " " " = 1223 "
555 " " 1⅛" " @ 4.303 " " " " = 2388 "
1358 " " 1¼" " @ 5.313 " " " " = 7215 "

PLUS 1% OVERRUN = 130 LBS.
TOTAL = 13,120 LBS.

BAR SUMMARY FOR CENTER PIER

1313 LIN. FT. ½" BARS @ 0.668 LBS. PER LIN. FT. = 1278 LBS.
1330 " " 1" " @ 2.670 " " " " = 3524 "
387 " " 1⅛" " @ 4.303 " " " " = 1665 "
781 " " 1¼" " @ 5.313 " " " " = 4150 "
89 " " 1" " @ 3.400 " " " " = 303 "

PLUS 1% OVERRUN = 100 LBS.
TOTAL = 11,020 LBS.

BAR SUMMARY FOR SOUTH PIER

1584 LIN. FT. ½" BARS @ 0.668 LBS. PER LIN. FT. = 1058 LBS.
110 " " ¾" " @ 1.502 " " " " = 165 "
201 " " 1" " @ 2.044 " " " " = 411 "
1165 " " 1" " @ 2.670 " " " " = 3111 "
338 " " 1¼" " @ 5.313 " " " " = 1795 "

PLUS 1% OVERRUN = 70 LBS.
TOTAL = 6,600 LBS.

BAR SUMMARY FOR SUPERSTRUCTURE

180 LIN. FT. ⅜" BARS @ 0.376 LBS. PER LIN. FT. = 65 LBS.
3420 " " ½" " @ 0.668 " " " " = 2285 "
9178 " " ¾" " @ 1.043 " " " " = 9573 "
237 " " 1" " @ 2.670 " " " " = 632 "
74 " " ¾" " @ 1.502 " " " " = 111 "

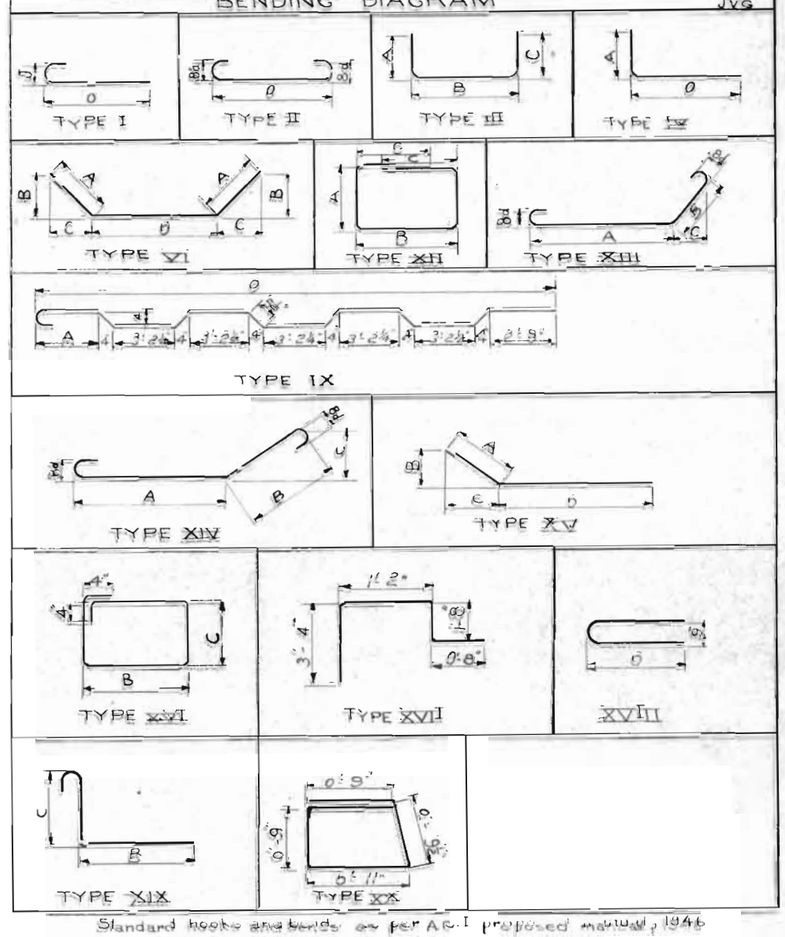
PLUS 1% OVERRUN = 131 LBS.
TOTAL = 12,900 LBS.

TOTAL REINFORCING STEEL ON THIS SHEET = 43,540 LBS. (WHICH INCLUDES 7080 LBS. OF STRAIGHT BARS)

FED. ROAD DIST. NO.	STATE	PROJ. Nº	SHEET NO.	TOTAL SHEETS
3	COLO.	UI 80E-2(23) UNIT NO. 1	8	

BENDING DIAGRAM

FL JVG



Standard hooks and bends as per A.R.I. proposed manual, 1946

NOTE:
See Sh.ª 9 for bar list for reinforcing steel furnished by the Colo. State Highway Dept.

SHEET Nº 8 OF 11

COLORADO
STATE HIGHWAY DEPARTMENT
SIXTEENTH ST.
VIADUCT MODIFICATION
REINFORCING STEEL

Inv. pass. Sta.
Near. Sec. T. R.
Designed by
Made by
Checked by
Approved by Bridge Engineer
Date:

STRUCTURE Nº E-16-EX

REVISIONS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	UI 002-2(23) UNIT NO. 1	9	

BAR LIST FOR NORTH ABUTMENT

FL. J.V.G.

MARK	SIZE	NO.	LENGTH	TYPE	DIMENSIONS O	J	A	B	C
S5, 35'-8"	5/8" ø	4	35'-8"	STR.					
S5, 21'-8"	5/8" ø	4	21'-8"	STR.					
S5, 35'-8"	5/8" ø	2	35'-8"	STR.					
S5, 18'-10"	5/8" ø	2	18'-10"	STR.					
S5, 35'-8"	5/8" ø	8	35'-8"	STR.					
S5, 7'-0"	5/8" ø	8	7'-0"	STR.					
S5, 35'-8"	5/8" ø	4	35'-8"	STR.					
S5, 4'-8"	5/8" ø	4	4'-9"	STR.					
S5, 35'-8"	5/8" ø	63	35'-8"	STR.					
S5, 4'-5"	5/8" ø	63	4'-5"	STR.					
S5, 34'-8"	5/8" ø	4	34'-8"	STR.					
S5, 31'-0"	5/8" ø	4	31'-0"	STR.					
S5, 28'-5"	5/8" ø	6	28'-5"	STR.					
S5, 27'-3"	5/8" ø	4	27'-3"	STR.					
S5, 25'-11"	5/8" ø	6	25'-11"	STR.					
S5, 23'-6"	5/8" ø	4	23'-6"	STR.					
S5, 21'-2"	5/8" ø	36	21'-2"	STR.					
S5, 19'-9"	5/8" ø	4	19'-9"	STR.					
S5, 16'-2"	5/8" ø	4	16'-2"	STR.					
S5, 12'-5"	5/8" ø	4	12'-5"	STR.					
S5, 8'-8"	5/8" ø	4	8'-8"	STR.					
S5, 8'-0"	5/8" ø	4	8'-0"	STR.					
S5, 5'-0"	5/8" ø	6	5'-0"	STR.					
S5, 10'-0"	5/8" ø	2	10'-0"	STR.					
B5, 4'-8"	5/8" ø	103	4'-8"	II	3'-6"				
Ba5, 4'-7"	5/8" ø	72	4'-7"	I	4'-0"	8d			
Ba5, 21'-0"	5/8" ø	23	21'-0"	I	20'-5"	6d			
Ba5, 32'-4"	5/8" ø	23	32'-4"	I	31'-9"	6d			
La5, 35'-8"	5/8" ø	15	35'-8"	IV	34'-11"		11"		
La5, 20'-4"	5/8" ø	15	20'-4"	IV	19'-7"		11"		
La5, 9'-9"	5/8" ø	7	9'-9"	III			9"	7'-4"	2'-0"
La5, 9'-1"	5/8" ø	10	9'-1"	III			9"	6'-8"	2'-0"
La5, 8'-11"	5/8" ø	8	8'-11"	III			9"	6'-6"	2'-0"
La5, 9'-2"	5/8" ø	11	9'-2"	III			9"	6'-9"	2'-0"
L5, 32'-4"	5/8" ø	28	32'-4"	IV	27'-6"		5'-0"		
L5, 23'-0"	5/8" ø	4	23'-0"	IV	22'-5"		9"		
L5, 22'-6"	5/8" ø	4	22'-6"	IV	21'-11"		9"		
L5, 22'-0"	5/8" ø	4	22'-0"	IV	21'-5"		9"		
L5, 21'-3"	5/8" ø	4	21'-3"	IV	20'-8"		9"		
L5, 20'-6"	5/8" ø	4	20'-6"	IV	19'-11"		9"		
L5, 19'-9"	5/8" ø	4	19'-9"	IV	19'-2"		9"		
L5, 19'-0"	5/8" ø	4	19'-0"	IV	18'-5"		9"		
L5, 18'-3"	5/8" ø	4	18'-3"	IV	17'-8"		9"		
L5, 17'-5"	5/8" ø	4	17'-5"	IV	16'-10"		9"		
L5, 16'-8"	5/8" ø	4	16'-8"	IV	16'-0"		9"		
L5, 15'-11"	5/8" ø	4	15'-11"	IV	15'-4"		9"		
L5, 15'-2"	5/8" ø	4	15'-2"	IV	14'-7"		9"		
L5, 14'-5"	5/8" ø	4	14'-5"	IV	13'-10"		9"		
L5, 13'-8"	5/8" ø	4	13'-8"	IV	13'-1"		9"		
L5, 13'-0"	5/8" ø	4	13'-0"	IV	12'-5"		9"		
L5, 12'-3"	5/8" ø	4	12'-3"	IV	11'-8"		9"		
L5, 11'-6"	5/8" ø	4	11'-6"	IV	10'-11"		9"		
L5, 10'-9"	5/8" ø	4	10'-9"	IV	10'-2"		9"		
L5, 10'-0"	5/8" ø	4	10'-0"	IV	9'-5"		9"		
L5, 9'-3"	5/8" ø	4	9'-3"	IV	8'-8"		9"		
L5, 7'-11"	5/8" ø	7	7'-11"	IV	7'-4"		9"		
L5, 8'-6"	5/8" ø	4	8'-6"	IV	7'-11"		9"		
L5, 7'-3"	5/8" ø	10	7'-3"	IV	6'-8"		9"		
L5, 7'-1"	5/8" ø	8	7'-1"	IV	6'-6"		9"		
L5, 7'-9"	5/8" ø	4	7'-9"	IV	7'-2"		9"		
L5, 7'-4"	5/8" ø	11	7'-4"	IV	6'-9"		9"		
L5, 7'-0"	5/8" ø	4	7'-0"	IV	6'-5"		9"		
L5, 6'-3"	5/8" ø	4	6'-3"	IV	5'-8"		9"		
L5, 5'-9"	5/8" ø	28	5'-9"	IV	5'-0"		11"		
L5, 4'-4"	5/8" ø	34	4'-4"	IV	2'-6"		2'-0"		
L5, 8'-4"	5/8" ø	3	8'-4"	IV	6'-6"		2'-0"		

BAR LIST FOR NORTH ABUTMENT CONT.

MARK	SIZE	NO.	LENGTH	TYPE	DIMENSIONS O	A	B	C	D	E	F	G
Bc5, 23'9"	5/8" ø	36	23'-9"	V		21'-2"				2'-2"		
A5, 6'-8"	5/8" ø	24	6'-8"	VI		1'-3"	10½"	10½"	4'-4"	10½"	10½"	1'-3"
A5, 6'-5"	5/8" ø	24	6'-5"	VI		1'-3"	10½"	10½"	4'-1"	10½"	10½"	1'-3"
Bd5, 23'8"	5/8" ø	29	23'-8"	VII		6'-4"		1'-0"		16'-6"		
Hp5, 5'-6"	5/8" ø	20	5'-6"	VIII		1'-9"	2'-1"	2'-0"	10"			
T5, 25'-6"	5/8" ø	28	25'-6"	IX	24'-2"							
T5, 31'-2"	5/8" ø	28	31'-2"	X	30'-4"							
T5, 34'-3"	5/8" ø	29	34'-3"	XI	34'-2"							

BAR LIST FOR CENTER PIER

FL. J.V.G.

MARK	SIZE	NO	LENGTH	TYPE	DIMENSIONS O	A	B	C
S5, 35'-8"	5/8" ø	4	35'-8"	STR.				
S5, 21'-8"	5/8" ø	4	21'-8"	STR.				
S5, 35'-8"	5/8" ø	4	35'-8"	STR.				
S5, 19'-5"	5/8" ø	4	19'-5"	STR.				
H5, 18'-0"	5/8" ø	7	18'-0"	XII		6'-2"	2'-8"	1'-8"
H5, 17'-10"	5/8" ø	2	17'-10"	XII		6'-1"	2'-8"	1'-8"
H5, 17'-2"	5/8" ø	2	17'-2"	XII		5'-9"	2'-8"	1'-8"
H5, 16'-7"	5/8" ø	2	16'-7"	XII		5'-5½"	2'-8"	1'-8"
H5, 16'-0"	5/8" ø	4	16'-0"	XII		6'-1"	1'-9"	1'-2½"
H25, 16'-0"	5/8" ø	2	16'-0"	XII		5'-2"	2'-8"	1'-8"
H5, 15'-8"	5/8" ø	4	15'-8"	XII		5'-11"	1'-9"	1'-2½"
H5, 15'-5"	5/8" ø	4	15'-5"	XII		5'-9½"	1'-9"	1'-2½"
H5, 15'-4"	5/8" ø	4	15'-4"	XII		4'-10"	2'-8"	1'-8"
H5, 15'-1"	5/8" ø	4	15'-1"	XII		5'-7½"	1'-9"	1'-2½"
H5, 15'-0"	5/8" ø	8	15'-0"	XII		4'-8"	2'-8"	1'-8"
H5, 14'-10"	5/8" ø	4	14'-10"	XII		5'-6"	1'-9"	1'-2½"
H5, 14'-6"	5/8" ø	4	14'-6"	XII		5'-4"	1'-9"	1'-2½"
H5, 14'-3"	5/8" ø	4	14'-3"	XII		5'-2½"	1'-9"	1'-2½"
H5, 13'-11"	5/8" ø	4	13'-11"	XII		5'-0½"	1'-9"	1'-2½"

BAR LIST FOR SOUTH PIER

FL. J.V.G.

MARK	SIZE	NO	LENGTH	TYPE	O
S5, 35'-8"	5/8" ø	4	35'-8"	STR.	
S5, 19'-10"	5/8" ø	4	19'-10"	STR.	
B5, 6'-8"	5/8" ø	28	6'-8"	II	5'-6"

BAR LIST FOR SUPERSTRUCTURE

FL. J.V.G.

MARK	SIZE	NO	LENGTH	TYPE	DIMENSIONS O	A	B	C
S5, 35'-8"	5/8" ø	267	35'-8"	STR.				
S5, 11'-10½"	5/8" ø	267	11'-10½"	STR.				
B5, 7'-9"	5/8" ø	144	7'-9"	II	6'-7"			
H5, 7'-1"	5/8" ø	71	7'-1"	XII		1'-3½"	2'-1"	1'-4½"
Ba5, 34'-11"	5/8" ø	148	34'-11"	I	34'-4"			
Ba5, 32'-8"	5/8" ø	138	32'-8"	I	32'-1"			

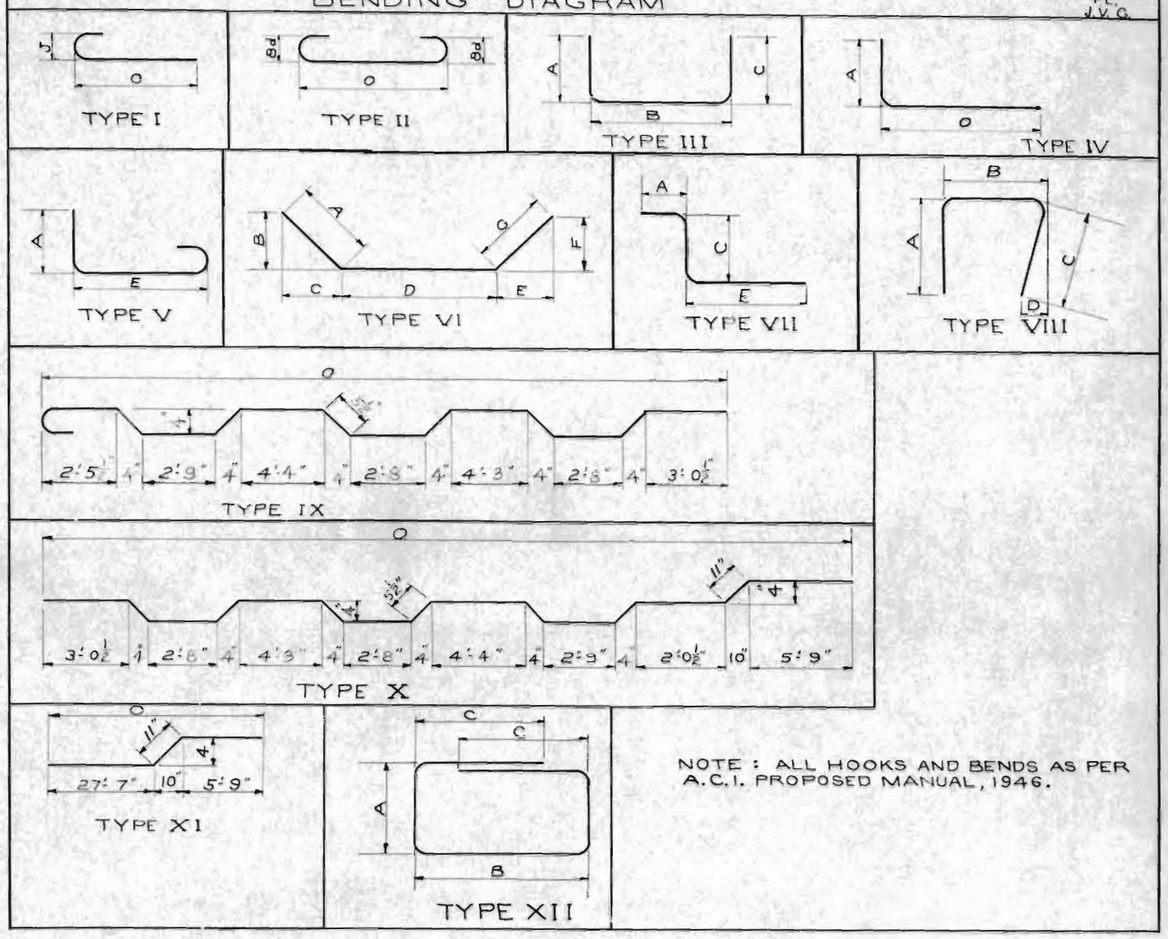
SUMMARY OF 5/8" ø BARS REQUIRED*

42,000 LIN. FT. @ 1.043 LBS. PER LIN. FT. = 43,806 LBS.

* 43,806 LBS. = NET WT. OF FABRICATED STEEL (NO OVERRUN INCLUDED) TO BE MADE FROM FURNISHED STEEL.

BENDING DIAGRAM

FL. J.V.G.



NOTE : ALL HOOKS AND BENDS AS PER A.C.I. PROPOSED MANUAL, 1946.

ALL REINFORCING BARS ON THIS SHEET TO BE FABRICATED FROM REINFORCING STEEL FURNISHED BY THE COLO. STATE HIGHWAY DEPT. THE FURNISHED STEEL IS IN THE AMOUNT AND AS TAGGED AS SHOWN BELOW.

	MARK	NUMBER OF PIECES	SIZE	LENGTH	DESCRIPTION
AS TAGGED	S5T 35-8	608	5/8" ø	35'-8"	35'-8"
AS TAGGED	B5T 36-10	608	5/8" ø	36'-10"	STANDARD HOOKS PER A.C.I. 35'-8"
	TOTAL WEIGHT = 45,975 LBS. (GROSS WT. OF FURNISHED STEEL)				

NOTE:
See sh.* 8 for bar lists for new Reinforcing Steel Furnished by the Colo State Highway Dept.

SHEET Nº 3 OF 11

COLORADO
STATE HIGHWAY DEPARTMENT
SIXTEENTH ST.
VIADUCT MODIFICATION
REINFORCING BARS MADE FROM FURNISHED STEEL

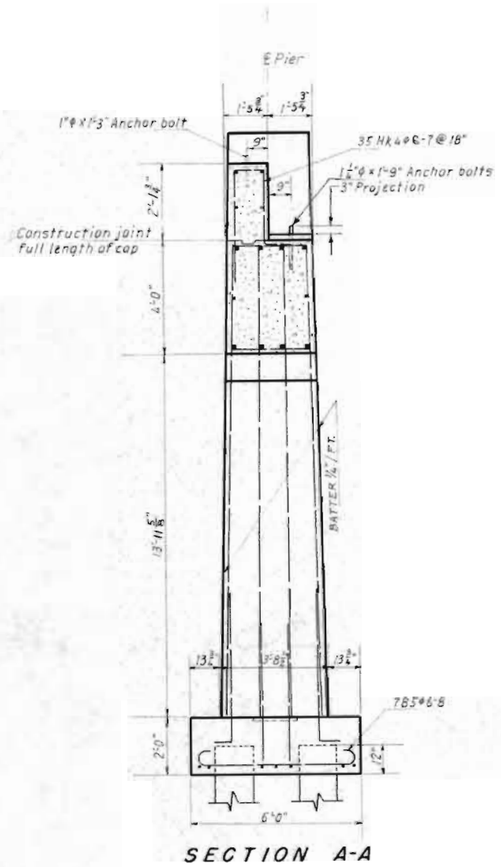
Across Sta.
Near Sec. T. R.

Designed by	Approved by
Made by	Bridge Engineer
Checked by	Date: 19

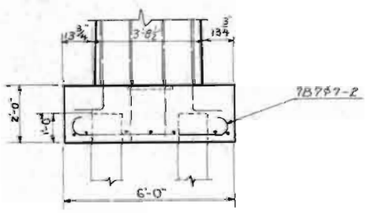
STRUCTURE Nº E-16-EX

Rev. 5-15-51 C.L.S. Respace Stringers

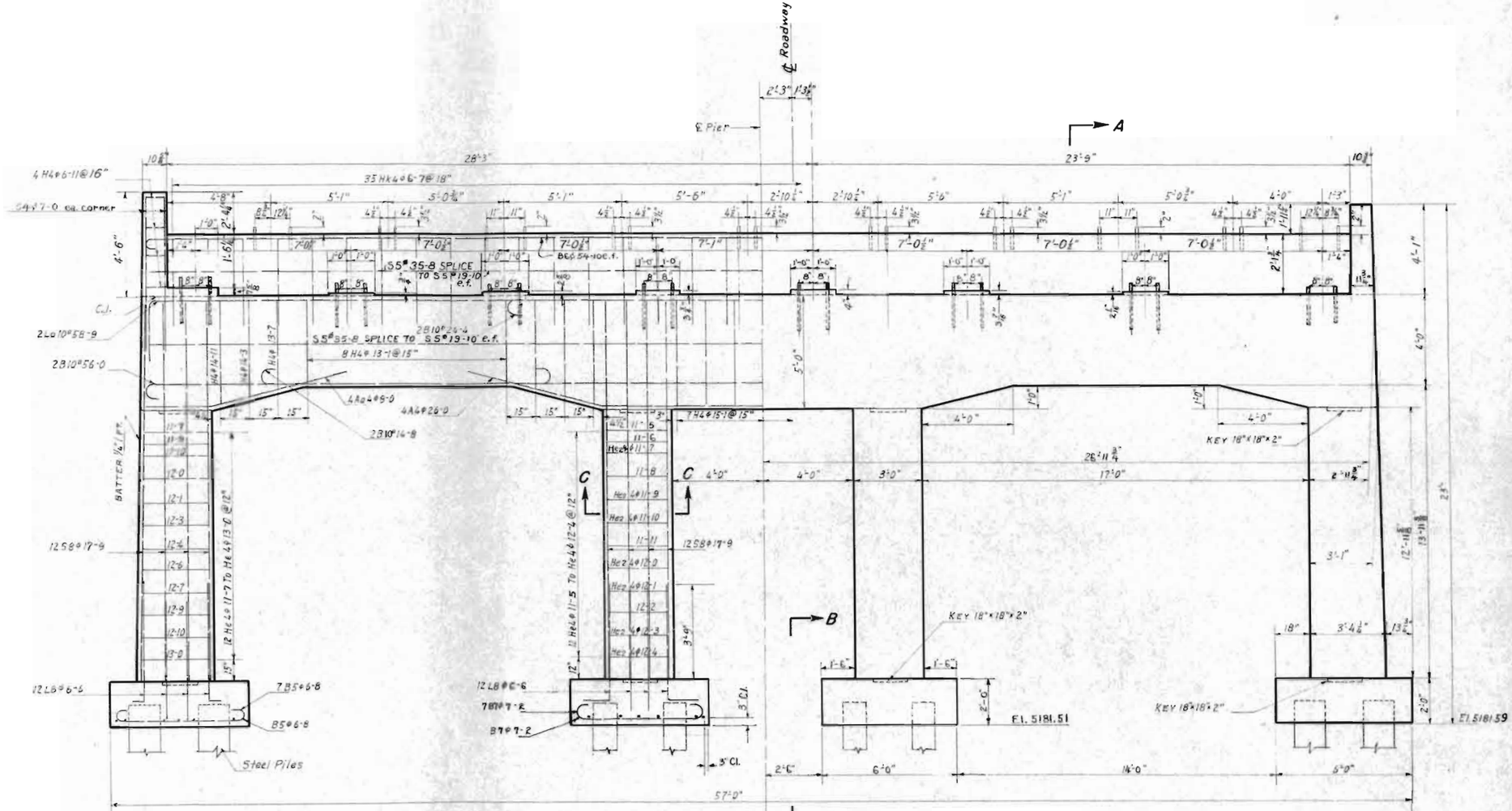
FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	U1 002-2(23) UNIT NO. 1	10	



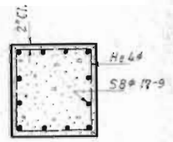
SECTION A-A



VIEW B-B



ELEVATION
(Looking south)



SECTION C-C

Chamfer all exposed corners ¾"
2" Min clear to steel except as noted.
Max. pile load = 70 kips

Scale ⅜" = 1'-0"

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY . . . . . DENVER, COLORADO

SIXTEENTH ST. VIADUCT MODIFICATION

SOUTH PIER

STRUCTURE NO. E-16-EX

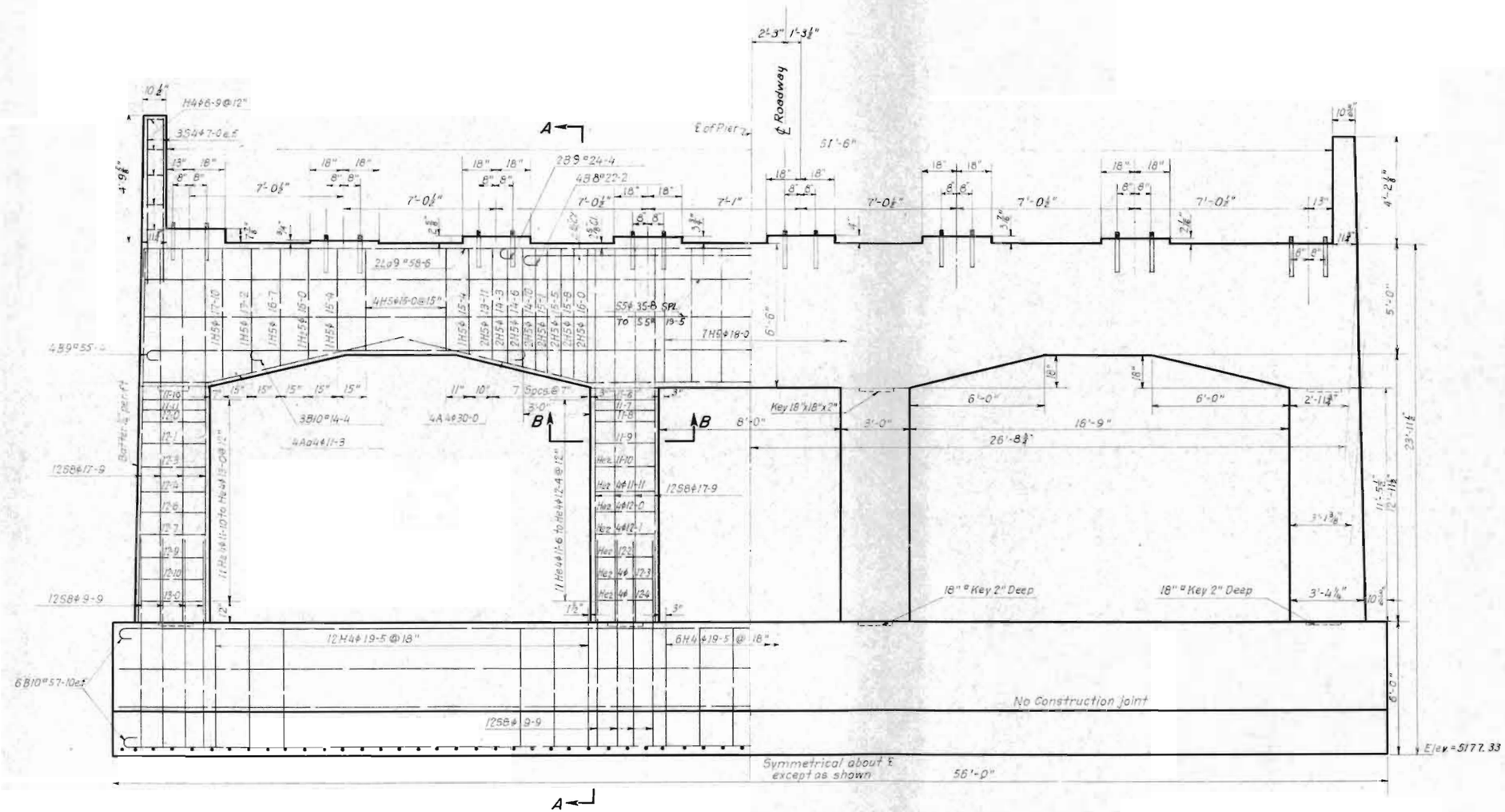
CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

DATE | SHEET 4 OF 11 | DWG. NO.

A.R. Ulrich

Rev: 5-15-51 C.L.S. Respace Stringers

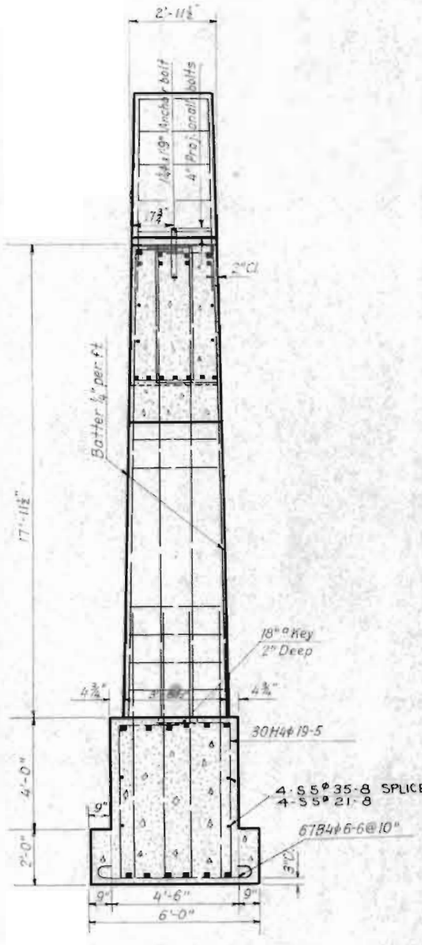
FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23) UNIT NO. 1	11	



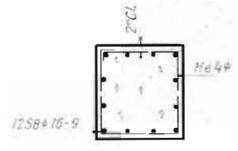
ELEVATION

Looking South

Scale 3/8" = 1'-0"



SECTION A-A



SECTION B-B

Chamfer all exposed corners, 3/4"
2" Min. clear to steel except as noted
Soil pressure = 4600 #/s.f.

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY . . . . . DENVER, COLORADO

SIXTEENTH ST. VIADUCT MODIFICATION

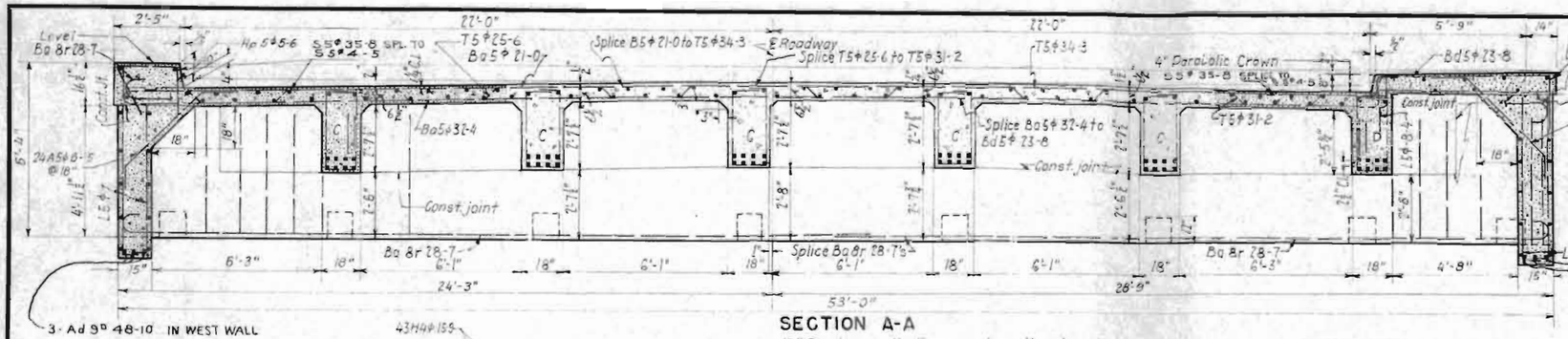
CENTER PIER

STRUCTURE NO. E-16-EX

CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

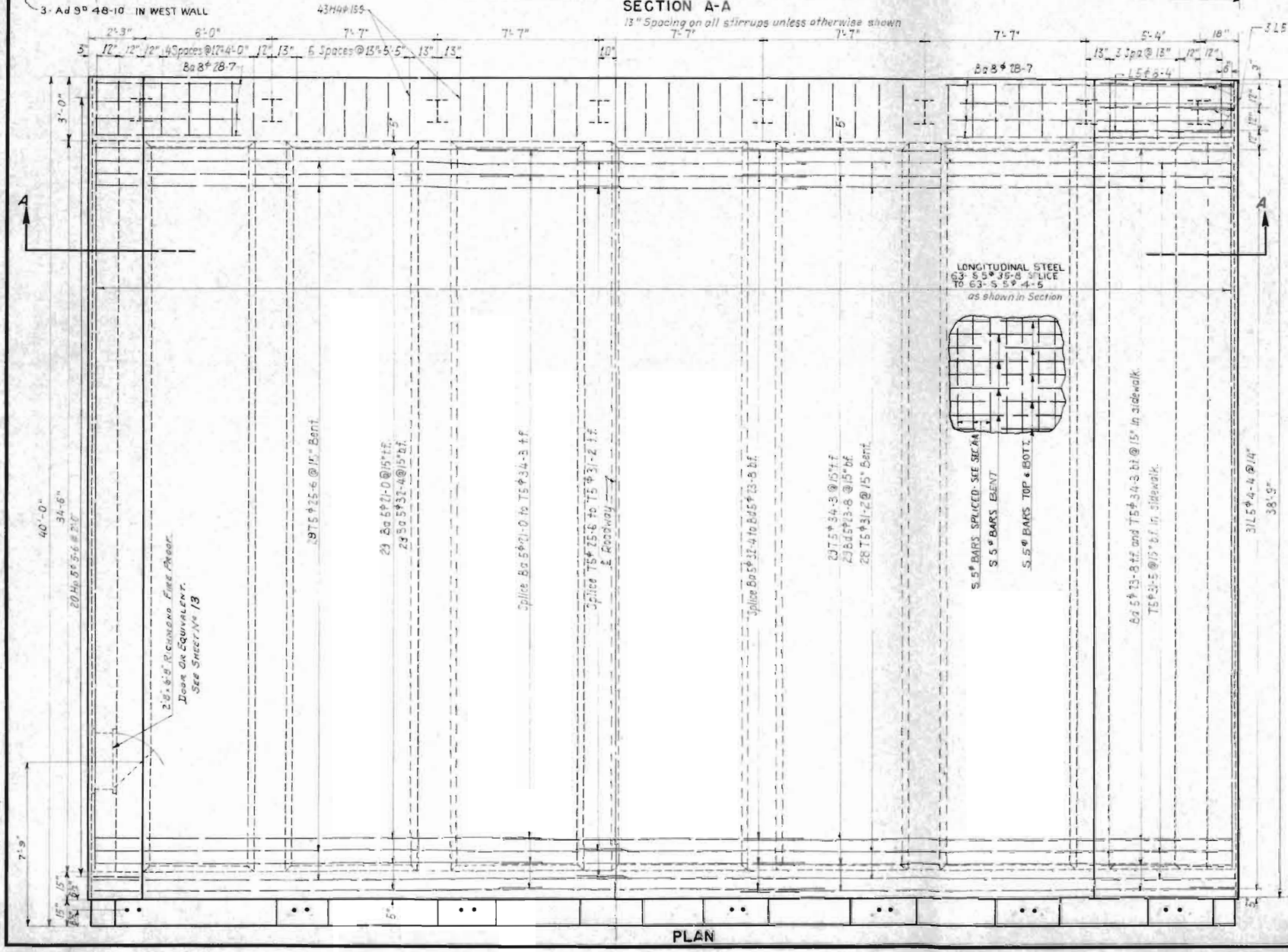
DATE | SHEET 5 OF 11 | DWG. NO.

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23) UNIT NO. 1	12	

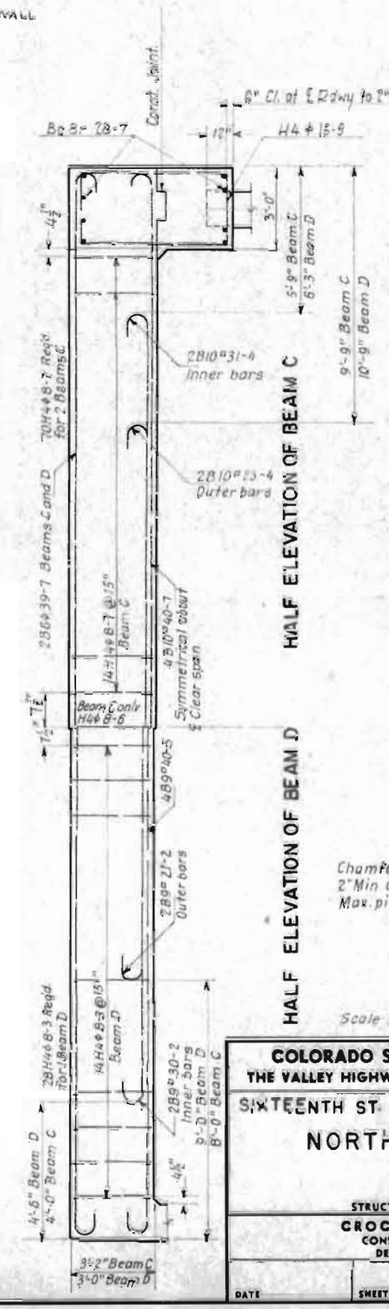


SECTION A-A

13" Spacing on all stirrups unless otherwise shown



PLAN



HALF ELEVATION OF BEAM C

HALF ELEVATION OF BEAM D

Chamfer exposed corners ¾"
2" Min clear to steel except as noted.
Max. pile load 75 kips per pile.

Scale 3/8" = 1'-0"

G.R Chown

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY . . . . . DENVER, COLORADO

SIXTEENTH ST. VIADUCT MODIFICATION

NORTH ABUTMENT DECK

STRUCTURE NO. E-16-EX

CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

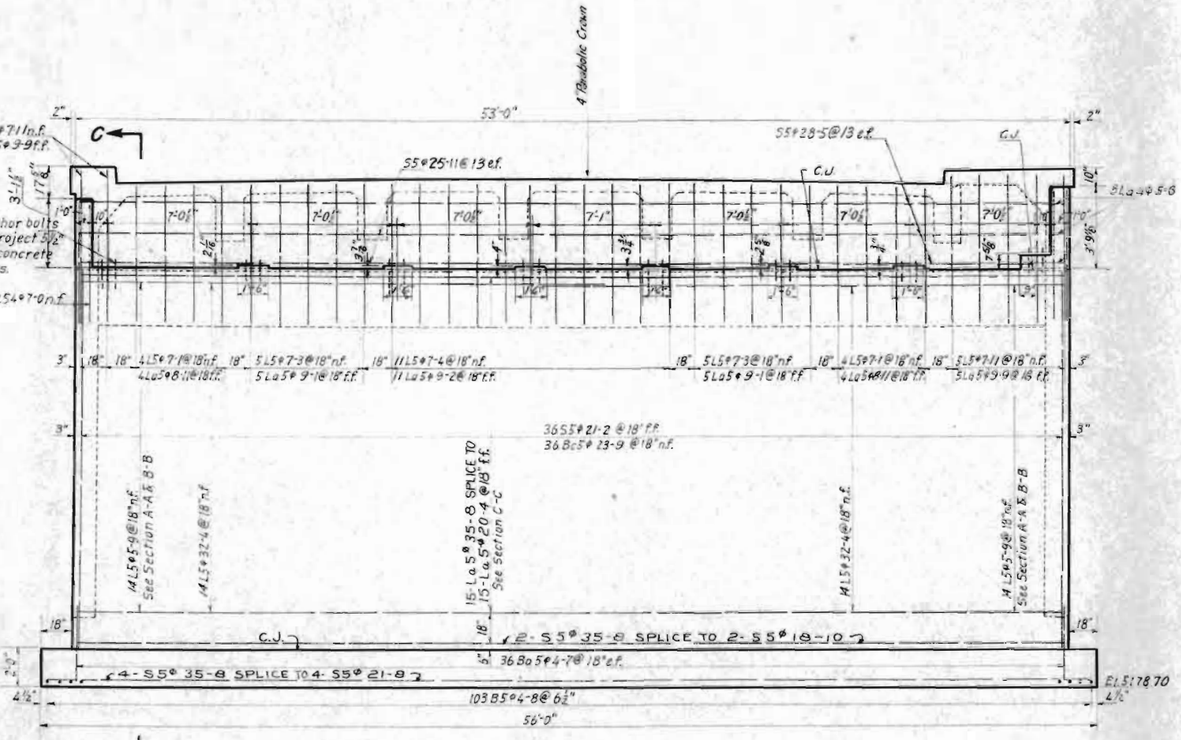
DATE

SHEET 6 OF 11

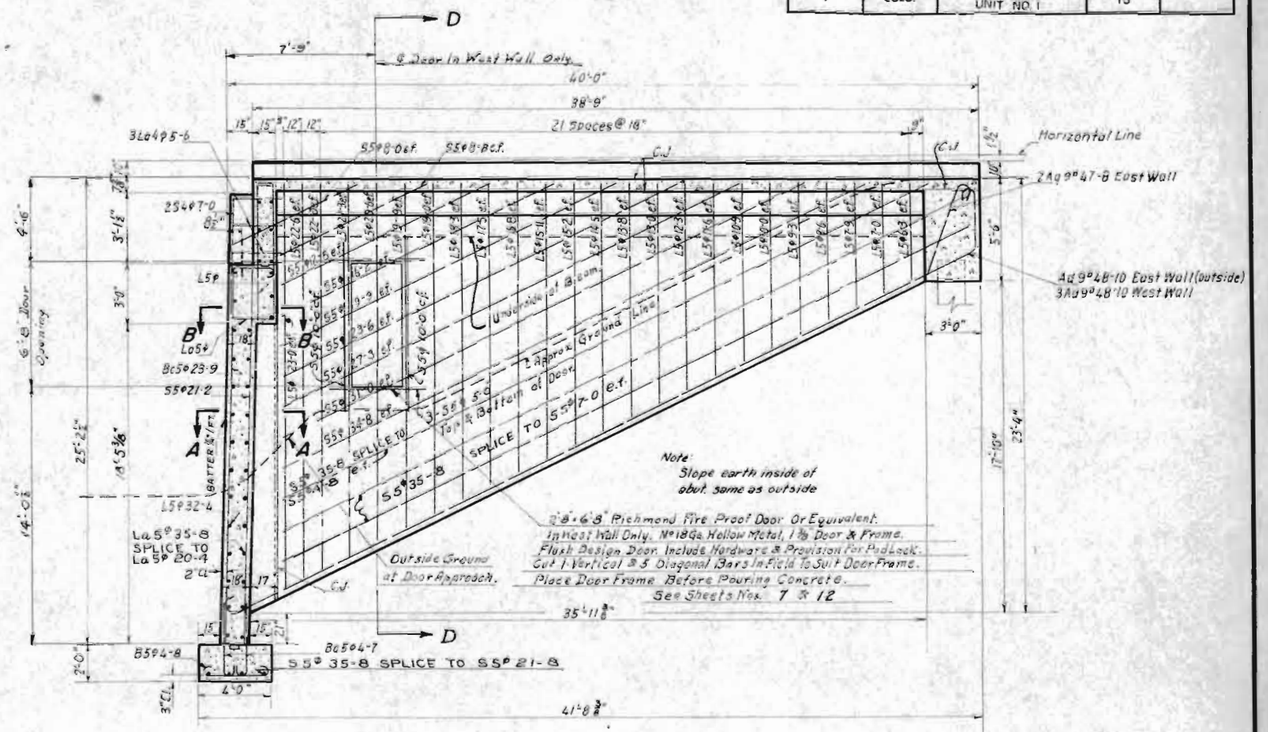
DWG. NO.

Rev. 5-15-61 C.L.S. Recpace Stringers.

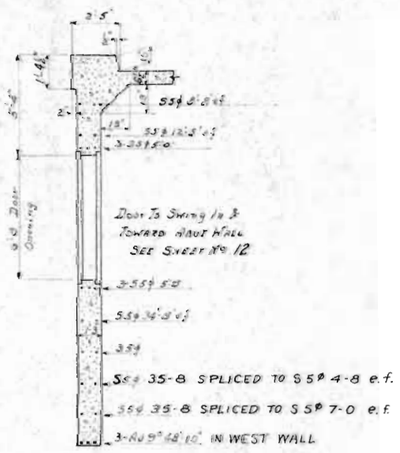
FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23) UNIT NO. 1	13	



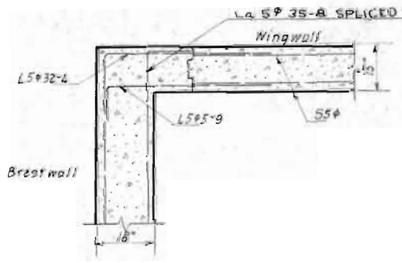
ELEVATION
Scale 1/4" = 1'-0"



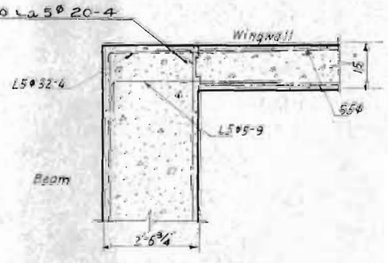
SECTION C-C
Scale 1/4" = 1'-0"



SECTION D-D.



SECTION A-A
Scale 1/2" = 1'-0"



SECTION B-B
Scale 1/2" = 1'-0"

Chamfer exposed corners ¾"
2" Min. clear to steel except as noted.
Max. soil pressure 5700 #/s.f.

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY ..... DENVER, COLORADO

SIXTEENTH ST. VIADUCT MODIFICATION
NORTH ABUTMENT

WALLS AND FOOTINGS

STRUCTURE NO. E-16-EX

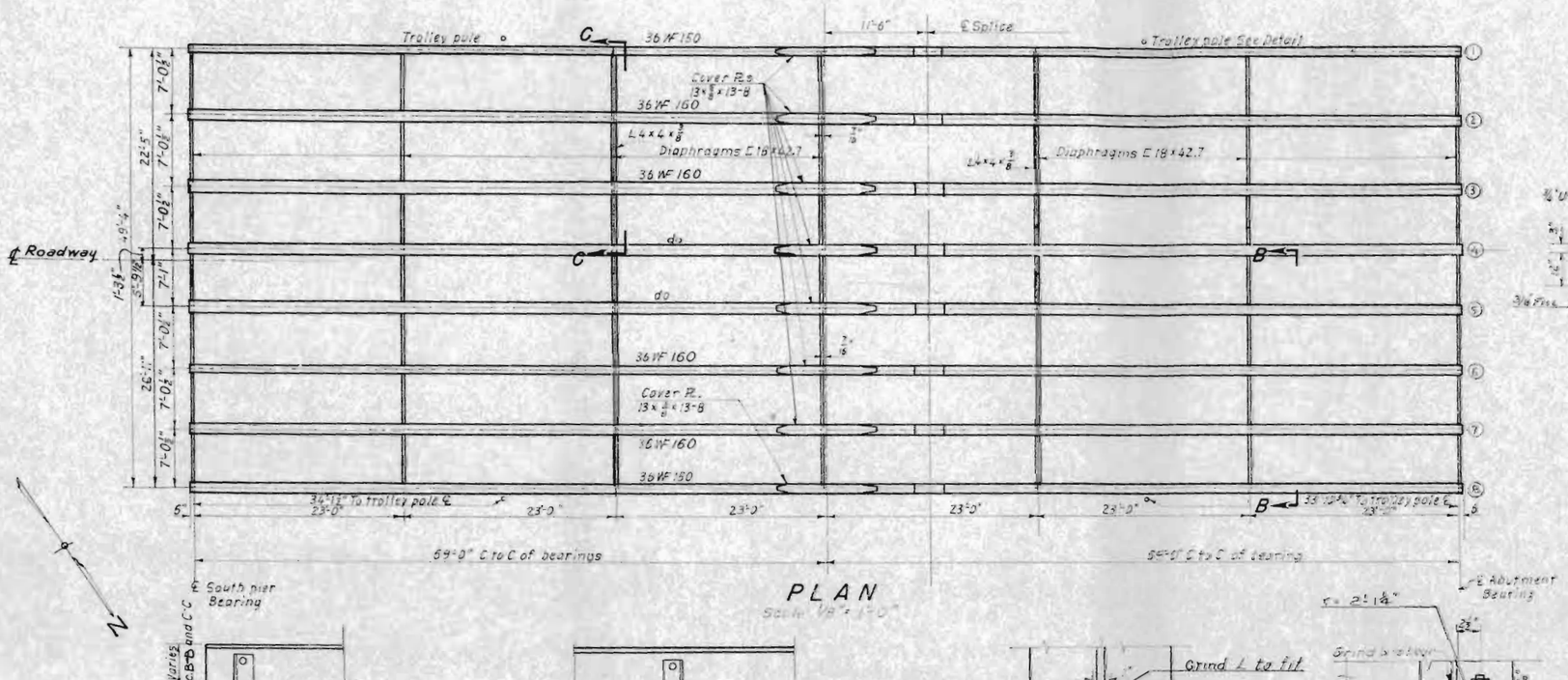
CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

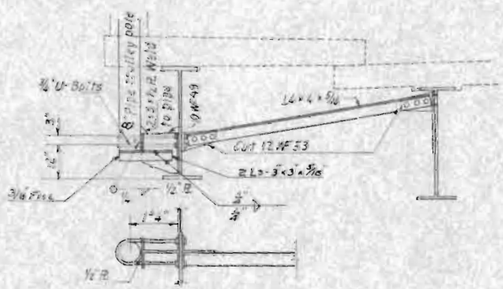
DATE | SHEET 7 OF 11 | DWG. NO.

A.K. Uhrich

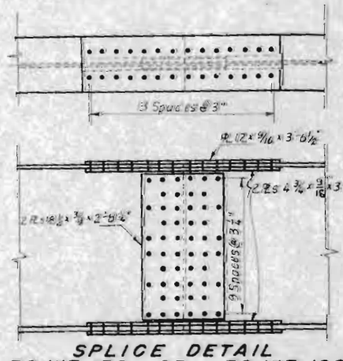
Rev. 5-15-51 C.E.S. Respace Stringers
Rev. 12-7-51 B.D.E. Revised End Diaphragm

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23) UNIT NO. 1	14	

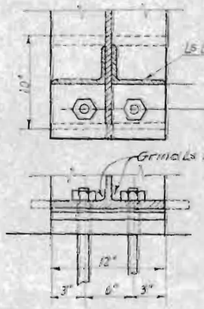


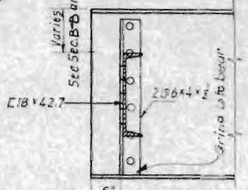


TROLLEY POLE SUPPORT
SIDEWALK SIDE
Similar on curb side

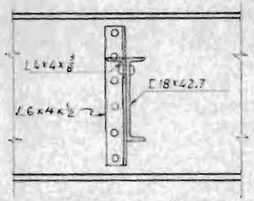


SPLICE DETAIL
36 WF 150 OR 36 WF 160
Scale 3/4" = 1'-0"

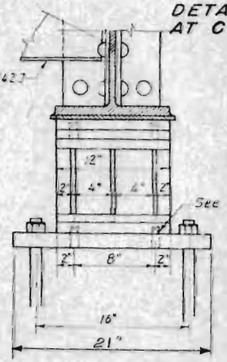


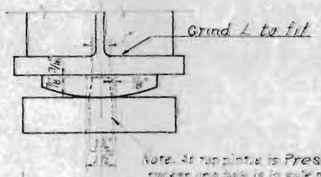


END DETAIL
Scale 3/4" = 1'-0"

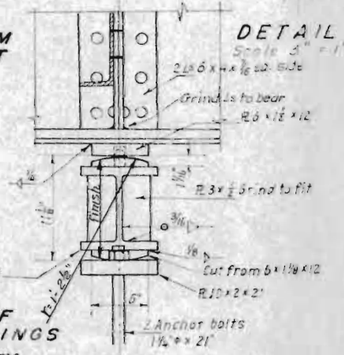


DETAIL THRU DIAPHRAGM
AT CONSTRUCTION JOINT
Scale 3/4" = 1'-0"

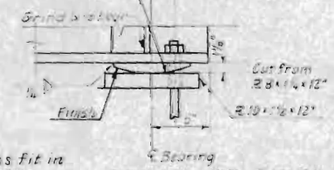




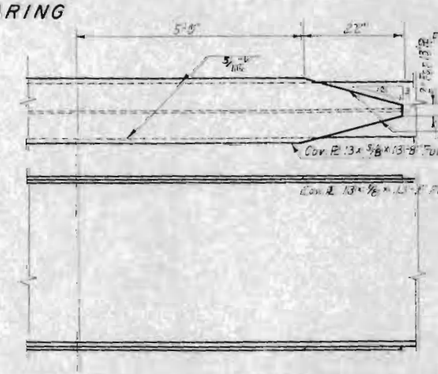
DETAIL A
Scale 3" = 1'-0"



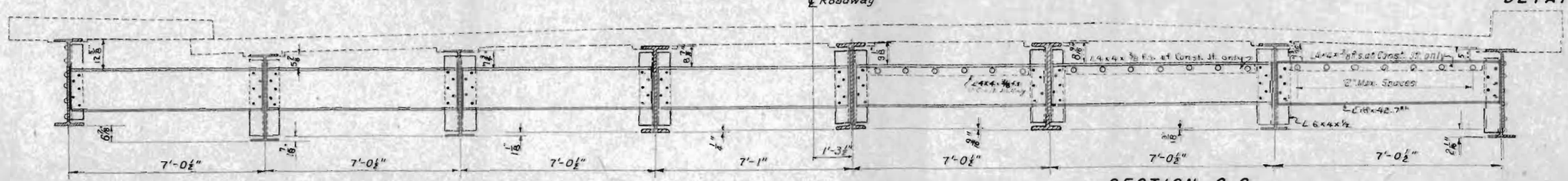
DETAIL OF
CENTER BEARINGS
South end Bearing Same
Scale 1½" = 1'-0"



DETAIL OF FIXED END BEARING
Identical for all beams
Scale 1-1/2" = 1'-0"



DETAIL OF COVER PLATES



SECTION B-B
No Scale

SECTION C-C
No Scale

All rivets ⅞" Dia.

Northeast

A.R. Ulrich

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY ..... DENVER, COLORADO

SIXTEENTH ST. VIADUCT MODIFICATION

BEAMS & BEARINGS

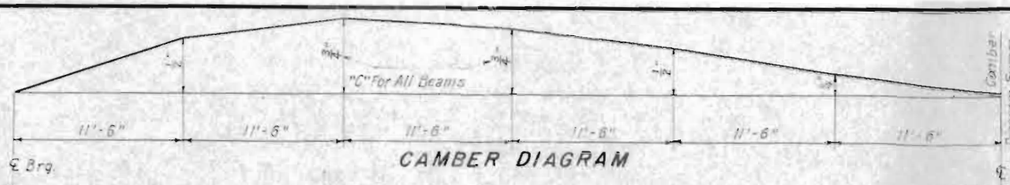
STRUCTURE NO. E-16-EX

CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

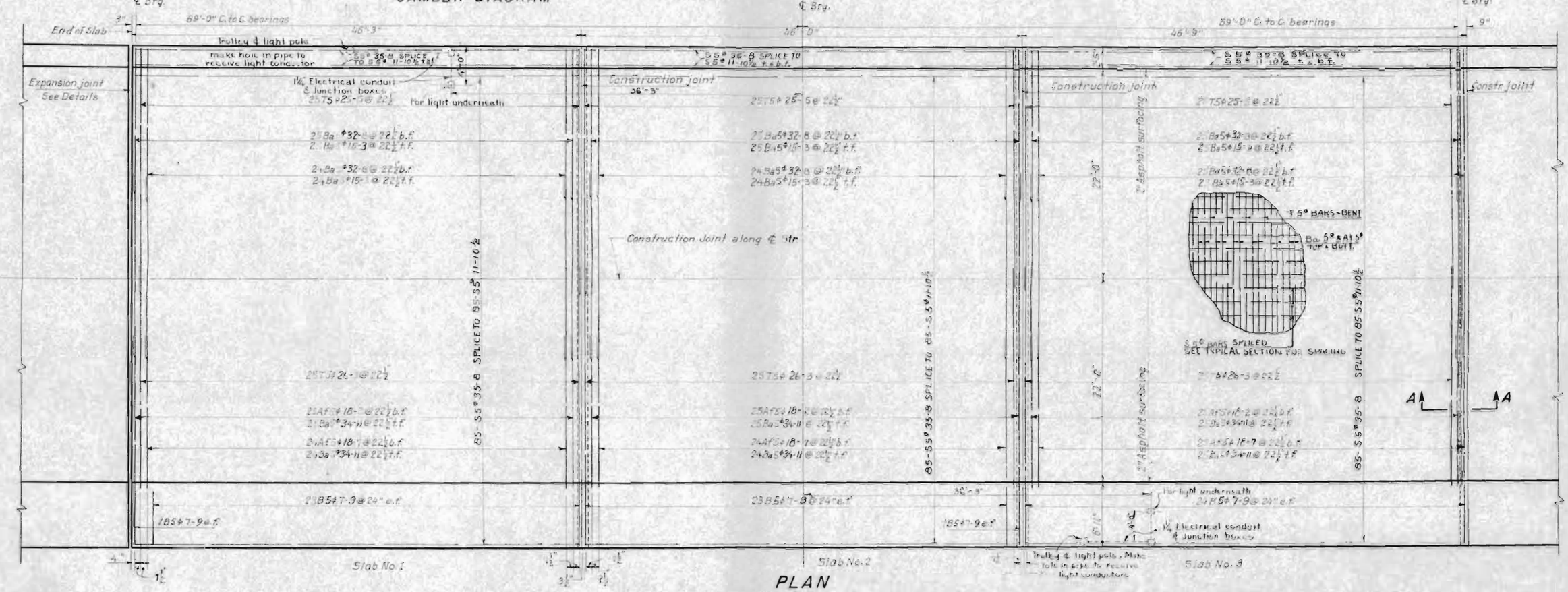
DATE | SHEET 8 OF 11 | DWG. NO.

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23) UNIT NO. 1	15	

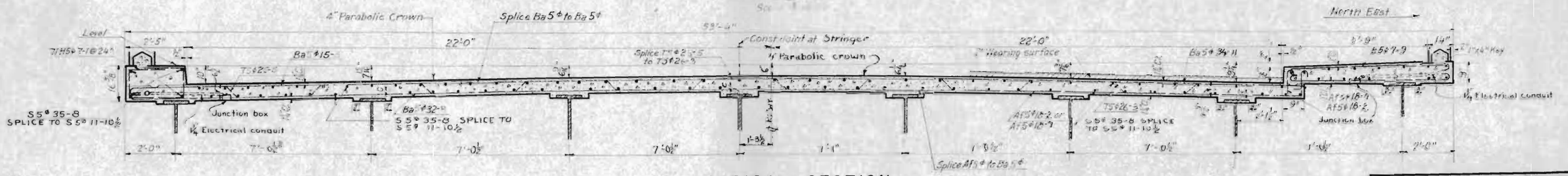
Rev. 12-10-51 BDE Revised End Diaphragm.



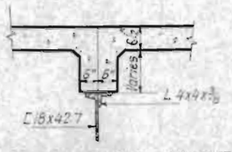
CAMBER DIAGRAM



PLAN

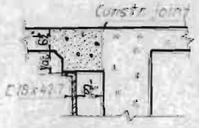


TYPICAL SECTION



CONSTRUCTION JOINT

Scale ½"=1'-0"



SECTION A-A

Scale ½"=1'-0"

GENERAL NOTES

Pouring Sequence:

Pour slabs No. 1 and No. 3 first.
Pour slab No. 2 next.
Pour sidewalk last.
Chamfer exposed corners ¾".
2" Min. clear to steel except as noted.

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY . . . . . DENVER, COLORADO

SIXTEENTH ST. VIADUCT MODIFICATION

DECK

STRUCTURE NO. E-16-EX

CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

DATE | SHEET 9 OF 11 | DWG. NO.

G.R. Crouch

Rev. W.L.A. 10-2-50 Remove Tram Tracks.
Rev. B.D.E. 5-15-51 Change Stringer Spacing

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23) UNIT NO. 1	17	

PLAN OF EXPANSION JOINT

Grating and Drain Trough not shown
Scale 1/2" = 1'-0"

SECTION 2-2

Existing Structure Scale 1/2"=1'-0"

SECTION 1-1

Scale 1/2"=1'-0"

PLAN OF GRATING

SECTION A-A

Scale 2"=1'-0"

SECTION B-B

Scale 2"=1'-0"

VIEW K-K

VIEW L-L

SECTION C-C

Scale 2"=1'-0"

SEC. D-D

Scale 1/2"=1'-0"

SECTION G-G

Scale 1/2"=1'-0"

VIEW E-E F VIEW F-F

Scale 1/2"=1'-0"

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY.....DENVER, COLORADO

SIXTEENTH ST. VIADUCT MODIFICATION

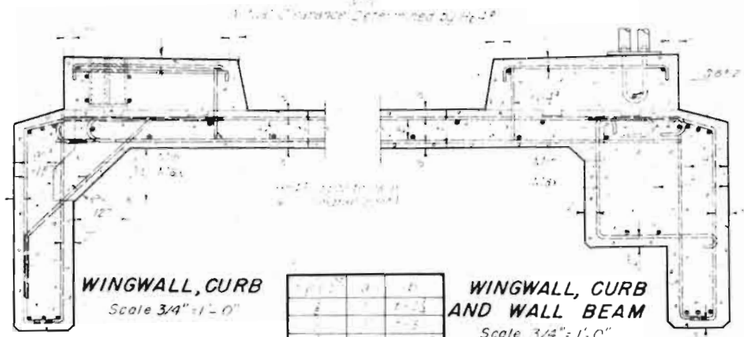
EXPANSION JOINT

STRUCTURE NO. E-16-EX

CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

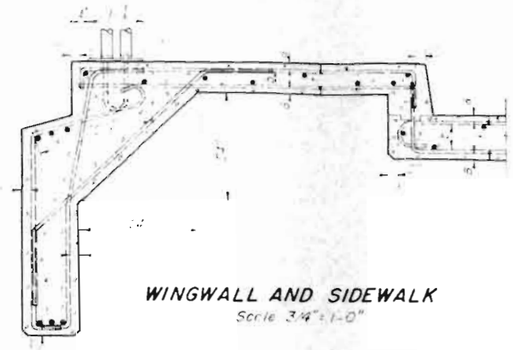
DATE | SHEET 11 OF 11 | DWG. NO.

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23) UNIT NO. 1	19	

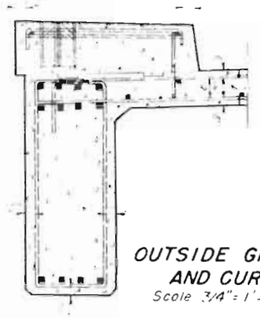


WINGWALL, CURB
Scale 3/4" = 1'-0"

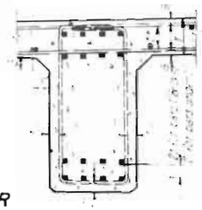
WINGWALL, CURB AND WALL BEAM
Scale 3/4" = 1'-0"



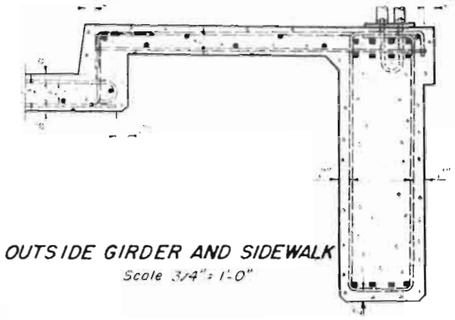
WINGWALL AND SIDEWALK
Scale 3/4" = 1'-0"



OUTSIDE GIRDER AND CURB
Scale 3/4" = 1'-0"

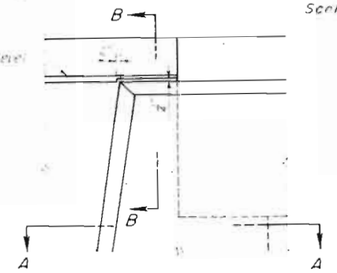


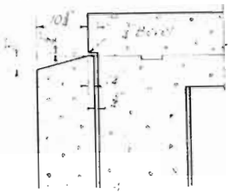
SECTION INSIDE GIRDER
Scale 3/4" = 1'-0"



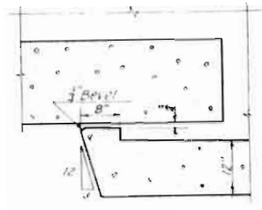
OUTSIDE GIRDER AND SIDEWALK
Scale 3/4" = 1'-0"

SECTION A-A

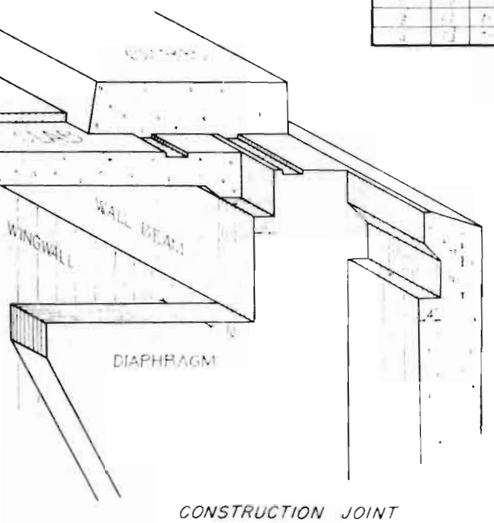




SECTION B-B



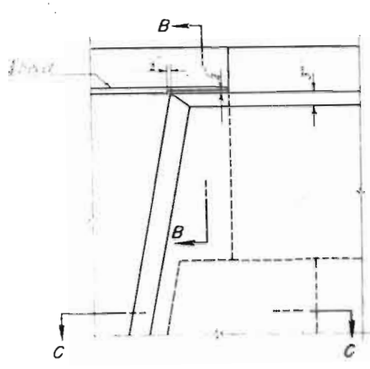
SECTION C-C

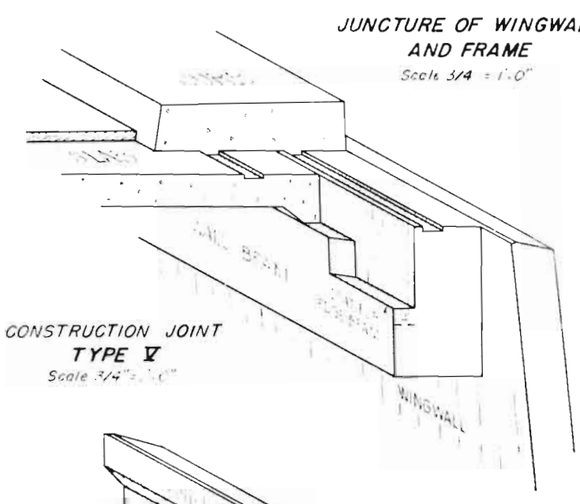


CONSTRUCTION JOINT
TYPE I
Scale 3/4" = 1'-0"

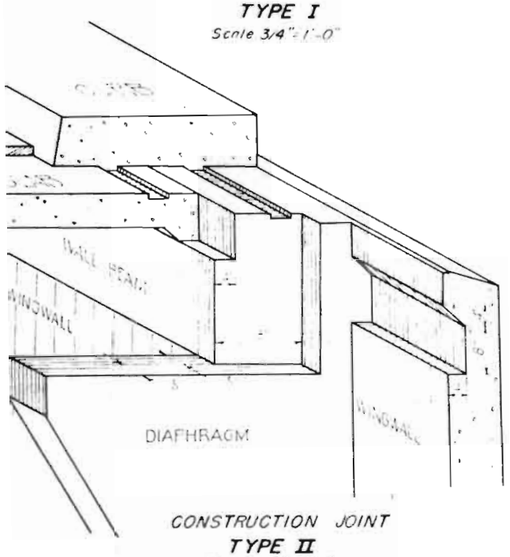
CONSTRUCTION JOINT
TYPE III
Scale 3/4" = 1'-0"

JUNCTURE OF WINGWALL AND FRAME
Scale 3/4" = 1'-0"

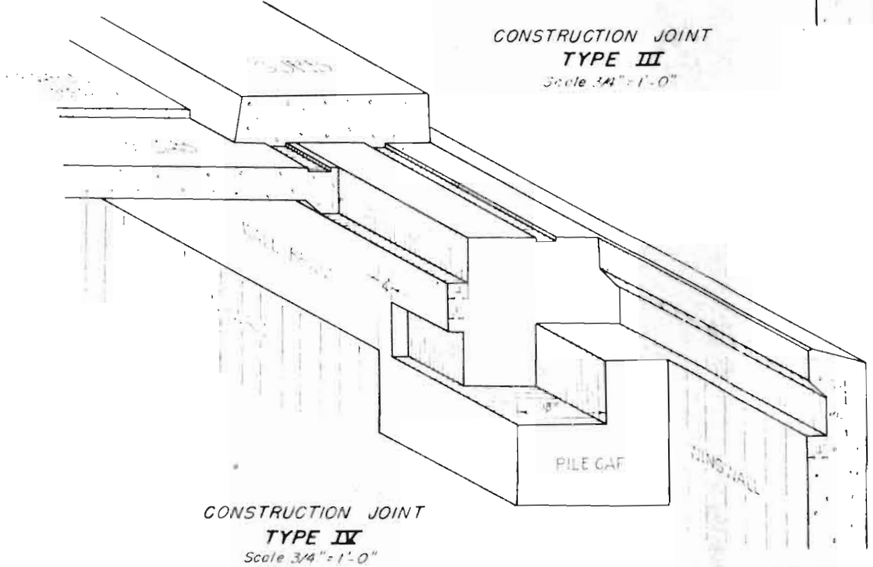




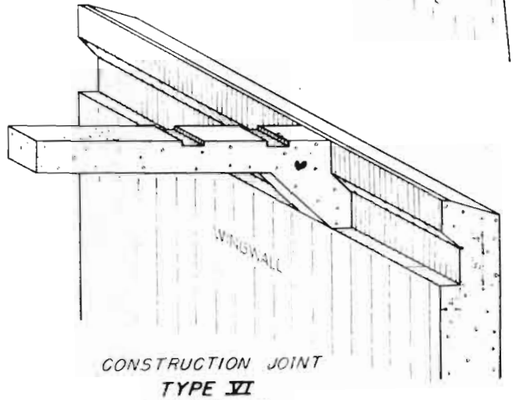
CONSTRUCTION JOINT
TYPE V
Scale 3/4" = 1'-0"



CONSTRUCTION JOINT
TYPE II
Scale 3/4" = 1'-0"



CONSTRUCTION JOINT
TYPE IV
Scale 3/4" = 1'-0"



CONSTRUCTION JOINT
TYPE VI
Scale 3/4" = 1'-0"

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY . . . . . DENVER, COLORADO

BRIDGE STANDARDS

DETAILS FOR

RIGID FRAME BRIDGES

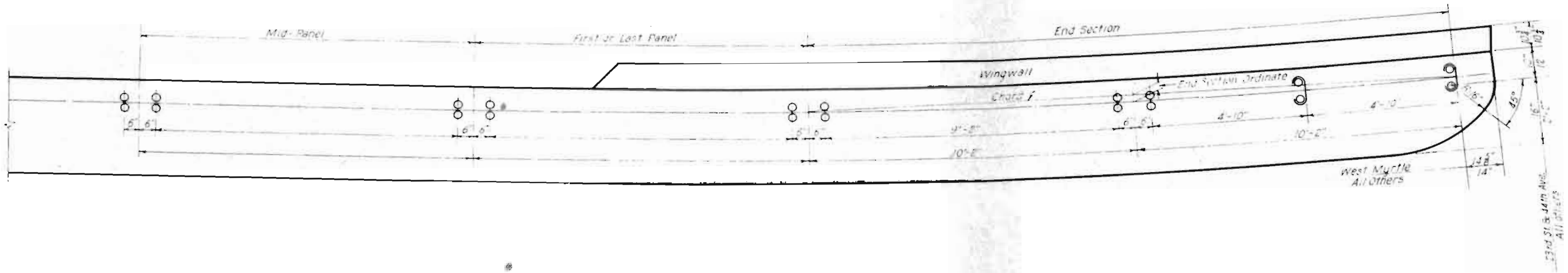
CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

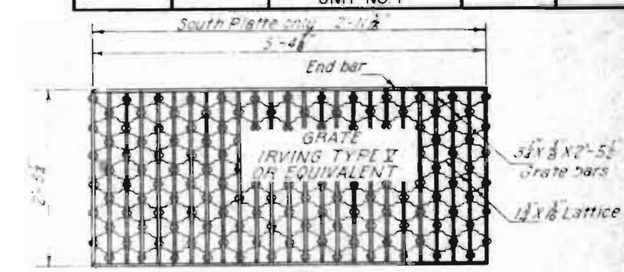
DATE

SHEET 1 OF 3

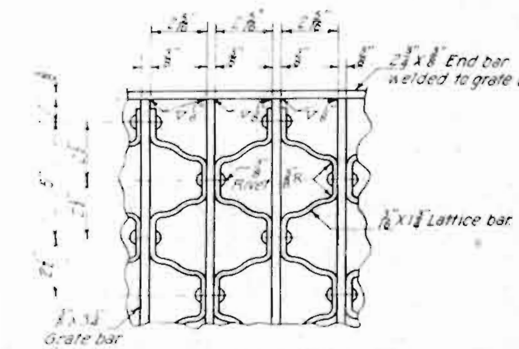
DWG. NO.

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23) UNIT NO. I	20	

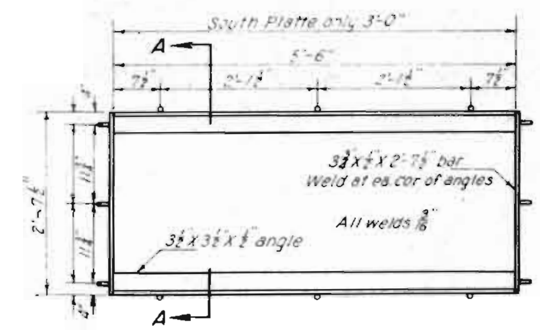




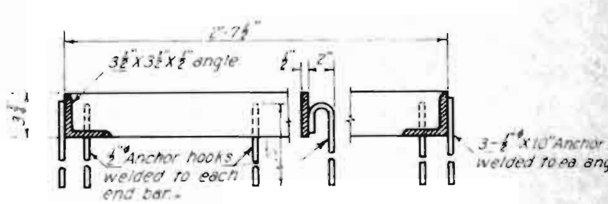
PLAN OF GRATE



DETAIL OF GRATE



PLAN OF FRAME



SECTION A-A

BRIDGE DRAIN GRATES AND FRAMES

Scale 1/2" = 1'-0"

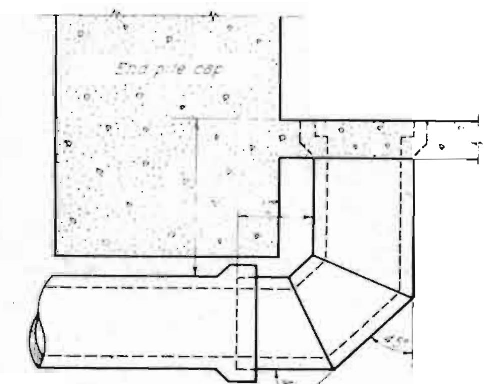
RAILING DATA

BRIDGE	TYPE OF ANCHORAGE	RAILING	NO. OF LINES	END SECTION ORDINATE	END SECTION	FIRST PANEL OR PANELS	MID-PANEL	LAST PANEL OR PANELS	END SECTION	LINE TOTAL	BRIDGE TOTAL
C&S, D&SL	Socket	North side	[illegible]	3"	20'-4"	11'-2 1/4"	39@10'-4 1/4" *	7'-9	20'-4"	463'-7 1/4"	955'-1 1/4"
		South side	[illegible]	[illegible]	20'-4	10'-4 1/2"	40@10'-0 3/4" †	9'-9	20'-4	483'-3 1/2"	
48th AVE.	Socket	All sides	4	3"	20'-4"	10'-4 1/2"	13@10'-5 1/4"	10'-4 1/2"	20'-4	197'-8"	790'-8"
46th AVE NE	Socket	East side	1	North end 3" South end 3"	20'-4"	10'-3 1/4"	14@10'-3"	10'-3 1/4"	20'-4"	204'-8 1/2"	412'-7 1/2"
		West side	1	North end 3" South end 4"	20'-4"	10'-5"	14@10'-5 1/2"	10'-5"	20'-4"	207'-11"	
46th AVE NW	Socket	East side	1	North end 3" South end 3 1/2"	20'-4"	10'-6"	9@10'-3"	10'-6"	20'-4	[illegible]	310'-4"
		West side	[illegible]	North end 3" South end 3"	20'-4"	10'-5 3/4"	9@10'-6 1/2"	10'-5 3/4"	20'-4"	156'-5"	
46th AVE SE	Socket	North side	1	East end 3 1/2" West end 3 1/2"	20'-4"	10'-2 3/8"	14@10'-2 3/8"	10'-2 3/8"	20'-4"	204'-4"	404'-0 3/4"
		South side	[illegible]	East end 2 3/4" West end 2 3/4"	20'-4"	10'-7 1/4"	13@10'-7 1/4"	10'-7 1/4"	20'-4"	199'-8 3/4"	
46th AVE SW	Socket	North side	[illegible]	East end 4" West end 4"	20'-4"	4@10'-2"	10@10'-7 1/2"	10'-7"	20'-4"	198'-2"	390'-6 5/8"
		South side	1	East end 2 1/2" West end 3"	20'-4"	10'-1 5/8"	13@10'-1 5/8"	10'-1 5/8"	20'-4"	192'-4 5/8"	
44th AVE	Base Plate and Bolt	Both sides	2	0	20'-4"	10'-2 1/4"	14@10'-2 1/4"	10'-2 1/4"	20'-4"	208'-4"	416'-8"
FOX ST (NORTH)	Socket	North side	1	East end 3 1/2" West end 3"	20'-4"	10'-6 5/8"	16@10'-6 5/8"	10'-6 5/8"	20'-4"	230'-1 3/4"	458'-10 3/4"
		South side	1	East end 2 3/4" West end 3"	20'-4"	9'-9"	17@9'-11"	9'-9"	20'-4"	223'-9"	
FOX ST (SOUTH)	Socket	North side	1	East end 3 1/2" West end 3"	20'-4"	10'-4 5/8"	17@10'-5 3/8"	10'-4 5/8"	20'-4"	238'-10 5/8"	473'-9 3/8"
		South side	1	East end 3" West end 3"	20'-4"	10'-3"	17@10'-0 5/8"	10'-7 3/8"	20'-4	234'-10 3/4"	
CB&Q, D&SL, C&S	Socket	All sides	4	3"	20'-4"	10'-4 3/4"	28@10'-5 3/4"	10'-4 3/4"	20'-4"	354'-7"	1418'-4"
18th ST	Socket	Both sides	2	East end 3 1/2" West end 0	20'-4"	10'-3"	15@10'-3"	10'-4"	20'-4"	215'-0"	430'-0"
15th ST	Base Plate and Bolt	Both sides	2	0	20'-4"	10'-0 3/4"	14@10'-7 1/2"	10'-0 3/4"	20'-4	203'-8"	407'-4"
23rd AVE	Base Plate and Bolt	Both sides	2	0	20'-4"	10'-0 3/4"	19@10'-5"	10'-0 3/4"	20'-4	253'-2"	506'-4"
SPEER BLVD	Socket	All sides	4	3"	20'-4"	10'-8 3/4"	18@10'-8 3/4"	10'-8 3/4"	20'-4"	255'-2"	1020'-8"
PLATTE RIVER	Socket	East side	2	3	20'-4	[illegible]	[illegible] ‡	9@10'-6 3/8"	20'-4	452'-7 1/8"	8[illegible]
		West side	2	3"	20'-4	4@10'-4"	[illegible] ‡	[illegible]	[illegible]	[illegible]	
MARKET ST (EAST)	Socket	East side	1	North end [illegible] South end [illegible]	20'-4	9'-3 1/2"	15@10'-3 1/2"	[illegible]	20'-4"	[illegible]	428'-[illegible]
		West side	1	North end [illegible] South end 3 1/2"	20'-4"	[illegible]	15@10'-0"	10'-0 1/2"	20'-4"	[illegible]	
MARKET ST (WEST)	Socket	East side	1	North end [illegible] South end [illegible]	[illegible]	9'-1 1/2"	14@10'-1 1/2"	9'-1 1/2"	[illegible]	[illegible]	400'-[illegible]
		West side	1	North end 3" South end 3"	20'-4	10'-2"	14@10'-0"	10'-2"	20'-4"	201'-0"	
MYRTLE PLACE	Socket*	All sides	4	3"	20'-4"	10'-4 1/2"	11@10'-4 1/2"	10'-4 1/2"	20'-4"	176'-6"	706'-0"

* Deck expansion joints between 21st and 22nd panels

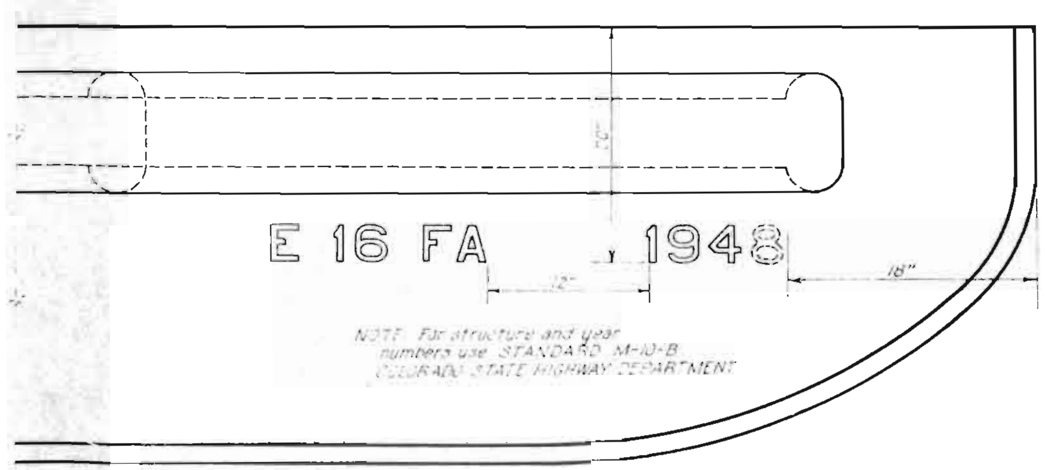
† Deck expansion joint between 22nd and 23rd panels

‡ Deck expansion joint at each end of these [illegible] panels



BRIDGE DRAIN OUTLET ELBOW

Scale 3/4" = 1'-0"



YEAR AND BRIDGE NO. POSITIONS

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY . . . . . DENVER, COLORADO

BRIDGE STANDARDS

RAILING DATA

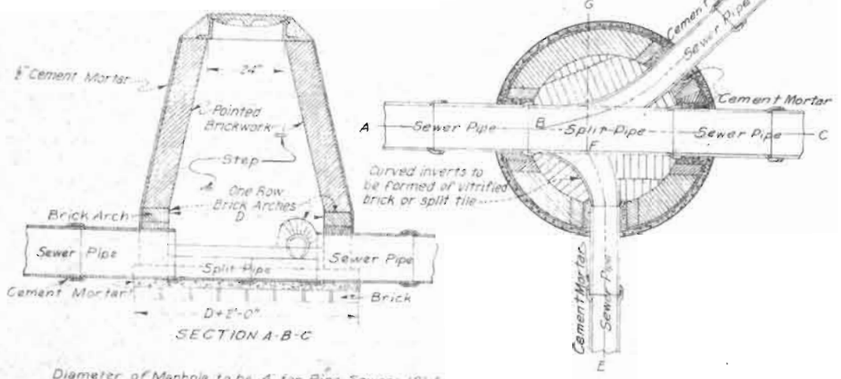
BRIDGE DATA, NUMBER POSITIONS

CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

DATE ______ SHEET 2 OF 3 DWG. NO.

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23)	21	

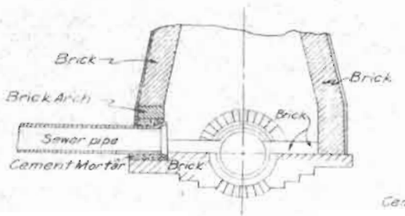
Unit No. 1



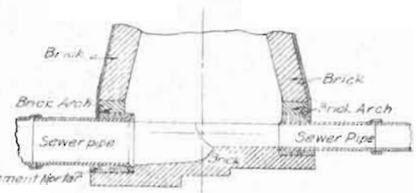
SECTION A-B-C

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

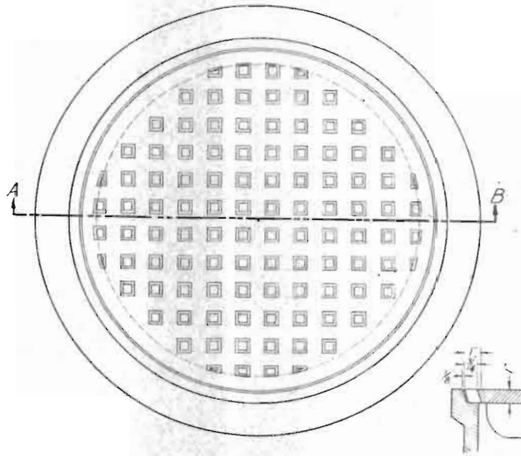


SECTION E-F-G



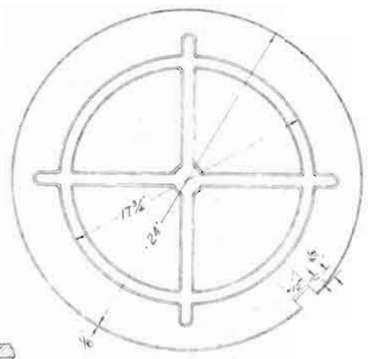
SECTION A-B-D

TYPE I MANHOLE (STORM & SANITARY)
Scale ½"=1'-0"

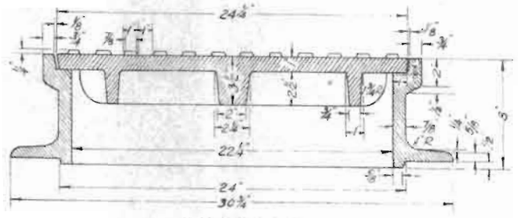


TOP VIEW OF RING & COVER

SECTION THRU SLOT USED TO LIFT COVER



BOTTOM VIEW OF COVER

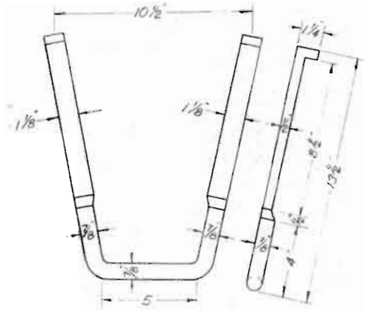


SECTION A-B

Weight - Frame Approx. 224#
Cover Approx. 176#
400#

Dipped or Painted with Asphalt or Coal Tar & Oil

DETAILS OF MANHOLE RING & COVER
Scale 3/4"=1'



WROUGHT IRON OR MILD STEEL STEPS

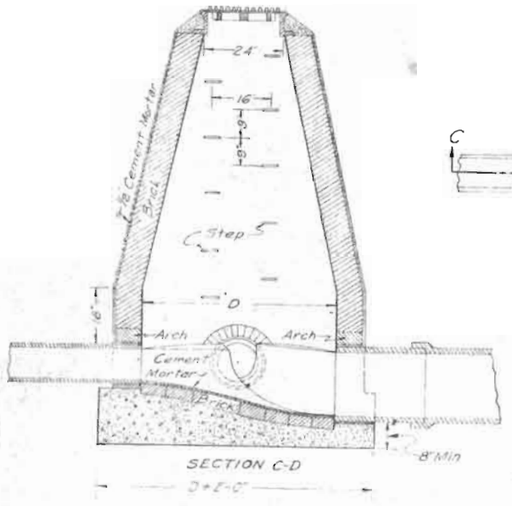
Scale 3"=1'-0"

This Step to be Used for All Types Manholes

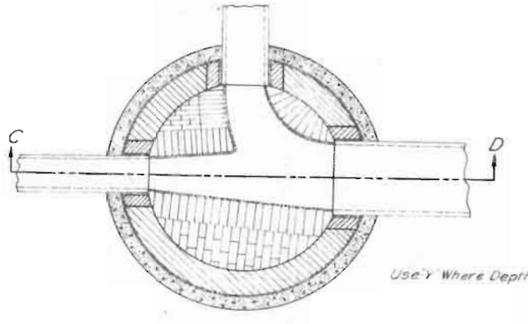
GENERAL NOTES:

All brick in manholes to conform to requirements of grade MA of A.A.S.H.O. Designation M-91-42. Manhole bottoms may be either brick or concrete. Manhole benches shall be of brick as specified.

Alternate design for Manholes using Precast Concrete Blocks, Cast in place Concrete, or Precast Concrete Manholes will be Permitted after approval of Details by the Department.



SECTION C-D

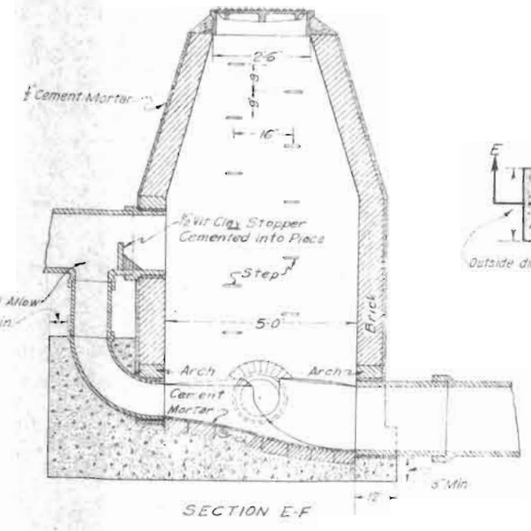


PLAN

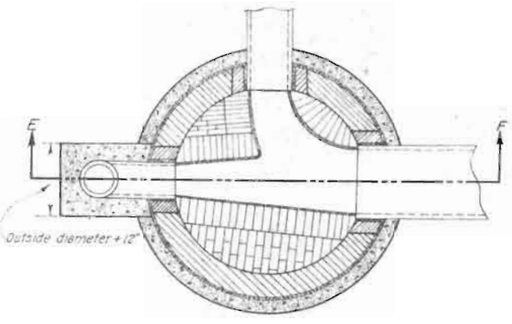
Diameter of Manhole to be 5' for Pipe Sewers 36" and Under, and 6' for Pipe Sewers 42" to 48".

TYPE I-A MANHOLE
Scale ½"=1'-0"

SANITARY & STORM SEWERS



SECTION E-F



PLAN

TYPE 2 MANHOLE (SANITARY ONLY)
Scale ½"=1'-0"

COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY ..... DENVER, COLORADO

MANHOLE DETAILS
TYPE I, IA AND 2

STRUCTURE NO.

CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

DATE | SHEET OF | DWG. NO.

REVISIONS
Rev. 12-13-47 J.P.K.
Rev. 7-1-49 J.R.E.
Rev. 9-14-50 J.E.R.

STANDARD M-10-B.

FED. ROAD DIST. NO.	STATE	SHEET NO.	TOTAL SHEETS
3	COLO.	21	
		002-2(23) 22	

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

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

Scale in Inches 0 1 2 3

2" 1⅛" 2"

SAMPLE BRIDGE NUMBER

½" 1¼" 1¼" 1¼"

SAMPLE YEAR NUMBER

SECTION

White Background

Do not bushhammer this area.

J 14 K

1950

Roadway

TYPICAL FOR CONCRETE ENDPOST

ROADWAY

J
14
K

1950

TYPICAL FOR STEEL HANDRAIL END POST

LETTERS TO FACE TRAFFIC

5'-0"

POST

Location of indentured year numbers.

J 14 K

Centered between Posts

TYPICAL FOR TIMBER WING HANDRAIL

J
14
f

TYPICAL FOR LARGE BOX CULVERTS

General Notes

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT, ADOPTED JANUARY 1ST 1946.

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

THE SIZE, SHAPE AND SPACING OF THE LETTERS AND FIGURES SHALL BE IN ACCORDANCE WITH THE FULL SIZE SHOWN ON THIS SHEET. ADDITIONAL COPIES OF THIS FULL SIZE SHEET CAN BE OBTAINED FROM THE DEPARTMENT WITHOUT CHARGE.

THE YEAR NUMBERS ARE RECESSED IN CONCRETE ⅜" 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 DETAIL S. 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 (PAINT AS SPECIFIED UNDER ITEM 38 PAINTS AND PAINTING. THE BRACES OF THE STENCILED LETTERS AND FIGURES SHALL BE CAREFULLY FILLED IN BY HAND TO MAKE SOLID FIGURES.

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

MINOR STRUCTURES WITH CLEAR SPANS 12 TO 20 FEET INCLUSIVE SHALL BE STENCILED WITH STRUCTURE NUMBER THUS W-18-2 ON 3" STEEL MARKER POSTS WHERE PROVIDED AND AS SHOWN ON STATE HIGHWAY STD. M-23-A

STRUCTURE NO.

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

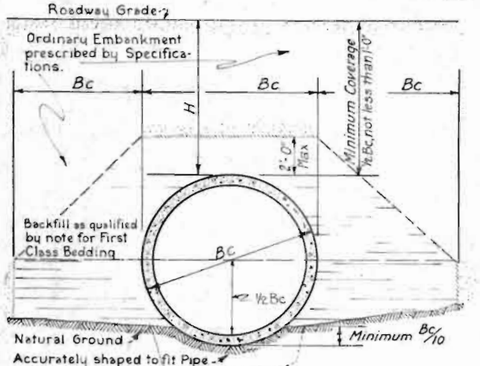
Designed by G.H.D.
Made by W.P.M.
Checked by

Approved by [signature]
Bridge Engineer
Date: June 1, 1946

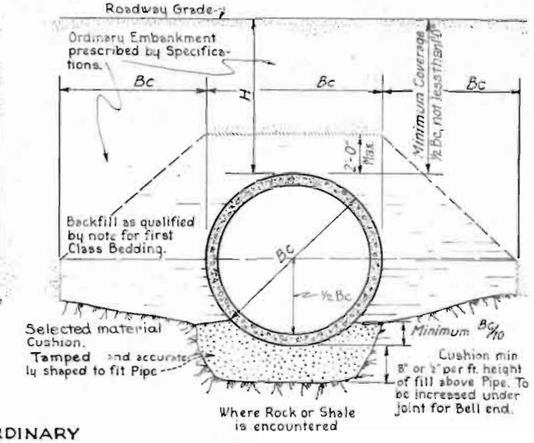
REVISIONS Rev 12-13-43 JRK

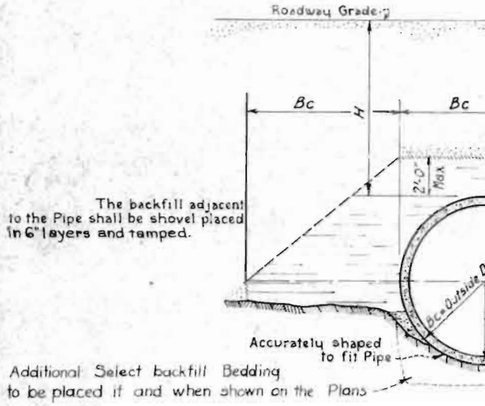
TYPES OF BEDDING

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



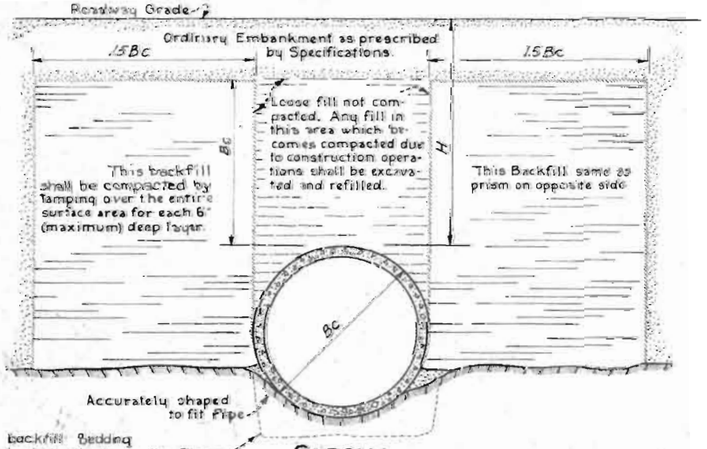
ORDINARY





Where rock is encountered a trench shall be excavated so that a minimum of 8" or 1" per foot height of fill over Pipe, of fine selected material cushion may be placed below the Pipe at all points. This cushion to be thoroughly compacted and accurately shaped to fit pipe.

FIRST CLASS



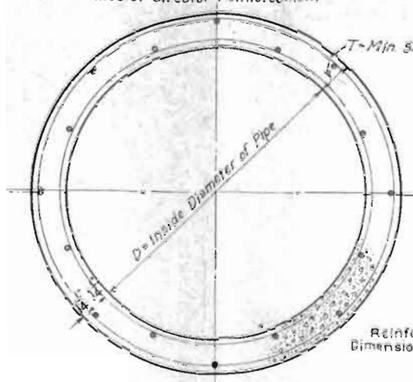
SPECIAL

A construction which consists of Ordinary Bedding or First Class Bedding combined with Special Backfilling, as noted above, to be used when height "H" exceeds limits noted in Table for Ordinary or First Class Bedding.

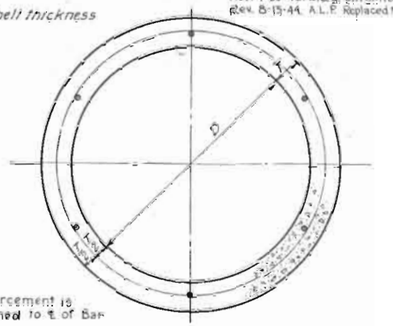
NOTE: When Special Bedding is called for or is implied by the maximum fill height limits the placement of the pipe and the backfill shall not be done except in the presence of the Engr.

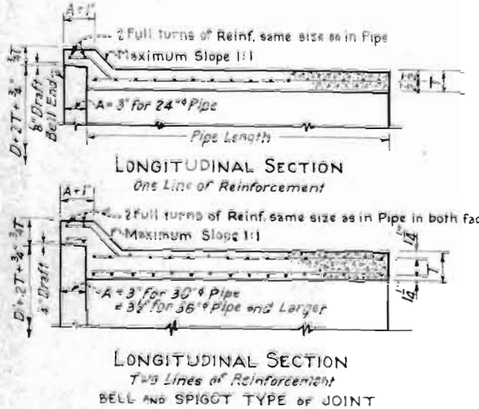
PIPE CROSS SECTIONS

With Two Lines of Circular Reinforcement



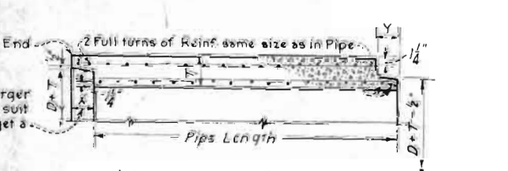
With One Line of Circular Reinforcement





LONGITUDINAL SECTION

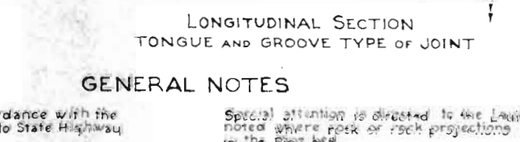
One Line of Reinforcement



LONGITUDINAL SECTION

Two Lines of Reinforcement

BELL AND SPIGOT TYPE OF JOINT



LONGITUDINAL SECTION

TONGUE AND GROOVE TYPE OF JOINT

GENERAL NOTES

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

Circular Reinforcement shall be Cold Drawn Steel Wire if Billet Steel of Hard or Intermediate Grade is used the steel area shall be increased by 33.5 per cent. Longitudinal Reinforcement shall be Billet Steel of Intermediate Grade.

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 concrete headwalls if and as shown on the plans in accordance with the Department's Standard Dwg. M102.

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 hereon.

Special attention is directed to the Laying Requirements noted where rock or rock projections are encountered in the Pipe bed.

This Pipe shall be laid with the Bell or Groove end placed upstream.

All excavation and work required for bedding and shaping, except for the volume of selected material, shall be included in Contract Unit Price for Reinforced Conc. Pipe.

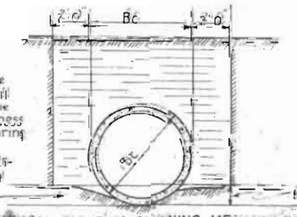
UNREINFORCED CONCRETE PIPE

Unreinforced Concrete Pipe will be accepted in the following sizes: 12", 15", 18".

Unreinforced Concrete Pipe shall meet the same specifications and may be of the same minimum thickness as shown for Reinforced Concrete Pipe. It will be noted however, that Unreinforced Concrete Pipe is required to meet the same Three-edged Bearing Tests as specified for Reinforced Concrete Pipe. Thickness of pipe may be increased as required in order to satisfy the three-edged bearing tests.

The same General Notes, Specifications, bedding Details, etc. shall apply to Unreinforced Concrete Pipe as is noted for Reinforced concrete pipe, excepting only those details and requirements which refer specifically to reinforcement.

Special bedding as specified not included in structural exc



TYPICAL DIAGRAM SHOWING METHOD OF CALCULATING STRUCTURAL EXCAVATION WHEN PIPE IS IN CUT

STRUCTURE NO.

STANDARD M-112-D

Rev. 2-2-42 Addn notes H.C.C.
Rev. 3-6-42 Sketch for calc str. exc in cut. G.B.B.
Rev. 4-20-42 W.G.S. Unreinforced Concrete Pipe notes.
Rev. 8-13-44 A.L.F. Replaced Mechanical Tamping with Selected Mat'l.

FED. ROAD DIST NO.	STATE	SHEET NO.	TOTAL SHEETS
3	COLO.	002-2(2) 23	

Revised: To conform to A.S.T.M. spec. D 76-41 of A.C.I. 12-30-41.
Rev. to include 12, 15 & 18" Dia Pipe H.C.C. 1-20-42

STANDARD STRENGTH REINF. CONCRETE CULVERT PIPE

Based on Concrete with an Ultimate Compressive Strength of 3500 #/in² and the Three-Edged Bearing Tests in Table I, A.A.S.H.O. Specification M-41-46

Max. Fill Heights above Top of Pipe for Standard Pipe	D Inches	T Inches	Circular Reinforcement Sq. In. per Lin. Ft. of Pipe	Longitudinal Reinforcement, Min. Total Area Reqd
(Fill height not limited for 12", 15" & 18" dia. pipes.)	12	2	1 Line 0.07	0.13 SQ. IN.
	15	2¼	1 Line 0.09	0.18 " "
	18	2½	1 Line 0.12	0.24 " "
Type of Bedding Ordinary H = 11 feet First Class H = 13 feet	24	3	1 Line 0.17	0.38 " "
	30	3½	1 Line each 0.22	0.55 " "
	36	4	2 Lines " 0.18	0.75 " "
	42	4½	2 " " 0.21	0.98 " "
	48	5	2 " " 0.25	1.25 " "
	54	5½	2 " " 0.30	1.57 " "
	60	6	2 " " 0.33	1.92 " "
	66	6½	2 " " 0.37	2.21 " "
	72	7	2 " " 0.40	2.67 " "
	78	7½	2 " " 0.43	3.03 " "
	84	8	2 " " 0.46	3.64 " "

EXTRA STRENGTH REINF. CONCRETE CULVERT PIPE

Based on Concrete with an Ultimate Compressive Strength of 4500 #/in² and the Three-Edged Bearing Tests in Table II, A.A.S.H.O. Specification M-41-46

Max. Fill Heights above Top of Pipe for Extra Strength Pipe	D Inches	T Inches	Circular Reinforcement Sq. In. per Lin. Ft of Pipe	Longitudinal Reinforcement, Min. Total Area Reqd.
Type of Bedding Ordinary H = 16 feet First Class H = 19 feet Ordinary Special H = 24 ft. First Class Special H = 30 ft.	24	3	1 Line 0.26	0.38 SQ. IN.
	30	3½	1 Line each 0.31	0.55 " "
	36	4	2 Lines " 0.28	0.75 " "
	42	4½	2 " " 0.33	0.98 " "
	48	5	2 " " 0.38	1.25 " "
	54	5½	2 " " 0.44	1.57 " "
	60	6	2 " " 0.50	1.92 " "
	66	6½	2 " " 0.56	2.21 " "
	72	7	2 " " 0.60	2.67 " "
	78	7½	2 " " 0.65	3.03 " "
	84	8	2 " " 0.72	3.64 " "

COLORADO
STATE HIGHWAY DEPARTMENT
UNREINFORCED CONCRETE PIPE
SIZES: 12", 15", 18"
REINFORCED CONCRETE PIPE
STANDARD & EXTRA STRENGTH
SIZES: 12", 15", 18", 24", 30", 36", 42", 48", 54", 60", 66", 72", 78", 84"

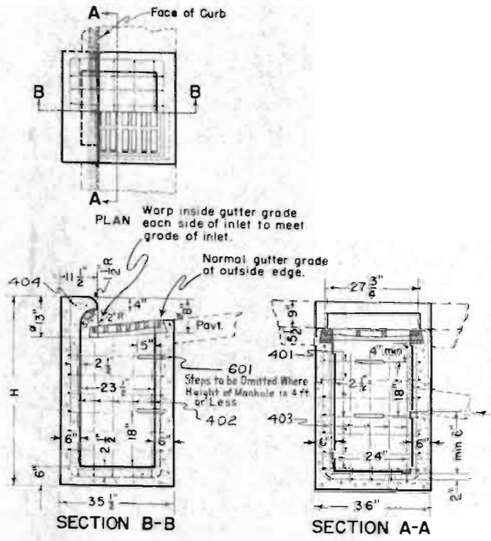
Designed by	Approved by
Made by W.G.S.	Bridge Engineer
Checked by A.L.C.	Date: June 1, 1944

STANDARD M-112-D

FED. ROAD DIVN. NO.	DISTRICT	SHEET NO.	TOTAL SHEETS
9	COLO.	202-2(2)24	

STANDARD M-12-D-13

NO. 12 CONCRETE INLET



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

BAR LIST FOR H = 3' 0"

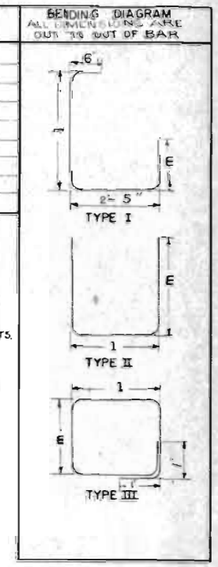
MARK	SIZE	NO. REQD	LENGTH	TYPE	DIMENSIONS l	DIMENSIONS m
601	3/4"ø	*Note	2' 6"	II	1'-0"	0'-10"
401	1/2"ø	3	11' 10"	III	2' 6"	2'-6
402	1/2"ø	5	3'-6"	II	2'-5	*1'-7"
403	1/2"ø	5	7'-1"	1	*2'-7	*1'-8"
404	1/2"ø	2	2' 7"	STR	—	—

* Omit 601 when H is 4'0" or less

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

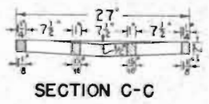
See Plans for size and locations of outlets.

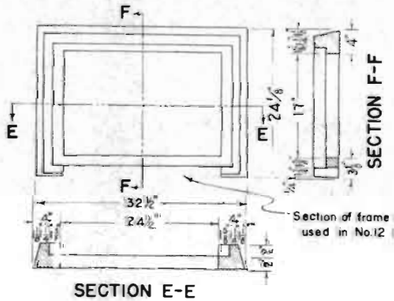
BENDING DIAGRAM ALL DIMENSIONS ARE OUT TO OUT OF BAR

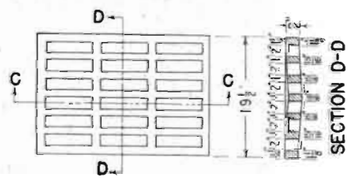


NO. 12 INLET GRATING & FRAME

Approx. Weight 340 lbs.

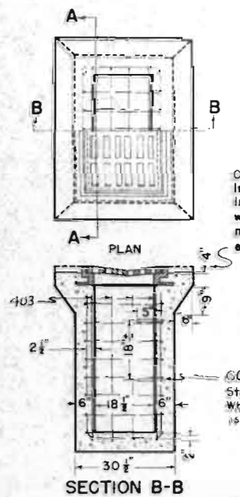




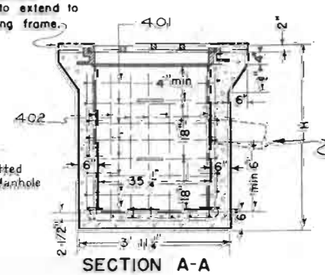


Section of frame to be cut out when used in No.12 Concrete Inlet.

NO. 13 CONCRETE INLET



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



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

See Plans for size and locations of outlets.

BAR LIST FOR H = 3'0"

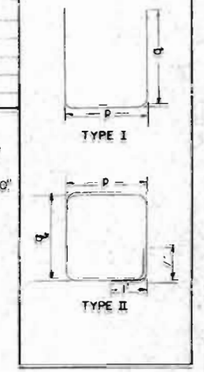
MARK	SIZE	NO. REQD	LENGTH	TYPE	DIMENSIONS p	DIMENSIONS q
601	3/4"ø	*Note	2' 6"	I	1'-0"	0'-10"
401	1/2"ø	3	12'-10"	II	3'-5	2'-1"
402	1/2"ø	7	6'-1"	I	2'-0"	*2'-1"
403	1/2"ø	4	7'-3"	I	3'-4"	*2'-1"

* Omit 601 When H is 4'0" or less

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

See Plans for size and locations of outlets.

BENDING DIAGRAM ALL DIMENSIONS ARE OUT TO OUT OF BAR



QUANTITIES

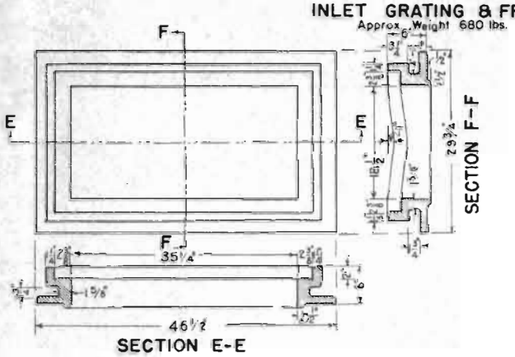
H	CLASS "A" CONCRETE *CU. YDS	* REINFORCING STEEL
3' 0"	.86	84 lbs
3' 6"	.96	100 "
4' 0"	1.06	116 "
4' 6"	1.16	136 "
5' 0"	1.26	156 "
5' 6"	1.36	172 "
6' 0"	1.46	192 "
6' 6"	1.57	206 "
7' 0"	1.67	225 "
7' 6"	1.77	245 "
8' 0"	1.87	261 "
8' 6"	1.97	277 "
9' 0"	2.07	297 "
9' 6"	2.17	313 "
10' 0"	2.28	329 "

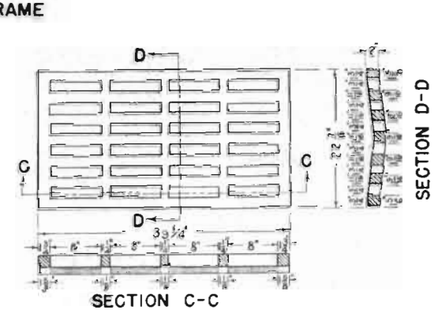
*Volume for inlet - volume occupied by pipes to be deducted for pay quantity of concrete.

* Includes 1% allowance for overrun.

NO. 13 INLET GRATING & FRAME

Approx. Weight 680 lbs.





QUANTITIES

H	CLASS "A" CONCRETE *CU. YDS	* REINFORCING STEEL
3' 0"	0.54	70 lbs.
3' 6"	0.63	85 "
4' 0"	0.72	100 "
4' 6"	0.81	119 "
5' 0"	0.90	137 "
5' 6"	0.99	152 "
6' 0"	1.08	166 "
6' 6"	1.17	185 "
7' 0"	1.27	200 "
7' 6"	1.36	215 "
8' 0"	1.45	233 "
8' 6"	1.54	248 "
9' 0"	1.63	263 "
9' 6"	1.73	282 "
10' 0"	1.82	297 "

*Volume for inlet - volume occupied by pipes to be deducted for pay quantity of concrete.

* Includes 1% allowance for overrun.

*VOLUME TO BE DEDUCTED FOR EACH OPENING

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

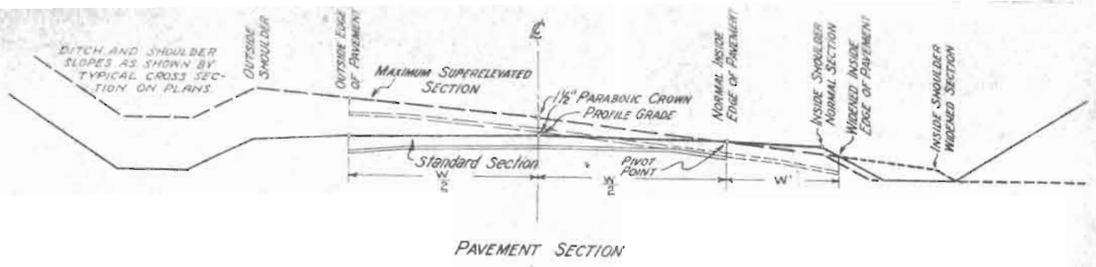
GENERAL NOTES

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

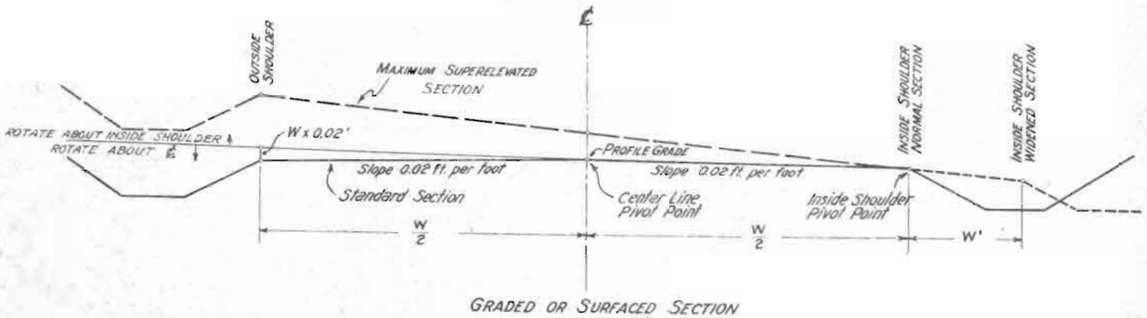
COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD
NO.12 AND NO.13
CONCRETE INLETS

Designed By A.P.G	Approved by C. J. Bailey
Made by A.P.G	Bridge Engineer
Check Design A.Z	
Check Detail C.N.	Date

STANDARD M-I-B



PAVEMENT SECTION

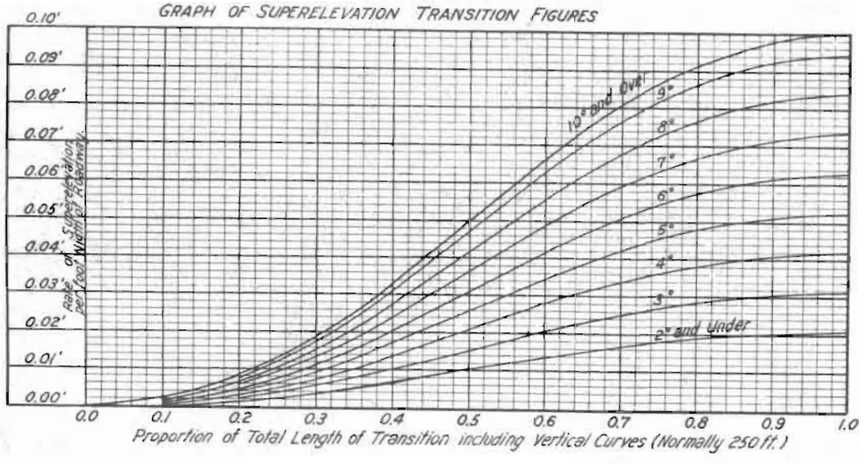


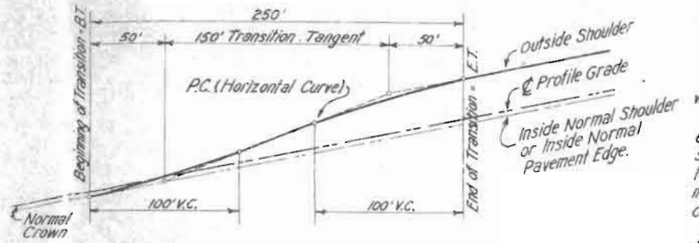
GRADED OR SURFACED SECTION

SUPERELEVATION AND WIDENING TABLES

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

GRAPH OF SUPERELEVATION TRANSITION FIGURES

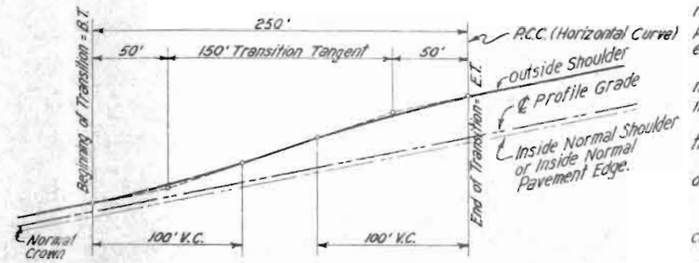




CASE I: SIMPLE CURVE WITH UNLIMITED TANGENT APPROACH

NOTE: CASE I

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



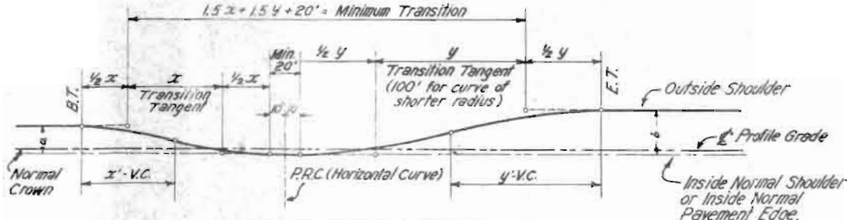
CASE II: COMPOUND CURVE

NOTE: CASE II

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

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

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



CASE III: REVERSE CURVES

NOTE: CASE III

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

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

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

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

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

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

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

GENERAL NOTES

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

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

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

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

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

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

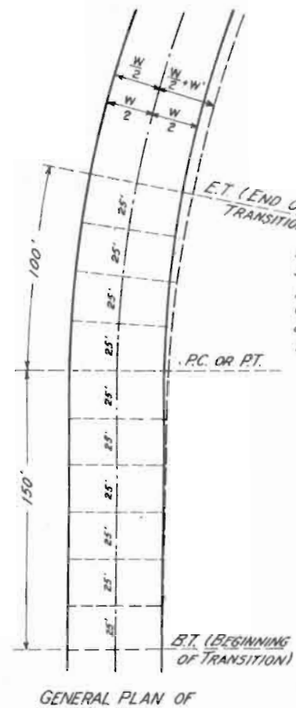
The rate of superelevation per foot width of roadway to be applied at the outside shoulder of the roadway is computed as follows:

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

0.0105 ft. x Degree of Curvature.

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

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



GENERAL PLAN OF WIDENING

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

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

Designed by R.E.L. Approved
Made by P.B.B.
Checked by F.F.S. & H.M. Chief Engineer
January 1st 1948

REVISIONS

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

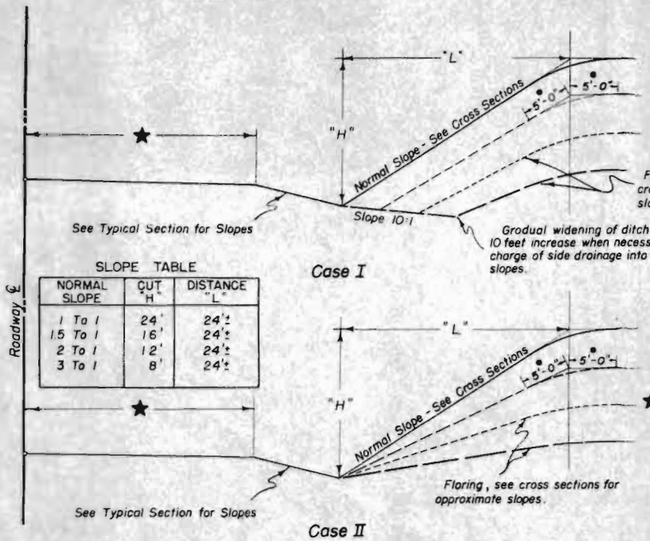
STANDARD SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT & WIDENING AT BRIDGES AND AT CREST OF GRADES

STANDARD M-2-DM

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

FED. ROAD DIVISION NO.	DISTRICT	SHEET NO.	TOTAL SHEETS
9.	COLO.	902-28 [illegible]	

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



SLOPE TABLE

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

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

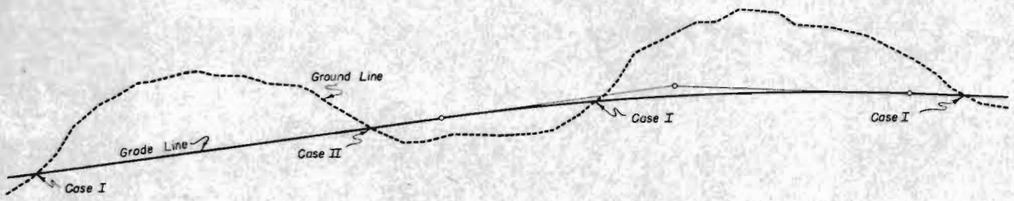
Flaring with widened ditch, see cross sections for approximate slopes.

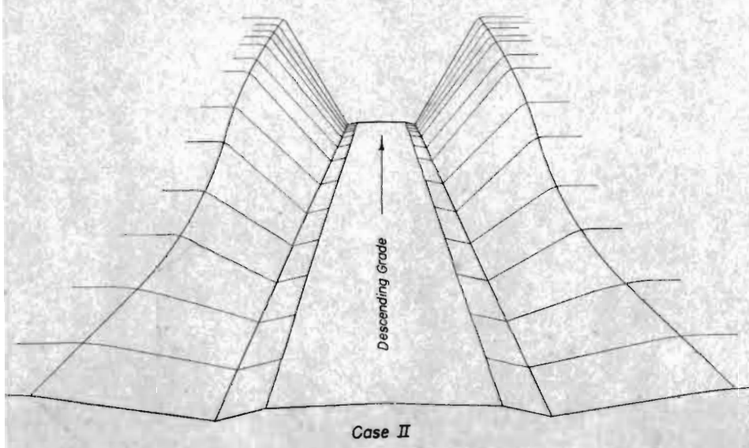
•CUT SLOPE TREATMENT IN EARTH CUTS: The intersection of cut slopes with the existing ground shall be rounded in earth cuts, beginning 5 ft. outside the slope stake and extending 5 ft. down the cut slope. Where the cut slope is less than 5 ft. reduce each of the above widths of slope treatment to the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

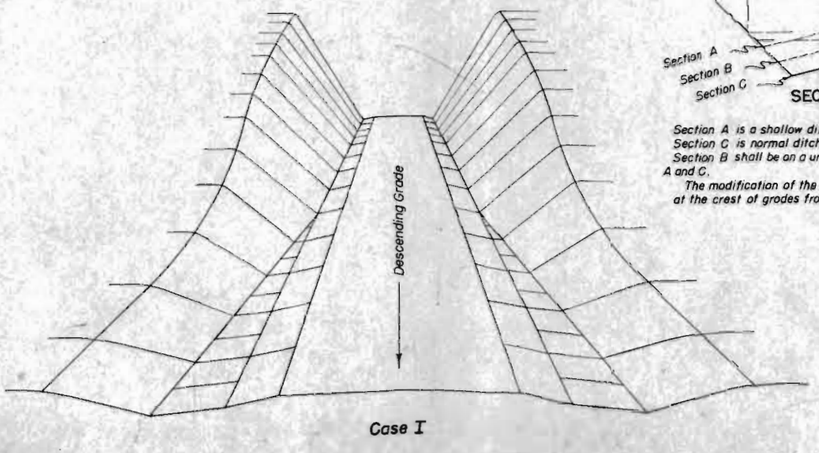
★ WIDENING AT BRIDGE APPROACHES: Roadway embankment at bridge approaches shall be so constructed that the finish point of the subgrade shoulder is a Min. of 2 ft. beyond the outside edge of bridge deck. Where widening of the section is necessary to achieve this result it shall take place gradually over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

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

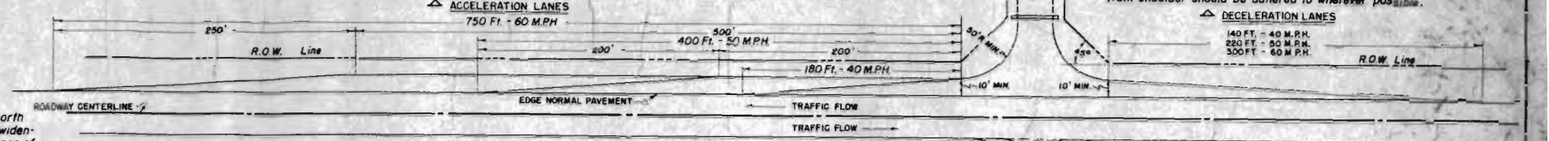
PLAN OF FLARING IN EARTH CUTS





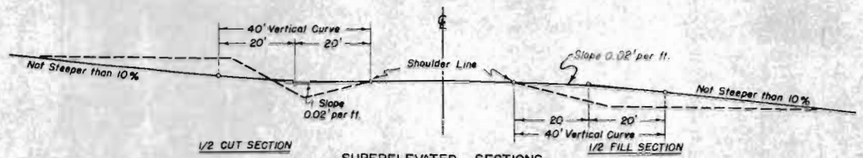


TYPICAL PLANS FOR SIDE APPROACH ROADS

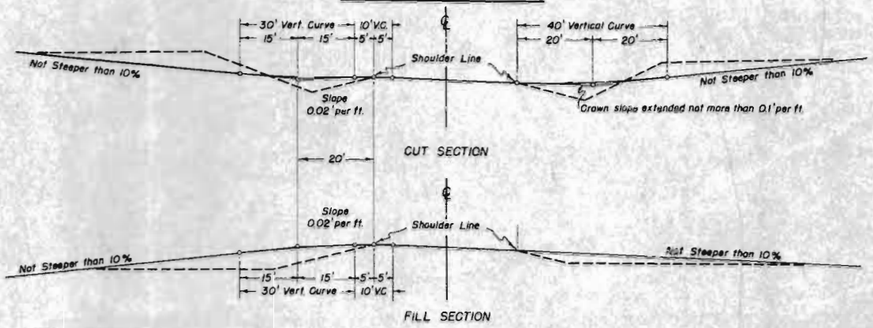


△ Values shown are general, see plans for specific requirements of each Type I Road Approach.

STANDARD CROWNED SECTION



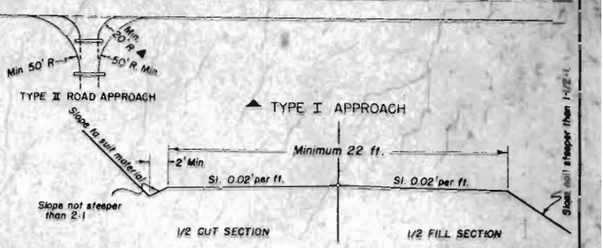
SUPERELEVATED SECTIONS



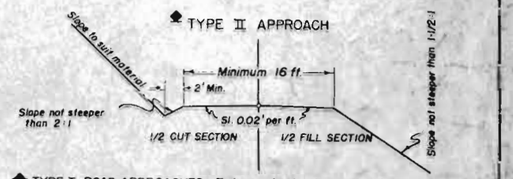
TYPE I ROAD APPROACH

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.

TYPE II ROAD APPROACH



TYPE II APPROACH



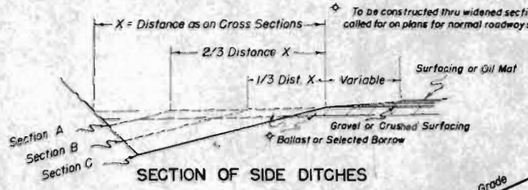
▲ TYPE I ROAD APPROACHES: To be used only when called for on plans. The width of crowned section shall not be less than the existing crowned width of the approaching road but in no case shall be less than twenty two (22) feet.

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

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

DETAILS FOR DITCH & WIDENED SHOULDERS AT CREST OF GRADES

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

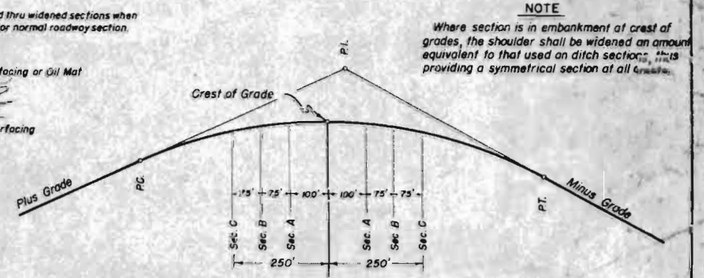


SECTION OF SIDE DITCHES

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

NOTE

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



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

GENERAL NOTES

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

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

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

COLORADO STATE HIGHWAY DEPARTMENT

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

Designed by A.Z.
Made by C.G.M.
Checked by [illegible]

Approved by [illegible]
Engineer, Surveys & Plans
Date: April 20th, 1949

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

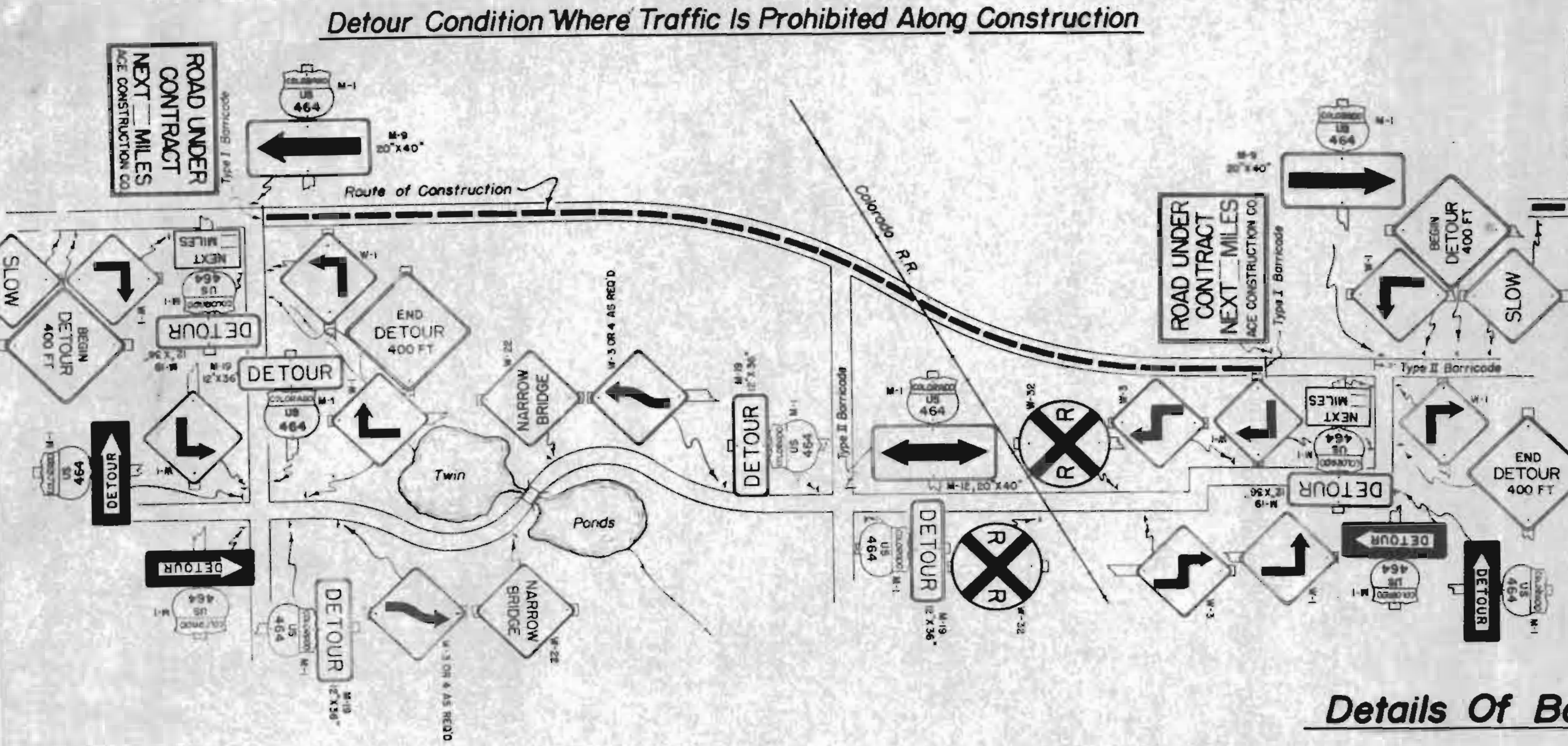
STANDARD M-2-DS

FED. ROAD DIVISION NO.	DISTRICT	U I	SHEET NO.	TOTAL SHEETS
9	COLO.	002-2(20) 27		

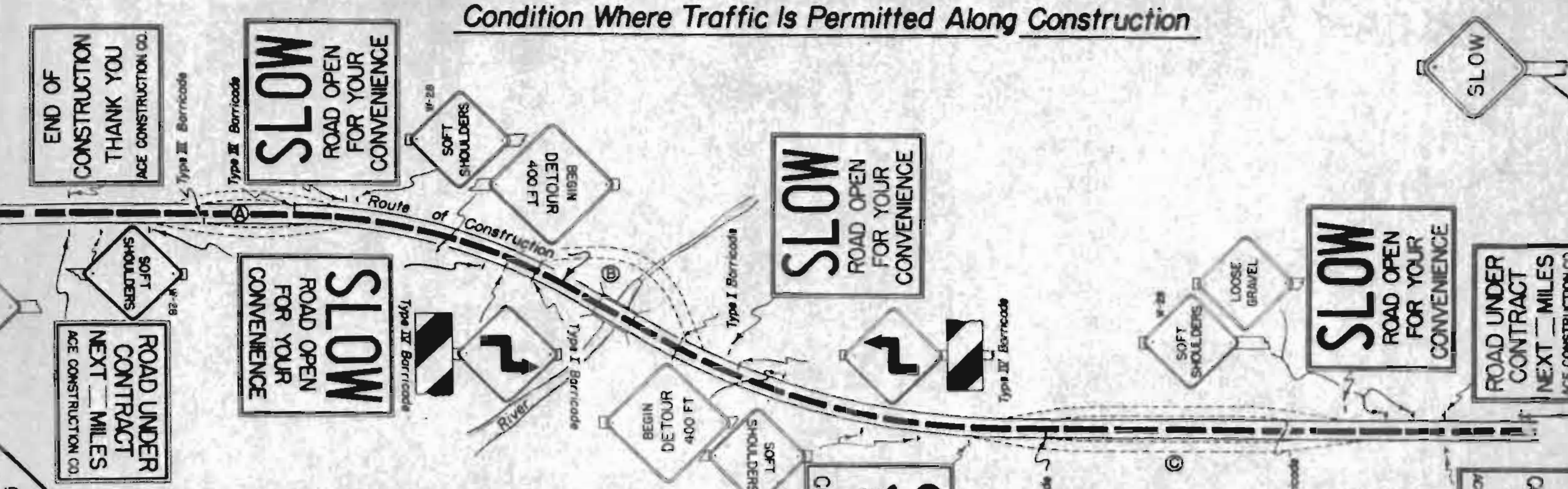
REV. - 8/16/49 - E.E.D.
REV. - 2/3/50 - E.A.R.

Typical Methods Of Marking Highways & Detours

Detour Condition Where Traffic Is Prohibited Along Construction



Condition Where Traffic Is Permitted Along Construction



LEGEND

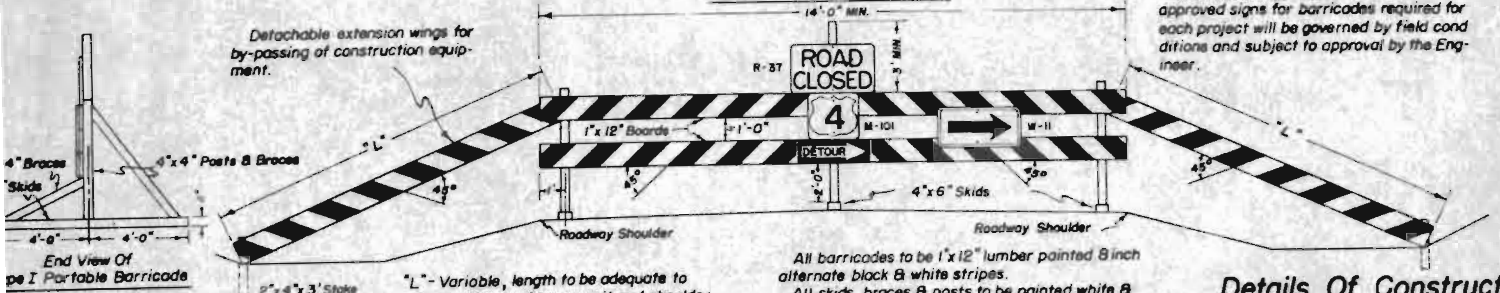
Ⓐ Placing Culvert, Traffic using shoulders.
Ⓑ Traffic using detour around structure.
Ⓒ New Grade, Traffic using shoulders.

NOTE

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

Details Of Barricades

Type I
(Road Closed)

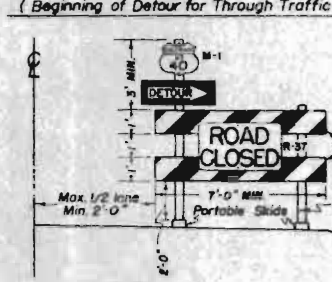


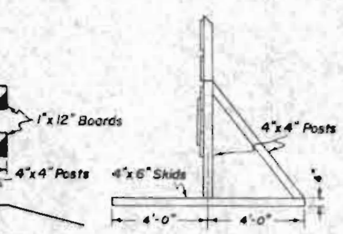
NOTE

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

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

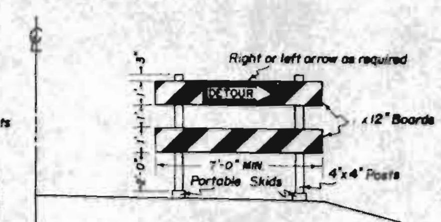
Type II
(Beginning of Detour for Through Traffic)





Typical End View Of Types II, III, IV, Portable Barricades

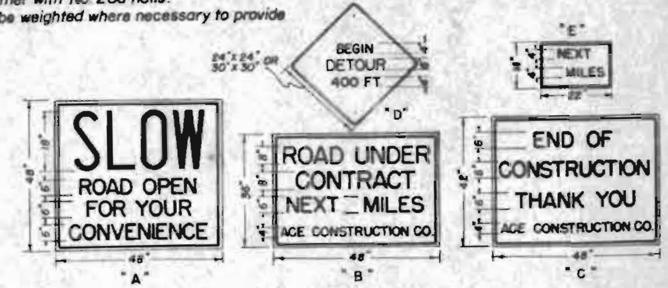
Type III
(Both Ends of By-Pass Areas within Project)



Diagonal stripes to slope in direction traffic is to travel.

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

Details Of Construction Signs



MARKINGS

Construction Sign "A" - to be of 1" material painted White, the word "SLOW" lettered in Red, balance of lettering to be Black.

Construction Signs "B", "C", "E" - to be of 1" material painted White, all lettering to be Black.

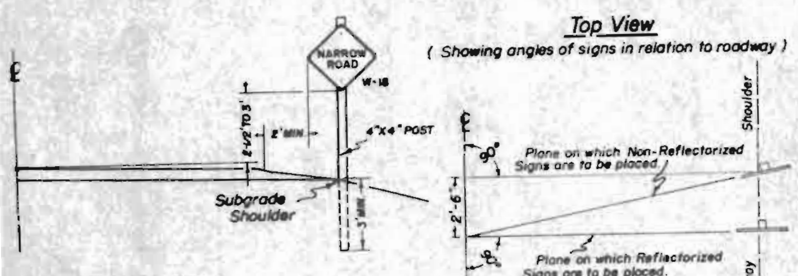
Detour Warning Sign "D" to be of 1/4" (min.) plywood or No. 10 (min.) gauge metal, painted Yellow, all lettering to be Black.

Construction Signs - "B", "E" - 3/4"x9" metal slides to be placed between words "Next & Miles", spaced so as to accomodate appropriate size numerals. Required numerals to be furnished by the Department and to be installed by the Contractor.

Signs to be fastened to 2- 4"x4" posts set 4 ft. in the ground with a minimum of 3 cleats on the back.

Position Of Signs Relative To Roadbed & Hazards

Top View
(Showing angles of signs in relation to roadway)



NOTE

Warning Signs to be made of 1/4" (Min.) plywood or No. 10 gauge (Min.) metal.

Location to be governed by field conditions. Exact location to be staked by the Engineer. In all cases warning signs are to be placed well in advance of hazard, the distance depending on topography, and existing approach speeds.

Details Of Reflectorized Arrows

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

TYPES W-11, W-12

MARKINGS A Black Arrow on a "Highway Yellow" background of "Scotchlite" Reflective Sheeting or suitable equivalent.

GENERAL NOTES

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

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

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

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

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

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

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

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

COLORADO
STATE HIGHWAY DEPARTMENT

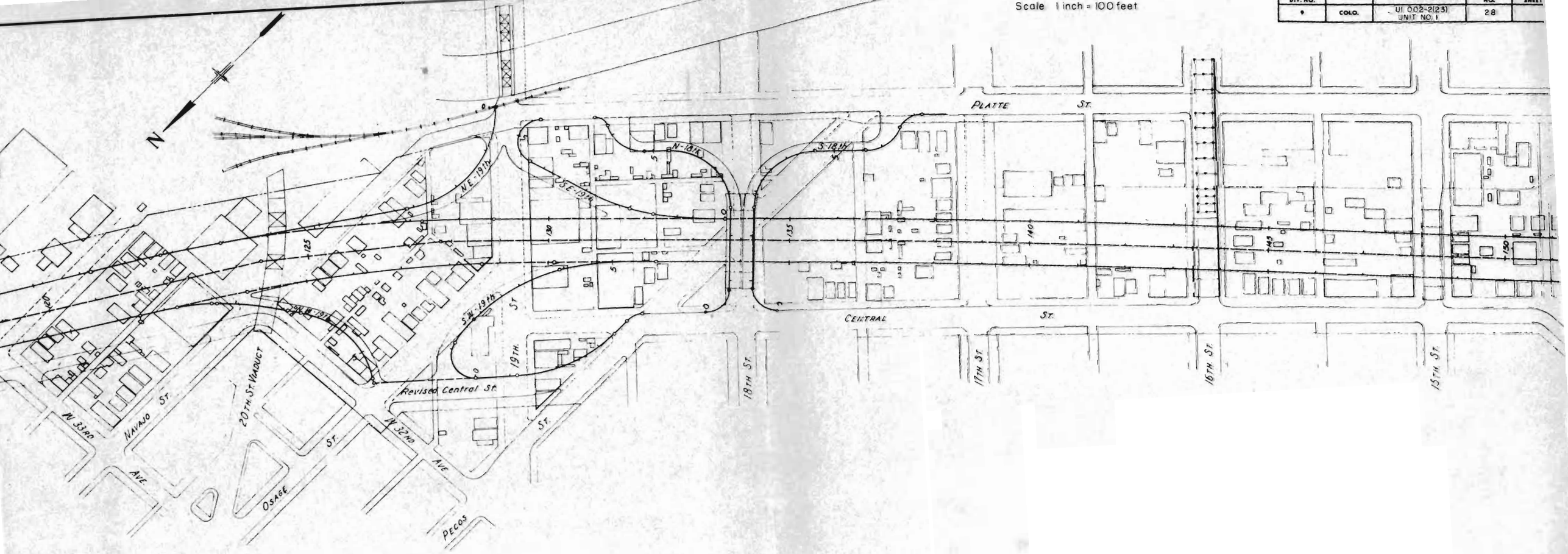
Standard Roadway Construction Traffic Signs

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

Approved by [signature]
Engineer, Signs & Plans
Date: 7-25-1949

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	UI 002-2(23) UNIT NO. 1	28	

Scale 1 inch = 100 feet



COLORADO STATE HIGHWAY DEPT.
THE VALLEY HIGHWAY . . . . . DENVER, COLORADO

PROPERTY MAP

CROCKER AND RYAN
CONSULTING ENGINEERS
DENVER, COLORADO

DATE | SHEET 10 OF 14 | DWG. NO.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	U1 002-2(23) UNIT NO. 1	29