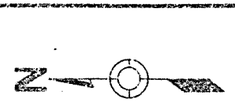
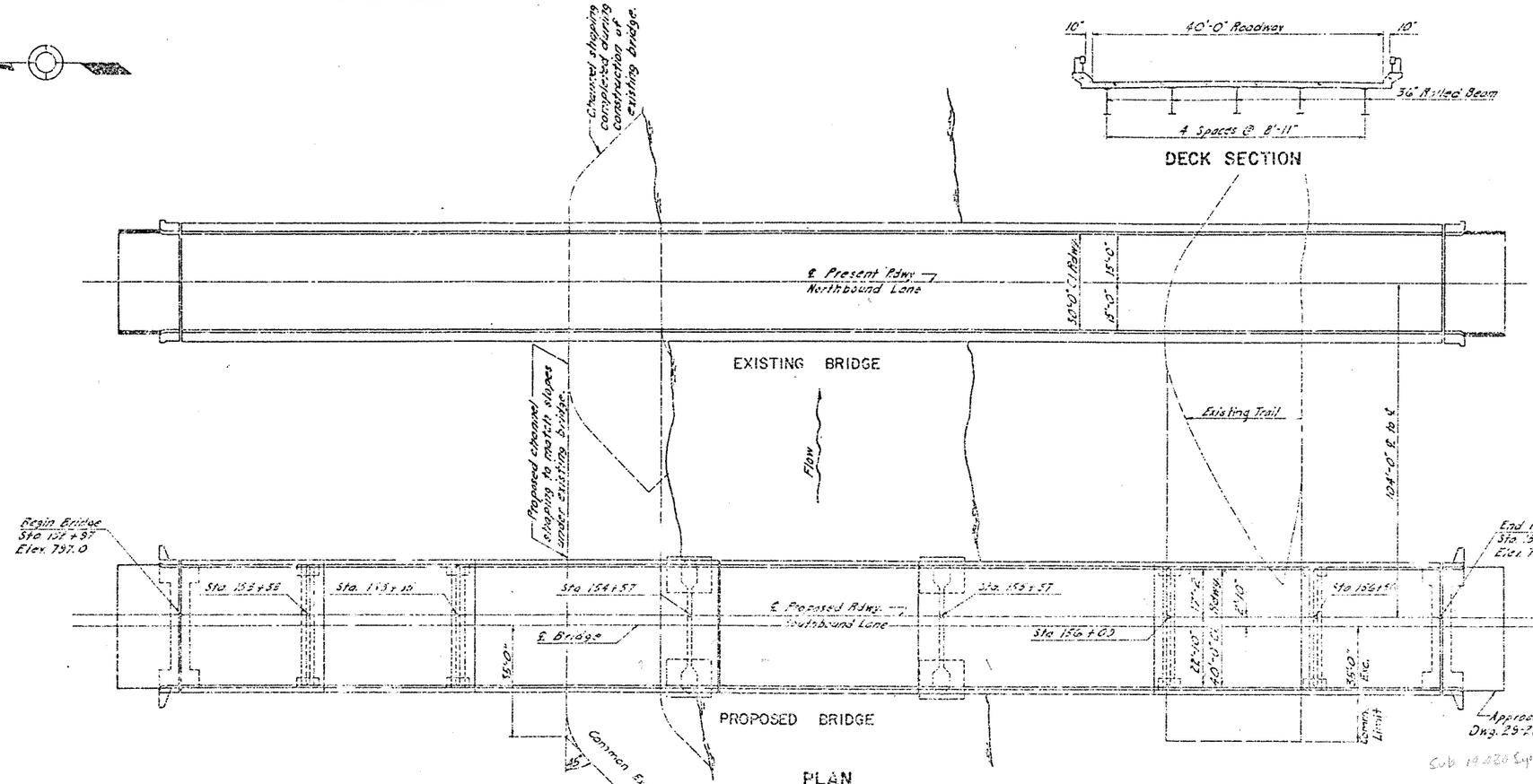
BRIDGE CODE	FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
X-071	8	N. D.	2029-5(23)	90	



DECK SECTION



The general notes for this project are shown on Drawing 29-214.23L-1.

SPECIAL PROVISIONS

NO.	NAME

ESTIMATE OF QUANTITIES

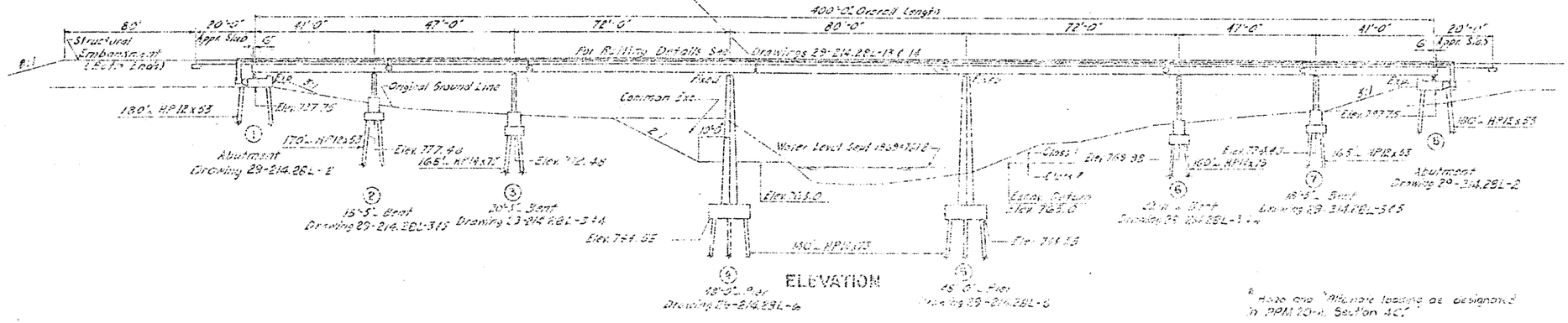
SPEC. NO.	ITEM NO.	BID ITEM	
203	0101	COMMON EXCAVATION - TYPE 1	14,567 CU. YD.
205	0100	CLASS 1 EXCAVATION	300 CU. YD.
209	0110	CLASS E EXCAVATION	300 CU. YD.
208	0100	SELECT BACKFILL	50 CU. YD.
213	0150	MOISTURE CONTROL	LUMP SUM
610	112	CLASS AE-1 CONCRETE (SUBSTRUCTURE)	595.0 CU. YD.
614	1134	CLASS AE-1.0 CONCRETE T-BEAM SUPERSTRUCTURE	604.9 CU. YD.
610	0158	CLASS AE-2 CONCRETE (RAILING & FOOTS)	28.93 CU. YD.
615	0140	REINFORCING STEEL (GRADE 40)	145,770 LB.
616	0361	STRUCTURAL STEEL (A-36) (ROLLED BEAMS)	43,605 LB.
620	0110	TREATED TIMBER	1.52 M.F.B.M.
622	0040	STEEL PILING (HP12X53)	3460 LIN. FT.
622	0060	STEEL PILING (HP14X73)	475.0 LIN. FT.
	0611	PREFORMED COMPRESSION JOINT SEAL 3/4 IN.	207.0 LIN. FT.
	0619	PREFORMED COMPRESSION JOINT SEAL 1 1/2 IN.	41.0 LIN. FT.
634	1100	CONCRETE	0 EACH
710	0100	LANDSCAPE SOIL TREATMENT	37 SQ. YD.

STRUCTURAL DRAWINGS

GENERAL NOTES TO DETAILS (THIS SHEET) & SPECIFICATIONS	
SUBSTRUCTURE (ABUTMENTS, PIERS & SLAB)	
SUPERSTRUCTURE (PRESTRESSED CONCRETE I-BEAMS)	
DESIGN LOADING: HS20-44 (MS18)	STRESS: f'c = 5.0 KSI, fy = 60 KSI

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
PEMBINA RIVER
BRIDGE LAYOUT
PROJECT S-029-5(23) SFA 1954-97
PEMBINA COUNTY

APPROVED
3-29-78 Orin J. Peterson
STATE HIGHWAY ENGINEER



* Note one "Alternate loading as designated in PPM 20-4, Section 4.C."

BENCH MARKS

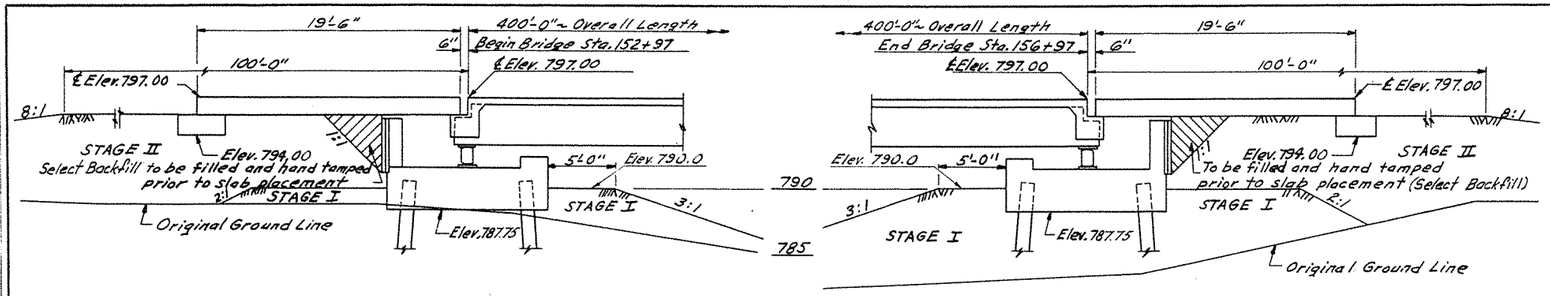
DESCRIPTION	LOCATION	ELEV.
"+" Mark by S.H. Bridge	Sta. 154+57, 55.0' Rt.	797.75
Bolt Spot in N.W. Corner of Bridge	Sta. 154+57, 50.0' Rt.	797.42
"+" Mark by N.W. Corner	Sta. 154+57, 45.0' Rt.	797.08

PILE LOADING

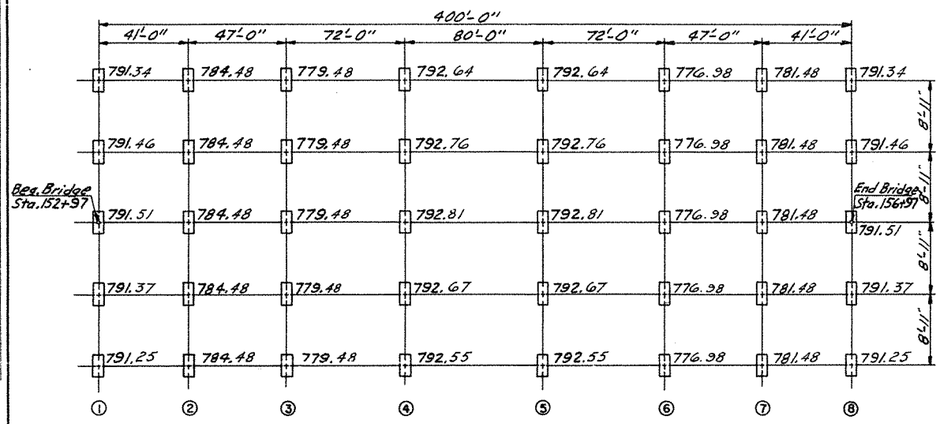
LOCATION	DEAD LOAD	LIVE LOAD	EARTH LOAD	WIND 50 LB.	WIND 75 LB.	WIND 100 LB./SQ.FT.	TOTAL LOAD	ULTIMATE LOAD
Abutment 1	15.0 T.	2.0 T.					17.0 T.	34.0 T.
Abutment 2	15.0 T.	14.0 T.	3.4 T.				32.4 T.	64.8 T.
Pier 3	15.0 T.	9.0 T.	0 T.				24.0 T.	48.0 T.
Pier 4	15.0 T.	12.0 T.	2.1 T.				29.1 T.	58.2 T.
Abutment 5	15.0 T.	12.5 T.	3.1 T.				30.6 T.	61.2 T.

DESIGN STRESSES:
f'c = 5.0 KSI Prestressing Steel
fy = 60 KSI Mild Steel Reinforcing
fy = 36 KSI Structural Steel (ASTM A36)

FED ROAD DIST NO.	STATE	PROJ NO	SHEET NO.	TOTAL SHEETS
8	N.D.	I-029-5(23)	91	

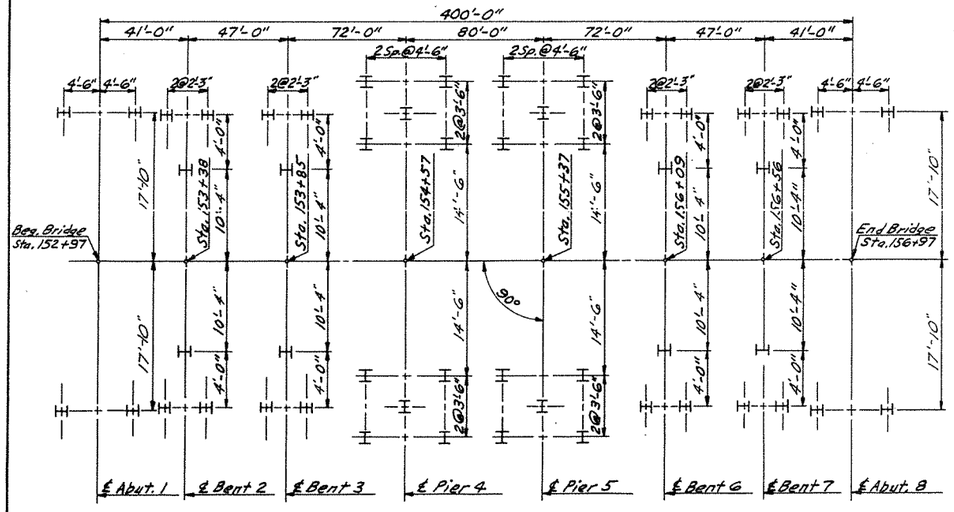


EMBANKMENT DETAILS AT ABUTMENTS



BEARING PLATE LAYOUT

In all cases the elevations shown are top of concrete. At Bents 2, 3, 6, & 7 this elevation is the top of Bent Footing (See Drawing 29-214.28L-3)



PILING LAYOUT

(Not to Scale)

HYDRAULIC DESIGN DATA

DRAINAGE AREA	3928 SQ. MI.
DESIGN FREQUENCY	50 YEAR
DESIGN DISCHARGE	14,880 CFS
STREAM GRADIENT	0.000379 FT/FT.
WATERWAY PROVIDED BELOW DESIGN STAGE (Q50)	2771 SQ. FT.
WATERWAY PROVIDED BELOW CLEARANCE	7244 SQ.FT.
AVERAGE VELOCITY OF FLOW IN NATURAL CHANNEL (Q50)	5.4 FPS
DEPTH OF FLOW (Q50)	23.5 FT.
VELOCITY OF FLOW UNDER BRIDGE (Q50)	5.4 FPS
FREEBOARD PROVIDED (Q50)	13.7 FT.
MAXIMUM RECORDED STAGE (1966) (BACKWATER RED RIVER)	793.6
MAXIMUM RECORDED DISCHARGE	UNKNOWN
FREQUENCY OF MAXIMUM FLOOD	UNKNOWN
MINIMUM WATER ELEVATION (SEPT. 1969)	761.8
CALCULATED HIGH WATER (Q50)	779.3
CLEARANCE ELEVATION	793.0
100-YEAR FLOOD HAZARD MAGNITUDE	18,500 CFS

100-YEAR FLOOD STAGE = BACKWATER EFFECT OF RED RIVER CONTROLS AT ELEV. 793.3 – 793.6 (1974 COOP. STUDY PLOT)

LINSEED OIL TREATMENT:

LINSEED OIL TREATMENT SHALL NOT BE DONE UNTIL ALL CONCRETE WORK IS COMPLETED AND THE ASPHALT CURB SEAL HAS BEEN INSTALLED.

STATIONING:

THE SURVEY STATIONING IS FROM NORTH TO SOUTH WHEREAS THE MILEAGE GIVEN IS DETERMINED FROM SOUTH TO NORTH.

STRUCTURAL EMBANKMENT:

THE CONTRACTOR MAY CONSTRUCT THE STRUCTURAL EMBANKMENT PRIOR TO THE PROPOSED STARTING DATE SHOWN IN THE PROGRESS SCHEDULE. IF THIS IS DONE, NO WORKING DAYS WILL BE CHARGED FOR THE GRADING WORK DONE BEFORE THE SCHEDULED STARTING DATE.

CONCRETE:

THE CONTRACTOR MAY SUBSTITUTE AE-3 CONCRETE FOR AE-1 CONCRETE BUT NOT AE-1 FOR AE-3. ANY SUBSTITUTIONS, HOWEVER, WILL BE AT THE CONTRACTOR'S EXPENSE AND THE CLASS OF CONCRETE PAID FOR WILL BE THAT CLASS SHOWN ON THE PLANS.

NOTES:

GENERAL:

WORK SHALL CONFORM TO ALL APPLICABLE PARAGRAPHS OF THE NORTH DAKOTA STATE HIGHWAY DEPARTMENT SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

THE COST OF FURNISHING AND PLACING JOINT FILLER, ASPHALT CURB SEAL, , AND OTHER MISC. ITEMS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CONCRETE.

WELDING WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE UNIT PRICE BID FOR STRUCTURAL STEEL.

BEARING AREAS SHALL BE FINISHED TRUE TO PLAN AND ELEVATION BY GRINDING, IF NECESSARY, BEFORE BEARING PLATES ARE SET.

ALL RIVETS OR HIGH STRENGTH BOLTS ARE TO BE 7/8" DIAMETER. OPEN HOLES ARE TO BE 15/16" DIAMETER EXCEPT AS NOTED. SHOP CONNECTIONS SHALL BE MADE AS SHOWN. FIELD CONNECTIONS SHALL BE MADE WITH HIGH TENSILE STRENGTH BOLTS OR SHALL BE RIVETED.

EXCAVATION:

EXCAVATION CLASS I AT THE ABUTMENTS SHALL EXTEND FROM THE BOTTOM OF THE FOOTING TO THE UPPER LIMIT OF THE STAGE I EMBANKMENT, AS SHOWN ON THIS SHEET. EXCAVATION CLASS I AT THE BENTS SHALL EXTEND FROM THE BOTTOM OF THE FOOTINGS TO THE ELEVATION OF THE ORIGINAL GROUND LINE AT EACH BENT. EXCAVATION CLASS 2 AT PIERS 4 AND 5 SHALL EXTEND FROM THE BOTTOM OF THE FOOTINGS TO ELEVATION 763.0, OR THE ORIGINAL GROUND LINE, WHICHEVER IS LOWER.

THE CHANNEL EXCAVATION IN THE VICINITY OF PIER 4, WHICH HAS BEEN DESIGNATED AS COMMON EXCAVATION, SHALL COMMENCE IN THE AREA EAST OF THE PROPOSED BRIDGE WHERE IT BECOMES TANGENT TO THE LINE AND GRADE OF PREVIOUS EXCAVATION DONE UNDER THE EXISTING BRIDGE. FROM THIS POINT, IT SHALL PROGRESS UPSTREAM UNDER THE LOCATION OF THE PROPOSED BRIDGE TO A POINT 35 FEET WEST OF THE CENTER OF THE PROPOSED BRIDGE, THEN TURN AT AN ANGLE OF 45 DEGREES TOWARD THE RIVER. THE VERTICAL LIMITS SHALL EXTEND UPWARD FROM THE BASE ELEVATION 763.0 AND FROM THE 2:1 BACKSLOPE PLANE.

EMBANKMENT:

ALL EMBANKMENT AT THE ENDS OF THE BRIDGE SHALL BE PLACED ACCORDING TO THE ELEVATIONS AND DIMENSIONS SHOWN ON THIS SHEET AND AS WIDE AS SHOWN ON THE GRADING PLANS OR AS STAKED BY THE ENGINEER.

THE EMBANKMENT SHALL BE PLACED IN STAGES. THE FIRST STAGE SHALL BE PLACED AND COMPACTED PRIOR TO THE DRIVING OF ANY ABUTMENT PILING. THE SECOND STAGE SHALL BE PLACED AND COMPACTED AFTER THE ABUTMENTS ARE CONSTRUCTED AND BACKING PLANK PLACED.

BACKFILL:

ALL BACKFILLING SHALL BE DONE ACCORDING TO SECTIONS 228 AND 203-2.3.2 OF THE STANDARD SPECIFICATIONS.

REINFORCING STEEL:

DIMENSIONS FOR BENT BARS ARE GIVEN OUT TO OUT AND TO TANGENT INTERSECTIONS UNLESS OTHERWISE NOTED. BENT BARS SHALL BE BENT AROUND ACI STANDARD SIZE PINS. THE BAR FABRICATOR SHALL ADD A PREFIX TO ALL BAR DESIGNATIONS TO DIFFERENTIATE BETWEEN THE SEVERAL PARTS OF THE STRUCTURE.

CONCRETE:

ALL CONCRETE SHALL BE COMPACTED BY VIBRATION. THE DECK SLAB CONCRETE SHALL BE STRUCK OFF AND COMPACTED BY AN APPROVED DECK FINISHING MACHINE. ALL EXPOSED EDGES OF CONCRETE SHALL BE BEVELED WITH 3/4" (CONT.)

CONCRETE CONTINUED:

TRIANGULAR MOLDING UNLESS OTHERWISE NOTED.

ALL CONCRETE ABOVE THE TOP OF THE CURBS SHALL BE CLASS AAE-3. SLAB, CURBS, AND END BEAMS SHALL BE CLASS AE-3. ABUTMENTS, BENTS, AND PIERS SHALL BE CLASS AE-1.

THE "RUBBED SURFACE FINISH" OR THE "SPECIAL SURFACE FINISH" (SECTION 602-3.10.5) WILL BE REQUIRED FOR THE ROADWAY AND OUTSIDE FACES OF CURBS, EDGES OF SLAB, ALL FACES OF THE RAILS, RAIL POSTS AND END POSTS, AND ALL EXPOSED FACES OF THE ABUTMENT WINGS. ALL OTHER SURFACES SHALL BE GIVEN THE "ORDINARY SURFACE FINISH". ALL "ORDINARY SURFACE FINISH" SHALL BE COMPLETED WITHIN 24 HOURS AFTER REMOVAL OF THE FORMS.

IF THE EXPOSED FACES OF THE ABUTMENTS, BENTS, AND PIERS HAVE A SURFACE FINISH ACCEPTABLE TO THE ENGINEER WITHOUT RUBBING, THE REQUIREMENT FOR "RUBBED OR SPECIAL SURFACE FINISH" MAY BE WAIVED AT THE OPTION OF THE ENGINEER AND THE "ORDINARY SURFACE FINISH" WILL APPLY.

THE SLAB SECTIONS SHALL BE POURED STARTING WITH THE SUSPENDED SPAN, PANEL "D". THE NEXT SECTIONS POURED SHALL BE PANEL "C" AND/OR "E", THEN PANELS "B", AND FINALLY PANELS "A" SHALL BE POURED. IN PANELS "A", "B", "C", AND E"", THE SUSPENDED END OF THE PANEL SHALL BE POURED FIRST, WORKING TOWARD THE CANTILEVER END, AS INDICATED BY THE DIRECTIONAL ARROWS SHOWN ON SLAB LAYOUT DETAIL, DWG. 29-214.28L-12.

NO CURBS WILL BE POURED UNTIL THE SLABS FOR THE ENTIRE BRIDGE HAVE BEEN POURED.

MATERIALS: (STRUCTURAL STEEL)

ROLLED BEAMS, COVER PLATES, HINGE PLATES, STIFFENERS, DIAPHRAGMS, CHANNEL SHEAR CONNECTORS, BEARING PLATES, ANCHOR BOLTS, ICE NOSES, AND ALL COLUMNS AND BRACING MEMBERS IN BENTS: A36

ALL HINGE PINS: A-235, CLASS E

BLAST CLEANING:
COMMERCIAL BALST CLEANING OF ALL EXPOSED MAIN AND SECONDARY STEEL MEMBERS WILL BE REQUIRED PRIOR TO PAINTING. (INCLUDE IN UNIT PRICE BID FOR STRUCTURAL STEEL.)

PAINT:

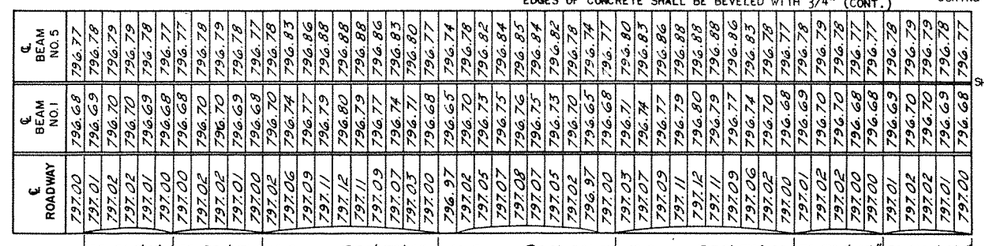
PAINT AND PAINTING SHALL CONFORM TO THE STANDARD SPEC., SECTION 718 AND 870-1.2.

ALL EXPOSED STEEL SURFACES SHALL BE GIVEN ONE SHOP COAT OF RED LEAD PAINT (INCLUDING TOP OF UPPER FLANGES BUT NOT SHEAR CONNECTORS), ONE SPOT COAT OF RED LEAD PAINT AFTER ERECTION AND CONCRETE WORK IS COMPLETED, AND TWO FIELD COATS OF ENAMEL CONFORMING TO SECTION 718 -2.5. THE FIRST FIELD COAT SHALL CONFORM TO GREEN NO. 24260 AND THE SECOND COAT SHALL CONFORM TO GRAY-GREEN COLOR NO. 24300. BOTH COATS SHALL MEET THE FEDERAL STANDARD NO. 595 FOR COLOR. COLOR CHIPS ARE ON FILE IN THE BRIDGE DIVISION OF THE NORTH DAKOTA STATE HIGHWAY DEPARTMENT, BISMARCK.

PILING:
THE PILE LENGTHS SHOWN ON THE BRIDGE LAYOUT DRAWING SHALL BE CONSIDERED TO BE THE ORDER LENGTH IN ALL CASES. NO TEST BORINGS HAVE BEEN TAKEN AT THE SITE OF THE PROPOSED BRIDGE. ALL PILE LENGTHS HAVE BEEN DETERMINED FROM THE PILE DRIVING RECORDS FOR THE EXISTING BRIDGE LOCATED IMMEDIATELY DOWNSTREAM FROM THE PROPOSED STRUCTURE; THE PILE DRIVING RECORDS ARE ON FILE IN THE BRIDGE DIVISION OF THE NORTH DAKOTA STATE HIGHWAY DEPARTMENT, BISMARCK.

PILE HAMMERS:
THE PILES FOR THIS STRUCTURE SHALL BE DRIVEN BY A STEAM (OR AIR) OR DIESEL HAMMER HAVING A RATED ENERGY AND RAM WEIGHT NOT LESS THAN 64,822 FOOT-POUND-TONS AS COMPUTED BY THE FORMULA $W(E-10,609)+1.222E$ WHERE W IS THE WEIGHT OF THE RAM IN TONS AND E IS THE RATED HAMMER ENERGY AS ALLOWED IN SECTION 622. IN NO CASE SHALL THE RAM WEIGHT BE LESS THAN 4800 POUNDS.

CURING CONCRETE:
EXCEPT AS PROVIDED IN THE FOLLOWING PARAGRAPH, LIQUID MEMBRANE CURING COMPOUND SHALL NOT BE USED ON ANY CONCRETE WHICH TO TO RECEIVE FURTHER TREATMENT.
THE WATER SOLUBLE LIQUID MEMBRANE CURE (SECTION 550-4.13.2.1) AND 880-5 OF THE STANDARD SPECIFICATIONS) SHALL BE USED FOR CURING THE DECK SLAB CONCRETE. A PROTECTIVE COVERING SHALL BE USED SO THAT LINSEED OIL IS NOT APPLIED TO THE AREA WITHIN THREE INCHES OF THE GUTTER LINE UNTIL AFTER THE ASPHALT CURB SEAL IS IN PLACE. IF THE CONTRACTOR ELECTS TO USE THIS METHOD OF CURING THE DECK SLAB CONCRETE, THE QUANTITY FOR LINSEED OIL TREATMENT MAY BE REDUCED WITHOUT ADJUSTMENT TO ITS UNIT BID PRICE. APPLICATION OF 0.015 GALLONS PER SQUARE YARD SHALL BE APPLIED TO THE DECK AND CURBS.



SCREED ELEVATION

Elevations are to top of finished concrete

PEMBINA RIVER

EMBANKMENT DETAILS, PILING & BRG. ℄ LAYOUT SCREED ELEVATION & NOTES

29-214.28L-1

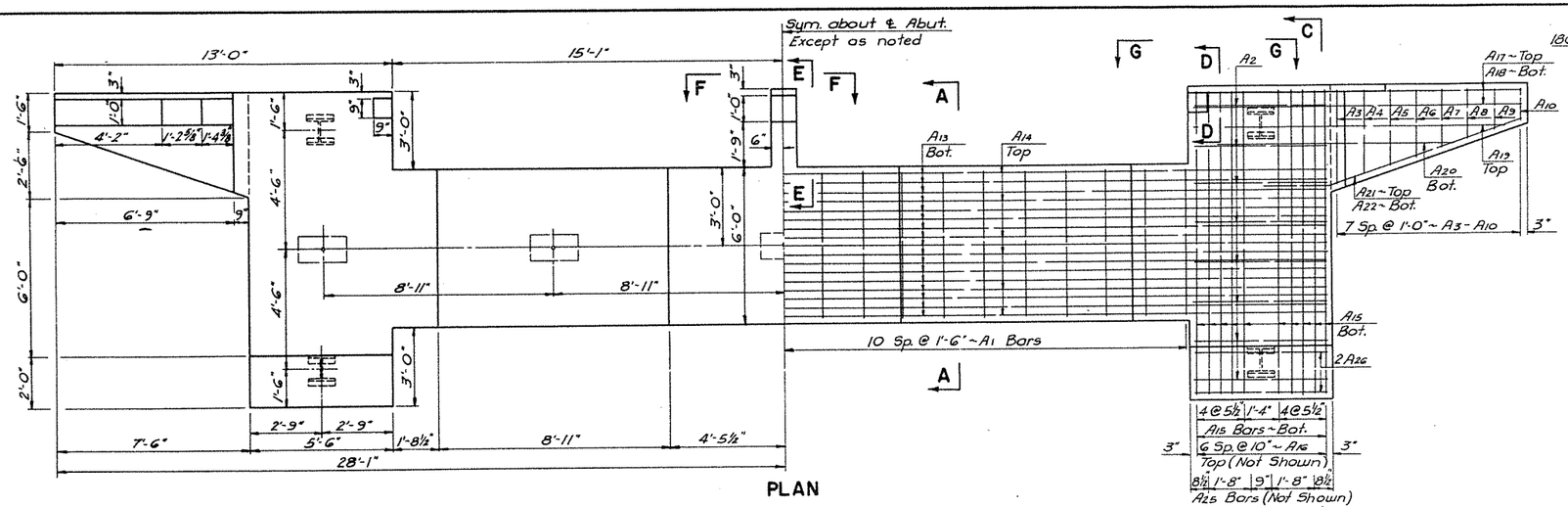
29-214.28L-1

DETAILS CHECKED BY C.A.B.
TRACING CHECKED BY C.A.B.
QUANTITIES MADE BY C.A.L. CHECKED BY

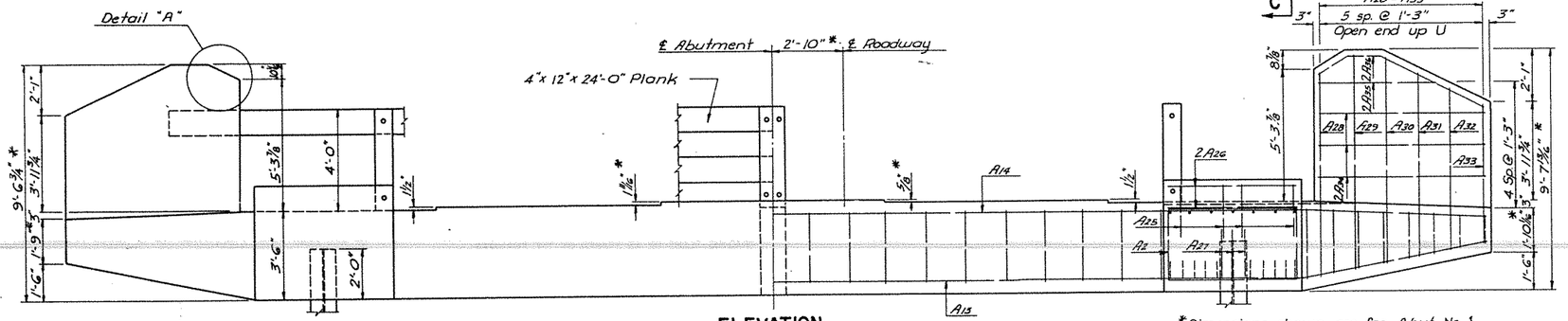
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	N. D.	I-029-5(23)	92	

BAR LIST (ONE ABUT.)

MARK	NUMBER: FOOTING	NUMBER: WING	NUMBER: POSTS	SIZE	LENGTH	SHAPE	UNIT WT.
A1	21		5	18'-2"	Bent		18.95
A2	16		5	17'-2"	"		17.91
A3	2		5	13'-10"	"		14.43
A4	2		5	12'-8"	"		13.21
A5	2		5	11'-6"	"		12.00
A6	2		5	10'-4"	"		10.78
A7	2		5	9'-2"	"		9.56
A8	2		5	8'-0"	"		8.34
A9	2		5	6'-10"	"		7.13
A10	2		5	5'-10"	"		6.08
A11	1		5	7'-10"	"		8.17
A12	1		5	6'-4"	"		6.61
A13	17		11	40'-10"	Str.		216.93
A14	6		6	40'-10"	"		61.34
A15	20		9	13'-8"	Bent		46.47
A16	14		5	11'-8"	Str.		12.17
A17	4		8	12'-8"	"		33.82
A18	4		8	12'-8"	Bent		33.82
A19	2		8	12'-4"	Str.		32.93
A20	2		8	10'-3"	Bent		27.37
A21	2		8	10'-0"	"		26.70
A22	2		8	10'-0"	"		26.70
A23	2		6	6'-2"	"		9.26
A24	2		6	6'-6"	"		8.26
A25	8		5	10'-6"	"		10.95
A26	8		5	5'-2"	Str.		5.39
A27	12		6	7'-10"	Bent		11.77
A28	2		5	16'-8"	"		17.39
A29	2		5	17'-6"	"		18.25
A30	2		5	16'-8"	"		17.39
A31	2		5	15'-0"	"		15.65
A32	2		5	13'-2"	"		13.73
A33	2		5	11'-6"	"		12.00
A34		12	4	6'-5"	Str.		4.28
A35		4	4	5'-1"	"		3.39
A36		4	5	7'-1"	Bent		7.39
A37	12		5	5'-11"	"		6.17
A38		16	3	2'-1"	"		.78
A39		8	3	3'-4"	"		1.25

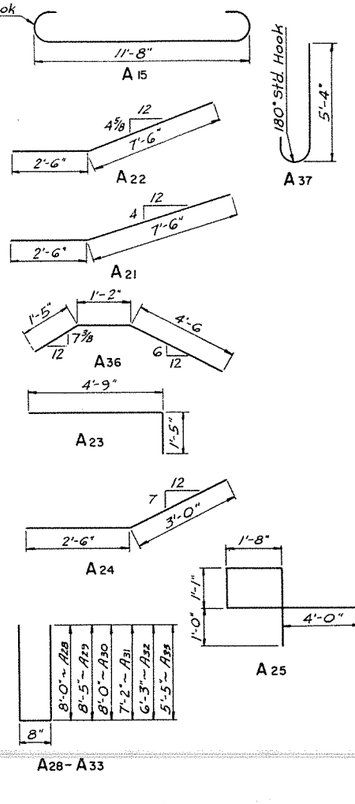


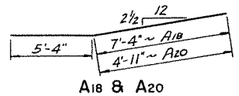
PLAN



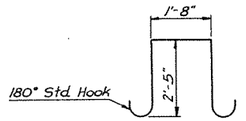
ELEVATION

*Dimensions shown are for Abut. No. 1. For Abut. No. 8, these dimensions should be reversed about ℄ abutment.

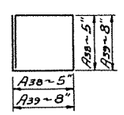




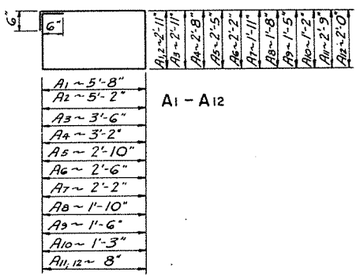
A18 & A20



A27



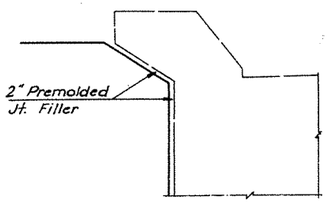
A38 & A39



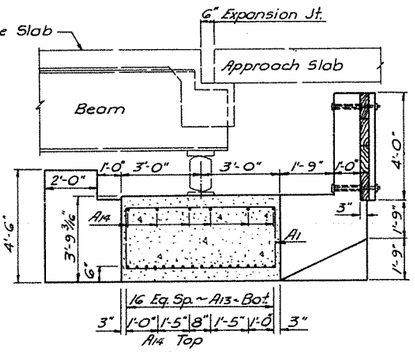
A1 – A12

BENT BAR DETAILS

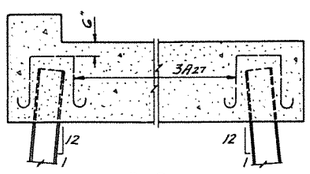
Dimensions shown are out to out



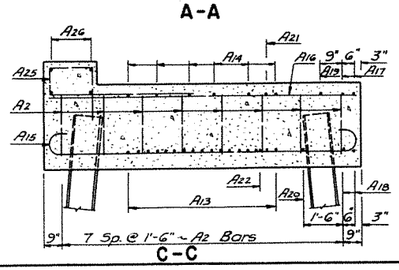
DETAIL "A"



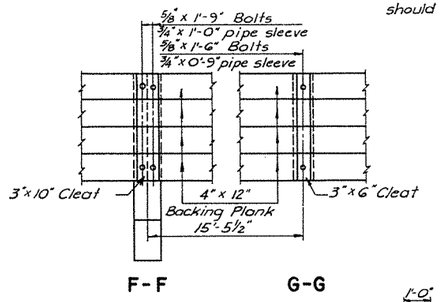
A-A



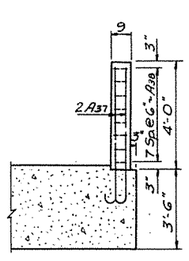
C-C
Showing A27 Bars



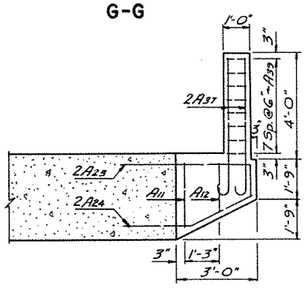
C-C



F-F G-G



D-D



E-E

BILL OF MATERIALS (ONE ABUT.)

NO.	SIZE	DESCRIPTION	
8	4" x 12" x 24'-0"	Backing Plank (Tr. Timber ~ Full Sawn Rough)	
1	3" x 10" x 4'-0"	Cleat	
2	3" x 6" x 4'-0"	Cleats	
4	⅝" Ø x 1'-0"	Pipe Sleeves	Δ
4	¾" Ø x 0'-9"	Pipe Sleeves	Δ
4	⅝" Ø x 1'-9"	Galv. Timb. Bolts with washer head & nuts	Δ
4	⅝" Ø x 1'-6"	" " " " " "	Δ

Δ To be included in price bid for Treated timber.

NOTE:

The treated timber backing plank has been provided for the abutments in the eventuality that extreme abut. movement might still be provided for. In such a circumstance the backing plank and concrete posts would be removed and the backfill immediately behind the abutment excavated, allowing the end of the beams to project into the void provided, cantilevering from the rollers.

In the probability the abutments move toward the river it will become necessary to reset the rollers to a plumb position. Holes have been provided in the bottom flange of the end beams so that the sole plate may be reattached in the position desired.

The beam holes may also be used to hold the jacking bracket while a jack is inserted between the bracket and the jacking toe, and the beams jacked longitudinally to counteract non-returning beam movement which has moved the spans toward the river.

QUANTITIES (ONE ABUT.)

Class AE-1 Concrete	50.1 C.Y.
Reinforcing Steel	7203 Lbs.
Treated Timber	.790 M.B.M.

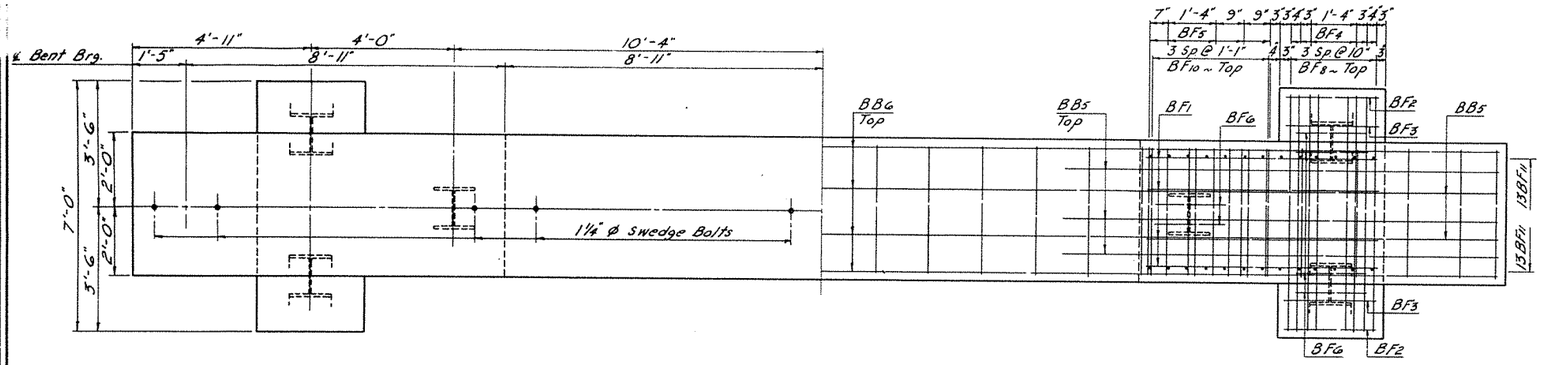
PEMBINA RIVER

ABUTMENT

29-214.28L-2

29-214.28L-2

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	N. D.	I-029-5 (23)	93	

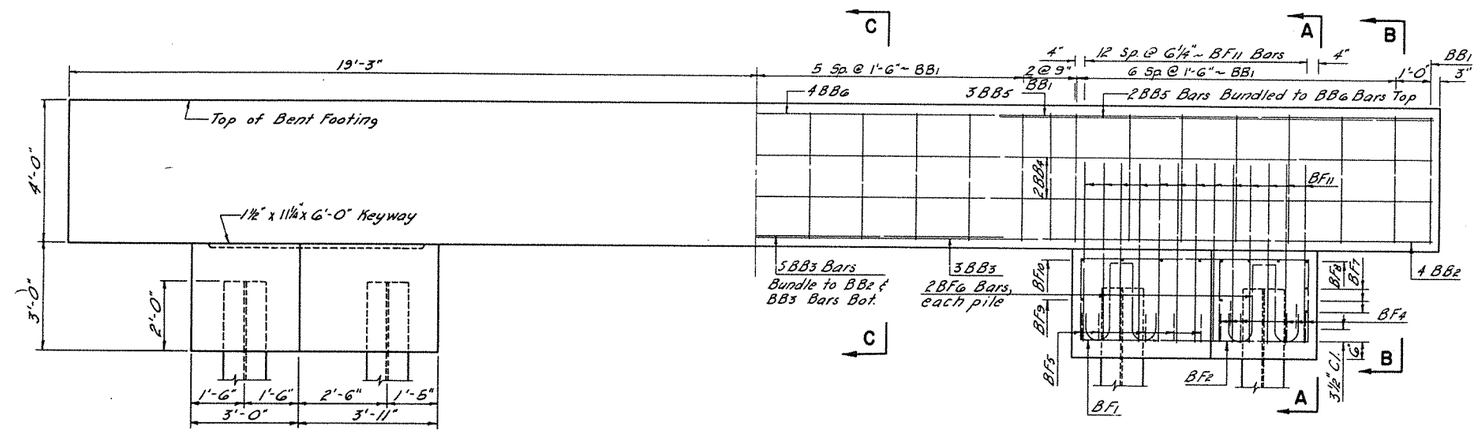


HALF PLAN
Showing Dimensions

HALF PLAN
Showing Reinforcing

BAR LIST (4 BENT FOOTINGS)

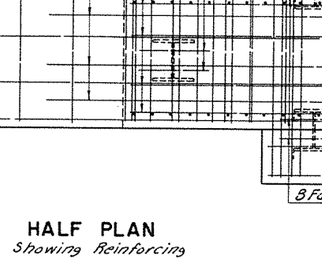
MARK	NUMBER FOOTING	NUMBER WALL	SIZE	LENGTH	SHAPE	UNIT WT.
BB1		116	4	15'-4"	Bent	10.24
BB2		16	9	38'-0"	Str.	129.20
BB3		32	9	14'-0"	"	47.60
BB4		16	5	38'-0"	"	39.64
BB5		40	8	12'-3"	"	32.71
BB6		16	8	38'-0"	"	101.47
BF1	32		5	18'-4"	Bent	19.12
BF2	16		5	10'-6"	"	10.93
BF3	16		5	7'-0"	"	7.30
BF4	48		10	8'-8"	"	37.29
BF5	40		6	4'-10"	"	7.26
BF6	48		6	6'-4"	"	9.51
BF7	24		6	6'-6"	Str.	9.76
BF8	32		6	6'-6"	"	9.76
BF9	8		6	3'-6"	"	3.26
BF10	32		6	3'-6"	"	5.26
BF11	208		6	5'-0"	"	7.51



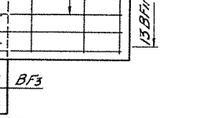
HALF ELEVATION
Showing Dimensions

HALF ELEVATION
Showing Reinforcing

B-B

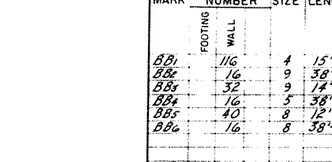


C-C



BF4 & BF5 BARS

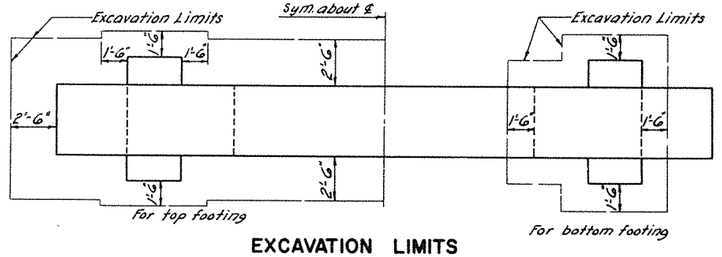
BB1, BF1 & BF2 BARS



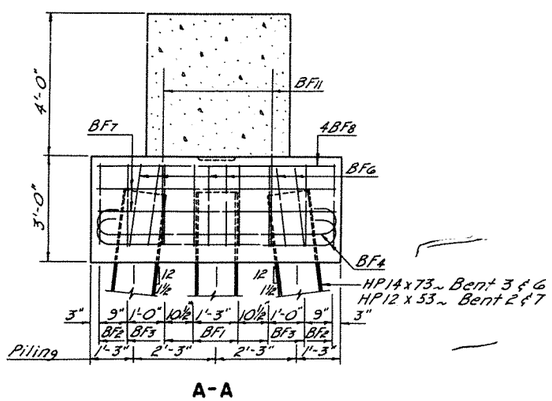
BF6 BAR

BF3 BAR

BENT BAR DETAILS
Dimensions shown are out to out



EXCAVATION LIMITS



A-A

QUANTITIES (BENT FTGS. 2, 3, 6 & 7)

Class AE-1 Concrete	193.9 C.Y.
Reinforcing Steel	14104 Lbs.

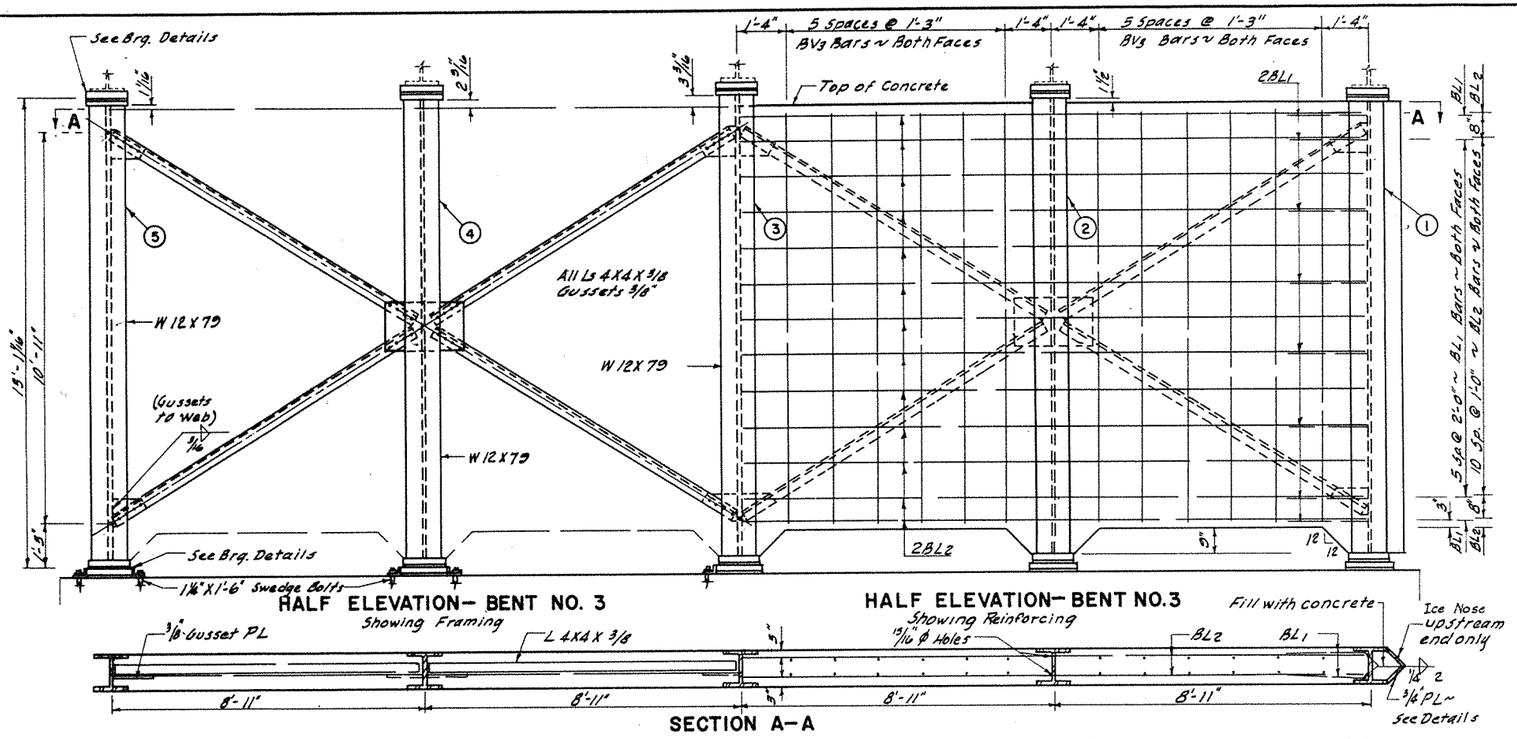
PEMBINA RIVER

BENT FOOTING DETAILS

29-214.28L-3

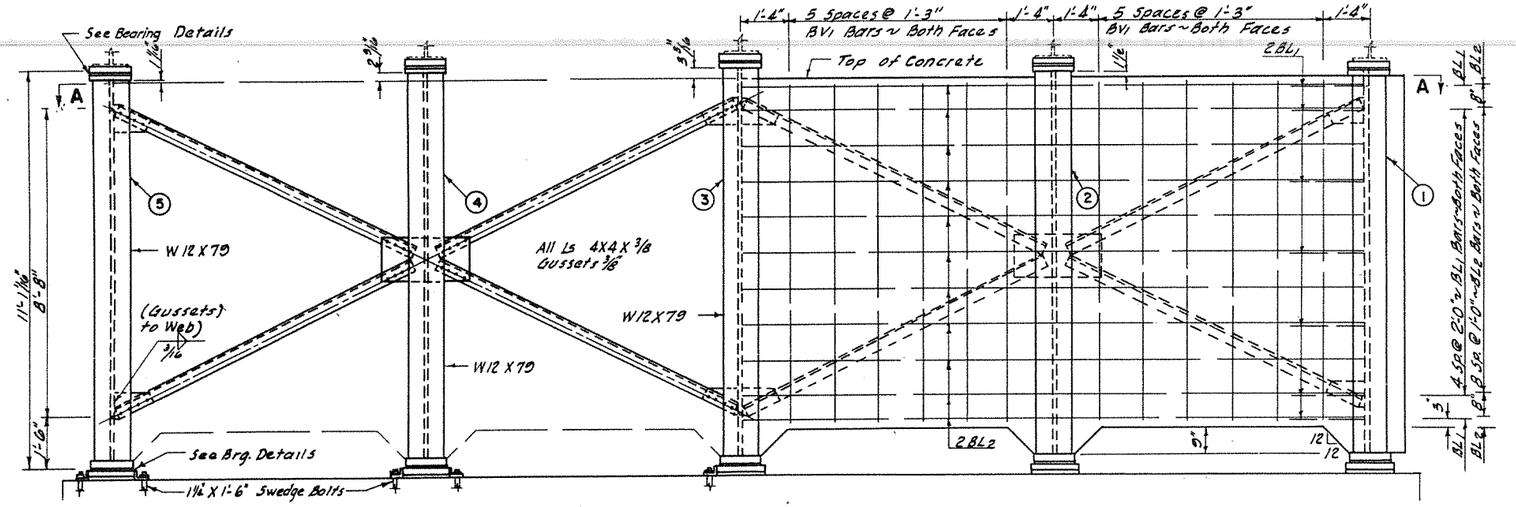
DETAILS
TRACING — CHECKED BY L.E.G. — MADE BY L.E.G.
QUANTITIES — CHECKED BY G.A.L. — MADE BY L.E.G.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	N. D.	I-029-5(23)	94	



HALF ELEVATION– BENT NO. 3
Showing Framing

SECTION A–A



HALF ELEVATION– BENT NO. 7
Showing Framing

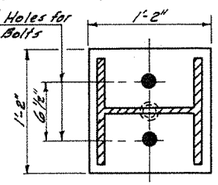
NOTES:

All plates and contact surfaces shown in views E-E & F-F shall be milled before the parts are welded together.

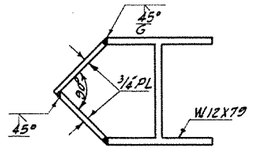
Check the threads of the 1¼" Swedge bolts at the base of the bents to prevent the nuts from loosening due to vibration.

Lead sheets are included in structural steel quantities.

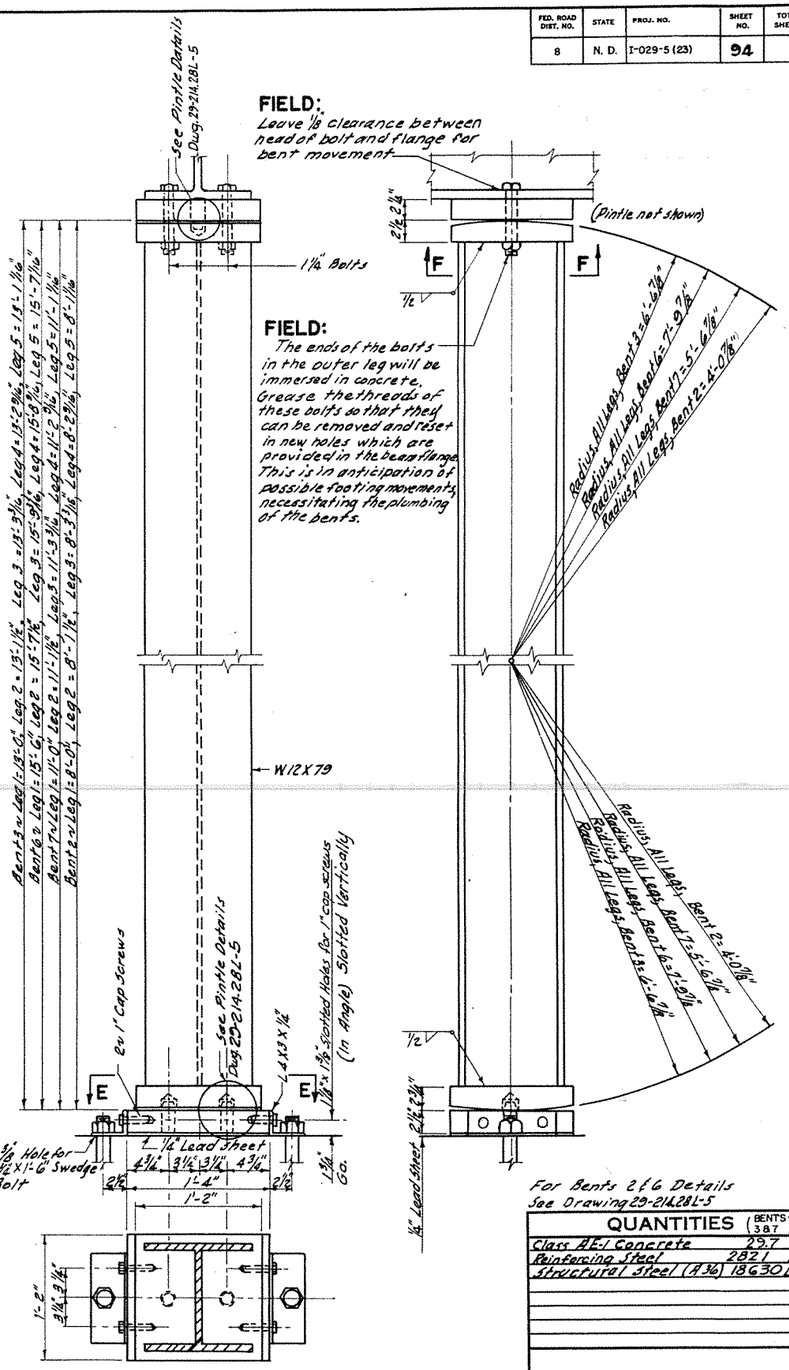
HALF ELEVATION– BENT NO. 7
Showing Reinforcing



F-F



ICE NOSE DETAILS



E–E
BENT BEARING DETAILS

QUANTITIES (BENTS 3 & 7)

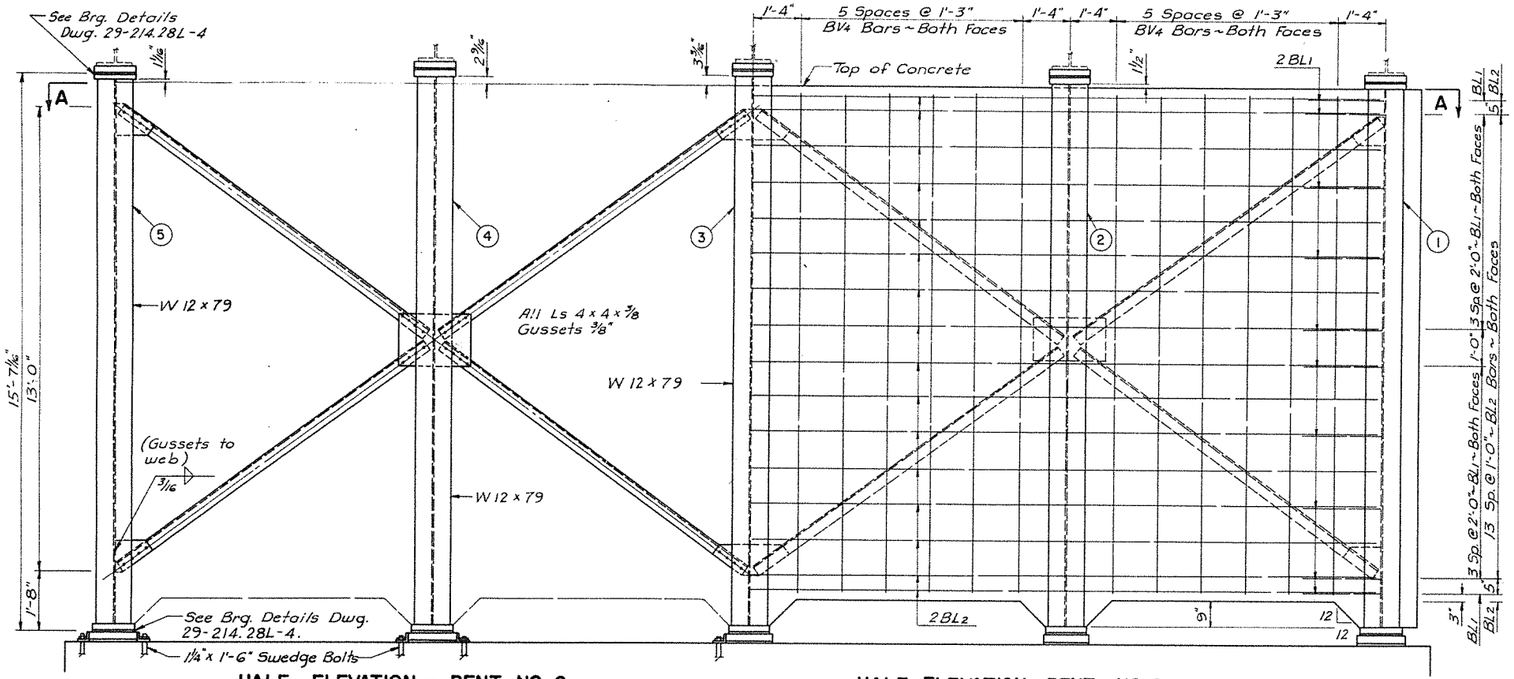
Class AE-1 Concrete	29.7 C.Y.
Reinforcing Steel	2821 Lbs.
Structural Steel (A36)	18630 Lbs.

PEMBINA RIVER

BENTS 3 & 7 DETAILS

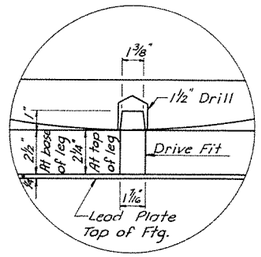
29-214.28L-4

FED. ROAD DIST. NO.	STATE	PROJ NO	SHEET NO.	TOTAL SHEETS
8	N. D.	I-029-5(23)	95	



HALF ELEVATION – BENT NO. 6
Showing Framing

HALF ELEVATION – BENT NO. 6
Showing Reinforcing

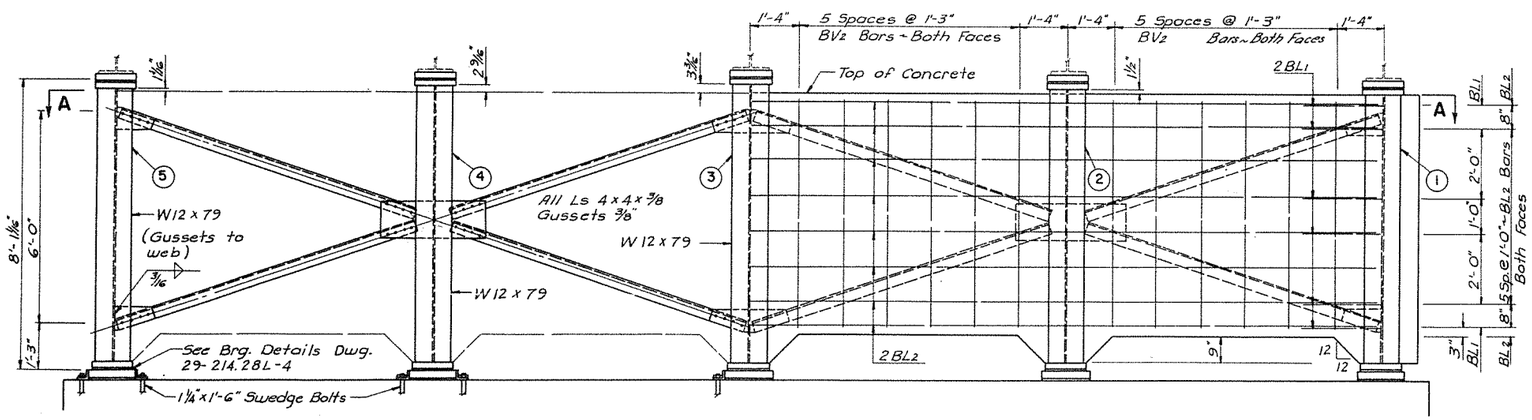


PINTLE DETAILS

*BAR LIST (BENTS 2, 3, 6 & 7)

MARK	NUMBER BENT 2	BENT 6	BENT 7	BENT 3	SIZE	LENGTH	SHAPE	UNIT WT.
BL1**	24				5	2'-3"	Str.	2.35
BL2	16				5	35'-4"	"	36.86
BV2	48				5	6'-6"	"	6.78
BL1**		40			5	2'-3"	Str.	2.35
BL2		32			5	35'-4"	"	36.86
BV4		48			5	14'-0"	"	14.60
BL1**			28		5	2'-3"	Str.	2.35
BL2			22		5	35'-4"	"	36.86
BV1			48		5	9'-6"	"	9.91
BL1**				32	5	2'-3"	Str.	2.35
BL2				26	5	35'-4"	"	36.86
BV3				48	5	11'-6"	"	12.00

*See Drawing 29-214.28L-4
**BL1 Bars to be paid for as Structural Steel.



HALF ELEVATION – BENT NO. 2
Showing Framing

HALF ELEVATION – BENT NO. 2
Showing Reinforcing

QUANTITIES (BENT 2 & 6)	
Class AE-1 Concrete	29.0 C.Y.
Reinforcing Steel	2796 Lbs.
Structural Steel (A36)	18380 Lbs.

PEMBINA RIVER

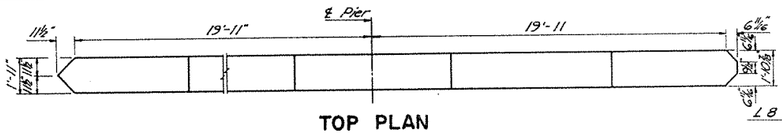
BENTS 2 & 6 DETAILS

MADE BY G.H.L.
CHECKED BY G.A.G.
TRACING MADE BY G.H.L.
CHECKED BY G.A.G.
QUANTITIES MADE BY G.H.L.
CHECKED BY G.A.G.

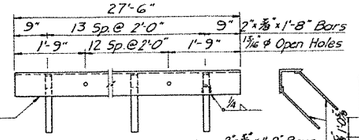
29-214.28L-5

29-214.28L-5

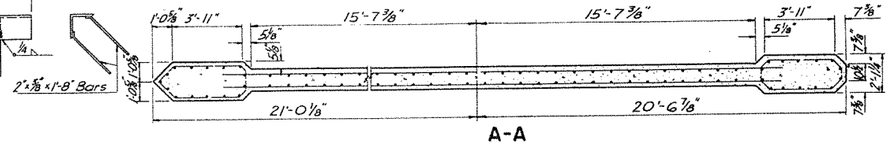
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	N.D.	I-029-5 (23)	9C	



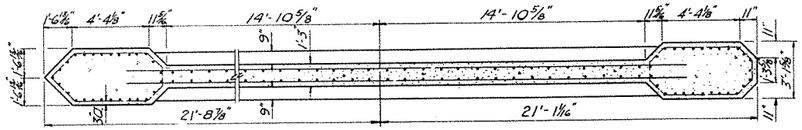
TOP PLAN



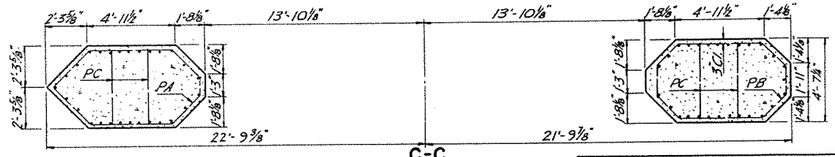
ICE NOSE ANGLE



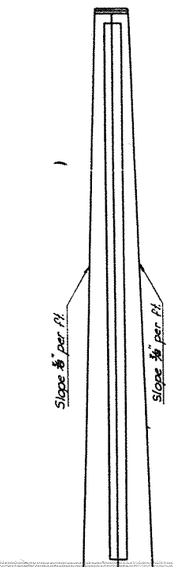
A-A

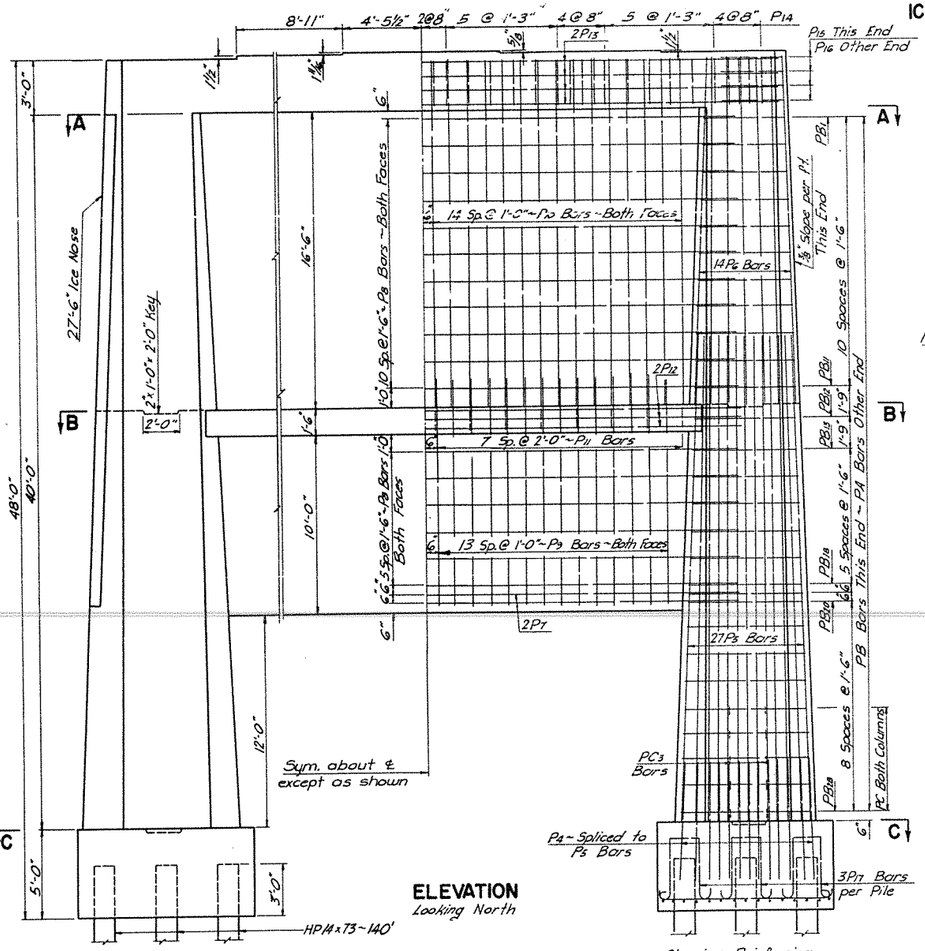


B-B



C-C

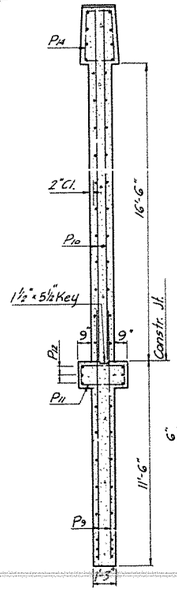




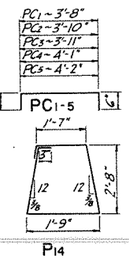
ELEVATION
Looking North

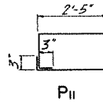
Showing Dimensions

Showing Reinforcing

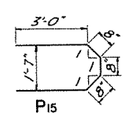


P14

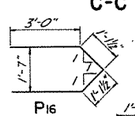




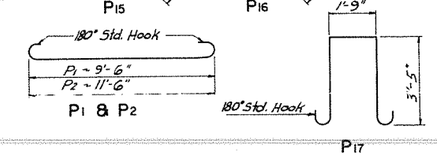
P11



P15



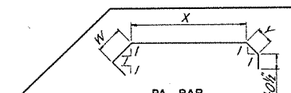
P16



℄ SECTION

BENT BAR DETAILS

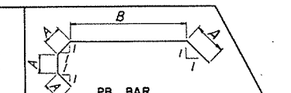
Dimensions are out to out



PA BAR

MARK	W	X	Y	LENGTH
PA1	1'-1¾"	3'-8½"	4½"	6'-0"
PA2	1'-2½"	3'-9"	5¾"	6'-11"
PA3	1'-3⅝"	3'-9⅜"	6½"	7'-1"
PA4	1'-4⅛"	3'-9⅞"	7⅝"	7'-3"
PA5	1'-5"	3'-10⅜"	8¼"	7'-6"
PA6	1'-5¾"	3'-10⅞"	9"	7'-8"
PA7	1'-6⅝"	3'-11⅛"	9⅞"	7'-10"
PA8	1'-7½"	3'-11¾"	10¾"	8'-0"
PA9	1'-8¼"	4'-0⅜"	11½"	8'-2"
PA10	1'-9⅛"	4'-0⅞"	1'-0⅜"	8'-4"
PA11	1'-9⅞"	4'-1"	1'-1¼"	8'-6"
PA12	1'-10¾"	4'-1½"	1'-2¼"	8'-9"
PA13	1'-11¾"	4'-2⅛"	1'-3⅜"	8'-11"
PA14	2'-0½"	4'-2⅝"	1'-4⅜"	9'-1"
PA15	2'-1⅛"	4'-3"	1'-5"	9'-3"
PA16	2'-2"	4'-3½"	1'-5¾"	9'-5"
PA17	2'-2¾"	4'-3⅞"	1'-6⅝"	9'-7"
PA18	2'-3⅝"	4'-4⅜"	1'-7½"	9'-9"
PA19	2'-3⅞"	4'-4½"	1'-7⅞"	9'-11"
PA20	2'-4¼"	4'-4⅝"	1'-8"	9'-11"
PA21	2'-5⅛"	4'-5⅛"	1'-8⅞"	10'-2"
PA22	2'-6"	4'-5⅝"	1'-9¾"	10'-4"
PA23	2'-6⅞"	4'-6¼"	1'-10½"	10'-6"
PA24	2'-7⅝"	4'-6⅝"	1'-11¼"	10'-7"
PA25	2'-8½"	4'-7"	2'-0"	10'-9"
PA26	2'-9⅜"	4'-7⅜"	2'-0¾"	10'-11"
PA27	2'-10¼"	4'-7⅞"	2'-1⅝"	11'-1"
PA28	2'-11"	4'-8⅝"	2'-2½"	11'-3"

Total Length One Set 254'-2"



PB BAR

MARK	A	B	LENGTH
PB1	8¼"	3'-8½"	6'-6"
PB2	8¾"	3'-9"	6'-8"
PB3	9⅛"	3'-9⅜"	6'-10"
PB4	9⅝"	3'-9⅞"	7'-0"
PB5	10⅛"	3'-10⅜"	7'-3"
PB6	10½"	3'-10¾"	7'-5"
PB7	11"	3'-11¼"	7'-7"
PB8	11⅜"	3'-11¾"	7'-9"
PB9	11⅞"	4'-0⅛"	8'-0"
PB10	1'-0¼"	4'-0⅝"	8'-2"
PB11	1'-0⅝"	4'-1"	8'-4"
PB12	1'-1¼"	4'-1⅝"	8'-7"
PB13	1'-1¾"	4'-2⅛"	8'-9"
PB14	1'-2⅛"	4'-2⅝"	9'-0"
PB15	1'-2⅝"	4'-3"	9'-2"
PB16	1'-3⅛"	4'-3½"	9'-4"
PB17	1'-3½"	4'-3⅞"	9'-6"
PB18	1'-4"	4'-4⅜"	9'-8"
PB19	1'-4⅞"	4'-4½"	9'-9"
PB20	1'-4¼"	4'-4⅝"	9'-10"
PB21	1'-4½"	4'-4¾"	9'-11"
PB22	1'-5"	4'-5¼"	10'-1"
PB23	1'-5½"	4'-5¾"	10'-4"
PB24	1'-6"	4'-6¼"	10'-6"
PB25	1'-6½"	4'-6⅝"	10'-9"
PB26	1'-6⅞"	4'-7"	10'-11"
PB27	1'-7¼"	4'-7½"	11'-1"
PB28	1'-7¾"	4'-8"	11'-3"

Total Length One Set 249'-11"

BAR LIST (ONE PIER)

MARK	NUMBER FOOTING	NUMBER WALL	NUMBER COLUMN & CAP	SIZE	LENGTH	SHAPE	UNIT WT
P1	44			6	10'-10"	Bent	16.27
P2	24			8	13'-2"	"	35.16
P3	6			8	11'-6"	Str.	30.71
P4	54			9	7'-6"	"	25.50
P5			54	9	27'-4"	"	92.93
P6			29	9	19'-4"	"	65.73
P7	4			11	35'-8"	"	189.48
P8	34			5	34'-4"	"	35.81
P9	56			5	12'-9"	"	13.30
P10	60			5	19'-3"	"	20.08
P11	16			5	7'-8"	Bent	8.00
P12	6			8	35'-9"	Str.	95.47
P13		8		8	39'-10"	"	106.31
P14		41		4	9'-2"	Bent	6.12
P15		4		6	8'-0"	"	12.02
P16		4		6	8'-3"	"	12.40
P17	30			6	9'-11"	"	14.90
PA		2 Sets		5	254'-2"	"	265.12
PB		2 Sets		5	249'-11"	"	260.69
PC1		4	4	4	4'-8"	Bent	3.12
PC2		4	4	4	4'-10"	"	3.23
PC3		4	4	4	4'-11"	"	3.28
PC4		4	4	4	5'-1"	"	3.39
PC5		4	4	4	5'-2"	"	3.45
SP1*		1	4	4	3'-8"	Str.	
SP2*		1	5	4	4'-0"	"	
SP6*		1	6	4	2'-6"	"	
SP7*		1	7	5	5'-0"	"	
SP8*		1	8	5	5'-4"	"	

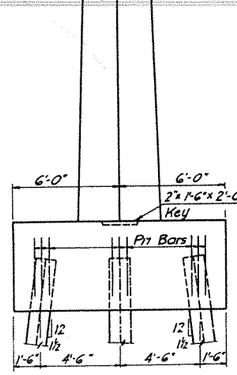
* Sample replacement bars to be spliced to bars from which 2'-0" sample has been cut. Furnish only one of each Par entire bridge. The replacement bars will not be paid Par directly. Their cost shall be included in the unit price bid Par reinforcing steel.

QUANTITIES (ONE PIER)

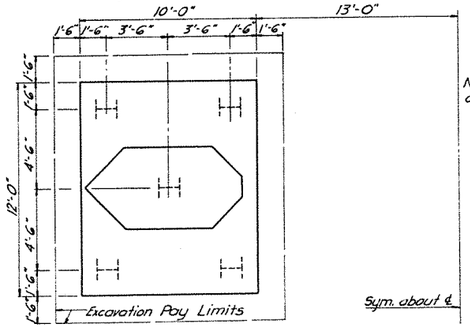
Class AE-1 Concrete	155.5 Cu. Yd.
Reinforcing Steel	17435 Lbs.
Structural Steel (A36)	1189 Lbs.

PEMBINA RIVER

48'-0" PIER



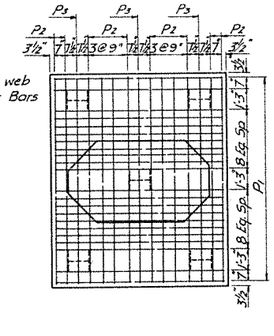
END VIEW



Showing Dimensions

FOOTING PLAN

Note: Burn holes in web of steel piles Par P5 Bars

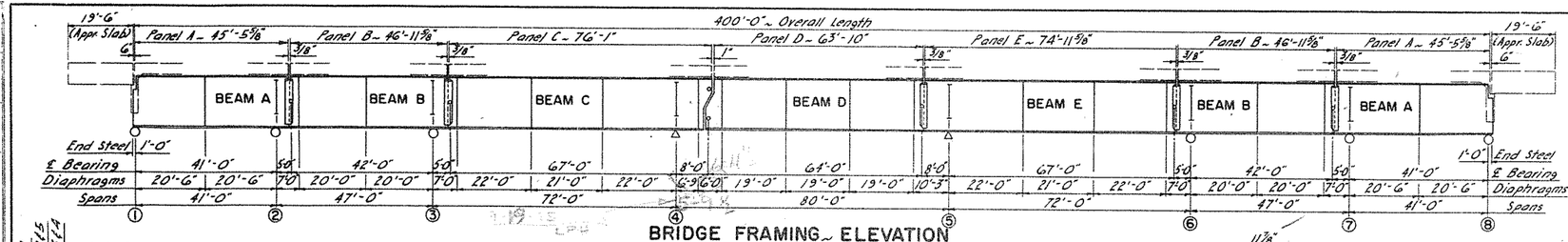


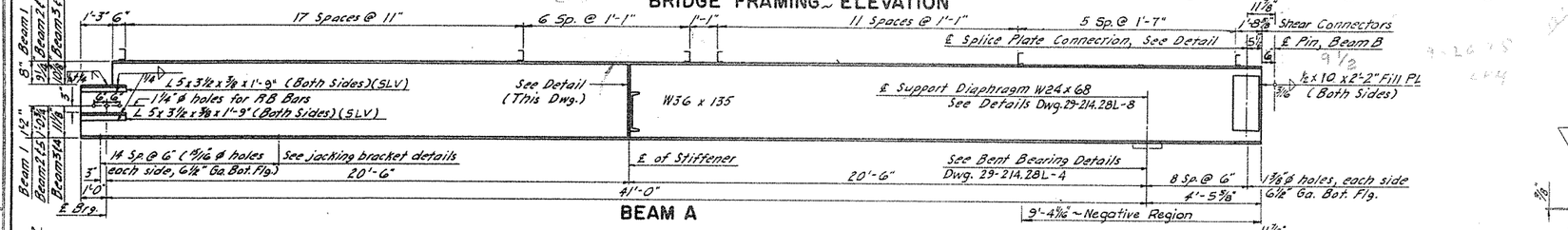
Showing Reinforcing

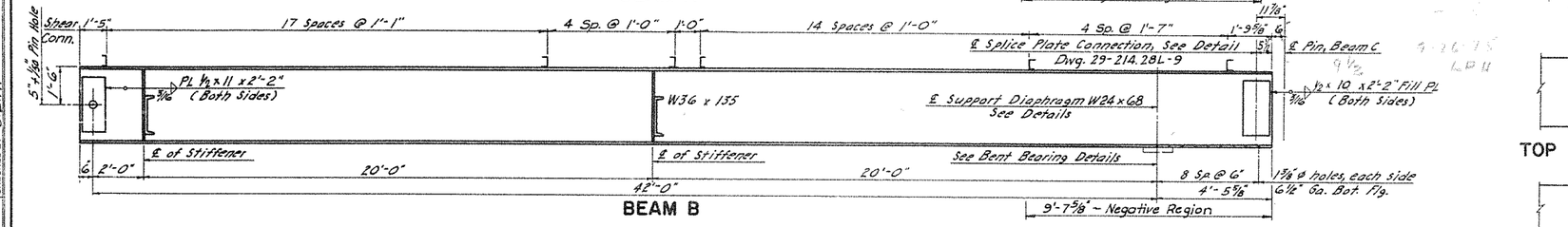
FED ROAD DIST NO	STATE	PROJ NO	SHEET NO.	TOTAL SHEETS
8	N.D.	I-029-5(23)	97	

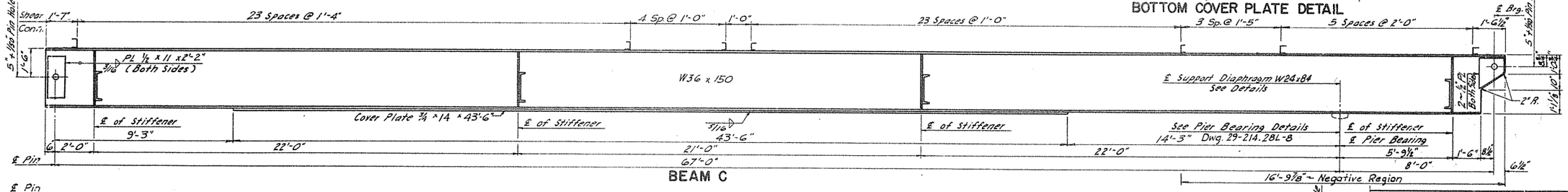
DESIGNED BY	L.E.G.
CHECKED BY	G.P.L.
MADE BY	G.P.L.
CHECKED BY	G.R.L.
MADE BY	D.L.A.
CHECKED BY	

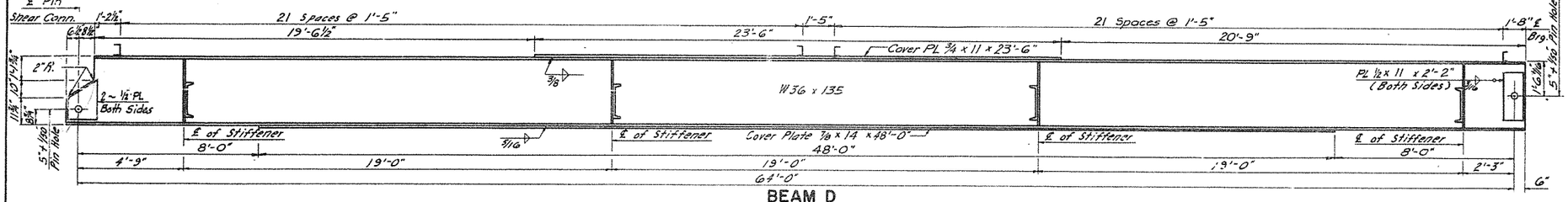
ILS TRACING QUANTITIES

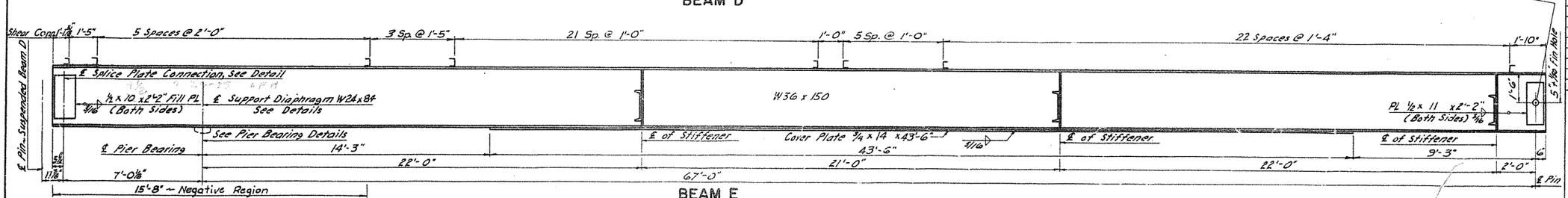


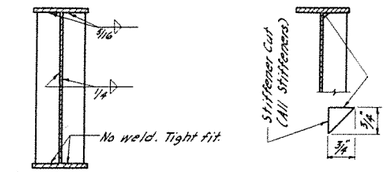


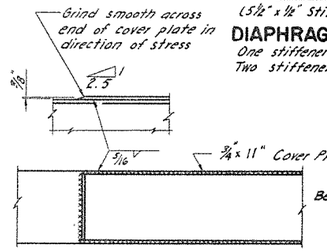


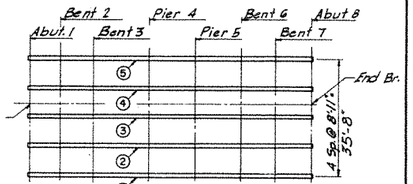


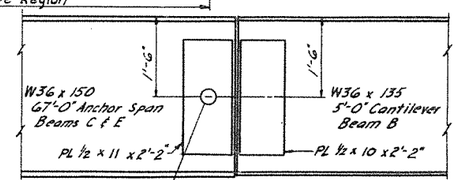












Designed for 25 #/S.F. F.W.S.

QUANTITIES

See Drawing 29-214.28-10

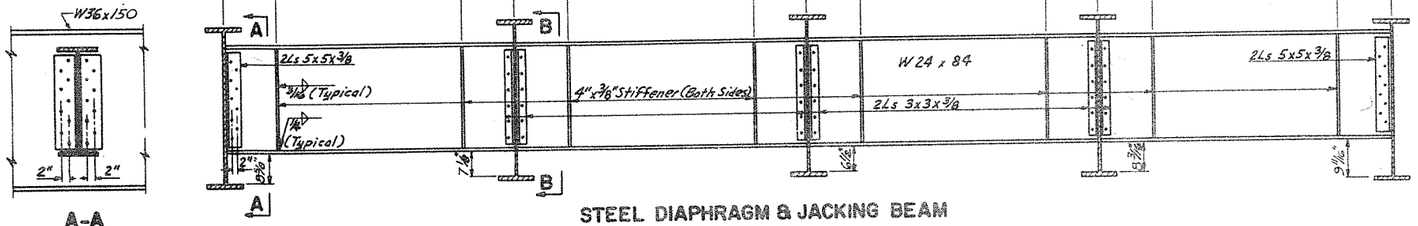
PEMBINA RIVER

BEAM DETAILS

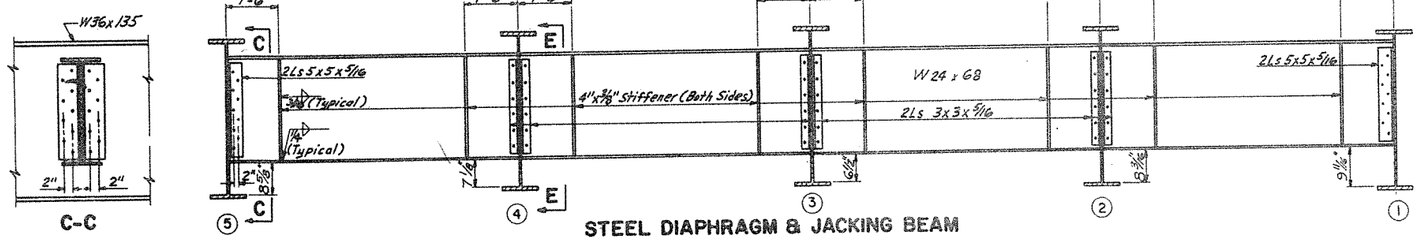
29-214.28L-7

29-214.28L-7

FED. ROAD DIST. NO.	STATE	PROJ. NO	SHEET NO.	TOTAL SHEETS
8	N. D.	I-029-5(23)	98	

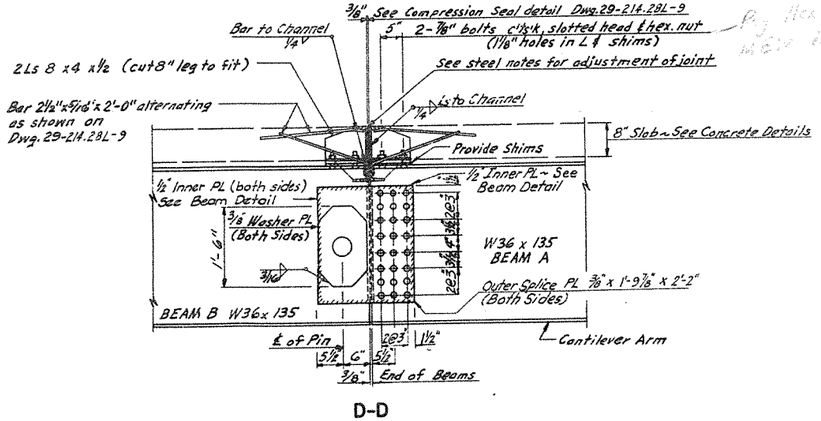


STEEL DIAPHRAGM & JACKING BEAM
AT PIERS 4 & 5
See Beam Details

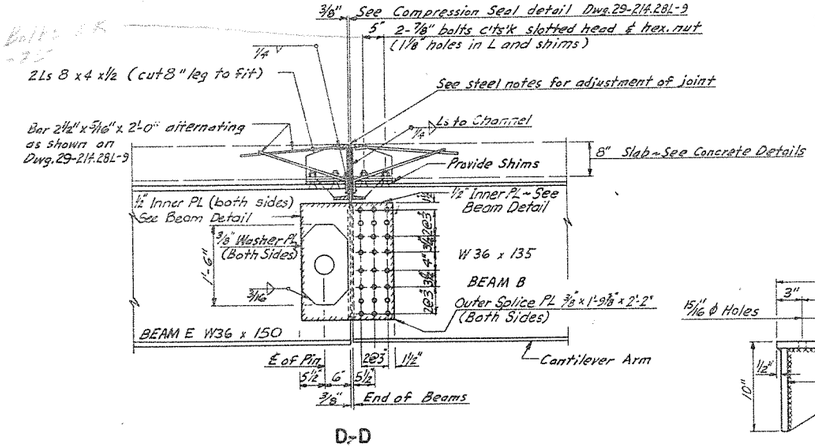


STEEL DIAPHRAGM & JACKING BEAM
AT BENTS 2,3,6 & 7
See Beam Details

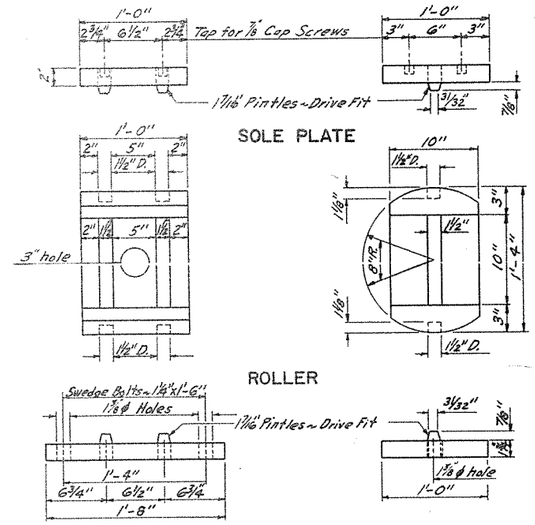
INTERMEDIATE DIAPHRAGMS
(Typical for all intermediate diaphragms)



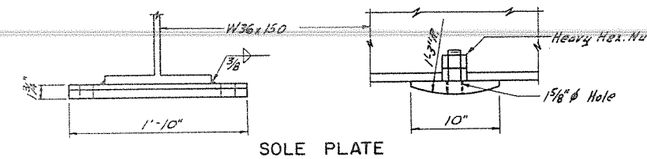
D-D
Location of section shown on Drawing 29-214.28L-9



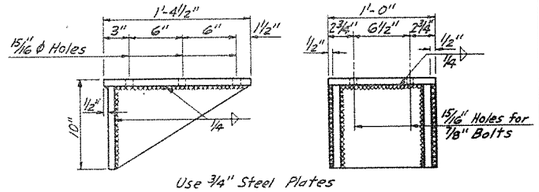
D-D
Location of section shown on Drawing 29-214.28L-9



EXPANSION BEARING DETAILS
STEEL CASTINGS, ASTM A27 GRADE 70-36, OR WELDED A-36 STEEL PLATES.
At Abutments



FIXED BEARING DETAILS
At Piers 4 & 5



Use 3/4" Steel Plates
JACKING BRACKET
2 Required for each Abut.
Provide 6 - 7/8" bolts per bracket

Designed for 25# S.F. F.W.S.

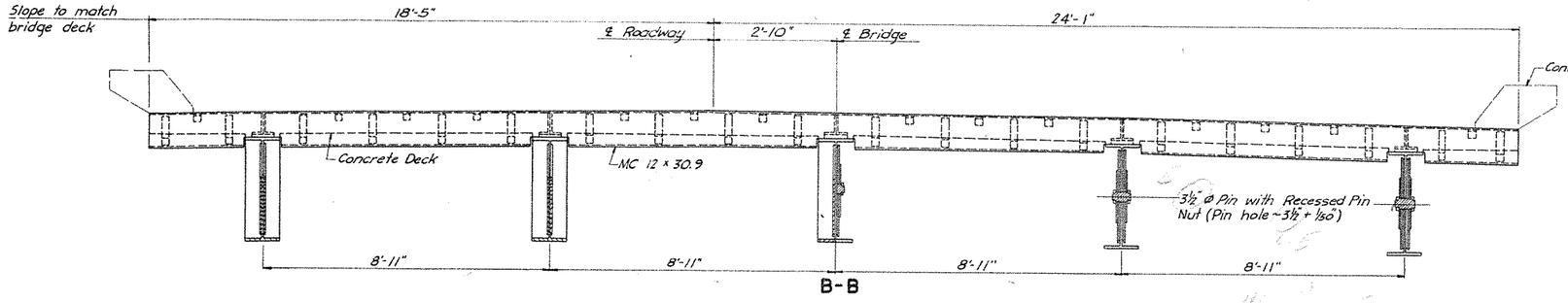
QUANTITIES
See Drawing 29-214.28L-10

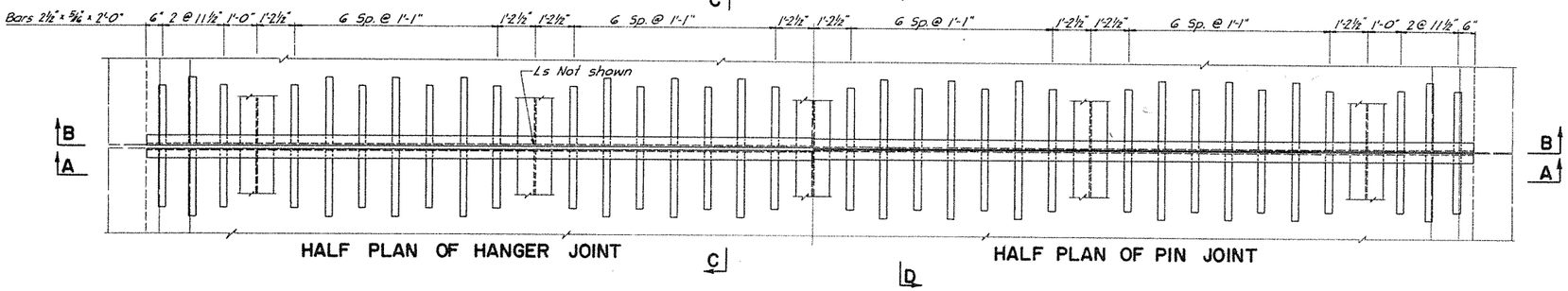
PEMBINA RIVER
MISCELLANEOUS STEEL
& BEARING DETAILS

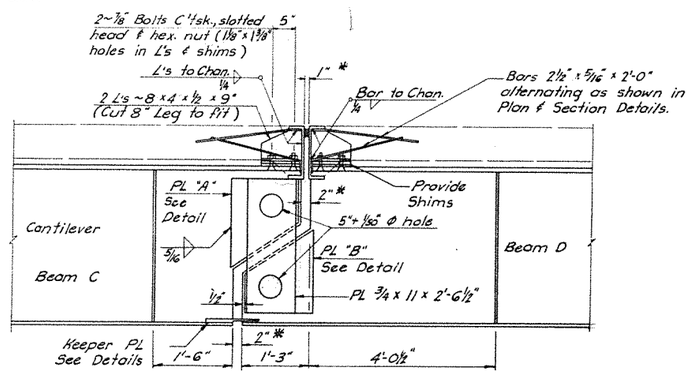
29-214.28L-8

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	N.D.	I-029-5(23)	99	

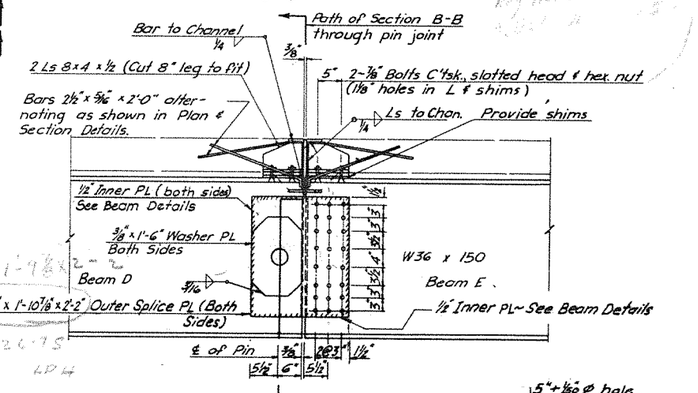
CHECKED BY L.F.D.
MADE BY G.A.L.
CHECKED BY L.E.G.
TRACING MADE BY G.A.L.
CHECKED BY L.E.G.
QUANTITIES MADE BY G.A.L.
CHECKED BY D.L.R.



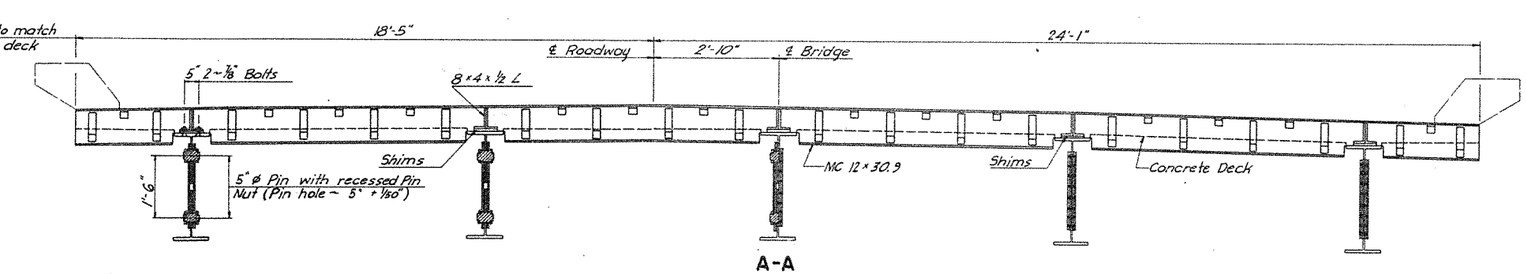




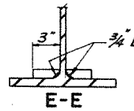
C-C



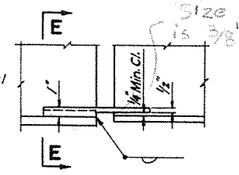
D-D

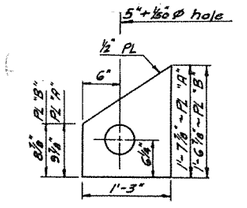


A-A

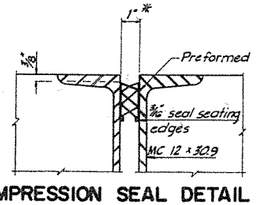


E-E

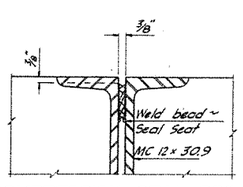




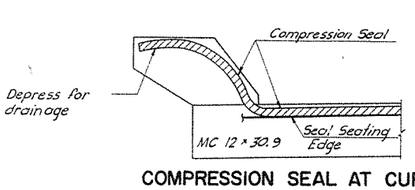
PLATES "A" & "B" DETAIL



COMPRESSION SEAL DETAIL
Detail taken from Section C-C



COMPRESSION SEAL DETAIL
Detail taken from Section D-D



COMPRESSION SEAL AT CURB
Same @ 1" and ⅜" opening

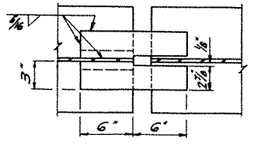
NOTES:

Type of seal used shall be approved by the Bridge Engineer.

All expansion or fixed joints shall be assembled to fit the crown of roadway and all interior joints shall be shop assembled on their supporting beams and properly fitted together and match marked. To allow for field adjustment, ⅛" shims has been assumed between the L supports and the beams.

The field shimming of the last half of each joint shall be done after the concrete has been poured in the adjoining slab. For placement of Expansion Joint at Abutment see Dwg. 29-214.28L-11.

All pins nuts, after being tightened, shall be tack welded to the ends of the pins.



KEEPER PL DETAILS

SEALS

LOCATION	WIDTH OF SEAL GROOVE	WIDTH OF SEAL	LENGTH OF SEAL L.F.
At Pin Joint	⅜"	⅝"	45'-6" (For 1 Joint)
At Hinge Joint	1" @ 50°	1¾"	45'-6"

*At 50° F. ~ Change per degree F. = 0.00624 in.

QUANTITIES

See Drawing 29-214.28L-10 for Struct. Steel Quant.

Pref. Compr. Jt. Seal ⅜"	227.5 L.F.
Pref. Compr. Jt. Seal 1¾"	45.5 L.F.

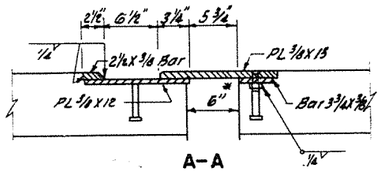
PEMBINA RIVER

DECK JOINTS, HANGER & COMPRESSION SEAL DETAILS

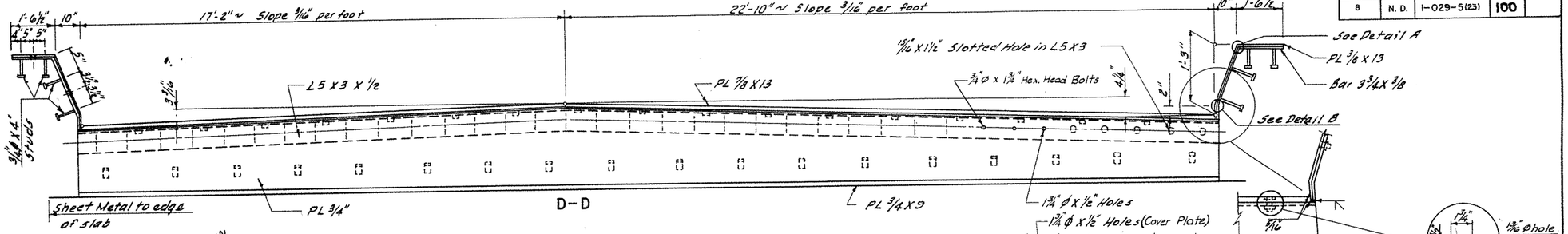
29-214.28L-9

29-214.28L-9

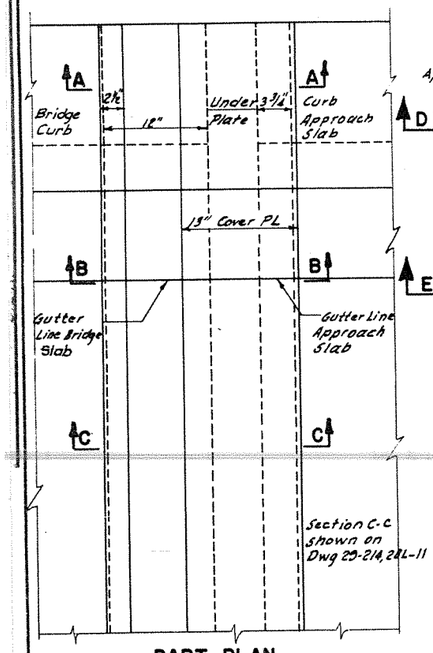
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	N. D.	I-029-5(23)	100	



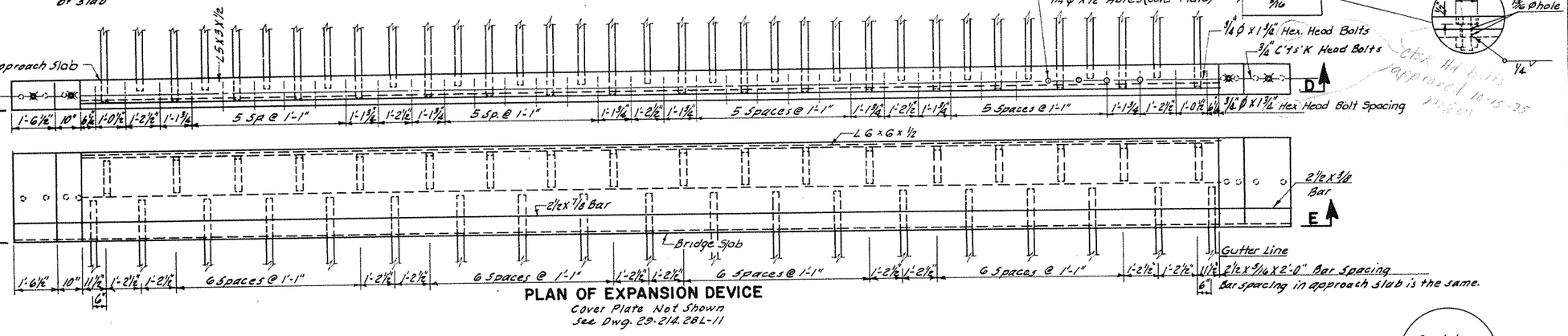
A-A



D-D

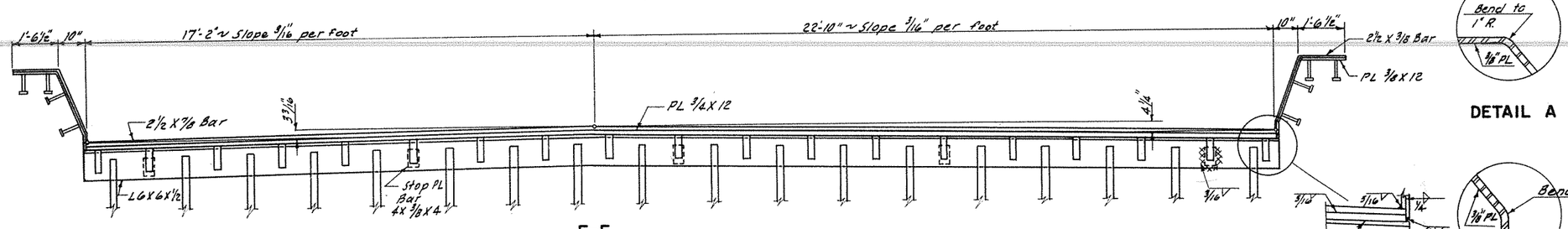


PART PLAN

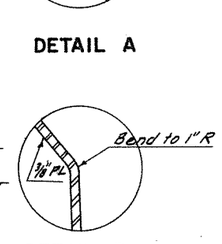


PLAN OF EXPANSION DEVICE

Cover Plate Not Shown
See Dwg. 29-214.28L-11

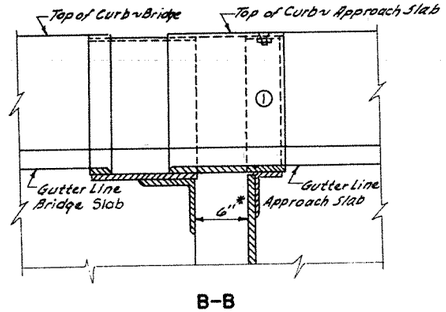


E-E



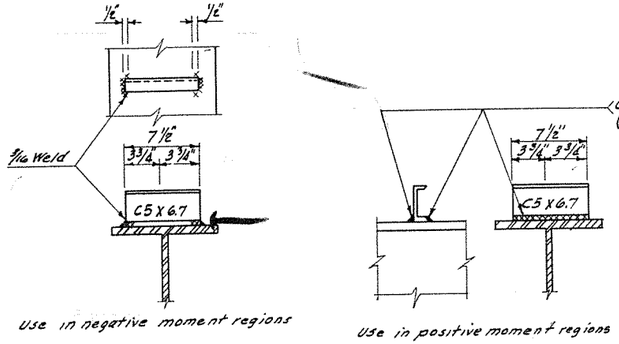
DETAIL A

DETAIL B

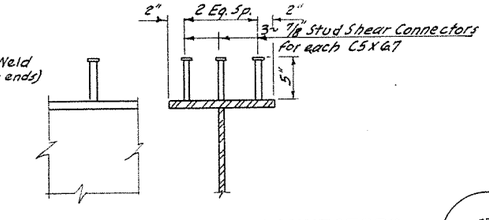


B-B

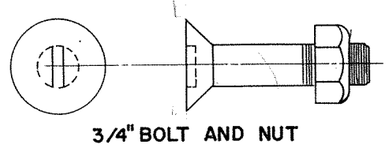
* At 50° F. ~ change per degree F. = 0.0140 in.



SHEAR CONNECTOR DETAILS



ALTERNATE SHEAR CONNECTORS



3/4" BOLT AND NUT

Furnish with slotted c'ts'k head A325 Bolts

NOTE:
Quantities include all structural steel shown on the superstructure drawings.
Designed for 25#/S.F. F.W.S.

QUANTITIES
Structural Steel (A36) 422,164 Lbs.

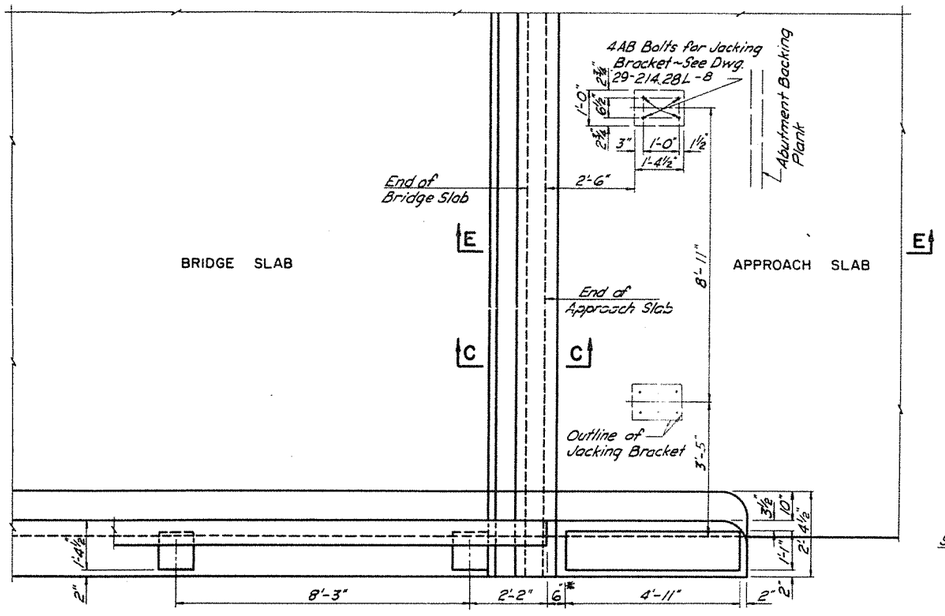
PEMBINA RIVER

APPROACH SLAB

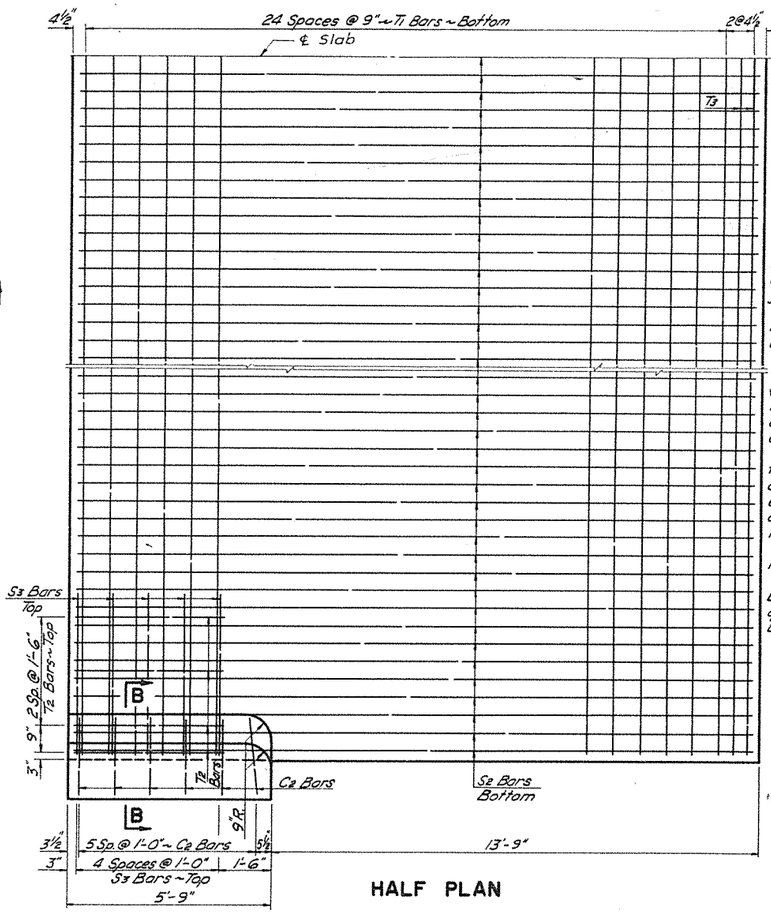
EXPANSION JOINT

29-214.28L-10

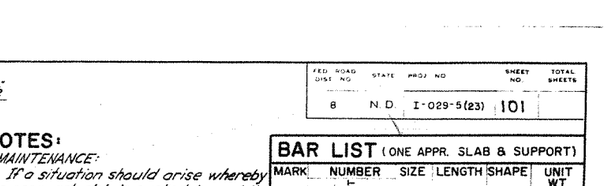
FED ROAD DIST NO.	STATE	PROJ NO	SHEET NO.	TOTAL SHEETS
8	N.D.	I-029-5(23)	101	



PART PLAN



HALF PLAN



HALF PLAN
APPROACH SLAB SUPPORT

NOTES:

MAINTENANCE:

If a situation should arise whereby the approach slab is pushed toward the abutment by the roadway slab, closing the expansion opening, a means has been provided to correct this condition.

First, a (6"±) slab section will be cut and removed from the far end of the approach slab.

Second, the steel jacking brackets will be attached to the bolts provided on the underside of the approach slab; jacks will then be inserted between the brackets and the end beam of the bridge and the approach slab jacked to closure with the roadway slab.

CONSTRUCTION:

¾" holes have been provided in the vertical leg of the 6"x 6"x ½" L so that it may be bolted to the concrete forms and the bridge half of the expansion device accurately adjusted to grade.

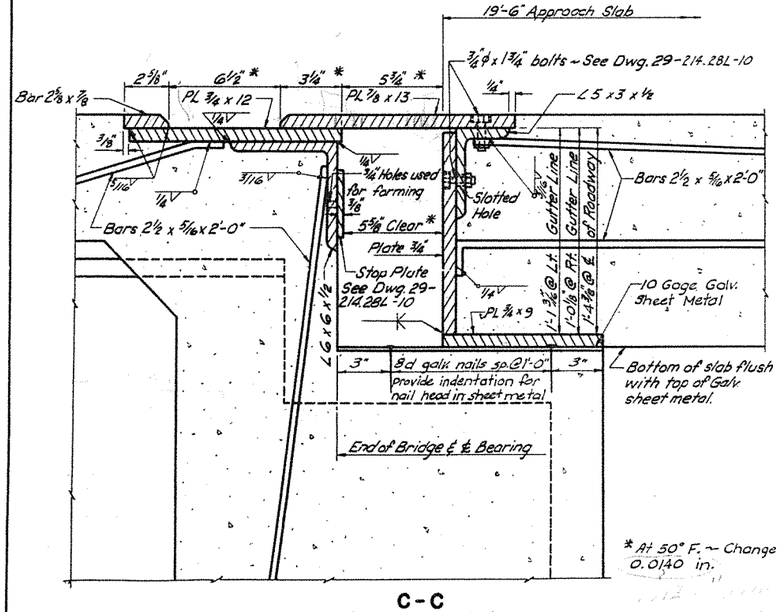
Slotted holes have been provided in the vertical leg of the 5 x 3 x ½ L of the approach slab so that this half of the expansion device may be accurately adjusted to grade when approach slab is poured.

See Dwgs. 29-214.28L-13 & 14 for railing details and general layout.

Railing quantities are shown on Dwg. 29-214.28L-13. Railing end post quantities are included in the quantities, Dwg. 29-214.28L-13.

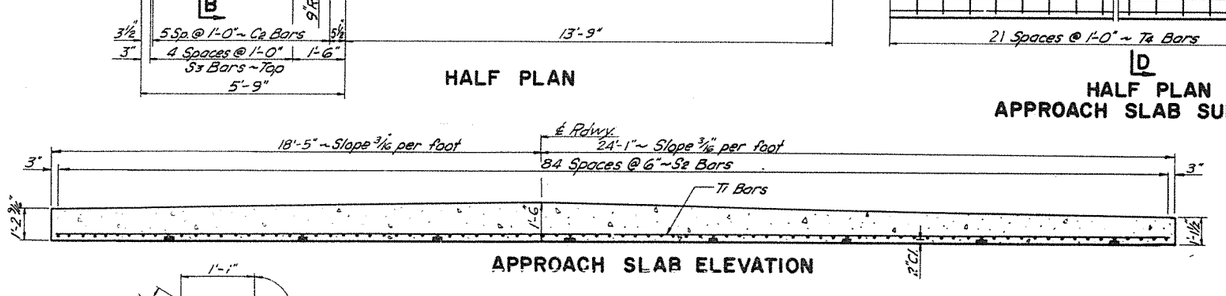
BAR LIST (ONE APPR. SLAB & SUPPORT)

MARK	NUMBER: SLAB	NUMBER: SUPPORT	NUMBER: CURB	SIZE	LENGTH	SHAPE	UNIT WT.
C2	12		5	6	6'-7"	Bent	6.87
S2	85		8	19	19'-0"	Str.	50.74
S3	10		6	5	5'-0"	Bent	7.51
S4		10	5	5	5'-3"	Str.	5.48
S5		2	6	4	4'-9"	"	7.13
S6		6	7	42	42'-2"	"	86.21
T1	25		4	42	42'-2"	Str.	28.15
T2	8		4	4	4'-3"	"	2.84
T3	2		6	42	42'-2"	"	63.34
T4		43	4	2	2'-6"	"	1.67

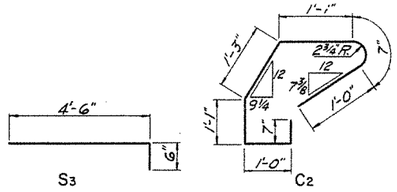


C-C
(See Dwg. 29-214.28L-10)

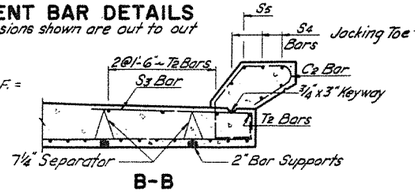
* At 50° F. ~ Change per degree F. = 0.0140 in.



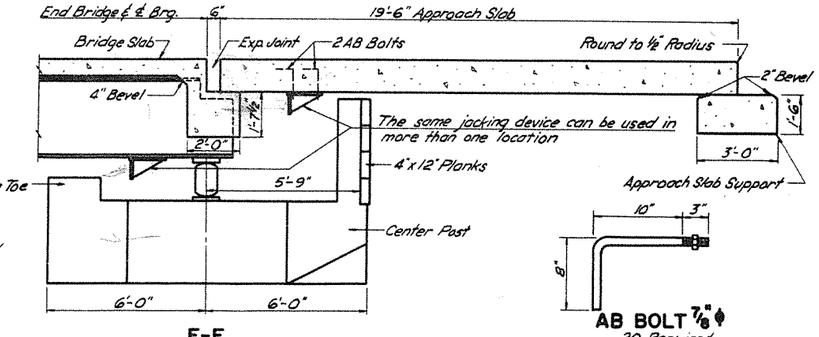
APPROACH SLAB ELEVATION



BENT BAR DETAILS
Dimensions shown are out to out



B-B



E-E

AB BOLT 7/8" ϕ
20 Required
(Included as Structural Steel)

Designed for 25# P.S.F. F.W.S.

QUANTITIES (ONE SLAB)

Class AE-3 Concrete	49.0 C.Y.
Reinforcing Steel	5982 Lbs.

PEMBINA RIVER

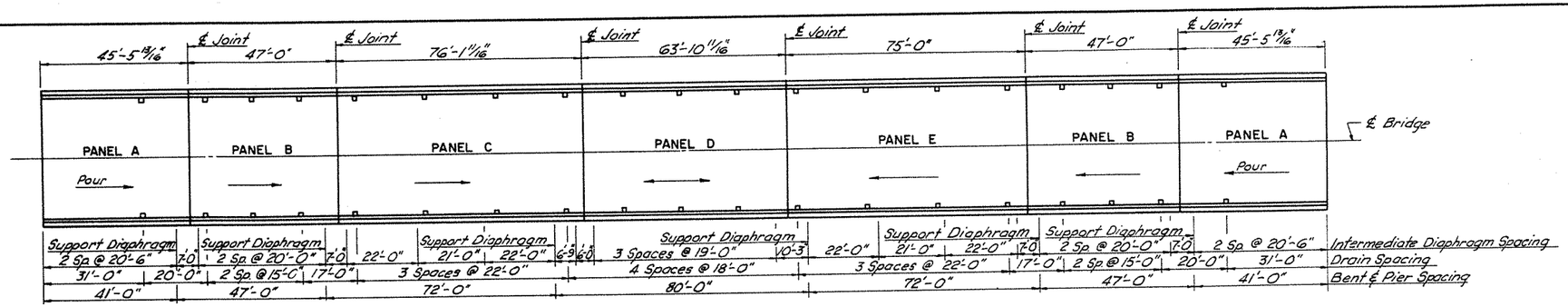
APPROACH SLAB

29-214.28L-11

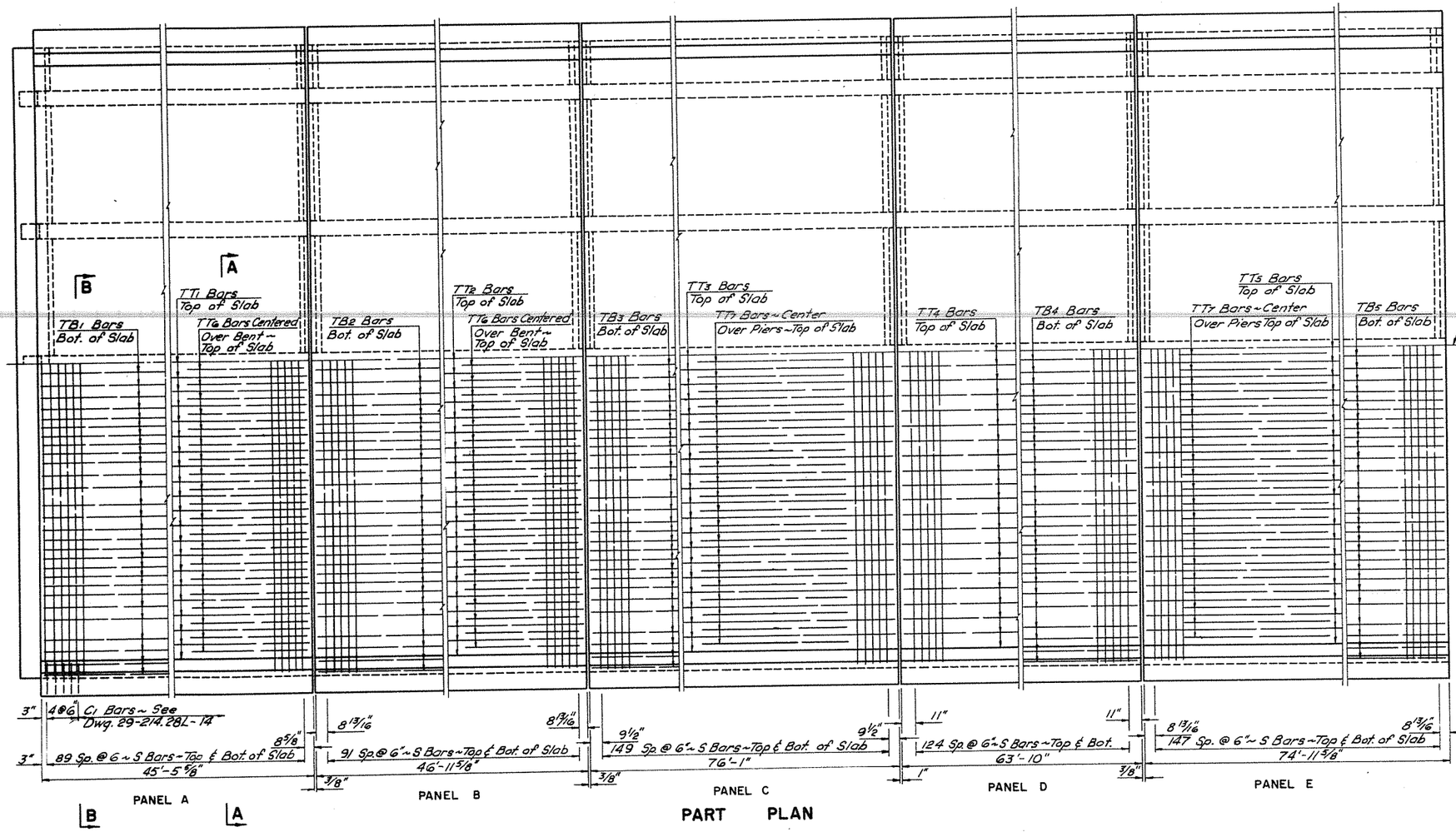
29-214.28L-11

CHECKED BY L.F.Q.
MADE BY G.F.C.
CHECKING
CHECKED BY G.F.C.
MADE BY G.J.H.
QUANTITIES
CHECKED BY G.J.H.

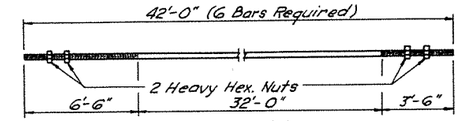
FED. ROAD DIST. NO.	STATE	PROJ. NO.		SHEET NO.	TOTAL SHEETS
8	N. D.	I-029-5(23)		102	



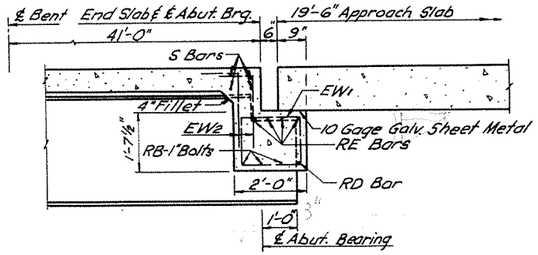
SLAB LAYOUT



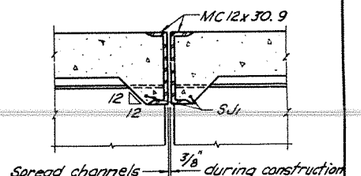
PART PLAN



RB BAR I" ♦
(Included in structural steel)

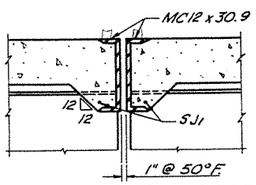


JUNCTION OF BRIDGE & APPROACH



Spread channels 3/8" during construction
See steel details Dwg. 29-214.28L-9

PIN JOINT



See steel detail Dwg. 29-214.28L-9

EXPANSION JOINT

Designed for 25# I.S.E. F.W.S.

QUANTITIES

See Drawing 29-214.28L-13

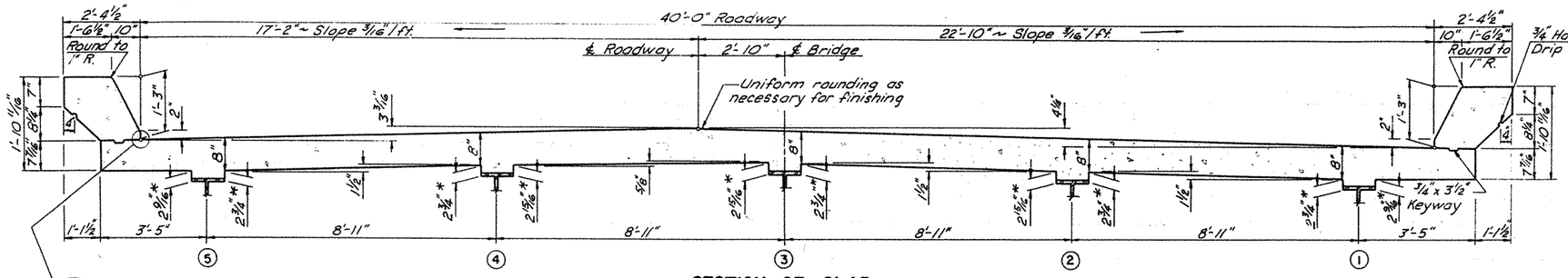
PEMBINA RIVER

SLAB DETAILS

29-214.28L-12

29-214.28L-12

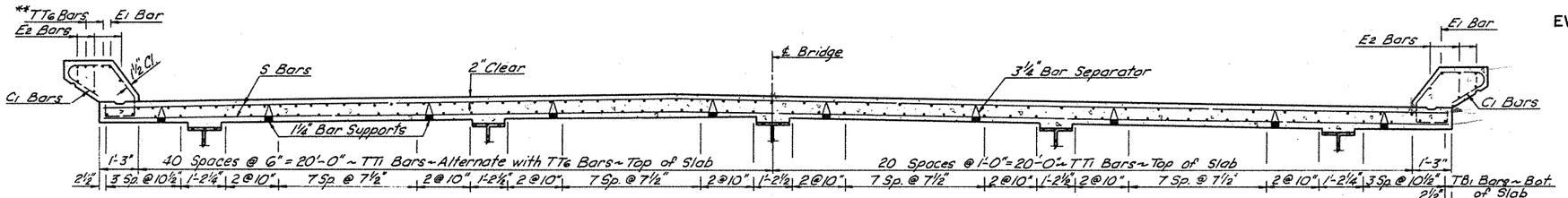
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	N. D.	I-029-5(23)	103	



Seal corner with Asphalt Flashing Compound (Knife grade)

SECTION OF SLAB
Showing Dimensions

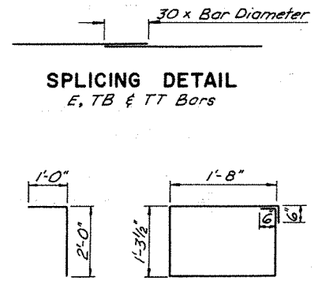
* Allow for variation in girder elevation by adjusting the riser dimension to maintain required slab thickness.



** Centered over Bent

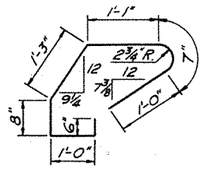
SECTION A-A
Showing Reinforcing Over Bent No. 2

SECTION B-B
Showing Reinforcing in Span Between Supports



SPLICING DETAIL
E, TB & TT Bars

EW2 BAR EW1 BAR

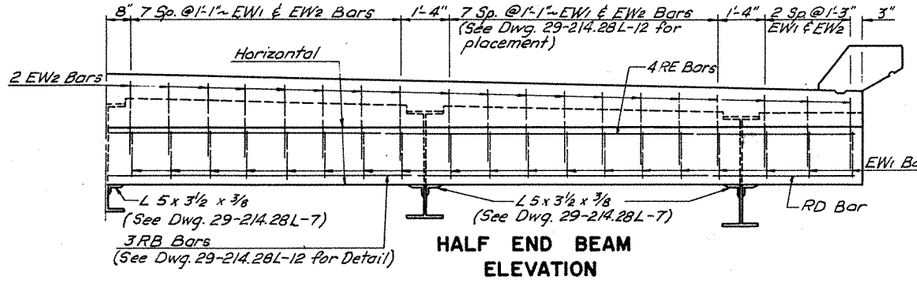


C1 BAR

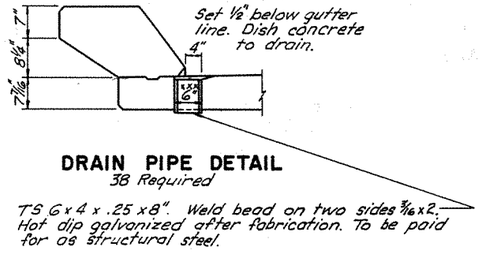
BENT BAR DETAILS
Dimensions shown are out to out

BAR LIST (SUPERSTRUCTURE)

MARK	NUMBER SLAB	NUMBER RAILING & POSTS	NUMBER CURB	SIZE	LENGTH	SHAPE	UNIT WT.
C1	984		5	6	6'-1"	Bent	6.35
E1		4	6	6	45'-2"	Str.	67.84
E2		20	5	6	45'-2"	"	47.11
E3		4	6	6	46'-8"	"	70.10
E4		20	5	6	46'-8"	"	48.68
E5		4	6	6	38'-10"	"	58.33
E6		20	5	6	38'-8"	"	40.33
E7		4	6	6	32'-9"	"	49.17
E8		20	5	6	32'-6"	"	33.90
E9		4	6	6	38'-3"	"	57.45
E10		20	5	6	38'-1"	"	39.73
EW1	76			4	6'-11"	Bent	4.62
EW2	152			4	3'-0"	"	2.00
P4		300		6	4'-4"	Bent	6.51
P5		42		6	5'-1"	"	7.64
P6		228		5	4'-9"	"	4.95
P7	228			3	4'-2"	"	1.56
P8	200			3	3'-2"	"	1.17
P9	28			3	4'-8"	"	1.75
R1		24		6	45'-9"	Str.	68.72
R2		24		6	46'-6"	"	69.85
R3		8		6	35'-10"	"	53.82
R4		8		6	38'-10"	"	58.33
R5		8		6	41'-10"	"	62.84
R6		8		6	29'-8"	"	44.56
R7		8		6	32'-8"	"	49.07
R8		8		6	35'-8"	"	53.57
R9		8		6	35'-3"	"	52.95
R10		8		6	38'-3"	"	57.45
R11		8		6	41'-3"	"	61.96
RC	784			3	3'-3"	Bent	1.22
RD	2			8	42'-2"	Str.	112.60
RE	8			6	42'-2"	"	63.34
S	1574			6	42'-2"	Str.	63.34
S1	48			5	7'-8"	"	8.00
TB1	112			5	45'-2"	Str.	47.11
TB2	112			5	46'-8"	"	48.68
TB3	112			5	38'-8"	"	40.33
TB4	112			5	32'-6"	"	33.90
TB5	112			5	38'-1"	"	39.73
TT1	82			4	45'-2"	"	30.15
TT2	82			4	46'-8"	"	31.15
TT3	82			4	38'-6"	"	25.70
TT4	82			4	32'-4"	"	21.59
TT5	82			4	37'-1"	"	25.31
TT6	160	16		5	8'-0"	"	8.34
TT7	80	8		5	15'-0"	"	15.65

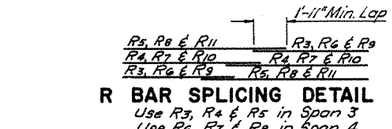


HALF END BEAM ELEVATION



DRAIN PIPE DETAIL
38 Required

TS G x 4 x .25 x 8". Weld bead on two sides ⅜ x 2. Hot dip galvanized after fabrication. To be paid for as structural steel.

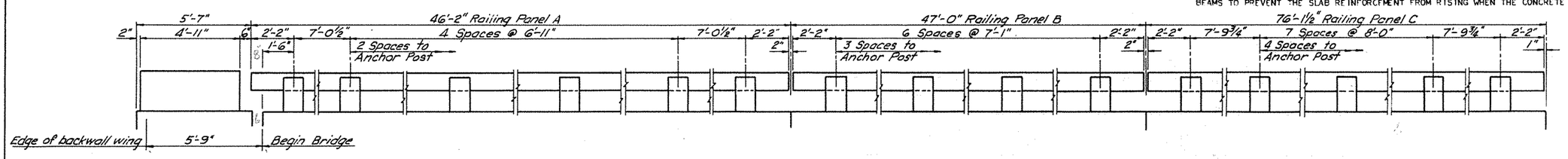


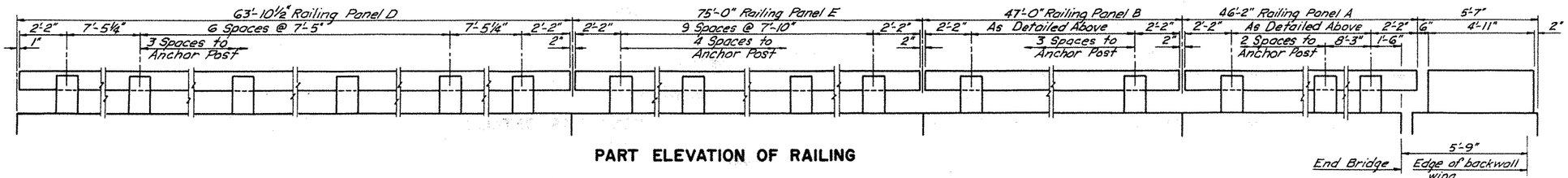
R BAR SPLICING DETAIL

Use R3, R4 & R5 in Span 3
Use R6, R7 & R8 in Span 4
Use R9, R10 & R11 in Span 5
Use R1 in Spans 1 & 7
Use R2 in Spans 2 & 6

REINFORCING STEEL:
THE TOP LAYER OF TRANSVERSE DECK SLAB REINFORCEMENT SHALL BE TIED DOWN WITH WIRE TIES TO THE SHEAR CONNECTORS OF THE BEAMS. SMALL HOLES MAY BE BURNED THROUGH THE TOP PORTION OF THE SHEAR CONNECTOR WEB TO FACILITATE MAKING THE TIE.

THE TIES SHALL BE AT INTERVALS OF 5 TO 6 FEET ALONG THE FULL LENGTH OF ALL BEAMS TO PREVENT THE SLAB REINFORCEMENT FROM RISING WHEN THE CONCRETE IS PLACED.





PART ELEVATION OF RAILING

Designed for 25#/S.F. F.W.S.

QUANTITIES

Class AE-3 Concrete	50.79 C.Y.
Class AAE-3 Concrete	26.93 C.Y.
Reinforcing Steel	162,809 Lbs.
Structural Steel (A36)	1074 Lbs.

Railing and end post quantities included.

PEMBINA RIVER

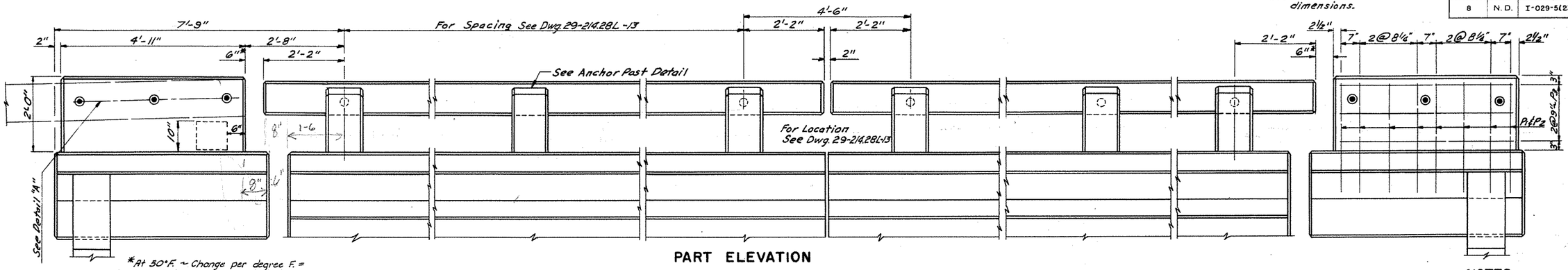
SLAB & RAILING DETAILS

29-214.28L-13

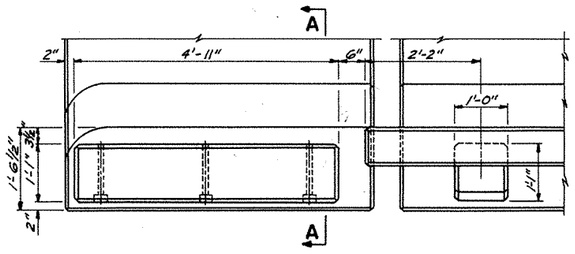
29-214.28L-13

DRAWING QUANTITIES
DETAILED BY D.L.R.
CHECKED BY G.A.L.
MADE BY G.A.L.
CHECKED BY D.L.R.

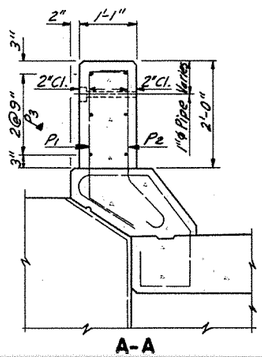
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	N. D.	I-029-5(23)	104	



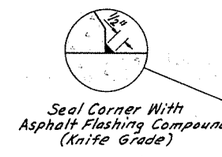
PART ELEVATION

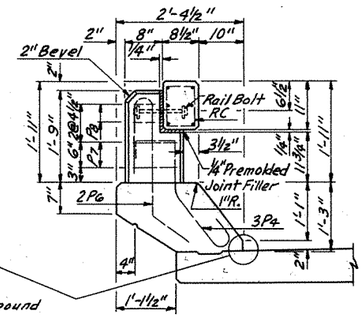


PART PLAN

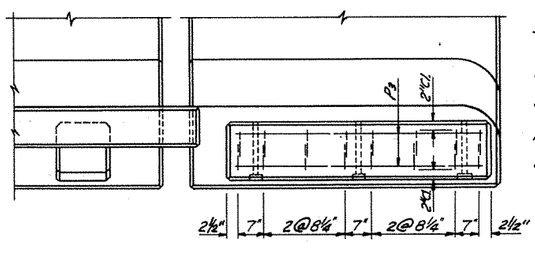


A-A





TYPICAL SECTION



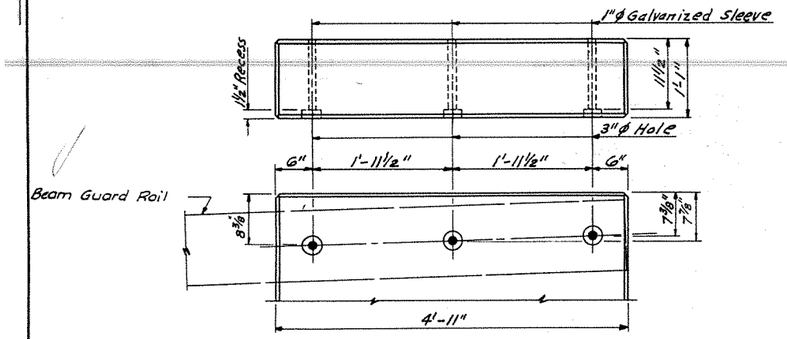
PART PLAN

NOTES:

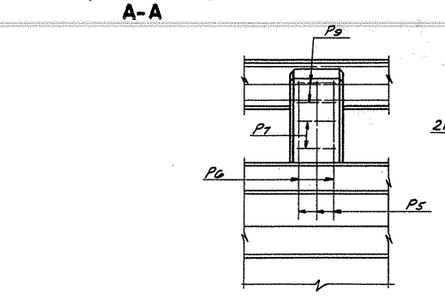
All concrete above top of curb shall be Class AAE-3.

"Rubbed Surface Finish" will be required for the roadway faces of curbs, the outside vertical faces of curb and slab, and all faces of rails, intermediate and end posts.

Designed in accordance with 1965 AASHO Specifications.

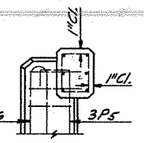


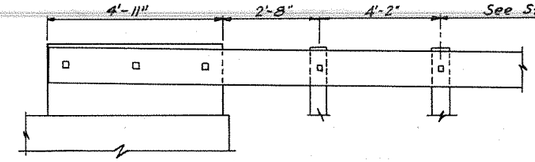
DETAIL "A"



ANCHOR POST DETAIL

See Dwg. 29-214.28L-13 For Placement





BEAM GUARD RAIL DETAIL

* Number of bars shown on Dwg. 29-214.28L-13.

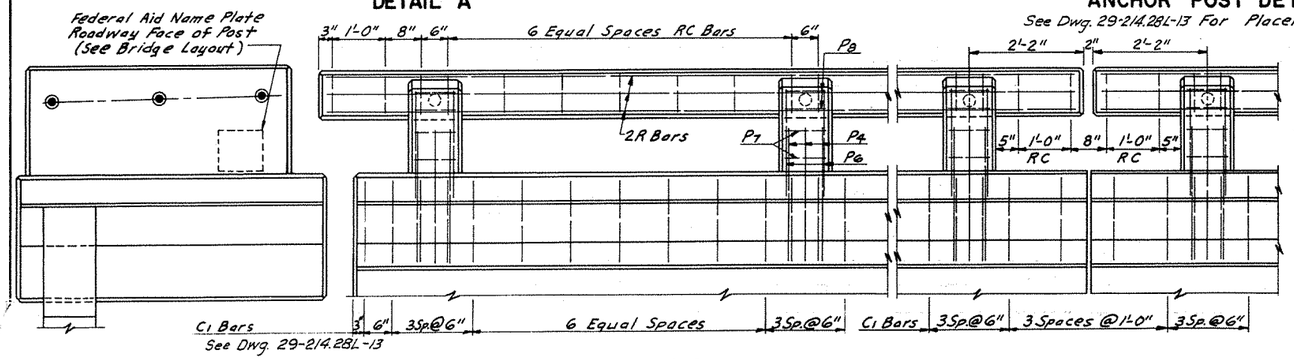
** Number, length & splicing information of R' bars shown on Dwg. 29-214.28L-13.

BAR LIST
(BARS FOR FOUR END POSTS)

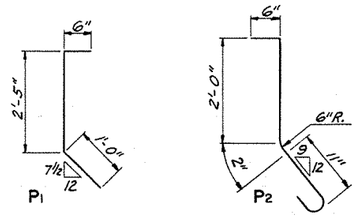
MARK	NO.	SIZE	LENGTH	SHAPE
P1	32	5	3'-11"	Bent
P2	32	5	4'-2"	"
P3	24	4	4'-7"	Str.

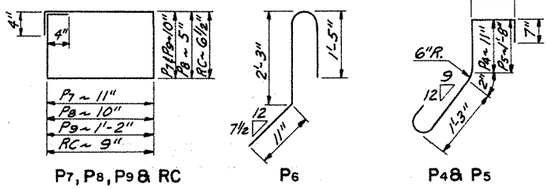
BAR LIST
(BARS FOR RAILING AND POSTS)

MARK	NO.	SIZE	LENGTH	SHAPE
P4	*	6	4'-4"	Bent
P5	*	6	5'-1"	"
P6	*	5	4'-9"	"
P7	*	3	4'-2"	"
P8	*	3	3'-2"	"
P9	*	3	4'-8"	"
RC	*	3	3'-3"	Bent
R**	**	6	**	Str.



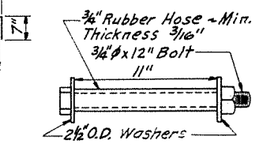
RAIL DETAILS





BENT BAR DETAILS

Dimensions shown are out to out



RAIL BOLT
(Galvanized)
To be included in the unit price bid for Class AAE-3 Concrete.

QUANTITIES 4 END POSTS *

Class AAE-3 Concrete	1.58 Cu. Yd.
Reinforcing Steel	344 Lbs.

* Railing and end post quantities are included in slab quantities on Dwg. 29-214.28L-13.

PEMBINA RIVER

RAILING, POSTS & END POSTS

29-214.28L-14