

STATE OF COLORADO  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS

**GENERAL NOTES**

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE DIVISION OF HIGHWAYS, STATE OF COLORADO, APPLICABLE TO THE PROJECT.

STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH STANDARD M-206-2.

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-202.

ALL STRUCTURAL STEEL SHALL BE AASHTO M-HES ASTM A-36 UNLESS OTHERWISE NOTED.

CLASS 1 FINCH FOLLOWED BY APPLICATION OF 4 COLORED ACETYLE COATING WILL BE REQUIRED ON ALL EXPOSED CONCRETE SURFACES DOWN TO 1/2" BELOW SPRING LINE. REQUIREMENTS FOR COATING ARE GIVEN IN REVISION 2 OF SECTION 02. STRUCTURAL CONCRETE COATING.

ALL EXTERIOR CONCRETE CORNERS SHALL BE CONSTRUCTED WITH 3/4" CHAMFERS UNLESS OTHERWISE NOTED.

GRADE 60 REINFORCING STEEL IS REQUIRED FOR #4 BARS AND LARGER. ALL REINFORCING STEEL SHALL BE EPOXY COATED UNLESS OTHERWISE NOTED.

THE FOLLOWING TABLE GIVES THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS:

BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH FOR CLASS 1 & 2 CONCRETE	1'-0"	1'-0"	1'-0"	2'-0"	2'-0"	2'-0"	4'-0"	5'-0"
SPLICE LENGTH FOR CLASS 3 & 4 CONCRETE	1'-0"	1'-0"	1'-0"	2'-0"	2'-0"	2'-0"	4'-0"	5'-0"

THE ABOVE SPLICE LENGTHS SHALL BE INCREASED BY 25 PERCENT FOR 3 BAR BUNDLES AND 33 PERCENT FOR 4 BAR BUNDLES.

ANY SPLICES NOT SHOWN SHALL BE APPROVED BY THE ENGINEER.

APPLIED WIND LOADS AND EARTHQUAKE LOADS WERE NOT CONSIDERED IN ANALYZING THE STRUCTURE FOR STABILITY DURING THE CONSTRUCTION PHASE.

ET: EACH FACE	ET: TOP FACE
FT: FAY FACE	BT: BOTTOM FACE
NT: NEAR FACE	RT: NON-NEAR FACE

FOR STRUCTURE NUMBER NOTATION, SEE STANDARD S-44-0.

PERMANENT STEEL BRIDGE DECK FORMS MAY BE USED AT THE CONTRACTOR'S OPTION AT NO ADDITIONAL COST TO THE STATE OF COLORADO. NO STEEL BRIDGE DECK FORMS WILL BE ALLOWED ON THE SAME LEVEL PORTION OF THE DECK.

THE INFORMATION SHOWN ON THESE PLANS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE TO THEM.

**DESIGN NOTES**

CURRENT AASHTO SPECIFICATIONS

LIVE LOAD: AASHTO HS-20-44 AND INTERSTATE ALTERNATE  
DEAD LOAD: ASSUMED 40 LB. PER SQ. FT. FOR BITUMINOUS PAVEMENT  
ASSUMED 120 LB. PER SQ. FT. FOR CONCRETE FORMWORK

REINFORCED CONCRETE

CLASS 4 CONCRETE	#4: 4000 PSI	#5: 4000 PSI	#6: 4000 PSI	#7: 4000 PSI	#8: 4000 PSI	#9: 4000 PSI
CLASS 3 CONCRETE	#4: 3500 PSI	#5: 3500 PSI	#6: 3500 PSI	#7: 3500 PSI	#8: 3500 PSI	#9: 3500 PSI
CLASS 2 CONCRETE	#4: 3000 PSI	#5: 3000 PSI	#6: 3000 PSI	#7: 3000 PSI	#8: 3000 PSI	#9: 3000 PSI

REINFORCING STEEL: #4 BARS AND LARGER: #4: 40000 PSI; #5: 40000 PSI

STRUCTURAL STEEL: AASHTO M-HES ASTM A-36 #4: 40000 PSI

PRESTRESSED CONCRETE

CLASS 3 CONCRETE	#4: 4000 PSI	#5: 4000 PSI	#6: 4000 PSI	#7: 4000 PSI	#8: 4000 PSI	#9: 4000 PSI
#4: 4000 PSI	#5: 4000 PSI	#6: 4000 PSI	#7: 4000 PSI	#8: 4000 PSI	#9: 4000 PSI	#10: 4000 PSI

PRESTRESSING STEEL: 1/2" DIA. LOW RELAXATION STRAND  
AASHTO M-202 GRADE 270  
#4: 40000 PSI

DESIGN METHOD

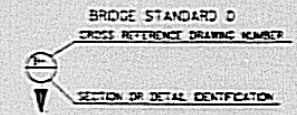
SUPERSTRUCTURE: SERVICE LOAD DESIGN WORKING STRESS  
SUBSTRUCTURE: SERVICE LOAD WORKING STRESS EXCEPT LATERAL FACTOR DESIGN FOR COLLISION

AS CONSTRUCTED

NO REVISIONS  REVISED  VOID

FED. ROAD REGION	DIVISION	PROJECT NO.	SHEET NO.	SHEET TOTAL
V III	C.D.D.	R25 - 2 198	126	242

REVISIONS	



**INDEX OF DRAWINGS**

- DWG. K-1-1 GENERAL INFORMATION
- DWG. K-1-2 SUMMARY OF QUANTITIES
- DWG. K-1-3 GENERAL LAYOUT - RAMP "Y" STRUCTURE
- DWG. K-1-4 GENERAL LAYOUT - RAMP "Y" STRUCTURE
- DWG. K-1-5 GENERAL LAYOUT - RAMP "Y" STRUCTURE
- DWG. K-1-6 ENGINEERING SECTION
- DWG. K-1-7 CONSTRUCTION LAYOUT - CASSON AND PILING LAYOUT - UNIT 1
- DWG. K-1-8 CONSTRUCTION LAYOUT - CASSON LAYOUT - UNIT 1
- DWG. K-1-9 CONSTRUCTION LAYOUT - CASSON LAYOUT - UNIT 2
- DWG. K-1-10 CONSTRUCTION LAYOUT - CASSON LAYOUT - UNIT 3
- DWG. K-1-11 CONSTRUCTION LAYOUT - CASSON LAYOUT - UNIT 4
- DWG. K-1-12 CASSON DETAILS
- DWG. K-1-13 ABUTMENT H - DETAILS
- DWG. K-1-14 ABUTMENT H AND WINGWALL DETAILS
- DWG. K-1-15 PER 3H - UNIT 1
- DWG. K-1-16 PER 3H G1 - UNIT 1
- DWG. K-1-17 PER 3H IN - UNIT 1
- DWG. K-1-18 PER 3H AND 5H - UNIT 2
- DWG. K-1-19 PER 3H AND 7H - UNIT 2
- DWG. K-1-20 PER 3E BEARING DETAILS
- DWG. K-1-21 BEARING DEVICE TYPE III
- DWG. K-1-22 DECK PLAN - SPAN 1 - UNIT 1
- DWG. K-1-23 DECK PLAN - SPAN 2 - UNIT 1
- DWG. K-1-24 DECK PLAN - SPANS 1, 2 & 3 - UNIT 2
- DWG. K-1-25 DECK PLAN - SPANS 4 & 5 - UNIT 2
- DWG. K-1-26 SUPERSTRUCTURE DETAILS SECTION G1 - UNIT 1
- DWG. K-1-27 SUPERSTRUCTURE DETAILS SECTION G1 - UNIT 1
- DWG. K-1-28 SUPERSTRUCTURE DETAILS SECTION G1 - UNIT 2
- DWG. K-1-29 SUPERSTRUCTURE DETAILS SECTION G1 - UNIT 2
- DWG. K-1-30 DIAPHRAGM DETAILS - UNIT 1
- DWG. K-1-31 DIAPHRAGM DETAILS - UNIT 1
- DWG. K-1-32 DIAPHRAGM DETAILS - UNIT 2
- DWG. K-1-33 SUPERSTRUCTURE PRESTRESSING DETAILS - SPAN 1 - UNIT 1
- DWG. K-1-34 SUPERSTRUCTURE PRESTRESSING DETAILS - SPAN 2 - UNIT 1
- DWG. K-1-35 SUPERSTRUCTURE PRESTRESSING DETAILS - SPAN 1 - UNIT 2
- DWG. K-1-36 SUPERSTRUCTURE PRESTRESSING DETAILS - SPANS 2, 3 & 4 - UNIT 2
- DWG. K-1-37 SUPERSTRUCTURE PRESTRESSING DETAILS - SPAN 5 - UNIT 2
- DWG. K-1-38 SUPERSTRUCTURE WEB FLARES - UNIT 1
- DWG. K-1-39 SUPERSTRUCTURE WEB FLARES - UNIT 2
- DWG. K-1-40 CAST-IN-PLACE PRESTRESSED BOX GROSS DETAILS
- DWG. K-1-41 CAST-IN-PLACE PRESTRESSED BOX GROSS DETAILS
- DWG. K-1-42 SUPERSTRUCTURE DEFLECTIONS
- DWG. K-1-43 EXPANSION DEVICE C - 4 INCH - ABUTMENT H
- DWG. K-1-44 BRIDGE EXPANSION DEVICE C - 4 INCH
- DWG. K-1-45 EXPANSION DEVICE C - 5 INCH - PER 3H IN
- DWG. K-1-46 EXPANSION DEVICE C - 5 INCH - PER 3E
- DWG. K-1-47 EXPANSION DEVICE C - 5 INCH
- DWG. K-1-48 COVER PLATE DETAILS - BACKUP WALL DETAILS
- DWG. K-1-49 SOIL BRIDGE BASE DETAILS
- DWG. K-1-50 BRIDGE RAIL TYPE 4
- DWG. K-1-51 BRIDGE DRAIN SPECIALS - DETAILS
- DWG. K-1-52 APPROACH SLAB DETAILS
- DWG. K-1-53 INTERIOR LIGHTING CONCRETE BOX GROSS
- DWG. K-1-54 BENCH MARK

**BRIDGE DESCRIPTION**

STRUCTURE NO. F-46-2K  
UNIT 1: 2-SPAN 102'-5 1/2" (2) 62'-8 1/2" (2) BRIDGE CONTINUOUS POST-TENSIONED CAST-IN-PLACE CONCRETE BOX GROSS INTERCHANGE RAMP, VARIABLE ROADWAY WIDTH AND SKIN.

STRUCTURE NO. F-46-2K  
UNIT 2: 5-SPAN 102'-0" (5) 71'-0" (4) 51'-0" (3) 64'-8 1/2" (2) BRIDGE CONTINUOUS POST-TENSIONED CAST-IN-PLACE CONCRETE BOX GROSS INTERCHANGE RAMP, VARIABLE ROADWAY WIDTH AND SKIN.

1'-0" CONCRETE BRIDGE RAIL TYPE 4.

DelBauw, Cotner & Company Denver, CO



DIVISION OF HIGHWAYS	
RAMP "Y"	
GENERAL INFORMATION	
Sta. 903+07.50 to 92+85.32	
In DENVER Sec. 4 T4S R58W	
Designer: S. S. G. G. G.	Checker: F - 15 - OK
Detailer: M. G. G. G.	Checker: F - 15 - NO
Drawing Number 54 of 54 Drawings	

CHECKED BY: [ ]  
 DATE: [ ]  
 DESIGNED BY: [ ]  
 DATE: [ ]  
 DRAWN BY: [ ]  
 DATE: [ ]  
 QUANTITY BY: [ ]  
 DATE: [ ]  
 REVISION BY: [ ]  
 DATE: [ ]

B.R.I.A.R.

PLANS 2000 3/14/94

Gut

1/2/187

SUMMARY OF QUANTITIES

REVISIONS		
8-25-87	Quantity Revised	J.C.K.

ITEM	DESCRIPTION	UNIT	STRUCTURE NUMBER F-16-OK					STRUCTURE NUMBER F-16-NO					RAMP *h TOTAL		
			SUPER-STRUCTURE	ABUT. 1H	PIER 2H	PIER 3H(S)	PIER 3H(N)	TOTAL	SUPER-STRUCTURE	PIER 4H	PIER 5H	PIER 6H		PIER 7H	TOTAL
206	STRUCTURE EXCAVATION	CU.YD.		325	263	131	131	354		110	110	105	36	421	1375
206	STRUCTURE BACKFILL (CLASS 1)	CU.YD.		549				549							549
206	STRUCTURE BACKFILL (CLASS 2)	CU.YD.			296	108	108	512		36	36	207	82	481	393
206	FILTER MATERIAL (CLASS B)	CU.YD.		13				13							13
403	HOT BITUMINOUS PAVEMENT (GRADING EX) (HAUL)	TON	164	4				168	224					224	392
403	HOT BITUMINOUS PAVEMENT (PATCHING) (HBA)	TON	2					2							2
411	ASPHALT-CEMENT (AC-10H) (FORTIFIED)	TON	10					10	13					13	23
502	STEEL PILING (HP 14 x 89)	LIN. FT.		1068				1068							1068
503	DRILLED CAISSON (48 INCH)	LIN. FT.			112			112	412	244	77	71	76	260	368
503	DRILLED CAISSON (60 INCH)	LIN. FT.				38	41	79						79	79
509	STRUCTURAL STEEL (GALVANIZED)	LB.	955	155		750	750	2610							2610
512	BEARING DEVICE (TYPE III)	EACH		2		2	4	8	2					2	10
513	BRIDGE DRAIN (SPECIAL)	EACH		2				2	2					2	4
513	DRAIN PIPE (3 INCH)	LIN. FT.		7				7							7
515	WATERPROOFING (MEMBRANE)	SQ. YD.	485	30				515	2024					2024	3645
518	BRIDGE COMPRESSION JOINT SEALER	LIN. FT.		18				18							18
518	WATERSTOP (6 INCH)	LIN. FT.		29				29							29
518	BRIDGE EXPANSION DEVICE (0-4 INCH)	LIN. FT.		30				30							30
518	BRIDGE EXPANSION DEVICE (0-9 INCH)	LIN. FT.					31	31	27					27	58
601	CONCRETE CLASS A (BRIDGE)	CU. YD.		192.6	127.1	100.5	107.4	542			41.9	44.7	40.4	127	669
601	CONCRETE CLASS D (BRIDGE)	CU. YD.								63.0				63	63
601	CONCRETE CLASS S (BRIDGE)	CU. YD.	1156.0					1156	1275.0					1275	2471
602	REINFORCING STEEL	LB.		4,915	5,770	4,255	4,550	19,490		2675	2910	2910	2955	11,450	30,940
602	REINFORCING STEEL (EPOXY COATED)	LB.	248,990	21,635	15,230	21,035	21,750	256,440	252,060	20,300	15,640	10,970	22,830	322,400	248,840
606	BRIDGE RAIL TYPE 4	LIN. FT.	632	24				656	1344	1345				1344	2689
612	LOAD CENTER (CONCRETE)	EACH						3						3	3
613	3/4 INCH ELECTRICAL CONDUIT	LIN. FT.							42	39				42	42
613	2 INCH ELECTRICAL CONDUIT	LIN. FT.	442	62				504	627	642				669	1491
613	INTERIOR LIGHTING (Conc. Box Girder)	EACH		1				1	1					1	2
618	PRESTRESSING STEEL WIRE OR STRAND	M. K. FT.		5156				5156	3906					3906	9062

- Volume of concrete for payment shall not be reduced by the volume occupied by the prestressing ducts.
- This item includes furnishing, placing in the concrete and post-tensioning the prestressing steel. The Contractor shall furnish all stressing equipment and accessories required for installation and stressing operation. Quantity shall not be remeasured, but shall be the number shown.
- ASTM A-53, Grade B Pipe
- Bearing Devices (Type III) shall be placed on Existing Pier I2E.
- Bridge Expansion Device (0-9 inch) shall be placed above Existing Pier I2E.
- Includes 15.2 cu. yd. Concrete Class A for Approach Slab.
- Includes 13.1 cu. yd. Concrete Class S for Deck Closure to Structure F-16-OH.
- Includes 1980 lbs. Reinforcing Steel (Epoxy-Coated) for Approach Slab.
- Includes 2950 lbs. Reinforcing Steel (Epoxy-Coated) for Deck Closure to Structure F-16-OH.
- Structure Excavation and Structure Backfill (Class 2) for Pier 6H Assumes a portion of Vertical Excavation Surface, Adjacent to Detour Roadway, Supported By Temporary Shoring And Bracing. Structure Excavation for Pier 6H Shall Include All Pumping, Bailing, Draining, Sheeting, Bracing and Incidentals Required for Proper Execution of the Work.

De Leuw, Cather & Company Denver, CO

DIVISION OF HIGHWAYS

SUMMARY OF QUANTITIES

Includes 7 Tons Hot Bituminous Pavement (Grading EX) (Haul) for Deck of Structure F-16-OH.  
Includes 61 Sq. Yd. Waterproofing (Membrane) for Deck of Structure F-16-OH.

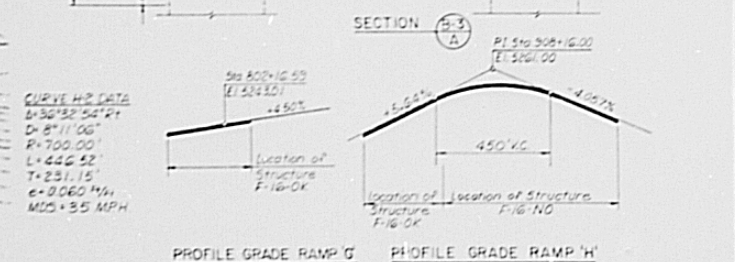
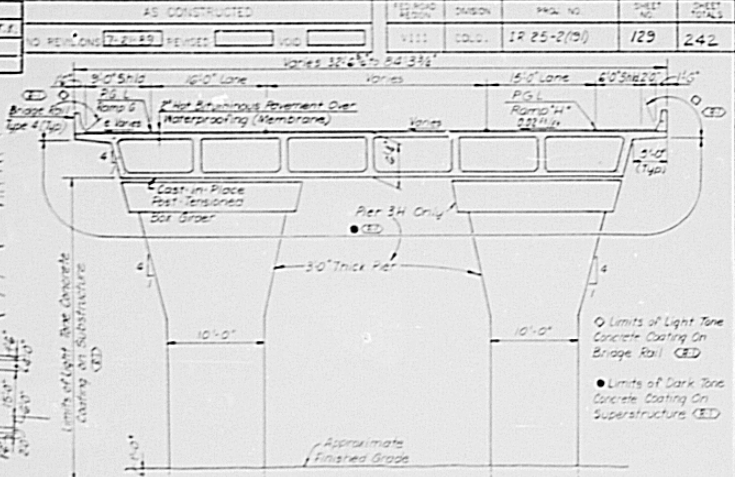
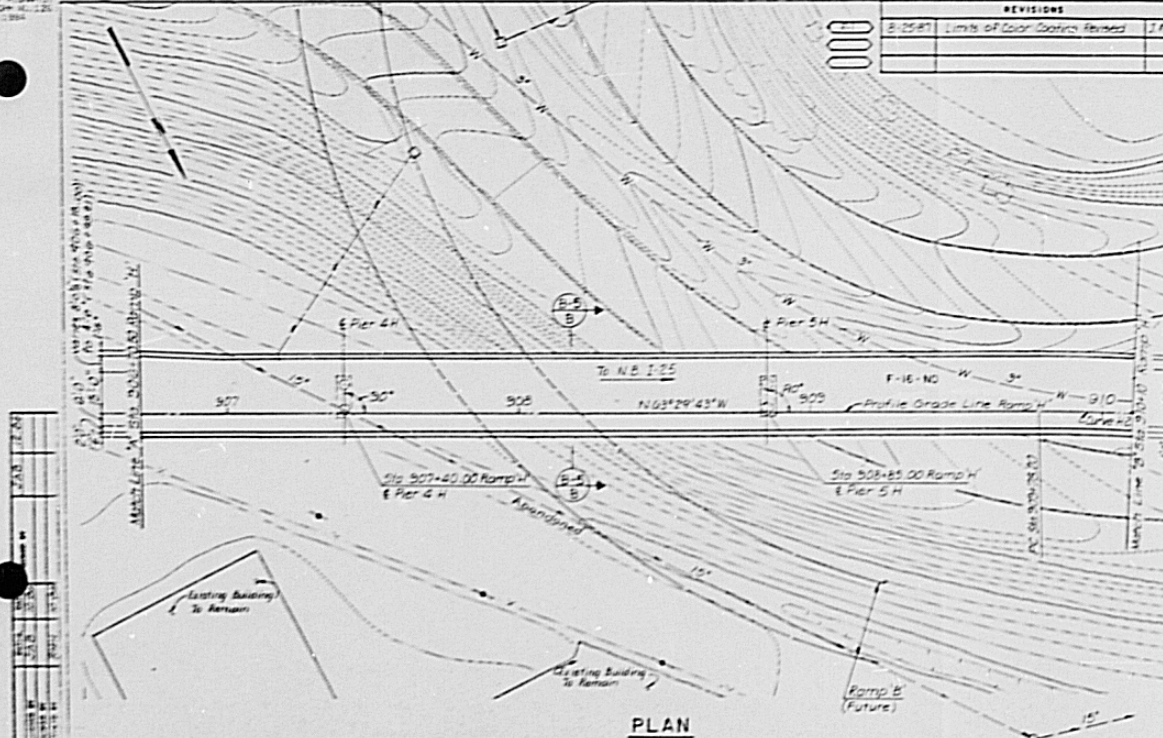
Designer: M. Parkington, J. Barrows	Structure: F-16-OH
Detailer: K. Hingshow	Numbers: F-16-NO
Drawing Number: B-2	of 54 Drawings



3/22/64  
 1/23/64  
 1/24/64  
 1/25/64

REVISIONS		
1	B-2587	Limits of Color Coating Revised J.F.F.

NO.	REVISION	BY	DATE	AS CONSTRUCTED	DESIGN DIVISION	PROJECT NO.	SHEET NO.	SHEET TOTALS
1	VOID					1R 25-2(9)	129	242

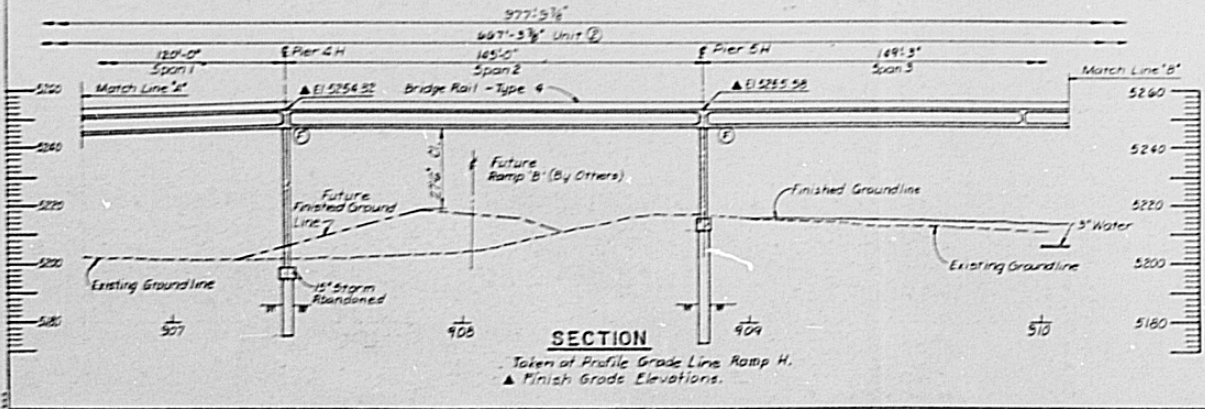


**CURVE HP DATA**  
 S=3032.50' Pt  
 D=8°11'06"  
 R=700.00'  
 L=444.52'  
 T=251.15'  
 e=0.060 Mh  
 MD=+35 MPH

**NOTE**  
 Live Loading - HS 20-44 And Interstate Alternate  
 For Continuation of Structure see Dwy B-5

De Leuw, Cather & Company  
 DIVISION OF HIGHWAYS  
 GENERAL LAYOUT  
 RAMP 'H' STRUCTURE

Checked by J. Barraba	Structure	FIG-NO
Checked by R. Hineshaw	Number	
Drawing Number B-4	of	54 Drawings
Scale		

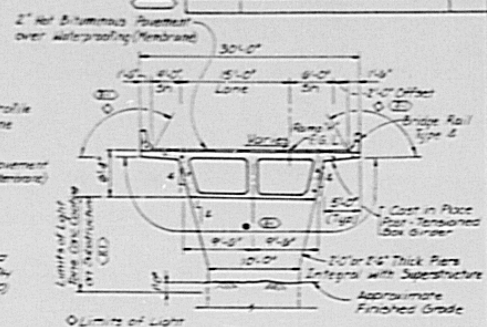
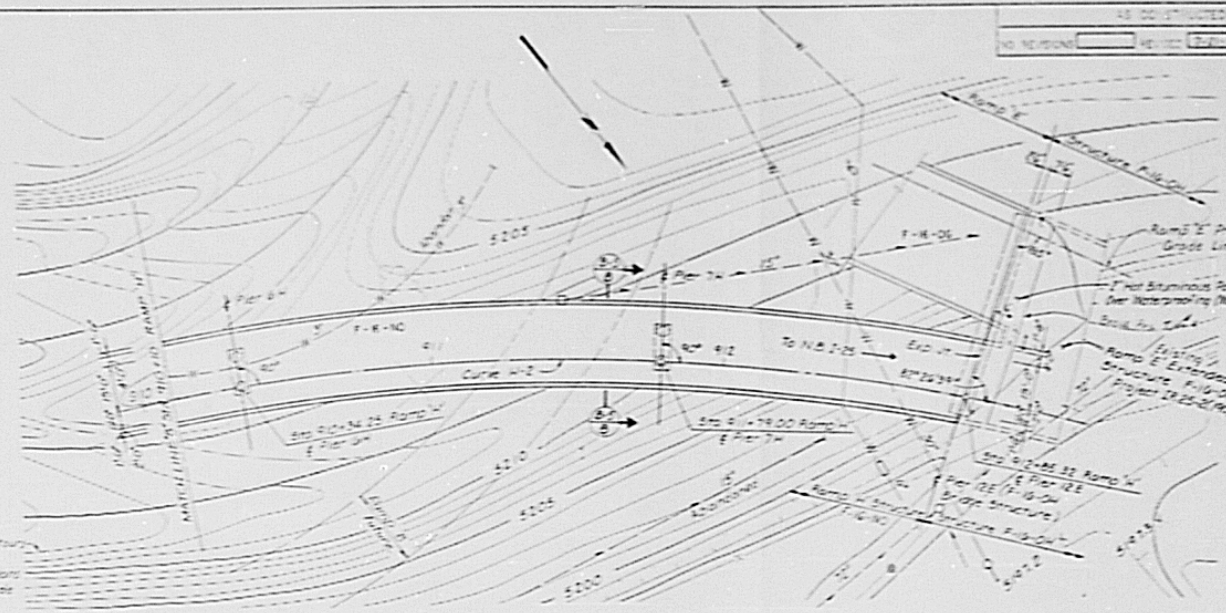


Section Taken at Profile Grade Line Ramp H.  
 ▲ Finish Grade Elevations.

NO. REVISIONS	NO. SHEETS	DATE	BY
	22-111	12-1-51	...

PROJECT NO.	130
SECTION NO.	242

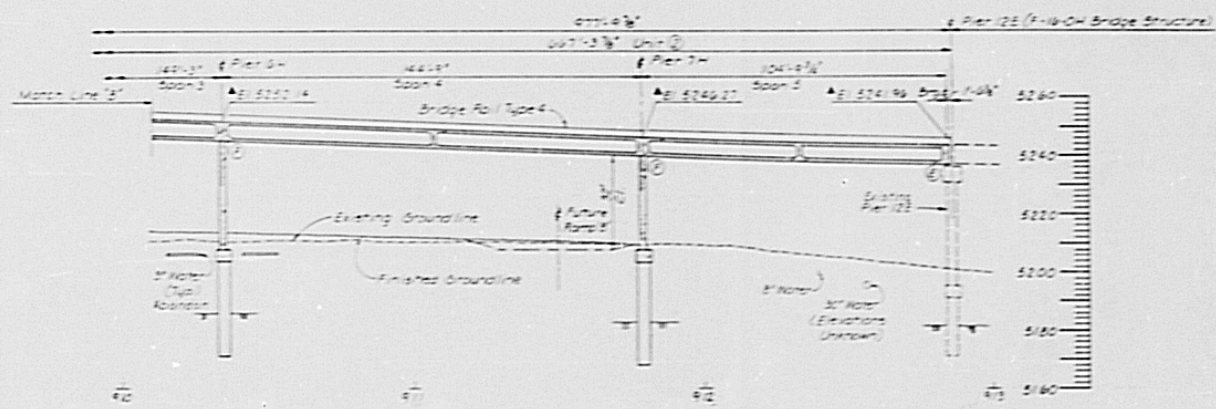
REVISIONS	
1	2'-0" Limits of Color Casting Formed



○ Limits of Light Tone Concrete Coating on Bridge Rail (E)  
 ● Limits of Dark Tone Concrete Coating on Superstructure (E)

**SECTION** B-4 B-5  
 B B

**PLAN**



NOTE: For Profile Grades See Dwg. No. B-4  
 For Curve H-2 Data See Dwg. No. B-4

De Leuw, Collier & Company

**DIVISION OF HIGHWAYS**

**GENERAL LAYOUT  
 RAMP H STRUCTURE**

Checked by	W. J. Bortz	Project	F-14-CH
Designed by	F. J. Bortz	Sheet	54
Drawn by	B-5	Scale	As Shown

**SECTION**  
 Taken at Profile Grade Line from H.  
 ▲ Finish Grade Elevations.





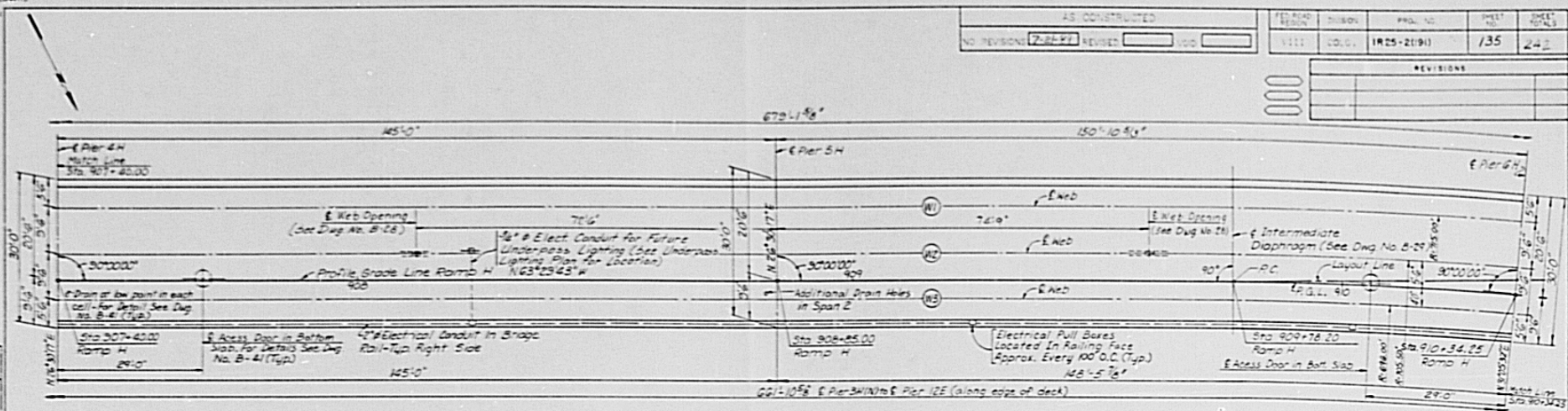




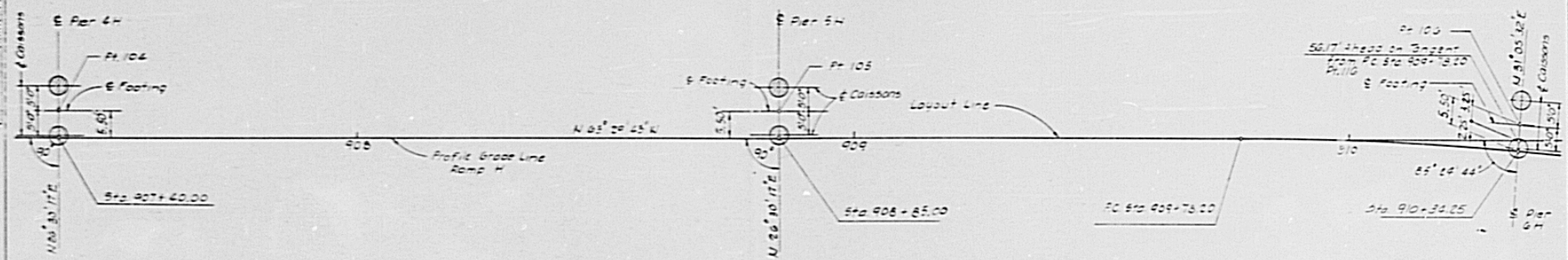


AS CONSTRUCTED	REVISED	NO. 1	NO. 2	NO. 3	NO. 4
NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6

REVISIONS	
NO.	DESCRIPTION



**CONSTRUCTION LAYOUT**



**CAISSON LAYOUT**

TABLE OF COORDINATES		
POINT	NORTH	EAST
104	690070.841	2137546.109
105	690035.550	2137416.408
106	690204.248	2137293.513
116	690207.131	2137295.191

De Leuw, Cather & Company Denver, CO

DIVISION OF HIGHWAYS

CONSTRUCTION LAYOUT  
CAISSON LAYOUT  
UNIT ②

Designer: J. Borrizzo  
Detailer: R. Hunsaw  
Drawing Number: B-10 of 54 Drawings

DRAWN BY: JAB 1/26  
 CHECKED BY: RWH 1/26  
 DATE: 1/26/87

AS CONSTRUCTED	REVISION	NO.	DATE
		136	2-2
REVISIONS			

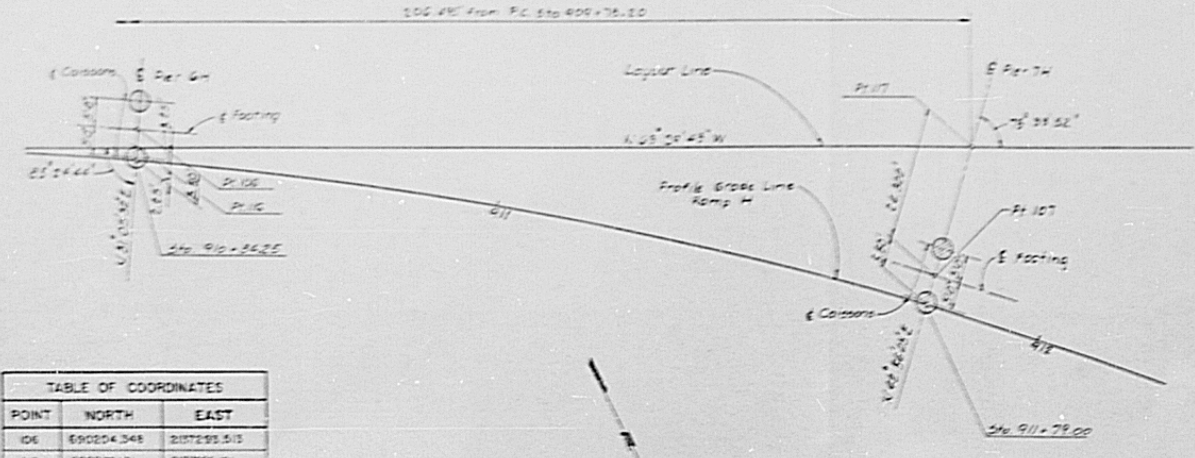
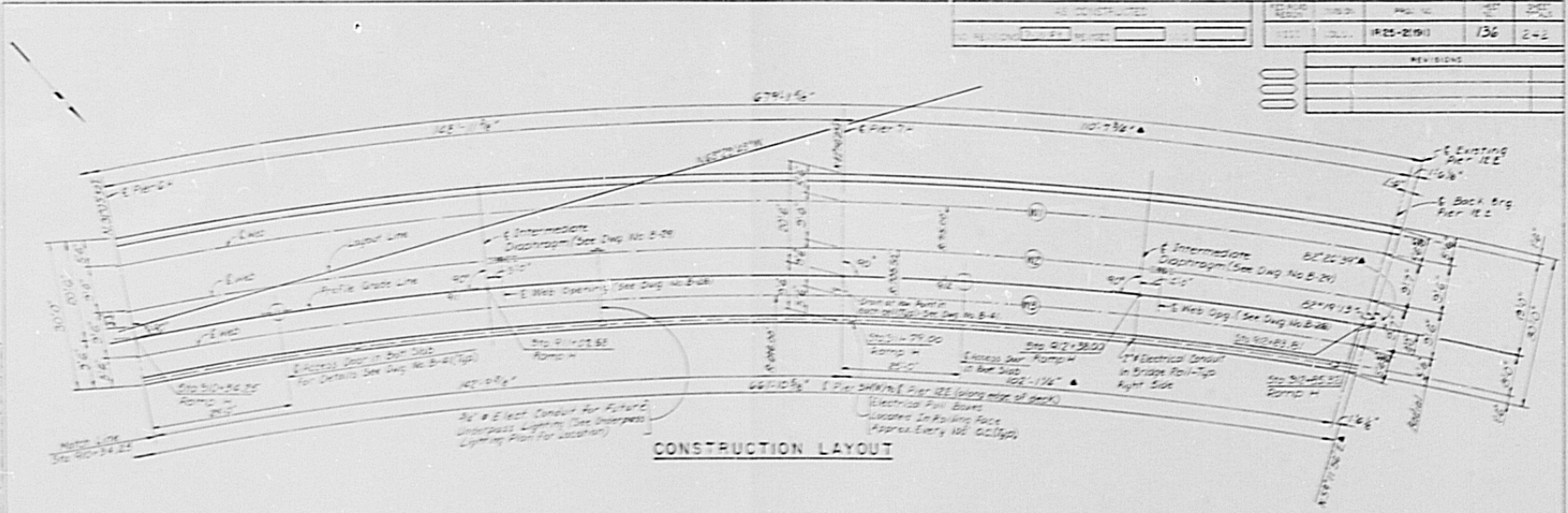


TABLE OF COORDINATES		
POINT	NORTH	EAST
106	690204.348	2137293.513
110	690207.13	2137296.89
107	690290.022	2137177.235
111	690274.217	2137401.646

NOTES:  
 1. Dimensions and angles marked with a triangle are based on location of Pier 12E as shown in Contract Plans 1P25-2(190) and shall be verified by the Contractor in the field before ordering materials.

De Laun, Cather & Company Denver, CO

DIVISION OF HIGHWAYS

CONSTRUCTION LAYOUT  
 CAISSON LAYOUT  
 UNIT ②

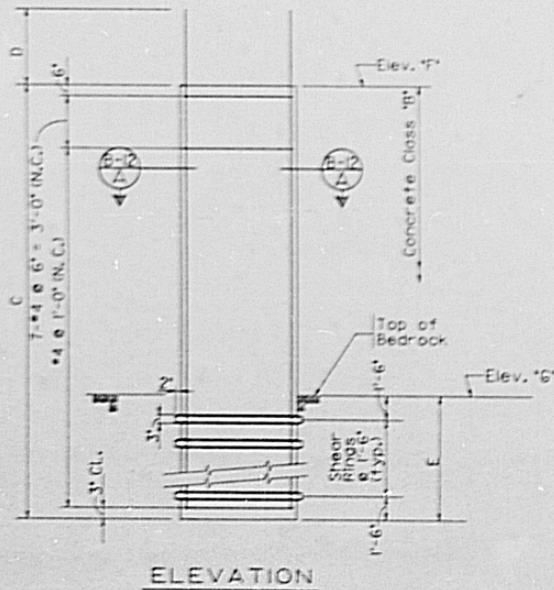
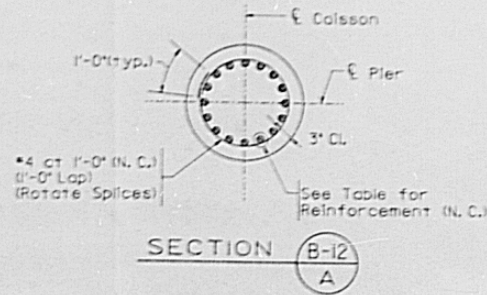
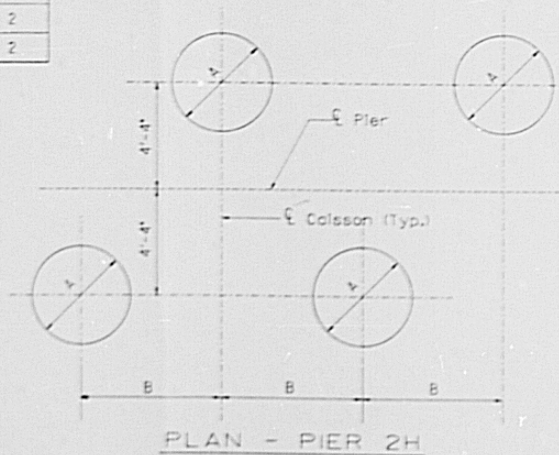
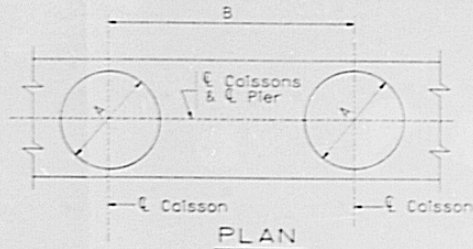
Designer: J. E. 10/10/10  
 Checker: R. H. 10/10/10  
 Drawing Number: R-11  
 Scale: 1" = 54' (as per drawing)

AS CONSTRUCTED  
 NO REVISIONS  REVISED  VOID

FED. ROAD REGION	DIVISION	PRG. NO.	SHEET NO.	SHEET TOTALS
V III	COLO.	IR25-2(19)	137	

CAISSON DATA

LOCATION	DIMENSIONS					ELEVATIONS		REINFORCEMENT		MAX. AXIAL LOAD PER CAISSON	TOTAL NUMBER OF CAISSONS
	A	B	C	D	E	F	G	NUMBER	SIZE		
PIER 2H	48"	5'-0"	28'-0"	4'-10"	18'-0"	5194.00	5184.00	12	#5	675ton	4
PIER 3(HIS)	60"	12'-6"	19'-0"	4'-9"	10'-0"	5194.00	5185.00	20	#10	600ton	2
PIER 3(HIN)	60"	12'-6"	15'-6"	4'-9"	10'-0"	5194.50	5185.00	20	#10	605ton	2
PIER 4H	48"	10'-0"	19'-6"	4'-3"	12'-0"	5194.50	5187.00	11	#10	485ton	2
PIER 5H	48"	10'-0"	38'-6"	4'-3"	4'-0"	5210.50	5186.00	13	#10	525ton	2
PIER 6H	48"	10'-0"	32'-0"	4'-3"	4'-6"	5203.50	5185.00	12	#10	540ton	2
PIER 7H	48"	10'-0"	35'-0"	4'-3"	4'-0"	5203.50	5182.50	16	#10	525ton	2



REVISIONS


- NOTES:
- For caisson layout see Dwg. No. B-7 thru B-11.
  - Dimension 'E' shown is the required minimum penetration in bedrock.
  - Dimension 'C' shown is based on an estimated top of bedrock elevation 'G'. Actual top of bedrock shall be as determined by the Engineer in the field.
  - Shear rings may be deleted, at the option of the Engineer, if the presence of water and/or weakly cemented materials result in the degradation of the hole during the installation of the shear rings.

DeLeuw, Cather & Company Denver, CO.

DIVISION OF HIGHWAYS

CAISSON DETAILS

Designer	J. Barroza	Structure	F-16-OK
Detailer	M. Davison	Number	F-16-N0
Drawing Number B-12 of 54 Drawings			

Revised Dates: \_\_\_\_\_ Preliminary Stage: (x/y)

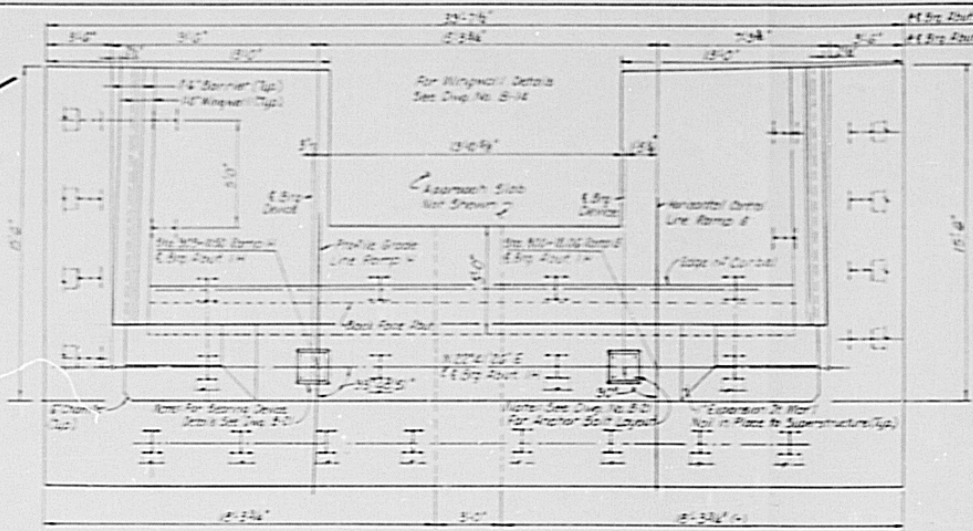
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 CHECKED BY: [ ]  
 DATE: [ ]

10-10-54  
 10-10-54  
 10-10-54

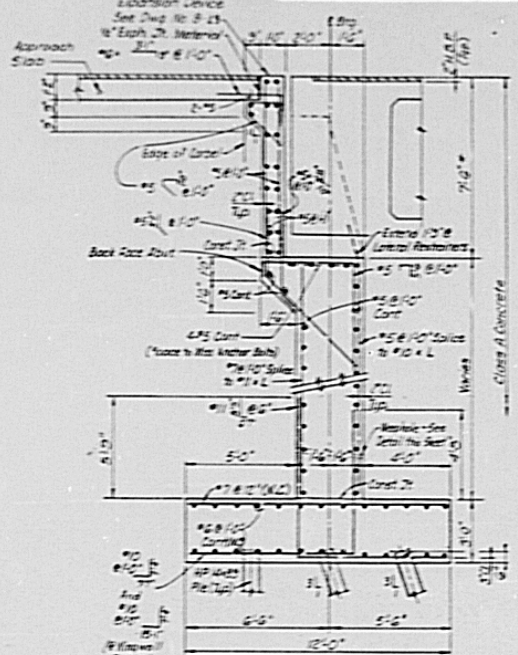
NO. REVISIONS	DATE	BY	REASON

PROJECT NO.	10-21-219-D
SHEET NO.	38
TOTAL SHEETS	54

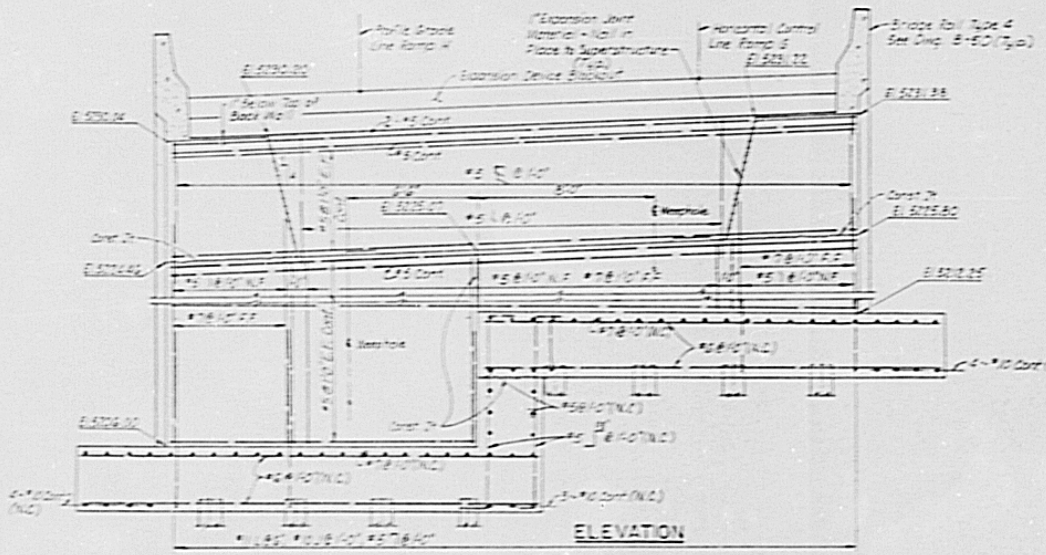
REVISIONS	



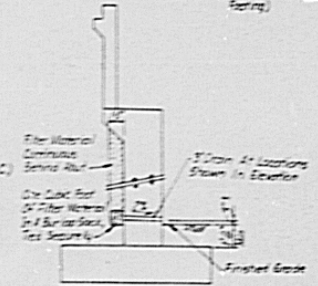
PLAN



TYPICAL SECTION



ELEVATION



WEEP HOLE DETAIL

De Leuw, Cather & Company Denver, CO

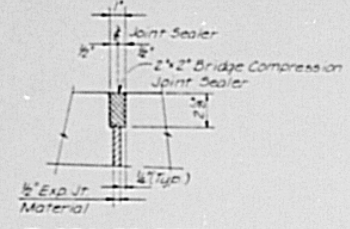
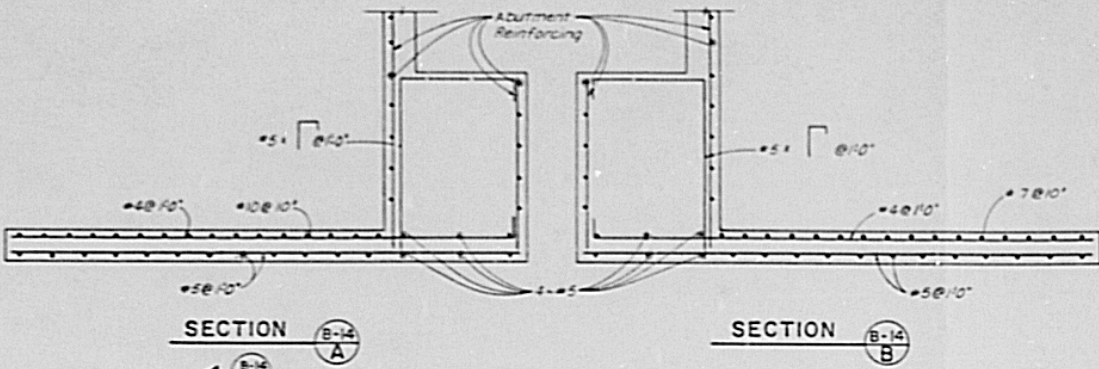
DIVISION OF HIGHWAYS

ABUTMENT 1H DETAILS

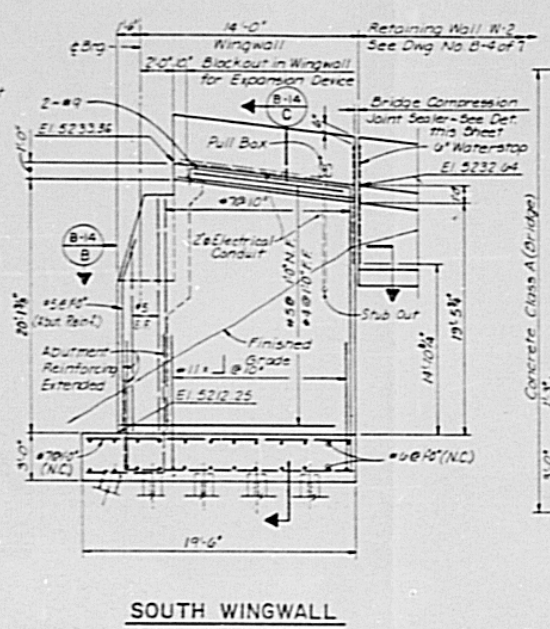
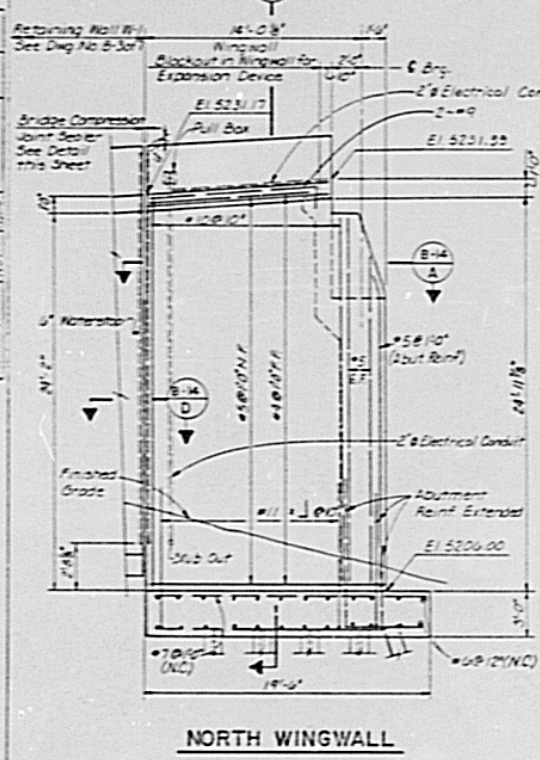
Designer: B. Zingales	Drawn: J. G. O'Connell
Checker: J. A. Brown	Checked: J. G. O'Connell
Drawing Number: B-13	of 54 Drawings

11-22-58  
 DIVISION OF HIGHWAYS  
 PROJECT NO. 1R25-2(191)  
 SHEET NO. 242

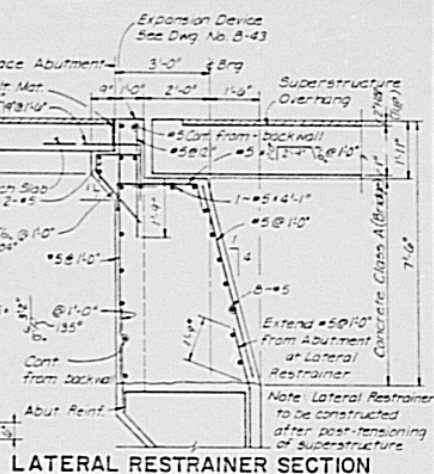
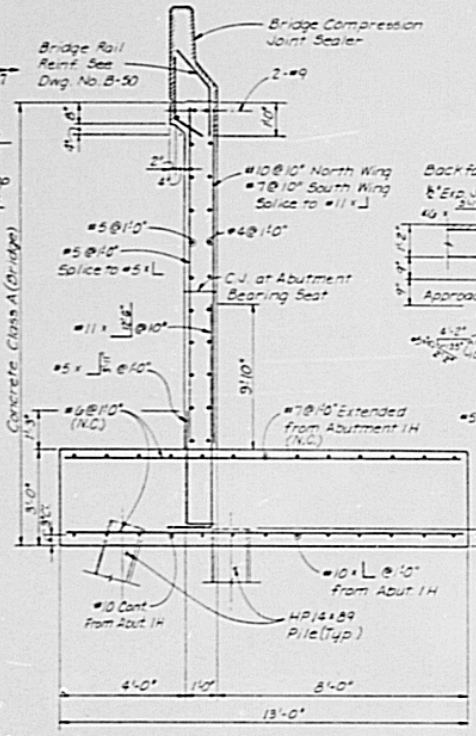
AS CONSTRUCTED		REV. NO.	DIVISION	PROJ. NO.	SHEET NO.
NO REVISIONS	7/2/57	REVISED	1R25-2(191)	135	242



DESIGNED BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE



**NOTE:**  
 See Dwg No B-50 for details for electrical conduit, pull box, and stub out location.



De Leuw, Cather & Company Denver, CO

**DIVISION OF HIGHWAYS**

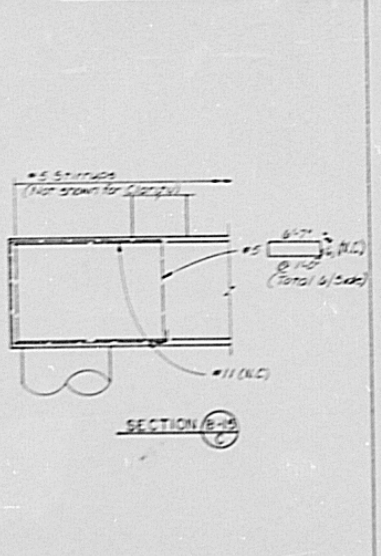
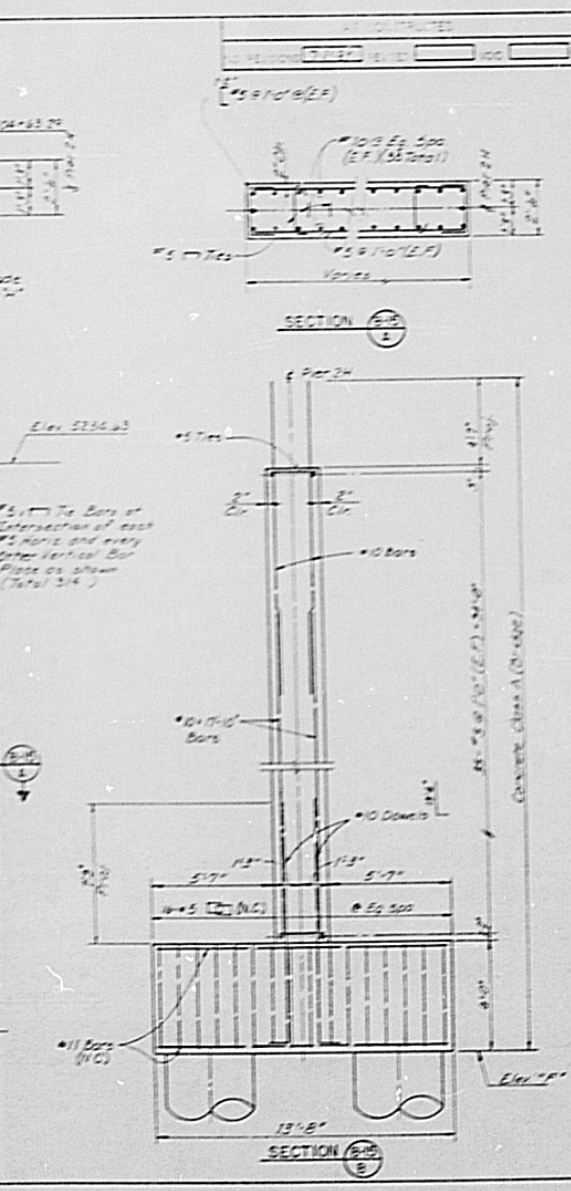
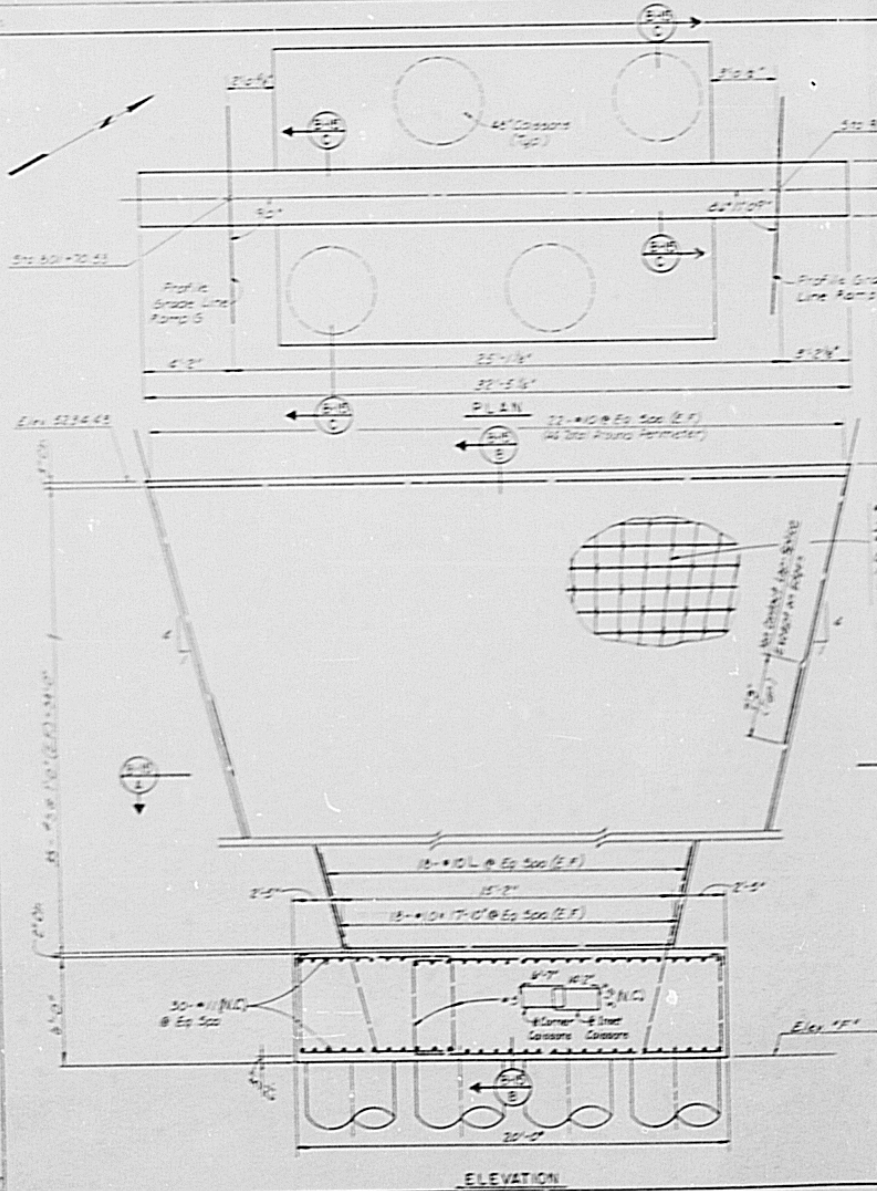
**ABUTMENT 1H AND WINGWALL DETAILS**

Designer: B. Arrighi	Structure: F-16-OK
Detailer: R. Manning	Numbers:
Drawing Number: B-14	of 54 Drawings

**ELEVATION**

DRAWING NO. 100-100-100  
 SHEET NO. 140  
 OF 242

NO.	DATE	BY	CHKD.	APP'D.
1	10-25-21(91)			



**NOTES:**  
 1. For Elevation "F", See "Caisson Details",  
 Dwg. No. B-12.  
 2. Elevations shown are at 4' Pier

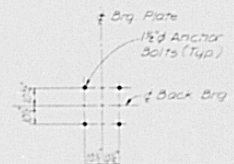
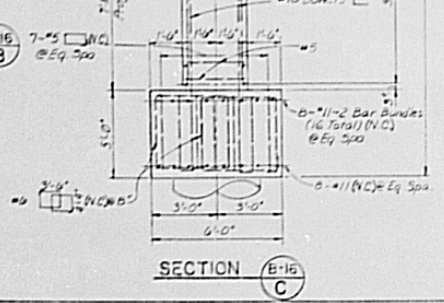
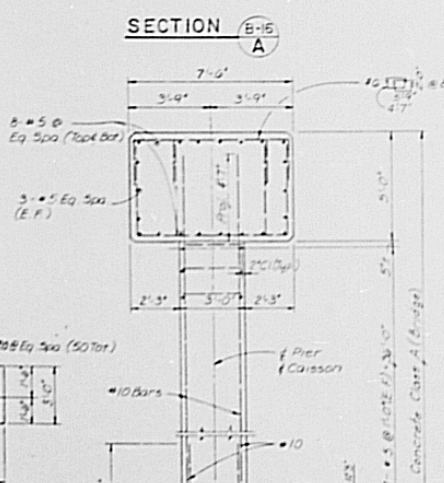
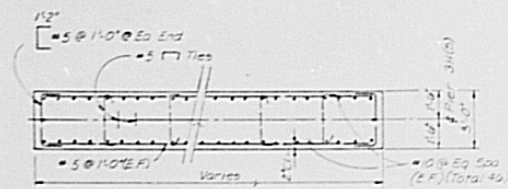
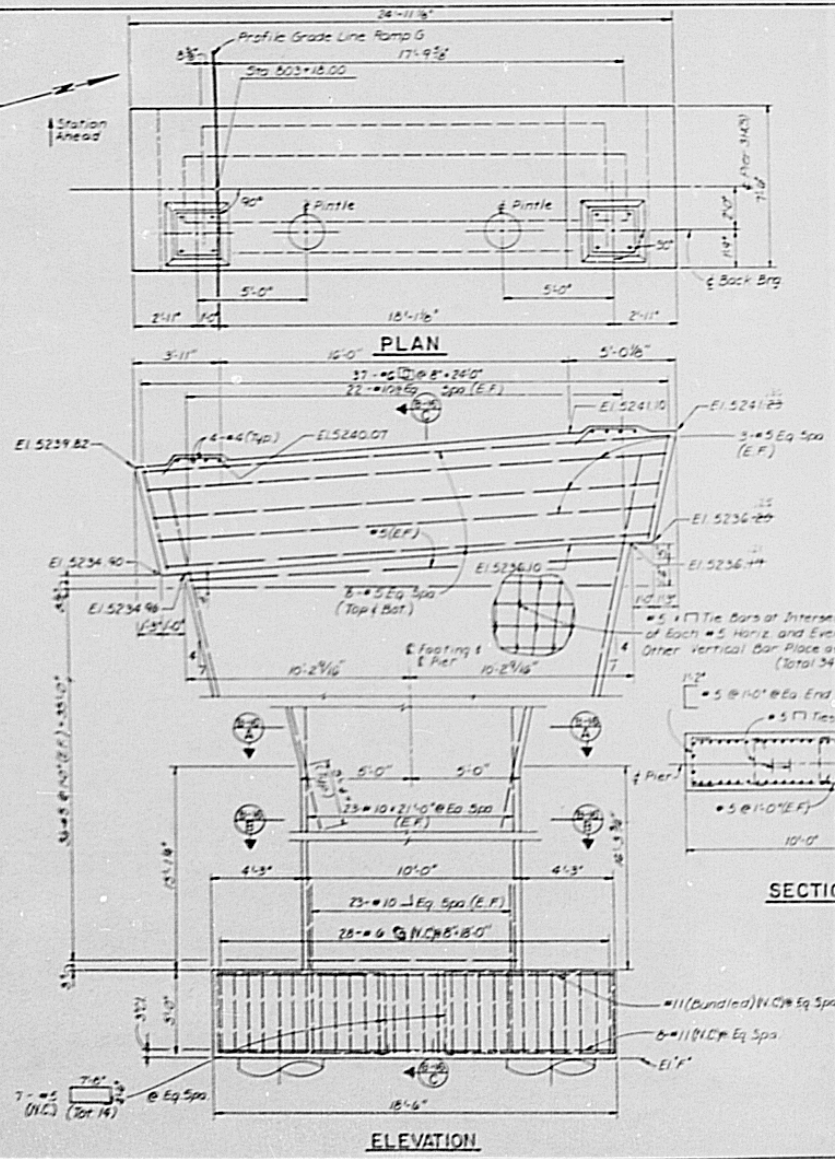
De Leuw, Cather & Company Denver, CO  
**DIVISION OF HIGHWAYS**  
**PIER 2H**  
**UNIT ①**  
 Designer: D. Henkle  
 Checker: S. Shiber, M. Division  
 Drawing Number: B-15 of 54 Drawings

3/2/58  
 2 1/2" x 11 1/2" x 11 1/2"  
 2 1/2" x 11 1/2" x 11 1/2"  
 2 1/2" x 11 1/2" x 11 1/2"

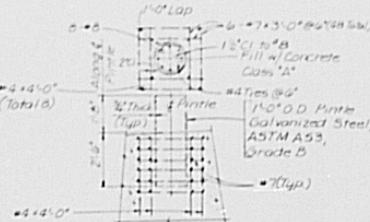
NO.	DATE	BY	CHKD.

PROJECT	DATE	SHEET	TOTAL SHEETS

REVISIONS	



- NOTES:**
- Elevation m at Pier
  - For Elevation n; See 'Caisson Details', Dwg No B-12
  - Place #10 Bars under #9 Stirrups in Footing



DeLeuw, Cather & Company Denver, CO

**DIVISION OF HIGHWAYS**

**PIER 3H(S) UNIT 1**

Designer: D. Henkle	Structure: F-16-OK
Detailer: R. Ransing	Number:
Drawing Number: B-16	of 54 Drawings



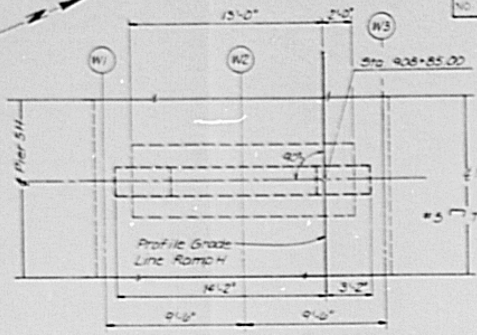
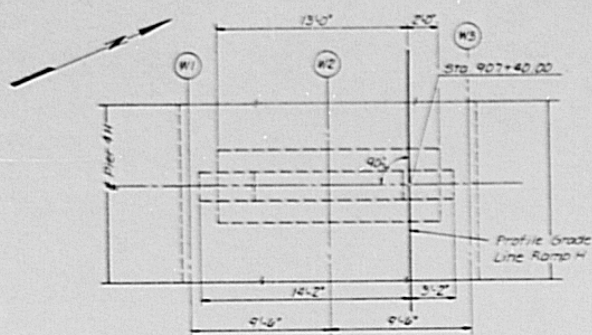


DESIGNED BY: [ ]  
 CHECKED BY: [ ]  
 DATE: [ ]

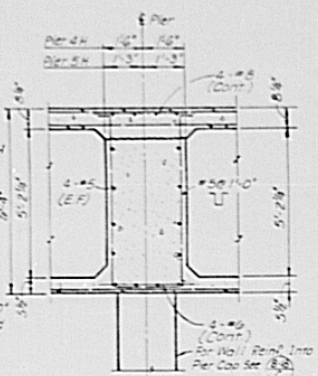
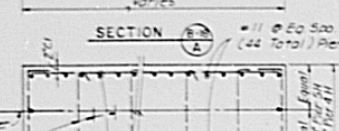
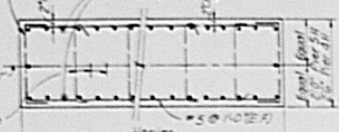
AS CONSTRUCTED	REVISED	NO. REVISED	DATE	BY
		7	7-17-77	REVISER
		100		

PROJECT NO.	DIVISION	PROJECT NO.	SHEET NO.
1111	COLL.	1R25-2(19)	143

REVISIONS	

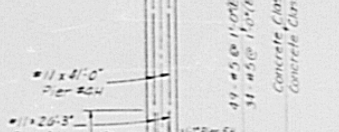
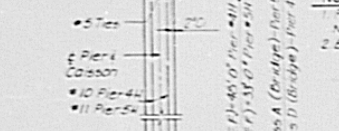
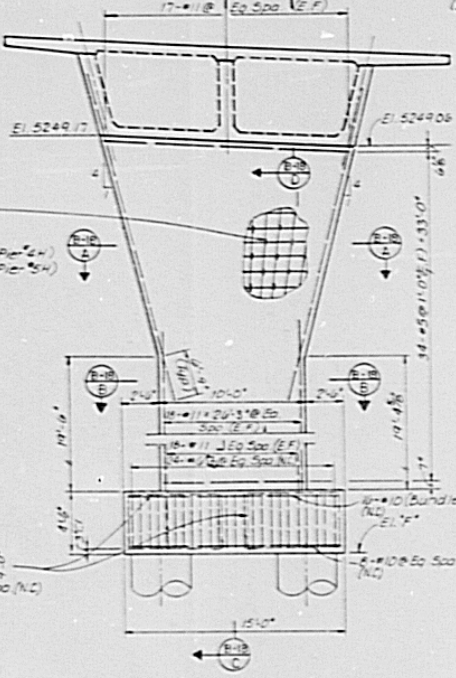
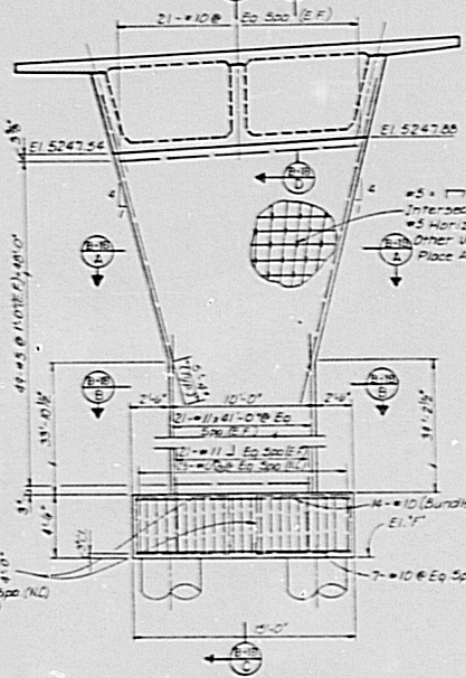


• 5 @ 14'-0" Ea End  
 • 10 @ Ea Spa (44 Total) Pier 4H  
 • 11 @ Ea Spa (56 Total) Pier 5H



PLAN-PIER NO. 4H

PLAN-PIER NO. 5H



ELEVATION-PIER NO. 4H

ELEVATION-PIER NO. 5H

NOTES:  
 1. For Elevation "F," see "Caisson Details," Dwg. No. B-12.  
 2. Elevations Shown are at F.R.

De Leuw, Cather & Company Denver, CO

DIVISION OF HIGHWAYS

PIERS 4H AND 5H

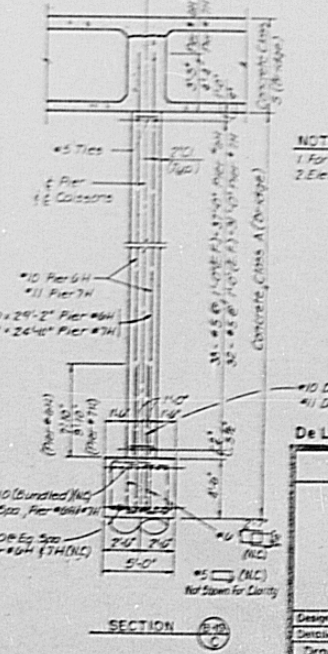
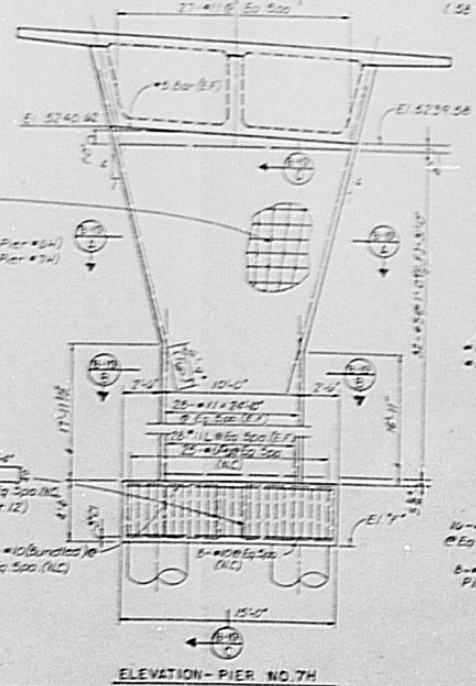
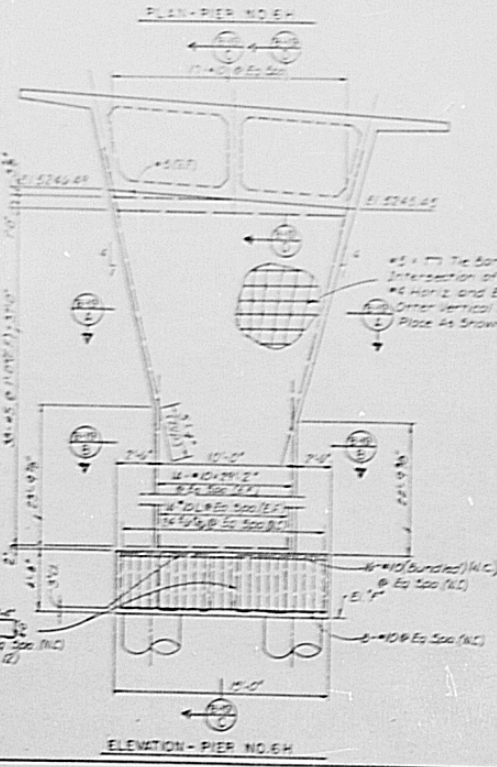
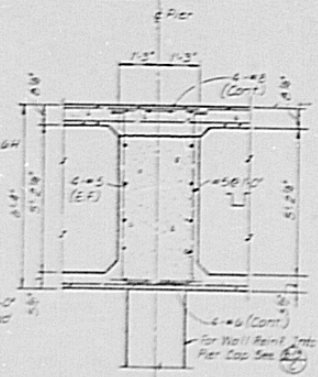
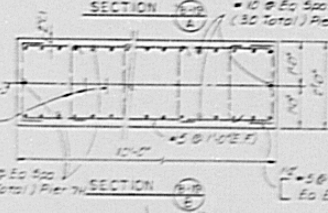
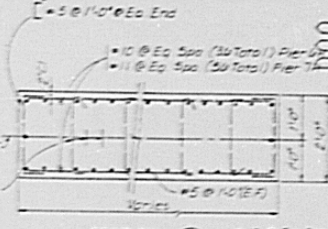
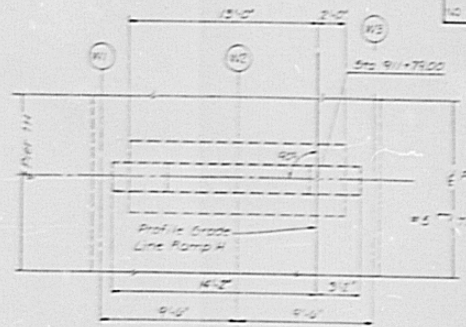
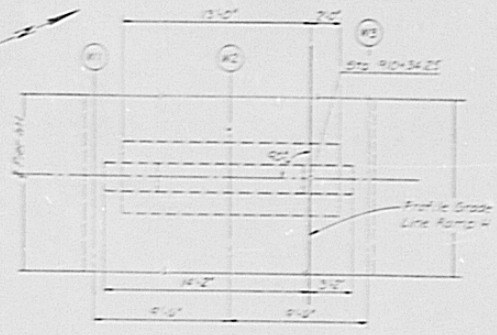
UNIT ②

Designer: D. Henke	Number: F-16-NO
Checker: R. Manning	
Drawing Number: B-18	of 54 Drawings

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NO. REVISIONS	DATE	BY	APP. NO.	SHEET NO.	SHEET TOTAL
AS CONSTRUCTED				144	144

REVISIONS	



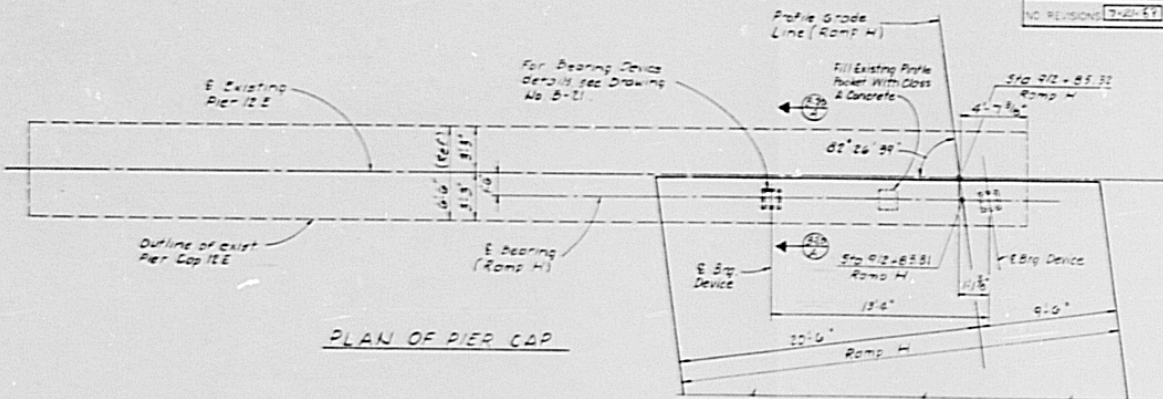
NOTES:  
 1 For Elevation "I," See "Caisson Details," Dwg. No. B-2  
 2 Elevations Shown are at  $\frac{1}{2}$  Pier.

De Leuw, Cather & Company  
 Denver, CO  
 DIVISION OF HIGHWAYS  
 PIERS 6H AND 7H  
 UNIT 2  
 Designer: D. Henrick  
 Designer: R. Penning  
 Drawing Number: B-19  
 of 54 Drawings  
 Structure: F-16-10  
 Date: \_\_\_\_\_  
 Checked: \_\_\_\_\_  
 Drawn: \_\_\_\_\_

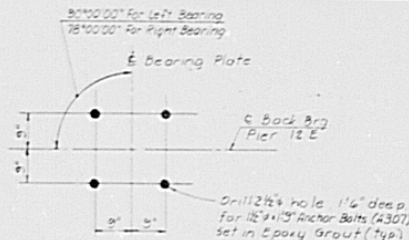
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PROJECT NO.	DIVISION	SHEET NO.	SHEET TOTAL
1R25-2(191)		145	242

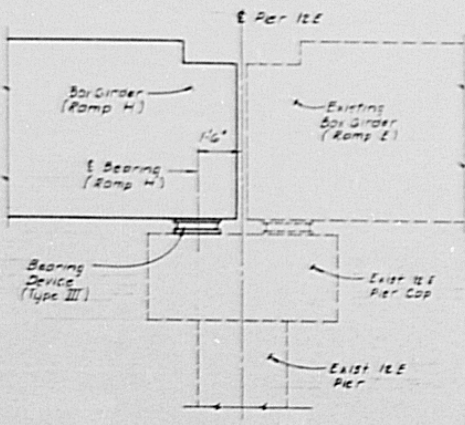
REVISIONS	



PLAN OF PIER CAP



ANCHOR BOLT LAYOUT



SECTION 57/2

- Notes:
1. For Bearing Device (Type III) Details see Dwg No. B-21.
  2. Contractor Shall Verify Top of Pier Elevation At Exist Pier I2E Before Preparing Shop Drawings For Bearing Devices.
  3. Bearing Seat Details Shall Conform to Dwg No. B-21.

De Leuw, Cather & Company Denver, CO

DIVISION OF HIGHWAYS			
PIER I2E BEARING DETAILS			
Designer J. Barrata	Structure Numbers	F-16-ND	
Detailer D. Stearns	Drawing Number B-20		of 54 Drawings

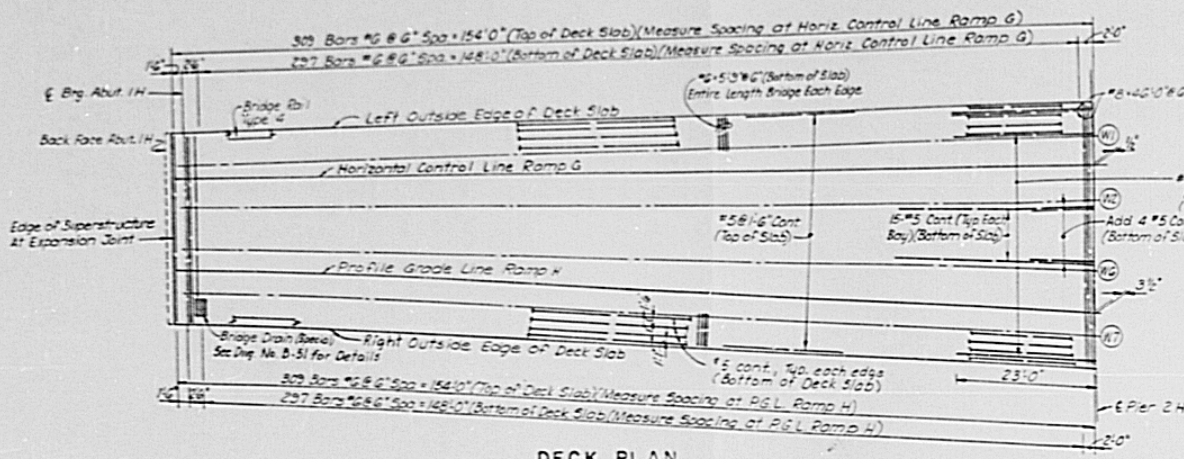


DATE: 10/26/42  
 DRAWN BY: RWH  
 CHECKED BY: RWH  
 DATE: 10/26/42

NO. REVISION	AS CONSTRUCTED	REVISED	NO.
2			

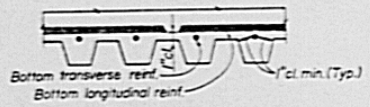
FEDERAL REGION	DIVISION	PROJ. NO.	SHEET NO.	SHEET TOTALS
VIII	COLG.	IR 25-119-1	147	242

REVISIONS	

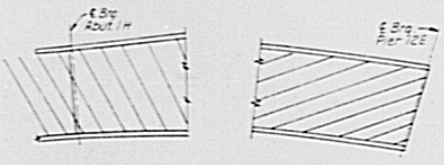


**EDGE DRAIN (SPECIAL) LOCATIONS**  
 Ramp 4 Sta 303+12.71, Right Side  
 Ramp 4 Sta 80+74.53, Left Side

**DECK PLAN**



**OPTIONAL, STAY-IN-PLACE FORM DETAIL**  
 Deck may be formed using permanent steel bridge deck forms. All cost of additional material and labor required to use forms shall be borne by the Contractor. Form flutes and transverse slab reinf. shall be placed perpendicular to girders. Two sets of shop drawings as described in Sect. 601.10 of the Standard Specifications shall be submitted to the Engineer for information only. Drawings will not be approved and returned to the contractor.



**BRIDGE DECK AND ROADWAY APPROACH CONTOURS**  
 A Deck Contour Drawing And An Approach Roadway Contour Will Be Provided To The Contractor At Time of Contract Award. This Drawing Will Have A Scale of 1/4\"/>

- NOTES**
1. All Transverse Slab Reinforcing Shall Be Placed Perpendicular to Centerline Girder Webs As Shown.
  2. Number And Location of Lap Splices Shall Be Approved by The Engineer.
  3. Lap Splices Shall Be Staggered At Least 2'-6\"/>

De Leuw, Cather & Company Denver, CO

**DIVISION OF HIGHWAYS**

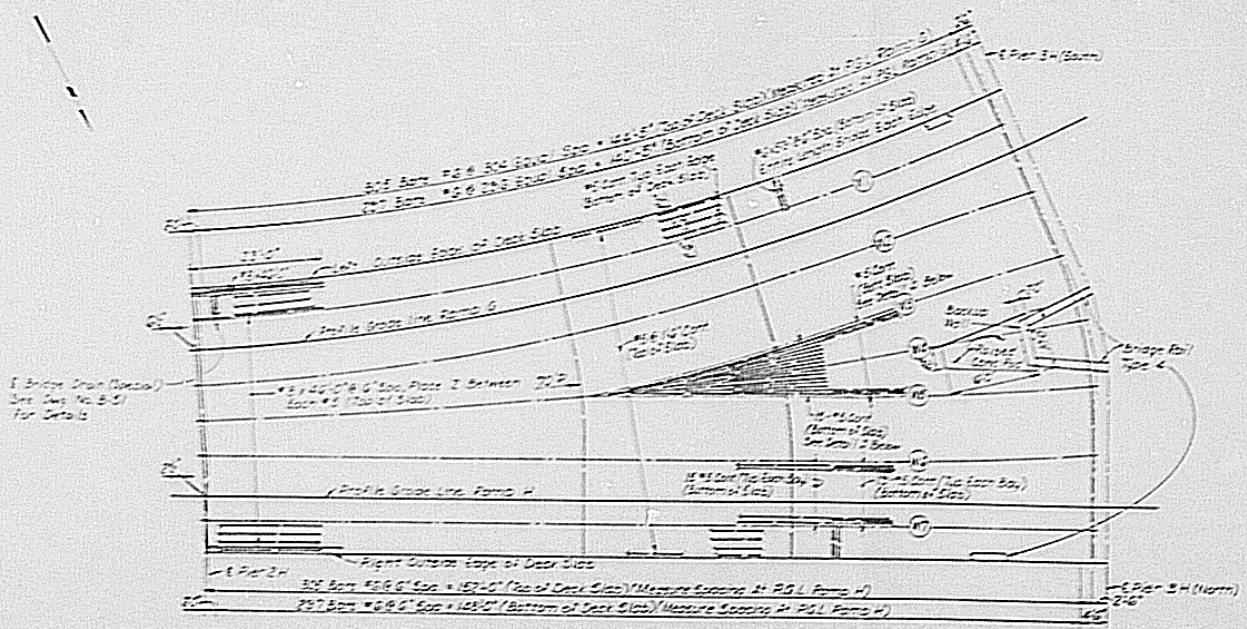
**DECK PLAN - SPAN I**

UNIT ①

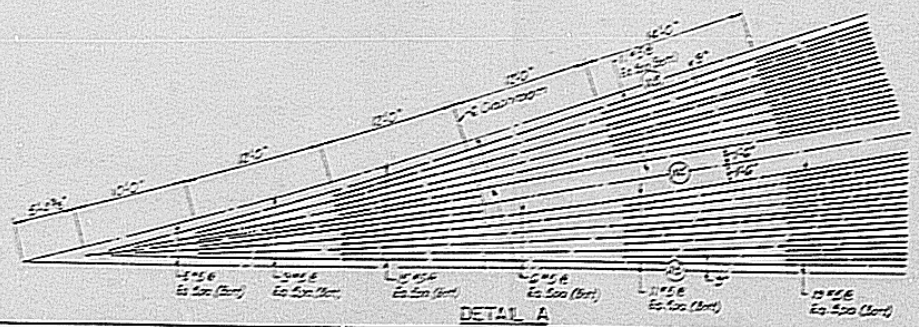
Designer M. Merlinger	Structure	Field-OK
Detailer R. Rishlow	Numbers	
Drawing Number B-22	of 54	Drawings

AS CONSTRUCTED		DESIGN	DATE	143	144
NO.	REVISION	NO.	DATE	1925-21190	

REVISIONS	



DECK PLAN



DETAIL A

- NOTES**
1. All Transverse Slab Reinforcing Shall Be Placed Perpendicular to Centerline Girder Webs As Shown.
  2. Number And Location of Lap Splices Shall Be Approved by The Engineer.
  3. Lap Splices Shall Be Staggered At Least 24\"/>

De Leuw, Cather & Company      Denver, CO

**DIVISION OF HIGHWAYS**

**DECK PLAN-SPAN 2**

**UNIT ①**

Designer: M. H. ...	Checked: F. H. ...
Drawn: R. H. ...	Reviewed: ...

Drawing Number: 9-23 of 56 Drawings

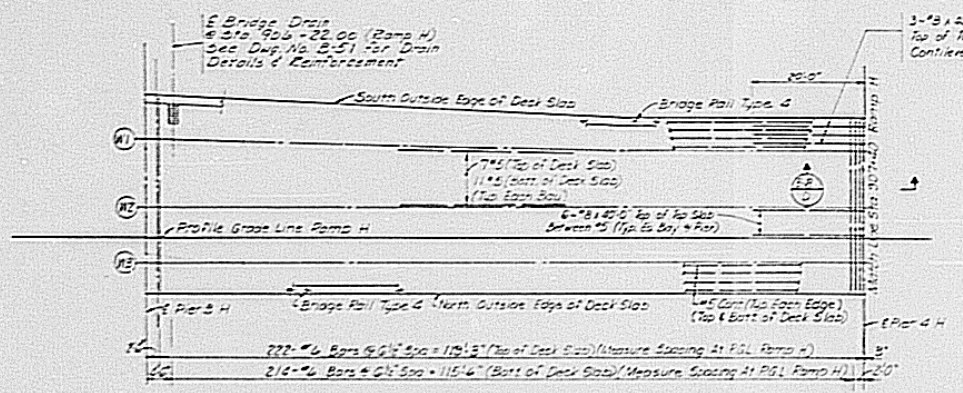
DATE	BY	REVISION

2-10-62  
 DIVISION OF HIGHWAYS  
 1175 KENNEDY  
 DENVER, COLORADO  
 80012

REVISIONS	7	10/21/62	100
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DATE	NO.	BY	CHKD.
1962-2(191)	149		242

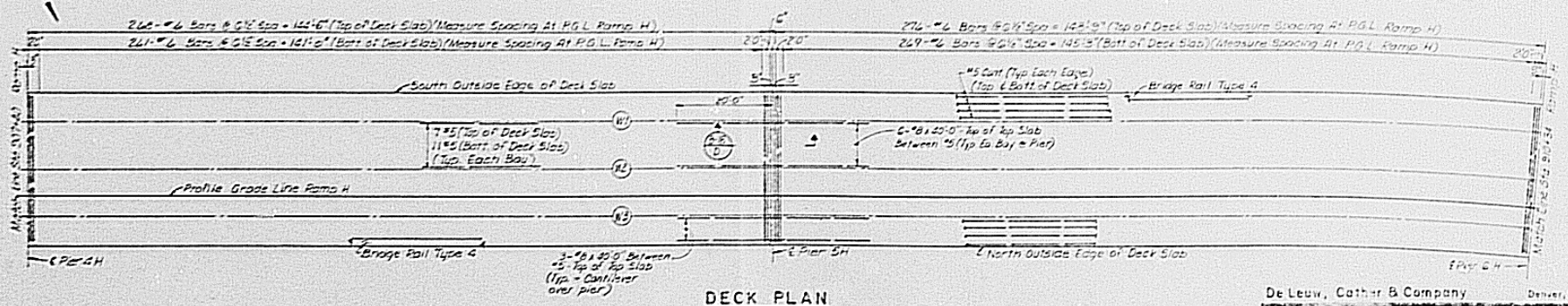
REVISIONS	



DECK PLAN

NOTES:

1. Number and Location of Lap Splices shall be Approved by the Engineer.
2. Lap Splices shall be staggered at Least 2'-0" Minimum.
3. Top Slab Reinforcing is shown and Noted.
4. Bottom Slab Reinforcing to be Placed As Shown On Drawing No. B-29.
5. All Transverse (Both Top And Bottom) Slab Reinforcing Shall be Placed Perpendicular to Profile Grade Line Ramp H.



DECK PLAN

DeLuw, Cathers & Company Denver, CO

DIVISION OF HIGHWAYS

DECK PLAN - SPANS 1, 2 AND 3

UNIT ②

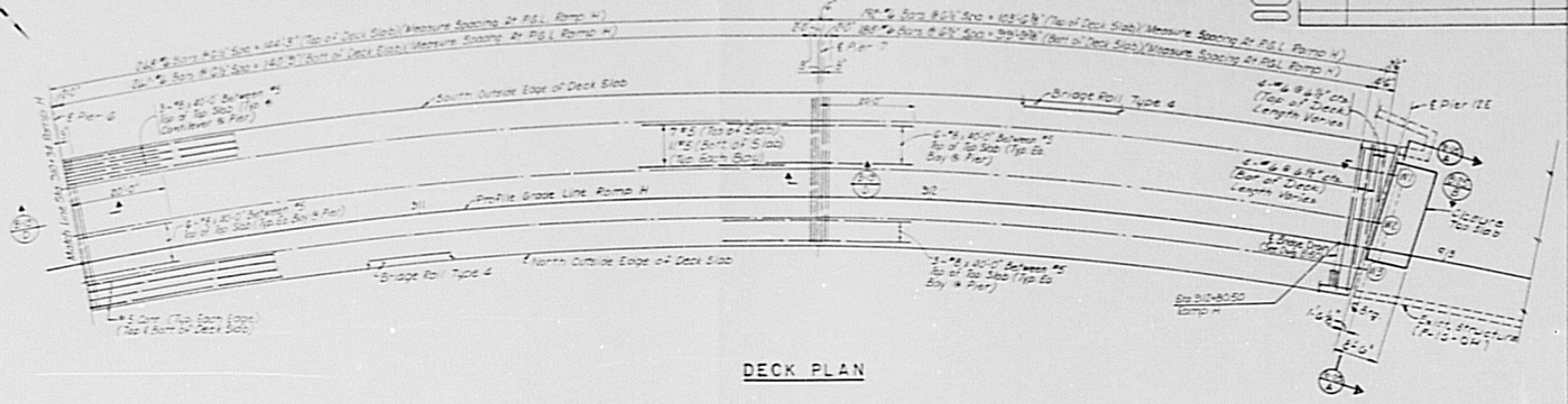
Designer: J. B. ...	Checker: R. ...	Structure: F-16-N0
Drawing Number: B-24	of 54	Drawings



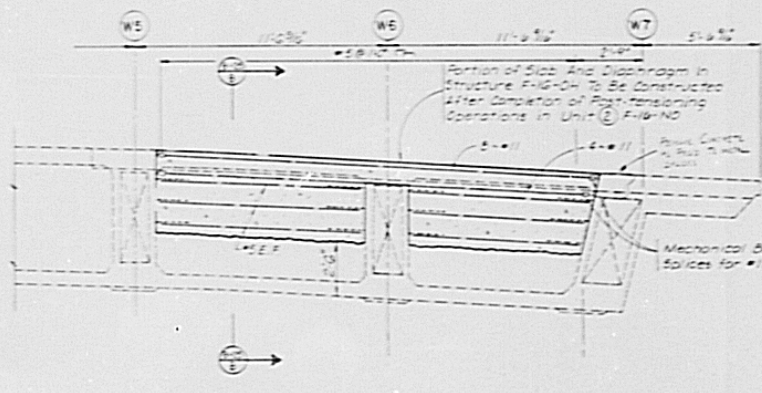
AS CONSTRUCTED	REVISED	REVISION NO.

PROJECT NO.	150
DATE	10-25-21(91)
SHEET NO.	242

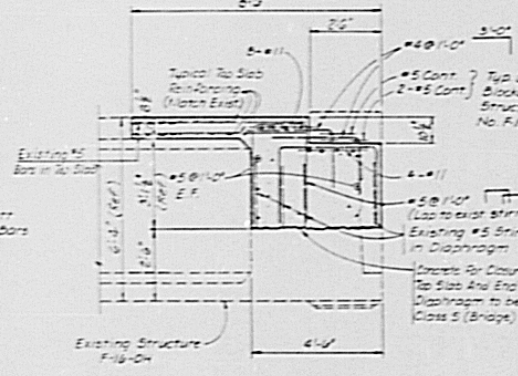
REVISION	



DECK PLAN



SECTION A-A



SECTION B-B

NOTES:

- Number and Location of Lap Splices shall be Approved by the Engineer
- Lap Splices shall be staggered at Least 2'-0" Minimum
- Top Slab Reinforcing is shown and Noted
- Bottom Slab Reinforcing to be Placed as shown on Drawing No. B-24
- All Transverse (Both Top and Bottom) Slab Reinforcing shall be placed Perpendicular to Profile Grade Line Ramp H
- Mechanical Butt Splices shall be approved by the Engineer, and shall Develop in Tension at least 125 Percent of the specified yield strength of the Bar
- Cost of Mechanical Butt Splices shall be included in the work under Pay Item 502 Reinforcing Steel (Epoxy-Coated) De Luis, Cather & Company Denver, CO

DIVISION OF HIGHWAYS

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DECK PLAN-SPANS 4 AND 5

UNIT 2

Designer: J. Borrazo	Checker: F16-10
Drawn: R. Hargrave	Number: 54
Drawn: J. Hargrave	of 54 Drawings

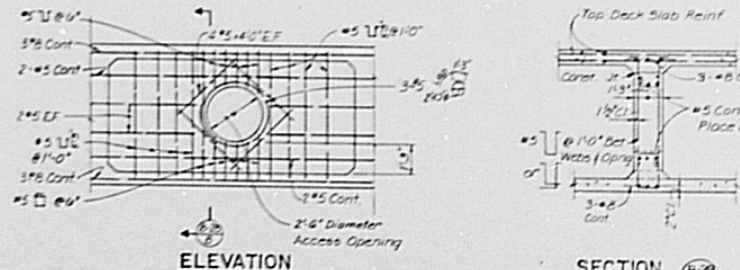
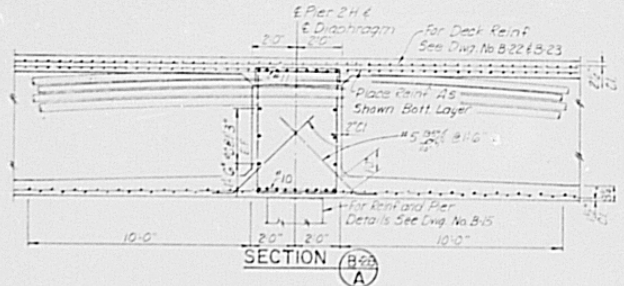
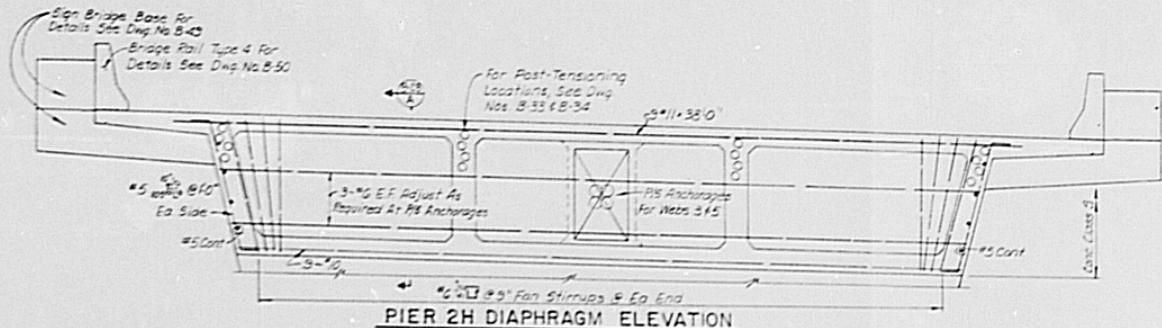




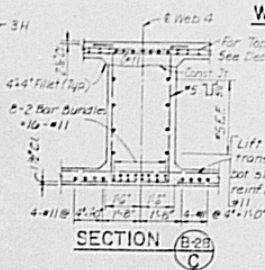
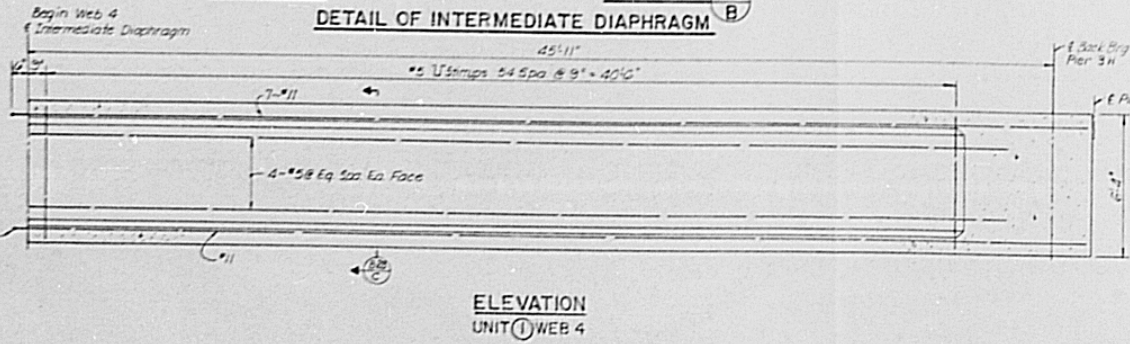
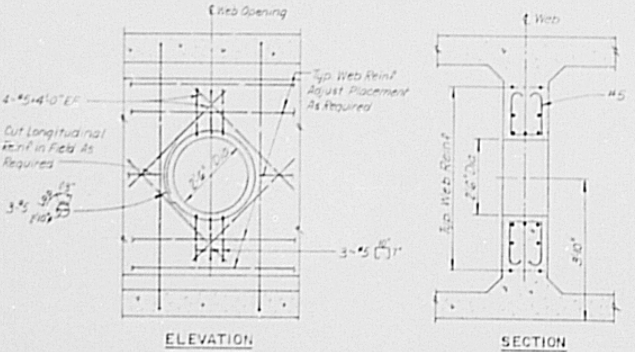
2. CHECKED  
 3. DESIGNED  
 4. APPROVED  
 5. DATE

NO. REVISED	DATE	BY	REASON
1	12-21-77	...	...

REVISIONS	



- NOTES:**
1. Locations of Web Openings Shown on Dwg. Nos B7 & B8.
  2. Locations of Intermediate Diaphragms Shown on Dwg. No. B-6.
  3. Provide one Access Opening between each Web in Each Intermediate Diaphragm.

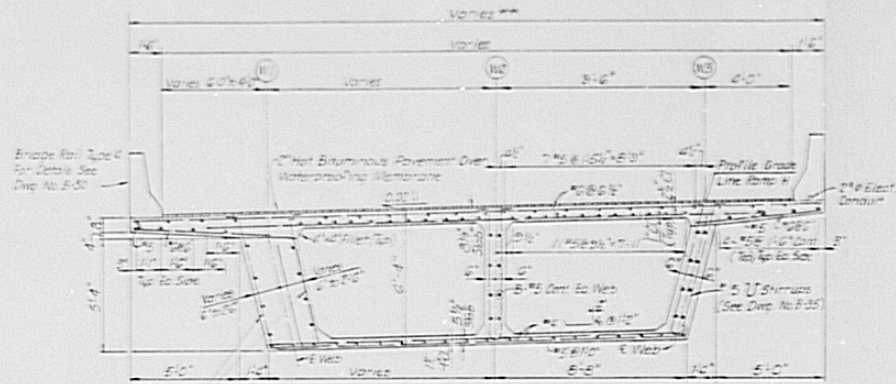


De Leuw, Cather & Company  
 DIVISION OF HIGHWAYS  
 SUPERSTRUCTURE  
 DETAILS  
 UNIT ①

Designer: M. Markelinger	Structure Number: E-12-27
Detailer: R. Hunsbary	
Drawing Number: B-26	of 54 Drawings

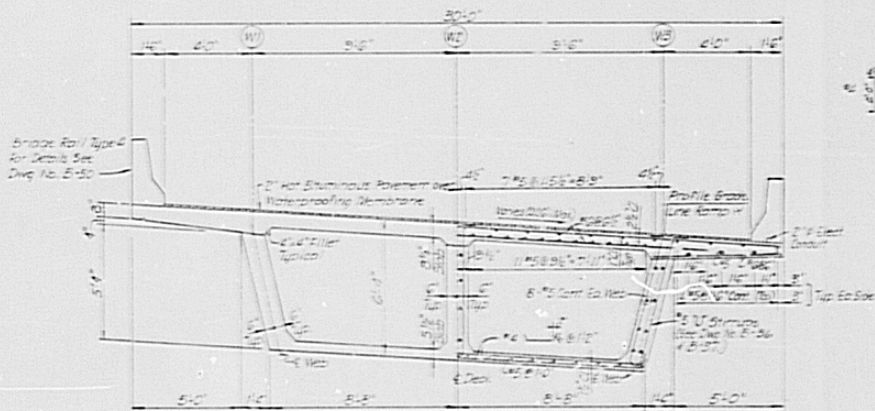
DRAWN BY: ...  
 CHECKED BY: ...  
 DATE: ...

DATE: 11/15/54  
 DRAWN BY: JAB  
 CHECKED BY: RMB  
 TITLE: BRIDGE



**TYPICAL SECTION SPAN 1 (UNIT 2)**

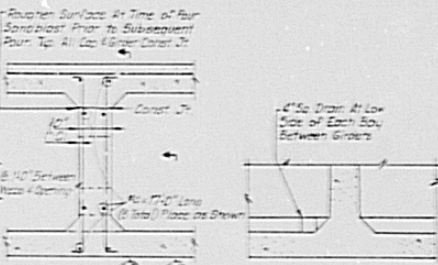
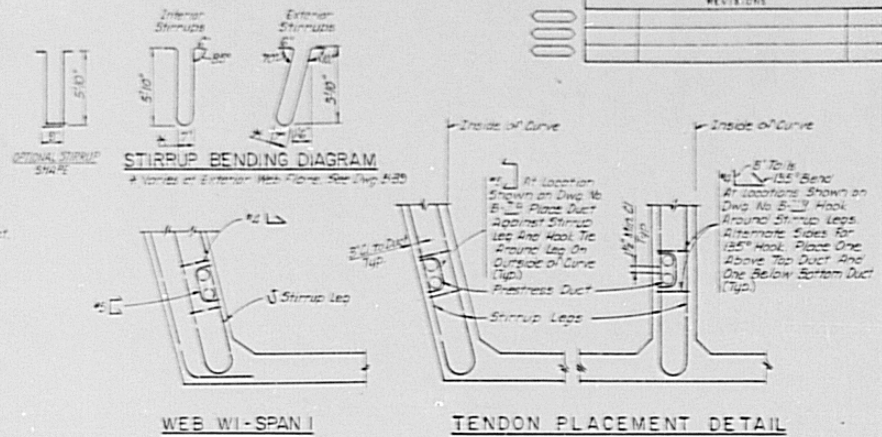
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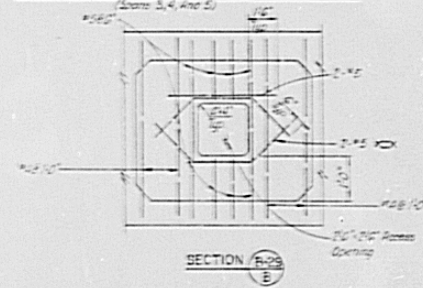
**TYPICAL SECTION SPAN 2,3,4 & 5 (UNIT 2)**

Note: Reinforcement Symmetrical About E Deck

REVISION	NO.	DATE	BY	APP'D.



**ELEVATION SECTION A-A**  
**DETAIL OF INTERMEDIATE DIAPHRAGM**  
 (Scale 3/4\"/>



**NOTES**

- 1) All Interior Webs to be Constructed Vertical
- 2) All Cross-Sections Are Normal to Profile Grade Line
- 3) For Location of Intermediate Diaphragms See Dwg. Nos. E-10 & E-11
- 4) For Web Thickness Variations At Beginning and End of Unit 2 See Dwg. No. E-25

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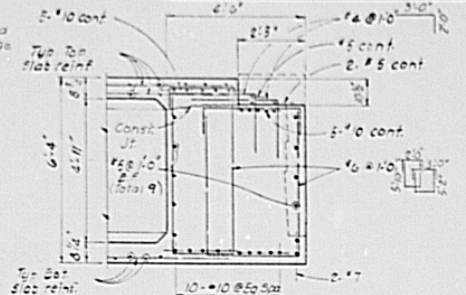
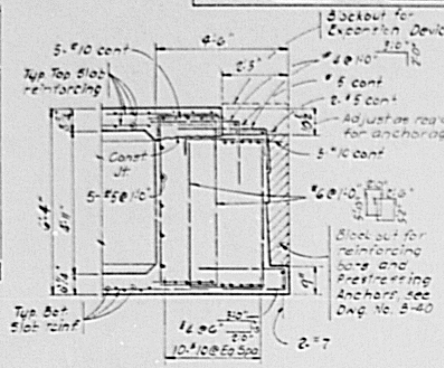
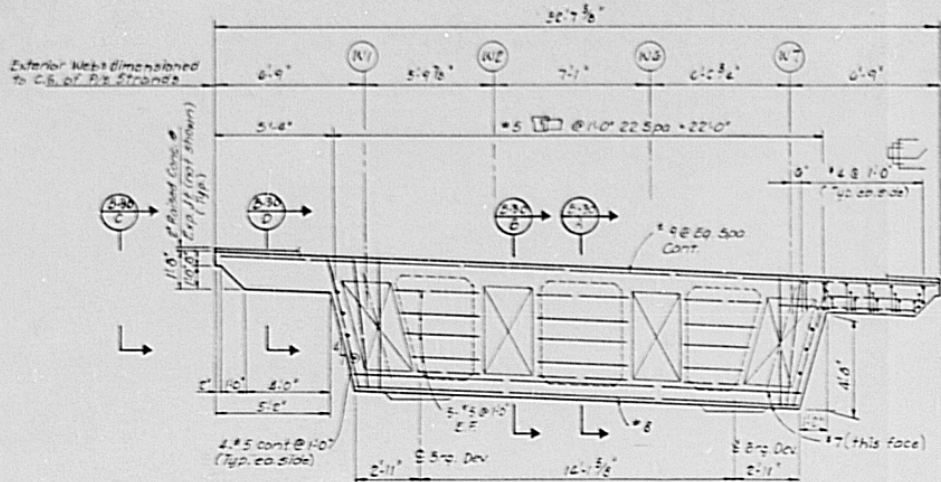
DIVISION OF HIGHWAYS	
SUPERSTRUCTURE DETAILS (SECTIONS) UNIT 2	
Designer: J. Spradley	Checked: F. J. G. M. G.
Detailer: R. H. H. H. H.	Number: _____
Drawings Number: E-25	of 54 Drawings

DESIGNED BY: M. MERKLINGER  
 CHECKED BY: D. S. BROWN  
 DATE: 11-11-54

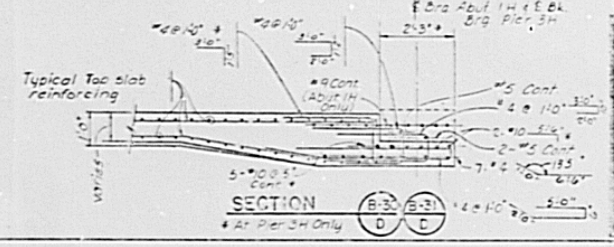
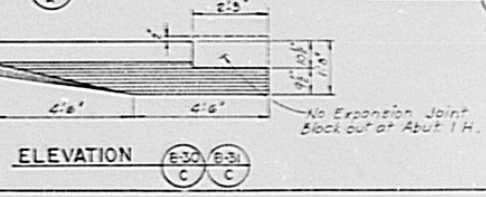
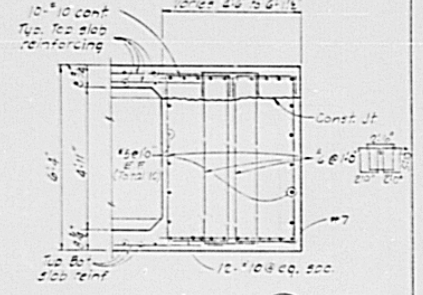
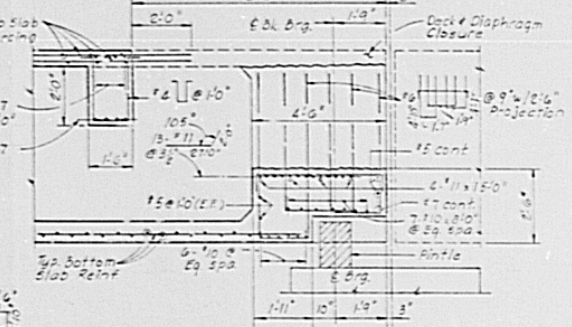
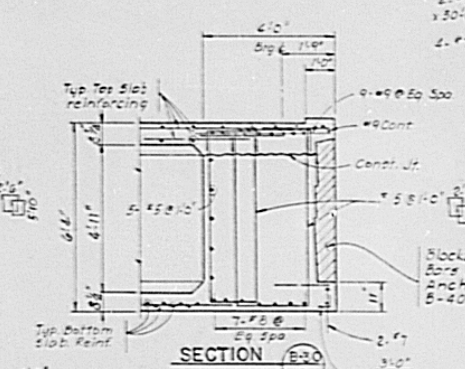
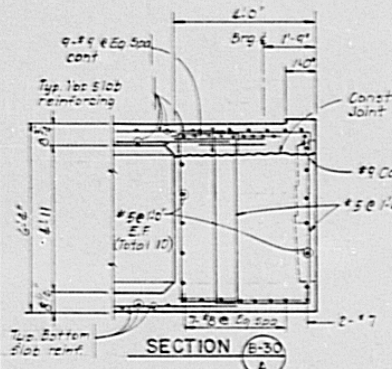
NO.	REVISION	DATE	BY	APP.
1	AS CONSTRUCTED			
2	NO. 10 @ 22" Sp. @ 22' 10"			

NO.	REVISION	DATE	BY	APP.
1	AS CONSTRUCTED			
2	NO. 10 @ 22" Sp. @ 22' 10"			



**DIAPHRAGM AT ABUTMENT IH**



DeLeuw, Cather & Company Denver, CO

**DIVISION OF HIGHWAYS**

**DIAPHRAGM DETAILS**

**UNIT ①**

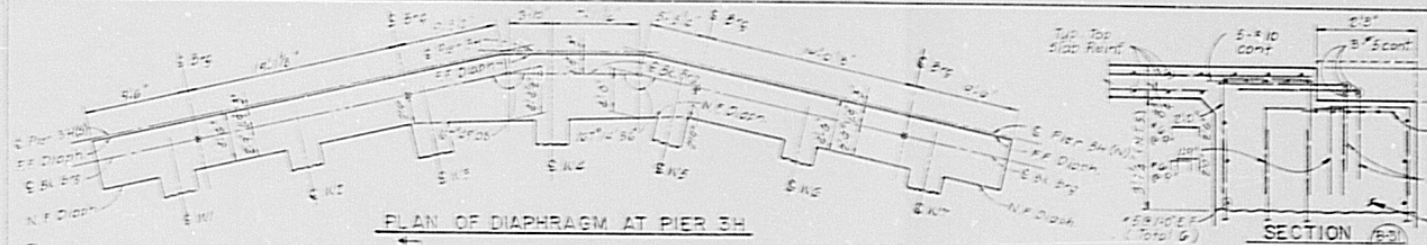
Designer: M. Merklinger	Checker: E-16-CX
Detailer: D. Brown	Number:
Drawing Number: B-30	Sheet: 54
Scale: 1/4\"/>	

NO.	DATE	BY	CHKD.
156	10-25-2019		

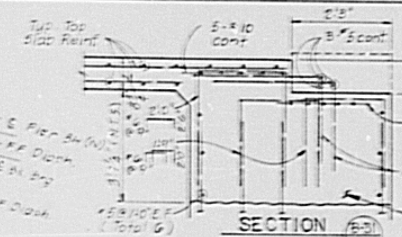
  

NO.	REVISIONS	DATE
AS CONSTRUCTED		
REVISED		
VOID		

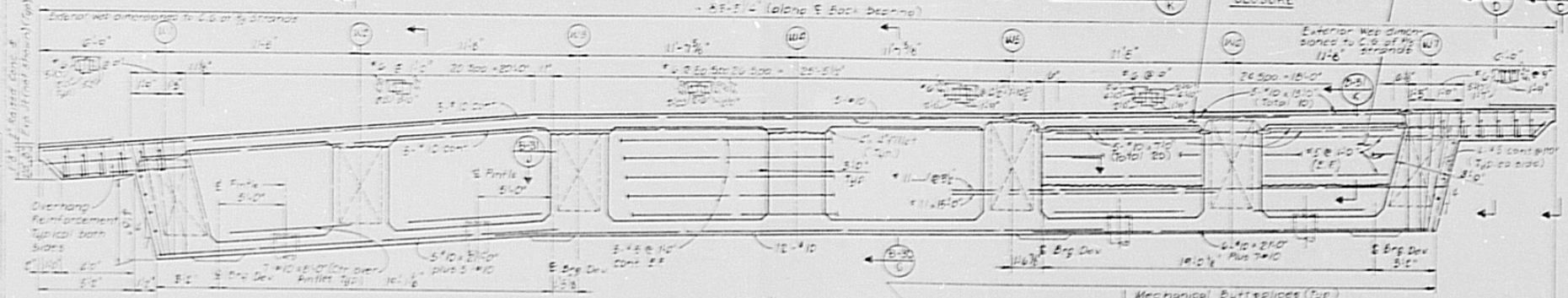
**PLAN OF DIAPHRAGM AT PIER 3H**



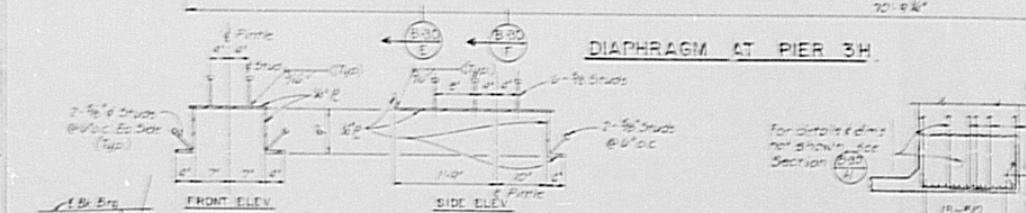
**SECTION B-31**



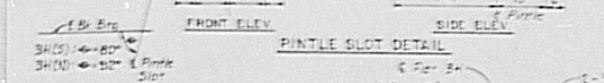
**DECK & DIAPHRAGM CLOSURE**



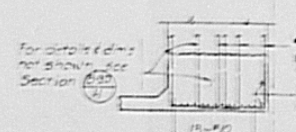
**DIAPHRAGM AT PIER 3H**



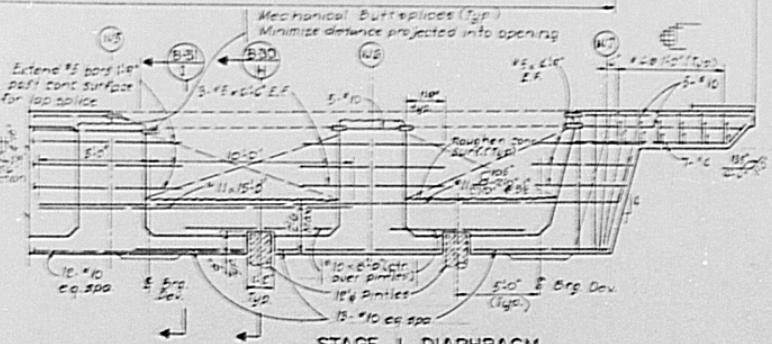
**PINTLE SLOT DETAIL**



**SECTION B-33**



**STAGE I DIAPHRAGM**



- Notes:
1. Stage I Diaphragm details show construction necessary prior to post-tensioning of Structure F-16-OK (Unit 1). For additional information, see Dwg. No. B-6 and B-61.
  2. Deck and Diaphragm Closure details shall be constructed after post-tensioning and acceptance of Structure F-16-NO (Unit 2).

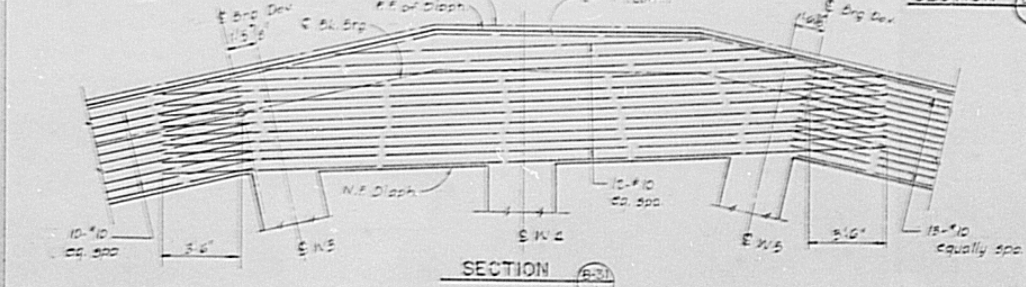
De Leuw, Cather & Company Denver, CO

DIVISION OF HIGHWAYS

**DIAPHRAGM DETAILS**  
UNIT 1

Designer: M. Marklinger	Structure Number: F-16-OK
Detailer: D. Stearns	
Drawing Number: B-31	of 54 Drawings

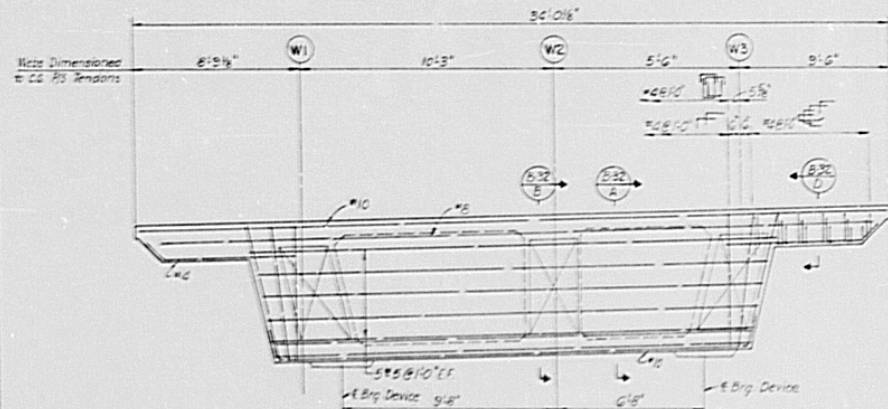
**SECTION B-31**



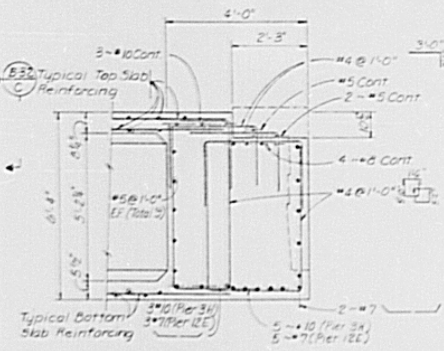
AS CONSTRUCTED	NO REVISIONS	REVISION	NO.	DATE
	2-7-77			

DESIGN NO.	BLVD.	FILE NO.	SHEET NO.	TOTAL SHEETS
1111	COLL.	IR 25-2 (191)	157	242

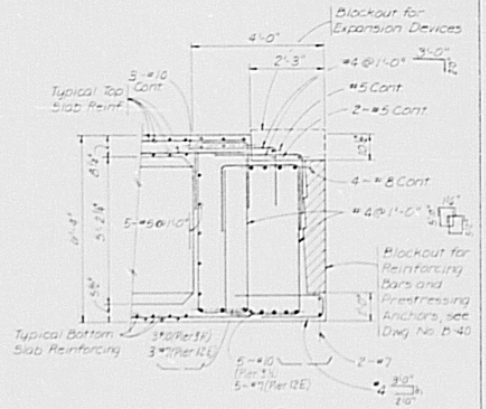
REV. SIGNS	



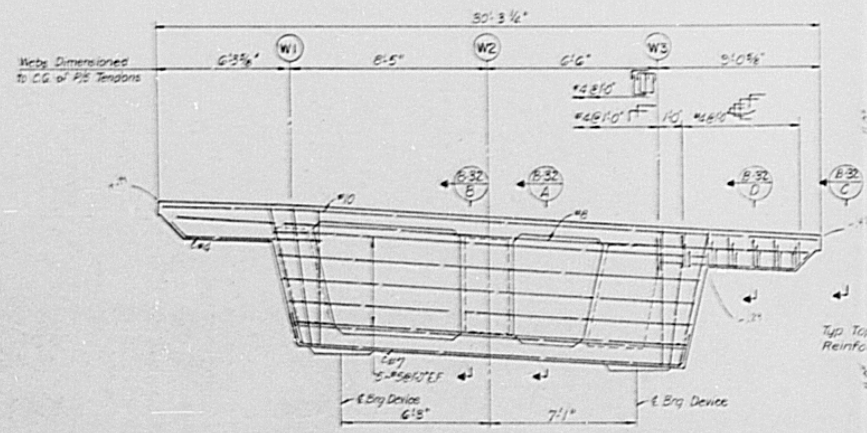
**DIAPHRAGM AT PIER 3H(N)**  
(Section Taken At & Bearing)



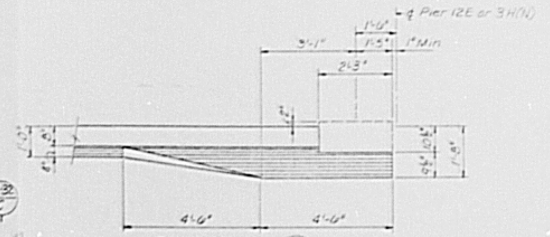
**SECTION B-32 A**



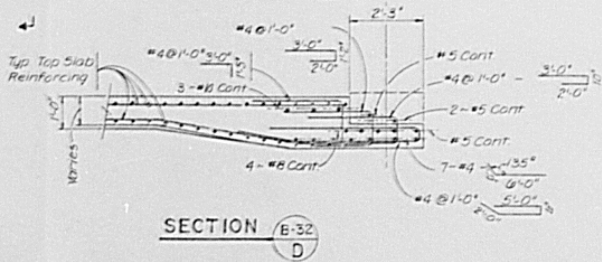
**SECTION B-32 B**



**DIAPHRAGM AT PIER 12E**  
(Section Taken At & Bearing)



**ELEVATION B-32 C**



**SECTION B-32 D**

NOTES:  
1. For Diaphragm Details At Piers 4H And 5H See Dwg. No. B-15. For Diaphragm Details At Piers 6H And 7H See Dwg. No. B-19.

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**DIVISION OF HIGHWAYS**

**DIAPHRAGM DETAILS**

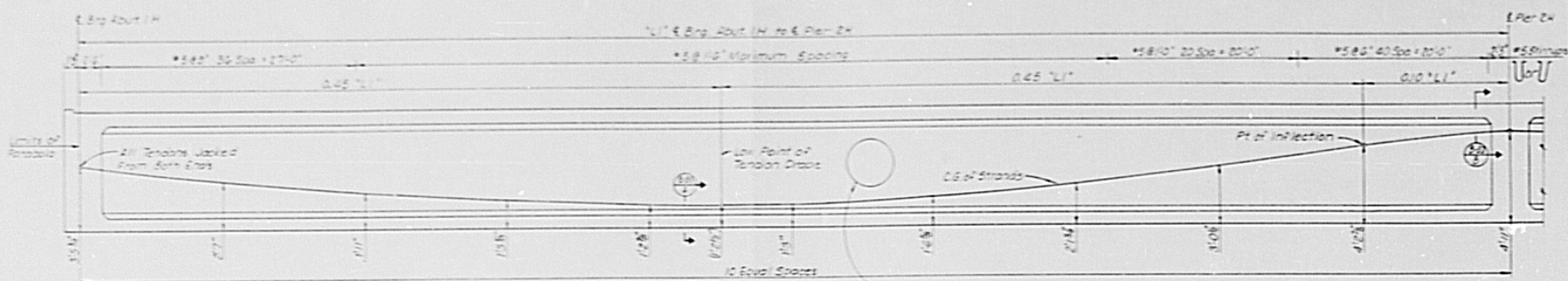
**UNIT (2)**

Designer J. Barroza	Structure F-16-140
Detailer R. Panning	Numbers
Drawing Number B-32	of 54 Drawings



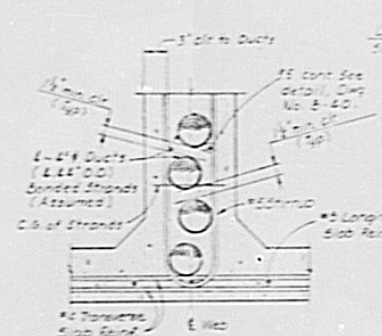
NO. REVISIONS	AS CONSTRUCTED	DESIGN NO.	PROJECT NO.	SHEET NO.	SHEET TOTAL
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REVISIONS	

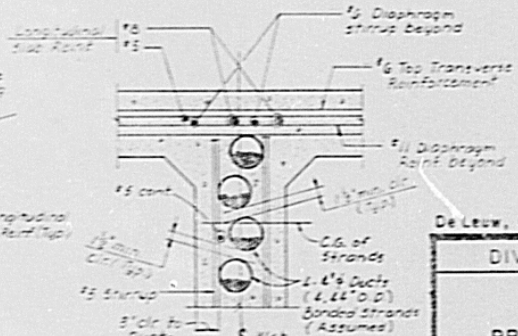


**SPAN I**  
**WEBS 1,2,6&7**

Web Access Opening in Interior Web. See Div. No. 5-7 for location. See Div. No. 5-28 for Details.



**SECTION 1-1**



**SECTION 2-2**

WEB NO.	LENGTH	PIECE
W1	52'-10"	3405K
W2	51'-0"	3405K
W6	52'-7"	3405K
W7	52'-3 1/2"	3405K

De Leuw, Cather & Company Denver, CO

**DIVISION OF HIGHWAYS**

**SUPERSTRUCTURE**

**PRESTRESSING DETAILS**

**SPAN I - UNIT 1**

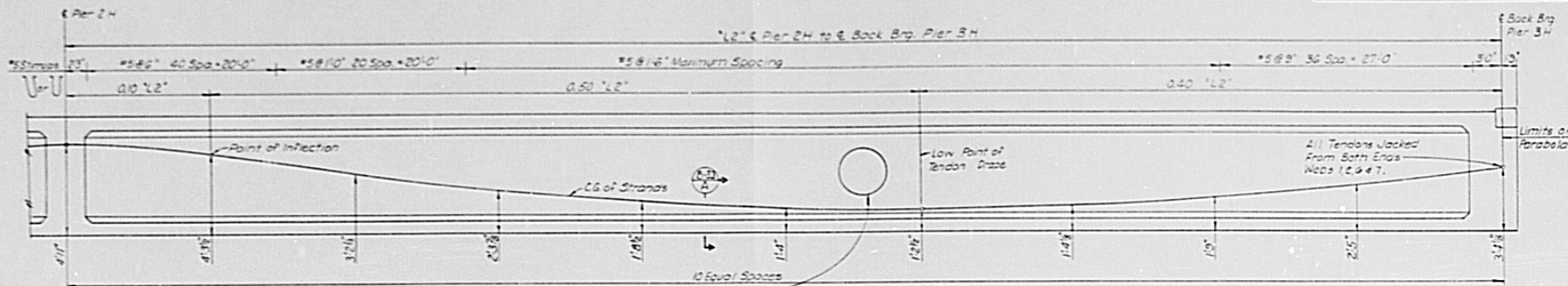
Checked: M. Steninger	Drawn: F. B. O'K
Scale: P. H. H. H.	Number: 54
Drawing Number: 5-33	of 54 Drawings

SCALE  
 1" = 10'-0"  
 1/8" = 1'-0"

AS CONSTRUCTED	REVISED	NO	DATE
NO REVISIONS	2	2/2/57	1957

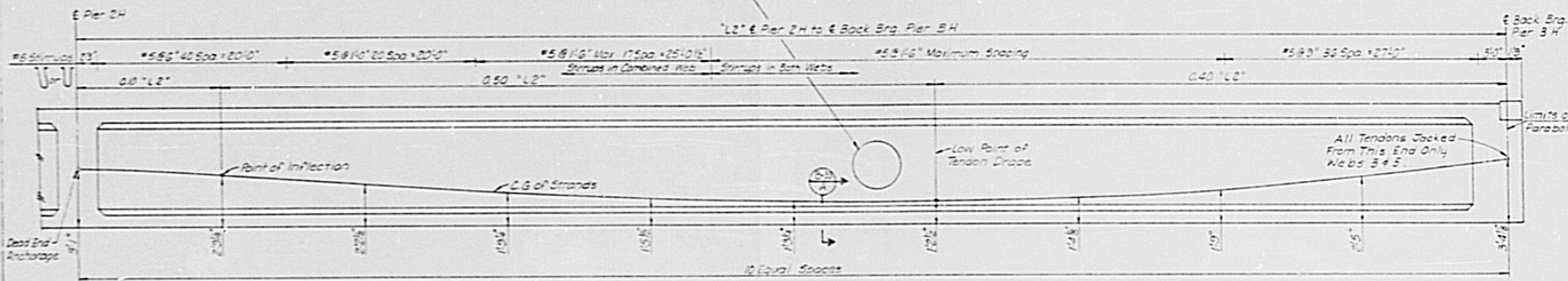
PROJECT NO.	1R25-2(191)
SECTION	159
DATE	2-7-57

REVISIONS	



Web Access Opening in Interior Webs See Dwg No. 5-6 for Location See Dwg No. 5-10 for Detail.

**SPAN 2  
 WEBS 1, 2, 6 & 7**



**SPAN 2  
 WEBS 3 & 5**

DATE	1/23/57
BY	WJH
CHECKED BY	
APPROVED BY	

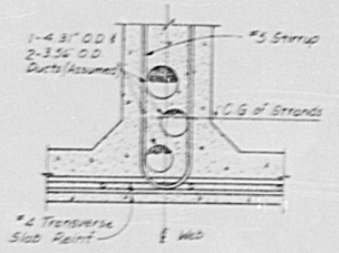
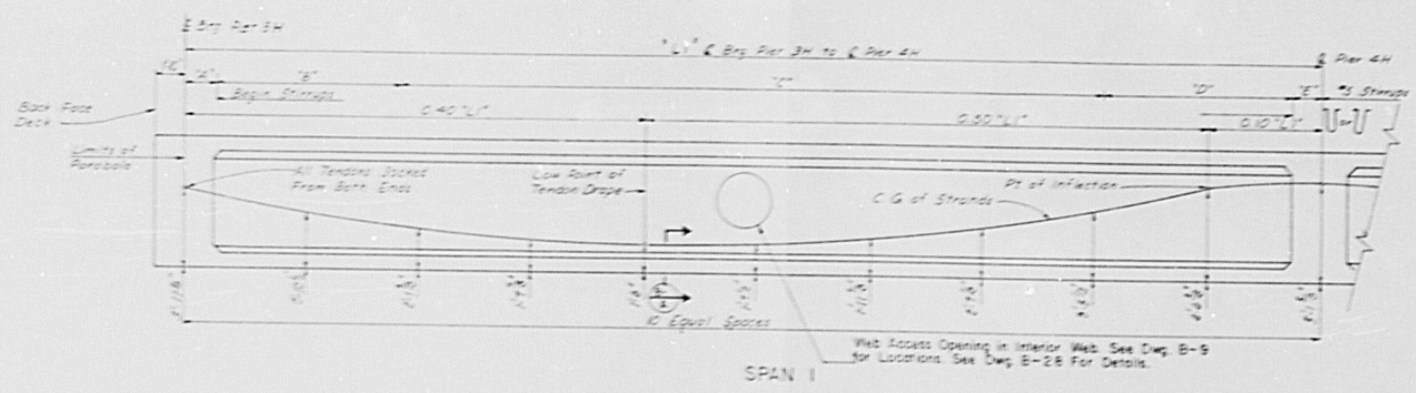
WEB NO	LENGTH	PULLBACK
W1	48'-7 1/2"	3408k
W2	47'-5 1/4"	3408k
W3	47'-8"	3408k
W5	43'-10 1/2"	3408k
W6	43'-2 1/4"	3408k
W7	42'-5 1/4"	3408k

De Leuw, Cather & Company Denver, CO

DIVISION OF HIGHWAYS		
SUPERSTRUCTURE		
PRESTRESSING DETAILS		
SPAN 2 - UNIT ①		
Designer M. Merzinger	Checker R. Hinchshaw	FIG. 06
Drawing Number B-34	of 54	Drawings

AS CONSTRUCTED  
 NO REVISIONS REVISIONS NO.

REL. BRIDGE REGION DIVISION PAGE NO. SHEET NO. SHEET TOTALS  
 VIII E.D.C. 1R25-2(196) 160 242



SPAN I

Web Access Opening in Interior Web. See Dwg. B-9 for Locations. See Dwg. B-26 For Details.

SPAN	WEB REINFORCING DATA					
	WEB NO.	"A"	"B"	"C"	"D"	"E"
I	W1	2'-6"	21 Sp. @ 1'-0" = 21'-0"	41 Sp. @ 1'-0" = 41'-0"	22 Sp. @ 1'-0" = 22'-0"	2'-0"
	W2	2'-6"	21 Sp. @ 1'-0" = 21'-0"	34 Sp. @ 1'-0" = 34'-0"	22 Sp. @ 1'-0" = 22'-0"	2'-6"
	W3	2'-6"	21 Sp. @ 1'-0" = 21'-0"	34 Sp. @ 1'-0" = 34'-0"	22 Sp. @ 1'-0" = 22'-0"	2'-4"

**PRESTRESSING FORCES**

Orders to be Post-Tensioned from Both Ends With the Following Forces.  
 P Jack = 5842 k  
 Jacking Force to be Distributed Thus  
 Web W1 = 1966 k  
 Web W2 = 1954 k  
 Web W3 = 1942 k

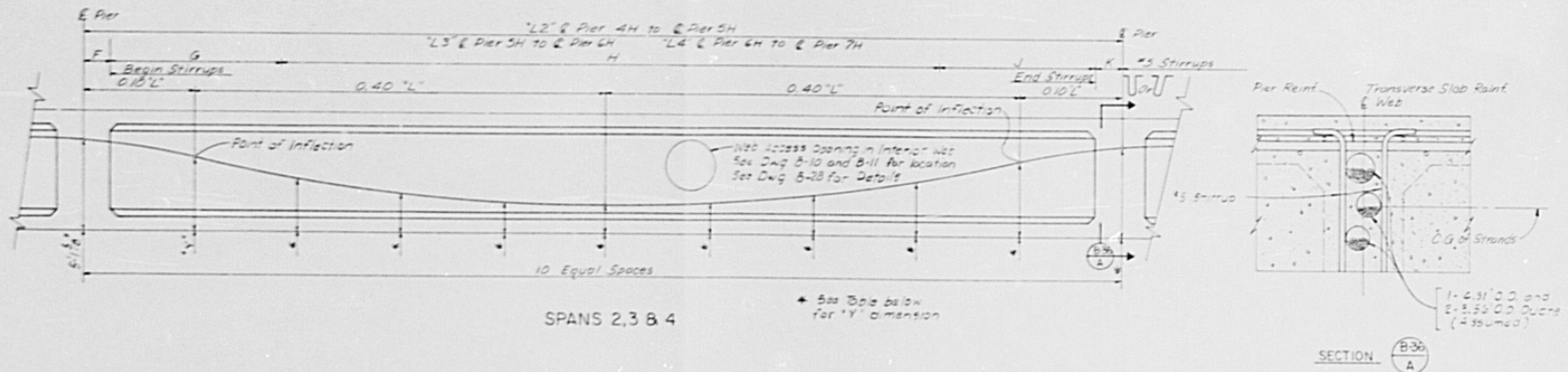
De Leuw, Cather & Company Denver, CO

**DIVISION OF HIGHWAYS**  
**SUPERSTRUCTURE**  
**PRESTRESSING DETAILS**  
**SPAN I - UNIT ②**

Designer J. Borrero	Structure F-16-110
Detailer D. Stearns	Numbers
Drawing Number B-35	of 54 Drawings
Revised Date	Revised By

AS CONSTRUCTED  
 NO REVISIONS  REVISED  VOID

FED. ROAD DIVISION PROJ. NO. SHEET NO. SHEET TOTALS  
 V111 COL. 1 (R25-21/91) 101



SPANS 2, 3 & 4

\* See Table below for 'Y' dimension

TABLE OF 'Y' DIMENSIONS											
SPAN	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
"L2"	5'-1 5/8"	4'-4 1/4"	3'-0"	2'-6 3/8"	1'-5 3/8"	1'-3"	1'-5 3/8"	2'-0 3/8"	3'-0"	4'-4 1/4"	5'-1 5/8"
"L3"	5'-1 5/8"	4'-3 7/8"	2'-10 7/8"	1'-10 3/4"	1'-3 3/8"	1'-1"	1'-3 3/8"	1'-10 3/4"	2'-10 7/8"	4'-3 7/8"	5'-1 5/8"
"L4"	5'-1 5/8"	4'-4 1/4"	3'-0"	2'-6 3/8"	1'-5 3/8"	1'-3"	1'-5 3/8"	2'-0 3/8"	3'-0"	4'-4 1/4"	5'-1 5/8"

WEB REINFORCING DATA						
SPAN	WEB NO.	"F"	"G"	"H"	"J"	"K"
2	W1	1'-9"	22 @ 1'-0" = 22'-0"	65 @ 1'-6" = 97'-4"	22 @ 1'-0" = 22'-0"	1'-9"
	W2	1'-9"	22 @ 1'-0" = 22'-0"	65 @ 1'-6" = 97'-4"	22 @ 1'-0" = 22'-0"	1'-9"
	W3	1'-9"	22 @ 1'-0" = 22'-0"	65 @ 1'-6" = 97'-4"	22 @ 1'-0" = 22'-0"	1'-9"
3	W1	1'-6"	23 @ 1'-0" = 23'-0"	68 @ 1'-6" = 102'-0"	27 @ 10" = 22'-4"	1'-5 1/2"
	W2	1'-5 5/8"	23 @ 1'-0" = 23'-0"	67 @ 1'-6" = 100'-4"	27 @ 10" = 22'-4"	1'-5 5/8"
	W3	1'-5 1/2"	23 @ 1'-0" = 23'-0"	67 @ 1'-6" = 100'-4"	27 @ 10" = 22'-4"	1'-5 1/2"
4	W1	1'-4"	28 @ 10" = 28'-4"	99 @ 1'-0" = 99'-0"	27 @ 10" = 22'-4"	1'-4"
	W2	1'-5 1/4"	27 @ 10" = 22'-4"	98 @ 1'-0" = 98'-0"	27 @ 10" = 22'-4"	1'-5 1/4"
	W3	1'-5 1/2"	26 @ 10" = 21'-8"	97 @ 1'-0" = 97'-0"	26 @ 10" = 21'-8"	1'-5 1/2"

De Leuw, Cather & Company Denver, CO

DIVISION OF HIGHWAYS  
 SUPERSTRUCTURE  
 PRESTRESSING DETAILS  
 SPANS 2, 3 & 4-UNIT ②

Designer J. Barroza Structure F-16-NO  
 Detailer D. Stegmaier Numbers  
 Drawing Number B-36 of 54 Drawings

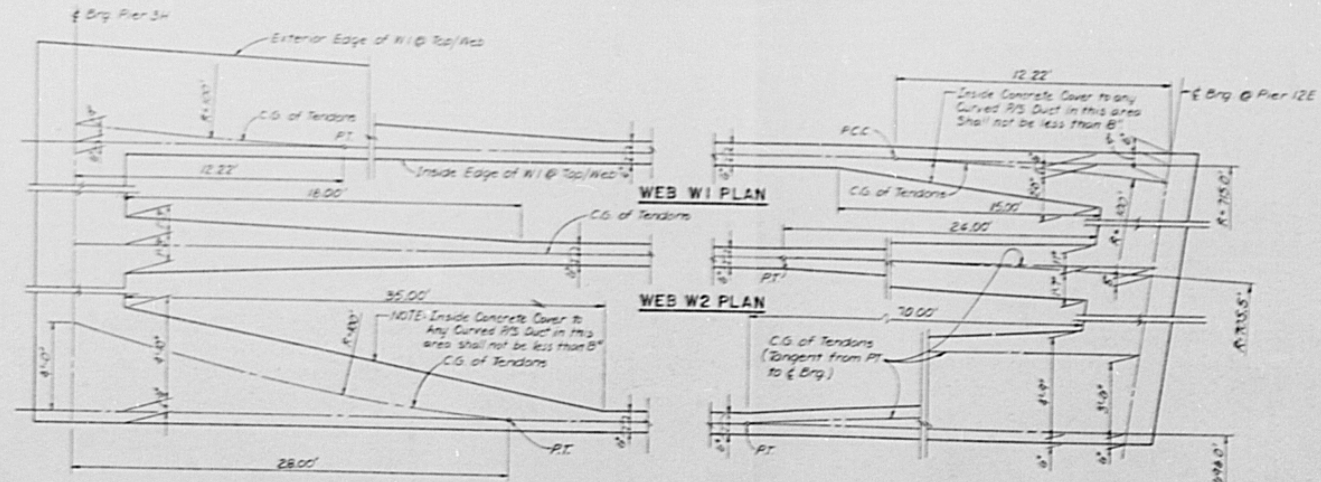
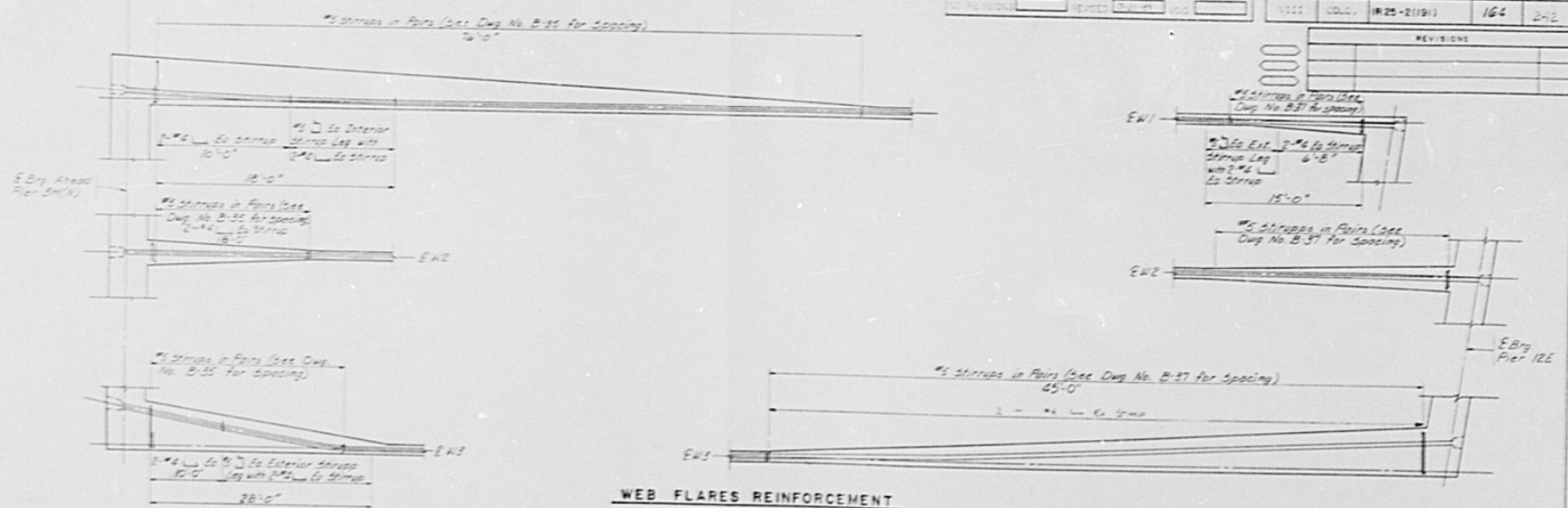
DESIGNED BY  
CHECKED BY  
DATE

DESIGNED BY  
CHECKED BY  
DATE

AS CONSTRUCTED	REVISION	NO.	DATE	BY

PROJECT NO.	DIVISION	SHEET NO.	TOTAL SHEETS
IR 25-2(19)	164	164	242

REVISIONS	



- NOTES**
1. For Prestress Anchorage Detail, see Dwg. No. B-40.
  2. For Prestress Tendon Elevations, see Dwg. No. B-35, B-36 & B-37.
  3. For placement details of additional web flare reinforcement refer to tendon placement details, Dwg. No. B-29.

**WEB FLARES DIMENSIONS & LOCATION OF P/S TENDONS**

De Leuw, Cather & Company Denver, CO

**DIVISION OF HIGHWAYS**

**SUPERSTRUCTURE  
WEB FLARES  
UNIT ②**

Designer J. Barroza	Structure F-16-N0
Checker R. Panning	Numbers
Drawing Number B-39	of 54 Drawings

3-10-81

**STRESSING NOTES:**

**GENERAL**

Reinforcing that interferes with the prestressing tendon alignment shall be adjusted as indicated in this drawing or as approved by the Engineer.

Where dead end anchorage and tendons are accessible, the anchorage system and length of projecting prestressing steel shall permit jacking with the same jacking equipment that was used on the live end.

Deviations from the duct pattern, duct size and strand size assumed in the design must be approved by the Engineer. Duct patterns 1, 2 and 3 are the only acceptable patterns.

**STRESSING SEQUENCE:**

Tendons may be jacked from both ends, either simultaneously or sequentially, or  $\frac{1}{2}$  the tendons may be jacked from each end. Tendons in Webs 3 and 5 of Str. F-1G-OK (Unit 1) shall be jacked from Pier 3H. If  $\frac{1}{2}$  the tendons are jacked from each end, the jacking force shall be increased to obtain the stress ratios indicated below. Contractor shall submit calculations with the shop drawings. No more than  $\frac{1}{2}$  of the prestressing force in any web may be stressed before an equal force is stressed in the adjacent web. At no time during the stressing operations will more than  $\frac{1}{2}$  of the total prestressing force be applied eccentrically about the centerline of the structure.

At the Contractor's option, the prestressing force may vary  $\pm 2\%$  from the theoretical force per web provided the total P(JACK) force is obtained and is distributed symmetrically about the centerline of the typical section. P(JACK) is the sum of the peak forces reached during jacking in each tendon. For additional Prestressing details, see Drawing Nos. B-33 thru B-37 and B-41.

**DESIGN:**

Design is based on  $K=0.0002$ , modified in each span for horizontal curvature and  $\lambda=0.25$  P(JACK) at the jacking ends includes friction, anchor set of  $\frac{3}{8}$ " at the jacking end, elastic shortening, and provisions for an additional 24 ksi long term loss in stress (Unit 1), and an additional 20 ksi long term loss in stress (Unit 2).

⊕ Designates critical points for P(JACK). The Contractor shall submit elongation and jacking calculations (including anchor set if any) that provide the Initial Stress Ratio values and Final Stress Ratio values at the critical locations shown. Initial Stress Ratio = Jacking Stress times Force Coefficient before long term losses. Final Stress Ratio = Jacking Stress times Force Coefficient after long term losses. Design assumes jacking stress at 75%  $P(JACK)$ .  $A_s = 0.75 f_c$

Use low-relaxation strands meeting the requirements of AASHTO M-203, Grade 270  
 $f_s = 270$  KSI  
 $f'c = 5500$  PSI at 28 days field compressive strength  
 $f'c = 4000$  PSI at stressing (Unit 1)  
 $f'c = 3500$  PSI at stressing (Unit 2)

**UNIT 1: WEBS 1, 2, 6, 7**

LOCATION	FORCE COEFF. BEFORE LTL	FORCE COEFF. AFTER LTL
1.0	0.9038	0.7951
1.4 ⊕	0.9303	0.8217
2.0 ⊕	0.9071	0.7984
2.6 ⊕	0.9227	0.8140
3.0	0.8760	0.7673

**UNIT 2**

**CRITICAL POINTS FOR P(JACK)**

LOCATION	FORCE COEFF. BEFORE LTL	FORCE COEFF. AFTER LTL
1.0	0.8918	0.7930
1.4	0.9262	0.8274
2.0	0.9094	0.8106
3.0 ⊕	0.8029	0.7042
3.5 ⊕	0.7481	0.6494
4.0 ⊕	0.7292	0.6305
5.0	0.8753	0.7765
6.0	0.8632	0.7645

**UNIT 1: WEBS 3 & 5**

LOCATION	FORCE COEFF. BEFORE LTL	FORCE COEFF. AFTER LTL
2.0 ⊕	0.8891	0.7755
2.6 ⊕	0.9268	0.8132
3.0	0.8801	0.7665

LTL = LONG TERM LOSSES

**PRESTRESSED ANCHORAGE NOTES:**

The anchorage shall be covered with concrete to provide a minimum of 2" of cover.

The distance between the edge of a bearing plate and the edge or corner of the concrete shall be 2" minimum.

The webs shall be flared near the anchorage as required to maintain a 1/2" minimum cover over the ducts and a 1" minimum cover over the stirrups. See Dwg. B-35 and B-39 for Details.

All reinforcing designated  $\Delta$  and concrete in flares not included in explicit details shall not be included in concrete and reinforcing quantities, but shall be included in the price of the prestressing steel, item 618.

See abutment details and superstructure details for dimensions and reinforcing not shown.

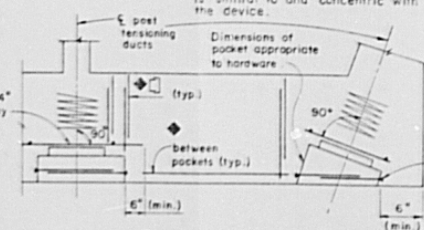
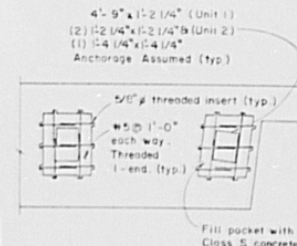
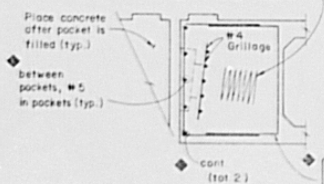
The Contractor shall submit calculations for bearing stresses at anchorages using:

A) at transfer of load  $FCP = 0.8 f'c \sqrt{\frac{A_b}{A_d}} - 0.2 \leq 1.25 f'c$

B) at service load  $FCP = 0.6 f'c \sqrt{\frac{A_b}{A_d}} \leq f'c$

Where:  $A_b$  = Bearing area of the device  
 $A_d$  = Max. area of the device bearing surface that is similar to and concentric with the bearing area of the device.

$\Delta$  Bursting steel (Epoxy Coated) (Typ.) if required by anchorage design. Provided by Anchorage supplier.

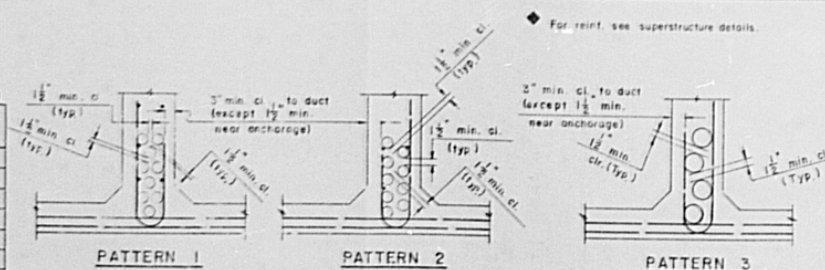


PLAN VIEW

SECTION

ELEVATION

**SEAT FOR PRESTRESSED ANCHORAGE**



CLEARANCE REQUIREMENTS FOR DUCTS

All exposed metal surfaces of the anchorage shall be epoxy coated before filling pockets.

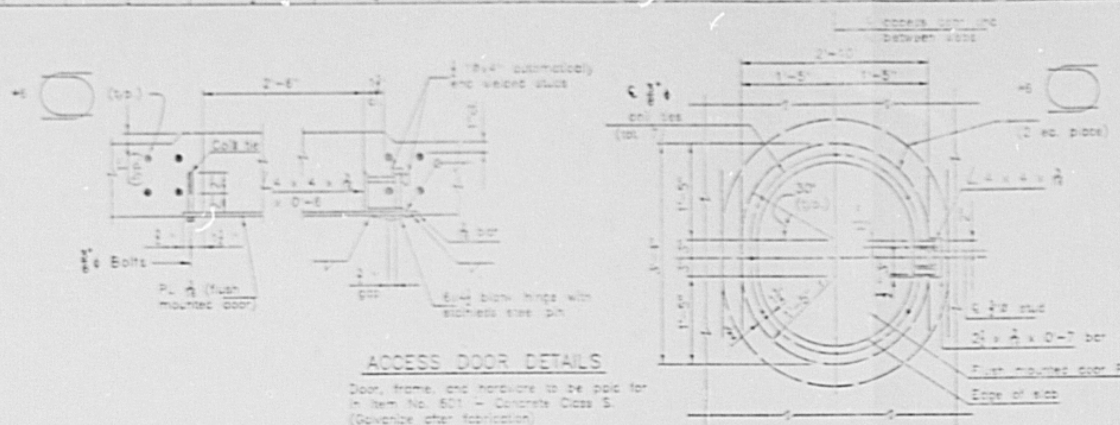
De Leuw, Cather & Company Denver, CO

**DIVISION OF HIGHWAYS**

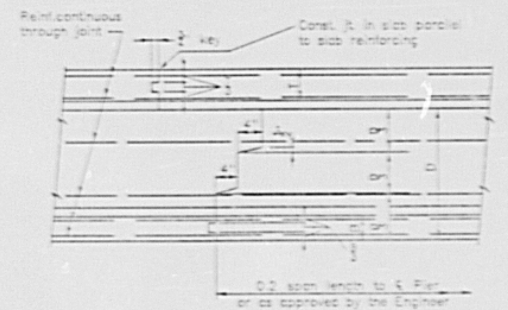
**CAST-IN-PLACE POST-TENSIONED BOX GIRDER DETAILS**

Designer: Barraco, Marklinger	Signature: F-16-OK
Checker: R. Fanning	Numbers: F-16-ND
Drawing Number: B-40	of 54 Drawings

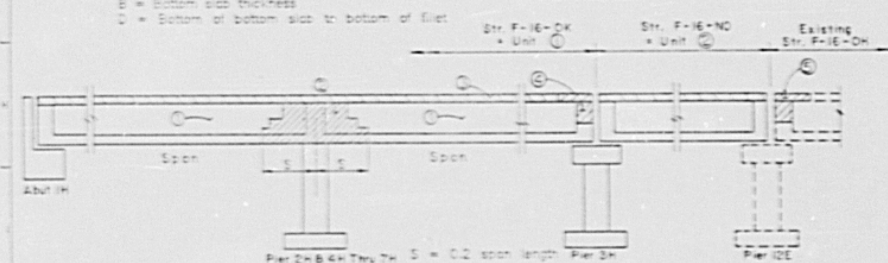
NO. CONTRACT	NO. SHEETS	TOTAL PAGES	SHEET NO.	PROJECT NAME	DATE
7-2-74			166	IR 25-2(191)	1966



**ACCESS DOOR DETAILS**  
 Door, frame, and hardware to be paid for in Item No. 601 - Concrete Class 5.  
 (Galvanize after fabrication)



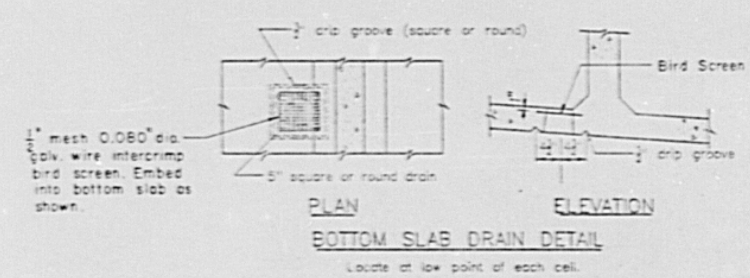
**TRANSVERSE WEB CONSTRUCTION JOINT**  
 T = Top slab thickness  
 B = Bottom slab thickness  
 D = Bottom of bottom slab to bottom of fillet



**SUPERSTRUCTURE PLACING SCHEDULE**

Note: Numbers ① and ② indicate sequence of placing bottom slab and web concrete when each section constitutes a separate pour. ③ may be placed continuously or in parts, as approved by the Engineer, providing no transverse construction joints fall within the ③ area. Contractor may submit an alternate placing schedule to the Engineer for approval.

- ① Construct according to Stage 1 Diaphragm Details on Dwg. No. B-31 to allow clearance for post-tensioning of Str. F-16-NO (Unit ①). After post-tensioning and acceptance of Str. F-16-NO (Unit ②) complete construction indicated by No. ③ according to Details on Dwg. No. B-31.
- ② After post-tensioning and acceptance of Str. F-16-NO (Unit ②) complete construction indicated by No. ③ according to Details on Dwg. No. B-25.



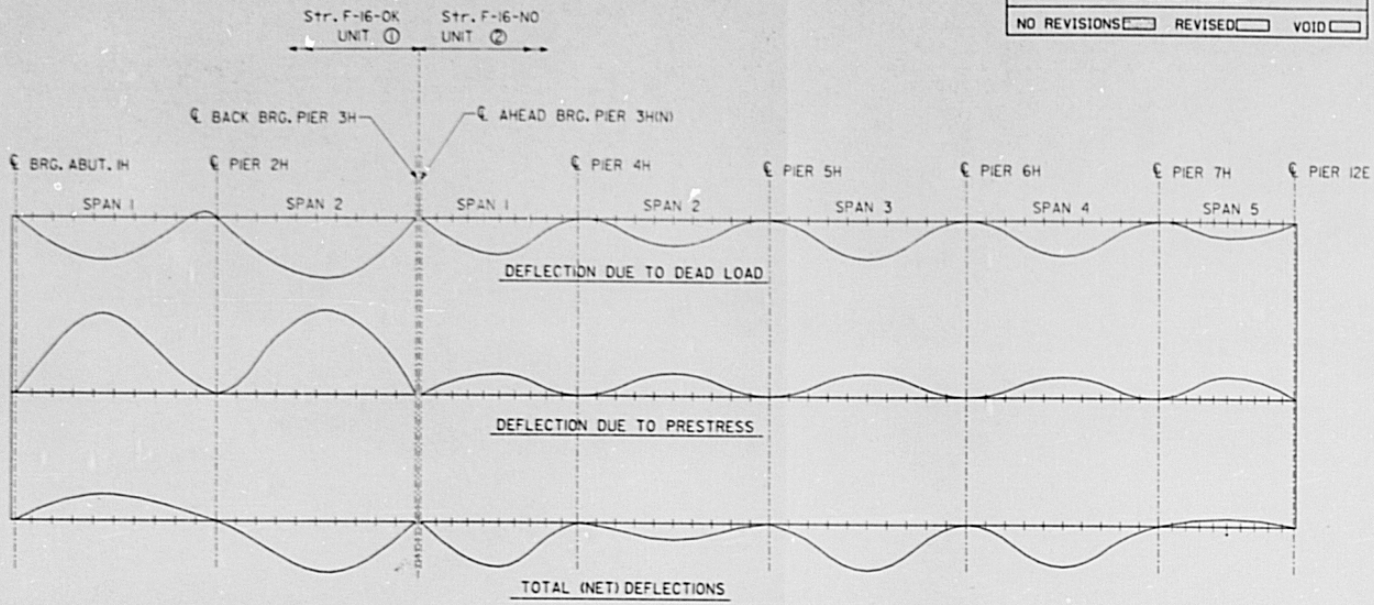
**BOTTOM SLAB DRAIN DETAIL**  
 Locate at low point of each cell.

DIVISION OF HIGHWAYS			
CAST-IN-PLACE POSTTENSIONED BOX GIRDER DETAILS			
Designer	M. Merklinger	Structure	F-16-DK
Detailer	D. Stearns	Numbers	F-16-NO
Drawing Number		B-41	of 54 Drawings

AS CONSTRUCTED  
 NO REVISIONS  REVISED  VOID

FED. NO. REGION	DIVISION	PROJ. NO.	SHEET NO.	SHEET TOTALS
V III	COLO.	IR25-2(191)	167	

REVISIONS	



- NOTES :
- All Deflections are in Feet.
  - Positive Deflections are Downward.
  - The Total (Net) Deflections have been Multiplied by the Factor of Three (3) to include the Long Term Effects.
  - Dead Load Deflections include Superimposed Dead Load Effects.
  - The Camber in the Tables shall be Applied to all Webs.

DEFLECTION TABLES

UNIT 1	L0	L1	L2	L3	L4	L5	L6	L7	L8	L9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
DEAD LOAD	0.000	0.049	0.089	0.113	0.120	0.109	0.083	0.050	0.018	-0.003	0.000	0.032	0.079	0.128	0.167	0.188	0.187	0.165	0.122	0.065	0.000
PRESTRESS	0.000	-0.062	-0.115	-0.150	-0.162	-0.153	-0.126	-0.086	-0.043	-0.010	0.000	-0.018	-0.053	-0.092	-0.126	-0.145	-0.147	-0.131	-0.097	-0.052	0.000
TOTAL	0.000	-0.039	-0.078	-0.111	-0.126	-0.132	-0.129	-0.108	-0.075	-0.039	0.000	0.042	0.078	0.108	0.123	0.129	0.120	0.102	0.075	0.039	0.000

UNIT 1	L0	L1	L2	L3	L4	L5	L6	L7	L8	L9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
DEAD LOAD	0.000	0.029	0.053	0.071	0.080	0.077	0.067	0.050	0.029	0.010	0.000	0.006	0.024	0.044	0.059	0.064	0.059	0.045	0.025	0.007	0.000
PRESTRESS	0.000	-0.021	-0.039	-0.053	-0.060	-0.059	-0.051	-0.037	-0.022	-0.007	0.000	-0.005	-0.019	-0.036	-0.048	-0.053	-0.049	-0.037	-0.022	-0.007	0.000
TOTAL	0.000	0.024	0.042	0.054	0.060	0.054	0.048	0.039	0.021	0.009	0.000	0.003	0.015	0.024	0.033	0.033	0.030	0.024	0.009	0.000	0.000

UNIT 2	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
DEAD LOAD	0.000	0.013	0.038	0.064	0.083	0.089	0.082	0.063	0.037	0.012	0.000	0.009	0.031	0.055	0.073	0.081	0.076	0.060	0.037	0.014	0.000
PRESTRESS	0.000	-0.007	-0.022	-0.038	-0.050	-0.054	-0.051	-0.039	-0.022	-0.007	0.000	-0.006	-0.020	-0.035	-0.046	-0.050	-0.045	-0.033	-0.017	-0.003	0.000
TOTAL	0.000	0.018	0.048	0.078	0.099	0.105	0.093	0.072	0.045	0.015	0.000	0.009	0.033	0.060	0.081	0.093	0.093	0.081	0.060	0.033	0.000

UNIT 2	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0
DEAD LOAD	0.000	0.001	0.009	0.020	0.030	0.037	0.040	0.037	0.028	0.015	0.000
PRESTRESS	0.000	-0.008	-0.021	-0.035	-0.047	-0.055	-0.057	-0.051	-0.038	-0.020	0.000
TOTAL	0.000	-0.021	-0.036	-0.045	-0.051	-0.054	-0.051	-0.042	-0.030	-0.015	0.000

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DIVISION OF HIGHWAYS

SUPERSTRUCTURE DEFLECTIONS

Designer: Barroza, Merklinger, Structure F-16-OK  
 Detaller: M. Davison Numbers: F-16-NO  
 Drawing Number B-42 of 54 Drawings

DESIGNED BY: JAB 12-86  
 CHECKED BY: JAB 12-86  
 DRAWN BY: JAB 12-86  
 REVISIONS BY: JAB 12-86

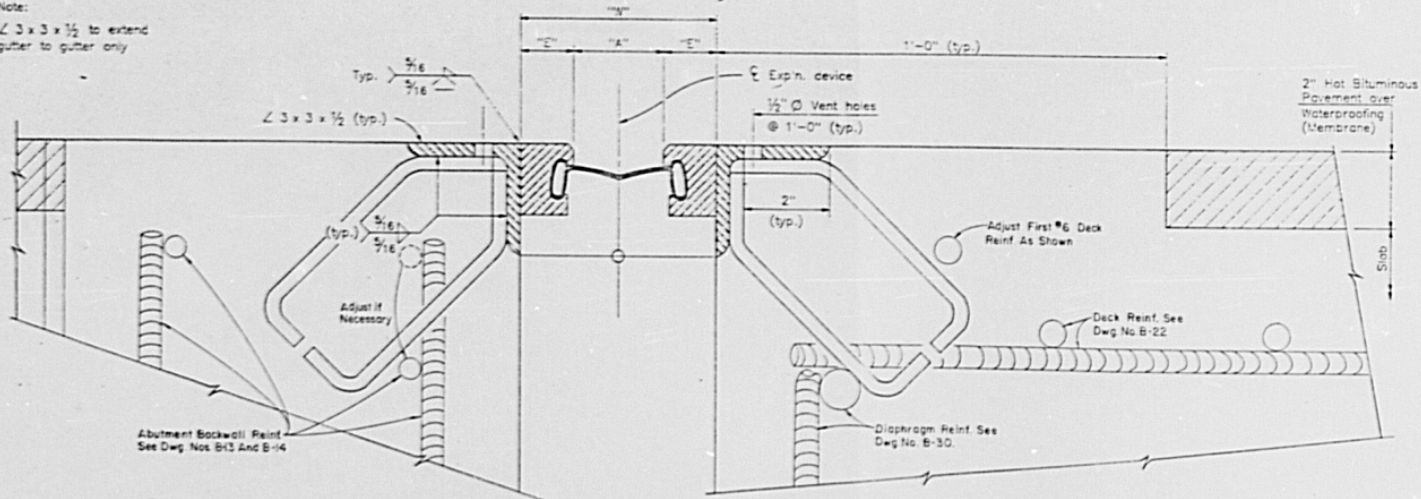




AS CONSTRUCTED	FED. ROAD DISTRICT	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
NO REVISIONS 2-2-74	NO. 182	1	1R25-2(191)	169	242

REVISIONS	

Note:  
 L 3 x 3 x 1/2 to extend  
 gutter to gutter only



**SECTION THRU BRIDGE EXPANSION DEVICE**

section taken perpendicular to  $\phi$  exp'n device  
 at pier  
 at abutment IH

**Acceptable Alternates**

- WABO-S-400
- GEN-STRIP CD
- ONFLEX 40-SD
- D.S.BROWN SS-400

**NOTES**

THE EXPANSION DEVICE SHALL BE INSTALLED ON GRADE, PARALLEL TO THE SLOPE AND GRADE OF THE DECK.

AFTER THE CONCRETE HAS ATTAINED INITIAL SET, THE ATTACHMENTS USED TO HOLD THE ANGLE ASSEMBLY IN ITS PROPER POSITION SHALL BE REMOVED.

DO NOT PAINT STEEL SURFACES IN CONTACT WITH CONCRETE AND EXPANSION DEVICE.

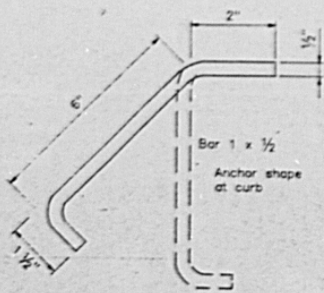
"W" AND "A" DIMENSIONS ARE DEPENDENT UPON THE PARTICULAR EXPANSION DEVICE SUPPLIED, AND SHALL BE SHOWN ON THE SHOP DRAWINGS.

THE SHOP DRAWINGS SHALL INDICATE THE "W" AND "A" DIMENSIONS AT A RANGE OF TEMPERATURES FROM 30°F TO 100°F ASSUMING A MID-POINT TEMPERATURE OF 40°F.

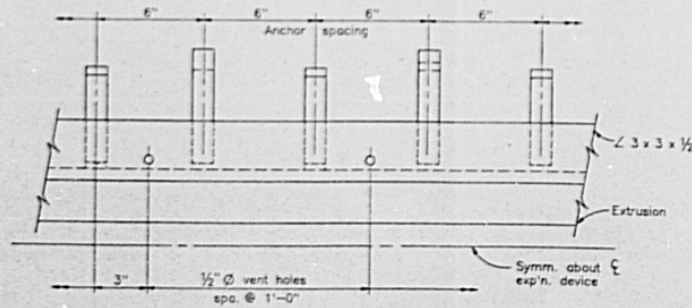
OPENING IN CURB TO BE CONSTRUCTED TO THE EXACT WIDTH OF THE EXISTING DECK OPENING.

THE NEOPRENE EXTRUSION SHALL BE ONE PIECE.

VENT HOLES SHALL NOT BE USED FOR SUPPORT BOLTS.



**TYPICAL ANCHOR DETAIL**



**ANCHOR AND VENT HOLE SPACING**

Str Temp.	ABUT. IH	"A"
30°F	2 3/8"	"A"
40°F	1 7/8"	
50°F	1 7/8"	
60°F	1 3/4"	
70°F	1 1/2"	
80°F	1 3/8"	
90°F	1 3/8"	
100°F	1"	

DIVISION OF HIGHWAYS	
<b>BRIDGE EXPANSION DEVICE</b> (0-4 INCH)	
DESIGNER <i>M. Merklinger</i>	STRUCTURE NUMBER <b>F-16-OK</b>
DETAILER <i>D. Stearns</i>	DRAWING NUMBER <b>B-44</b>
OF 54 DRAWINGS	

REVISION DATES	DATE	BY	REVISION
4-85	6/85		

EXPDEVI

DESIGNED BY: [ ]  
 CHECKED BY: [ ]  
 DATE: [ ]

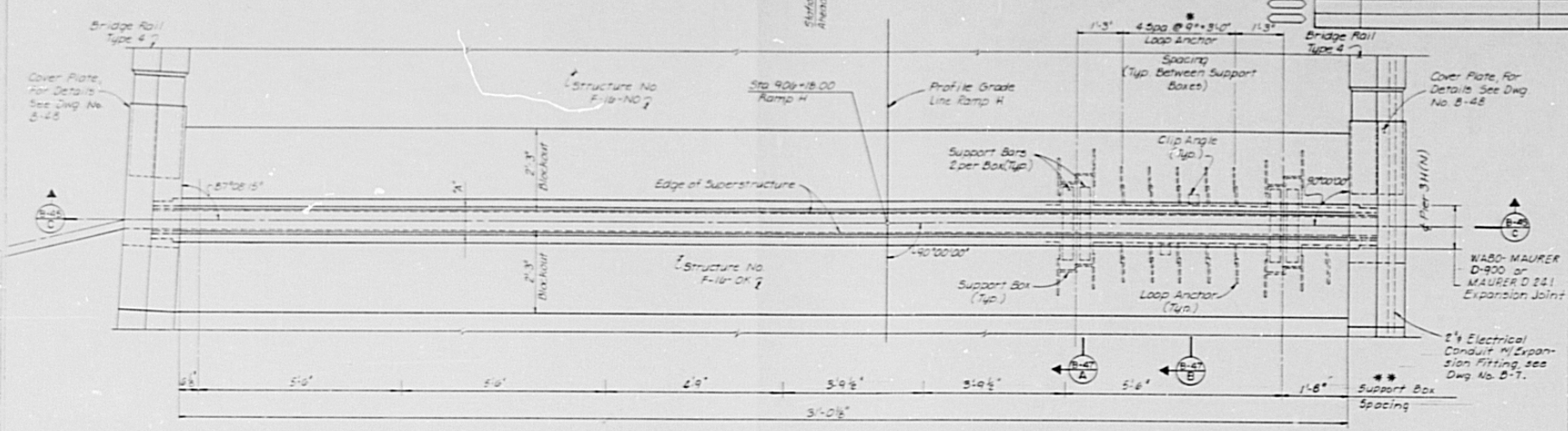
NO. REVISIONS		REVISED	DATE	BY

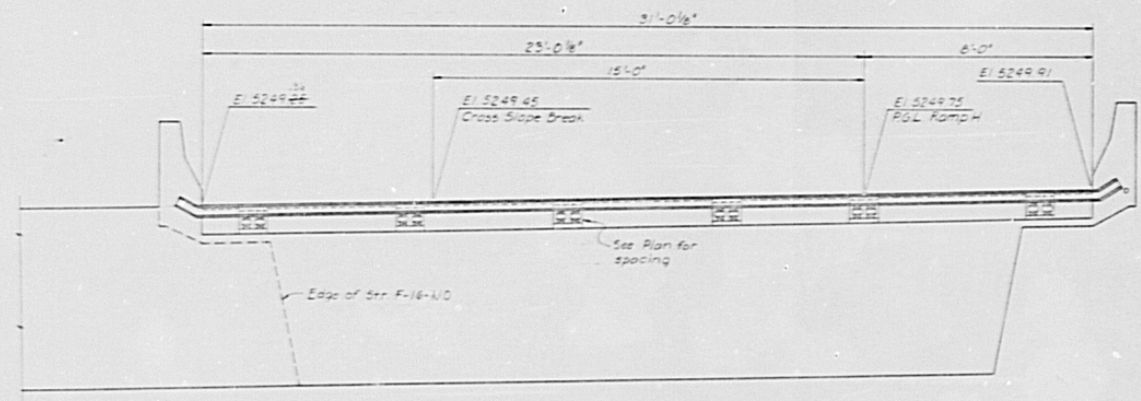
FEDERAL ROAD DISTRICT	DIVISION	PROJECT NO.	SHEET NO.	SHEET TOTALS
		IR 25-2(191)	170	242

REVISIONS	



PLAN AT PIER 3H(N)



SECTION (B-45) C

- \* Adjust as req'd at P/A Anchorages.
- \*\* Spacing may be adjusted if coordinated with P/A anchorages. Contractor to coordinate.

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DIVISION OF HIGHWAYS

EXPANSION DEVICE  
 (0-9 INCH)  
 PIER 3H(N)

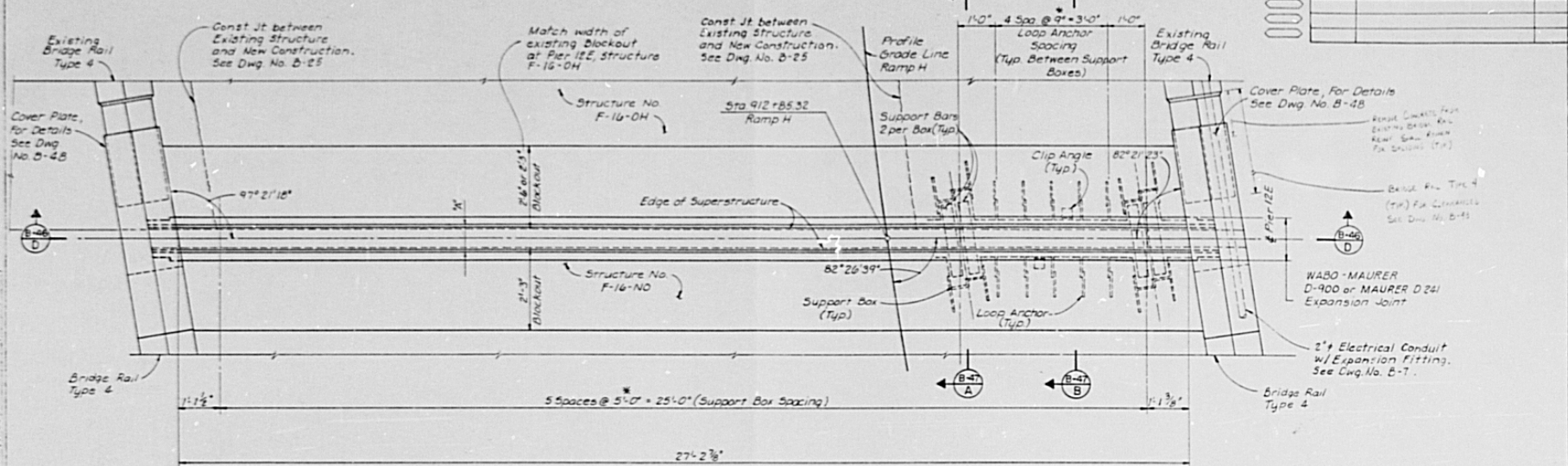
Designer: M. Storkinger	Structure: F-16-OK
Detailer: R. Rognung	Number: F-16-ND
Drawing Number: E-45	of 54 Drawings

BY: JAB  
 DATE: 7-21-91  
 58, 1984

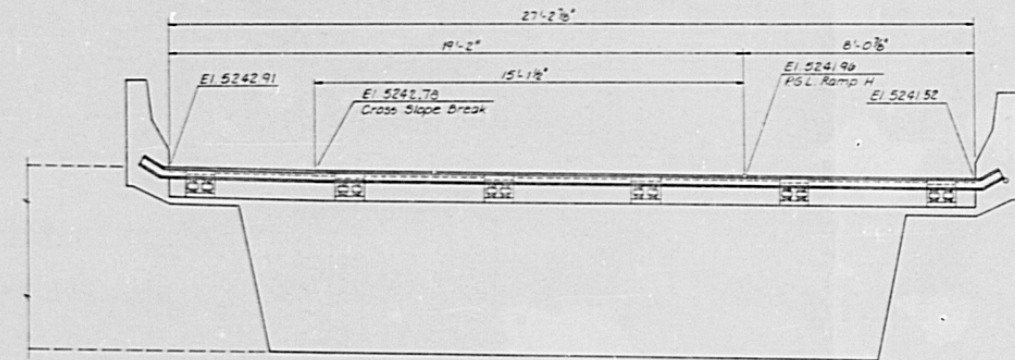
AS CONSTRUCTED		REVISED	NO. REVISIONS	DATE	BY	CHKD.	APP'D.
		7-21-91	1				

PROJECT NO.	SHEET NO.	SHEET TOTALS
IR25-2(191)	171	24

REVISIONS	



PLAN AT PIER 12E



SECTION (B-46) D

- NOTES:**
1. Adjust as required at Pyl Anchorage those dimensions designated thus: \*. See Note 9, Dwg. No. B-47.
  2. Align Support Boxes and related Hardware to provide for movement of Superstructure.
  3. Contractor shall verify dimensions of Existing Bridge Rail Type 4 to insure fit of Cover Plates. Construct As Noted Here.

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DIVISION OF HIGHWAYS

EXPANSION DEVICE  
 (0-9 INCH)  
 PIER 12E

Designer: J. Barroza	Structure Number: F-16-ND
Checker: R. Ranning	
Drawing Number: B-46	of 54 Drawings

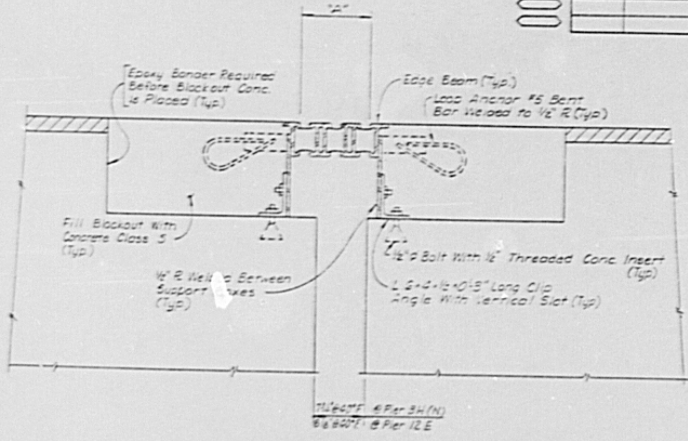
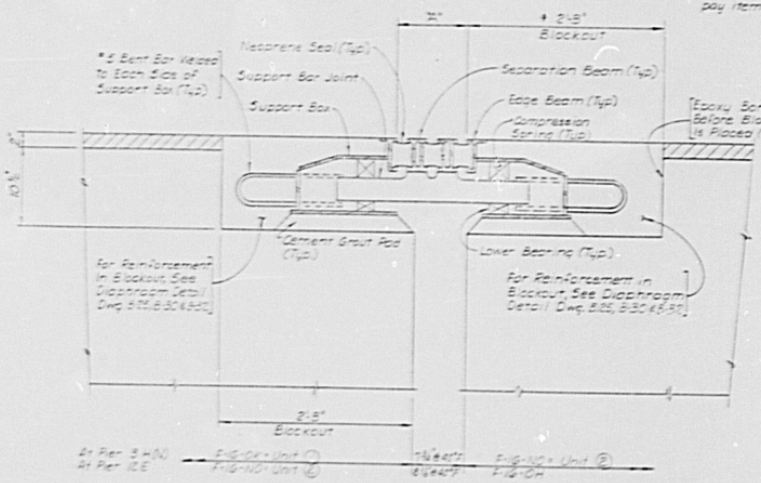
NO.	DATE	BY	CHKD.	APP'D.
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2	7/21/91	JAB	JAB	JAB
3	7/21/91	JAB	JAB	JAB

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 98. 1/2" DIA. STEEL  
 99. 1/2" DIA. STEEL  
 100. 1/2" DIA. STEEL

\* Contractor shall verify the dimension  
 on Structure F-16-04 at Pier 12E  
 No adjustment will be made in the  
 pay item quantities.

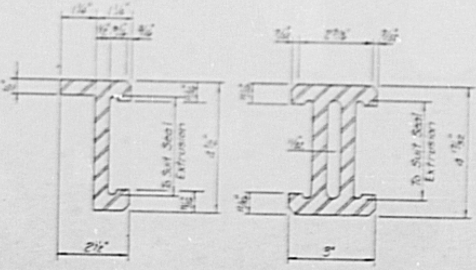
AS CONSTRUCTED		REGION	DIVISION	PROJ. NO.	SHEET NO.	SHEET TOTAL
NO REVISIONS	REVISED	VIII	COLO.	IR 25-2(191)	172	211

REVISIONS	



SECTION A-A

SECTION B-B



EDGE BEAM SEPARATION BEAM

STRUCTURE TEMPERATURE	PIER 33N1	PIER 12E
	DIMENSION "A"	DIMENSION "A"
30°F	6 3/4"	8 1/4"
40°F	6 5/8"	7 7/8"
50°F	5 7/8"	6 3/4"
60°F	5 3/8"	6 1/4"
70°F	4 9/8"	5 1/4"
80°F	4 1/4"	4 7/8"
90°F	4"	4 1/4"
100°F	3 1/2"	3 3/8"

Min "A" = 3", Max "A" = 9"

B. Adjustments may be required if the post-tensioning  
 anchorage and related concrete extend up into the  
 expansion device blockout. No adjustment will be  
 made in the pay item quantities.

- NOTES:
1. Location and size of support bars, anchor assembly, anchor angle, bracket for attachment to steel and stiffener plates shall be per manufacturers drawings.
  2. See table for dimension "A".
  3. The expansion device shall be installed on grade, parallel to the slope and grade of the deck.
  4. After the concrete has attained initial set the attachments used to hold the expansion device assembly in its proper position shall be removed.
  5. Do not paint steel surfaces in contact with concrete and elastomeric seals.
  6. "A" dimensions are dependent upon the particular expansion device supplied and shall be shown on the shop drawings.
  7. The shop drawings shall indicate the "A" dimensions at a range of temperatures from 30°F to 100°F assuming a mid-point temperature of 40°F.
  8. The neoprene seals shall be supplied and installed in one continuous piece.

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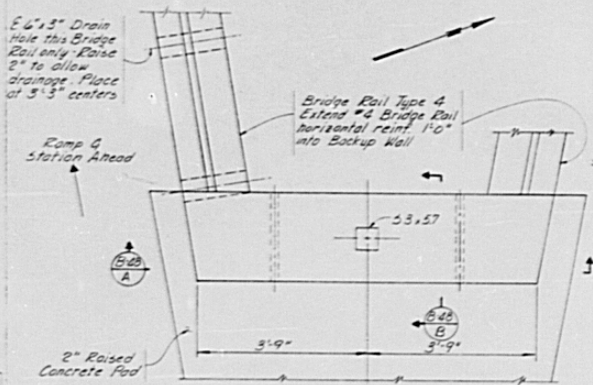
EXPANSION DEVICE  
(0 - 9 INCH)

Designer	Barraza, Winkinger	Structure Numbers	F-16-OK
Detailer	R. H. Shaw	Structure Numbers	F-16-NQ
Drawing Number	B-47	of	54 Drawings

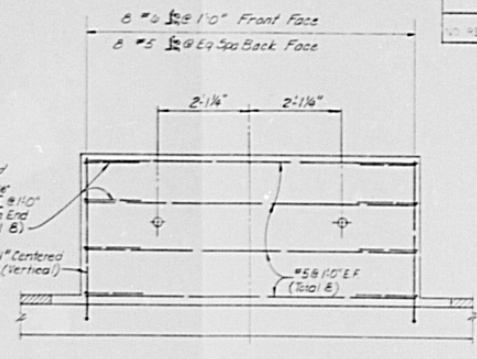
Revision Date: \_\_\_\_\_ (Primary Stage Only)

NO.	REVISION	DATE	BY	CHKD.
1	AS CONSTRUCTED			
2	REVISED	7-2-21		

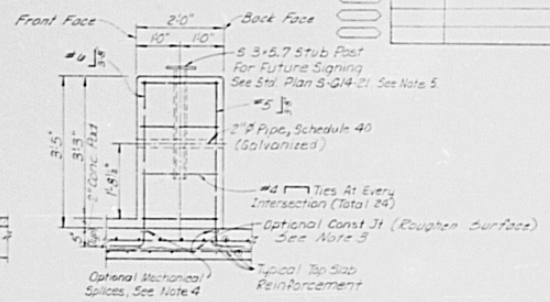
NO.	REVISION	DATE	BY	CHKD.
1	AS CONSTRUCTED			
2	REVISED	7-2-21		



**BACKUP WALL PLAN**



**SECTION B-4B**

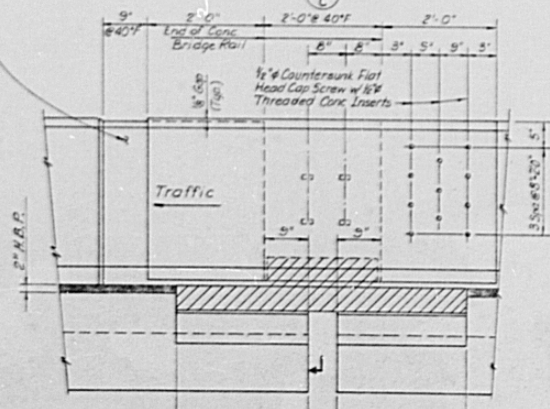


**SECTION B-4B**

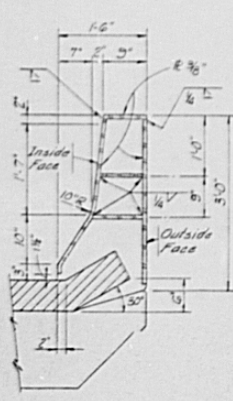
A- Pier 12L 25th Street, AND  
 At Pier 3H(N) Left Rail Only, F-16-NO  
 portion. Provide for movement  
 not in line with Bridge Rail by  
 reducing concrete Bridge Rail  
 dimensions by 1" rather than 1/2".

Bridge Rail Cover Plate required:  
 Pier 3H(N) Right & Left  
 Pier 11E Right & Left  
 Abut 2+ Right & Left

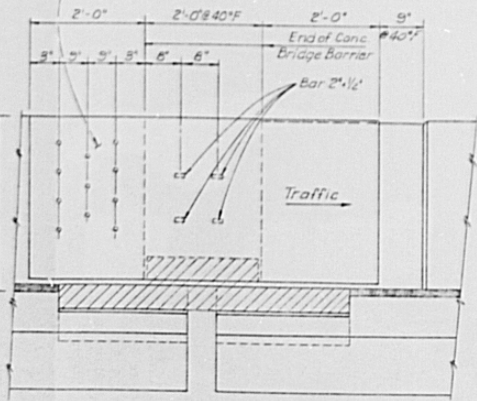
At Pier 3H(S) Right & Left  
 Provide for Future Cover Plates  
 by reducing concrete Bridge  
 Rail dimensions by 1/2".



**ELEVATION - RIGHT RAIL INSIDE FACE**



**SECTION B-4B**



**ELEVATION - RIGHT RAIL OUTSIDE FACE**

- NOTES:**
1. Visible Metal Surfaces on Cover Plates shall be treated with a colored acrylic coating to match the concrete bridge rail.
  2. Cover plates and related hardware shall not be paid for separately, but shall be included in payment for item No. 518, Bridge Expansion Device (0-3 Inch).
  3. All top slab concrete shall be poured and reach 70% strength prior to post-tensioning, including top slab concrete above the optional construction joint.
  4. Contractor may use mechanical splices at no additional cost to the State of Colorado, as approved by the Engineer. Mechanical splices shall be installed per manufacturer recommendations.
  5. Stub post shall be paid with sign quantities. See tabulation of signs, sign #53.
- De Leuw, Cather & Company Denver, CO

DIVISION OF HIGHWAYS			
COVER PLATE DETAILS BACKUP WALL DETAILS			
Designer: M. Strohlinger	Structure Number:	F-16-OK	
Designer: R. Hoshaw	Structure Number:	F-16-NO	
Drawing Number: B-48	of	54	Drawings

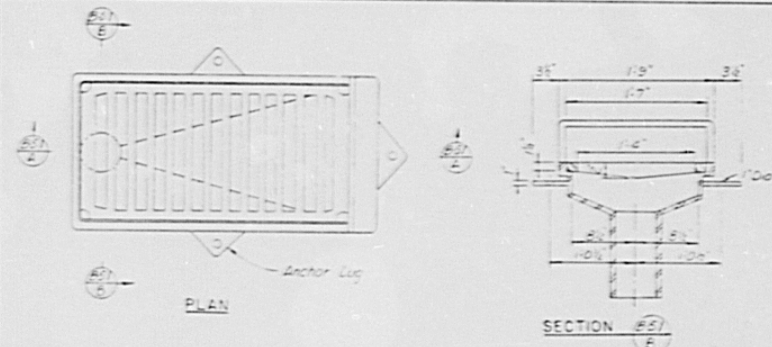






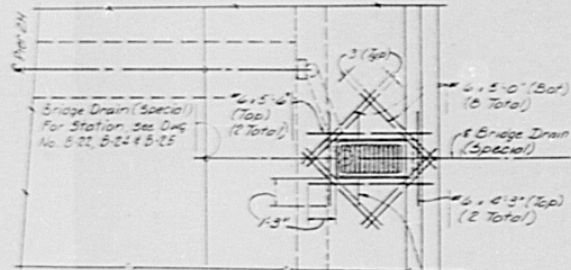
AS CONSTRUCTED  
 NO REVISIONS  REVISED  VOID

FED. ROAD DISTRICT	DIVISION	PROJ. NO.	SHEET NO.	SHEET TOTALS
VIII	COLL.	1R25-2(19)	176	242

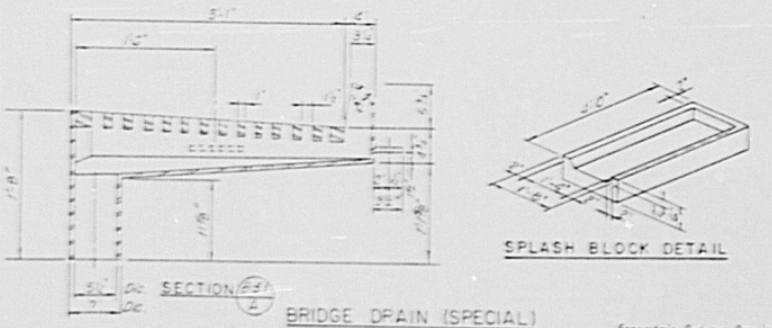


PLAN

SECTION #E

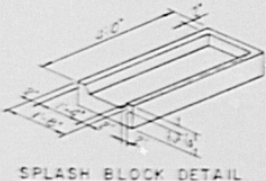


PLAN

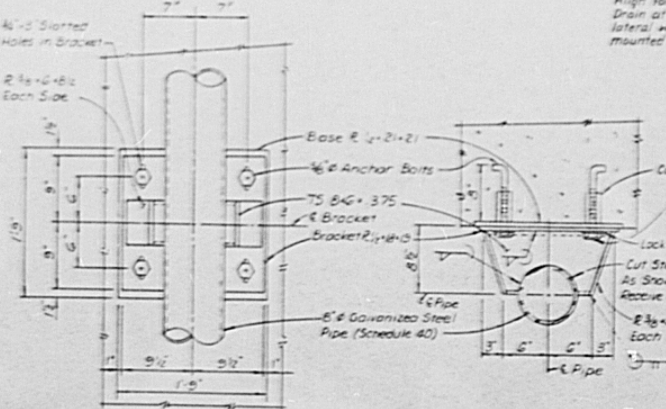


SECTION #B

BRIDGE DRAIN (SPECIAL)



SPLASH BLOCK DETAIL

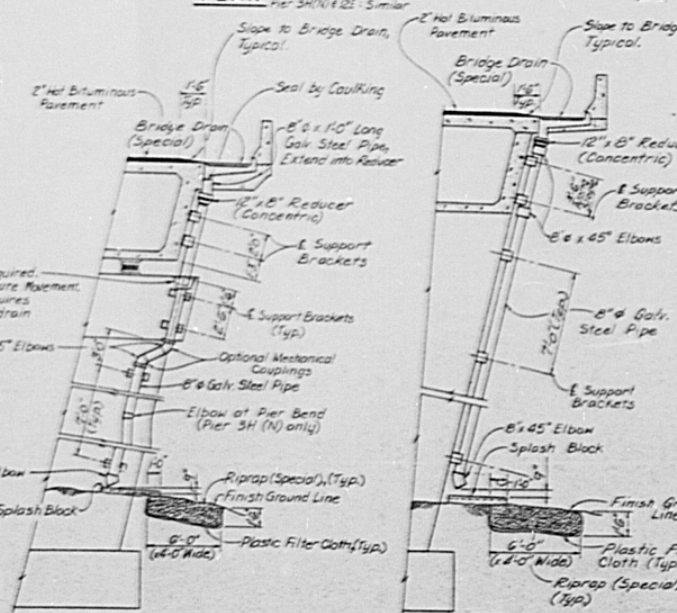


SECTION #B1

SUPPORT BRACKET

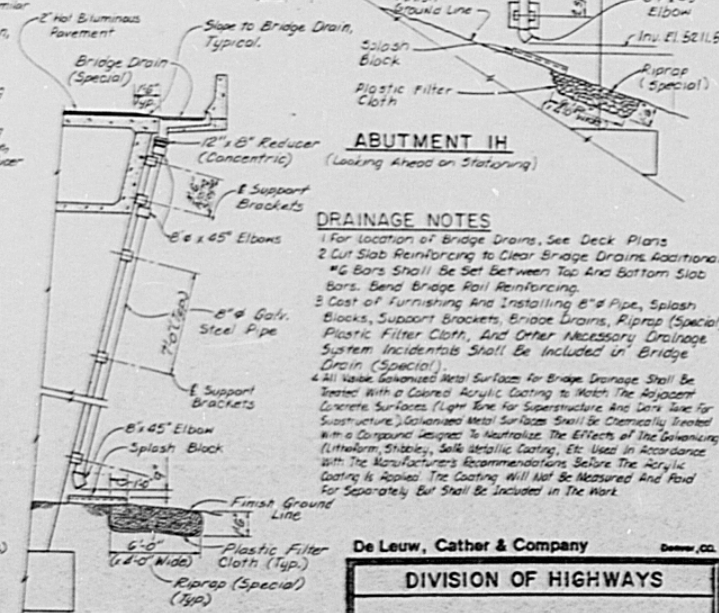
(Galvanized after fabrication)

SECTION #B2



PIER 12E (Looking Ahead on Stationing)

PIER 3H(N)-SIMILAR (Looking Back on Stationing)



ABUTMENT 1H

(Looking Ahead on Stationing)

**DRAINAGE NOTES**

- 1 For location of Bridge Drains, See Deck Plans
- 2 Cut Slab Reinforcing to Clear Bridge Drains. Additional #6 Bars Shall be Set Between Top and Bottom Slab Bars. Bend Bridge Rail Reinforcing.
- 3 Cost of Furnishing and Installing 8" Pipe, Splash Blocks, Support Brackets, Bridge Drains, Riprap (Special), Plastic Filter Cloth, and Other Necessary Drainage System Incidentals Shall be Included in Bridge Drain (Special).
- 4 All Visible Galvanized Metal Surfaces for Bridge Drainage Shall be Treated with a Colored Acrylic Coating to Match the Adjacent Concrete Surfaces (Light Tone for Superstructure and Dark Tone for Substructure). Galvanized Metal Surfaces Shall be Chemically Treated with a Compound Designed to Neutralize the Effects of the Galvanizing (Ultraform, Shibley, Salk Metallic Coating, Etc.) Used in Accordance with the Manufacturer's Recommendations Before the Acrylic Coating is Applied. The Coating Will Not be Measured and Paid for Separately, but Shall be Included in the Work.

De Leuw, Cather & Company Denver, CO.

**DIVISION OF HIGHWAYS**

**BRIDGE DRAIN (SPECIAL) DETAILS**

Designer M. Mierlinger	Structure F-16-OK
Detailer D. Kuschinski	F-16-NO
Drawing Number B-51	of 54 Drawings
Issue Date	Preparatory Stage

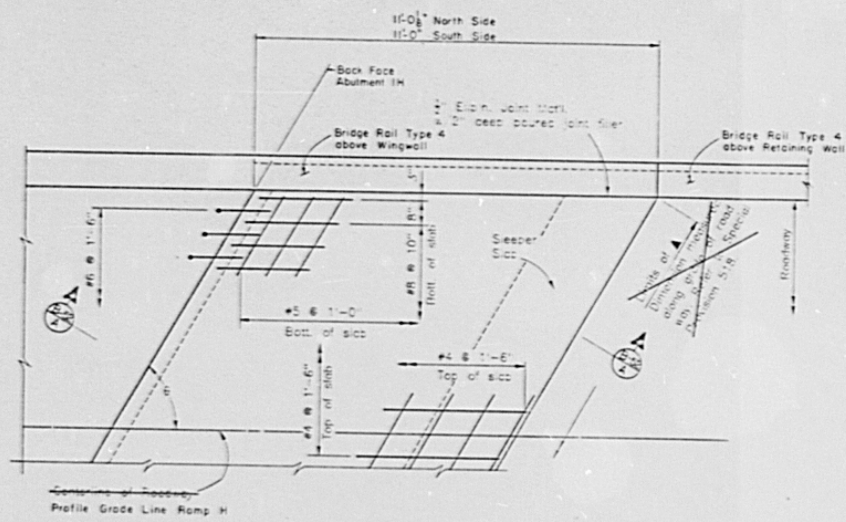
DESIGNED BY: M. MERKLINGER  
 CHECKED BY: D. STEARNS  
 DATE: 7-2-54

NO. REVISIONS	7-2-54	BY	MEM	DATE
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FEDERAL AID DISTRICT	ILLINOIS	PROJECT NUMBER	IR25-2 (191)	SHEET NUMBER	177
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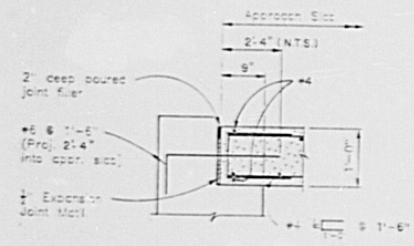
B-601-

NOTES:  
 Concrete for approach slab may be Class A.  
 Expansion Joint Material shall meet AASHTO Specification M212.

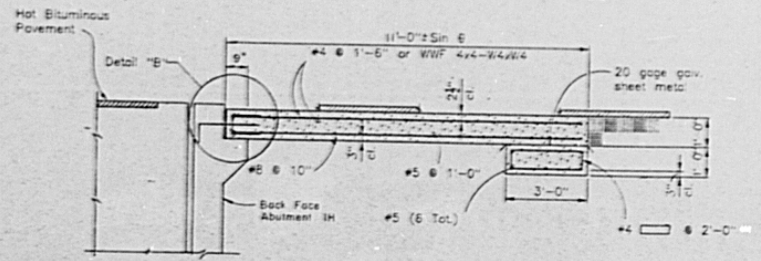


PLAN:

④ → 88°42'44" To Profile Grade Line Ramp H  
 ④ → 90°00'00" To Horizontal Control Line Ramp G

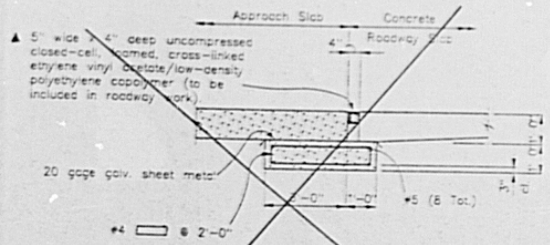


DETAIL "B"



SECTION A-A

With asphalt roadway



SECTION B-B

With concrete roadway slab

DIVISION OF HIGHWAYS	
APPROACH SLAB DETAILS	
Designer: M. Merklinger	Structure: F-16-OK
Detailer: D. Stearns	Numbers:
Drawing Number: B-52	of 54 Drawings
By: M. Merklinger	(Preliminary Stage Only)

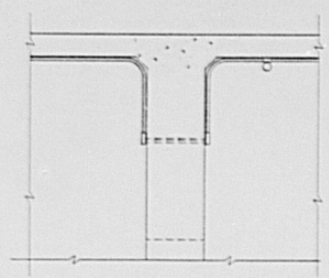
DESIGNED BY: M. MERKLINGER  
 CHECKED BY: D. STEARNS  
 DATE: 7-2-54

DATE: 7-2-54

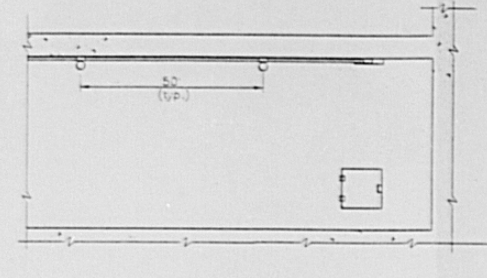
DESIGNED BY: C.D.O.H.  
 CHECKED BY: C.D.O.H.  
 DATE: 10/1/54

DESIGNED BY: C.D.O.H.  
 CHECKED BY: C.D.O.H.  
 DATE: 10/1/54

11/18/54



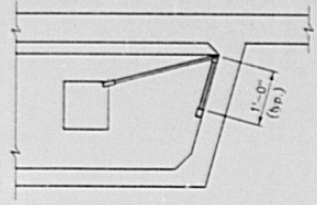
SECTION A-A



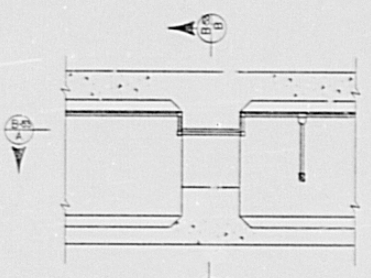
PLAN

NO. REVISIONS	7-27-57	REVISED	VOID	FEDERAL ROAD DISTRICT NO.	14	PROJECT NUMBER	15	SHEET NUMBER	16
				COLORADO		IR 25-2(191)		178	

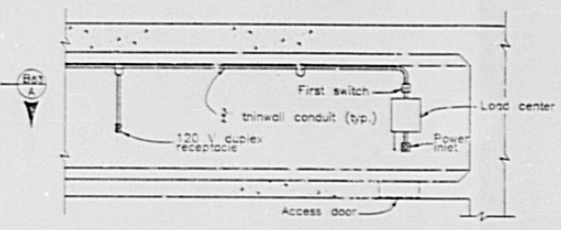
REVISIONS	



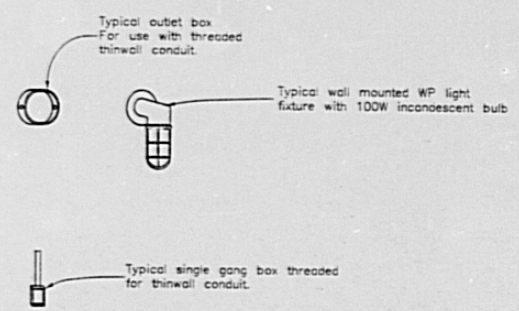
SECTION B-B



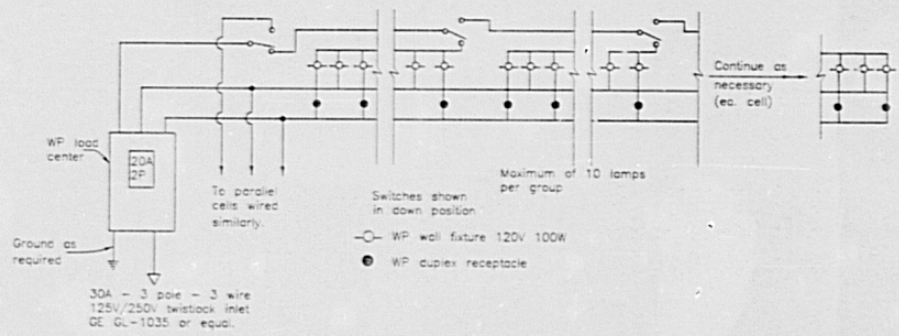
ELEV. A-A



ELEVATION B-B



FIXTURE DETAILS



WIRING DIAGRAM

NOTE:  
 All fasteners shall be 1/2".  
 Supports for conduit shall be at 10' spacing (max.).

DIVISION OF HIGHWAYS		
INTERIOR LIGHTING (CONCRETE BOX GIRDER)		
Designer C.D.O.H.	Structure	F-16-OK
Detailer C.D.O.H.	Numbers	F-16-NO
Drawing Number B-53 of 54 Drawings		
Revision Dates (Primary Stage Only)		

STATE OF COLORADO  
 DIVISION OF HIGHWAYS  
 OCT. 1, 1954

100-19-157-109 (Rev. 1-10-54) (S105-451505) BMS:JUL 03

