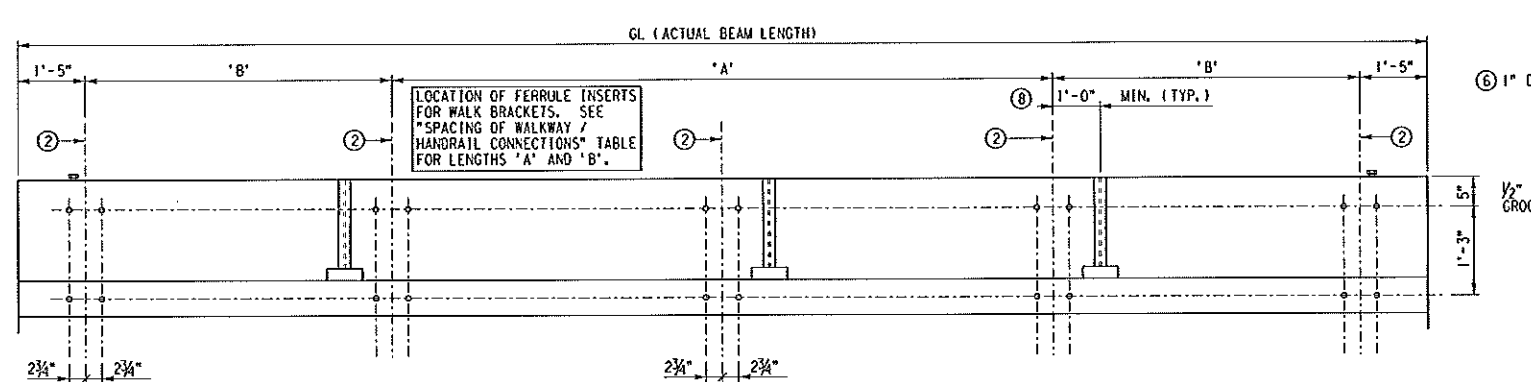
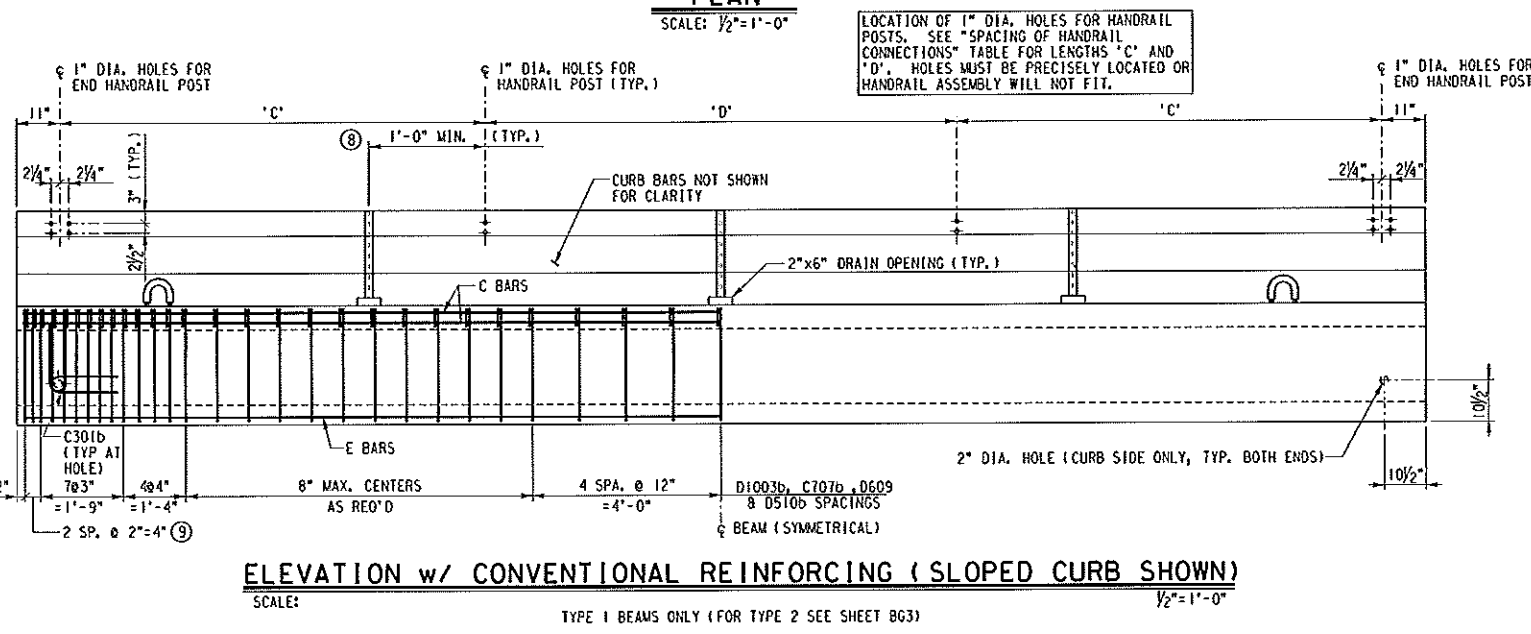
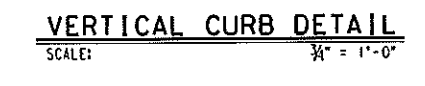
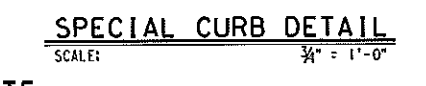
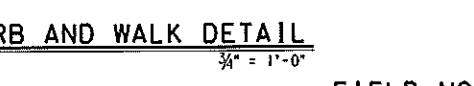
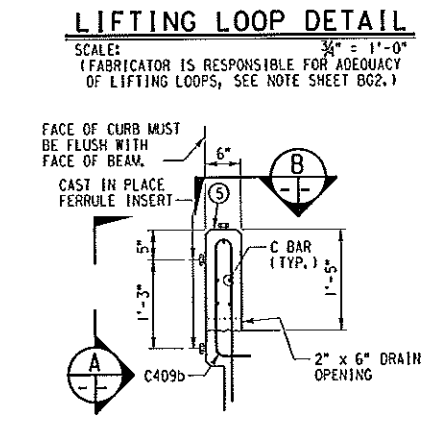
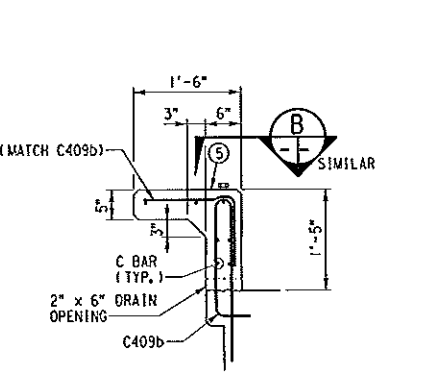
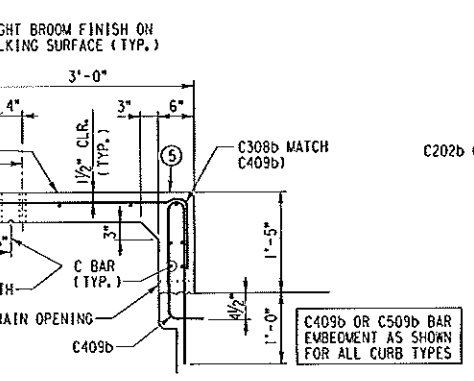
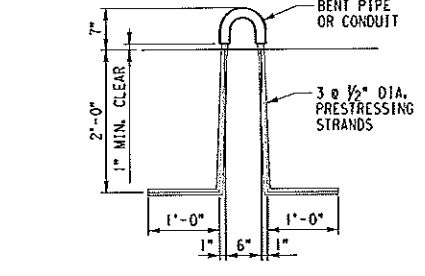
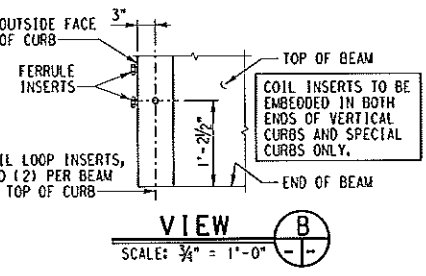
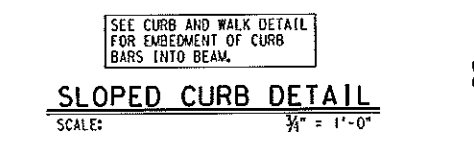
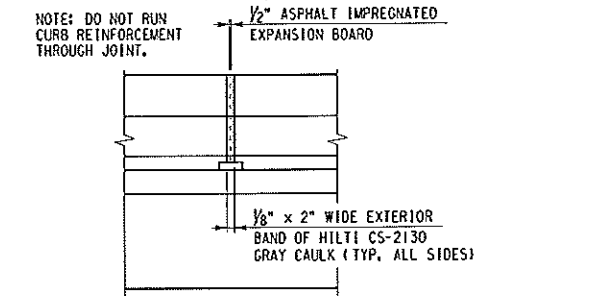
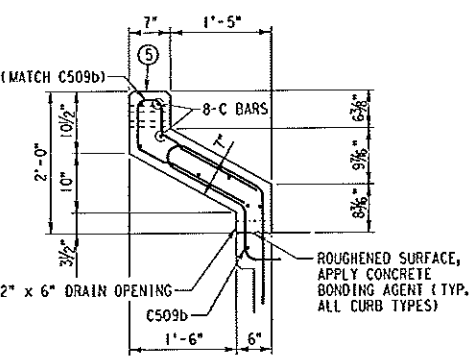


SPACING OF WALKWAY / HANDRAIL CONNECTIONS

ACTUAL BEAM LENGTH	FERRULE INSERTS		1" DIA. HOLES	
	'A'	'B'	'C'	'D'
19'-10"	84"	60"	9'-0"	N/A
20'-10"	84"	66"	9'-6"	N/A
21'-10"	84"	72"	10'-0"	N/A
22'-10"	84"	78"	5'-6"	10'-0"
23'-10"	84"	84"	6'-0"	10'-0"
24'-10"	2084"	48"	6'-6"	10'-0"
25'-10"	2084"	54"	7'-0"	10'-0"
26'-10"	2084"	60"	7'-6"	10'-0"
27'-10"	2084"	66"	8'-0"	10'-0"
28'-10"	2084"	72"	8'-6"	10'-0"
29'-10"	2084"	78"	9'-0"	10'-0"
30'-10"	2084"	84"	9'-6"	10'-0"
31'-10"	3084"	48"	10'-0"	10'-0"
32'-10"	3084"	54"	5'-6"	20'10'-0"
33'-10"	3084"	60"	6'-0"	20'10'-0"
34'-10"	3084"	66"	6'-6"	20'10'-0"
35'-10"	3084"	72"	7'-0"	20'10'-0"

SECTION w/ CONVENTIONAL REINFORCING (w/o CURB)
SCALE: 3/4" = 1'-0"



- Adjust as required to miss other reinforcement, ferrule inserts, handrail post holes, and curb expansion joints.
- Cast-in-place ferrule inserts, F-65, 7/8" dia. type LF as manufactured by Dayton/Richmond or equal. Minimum shear = 3,000 lb, minimum tension = 3,320 lb with a factor of safety of 3 to 1. 4 inserts per walk bracket location. Furnish with 7/8" dia. bolts and washers. All items shall be galvanized.
- Void dimensions shown are maximum and must not be exceeded at any point including splices of void form.
- Coil loop inserts are to be single flared type B-18, 1" dia. x 12" as manufactured by Dayton Superior, and have a safe working load of 4,750 lb. with a factor of safety of 4 to 1. The inserts are to be completely recessed with spiral bolts furnished in the insert.
- 3" x 6" I.D. Plate is to be embedded flush in top of curb and centered. Locate 6" from end of curb for curb and walk, special curb, or vertical curb; 18" from end for curb for sloped curb. Plate shall contain the following information in 1/2" lettering: item name, length, number and diameter of prestressing strands, date manufactured, and name of manufacturer. The same information, plus actual lifting weight, shall be clearly stenciled on the side of the beam.
- Two 1" dia. holes shall be located 17", 17"+A, 17"+2A, and 17"+3A from one end of beam. Holes must be in proper location or handrail will not fit. A = (GL - 34")/3.
- Optional center lifting loops (shown dashed) to be provided only if specified by purchasing railroad.
- Curb to be divided into four (4) equal segments as shown. If curb joints cannot be equally spaced due to conflicts with handrail connections, then fabricator shall adjust curb segment lengths so that each curb joint is a minimum of 12" from centerline of any walkway / handrail connection.
- Increase end stirrup group to 6 spaces of 2" = 1'-0" for L > 34'. All other spacings remain as shown.

BLOCKING NOTE:
BEAM SHALL BE SUPPORTED BY BLOCKING WITHIN 1'-6" OF ENDS DURING STORAGE AND TRANSPORT. STORE AND TRANSPORT BEAMS IN LEVEL POSITIONS.

FIELD NOTE

For beams located over roadways, the drain openings shall be covered with wire screen to prevent ballast from falling off beams. Screen shall be Industrial wire screen meeting the requirements specified in ASTM E437-85, Heavy Grade, 1/4" opening, plain weave, galvanized sheet. Screen shall fully cover opening and be anchored into the concrete. Screen installation to be in field by Railroad forces or contractor.

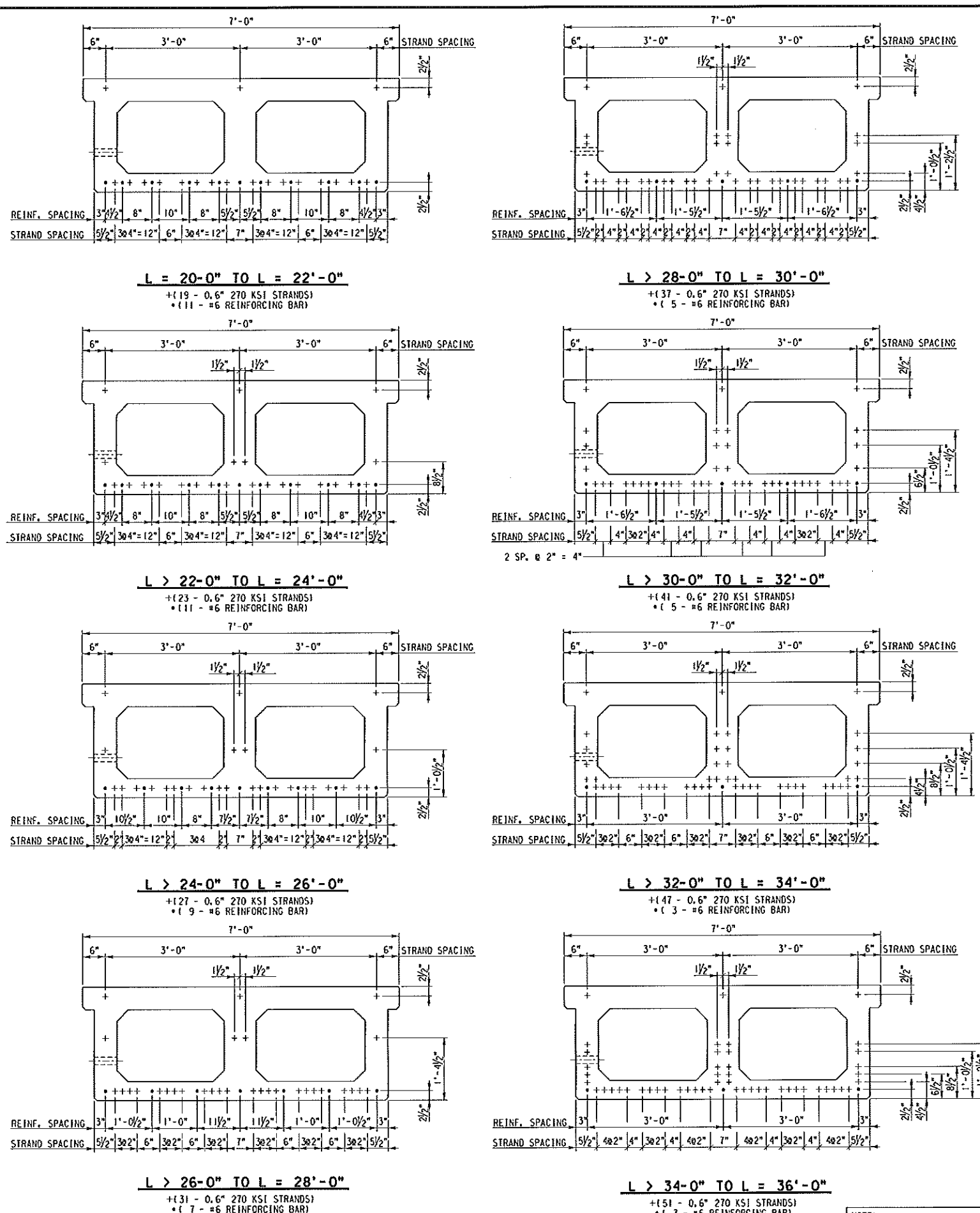
REVISIONS			DESIGN BY: MLM	DRAWN BY: DTP	CHECKED BY: MLM
8/03	A	CHANGE SIZE & SPACING OF CURB BAR	APPROVED:		
10/03	B	1" DIA. HOLES IN WALK (NOTE 8)	<i>K.H. Jannison</i>		
2/04	C	LIFTING LOOPS, STIRRUPS, I.D. PLATE	BNSF - ASSISTANT DIRECTOR STRUCTURES DESIGN		
1/08	D	CURB REBARS	<i>George J. Mann</i>		
10/06	E	CURB REBARS & JOINT, OPTIONAL LOOP	UPRR - MGR SPECIAL PROJECTS STRUCTURES DESIGN		
12/07	F	STRAND PATTERNS, WEIGHTS, MISC.			

BNSF RAILWAY **UNION PACIFIC**

BRIDGE STANDARDS
CONCRETE BEAM BRIDGES
30"x7'-0" DOUBLE BOX BEAM
VARIOUS LENGTHS
FRAMING AND REINFORCING

FILE OWNER: UPRR DATE: MAY 2003
PLAN NO.: 600000 SHEET: BG1

FILE NAME: p:\Navigation\gfv\cabin\log\mtrn.std



GENERAL NOTES

CONCRETE:
Concrete material, placing and curing shall be in accordance with the requirements specified in BNSF / UPR Joint Specifications for Precast / Prestressed Concrete Products and the current edition of Chapter 8 of the AREMA Manual for Railway Engineering.

The compressive strength of the beam concrete shall be as specified in table below. The compressive strength of the curb concrete shall exceed 4000 psi at 28 days.

TYPE	LENGTH	AT TRANSFER	AT 28 DAYS
1	L ≤ 30	4,500	6,000
1	30 < L ≤ 34	5,000	7,000
1	L > 34	5,500	7,000
2	L ≤ 24	5,500	7,000
2	L > 24	6,000	8,500

Air entraining agents shall be in accordance with the requirements specified in the current edition of ASTM C260. The total entrained air content shall be 6% ± 1% by volume of the plastic concrete.

Concrete aggregate shall be in accordance with the requirements specified in the current edition of ASTM C33. Coarse aggregate shall be Size No. 67.

PRESTRESSING STRAND:
Prestressing strand shall be 0.6 inch diameter, seven wire, uncoated, low relaxation strand which is in accordance with the requirements specified in ASTM A416. The strand shall have an ultimate tensile strength of 270 ksi. The initial prestress shall be 43,400 lbs. per strand unless noted otherwise.

Strand shall be tested in accordance with PCI recommendations (Mustafa Method) and certified by the fabricator as having adequate bond characteristics to satisfy the prediction equations for transfer and development length given in the AREMA Manual for Railway Engineering.

An alternate strand pattern which has the same eccentricity as the pattern shown on this plan and is better suited to the manufacturer's facilities will be considered. Manufacturer must submit plans and computations for Railroad approval prior to casting.

REINFORCING STEEL:
Reinforcing steel shall be deformed, per current ASTM A615 Specification and meet grade 60 requirements, except bars crossing curb joint to be per current ASTM A1035 specification. Bars required to meet ASTM A1035 are noted in the Bending Diagrams.

Fabrication of reinforcing steel shall be per Chapter 7 of the CRSI Manual of Standard Practice. Dimensions of bending details are out to out of bar.

Reinforcing steel is to be blocked to proper location and securely wired against displacement. Use plastic protected reinforcing supports, meeting CRSI specifications Chapter 3, Class 1. Tack welding of reinforcing is prohibited. Minimum concrete cover on reinforcement shall meet current AREMA requirements.

DESIGN LOADS:
Dead Load (assumed - lb. per lin. ft. of track):

Track, fasteners, etc.	200
Ballast	4,065
Curb, Walk, & Handrail	560
Beams	2,825
Total	7,650

Live Load: Cooper E80; centrifugal force and effects of eccentricity and superelevation applied per provisions of AREMA Chapter 8. Design superelevation is 5" with 2" unbalance.

Impact: $\frac{225}{\sqrt{L}}$ (where L = L - 14")
Type 1 beams have been designed to accommodate a maximum offset between the centerline of track and the center of the longitudinal joint between beams of 6 inches. Type 1 beams shall be supplied with curb.

Type 2 beams have been designed to accommodate the placement of the track anywhere on the beam. Type 2 beams may be supplied with or without a curb.

MANUFACTURE:
Production procedures and dimensional tolerances for the manufacture of precast, prestressed beams shall be in accordance with the AREMA Manual for Railway Engineering and the Prestressed Concrete Institute's current Manual MNL 116 for Quality Control.

Tolerance for location of lifting loops shall be ± 1/2".
The ends of the strands shall be burned off and recessed to a depth of 1 inch. Such recesses and minor spalls must be filled and finished to the plan dimensions using an epoxy bonding compound and grout.

Curb shall be cast after beam is removed from form.
Concrete bonding agent: refer to specifications.

Surfaces shall be formed in a manner which will produce a smooth and uniform appearance without rubbing or plastering. Unless otherwise noted, exposed edges of 90-degrees or less are to be chamfered 3/4" x 3/8". Unformed surfaces shall have a smooth finish free of all float and trowel marks.

The fabricator shall stencil the fabricator's name, date of fabrication, piece mark, and actual lifting weight of location shown.

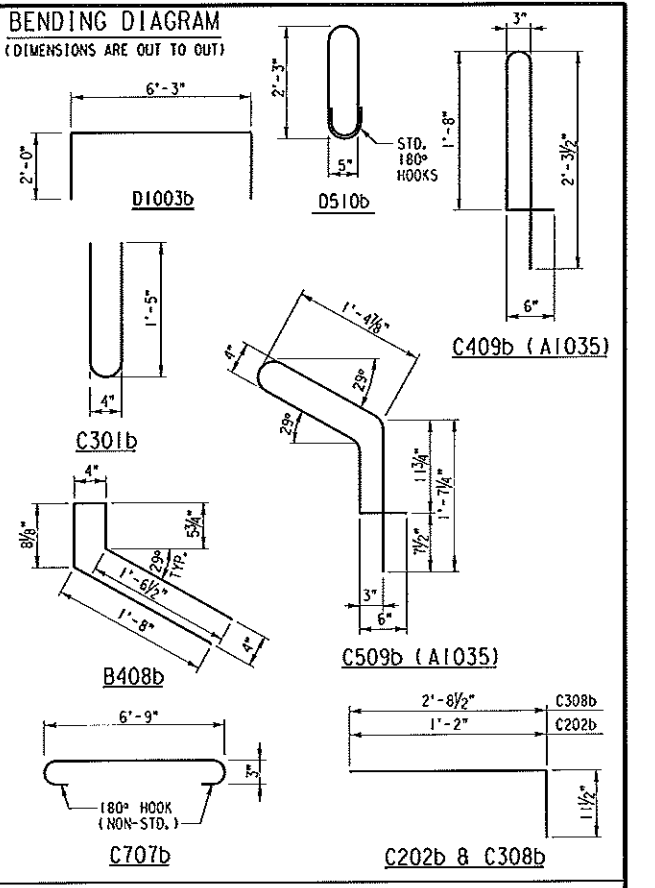
The area around lifting loops shall not be recessed. Lifting loops to be removed in field flush with concrete surface.

Inspection, loading, and securing for shipment: refer to specifications.

If lifted with slings instead of lifting loops, slings must not be placed more than 3'-0" from ends of beams.

For intermediate beam lengths (not shown in "Spacing of Handrail Connections" table):
Vertical Curb - Length 'A' shall be held constant and length 'B' shall be adjusted.
Sloped Curb - Length 'D' shall be held constant and length 'C' shall be adjusted.

LIFTING LOOPS:
Fabricator is responsible for developing lifting loop anchorage detail to provide safety factor of 4 on working load. Detail shall be proof-tested with test results kept on file by fabricator and available for inspection by the railroad.



BAR DESIGNATIONS CONSIST OF BAR SIZE AND LENGTH FOLLOWED BY THE LETTER "B" IF BENT. BAR SIZES ARE REPRESENTED BY THE LETTERS A THROUGH L CORRESPONDING TO BAR NUMBERS 2 THROUGH 18. BAR LENGTHS ARE GIVEN IN FEET AND INCHES WITH THE FIRST DIGIT(S) INDICATING FEET AND THE LAST TWO DIGITS INDICATING INCHES.

LETTER	SIZE #
B	3
C	4
D	5
E	6

NOMINAL WEIGHT * (ONE BEAM)

NOMINAL BEAM LENGTH (L)	WEIGHT (WITH CURB AND WALK)		WEIGHT (WITH SLOPED CURB)		WEIGHT (WITH SPECIAL CURB)		WEIGHT (WITH VERT. CURB)		WEIGHT (NO CURB)	
	LB.	TONS	LB.	TONS	LB.	TONS	LB.	TONS	LB.	TONS
PER FT	1,685	0.85	1,665	0.84	1,595	0.80	1,525	0.77	1,495	0.75
16'	26,800	13.4	26,400	13.2	25,300	12.7	24,300	12.2	23,200	11.6
17'	28,500	14.3	28,100	14.1	26,900	13.5	25,800	12.9	24,600	12.3
18'	30,100	15.1	29,700	14.9	28,400	14.2	27,200	13.6	25,900	13.0
19'	31,800	15.9	31,400	15.7	30,000	15.0	28,800	14.4	27,300	13.7
20'	33,400	16.7	33,000	16.5	31,600	15.8	30,300	15.2	28,700	14.4
21'	35,100	17.6	34,700	17.4	33,200	16.6	31,800	15.9	30,100	15.1
22'	36,800	18.4	36,300	18.2	34,700	17.4	33,300	16.7	31,500	15.8
23'	38,500	19.3	38,000	19.0	36,400	18.2	34,800	17.4	32,900	16.5
24'	40,200	20.1	39,600	19.8	38,000	19.0	36,300	18.2	34,400	17.2
25'	41,800	20.9	41,300	20.7	39,500	19.8	37,900	19.0	35,800	17.9
26'	43,500	21.8	42,900	21.5	41,100	20.6	39,300	19.7	37,100	18.6
27'	45,100	22.6	44,600	22.3	42,700	21.4	40,900	20.5	38,600	19.3
28'	46,800	23.4	46,200	23.1	44,300	22.2	42,400	21.2	40,000	20.0
29'	48,500	24.3	47,900	24.0	45,900	23.0	43,900	22.0	41,400	20.7
30'	50,200	25.1	49,500	24.8	47,400	23.7	45,400	22.7	42,700	21.4
31'	51,900	26.0	51,200	25.6	49,100	24.6	47,000	23.5	N/A	N/A
32'	53,600	26.8	52,900	26.5	50,700	25.4	48,500	24.3	N/A	N/A
33'	55,300	27.7	54,600	27.3	52,300	26.2	50,100	25.1	N/A	N/A
34'	56,900	28.5	56,200	28.1	53,800	26.9	51,500	25.8	N/A	N/A
35'	58,500	29.3	57,800	28.9	55,300	27.7	53,000	26.7	N/A	N/A
36'	60,100	30.2	59,400	29.7	56,800	28.4	54,400	27.4	N/A	N/A

* Computed weights using nominal dimensions. For planning purposes only. Fabricator to determine actual lifting weight (see Note 5 on Sheet B61). If scale weight not available, use maximum weights on Sheet B63.

REVISIONS		
DATE	LTR.	DESCRIPTION
6/03	A	CHANGE SIZE OF CURB BARS
10/03	B	ADD WT. SPECIAL & VERTICAL CURBS
2/04	C	CHANGE MIN. SPAN LENGTH TO 20'
10/06	D	CURB REBARS
10/06	E	MIN. SPAN = 16', CURB REBARS
12/07	F	STRAND PATTERNS, WEIGHTS, MISC.

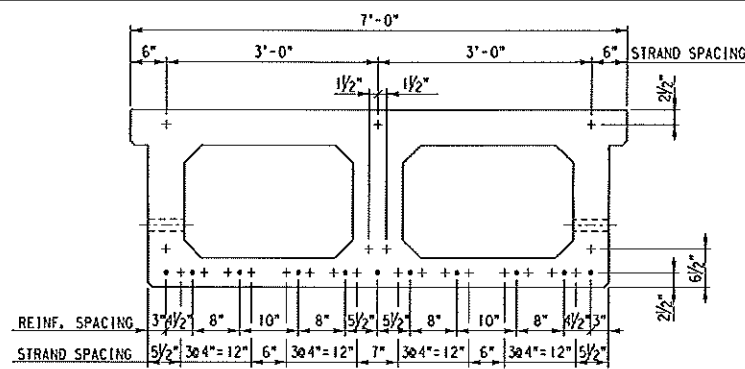
DESIGN BY: MLM | DRAWN BY: DTP | CHECKED BY: MLM
APPROVED:
K.H. Jemison
BNSF - ASSISTANT DIRECTOR STRUCTURES DESIGN
George J. Mann
UPRR - MGR. SPECIAL PROJECTS STRUCTURES DESIGN

BNSF **UNION PACIFIC**

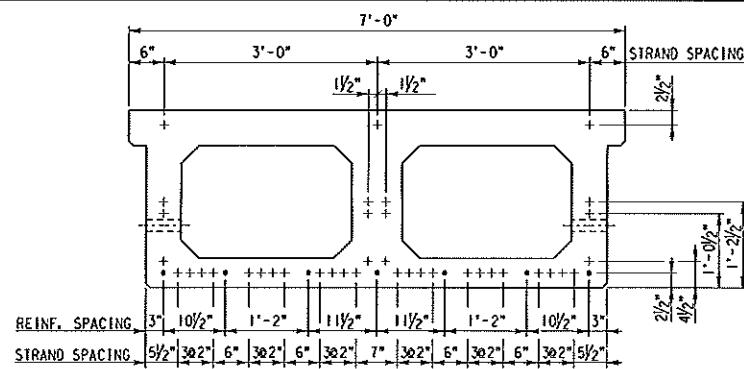
BRIDGE STANDARDS
CONCRETE BEAM BRIDGES
30"x7'-0" DOUBLE BOX BEAM
NOTES, REBAR DETAILS,
TYPE 1 STRAND PATTERNS

FILE OWNER: UPRR | DATE: MAY 2003
PLAN NO.: 500000 | SHEET: B62

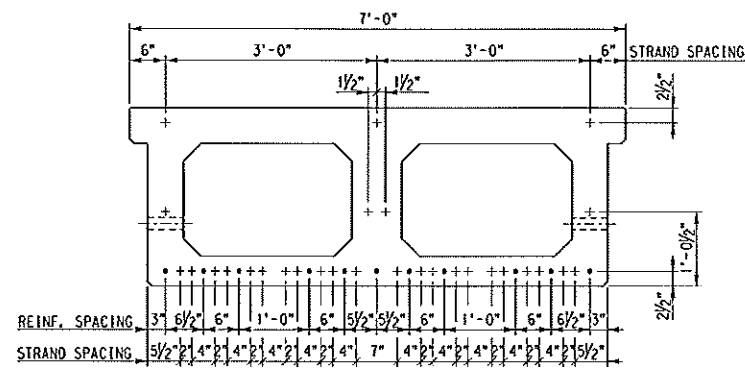
NOTE:
STRAND PATTERNS ARE TO BE USED ONLY FOR THE LENGTHS SHOWN. IF THE FABRICATOR, FOR CONVENIENCE, DESIRES TO USE A PATTERN SHOWN FOR A GREATER LENGTH, APPROVAL MUST BE OBTAINED FROM THE ENGINEER OF THE PURCHASING RAILROAD.



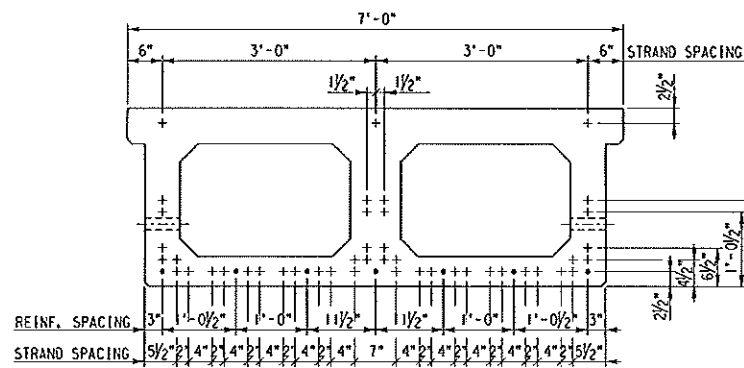
L = 20'-0" TO 22'-0"
 + (23 - 0.6" 270 KSI STRANDS)
 + (11 - #6 REINFORCING BAR)



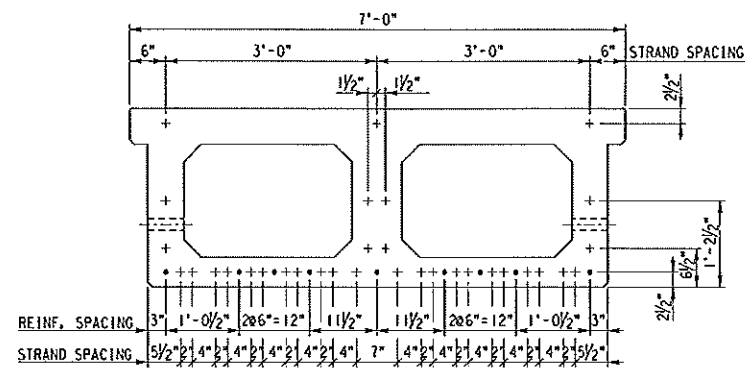
L > 26'-0" TO 28'-0"
 + (39 - 0.6" 270 KSI STRANDS)
 + (7 - #6 REINFORCING BAR)



L > 22'-0" TO 24'-0"
 + (29 - 0.6" 270 KSI STRANDS)
 + (11 - #6 REINFORCING BAR)

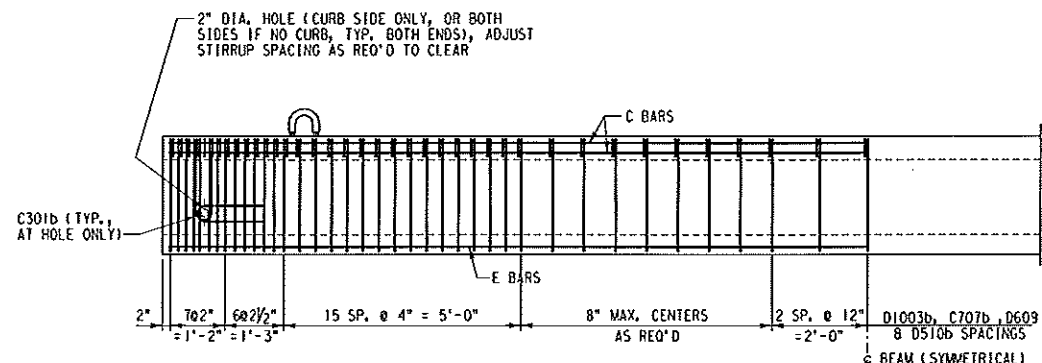


L > 28'-0" TO 30'-0"
 + (45 - 0.6" 270 KSI STRANDS)
 + (7 - #6 REINFORCING BAR)



L > 24'-0" TO 26'-0"
 + (33 - 0.6" 270 KSI STRANDS)
 + (9 - #6 REINFORCING BAR)

TYPE 2 30" BOX BEAMS
 SCALE: 3/4" = 1'-0"
 (MAXIMUM LENGTHS ARE NOMINAL (L))



ELEVATION w/ CONVENTIONAL REINFORCING
 SCALE: TYPE 2 BEAMS ONLY (FOR TYPE 1 SEE SHEET BG1) 1/2" = 1'-0"

NOTE:
 STRAND PATTERNS ARE TO BE USED ONLY FOR THE LENGTHS SHOWN. IF THE FABRICATOR, FOR CONVENIENCE, DESIRES TO USE A PATTERN SHOWN FOR A GREATER LENGTH, APPROVAL MUST BE OBTAINED FROM THE ENGINEER OF THE PURCHASING RAILROAD.

MAXIMUM LIFTING WEIGHT * (ONE BEAM)										
NOMINAL BEAM LENGTH (L)	WEIGHT (WITH CURB AND WALK)		WEIGHT (WITH SLOPED CURB)		WEIGHT (WITH SPECIAL CURB)		WEIGHT (WITH VERT. CURB)		WEIGHT (NO CURB)	
	LB.	TONS	LB.	TONS	LB.	TONS	LB.	TONS	LB.	TONS
PER FT	1,780	0.89	1,755	0.88	1,685	0.85	1,610	0.81	1,580	0.79
16'	28,300	14.2	27,900	14.0	26,800	13.4	25,700	12.9	24,500	12.3
17'	30,100	15.1	29,700	14.9	28,500	14.3	27,300	13.7	26,000	13.0
18'	31,800	15.9	31,400	15.7	30,100	15.1	28,800	14.4	27,400	13.7
19'	33,600	16.8	33,100	16.6	31,800	15.9	30,400	15.2	28,900	14.5
20'	35,300	17.7	34,900	17.5	33,400	16.7	32,000	16.0	30,300	15.2
21'	37,100	18.6	36,600	18.3	35,100	17.6	33,600	16.8	31,800	15.9
22'	38,800	19.4	38,300	19.2	36,700	18.4	35,200	17.6	33,300	16.7
23'	40,700	20.4	40,100	20.1	38,400	19.2	36,800	18.4	34,800	17.4
24'	42,400	21.2	41,900	21.0	40,100	20.1	38,400	19.2	36,300	18.2
25'	44,200	22.1	43,600	21.8	41,800	20.9	40,000	20.0	37,800	18.9
26'	45,900	23.0	45,300	22.7	43,400	21.7	41,600	20.8	39,200	19.6
27'	47,700	23.9	47,100	23.6	45,100	22.6	43,200	21.6	40,800	20.4
28'	49,500	24.8	48,800	24.4	46,800	23.4	44,800	22.4	42,300	21.2
29'	51,300	25.7	50,600	25.3	48,500	24.3	46,400	23.2	43,700	21.9
30'	53,000	26.5	52,300	26.2	50,100	25.1	48,000	24.0	45,200	22.6
31'	54,800	27.4	54,100	27.1	51,900	26.0	49,700	24.9	N/A	N/A
32'	56,600	28.3	55,900	28.0	53,500	26.8	51,300	25.7	N/A	N/A
33'	58,400	29.2	57,700	28.9	55,300	27.7	52,900	26.5	N/A	N/A
34'	60,200	30.1	59,400	29.7	56,900	28.5	54,500	27.3	N/A	N/A
35'	62,000	31.1	61,400	30.7	58,800	29.4	56,300	28.2	N/A	N/A
36'	64,000	32.0	63,100	31.6	60,500	30.3	57,900	29.0	N/A	N/A

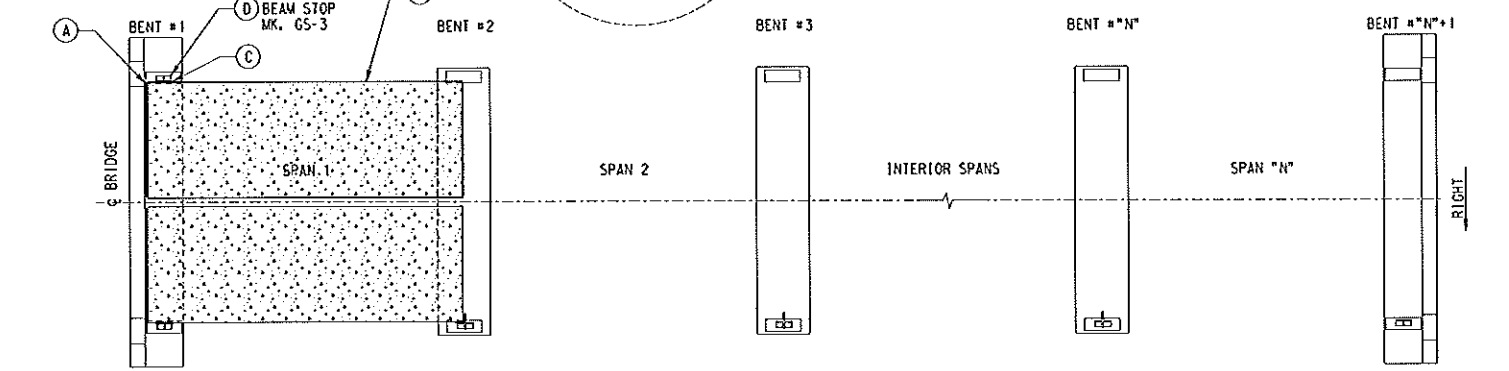
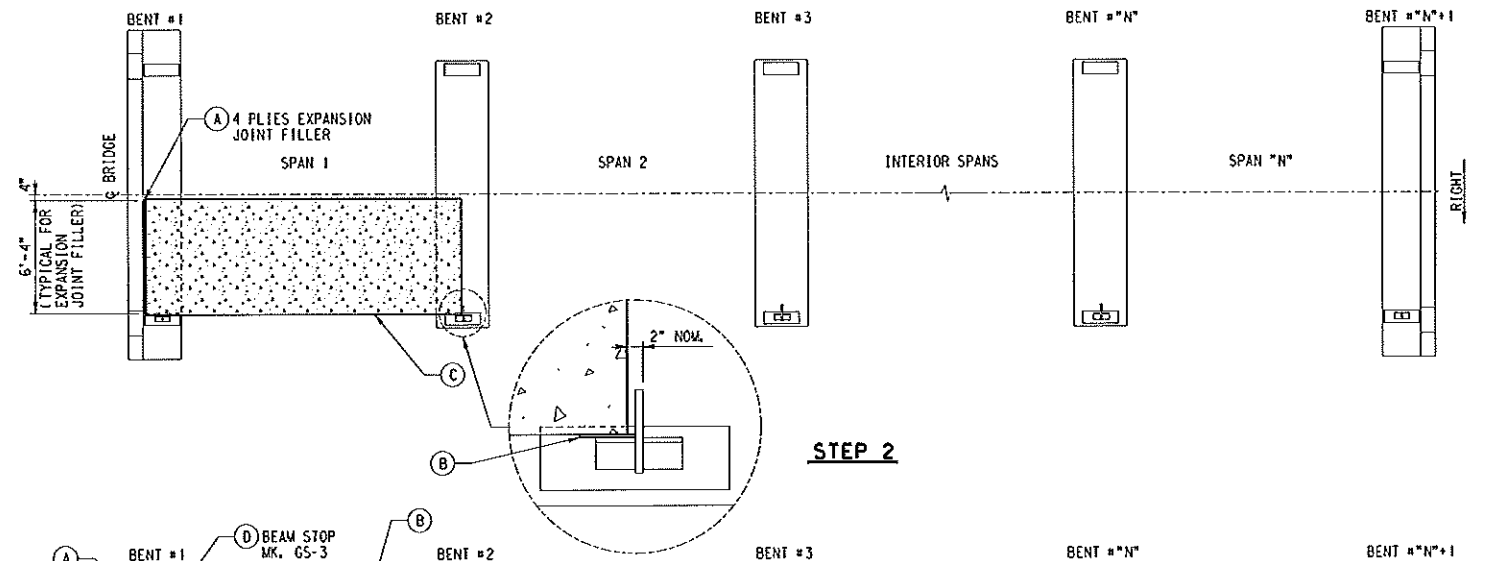
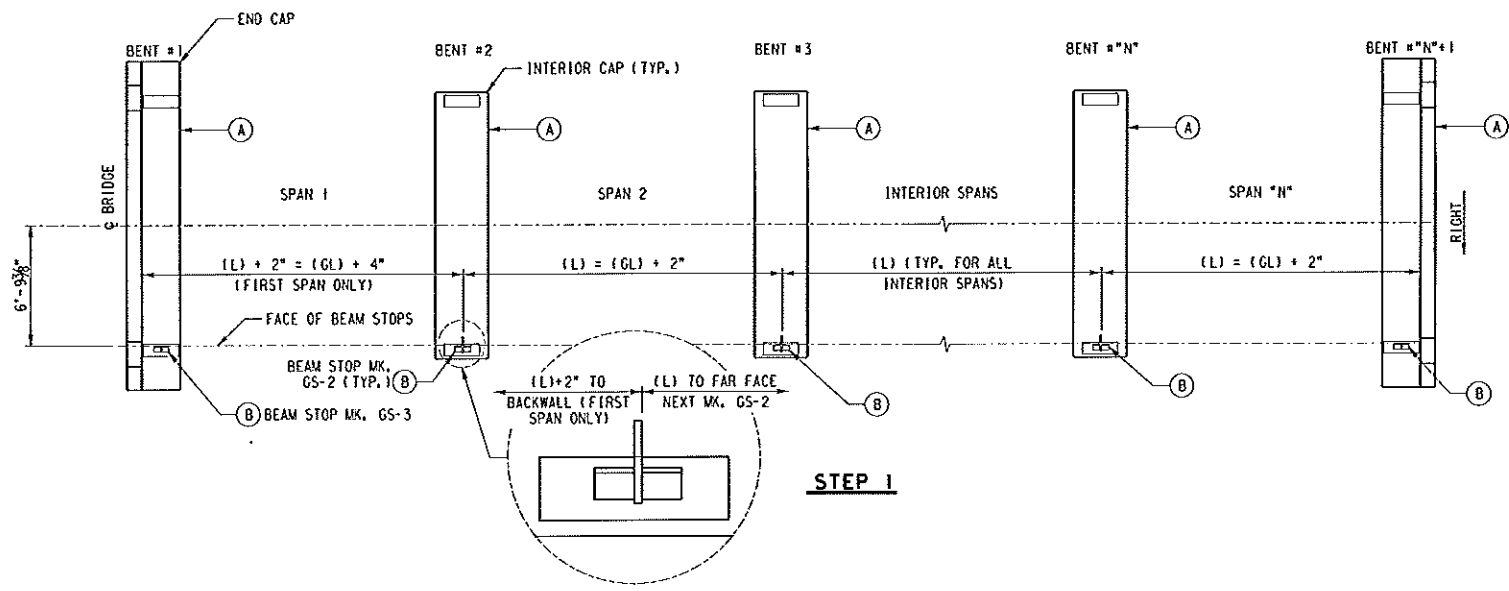
* Computed weights using maximum dimensions per allowable tolerances. Use for lifting weight if scale weight is not available.



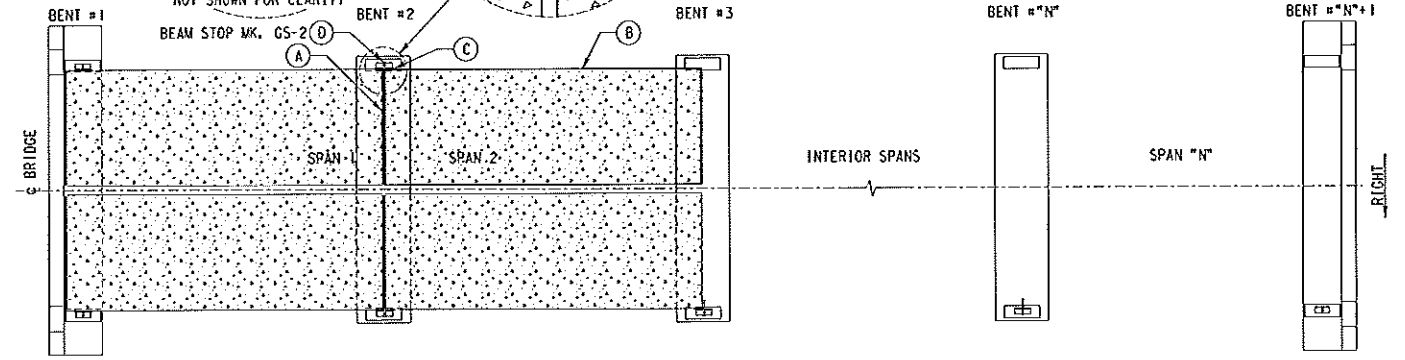
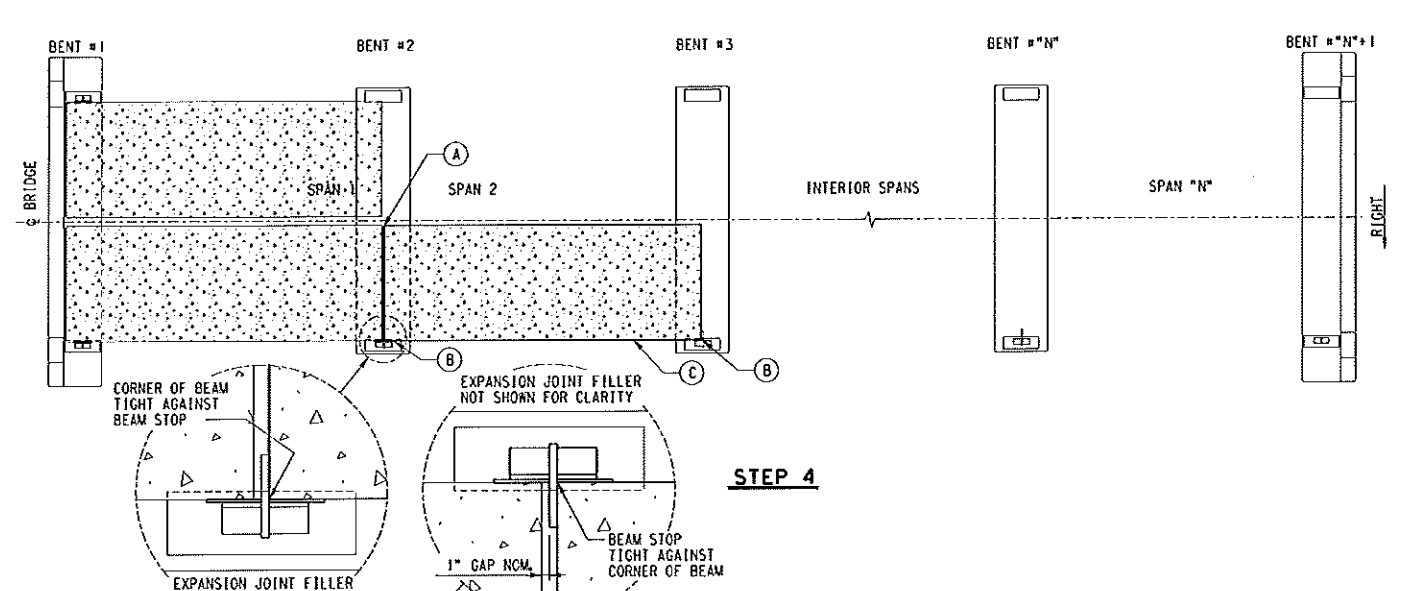
BRIDGE STANDARDS
 CONCRETE BEAM BRIDGES
30"x7'-0" DOUBLE BOX BEAM TYPE 2 REINFORCING AND STRAND PATTERNS

FILE OWNER: UPRR DATE: MAY 2003
 PLAN NO.: 500000 SHEET: BG3

REVISIONS			DESIGN BY: MLM	DRAWN BY: DTP	CHECKED BY: MLM
DATE	LTR	DESCRIPTION	APPROVED:		
2/04	A	CHANGE MIN. SPAN LENGTH TO 20'	 BNSF - ASSISTANT DIRECTOR STRUCTURES DESIGN UPRR - MGR SPECIAL PROJECTS STRUCTURES DESIGN		
10/06	B	CHANGE MIN. SPAN LENGTH TO 16'			
5/07	C	ELIMINATE MIN. SPAN LENGTH			
12/07	F	STRAND PATTERNS, AREMA 2006 IMPACT			
/	/	/			



CONSTRUCTION SEQUENCE
SCALE: 3/8" = 1'-0"



STEP 5

GENERAL NOTES:

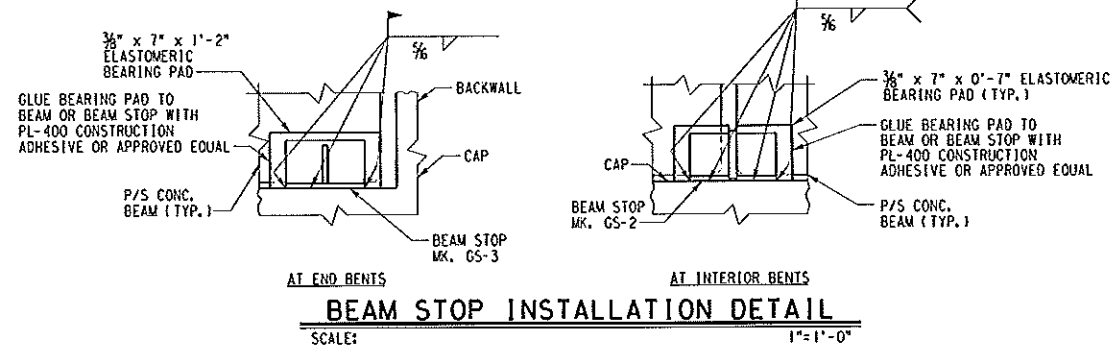
For illustration purposes, construction sequence based on assumptions that construction starts at Bent #1 (end cap) and that right beams will be placed before left beams. Construction may actually proceed from either end with beam placement in either order; modify instructions to suit. Construction sequence may be varied due to site or project constraints. Slab beams shown in details; box beam installation sequence is identical. Install handrail assembly on each beam before lifting into place. Adjust number of plies of expansion joint filler as required to maintain proper beam spacing.

LIFTING LOOP REMOVAL:

After each beam is set and in final position, remove lifting loops flush with concrete surface.

RECOMMENDED CONSTRUCTION SEQUENCE:

- (A) Drive piles and place all caps, including end caps if possible.
(B) Weld all beam stops on right side of caps. Place beam stops to form straight line exactly 6'-9 3/8" from centerline of bridge. Center MK. GS-3 on end cap. Locate for face of MK. GS-2 to provide guide for placement of beam (see Step 4, B).
 - (A) Place expansion joint filler against right side of backwall.
(B) Install 3/8" elastomeric pads.
(C) Place Span 1 right beam tight against pad.
 - (A) Place expansion joint filler against left side of backwall.
(B) Place Span 1 left beam tight against and lined up with right beam.
(C) Install 3/8" elastomeric pads.
(D) Weld left side Beam Stop MK. GS-3 on end cap, tight against pad.
 - (A) Place expansion joint filler against Span 1 right side beam, notching around Beam Stop MK. GS-2 as needed.
(B) Install 3/8" elastomeric pads.
(C) Place Span 2 right beam, seat corner firmly against both faces of Bent #2 Beam Stop MK. GS-2, leaving a gap at Bent #3 MK. GS-2.
 - (A) Place expansion joint filler against Span 1 left side beam, cutting notch for Beam Stop MK. GS-2 (to be placed later).
(B) Place Span 2 left beam tight against and lined up with right beam.
(C) Install 3/8" elastomeric pads.
(D) Place Bent #2 left side Beam Stop MK. GS-2 tight against corner of Span #2 beam (leaving gap to Span #1 beam). Weld in place.
 - Repeat steps 4 and 5 for all remaining spans. Place Beam Stop MK. GS-3 on left side of end beam after placement of final beam.
- Each wingwall may be placed at any time after corresponding end span and Beam Stop MK. GS-3 have been installed.



BEAM STOP INSTALLATION DETAIL
SCALE: 1" = 1'-0"

REVISIONS		
DATE	LTR.	DESCRIPTION
9/07	A	GENERAL UPDATE
/		
/		
/		
/		
/		

DESIGN BY: UPRR | DRAWN BY: UPRR | CHECKED BY: HDR
APPROVED:
George J. Meyn 4-17-2007
UPRR - MGR/SPECIAL PROJECTS STRUCTURES DESIGN

UNION PACIFIC
BRIDGE STANDARDS
CONCRETE BEAM BRIDGES
CONSTRUCTION SEQUENCE & BEAM STOP INSTALLATION
FILE OWNER: UPRR | DATE:
PLAN NO.: 630000 | SHEET: A1

FILE NAME: p:\n\std\on\gen\std\std\regemr.rvt

**PILE LAYOUT FOR END BENTS
8" BALLAST UNDER
TIMBER TIES**

BEAM DEPTH	END BENTS			
	yENDCAP	X	X2	Z
14"	4'-6 3/4"	5'-8"	4'-2"	1'-1 3/4"
16"	4'-8 3/4"	5'-8 3/8"	4'-2 3/8"	1'-2 1/4"
18"	4'-10 3/4"	5'-8 3/4"	4'-2 3/4"	1'-2 3/4"
20"	5'-0 3/4"	5'-9"	4'-3"	1'-3 1/4"
30"	5'-10 3/4"	5'-10 5/8"	4'-4 5/8"	1'-5 3/4"

**PILE LAYOUT FOR END BENTS
12" BALLAST UNDER
CONCRETE TIES**

BEAM DEPTH	END BENTS			
	yENDCAP	X	X2	Z
14"	4'-11 3/4"	5'-8 1/2"	4'-2 3/8"	1'-3"
16"	5'-1 3/4"	5'-9 1/8"	4'-3 1/8"	1'-3 1/2"
18"	5'-3 3/4"	5'-9 1/2"	4'-3 1/2"	1'-4"
20"	5'-5 3/4"	5'-9 3/8"	4'-3 3/8"	1'-4 1/2"
30"	6'-3 3/4"	5'-11 1/2"	4'-5 1/2"	1'-7"

**MAXIMUM PILE LOAD
(FOR END BENTS - TONS)**

EQUILIBRIUM SUPERELEVATION	3-PILE BENT INSIDE PILE PLUMB				3-PILE BENT 3:12 FORWARD BATTER ON INSIDE PILE				4-PILE BENT INSIDE PILES PLUMB				4-PILE BENT 3:12 FORWARD BATTER ON INSIDE PILES			
	SPAN L				SPAN L				SPAN L				SPAN L			
	34'	32'	30'	28'	34'	32'	30'	28'	34'	32'	30'	28'	34'	32'	30'	28'
0"	82	79	76	72	113	112	111	110	--	--	--	--	--	--	--	--
≤ 2"	89	86	82	79	113	112	111	110	--	--	--	--	--	--	--	--
≤ 3"	92	89	85	81	113	112	111	110	--	--	--	--	--	--	--	--
≤ 4"	--	--	--	--	--	--	--	--	75	72	69	67	100	95	90	86
≤ 7"	--	--	--	--	--	--	--	--	85	82	78	75	109	104	99	94

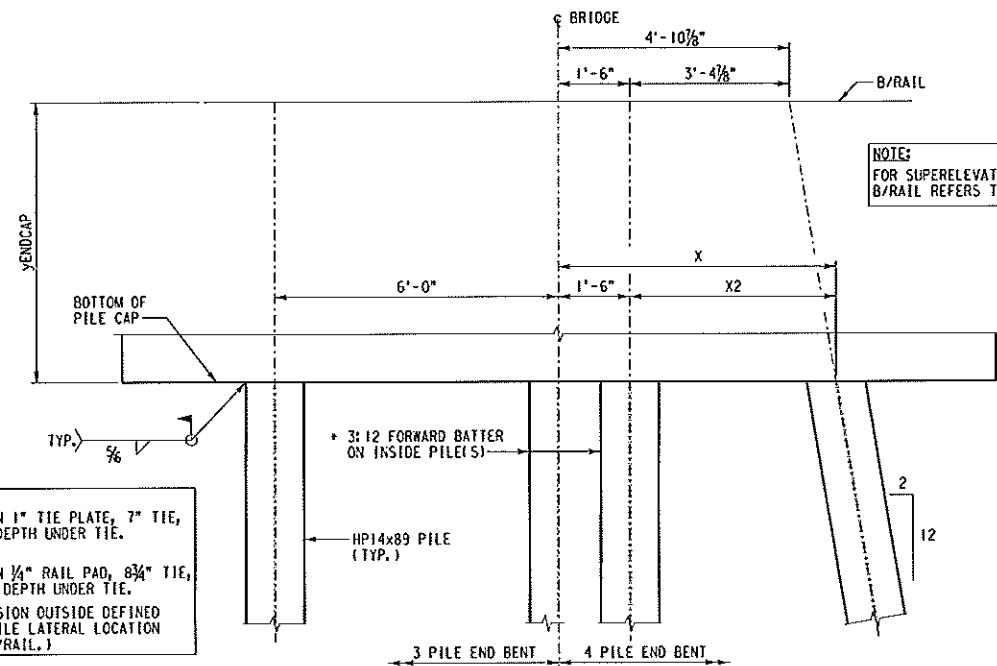
GENERAL NOTES:

Longitudinal bracing between bents required in selected bays on bridges longer than 200 ft. See Sheets A6 & A7.
 Pile capacities:
 For required driven pile capacities, see "Maximum Pile Load" table.
 Steel:
 Piles - ASTM A588
 Pile splices - ASTM A572 Gr. 50 or A588
 Bracing - ASTM A588
 Shop paint:
 None
 Welding:
 Use shielded metal arc welding (SMAW) or flux core arc welding (FCAW) process per AWS D1.5. Acceptable filler metal is E7018 electrode for SMAW and E70T-1 or E70T-5 electrode for FCAW. For other acceptable electrodes, refer to AWS D1.5.

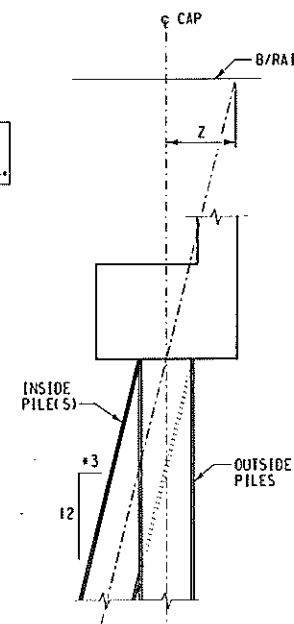
Splices:
 Splices shall be made a sufficient distance above the ground or water (not less than one foot) so that the splice can be observed during driving. The number of splices shall be kept to a minimum. Splicing cut-offs or short pieces to make a main bearing pile is not permitted. The pile shall be driven so that the upper splice is at least 10 feet below the ground surface.
 Tip reinforcement:
 Pile tip reinforcement shall be used where piles may be damaged by driving through heavy gravel, cobbles, boulders or formations known to contain obstructions. Tip reinforcement shall also be used when the pile will bear on rock.
 Driving tolerances:
 Variations greater than 1/8 inch per foot from vertical or batter line shall not be allowed. The deviation of the top of piles in a bent shall not exceed one inch from the plan location. Rotation of pile about its centerline shall not exceed 5 degrees from its orientation as shown in plans. Piles not meeting tolerance requirements or out of line as to impair usefulness, or piles that are damaged in driving as to impair structural capacity, shall be pulled and redriven or an additional pile shall be driven to provide added support. If any numbered pile cannot be driven to their capacity, notify the Structures Design Group, Office of AVP Engineering Design.

BENT DESIGN NOTES:

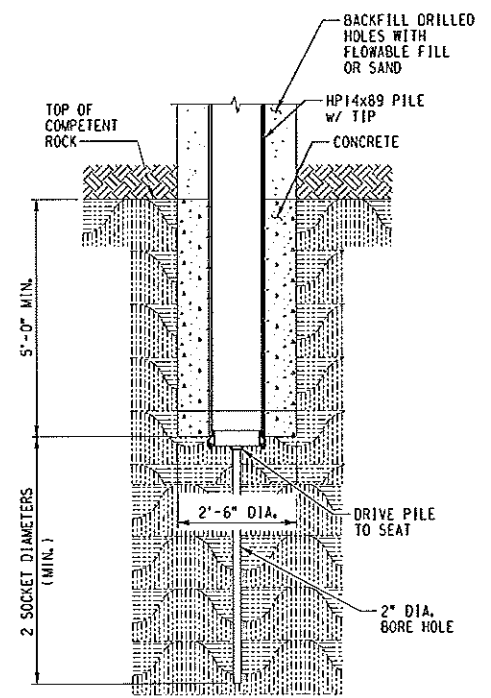
Selection of pile configuration and maximum heights based on equilibrium super-elevation (regardless of actual super-elevation installed). Refer to UPRR Track Standards Book, Std. Dwg. 0020 latest revision.
 Preferred pile configuration is with 2:12 transverse pile batter on interior bents and all plumb pile for end bents.
 Standard design is valid for minimum pile penetration of 10' if geotechnical investigation demonstrates that piles can be firmly seated in hard rock or shale; otherwise minimum pile penetration of 25' required. If these values cannot be achieved, piles shall be socketed into rock per detail on this sheet. For any other conditions, special design is required.
 For span lengths less than 28', use values shown for 28' spans.
 Bent shall be driven per requirements of longer span length supported. For example, for a bent supporting 28' and 34' spans, drive per 34' span requirements.
 Maximum track offset (from bridge centerline) is 6' with this bent standard.



END BENT PILE LAYOUT
SCALE: 1/2" = 1'-0"



SIDE VIEW

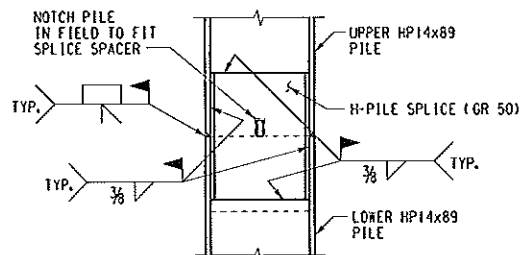


PILE SOCKET DETAIL
SCALE: 1/2" = 1'-0"
EST. VOLUME OF CONCRETE = 0.9 CU. YD. PER 5' SOCKET DEPTH

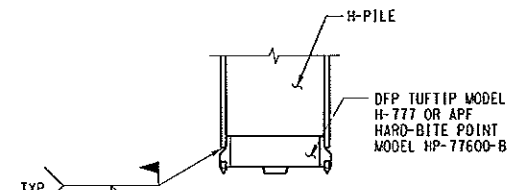
- PILE SOCKET NOTES:**
- SEE BENT DESIGN NOTES TO DETERMINE WHEN PILE SOCKETING IS REQUIRED.
 - PILING SHALL BE SEATED IN PREDRILLED HOLES IN THE ROCK AND ENCASED IN CONCRETE WITHIN THE BEDROCK (SEE DETAIL).
 - MINIMUM DEPTH OF PILE SOCKET SHALL BE 5'-0" INTO ROCK.
 - PILING WITH TIP REINFORCEMENT SHALL BE PLACED INTO ROCK SOCKET AND DRIVEN TO ACHIEVE REQUIRED CAPACITY.
 - SEATED PILE SHALL BE ENCASED IN ROCK SOCKET WITH CONCRETE.
 - MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 4000 LB. PER SQUARE INCH AT 28 DAYS.
 - BORE 2" DIA. HOLE IN CENTER OF PILE SEAT TO A MINIMUM DEPTH OF 2 SOCKET DIAMETERS.

TIMBER TIES:
 yCAP IS BASED ON 1" TIE PLATE, 7" TIE, AND 8" BALLAST DEPTH UNDER TIE.
CONCRETE TIES:
 yCAP IS BASED ON 1/4" RAIL PAD, 8 3/4" TIE, AND 12" BALLAST DEPTH UNDER TIE.
 (FOR yCAP DIMENSION OUTSIDE DEFINED RANGE, ADJUST PILE LATERAL LOCATION DIMENSIONS AT B/RAIL.)

NOTE:
 FORWARD BATTER ON INSIDE PILE(S) NOT REQUIRED FOR BRIDGES COMPOSED ENTIRELY OF CONCRETE BEAM SPANS.



ALTERNATE PILE SPLICE DETAIL
SCALE: 1" = 1'-0"



- TIP REINFORCEMENT INSTALLATION INSTRUCTIONS:**
- FIT POINT ONTO SQUARE CUT PILE.
 - WELD POINT TO THE PILE IN EITHER FLAT OR VERTICAL POSITION.
 - FILL THE AREA ACROSS BOTH FLANGES WITH WELD.

PILE TIP DETAIL
SCALE: 1" = 1'-0"

- INSTALLATION INSTRUCTIONS:**
 (NOTE: SPLICE IS SHOWN INSTALLED ON UPPER PILE SECTION FIRST. ALTERNATIVELY, SPLICE MAY BE INSTALLED ON BOTTOM SECTION FIRST.)
- NOTCH THE END OF H-PILE SECTION TO RECEIVE SPLICE FIRST (NOTCH TO ACCOMMODATE THE SPLICE SPACER BAR).
 - FIT SPLICE OVER NOTCHED END OF H-PILE AND FILLET WELD SPLICE END TO PILE WEB AS SHOWN.
 - PLACE THE UPPER H-PILE SECTION INTO POSITION ONTO THE LOWER SECTION.
 - COMPLETE FILLET WELD ALONG SPLICE EDGES.
 - WELD FLANGE JOINT BETWEEN UPPER AND LOWER PILE SECTIONS.

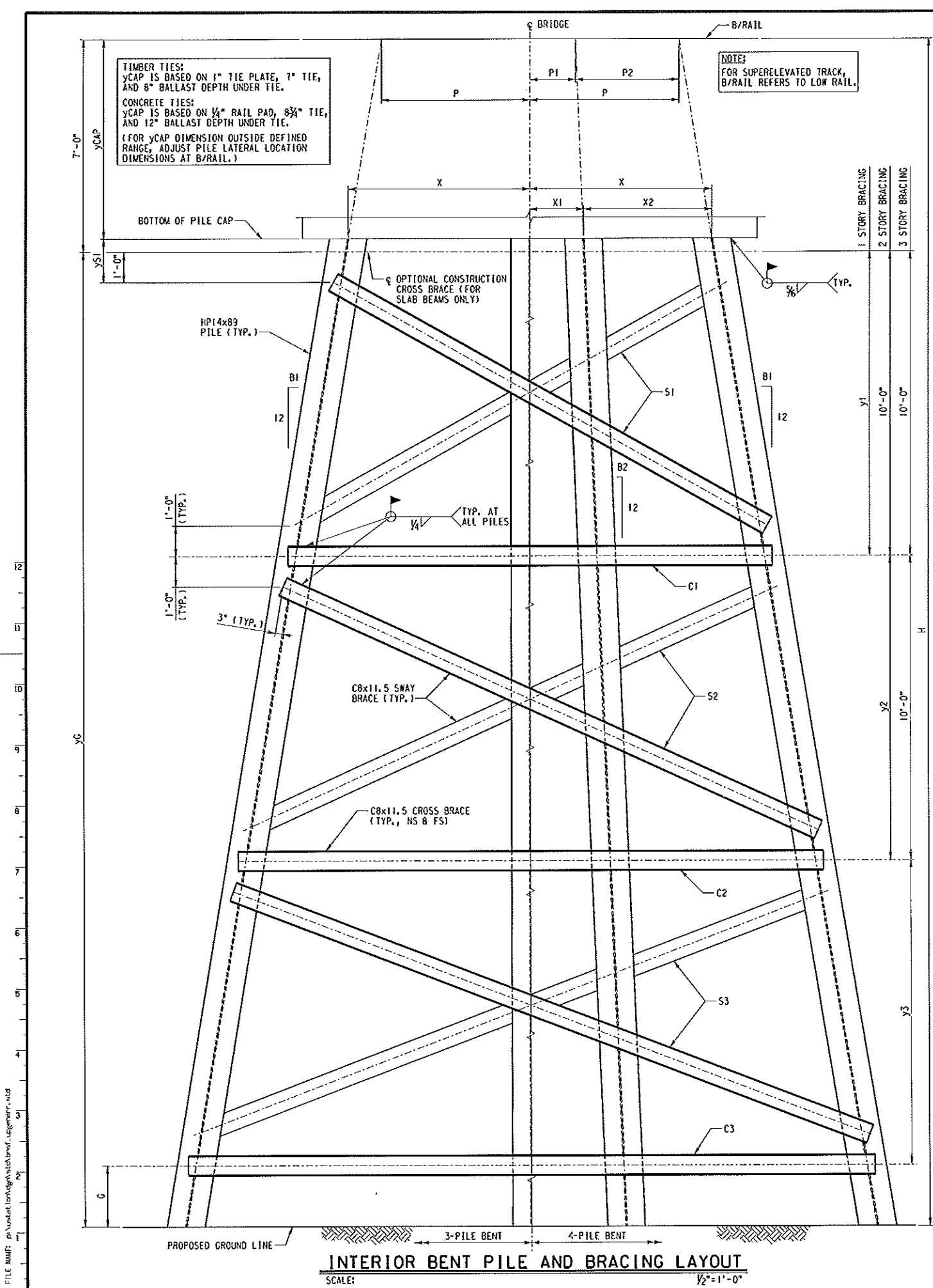
PILE SPLICE DETAIL
SCALE: 1" = 1'-0"

REVISIONS			DESIGN BY: UPRR	DRAWN BY: UPRR	CHECKED BY: HDR
DATE	LTR.	DESCRIPTION	APPROVED:		
9/07	A	REVISED SOCKET NOTES & GEN. UPDATE			
/					
/					
/					
/					
/					

George J. Meyer 4-17-2007
 UPRR - MGR/SPECIAL PROJECTS STRUCTURES DESIGN

UNION PACIFIC
BRIDGE STANDARDS
 CONCRETE BEAM BRIDGES
 H-PILE AND BRACING LAYOUT
 END BENT LAYOUT AND PILE LOADS
 PILE INSTALLATION DETAILS AND NOTES
 BENT DESIGN AND GENERAL NOTES
 (SHEET 1 OF 4)
 FILE OWNER: UPRR DATE:
 PLAN NO.: 530000 SHEET: A2

FILE NAME: p:\data\long\m\std\brn\ugener\std



TIMBER TIES:
yCAP IS BASED ON 1" TIE PLATE, 7" TIE, AND 8" BALLAST DEPTH UNDER TIE.

CONCRETE TIES:
yCAP IS BASED ON 1/4" RAIL PAD, 8 3/4" TIE, AND 12" BALLAST DEPTH UNDER TIE.
(FOR yCAP DIMENSION OUTSIDE DEFINED RANGE, ADJUST PILE LATERAL LOCATION DIMENSIONS AT B/RAIL.)

NOTE:
FOR SUPERELEVATED TRACK, B/RAIL REFERS TO LOW RAIL.

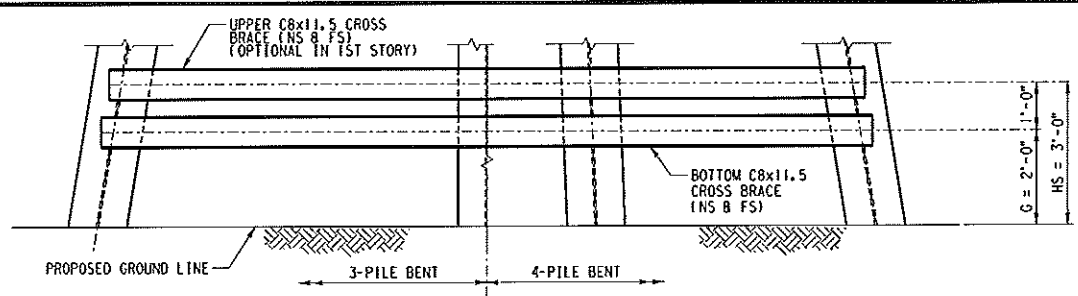
CONSTRUCTION NOTE:
ROUND UP TO THE NEAREST FOOT TO DETERMINE STORY HEIGHTS AND BRACING MEMBER LENGTHS.

BRACING NOTE:
STANDARD CBx11.5 BRACING SHOWN. IF HEAVY BRACING IS SPECIFIED, SUBSTITUTE C10x15.3 BRACING.

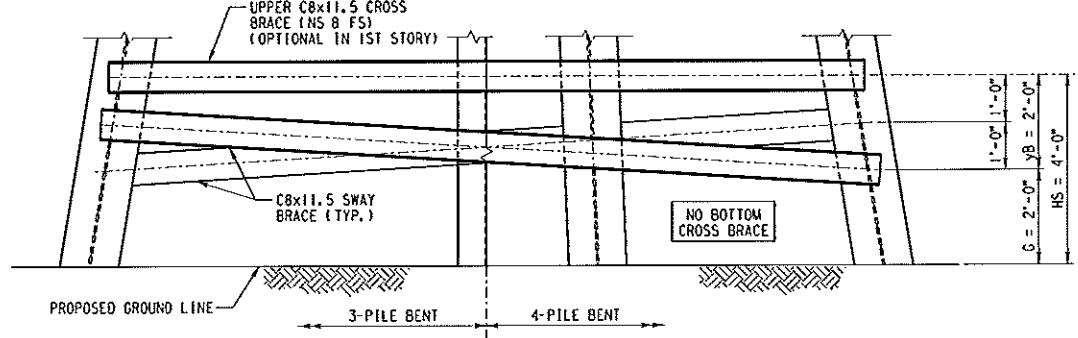
BOTTOM STORY BRACING NOTES:
HS = Height from ground line to centerline of cross brace for the story under consideration
yB = Height of bottom story
yG = Height from ground line to uppermost cross brace centerline
G = Distance from ground line to bottom brace centerline

The process for determining the bottom story bracing layout (as depicted in the details and charts) is as follows:

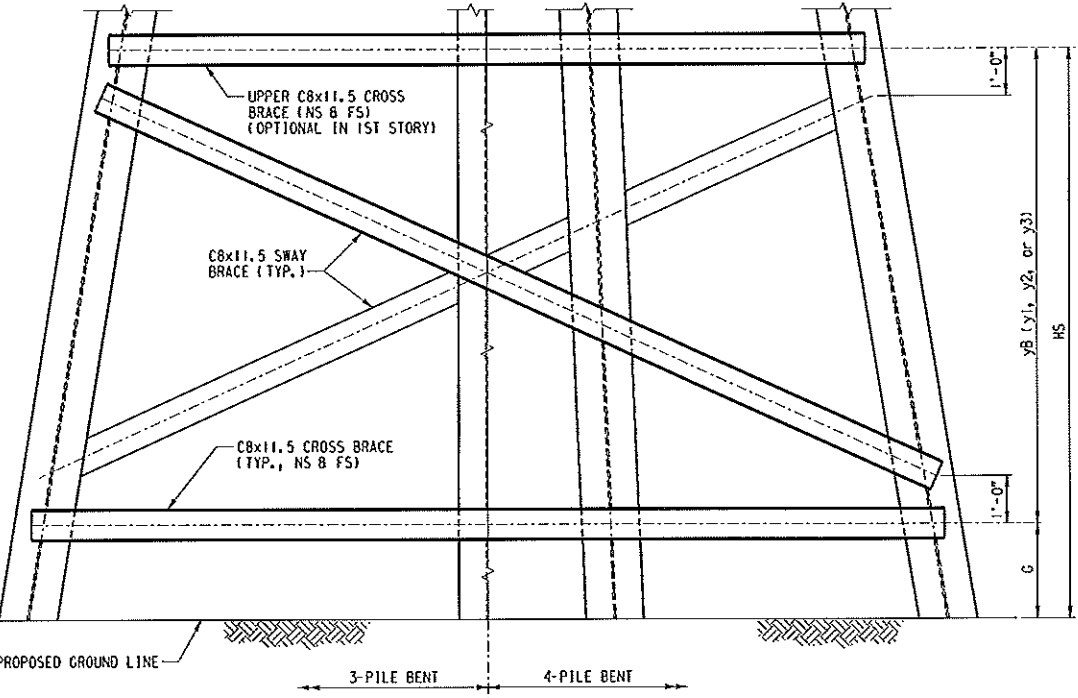
1. Set $HS = yG - H - 7'$.
2. Check if $HS > 12'$ -->. If so, install 10' high story bracing and repeat Step 2 setting HS equal to the previous HS minus 10' (Next HS = Current HS - 10'). If not, then continue to Step 3.
3. Check if $5' < HS < 12'$ -->. If so, $G = 2'$ and bottom story sway & cross bracing is required per the applicable detail on this sheet. If not then continue to Step 4.
4. Check if $HS = 4'$ -->. If so, $G = 2'$ and bottom story sway bracing is required per the applicable detail on this sheet, but lower cross bracing may be omitted. If not, then continue to Step 5.
5. Check if $HS = 3'$ -->. If so, $G = 2'$ and additional bottom cross bracing is required per the applicable detail above, but no sway bracing is necessary. If not, then continue to Step 6.
6. Check if $HS = 2'$ -->. If so, $G = HS = 2'$ and no additional bracing is required below upper cross brace.



BOTTOM STORY BRACING LAYOUT (HS = 3')
SCALE: 1/2"=1'-0"



BOTTOM STORY BRACING LAYOUT (HS = 4')
SCALE: 1/2"=1'-0"



BOTTOM STORY BRACING LAYOUT (HS = 5' TO 12')
SCALE: 1/2"=1'-0"

NOTE:
NS = Near Side
FS = Far Side

4-PILE BENT DATA

B1: 12	B2: 12
G: 12	G: 12
1/2: 12	G: 12
1: 12	1/2: 12
2: 12	1/2: 12

REVISIONS

DATE	LTR.	DESCRIPTION
9/07	A	REVISED BOT. STORY BRACING NOTES
/		
/		
/		
/		
/		

DESIGN BY: UPRR | DRAWN BY: UPRR | CHECKED BY: HOR
APPROVED:
George J. Meyer 4-17-2007
UPRR - MGR/SPECIAL PROJECTS STRUCTURES DESIGN

UNION PACIFIC

BRIDGE STANDARDS

CONCRETE BEAM BRIDGES
H-PILE AND BRACING LAYOUT
INTERIOR BENT
(SHEET 2 OF 4)

FILE OWNER: UPRR | DATE:
PLAN NO.: 630000 | SHEET: A3

ALTERNATE INTERIOR BENTS 1:12 BATTER

PILE LAYOUT 8" BALLAST UNDER TIMBER TIES								
BEAM DEPTH	INTERIOR BENTS, BI:12 = 1:12							
	yCAP	yS1	P	P1	P2	X	X1	X2
14"	5'-2 3/4"	2'-9 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	5'-10 3/4"	1'-8 5/8"	4'-2 1/8"
16"	5'-4 3/4"	2'-7 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	5'-10 3/8"	1'-8 5/8"	4'-2 1/4"
18"	5'-6 3/4"	2'-5 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	5'-11 1/8"	1'-8 3/8"	4'-2 3/8"
20"	5'-8 3/4"	2'-3 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	5'-11 1/4"	1'-8 3/8"	4'-2 3/8"
30"	6'-6 3/4"	1'-5 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	6'-0"	1'-9 1/4"	4'-2 3/4"

PILE LAYOUT 12" BALLAST UNDER CONCRETE TIES								
BEAM DEPTH	INTERIOR BENTS, BI:12 = 1:12							
	yCAP	yS1	P	P1	P2	X	X1	X2
14"	5'-7 3/4"	2'-4 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	5'-11 1/8"	1'-8 3/4"	4'-2 3/8"
16"	5'-9 3/4"	2'-2 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	5'-11 1/4"	1'-8 3/4"	4'-2 3/8"
18"	5'-11 3/4"	2'-0 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	5'-11 1/2"	1'-9"	4'-2 1/2"
20"	6'-1 3/4"	1'-10 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	5'-11 5/8"	1'-9"	4'-2 3/8"
30"	6'-11 3/4"	1'-0 1/4"	5'-5 1/2"	1'-6"	3'-11 1/2"	6'-0 1/2"	1'-9 1/2"	4'-3"

ALTERNATE INTERIOR BENTS 1/2:12 BATTER

PILE LAYOUT 8" BALLAST UNDER TIMBER TIES								
BEAM DEPTH	INTERIOR BENTS, BI:12 = 1/2:12							
	yCAP	yS1	P	P1	P2	X	X1	X2
14"	5'-2 3/4"	2'-9 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	5'-11 3/8"	1'-6"	4'-5 3/8"
16"	5'-4 3/4"	2'-7 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	5'-11 1/2"	1'-6"	4'-5 1/2"
18"	5'-6 3/4"	2'-5 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	5'-11 1/2"	1'-6"	4'-5 1/2"
20"	5'-8 3/4"	2'-3 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	5'-11 5/8"	1'-6"	4'-5 3/8"
30"	6'-6 3/4"	1'-5 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	6'-0"	1'-6"	4'-6"

PILE LAYOUT 12" BALLAST UNDER CONCRETE TIES								
BEAM DEPTH	INTERIOR BENTS, BI:12 = 1/2:12							
	yCAP	yS1	P	P1	P2	X	X1	X2
14"	5'-7 3/4"	2'-4 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	5'-11 5/8"	1'-6"	4'-5 3/8"
16"	5'-9 3/4"	2'-2 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	5'-11 1/8"	1'-6"	4'-5 3/8"
18"	5'-11 3/4"	2'-0 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	5'-11 3/4"	1'-6"	4'-5 3/4"
20"	6'-1 3/4"	1'-10 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	5'-11 3/8"	1'-6"	4'-5 3/8"
30"	6'-11 3/4"	1'-0 1/4"	5'-8 3/4"	1'-6"	4'-2 3/4"	6'-0 1/4"	1'-6"	4'-6 1/4"

ALTERNATE INTERIOR BENTS 0:12 BATTER

PILE LAYOUT 8" BALLAST UNDER TIMBER TIES					
BEAM DEPTH	INTERIOR BENTS, BI:12 = 0:12				
	yCAP	yS1	P = X	P1 = X1	P2 = X2
14"	5'-2 3/4"	2'-9 1/4"	6'-0"	1'-6"	4'-6"
16"	5'-4 3/4"	2'-7 1/4"	6'-0"	1'-6"	4'-6"
18"	5'-6 3/4"	2'-5 1/4"	6'-0"	1'-6"	4'-6"
20"	5'-8 3/4"	2'-3 1/4"	6'-0"	1'-6"	4'-6"
30"	6'-6 3/4"	1'-5 1/4"	6'-0"	1'-6"	4'-6"

PILE LAYOUT 12" BALLAST UNDER CONCRETE TIES					
BEAM DEPTH	INTERIOR BENTS, BI:12 = 0:12				
	yCAP	yS1	P = X	P1 = X1	P2 = X2
14"	5'-7 3/4"	2'-4 1/4"	6'-0"	1'-6"	4'-6"
16"	5'-9 3/4"	2'-2 1/4"	6'-0"	1'-6"	4'-6"
18"	5'-11 3/4"	2'-0 1/4"	6'-0"	1'-6"	4'-6"
20"	6'-1 3/4"	1'-10 1/4"	6'-0"	1'-6"	4'-6"
30"	6'-11 3/4"	1'-0 1/4"	6'-0"	1'-6"	4'-6"

BRACING FOR SLAB & BOX BEAM SPANS
BI:12 = 1:12

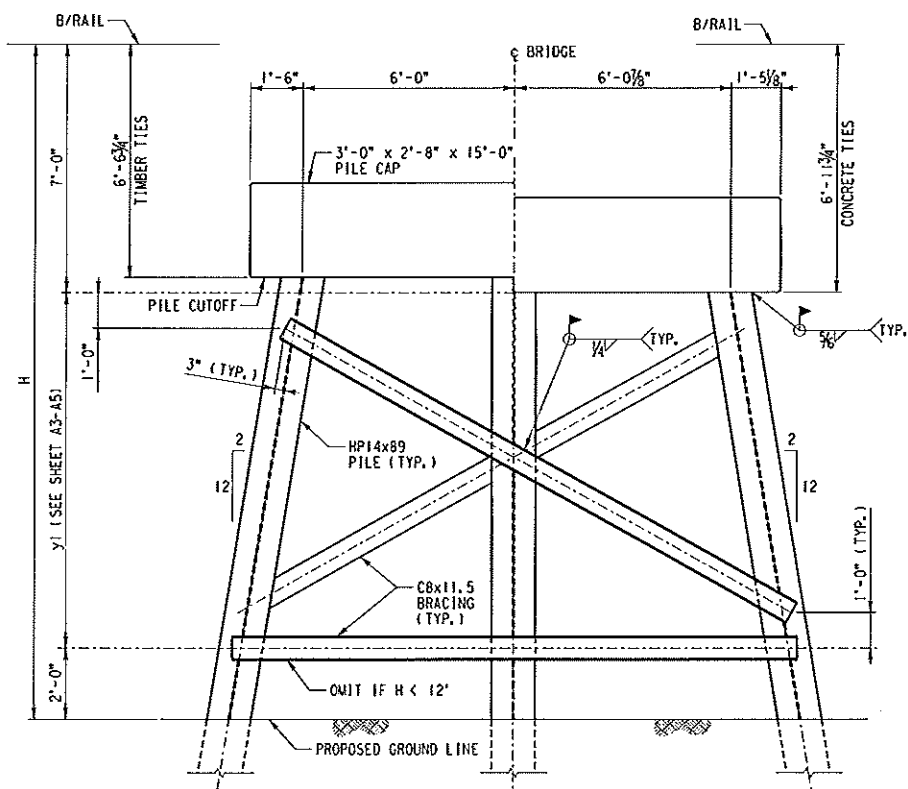
H	yG	G	HS	STORY HEIGHT			BRACE MEMBER LENGTH					
				y1	y2	y3	S1	C1	S2	C2	S3	C3
<11'-0"--> NO BRACING REQUIRED												
11'-0"	4'-0"	2'-0"	4'-0"	2'-0"	--	--	12'-10"	--	--	--	--	--
12'-0"	5'-0"	2'-0"	5'-0"	3'-0"	--	--	12'-10"	13'-1"	--	--	--	--
13'-0"	6'-0"	2'-0"	6'-0"	4'-0"	--	--	13'-1"	13'-3"	--	--	--	--
14'-0"	7'-0"	2'-0"	7'-0"	5'-0"	--	--	13'-4"	13'-5"	--	--	--	--
15'-0"	8'-0"	2'-0"	8'-0"	6'-0"	--	--	13'-8"	13'-7"	--	--	--	--
16'-0"	9'-0"	2'-0"	9'-0"	7'-0"	--	--	14'-1"	13'-9"	--	--	--	--
17'-0"	10'-0"	2'-0"	10'-0"	8'-0"	--	--	14'-7"	13'-11"	--	--	--	--
18'-0"	11'-0"	2'-0"	11'-0"	9'-0"	--	--	15'-1"	14'-1"	--	--	--	--
19'-0"	12'-0"	2'-0"	12'-0"	10'-0"	--	--	15'-8"	14'-3"	--	--	--	--
20'-0"	13'-0"	2'-0"	13'-0"	10'-0"	--	--	15'-8"	14'-3"	--	14'-5"	--	--
21'-0"	14'-0"	2'-0"	14'-0"	10'-0"	2'-0"	--	15'-8"	14'-3"	14'-6"	--	--	--
22'-0"	15'-0"	2'-0"	15'-0"	10'-0"	3'-0"	--	15'-8"	14'-3"	14'-6"	14'-9"	--	--
23'-0"	16'-0"	2'-0"	16'-0"	10'-0"	4'-0"	--	15'-8"	14'-3"	14'-9"	14'-11"	--	--
24'-0"	17'-0"	2'-0"	17'-0"	10'-0"	5'-0"	--	15'-8"	14'-3"	15'-0"	15'-1"	--	--
25'-0"	18'-0"	2'-0"	18'-0"	10'-0"	6'-0"	--	15'-8"	14'-3"	15'-4"	15'-3"	--	--
26'-0"	19'-0"	2'-0"	19'-0"	9'-0"	7'-0"	--	15'-8"	14'-3"	15'-8"	15'-5"	--	--
27'-0"	20'-0"	2'-0"	20'-0"	10'-0"	8'-0"	--	15'-8"	14'-3"	16'-1"	15'-7"	--	--
28'-0"	21'-0"	2'-0"	21'-0"	11'-0"	9'-0"	--	15'-8"	14'-3"	16'-7"	15'-9"	--	--
29'-0"	22'-0"	2'-0"	22'-0"	10'-0"	10'-0"	--	15'-8"	14'-3"	17'-2"	15'-11"	--	--
30'-0"	23'-0"	2'-0"	23'-0"	10'-0"	10'-0"	--	15'-8"	14'-3"	17'-2"	15'-11"	--	16'-1"
31'-0"	24'-0"	2'-0"	24'-0"	10'-0"	10'-0"	2'-0"	15'-8"	14'-3"	17'-2"	15'-11"	16'-2"	--
32'-0"	25'-0"	2'-0"	25'-0"	10'-0"	10'-0"	3'-0"	15'-8"	14'-3"	17'-2"	15'-11"	16'-2"	16'-5"
33'-0"	26'-0"	2'-0"	26'-0"	10'-0"	10'-0"	4'-0"	15'-8"	14'-3"	17'-2"	15'-11"	16'-4"	16'-7"
34'-0"	27'-0"	2'-0"	27'-0"	10'-0"	10'-0"	5'-0"	15'-8"	14'-3"	17'-2"	15'-11"	16'-7"	16'-9"
35'-0"	28'-0"	2'-0"	28'-0"	10'-0"	10'-0"	6'-0"	15'-8"	14'-3"	17'-2"	15'-11"	16'-11"	16'-11"
36'-0"	29'-0"	2'-0"	29'-0"	10'-0"	10'-0"	7'-0"	15'-8"	14'-3"	17'-2"	15'-11"	17'-3"	17'-1"
37'-0"	30'-0"	2'-0"	30'-0"	10'-0"	10'-0"	8'-0"	15'-8"	14'-3"	17'-2"	15'-11"	17'-8"	17'-3"
38'-0"	31'-0"	2'-0"	31'-0"	11'-0"	10'-0"	9'-0"	15'-8"	14'-3"	17'-2"	15'-11"	18'-1"	17'-5"
39'-0"	32'-0"	2'-0"	32'-0"	10'-0"	10'-0"	10'-0"	15'-8"	14'-3"	17'-2"	15'-11"	18'-7"	17'-7"

BRACING FOR SLAB & BOX BEAM SPANS
BI:12 = 1/2:12

H	yG	G	HS	STORY HEIGHT			BRACE MEMBER LENGTH					
				y1	y2	y3	S1	C1	S2	C2	S3	C3
<11'-0"--> NO BRACING REQUIRED												
11'-0"	4'-0"	2'-0"	4'-0"	2'-0"	--	--	12'-8"	--	--	--	--	--
12'-0"	5'-0"	2'-0"	5'-0"	3'-0"	--	--	12'-8"	12'-9"	--	--	--	--
13'-0"	6'-0"	2'-0"	6'-0"	4'-0"	--	--	12'-10"	12'-10"	--	--	--	--
14'-0"	7'-0"	2'-0"	7'-0"	5'-0"	--	--	13'-1"	12'-11"	--	--	--	--
15'-0"	8'-0"	2'-0"	8'-0"	6'-0"	--	--	13'-5"	13'-0"	--	--	--	--
16'-0"	9'-0"	2'-0"	9'-0"	7'-0"	--	--	13'-10"	13'-1"	--	--	--	--
17'-0"	10'-0"	2'-0"	10'-0"	8'-0"	--	--	14'-3"	13'-2"	--	--	--	--
18'-0"	11'-0"	2'-0"	11'-0"	9'-0"	--	--	14'-9"	13'-3"	--	--	--	--
19'-0"	12'-0"	2'-0"	12'-0"	10'-0"	--	--	15'-4"	13'-4"	--	--	--	--
20'-0"	13'-0"	2'-0"	13'-0"	10'-0"	--	--	15'-4"	13'-4"	--	13'-6"	--	--
21'-0"	14'-0"	2'-0"	14'-0"	10'-0"	2'-0"	--	15'-4"	13'-4"	13'-6"	--	--	--
22'-0"	15'-0"	2'-0"	15'-0"	10'-0"	3'-0"	--	15'-4"	13'-4"	13'-6"	13'-7"	--	--
23'-0"	16'-0"	2'-0"	16'-0"	10'-0"	4'-0"	--	15'-4"	13'-4"	13'-8"	13'-8"	--	--
24'-0"	17'-0"	2'-0"	17'-0"	10'-0"	5'-0"	--	15'-4"	13'-4"	13'-11"	13'-9"	--	--
25'-0"	18'-0"	2'-0"	18'-0"	10'-0"	6'-0"	--	15'-4"	13'-4"	14'-3"	13'-10"	--	--
26'-0"	19'-0"	2'-0"	19'-0"	9'-0"	7'-0"	--	15'-4"	13'-4"	14'-7"	13'-11"	--	--
27'-0"	20'-0"	2'-0"	20'-0"	10'-0"	8'-0"	--	15'-4"	13'-4"	15'-0"	14'-0"	--	--
28'-0"	21'-0"	2'-0"	21'-0"	11'-0"	9'-0"	--	15'-4"	13'-4"	15'-6"	14'-1"	--	--
29'-0"	22'-0"	2'-0"	22'-0"	10'-0"	10'-0"	--	15'-4"	13'-4"	16'-0"	14'-2"	--	--
30'-0"	23'-0"	2'-0"	23'-0"	10'-0"	10'-0"	--	15'-4"	13'-4"	16'-0"	14'-2"	--	14'-4"
31'-0"	24'-0"	2'-0"	24'-0"	10'-0"	10'-0"	2'-0"	15'-4"	13'-4"	16'-0"	14'-2"	14'-4"	--
32'-0"	25'-0"	2'-0"	25'-0"	10'-0"	10'-0"	3'-0"	15'-4"	13'-4"	16'-0"	14'-2"	14'-4"	14'-5"
33'-0"	26'-0"	2'-0"	26'-0"	10'-0"	10'-0"	4'-0"	15'-4"	13'-4"	16'-0"	14'-2"	14'-6"	14'-6"
34'-0"	27'-0"	2'-0"	27'-0"	10'-0"	10'-0"	5'-0"	15'-4"	13'-4"	16'-0"	14'-2"	14'-9"	14'-7"
35'-0"	28'-0"	2'-0"	28'-0"	10'-0"	10'-0"	6'-0"	15'-4"	13'-4"	16'-0"	14'-2"	15'-0"	14'-8"
36'-0"	29'-0"	2'-0"	29'-0"	10'-0"	10'-0"	7'-0"	15'-4"	13'-4"	16'-0"	14'-2"	15'-4"	14'-9"
37'-0"	30'-0"	2'-0"	30'-0"	10'-0"	10'-0"	8'-0"	15'-4"	13'-4"	16'-0"	14'-2"	15'-9"	14'-10"
38'-0"	31'-0"	2'-0"	31'-0"	11'-0"	10'-0"	9'-0"	15'-4"	13'-4"	16'-0"	14'-2"	16'-3"	14'-11"
39'-0"	32'-0"	2'-0"	32'-0"	10'-0"	10'-0"	10'-0"	15'-4"	13'-4"	16'-0"	14'-2"	16'-9"	15'-0"

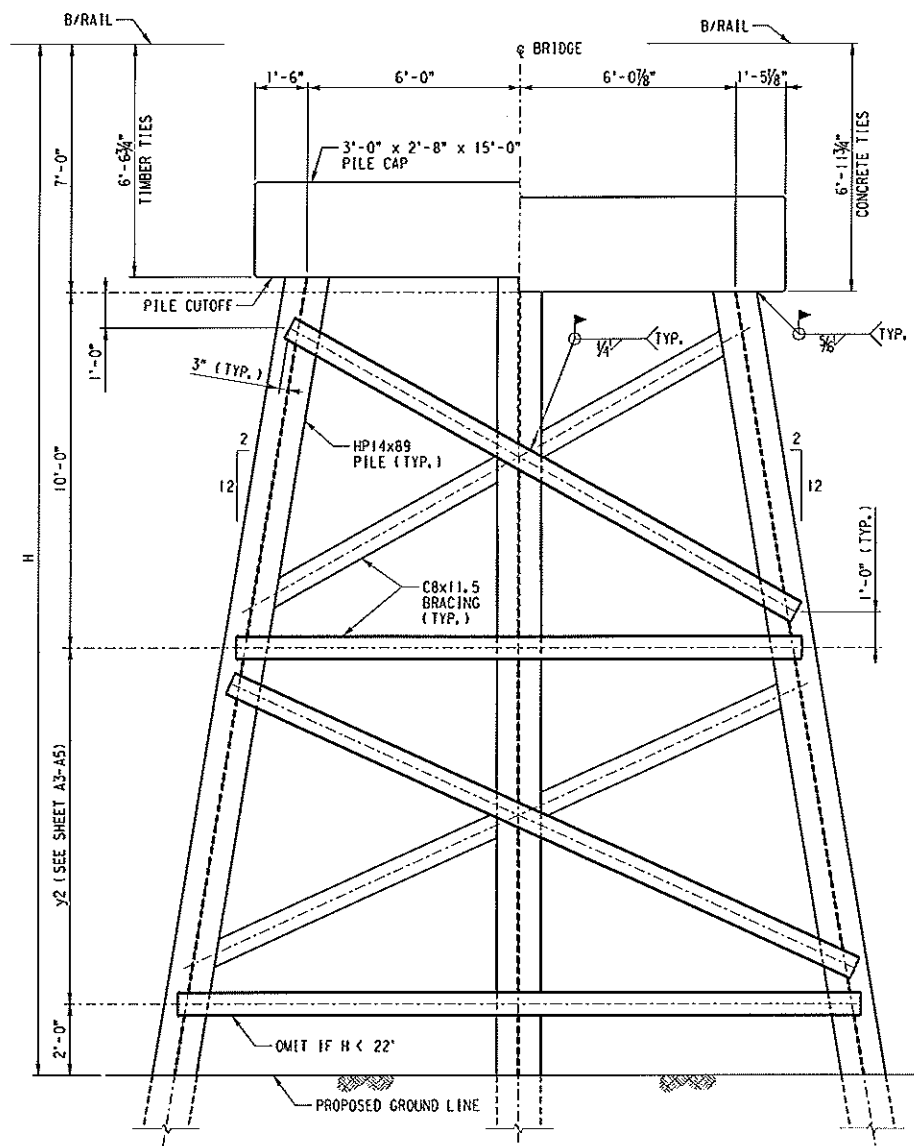
BRACING FOR SLAB & BOX BEAM SPANS
BI:12 = 0:12

H	yG	G	HS	STORY HEIGHT			BRACE MEMBER LENGTH					
				y1	y2	y3	S1	C1	S2	C2	S3	C3
<11'-0"--> NO BRACING REQUIRED												
11'-0"	4'-0"	2'-0"	4'-0"	2'-0"	--	--	12'-6"	--	--	--	--	--
12'-0"	5'-0"	2'-0"	5'-0"	3'-0"	--	--	12'-6"	12'-6"	--	--	--	--
13'-0"	6'-0"	2'-0"	6'-0"	4'-0"	--	--	12'-8"	12'-6"	--	--	--	--
14'-0"	7'-0"	2'-0"	7'-0"	5'-0"	--	--	12'-10"	12'-6"	--	--	--	--
15'-0"	8'-0"	2'-0"	8'-0"	6'-0"	--	--	13'-2"	12'-6"	--	--	--	--
16'-0"	9'-0"	2'-0"	9'-0"	7'-0"	--	--	13'-6"	12'-6"	--	--	--	--
17'-0"	10'-0"	2'-0"	10'-0"	8'-0"	--	--	13'-11"	12'-6"	--	--	--	--
18'-0"	11'-0"	2'-0"	11'-0"	9'-0"	--	--	14'-5"	12'-6"	--	--	--	--
19'-0"	12'-0"	2'-0"	12'-0"	10'-0"	--	--	14'-11"	12'-6"	--	--	--	--
20'-0"	13'-0"	2'-0"	13'-0"	10'-0"	--	--	14'-11"	12'-6"	--	12'-6"	--	--
21'-0"	14'-0"	2'-0"	14'-0"	10'-0"	2'-0"	--	14'-11"	12'-6"	12'-6"	--	--	--
22'-0"	15'-0"	2'-0"	15'-0"	10'-0"	3'-0"	--	14'-11"	12'-6"	12'-6"	12'-6"	--	--
23'-0"	16'-0"	2'-0"	16'-0"	10'-0"	4'-0"	--	14'-11"	12'-6"	12'-8"	12'-6"	--	--
24'-0"	17'-0"	2'-0"	17'-0"	10'-0"	5'-0"	--	14'-11"</					



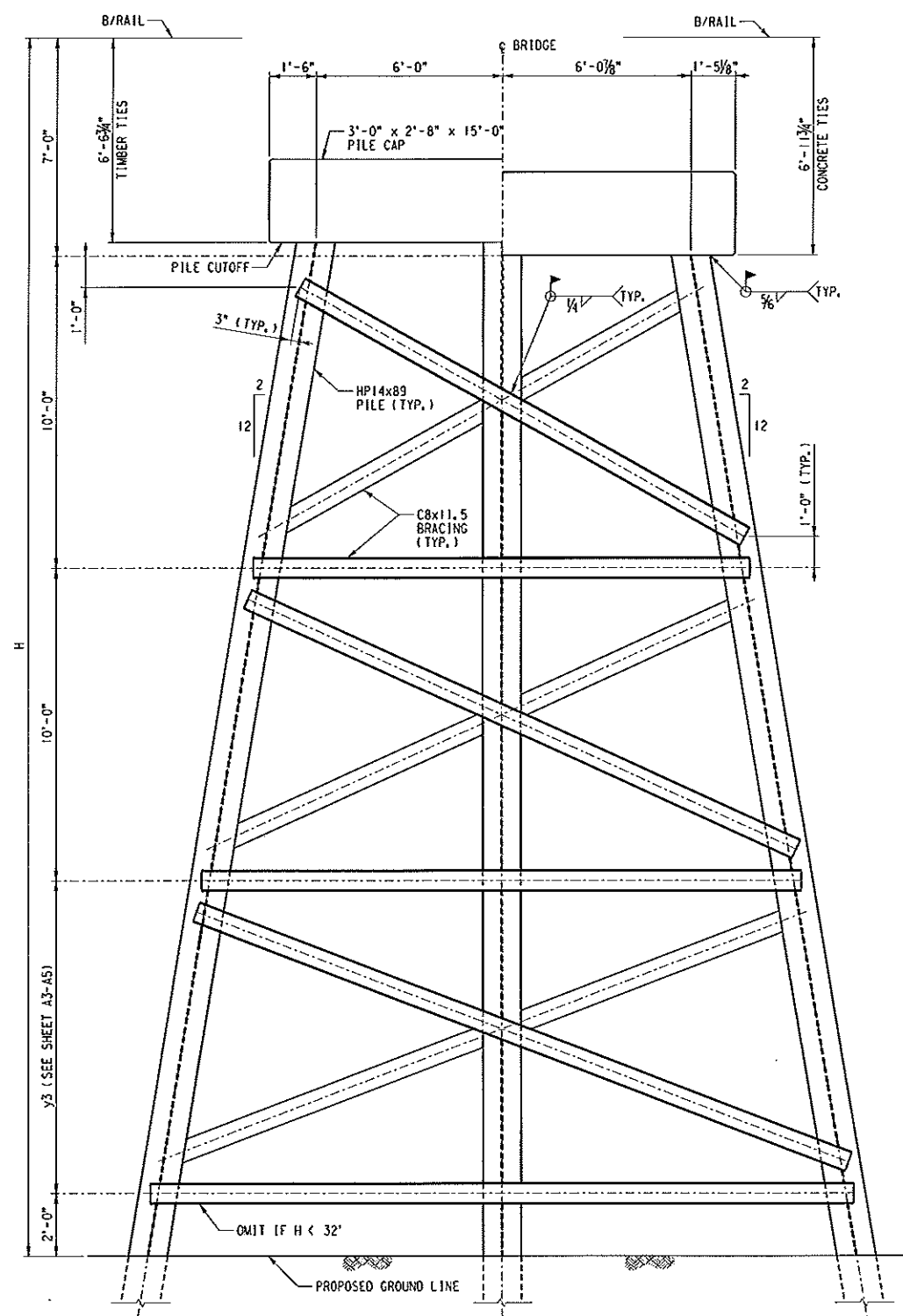
INTERIOR BENT - ONE STORY

SCALE: $\frac{3}{8}'' = 1'-0''$
 $H < 11'$ NO BRACING
 $11' \leq H < 20'$ BRACING AS SHOWN
 $20' \leq H < 21'$ ADD SECOND BOTTOM CROSS BRACE



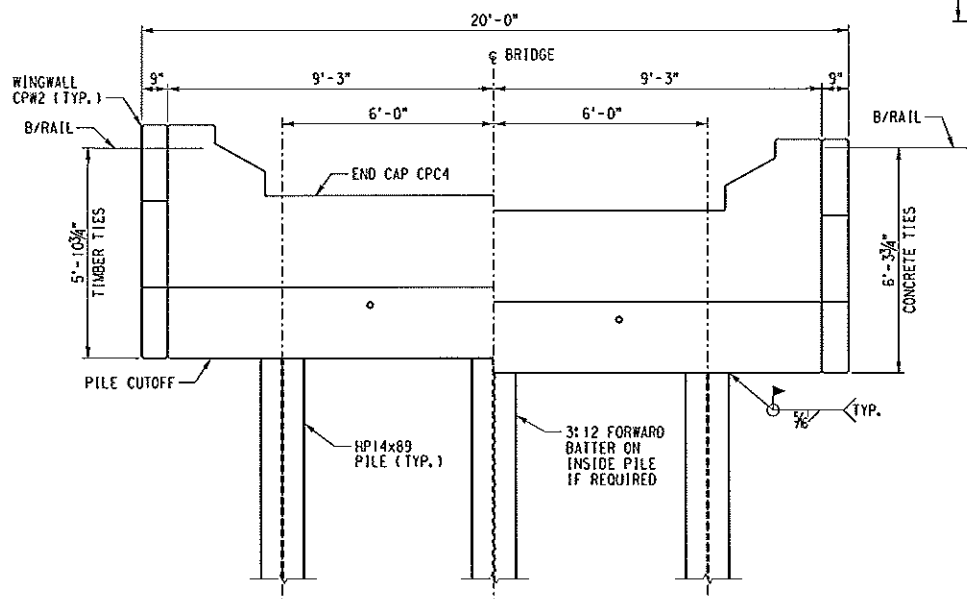
INTERIOR BENT - TWO STORY

SCALE: $\frac{3}{8}'' = 1'-0''$
 $21' \leq H < 30'$ BRACING AS SHOWN
 $30' \leq H < 31'$ ADD SECOND BOTTOM CROSS BRACE



INTERIOR BENT - THREE STORY

SCALE: $\frac{3}{8}'' = 1'-0''$
 $31' \leq H \leq 39'$



END BENT

SCALE: $\frac{3}{8}'' = 1'-0''$

SEE SHEET A2-A5 FOR:
 BENT HEIGHT LIMITATIONS
 LOCATION OF PILES AT BASE OF RAIL
 GENERAL NOTES FOR H-PILE BENTS
 PILE SPLICE AND TIP DETAILS
 TABLE OF SWAY AND CROSS BRACING LENGTHS
 BATTER OF OUTSIDE PILES OTHER THAN 2:12
 HEAVY BRACING

REVISIONS		
DATE	LTR.	DESCRIPTION

DESIGN BY: UPRR | DRAWN BY: UPRR | CHECKED BY: HDR
 APPROVED:
George J. Meyer 4-17-2007
 UPRR - MGR/SPECIAL PROJECTS STRUCTURES DESIGN

UNION PACIFIC

BRIDGE STANDARDS

CONCRETE BEAM BRIDGES
30" BOX BEAMS
3 H-PILE BENTS
SINGLE TRACK

FILE OWNER: UPRR | DATE:
 PLAN NO: 530000 | SHEET: B4

PRECAST CONCRETE NOTES:

CONCRETE:

All concrete materials, placement and workmanship shall be in accordance with Part 1, Chapter 8 of the current AREMA Manual for Railway Engineering. Compressive strength - 4000 Lb. per square inch at 28 days.

Exposed surfaces shall be formed in a manner which will produce a smooth and uniform appearance without rubbing or plastering. Exposed edges of 90 degrees or less are to be chamfered $\frac{3}{8}$ " x $\frac{3}{8}$ ". Top surface to have a smooth finish, free of all foot or travel marks.

Concrete shall be proportioned such that the water - cement ratio (by weight) does not exceed 0.45. Concrete must contain a minimum of $6\frac{1}{2}$ sacks of cement per cubic yard of concrete.

Cement shall be Type I, Type II or Type III Portland Cement.

Coarse aggregate shall be size No. 67.

Fine aggregate shall be natural sand.

Air content shall be between 5% and 7% (by volume).

Admixtures shall not be used without approval by Engineer.

Curing shall be accomplished by wet curing or the application of a Type 2 membrane.

The fabricator shall stencil the fabricator's name, date of fabrication, bridge number, and piece mark at location shown.

Production procedures for the manufacture of precast members shall be in accordance with the AREMA Manual for Railway Engineering and the Prestressed Concrete Institute's Manual MNL 116-77 for Quality Control.

Dimensional tolerances governing the manufacture of precast members shall conform to Division VI, Section 6.4.6 of the Precast Concrete Institute's Manual MNL 116-77 for Quality Control. Tolerance for location of lifting devices shall be $\pm\frac{1}{2}$ ".

The fabricator will be responsible for loading and properly securing all precast concrete members for shipment. All concrete components shall be inspected, by the Railroad, at the fabricator's plant prior to shipment.

REINFORCING STEEL:

Reinforcing steel shall be deformed, new billet bars per current ASTM A615 Specifications and to meet grade 60 requirements.

Welding of reinforcing steel shall conform to AWS D1.4. Welding shall be performed by a certified welder.

Fabrication of reinforcing steel shall be per Chapter 7 of the CRSI Manual of standard practice. Dimensions of bending details are out to out of bar.

Reinforcing steel is to be blocked to proper location and securely wired against displacement. Tack welding of reinforcing is prohibited. Minimum concrete cover on reinforcement shall meet current AREMA Specifications.

STRUCTURAL STEEL:

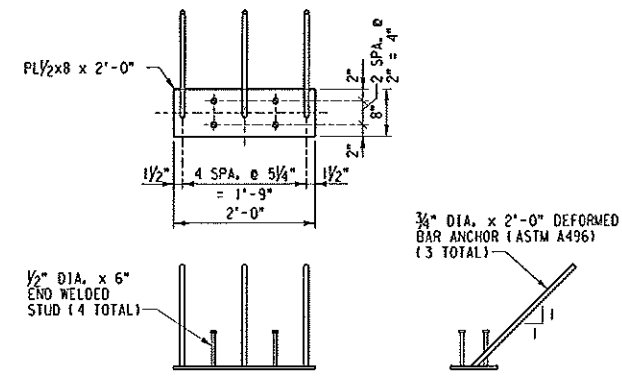
Steel plate shall conform to ASTM A36 OR A709-Grade 36 Specifications. Studs shall be C1015, C1017 or C1020 cold drawn steel which conform to ASTM A108 Specifications.

LIFTING ANCHORS:

Swift lift anchors shall be Dayton Richmond P-525L Anchors or approved alternate, with a minimum safe working load of 12,200 lb. per anchor with 1'-6" edge distance. The safe working load shall provide a minimum safety factor of 4.

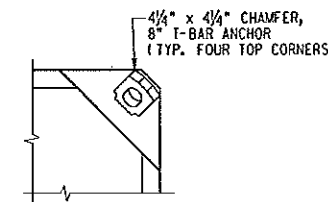
MISCELLANEOUS HARDWARE:

8" T-Bar Anchors as manufactured by Burke Company, or approved alternate.

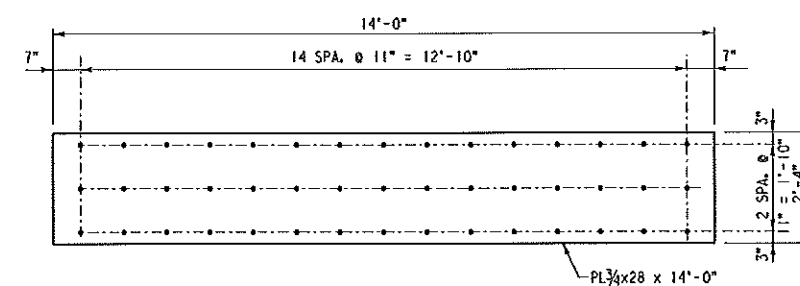


EMBED PLATE $\frac{1}{2}$ x8 x 2'-0"

SCALE: $\frac{3}{4}$ "=1'-0"
EST. WT. = 37.8 LB.

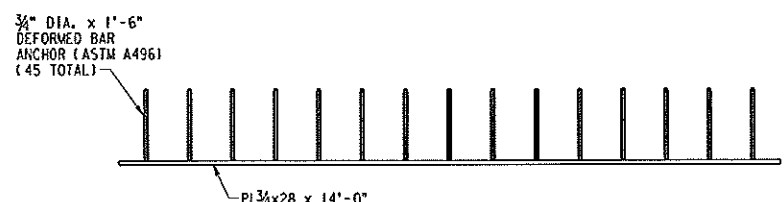


DETAIL A
SCALE: NONE



EMBED PLATE $\frac{3}{4}$ x28 x 14'-0"

SCALE: $\frac{1}{2}$ "=1'-0"
EST. WT. = 1,101 LB.



NOTE:
DO NOT PAINT OR GALVANIZE PLATES.

REVISIONS			DESIGN BY: HDR	DRAWN BY: HDR	CHECKED BY: HDR
DATE	LTR.	DESCRIPTION	APPROVED:		

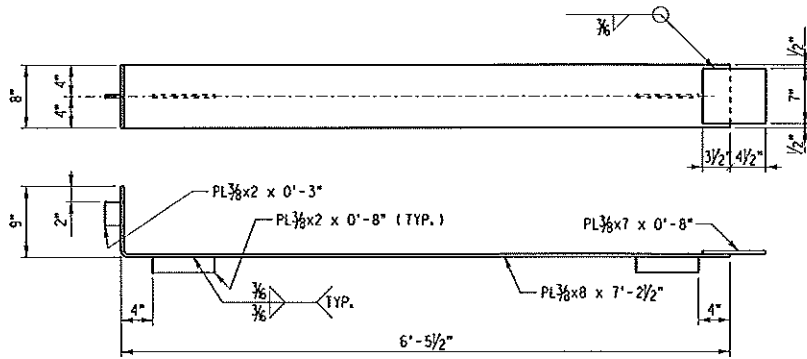
BNSF - ASSISTANT DIRECTOR STRUCTURES DESIGN
George J. Meyer 4-17-2007
UPRR - M&P SPECIAL PROJECTS STRUCTURES DESIGN

BNSF RAILWAY **UNION PACIFIC**

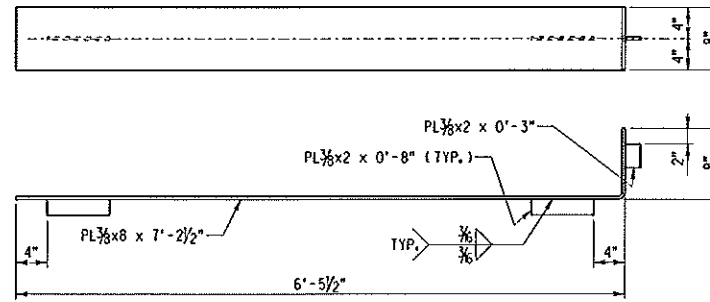
BRIDGE STANDARDS
CONCRETE BEAM BRIDGES
PRECAST CONCRETE PILE CAP
SHEET 2 OF 2

FILE OWNER: UPRR DATE:
PLAN NO.: 601000 SHEET: C2

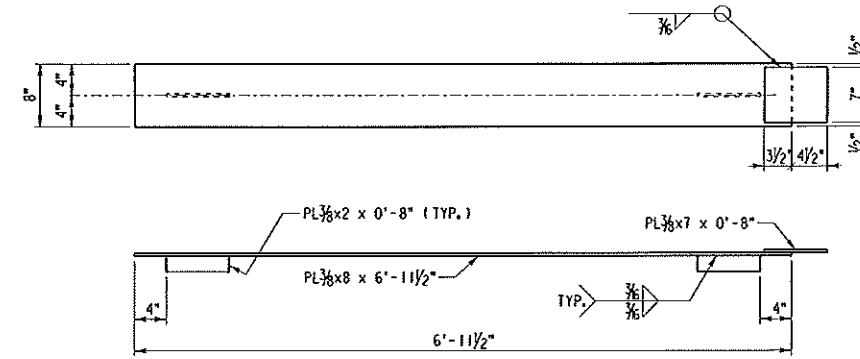
FILE NAME: pr:\ambast\en\sign\std\incoring HDR\beam\locapn.dgn



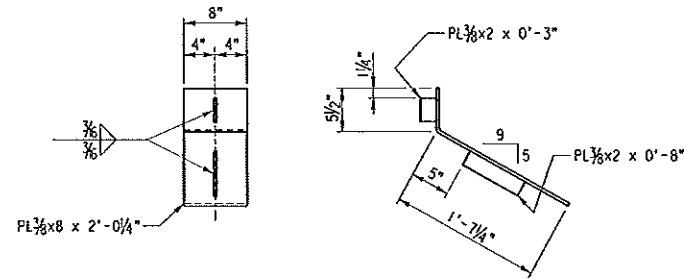
DECK PLATE MK. CDP1
 SCALE: 1"=1'-0"
 EST. WT. = 83.6 LB. EA.
 GALVANIZE AFTER FABRICATION



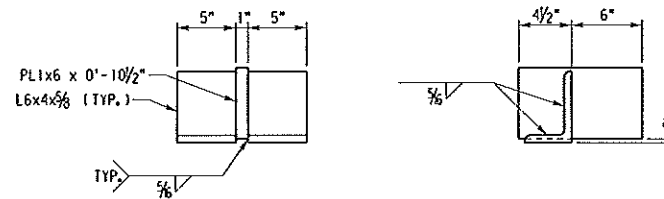
DECK PLATE MK. CDP2
 SCALE: 1"=1'-0"
 EST. WT. = 77.6 LB. EA.
 GALVANIZE AFTER FABRICATION



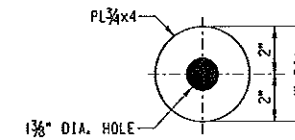
DECK PLATE MK. CDP4
 SCALE: 1"=1'-0"
 EST. WT. = 77.0 LB. EA.
 GALVANIZE AFTER FABRICATION



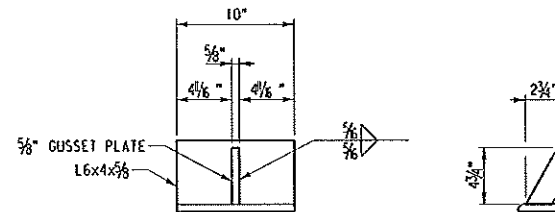
DECK PLATE MK. CDP3
 SCALE: 1"=1'-0"
 EST. WT. = 23.0 LB. EA.
 GALVANIZE AFTER FABRICATION



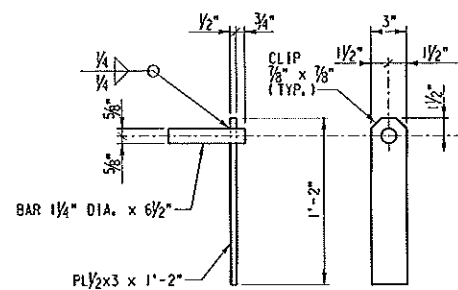
BEAM STOP MK. GS-2
 SCALE: 1/2"=1'-0"
 EST. WT. = 34.5 LB. EA.



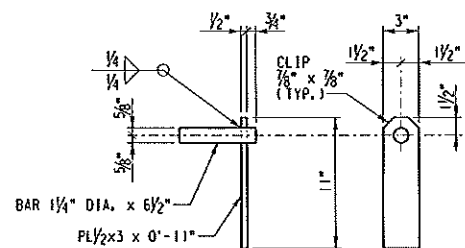
WASHER MK. W100
 SCALE: 3"=1'-0"
 EST. WT. = 2.7 LB. EA.
 GALVANIZE AFTER FABRICATION



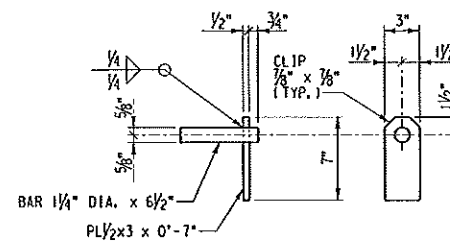
BEAM STOP MK. GS-3
 SCALE: 1/2"=1'-0"
 EST. WT. = 18.6 LB. EA.



SEISMIC STRAP MK. SS-I
 SCALE: 1/2"=1'-0"
 EST. WT. = 8.3 LB. EA.



SEISMIC STRAP MK. SS-EB
 SCALE: 1/2"=1'-0"
 EST. WT. = 7.0 LB. EA.



SEISMIC STRAP MK. SS-ES
 SCALE: 1/2"=1'-0"
 EST. WT. = 5.3 LB. EA.

NOTES:

- Material shall conform to the following requirements:
 Rolled shapes & plates ASTM A36
- Design, fabrication, and erection per the AREMA Manual for Railway Engineering, Chapter 15, Steel Structures.
- Welding requirements:
 A. All welding shall be with the SAW or SMAW process.
 B. All welding per AWS D1.1, Structural Welding Code.
 C. Welders must possess valid certification.
- Deck Plate assemblies CDP1, CDP2, CDP3, and CDP4 and Washer W100 to be galvanized after fabrication in accordance with ASTM A123. After galvanizing, all elements shall be free of fins, abrasions, rough or sharp edges, and other surface defects.

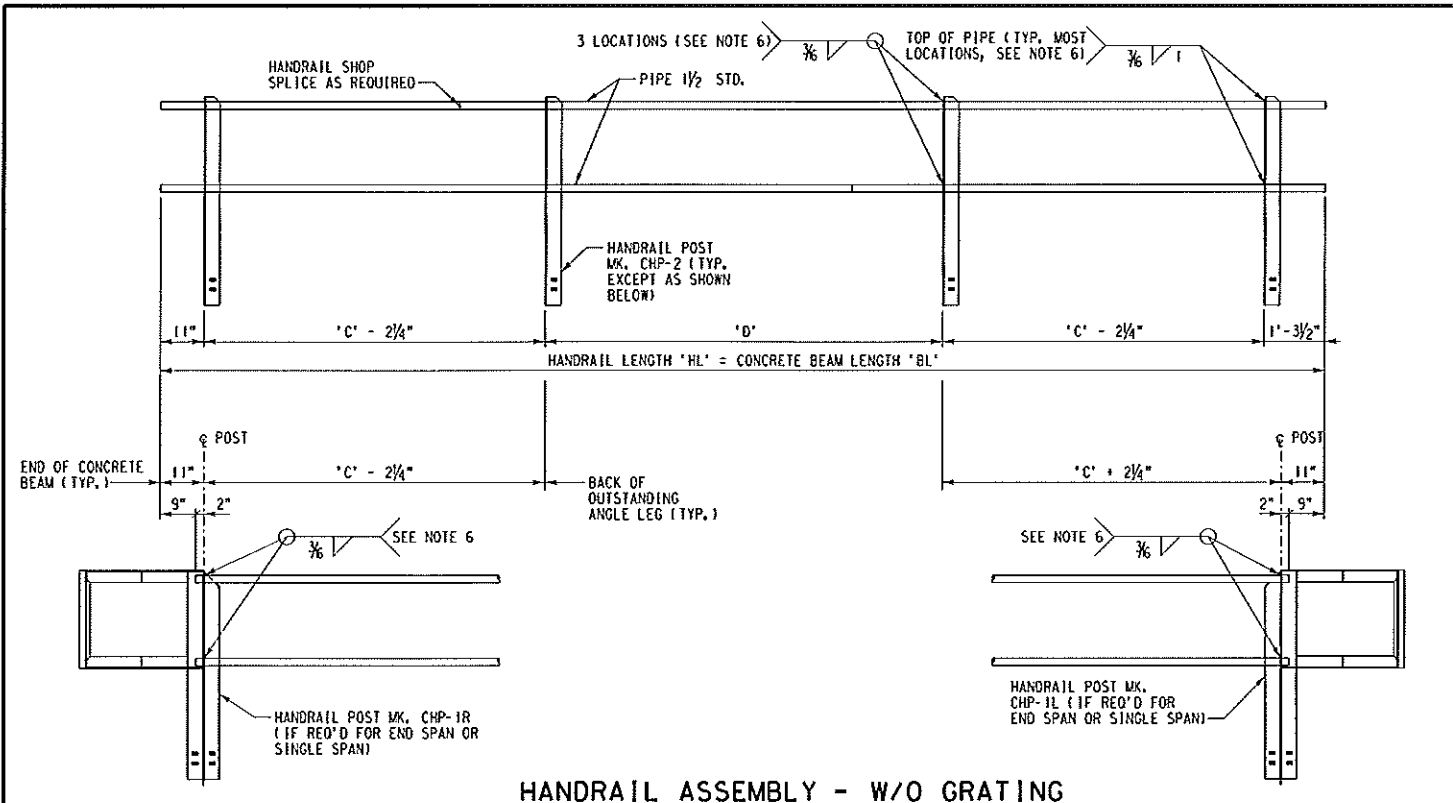
Formerly Plan No. 530010 (UPRR Only), Sheet 1



BRIDGE STANDARDS
 CONCRETE BEAM BRIDGES
DECK PLATES
AND BEAM STOPS
STEEL DETAILS

REVISIONS			DESIGN BY: MLM	DRAWN BY: MLM	CHECKED BY:
DATE	LTR.	DESCRIPTION	APPROVED:		
9/07	A	ADDED SEISMIC STRAPS	 BNSF - ASSISTANT DIRECTOR STRUCTURES DESIGN UPRR - MGR SPECIAL PROJECTS STRUCTURES DESIGN		
/					
/					
/					
/					

FILE OWNER: UPRR DATE: 4-17-2007
 PLAN NO.: 602000 SHEET: 1



HANDRAIL ASSEMBLY - W/O GRATING
SCALE: 1/2" = 1'-0"

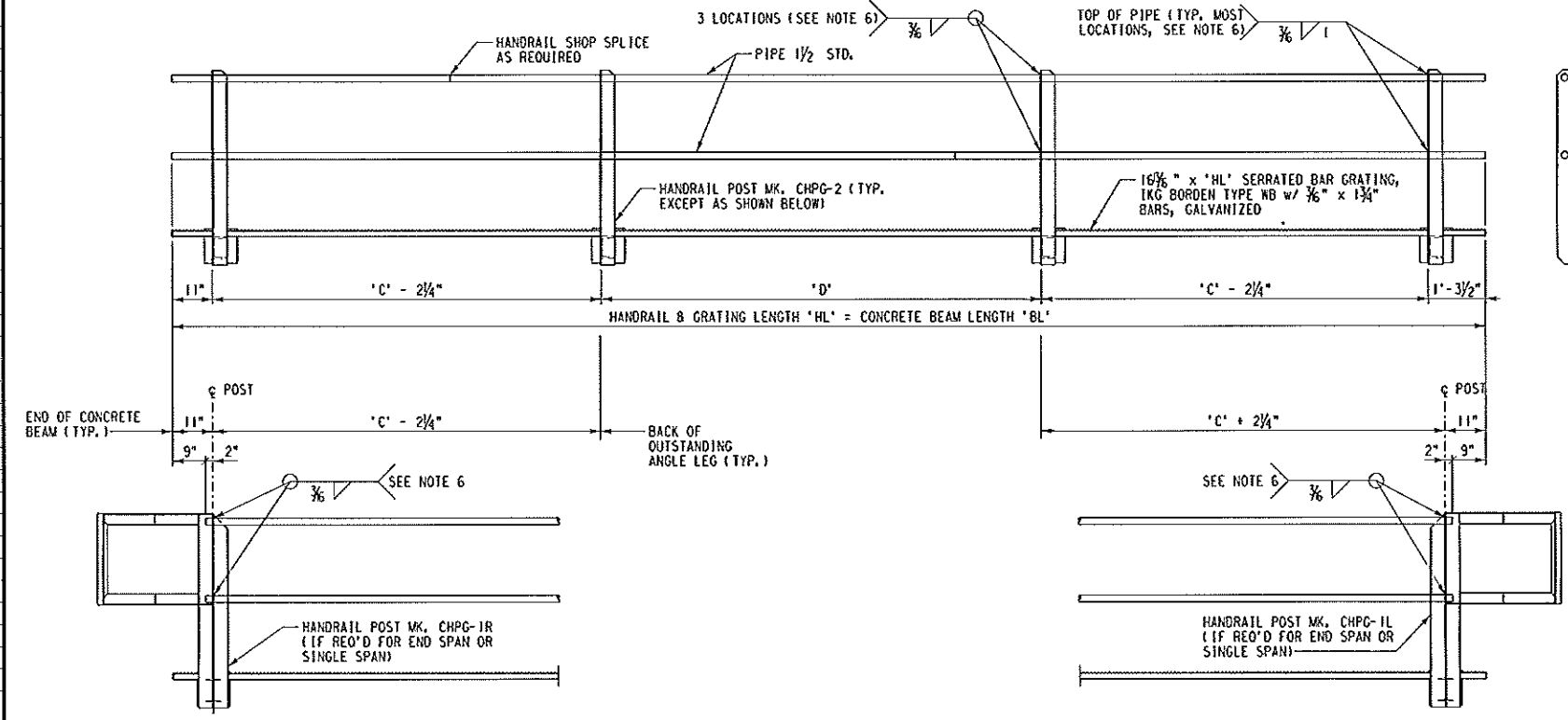
ASSEMBLY C21 FOR INTERIOR OR SINGLE SPAN AND END SPAN WHEN USED IN CONJUNCTION WITH HANDRAIL ASSEMBLY CEH
 ASSEMBLY C2L FOR END SPAN, HANDRAIL POST MK. CHP-1L ON RIGHT END (OPTIONAL)
 ASSEMBLY C2R FOR END SPAN, HANDRAIL POST MK. CHP-1R ON LEFT END (OPTIONAL)
 ASSEMBLY C2S FOR SINGLE SPAN, HANDRAIL POST MK. CHP-1R ON LEFT END AND MK. CHP-1L ON RIGHT END (OPTIONAL)

SHIP WITH 3/4" DIA. x 9/2" BOLTS WITH LOCKNUT AND WASHER PER TABLE, THIS SHEET

BEAM LENGTH		HANDRAIL (PIPE) LENGTH			GRATING LENGTH 'HL' ALL SPANS	HANDRAIL POST SPACINGS			EST. WEIGHT (LB., NO GRATING)			EST. WEIGHT (LB., WITH GRATING)			SHIP WITH 3/4" DIA. x 9/2" BOLT W/ ELASTIC LOCKNUT AND FLAT CIRCULAR WASHER			
NOMINAL 'L'	ACTUAL 'BL'	INTERIOR SPAN 'HL'	END SPAN	SINGLE SPAN		INTERIOR	END OR SINGLE	ALL	INTERIOR SPAN	END SPAN	SINGLE SPAN	INTERIOR SPAN	END SPAN	SINGLE SPAN	INTERIOR SPAN	END SPAN	SINGLE SPAN	
12'	11'-10"	11'-10"	11'-1"	10'-4"	11'-10"	* SEE NOTE	* SEE NOTE	* SEE NOTE	N/A	122.6	196.8	271.0	421.2	495.5	569.7	5	7	9
13'	12'-10"	12'-10"	12'-1"	11'-4"	12'-10"	5'-3 3/4"	5'-3 3/4"	5'-8 1/4"	N/A	157.1	231.3	305.6	512.9	587.2	661.4	7	9	11
14'	13'-10"	13'-10"	13'-1"	12'-4"	13'-10"	5'-9 3/4"	5'-9 3/4"	6'-2 1/4"	N/A	162.6	236.8	311.0	537.1	611.3	685.6	7	9	11
15'	14'-10"	14'-10"	14'-1"	13'-4"	14'-10"	6'-3 3/4"	6'-3 3/4"	6'-8 1/4"	N/A	168.0	242.2	316.4	561.3	635.5	709.8	7	9	11
16'	15'-10"	15'-10"	15'-1"	14'-4"	15'-10"	6'-9 3/4"	6'-9 3/4"	7'-2 1/4"	N/A	173.4	247.7	321.9	585.5	659.7	733.9	7	9	11
17'	16'-10"	16'-10"	16'-1"	15'-4"	16'-10"	7'-3 3/4"	7'-3 3/4"	7'-8 1/4"	N/A	178.9	253.1	327.3	609.7	683.9	758.1	7	9	11
18'	17'-10"	17'-10"	17'-1"	16'-4"	17'-10"	7'-9 3/4"	7'-9 3/4"	8'-2 1/4"	N/A	184.3	258.5	332.8	633.9	708.1	782.3	7	9	11
19'	18'-10"	18'-10"	18'-1"	17'-4"	18'-10"	8'-3 3/4"	8'-3 3/4"	8'-8 1/4"	N/A	189.8	264.0	338.2	658.1	732.3	806.5	7	9	11
20'	19'-10"	19'-10"	19'-1"	18'-4"	19'-10"	8'-9 3/4"	8'-9 3/4"	9'-2 1/4"	N/A	195.2	269.4	343.6	682.3	756.5	830.7	7	9	11
21'	20'-10"	20'-10"	20'-1"	19'-4"	20'-10"	9'-3 3/4"	9'-3 3/4"	9'-8 1/4"	N/A	200.6	274.9	349.1	706.5	780.7	854.9	7	9	11
22'	21'-10"	21'-10"	21'-1"	20'-4"	21'-10"	9'-9 3/4"	9'-9 3/4"	10'-2 1/4"	N/A	206.1	280.3	354.5	730.6	804.9	879.1	7	9	11
23'	22'-10"	22'-10"	22'-1"	21'-4"	22'-10"	10'-3 3/4"	10'-3 3/4"	10'-8 1/4"	N/A	211.5	285.7	359.9	754.7	828.9	903.2	7	9	11
24'	23'-10"	23'-10"	23'-1"	22'-4"	23'-10"	10'-9 3/4"	10'-9 3/4"	11'-2 1/4"	N/A	217.0	291.1	365.3	778.8	852.8	927.2	7	9	11
25'	24'-10"	24'-10"	24'-1"	23'-4"	24'-10"	11'-3 3/4"	11'-3 3/4"	11'-8 1/4"	N/A	222.4	296.5	370.7	802.9	876.7	951.2	7	9	11
26'	25'-10"	25'-10"	25'-1"	24'-4"	25'-10"	11'-9 3/4"	11'-9 3/4"	12'-2 1/4"	N/A	227.9	301.9	376.1	826.9	900.6	975.2	7	9	11
27'	26'-10"	26'-10"	26'-1"	25'-4"	26'-10"	12'-3 3/4"	12'-3 3/4"	12'-8 1/4"	N/A	233.3	307.3	381.5	851.0	924.5	1000.0	7	9	11
28'	27'-10"	27'-10"	27'-1"	26'-4"	27'-10"	12'-9 3/4"	12'-9 3/4"	13'-2 1/4"	N/A	238.8	312.7	386.9	875.0	948.4	1024.8	7	9	11
29'	28'-10"	28'-10"	28'-1"	27'-4"	28'-10"	13'-3 3/4"	13'-3 3/4"	13'-8 1/4"	N/A	244.2	318.1	392.3	899.0	972.2	1049.5	7	9	11
30'	29'-10"	29'-10"	29'-1"	28'-4"	29'-10"	13'-9 3/4"	13'-9 3/4"	14'-2 1/4"	N/A	249.7	323.5	397.7	923.0	996.0	1074.2	7	9	11
31'	30'-10"	30'-10"	30'-1"	29'-4"	30'-10"	14'-3 3/4"	14'-3 3/4"	14'-8 1/4"	N/A	255.1	328.9	403.1	946.9	1019.8	1098.9	7	9	11
32'	31'-10"	31'-10"	31'-1"	30'-4"	31'-10"	14'-9 3/4"	14'-9 3/4"	15'-2 1/4"	N/A	260.6	334.3	408.5	970.8	1043.6	1123.6	7	9	11
33'	32'-10"	32'-10"	32'-1"	31'-4"	32'-10"	15'-3 3/4"	15'-3 3/4"	15'-8 1/4"	20'10"-0"	266.0	339.7	413.9	994.7	1067.4	1148.2	7	9	11
34'	33'-10"	33'-10"	33'-1"	32'-4"	33'-10"	15'-9 3/4"	15'-9 3/4"	16'-2 1/4"	20'10"-0"	271.4	345.1	419.3	1018.6	1091.1	1172.8	7	9	11

* FOR NOMINAL 12' SPAN, HANDRAIL ASSEMBLY W/O GRATING HAS ONLY TWO POSTS, WITH SPACING AS FOLLOWS -
 INTERIOR SPAN (ASSEMBLY C21): 9'-7 1/2" BACK TO BACK OF ANGLES
 END SPAN W/ CHP-1L (ASSEMBLY C2L): 10'-0" BACK OF ANGLE TO C OF TEE
 END SPAN W/ CHP-1R (ASSEMBLY C2R): 9'-7 1/2" C TEE TO BACK OF ANGLE
 SINGLE SPAN (ASSEMBLY C2S): 10'-0" C TO C OF TEES
 (SPACING FOR ASSEMBLY WITH GRATING IS IDENTICAL; ASSEMBLY MARK INCLUDES "G" AND USE "G" POSTS)

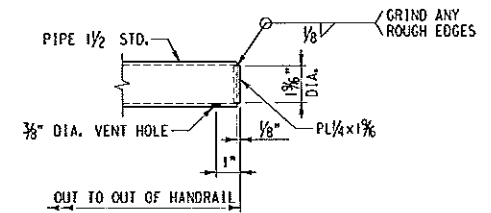
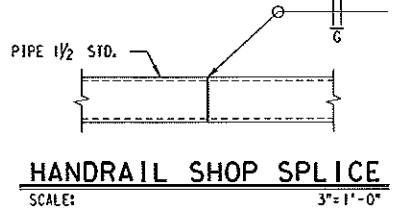
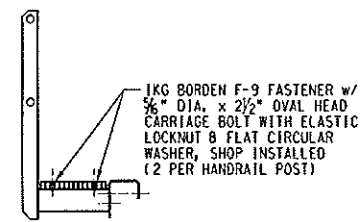
'C' DIMENSION IS C/C OF HOLES OR HOLE GROUPS PER STD. DWG. 500000 SHEET BGI OR STD. DWG. 530020 (UP-ONLY) SHEET SGI.



HANDRAIL ASSEMBLY - W/ GRATING
SCALE: 1/2" = 1'-0"

ASSEMBLY C2G1 FOR INTERIOR SPAN OR SINGLE SPAN WHEN USED IN CONJUNCTION WITH END HANDRAIL ASSEMBLY CEH
 ASSEMBLY C2G2 FOR END SPAN, HANDRAIL POST MK. CHPG-1L ON RIGHT END (OPTIONAL)
 ASSEMBLY C2G3 FOR END SPAN, HANDRAIL POST MK. CHPG-1R ON LEFT END (OPTIONAL)
 ASSEMBLY C2G4 FOR SINGLE SPAN, HANDRAIL POST MK. CHPG-1R ON LEFT END AND MK. CHPG-1L ON RIGHT END (OPTIONAL)

SHIP WITH 3/4" DIA. x 9/2" BOLTS WITH LOCKNUT AND WASHER PER TABLE, THIS SHEET



- NOTES:**
- Material shall conform to the following requirements:
 Rolled shapes & plates ASTM A36
 Pipe ASTM A53 Gr. B
 Bolts ASTM A307 Gr. A
 Elastic Locknut MIL-N-25027
 Washer ASTM F436
 - Design, fabrication, and erection per the AREMA Manual for Railway Engineering, Chapter 15, Steel Structures.
 - Welding requirements:
 A. All welding shall be with the SAW, SMAW, or GMAW process.
 B. All welding per AWS D1.1, Structural Welding Code.
 C. Welders must possess valid certification.
 - Handrail assemblies to be galvanized after fabrication in accordance with ASTM A123. After galvanizing, all elements shall be free of fins, abrasions, rough or sharp edges, and other surface defects.
 - Grating, where required, shall be fastened to assembly in shop after galvanizing.
 - Welding pipe rails to posts: Three welds for each assembly shall be all-around, both sides; remaining welds shall be one inch long, one side, on top of pipe only. Locate full welds as follows:
 Interior Span - Both welds on one post at or near center; top weld only on adjacent post.
 End Span - Both welds on end post; top weld only on post of opposite end.
 Single Span - Both welds on one end post; top weld only on other end post.

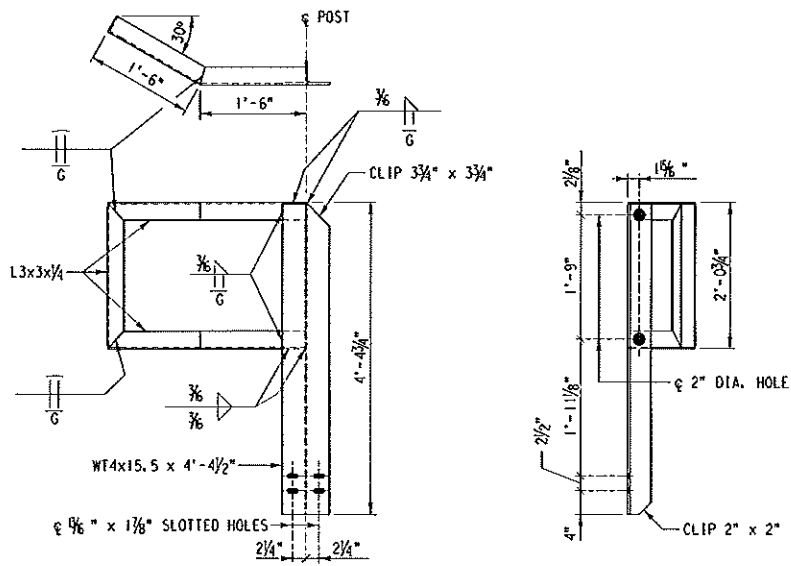
Formerly Plan No. 530010 (UPRR Only), Sheet 2

BNSF RAILWAY **UNION PACIFIC**

BRIDGE STANDARDS
CONCRETE BEAM BRIDGES
HANDRAILS ASSEMBLY DETAILS

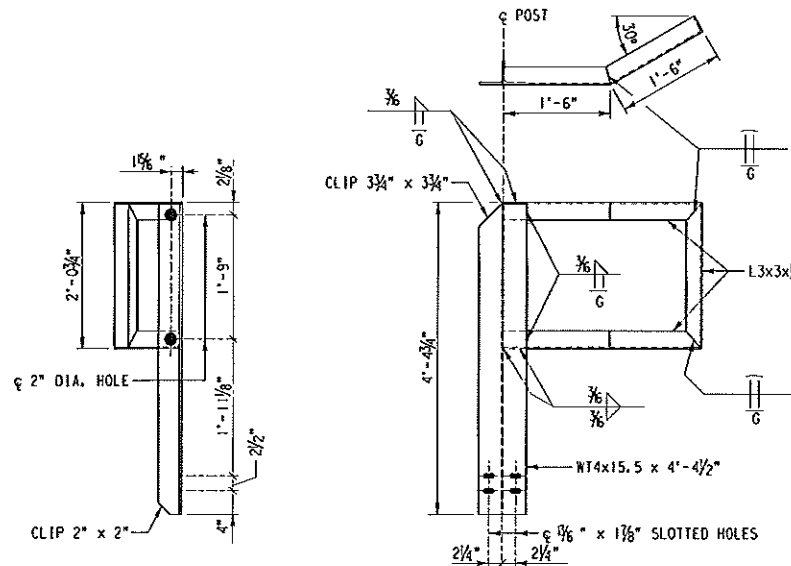
REVISIONS			DESIGN BY: MLM	DRAWN BY: MLM	CHECKED BY:
DATE	LTR.	DESCRIPTION	APPROVED:		
9/07	A	CHANGED GIRDER TO BEAM			
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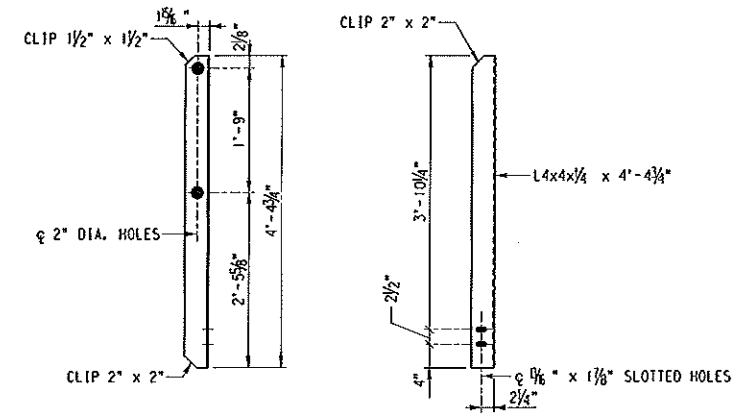
HANDRAIL POST MK. CHP-1L

SCALE: 3/4" = 1'-0" EST. WT. = 107.4 LB. EACH



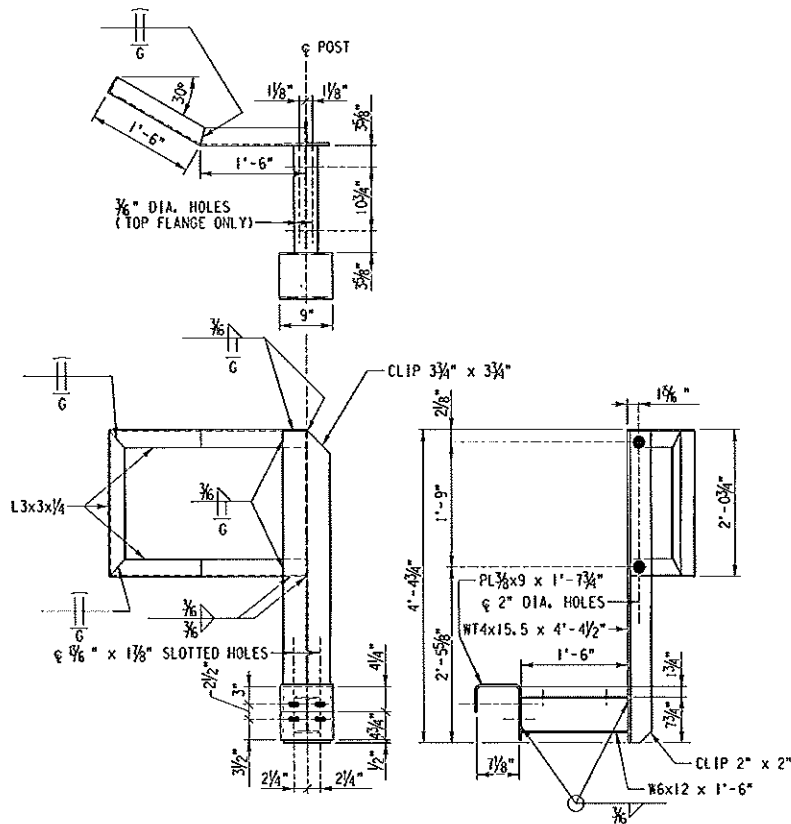
HANDRAIL POST MK. CHP-1R

SCALE: 3/4" = 1'-0" EST. WT. = 107.4 LB. EACH



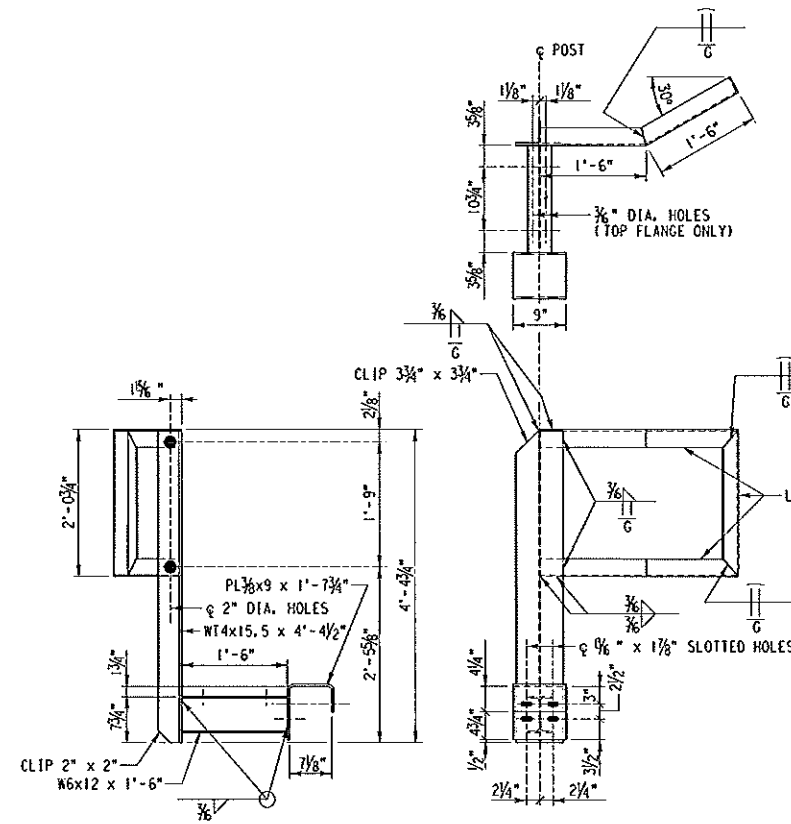
HANDRAIL POST MK. CHP-2

SCALE: 3/4" = 1'-0" EST. WT. = 29.1 LB. EACH



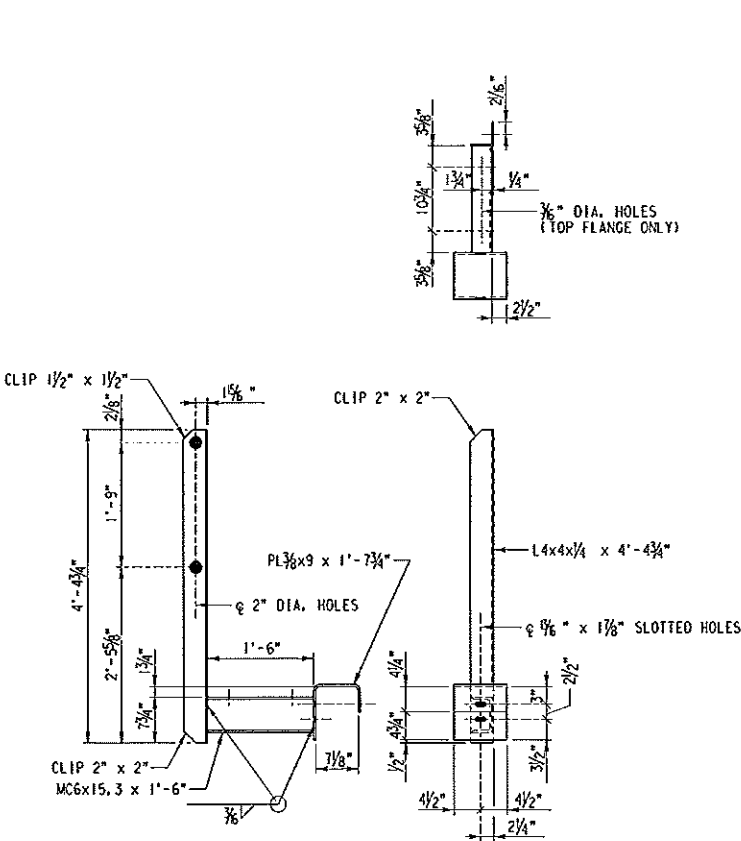
HANDRAIL POST MK. CHPG-1L

SCALE: 3/4" = 1'-0" EST. WT. = 145.8 LB. EACH



HANDRAIL POST MK. CHPG-1R

SCALE: 3/4" = 1'-0" EST. WT. = 145.8 LB. EACH



HANDRAIL POST MK. CHPG-2

SCALE: 3/4" = 1'-0" EST. WT. = 67.5 LB. EACH

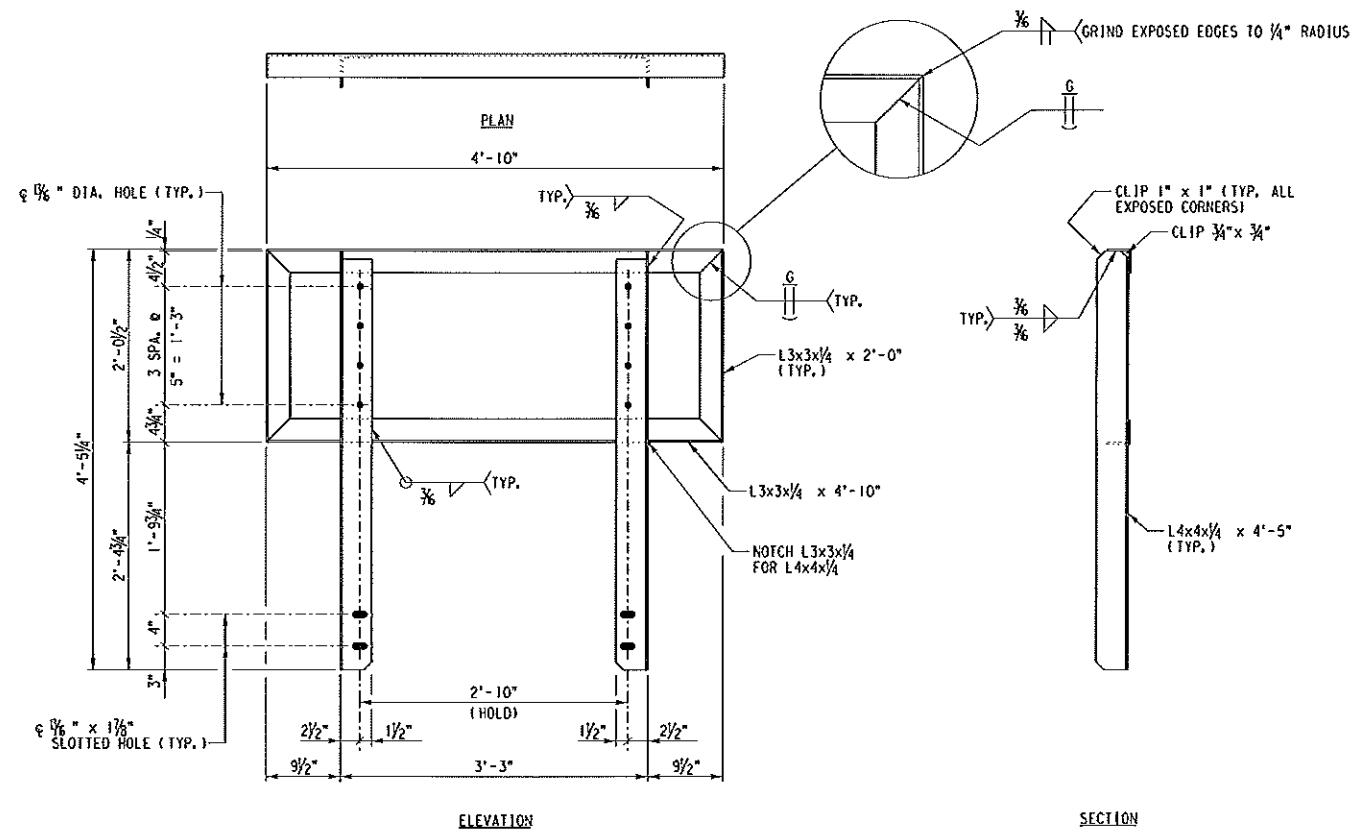
REVISIONS			DESIGN BY: MLM	DRAWN BY: MLM	CHECKED BY:
DATE	LTR.	DESCRIPTION	APPROVED:		
/			 BNSF - ASSISTANT DIRECTOR STRUCTURES DESIGN UPRR - MGR SPECIAL PROJECTS STRUCTURES DESIGN		
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Formerly Plan No. 530010 (UPRR Only), Sheet 3

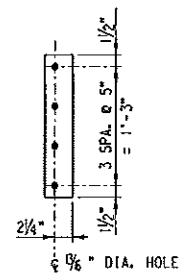


BRIDGE STANDARDS
 CONCRETE BEAM BRIDGES
HANDRAILS
PIECE MARK DETAILS

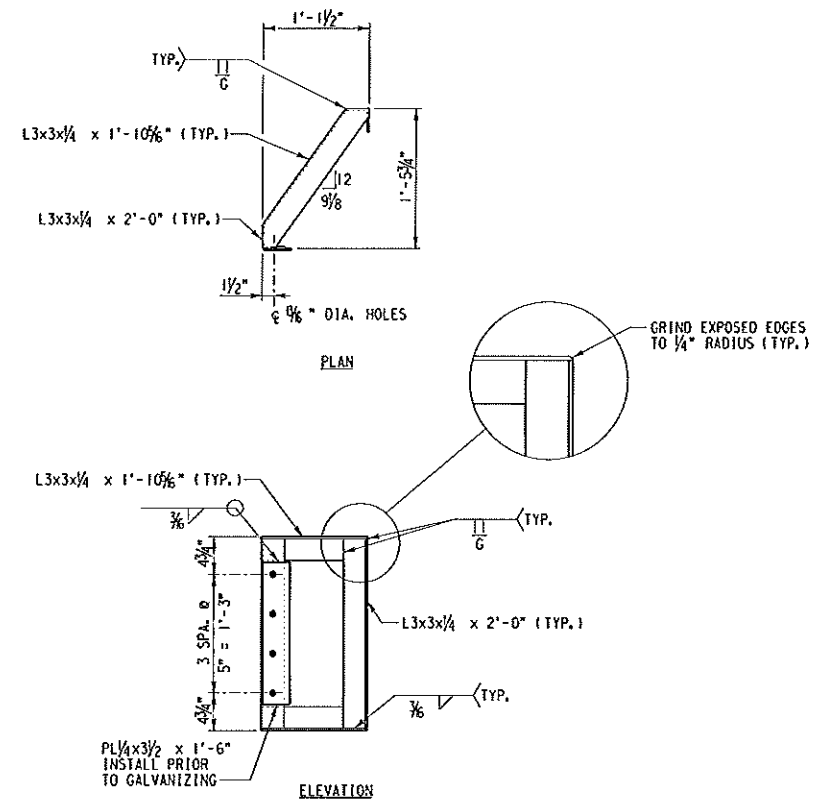
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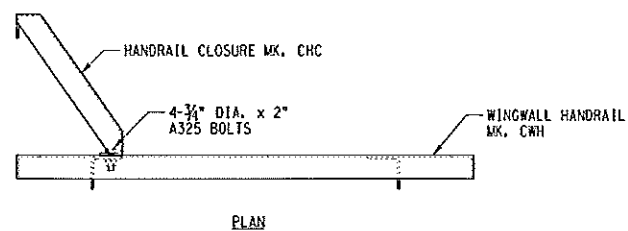
WINGWALL HANDRAIL MK. CWH
 SCALE: 1"=1'-0"
 EST. WT. = 126 LB. EACH
 GALVANIZE AFTER FABRICATION



PL 1/4 x 3/2 x 1'-6"
 SCALE: 1"=1'-0"

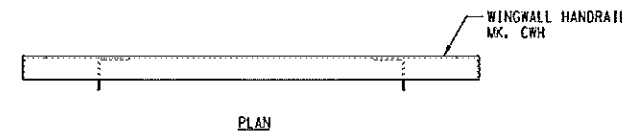


HANDRAIL CLOSURE MK. CHC
 SCALE: 1"=1'-0"
 EST. WT. = 42.3 LB. EACH
 GALVANIZE AFTER FABRICATION



NOTE:
 LEFT ASSEMBLY SHOWN, CONNECT MK. CHC TO OTHER LEG OF MK. CWH FOR RIGHT ASSEMBLY.

END HANDRAIL ASSEMBLY CEH (W/O GRATING)
 SCALE: 1"=1'-0"
 EST. WT. = 169 LB. EACH
 (SHOP ASSEMBLED)
 SHIP WITH 3/4" DIA. x 11" BOLTS WITH LOCKNUT AND WASHER PER SCHEDULE, THIS SHEET



END HANDRAIL ASSEMBLY CEHG (WITH GRATING)
 SCALE: 1"=1'-0"
 EST. WT. = 126 LB. EACH
 (SHOP ASSEMBLED)
 SHIP WITH 3/4" DIA. x 11" BOLTS WITH LOCKNUT AND WASHER PER SCHEDULE, THIS SHEET

MATERIAL SCHEDULE		
(QUANTITY PER END HANDRAIL ASSEMBLY CEHG)		
REQ'D	UNIT	DESCRIPTION
1	EA.	WINGWALL HANDRAIL MK. CWH
5	EA.	3/4" DIA. x 11" A307 GRADE A HVY. HEX BOLT W/ HVY. HEX ELASTIC LOCKNUT (MIL-N-25027) & FLAT CIRCULAR WASHER (F436), GALVANIZED

MATERIAL SCHEDULE		
(QUANTITY PER END HANDRAIL ASSEMBLY CEH)		
REQ'D	UNIT	DESCRIPTION
1	EA.	WINGWALL HANDRAIL MK. CWH
1	EA.	HANDRAIL CLOSURE MK. CHC
4	EA.	3/4" DIA. x 2" A325 HVY. HEX BOLT, TYPE 1 W/ HVY. HEX NUT (A563, LUBRICATED) AND FLAT CIRCULAR WASHER (F436), EACH COMPONENT HOT DIP OR MECHANICALLY ZINC COATED
5	EA.	3/4" DIA. x 11" A307 GRADE A HVY. HEX BOLT W/ HVY. HEX ELASTIC LOCKNUT (MIL-N-25027) & FLAT CIRCULAR WASHER (F436), GALVANIZED

REVISIONS			DESIGN BY: HDR	DRAWN BY: HDR	CHECKED BY: HDR
DATE	LTR.	DESCRIPTION	APPROVED:		

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George J. Meyer 4-17-2007
 UPRR - MGR SPECIAL PROJECTS, STRUCTURES DESIGN

BNSF RAILWAY

BRIDGE STANDARDS
 CONCRETE BEAM BRIDGES
WINGWALL HANDRAIL DETAILS

FILE OWNER: UPRR DATE:
 PLAN NO.: 602000 SHEET: 4

FILE NAME: p:\unloc\on\sgn\143\brmf\uprhandrwhr.cad