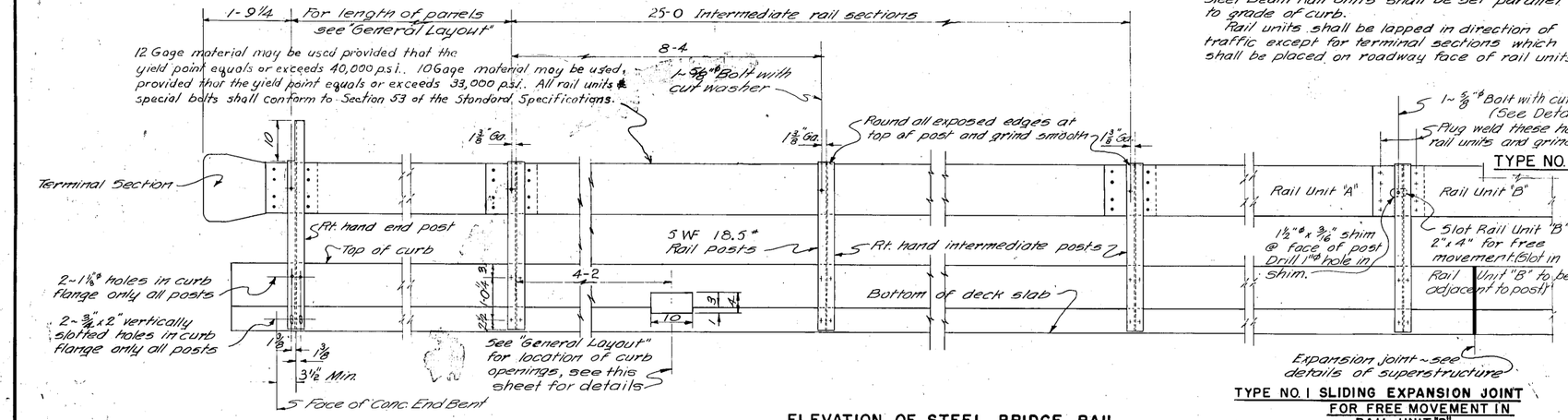
NOTE: Shop drawings shall include a complete erection diagram and complete details of all rail units.

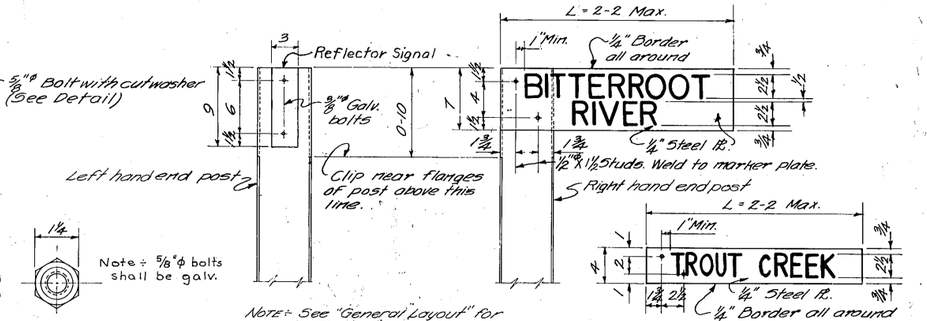


ELEVATION OF STEEL BRIDGE RAIL

Scale ~ ¾" = 1'-0"

NOTE: Type of expansion joint for each location shall be selected which permits utilization of the greatest number of full length sections.

TYPE NO. 1 SLIDING EXPANSION JOINT FOR FREE MOVEMENT IN RAIL UNIT "B"



NOTE: See "General Layout" for Reflector Signal & Bridge Marker requirements.
NOTE: Where 'Markers' are not called for they shall be replaced with Reflector Signals comparable to left hand end post if Reflector Signals are required.

ONE-LINE BRIDGE MARKER

BRIDGE MARKER DETAILS

Scale ~ 1½" = 1'-0"

DETAIL OF PIPE SPACER

Scale ~ 3" = 1'-0"

DETAIL OF SHIM R

Scale ~ 3" = 1'-0"

TYPE NO. 2 SLIDING EXPANSION JOINT FOR FREE MOVEMENT IN RAIL UNIT "C"

Scale ~ 3" = 1'-0"

NOTES

RAIL UNITS: The rail units and special bolts shall be made of open hearth or electric furnace steel. A two-inch specimen shall elongate not less than 12 per cent. All metal work shall be fabricated in the shop. No punching, cutting or welding shall be done in the field except that holes for special details in exceptional cases may be drilled in the field when approved by the Engineer.

PAYMENT: The unit price bid per lineal foot for Steel Beam Bridge Rail shall be payment for rail units and posts, complete in place, including painting, anchor bolts, shims, spacers and all incidentals pertaining thereto. The number of lineal feet of Steel Beam Bridge Rail for payment shall be computed as the distance between ends of terminal sections measured parallel to ℄ roadway for each line of rail.

PAINTING: Rail units shall be given one shop coat of paint before shipping, see Standard Specifications. Before erection in the field the first field coat shall be applied. After erection, all abrasions on steel bridge rail, bolts and bolt heads shall be spotted with first field coat before final application of second field coat of aluminum paint. All paint used shall conform to the Montana State Highway Standard Specifications for Road & Bridge Construction.

REFLECTOR SIGNALS: Reflector signals shall be placed on left end posts of bridge as indicated. Signals shall be made with "Silver Scotchlite", or equal, reflective material applied with waterproof glue to a 3"x5"x16 gage flat steel plate.

Paint steel plate one prime coat and two enamel coats both sides before reflective material is applied. Fasten signal to end posts with 2-⅜"x1¼ galv. bolts.

The cost of furnishing and placing bridge reflector signals shall be included in the unit price bid per lineal foot for Steel Beam Bridge Rail.

BRIDGE MARKERS: Prior to painting, the bridge marker plates shall be cleaned with gasoline. One coat of flat white and two coats of white enamel shall be applied over the entire surface of the plate. "Silver Scotchlite" or equivalent reflectorizing material shall then be applied to the entire face of the marker plate with special waterproof adhesive as recommended by the manufacturers of the reflectorizing material. For name or marker see the "General Layout" sheet.

Lettering and ¼" border shall be of sign writer's "Lettering Blank". Length "L" of bridge marker plate shall be of sufficient length to properly proportion the Gothic letters on the marker using ⅜" brush width and ½ inch space between letters. If "L" exceeds 2'-2", for proper proportion of the letters, use the two line marker as detailed.

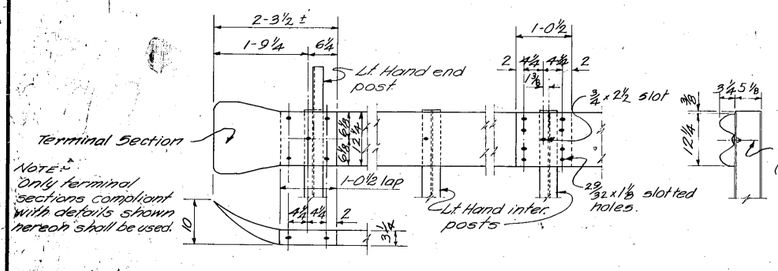
All corners of the bridge marker plates shall be round and smooth.

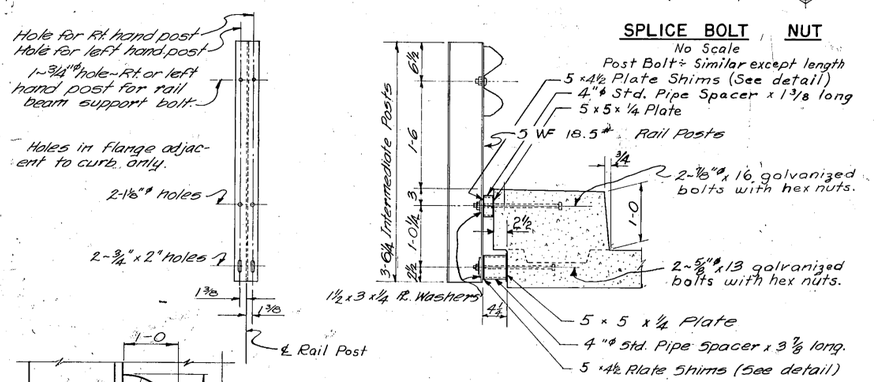
Bridge marker plates shall be bolted to the webs of the end posts as detailed above, with ½"ø studs (welded to marker plate) nuts and washers.

Cost of furnishing and placing bridge marker plates shall be included in the unit price bid per lineal foot for Steel Beam Bridge Rail.

RAIL BEAM AND SPLICE DETAILS

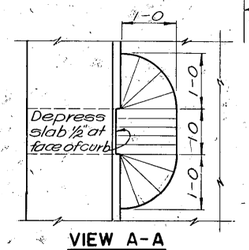
Scale ~ ¾" = 1'-0"





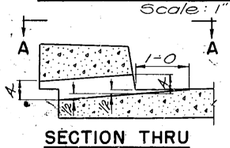
RAIL POST CONNECTION & DETAILS

Scale: 1" = 1'-0"



VIEW A-A

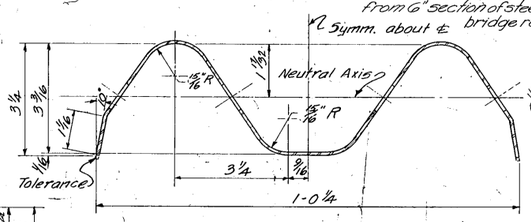
Scale: ¾" = 1'-0"



SECTION THRU CURB OPENING

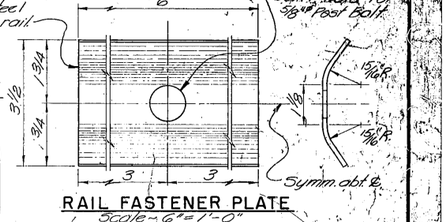
Scale: ¾" = 1'-0"

NOTE: Bend slab reinforcing steel at Curb openings as required to provide 1" min. concrete cover.



SECTION THRU RAIL ELEMENT

Scale ~ 6" = 1'-0"



RAIL FASTENER PLATE

Scale ~ 6" = 1'-0"

Fastener Plate to be cut from 6" Section of Steel bridge rail

STATE OF MONTANA
STATE HIGHWAY COMMISSION

STEEL BEAM BRIDGE RAIL AND DETAILS

Scale ~ As noted

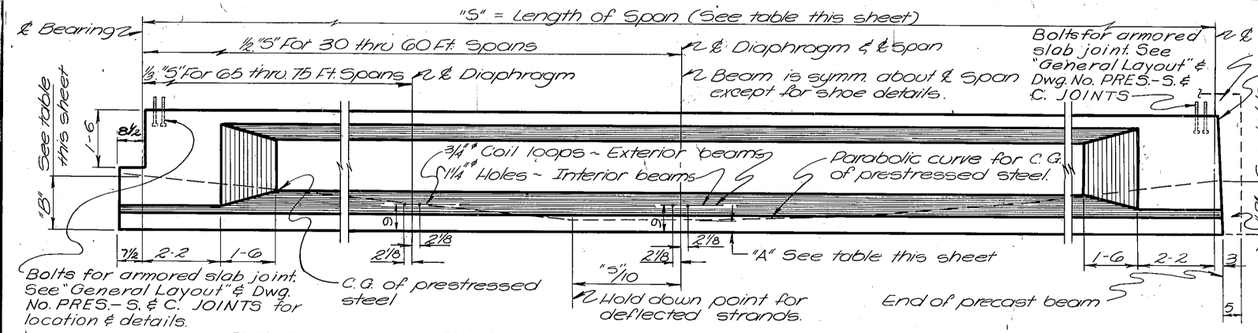
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.		SHEET NO.	TOTAL SHEETS
8	MONT.				

REVISED			DESIGNED		
REVISED			DRAWN	R.F.M.	1-11-56
REVISED	R.S.K.	10-8-62	TRACED	F.L.S.	1-16-56
REVISED	JCB	10-23-59	CHECKED	R.E.R.	1-20-56
REVISED	D.R.S.	7-10-61	REVISED	H.E.S.	2-10-58
REVISED	H.E.S.	1-27-59	REVISED	H.E.S.	6-12-58

APPROVED BY _____ BRIDGE ENGINEER

DRAWING NO. SBBR

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.		SHEET NO.	TOTAL SHEETS
8	MONT.				



HALF ELEVATION - PRE-TENSIONED BEAM

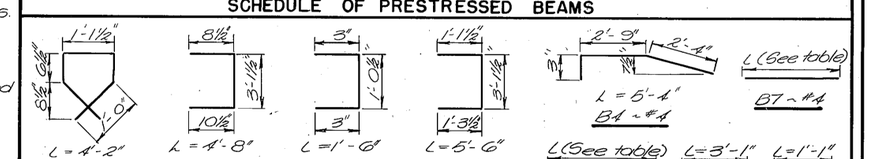
HALF ELEVATION - POST-TENSIONED BEAM

NOTE: Location of diaphragms not shown for the Post-tensioned beam shall be as shown for Pre-tensioned beam.

NOTE:- Details for post-tensioned beams shall be as shown for the pre-tensioned beams except as otherwise noted. Prestressing details are shown for the pre-tensioned beams using 7/16"ø deflected strands. Any modification of the pre-tensioned prestressing system shown, and all post-tensioned prestressing systems shall be approved by the engineer prior to the fabrication of the beams. See Special Provisions.

NOTE: "B" dimension for post-tensioned beams is the minimum required. This dimension may be increased to provide adequate spacing between end anchorages.

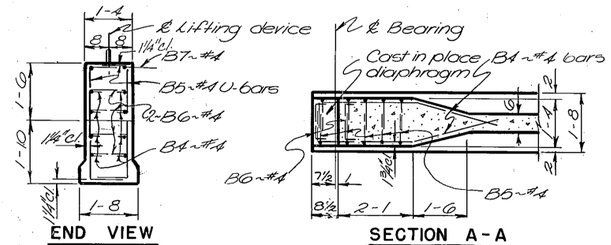
SCHEDULE OF PRESTRESSED BEAMS



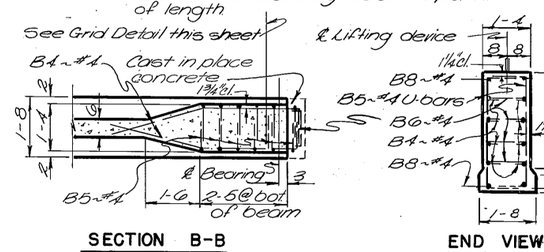
NOTE: L = Total Length of Bar

Span "S"	No. Of Beams Per Span	Min. Concrete Strength Req'd. At Transfer of Prestressing	Prestressing Steel (Per Beam)					Reinforcing Steel (No. Of Bars Per Beam)																
			Pre-tensioned Beam			Post-tensioned Beam		For Pre-tensioned Beam Or Post-tensioned Beam		For Pre-tensioned Beam Only			For Post-tensioned Beam Only											
			Final Force Req'd. At ℄ Beam (Kips)	No. Of 7/16" ø Strands	Dimensions To C.G. Of Prestress Force "A"	"B"	Final Force Req'd. At ℄ Beam (Kips)	Dimensions To C.G. Of Prestress Force "A"	"B"	B1		B3	B4	B5	B6	B7 No	Length	B5	B6	B8 No	Length	B9	B10
Beam Details For 40 Ft. Roadway H20-S16 Loading																								
30-0	6	4000	1060	14	4	10	1050	5	10	17	-	34	16	20	16	4	16-2	24	8	8	16-2	8	24
35-0			1210	16	5		1200	5		20	-	40					18-8				18-8		
40-0			1515	20	5½		1450	5		24	-	48					21-2				21-2		
45-0			1815	24	5½		1750	5		27	-	54					23-8				23-8		
50-0		4000	2125	28	5½		2050	5		30	-	60					26-2				26-2		
55-0	6	4500	2425	32	5½		2425	5½		34	-	68					28-8				28-8		
60-0	7	4500	2425	32	5½	10	2425	5	10	37	-	74	16	20	16	4	31-2	24	8	9	31-2	8	24
65-0	8	4500	2425	32	5½	10	2425	5	10	40	-	80	16	20	16	4	33-8	24	8	8	33-8	8	24
70-0	8	4500	2720	36	6	12	2675	5½	11	44	-	88	16	20	16	4	36-2	24	8	8	36-2	8	24

Span "S"	No. Of Beams Per Span	Min. Concrete Strength Req'd. At Transfer of Prestressing	Pre-tensioned Beam																					
			Final Force Req'd. At ℄ Beam (Kips)	No. Of 7/16" ø Strands	Dimensions To C.G. Of Prestress Force "A"	"B"	Final Force Req'd. At ℄ Beam (Kips)	Dimensions To C.G. Of Prestress Force "A"	"B"	B1		B3	B4	B5	B6	B7 No	Length	B5	B6	B8 No	Length	B9	B10
Beam Details For 28 Ft. Roadway H15-S12 Loading																								
30-0	4	4000	910	12	5	10				17	-	34	16	20	16	4	16-2	24	8	8	16-2	8	24
35-0			1060	14	5					20	-	40					18-8				18-8		
40-0			1360	18	5					24	-	48					21-2				21-2		
45-0			1665	22	5					27	-	54					23-8				23-8		
50-0			1965	26	5					30	-	60					26-2				26-2		
55-0	4		2270	30	5½					34	-	68					28-8				28-8		
60-0	5	4000	2125	28	5					37	-	74					31-2				31-2		
65-0	5	4500	2425	32	5½					40	-	80					33-8				33-8		
70-0	5	4500	2720	36	6½	10				44	-	88	16	20	16	4	36-2	24	8	8	36-2	8	24

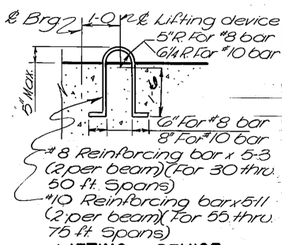


PRE-TENSIONED BEAM



POST-TENSIONED BEAM

Note: Chamfer bottom edges of concrete beams ¾ inches unless otherwise noted.



DETAILS OF REINFORCING STEEL

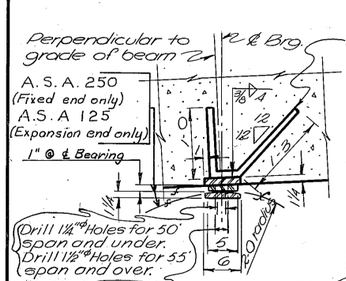
NOTE: For Slab, Curb & Diaphragm details see "Standard Slab Drawings."

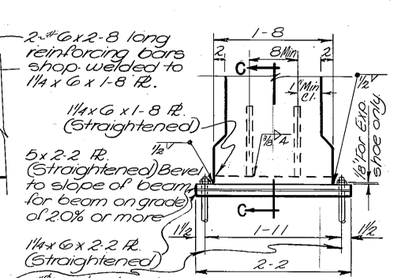
NOTE: To allow for elastic shortening, concrete shrinkage and creep of beams the overall length of beams shall be increased by 0.0075 in per ft. of length

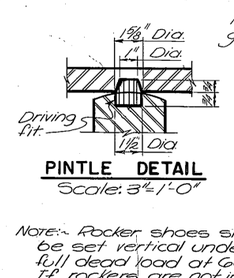
STANDARD GRID SYSTEM FOR LOCATION OF 7/16" STRANDS AT ℄ SPAN OR ℄ BEARING FOR PRE-TENSIONED BEAMS

END BLOCK DETAILS FOR PRE-TENSIONED BEAM

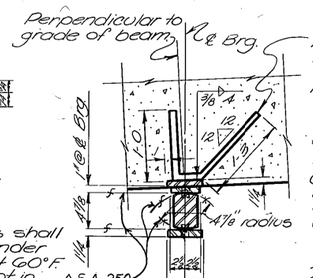
END BLOCK DETAILS FOR POST-TENSIONED BEAM



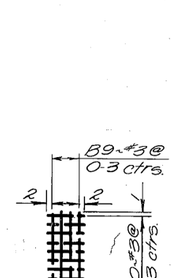




Note:- Rocker shoes shall be set vertical under full dead load at 60° F. If rockers are not in correct position with final dead load on spans, spans shall be jacked and adjustments made.



NOTE: For post-tensioning notes and General Notes, see Special Provisions.



NOTE:- Grid reinforcing steel placement subject to change due to placement of prestressing steel.

DESIGNED	J.C.B.	2-3-60	
DRAWN	H.K.L.	1-28-59	
TRACED	K.L.F.	2-3-59	
CHECKED	H.E.S.	3-3-60	
REVISED	H.E.S.	6-29-60	
REVISED	D.R.S.	12-1-61	
REVISED	J.J.W.	8-24-62	
REVISED	J.J.W.	3-27-63	

STATE OF MONTANA
STATE HIGHWAY COMMISSION

STANDARD PRE-TENSIONED & POST-TENSIONED (PRESTRESSED) CONCRETE BEAMS

40 FT. RDWY. H20-S16 SPECIAL LOADING

28 FT. RDWY. H15-S12 LOADING

Scale - 1½" = 1'-0" Except As Otherwise Noted

No Changes

APPROVED BY: _____ BRIDGE ENGINEER

DRAWING NO. PRES. BEAM STD. NO. 2 TYPE A

J.P.B.