STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-223

REVISIONS		

DESIGN SPECIFICATIONS:

AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 1983 EDITION WITH SUBSEQUENT INTERIM SPECIFICATION, EXCEPT AS SUPPLEMENTED OR AMENDED BY THE PLANS.

COLORADO BRIDGE DESIGN MANUAL, VOLUMES I AND II, PREPARED BY THE BRIDGE DESIGN SECTION OF THE COLORADO DEPARTMENT OF HIGHWAYS.

DESIGN AND CONSTRUCTION SPECIFICATIONS FOR SEGMENTAL CONCRETE BRIDGES, PREPARED BY THE POST TENSIONING INSTITUTE DATED FEBRUARY, 1988.

CONSTRUCTION SPECIFICATIONS:

ALL WORK SHALL BE DONE ACCORDING TO THE STATE DEPARTMENT OF HIGHWAYS, DIVISION OF HIGHWAYS, STATE OF COLORADO - STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 1986 AND SPECIAL PROVISIONS APPLICABLE TO THE PROJECT.

DESIGN LOADS:

DEAD LOADS:

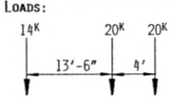
SUPERSTRUCTURE CONCRETE, INCLUDING REINFORCING STEEL	155 PCF
SUBSTRUCTURE CONCRETE, INCLUDING REINFORCING STEEL	150 PCF
INITIAL WEARING SURFACE	24 PSF
FUTURE WEARING SURFACE	24 PSF

LIVE LOADS:

AASHTO HS20-44 AND INTERSTATE ALTERNATE

COLORADO LEGAL LOADS:

TYPE 3



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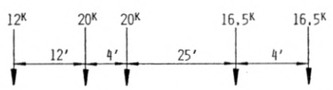

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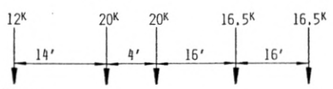
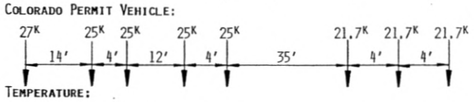


COLORADO PERMIT VEHICLE:



TEMPERATURE:

TEMPERATURE RISE - 45°
TEMPERATURE FALL - 45°
TEMPERATURE MEAN - 40°

THERMAL GRADIENT, VARIES LINEARLY FROM TOP SLAB TO BOTTOM SLAB (TOP WARMER = +).

(A) DEAD LOAD + PRESTRESS + 20° F GRADIENT
(B) DEAD LOAD + PRESTRESS - 10° F GRADIENT
(C) DEAD LOAD + PRESTRESS + LIVE LOAD + 10° F GRADIENT

WIND LOADS:

IN ACCORDANCE WITH AASHTO

EARTHQUAKE:

IN ACCORDANCE WITH AASHTO "GUIDE SPECIFICATIONS FOR SEISMIC DESIGN OF HIGHWAY BRIDGES," SEISMIC PERFORMANCE CATEGORY A.

CREEP AND SHRINKAGE:

IN ACCORDANCE WITH THE CEB-FIP MODEL CODE FOR CONCRETE STRUCTURES (COMITE EURO-INTERNATIONAL DU BETON - FEDERATION INTERNATIONAL DE LA PRECONTRAINTE, 3RD ED., 1978).

THE FOLLOWING PARAMETERS WERE ASSUMED FOR THE DESIGN:

$\phi_D = 0.40$

$\phi_F = 3.17$

$\phi_S = -.00031$

ASSUMED SEGMENT AGE AT TIME OF ERECTION = 60 DAYS

MATERIALS:

SUPERSTRUCTURE CONCRETE:

CLASS S F'c = 6,000 PSI (PRECAST AND CAST IN PLACE)

SUBSTRUCTURE CONCRETE:

CAST IN PLACE, CLASS D F'c = 4,500 PSI
CAST IN PLACE, CLASS FS F'c = 6,000 PSI
DRILLED CAISSONS, CLASS D F'c = 4,500 PSI

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE ASTM A-615, GRADE 60
ALL REINFORCING STEEL ABOVE FOOTING, INCLUDING FOOTING DOWEL BARS, SHALL BE EPOXY COATED.
CONCRETE COVERS SHALL BE:

TOP SLAB:	TOP 2-1/2", BOTTOM 1"
BOTTOM SLAB:	TOP 1", BOTTOM 1-1/2"
WEBS:	OUTSIDE 1-1/2", INSIDE 1"
SUBSTRUCTURE:	3" (2" FROM RUSTICATION)

PRESTRESSING STEEL:

STRANDS: ASTM A-416, GRADE 270, LOW RELAXATION
FRICTION COEFFICIENT: 0.25
WOBBLE COEFFICIENT: 0.0 (EXTERNAL), 0.0002 (INTERNAL)
ANCHOR SET: 0.375"
APPARENT MODULUS (FOR ELONGATION CALCULATIONS): 28,000
JACKING STRESS: SHALL BE DETERMINED BASED ON ACCOMPLISHING 189 KSI (70% ULTIMATE) ALONG THE LENGTH OF THE TENDON AFTER ANCHOR SETS, BUT IN NO CASE SHALL IT EXCEED 216 KSI (80% ULTIMATE) UNLESS NOTED OTHERWISE IN THE CONTRACT DOCUMENTS.

BARS: ASTM A-722, GRADE 150
JACKING STRESS: SHALL BE DETERMINED BASED ON ACCOMPLISHING 105 KSI (70% ULTIMATE) AFTER ANCHOR SET BUT IN NO CASE SHALL IT EXCEED 120 KSI (80% ULTIMATE) UNLESS OTHERWISE NOTED IN THE CONTRACT DOCUMENTS.

ELASTOMERIC BEARINGS: DUROMETER 60

ROCK ANCHORS: ASTM A-722 GRADE 150, 1-3/8" DIAMETER, DOUBLE CORROSION PROTECTED. BOND BY CEMENT GROUT. JACKING STRESS: TO BE CALCULATED BY SUPPLIER TO ACHIEVE LIFT OFF FORCES SHOWN IN PLANS, BUT IN NO CASE SHALL IT EXCEED 120 KSI (80% ULTIMATE).

ALLOWABLE STRESSES

REINFORCED CONCRETE:

IN ACCORDANCE WITH AASHTO

PRESTRESSED CONCRETE:

TEMPORARY STRESSES DURING CONSTRUCTION.
COMPRESSION: .55 F'c
TENSION:
PRECAST: $3\sqrt{F'c}$
CAST-IN-PLACE: $4.5\sqrt{F'c}$

STRESS AT SERVICE LEVEL AFTER LOSSES HAVE OCCURRED:
MAXIMUM COMPRESSION: 0.4 F'c
LONGITUDINAL TENSION IN THE PRECOMPRESSED TENSILE ZONE
PRECAST: ZERO
CAST-IN-PLACE WITH WELL DISTRIBUTED BONDED REINFORCING: $3\sqrt{F'c}$
TRANSVERSE TENSION IN DECK: $3\sqrt{F'c}$

FOR A CONCRETE STRENGTH OF F'c = 6,000 PSI, STRESSES ARE:
COMPRESSION: 2,400 PSI
TENSION LONGITUDINALLY IN THE PRECOMPRESSED TENSILE ZONE:
PRECAST: 0 PSI
CAST-IN-PLACE WITH WELL DISTRIBUTED BONDED REINFORCING: 232 PSI
TENSION TRANSVERSELY IN THE DECK: 232 PSI

ANCHORAGE BEARING STRESSES:

AT TRANSFER OF LOAD:

$$FCP = 0.8\ F'ci\sqrt{\frac{A'_B}{A_B} - 0.2} \leq 5000\ PSI$$

AT SERVICE LOAD:

$$FCP = 0.6\ F'c\sqrt{\frac{A'_B}{A_B}} \leq 6250\ PSI$$

FOUNDATION ELEMENTS: IN ACCORDANCE WITH THE FINAL FOUNDATION REPORT FOR HANGING LAKE VIADUCT, PREPARED BY THE COLORADO DEPARTMENT OF HIGHWAYS, DATED DECEMBER 19, 1988.

CASTING, HANDLING AND ERECTION (MINIMUM CONCRETE STRENGTHS)

PRECAST SEGMENTAL:

CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 2500 PSI PRIOR TO FORM STRIPPING OR MOVING THE SEGMENT WHILE RESTING ON ITS SOFFIT FORM IN THE CASTING BED.

CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI PRIOR TO APPLICATION OF THE TRANSVERSE POST-TENSIONING AND LIFTING OF THE SEGMENT FROM ITS SOFFIT FORM.

SEGMENTS SHALL BE A MINIMUM OF 14 DAYS OLD WHEN ERECTED.

ERECTION:

LONGITUDINAL OR TRANSVERSE CLOSURE STRIPS SHALL ATTAIN A MINIMUM STRENGTH OF 3,000 PSI BEFORE POST-TENSIONING.

BEFORE STRESSING POST-TENSIONING TENDONS OR BARS THE CONCRETE COMPRESSIVE STRENGTH AT THE ANCHORAGE LOCATION SHALL BE 6,000 PSI.

OTHERS:

CLASS I FINISH, FOLLOWED BY APPLICATION OF A COLORED ACRYLIC COATING, WILL BE REQUIRED ON ALL EXTERIOR EXPOSED CONCRETE AND DOWN TO 1' BELOW GROUND LINE. REQUIREMENTS FOR COATING ARE GIVEN IN REVISION OF SECTION 601, STRUCTURAL CONCRETE (COATING).

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

BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH FOR ALL CLASSES OF CONCRETE	1'-3"	1'-7"	1'-10"	2'-3"	2'-11"	3'-7"	4'-9"	5'-10"

THE ABOVE SPLICE LENGTHS SHALL BE INCREASED BY 20% FOR 3-BAR BUNDLES AND 33% FOR 4-BAR BUNDLES.

STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH ROADWAY PLANS AND CROSS SECTIONS AND PROJECT SPECIAL PROVISIONS.

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213.

THE FOLLOWING STRUCTURAL STEEL SHALL BE AASHTO M-183 (ASTM A-36): EXPANSION DEVICES, BEARING PLATES AND BEARING DEVICES.

THE FOLLOWING STRUCTURAL STEEL SHALL BE AASHTO M-223 (ASTM A-572): EXPANSION JOINT BEAM.

ALL AASHTO M-183 (ASTM A-36) AND M-223 (ASTM A-572) STEEL, NOT OTHERWISE NOTED, SHALL BE PAINTED IN ACCORDANCE WITH SECTION 509 OF THE STANDARD SPECIFICATIONS.

GENERAL

UTILITIES: THE CONTRACTOR SHALL VERIFY ALL UTILITIES.

ABBREVIATIONS

I.F. - INSIDE FACE
O.F. - OUTSIDE FACE
E.E. - EACH END
Ⓝ - NON-EPOXY-COATED REINFORCEMENT
B.F.B.W. - BACK FACE BACK WALL
F.F.B.W. - FRONT FACE BACK WALL
E.F. - EACH FACE
CL - CLEARANCE
NIC - NOT IN CONTRACT

INITIAL	DATE	
Designed By T.L.S.	1-88	Checked By A.M.
Checked By K.S.H.	1-88	Quantities By
Detailed By M.M.M.	1-88	Checked By

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO
/ Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT I7W
CONCRETE ALTERNATE

GENERAL NOTES I

Designer T. Stelmack	Structure Numbers	F-08-BJ (I7W)
Detailer M. Miyamoto		
Drawing Number B-2	of 217	Drawings

Revision Dates (Preliminary Stage Only)

BRUNING 44 232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-26-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-224

REVISIONS		

DESIGN ASSUMPTIONS

Erection of Superstructure

The superstructure has been designed to withstand the forces induced by the loads shown in the erection sequence and erection details drawings. This was accomplished using the temporary post-tensioning shown on the post-tensioning layout sheets, as well as the counterweighting shown in the erection sequence and erection details drawings. The sequence of stressing and destressing the temporary post-tensioning, as well as placing and removing the counterweight, affect the long term forces in the structure and have been considered in the design under service conditions.

The location of temporary supports for superstructure erection have been accounted for in the design of the superstructure and affect the forces in the structure under service conditions. These supports include:

1.) Segment support at all abutments.

2.) The pier bracket at all piers.

3.) The bracket at Piers 5,6,7 and 8 to allow assembly of the straddle segments.

Stability

Stability of the pier segment while supported on the pier shall be the responsibility of the contractor. The erection procedure submitted to the engineer shall show the proposed system of setting the pier segment and the bracing required to ensure stability during erection.

The longitudinal, transverse and rotational stability of the cantilever shall be the responsibility of the contractor. The pier bracket and longitudinal restraint shall be sufficient to withstand anticipated construction loadings including, but not limited to impact, earthquake, wind, segment imbalance and the like.

The piers have been designed using their ultimate strength to withstand the imbalance corresponding to 1/2 segment out of balance plus segment drop, according to the following formulas:

$$1.1\,(DL + DIFF) + 1.3CE + 2A$$
$$\text{or } DL + CE + 2A$$

Where:

DL = Dead load of structure

DIFF = Differential load of cantilever: which is equal to 2% of the dead load applied to one cantilever.

CE = Construction equipment: This includes all fixed location construction equipment as well as the 50^K counterweight (which is always opposite the unbalanced segment.

2A = Segment drop: This is twice the segment weight, applied at the end of the cantilever to account for the dynamic effects of dropping a segment during erection.

The pier bracket shall be positively anchored to the pier (or supported on the footing) and shall withstand the above mentioned "worst case" construction imbalance.

Handling and Storage of Segments

The segments have not been designed for a specific lifting hole location, as these locations will vary with equipment types. The contractor shall be responsible to verify that his lifting system does not induce stresses beyond the limits set forth on page 1 of the General Notes.

All typical segments and one-piece pier segments were designed to be stored upright, on a three point support system. These supports were assumed to be directly below the web-bottom slab intersection.

The split main pier segment and split-straddle pier segment can, at the contractors option, be stored horizontally. The contractor shall be responsible for determining stability during storage if the segments are stored upright. If the segments are stored on their side, the contractor shall be responsible for determining the support points, as well as any additional reinforcing required to take the storage loads.

Substructure Erection

All piers and footings shall be constructed "in the dry". Cofferdams shall be paid for separately only for those areas shown in the contract documents. The contractor is also responsible for the design and procedure for any additional piers that may be below the water table and require special consideration. Any additional costs at these piers shall be incidental to the item concrete class D (bridge).

Bearing Replacement

The piers and pier segments have been designed to permit bearing replacement by placing jacks between the top of the pier and the bottom of the segment. Lateral loads such as wind and temperature were not considered in the design and shall be considered in any future bearing replacement operation on a case by case basis. It was assumed that live load would not be permitted during replacement operations.

Jack locations and devices for bearing replacement at the expansion joint steel beam have been specified on the drawings. The actual jacking force and replacement procedure shall be determined at the time of replacement and must account for the age of the structure and temperature conditions. It was assumed that live load would not be permitted during replacement.

Deck Replacement

This bridge was designed so that the top slab could be removed and replaced from the precast box girder. The deck is completely removed between the webs, as well as the overhang outside the webs. A portion of the top slab directly over the webs is left in place. The upper portion on the web contains the longitudinal top slab cantilever tendons.

The replacement scheme was integral with the design of the entire superstructure, as the scheme requires a uniform stress distributon in the top slab at the time of deck replacement. This stress distribution was accomplished by using a combination of top slab tendons, draped tendons and bottom slab continuity tendons. The scheme shown requires that long term losses due to concrete creep, shrinkage and post-tensioning relaxation has taken place. This corresponds to approximately 12 years of age. After this time, the stresses within the structure are stable and therefore can be predicted with a reasonable degree of accuracy.

The deck replacement scheme shown in the contract documents was for a "typical 200 Ft. span". Span lengths greater than or less than 200' will require additional engineering to tailor the procedure to the specific case. Spans with horizontal radius of curvature less than 1900 Ft. shall receive special consideration and it is recommended that a diagonal tension strut in the top slab be used to eliminate torsional deformations during replacement.

The actual jacking and counterweighting scheme used to replace a given span is dependent on the stress distribution present in that span. The procedure shown should be used as a guideline only for final engineering required for future top slab replacement.

Post-Tensioning Operations

The post-tensioning system assumed in the design was the VSL EC system. Specific details of the post-tensioning system can be found on Drawing B- 170.

The term "stress tendon to" or "stressing force" is the same as the "jacking force" required for a given tendon. These terms have been used interchangably throughout the contract documents and specification but have the same meaning.

The required force for the post-tensioning bars has been specified as a "lift-off force". The lift-off force is determined after the post-tensioning bar nut has been seated.

Tendons are often referred to as general groups. These groups are as follows:

1.) Cantilever Tendons: These tendons are generally arranged symmetrically about the pier, are anchored in the upper part of the web and run in ducts contained in the top slab. These tendons are jacked as a given pair of segments are erected.

It should be noted that cantilever (top slab) tendons are not present for each pair of segments that are erected in balanced cantilever. The segment weight is supported by the six, 1-3/8"ø longitudinal post-tensioning bars present in each segment. These bars are coupled and stressed after each segment is assembled.

2.) Draped tendons: These tendons are arranged symmetrically about the pier, but are anchored in the bottom slab and deviate at the pier segment. These tendons are external. They are jacked after the next cantilever segment is erected.

3.) Continuity tendons: These tendons are generally arranged symmetrically about the closure joint in the top and bottom slab. These tendons are anchored at blisters inside the segment and are jacked in accordance to the sequence shown on the post-tensioning layout sheets.

4.) Temporary tendons: These tendons are top slab tendons both over the pier and accross the closure joint. These tendons are jacked and destressed according to the Erection sequence and detail drawings, and are dependent on the sequence of erection operations.

	INITIAL	DATE	Checked By	
Designed By	TWS	1-89		
Checked By	LCM	1-89	Quantities By	
Detailed By	MMM	1-89	Checked By	

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT 17W
CONCRETE ALTERNATE

GENERAL NOTES II

Designer T. Stelmack	Structure	F-08-BJ
Detailer M. Miyamoto	Numbers	(17W)
Drawing Number B-3	of 217	Drawings

Revision Dates (Preliminary Stage Only)

BRUNING 44 232 73350

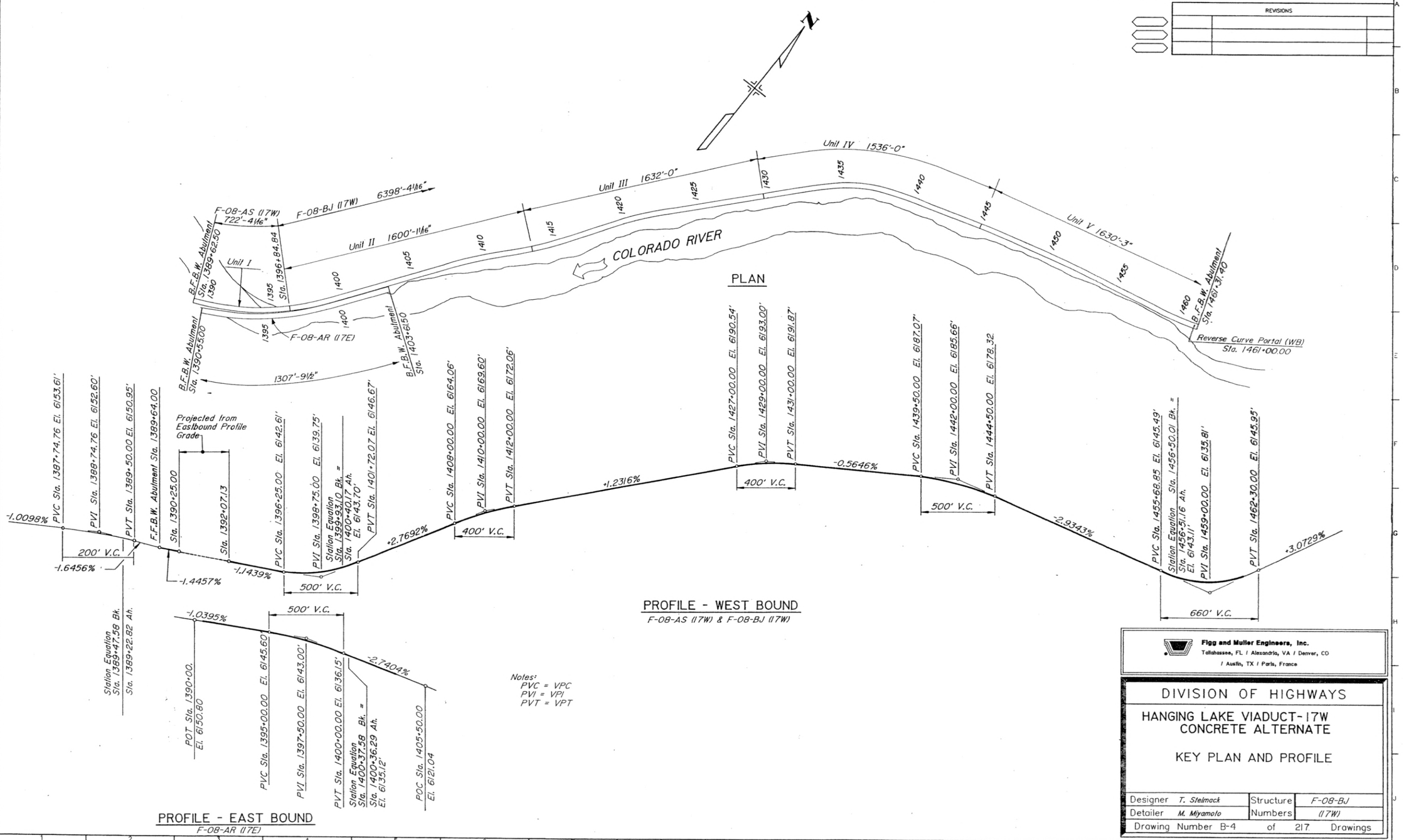
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS	7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-225

REVISIONS		

	INITIAL	DATE	
Designed By	T.S.	3.88	Checked By T.F. 5.88
Checked By	D.S.	5.88	Quantities By A.P.S. 4.89
Detailed By	M.M.	5.88	Checked By



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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

KEY PLAN AND PROFILE

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-4		of 217	Drawings

Revision Dates (Preliminary Stage Only)

BRUNING 44 232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED		
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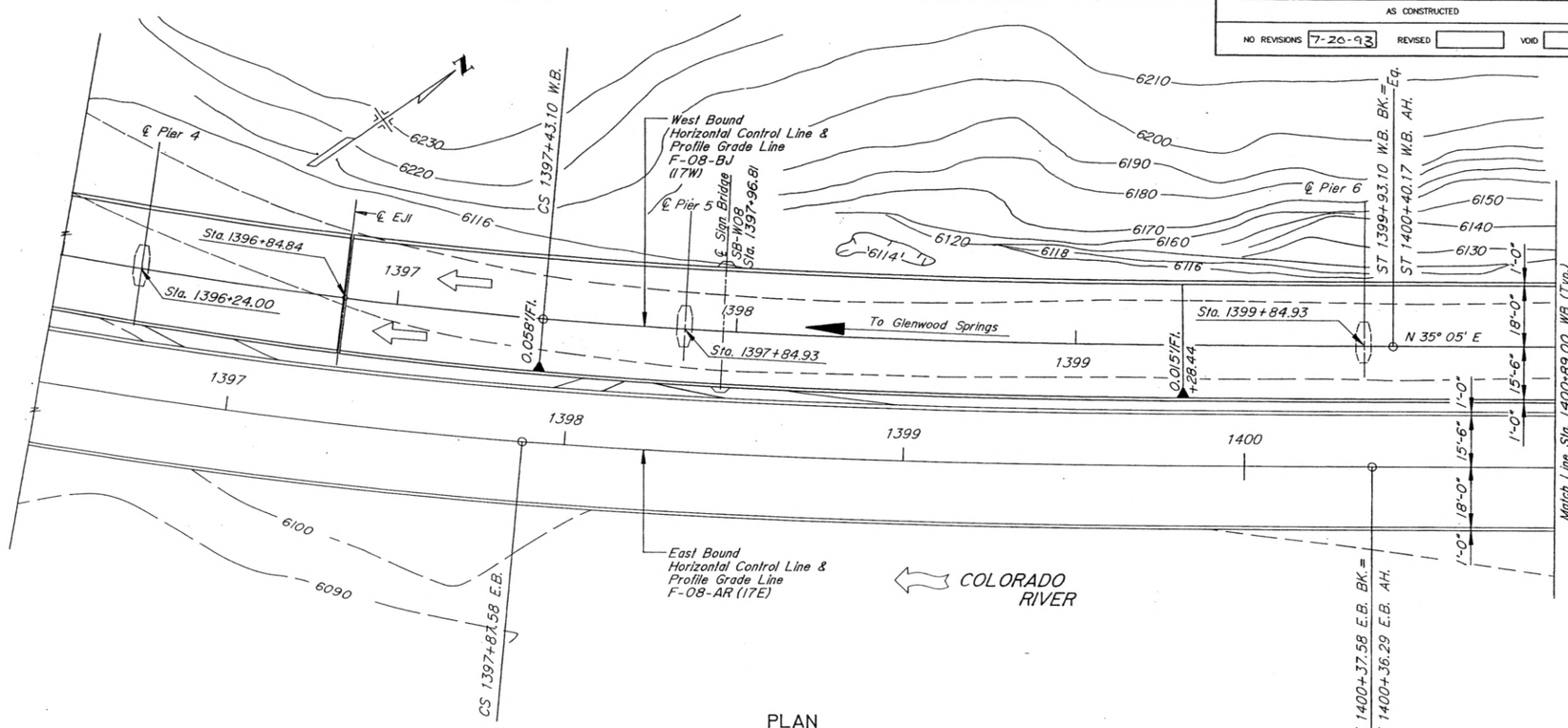
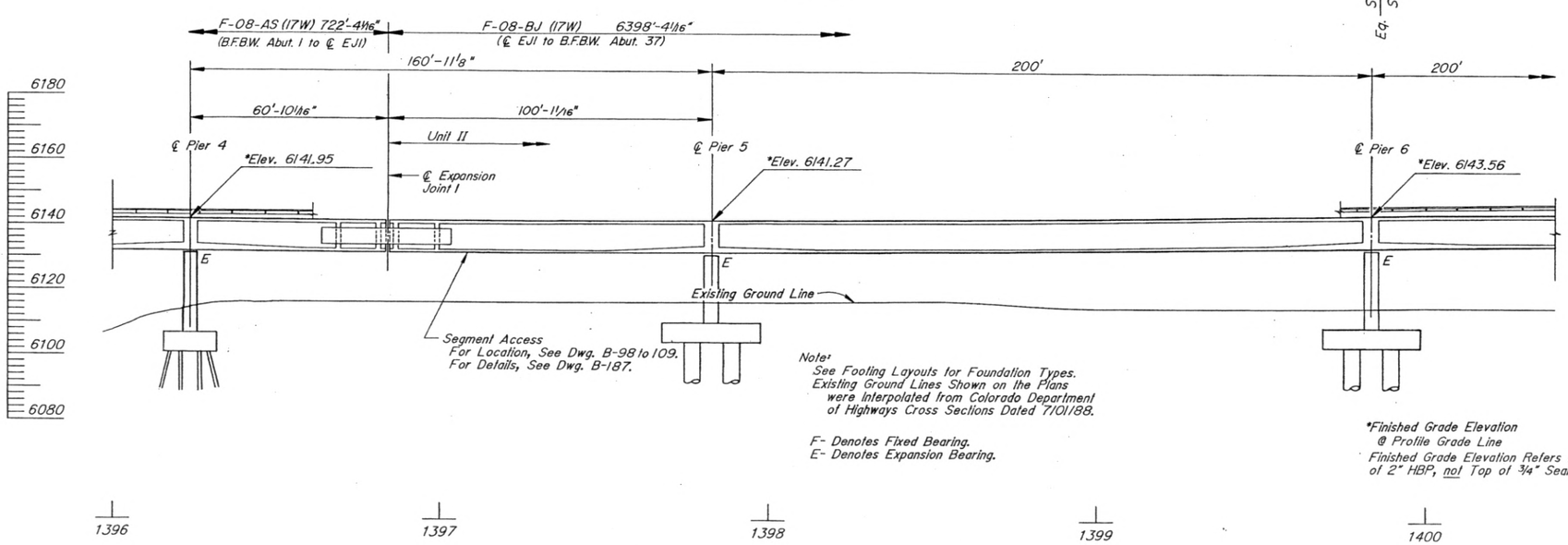
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-228

REVISIONS		



PLAN



SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

Note:
See Footing Layouts for Foundation Types.
Existing Ground Lines Shown on the Plans were Interpolated from Colorado Department of Highways Cross Sections Dated 7/01/88.

F- Denotes Fixed Bearing.
E- Denotes Expansion Bearing.

*Finished Grade Elevation @ Profile Grade Line
Finished Grade Elevation Refers to Top of 2" HBP, not Top of 3/4" Seal Coat.

Curve No. 04 - West Bound

Δs	=	30° 45' 29.7" LT.
Ts	=	545.723 FT.
Es	=	58.510 FT.
Δc	=	21° 23' 02.2" LT.
Dc	=	03° 44' 59.0"
Tc	=	288.497 FT.
Lc	=	570.281 FT.
Rc	=	1528.000 FT.
Os	=	04° 41' 13.8"
Ls	=	250.000 FT.
ST	=	83.386 FT.
LT	=	166.725 FT.
S	=	0.058'/FT.
SSD	=	393 FT.
MDS	=	50 MPH

INITIAL	DATE	INITIAL	DATE
Designed By	TS	3/88	Checked By	A.D.S.	4/88
Checked By	GS	5/88	Quantities By	A.S.	4/88
Detailed By	AS	4/88	Checked By	SJG	5/88

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 1
STATION 1396+00.00 WB TO
STATION 1400+89.00 WB

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	A. Sanchez		
Drawing Number B-7		of 217	Drawings

Revision Dates (Preliminary Stage Only)

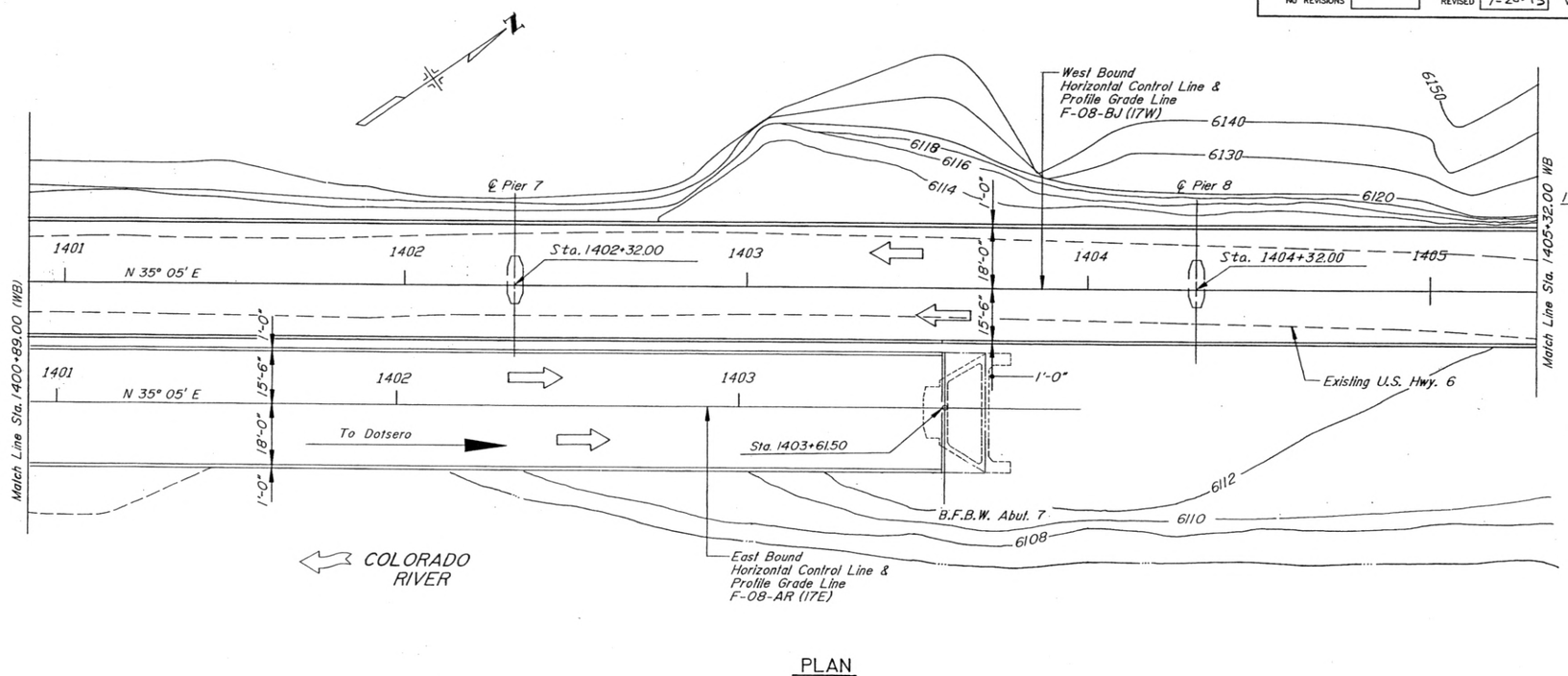
BRUNING 44-222 72350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1988

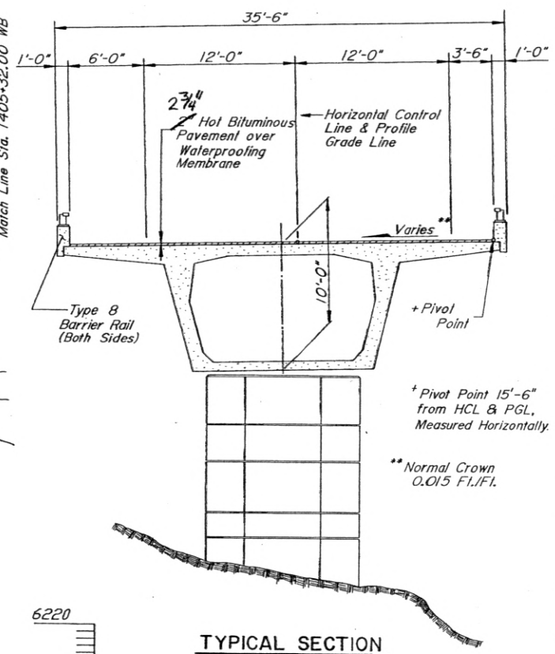
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-229

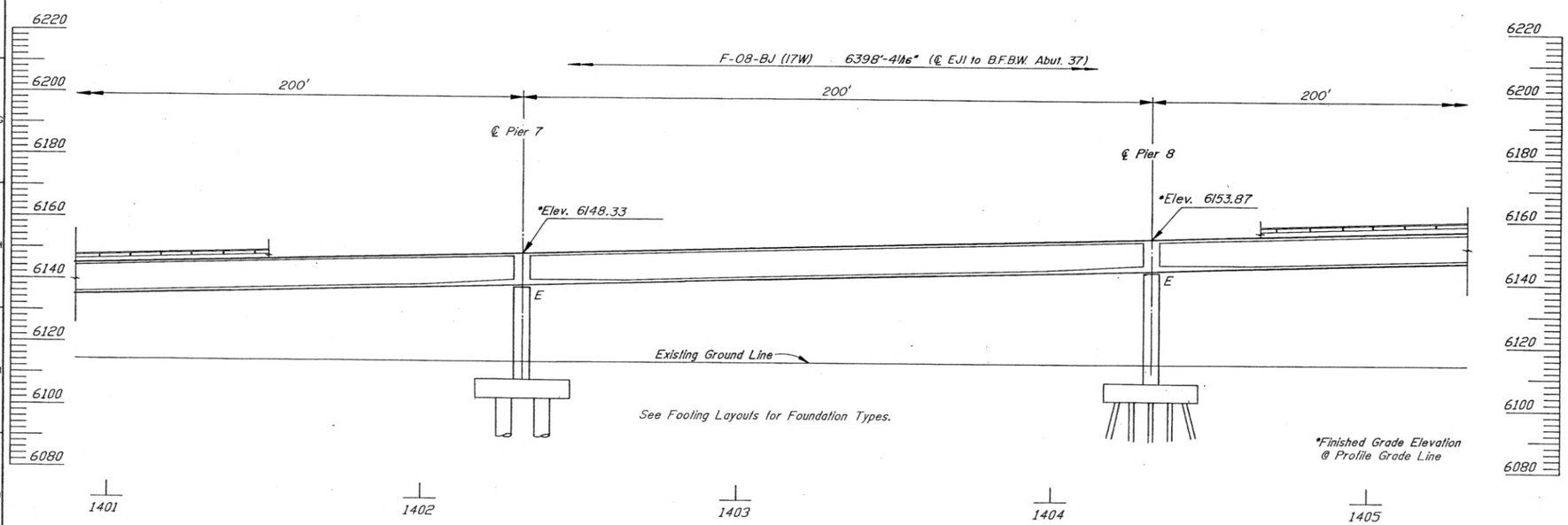
REVISIONS



PLAN



TYPICAL SECTION
F-08-BJ (17W)
(Looking Up Station)



SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

INITIAL	DATE	
Designed By	TS	3/88
Checked By	GS	5/88
Detailed By	ES	4/88
Checked By	TF	5/88
Quantities By	A.O.S.	4-89
Checked By	A.C.S.	4-89
	S/C	5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 2
STATION 1400+89.00 WB TO
STATION 1405+32.00 WB

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	A. Sanchez		
Drawing Number B-8		of 217	Drawings

Revision Dates (Preliminary Stage Only)

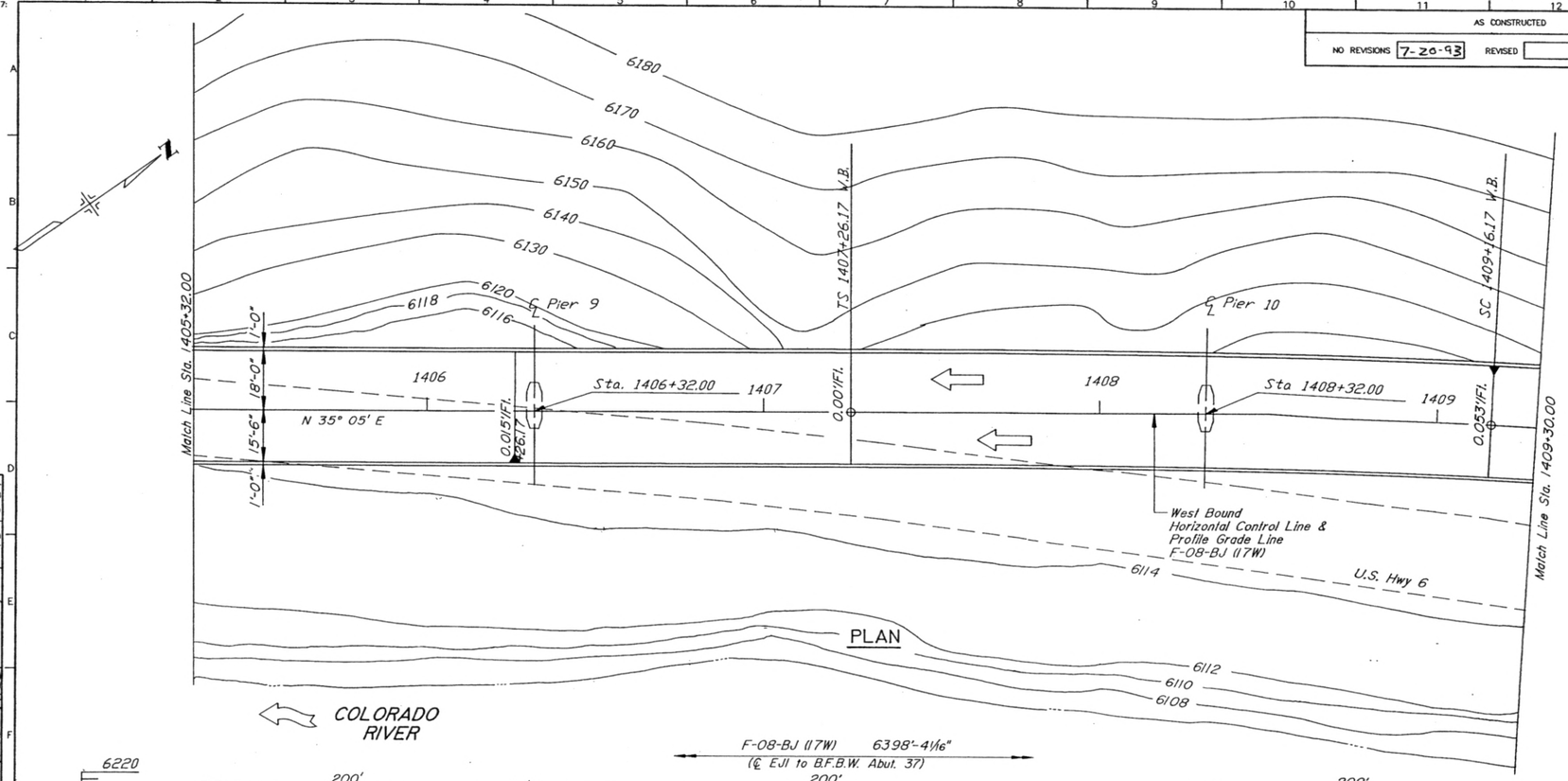
BRUNING 44-232 73350

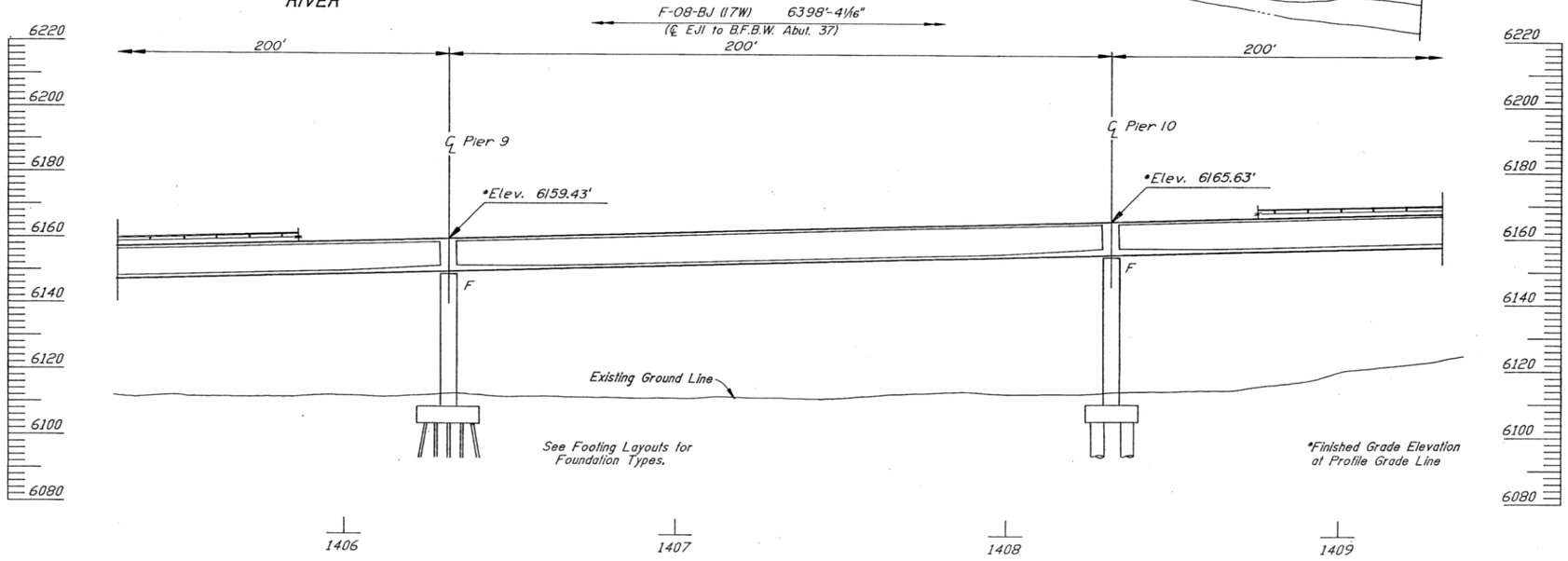
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-230

REVISIONS		





SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

	INITIAL	DATE				
Designed By	TS	3/88	Checked By	TE	5/88	
Checked By	GS	5/88	Quantities By	AOS	4-89	
Detailed By	AS	4/88	Checked By	SJC	6-89	

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 3
STATION 1405+32.00 WB TO
STATION 1409+30.00 WB

Designer	T. Stelmack	Structure	F-08-BJ
Detailer	A. Sanchez	Numbers	(17W)
Drawing Number B-9		of 217	Drawings

Revision Dates (Preliminary Stage Only)

BRUNING 44-24-7 (1257)

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

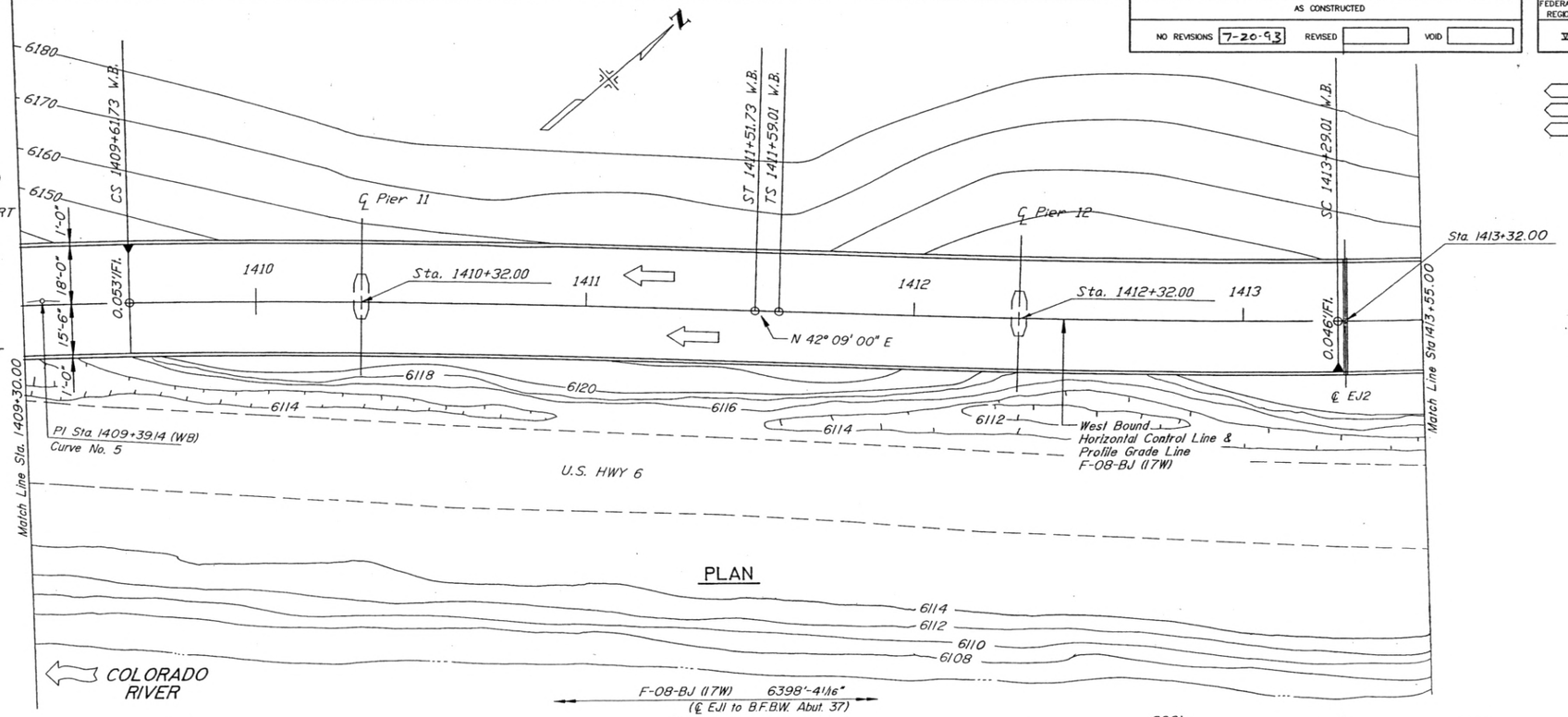
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

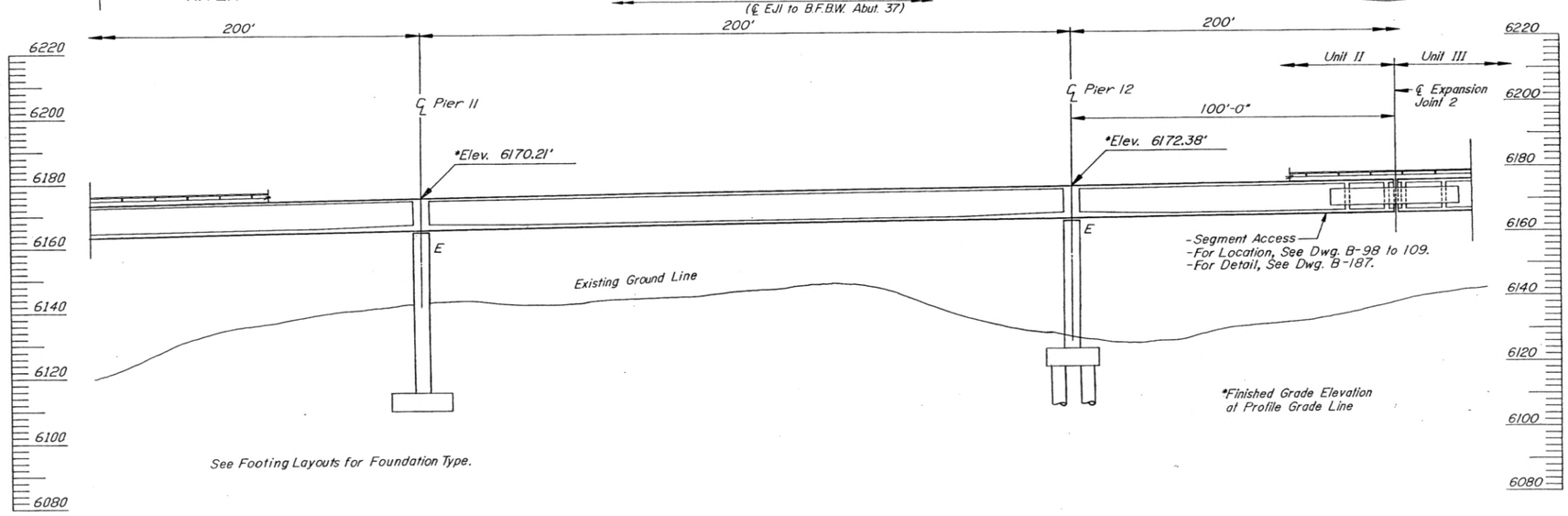
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-231

REVISIONS		

Curve No. 5 (WB)

Δ_s	=	07° 04' RT
T_s	=	212.97'
Δ_c	=	01° 22'
D_c	=	03° 00'
T_c	=	22.78'
L_c	=	45.56'
R_c	=	1909.86'
θ_s	=	02° 51'
L_s	=	190.00'
ST	=	63.35'
LT	=	126.68'
S	=	0.053'/FT
SSD	=	380 FT
MDS	=	48 MPH





SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

	INITIAL	DATE	
Designed By	TS	3/88	Checked By TF 5/88
Checked By	GS	5/88	Quantities By AOS 4-89
Detailed By	AS	4/88	Checked By SLG 5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 4
STATION 1409+30.00 WB TO
STATION 1413+55.00 WB

Designer	T. Steimack	Structure Numbers	F-08-BJ (17W)
Detailer	A. Sanchez		
Drawing Number B-10	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

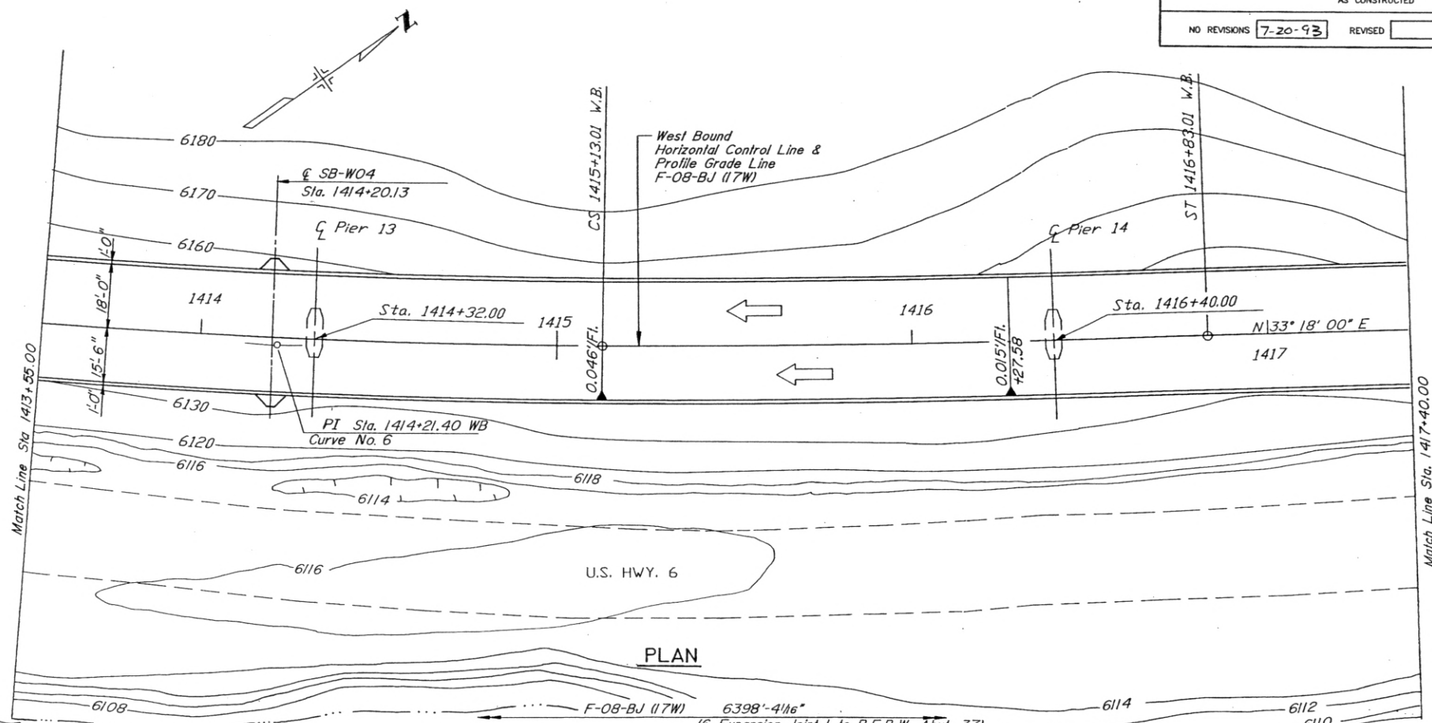
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

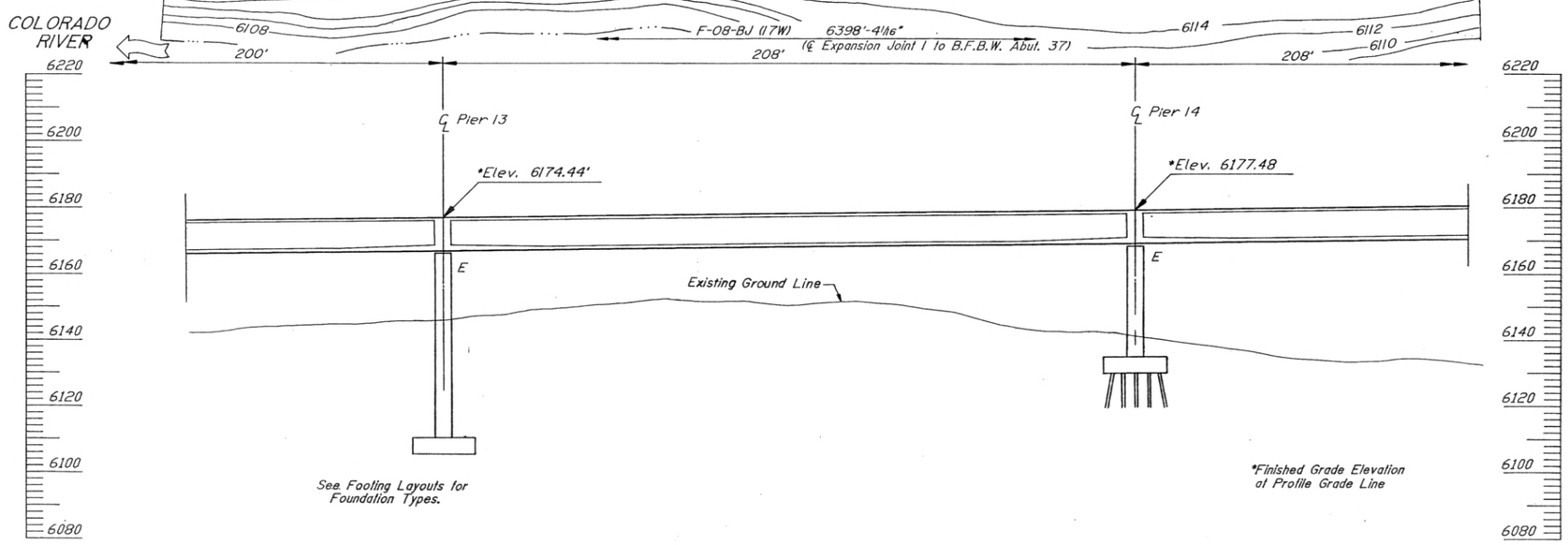
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-232

REVISIONS		



PLAN



SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

1414 1415 1416 1417

Curve No. 6

Δ s	=	08° 51' LT
T s	=	262.39'
Δ c	=	04° 36'
D c	=	02° 30'
T c	=	92.05'
L c	=	184.00'
R c	=	2291.83'
Θ s	=	02° 07' 30"
L s	=	170.00'
ST	=	56.67'
LT	=	113.34'
S	=	0.046'/FT
SSD	=	482'
MDS	=	50 MPH

	INITIAL	DATE
Designed By	TS	5/88
Checked By	GS	5/88
Detailed By	AS	4/88
Checked By	TF	5/88
Quantities By	Δ.O.S.	4-89
Checked By	C.O.S.	4-89
Quantities By	S.K.C.	5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 5
STATION 1413+55.00 WB TO
STATION 1417+40.00 WB

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	A. Sanchez		
Drawing Number B-11		of 217	Drawings

Revision Dates (Preliminary Stage Only)

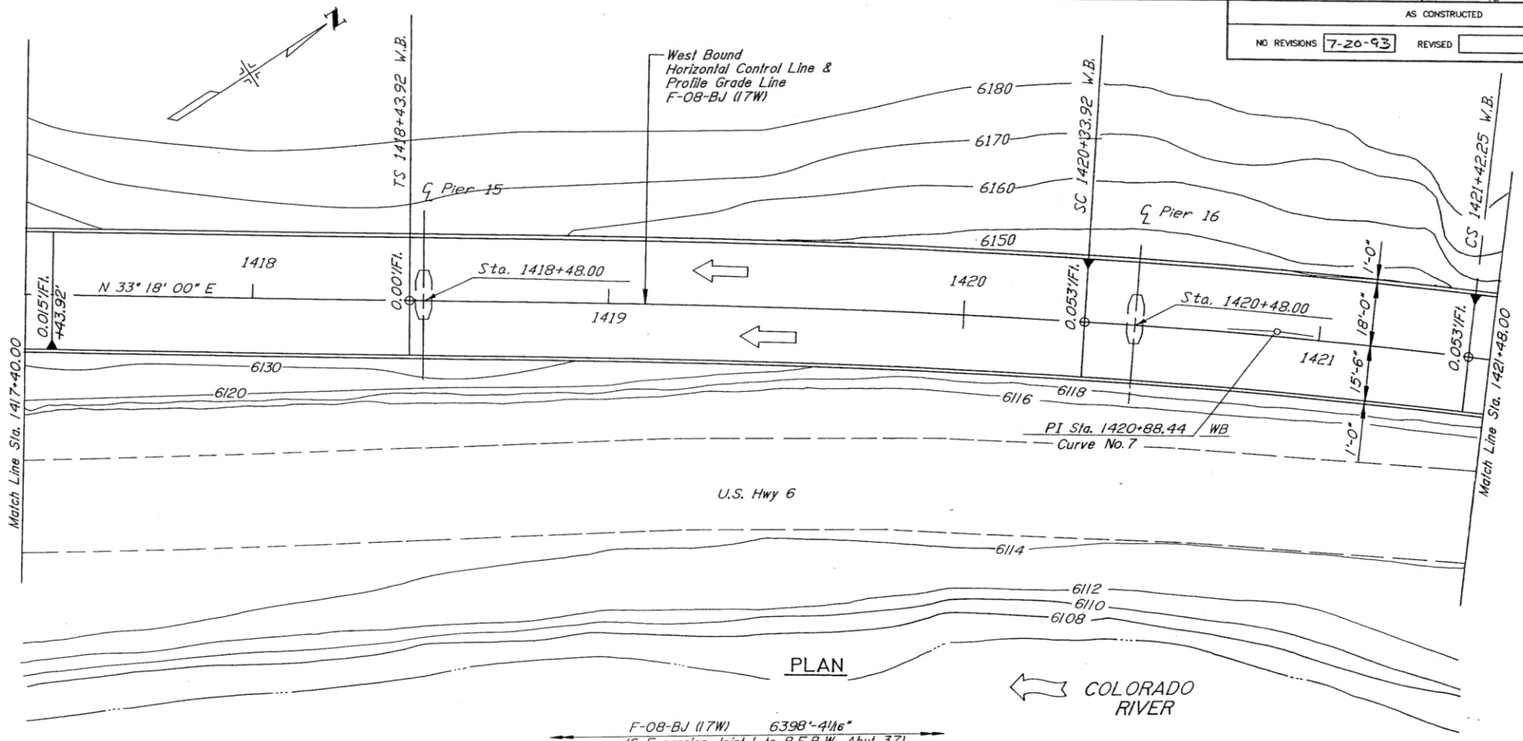
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-233

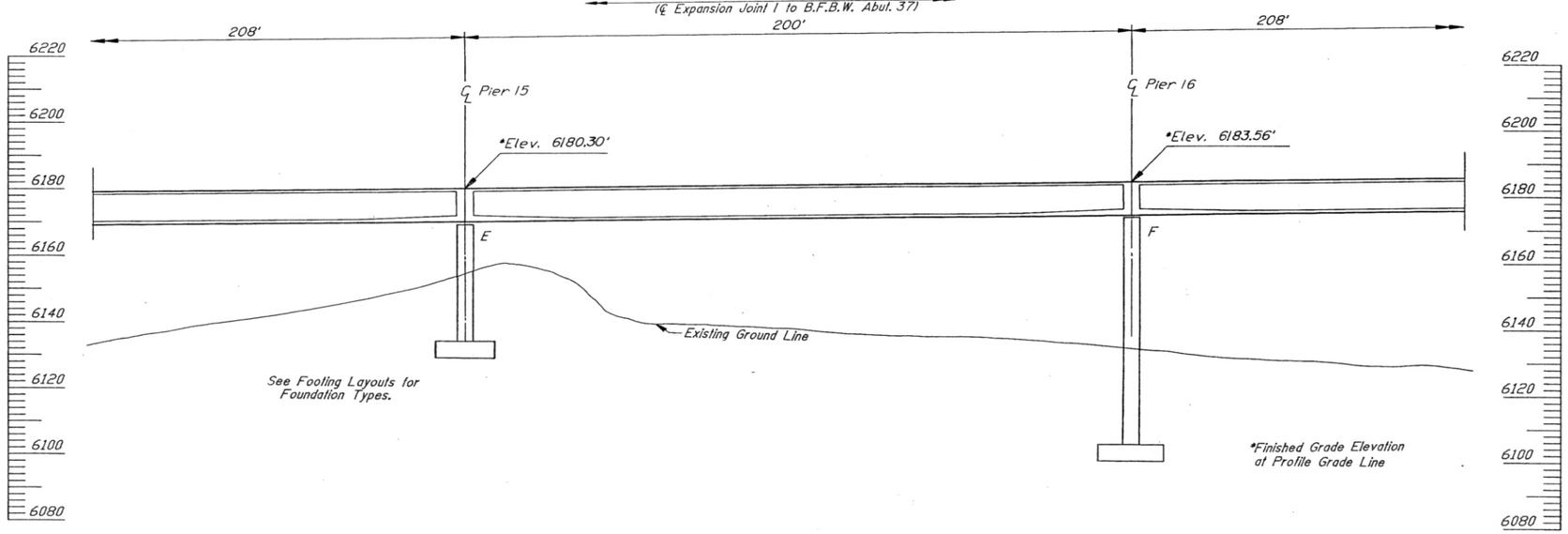
REVISIONS		



PLAN

Curve No. 7

Δ_s	=	08° 57' RT
T_s	=	244.53'
Δ_c	=	03° 15'
D_c	=	03° 00'
T_c	=	54.18'
L_c	=	108.33'
R_c	=	1909.86'
Θ_s	=	02° 51'
L_s	=	190.00'
ST	=	63.35'
LT	=	126.68'
S	=	0.053'/FT
SSD	=	380 FT.
MDS	=	48 MPH



SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

	INITIAL	DATE			INITIAL	DATE
Designed By	TS	3/88	Checked By	TF	S.B.B.	
Checked By	SS	5/88	Quantities By	A.O.S.	4/88	
Detailed By	AS	4/88	Checked By	S.F.	5/88	

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 6
STATION 1417+40.00 WB TO
STATION 1421+48.00 WB

Designer	T. Steimack	Structure Numbers	F-08-BJ (17W)
Detailer	A. Sanchez		
Drawing Number B-12		of 217	Drawings

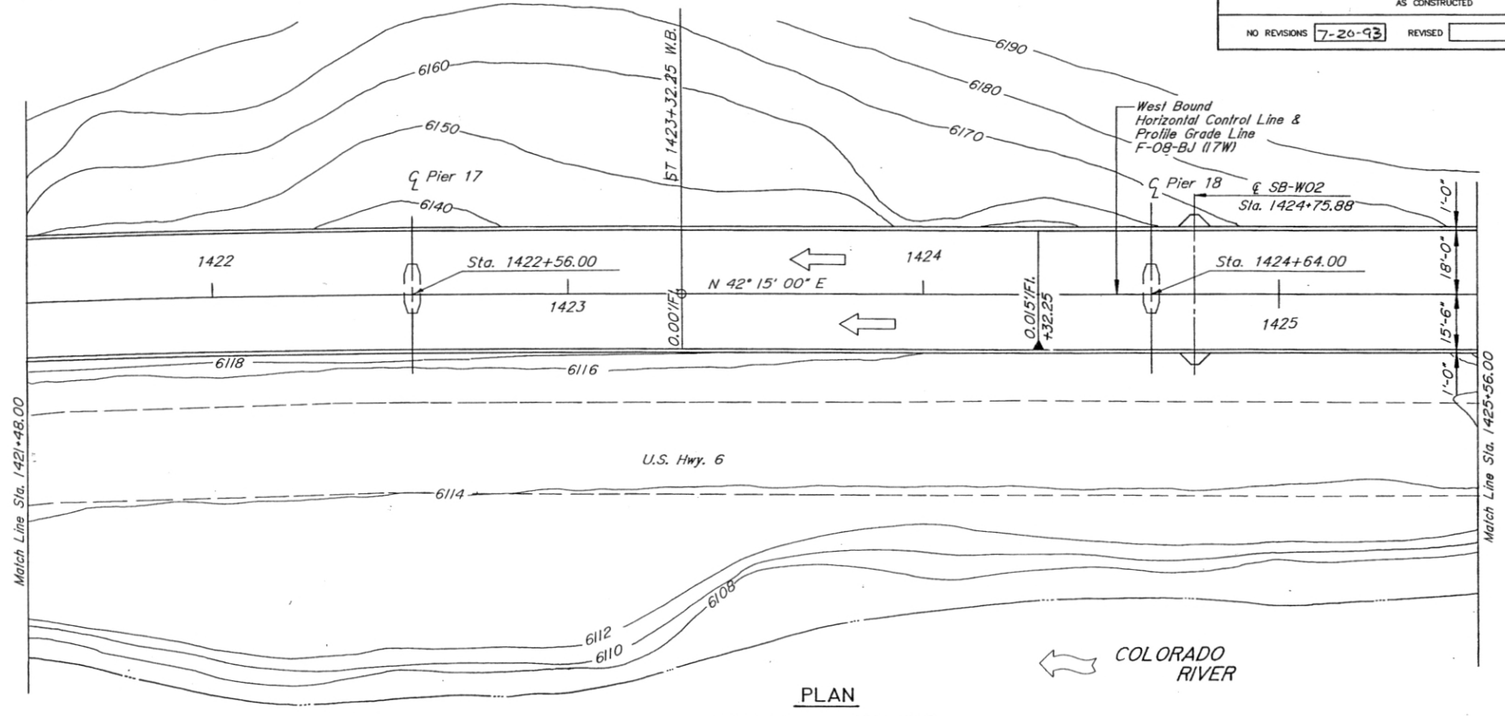
Revision Dates (Preliminary Stage Only)

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS 7-20-93	REVISED		VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-234

REVISIONS		



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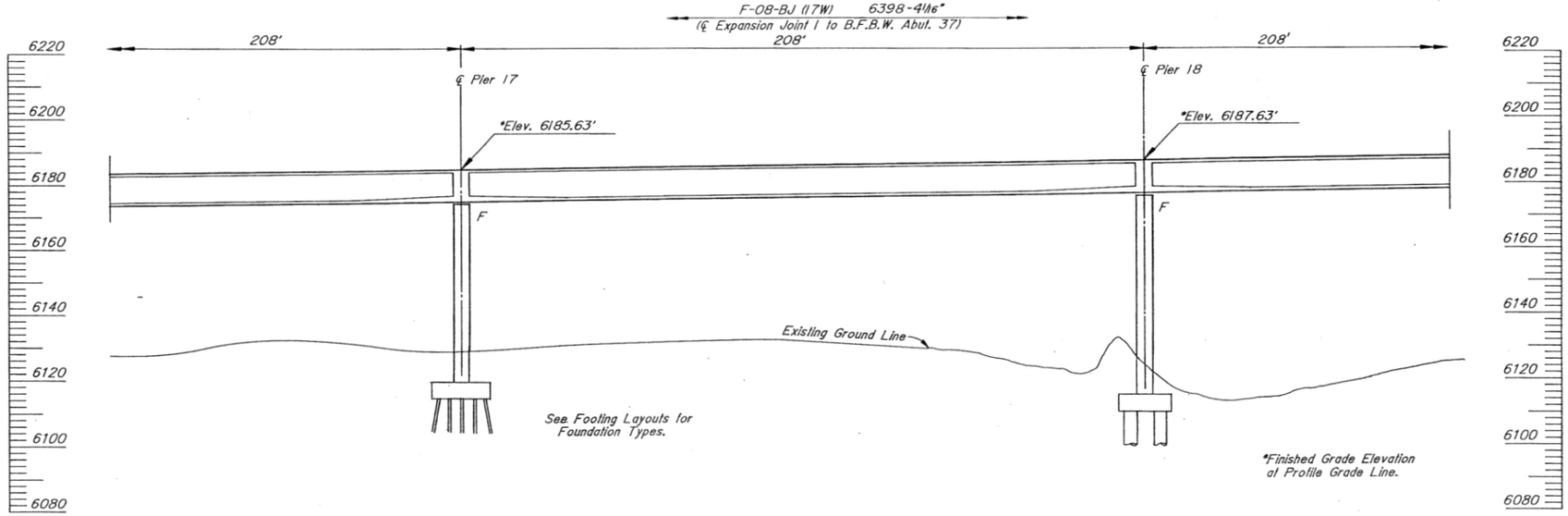

SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

1422 1423 1424 1425

INITIAL	DATE		INITIAL	DATE
Designed By	TS	3/88	Checked By	TF 5/88
Checked By	GS	5/88	Quantities By	AOS 4/89
Detailed By	AS	4/88	Checked By	SLC 5/89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 7
STATION 1421+48.00 WB TO
STATION 1425+56.00 WB

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	A. Sanchez		
Drawing Number B-13		of 217	Drawings

Revision Dates (Preliminary Stage Only)

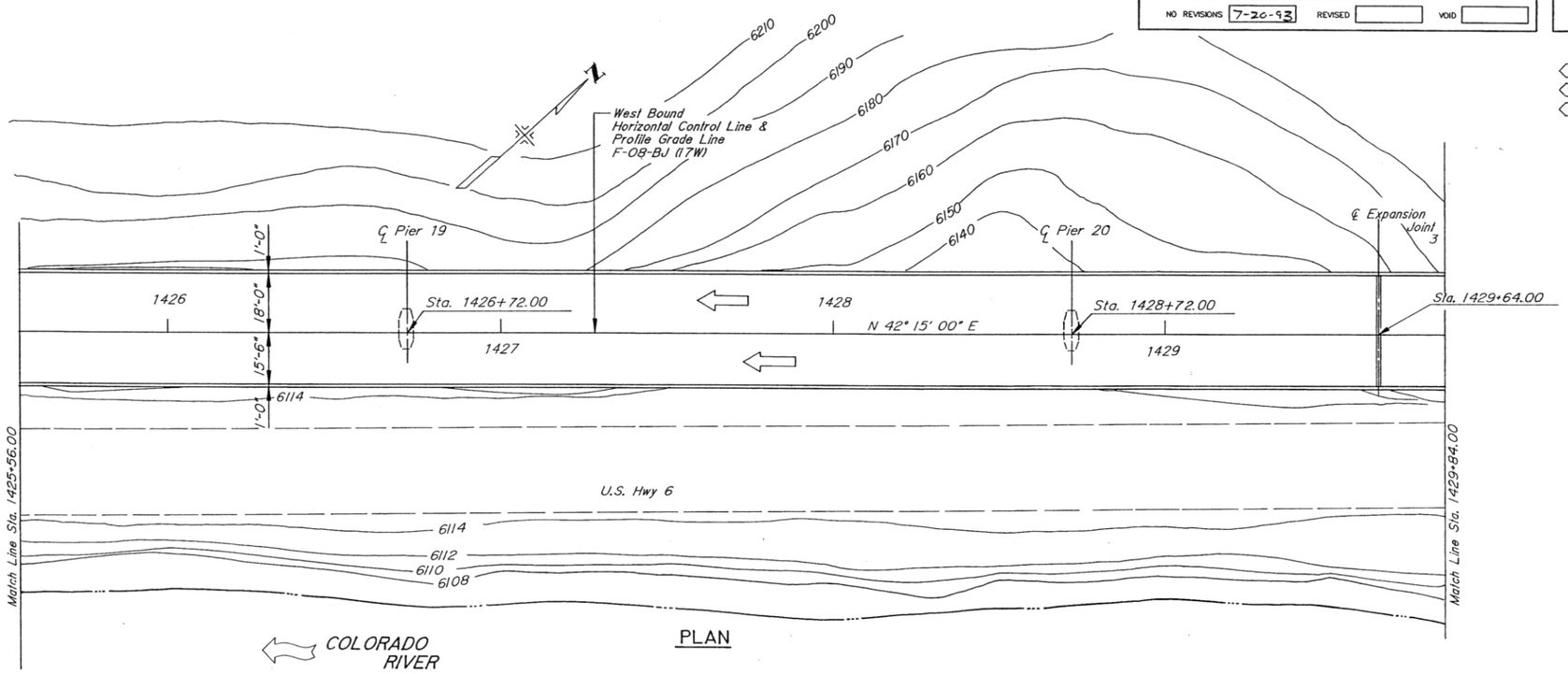
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-235

REVISIONS		



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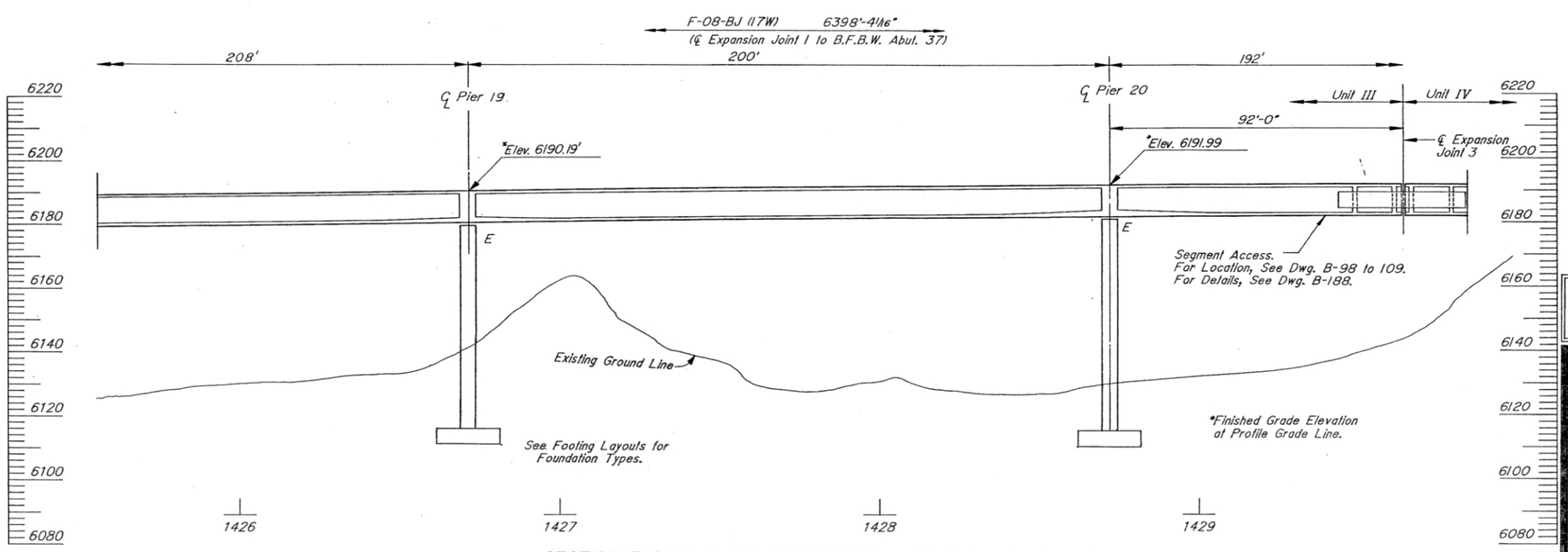

SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

	INITIAL	DATE		INITIAL	DATE
Designed By	TS	5/88	Checked By	TF	5/88
Checked By	GS	5/88	Quantities By	AOS	4/89
Detailed By	AS	4/88	Checked By	SG	5/89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 8
STATION 1425+56.00 WB TO
STATION 1429+84.00 WB

Designer	T. Stelmack	Structure	F-08-BJ
Detailer	A. Sanchez	Numbers	(17W)
Drawing Number B-14		of 217	Drawings

Revision Dates (Preliminary Stage Only)

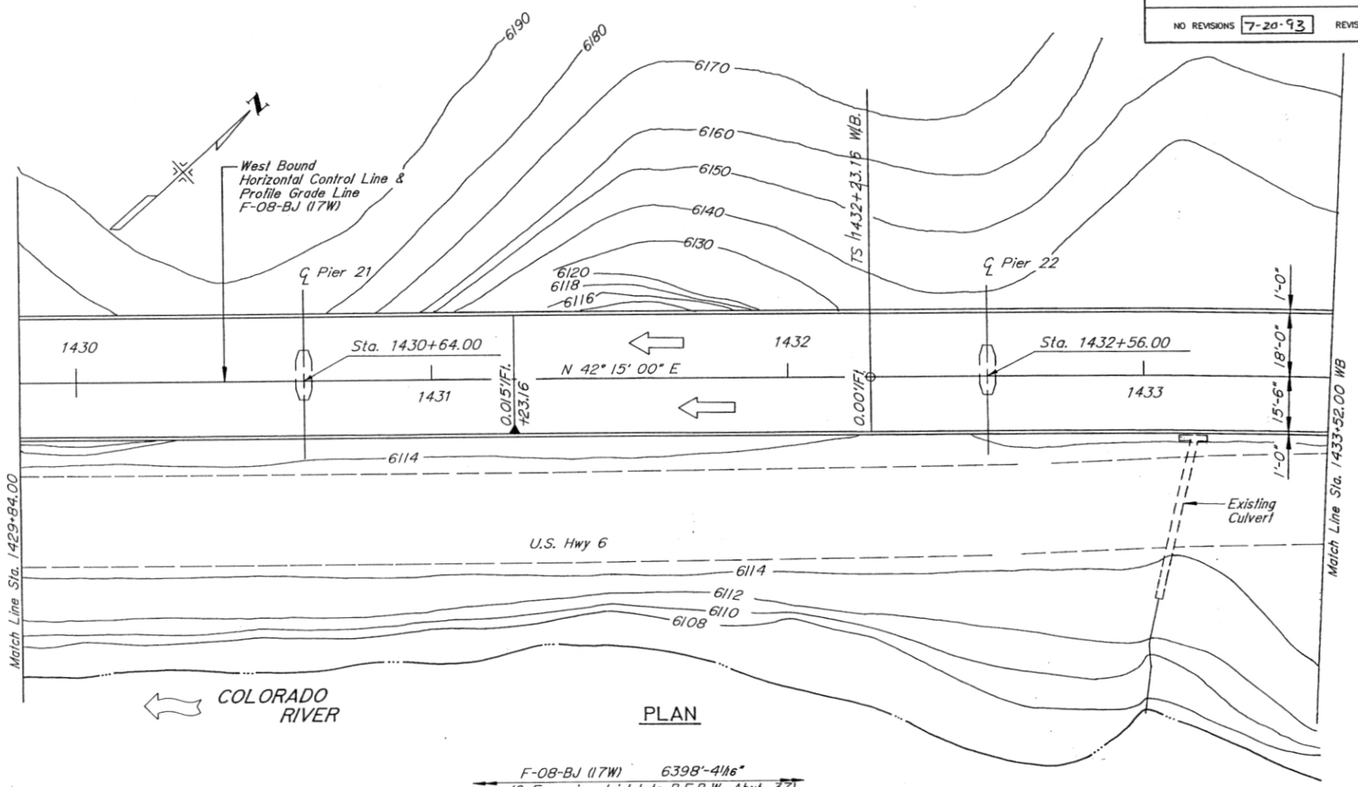
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1988

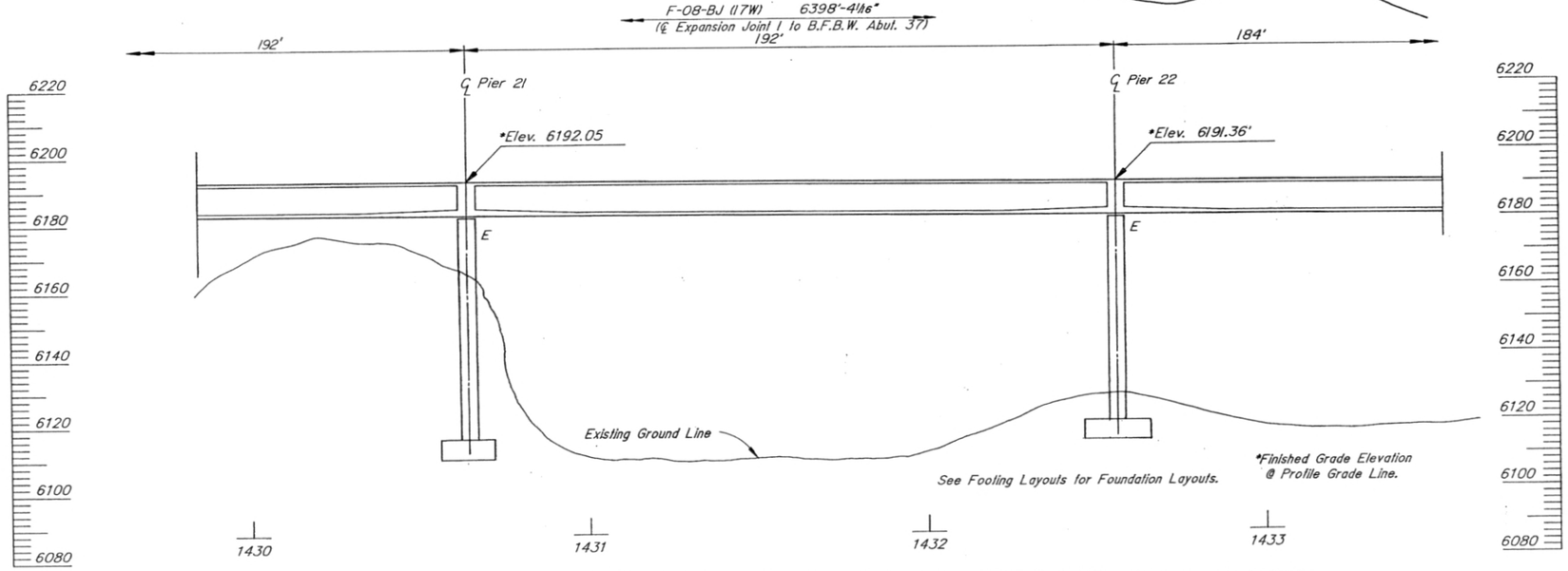
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-236

REVISIONS		



PLAN



SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

	INITIAL	DATE	
Designed By	TS	3/88	
Checked By	GS	5/88	Checked By TF 5/88
Detailed By	AS	4/88	Quantities By AOS 4/89
			Checked By SJG 5/89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 9
STATION 1429+84.00 WB TO
STATION 1433+52.00 WB

Designer	T. Stelmack	Structure Numbers	F-08-BJ
Detailer	A. Sanchez		(17W)
Drawing Number B-15		of 217	Drawings

Revision Dates (Preliminary Stage Only)

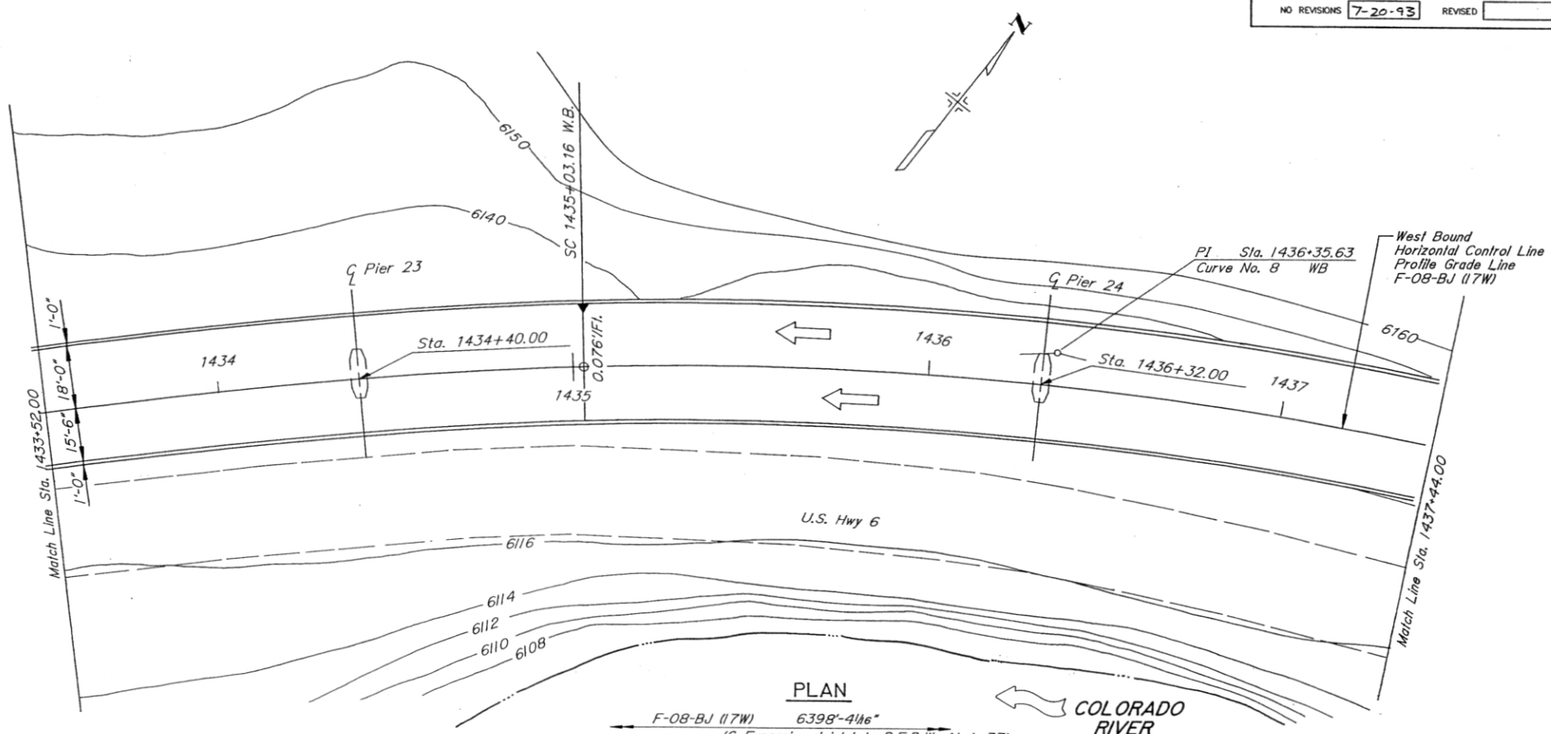
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-237

REVISIONS		



PLAN

SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

Curve No. 8

Δs	=	30° 30' RT
Ts	=	412.46'
Δc	=	14° 24'
Dc	=	05° 45'
Tc	=	125.88'
Lc	=	250.44'
Rc	=	996.45'
Θs	=	08° 03'
Ls	=	280.00'
ST	=	93.51'
LT	=	186.86'
S	=	0.076'/FT
SSD	=	275 FT
MDS	=	40 MPH

Designed By	TS	DATE 5/88	Checked By	TF	5/88
Checked By	GS	5/88	Quantities By	AGS	4/89
Detailed By	MM	4/88	Checked By	SJG	5/89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 10
STATION 1433+52.00 WB TO
STATION 1437+44.00 WB

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-16		of 217	Drawings

Revision Dates (Preliminary Stage Only)

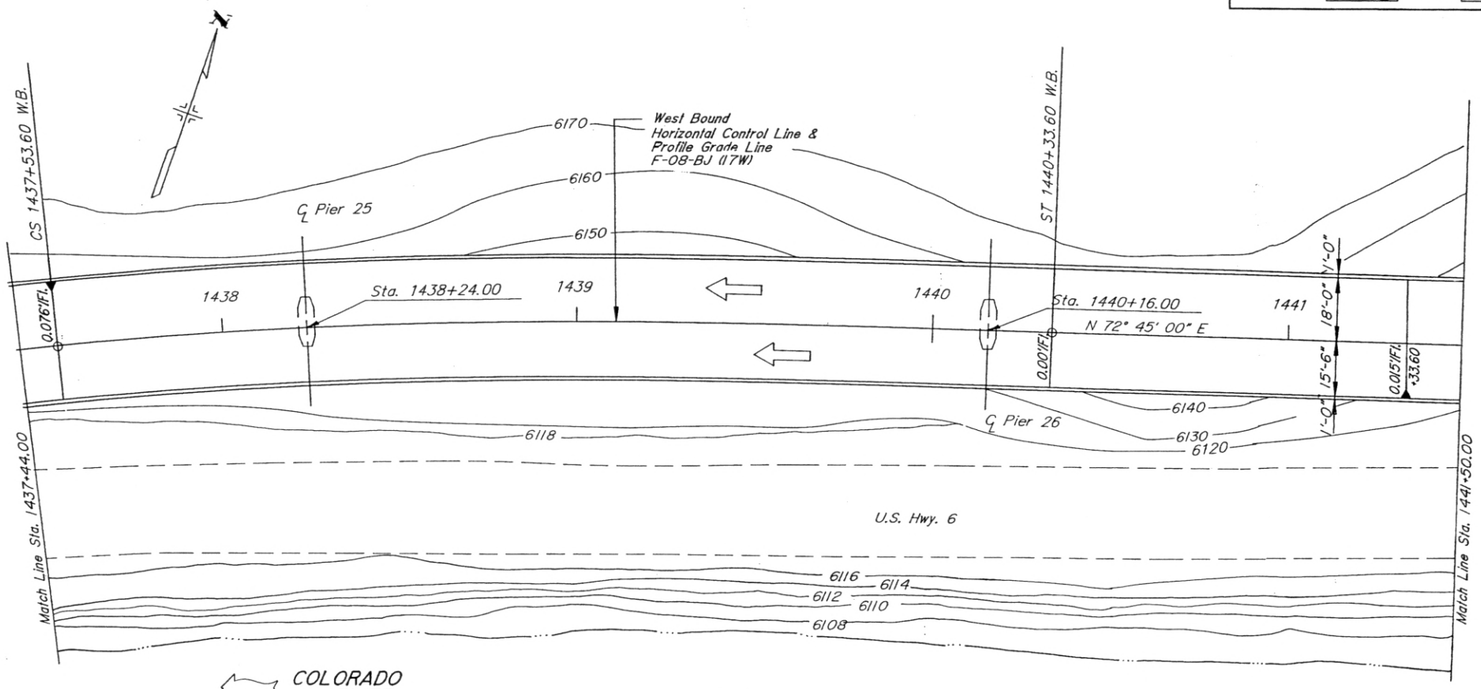
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

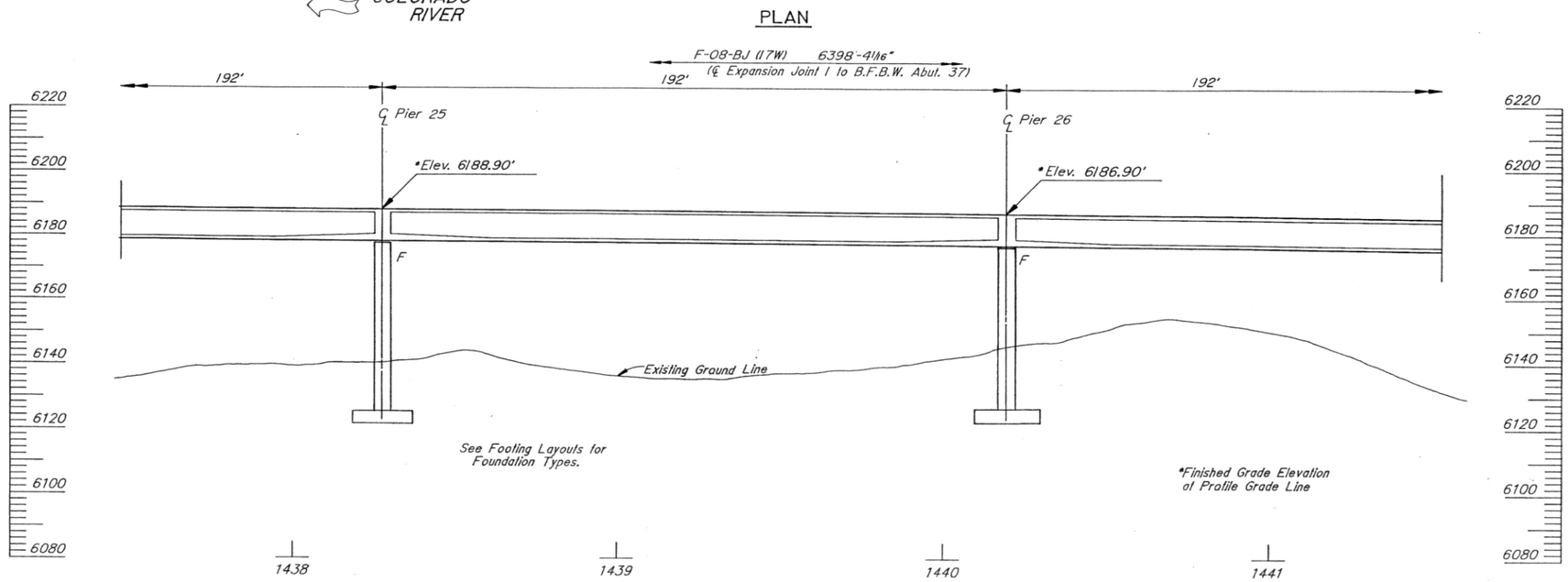
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VII	COLORADO	I 70-2(145)	II-238

REVISIONS		



PLAN



See Footing Layouts for Foundation Types.

*Finished Grade Elevation of Profile Grade Line

SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

	INITIAL	DATE			
Designed By	TS	5/86	Checked By	TF	5/86
Checked By	GS	5/86	Quantities By	A.O.S.	4/89
Detailed By	MM	4/86	Checked By	A.O.S.	5/89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT II
STATION 1437+44.00 WB TO
STATION 1441+50.00 WB

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-17	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 23350

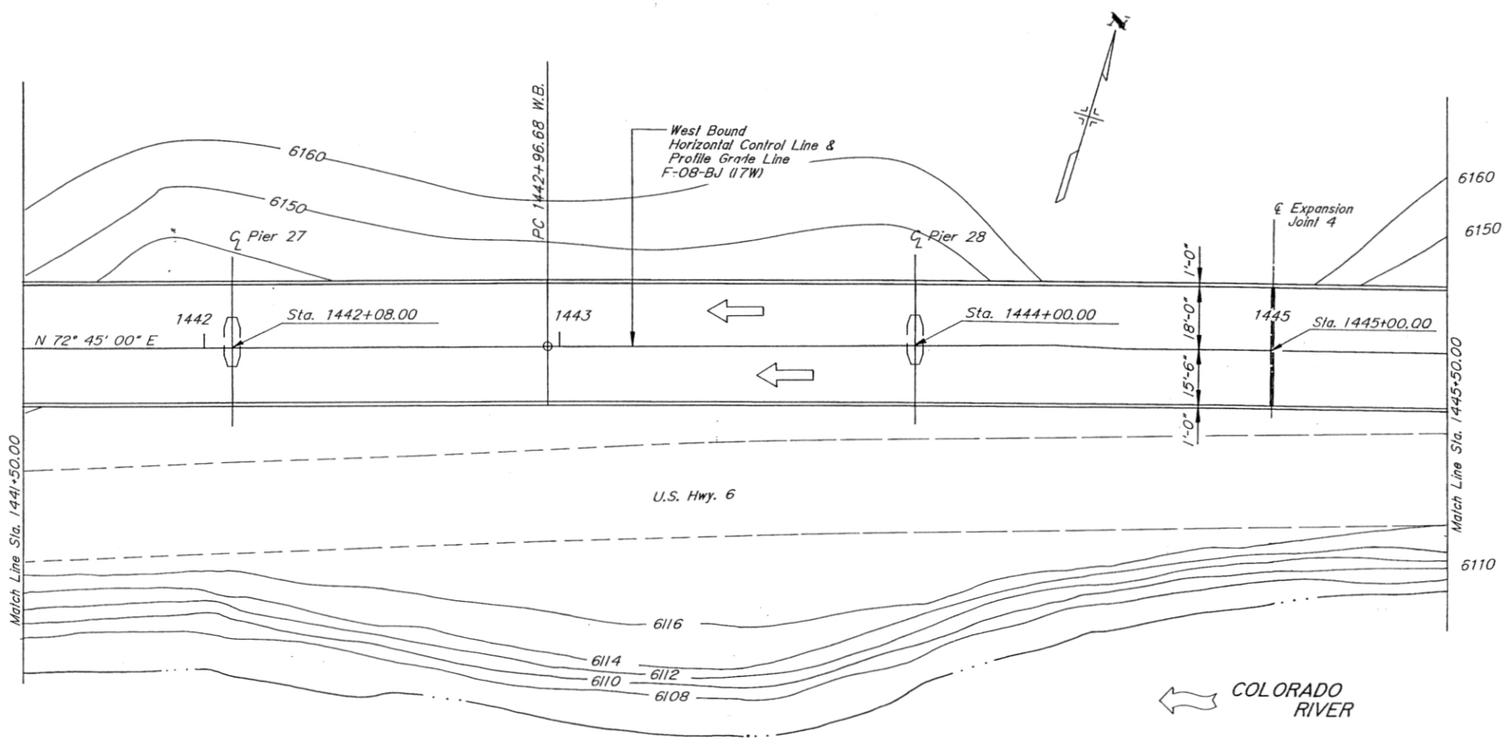
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-239

REVISIONS		

	INITIAL	DATE		
Designed By	TS	3/88	Checked By	TF 5/88
Checked By	GS	5/88	Quantities By	AOS 4/89
Detailed By	MM	4/88	Checked By	SIG 5/89



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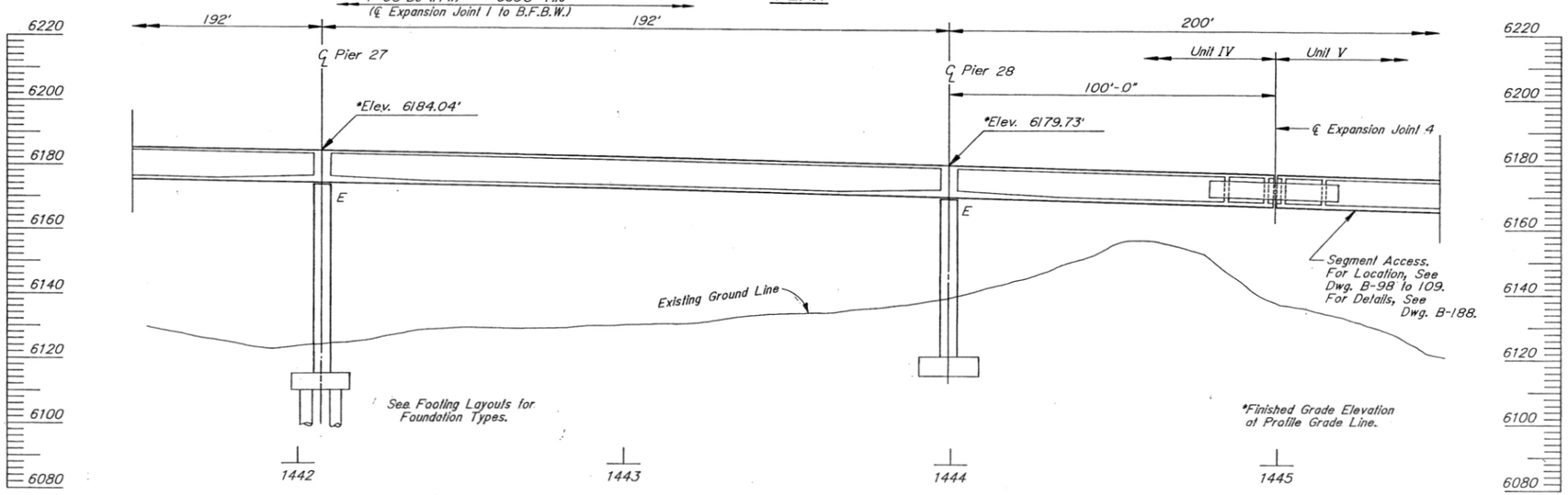

SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 12
STATION 1441+50.00 WB TO
STATION 1445+50.00 WB

Designer	T. Sleimack	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-18		of 217	Drawings

Revision Dates (Preliminary Stage Only)

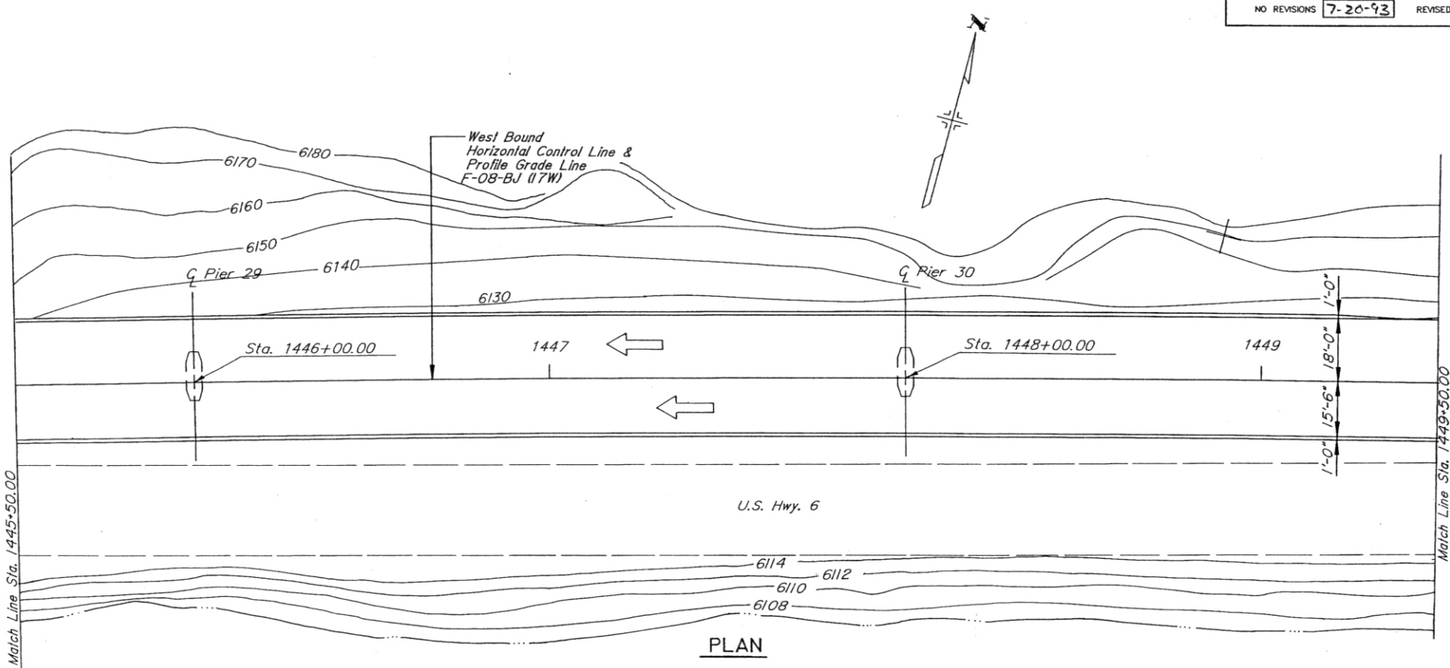
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

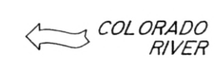
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

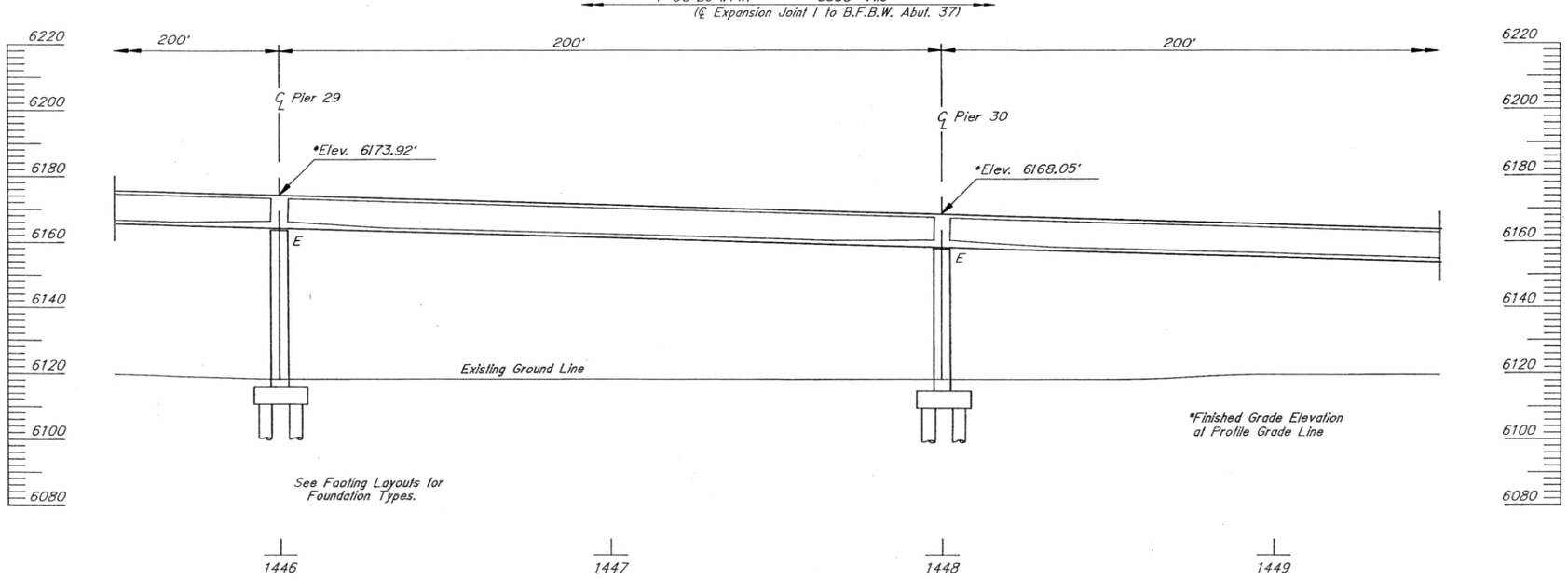
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-240

REVISIONS		



PLAN





SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

	INITIAL	DATE	
Designed By	TS	3/88	
Checked By	GS	5/88	Checked By
Detailed By	MM	4/88	Quantities By
			Checked By

TF	5/88	
AOS	4/89	
AOS	4/89	
RJG	5/89	

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 13
STATION 1445+50.00 WB TO
STATION 1449+50.00 WB

Designer	T. Stelmack	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-19		of 217	Drawings

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

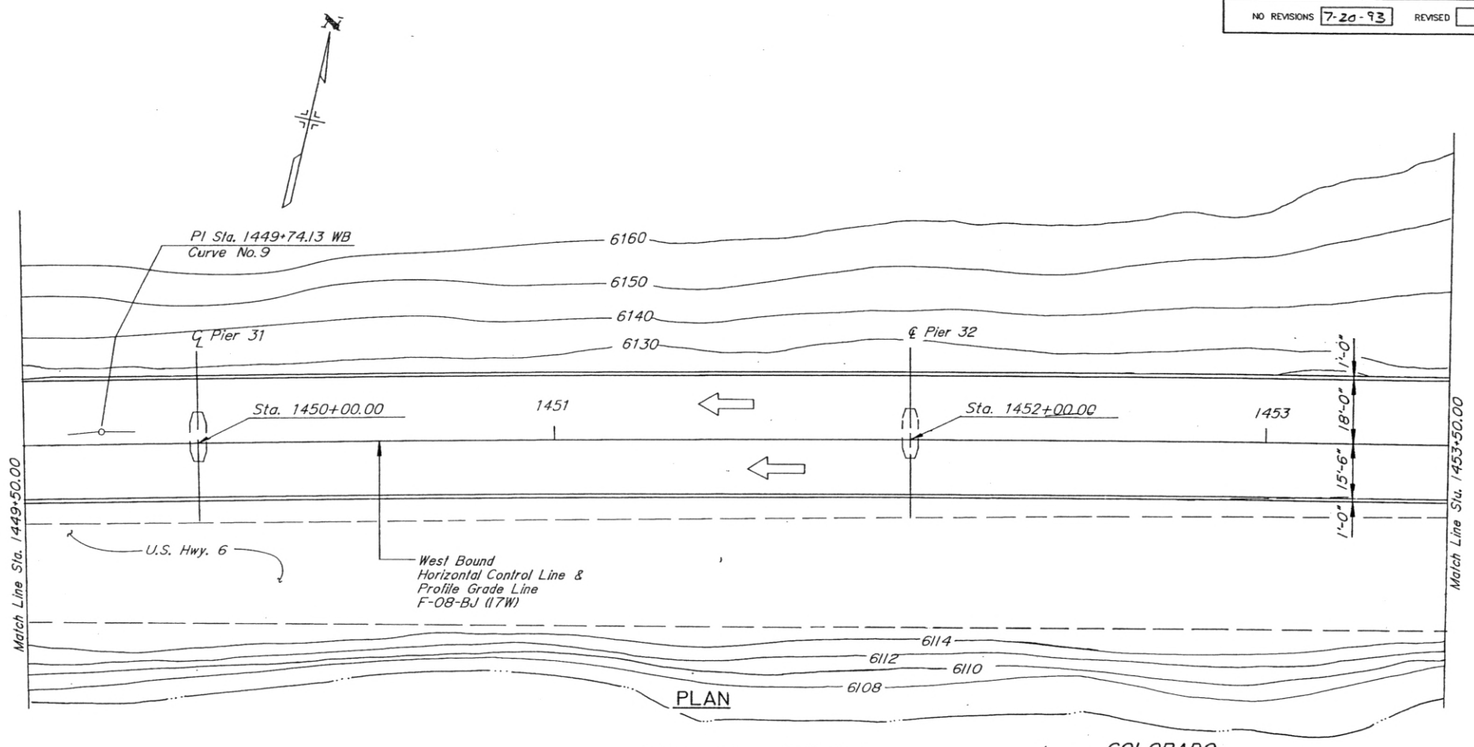
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VII	COLORADO	I 70-2(145)	11-241

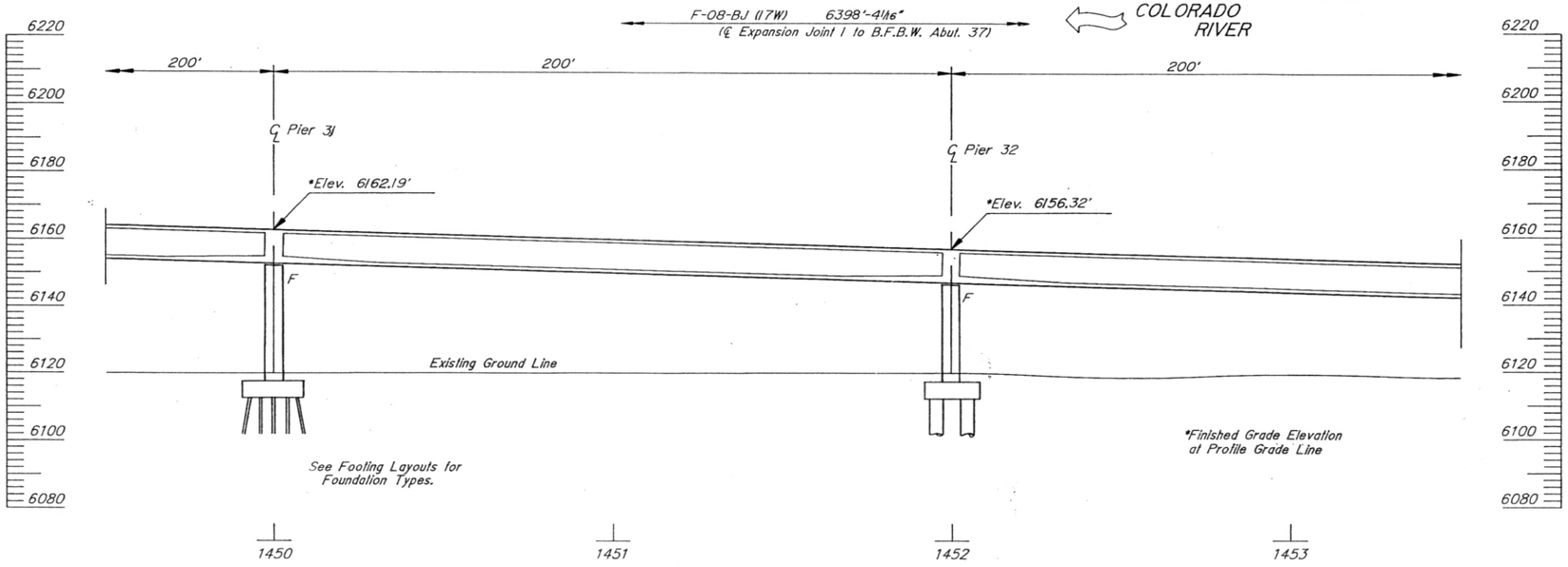
REVISIONS		

	INITIAL	DATE	
Designed By	TS	3/88	TF 5/88
Checked By	SS	5/88	ΔDS 4/89
Detailed By	MM	4/88	ΔDS 4/89
			SIG 5/89
			Checked By
			Quantities By
			Checked By



Curve No. 9 WB

Δ = 06° 46' RT.
D = 00° 30'
T = 677.45'
L = 1353.33'
R = 11459.16'
S = N. C.
SSD = 932'
MDS ⇒ 50 MPH



SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

Figg and Muller Engineers, Inc.
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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 14
STATION 1449+50.00 WB TO
STATION 1453+50.00 WB

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-20	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

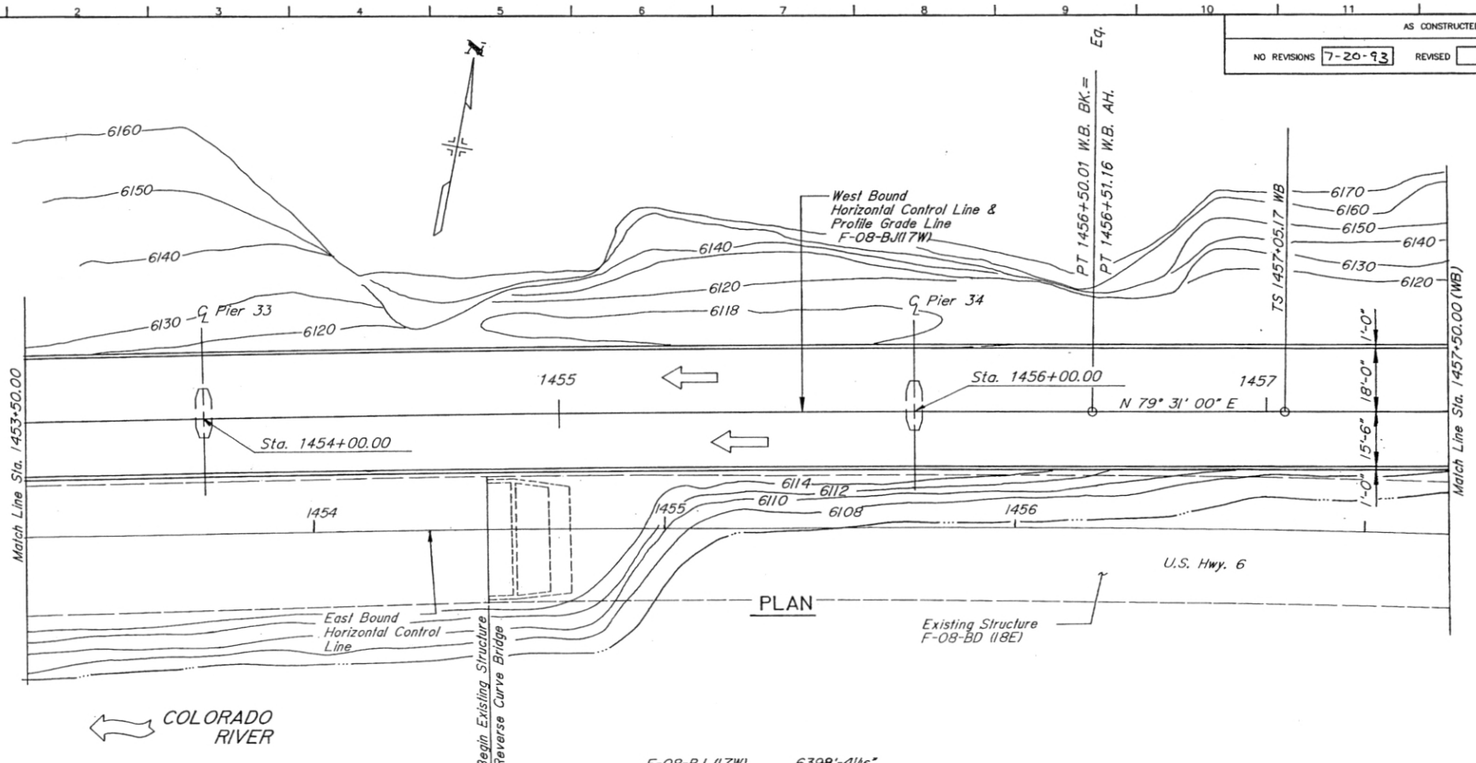
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1988

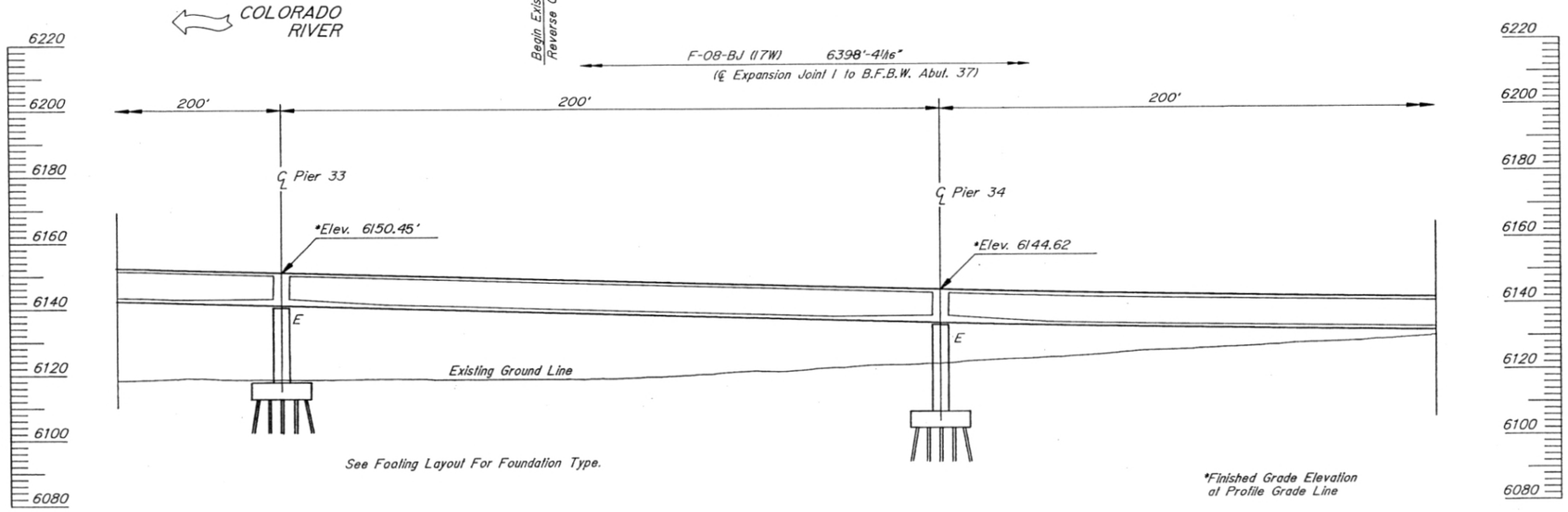
AS CONSTRUCTED			
NO REVISIONS 7-20-93	REVISED		VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-242

REVISIONS		



PLAN



SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ (17W))

	INITIAL	DATE		INITIAL	DATE
Designed By	TS	3/88	Checked By	TE	5/88
Checked By	GS	5/88	Quantities By	AOS	4/89
Detailed By	MM	4/88	Checked By	SLG	5/89

Figg and Muller Engineers, Inc.
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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 15
STATION 1453+50.00 WB TO
STATION 1457+50.00 WB

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-21	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

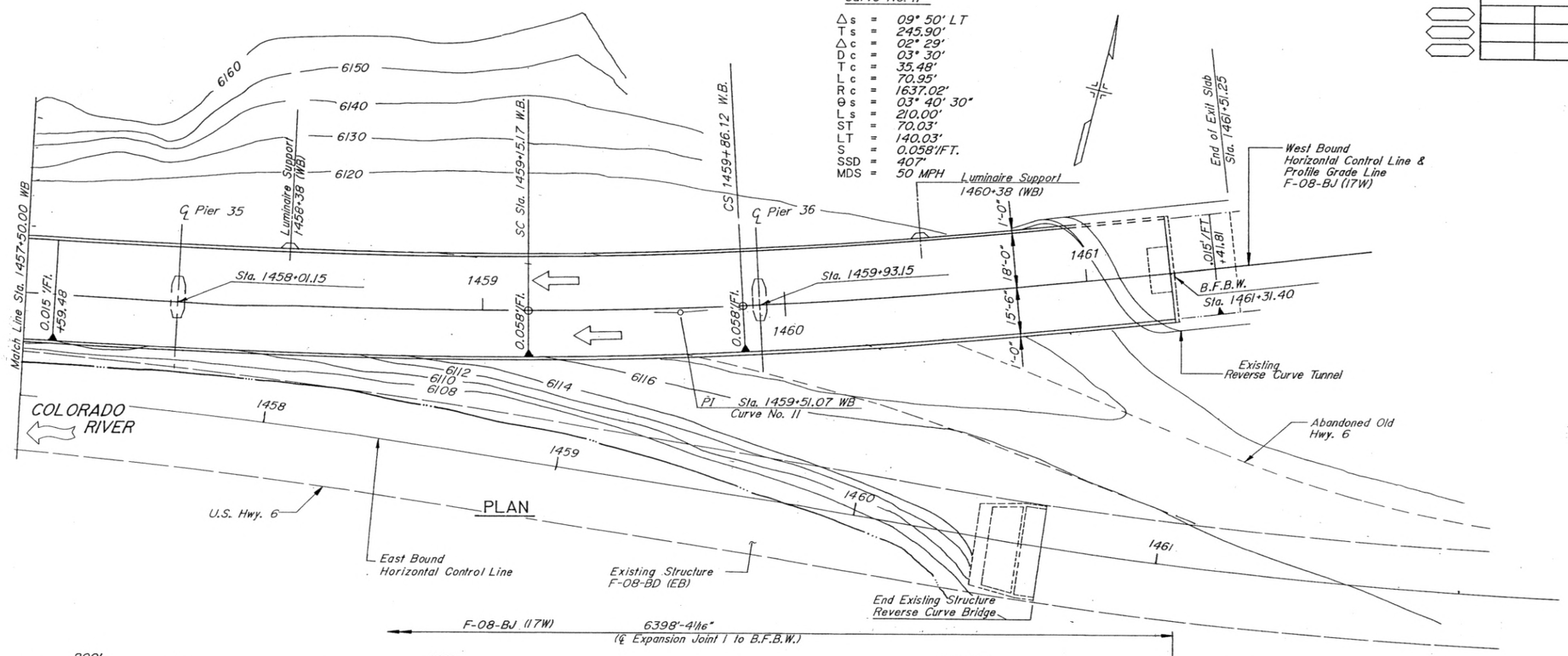
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

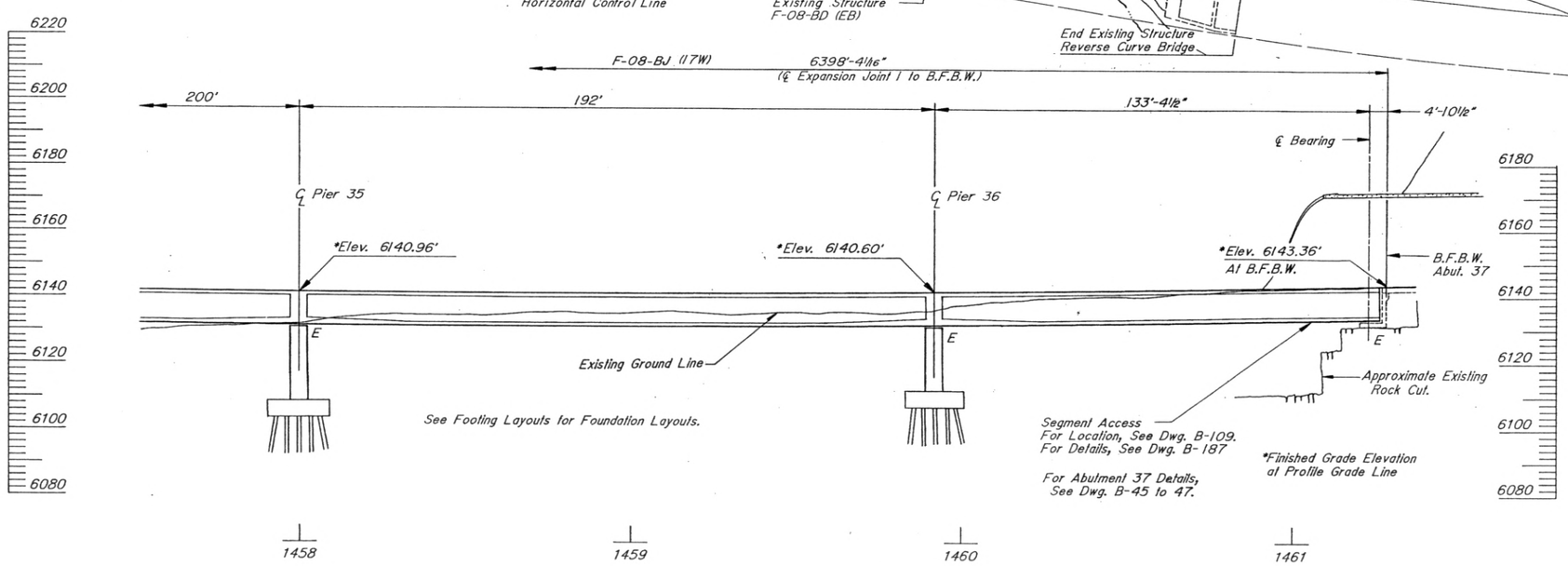
AS CONSTRUCTED		
NO REVISIONS 7-26-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-243

REVISIONS		

	INITIAL	DATE		TF	5/88
Designed By	TS	3/88	Checked By	ACS	4/89
Checked By	GS	5/88	Quantities By	ACS	4/89
Detailed By	MM	4/88	Checked By	SJG	5/89





SECTION TAKEN ALONG HORIZONTAL CONTROL LINE (Structure No. F-08-BJ)

Figg and Muller Engineers, Inc.
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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W
CONCRETE ALTERNATE

GENERAL LAYOUT 16
STATION 1457+50.00 WB TO
STATION 1461+29.88 WB

Designer	T. Stelmack	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-22		of 217	Drawings

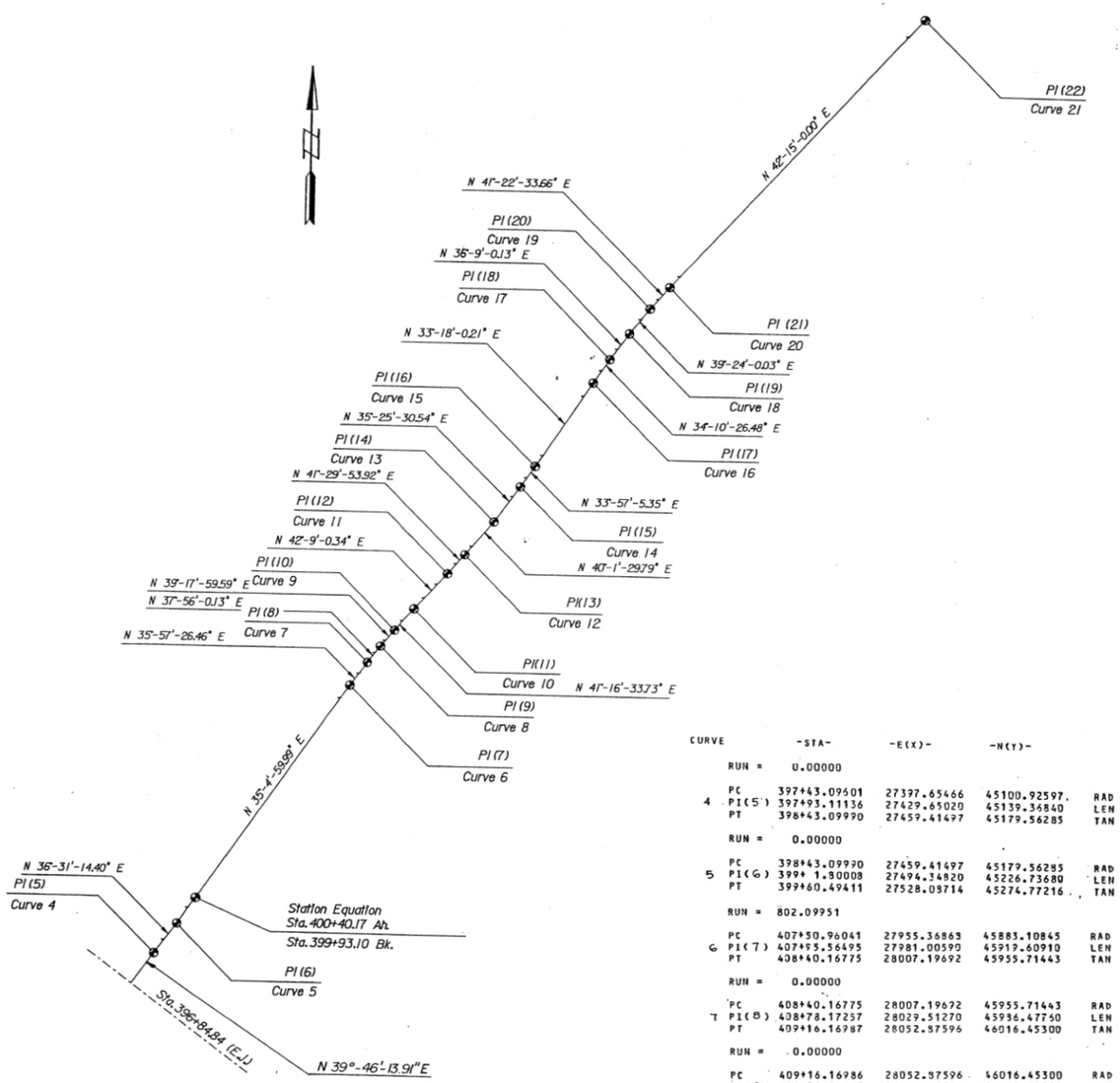
Revision Dates (Preliminary Stage Only)

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-256

REVISIONS	



CURVE		-STA-	-E(X)-	-N(Y)-			
	RUN =	0.00000					
12	PC	412+61.00545	28279.44177	46276.31261	RAD	2544.50675	D= 2° 10' 00"
	PI(13)	412+95.01022	28301.97260	46301.78060	LEN	68.00381	Δ= 1° 28' 24"
	PT	413+29.01025	28323.84114	46327.81949	TAN	34.00378	
	RUN =	0.00000					
13	PC	413+29.01025	28323.84114	46327.81949	RAD	2291.83118	D= 2° 30' 00"
	PI(14)	414+21.05553	28383.03740	46398.30450	LEN	183.99168	Δ= 4° 35' 59"
	PT	415+13.00193	28436.39043	46473.30975	TAN	92.04528	
	RUN =	0.00000					
14	PC	415+13.00193	28436.39043	46473.30975	RAD	2544.14530	D= 2° 10' 01"
	PI(15)	415+47.00788	28456.10160	46501.02030	LEN	68.00815	Δ= 1° 28' 25"
	PT	415+81.01008	28475.09361	46529.22860	TAN	34.00595	
	RUN =	0.00000					
15	PC	415+81.01008	28475.09361	46529.22860	RAD	7021.76800	D= 0° 48' 58"
	PI(16)	416+20.92783	28497.38730	46562.34080	LEN	79.83463	Δ= 0° 39' 05"
	PT	416+60.84471	28519.30309	46595.70432	TAN	39.91774	
	RUN =	207.85528					
16	PC	418+68.69999	28633.42055	46769.43118	RAD	5848.71750	D= 0° 58' 47"
	PI(17)	419+13.30781	28657.91130	46806.71470	LEN	89.21390	Δ= 0° 52' 26"
	PT	419+57.91390	28682.96788	46843.62032	TAN	44.60782	
	RUN =	0.00000					
17	PC	419+57.91389	28682.96788	46843.62032	RAD	2203.70090	D= 2° 35' 60"
	PI(18)	419+95.91817	28704.31529	46875.06260	LEN	76.00102	Δ= 1° 58' 34"
	PT	420+33.91491	28726.73399	46905.75011	TAN	38.00428	
	RUN =	0.00000					
18	PC	420+33.91492	28726.73399	46905.75011	RAD	1909.85932	D= 3° 00' 00"
	PI(19)	420+88.09565	28758.69530	46949.49970	LEN	108.33241	Δ= 3° 14' 60"
	PT	421+42.24733	28793.08547	46991.36697	TAN	54.18073	
	RUN =	0.00000					
19	PC	421+42.24733	28793.08547	46991.36697	RAD	2203.66120	D= 2° 36' 00"
	PI(20)	421+80.25093	28817.20750	47020.73360	LEN	75.99961	Δ= 1° 58' 34"
	PT	422+18.24694	28842.32778	47049.25102	TAN	38.00357	
	RUN =	0.00000					
20	PC	422+18.24694	28842.32778	47049.25102	RAD	5848.85660	D= 0° 58' 47"
	PI(21)	422+62.85665	28871.81470	47082.72560	LEN	89.21769	Δ= 0° 52' 26"
	PT	423+ 7.46463	28901.80379	47115.74651	TAN	44.60971	
	RUN =	952.21502					
21	PC	432+59.67965	29542.04655	47820.59334	RAD	3051.52300	D= 1° 52' 39"
	PI(22)	433+25.42905	29586.25360	47869.26150	LEN	131.47647	Δ= 2° 28' 07"
	PT	433+91.15612	29632.51586	47915.98040	TAN	65.74841	

CURVE		-STA-	-E(X)-	-N(Y)-			
	RUN =	0.00000					
4	PC	397+43.09501	27397.65466	45100.92597	RAD	1763.08985	D= 3° 14' 59"
	PI(5)	397+93.11136	27429.65020	45139.36840	LEN	100.00389	Δ= 3° 15' 00"
	PT	398+43.09990	27459.41497	45179.56285	TAN	50.01535	
	RUN =	0.00000					
5	PC	398+43.09990	27459.41497	45179.56285	RAD	4579.61750	D= 1° 13' 28"
	PI(6)	399+ 1.80008	27494.34820	45226.73680	LEN	117.39422	Δ= 1° 26' 14"
	PT	399+60.49411	27528.08714	45274.77216	TAN	58.70019	
	RUN =	802.09951					
6	PC	407+50.96041	27955.36863	45883.10845	RAD	5847.92100	D= 0° 58' 47"
	PI(7)	407+95.56495	27981.00590	45919.60910	LEN	89.20734	Δ= 0° 52' 26"
	PT	408+40.16775	28007.19692	45955.71443	TAN	44.60453	
	RUN =	0.00000					
7	PC	408+40.16775	28007.19692	45955.71443	RAD	2203.72350	D= 2° 36' 00"
	PI(8)	408+78.17257	28029.51270	45936.47750	LEN	76.00212	Δ= 1° 58' 34"
	PT	409+16.16987	28052.87596	46016.45300	TAN	38.00483	
	RUN =	0.00000					
8	PC	409+16.16986	28052.87596	46016.45300	RAD	1909.85932	D= 3° 00' 00"
	PI(9)	409+38.94621	28066.87760	46034.41730	LEN	45.55053	Δ= 1° 21' 59"
	PT	409+61.72040	28081.30367	46052.04258	TAN	22.77635	
	RUN =	0.00000					
9	PC	409+61.72040	28081.30367	46052.04258	RAD	2203.72070	D= 2° 36' 00"
	PI(10)	409+99.72769	28105.37670	46081.45420	LEN	76.00704	Δ= 1° 58' 34"
	PT	410+37.72744	28130.44963	46110.01820	TAN	38.00729	
	RUN =	0.00000					
10	PC	410+37.72744	28130.44963	46110.01820	RAD	5849.78250	D= 0° 58' 46"
	PI(11)	410+62.34808	28159.83530	46143.55240	LEN	89.23955	Δ= 0° 52' 27"
	PT	411+26.96699	28189.82910	46176.63367	TAN	44.62064	
	RUN =	54.18959					
11	PC	411+81.15658	28226.19436	46216.80926	RAD	7019.29350	D= 0° 48' 59"
	PI(12)	412+21.08194	28252.98730	46246.40950	LEN	79.84937	Δ= 0° 39' 06"
	PT	412+61.00545	28279.44177	46276.31261	TAN	39.92537	

NOTES:

1. To Match Coordinates Shown With USGS Coordinate System Add:
   600,000 North(Y)
   1,500,000 East(X)
2. Add 1000+ 00 To All Stations Shown To Match Project Stations.

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - I7W
CONCRETE ALTERNATE

SIMULATED GEOMETRY I

Designer	J.Corven	Structure Numbers	F-08-BJ (I7W)
Detailer	T.Shifflett		

Drawing Number B-35 of 217 Drawings

Revision Dates (Preliminary Stage Only)

INITIAL	DATE	
JAC	4-89	Checked By
BWD	4-89	Quantities By
TDS	4-89	Checked By

Designed By
Checked By
Detailed By

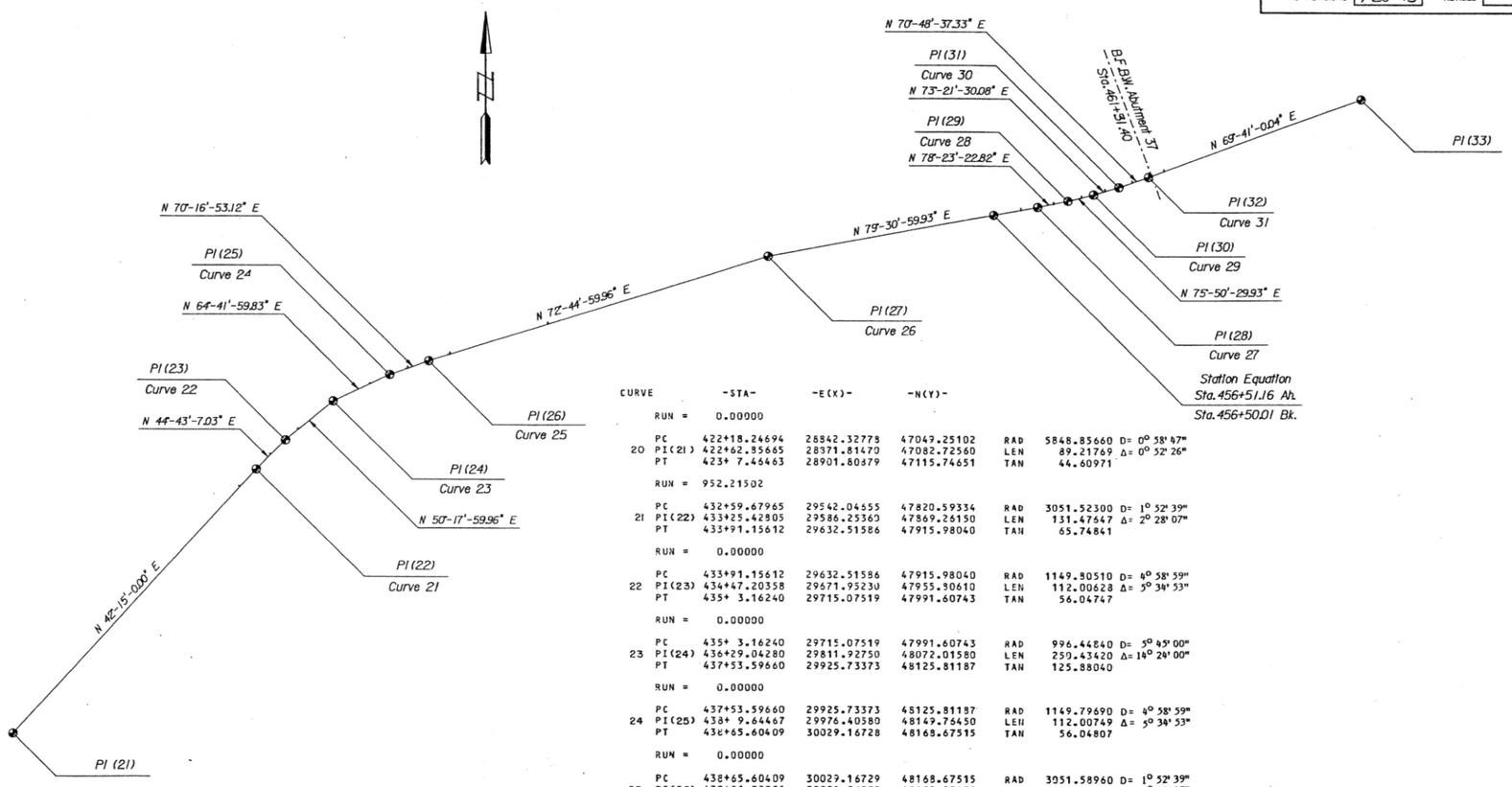
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS	7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-257

REVISIONS		



CURVE		-STA-	-E(X)-	-N(Y)-			
	RUN =	0.00000					
	PC	422+18.24694	28842.32778	47049.25102	RAD	5848.85660	D= 0° 58' 47"
20	PI(21)	422+62.85665	28871.81470	47082.72560	LEN	89.21769	Δ= 0° 52' 26"
	PT	423+ 7.46463	28901.80879	47115.74651	TAN	44.60971	
	RUN =	952.21502					
	PC	432+59.67965	29542.04555	47820.59334	RAD	3051.52300	D= 1° 52' 39"
21	PI(22)	433+25.42805	29586.25360	47869.26150	LEN	131.47647	Δ= 2° 28' 07"
	PT	433+91.15612	29632.51586	47915.98040	TAN	65.74841	
	RUN =	0.00000					
	PC	433+91.15612	29632.51586	47915.98040	RAD	1149.30510	D= 4° 58' 59"
22	PI(23)	434+47.20358	29671.95230	47955.30610	LEN	112.00628	Δ= 5° 34' 53"
	PT	435+ 3.16240	29715.07519	47991.60743	TAN	56.04747	
	RUN =	0.00000					
	PC	435+ 3.16240	29715.07519	47991.60743	RAD	996.44840	D= 5° 45' 00"
23	PI(24)	436+29.04280	29811.92750	48072.01580	LEN	250.43420	Δ= 14° 24' 00"
	PT	437+53.59660	29925.73373	48125.81187	TAN	125.88040	
	RUN =	0.00000					
	PC	437+53.59660	29925.73373	48125.81187	RAD	1149.79690	D= 4° 58' 59"
24	PI(25)	438+ 9.64467	29976.40580	48149.76450	LEN	112.00749	Δ= 5° 34' 53"
	PT	438+65.60409	30029.16728	48168.67515	TAN	56.04807	
	RUN =	0.00000					
	PC	438+65.60409	30029.16729	48168.67515	RAD	3051.58960	D= 1° 52' 39"
25	PI(26)	439+31.33251	30091.06030	48190.85370	LEN	131.47650	Δ= 2° 28' 07"
	PT	439+97.08060	30153.85135	48210.35585	TAN	65.74842	
	RUN =	299.60332					
	PC	442+96.68391	30439.97843	48299.20075	RAD	11459.15590	D= 0° 30' 00"
26	PI(27)	449+74.13737	31036.96000	48500.09400	LEN	1353.33173	Δ= 6° 46' 00"
	PT	456+50.01564	31753.10528	48623.35655	TAN	677.45346	
	RUN =	130.70884					
	PC	457+32.55969	31833.14993	48638.16789	RAD	5013.24650	D= 1° 08' 34"
27	PI(28)	457+81.86508	31881.63230	48647.13900	LEN	98.60758	Δ= 1° 07' 37"
	PT	458+31.16728	31929.92884	48657.06193	TAN	49.30538	
	RUN =	0.00000					
	PC	458+31.16728	31929.92884	48657.06193	RAD	1888.87380	D= 3° 02' 00"
28	PI(29)	458+73.17465	31971.07670	48665.51610	LEN	84.00089	Δ= 2° 32' 53"
	PT	459+15.16817	32011.30803	48675.79121	TAN	42.00737	
	RUN =	0.00000					
	PC	459+15.16817	32011.30803	48675.79121	RAD	1637.02230	D= 3° 30' 00"
29	PI(30)	459+50.64934	32046.21140	48684.47000	LEN	70.95122	Δ= 2° 29' 00"
	PT	459+86.11940	32080.20543	48694.63127	TAN	35.48117	
	RUN =	0.00000					
	PC	459+86.11940	32080.20543	48694.63127	RAD	1888.91050	D= 3° 02' 00"
30	PI(31)	460+28.12697	32120.45450	48706.66160	LEN	84.00130	Δ= 2° 32' 53"
	PT	460+70.12070	32160.12796	48720.46931	TAN	42.00758	
	RUN =	0.00000					
	PC	460+70.12070	32160.12796	48720.46931	RAD	5013.00510	D= 1° 08' 35"
31	PI(32)	461+19.42584	32206.69350	48736.67570	LEN	98.60709	Δ= 1° 07' 37"
	PT	461+65.72779	32252.93127	48753.79485	TAN	49.30514	
	RUN =	615.27094					
	PI(33)	467+83.99873	32829.92500	48967.42200			

NOTES:

1. To Match Coordinates Shown With USGS Coordinate System Add:
   600,000 North (Y)
   1,500,000 East (X)
2. Add 1000+ 00 To All Stations Shown To Match Project Stations.

	INITIAL	DATE	
Designed By	JAC	4-89	Checked By
Checked By	BWD	4-89	Quantities By
Detailed By	MM	4-89	Checked By

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/ Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - I7W
CONCRETE ALTERNATE

SIMULATED GEOMETRY II

Designer	J. Corven	Structure Numbers	F-08-BJ (I7W)
Detailer	D. Brewton		
Drawing Number B-36		of 217	Drawings

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

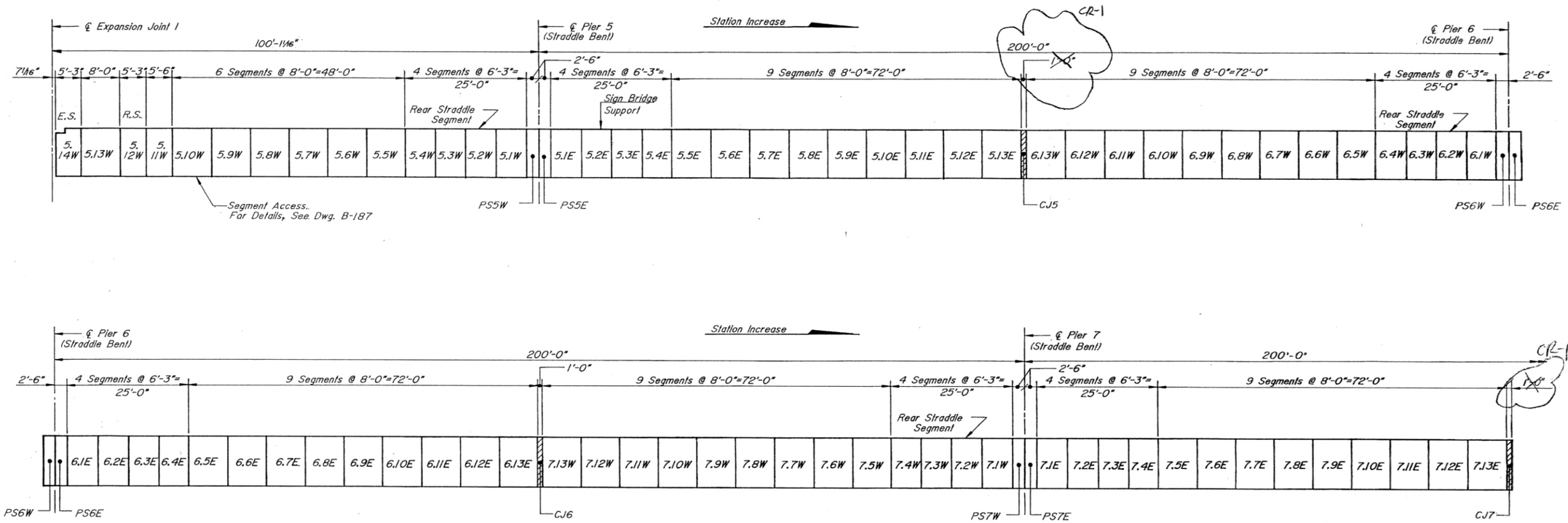
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VII	COLORADO	I 70-2(145)	II-319

	REVISIONS	
CR-1	REVISE CLOSURE SEGMENT LENGTHS	CFB

SEE CMO #30
REINFORCING ADDED



	INITIAL	DATE		
Designed By	TWS	4-89	Checked By	AOS 4-89
Checked By	WSH	4-89	Quantities By	AOS 4-89
Detailed By	MWM	4-89	Checked By	SJG 5-89

E.S. - Denotes Expansion Joint Segment
R.S. - Denotes Rear Expansion Beam Segment
PS - Denotes Pier Segment
CJ - Denotes Closure Joint

LEGEND

2.2E
- E-East Side (Station Increase)
- W-West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 5 THRU CANTILEVER 7

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number	B-98 of 217 Drawings		

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

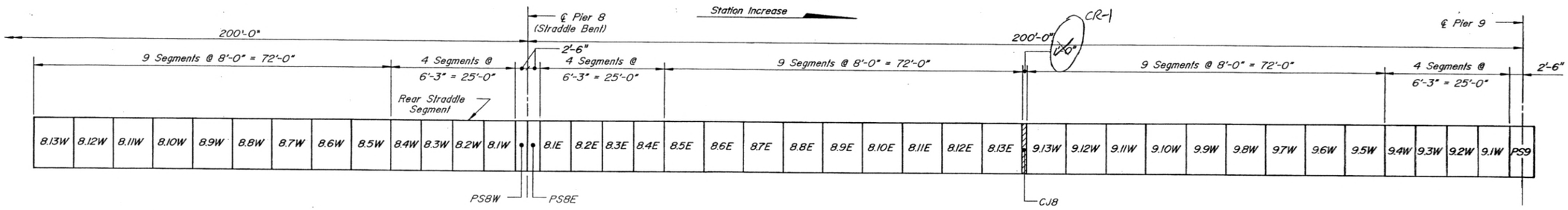
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

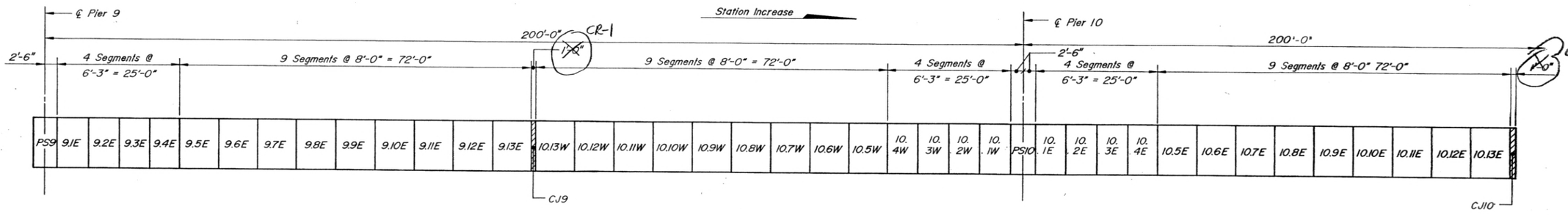
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-320

	REVISIONS	
CR-1	REVISE CLOSURE JOINT DIMENSIONS	CFB

SEE CMO #30
REINFORCING ADDED





	INITIAL	DATE			
Designed By	TWS	4-89	Checked By	AOS	4-89
Checked By	WSM	4-89	Quantities By	AOS	4-89
Detailed By	MMM	4-89	Checked By	SLG	5-89

PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.

LEGEND

2.2E

- E-East Side (Station Increase)
- W-West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 8 THRU CANTILEVER 10

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-99 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

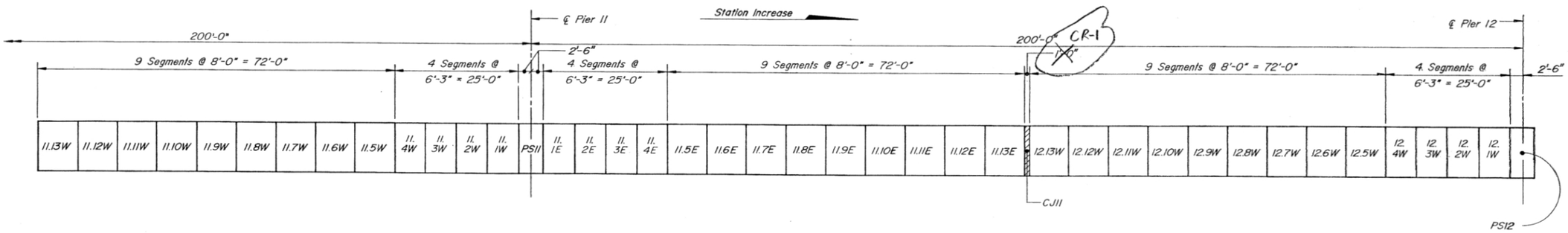
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1988

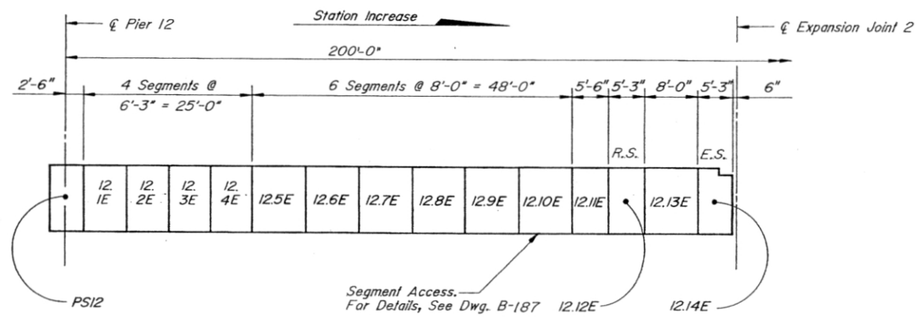
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-321

REVISIONS			
CR-1		REVISE CLOSURE JOINT DIMENSION	CFB

SEE CMO #30
REINFORCING ADDED





E.S. - Denotes Expansion Joint Segment
R.S. - Denotes Rear Expansion Beam Segment
PS - Denotes Pier Segment
CJ - Denotes Closure Joint

LEGEND

2.2E
- E - East Side (Station Increase) / W - West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.

	INITIAL	DATE	Checked By	AOS	4-89
Designed By	TWS	4-89	Quantities By	AOS	4-89
Checked By	WSM	4-89	Checked By	SLG	5-89
Detailed By	MKM	4-89			

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 11 THRU CANTILEVER 12

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-100 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

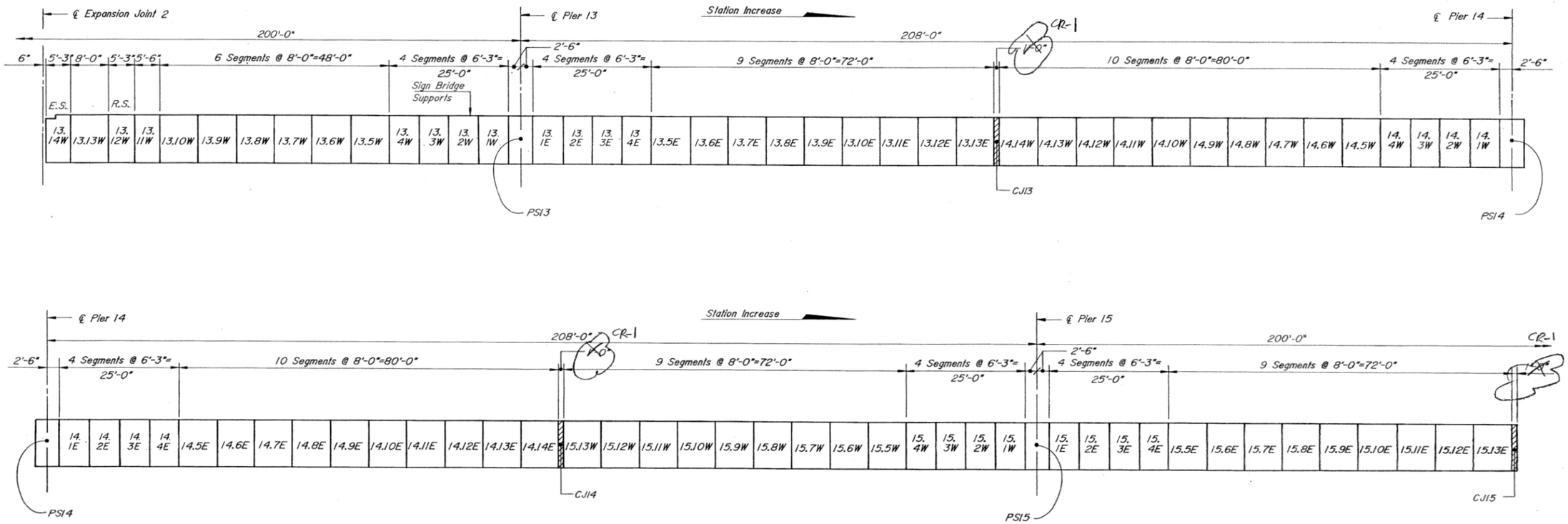
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1966

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-322

REVISIONS		
CR-1	REVISE CLOSURE DIMENSIONS	CFB

SEE CMO #30
REINFORCING ADDED



E.S. - Denotes Expansion Joint Segment
R.S. - Denotes Rear Expansion Beam Segment
PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line

LEGEND

2.2E

- E - East Side (Sation Increase)
  W - West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

	INITIAL	DATE	
Designed By	TWS	4-89	Checked By
Checked By	WJM	4-89	Quantities By
Detailed By	MHM	4-89	Checked By

Checked By	AOS	4-89	
Quantities By	AOS	4-89	
Checked By	SJG	5-89	

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 13 THRU CANTILEVER 15

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-101 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

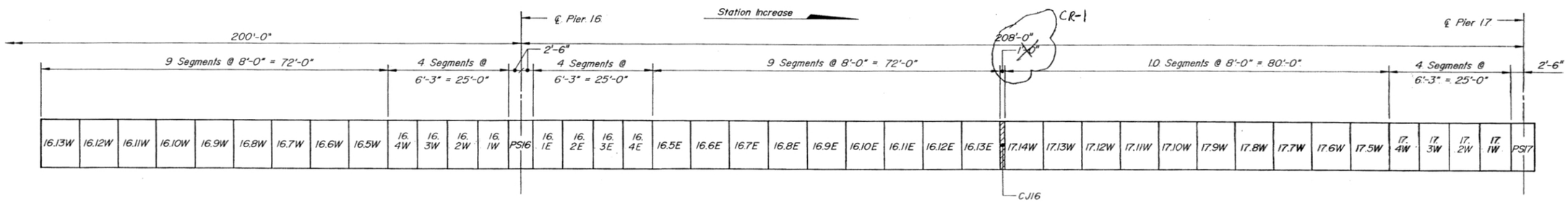
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

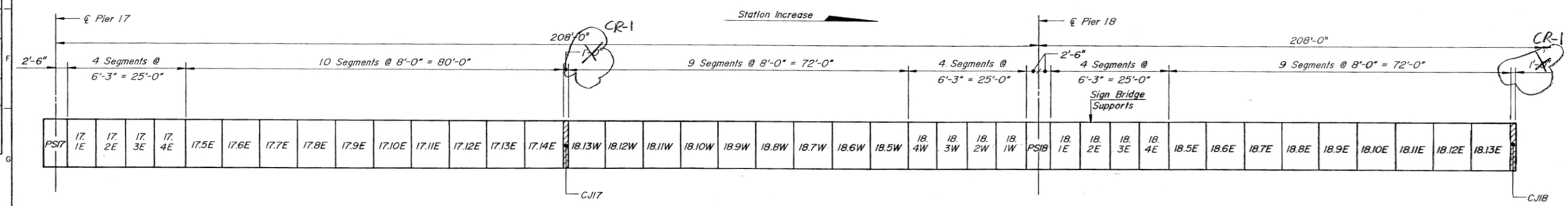
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-323

REVISIONS		
CR-1	REVISE CLOSURE DIMENSIONS	CTB

SEE CMO #30
REINFORCING ADDED





	INITIAL	DATE	Checked By	405	4-89
Designed By	TWS	4-89	Quantities By	405	4-89
Checked By	WSH	4-89	Checked By	SIG	5-89
Detailed By	MMM	4-89			

PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.

LEGEND

2.2E
- E-East Side (Station Increase)
- W-West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 16 THRU CANTILEVER 18

Designer	T. Stelmack	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-102		of 217	Drawings

Revision Dates (Preliminary Stage Only)

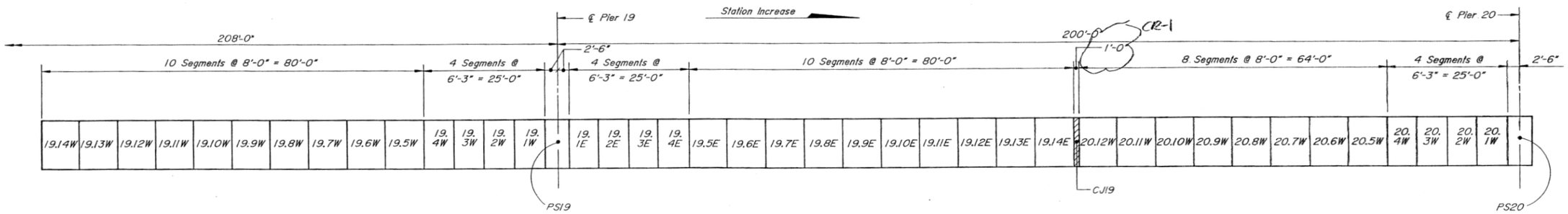
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

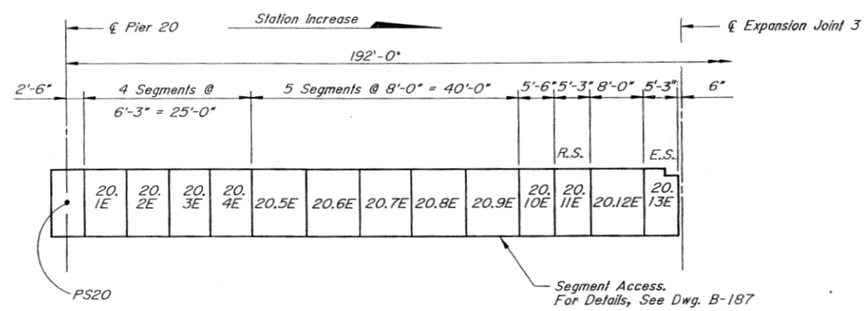
AS CONSTRUCTED		
NO REVISIONS	REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-324

REVISIONS		

SEE CMO #30
REINFORCING ADDED





E.S. - Denotes Expansion Joint Segment
R.S. - Denotes Rear Expansion Beam Segment
PS - Denotes Pier Segment
CJ - Denotes Closure Joint

LEGEND

2.2E
- E-East Side (Station Increase)
- W-West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.

INITIAL	DATE		
Designed By	TVA	4-89	Checked By	AOS	4-89
Checked By	WSA	4-89	Quantities By	AOS	4-89
Detailed By	MHM	4-89	Checked By	SJG	5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 19 THRU CANTILEVER 20

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-103	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

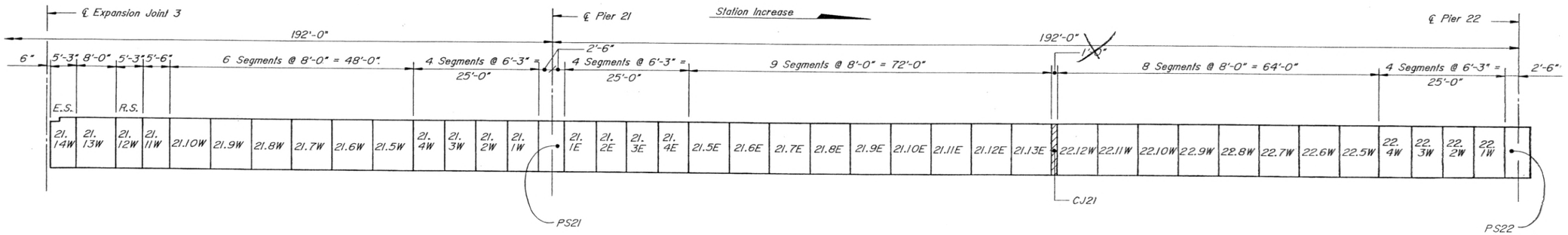
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

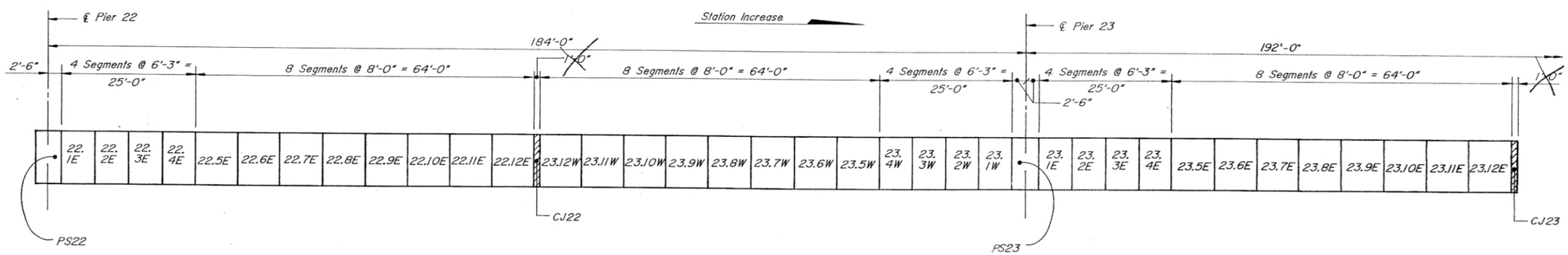
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-325

REVISIONS			
CR-1		REVISE CLOSURE DIMENSIONS	CFB

SEE CMO #30
REINFORCING ADDED





E.S. - Denotes Expansion Joint Segment
R.S. - Denotes Rear Expansion Beam Segment
PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line

LEGEND

2.2E
- E-East Side (Station Increase)
- W-West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

INITIAL	DATE		INITIAL	DATE
Designed By	T.S.	4-89	Checked By	4-89
Checked By	W.P.M.	4-89	Quantities By	4-89
Detailed By	M.M.M.	4-89	Checked By	5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 21 THRU CANTILEVER 23

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-104 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

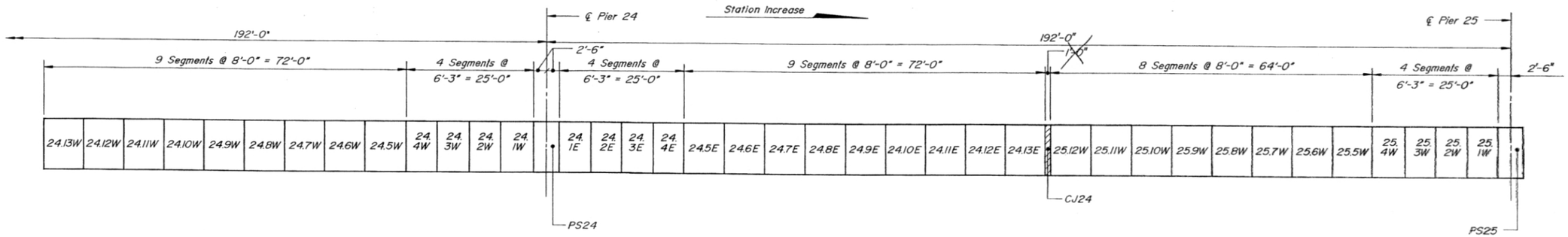
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

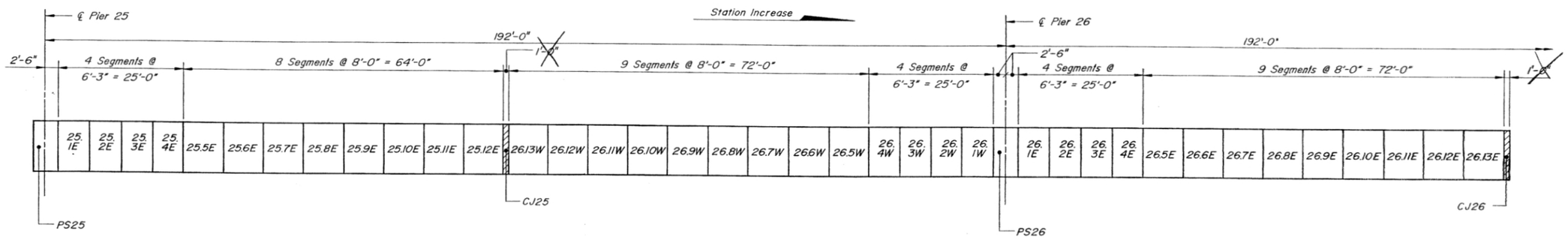
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VII	COLORADO	I 70-2(145)	II-326

SEE CMO #30
ADDED REINFORCING

	REVISIONS	
CR-	REVISE CLOSURE DIMENSIONS	CFB





PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.

LEGEND

2.2E
- E-East Side (Station Increase)
- W-West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 24 THRU CANTILEVER 26

Designer	T. Stelmack	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-105 of 217 Drawings			

Revision Dates			(Preliminary Stage Only)			

	INITIAL	DATE		
Designed By	TWS	4-89	Checked By	AOS 4-89
Checked By	WHH	4-89	Quantities By	MJS 4-89
Detailed By	MMM	4-89	Checked By	SJG 5-89

BRUNING 44-232 73350

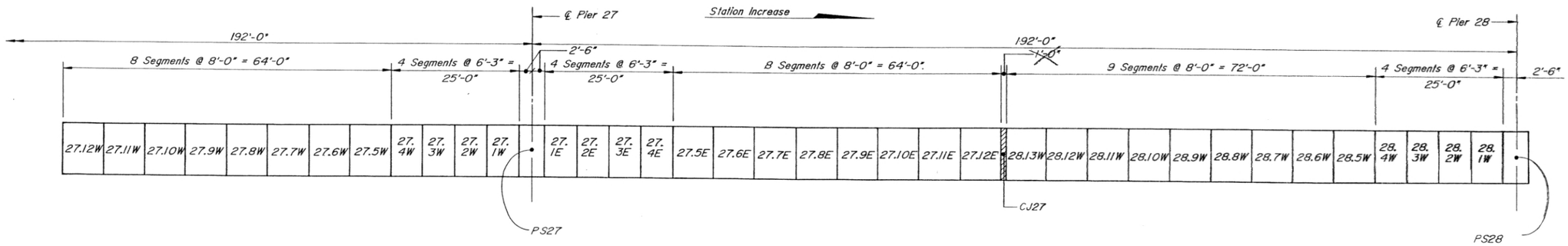
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1988

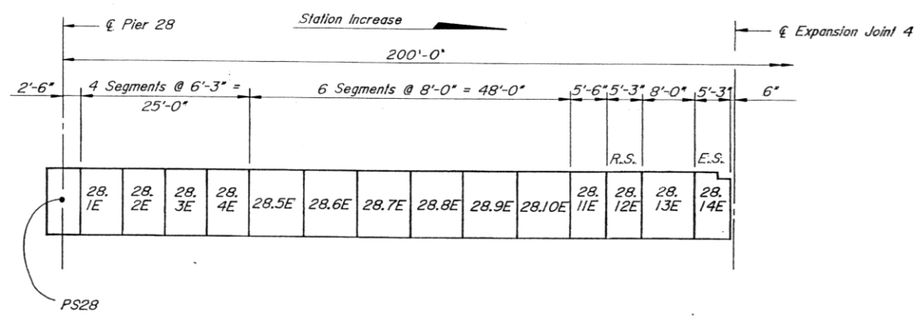
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VII	COLORADO	I 70-2(145)	11-327

REVISIONS		
CR-1	REVISE CLOSURE DIMENSIONS	CFB

SEE CMO #30
ADDED REINFORCING





	INITIAL	DATE		
Designed By	TWS	4-89	Checked By	ACS 4-89
Checked By	WSH	4-89	Quantities By	AOE 4-89
Detailed By	MHH	4-89	Checked By	SJC 5-89

E.S. - Denotes Expansion Joint Segment
R.S. - Denotes Rear Expansion Beam Segment
PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line

LEGEND

2.2E
- E-East Side (Station Increase)
  W-West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 27 THRU CANTILEVER 28

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-106 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

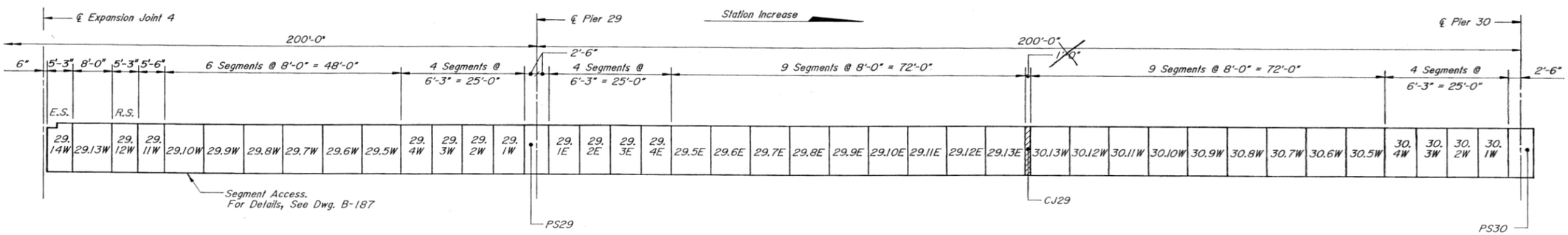
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

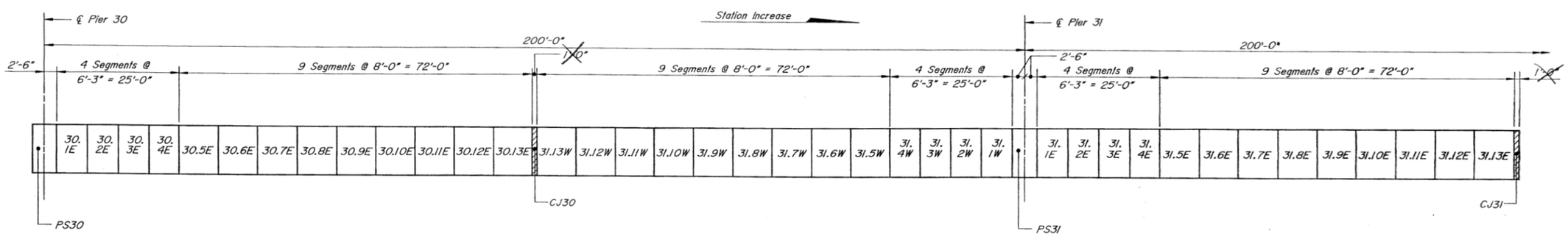
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-328

SEE CMO #30
ADDED REINFORCING

REVISIONS			
CR-1		REVISE CLOSURE DIMENSIONS	CFB





E.S. - Denotes Expansion Joint Segment
R.S. - Denotes Rear Expansion Beam Segment
PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.

LEGEND

2.2E

- E - East Side (Station Increase) / W - West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

INITIAL	DATE	
Designed By TWS	4-89	
Checked By WSM	4-89	
Detailed By MMM	4-89	
Checked By		
Quantities By	4-89	
Checked By	4-89	

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 29 THRU CANTILEVER 31

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-107 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

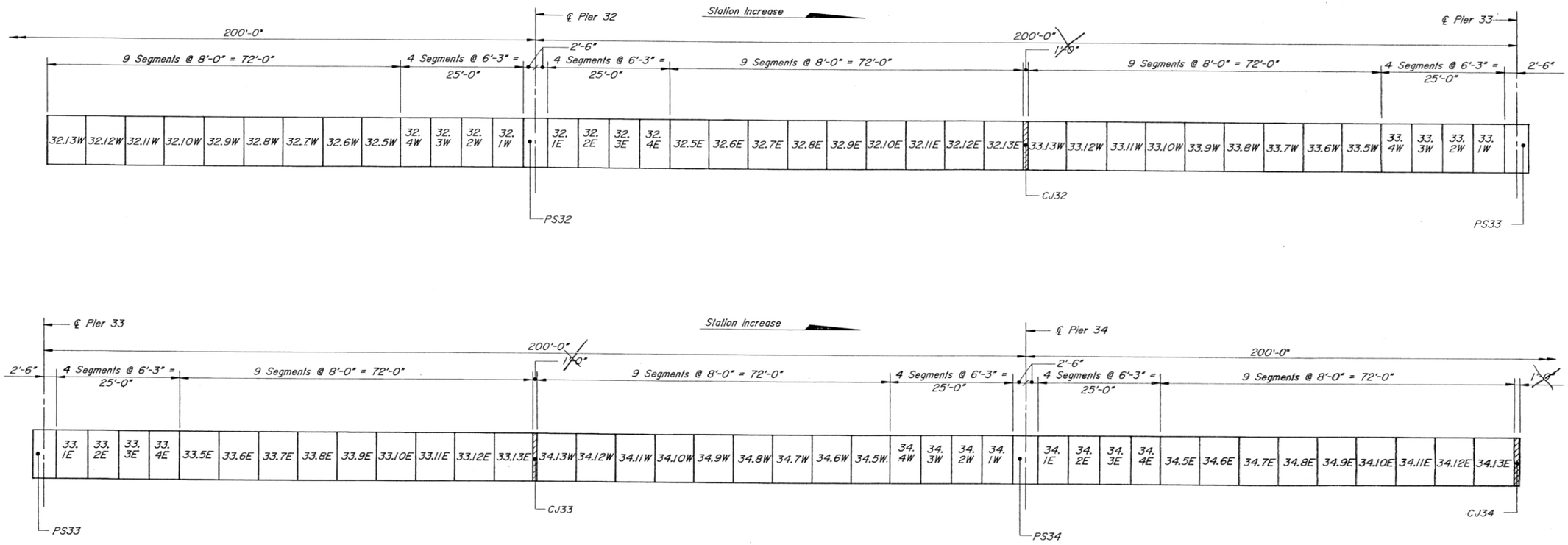
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-329

REVISIONS		
CR-1	REVISE CLOSURE DIMENSIONS	CFB

SEE CMO #30
ADDED REINFORCING



PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line

LEGEND

2.2E
- E-East Side (Station Increase)
- W-West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 32 THRU CANTILEVER 34

Designer	T. Stelmack	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-108	of 217	Drawings	

Revision Dates	(Preliminary Stage Only)						

Designed By	TWG	4-89
Checked By	WHH	4-89
Detailed By	MMH	4-89
Checked By		4-89
Quantities By		4-89
Checked By		5-89

BRUNING 44-232 73350

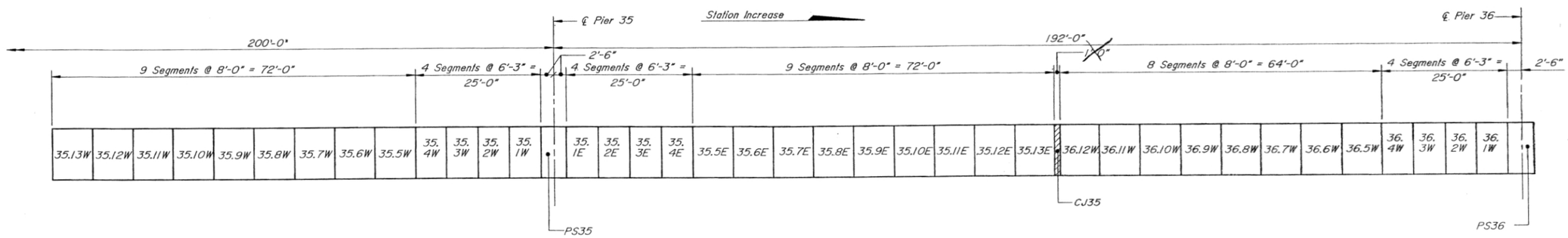
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117:
REV. APR. 1986

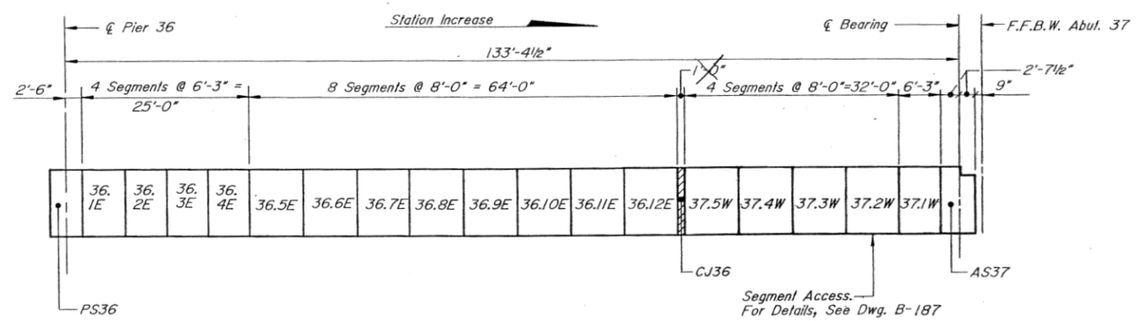
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-330

REVISIONS			
CR-1		REVISE CLOSURE DIMENSIONS	CFB

SEE CMO #30
ADDED REINFORCING





AS - Denotes Abutment Segment
PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
All Lengths Given are Horizontal Projections Along the Horizontal Control Line

LEGEND

2.2E
- E-East Side (Station Increase)
- W-West Side (Station Decrease)
- Segment Number
- Pier and Cantilever Number

	INITIAL	DATE		INITIAL	DATE
Designed By	TWS	4-89	Checked By	AOS	4-89
Checked By	WSM	4-89	Quantities By	AOS	4-89
Detailed By	MMM	4-89	Checked By	SLG	5-89

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Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SEGMENT DESIGNATION
CANTILEVER 35 THRU ABUTMENT 37

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-109	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

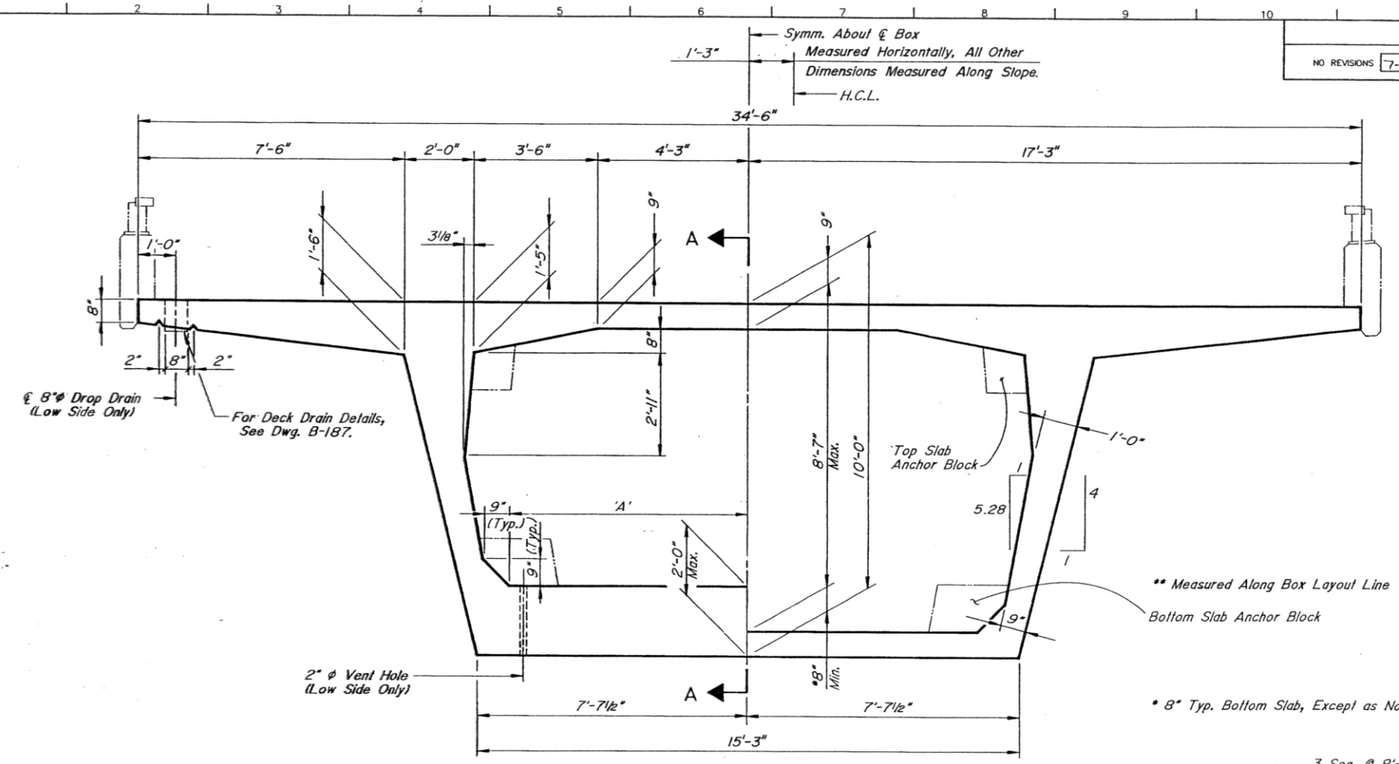
DGN 7/27/94 9:46 AM

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS;
D. O. H. FORM NO. 117;
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS	7-20-93	REVISED	VOID

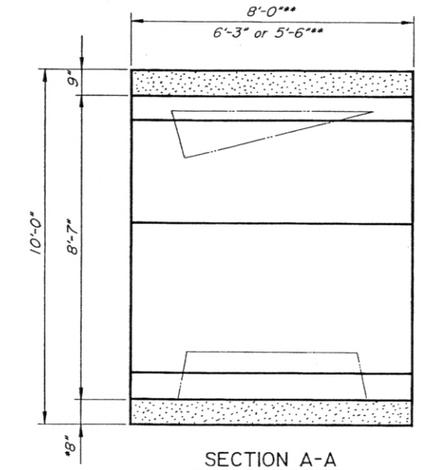
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-331

REVISIONS		



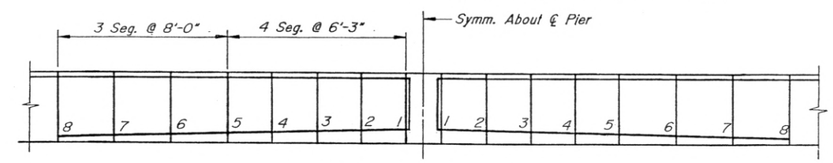
CROSS SECTION

* 8" Typ. Bottom Slab, Except as Noted Below.

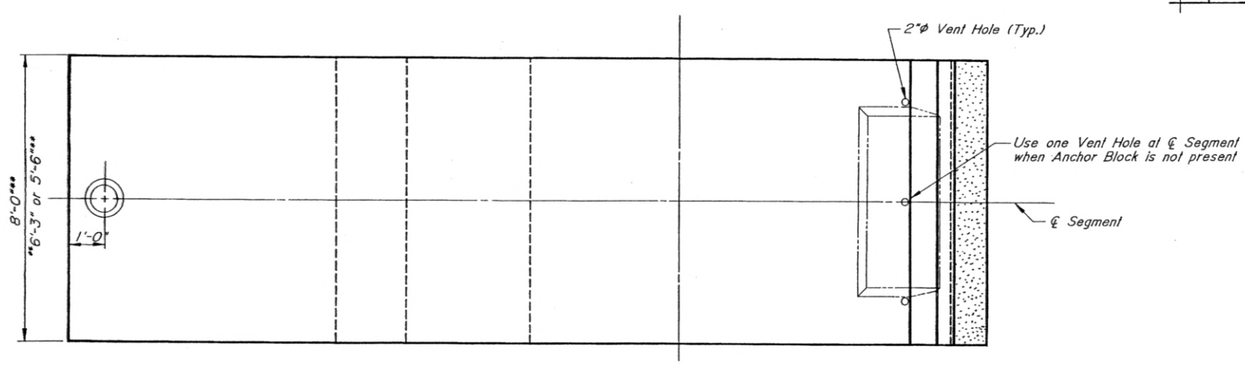


SECTION A-A

(8'-0" Segment Shown, 6'-3" and 5'-6" are Similar.)



VARIABLE BOTTOM SLAB



HALF PLAN - TOP SLAB

HALF PLAN - BOTTOM SLAB

Joint Number	Bottom Slab Thickness	Dimension 'A'
1	2'-0"	6'-8 1/2"
2	1'-10"	6'-8 1/8"
3	1'-7 1/8"	6'-7 3/4"
4	1'-5 7/8"	6'-7 3/8"
5	1'-3 7/8"	6'-7"
6	1'-1 1/4"	6'-6 1/2"
7	10 5/8"	6'-6"
8	8"	6'-5 1/2"

Notes:

- For Transverse Post-Tensioning Details, See Dwg. B-146.
- For Longitudinal Post-Tensioning Details, See Dwg. B-163 to 166.
- For Bottom Slab Anchor Block Details, See Dwg B-176 to 186.
- For Barrier Rail Details, See Dwg. B-201 & 202.

- For Bulkhead Details, See Dwg. B-145.
- For Top Slab Anchor Block Details, See Dwg. B-175.

	INITIAL	DATE				
Designed By	W.S.M.	4-89	Checked By	M.H.H.	4-89
Checked By	T.W.S.	4-89	Quantities By	A.O.S.	4-89
Detailed By	A.O.S.	4-89	Checked By	KDK	4-89
				S/G	5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

TYPICAL SEGMENT DIMENSIONS
(10'-0" Depth)

Designer	W. S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	A. Sanchez		
Drawing Number B-110 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

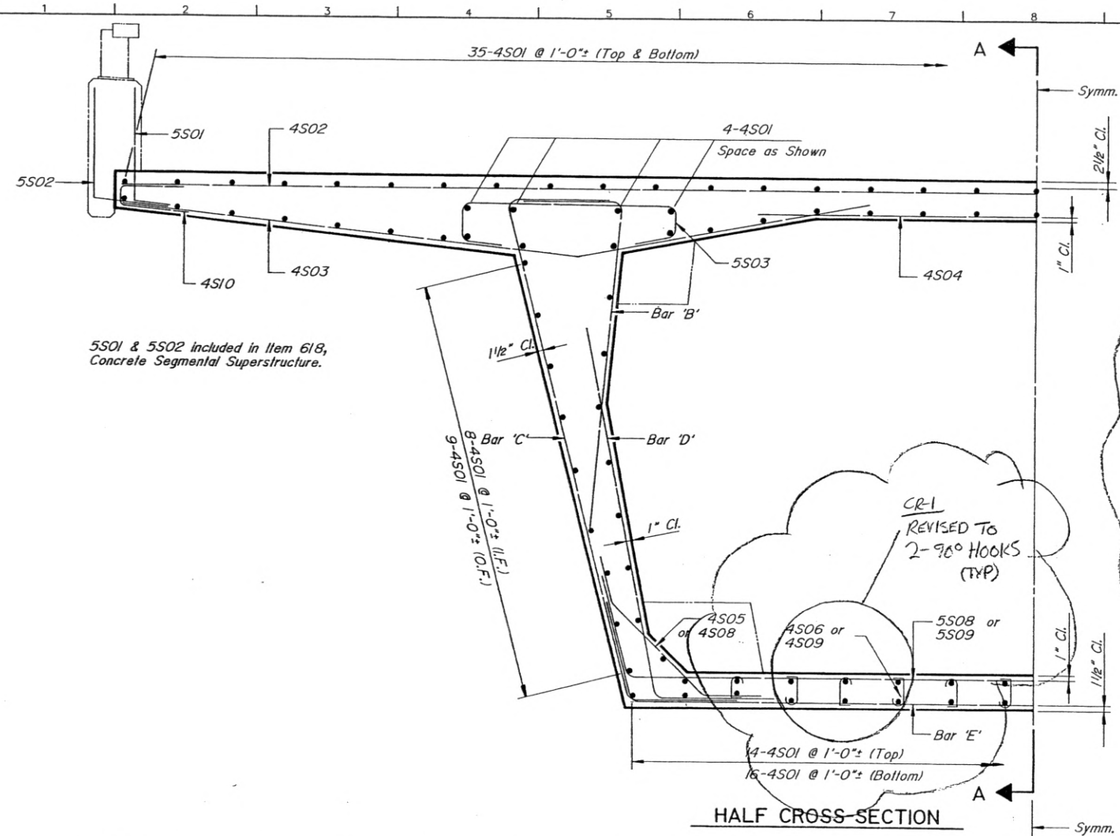
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

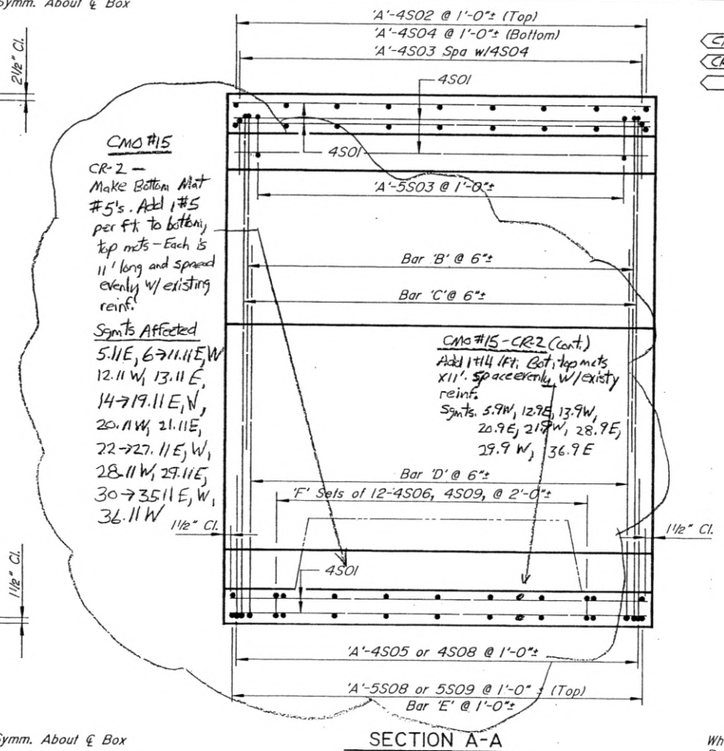
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-332

REVISIONS		
CR-1	REVISE REINFORCING	CFB
CR-2	REVISE REINFORCING	CFB



5S01 & 5S02 included in Item 618, Concrete Segmental Superstructure.

HALF CROSS-SECTION



CMO #15
CR-2 — Make Bottom Mat #5's. Add 1 #5 per ft to bottom, top mats — Each is 11' long and spaced evenly w/ existing reinf.
Sgmts Affected
5.11E, 6→11.11E,W
12.11 W, 13.11 E,
14→19.11 E,W,
20.11 W, 21.11E,
22→27.11 E,W,
28.11 W, 29.11E,
30→35.11 E,W,
36.11 W

CMO #15 - CR2 (cont.)
Add 1 #11 1 ft. Bot, top mats x 11'. Spaced evenly w/ existy reinf.
Sgmts. 5.9W, 12.9E, 13.9W,
20.9E, 21.9W, 28.9E,
29.9 W, 36.9E

SECTION A-A

Notes:

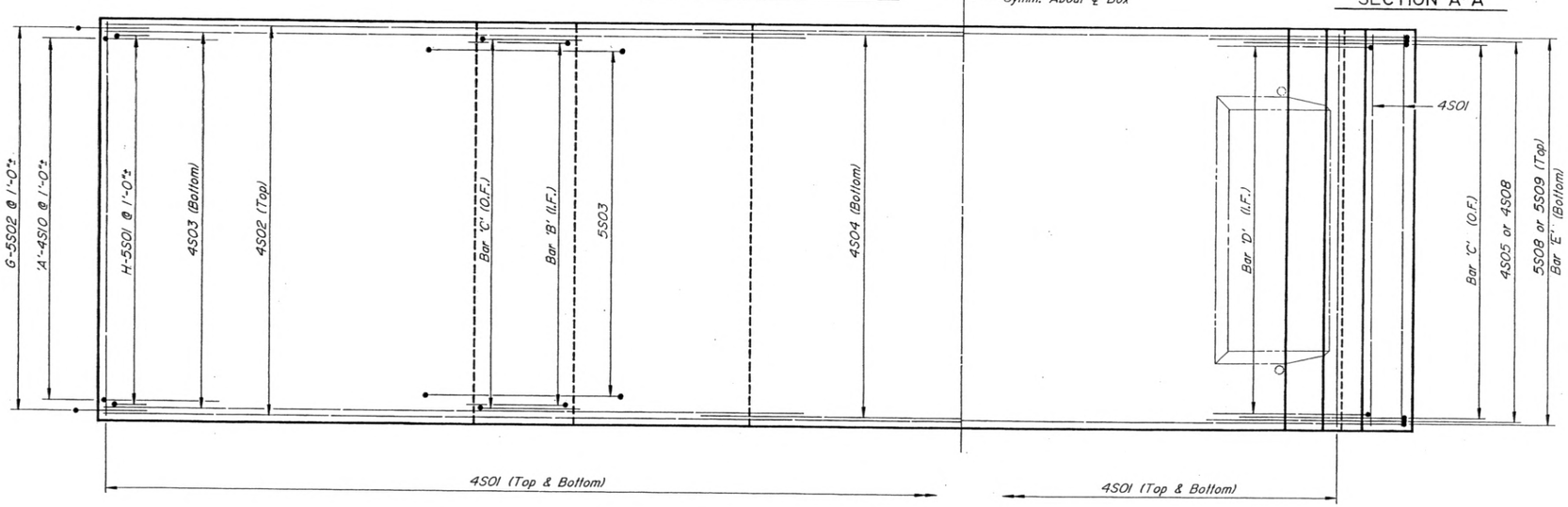
'G' for 8'-0" Segment = 8
'G' for 6'-3" Segment = 6
'G' for 5'-6" Segment = 5

'H' for 8'-0" Segment = 15
'H' for 6'-3" Segment = 12
'H' for 5'-6" Segment = 11

'A' for 8'-0" Segment = 9
'A' for 6'-3" Segment = 7
'A' for 5'-6" Segment = 6

'F' for 8'-0" Segment = 4
'F' for 6'-3" Segment = 3
'F' for 5'-6" Segment = 3

When Bottom Slab Thickens 4S08 Replaces 4S05, 5S09 Replaces 5S08 & 4S06 Replaces 4S09



HALF PLAN - TOP

HALF PLAN - BOTTOM

Notes:

Space Reinforcement to Avoid Tendons.
1½" Concrete Cover unless Noted Otherwise.
For Transverse P.T. Details, See Dwg. B-146.
For Longitudinal P.T. Details, See Dwg. B-163 to 170.
For Bottom Slab Anchor Block Reinforcement, See Dwg. B-176 to 186.
For Top Slab Anchor Block Reinforcement, See Dwg. B-175.
For Barrier Rail Reinforcement, See Dwg. B-201 & 202..
O.F. denotes Outside Face.
I.F. denotes Inside Face.
Location of Drains & Vent Holes May be Adjusted Longitudinally to Avoid P.T. Tendons & Reinforcement.

	INITIAL	DATE				
Designed By	TW.S.	4-89	Checked By	A.O.S	4-89
Checked By	W.S.M.	4-89	Quantities By	M.M.M.	4-89
Detailed By	M.M.M.	4-89	Checked By	S.C.	5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

TYPICAL SEGMENT
REINFORCEMENT I

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-111		of 217	Drawings

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS	REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-333

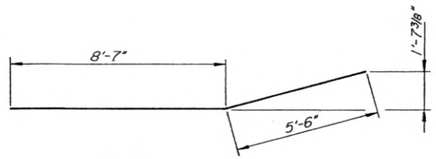
CR-1

*-SPACING ON PARAPET/ TYPE 8 RAIL DRAWING GOVERNS

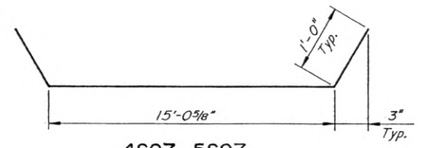
REVISIONS		
CR-1	REVISE REINFORCING DETAIL	CFB

BAR BENDING DIAGRAMS

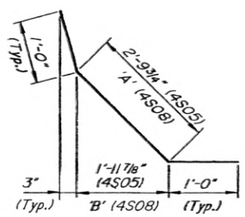
(All Dimensions are Out to Out)

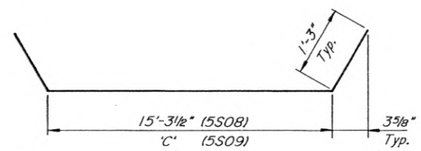


4S03



4S07, 5S07





°Seg. No.	'A' Varies	'B' Varies	Aver. Length
1	4'-7 1/4" to 4'-10 1/4"	3'-3 1/8" to 3'-5 1/4"	6'-9"
2	4'-4" to 4'-7 1/4"	3'-0 3/4" to 3'-3 1/8"	6'-6"
3	4'-0 3/4" to 4'-4"	2'-10 1/2" to 3'-0 3/4"	6'-3"
4	3'-9 3/4" to 4'-0 3/4"	2'-8 3/8" to 2'-10 1/2"	6'-0"
5	3'-5 3/4" to 3'-9 3/4"	2'-5 1/2" to 2'-8 3/8"	5'-8"
6	3'-1 3/4" to 3'-5 3/4"	2'-2 3/4" to 2'-5 1/2"	5'-4"
7	2'-9 3/4" to 3'-1 3/4"	1'-11 7/8" to 2'-2 3/4"	5'-0"

4S05, 4S08

°Seg. No.	'C' Varies	Aver. Length
1	15'-10 1/2" to 15'-11 1/2"	18'-5"
2	15'-9 1/4" to 15'-10 1/2"	18'-4"
3	15'-8 1/4" to 15'-9 1/4"	18'-3"
4	15'-7 1/4" to 15'-8 1/4"	18'-2"
5	15'-6" to 15'-7 1/4"	18'-1"
6	15'-4 3/4" to 15'-6"	18'-0"
7	15'-3 1/2" to 15'-4 3/4"	17'-11"

° Refers to the Second Number of the Segment Designation.
Seg. No. 1 thru 4 are 6'-3" Segments.
Seg. No. 5,6, & 7 are 8'-0" Segments.

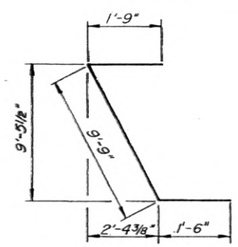
2.(2)E

*Number Preceding Letter Denotes Bar Size.
All Bar Bends shall be in Accordance with A.C.I. Standards.

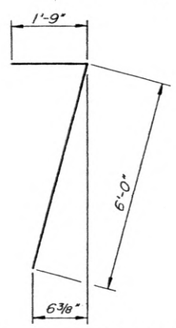
BAR LIST

8'-0" SEGMENT					6'-3" SEGMENT					5'-6" SEGMENT				
*Bar	No.	Length	Str.	Bent	*Bar	No.	Length	Str.	Bent	*Bar	No.	Length	Str.	Bent
4S01	142	7'-9"	●		4S01	142	6'-0"	●		4S01	142	5'-3"	●	
4S02	9	34'-3"	●		4S02	7	34'-3"	●		4S02	6	34'-3"	●	
4S03	18	14'-1"		●	4S03	14	14'-1"		●	4S03	12	14'-1"		●
4S04	9	10'-6"	●		4S04	7	10'-6"	●		4S04	6	10'-6"	●	
**4S05	18	4'-10"		●	4S06	36	See Chart		●	4S05	12	4'-10"		●
** 4S06	48	See Chart		●										●
4S07	***	17'-1"		●						4S07	***	17'-1"		●
**4S08	18	See Chart		●	4S08	14	See Chart		●	4S10	12	2'-10"		●
** 4S09	48	****2'-3"		●						4S09	36	1'-9"		●
4S10	18	2'-10"		●	4S10	14	4'-10"		●					
5S01	18	3'-5"		●	5S01	14	3'-5"		●	5S01	12	3'-5"		●
5S02	18	4'-2"		●	5S02	14	4'-2"		●	5S02	12	4'-2"		●
5S03	18	8'-0"		●	5S03	14	8'-0"		●	5S03	12	8'-0"		●
5S04	***	7'-9"		●	5S07	***	17'-1"		●	5S04	***	7'-9"		●
5S05	***	13'-3"		●	5S09	7	See Chart		●	5S05	***	13'-3"		●
5S06	***	8'-9"		●						5S06	***	8'-9"		●
5S07	***	17'-1"		●						5S08	6	19'-10"		●
5S08	9	17'-10"		●	6S01	***	13'-3"		●	6S01	***	13'-3"		●
5S09	9	See Chart		●	6S02	***	7'-9"		●	6S02	***	7'-9"		●
6S01	***	13'-3"		●	6S03	***	8'-9"		●					
6S02	***	7'-9"		●										
6S03	***	8'-9"		●	7S01	***	13'-3"		●					
7S01	***	13'-3"		●	7S02	***	7'-9"		●					
7S02	***	7'-9"		●										

**** Length Given is an Average.

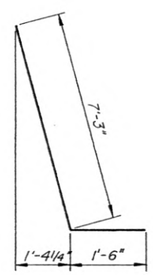


5S05, 6S01, & 7S01



5S08, 5S09

5S04, 6S02, & 7S02

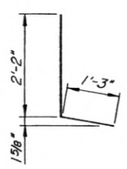


5S06, 6S03

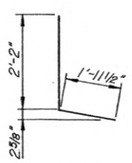
***Web Reinforcing (No. of Bars Shown for 1 Side , Except for 4S07 & 5S07 which is the Total for One Segment.)

Bar	6'-3" Segments	8'-0" Segments: °Segments 5 - 7	8'-0" Segments: Remaining Segments	5'-6" Segments
'B'	7-7S02 + 6-6S02 Alternate @ 6"	17-6S02 Spaced @ 6"	9-6S02 + 8-5S04 Alternate @ 6"	6-6S02 + 6-5S04 Alternate @ 6"
'C'	7-7S01 + 6-6S01 Alternate @ 6"	17-6S01 Spaced @ 6"	9-6S01 + 8-5S05 Alternate @ 6"	6-6S01 + 6-5S05 Alternate @ 6"
'D'	13-6S03 Spaced @ 6"	17-5S06 Spaced @ 6"	17-5S06 Spaced @ 6"	12-5S06 Spaced @ 6"
'E'	7-5S07 Spaced @ 12"	9-5S07 Spaced @ 12"	9-4S07 Spaced @ 12"	6-4S07 Spaced @ 12"

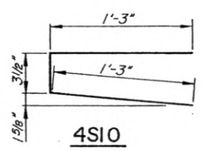
**When Bottom Slab Thickens, 4S05, 4S09, & 5S08 are Replaced w/ 4S08, 4S06, & 5S09 Respectively.



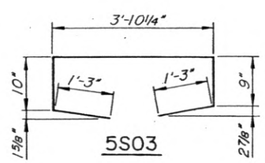
5S01



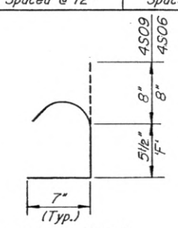
5S02



4S10



5S03



4S06, 4S09

°Seg. No.	'F' Varies	Aver. Length
1	1'-7 3/4" to 1'-9 1/4"	1'-9"
2	1'-5 3/4" to 1'-7 1/4"	1'-7"
3	1'-3 1/2" to 1'-5 1/4"	1'-5"
4	1'-1 1/2" to 1'-3"	1'-3"
5	11" to 1'-1"	1'-0"
6	8 1/4" to 10 1/2"	10"
7	5 3/4" to 7 3/4"	7"

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

TYPICAL SEGMENT
REINFORCEMENT II

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	D. Michael		
Drawing Number B-112		of 217	Drawings

INITIAL	DATE	
T.H.S.	4-89	Designed By
W.S.M.	4-89	Checked By
D.M.	4-89	Detailed By
A.P.S.	4-89	Checked By
M.M.M.	4-89	Quantities By
S.J.C.	5-89	Checked By

Revision Dates (Preliminary Stage Only)

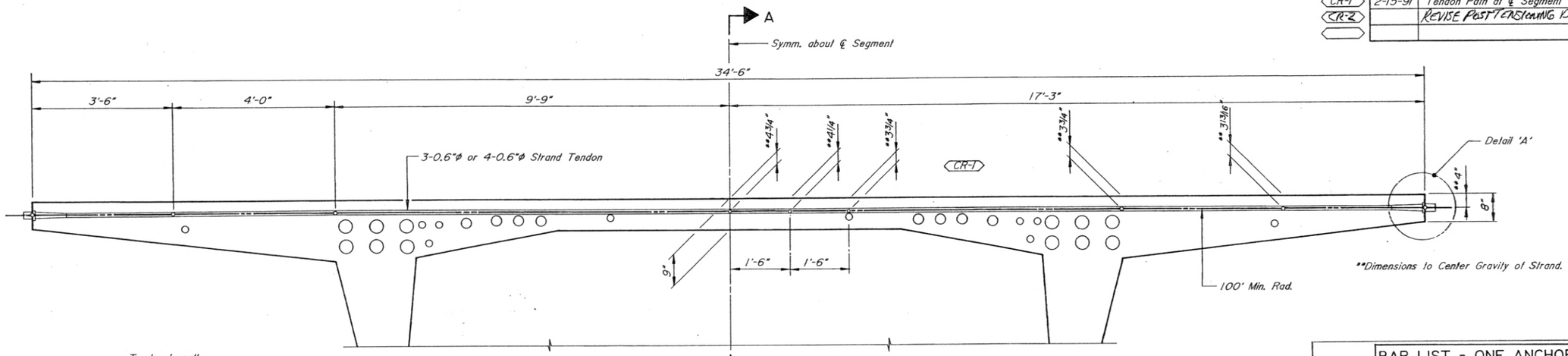
BRUNING 44-233 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

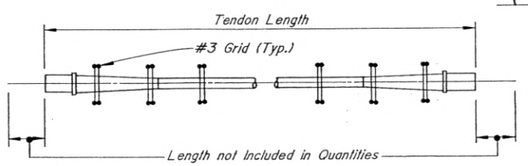
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

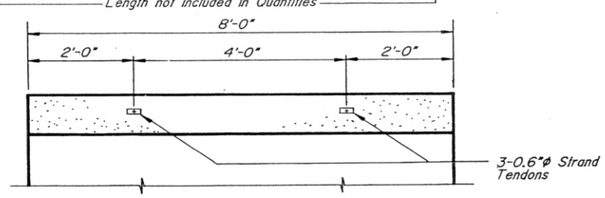
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-367X

REVISIONS			
CR-1	2-15-91	Tendon Path at ℄ Segment	TWS
CR-2		REVISE POST TENSIONING DETAIL	CJB

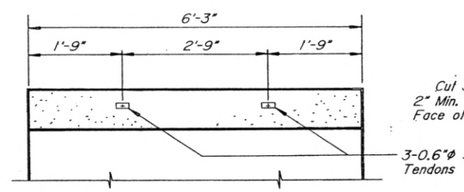


HALF CROSS SECTION - TOP SLAB

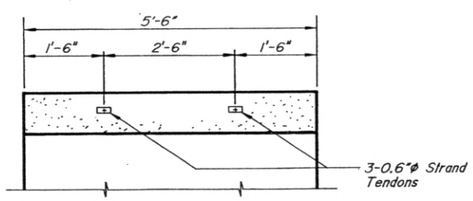




SECTION A-A @ 8'-0" SEGMENT

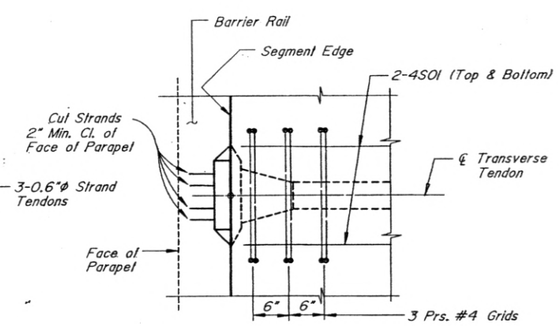


SECTION A-A @ 6'-3" SEGMENT



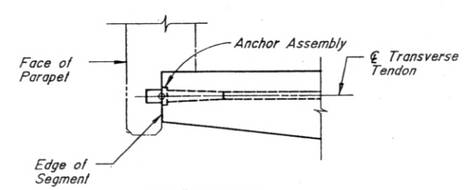
SECTION A-A @ 5'-6" SEGMENT

Notes:
All Tendons shall be Single end Stressed.
The Stressing end for Tendons within a Segment shall be Staggered.
Stressing Force for 4-0.6"ϕ Tendon = 176K.
Stressing Force for 3-0.6"ϕ Tendon = 132K.



PLAN

(Typical @ Each Anchor)



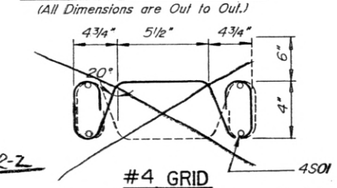
DETAIL 'A'

BAR LIST - ONE ANCHOR

*Bar	No.	Length	Str.	Bent
#4 Grid	6	2'-8"		●
4S01	4	2'-9"	●	

BAR BENDING DIAGRAMS

(All Dimensions are Out to Out.)



CR-2

#4 GRID

CHANGED TO "FREXSINET" GRIDS

*Number Preceding Letter Denotes Bar Size.
All Bar Bends Shall be in Accordance with A.C.I. Standards.
The Cost of Reinforcement is Incidental to the Cost of Post-Tensioning.

Figg and Muller Engineers, Inc.
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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - I7W
CONCRETE ALTERNATE

TRANSVERSE POST-TENSIONING DETAILS

Designer	L.C. Powell	Structure Numbers	F-08-BJ (I7W)
Detailer	K. Krueger		
Drawing Number B-146X of 217 Drawings			

Revision Dates								
(Preliminary Stage Only)								

	INITIAL	DATE		
Designed By	LCP	4-89	Checked By	4-89
Checked By	LSM	4-89	Quantities By	4-90
Detailed By	KK	4-89	Checked By	5-90

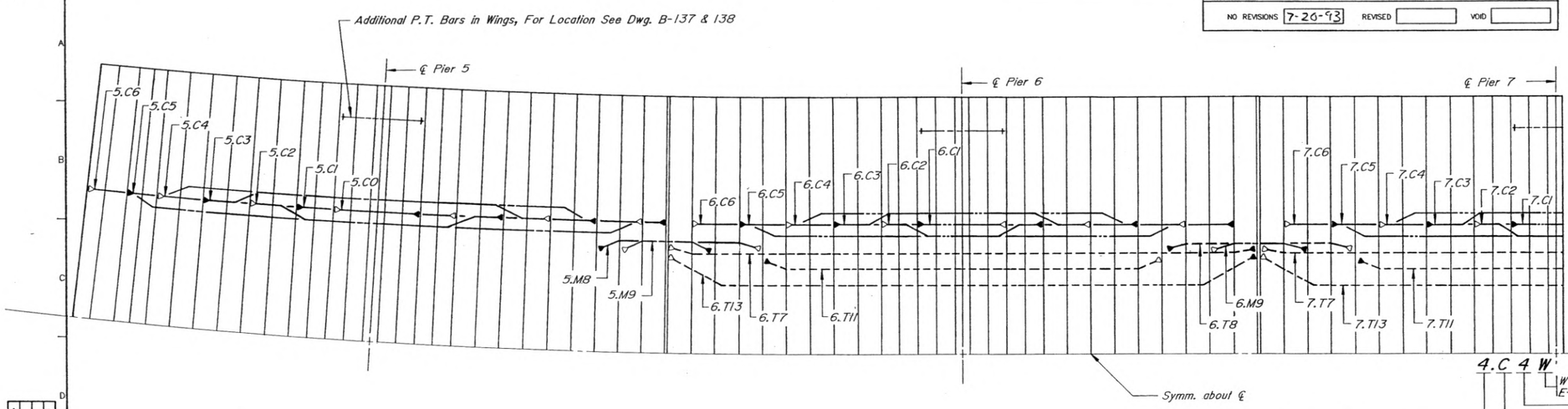
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1988

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

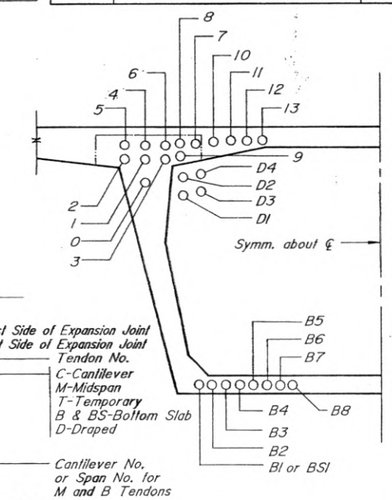
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-368

REVISIONS		

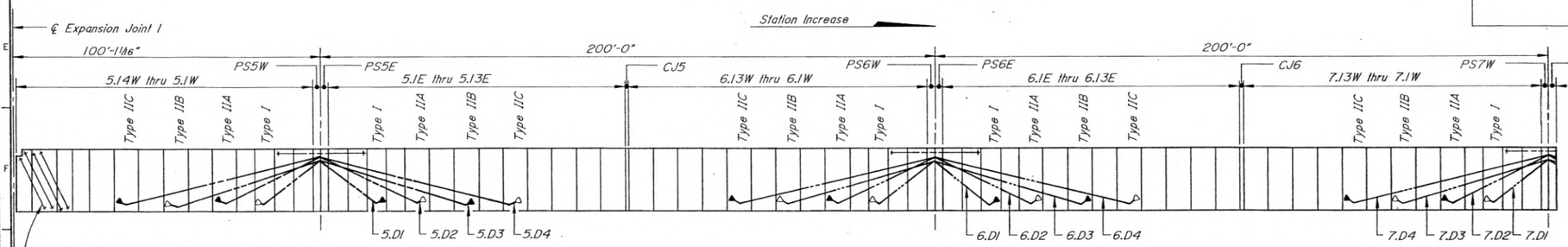


Tendons 7, 8, & 9 require a Top Slab Anchor Block, See Dwg. B-175

PARTIAL PLAN - TOP SLAB TENDONS



4.C 4 W
- W-West Side of Expansion Joint
- E-East Side of Expansion Joint
- Tendon No.
- C-Cantilever
- M-Midspan
- T-Temporary
- B & BS-Bottom Slab
- D-Draped
- Cantilever No. or Span No. for M and B Tendons



ELEVATION - DRAPED TENDONS

- Permanent Tendon
- Temporary Tendon
- ▲ Stressing End
- △ Non-Stressing End

PS - Denotes Pier Segment.
CJ - Denotes Closure Joint.

Notes:
- For Post-Tensioning Details, See Dwg. B-163 to 169
- This Drawing is Schematic only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- Tendons 5.C0 thru 5.C6, 6.C1 & 7.C1 are 19-0.6" ϕ Strands.
- Tendon 4.B6E & All M8, M9, T7, T8 Tendons are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
- Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendons 6.BS1 & 7.BS1 shall be Stressed after the Cantilever Tendons in the Next Erected Segment have been Stressed.

STRESSING SEQUENCE SPAN 4E

-- Before Expansion Joint Beam is Placed:
4.B6E, 4.B4E, 4.B3E

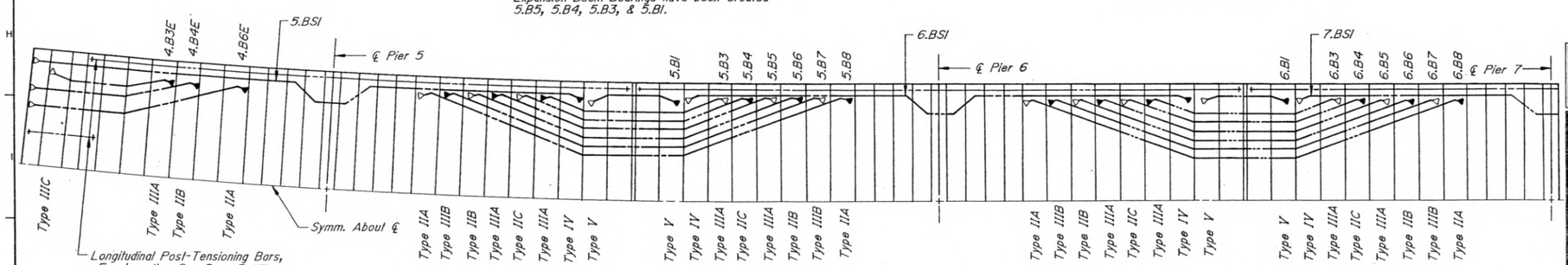
For Web Post-Tensioning Details, See Dwg. B-171

STRESSING SEQUENCE SPAN 5

-- After Closure CJ5: 5.M9, 5.B8, 5.M8, 5.B7, & 5.B6.
-- After Gantry has been Launched to Pier 7 and Expansion Beam Bearings have been Grouted:
5.B5, 5.B4, 5.B3, & 5.B1.

STRESSING SEQUENCE SPAN 6

-- After Closure CJ6: 6.M9, 6.B8, 6.B6, & 6.B7.
-- After Gantry has been Launched to Pier 7:
6.B5, 6.B4, 6.B3, & 6.B1.



PARTIAL PLAN - BOTTOM SLAB TENDONS

Notes:
- Tendon 5.BS1 Shall be Stressed after the Last Segment in Cantilever 5 has been Erected.
- For Longitudinal P.T. Bar Details, See Dwg. B-171

Designed By	W.S.M.	8-88	A.D.S. 4-89
Checked By	T.W.S.	4-89	A.D.S. 4-89
Detailed By	M.M.M.	8-88	S.K. 5-89
Quantities By			
Checked By			

INITIAL DATE

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 5 THRU PIER 7

Designer	W. S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-147 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

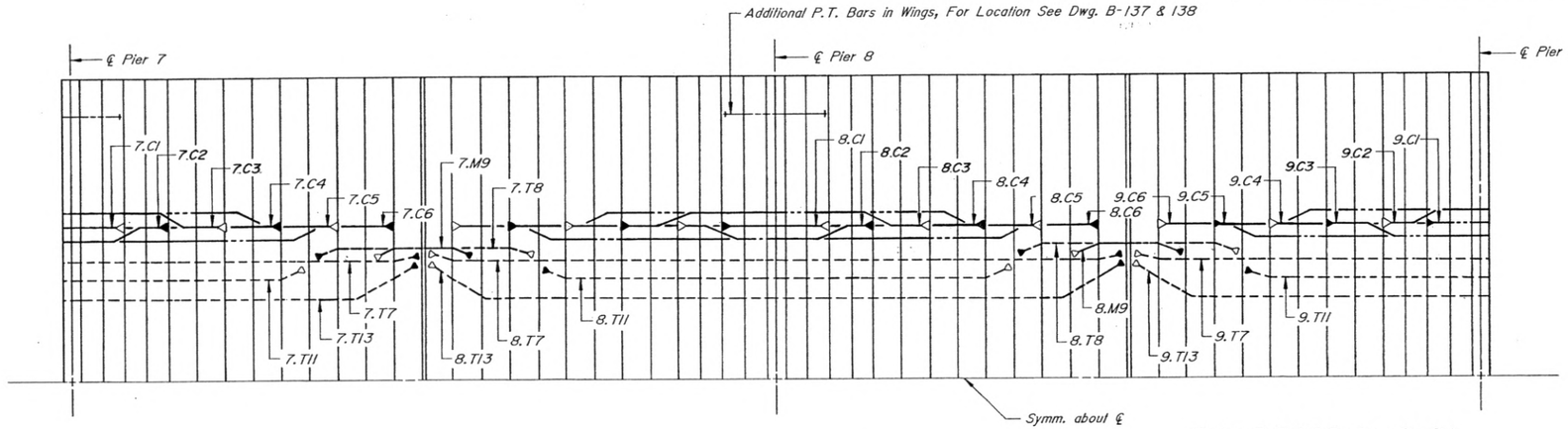
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

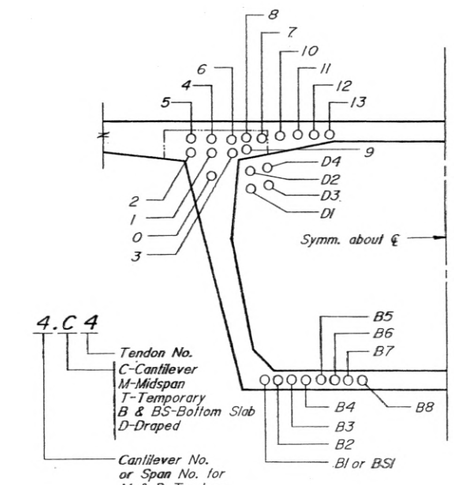
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-369

REVISIONS		



Tendons 7, 8, & 9 require a Top Slab Anchor Block, See Dwg. B-175

PARTIAL PLAN - TOP SLAB TENDONS



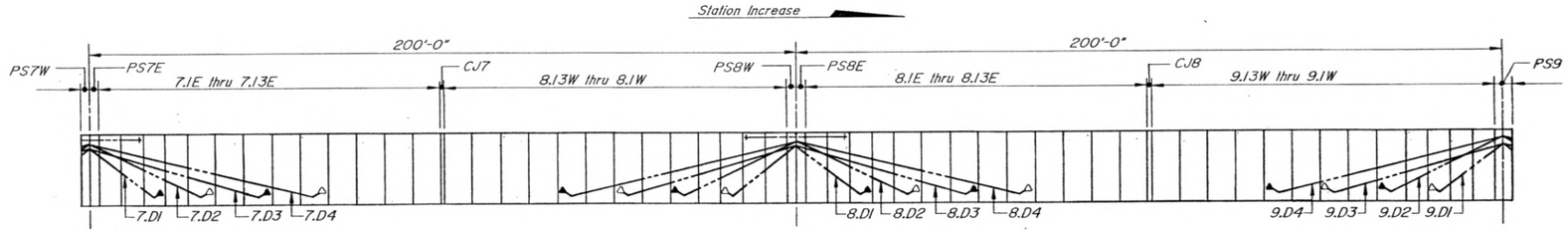
4.C 4
- Tendon No.
- C-Cantilever
- M-Midspan
- T-Temporary
- B & BS-Bottom Slab
- D-Draped
- Cantilever No. or Span No. for M & B Tendons

——— Permanent Tendon
- - - - Temporary Tendon

▲ Stressing End
△ Non-Stressing End

PS - Denotes Pier Segment
CJ - Denotes Closure Joint.

Note:
- This Drawing is Schematic only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- All C1 Tendons on this Dwg. are 19-0.6" ϕ Strands.
- All M9, T7, & T8 Tendons on this Dwg. are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Anchor Block Types, See Dwg. B-147.
- For Longitudinal P.T. Bar Details, See Dwg. B-171



ELEVATION - DRAPED TENDONS

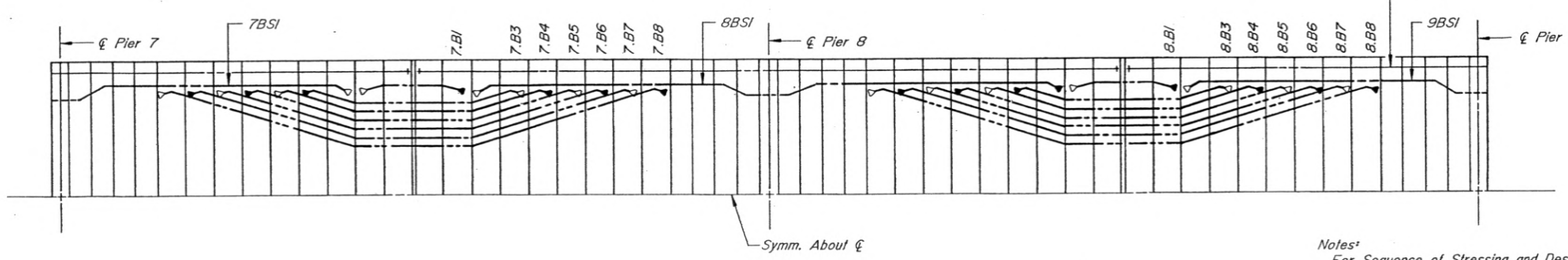
STRESSING SEQUENCE SPAN 7

-- After Closure Joint CJ7: 7.M9, 7.B8, 7.B7, & 7.B6.
-- After Gantry has been Launched to Pier 9: 7.B5, 7.B4, 7.B3, & 7.B1.

STRESSING SEQUENCE SPAN 8

-- After Closure Joint CJ8: 8.M9, 8.B8, 8.B7, & 8.B6.
-- After Gantry has been Launched to Pier 10: 8.B5, 8.B4, 8.B3, & 8.B1.

Longitudinal Post-Tensioning Bars, For Location See Dwg. B-171



PARTIAL PLAN - BOTTOM SLAB TENDONS

Notes:
For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190to193
Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendon (BS) shall be Stressed after the Cantilever Tendons in the next Erected Segment.

Designed By	W.S.M.	DATE 8-88	Checked By	A.D.S. 4-89
Checked By	T.W.S.	7-89	Quantities By	A.D.S. 4-89
Detailed By	M.M.M.	8-88	Checked By	S.L.S. 5-90

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 7 THRU PIER 9

Designer	W. S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-148	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

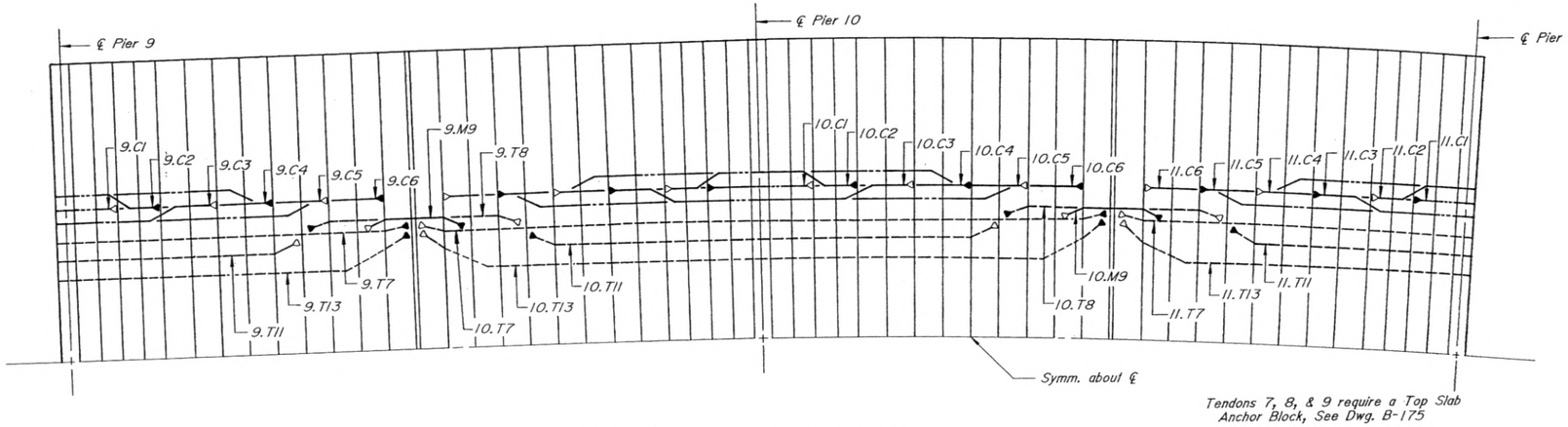
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1988

AS CONSTRUCTED			
NO REVISIONS	7-20-93	REVISED	
		VOID	

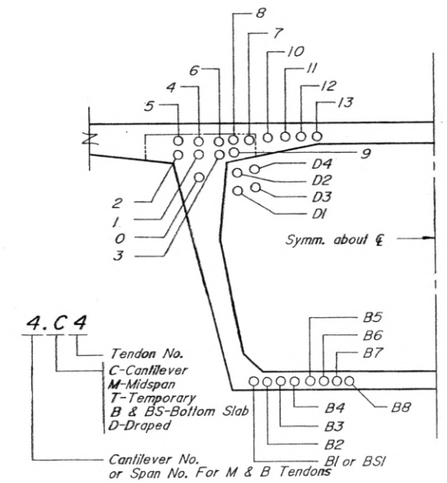
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-370

REVISIONS	



Tendons 7, 8, & 9 require a Top Slab Anchor Block, See Dwg. B-175

PARTIAL PLAN - TOP SLAB TENDONS



4.C4
- Tendon No.
- C-Cantilever
- M-Midspan
- T-Temporary
- B & B5-Bottom Slab
- D-Draped
- Cantilever No. or Span No. For M & B Tendons

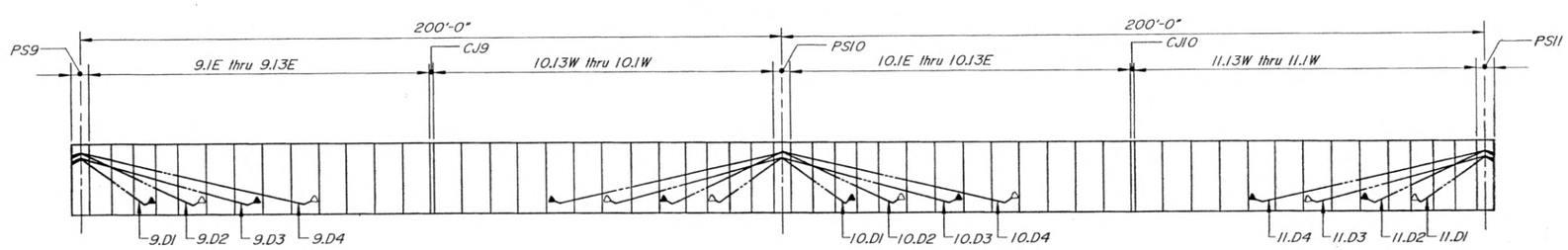
——— Permanent Tendon
------ Temporary Tendon

▲ Stressing End
△ Non-Stressing End

PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
This Drawing is Schematic only.
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
For Post-Tensioning Details, See Dwg. B-163 to 169.

Station Increase



ELEVATION - DRAPED TENDONS

For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendons (B5) Shall be Stressed after the Cantilever Tendons in the Next Erected Segment have been Stressed.
For Anchorage Type, See Dwg. B-147.
- For Longitudinal P.T. Bar Details, See Dwg. B-171.

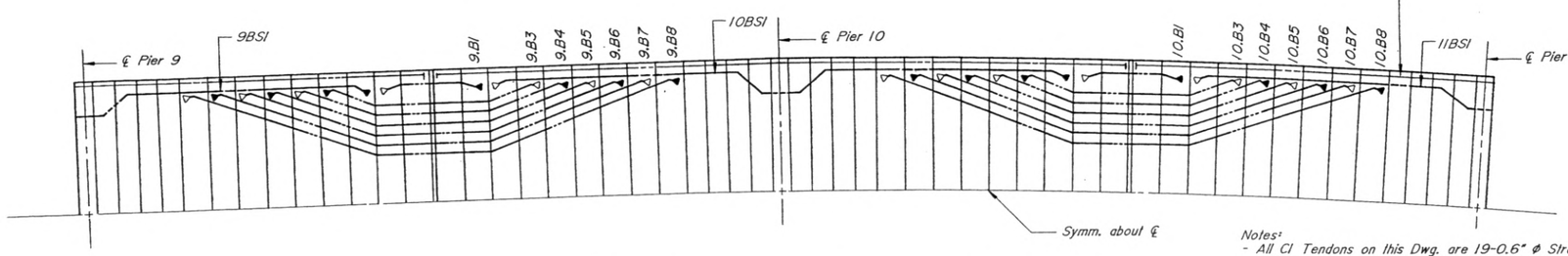
STRESSING SEQUENCE SPAN 9

-- After Closure Joint CJ9: 9.M9, 9.B8, 9.B7, & 9.B6
-- After Gantry has been Launched to Pier 11: 9.B5, 9.B4, 9.B3, & 9.B1

STRESSING SEQUENCE SPAN 10

-- After Closure Joint CJ10: 10.M9, 10.B8, 10.B7, & 10.B6
-- After Gantry has been Launched to Pier 12: 10.B5, 10.B4, 10.B3, & 10.B1

Longitudinal Post-Tensioning Bars For Location, See Dwg. B-171.



Notes:
- All C1 Tendons on this Dwg. are 19-0.6" ϕ Strands.
- All M9, T7, & T8 Tendons on this Dwg. are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-.6" ϕ Strands.

PARTIAL PLAN - BOTTOM SLAB TENDONS

	INITIAL	DATE			
Designed By	W.S.M.	8-88	Checked By	M.O.S.	4-89
Checked By	T.H.S.	4-89	Quantities By	H.D.S.	4-89
Detailed By	M.M.M.	8-88	Checked By	S.G.	5-89

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 9 THRU PIER 11

Designer	W. S. McNary	Structure	F-08-B1
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-149		of 217	Drawings

Revision Dates (Preliminary Stage Only)

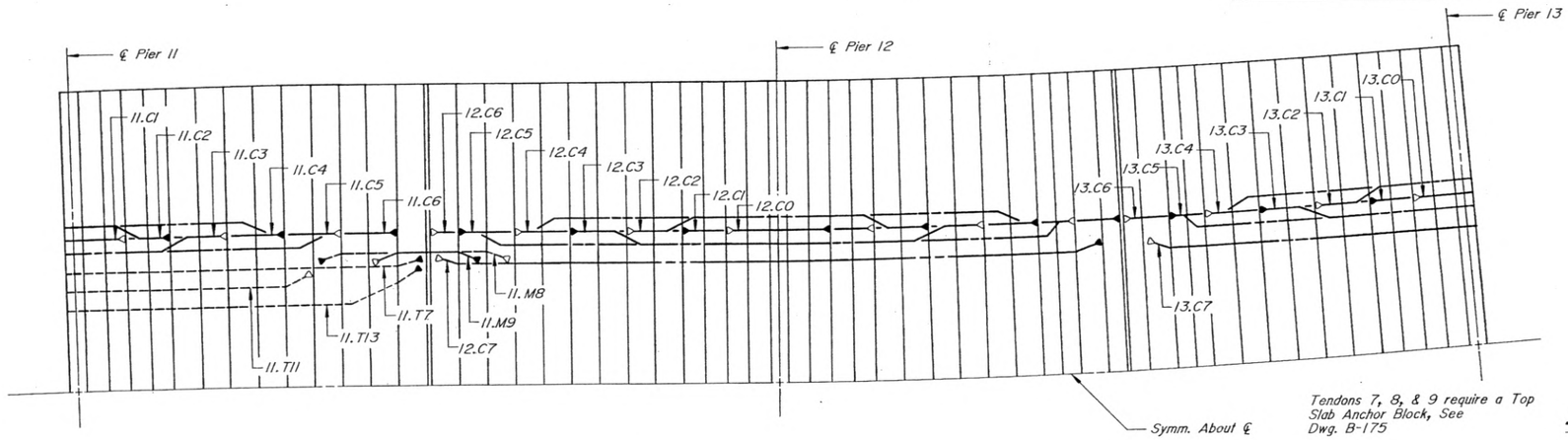
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

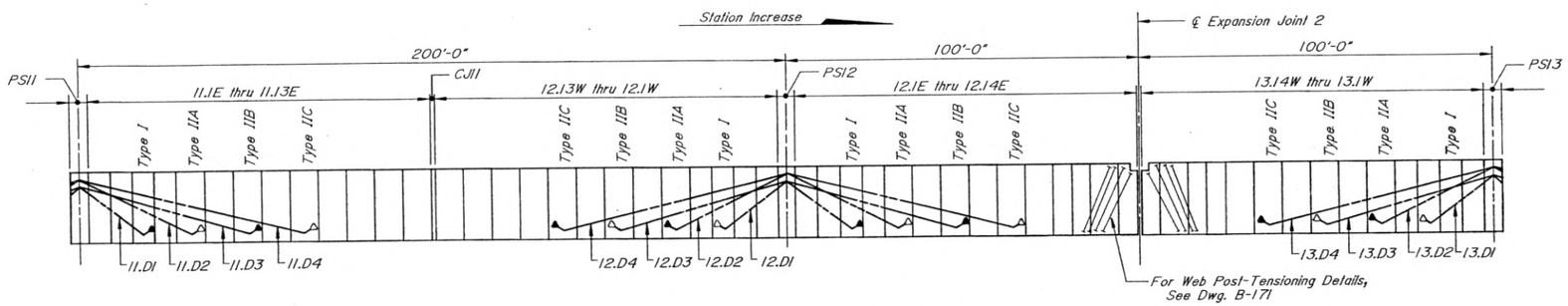
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-371

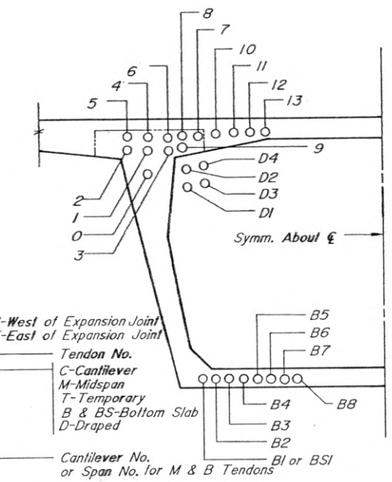
REVISIONS



PARTIAL PLAN - TOP SLAB TENDONS



ELEVATION - DRAPED TENDONS



——————— Permanent Tendon
- - - - - - - Temporary Tendon

▲ Stressing End
△ Non-Stressing End

PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
- This Drawing is Schematic Only.
- All lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- Tendons 11.C1, 12.C0 thru 12.C6 & 13.C0 thru 13.C6 are 19-0.6" ϕ Strands.
- Tendon 11.B3 and all M8, M7, T7, & C7 Tendons on this Dwg. are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.

For Anchorage Types, See Dwg. B-147.

- For Longitudinal P.T. Bar Details, See Dwg. B-171

STRESSING SEQUENCE SPAN 11

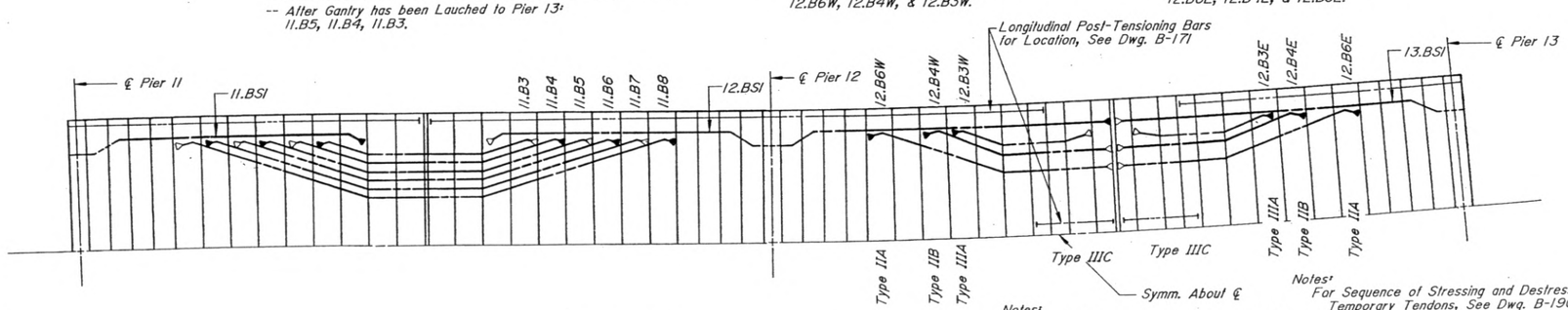
-- After Closure Joint CJ11: 11.M9, 11.B8, 11.M8, 11.B7, & 11.B6.
-- After Gantry has been Lauched to Pier 13: 11.B5, 11.B4, 11.B3.

STRESSING SEQUENCE SPAN 12W

-- Before Expansion Beam is Shimmed: 12.B6W, 12.B4W, & 12.B3W.

STRESSING SEQUENCE SPAN 12E

-- Before Expansion Beam is Shimmed: 12.B6E, 12.B4E, & 12.B3E.



PARTIAL PLAN - BOTTOM SLAB TENDONS

Notes:
Tendon 12.BS1 shall be Stressed after the Last Segment in Cantilever 12 is Erected.
Tendon 13.BS1 shall be Stressed after the Last Segment in Cantilever 13 is Erected.

Notes:
For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendon 11.BS1 shall be Stressed after the Cantilever Tendons in the Next Erected Segment have been Stressed.

	INITIAL	DATE	Checked By	A.D.S.	4-89
Designed By	W.S.M.	8-88	Quantities By	A.D.S.	4-89
Checked By	T.L.S.	4-89	Checked By	S/G.	5-89
Detailed By	M.M.M.	8-88			

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 11 THRU PIER 13

Designer	W. S. McNary	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-150		of 217	Drawings

Revision Dates (Preliminary Stage Only)

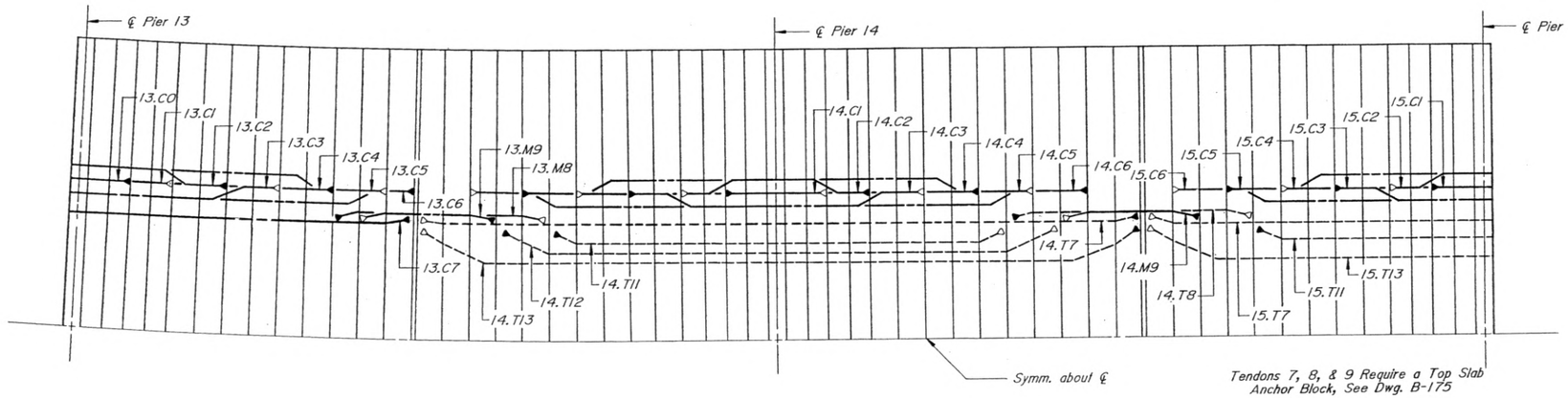
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

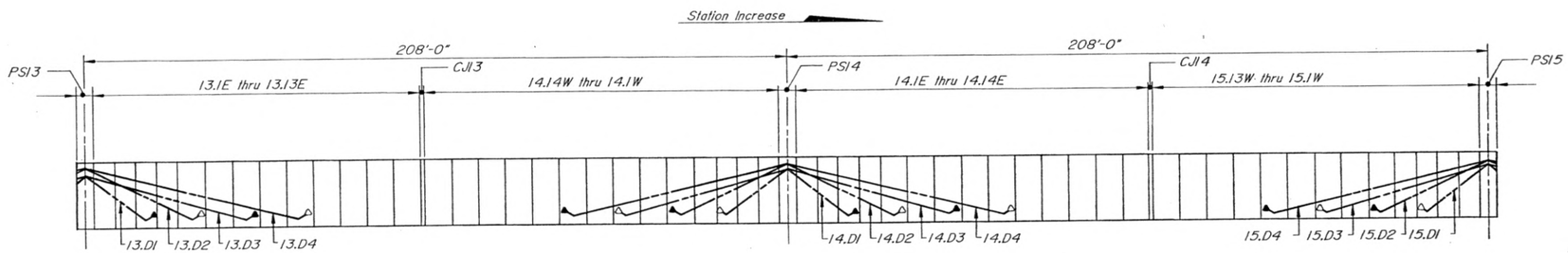
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-372

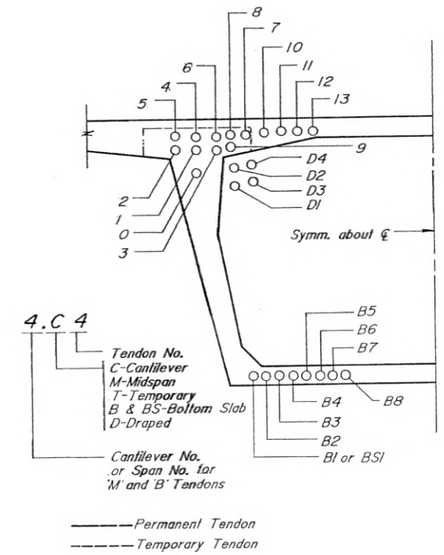
REVISIONS		



PARTIAL PLAN - TOP SLAB TENDONS



ELEVATION - DRAPED TENDONS



——— Permanent Tendon
- - - - Temporary Tendon

▲ Stressing End
△ Non-Stressing End
PS - Denotes Pier Segment
CJ - Denotes Closure Joint

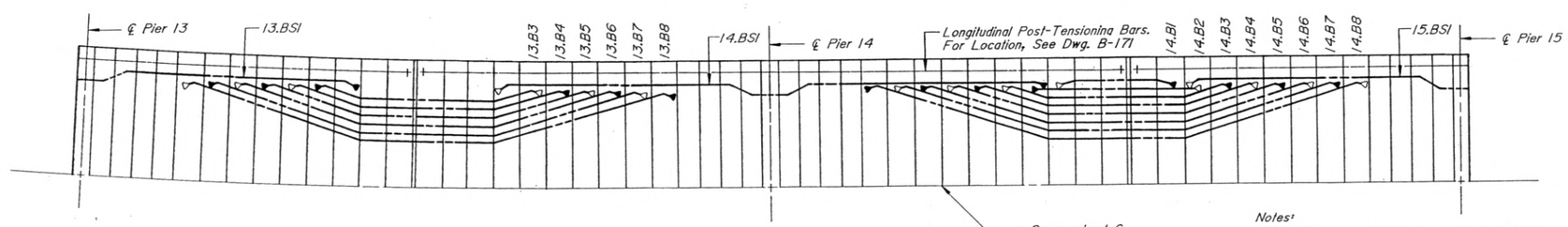
Notes:
- This Drawing is Schematic only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- Tendons 13.C0 thru 13.C6, 14.C1, & 15.C1 are 19-0.6" ϕ Strands.
- All M8, M9, T7, T8, & C7 Tendons on this Dwg. are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Anchorage Type, See Dwg. B-147.
- For Longitudinal P.T. Bar Details, See Dwg. B-171

STRESSING SEQUENCE SPAN 13

-- After Closure Joint CJ13: 13.M9, 13.B8, 13.M8, 13.B7, & 13.B6
-- After Gantry has been Launched to Pier 15: 13.B5, 13.B4, 13.B3.

STRESSING SEQUENCE SPAN 14

-- After Closure Joint CJ14: 14.M9, 14.B8, 14.B7, & 14.B6.
-- After Gantry has been Launched to Pier 16: 14.B5, 14.B4, 14.B3, 14.B2, & 14.B1.



Notes:
Tendon 13.BS1 shall be Stressed after the Last Segment in Cantilever 13 is Erected.

Notes:
For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendon 14.BS1 & 15.BS1 shall be Stressed after the Cantilever Tendons in the Next Erected Segment have been Stressed.

PARTIAL PLAN - BOTTOM SLAB TENDONS

	INITIAL	DATE			
Designed By	W.S.M.	8-88	Checked By	A.D.S.	4-89
Checked By	T.W.S.	4-89	Quantities By	A.D.S.	4-89
Detailed By	M.M.M.	8-88	Checked By	S.G.	5-89

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 13 THRU PIER 15

Designer	W. S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number	B-151	of 217	Drawings

Revision Dates (Preliminary Stage Only)

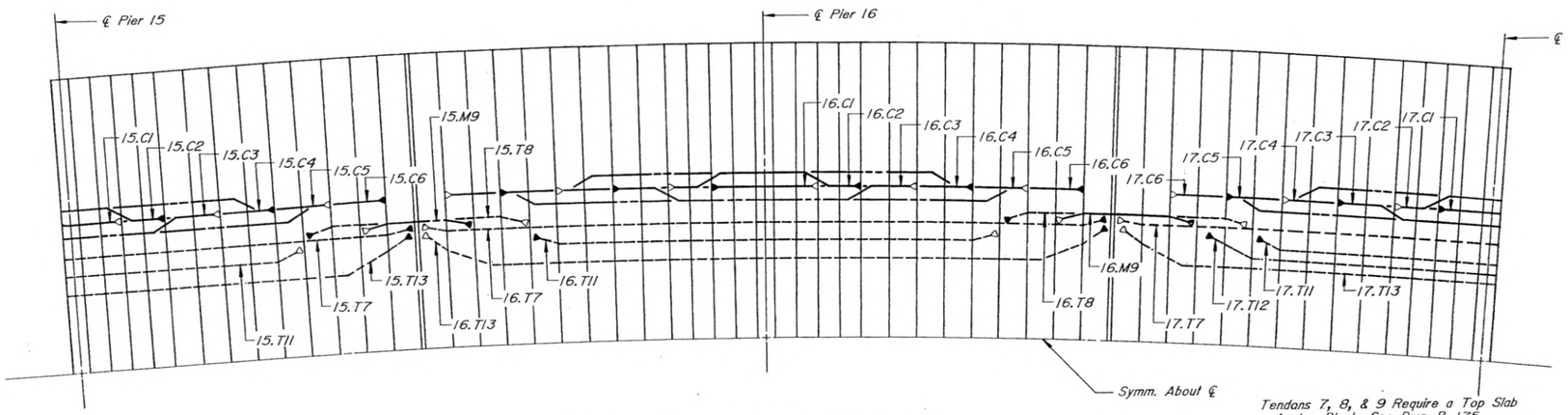
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

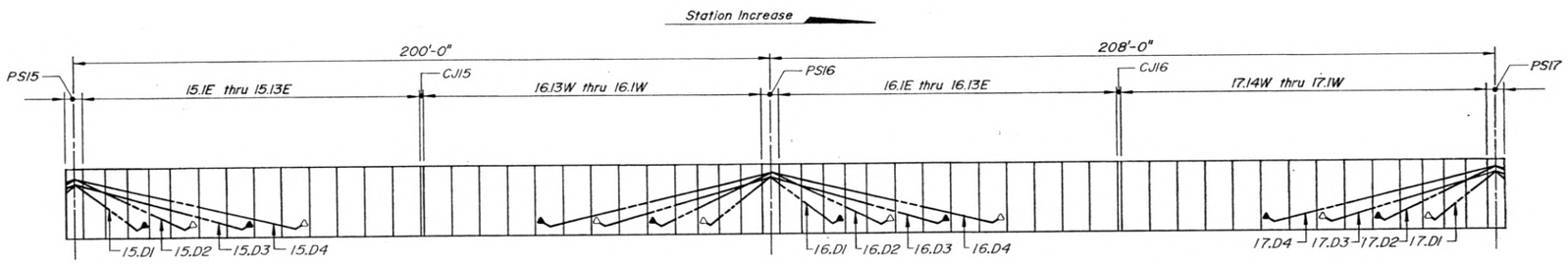
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-373

REVISIONS	

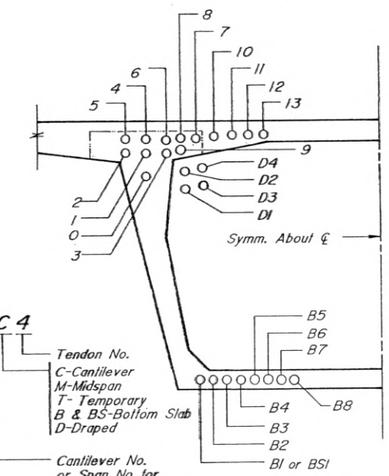


Tendons 7, 8, & 9 Require a Top Slab Anchor Block, See Dwg. B-175

PARTIAL PLAN - TOP SLAB TENDONS



ELEVATION - DRAPED TENDONS



4.C4
- Tendon No.
- C-Cantilever
- M-Midspan
- T- Temporary
- B & BS-Bottom Slab
- D-Draped
- Cantilever No. or Span No. for 'M' and 'B' Tendons.

——— Permanent Tendon
- - - - Temporary Tendon
▲ Stressed End
△ Non-Stressed End

PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Notes:
- This Drawing is Schematic Only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- All C1 Tendons on this Dwg. are 19-0.6" ϕ Strands.
- All M9, T7, & T8 Tendons on this Dwg. are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Anchorage types, See Dwg. B-147.
- For Longitudinal P.T. Bar Details, See Dwg. B-171

STRESSING SEQUENCE SPAN 15

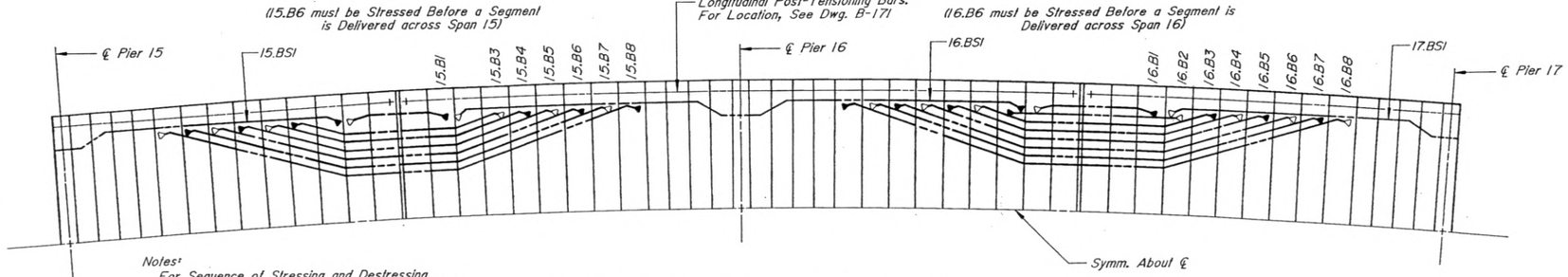
-- After Closure Joint CJ15: 15.M9, 15.B8, 15.B7.
-- After Gantry has been Launched to Pier 17: 15.B6, 15.B5, 15.B4, 15.B3, & 15.B1

(15.B6 must be Stressed Before a Segment is Delivered across Span 15)

STRESSING SEQUENCE SPAN 16

-- After Closure Joint CJ16: 16.M9, 16.B8, 16.B7.
-- After Gantry has been Launched to Pier 18: 16.B6, 16.B5, 16.B4, 16.B3, 16.B2, & 16.B1.

(16.B6 must be Stressed Before a Segment is Delivered across Span 16)



Notes:
For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendon (BS) shall Be Stressed after the Cantilever Tendons in the Next Erected Segment have been Stressed.

PARTIAL PLAN - BOTTOM SLAB TENDONS

Designed By	W.S.M.	DATE 8-88	
Checked By	T.W.S.	DATE 4-89	
Detailed By	M.M.M.	DATE 8-88	
Checked By	A.D.S.	DATE 4-89	
Quantities By	A.D.S.	DATE 4-89	
Checked By	S.J.K.	DATE 5-89	

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 15 THRU PIER 17

Designer W. S. McNary		Structure Numbers	F-08-BJ (17W)
Detailer M. Miyamoto			
Drawing Number B-152	of 217		Drawings

Revision Dates (Preliminary Stage Only)

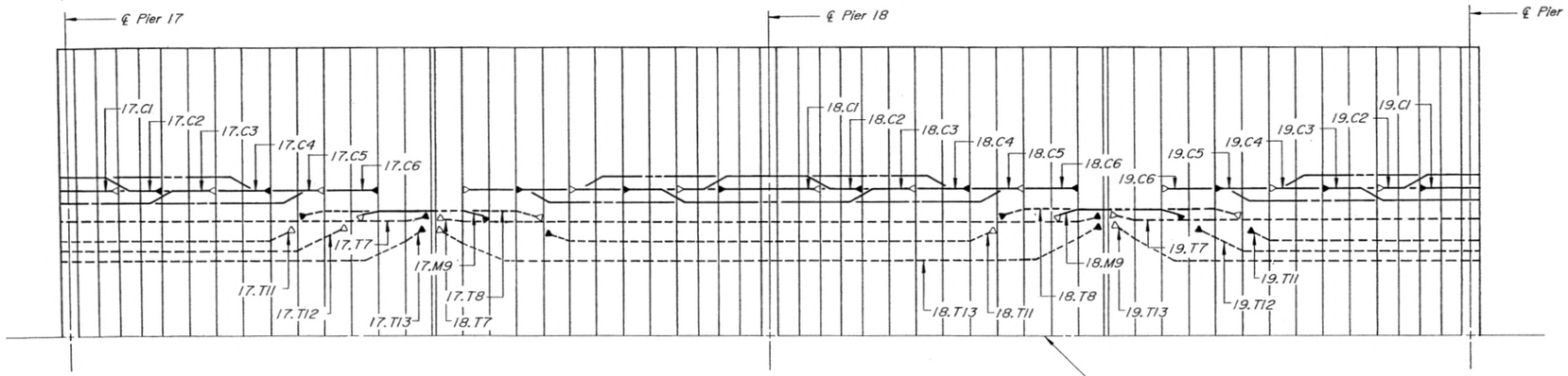
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

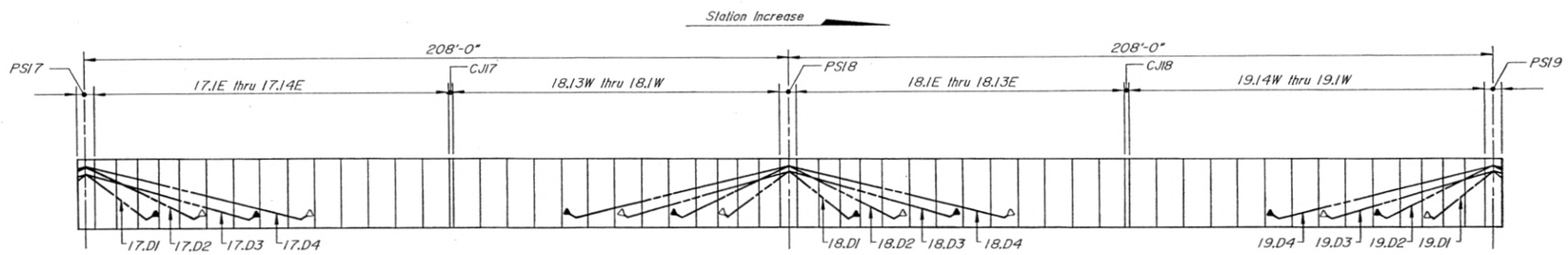
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-374

REVISIONS		

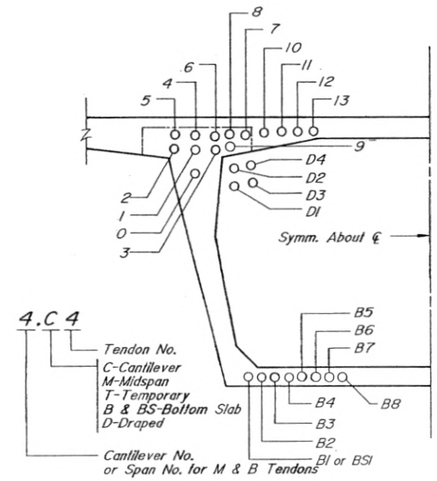


Tendons 7, 8, & 9 require a Top Slab Anchor Block, See Dwg. B-175

PARTIAL PLAN - TOP SLAB TENDONS



ELEVATION - DRAPED TENDONS



4.C 4
- Tendon No.
- C-Cantilever
- M-Midspan
- T-Temporary
- B & BS-Bottom Slab
- D-Draped
- Cantilever No. or Span No. for M & B Tendons

——————— Permanent Tendon
- - - - - - - - - Temporary Tendon

▲ Stressing End
△ Non-Stressing End

PS - Denotes Pier Segment
CJ - Denotes Closure Joint

STRESSING SEQUENCE SPAN 17

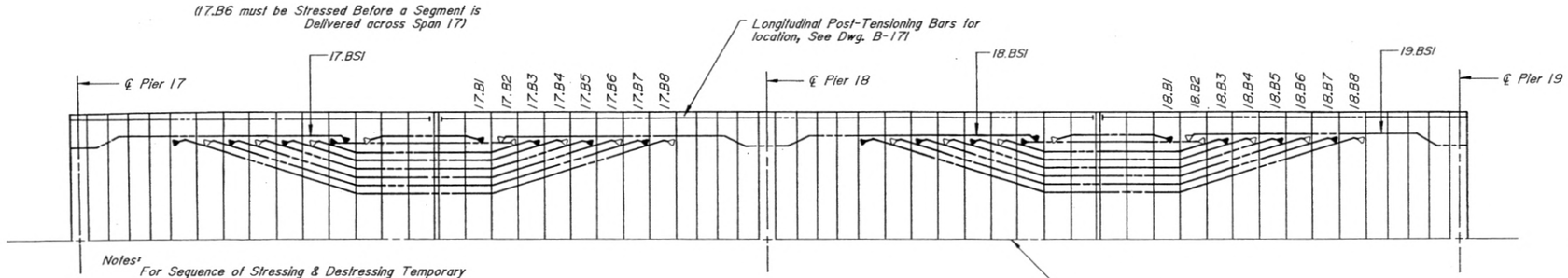
-- After Closure Joint CJ17: 17.M9, 17.B8, 17.B7.
-- After Gantry has been Launched to Pier 19: 17.B6, 17.B5, 17.B4, 17.B3, & 17.B1

(17.B6 must be Stressed Before a Segment is Delivered across Span 17)

STRESSING SEQUENCE SPAN 18

-- After Closure Joint CJ18: 18.M9, 18.B8, 18.B7, & 18.B6.
-- After Gantry has been Launched to Pier 20: 18.B5, 18.B4, 18.B3, 18.B2, & 18.B1.

Notes:
- This Drawing is Schematic Only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169.
- All C1 Tendons on this Dwg. are 19-0.6" ϕ Strands.
- All M9, T7, & T8 Tendons on this Dwg. are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Anchorage Types, See Dwg. B-147.
- For Longitudinal P.T. Bar Details, See Dwg. B-171.



Notes:
For Sequence of Stressing & Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) & Bottom Slab Tendon (BS) shall be Stressed after the Cantilever Tendons in the next Erected Segment have been Stressed.

PARTIAL PLAN - BOTTOM SLAB TENDONS

Designed By	INITIAL W.S.M.	DATE 8-88	Checked By	A.O.S.	4-89
Checked By	T.W.S.	4-89	Quantities By	A.O.S.	4-89
Detailed By	M.M.M.	8-88	Checked By	S.G.	5-89

Figg and Muller Engineers, Inc.
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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 17 THRU PIER 19

Designer W. S. McNary		Structure Numbers	F-08-BJ (17W)
Detailer M. Miyamoto			
Drawing Number B-153	of 217		Drawings

Revision Dates (Preliminary Stage Only)

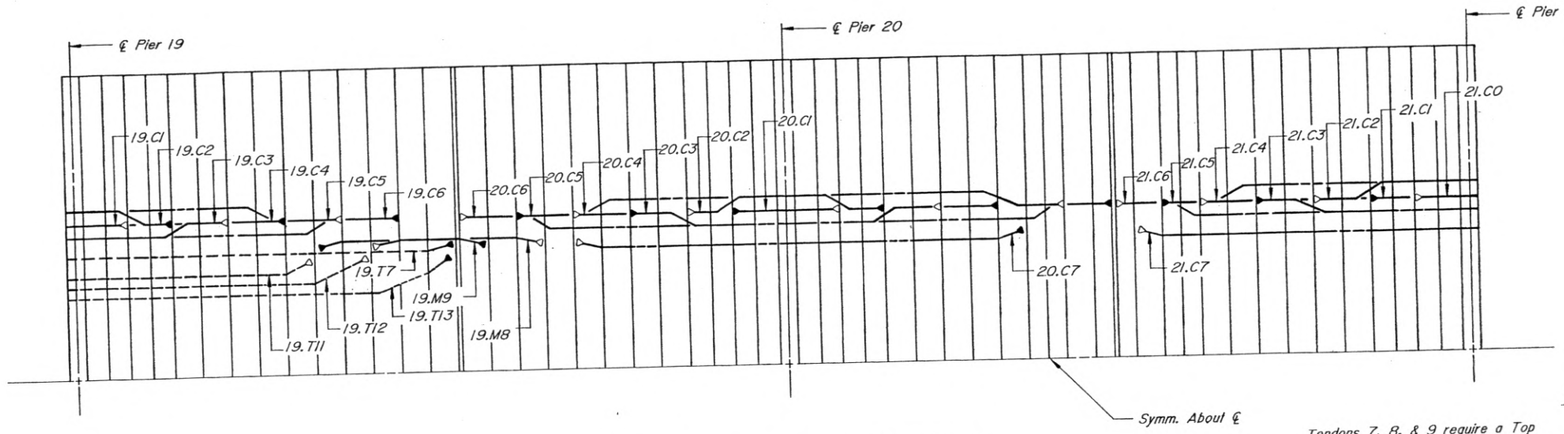
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

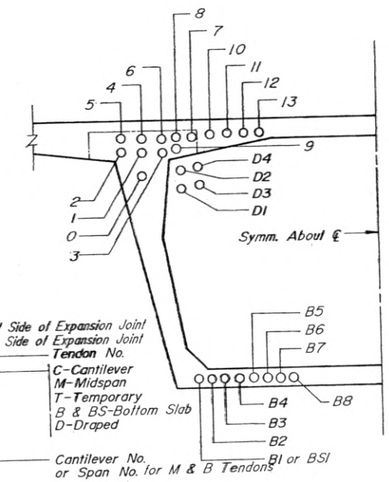
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VII	COLORADO	I 70-2(145)	II-375

REVISIONS		



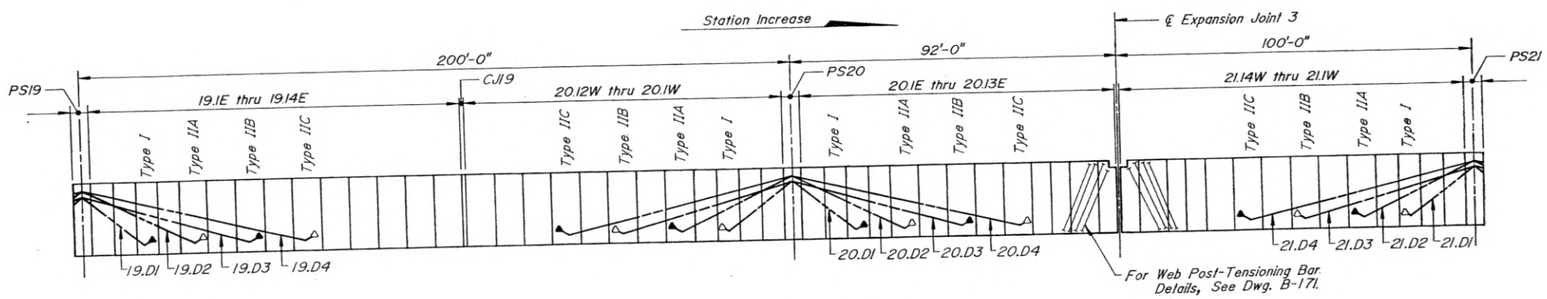
PARTIAL PLAN - TOP SLAB TENDONS

Tendons 7, 8, & 9 require a Top Slab Anchor Block, See Dwg. B-175.



4.C 4 W
- W-West Side of Expansion Joint
- E-East Side of Expansion Joint
- Tendon No.
- C-Cantilever
- M-Midspan
- T-Temporary
- B & BS-Bottom Slab
- D-Draped
- Cantilever No. or Span No. for M & B Tendons

Station Increase



ELEVATION - DRAPED TENDONS

- Permanent Tendon
- Temporary Tendon
- ▲ Stressing End
- △ Non-Stressing End
- PS - Denotes Pier Segment
- CJ - Denotes Closure Joint

Notes:
- This Drawing is Schematic Only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- Tendons 19.C1, 20.C1 thru 20.C6, & 21.C0 thru 21.C6 are 19-0.6" ϕ Strands.
- Tendon 19.B3 & all M8, M9, T7, & T8 Tendons are 7-0.6" ϕ Strands
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Anchorage Types, See Dwg. B-147.
- For Longitudinal P.T. Bar Details, See Dwg. B-171.

STRESSING SEQUENCE SPAN 19

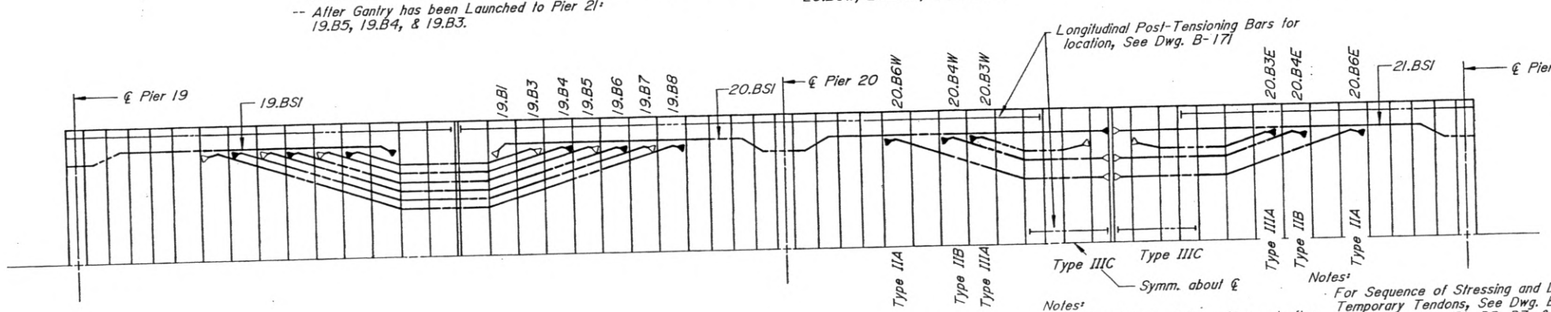
-- After Closure Joint CJ19: 19.M9, 19.B8, 19.M8, 19.B7, & 19.B6.
-- After Gantry has been Launched to Pier 21: 19.B5, 19.B4, & 19.B3.

STRESSING SEQUENCE SPAN 20W

-- Before Expansion Beam is Shimmed 20.B6W, 20.B4W, & 20.B3W.

STRESSING SEQUENCE SPAN 20E

-- Before Expansion Beam is Shimmed 20.B6E, 20.B4E, & 20.B3E.



PARTIAL PLAN - BOTTOM SLAB TENDONS

Notes:
Tendon 20.BS1 shall be Stressed after the Last Segment in Cantilever 20 has been Erected.
Tendon 21.BS1 shall be Stressed after the Last Segment in Cantilever 21 has been Stressed.

Notes:
For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendon 19.BS1 shall be Stressed after the Cantilever Tendons in the Next Erected Segment have been Stressed.

	INITIAL	DATE		
Designed By	W.S.M.	8-88	Checked By	A.D.S. 4-89
Checked By	T.W.S.	4-89	Quantities By	A.D.S. 4-89
Detailed By	M.M.M.	8-88	Checked By	S.L. 5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 19 THRU PIER 21

Designer W. S. McNary		Structure Numbers	F-08-BJ (17W)
Detailer M. Miyamoto			
Drawing Number B-154	of 217		Drawings

Revision Dates (Preliminary Stage Only)

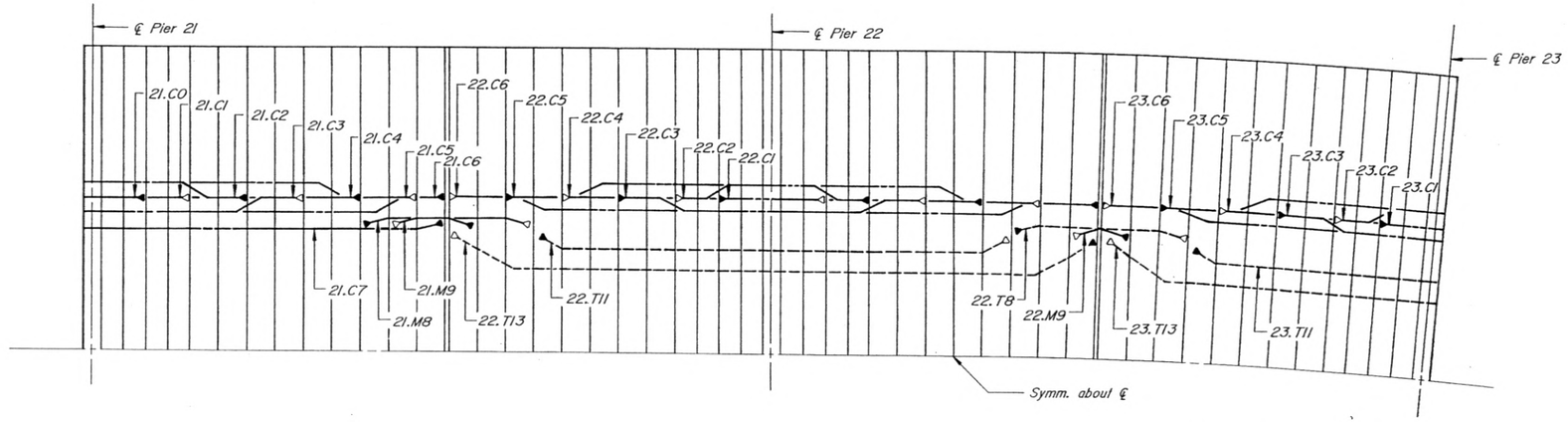
2 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-26-93	REVISED	VOID

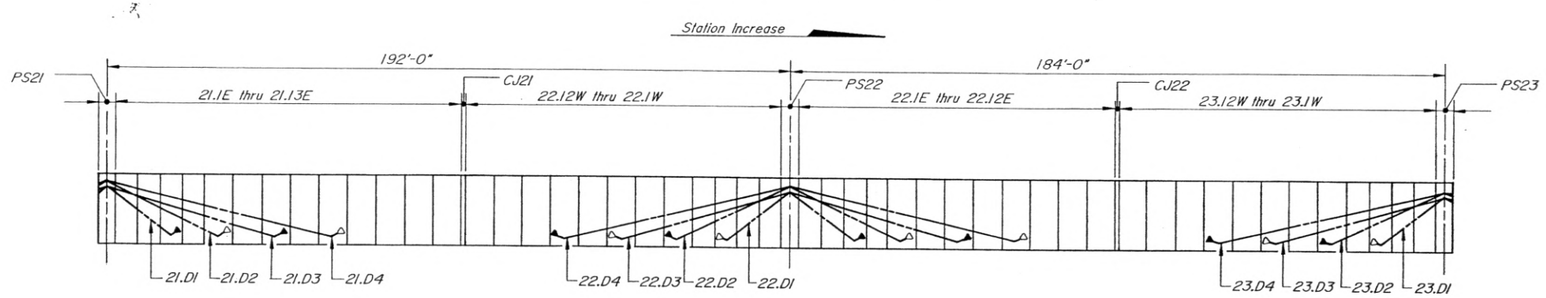
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-376

REVISIONS		

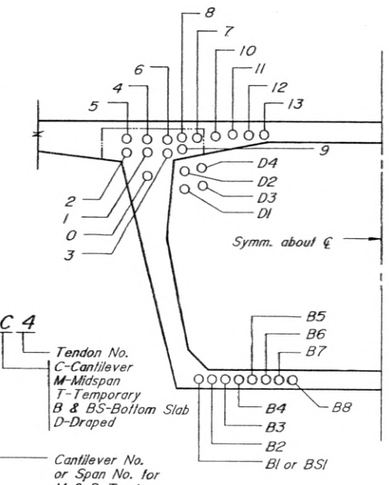


Tendons 7, 8, & 9 require a Top Slab Anchor Block, See Dwg. B-175.

PARTIAL PLAN - TOP SLAB TENDONS



ELEVATION - DRAPED TENDONS



4.C4
- Tendon No.
- C-Cantilever
- M-Midspan
- T-Temporary
- B & B5-Bottom Slab
- D-Draped
- Cantilever No. or Span No. for M & B Tendons

——————Permanent Tendon
- - - - - - - - -Temporary Tendon

▲ Stressing End
△ Non-Stressing End

PS - Denotes Pier Segment
CJ - Denotes Closure Joint

Note:
This Drawing is Schematic only.
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
For Post-Tensioning Details, See Dwg. B-163 to 169.

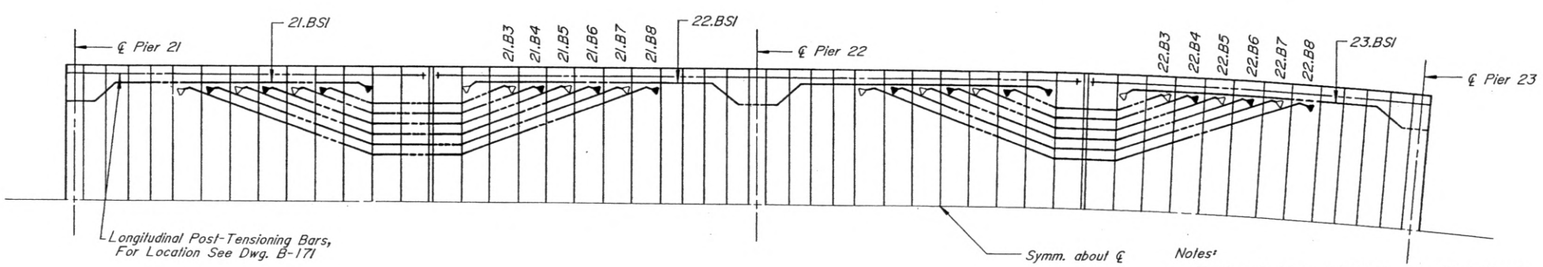
For Anchorage Types, See Dwg. B-147.
For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193.
Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendons 22.B5I & 23.B5I Shall be Stressed after the Cantilever Tendons in the Next Erected Segment have been Stressed.
Tendon 21.B5I shall be Stressed after the Last Segment in Cantilever 21 is Erected.

STRESSING SEQUENCE SPAN 21

-- After Closure Joint CJ21: 21.M9, 21.B8, 21.M8, 21.B7, & 21.B6.
-- After Gantry has been Launched to Pier 23: 21.B5, 21.B4, & 21.B3.

STRESSING SEQUENCE SPAN 22

-- After Closure Joint CJ22: 22.M9, 22.B8, 22.B7, & 22.B6.
-- After Gantry has been Launched to Pier 24: 22.B5, 22.B4, & 22.B3.



PARTIAL PLAN - BOTTOM SLAB TENDONS

Notes:
- Tendons 21.C0 thru 21.C6 are 19-0.6" ϕ Strands.
- Tendons 22.C4 thru 22.C6, & 23.C4 thru 23.C6 are 9-0.6" ϕ Strands.
- Tendons 21.B3, 22.T11 & 23.T11, and all M8, M9, T8, C7 Tendons are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Longitudinal P.T. Bar Details, See Dwg. B-171

Designed By	INITIAL	DATE	Checked By	A.D.S.	4-89
Checked By	W.S.M.	8-88	Quantities By	A.D.S.	4-89
Detailed By	T.W.S.	4-89	Checked By	S.L.	5-89
	M.M.M.	8-88			

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - I7W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 21 THRU PIER 23

Designer	W. S. McNary	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(I7W)
Drawing Number B-155		of 217	Drawings

Revision Dates (Preliminary Stage Only)

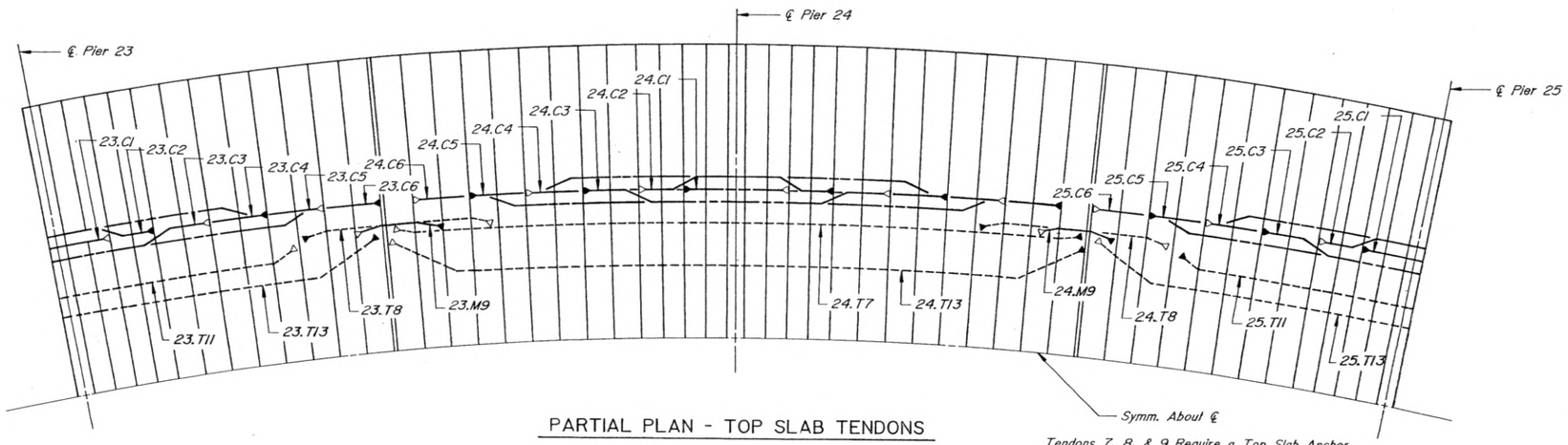
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

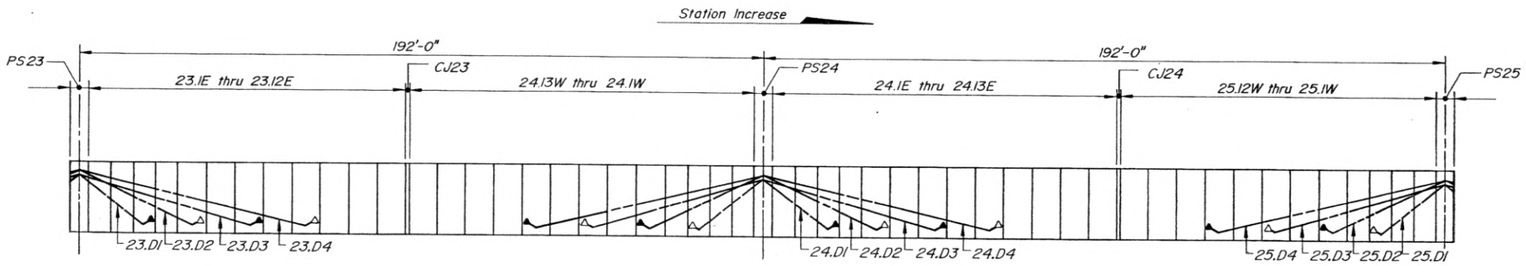
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-377

REVISIONS		



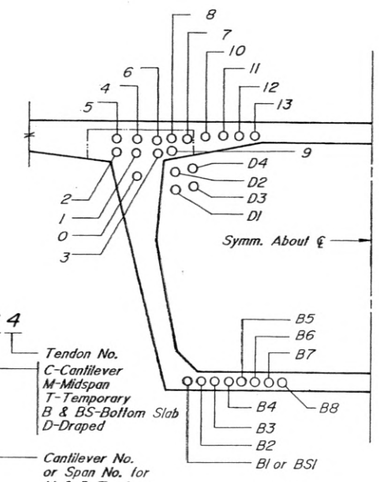
PARTIAL PLAN - TOP SLAB TENDONS

Tendons 7, 8, & 9 Require a Top Slab Anchor Block, See Dwg. B-175



ELEVATION - DRAPED TENDONS

Notes:
For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendon (BS) shall be Stressed after the Cantilever Tendons in the next Erected Segment have been Stressed.



4.C4
Tendon No.
C-Cantilever
M-Midspan
T-Temporary
B & BS-Bottom Slab
D-Draped
Cantilever No. or Span No. for M & B Tendons

——— Permanent Tendon
- - - Temporary Tendon

▲ Stressing End
△ Non-Stressing End

PS-Denotes Pier Segment.
CJ-Denotes Closure Joint.

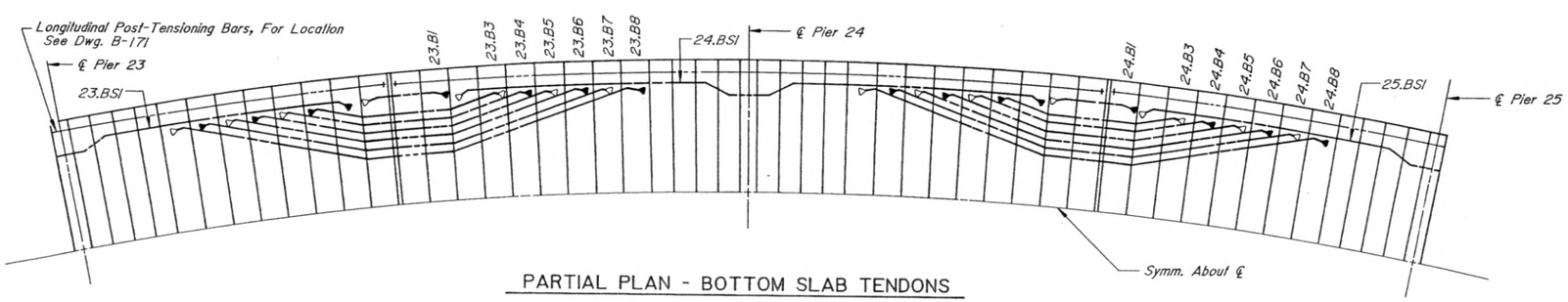
Notes:
- For Anchorage Types, See Dwg. B-147.
- This Drawing is Schematic Only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- Tendon 24.C1 is 19-0.6" ϕ Strands.
- Tendons 23.C4 thru 23.C6, & 25.C4 thru 25.C6 are 9-0.6" ϕ Strands.
- Tendons 23.B1, 24.B1, 23.T11, 25.T11, and All M9, T7, T8 Tendons are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Longitudinal P.T. Bar Details, See Dwg. B-171

STRESSING SEQUENCE SPAN 23

-- After Closure Joint CJ23: 23.M9, 23.B8, 23.B7, & 23.B6
-- After Gantry has been Launched to Pier 25: 23.B5, 23.B4, 23.B3, & 23.B1

STRESSING SEQUENCE SPAN 24

-- After Closure Joint CJ24: 24.M9, 24.B8, 24.B7, & 24.B6
-- After Gantry has been Launched to Pier 26: 24.B5, 24.B4, 24.B3, & 24.B1



PARTIAL PLAN - BOTTOM SLAB TENDONS

	INITIAL	DATE		
Designed By	W.S.M.	8-88	Checked By	A.O.S. 4-89
Checked By	T.W.S.	4-89	Quantities By	A.O.S. 4-89
Detailed By	M.M.M.	8-88	Checked By	S/G 5-89

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 23 THRU PIER 25

Designer W. S. McNary	Structure Numbers	F-08-BJ (17W)	
Detailer M. Miyamoto			
Drawing Number B-156	of	217	Drawings

Revision Dates (Preliminary Stage Only)

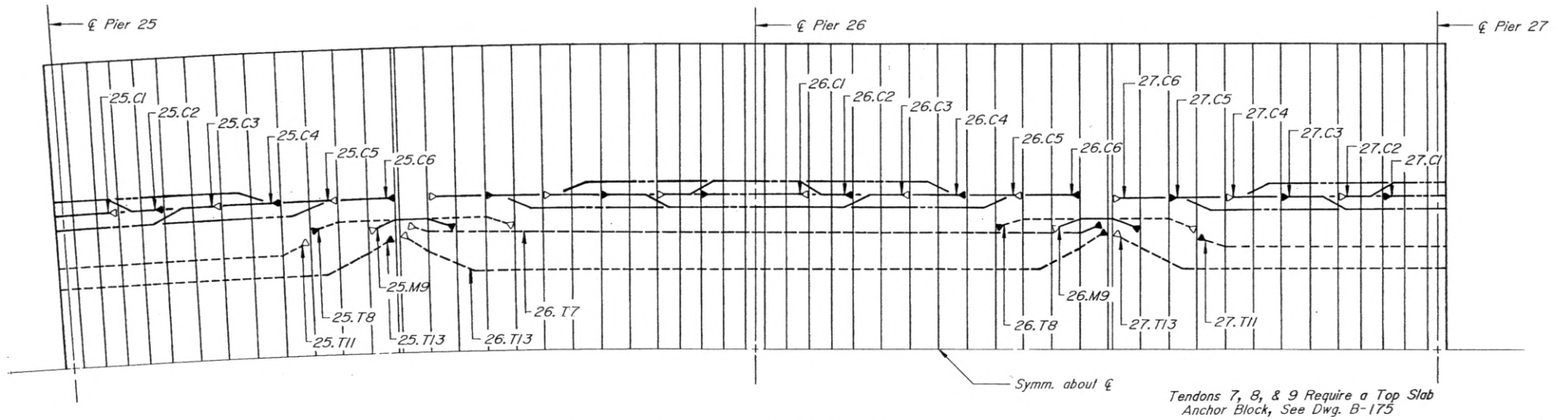
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1966

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

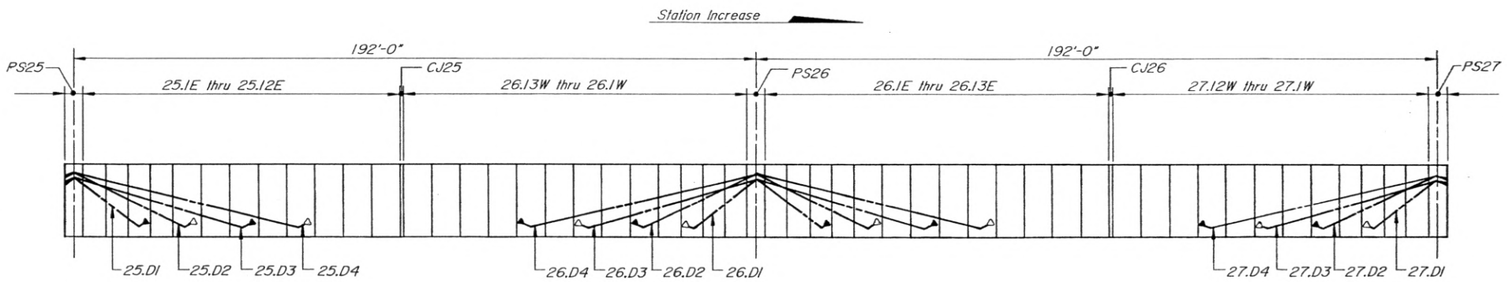
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-378

REVISIONS		



Tendons 7, 8, & 9 require a Top Slab Anchor Block, See Dwg. B-175

PARTIAL PLAN - TOP SLAB TENDONS



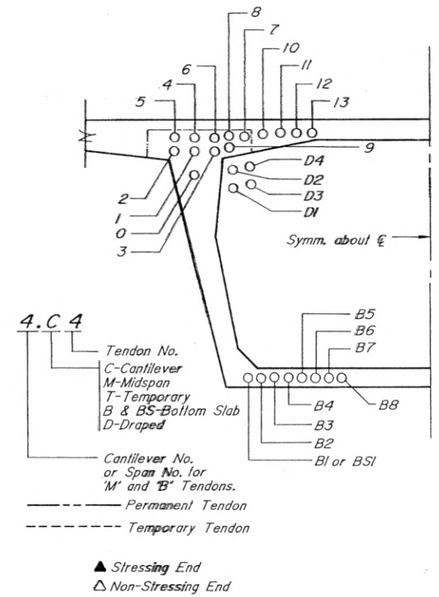
ELEVATION - DRAPED TENDONS

STRESSING SEQUENCE SPAN 25

-- After Closure Joint CJ25: 25.M9, 25.B8, 25.B7, & 25.B6.
-- After Gantry has been Launched to Pier 27: 25.B5, 25.B4, 25.B3, & 25.B1.

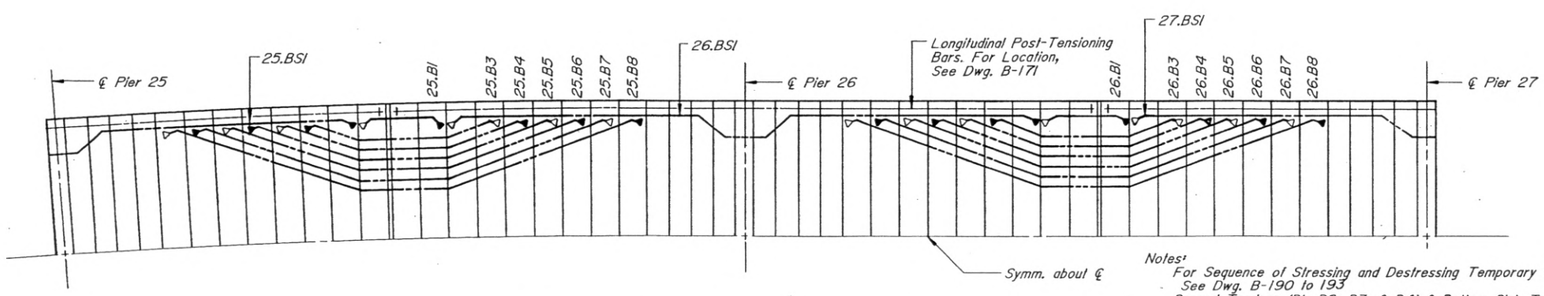
STRESSING SEQUENCE SPAN 26

-- After Closure Joint CJ26: 26.M9, 26.B8, 26.B7, & 26.B6.
-- After Gantry has been Launched to Pier 28: 26.B5, 26.B4, 26.B3, & 26.B1.



PS-Denotes Pier Segment.
CJ-Denotes Closure Joint.

Notes:
- This Drawing is Schematic only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- Tendon 26.C1 is 19-0.6" ϕ Strands.
- Tendons 25.C4 thru 25.C6, & 27.C4 thru 27.C6 are 9-0.6" ϕ Strands.
- Tendons 25.B1, 26.B1, 25.T11, & All M9, T7, T8 Tendons are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Anchorage types, See Dwg. B-147.
- For Longitudinal P.T. Bar Details, See Dwg. B-171



Notes:
For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) & Bottom Slab Tendon (BS) Shall be Stressed after the Cantilever Tendons in the next Erected Segment have been Stressed.

PARTIAL PLAN - BOTTOM SLAB TENDONS

Designed By	W.S.M.	DATE 8-88	Checked By	A.G.S.	4-89
Checked By	T.L.S.	4-89	Quantities By	R.L.S.	4-89
Detailed By	M.M.M.	8-88	Checked By	S.L.	6-89

Figg and Muller Engineers, Inc.
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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - I7W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 25 THRU PIER 27

Designer W. S. McNary		Structure	F-08-BJ
Detailer M. Miyamoto		Numbers	(I7W)
Drawing Number B-157	of 217		Drawings

Revision Dates (Preliminary Stage Only)

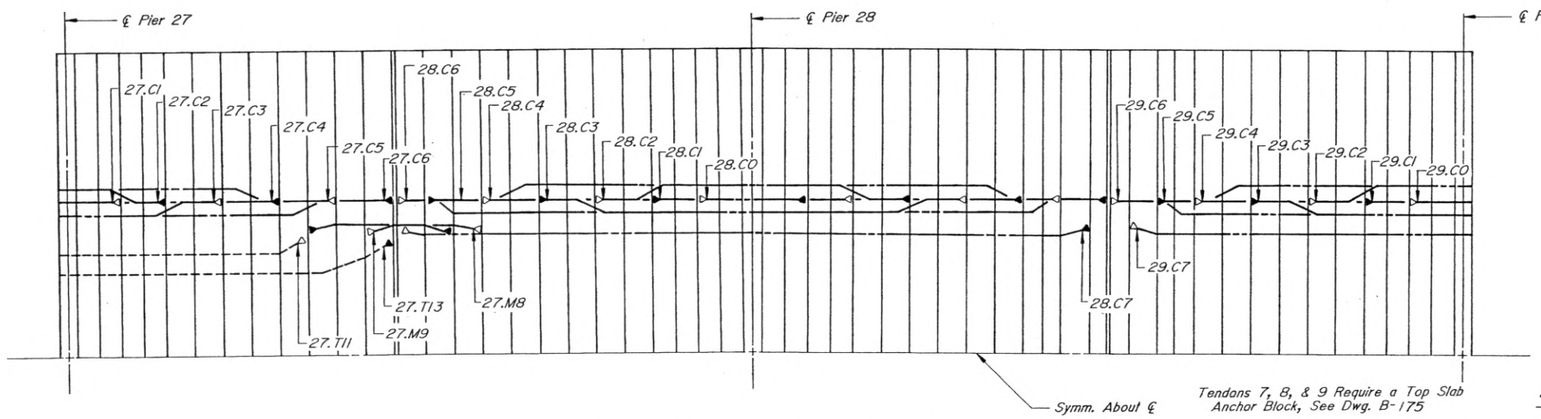
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. D. H. FORM NO. 117:
REV. APR. 1986

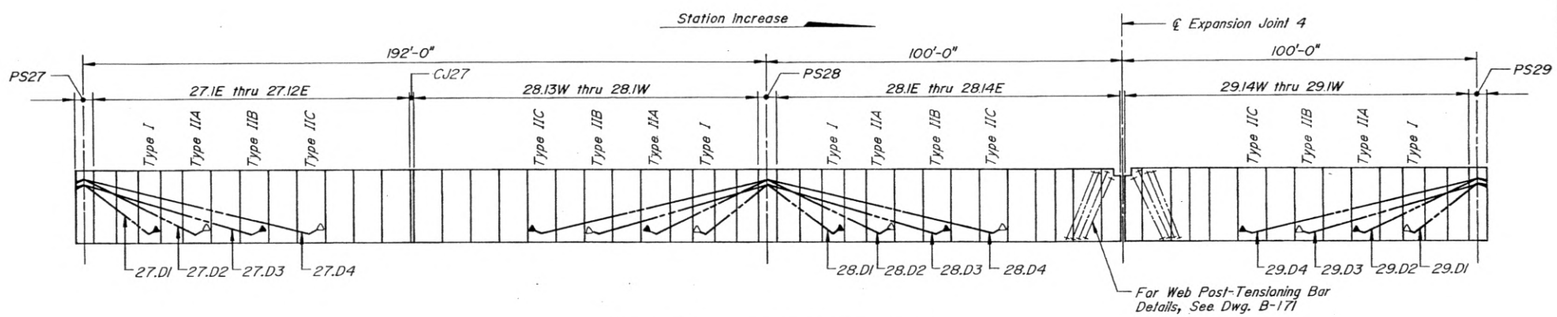
AS CONSTRUCTED			
NO REVISIONS	7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-379

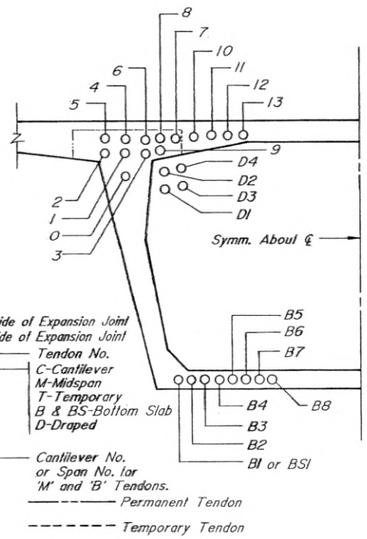
REVISIONS		



PARTIAL PLAN - TOP SLAB TENDONS



ELEVATION - DRAPED TENDONS



4.C 4 W
- W-West Side of Expansion Joint
- E-East Side of Expansion Joint
- Tendon No.
- C-Cantilever
- M-Midspan
- T-Temporary
- B & BS-Bottom Slab
- D-Draped
- Cantilever No. or Span No. for 'M' and 'B' Tendons.

——— Permanent Tendon

- - - - - Temporary Tendon

▲ Stressing End

△ Non-Stressing End

PS- Denotes Pier Segment.
CJ- Denotes Closure Joint.

STRESSING SEQUENCE SPAN 27

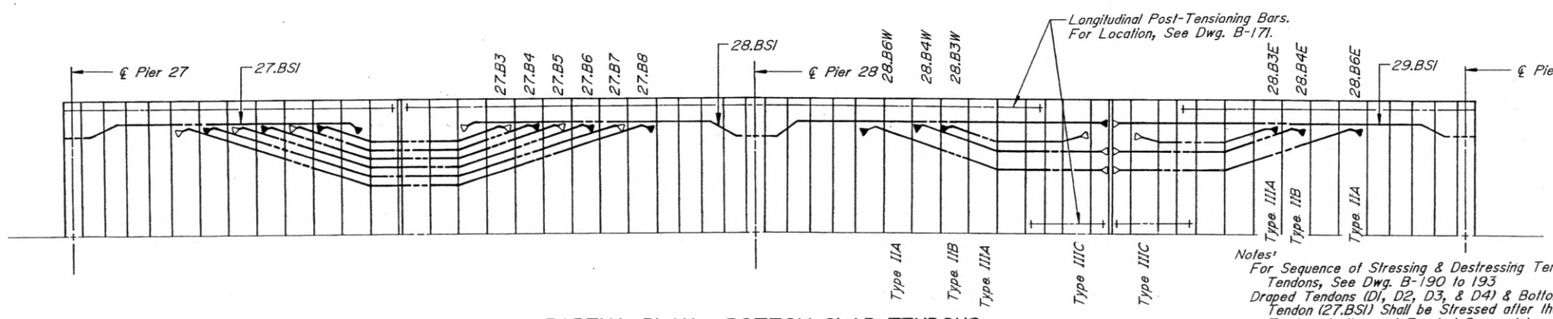
-- After Closure Joint CJ27: 27.M9, 27.B8, 27.M8, 27.B7, & 27.B6.
-- After Gantry has been Launched to Pier 29: 27.B5, 27.B4, & 27.B3.

STRESSING SEQUENCE SPAN 28W

-- Before Expansion Beam is Shimmed
28.B6W, 28.B4W, & 28.B3W.

STRESSING SEQUENCE SPAN 28E

-- Before Expansion Beam is Shimmed
28.B6E, 28.B4E, & 28.B3E.



PARTIAL PLAN - BOTTOM SLAB TENDONS

Notes:
- For Sequence of Stressing & Destressing Temporary Tendons, See Dwg. B-190 to 193
- Draped Tendons (D1, D2, D3, & D4) & Bottom Slab Tendon (27.BS1) Shall be Stressed after the Cantilever Tendons in the next Erected Segment have been Stressed
- Tendon (28.BS1) Shall be Stressed after the last Segment in Cantilever (28) is Erected.
- Tendon (29.BS1) Shall be Stressed after the last Segment in Cantilever (29) is Erected.

Notes:
- This Drawing is Schematic Only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169.
- Tendons 28.C0 Thru 28.C6, & 29.C0 Thru 29.C6 are 19-0.6" ϕ Strands.
- Tendons 27.C4 Thru 27.C6 are 9-0.6" ϕ Strands.
- Tendons 27.B3, 27.T11 and all M8, M9, C7 Tendons are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Anchorage Types, See Dwg. B-147.
- For Longitudinal P.T. Bar Details, See Dwg. B-171.

Designed By	W.S.M.	DATE 8-88	Checked By	A.D.S. 4-89
Checked By	T.H.S.	4-89	Quantities By	A.D.S. 4-89
Detailed By	M.M.M.	8-88	Checked By	S.G. 5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 27 THRU PIER 29

Designer	W. S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-158		of 217	Drawings

Revision Dates (Preliminary Stage Only)

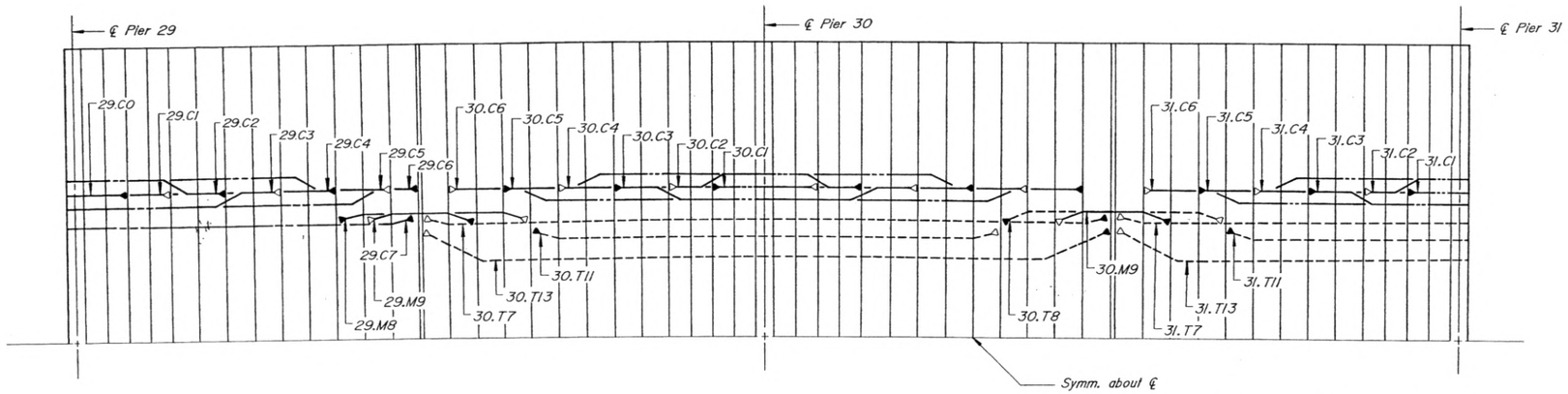
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

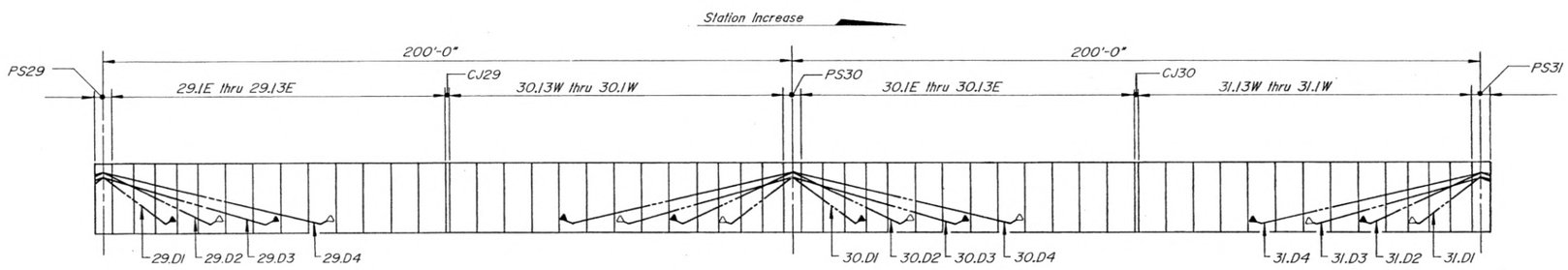
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-380

REVISIONS		



Tendons 7, 8, & 9 Require a Top Slab Anchor Block, See Dwg. B-175

PARTIAL PLAN - TOP SLAB TENDONS



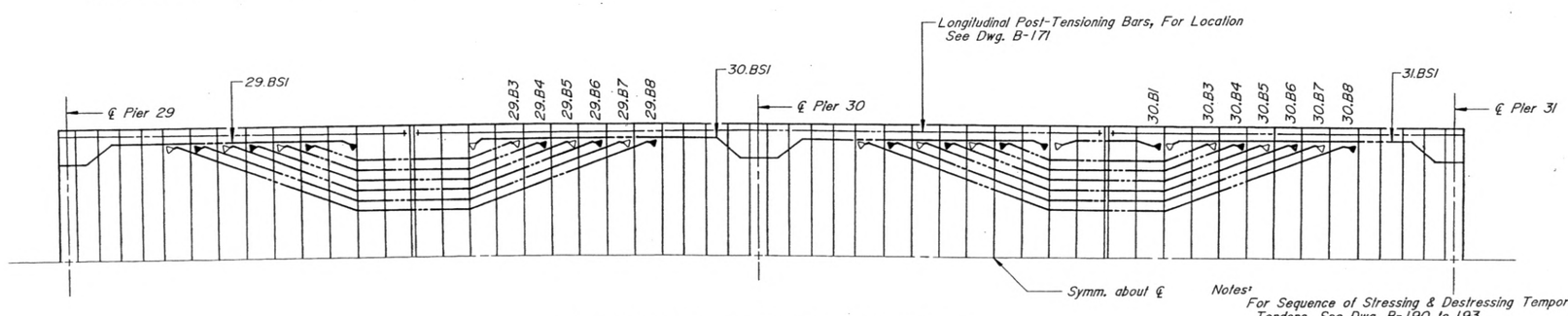
STRESSING SEQUENCE SPAN 29

-- After Closure Joint CJ 29: 29.M9, 29.B8, 29.M8, 29.B7, & 29.B6.
-- After Gantry has been Launched to Pier 31: 29.B5, 29.B4, & 29.B3.

ELEVATION - DRAPED TENDONS

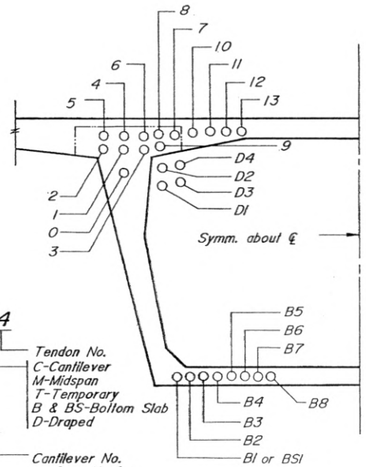
STRESSING SEQUENCE SPAN 30

-- After Closure Joint CJ30: 30.M9, 30.B8, 30.B7, & 30.B6.
-- After Gantry has been Launched to Pier 32: 30.B5, 30.B4, 30.B3, & 30.B1.



PARTIAL PLAN - BOTTOM SLAB TENDONS

Notes:
For Sequence of Stressing & Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) & Bottom Slab Tendons (30.BS1) and (31.BS1) Shall be Stressed after the Cantilever Tendons in the next Erected Segment have been Stressed.
Tendon (29.BS1) Shall be Stressed after the last Segment in Cantilever (29) is Erected.



4.C 4
Tendon No.
C-Cantilever
M-Midspan
T-Temporary
B & BS-Bottom Slab
D-Draped
Cantilever No. or Span No. for M & B Tendons

Permanent Tendon
Temporary Tendon

▲ Stressing End
△ Non-Stressing End
PS- Denotes Pier Segment.
CJ- Denotes Closure Joint.

Notes:
- This Drawing is Schematic only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- For Anchorage Types, See Dwg. B-147.
- Tendons 29.C0 Thru 29.C6, 30.C1, & 31.C1 are 19-0.6" ϕ Strands.
- Tendons 29.B3 and all M8, M9, T7, T8, C7 Tendons are 7-0.6" ϕ Stands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Longitudinal P.T. Bar Details, See Dwg. B-171

Figg and Muller Engineers, Inc.
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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 29 THRU PIER 31

Designer	W. S. McNary	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-159		of 217	Drawings

Revision Dates							(Preliminary Stage Only)

	INITIAL	DATE		
Designed By	W.S.M.	8-88	Checked By	A.O.S. 4-89
Checked By	T.W.S.	4-89	Quantities By	A.O.S. 4-89
Detailed By	M.M.M.	8-88	Checked By	S.G. 5-89

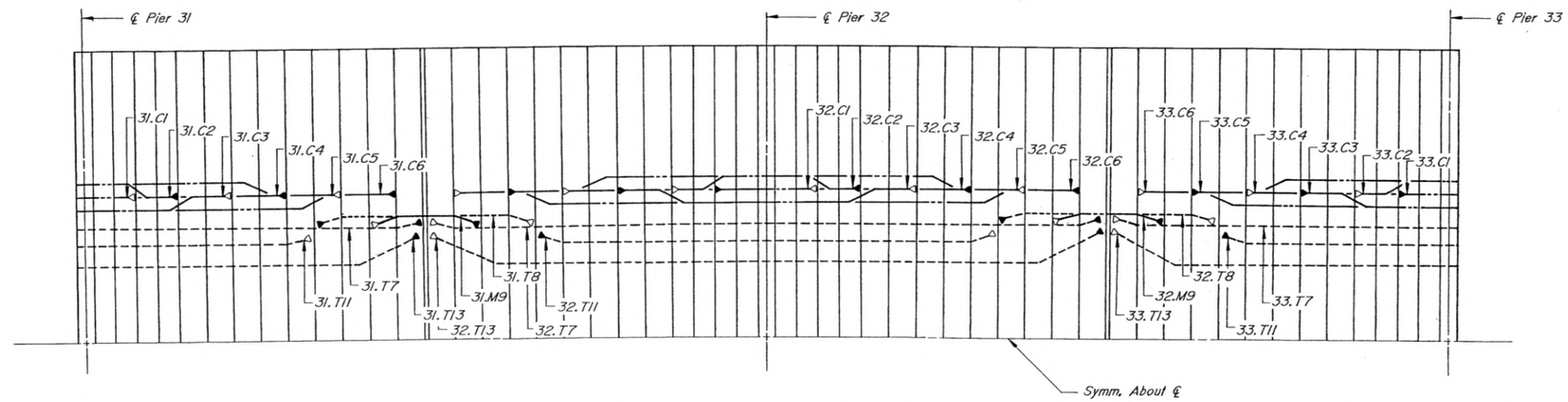
BRUNING 44-232 75350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS 7-20-93	REVISED		VOID

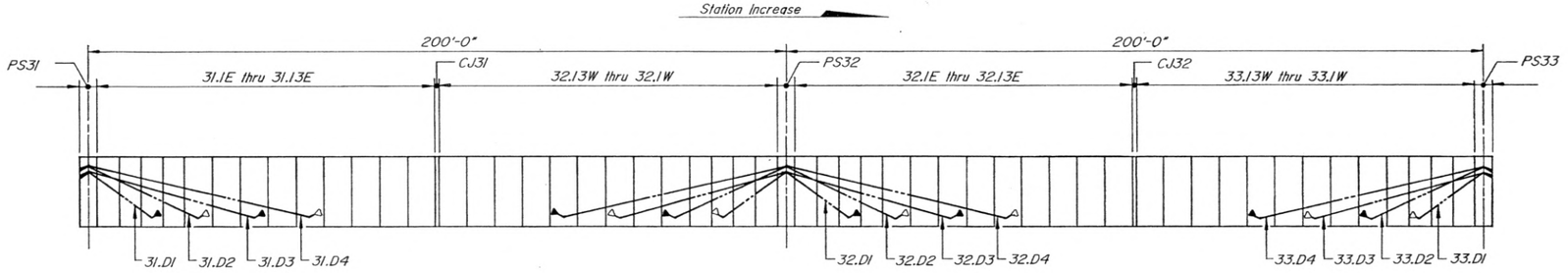
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-381

REVISIONS		

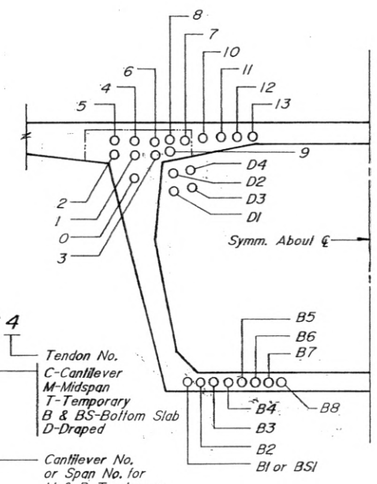


PARTIAL PLAN - TOP SLAB TENDONS

Tendons 7, 8, & 9 require a Top Slab Anchor Block, See Dwg. B-175



ELEVATION - DRAPED TENDONS



4.C4
- Tendon No.
- C-Cantilever
- M-Midspan
- T-Temporary
- B & BS-Bottom Slab
- D-Draped
- Cantilever No. or Span No. for M & B Tendons

——————— Permanent Tendons
- - - - - - - - Temporary Tendons

▲ Stressing End
△ Non-Stressing End
PS- Denotes Pier Segment.
CJ- Denotes Closure Joint.

STRESSING SEQUENCE SPAN 31

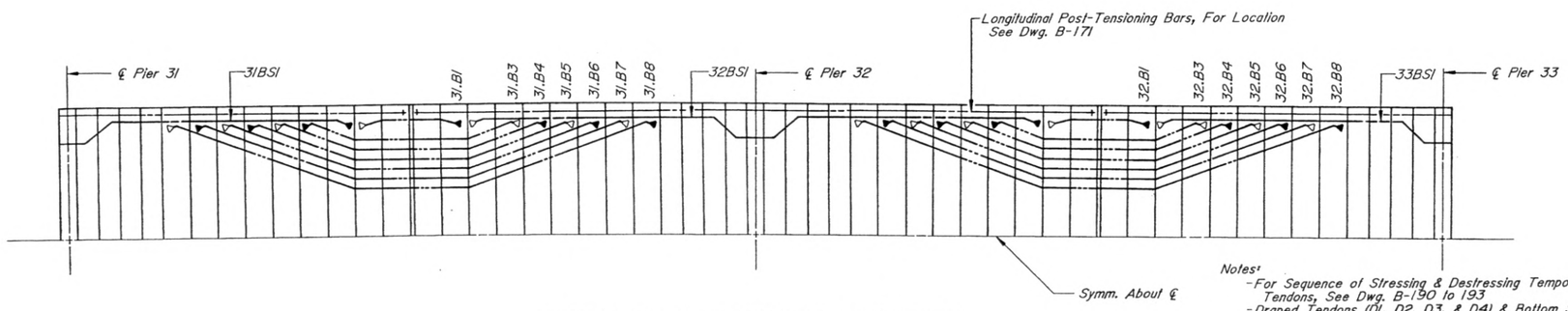
-- After Closure Joint CJ31: 31.M9, 31.B8, 31.B7, & 31.B6.
-- After Gantry has been Launched to Pier 33: 31.B5, 31.B4, 31.B3, & 31.B1.

STRESSING SEQUENCE SPAN 32

-- After Closure Joint CJ32: 32.M9, 32.B8, 32.B7, & 32.B6.
-- After Gantry has been Launched to Pier 34: 32.B5, 32.B4, 32.B3, & 32.B1.

Notes:
- This Drawing is Schematic Only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- For Anchorage Types, See Dwg. B-147.

- All C1 Tendons on this Dwg. are 19-0.6" ϕ Strands.
- All M9, T7, T8 Tendons are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Longitudinal P.T. Bar Details, See Dwg. B-171



PARTIAL PLAN - BOTTOM SLAB TENDONS

Notes:
- For Sequence of Stressing & Destressing Temporary Tendons, See Dwg. B-190 to 193
- Draped Tendons (D1, D2, D3, & D4) & Bottom Slab Tendon (BS) Shall be Stressed after the Cantilever Tendons in the next Erected Segment have been Stressed.

	INITIAL	DATE		
Designed By	W.S.M.	8-88	Checked By	A.O.S. 4-89
Checked By	T.W.S.	4-89	Quantities By	A.O.S. 4-89
Detailed By	M.M.M.	8-88	Checked By	S.K. 6-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 31 THRU PIER 33

Designer	W. S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-160 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

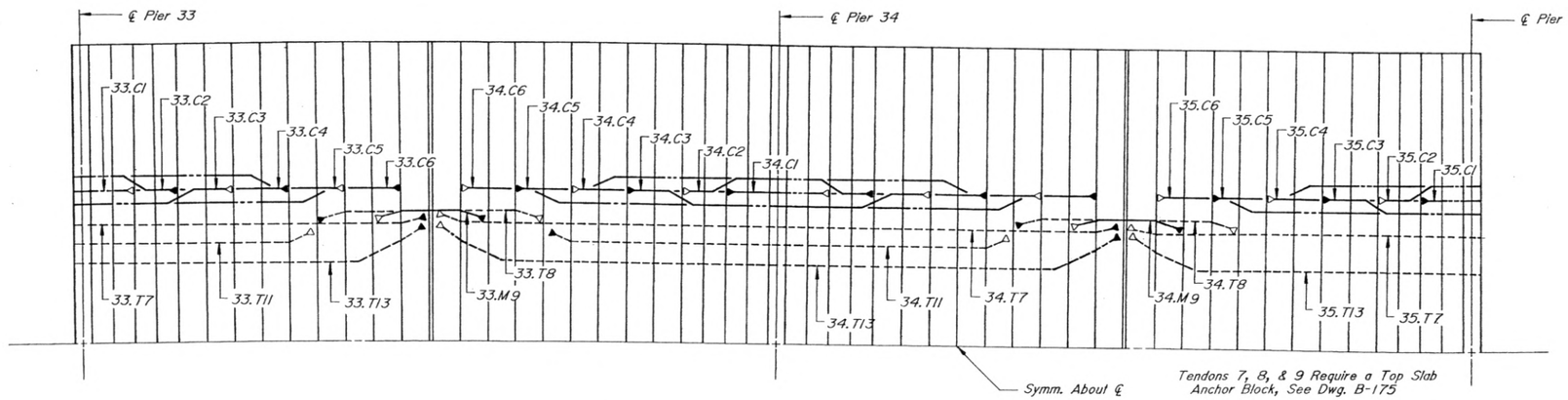
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

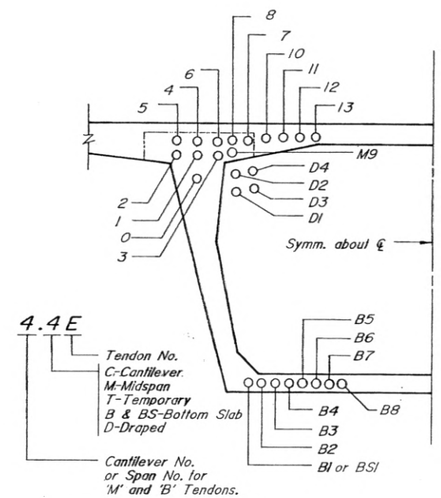
AS CONSTRUCTED			
NO REVISIONS 7-26-93	REVISED		VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-382

REVISIONS		



PARTIAL PLAN - TOP SLAB TENDONS



4.4E

Tendon No.
C-Cantilever.
M-Midspan
T-Temporary
B & BS-Bottom Slab
D-Draped

Cantilever No.
or Span No. for
'M' and 'B' Tendons.

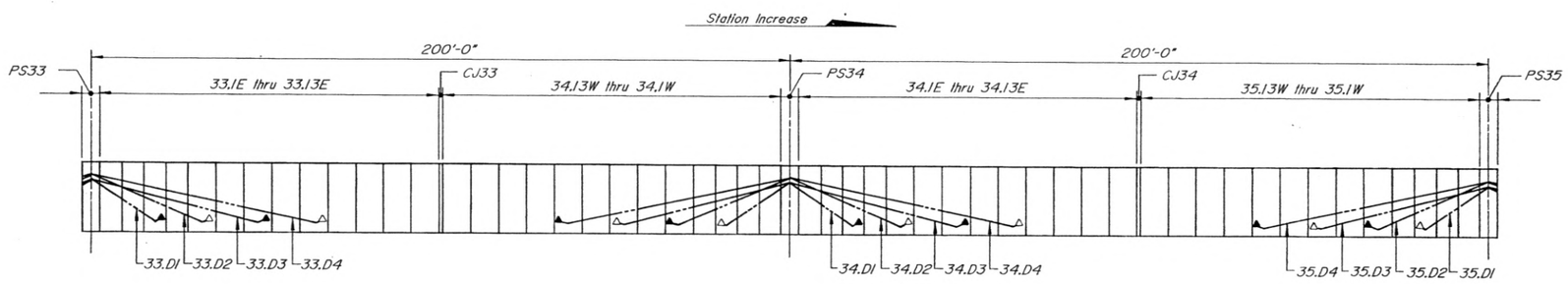
———Permanent Tendons
- - - - - -Temporary Tendons

▲ Stressing End
△ Non-Stressing End

PS- Denotes Pier Segment.
CJ- Denotes Closure Joint.

Notes:
This Drawing is Schematic Only.
All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
For Post-Tensioning Details, See Dwg. B-163 to 169
For Anchorage Types, See Dwg. B-147.

All C1 Tendons on this Dwg. are 19-0.6" ϕ Strands.
All M9, T7, T8 Tendons are 7-0.6" ϕ Strands.
All other Tendons on this Dwg. are 12-0.6" Strands.
For Longitudinal P.T. Bar Details, See Dwg. B-171



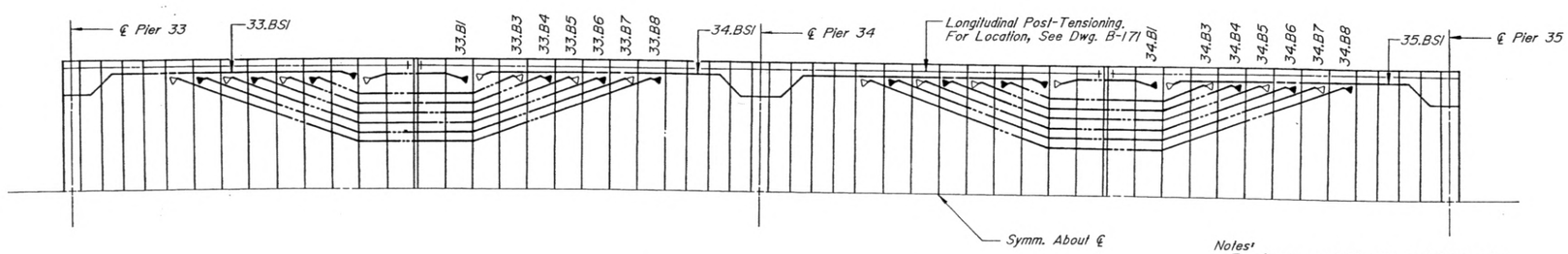
STRESSING SEQUENCE SPAN 23

-- After Closure Joint CJ33: 33.M9, 33.B8, 33.B7, & 33.B6
-- After Gantry has been Launched to Pier 35: 33.B5, 33.B4, 33.B3, & 33.B1

ELEVATION - DRAPED TENDONS

STRESSING SEQUENCE SPAN 34

-- After Closure Joint CJ34: 34.M9, 34.B8, 34.B7, & 34.B6
-- After Gantry has been Launched to Pier 36: 34.B5, 34.B4 34.B3, & 34.B1



PARTIAL PLAN - BOTTOM SLAB TENDONS

Notes:
For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendons (BS) shall be Stressed after the Cantilever Tendons in the next Erected Segment have been Stressed.

Designed By	W.S.M.	INITIAL	
Checked By	T.L.S.	DATE	8-88
Detailed By	M.M.M.		8-88
Checked By			4-89
Quantities By			4-89
Checked By			5-89

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Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 33 THRU PIER 35

Designer	W. S. McNary	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number B-161		of 217	Drawings

Revision Dates (Preliminary Stage Only)

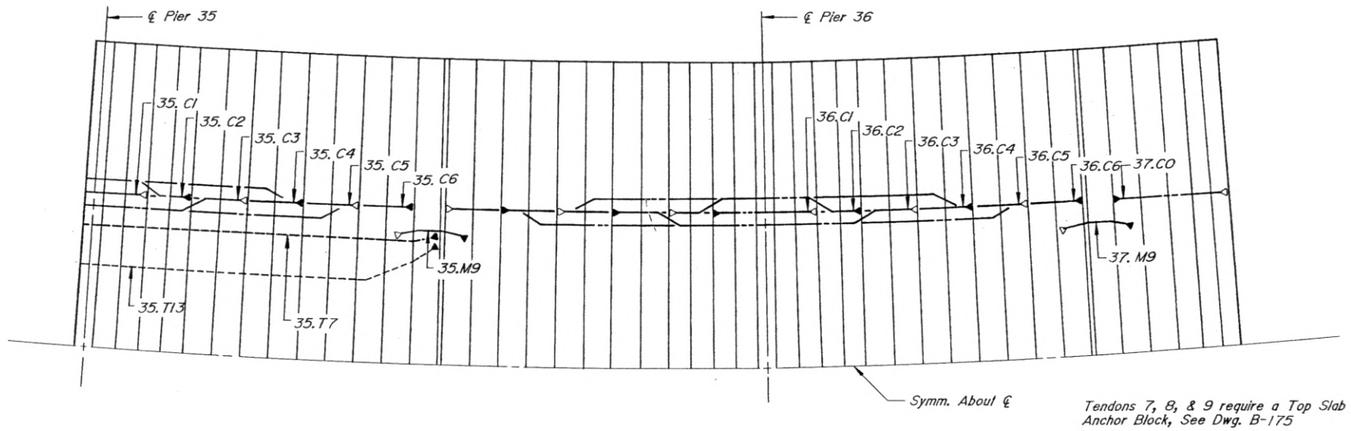
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

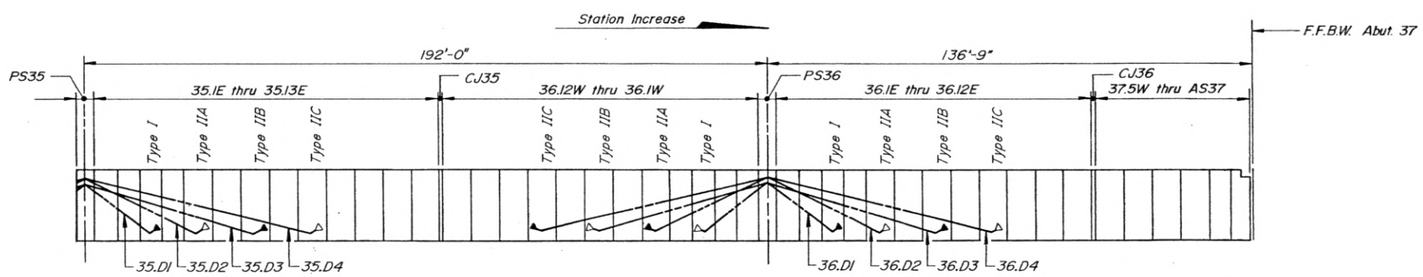
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-383

REVISIONS		

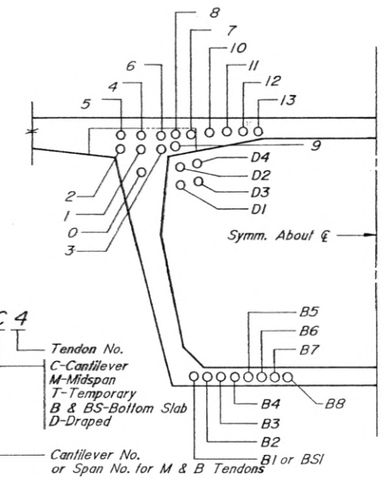


Tendons 7, 8, & 9 require a Top Slab Anchor Block, See Dwg. B-175

PARTIAL PLAN - TOP SLAB TENDONS



ELEVATION - DRAPED TENDONS



▲ Stressing End
△ Non-Stressing End
PS- Denotes Pier Segment.
CJ- Denotes Closure Joint.

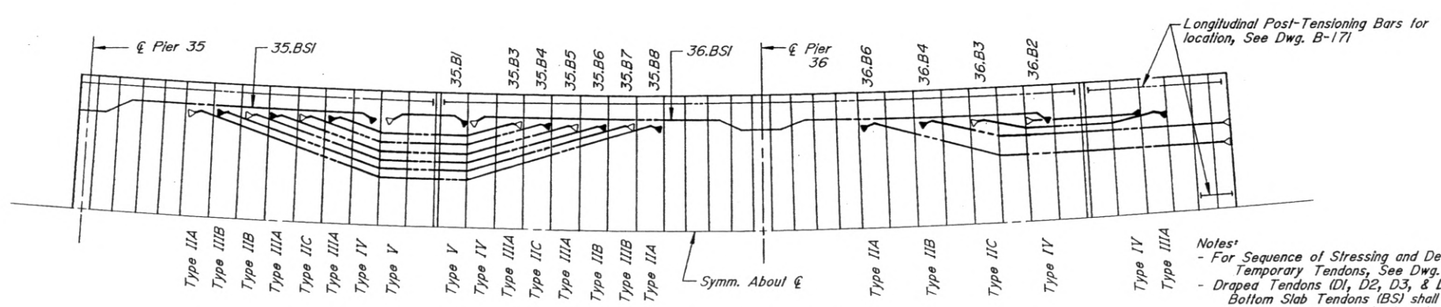
Notes:
- This Drawing is Schematic Only.
- All Lengths Given are Horizontal Projections Along the Horizontal Control Line.
- For Post-Tensioning Details, See Dwg. B-163 to 169
- Tendon 35.C1 is 19-0.6" ϕ Strands.
- Tendons 36.C4 thru 36.C6 are 19-0.6" ϕ Strands.
- Tendons 35.B1, 37.C0, and All M9, T7 Tendons are 7-0.6" ϕ Strands.
- All other Tendons on this Dwg. are 12-0.6" ϕ Strands.
- For Anchorage Types, See Dwg. B-147.
- For Longitudinal P.T. Bar Details, See Dwg. B-171

STRESSING SEQUENCE SPAN 35

-- After Closure Joint CJ35: 35.M9, 35.B8, 35.B7, 35.B6 35.B5, 35.B4, 35.B3, & 35.B1

STRESSING SEQUENCE SPAN 36

-- After Closure Joint CJ36: 36.B6, 36.B4, 36.B3, & 36.B2



Notes:
- For Sequence of Stressing and Destressing Temporary Tendons, See Dwg. B-190 to 193
- Draped Tendons (D1, D2, D3, & D4) and Bottom Slab Tendons (BS) shall be Stressed after the Cantilever Tendons in the next Erected Segment have been Stressed.

PARTIAL PLAN - BOTTOM SLAB TENDONS

Designed By	W.S.M.	DATE 8-88	Checked By	A.o.S.	4-89
Checked By	T.L./S.	4-89	Quantities By	A.o.S.	4-89
Detailed By	M.M.M.	8-88	Checked By	S/G	5-89

Figg and Muller Engineers, Inc.
Tallahassee, FL / Alexandria, VA / Denver, CO / Austin, TX / Paris, France

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - I7W
CONCRETE ALTERNATE

POST-TENSIONING LAYOUT
PIER 35 THRU ABUTMENT 37

Designer	W. S. McNary	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(I7W)
Drawing Number B-162		of 217	Drawings

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

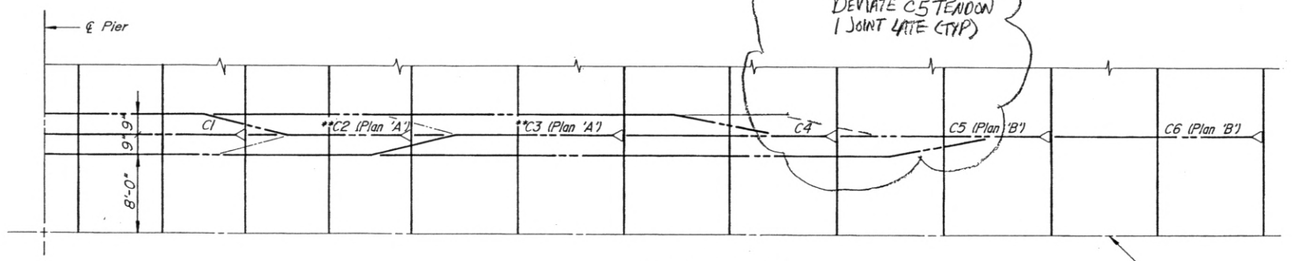
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS;
D. O. H. FORM NO. 117;
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

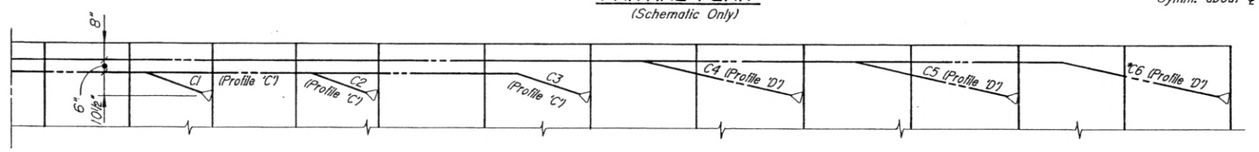
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-384

REVISIONS		
CR-1	REVISE TENDON PATH	CFB

CR-1
DEVIATE C5 TENDON
1 JOINT LATE (TYP)

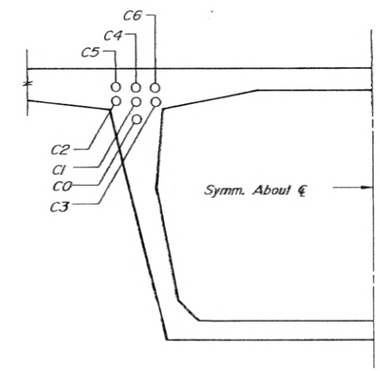


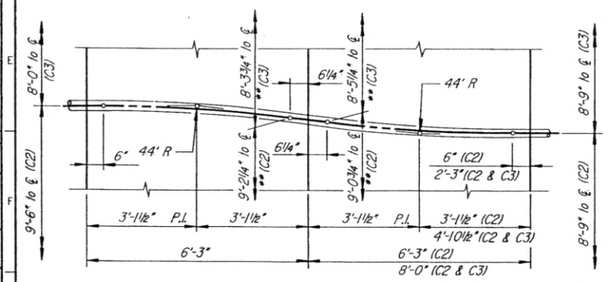
PARTIAL PLAN
(Schematic Only)



PARTIAL ELEVATION
(Schematic Only)

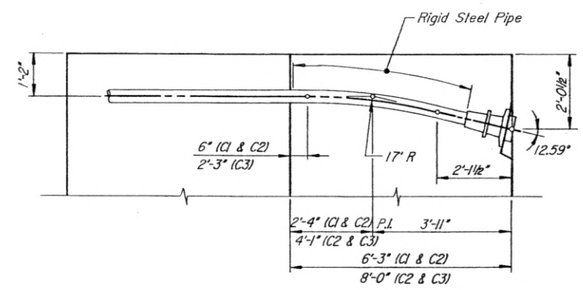
*For Tendon C6 in Segments 22.12W, 22.12E, 23.12W, & 27.12E Use Profile 'K'.



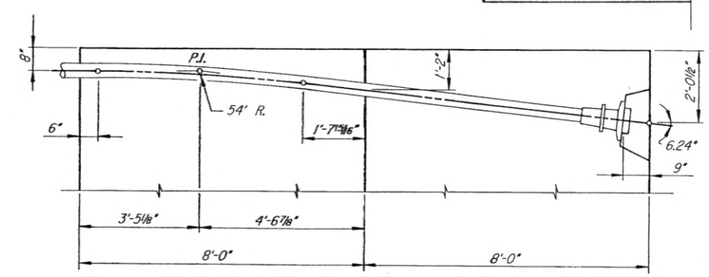


Tendon C3 is Opposite Hand.

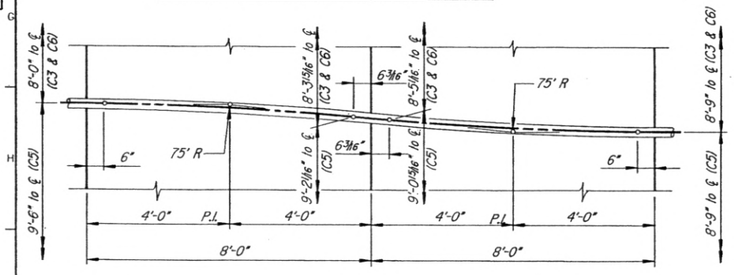
PLAN 'A' - (TENDONS C2 & C3)



PROFILE 'C' - (TENDONS C1, C2, & C3)

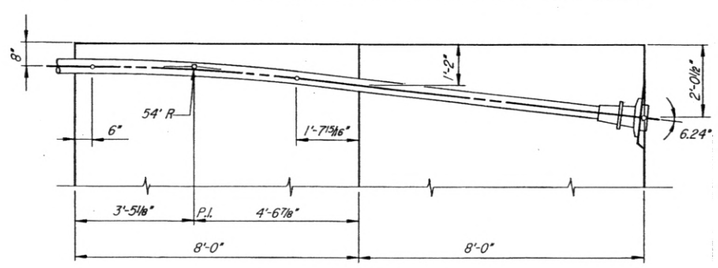


PROFILE 'K' - (TENDON C6)
(For Segments 22.12W, 22.12E, 23.12W, & 27.12E)



PLAN 'B' - (TENDONS C3, C5, & C6)

Tendon C3 & C6 are Opposite Hand.



PROFILE 'D' - (TENDONS C4, C5, & C6)

Notes
- Work this Drawing with Post-Tensioning Layout Dwgs.
- **At Piers 5, 6, 7, & 8, Tendon C2 Deviates into Hole C3 while Tendon C3 Deviates into Hole C2.
- Unless Noted Otherwise, Ducts Shall be Flexible Metal.
- For Bulkhead Sheet, See Dwg. B-145.
- For Anchorage Details, See Dwg. B-170.

	INITIAL	DATE		A.O.S.	4-89
Designed By	W.S.M.	4-89	Checked By	A.O.S.	4-89
Checked By	T.W.S.	4-89	Quantities By	A.O.S.	5-89
Detailed By	M.M.H.	4-89	Checked By	S/G	5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - I7W
CONCRETE ALTERNATE

CANTILEVER POST-TENSIONING
DETAILS I
(Typical)

Designer	W. S. McNary	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(I7W)
Drawing Number B-163		of 217	Drawings

Revision Dates (Preliminary Stage Only)

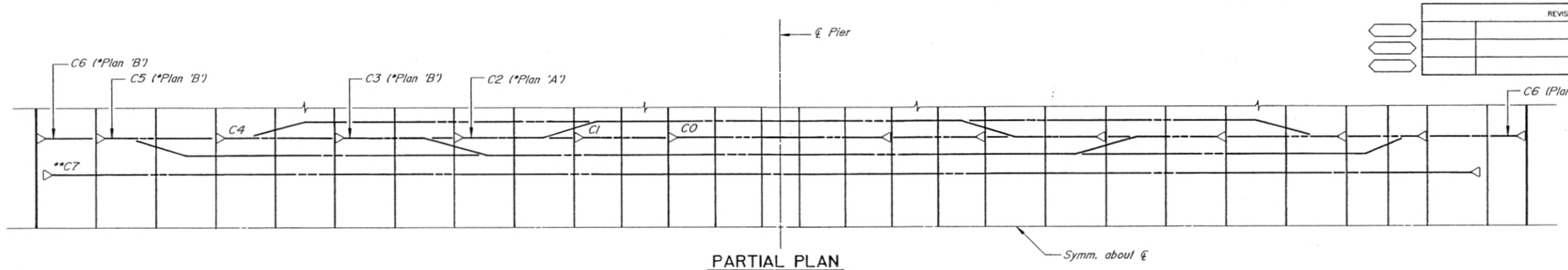
BRUNING 44-232 7335D

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

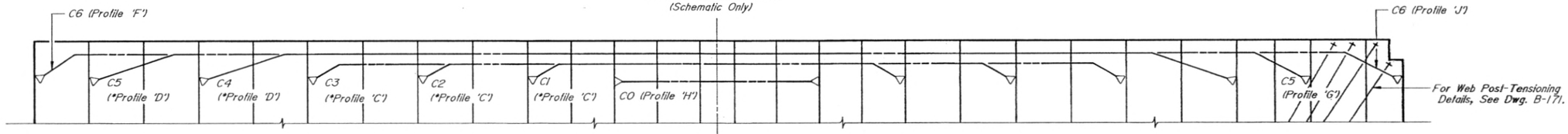
AS CONSTRUCTED		
NO REVISIONS 7-26-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VII	COLORADO	I 70-2(145)	II-385

REVISIONS		



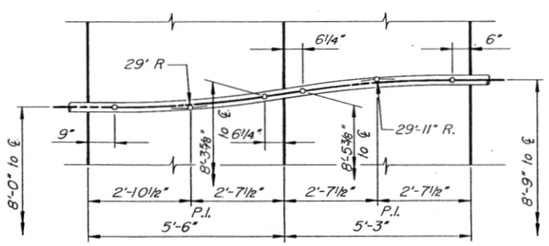
PARTIAL PLAN
(Schematic Only)



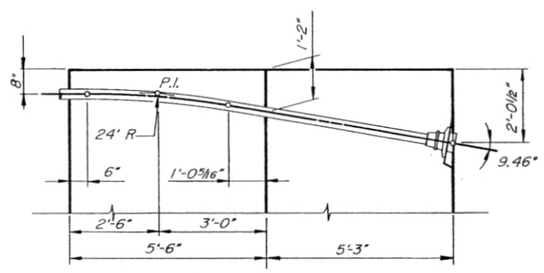
PARTIAL ELEVATION
(Schematic Only)

* For Plans 'A' & 'B' & Profiles 'C' & 'D', See Cantilever Post-Tensioning Details, Dwg B-163.
Unless Noted Otherwise, Ducts Shall be Flexible Metal.

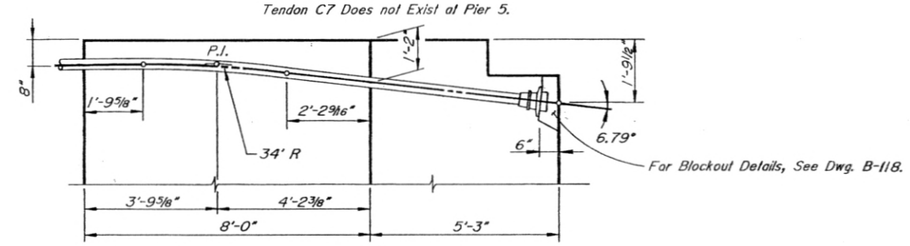
** For Tendon C7 Geometry, See Top Slab Anchor Block Details, Dwg B-175.
Tendon C7 Does not Exist at Pier 5.



PLAN 'E' - TENDON C6

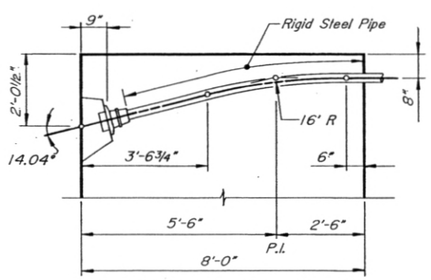


PROFILE 'G' - TENDON C5

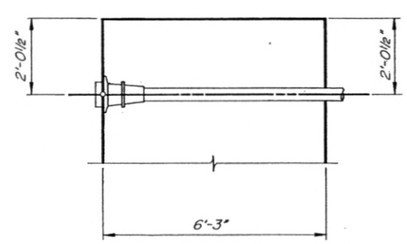


PROFILE 'J' - TENDON C6

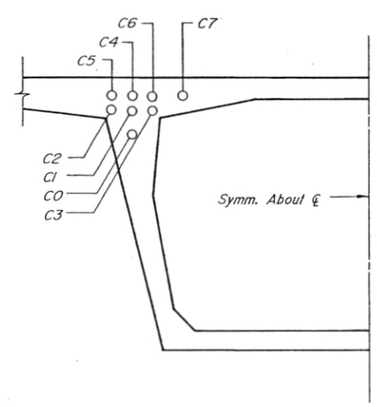
Notes:
-For Anchorage Details, See Dwg. B-170.
-For Bulkhead Sheet, See Dwg. B-145.



PROFILE 'F' - TENDON C6



PROFILE 'H' - TENDON CO



INITIAL	DATE	Checked By	A.O.S.	4-89
R.K.M.	4-89	Quantities By	A.O.S.	4-89
W.S.M.	4-89	Checked By	S.L.	5-89
M.M.M.	4-89			
Designed By				
Checked By				
Detailed By				

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

CANTILEVER POST-TENSIONING DETAILS II
(Piers 5, 12, 13, 21, 28, & 29)

Designer	R.K. Montgomery	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-164	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

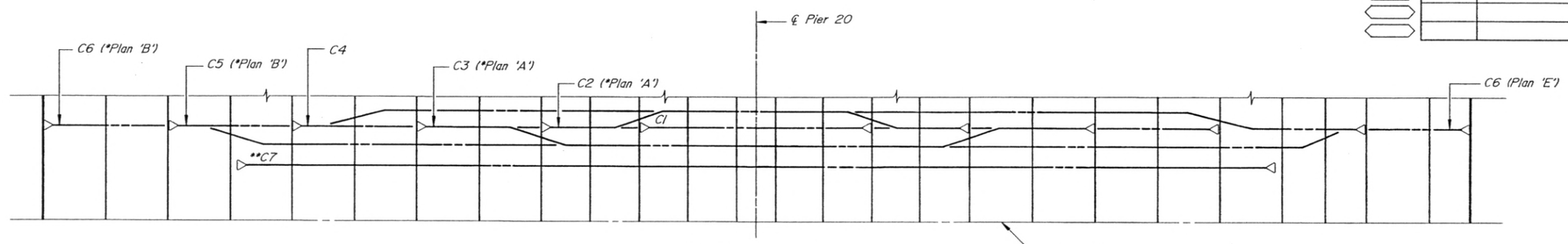
BRUNING 44 232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

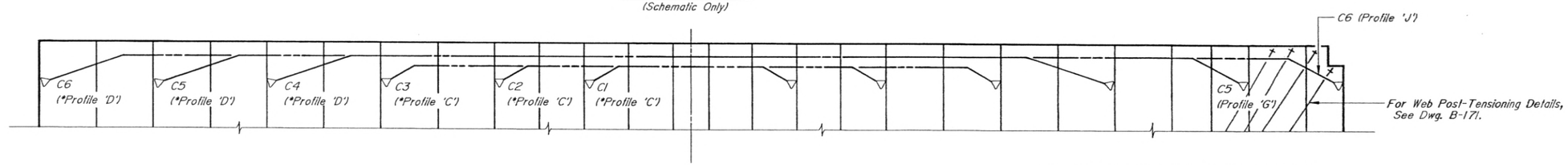
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-386

REVISIONS	



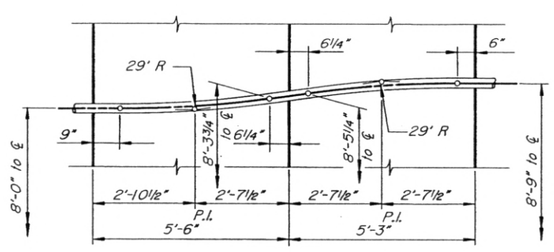
PARTIAL PLAN
(Schematic Only)



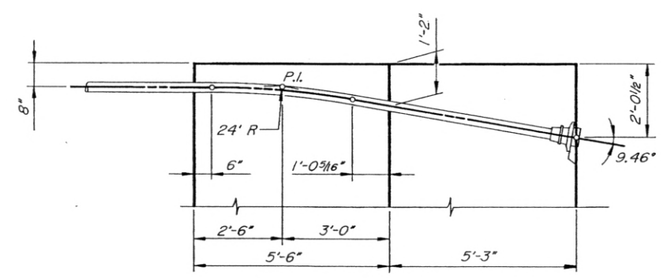
PARTIAL ELEVATION
(Schematic Only)

* For Plans 'A' & 'B' & Profiles 'C' & 'D', See Cantilever Post-Tensioning Details, Dwg B-163.
- Unless Noted Otherwise, Ducts Shall be Flexible Metal.

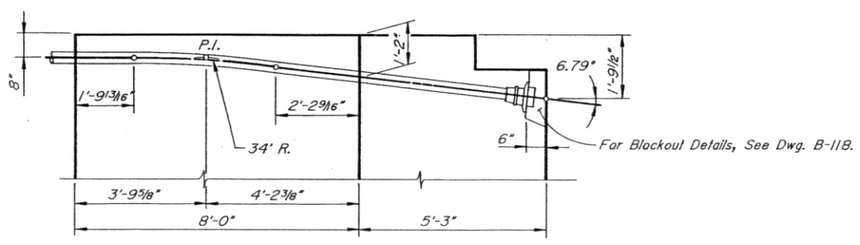
** For Tendon C7 Geometry, See Top Slab Anchor Block Details, Dwg B-175.
- For Anchorage Details, See Dwg. B-170.
- For Bulkhead Sheet, See Dwg. B-145.



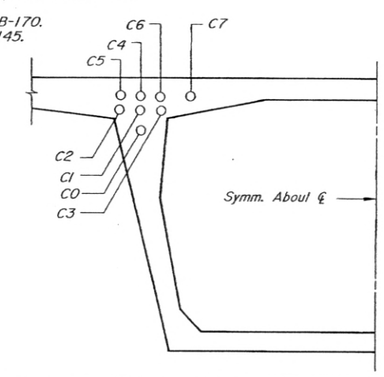
PLAN 'E' - TENDON C6



PROFILE 'G' - TENDON C5



PROFILE 'J' - TENDON C6



	INITIAL	DATE		
Designed By	R.K.M.	4-89	Checked By	4-89
Checked By	W.S.M.	4-89	Quantities By	4-89
Detailed By	M.M.M.	4-89	Checked By	5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

CANTILEVER POST-TENSIONING DETAILS III
(Pier 20)

Designer	R.K. Montgomery	Structure	F-08-BJ
Detailer	M. Miyamoto	Numbers	(17W)
Drawing Number	B-165	of 217	Drawings

Revision Dates (Preliminary Stage Only)

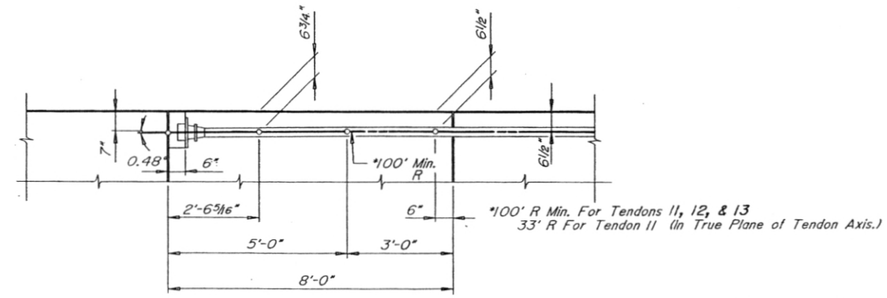
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H FORM NO. 117
REV. APR. 1986

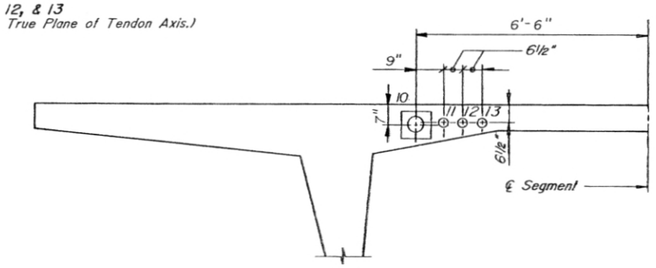
AS CONSTRUCTED		
NO REVISIONS 7-26-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-387

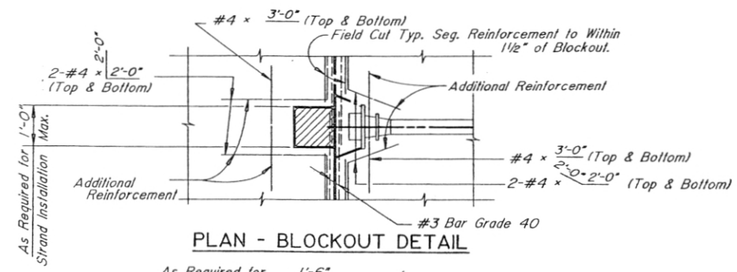
REVISIONS		



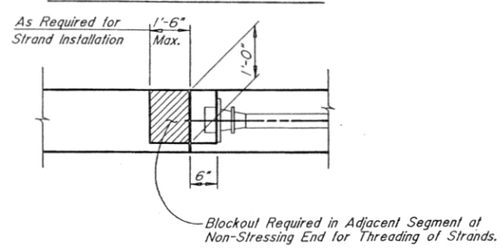
PROFILE - (TENDONS 11 THRU 13)



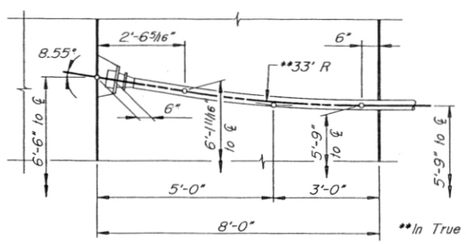
TENDON LOCATION



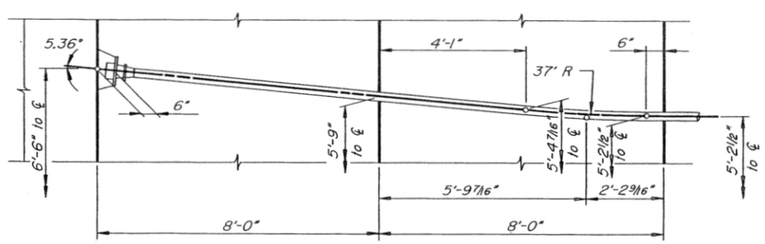
PLAN - BLOCKOUT DETAIL



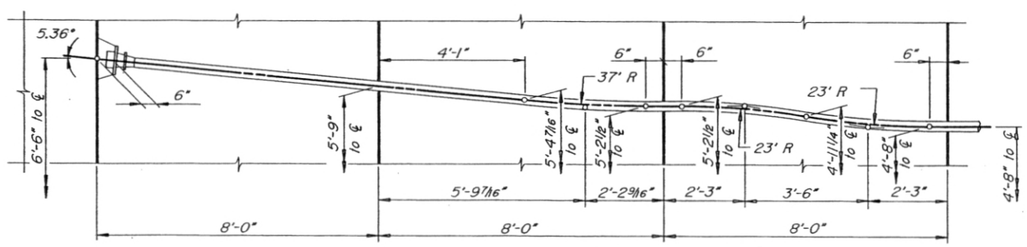
PROFILE - BLOCKOUT DETAIL



PLAN - (TENDON 11)



PLAN - (TENDON 12)



PLAN - (TENDON 13)

	INITIAL	DATE	Checked By	Quantities By	Checked By
Designed By	R.K.M.	4-89	A.D.S.	A.D.S.	4-89
Checked By	T.H.S.	4-89	A.D.S.	S/G	5-89
Detailed By	M.M.M.	4-89			

Notes:
For Bulkhead Details, See Dwg. B-145.
For Additional Anchorage Details, See Dwg. B-170.
For Tendons 10 thru 13 Locations, See Post-Tensioning Layout Drawings.
Unless Noted Otherwise, Ducts Shall be Flexible Metal.

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

CANTILEVER POST-TENSIONING DETAILS IV

(Tendons 11, 12, & 13)

Designer	R.K. Montgomery	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		

Drawing Number B-166 of 217 Drawings

Revision Dates (Preliminary Stage Only)

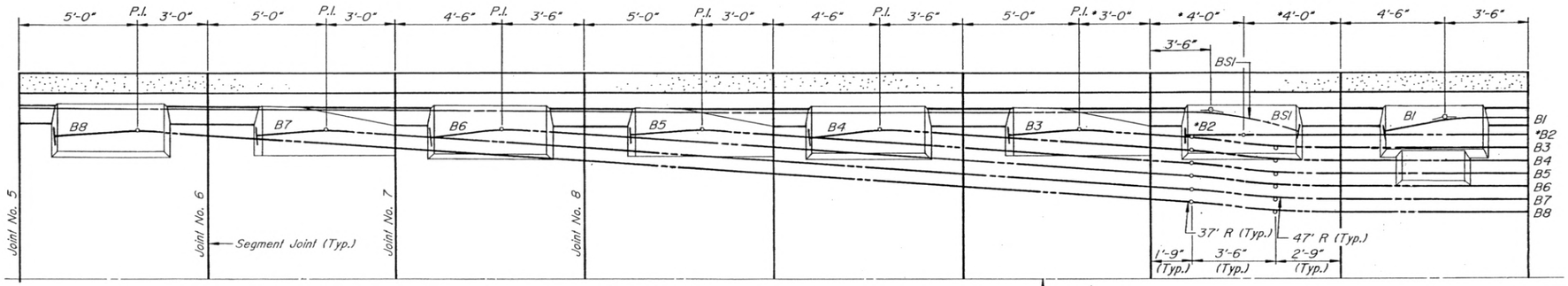
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

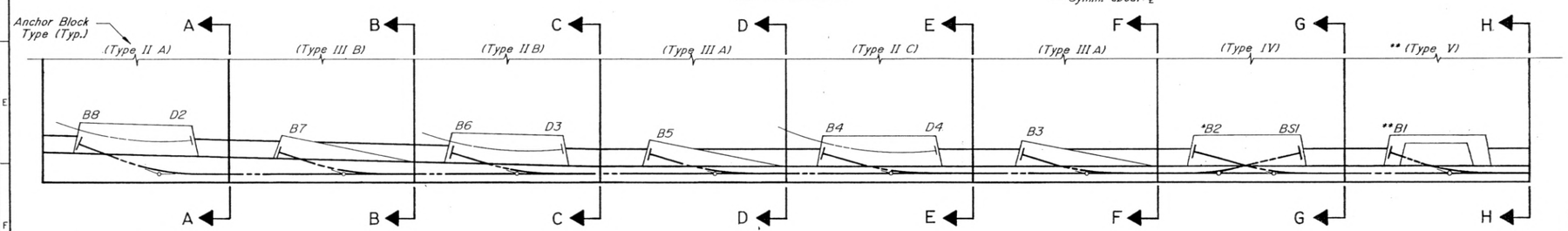
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-388

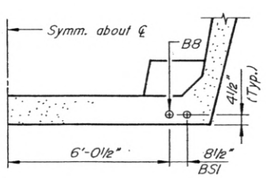
REVISIONS		



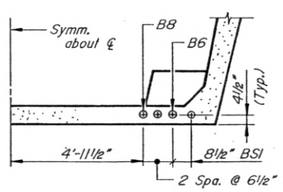
HALF PLAN



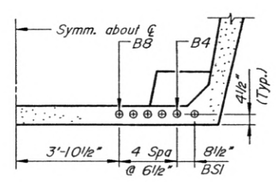
ELEVATION



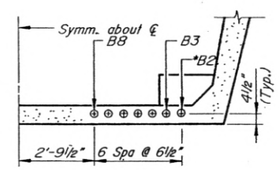
SECTION A-A



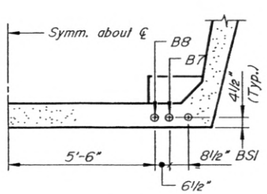
SECTION C-C



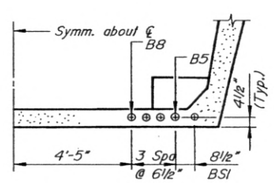
SECTION E-E



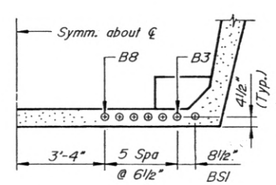
SECTION G-G



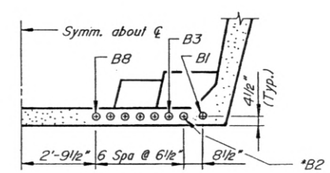
SECTION B-B



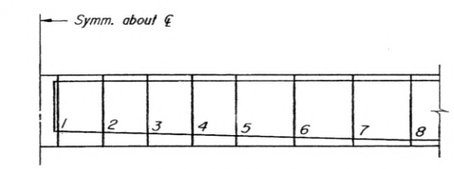
SECTION D-D



SECTION F-F



SECTION H-H



SEGMENT JOINT NUMBERS

Notes:
- For Anchor Block Details, See Dwg. B-176 to 186.
- *Tendon B2 is used in Spans 14, 16, 17, & 18.
- For Contingency Tendon Details, See Dwg. B-172 to 174.
- Use Anchor Block Type I for Tendon D1.
- Work this Dwg. with Post-Tensioning Layouts.
- ** Tendon B1 is not used in Spans 11, 13, 19, 21, 22, 27, & 29.

	INITIAL	DATE		INITIAL	DATE
Designed By	WS.M.	4-89	Checked By	A.O.S.	4-93
Checked By	T.L.S.	4-89	Quantities By	A.O.S.	4-93
Detailed By	M.M.M.	4-89	Checked By	S.G.	5-93

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

BOTTOM SLAB POST-TENSIONING DETAILS I
(Typical)

Designer	W.S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-167	of 217		Drawings

Revision Dates (Preliminary Stage Only)

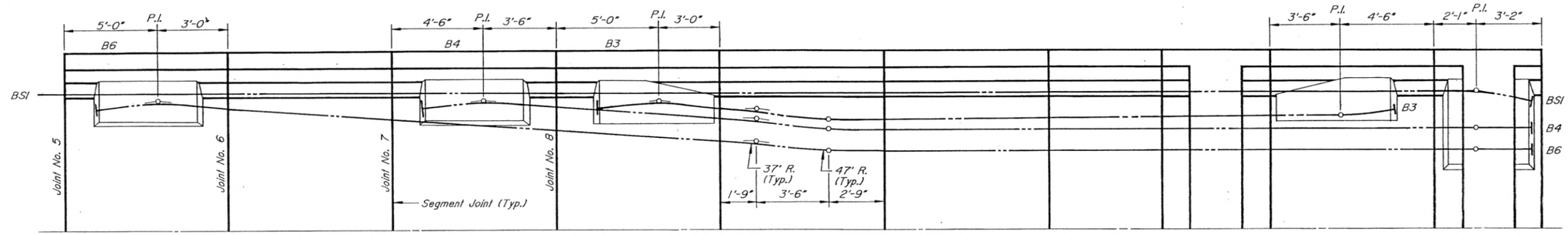
BRUNING 44 232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

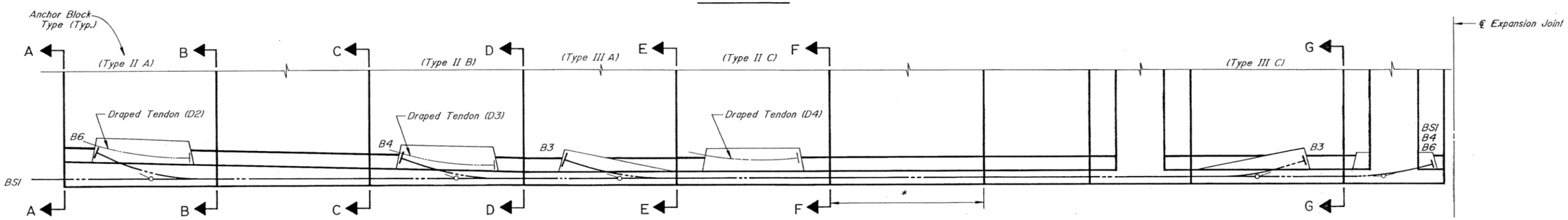
AS CONSTRUCTED		
NO REVISIONS 7-26-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-389

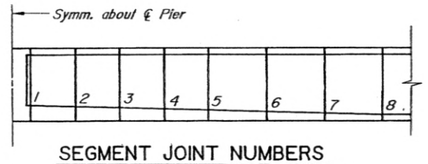
REVISIONS		



HALF PLAN

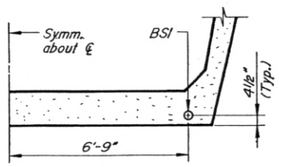


ELEVATION

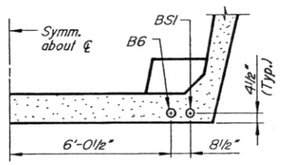


SEGMENT JOINT NUMBERS

For Anchor Block Details, See Dwg. B-176 to 186.
** This Segment does not Exist for Cantilever 20W.*
Use Anchor Block Type I for Tendon D1.



SECTION A-A



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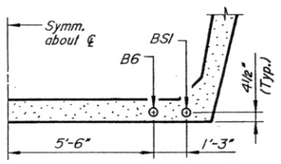

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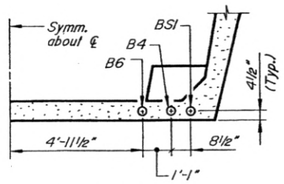

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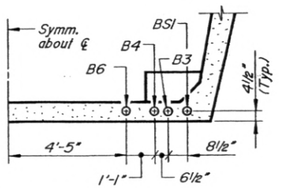

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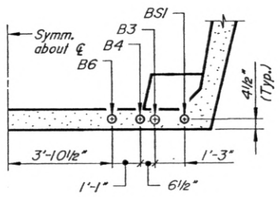

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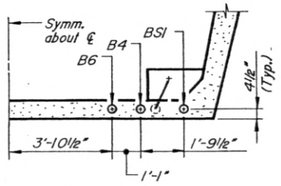

SECTION G-G

Designed By		INITIAL	DATE
Checked By	A.O.S.	H.S.M.	4-89
Detailed By	K.K.	T.M.S.	4-89
Checked By	S/K	K.K.	4-89
Quantities By	A.O.S.		
Checked By	S/K		

Figg and Muller Engineers, Inc.
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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W CONCRETE ALTERNATE

BOTTOM SLAB POST-TENSIONING DETAILS II

(Expansion Joint Spans)

Designer	W.S. McNary	Structure Numbers	F-08-BJ
Detailer	K. Krueger		17W
Drawing Number B-168		of 217	Drawings

Revision Dates (Preliminary Stage Only)

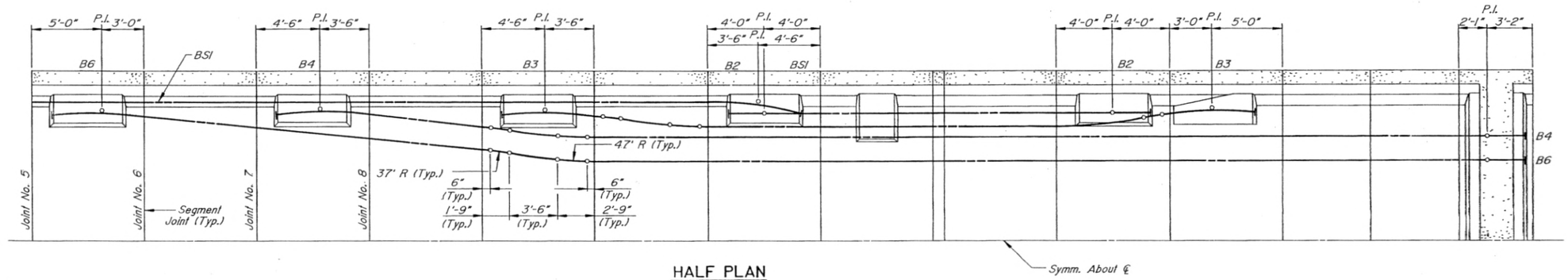
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

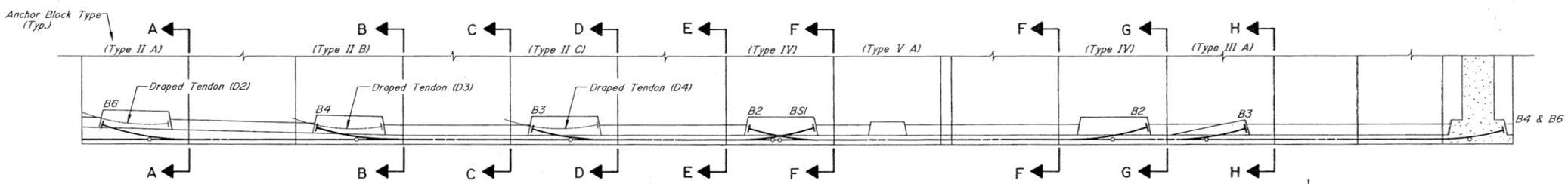
AS CONSTRUCTED		
NO REVISIONS 7-26-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-390

REVISIONS		



HALF PLAN



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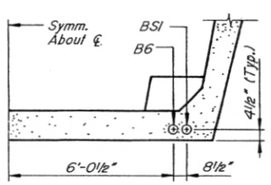
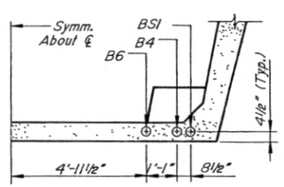


SECTION A-A



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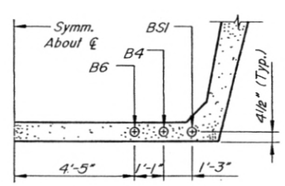
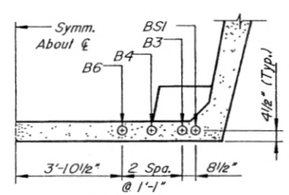
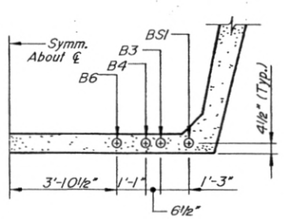


SECTION C-C



SECTION D-D



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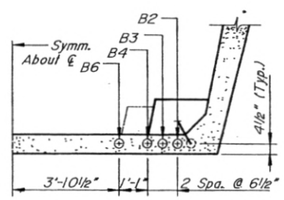
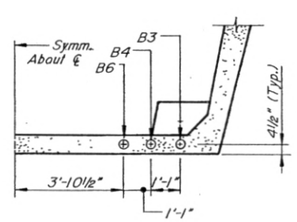


SECTION F-F



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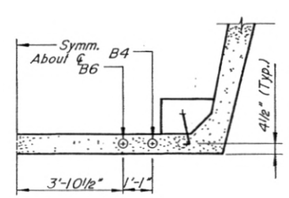

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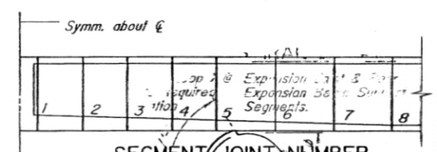

SEGMENT JOINT NUMBER

Notes:
For Anchor Block Details, See Dwg. B-176 to 186.
For Contingency Tendon Details, See Dwg. B-172 to 174.
For Deviation Block Details, See Dwg. B-186.
Use Anchor Block Type 1 for Tendon D1.

SEE DETAIL

INITIAL	DATE				
Designed By	W.S.M.	4-89	Checked By	A.O.S.	4-89
Checked By	A.O.S.	4-89	Quantities By	A.O.S.	4-89
Detailed By	D.M.	4-89	Checked By	S.K.	5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

BOTTOM SLAB POST-TENSIONING DETAILS III
(End Span 36)

Designer	W.S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	D. Michael		
Drawing Number B-169	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-391

REVISIONS		
CR-1	REVISE POST-TENSIONING DETAIL	CFB

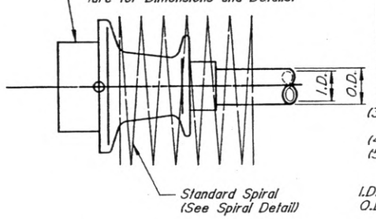
TENDON DETAILS

0.6"ϕ Strand	Equivalent 0.5"ϕ Strand	Stressing Force	Flexible Metal I.D. Min.	Flexible Metal O.D. Max.	Rigid Steel Pipe I.D.	Rigid Steel Pipe O.D.	Oversized (3) Pipe I.D.	Oversized (3) Pipe O.D.	α	Spiral Size	(4) 'Y'	'Z'	Jack Size (VSL shown or Equivalent)
7-0.6"	10-0.5"	308K	2.25"	3"	2.469"	2.875"	—	—	20°	4SP01	6"	10½"	E6-7
9-0.6"	13-0.5"	396K	2.81"	3.56"	3.068"	2.875"	—	—	20°	5SP01	6"	10½"	E6-12
12-0.6"	17-0.5"	527K(5)	3.00"	3.56"	3.068"	3.500"	4.026"	4.500"	20°	5SP01	6"	1'-2½"	E6-12
19-0.6"	27-0.5"	835K	3.75"	4.31"	4.026"	4.500"	5.047"	5.563"	20°	5SP02	6"	1'-5½"	E6-19

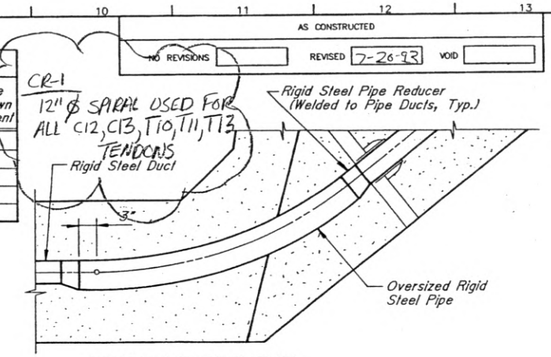
(3) Oversized Ducts Shall be Galvanized Standard Weight Pipe and Shall be Used for 12-0.6"ϕ and 19-0.6"ϕ Tendons with a Radius of Less than 6'-6".
(4) Unless Noted Otherwise on Segment Post-Tensioning Dwgs.
(5) 'B5' Tendons shall be Stressed to 350K.

I.D. - Denotes Inside Diameter.
O.D. - Denotes Outside Diameter

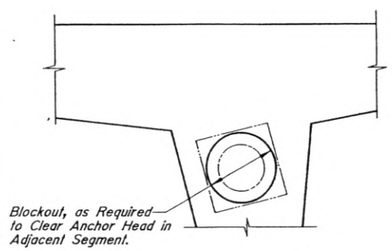
CR-1
12" ϕ SPIRAL USED FOR ALL C12, C13, T10, T11, T12 TENDONS



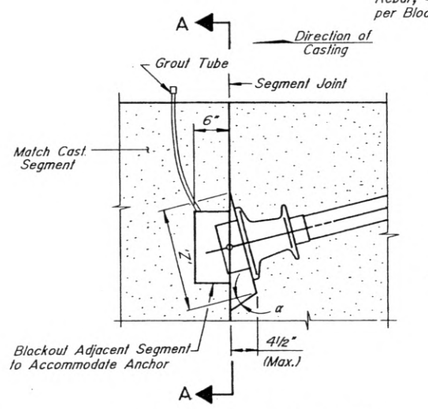
TYPICAL ANCHOR DETAILS



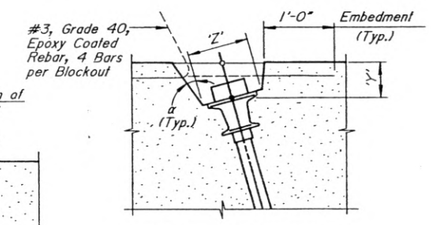
STRADDLE SEGMENT



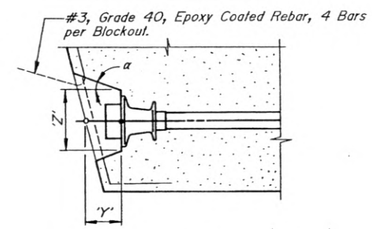
SECTION A-A



SIDE ELEVATION OF WEB
TYPICAL ANCHORAGE DETAILS



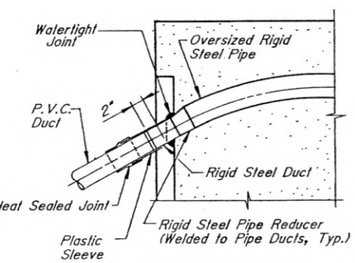
ANCHOR IN TOP SLAB



ANCHOR IN FACE OF WEB

TYPICAL CANTILEVER TENDONS C0 to C6

TYPICAL BLOCKOUT DETAILS



(2) Contractor May Propose Alternate Method of Connection.

PIER SEGMENT

PIPE REDUCER DETAILS

The Cost of #3 Bar shall be Incidental to the Cost of Post-Tensioning.

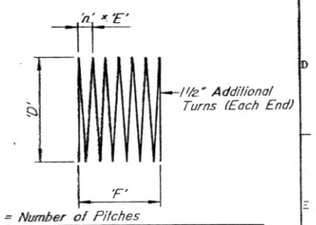
BAR LIST

*Bar	Length	Str.	Bent
4SP01	23'-8"		●
5SP01	34'-3"		●
5SP02	41'-4"		●
5SP03	5'-5"		●

*Number Preceding Letter Denotes Bar Size
All Bar Bends Shall Be in Accordance with A.C.I. Standards.

BAR BENDING DIAGRAM

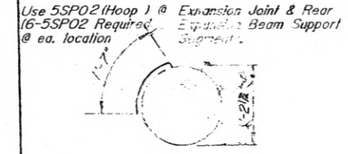
(All Dimensions are Out to Out)



'n' = Number of Pitches

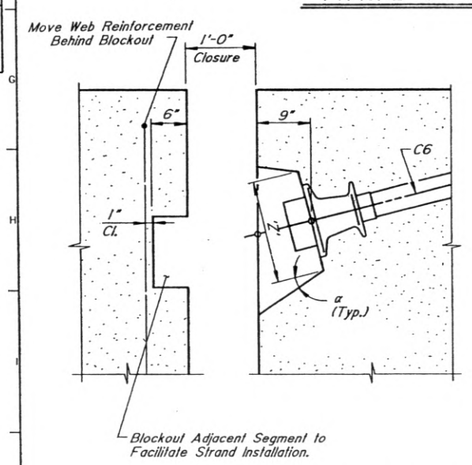
Bar	'D'	'n' × 'E'	'F'
4SP01	10"	6×2"	1'-0"
5SP01	1'-2½"	6×2⅜"	1'-2¼"
5SP02	1'-5½"	6×2⅝"	1'-3¾"

4SP01, 5SP01, 5SP02
STANDARD SPIRAL DETAIL

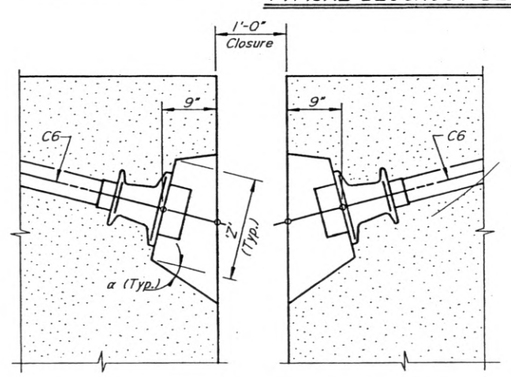


5SP03
'HOOP' DETAIL

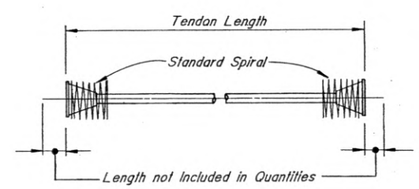
The Cost of Reinforcement shall be Incidental to the Cost of Post-Tensioning.



ELEVATION @ C.J. 11, C.J. 19, C.J. 24, C.J. 26 & C.J. 35



ELEVATION @ C.J. 21, C.J. 22 & C.J. 27



ANCHORAGE DETAIL - TENDON C6 IN CANTILEVERS 11, 19, 20, 21, 22, 24, 26, 27, & 35

INITIAL	DATE	
Designed By	W.S.M.	4.89
Checked By	T.L.S.	4.89
Detailed By	A.O.S.	4.89
Checked By	MHM	4.89
Quantities By	A.O.S.	4.89
Checked By	S.L.K.	5.89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING DETAILS

Designer	W.S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	A. Sanchez		
Drawing Number	B-170	of 217	Drawings

Revision Dates (Preliminary Stage Only)

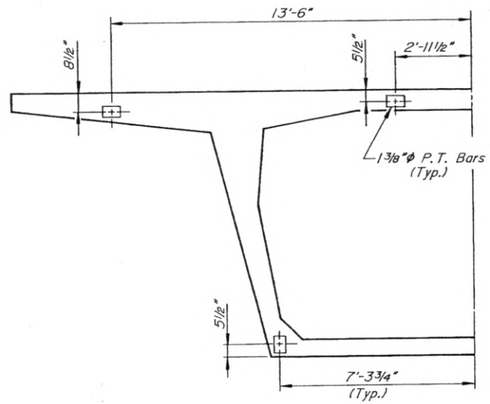
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117:
REV. APR. 1986

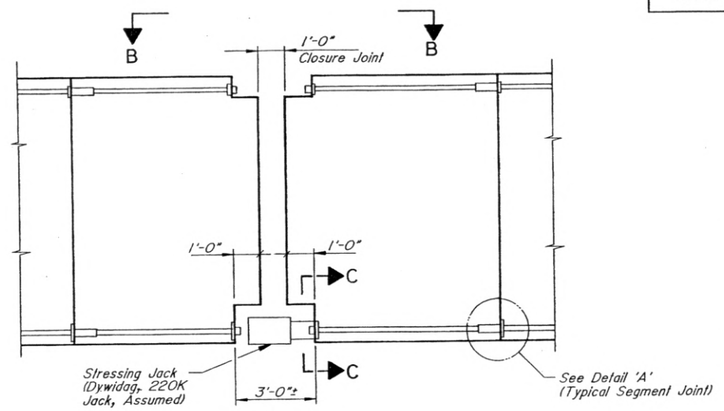
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VII	COLORADO	I 70-2(145)	11-392

REVISIONS

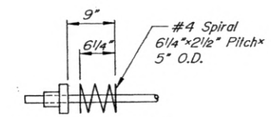


HALF CROSS SECTION



ELEVATION

LONGITUDINAL POST-TENSIONING BAR DETAILS



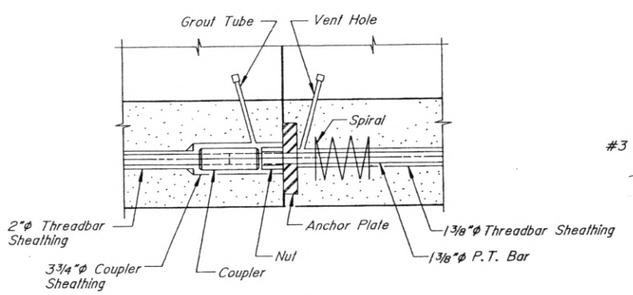
TYPICAL SPIRAL

(1¼" Φ & 1⅜" Φ Bar)

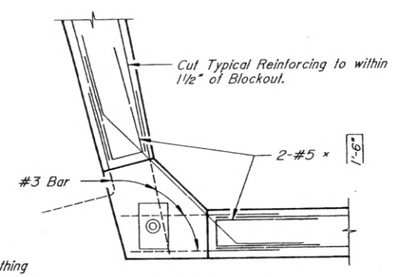
Bar Size	Reqd. Lift-Off Force	Anchor R. Size	Sheathing Φ I.D.	Sheathing Φ O.D.
1¼" Φ	130K	6¼"×6¼"×1½" 5"×8"×1½"	1⅝"	1⅞"
1⅜" Φ	160K	7"×7½"×1¾" 5"×9½"×1¾"	1¾"	2"

I.D.-Denotes Inside Diameter.
O.D.-Denotes Outside Diameter.

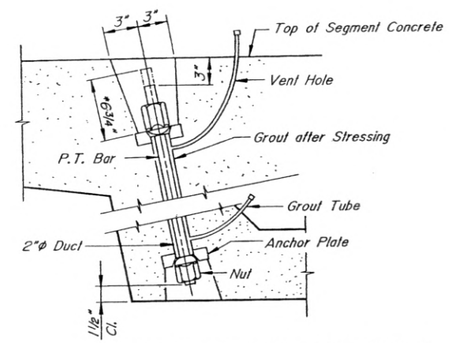
Notes:
1. #3 Bars shall be Grade 40, Epoxy Coated Rebar.
2. After Stressing, the Bent Bar shall be Returned to its Straight Position and Tied.
3. Blockouts shall be Filled when the Closure Joint is Poured.



DETAIL 'A'



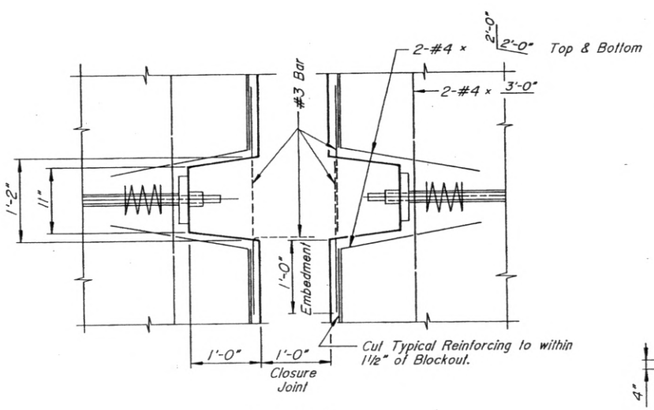
SECTION C-C



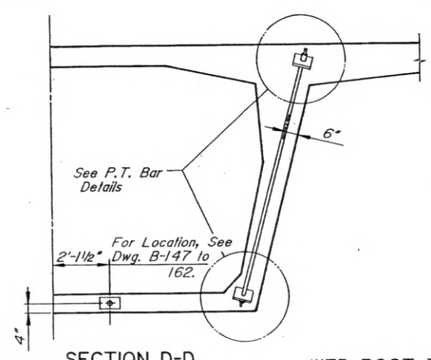
POST-TENSIONING BAR DETAILS

*Note: Dimension Shown is that Required for Stressing. Bars are to be Saw or Flame Cut after Stressing to Provide 3" Clearance to Top of Concrete.

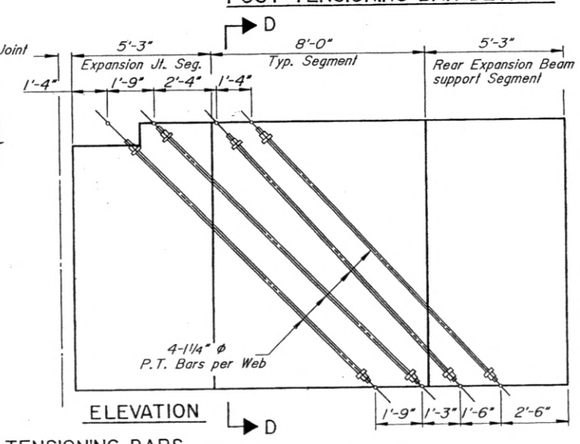
Notes:
1. To Facilitate Installation of Longitudinal Post-Tensioning Bars in Curved Portions of Bridge, the Contractor May Use Oversized Sheathing with a Slotted Anchor Plate.
2. A Minimum Uniform Pressure of 55 PSI is Required Across Epoxy Joint.
3. Post-Tensioning Bars are to be Grade 150 High Strength Bars.
4. The 6-1⅜"Φ Longitudinal P.T. Bars are Permanent, and are Coupled and Stressed after each Segment is Stressed.



VIEW B-B



SECTION D-D



ELEVATION

WEB POST TENSIONING BARS

Typical -- Expansion Joints 1, 2, 3 & 4.
Note: Stress P.T. Bars after Segments have been assembled.

For Additional Details, See Dwg. B-137 & 144.

INITIAL	DATE		INITIAL	DATE
Designed By	W.S.M.	4-89	Checked By	M.M.M. 4-89
Checked By	T.W.S.	4-89	Quantities By	A.O.S. 4-89
Detailed By	A.O.S.	4-89	Checked By	S.G. 5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

POST-TENSIONING BAR DETAILS

Designer W.S. McNary		Structure Numbers	F-08-BJ (17W)
Detailer A. Sanchez			
Drawing Number B-171	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

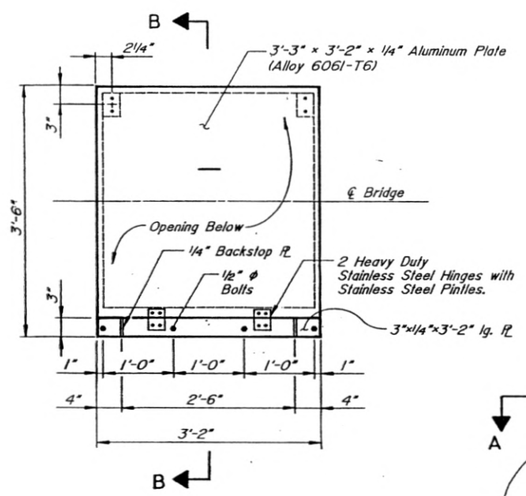
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H FORM NO. 117
REV. APR. 1986

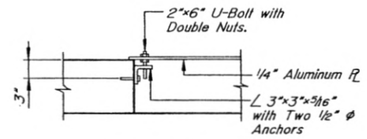
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-408

REVISIONS		
CR-1	REVISE ACCESS HOLE LOCATION	CRB



SECTION A-A



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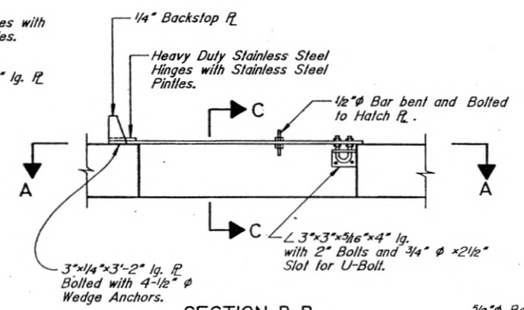
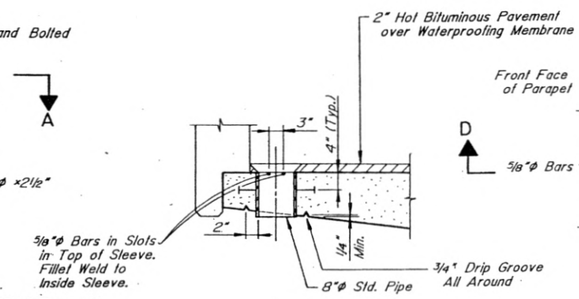


SECTION B-B

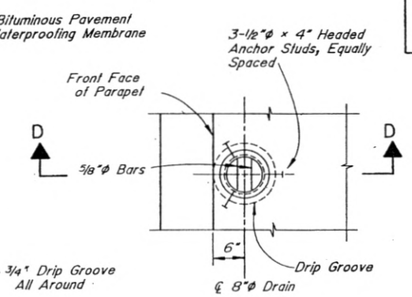
DROP DRAIN DETAILS

Drop Drain Pipe shall be ASTM A5 , Grade B Standard weight. Galvanize per ASTM A123 aler Fabrication.

Drop Drains shall be Located on the low Side of all odd Numbered Segment. (1E, 1W, 3E, 3W etc.)



SECTION D-D

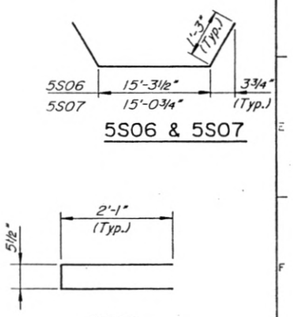


PLAN

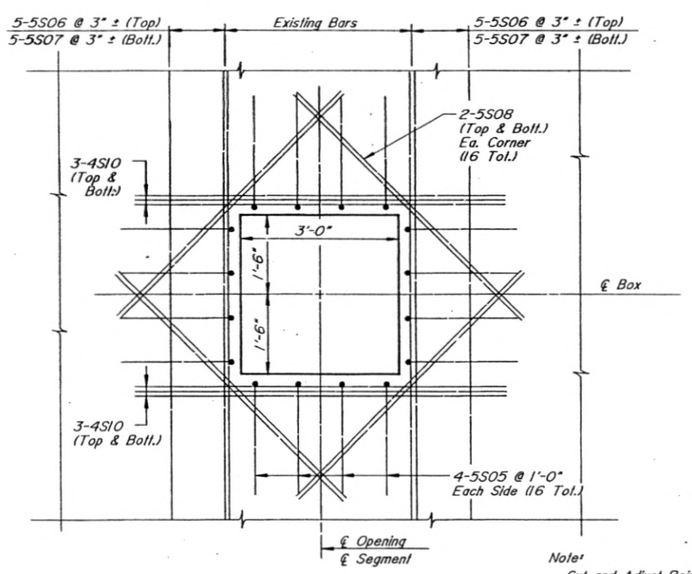
BAR LIST / ONE ACCESS				
*Bar	No.	Length	Str.	Bent
4S10	12	7'-0"	●	
5S05	16	4'-8"		●
5S06	10	17'-10"		●
5S07	10	17'-7"		●
5S08	16	6'-0"	●	

*Number Preceding Letter Denotes Bar Size. All Bar Bends Shall be in Accordance with A.C.I. Standards.

BAR BENDING DIAGRAM

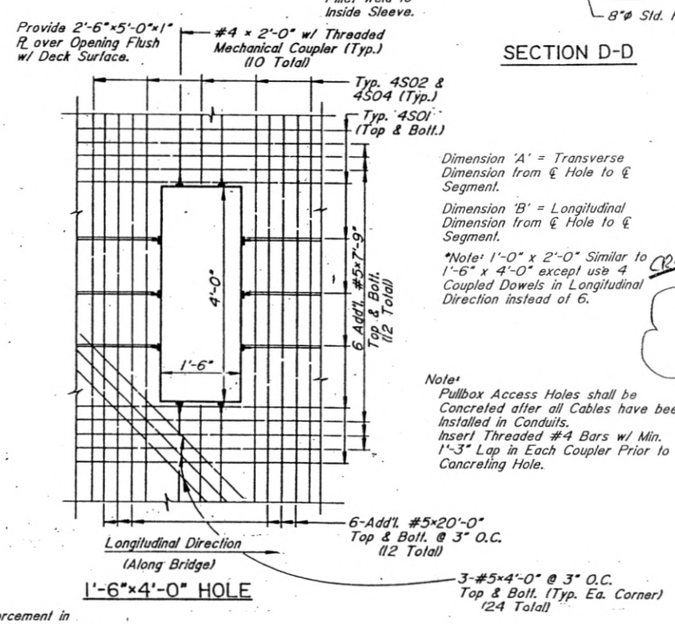


SEGMENT ACCESS DETAILS



Note:
Cut and Adjust Reinforcement in Segment to Provide 1½" Clearance

PARTIAL PLAN BOTTOM SLAB
ACCESS REINFORCING



1'-6"x4'-0" HOLE

Dimension 'A' = Transverse Dimension from ℄ Hole to ℄ Segment.

Dimension 'B' = Longitudinal Dimension from ℄ Hole to ℄ Segment.

*Note: 1'-0" x 2'-0" Similar to 1'-6" x 4'-0" except use 4 Coupled Dowels in Longitudinal Direction instead of 6.

Note:
Pullbox Access Holes shall be Concreted after all Cables have been Installed in Conduits.
Insert Threaded #4 Bars w/ Min. 1'-3" Lap in Each Coupler Prior to Concreting Hole.

Segment	Hole Size	'A'	'B'
5.9W	1'-6" x 4'-0"	0	0
5.7E	1'-6" x 4'-0"	0	0
6.4E	1'-0" x 2'-0"	*3'-8" Lt.	0
7.5W	1'-6" x 4'-0"	0	0
9.7W	1'-6" x 4'-0"	0	0
13.7W	1'-6" x 4'-0"	0	0
11.11W	1'-6" x 4'-0"	0	0
12.9E	1'-6" x 4'-0"	0	0
13.9W	1'-6" x 4'-0"	0	0
14.7E	1'-6" x 4'-0"	0	0
16.7E	1'-6" x 4'-0"	0	0
18.7W	1'-6" x 4'-0"	0	0
19.4E	1'-6" x 4'-0"	0	0
20.8E	1'-6" x 4'-0"	0	0
21.9W	1'-6" x 4'-0"	0	0
23.7W	1'-6" x 4'-0"	0	0
25.7W	1'-6" x 4'-0"	0	0
27.7W	1'-6" x 4'-0"	0	0
28.9E	1'-6" x 4'-0"	0	0
29.9W	1'-6" x 4'-0"	0	0
30.7E	1'-6" x 4'-0"	0	0
32.7E	1'-6" x 4'-0"	0	0
34.4E	1'-6" x 4'-0"	0	0
37.1W	1'-6" x 4'-0"	0	0

Notes:
All Hatches to be Secured by Heavy Duty Corrosion Resistant Padlock and Keys Furnished by the Engineer upon acceptance of the Project.
For Access Opening Locations, See Dwg. B-98 to 109.
All Items for Segment Access Details shall be Incidental to the Segments.
For Typical Segment Reinforcement, See Dwg. B-111 to 113.

TOP SLAB PULLBOX ACCESS HOLE DETAILS
For Pullbox and Conduit Details, See Dwg. B- thru B-

Designed By	W.S.M.	7-89	
Checked By	T.W.S.	7-89	
Detailed By	D.J.M.	7-89	
Checked By	D.O.S.	7-89	
Quantities By	A.G.S.	7-89	
Checked By	S.L.	5-90	

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

DRAIN & ACCESS DETAILS

Designer	W.S. McNary	Structure Numbers	F-08-BJ (17W)
Detailer	D. Michael		

Drawing Number B-187 of 217 Drawings

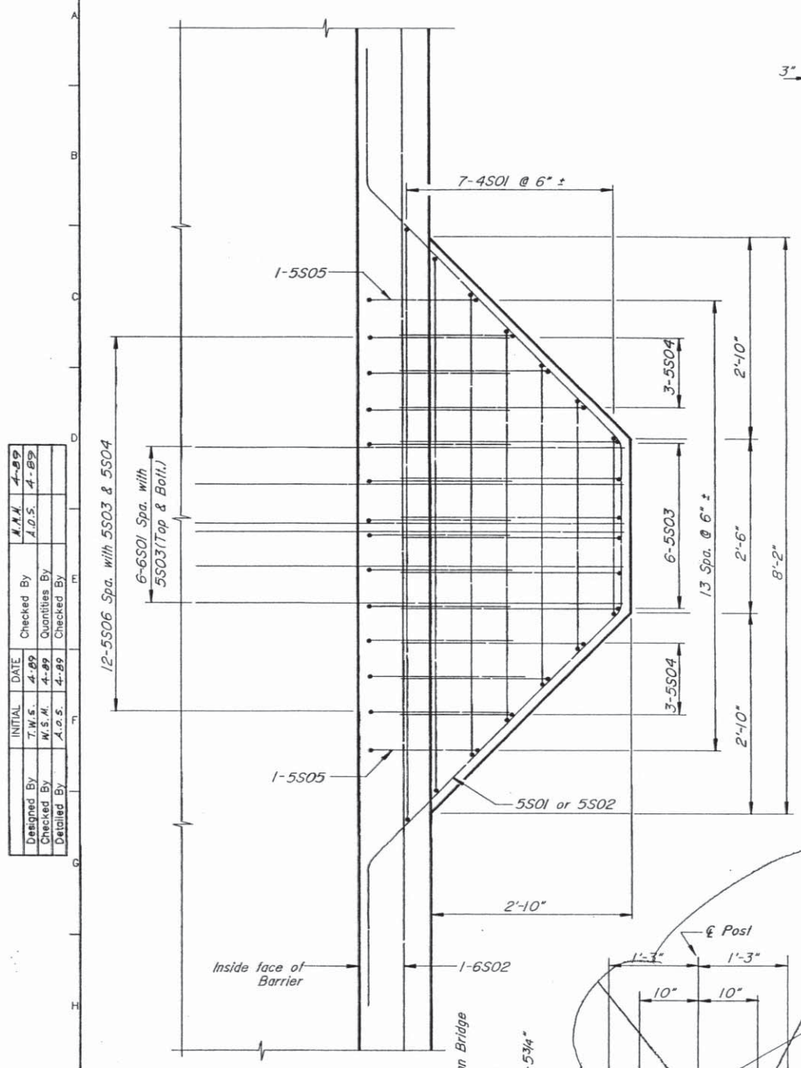
Revision Dates (Preliminary Stage Only)

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

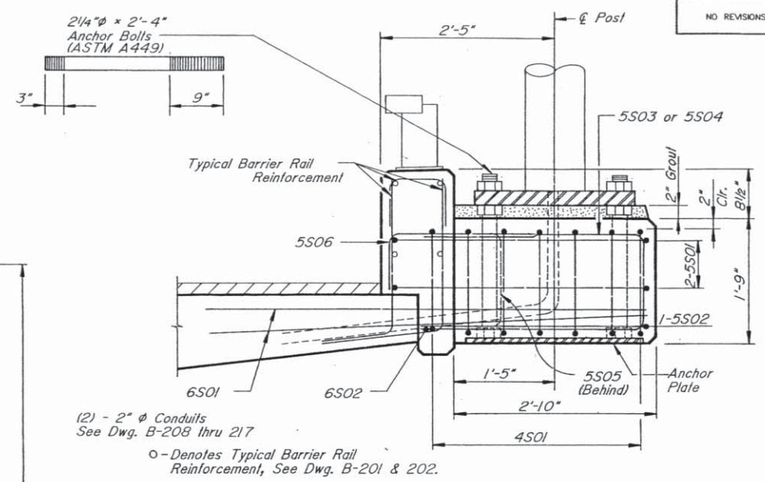
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	11-409

REVISIONS		
CR-1	REVISE SIGNPOST ANCHOR, BASE PLS	CFB



PLAN

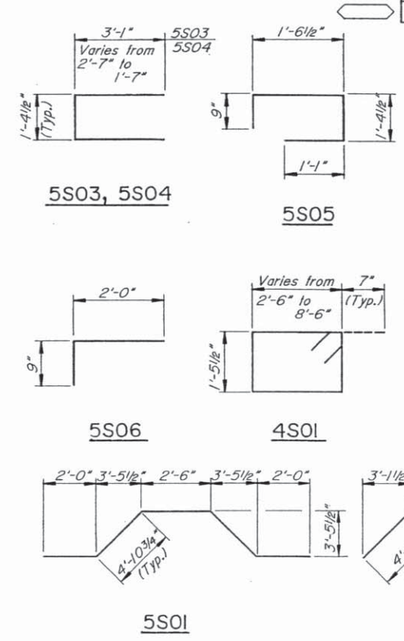


ELEVATION

Notes:
Concrete Cover shall be 1½" unless Noted Otherwise.
Space Reinforcement to Avoid Anchor Bolt and Nut.
Two Supports are Required at Each Sign Bridge Location.

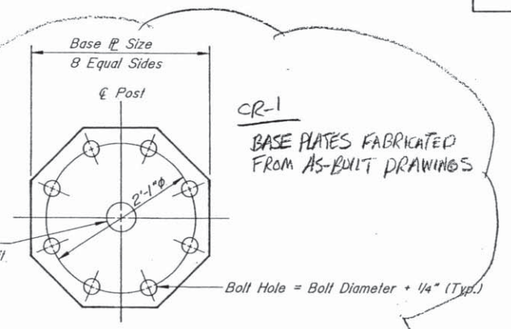
BAR BENDING DIAGRAMS

(All Dimensions are Out to Out)



BAR LIST				
*Bar	No.	Length	Str.	Bent
4S01	7	** 15'-1"		•
5S01	2	16'-4"		•
5S02	1	11'-4"		•
5S03	6	7'-7"		•
5S04	6	** 5'-7"		•
5S05	2	4'-9"		•
5S06	12	2'-9"		•
6S01	12	6'-6"	•	
6S02	1	20'-0"	•	

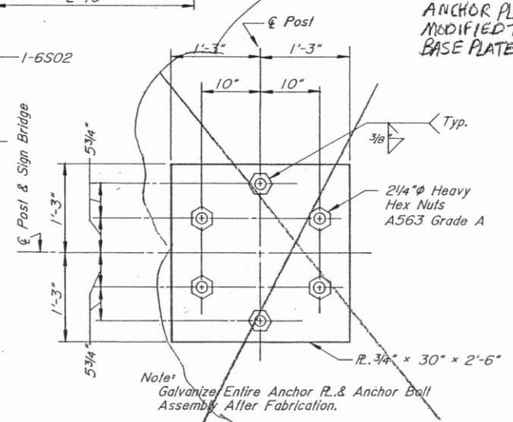
*Number Preceding Letter Denotes Bar Size.
All Bar Bends shall be in Accordance with A.C.I. Standards.
**Length Given is an Average.



CR-1
BASE PLATES FABRICATED FROM AS-BUILT DRAWINGS

8 BOLTS

CR-1
ANCHOR PLATES MODIFIED TO MATCH BASE PLATE



Note:
Galvanize Entire Anchor ℞ & Anchor Bolt Assembly After Fabrication.

ANCHOR PLATE

Sign Bridge	Location	Base ℞ Size	Anchor Bolts
SB-W02	1424+75.88 (WB)	2'-6" x 2½"	8-2¼"Ø
SB-W04	1414+20.13 (WB)	2'-6" x 2½"	8-2¼"Ø
SB-W08	1397+96.81 (WB)	2'-6" x 2½"	8-2¼"Ø

BASE PLATE DETAILS

- 2 Supports Required at Each Location
- Base Plate and Sign Bridge N.I.C.

	INITIAL	DATE
Designed By	T.W.S.	4-89
Checked By	W.S.M.	4-89
Detailed By	A.O.S.	4-89
Checked By		
Quantities By		
Checked By		

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

SIGN POST
SUPPORT DETAILS

Designer	T. Stelmack	Structure	F-08-BJ
Detailer	A. Sanchez	Numbers	(17W)
Drawing Number B-188		of 217	Drawings

Revision Dates (Preliminary Stage Only)

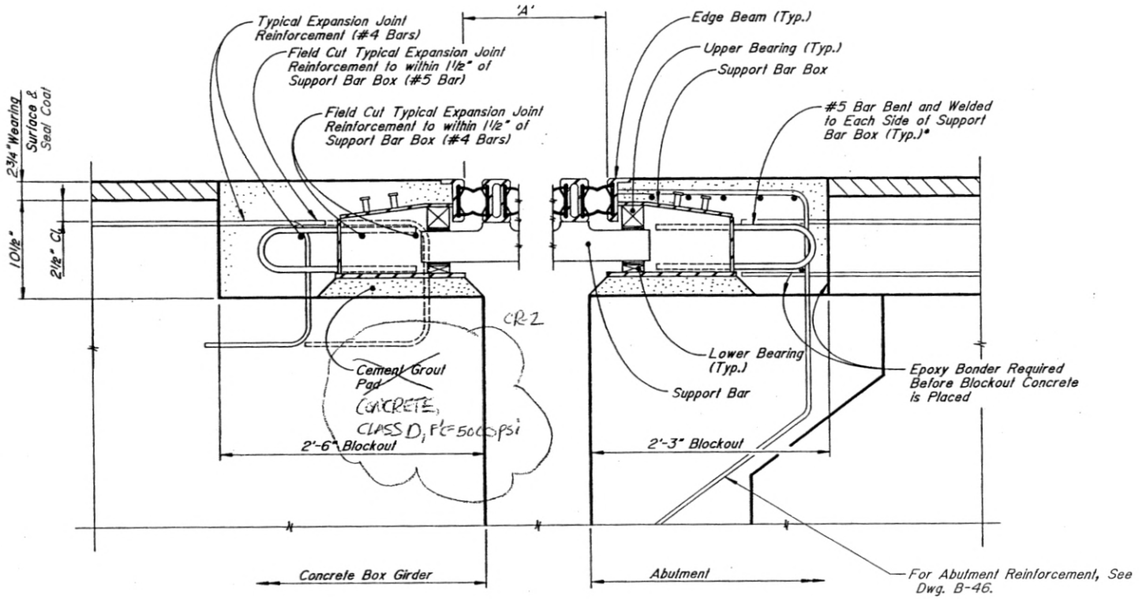
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

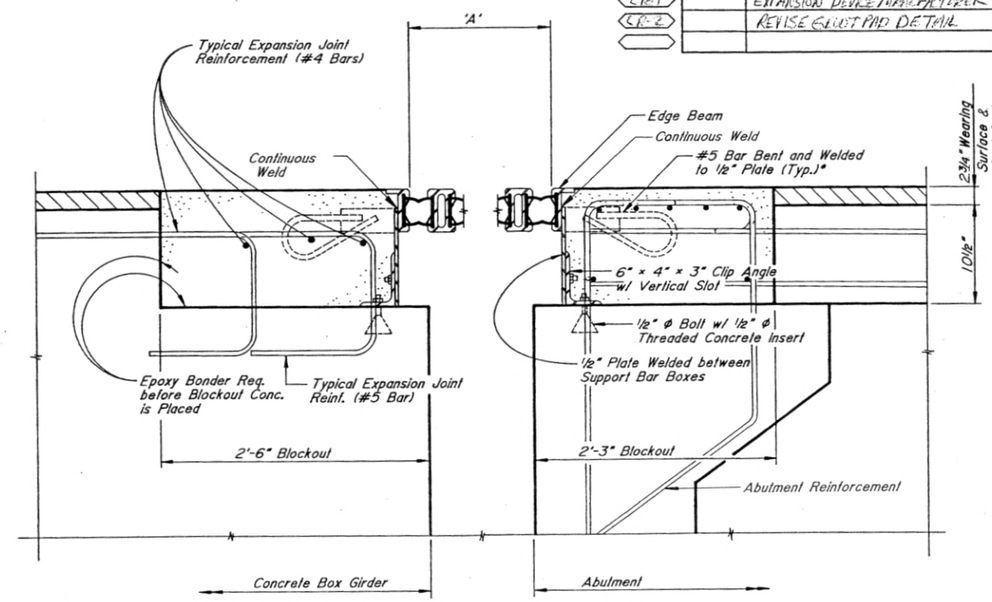
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-419

REVISIONS		
CR-1	EXPANSION DEVICE/MANUFACTURER	CFB
CR-2	REVISE CONCRETE PAD DETAIL	CFB



TYPICAL SECTION @ SUPPORT BAR BOX



TYPICAL SECTION BETWEEN SUPPORT BAR BOXES

EXPN DEVICE SUPPLIER
WATSON/ACME/BOWMAN
MODEL D-1500 AT ABUT. 37

Notes:

Pay Lengths for Expansion Joints shall be from Inside Faces of Barriers.

Location and Size of Support Bars Anchor Assembly, Anchor Angle Bracket for Attachment to Steel and Stiffener Plates shall be per Manufacturer's Drawing.

See Table for Dimension 'A'.

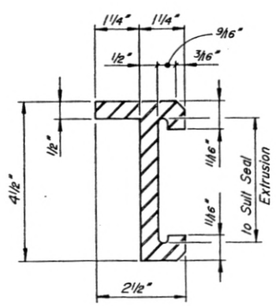
The Expansion Device shall be Installed Parallel to the Slope and Grade of the Deck.

*All Reinforcing Steel Welded to Expansion Device shall be ASTM A706 or A36.

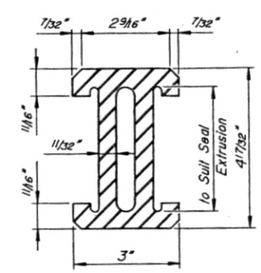
For Cement Grout, fc' = 5,000 psi Min.

Structure Temp.	Abut. 37 'A'
30°F	18⅝"
40°F	17⅞"
50°F	17¼"
60°F	16⅝"
70°F	15⅞"
80°F	15¼"
90°F	14⅝"
100°F	13⅞"
110°F	13¼"

Acceptable Alternates:
Maurer D.S. Brown D-401
or
Wabo Maurer D-1500



EDGE BEAM



SUPPORT BEAM

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

EXPANSION JOINT DETAILS I

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-198		of 217	Drawings

Revision Dates (Preliminary Stage Only)

	INITIAL	DATE		
Designed By	T. W. S.	4-89	Checked By	A.O.S. 4-89
Checked By	W. S. M.	4-89	Quantities By	A.O.S. 4-89
Detailed By	M. M. M.	4-89	Checked By	S.K. 5-89

BRUNING 44-232 73350

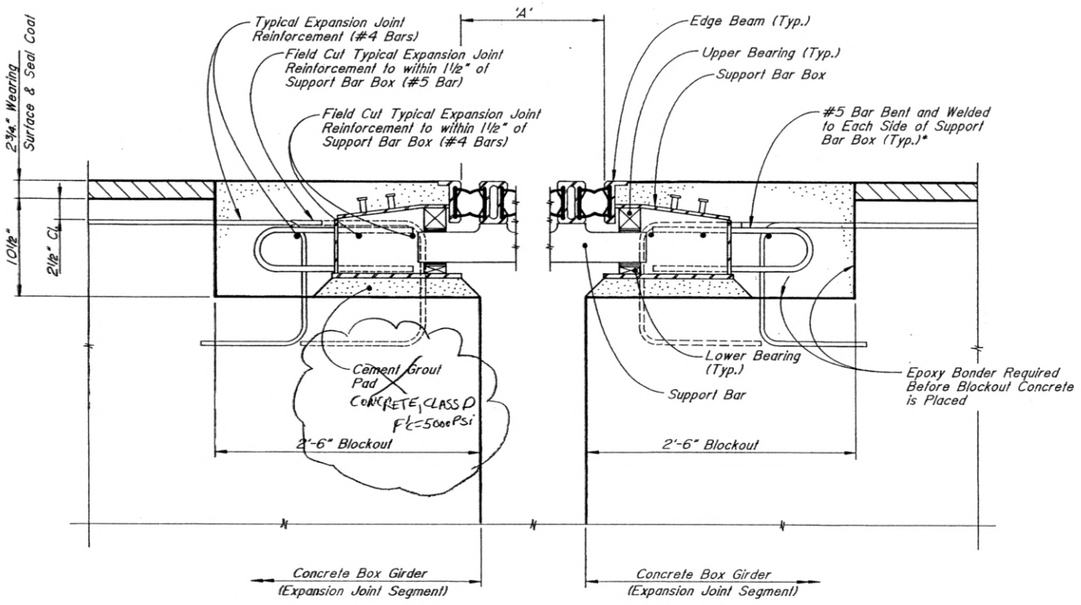
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

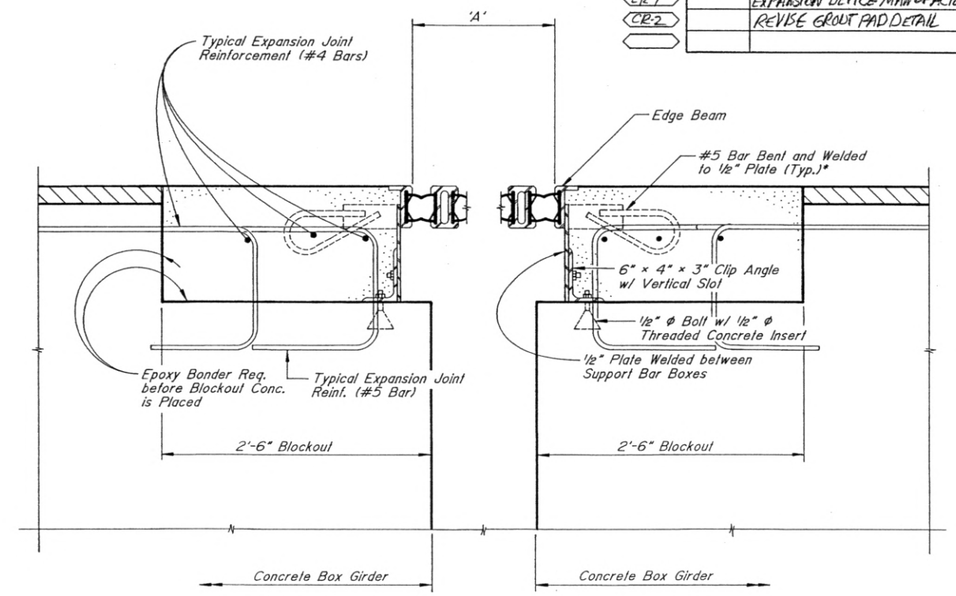
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-420

REVISIONS			
CR-1		EXPANSION DEVICE MANUFACTURER	CFB
CR-2		REVISE GROUT PAD DETAIL	CFB

For Expansion Joint Segment Reinforcement, See Dwg. B-120 to 122.



TYPICAL SECTION @ SUPPORT BAR BOX



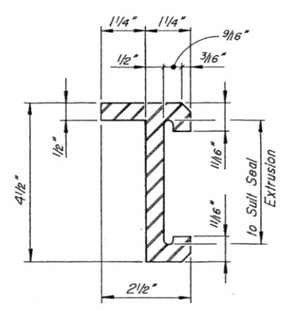
TYPICAL SECTION BETWEEN SUPPORT BAR BOXES

EXPN DEVICE SUPPLIER
WATSON/ACME/BOWMAN

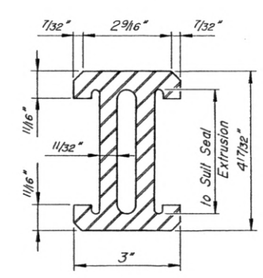
MODEL D-2100 EJ's 2,3
MODEL D-1800 EJ's 1,4

Structure Temp.	Exp. Jt. 1 & 4 'A'	Exp. Jt. 2 & 3 'A'
30°F	23⅛"	28⅝"
40°F	22⅜"	27½"
50°F	21½"	26⅜"
60°F	20⅝"	25¼"
70°F	19⅞"	24¼"
80°F	19"	23⅛"
90°F	18⅛"	22"
100°F	17⅜"	20⅞"
110°F	16½"	19¾"

Acceptable Alternates:
Exp. Jt. 1 & 4 - Maurer D.S. Brown D-481 or Wabo Maurer D-1800.
Exp. Jt. 2 & 3 - Maurer D.S. Brown D-561 or Wabo Maurer D-2100.



EDGE BEAM



SUPPORT BEAM

Notes:

Pay Length for Expansion Joints shall be from Inside Faces of Barriers.

Location and Size of Support Bars Anchor Assembly, Anchor Angle Bracket for Attachment to Steel and Stiffener Plates shall be per Manufacturer's Drawing.

See Table for Dimension 'A'.

The Expansion Device shall be Installed Parallel to the Slope and Grade of the Deck.

*All Reinforcing Steel Welded to Expansion Device shall be ASTM A706 or A36.

For Cement Grout, f'c = 5,000 psi Min.

	INITIAL	DATE			DATE	
Designed By	T.W.S.	4-89	Checked By	A.O.S.	4-89	
Checked By	W.S.M.	4-89	Quantities By	A.O.S.	4-89	
Detailed By	M.M.M.	4-89	Checked By	S/G	5-89	

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - I7W
CONCRETE ALTERNATE

EXPANSION JOINT DETAILS II

Designer	T. Stelmack	Structure Numbers	F-08-BJ (I7W)
Detailer	M. Miyamoto		
Drawing Number B-199		of 217	Drawings

Revision Dates (Preliminary Stage Only)

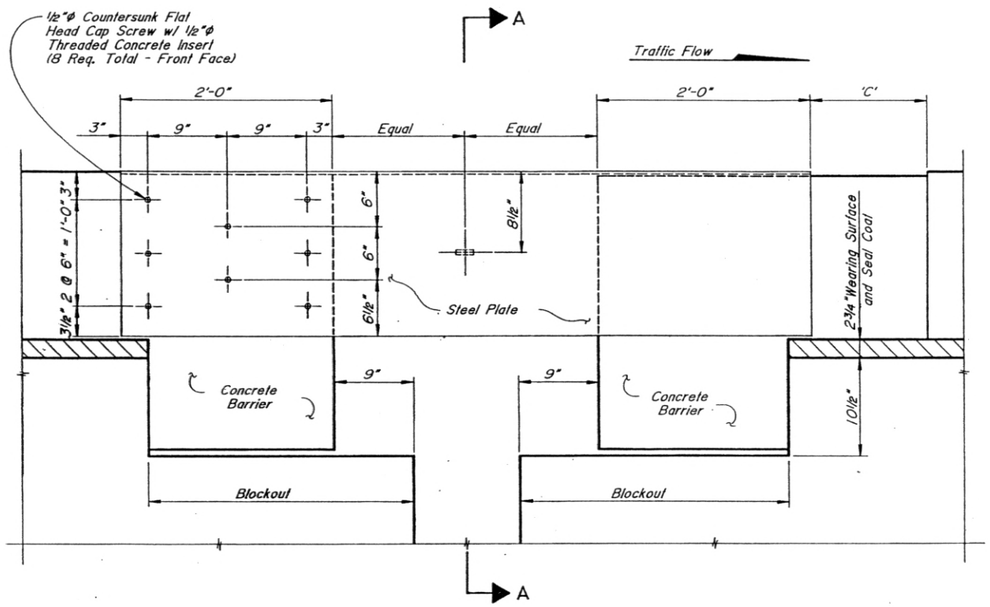
BRUNING 44-232 73350

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
S. O. H FORM NO. 117
REV. APR. 1988

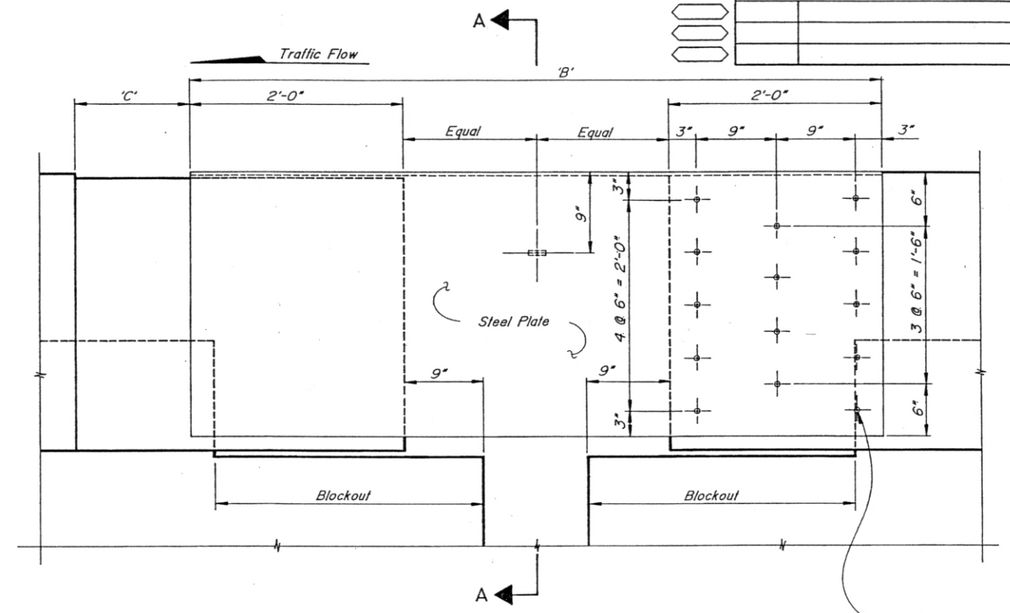
AS CONSTRUCTED			
NO REVISIONS 7-20-93	REVISED	VOID	

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-421

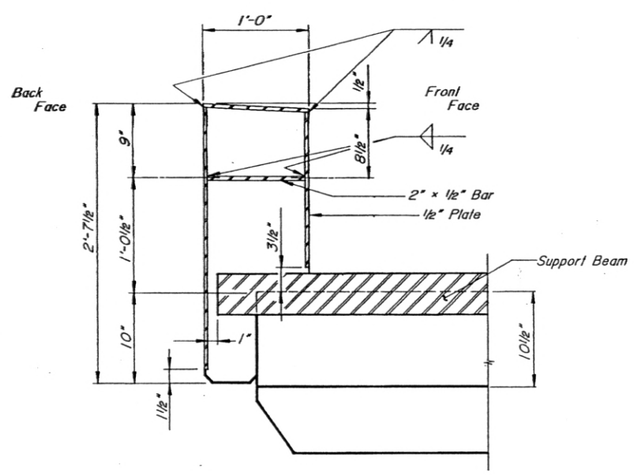
REVISIONS		



ELEVATION - FRONT FACE



ELEVATION - BACK FACE



SECTION A-A

Location	Dim. 'B'	Dim. 'C'
Exp. Jt. 1	7'-0"	*A-15"
Exp. Jt. 2	7'-3"	*A-18"
Exp. Jt. 3	7'-3"	*A-18"
Exp. Jt. 4	7'-0"	*A-15"
Abut. 37	6'-9"	*A-12"

Notes:

Steel Plate is ASTM A36

Barrier Rail Plates shall receive one Shop Coat of Paint plus two Field Coats of Approved Paint that Matches the Concrete Coating Color.

For Details of Barrier Rail Railing Splice, See Dwg. B-201

*For Dimension 'A' See Expansion Joint Details I, Dwg. B-198

	INITIAL	DATE	
Designed By	T.L.S.	4-89	Checked By A.D.S. 4-89
Checked By	L.C.M.	4-89	Quantities By A.D.S. 4-89
Detailed By	M.M.M.	4-89	Checked By S.L. 5-89

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

EXPANSION JOINT DETAILS III

Designer	T. Stelmack	Structure Numbers	F-08-BJ (17W)
Detailer	M. Miyamoto		
Drawing Number B-200 of 217 Drawings			

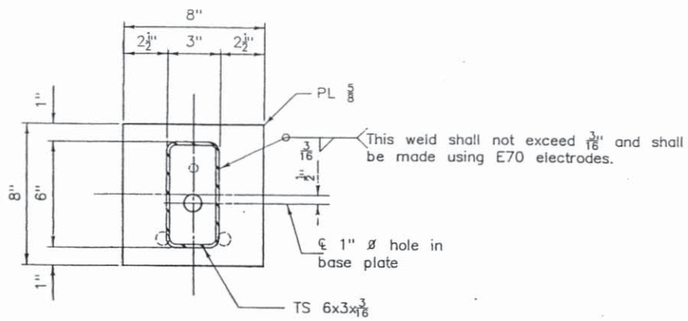
Revision Dates (Preliminary Stage Only)

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
J. G. H. FORM NO. 117
REV. APR. 1986

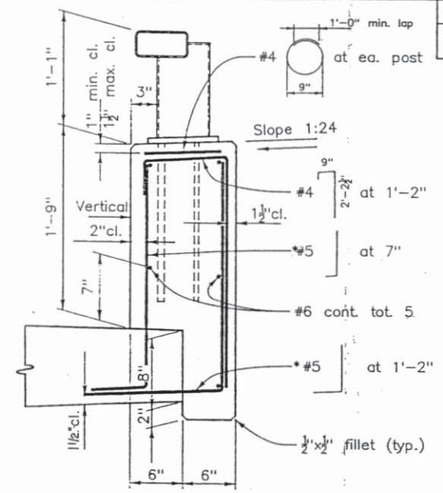
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-422

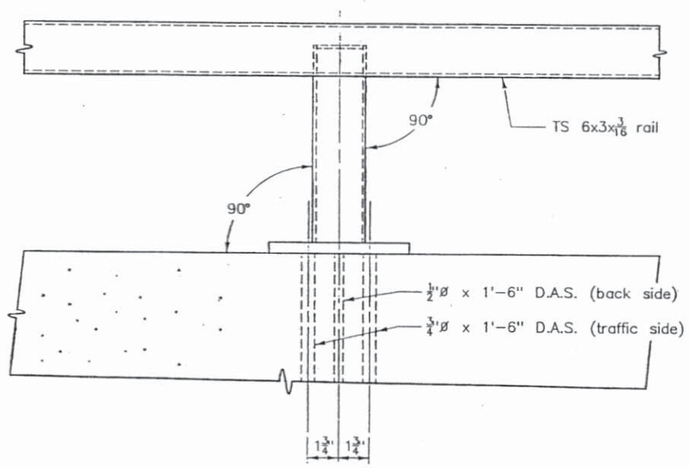
REVISIONS		
CR-1	REVISE RAIL POST DIMENSIONS	CFB



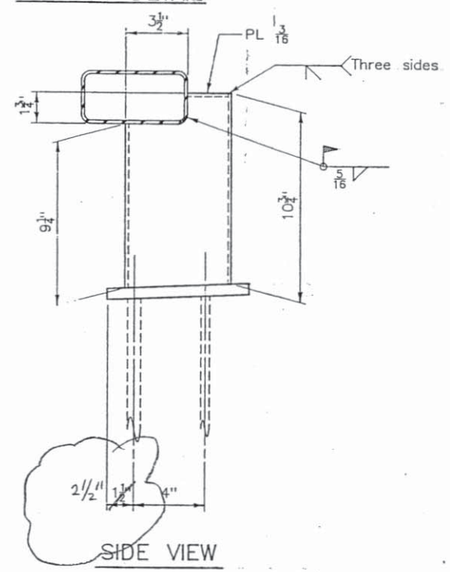
BASE PLATE DETAIL



PARAPET DETAIL

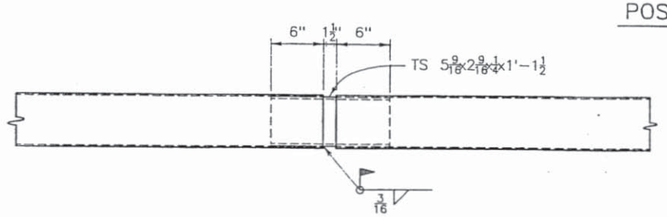


ELEVATION



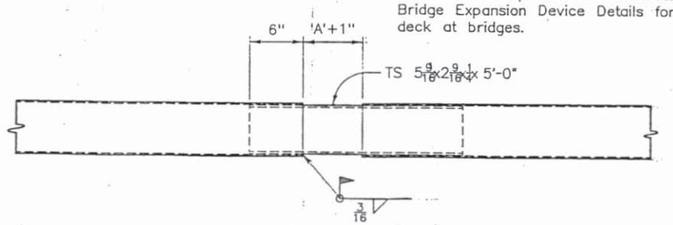
SIDE VIEW

POST DETAIL



RAIL SPLICE

'A'=1 inch for prestressed concrete pavement joints, and see Bridge Expansion Device Details for joint gap 'A' in concrete deck at bridges.



RAIL EXPANSION JOINT

NOTES

Tubing shall be shop bent or fabricated to fit horizontal curves of less than 2,400 foot radius.

Tube shall be continuous over not less than three (3) posts, but over four (4) posts is preferred, and terminal end is considered a post.

Tubing shall be manufactured in accordance with the requirements of ASTM A847.

All structural steel shall be weathering steel, AASHTO M-222(ASTM A588).

See roadway plans for location of terminal sections.

All reinforcing steel shall be epoxy coated.

All concrete shall be class D (Bridge), Conforming to and be Paid Under Section 601.

D.A.S.=Deformed Anchor Stud, minimum grade 60 material, automatically end welded.

Steel parts of bridge rail shall be as shown on roadway plans, which shall govern.

Steel quantities for bridge rail are not included in bridge quantities.

For delineators, see roadway details.

* Vertical #5 Reinforcing Bars are included in Concrete Segmental Superstructure, Remaining Reinforcement to be Paid under Item 601.

Designed By		INITIAL	DATE
Checked By			
Detailed By			
Checked By			
Quantities By			
Checked By			

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT -17W
CONCRETE ALTERNATE

BRIDGE RAIL TYPE 8
DETAILS I

Designer CDOH		Structure Numbers	F-08-BJ (17W)
Detailer CDOH			
Drawing Number B-201	of 217	Drawings	

Revision Dates (Preliminary Stage Only)

07/23/98 DUA1:(H098.STDS)NEWR8

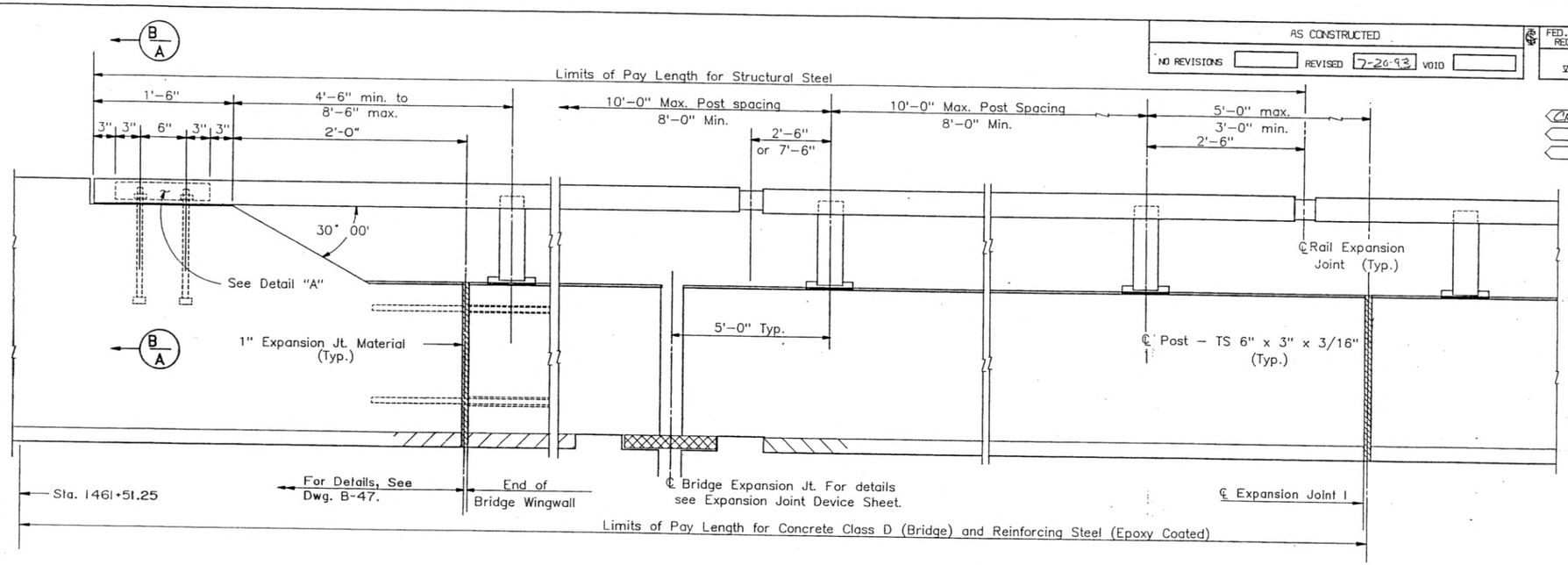
OF COLORADO
DEPARTMENT OF HIGHWAYS
ION OF HIGHWAYS
H: FORM NO. 117:
CT. 1983:

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-26-93	VOID

FED. ROAD REGION	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLO.	I 70-2(145)	11-423	

REVISIONS		
CR-1	REVISE LIGHTING CONDUIT ROUTING	CFB

SHEET 2 OF 2

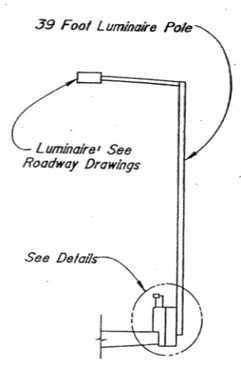


TRANSITION TO ROADWAY CONCRETE BARRIER TYPE 4

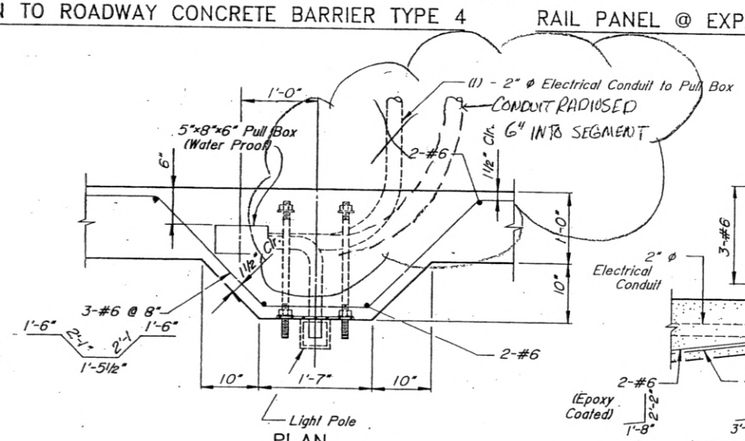
CR-1

RAIL PANEL @ EXPANSION JOINT

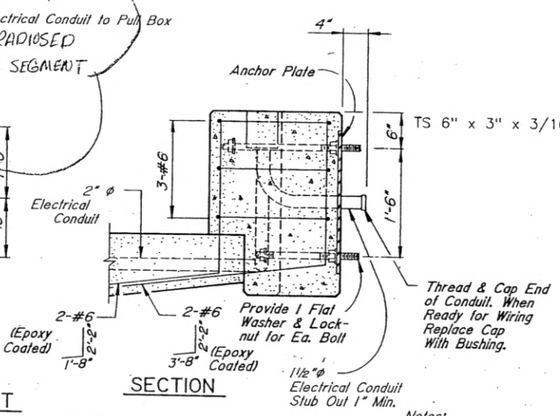
CONNECTON TO ROADWAY RAIL BARRIER



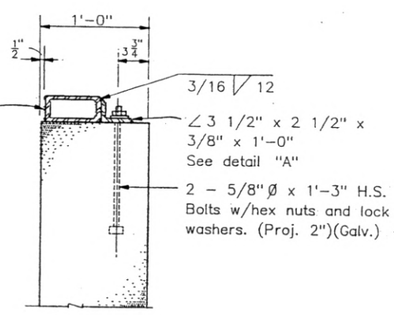
TYPICAL LUMINAIRE SUPPORT



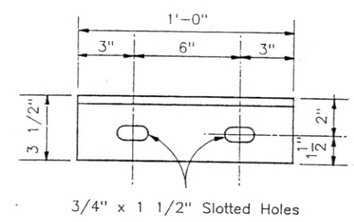
PLAN



SECTION



SECTION B/A

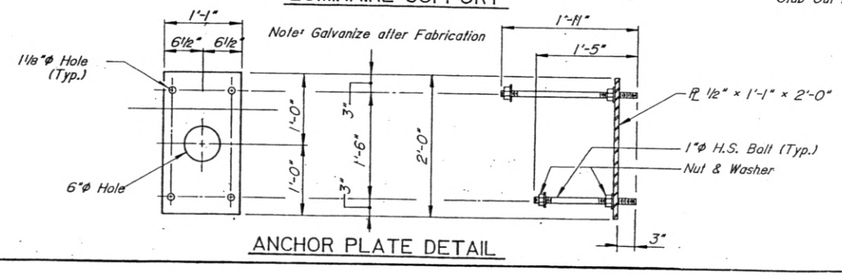


DETAIL "A"

All reinforcing steel shall be epoxy coated.

LUMINAIRE SUPPORT

Note: Galvanize after Fabrication



ANCHOR PLATE DETAIL

Notes:
1. Cost of Luminaire Support is Incidental to Concrete Class D (Bridge).
2. Anchor Plate shall be Painted to Match Color of Concrete Barrier.

Locations:
1458+38.00 (WB - North Side)
1460+38.00 (WB - North Side)

DESIGNED BY	INITIAL CDOH	DATE
CHECKED BY		
DETAILED BY		
CHECKED BY		
QUANTITIES BY		
CHECKED BY		

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
CONCRETE ALTERNATE

BRIDGE RAIL TYPE 8
DETAILS II

DESIGNER CDOH	STRUCTURE NUMBERS	F-08-BJ
DETAILER CDOH		(17W)
DRAWING NUMBER B-202	OF 217	DRAWINGS

REVISION DATES (PRELIMINARY STAGE ONLY)

WD NUMBER: 01/17/86 16:31:35 _DUAI:(DRAW.PJ.77014.RDWY.H098.DETAIL) RKL

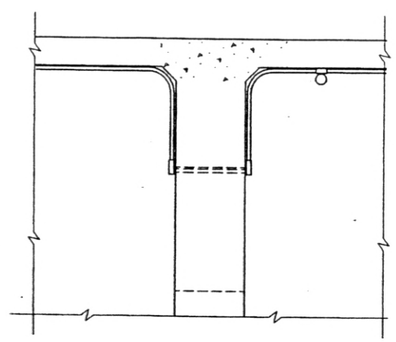
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

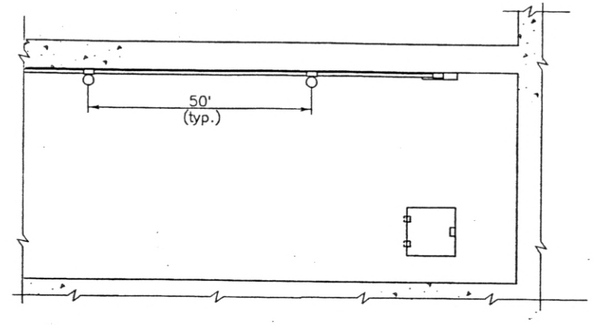
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-424

REVISIONS		

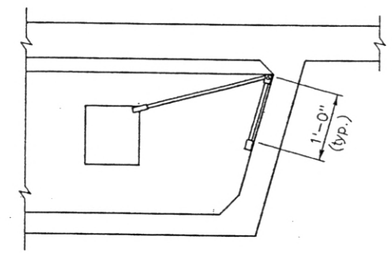
B-613-C



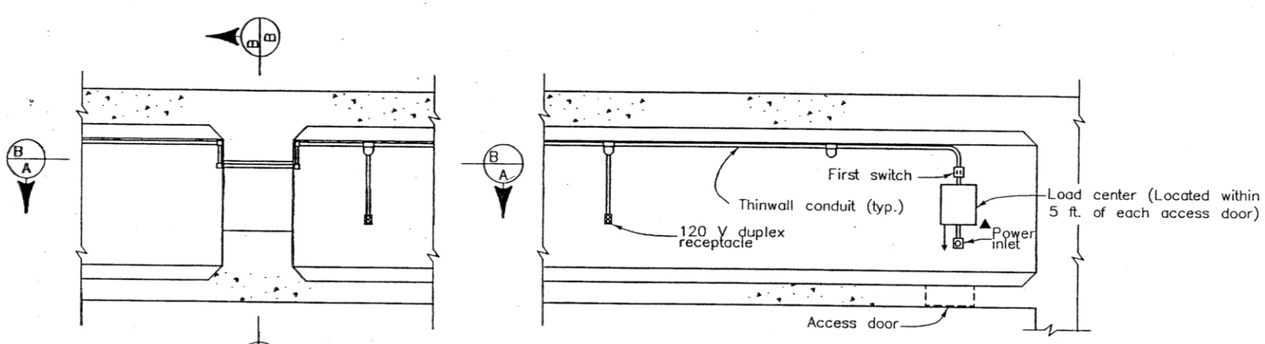
SECTION B/A



PLAN

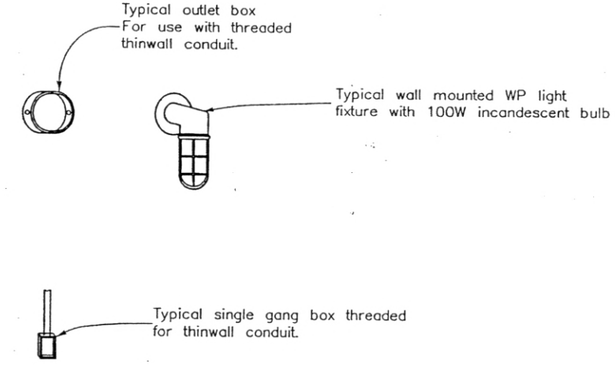


SECTION B/B

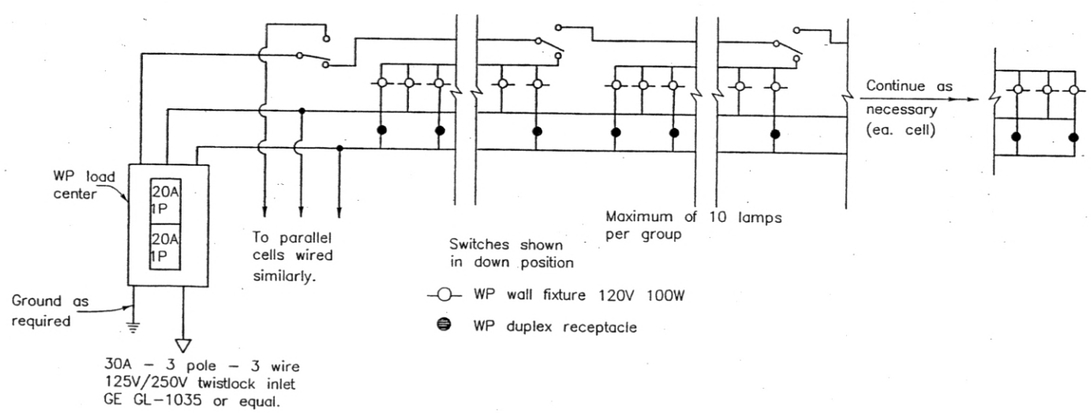


ELEVATION

▲ When conduit is shown on the Construction Layout, the load center shall be connected to this power source instead of using a separate power inlet. Use 3 – #6 copper wires in conduit.



FIXTURE DETAILS



WIRING DIAGRAM

NOTE:
All fasteners shall be $\frac{1}{4}$".
Supports for conduit shall be at 10' spacing (max.).
Maximum length of any system shall be 1300'.
Lighting systems shall be similar length when more than one system is required.

See Sheet # II-210

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT - 17W
INTERIOR LIGHTING
(CONCRETE BOX GIRDER)

Designer	CDOH	Structure Numbers	F-08-BJ (17W)
Detailer	CDOH		
Drawing Number B-203 of 217 Drawings			

Revision Dates	(Preliminary Stage Only)

	INITIAL	DATE
Designed By	CDOH	
Checked By		
Detailed By		
Checked By		
Quantities By		
Checked By		

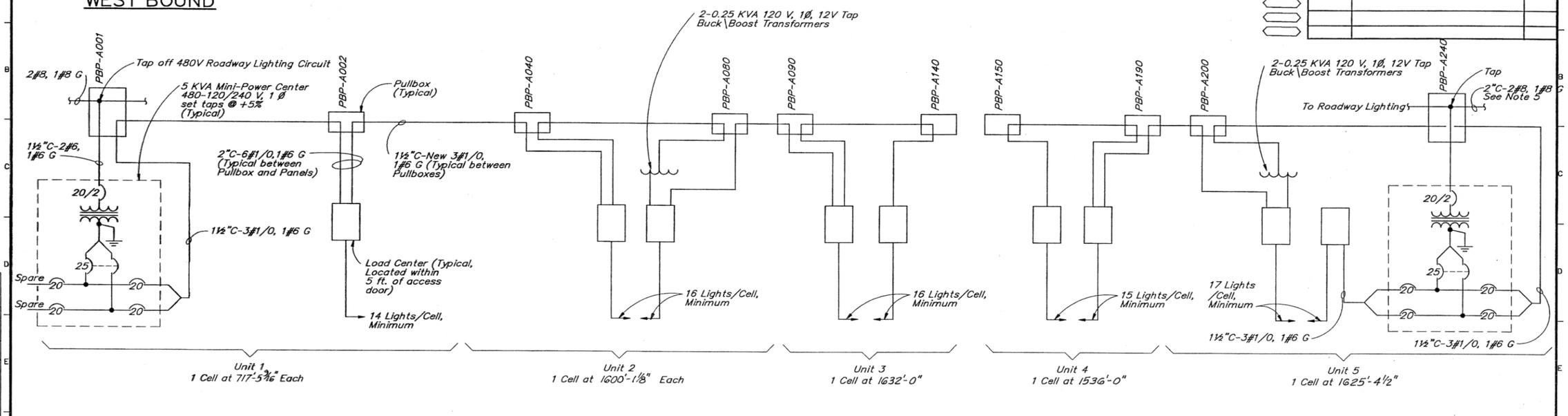
01/27/99 LONGS:::(br_admin2/srdgetds)B613C

AS CONSTRUCTED		
NO REVISIONS	REVISED 7-20-93	VOID

FED. ROAD REGION	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLO.	170-2(145)	II-425	

REVISIONS

WEST BOUND



	INITIAL	DATE		Checked By	MG	6/89
Designed By	MG	5/89		Quantities By	LR	6/89
Checked By	BC	6/89		Checked By	SG	6/89
Detailed By	RD	5/89				

SEE: MCR #17

NOTES: See Roadway Electric Co's Drawing

1. For Lighting and Receptacle wiring from load centers, see Interior Lighting Details. Alternate Light and Receptacle loads at each load center.
2. All materials and labor necessary to provide power to the Interior Lighting Load Centers, including Mini-Power centers, conduit between Pull Boxes and Load Centers, and buck/boost Transformers as shown on this Dwg. shall not be measured and paid for separately, but shall be included in the Bid price for Item 618, Interior Lighting.
3. For Mini-Power Center grounding, bond #6 ground conductor to the Tunnel ground per the NEC.
4. For Pull Box locations and conduit between pull boxes See Conduit Schematic Plan.
5. Route to 480V Tunnel Lighting Panel. Provide 20A, 2 pole Circuit Breaker in panel and connect to Roadway/Bridge Lighting Circuit. Tunnel Lighting Panel is approx. 600' east of Abut. 37.

CH2M HILL — Denver, Colorado

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT
CONCRETE ALTERNATE

INTERIOR LIGHTING
ONE-LINE DIAGRAM

Designer M. Gross		Structure Numbers	F-08-AS, F-08-BJ (17W Units I-V)
Detailer L. Wilcox			
Drawing Number B-204	of 217		Drawings

Revision Dates (Preliminary Stage Only)

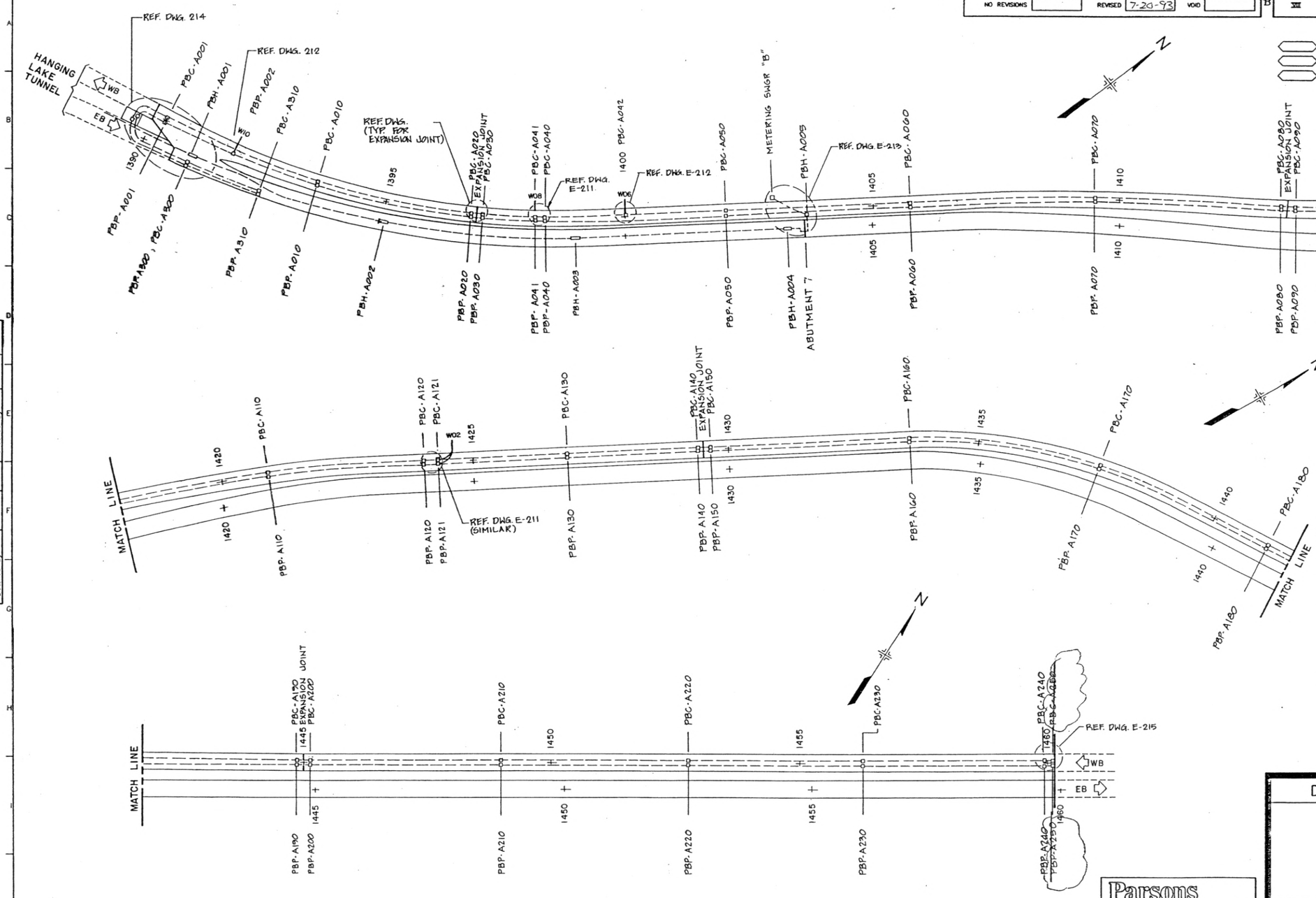
WBLITE-C.DWG 06/15/89 CH2M HILL

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I70-2(145)	II-429

REVISIONS



LEGEND:

- PULLBOX/JUNCTION BOX
- CONDUITS

ABBREVIATIONS:

PBC - COMM PULLBOX
PBP - POWER PULLBOX
PBH - HIGH VOLTAGE PULLBOX
UON - UNLESS OTHERWISE NOTED

NOTES:

1. SEE CONDUIT SCHEDULES (REF. DWG. E-231 & E-232) FOR NUMBER & ROUTING OF CONDUITS BETWEEN DEVICES. RACEWAYS BY THE BRIDGE CONTRACTOR UON.
2. PLAN IS SCHEMATIC. PULLBOXES, CONDUITS AND DEVICES TO BE FIELD LOCATED AS REQUIRED.
3. AN 18"X18" OPENING IN THE BRIDGE DECK SHALL BE LOCATED CENTERED ABOVE EACH PULLBOX "PBP" AND "PBC". A 24"X24" OPENING ABOVE EACH PULLBOX "PBH" SHALL BE PROVIDED - THE OPENING IS FOR CABLE INSTALLATION AND SHALL BE CONCRETED BY THE BRIDGE CONTRACTOR AFTER INSTALLATION OF CABLES.
4. REFERENCE DRAWING NUMBERS REFER TO "A" PREFIX.

INITIAL	DATE	
Designed By		Checked By
Checked By		Quantities By
Detailed By		Checked By

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Parsons Brinckerhoff Quade & Douglas, Inc.
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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17

Concrete Alternate

CONDUIT SCHMATIC PLAN

A-E-201

Designer	W. R. PETERSON	Structure Numbers	F-08-BJ (17W)
Detailer	T. K. BURNS		
Drawing Number B-208 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

F117B

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
S. O. H. FORM NO. 117
REV. APR. 1986

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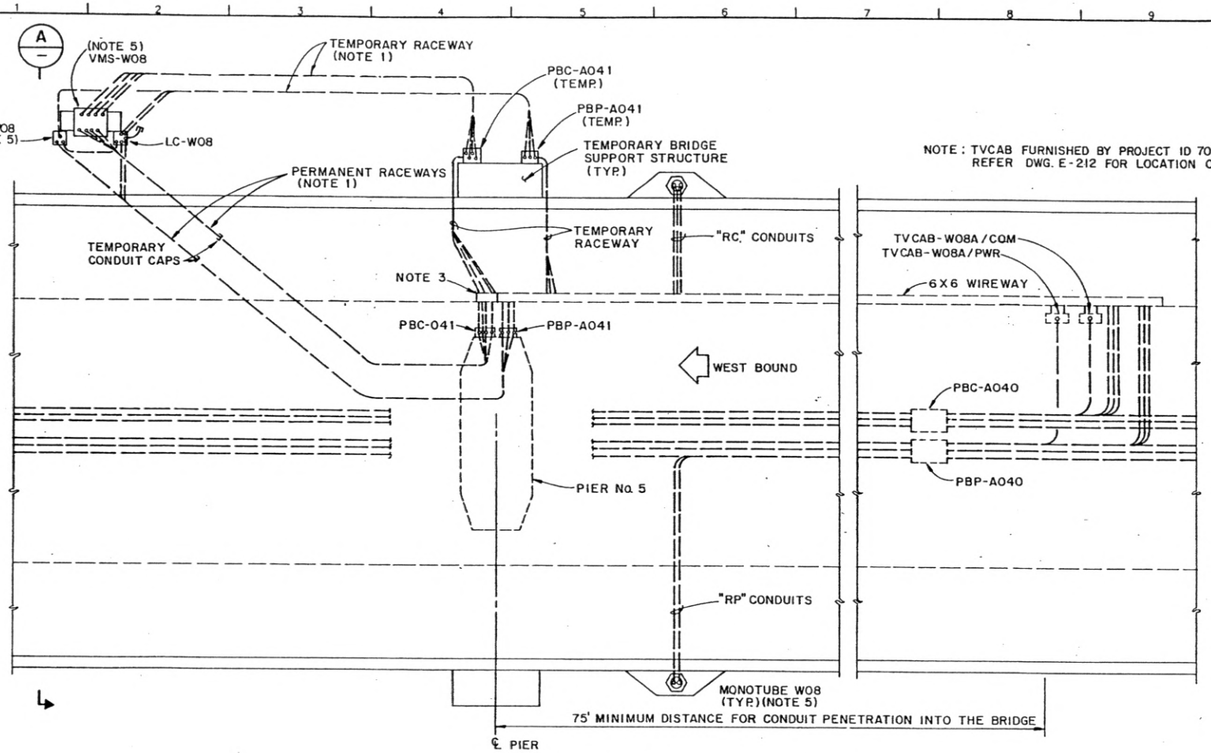
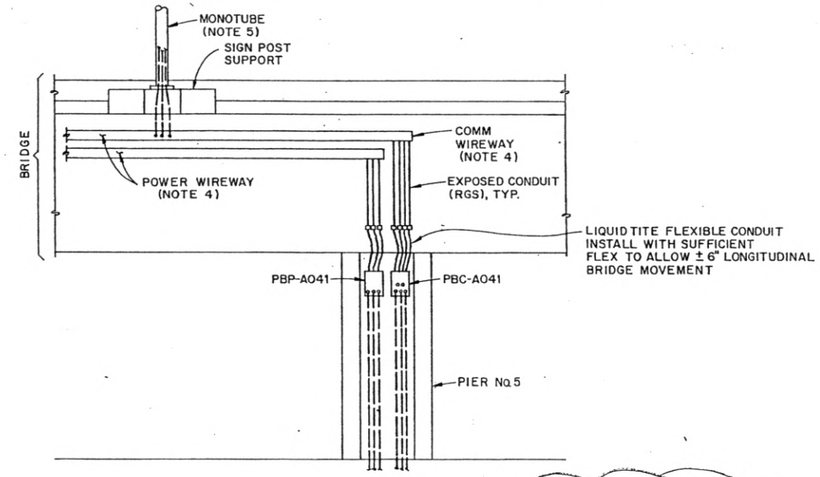
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I70-2(145)	II-430

REVISIONS	



NOTE: TVCAB FURNISHED BY PROJECT ID 70(TCS)-2(139)
REFER DWG. E-212 FOR LOCATION OF CAMERAS



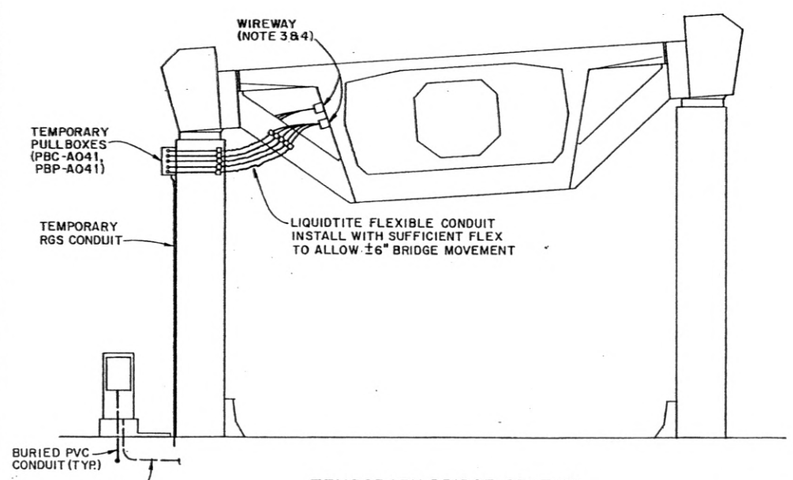
BRIDGE PLAN AT SB-W08

SEE NOTE 2

VIEW C

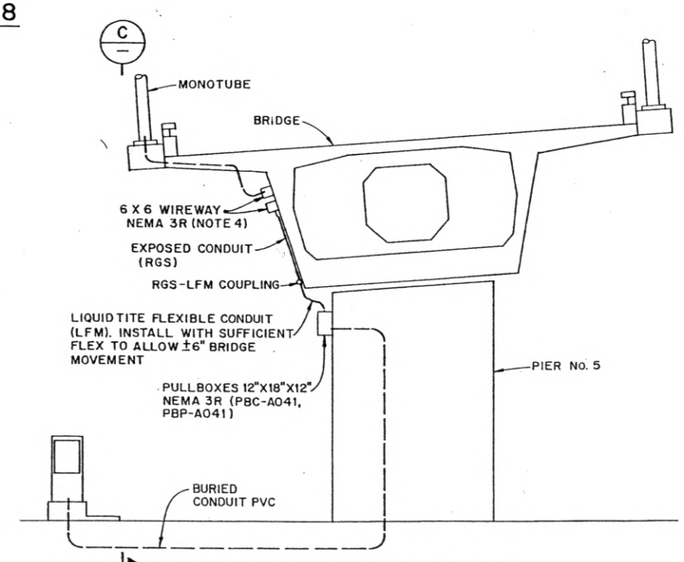
SOUTH BOUND - W08
PERMANENT INSTALLATION
SEE NOTE 2

See Drawing # II-213



TEMPORARY BRIDGE SECTION

(LOOKING AHEAD STATION)



SECTION A

BRIDGE SECTION
NEAR SB-W08

PERMANENT BRIDGE SECTION

(LOOKING AHEAD STATION)

NOTES:

1. TEMPORARY INSTALLATION SHALL INCLUDE RACEWAYS AND PULLBOXES TO CONNECT THE EQUIPMENT LOCATED AT GRADE (VMS-W03, DS-W08 AND TVCAB-W08) TO THE EQUIPMENT LOCATED ON THE BRIDGE. THE TEMPORARY INSTALLATION SHALL BE ROUTED VIA THE TEMPORARY BRIDGE SUPPORT STRUCTURE. THE PERMANENT RACEWAY SHALL BE STUBBED OUT OF THE EQUIPMENT CABINETS, CAPPED, AND MARKED. CONTINUATION OF THE PERMANENT RACEWAYS SHALL BE DURING CONSTRUCTION OF PIER #5. AFTER COMPLETION OF THE PERMANENT RACEWAYS, THE TEMPORARY RACEWAYS SHALL BE ABANDONED, REMOVED AS PRACTICAL, AND PLUGGED WHERE STUBBED INTO THE EQUIPMENT.
2. THE PERMANENT RACEWAY CONFIGURATION IS SIMILAR FOR SIGN BRIDGE W04 AND W02 EXCEPT LOCATION OF EQUIPMENT WILL VARY TO MATCH TERRAIN AND RACEWAY CONFIGURATION WILL VARY AS REQUIRED. REFER TO RACEWAY SCHEDULE FOR LISTING OF CONDUITS.
3. NEW SECTIONS OF WIREWAY SHALL BE PROVIDED TO TERMINATE THE PERMANENT RACEWAY FROM PBC-A041 AND PBP-A041.
4. WIREWAY SHALL BE NEMA 3R, GALVANIZED AND PAINTED TO MATCH BRIDGE COLOR. EXPOSED RGS CONDUIT SHALL BE PAINTED TO MATCH BRIDGE COLOR.
5. EQUIP. FOUNDATIONS & RACEWAYS SHALL BE BY THE BRIDGE / ROADWAY CONTRACTOR (PROJECT I 70-2(145)). EQUIP. & CABLES SHALL BE BY THE CONTROL SYSTEMS CONTRACTOR (PROJECT ID 70 (TCS)-2(139)). THE CONTROL SYSTEMS CONTRACTOR SHALL COORDINATE LOCATION OF CONDUITS STUBOUTS FROM EQUIPMENT FOUNDATIONS W/ BRIDGE /ROADWAY CONTRACTOR. SEE RACEWAY AND CABLE SCHEDULES FOR DETAILS.

INITIAL	DATE	
Designed By		Checked By
Checked By		Quantities By
Detailed By		Checked By

DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W

Concrete Alternate

CONDUIT PLANS AND SECTIONS
SHEET I

A-E-211

Designer	W. R. PETERSON	Structure Numbers	F-08-BJ (17W)
Detailer	B. Y. IDE		
Drawing Number B-209	of 217		Drawings

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Revision Dates (Preliminary Stage Only)

F117B

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

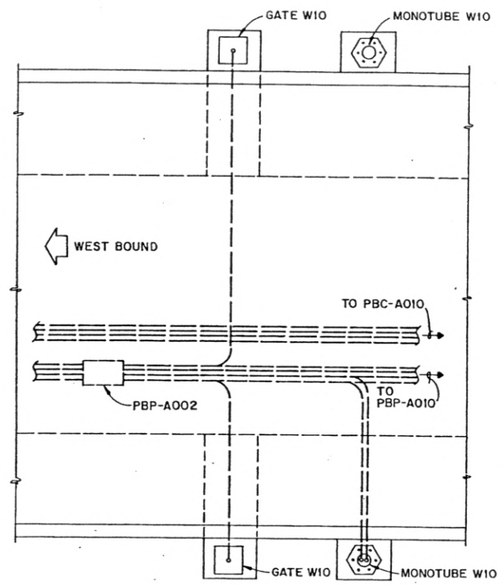
AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I70-2(145)	II-431

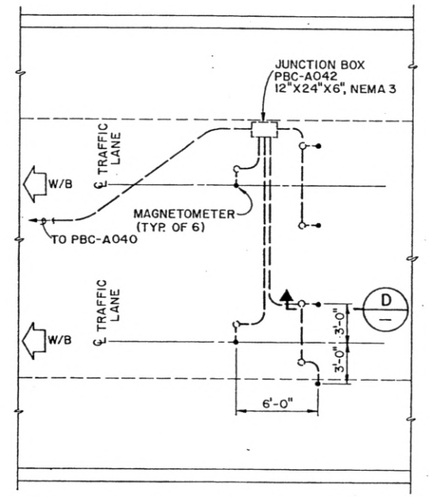
REVISIONS		

CAMERA NUMBER	LOCATION
TVC-W03A	1397+97
TVC-W03B	1410+05
TVC-W03C	1420+35
TVC-W03D	1428+40
TVC-W03E	1437+20
TVC-W03F	1445+80

NOTE: ALL CAMERAS INSTALLED ON WESTBOUND ROADWAY ON NORTH SIDE.



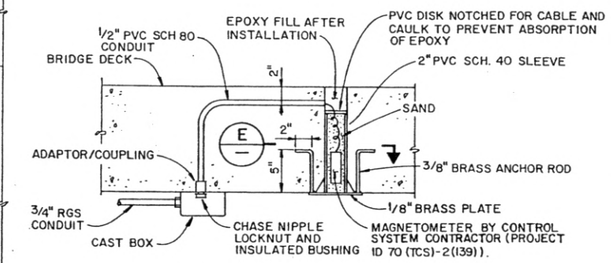
BRIDGE PLAN AT SB-W10



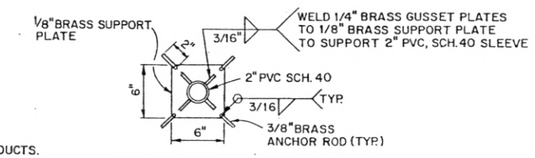
NOTE: MAGNETOMETER SPACING FOR REFERENCE ONLY, CONFIRM WITH MANUFACTURER PRIOR TO INSTALLATION. PLACE SLEEVE TO AVOID CONFLICTS WITH POST-TENSIONING DUCTS.

BRIDGE PLAN AT W06

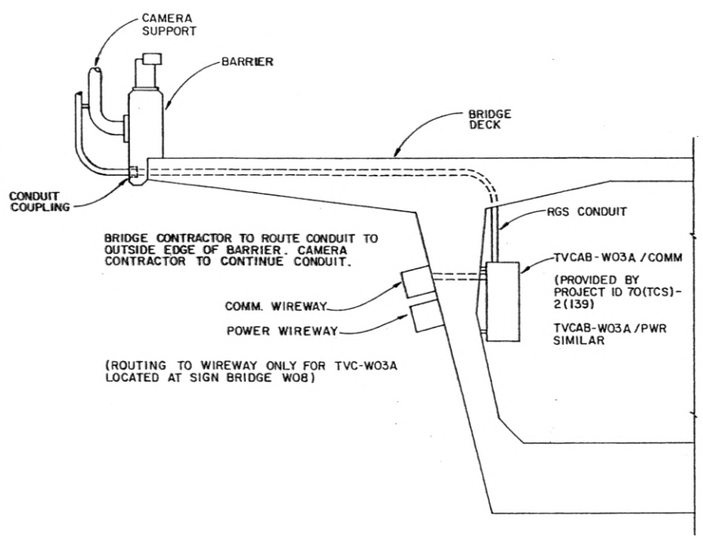
TRAFFIC DETECTORS



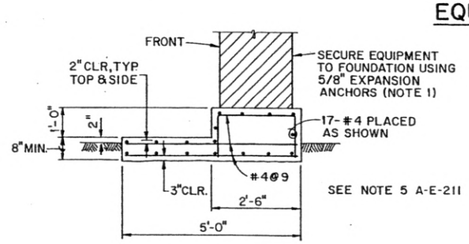
SECTION D
MAGNETOMETER INSTALLATION



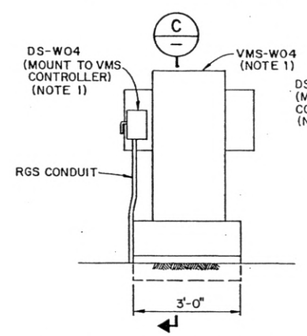
SECTION E
SUPPORT PLATE



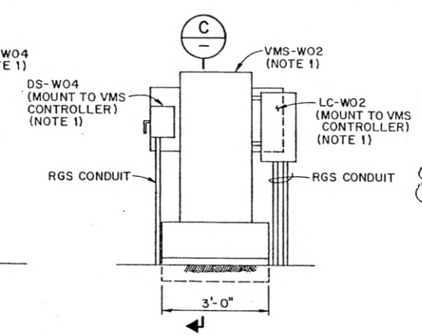
TVCAB SECTION



SECTION C
EQUIPMENT FOUNDATION



EQUIPMENT ELEVATION
SB-W04



EQUIPMENT ELEVATION
SB-W02
SB-W08

NOTES:

1. EQUIPMENT PROVIDED BY CONTROL SYSTEMS CONTRACTOR (PROJECT ID 70 (TCS)-2(139)).

See Drawing # II-214

INITIAL	DATE	
Designed By		Checked By
Checked By		Quantities By
Detailed By		Checked By

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W

Concrete Alternate

CONDUIT PLANS AND SECTIONS
SHEET II

A-E-212

Designer	W. R. PETERSON	Structure	F-08-BJ
Detailer	B. Y. IDE	Numbers	(17W)
Drawing Number B-210 of 217 Drawings			

Revision Dates (Preliminary Stage Only)

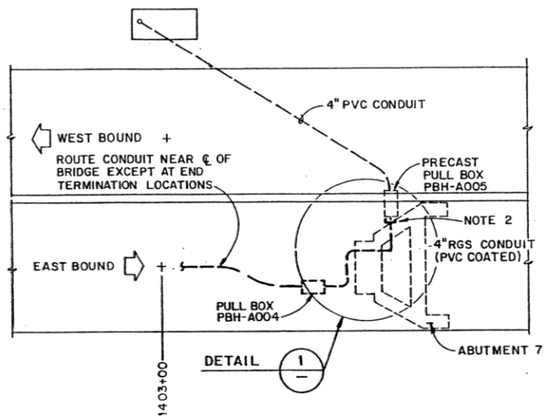
F117B

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1956

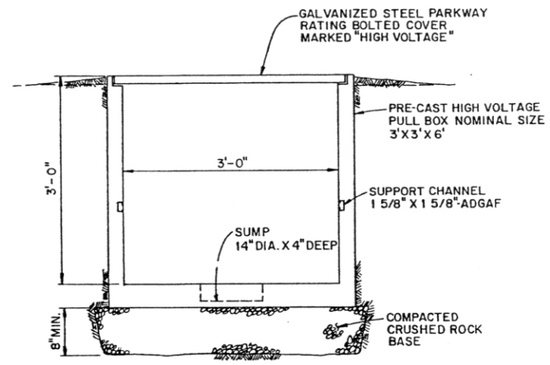
AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I70-2(145)	11-432

REVISIONS		



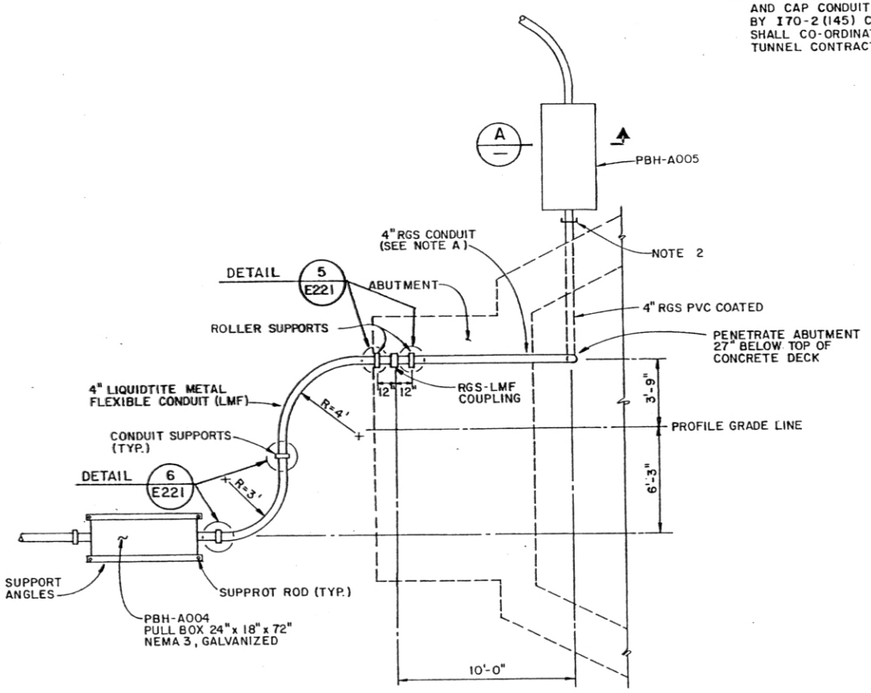
BRIDGE PLAN NEAR STA. 1403+00



SECTION A

NOTE: 1. PULL BOX PBH-A005 N.I.C. AND WILL BE PROVIDED AND INSTALLED BY HANGING LAKE TUNNEL CONTRACTOR (PROJECT ID 70-2(139)).

2. HANGING LAKE TUNNEL CONTRACTOR WILL STUB OUT 4" CONDUIT AND CAP CONDUIT FROM PBH-A005 FOR CONTINUATION BY I70-2(145) CONTRACTOR. I70-2(145) CONTRACTOR SHALL CO-ORDINATE INSTALLATION WITH HANGING LAKE TUNNEL CONTRACTOR (PROJECT I70-2(139)).



DETAIL 1

HIGH VOLTAGE CONDUIT PLAN AT E/B ABUTMENT 7

NOTE: A. 4" RGS CONDUIT TO PENETRATE BRIDGE SECTION THROUGH SLEEVE AS NECESSARY TO ALLOW FREE MOVEMENT FOR BRIDGE EXPANSION/CONTRACTION

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Detailed By			
Checked By			
Quantities By			
Checked By			

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17

Concrete Alternate

CONDUIT PLANS AND SECTIONS
SHEET III

A-E-213

Designer	W.R. PETERSON	Structure	F-08-BJ
Detailer	B.Y. IDE	Numbers	(17W)
Drawing Number	B-211	of 217	Drawings

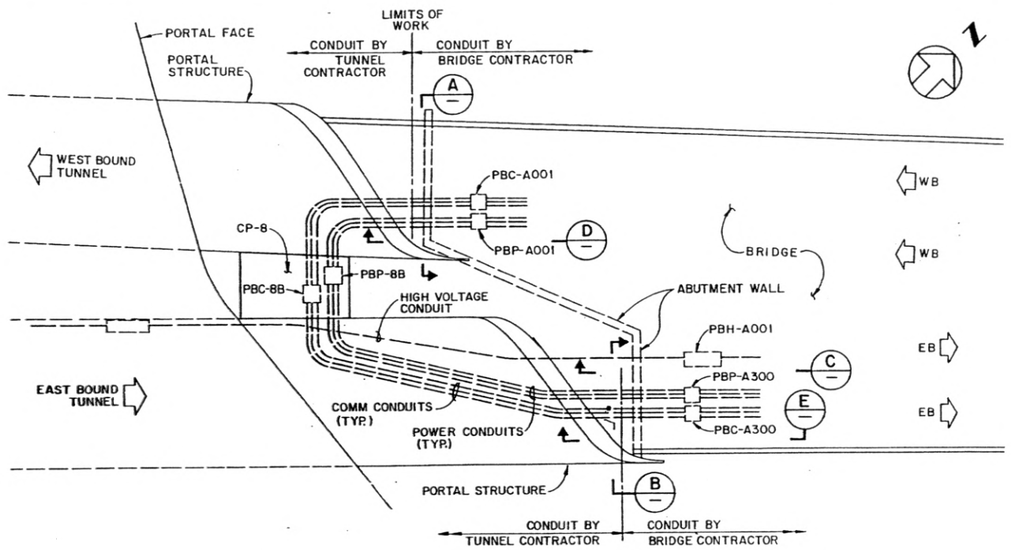
Revision Dates (Preliminary Stage Only)

F117B

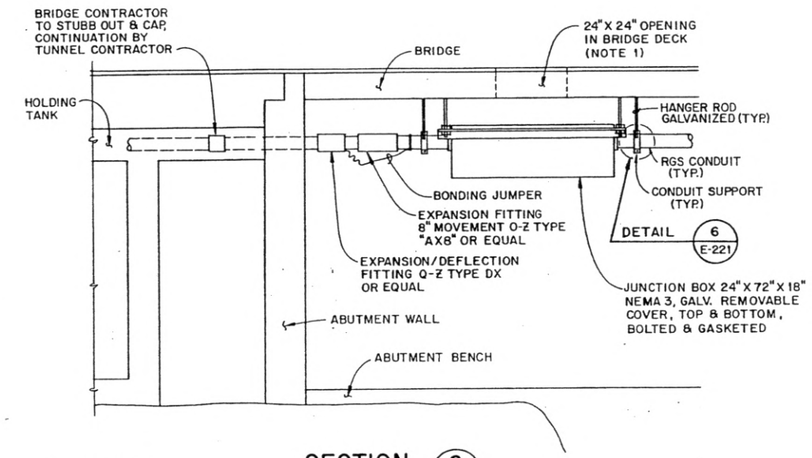
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. O. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED				FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
NO REVISIONS 7-20-93	REVISED		VOID	VIII	COLORADO	I70-2(145)	II-433

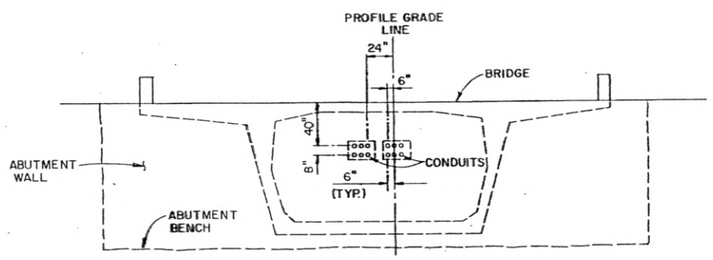
REVISIONS		



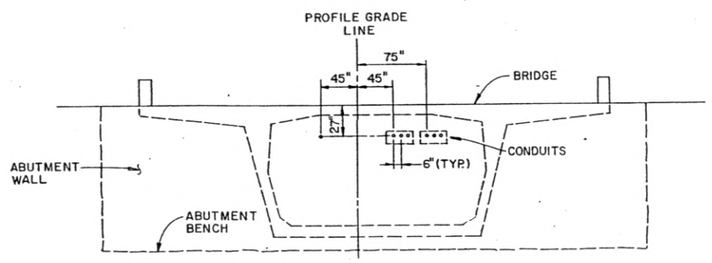
CONDUIT SCHEMATIC PLAN AT AMPHITHEATER PORTAL



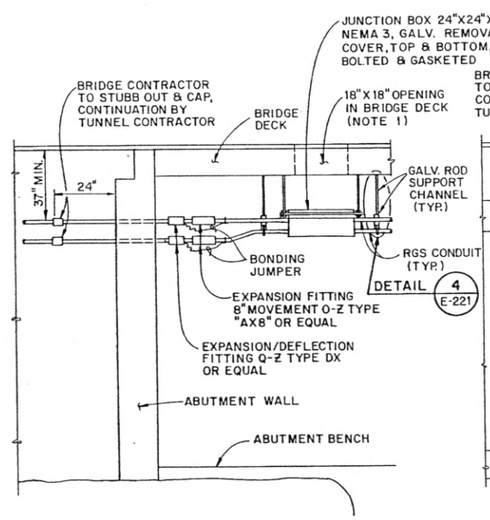
SECTION C
HIGH VOLTAGE CONDUIT INTERFACE



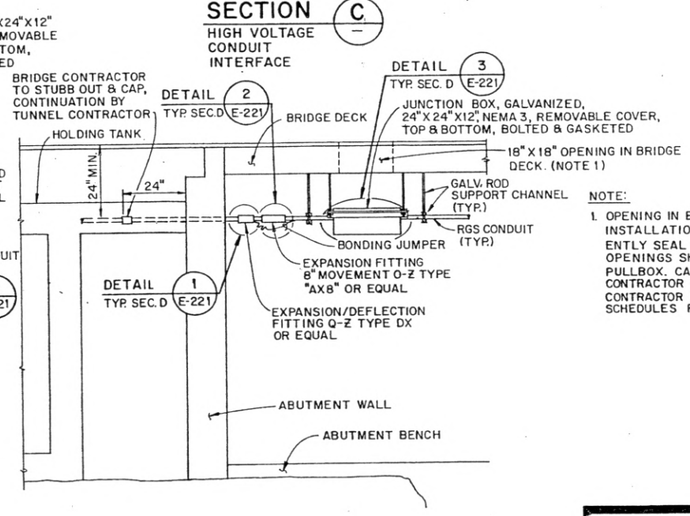
SECTION A
W/B ROADWAY CONDUIT TRANSITION



SECTION B
E/B ROADWAY CONDUIT TRANSITION



SECTION D
COMMUNICATION & POWER CONDUIT INTERFACE



SECTION E
COMMUNICATION & POWER CONDUIT INTERFACE

NOTE:

1. OPENING IN BRIDGE DECK TO ALLOW INITIAL CABLE INSTALLATION BY OTHERS. CONTRACTOR SHALL PERMANENTLY SEAL OPENING AFTER CABLE INSTALLATION. OPENINGS SHALL BE PROVIDED CENTERED ABOVE EACH PULLBOX. CABLE INSTALLATION BY CONTROL SYSTEMS CONTRACTOR (PROJECT ID 70 (TCS)-2(139)) OR TUNNEL CONTRACTOR (PROJECT ID 70-2(139)). SEE CABLE SCHEDULES FOR DETAILS.

INITIAL	DATE	
Designed By		Checked By
Checked By		Quantities By
Detailed By		Checked By

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17

Concrete Alternate

CONDUIT PLANS AND SECTIONS
SHEET IV

A-E-214

Designer	W.R. PETERSON	Structure Numbers	F-08-BJ (17W)
Detailer	B.Y. IDE		
Drawing Number	B-212	of 217	Drawings

Revision Dates (Preliminary Stage Only)

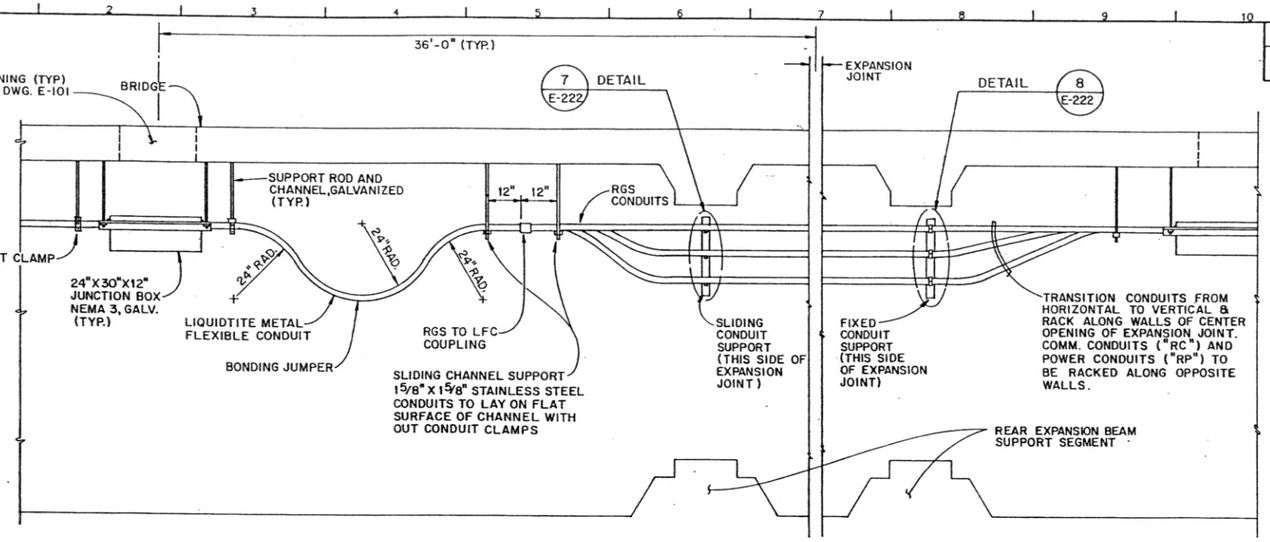
F117B

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I70-2(145)	II-434

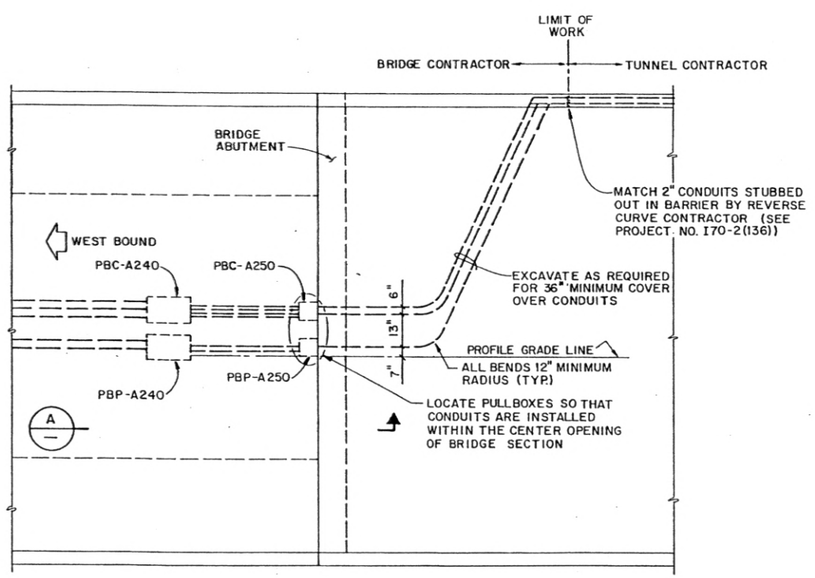
REVISIONS



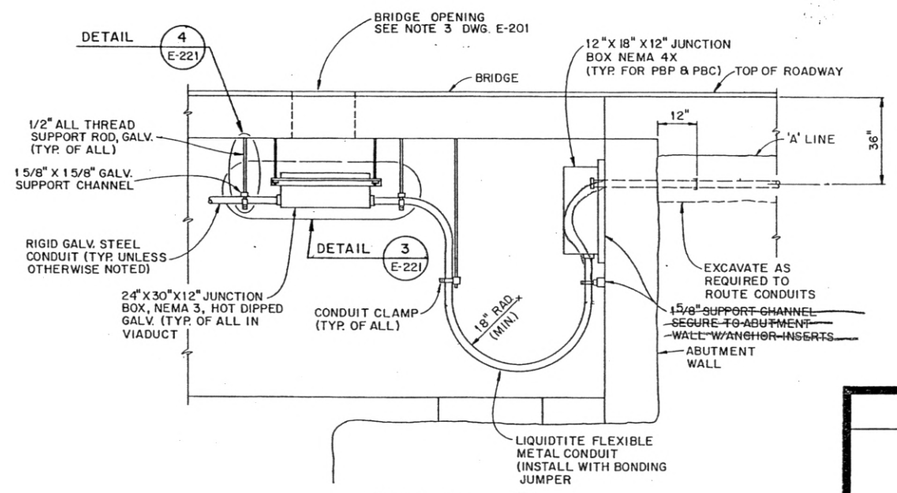
BRIDGE SECTION AT EXPANSION JOINT

TYPICAL CONCEPT FOR COMMUNICATION (RC) AND POWER (RP) CONDUITS

NOTE: SINGLE-RACKED CONDUIT INSTALLATION. FOR DOUBLE-RACKED CONDUITS, CLAMPED SUPPORT TO BE SIMILAR TO DETAIL 4, DWG. E-221 AND SLIDING CONDUIT AREA TO INCLUDE DUAL SLIDING SUPPORT CHANNELS.



BRIDGE PLAN AT REVERSE CURVE TUNNEL PORTAL



SECTION A

INITIAL	DATE	
Designed By		Checked By
Checked By		Quantities By
Detailed By		Checked By

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DIVISION OF HIGHWAYS

HANGING LAKE VIADUCT-17W

Concrete Alternate

CONDUIT PLANS AND SECTIONS
SHEET V

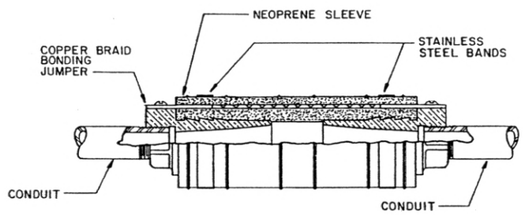
A-E-215

Designer W. R. PETERSON		Structure Numbers	F-08-BJ (17W)
Detailer B. Y. IDE			
Drawing Number B-213	of 217	Drawings	

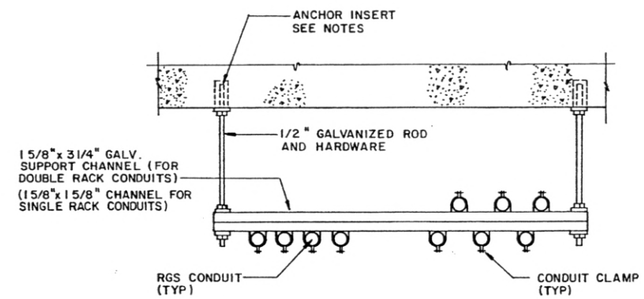
Revision Dates (Preliminary Stage Only)

F117B

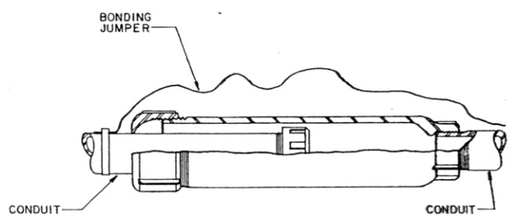
STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986



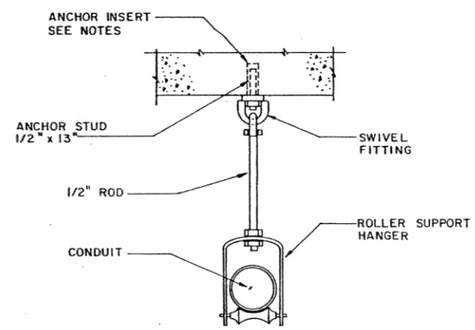
DETAIL 1
CONDUIT DEFLECTION / EXPANSION FITTING



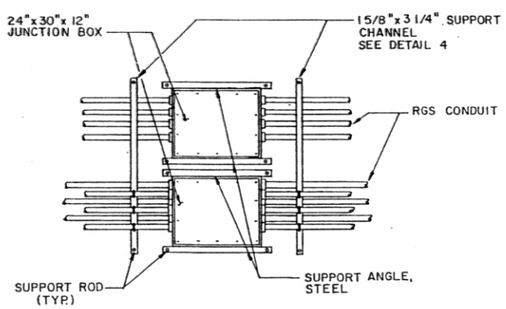
DETAIL 4
CONDUIT SUPPORT DETAIL



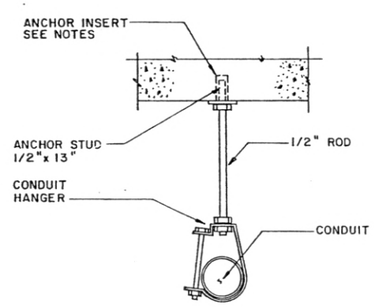
DETAIL 2
EXPANSION FITTING W/ 8" MOVEMENT



DETAIL 5
4" HIGH VOLTAGE CONDUIT ROLLER SUPPORT



DETAIL 3
PULLBOX PLAN COMM. & POWER PULLBOXES



DETAIL 6
4" HIGH VOLTAGE CONDUIT SUPPORT

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I70-2(145)	II-435

REVISIONS		

NOTES:

1. ANCHOR HOLES TO BE DRILLED USING NON-PERCUSSION TYPE DRILL.
2. HOLES SHALL BE RELOCATED IF REINFORCING STEEL IS ENCOUNTERED.
3. ANCHOR DEVICE SHALL BE CAPABLE OF SUSTAINED TENSION TEST LOAD OF 3,200 POUNDS.
4. ANCHOR IMBEDMENT SHALL BE EIGHT TIMES THE DIAMETER OF THE ANCHOR BOLT.
5. CONDUIT SUPPORTS SHALL BE PROVIDED IN ACCORDANCE WITH NEC.
6. UNLESS OTHERWISE NOTED, POWER AND COMM PULLBOXES INSTALLED IN BRIDGE TO BE 24 X 30 X 12, NEMA 3, HOT DIPPED GALVANIZED, WITH BOLTED AND GASKETED COVERS BOTH TOP AND BOTTOM. BOXES SHALL INCLUDE SIDE MOUNTED SUPPORT STEEL TO ALLOW INSTALLATION OF BOX BY HANGER RODS AND ALLOW REMOVAL OF TOP AND BOTTOM COVERS.
7. UNLESS OTHERWISE. NOTED, HIGH VOLTAGE PULLBOXES INSTALLED IN BRIDGE TO BE 24" X 72" X 18", NEMA 3, HOT DIPPED GALVANIZED, WITH BOLTED COVER. BOXES SHALL INCLUDE SIDE MOUNTED SUPPORT STEEL TO ALLOW INSTALLATION OF BOX BY HANGER RODS AND ALLOW REMOVAL OF TOP AND BOTTOM COVERS.

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Detailed By		
Checked By		
Quantities By		
Checked By		

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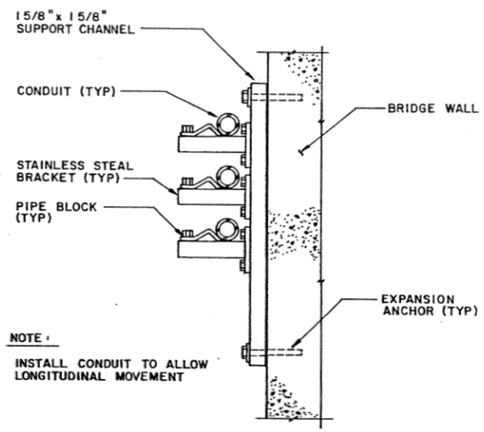
DIVISION OF HIGHWAYS
HANGING LAKE VIADUCT-17
Concrete Alternate
CONDUIT DETAILS
SHEET 1
A-E-221

Designer	W.R. PETERSON	Structure Numbers	F-08-BJ (17W)
Detailer	T. K. BURNS		
Drawing Number B-214		of 217	Drawings

Revision Dates (Preliminary Stage Only)

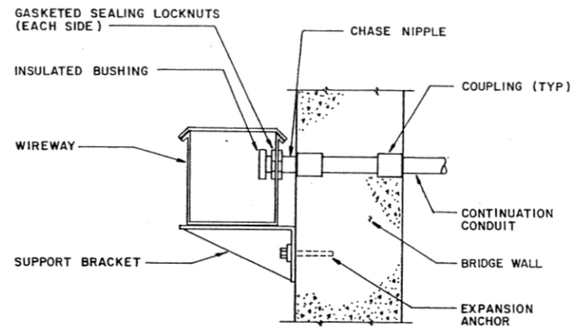
F117B

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

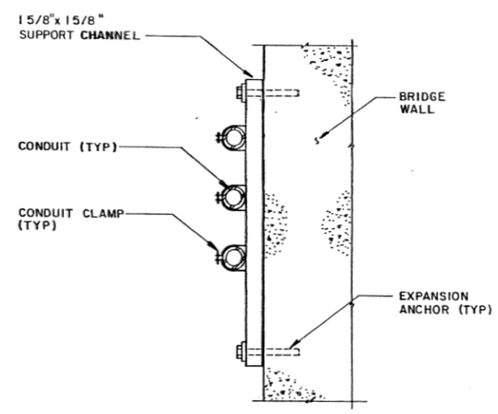


NOTE:
INSTALL CONDUIT TO ALLOW LONGITUDINAL MOVEMENT

DETAIL 7
VERTICAL CONDUIT RACK – SLIDING



DETAIL 9
CONDUIT PENETRATION WIREWAY – BRIDGE



DETAIL 8
VERTICAL CONDUIT RACK – FIXED

AS CONSTRUCTED		
NO REVISIONS 7-20-93	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I70-2(145)	11-436

REVISIONS		

NOTE:
SEE DWG. E-121 FOR NOTES

INITIAL	DATE	
		Checked By
		Quantities By
		Checked By
		Designed By
		Checked By
		Detailed By

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DIVISION OF HIGHWAYS
HANGING LAKE VIADUCT – 17
Concrete Alternate
CONDUIT DETAILS
SHEET II
A-E-222

Designer	W.R. PETERSON	Structure Numbers	F-08-BJ (17W)
Detailer	T.K. BURNS		
Drawing Number	B-215 of 217		Drawings

Revision Dates (Preliminary Stage Only)

F117B

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
D. O. H. FORM NO. 117
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-437

REVISIONS		

POWER CONDUITS

RACEWAY NO.	SIZE IN.	FROM	TO	CABLES/CIRCUITS	REMARKS
RP-A001	2	PBP-A001	PBP-BB	CP-8045, CP-8046, CP-8047 CP-8048, CP-8049,	
RP-A002	2	PBP-A001	PBP-BB	CP-8146, CP-8173, CP-8147	
RP-A003	2	PBP-A001	PBP-BB	CP-8200, CP-8201, CP-8202 CP-8203, CP-8204, CP-8206 CP-8207, "	
RP-A004	1 1/2	PBP-A001	PBP-BB	CP-8143, "	ROADWAY LTG
RP-A005	1 1/2	PBP-A001	PBP-BB	" "	SPARE
RP-A006	1 1/2	PBP-A001	PBP-BB	" "	SPARE
RP-A010	1 1/2	PBP-A001	PBP-A002	" "	INTERNAL BRIDGE LTG
RP-A011	2	PBP-A001	PBP-A002	CP-8045, CP-8046, CP-8047 CP-8048, CP-8049,	
RP-A012	1 1/2	PBP-A001	PBP-A002	CP-8146, CP-8173, CP-8147	
RP-A013	2	PBP-A001	PBP-A002	CP-8200, CP-8201, CP-8202 CP-8203, CP-8204, CP-8206 CP-8207, "	
RP-A014	1 1/2	PBP-A001	PBP-A002	CP-8143, "	ROADWAY LTG
RP-A015	1 1/2	PBP-A001	PBP-A002	" "	SPARE
RP-A016	1 1/2	PBP-A001	PBP-A002	" "	SPARE
RP-A017	2	PBP-A002	PBP-A010	CP-8146, CP-8147,	
RP-A018	1 1/2	PBP-A002	PBP-A010	" "	SPARE
RP-A019	1 1/2	PBP-A002	PBP-A010	CP-8206, CP-8207, CP-8049	
RP-A020	1 1/2	PBP-A002	PBP-A010	" "	SPARE
RP-A021	2	PBP-A010	PBP-A020	CP-8146, CP-8147,	
RP-A022	1 1/2	PBP-A010	PBP-A020	" "	SPARE
RP-A023	1 1/2	PBP-A010	PBP-A020	CP-8206, CP-8207, CP-8049	
RP-A024	1 1/2	PBP-A010	PBP-A020	" "	SPARE
RP-A025	1 1/2	PBP-A002	PBP-A010	" "	INTERNAL BRIDGE LTG
RP-A026	1 1/2	PBP-A010	PBP-A020	" "	INTERNAL BRIDGE LTG
RP-A030	1 1/2	PBP-A020	PBP-A030	" "	INTERNAL BRIDGE LTG
RP-A031	2	PBP-A020	PBP-A030	CP-8146, CP-8147,	
RP-A032	1 1/2	PBP-A020	PBP-A030	" "	SPARE
RP-A033	1 1/2	PBP-A020	PBP-A030	CP-8206, CP-8207, CP-8049	
RP-A034	1 1/2	PBP-A020	PBP-A030	" "	SPARE
RP-A040	1 1/2	PBP-A030	PBP-A040	" "	INTERNAL BRIDGE LTG
RP-A041	2	PBP-A030	PBP-A040	CP-8146, CP-8147,	
RP-A042	1 1/2	PBP-A030	PBP-A040	CP-8206, CP-8207, CP-8049	
RP-A043	1 1/2	PBP-A030	PBP-A040	" "	SPARE
RP-A044	1 1/2	PBP-A030	PBP-A040	" "	SPARE
RP-A045	2	PBP-A040	MONOTUBE	CP-8206, CP-8207, CP-8049	
RP-A046	1 1/2	PBP-A040	PBP-A041	CP-A001, "	
RP-A050	1 1/2	PBP-A040	PBP-A050	" "	INTERNAL BRIDGE LTG
RP-A051	2	PBP-A040	PBP-A050	CP-8146, CP-8147,	
RP-A052	1 1/2	PBP-A040	PBP-A050	" "	SPARE
RP-A053	1 1/2	PBP-A040	PBP-A050	" "	SPARE
RP-A060	1 1/2	PBP-A050	PBP-A060	" "	INTERNAL BRIDGE LTG
RP-A061	2	PBP-A050	PBP-A060	CP-8146, CP-8147,	
RP-A062	1 1/2	PBP-A050	PBP-A060	" "	SPARE
RP-A063	1 1/2	PBP-A050	PBP-A060	" "	SPARE
RP-A070	1 1/2	PBP-A060	PBP-A070	" "	INTERNAL BRIDGE LTG
RP-A071	2	PBP-A060	PBP-A070	CP-8146, CP-8147,	
RP-A072	1 1/2	PBP-A060	PBP-A070	" "	SPARE
RP-A073	1 1/2	PBP-A060	PBP-A070	" "	SPARE
RP-A080	1 1/2	PBP-A070	PBP-A080	" "	INTERNAL BRIDGE LTG
RP-A081	2	PBP-A070	PBP-A080	CP-8146, CP-8147,	
RP-A082	1 1/2	PBP-A070	PBP-A080	" "	SPARE
RP-A083	1 1/2	PBP-A070	PBP-A080	" "	SPARE
RP-A090	1 1/2	PBP-A080	PBP-A090	" "	INTERNAL BRIDGE LTG
RP-A091	2	PBP-A080	PBP-A090	CP-8146, CP-8147,	
RP-A092	1 1/2	PBP-A080	PBP-A090	" "	SPARE
RP-A093	1 1/2	PBP-A080	PBP-A090	" "	SPARE
RP-A095	1 1/2	PBP-A090	PBP-A091	CP-A010, "	
RP-A100	1 1/2	PBP-A090	PBP-A100	" "	INTERNAL BRIDGE LTG
RP-A101	2	PBP-A090	PBP-A100	CP-8146, CP-8147,	
RP-A102	1 1/2	PBP-A090	PBP-A100	" "	SPARE
RP-A103	1 1/2	PBP-A090	PBP-A100	" "	SPARE
RP-A110	1 1/2	PBP-A100	PBP-A110	" "	INTERNAL BRIDGE LTG
RP-A111	2	PBP-A100	PBP-A110	CP-8146, CP-8147,	
RP-A112	1 1/2	PBP-A100	PBP-A110	" "	SPARE
RP-A113	1 1/2	PBP-A100	PBP-A110	" "	SPARE
RP-A120	1 1/2	PBP-A110	PBP-A120	" "	INTERNAL BRIDGE LTG
RP-A121	2	PBP-A110	PBP-A120	CP-8146, CP-8147,	
RP-A122	1 1/2	PBP-A110	PBP-A120	" "	SPARE
RP-A123	1 1/2	PBP-A110	PBP-A120	" "	SPARE
RP-A125	1 1/2	PBP-A120	PBP-A121	CP-A015, "	
RP-A130	1 1/2	PBP-A120	PBP-A130	" "	INTERNAL BRIDGE LTG
RP-A104	2"	PBP-A090	MONOTUBE		
RP-A105	2"	PBP-A090	MONOTUBE		

POWER CONDUITS

RACEWAY NO.	SIZE IN.	FROM	TO	CABLES/CIRCUITS	REMARKS
RP-A131	2	PBP-A120	PBP-A130	CP-8147, "	
RP-A132	1 1/2	PBP-A120	PBP-A130	" "	SPARE
RP-A133	1 1/2	PBP-A120	PBP-A130	" "	SPARE
RP-A140	1 1/2	PBP-A130	PBP-A140	" "	INTERNAL BRIDGE LTG
RP-A141	2	PBP-A130	PBP-A140	CP-8147, "	
RP-A142	1 1/2	PBP-A130	PBP-A140	" "	SPARE
RP-A143	1 1/2	PBP-A130	PBP-A140	" "	SPARE
RP-A150	1 1/2	PBP-A140	PBP-A150	" "	INTERNAL BRIDGE LTG
RP-A151	2	PBP-A140	PBP-A150	CP-8147, "	
RP-A152	1 1/2	PBP-A140	PBP-A150	" "	SPARE
RP-A153	1 1/2	PBP-A140	PBP-A150	" "	SPARE
RP-A160	1 1/2	PBP-A150	PBP-A160	" "	INTERNAL BRIDGE LTG
RP-A161	2	PBP-A150	PBP-A160	CP-8147, "	
RP-A162	1 1/2	PBP-A150	PBP-A160	" "	SPARE
RP-A163	1 1/2	PBP-A150	PBP-A160	" "	SPARE
RP-A170	1 1/2	PBP-A160	PBP-A170	" "	INTERNAL BRIDGE LTG
RP-A171	2	PBP-A160	PBP-A170	CP-8147, "	
RP-A172	1 1/2	PBP-A160	PBP-A170	" "	SPARE
RP-A173	1 1/2	PBP-A160	PBP-A170	" "	SPARE
RP-A180	1 1/2	PBP-A170	PBP-A180	" "	INTERNAL BRIDGE LTG
RP-A181	2	PBP-A170	PBP-A180	CP-8147, "	
RP-A182	1 1/2	PBP-A170	PBP-A180	" "	SPARE
RP-A183	1 1/2	PBP-A170	PBP-A180	" "	SPARE
RP-A190	1 1/2	PBP-A180	PBP-A190	" "	INTERNAL BRIDGE LTG
RP-A191	2	PBP-A180	PBP-A190	CP-8147, "	
RP-A193	1 1/2	PBP-A180	PBP-A190	" "	SPARE
RP-A200	1 1/2	PBP-A190	PBP-A200	" "	INTERNAL BRIDGE LTG
RP-A201	2	PBP-A190	PBP-A200	" "	
RP-A202	1 1/2	PBP-A190	PBP-A200	" "	SPARE
RP-A203	1 1/2	PBP-A190	PBP-A200	" "	SPARE
RP-A210	1 1/2	PBP-A200	PBP-A210	" "	INTERNAL BRIDGE LTG
RP-A211	2	PBP-A200	PBP-A210	" "	
RP-A212	1 1/2	PBP-A200	PBP-A210	" "	SPARE
RP-A213	1 1/2	PBP-A200	PBP-A210	" "	SPARE
RP-A220	1 1/2	PBP-A210	PBP-A220	" "	INTERNAL BRIDGE LTG
RP-A221	2	PBP-A210	PBP-A220	" "	
RP-A222	1 1/2	PBP-A210	PBP-A220	" "	SPARE
RP-A223	1 1/2	PBP-A210	PBP-A220	" "	SPARE
RP-A230	1 1/2	PBP-A220	PBP-A230	" "	INTERNAL BRIDGE LTG
RP-A231	2	PBP-A220	PBP-A230	" "	
RP-A232	1 1/2	PBP-A220	PBP-A230	" "	SPARE
RP-A233	1 1/2	PBP-A220	PBP-A230	" "	SPARE
RP-A240	1 1/2	PBP-A230	PBP-A240	" "	INTERNAL BRIDGE LTG
RP-A241	2	PBP-A230	PBP-A240	" "	
RP-A242	1 1/2	PBP-A230	PBP-A240	" "	SPARE
RP-A243	1 1/2	PBP-A230	PBP-A240	" "	SPARE
RP-A251	2	PBP-A240	REVERSE CURVE	" "	SPARE
RP-A252	1 1/2	PBP-A240	REVERSE CURVE	" "	SPARE
RP-A301	1 1/2	PBP-A300	PBP-BB	" "	SPARE
RP-A302	1 1/2	PBP-A300	PBP-BB	" "	SPARE
RP-A303	1 1/2	PBP-A300	PBP-BB	CP-8142, "	ROADWAY LTG
RP-A304	1 1/2	PBP-A300	PBP-BB	" "	SPARE
RP-A311	1 1/2	PBP-A300	PBP-A310	" "	SPARE
~~RP-A501~~	~~2~~	~~PBP-A002~~	~~GATE-W10/NORTH~~	~~CP-8045, CP-8047, CP-8173~~	~~SPLICE PWR IN PBP~~
~~RP-A502~~	~~2~~	~~PBP-A002~~	~~GATE-W10/SOUTH~~	~~CP-8046, CP-8048, CP-8173~~	~~SPLICE PWR IN PBP~~
RP-A503	2	PBP-A002	MONOTUBE	CP-8200, CP-8201, CP-8202 CP-8203, CP-8204,	
RP-A504	2	PBP-A002	MONOTUBE	" "	SPARE
RP-A540	1	PBP-A041	DS-W08	CP-A001, "	
RP-A541	1 1/2	PBP-A041	LC-W08	CP-A004, CP-A005,	
RP-A542	1 1/2	PBP-A041	LC-W08	" "	SPARE
RP-A543	2	PBP-A040	MONOTUBE	CP-A004, CP-A005,	USE ARMORED CABLE
RP-A544	1	DS-W08	VMS-W08	CP-A002, "	
RP-A545	1 1/2	PBP-A040	TVCAB-W03A/PWR	CP-A040, "	
RP-A546	1 1/2	TVCAB-W03A/PWR	TVCAB-W03A/COMM	CP-A041, "	
RP-A547	1 1/2	TVCAB-W03A/PWR	TVC-W03A	CP-A042, "	
RP-A575	1 1/2	PBP-A070	TVCAB-W03B/PWR	CP-A070, "	
RP-A576	1 1/2	TVCAB-W03B/PWR	TVCAB-W03B/COMM	CP-A071, "	
RP-A577	1 1/2	TVCAB-W03B/PWR	TVC-W03B	CP-A072, "	
RP-A590	1	PBP-A091	DS-W04	CP-A010, "	
RP-A591	1	DS-W04	VMS-W04	CP-A011, "	
RP-A615	1 1/2	PBP-A110	TVCAB-W03C/PWR	CP-A110, "	
RP-A616	1 1/2	TVCAB-W03C/PWR	TVCAB-W03C/COMM	CP-A111, "	
RP-A592	1 1/2	PBP-A091	VMS-W04		

POWER CONDUITS

RACEWAY NO.	SIZE IN.	FROM	TO	CABLES/CIRCUITS	REMARKS
RP-A617	1 1/2	TVCAB-W03C/PWR	TVC-W03C	CP-A112, "	
RP-A620	1	PBP-A121	DS-W02	CP-A015, "	
RP-A621	1 1/2	PBP-A121	LC-W02	CP-A018, "	
RP-A622	1	DS-W02	VMS-W02	CP-A016, "	
RP-A623	1	DS-W02	LC-W02	CP-A017, "	
RP-A624	2	PBP-A120	MONOTUBE	CP-A018, "	
RP-A624	2	LC-W02	BASE OF PAD	" "	SCAN POWER DUCT
RP-A625	2	PBP-A120	MONOTUBE	" "	SPARE
RP-A635	1 1/2	PBP-A130	TVCAB-W03D/PWR	CP-A130, "	
RP-A636	1 1/2	TVCAB-W03D/PWR	TVCAB-W03D/COMM	CP-A131, "	
RP-A637	1 1/2	TVCAB-W03D/PWR	TVC-W03D	CP-A132, "	
RP-A675	1 1/2	PBP-A170	TVCAB-W03E/PWR	CP-A170, "	
RP-A676	1 1/2	TVCAB-W03E/PWR	TVCAB-W03E/COMM	CP-A171, "	
RP-A677	1 1/2	TVCAB-W03E/PWR	TVC-W03E	CP-A172, "	
RP-A703	1 1/2	TVCAB-W03F/PWR	TVC-W03F	CP-A203, "	
RP-A705	1 1/2	PBP-A200	TVCAB-W03F/PWR	CP-A200, "	
RP-A706	1 1/2	TVCAB-W03F/PWR	TVCAB-W03F/COMM	CP-A201, "	
RP-A751	2	PBP-A250	REVERSE CURVE	" "	ROADWAY LTG
RP-A626	1 1/2	PBP-A121	VMS W02		

HIGH VOLTAGE CONDUITS

RACEWAY NO.	SIZE IN.	FROM	TO	CABLES/CIRCUITS	REMARKS
RH-A001	4	PBH-A001	PBH-A002	CH-A001, "	25 kV FEEDER
RH-A002	4	PBH-A002	PBH-A003	CH-A001, "	25 kV FEEDER
RH-A003	4	PBH-A003	PBH-A004	CH-A001, "	25 kV FEEDER
RH-A004	4	PBH-A004	PBH-A005	CH-A001, "	25 kV FEEDER
RH-A005	4	PBH-A005	METER SWGR "B"	CH-A001, "	25 kV FEEDER

INITIAL	DATE
Designed By	
Checked By	
Detailed By	
Checked By	
Quantities By	
Checked By	

Parsons Brinckerhoff
Parsons Brinckerhoff Quade & Douglas, Inc.
Engineers • Architects • Planners

DIVISION OF HIGHWAYS
HANGING LAKE VIADUCT-17W
Concrete Alternate
CONDUIT SCHEDULE
SHEET I
A-E-231

Designer	W.R. PETERSON	Structure Numbers	F-08-BJ (17W)
Detailer	T. K. BURNS		
Drawing Number B-216		of 217	Drawings

Revision Dates (Preliminary Stage Only)

F117B

STATE OF COLORADO
STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS:
D. G. H. FORM NO. 117:
REV. APR. 1986

AS CONSTRUCTED			
NO REVISIONS		REVISED 7-20-93	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
VIII	COLORADO	I 70-2(145)	II-438

REVISIONS		

COMM CONDUITS

RACEWAY NO.	SIZE IN.	FROM	TO	CABLES/CIRCUITS	REMARKS
RC-A001	1 1/2	PBC-A001	PBC-8B	CC-8047, CC-8048, CC-8049 CC-8050, CC-8051,	
RC-A002	1 1/2	PBC-A001	PBC-8S	CC-8227, CC-8228, CC-8229 CC-8230, CC-8231, CC-8232	
RC-A003	1 1/2	PBC-A001	PBC-8B	, ,	SPARE
RC-A004	1 1/2	PBC-A001	PBC-8B	, ,	SPARE
RC-A005	2	PBC-A001	PBC-8B	, ,	SCAN
RC-A006	2	PBC-A001	PBC-8B	CC-6520, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A011	1 1/2	PBC-A001	PBC-A010	CC-8047, CC-8048, CC-8049 CC-8050, CC-8051,	
RC-A012	1 1/2	PBC-A001	PBC-A010	CC-8227, CC-8228, CC-8229 CC-8230, CC-8231, CC-8232	
RC-A013	2	PBC-A001	PBC-A010	CC-6520, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A014	1 1/2	PBC-A001	PBC-A010	, ,	SPARE
RC-A015	2	PBC-A001	PBC-A010	, ,	SCAN
RC-A021	1 1/2	PBC-A010	PBC-A020	CC-8047, CC-8048, CC-8049 CC-8050, CC-8051,	
RC-A022	2	PBC-A010	PBC-A020	CC-6520, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A023	1 1/2	PBC-A010	PBC-A020	CC-8227, CC-8228, CC-8230 CC-8231, CC-8232, CC-8229	
RC-A024	1 1/2	PBC-A010	PBC-A020	, ,	SPARE
RC-A025	2	PBC-A010	PBC-A020	, ,	SCAN
RC-A031	1 1/2	PBC-A020	PBC-A030	CC-8047, CC-8048, CC-8049 CC-8050, CC-8051,	
RC-A032	2	PBC-A020	PBC-A030	CC-6520, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A033	1 1/2	PBC-A020	PBC-A030	CC-8227, CC-8228, CC-8230 CC-8231, CC-8232, CC-8229	
RC-A034	1 1/2	PBC-A020	PBC-A030	, ,	SPARE
RC-A035	2	PBC-A020	PBC-A030	, ,	SCAN
RC-A041	1 1/2	PBC-A030	PBC-A040	CC-8047, CC-8048, CC-8049 CC-8050, CC-8051,	
RC-A042	2	PBC-A030	PBC-A040	CC-6520, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A043	1 1/2	PBC-A030	PBC-A040	CC-8227, CC-8228, CC-8230 CC-8231, CC-8232, CC-8229	
RC-A044	1 1/2	PBC-A030	PBC-A040	, ,	SPARE
RC-A045	2	PBC-A030	PBC-A040	, ,	SCAN
RC-A046	1 1/2	PBC-A040	PBC-A042	CC-8227, CC-8228, CC-8229 CC-8230, ,	
RC-A051	1 1/2	PBC-A040	PBC-A050	CC-8048, CC-8049, CC-8050 CC-8051, CC-8231, CC-8232	
RC-A052	2	PBC-A040	PBC-A050	CC-A451, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A053	1 1/2	PBC-A040	PBC-A050	, ,	SPARE
RC-A054	2	PBC-A040	PBC-A050	, ,	SCAN
RC-A061	1 1/2	PBC-A050	PBC-A060	CC-8048, CC-8049, CC-8050 CC-8051, CC-8231, CC-8232	
RC-A062	2	PBC-A050	PBC-A060	CC-A451, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A063	1 1/2	PBC-A050	PBC-A060	, ,	SPARE
RC-A064	2	PBC-A050	PBC-A060	, ,	SCAN
RC-A071	1 1/2	PBC-A060	PBC-A070	CC-8048, CC-8049, CC-8050 CC-8051, CC-8231, CC-8232	
RC-A072	2	PBC-A060	PBC-A070	CC-A451, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A073	1 1/2	PBC-A060	PBC-A070	, ,	SPARE
RC-A074	2	PBC-A060	PBC-A070	, ,	SCAN
RC-A081	1 1/2	PBC-A070	PBC-A080	CC-8048, CC-8049, CC-8050 CC-8051, CC-8231, CC-8232	
RC-A082	2	PBC-A070	PBC-A080	CC-A453, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A083	1 1/2	PBC-A070	PBC-A080	, ,	SPARE
RC-A084	2	PBC-A070	PBC-A080	, ,	SCAN
RC-A091	1 1/2	PBC-A080	PBC-A090	CC-8048, CC-8049, CC-8050 CC-8051, CC-8231, CC-8232	
RC-A092	2	PBC-A080	PBC-A090	CC-A453, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A093	1 1/2	PBC-A080	PBC-A090	, ,	SPARE
RC-A094	2	PBC-A080	PBC-A090	, ,	SCAN
RC-A101	1 1/2	PBC-A090	PBC-A100	CC-8049, CC-8050, CC-8051 CC-8231, CC-8232,	
RC-A102	2	PBC-A090	PBC-A100	CC-A453, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A103	1 1/2	PBC-A090	PBC-A100	, ,	SPARE
RC-A104	2	PBC-A090	PBC-A100	, ,	SCAN
RC-A111	1 1/2	PBC-A100	PBC-A110	CC-8049, CC-8050, CC-8051 CC-8231, CC-8232,	
RC-A112	2	PBC-A100	PBC-A110	CC-A453, CC-6521, CC-6522 CC-6523, CC-6524, CC-6525	FIBRE OPTIC FOR TVC
RC-A113	1 1/2	PBC-A100	PBC-A110	, ,	SPARE
RC-A114	2	PBC-A100	PBC-A110	, ,	SCAN
RC-A121	1 1/2	PBC-A110	PBC-A120	CC-8049, CC-8050, CC-8051 CC-8231, CC-8232,	
RC-A122	2	PBC-A110	PBC-A120	CC-A455, CC-6522, CC-6523 CC-6524, CC-6525,	FIBRE OPTIC FOR TVC

COMM CONDUITS

RACEWAY NO.	SIZE IN.	FROM	TO	CABLES/CIRCUITS	REMARKS
RC-A123	1 1/2	PBC-A110	PBC-A120	, ,	SPARE
RC-A124	2	PBC-A110	PBC-A120	, ,	SCAN
RC-A131	1 1/2	PBC-A120	PBC-A130	CC-8231, CC-8232,	
RC-A132	2	PBC-A120	PBC-A130	CC-A455, CC-6522, CC-6523 CC-6524, CC-6525,	FIBRE OPTIC FOR TVC
RC-A133	1 1/2	PBC-A120	PBC-A130	, ,	SPARE
RC-A134	2	PBC-A120	PBC-A130	, ,	SCAN
RC-A141	1 1/2	PBC-A130	PBC-A140	CC-8231, CC-8232,	
RC-A142	2	PBC-A130	PBC-A140	CC-A457, CC-6522, CC-6523 CC-6524, CC-6525,	FIBRE OPTIC FOR TVC
RC-A143	1 1/2	PBC-A130	PBC-A140	, ,	SPARE
RC-A144	2	PBC-A130	PBC-A140	, ,	SCAN
RC-A151	1 1/2	PBC-A140	PBC-A150	CC-8231, CC-8232,	
RC-A152	2	PBC-A140	PBC-A150	CC-A457, CC-6522, CC-6523 CC-6524, CC-6525,	FIBRE OPTIC FOR TVC
RC-A153	1 1/2	PBC-A140	PBC-A150	, ,	SPARE
RC-A154	2	PBC-A140	PBC-A150	, ,	SCAN
RC-A161	1 1/2	PBC-A150	PBC-A160	CC-8231, CC-8232,	
RC-A162	2	PBC-A150	PBC-A160	CC-A457, CC-6522, CC-6523 CC-6524, CC-6525,	FIBRE OPTIC FOR TVC
RC-A163	1 1/2	PBC-A150	PBC-A160	, ,	SPARE
RC-A164	2	PBC-A150	PBC-A160	, ,	SCAN
RC-A171	1 1/2	PBC-A160	PBC-A170	CC-8231, CC-8232,	
RC-A172	2	PBC-A160	PBC-A170	CC-A457, CC-6522, CC-6523 CC-6524, CC-6525,	FIBRE OPTIC FOR TVC
RC-A173	1 1/2	PBC-A160	PBC-A170	, ,	SPARE
RC-A174	2	PBC-A160	PBC-A170	, ,	SCAN
RC-A181	1 1/2	PBC-A170	PBC-A180	CC-8231, CC-8232,	
RC-A182	2	PBC-A170	PBC-A180	CC-A460, CC-6523, CC-6524 CC-6525,	FIBRE OPTIC FOR TVC
RC-A183	1 1/2	PBC-A170	PBC-A180	, ,	SPARE
RC-A184	2	PBC-A170	PBC-A180	, ,	SCAN
RC-A191	1 1/2	PBC-A180	PBC-A190	CC-8231, CC-8232,	
RC-A192	2	PBC-A180	PBC-A190	CC-A460, CC-6523, CC-6524 CC-6525,	FIBRE OPTIC FOR TVC
RC-A193	1 1/2	PBC-A180	PBC-A190	, ,	SPARE
RC-A194	2	PBC-A180	PBC-A190	, ,	SCAN
RC-A201	1 1/2	PBC-A190	PBC-A200	CC-8231, CC-8232,	
RC-A202	2	PBC-A190	PBC-A200	CC-A460, CC-6523, CC-6524 CC-6525,	FIBRE OPTIC FOR TVC
RC-A203	1 1/2	PBC-A190	PBC-A200	, ,	SPARE
RC-A204	2	PBC-A190	PBC-A200	, ,	SCAN
RC-A211	1 1/2	PBC-A200	PBC-A210	CC-8231, CC-8232,	
RC-A212	2	PBC-A200	PBC-A210	CC-A462, CC-6523, CC-6524 CC-6525,	FIBRE OPTIC FOR TVC
RC-A213	1 1/2	PBC-A200	PBC-A210	, ,	SPARE
RC-A214	2	PBC-A200	PBC-A210	, ,	SCAN
RC-A221	1 1/2	PBC-A210	PBC-A220	CC-8231, CC-8232,	
RC-A222	2	PBC-A210	PBC-A220	CC-A462, CC-6523, CC-6524 CC-6525,	FIBRE OPTIC FOR TVC
RC-A223	1 1/2	PBC-A210	PBC-A220	, ,	SPARE
RC-A224	2	PBC-A210	PBC-A220	, ,	SCAN
RC-A231	1 1/2	PBC-A220	PBC-A230	CC-8231, CC-8232,	
RC-A232	2	PBC-A220	PBC-A230	CC-A462, CC-6523, CC-6524 CC-6525,	FIBRE OPTIC FOR TVC
RC-A233	1 1/2	PBC-A220	PBC-A230	, ,	SPARE
RC-A234	2	PBC-A220	PBC-A230	, ,	SCAN
RC-A241	1 1/2	PBC-A230	PBC-A240	CC-8231, CC-8232,	
RC-A242	2	PBC-A230	PBC-A240	CC-A462, CC-6523, CC-6524 CC-6525,	FIBRE OPTIC FOR TVC
RC-A243	1 1/2	PBC-A230	PBC-A240	, ,	SPARE
RC-A244	2	PBC-A230	PBC-A240	, ,	SCAN
RC-A251	1 1/2	PBC-A240	PBC-A250	CC-8231, CC-8232,	
RC-A252	2	PBC-A240	PBC-A250	CC-A462, CC-6523, CC-6524 CC-6525,	FIBRE OPTIC FOR TVC
RC-A253	1 1/2	PBC-A240	PBC-A250	, ,	SPARE
RC-A254	2	PBC-A240	PBC-A250	, ,	SCAN
RC-A301	1 1/2	PBC-A300	PBC-8B	, ,	SPARE
RC-A302	1 1/2	PBC-A300	PBC-8B	, ,	SPARE
RC-A303	2	PBC-A300	PBC-8B	, ,	SCAN
RC-A311	1 1/2	PBC-A300	PBC-A310	, ,	SPARE
RC-A312	2	PBC-A300	PBC-A310	, ,	SCAN
RC-A540	1 1/2	PBC-A040	TVCAB-W03A	CC-A450, ,	FIBRE OPTIC FOR TVC
RC-A541	1 1/2	PBC-A040	PBC-A041	CC-8047, ,	
RC-A542				, ,	NOT USED
RC-A543				, ,	NOT USED
RC-A544				, ,	NOT USED
RC-A545	1 1/2	PBC-A041	VMS-W08	CC-8047, ,	
RC-A546	2	PBC-A041	VMS-W08	, ,	CABLE BY CONTRACTOR

COMM CONDUITS

RACEWAY NO.	SIZE IN.	FROM	TO	CABLES/CIRCUITS	REMARKS
RC-A547	2	PBC-A041	VMS-W08	, ,	CABLE BY CONTRACTOR
RC-A548	1 1/2	PBC-A041	VMS-W08	, ,	SPARE
RC-A549	2	PBC-A041	MONOTUBE	, ,	CABLE BY CONTRACTOR
RC-A550	2	PBC-A041	MONOTUBE	, ,	CABLE BY CONTRACTOR
RC-A551	1 1/2	TVCAB-W03A	MONOTUBE(TVC)	, ,	CABLE BY CONTRACTOR
RC-A560	1 1/2	PBC-A070	TVCAB-W03B	CC-A452, ,	FIBRE OPTIC FOR TVC
RC-A562	1 1/2	TVCAB-W03B	TVC-W03B	, ,	CABLE BY CONTRACTOR
RC-A590	1	PBC-A090	PBC-A091	CC-8048, ,	
RC-A591	1 1/2	PBC-A091	VMS-W04	CC-8048, ,	
RC-A592	2	PBC-A091	VMS-W04	, ,	CABLE BY CONTRACTOR
RC-A593	2	PBC-A091	VMS-W04	, ,	CABLE BY CONTRACTOR
RC-A594	1 1/2	PBC-A091	VMS-W04	, ,	SPARE
RC-A595	2	PBC-A091	MONOTUBE	, ,	CABLE BY CONTRACTOR
RC-A596	2	PBC-A091	MONOTUBE	, ,	CABLE BY CONTRACTOR
RC-A600	1 1/2	PBC-A110	TVCAB-W03C	CC-A454, ,	FIBRE OPTIC FOR TVC
RC-A602	1 1/2	TVCAB-W03C	TVC-W03C	, ,	CABLE BY CONTRACTOR
RC-A619	2	PBC-A120	PBC-A121	, ,	SCAN
RC-A620	1 1/2	PBC-A120	PBC-A121	CC-8049, CC-8050, CC-8051	
RC-A621	1 1/2	PBC-A121	VMS-W02	CC-8049, ,	
RC-A622	2	PBC-A121	VMS-W02	, ,	CABLE BY CONTRACTOR
RC-A623	2	PBC-A121	VMS-W02	, ,	CABLE BY CONTRACTOR
RC-A624	1 1/2	PBC-A121	VMS-W02	, ,	SPARE
RC-A625	2	PBC-A121	MONOTUBE	, ,	CABLE BY CONTRACTOR
RC-A626	2	PBC-A121	MONOTUBE	, ,	CABLE BY CONTRACTOR
RC-A627	1 1/2	PBC-A121	MONOTUBE	CC-8050, CC-8051,	
RC-A628	2	PBC-A121	BASE OF PIER	, ,	SCAN
RC-A630	1 1/2	PBC-A130	TVCAB-W03D	CC-A456, ,	FIBRE OPTIC FOR TVC
RC-A632	1 1/2	TVCAB-W03D	TVC-W03D	, ,	CABLE BY CONTRACTOR
RC-A640	1 1/2	PBC-A170	TVCAB-W03E	CC-A459, ,	FIBRE OPTIC FOR TVC
RC-A642	1 1/2	TVCAB-W03E	TVC-W03E	, ,	CABLE BY CONTRACTOR
RC-A650	1 1/2	PBC-A200	TVCAB-W03F	CC-A461, ,	FIBRE OPTIC FOR TVC
RC-A652	1 1/2	TVCAB-W03F	TVC-W03F	, ,	CABLE BY CONTRACTOR
RC-A751	2	PBC-A250	REVERSE CURVE	CC-8231, CC-8232,	
RC-A752	2	PBC-A250	REVERSE CURVE	CC-A464, CC-A465,	FIBRE OPTIC FOR TVC

RC-A618 2" PBC-A120 PBC-A121
RC-A629 2" PBC-A121 BASE OF PIER

NOTES:

1. "CABLE BY CONTRACTOR" REFERS TO HANGING LAKE CONTROL SYSTEM CONTRACTOR.

Parsons Brinckerhoff
Parsons Brinckerhoff Quade & Douglas, Inc.
Engineers • Architects • Planners

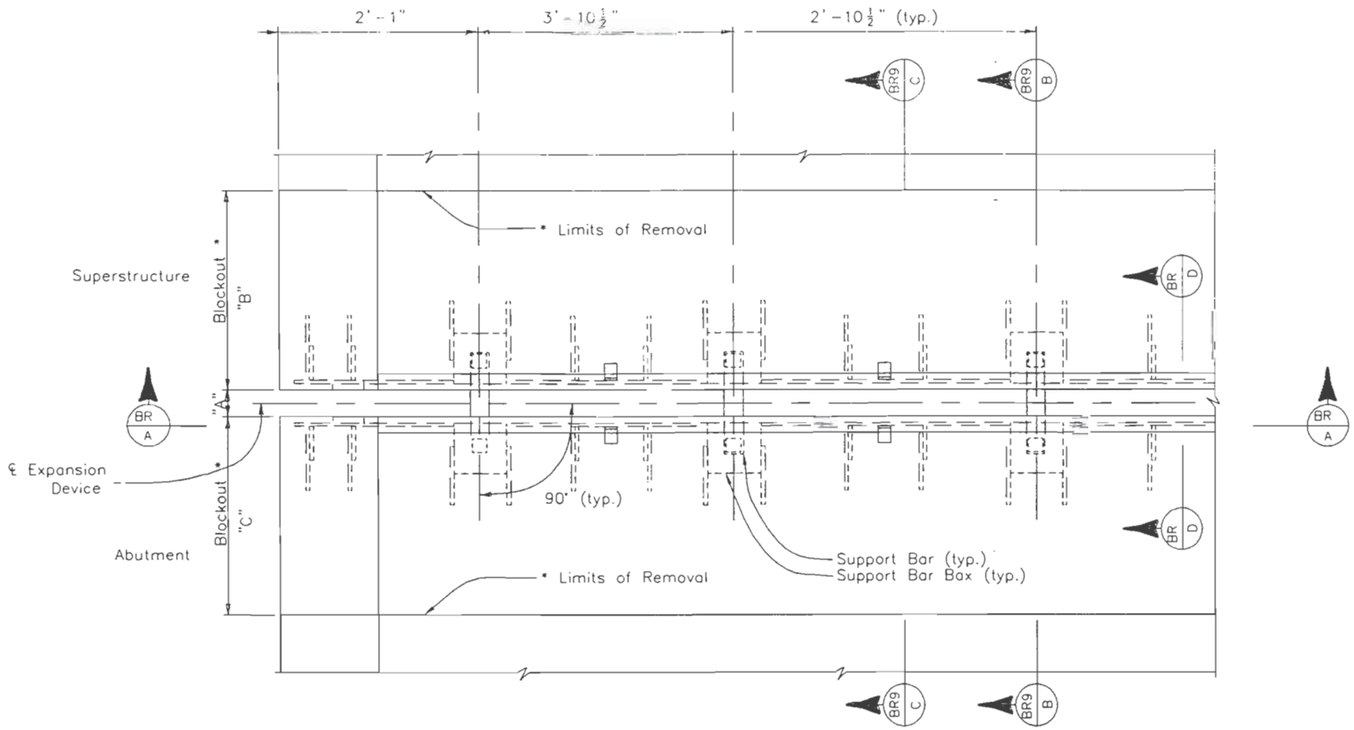
DIVISION OF HIGHWAYS
HANGING LAKE VIADUCT-17W
Concrete Alternate
CONDUIT SCHEDULE
SHEET II
A-E-232

Designer	W.R. PETERSON	Structure	F-08-BJ
Detailer	S. J. JOHNSON	Numbers	(17W)
Drawing Number B-217		of 434	Drawings

Revision Dates (Preliminary Stage Only)

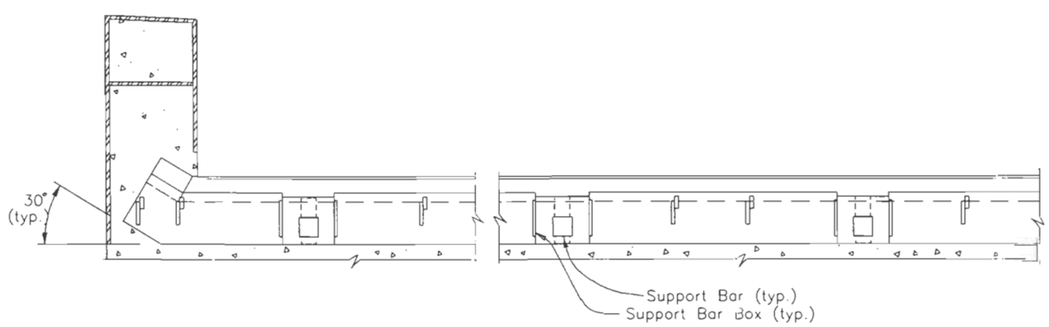
INITIAL	DATE	
Designed By		
Checked By		Checked By
Detailed By		Quantities By

F117B

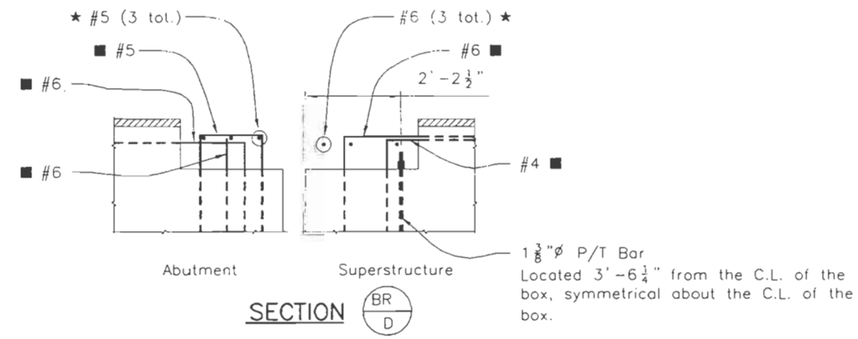


* See Drawing B-9 of 12 for dimensions. 1" Sawcut at all removal lines to eliminate feathered edges.

PLAN

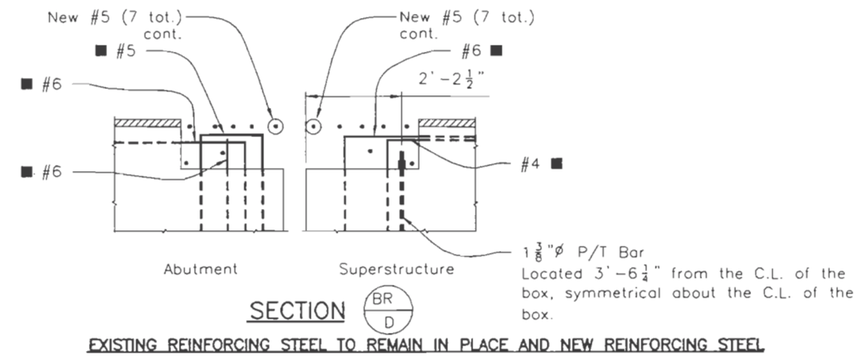


SECTION BR/A



SECTION BR/D

EXISTING REINFORCING STEEL TO REMAIN IN PLACE AND TO BE REMOVED AND REPLACED



SECTION BR/D

EXISTING REINFORCING STEEL TO REMAIN IN PLACE AND NEW REINFORCING STEEL

★ Reinforcing steel designated to be removed and replaced.

■ Reinforcing steel designated to remain in place.

NOTES:

The expansion device is designed for live load HS44-20. The existing support bar boxes are at 5'-11" spacing (typ). New spacing is 2'-10½" (see plan view). This requires the existing reinforcing steel to be bent at the new support bar boxes.

The Contractor shall take all steps necessary to prevent damaging the P/T bars. Any such bars damaged by the Contractor's operations shall be repaired at the Contractor's expense with no allowance for contract time extension. The repair method used shall be approved by the Engineer.

The Contractor shall take all steps necessary to prevent cutting or otherwise damaging reinforcing steel designated to remain in place. Any such bars damaged by the Contractor's operations shall be repaired or replaced at the Contractor's expense with no allowance for contract time extension. The repair method used shall be approved by the Engineer.

All exposed reinforcing steel designated to remain in place shall be cleaned.

All reinforcing steel at this location is epoxy coated.

Design	INITIAL	DATE
Designed By	GHD	09/00
Checked By	DLD	10/00

Detail	INITIAL	DATE
Detailed By	LEC	10/00
Checked By	KLL	09/00

Quantities	INITIAL	DATE
Quantities By	GHD	10/00
Checked By	LEC	10/00

Revision Dates (Preliminary Stage Only)

Computer File Information			
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Last Modification Date:	10/06/2000	Initials:	LEC
Full Path:	D:\...\Projects\12238\		
Drawing File Name:	08 Repair F-08-BJ.dwg		
Acad Ver. R14.01	Scale:	Units:	English

Sheet Revisions

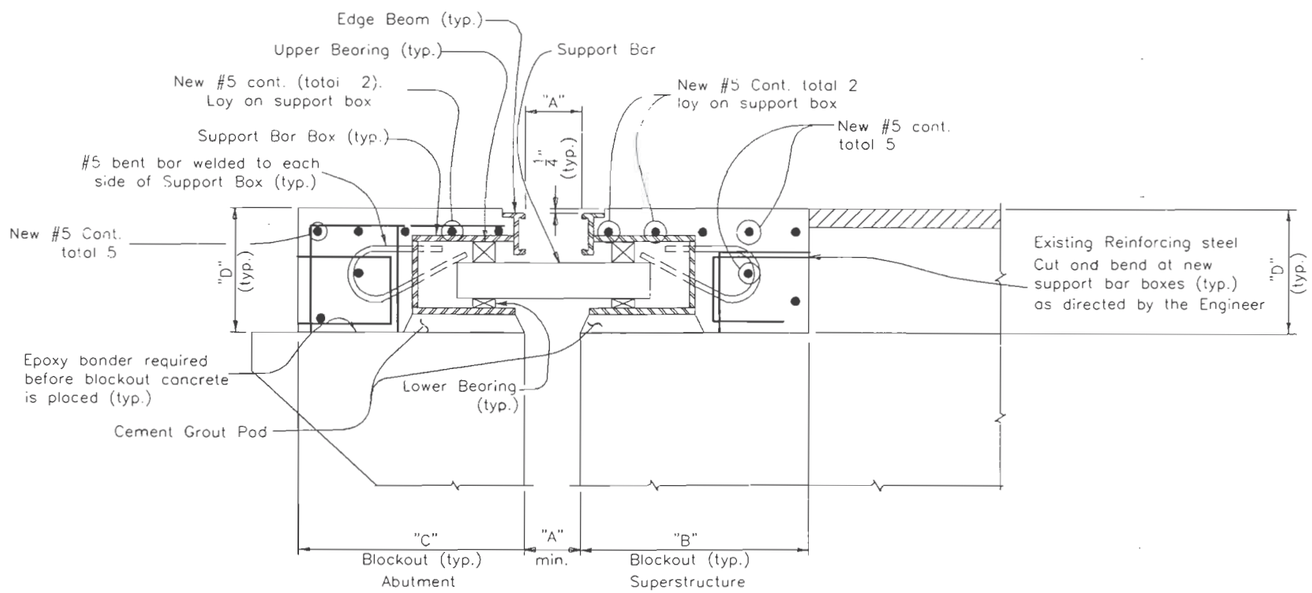
Colorado Department of Transportation
DOT
4201 East Arkansas Avenue, Room 330
Denver, Colorado 80222-3400
Phone: 303-757 9352 FAX: 303-757-9197
Bridge Design and Management Branch

As Constructed
No Revisions: 7 3 02
Revised:
Void:

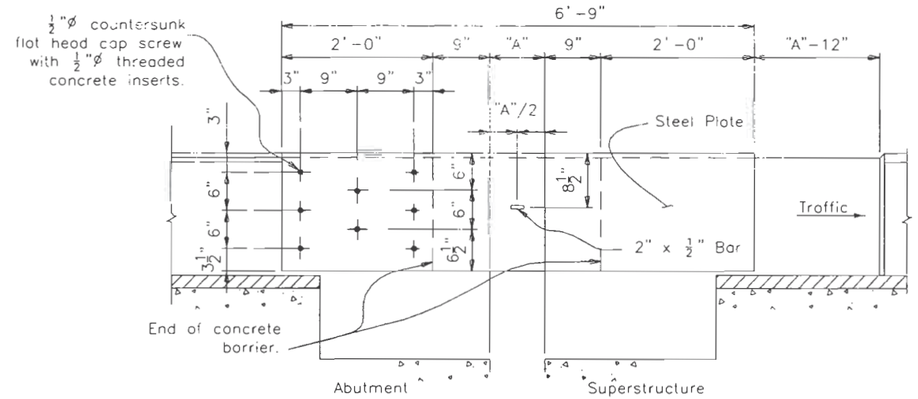
BRIDGE EXPANSION DEVICE (0 TO 15 INCH)

Designer:	G. DAVYDOV	Structure Numbers	F-08-BJ
Detailer:	L. CROSWELL		
Sheet Subset:	Bridge Repair	Subset Sheets:	BR 8 of 12

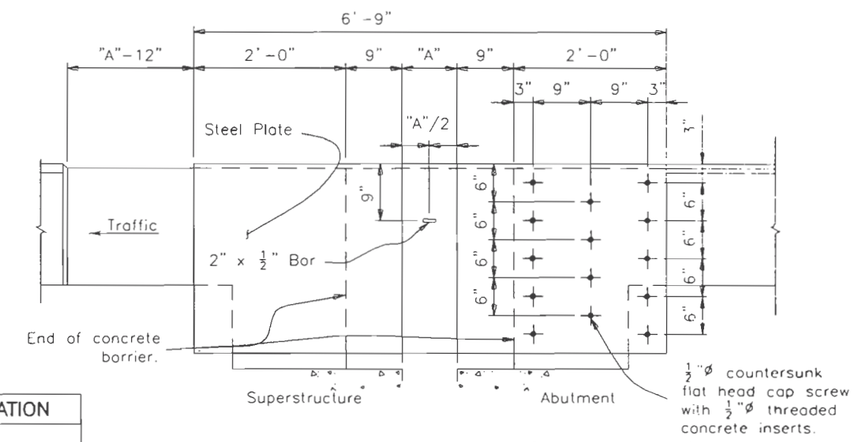
Project No./Code
NH 0702-217
12238
Sheet Number 34



SECTION (BR8 B)



ELEVATION OF COVER PLATE (front face)



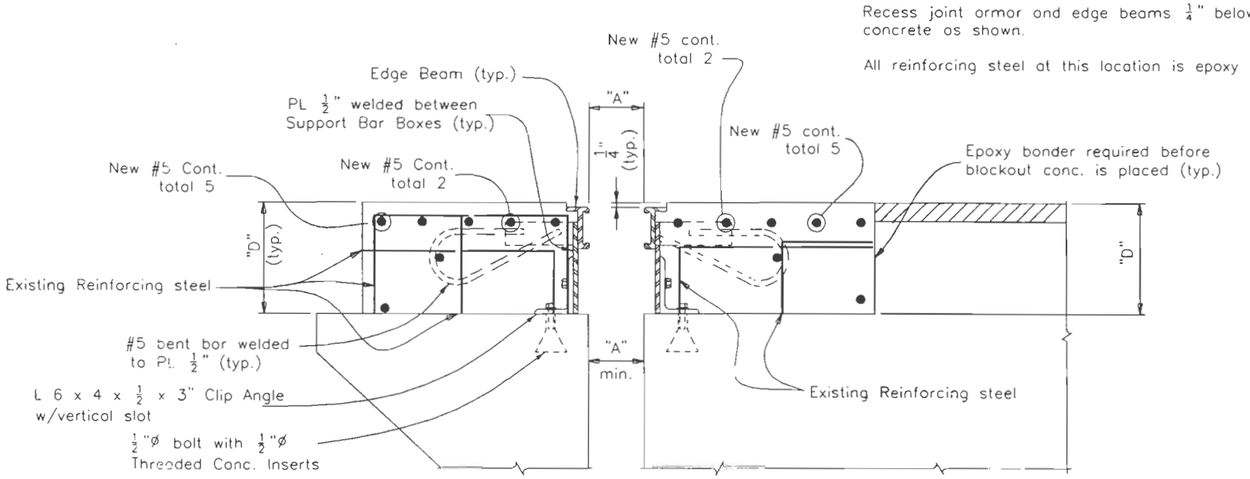
ELEVATION OF COVER PLATE (outside face)

ACCEPTABLE EXPANSION DEVICE ALTERNATES

WABO MODULAR EXPANSION JOINT SYSTEM
STEELFLEX MODULAR EXPANSION JOINT

NOTE:
Recess joint armor and edge beams 1/4" below finished concrete as shown.

All reinforcing steel at this location is epoxy coated.

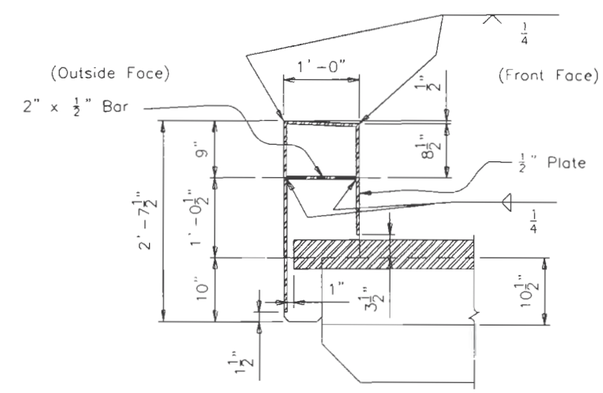


SECTION (BR8 C)

DIMENSIONS	LOCATION
"A" Structure Temp.	Abutment 37
30°	18 1/2"
40°	17 3/4"
50°	17"
60°	16 1/4"
70°	15 1/2"
80°	14 3/4"
90°	14"
100°	13 1/4"

LIMITS OF REMOVAL	
"B"	2'-6"
"C"	2'-3"
"D"	1'-1 1/4"

Dimension "A" is based on the width center beam = 3".



SECTION THROUGH COVER PLATE

Design			Detail			Quantities		
	INITIAL	DATE		INITIAL	DATE		INITIAL	DATE
Designed By	GHD	09/00	Detailed By	LEC	09/00	Quantities By	GHD	09/00
Checked By	DLD	09/00	Checked By	KLL	09/00	Checked By	LEC	09/00

Revision Dates (Preliminary Stage Only)

Computer File Information			
Creation Date:	09/05/2000	Initials:	LEC
Last Modification Date:	10/20/2000	Initials:	LEC
Full Path:	D:\...\Projects\12238\		
Drawing File Name:	09 Repair F-08-BJ.dwg		
Acad Ver. R14.01	Scale:	Units:	English

Sheet Revisions

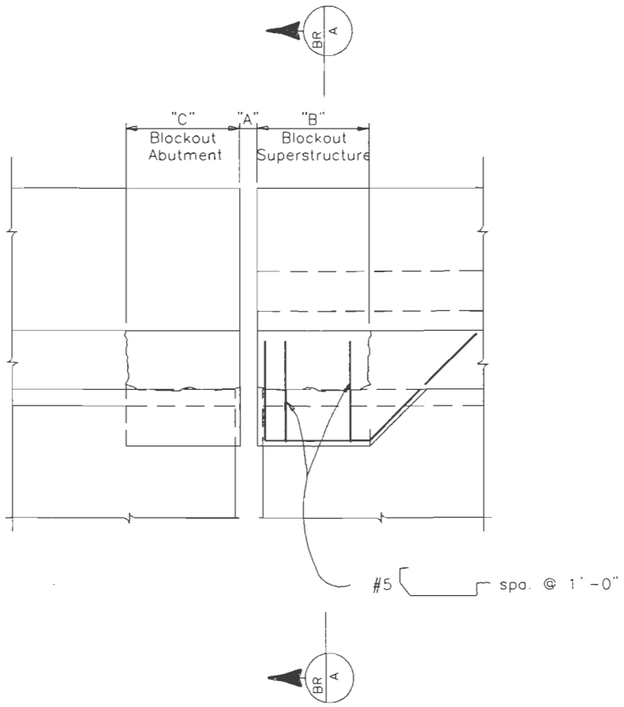
Colorado Department of Transportation
DOT
4201 East Arkansas Avenue, Room 330
Denver, Colorado 80222-3400
Phone: 303-757-9352 FAX: 303-757-9197
Bridge Design and Management Branch

As Constructed
No Revisions: 7 3 02
Revised:
Void:

BRIDGE EXPANSION DEVICE
(0 TO 15 INCH)

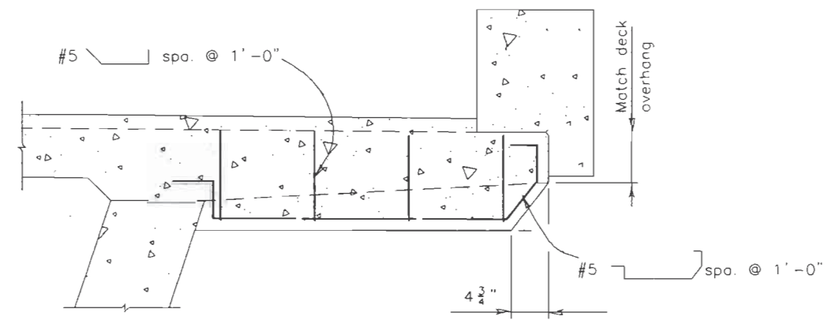
Designer:	G. DAVYDOV	Structure Numbers	F-08-BJ
Detailer:	L. CROSWELL		
Sheet Subset:	Bridge Repair	Subset Sheets:	BR 9 of 12

Project No./Code
NH 0702-217
12238
Sheet Number 35



ELEVATION

MODIFIED OVERHANG AT ABUTMENT
BRIDGE EXPANSION DEVICE



AT CONCRETE BOX GIRDER

SECTION BR A

Revision Dates	(Preliminary Stage Only)

Quantities	INITIAL	DATE
Quantities By	GHD	09/00
Checked By	LEC	09/00

Detail	INITIAL	DATE
Detailed By	LEC	09/00
Checked By	KLL	09/00

Design	INITIAL	DATE
Designed By	GHD	09/00
Checked By	DLD	09/00

Computer File Information			
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Last Modification Date:	09/13/2000	Initials:	LEC
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Acad Ver. R14.01	Scale:	Units:	English

Sheet Revisions

Colorado Department of Transportation
4201 East Arkansas Avenue, Room 330
Denver, Colorado 80222-3400
Phone: 303-757-9352 FAX: 303-757-9197
Bridge Design and Management Branch

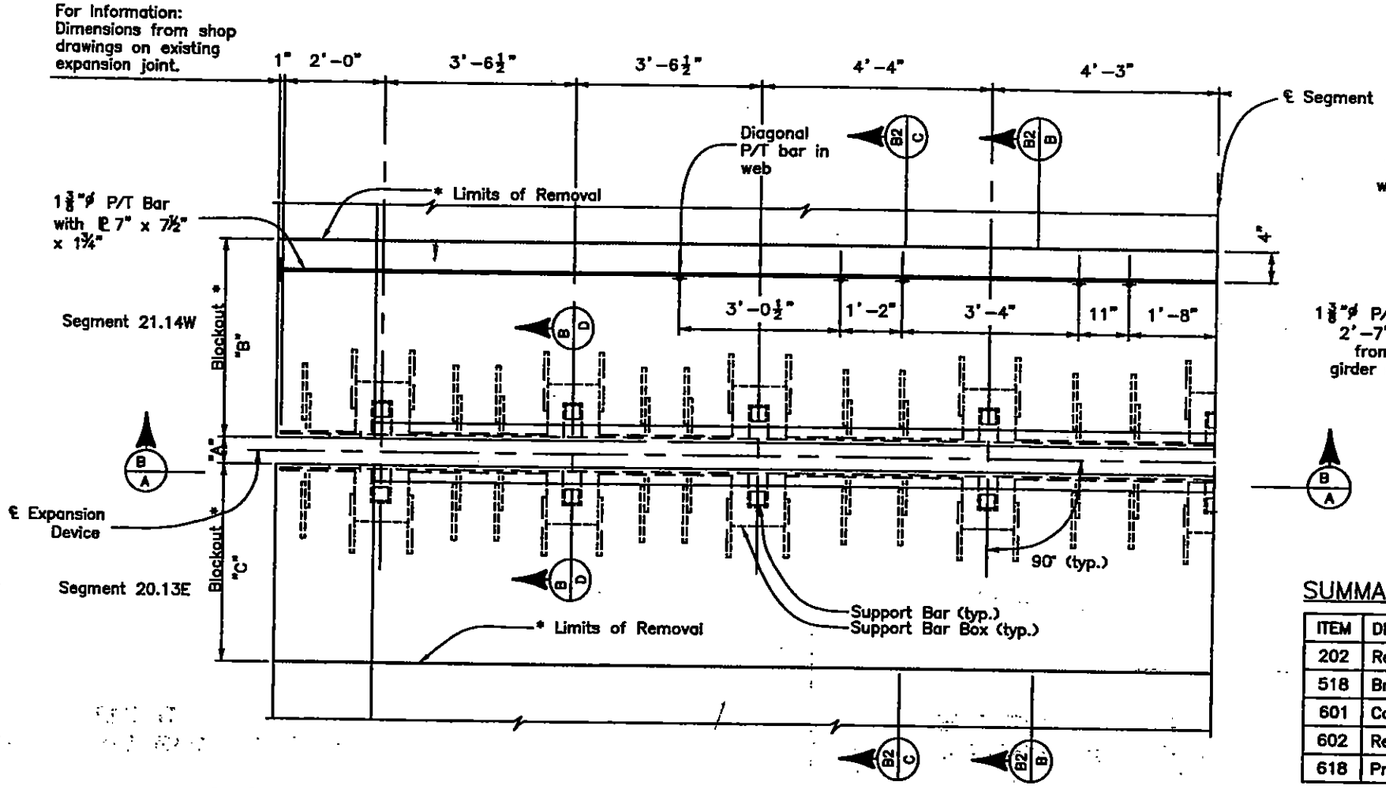
As Constructed
No Revisions: 7 3 02
Revised:
Void:

BRIDGE EXPANSION DEVICE
(0 TO 15 INCH)

Designer:	G. DAVYDOV	Structure Numbers	F-08-BJ
Detailer:	L. CROSWELL		
Sheet Subset:	Bridge Repair	Subset Sheets:	BR 10 of 12

Project No./Code
NH 0702-217
12238
Sheet Number 36

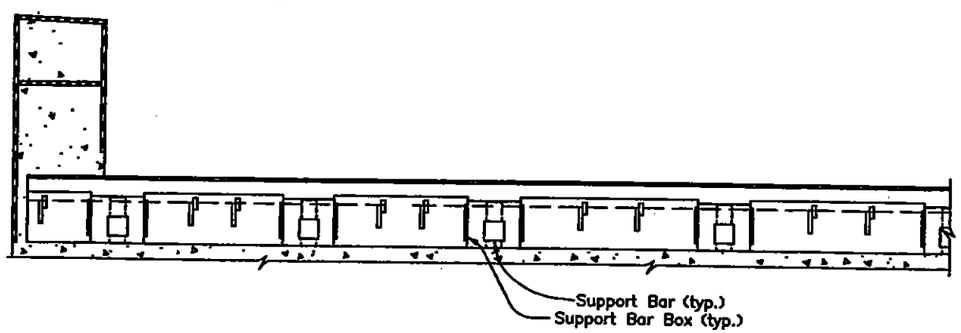
For Information:
Dimensions from shop drawings on existing expansion joint.



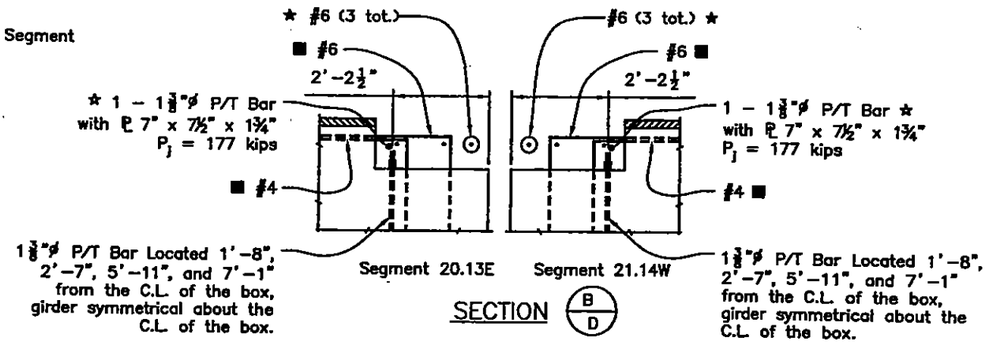
* See Drawing B2 of 3 for dimensions. 1" Sawcut at all removal lines to eliminate feathered concrete edges.

PLAN

Support bar box location, size, and scale may not be consistent the scale used for the location of the vertical P/T bars.



SECTION B/A



SECTION B/D

EXISTING REINFORCING STEEL

★ Reinforcing steel designated to be removed and replaced.

■ Reinforcing steel designated to remain in place.

SUMMARY OF APPROXIMATE QUANTITIES:

ITEM	DESCRIPTION	UNIT	TOTAL
202	Removal of Expansion Device	FT	34
518	Bridge Expansion Device (0-15 Inch)	FT	34
601	Concrete Class S (Bridge)	CY	7
602	Reinforcing Steel (Epoxy Coated)	LB	154
618	Prestressing Steel Bar	MKFT	6.3

NOTES:

The expansion device shall be designed for live load HS20-44. The existing reinforcing steel shall be bent or cut to accommodate the new support bar boxes.

The support bars shall be designed in accordance with the AASHTO LRFD Bridge Design Specifications and the fatigue requirements of NCHRP Report 402. They shall be sized for the distance between the segments at -5° F, calculated to be 2'-7", plus the distance to the center of the bearings.

The full penetration welds between the center beams and the support bars shall be designed in accordance with NCHRP Report 402.

The Contractor shall take all steps necessary to prevent damaging the P/T components of the bridge. Any P/T components damaged by the Contractor's operations shall be repaired at the Contractor's expense with no allowance for contract time extension. The repair method used shall be approved by the Engineer.

The Contractor shall take all steps necessary to prevent cutting or otherwise damaging reinforcing steel designated to remain in place. All reinforcing steel damaged by the Contractor's operations shall be repaired or replaced at the Contractor's expense with no allowance for contract time extension. The repair method used shall be approved by the Engineer.

All exposed reinforcing steel designated to remain in place shall be cleaned.

All reinforcing steel at this location shall be epoxy coated.

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Design	INITIAL	DATE
Designed By	DEC	08/02
Checked By		

Detail	INITIAL	DATE
Detailed By	LEC	08/02
Checked By		

Quantities	INITIAL	DATE
Quantities By:		
Checked By		

Revision Dates (Preliminary Stage Only)

Computer File Information	
Creation Date: 8/28/02	Initials: LEC
Last Modification Date: 2/03/03	Initials: LEC
Full Path: C:\Croswell\Projects\F-08-BJ Modular Expn Joint\	
Drawing File Name: 1 Repair F-08-BJ.dwg	
Acad Ver. 15.06s Scale: none	Units: English

Sheet Revisions

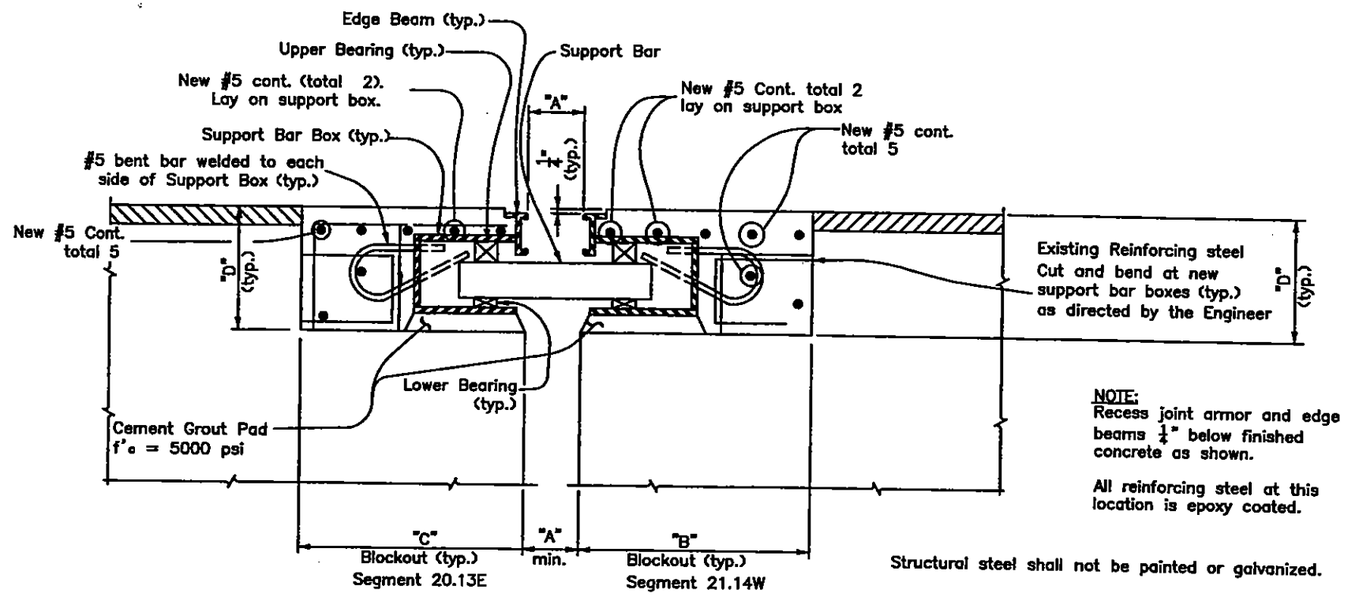
Colorado Department of Transportation
4201 East Arkansas Avenue, Room 330
Denver, Colorado 80222-3400
Phone: 303-757-9352 FAX: 303-757-9197
Staff Bridge Branch

As Constructed
No Revisions:
Revised:
Void:

BRIDGE EXPANSION DEVICE (0 TO 15 INCH)

Designer: D. CHRISTENSEN
Detailer: L. CROSWELL
Structure Numbers: F-08-BJ
Sheet Subset: Bridge
Subset Sheets: B1 of 3

Project No./Code
MTCE 03-013
M3013
Sheet Number

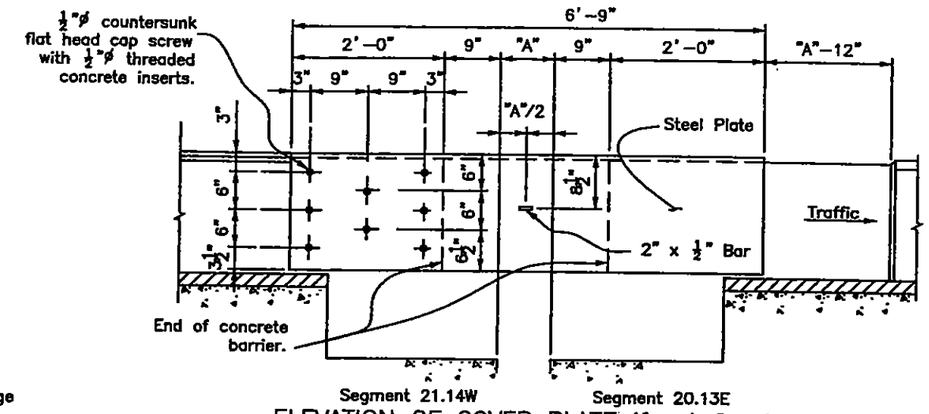


SECTION (B1/B)

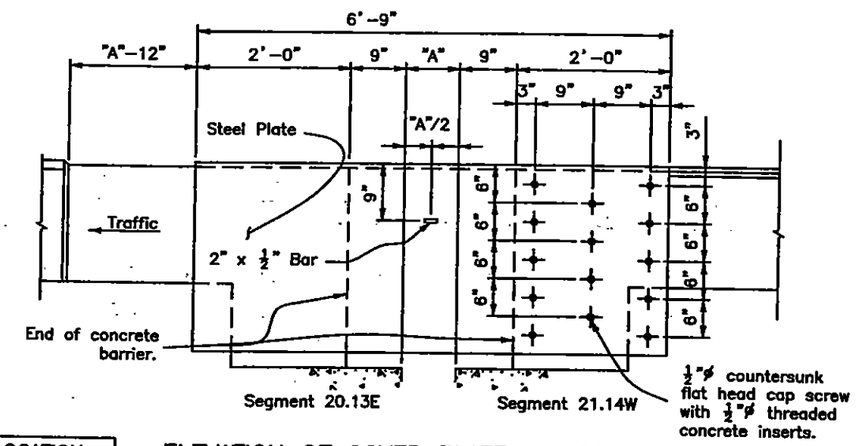
NOTE:
Recess joint armor and edge beams ¼" below finished concrete as shown.

All reinforcing steel at this location is epoxy coated.

Structural steel shall not be painted or galvanized.



ELEVATION OF COVER PLATE (front face)



ELEVATION OF COVER PLATE (outside face)

ACCEPTABLE EXPANSION DEVICE ALTERNATES

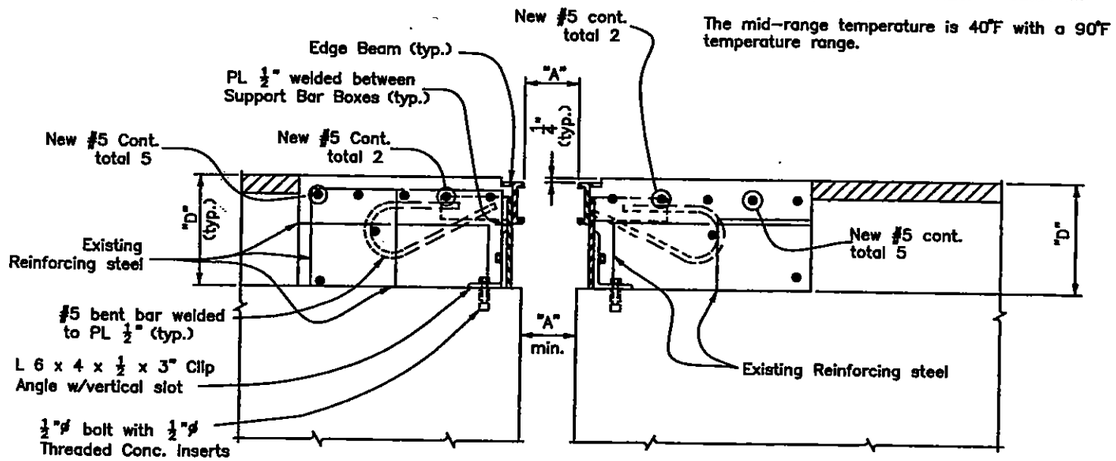
WABO MODULAR EXPANSION JOINT SYSTEM
STEELFLEX MODULAR EXPANSION JOINT

Requirements for Expansion Device

The maximum opening between transverse beams shall be no greater than 3".

Movement capability: 1.3 (10.26) = 13.34 in.

The mid-range temperature is 40°F with a 90°F temperature range.

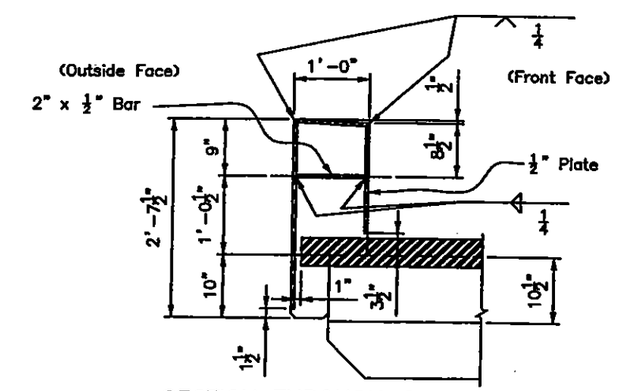


SECTION (B1/C)

DIMENSIONS	LOCATION
"A" Structure Temp.	Span 20
30°	26⅞"
40°	25¾"
50°	24⅝"
60°	23½"
70°	22⅜"
80°	21¼"
90°	20⅛"

LIMITS OF REMOVAL	
"B"	2'-6"
"C"	2'-6"
"D"	1'-1¼"

Class S concrete, f'c = 6000 psi, shall be used for the blockout.



SECTION THROUGH COVER PLATE

Computer File Information		
Creation Date: 8/28/02	Initials: LEC	
Last Modification Date: 2/03/03	Initials: LEC	
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Drawing File Name: 2 Repair F-08-BJ.dwg		
Acad Ver. 15.06s	Scale: none	Units: English

Sheet Revisions

Colorado Department of Transportation
DOT
4201 East Arkansas Avenue, Room 330
Denver, Colorado 80222-3400
Phone: 303-757-9352 FAX: 303-757-9197
Staff Bridge Branch

As Constructed
No Revisions:
Revised:
Void:

BRIDGE EXPANSION DEVICE (0 TO 15 INCH)

Designer: D. CHRISTENSEN
Detailer: L. CROSWELL
Structure Numbers: F-08-BJ
Sheet Subset: Bridge
Subset Sheets: B2 of 3

Project No./Code
MTCE 03-013
M3013
Sheet Number

Design: INITIAL DEC DATE 08/02 Designed By / Checked By
Detail: INITIAL LEC DATE 08/02 Detailed By / Checked By
Quantities: INITIAL DATE Quantities By / Checked By
Revision Dates (Preliminary Stage Only)

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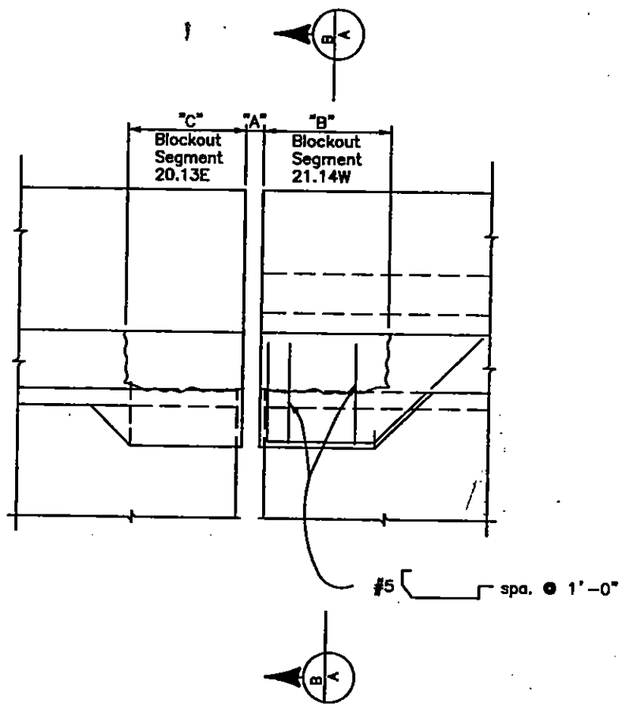
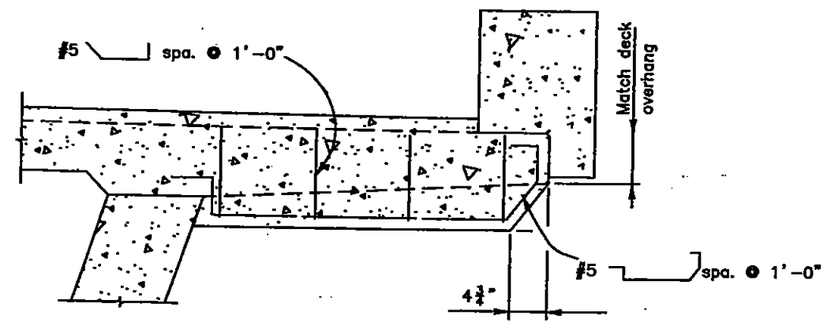


ELEVATION

OVERHANG AT BRIDGE EXPANSION DEVICE



SECTION B/A

Computer File Information	
Creation Date: 8/28/02	Initials: LEC
Last Modification Date: 2/03/03	Initials: LEC
Full Path: C:\Croswell\Projects\F-08-BJ Modular Expn Joint\	
Drawing File Name: 3 Repair F-08-BJ.dwg	
Acad Ver. 15.06s Scale: none	Units: English

Sheet Revisions

Colorado Department of Transportation
4201 East Arkansas Avenue, Room 330
Denver, Colorado 80222-3400
Phone: 303-757-9352 FAX: 303-757-9197
Staff Bridge Branch

As Constructed
No Revisions:
Revised:
Void:

BRIDGE EXPANSION DEVICE
(0 TO 15 INCH)

Designer: D. CHRISTENSEN
Detailer: L. CROSWELL
Structure Numbers: F-08-BJ
Sheet Subset: Bridge
Subset Sheets: B3 of 3

Project No./Code
MTCE 03-013
M3013
Sheet Number

Design			
Designed By	INITIAL DEC	DATE 08/02	Detailed By
Checked By			Checked By

Detail			
	INITIAL LEC	DATE 08/02	Quantities By
			Checked By

Quantities		
	INITIAL	DATE
Quantities By		
Checked By		

Revision Dates (Preliminary Stage Only)

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