



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

MEMORANDUM TO: Project Engineers
Project Design Engineers

FROM: T. K. Koch, P. E.
State Structures Engineer

DATE: January 23, 2015

SUBJECT: 32" ALASKA RAIL AND 42" OREGON RAIL

The 32" Alaska Rail and 42" Oregon Rail (a.k.a. open rails) have been recognized by the Federal Highway Administration as Test Level Four (TL-4) bridge rails in accordance with the AASHTO LRFD Bridge Design Specifications. The 32" Alaska Rail consists of two horizontal metal tubes attached to vertical metal posts with a height 32" above the riding surface of the bridge deck. The 42" Oregon Rail consists of three horizontal metal tubes attached to vertical metal posts with a height 42" above the riding surface of the bridge deck. Use of the 32" Alaska Rail and 42" Oregon Rail shall be limited to the following types of projects:

- Bridge replacements in which the Project Commitments Sheet in the Environmental Document note the 32" Alaska Rail or the 42" Oregon Rail are required.
- Bridge replacements where the conveyance of storm water requires the use of an open rail.

The attached Design Manual Figures 6-35a, 6-35b, 6-35c, 6-35d, 6-37a, and 6-37b have been developed to show rail, curb, and slab details. The attached Figures 6-81b and 6-88a have been developed to show modified section properties when placing the 32" Alaska Rail or 42" Oregon Rail on exterior cored slab and box beam units.

Standard Drawings BMR8, BMR9, BMR10, and BMR11 have been developed to show metal rail details, rail post spacings, and end post attachment details for the 32" Alaska Rail and 42" Oregon Rail.

The models within Standard Drawings GRA3, PCBB2, PCBB4, PCBB6, PCBB8, PCS2, PCS3, and PCS4 have been revised to accommodate the 32" Alaska Rail and 42" Oregon Rail.

Rail post bases shall not be located on grooved contraction joints or expansion joints in the curb.

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Project Engineers
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January 23, 2015

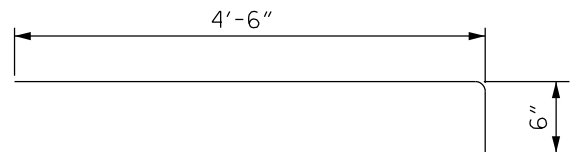
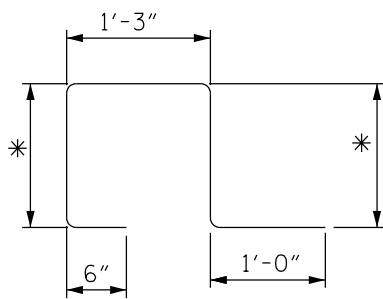
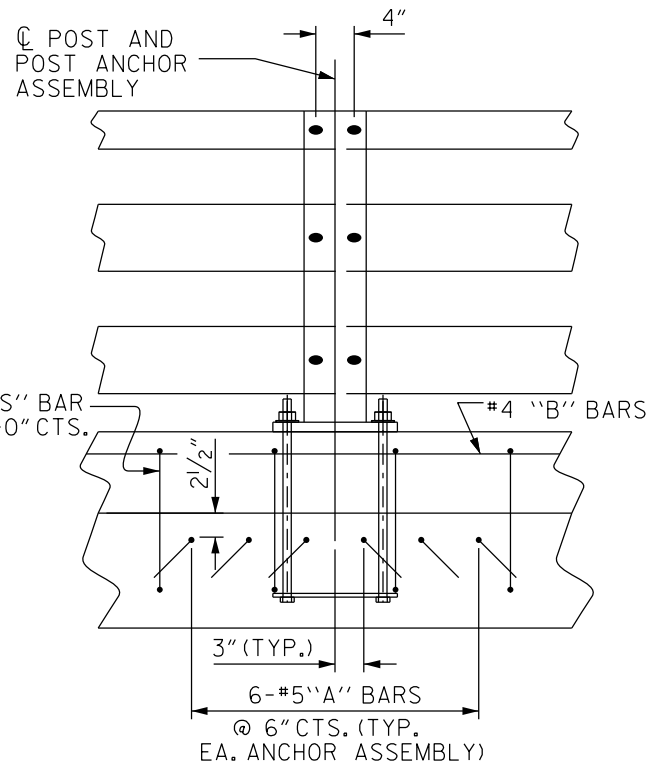
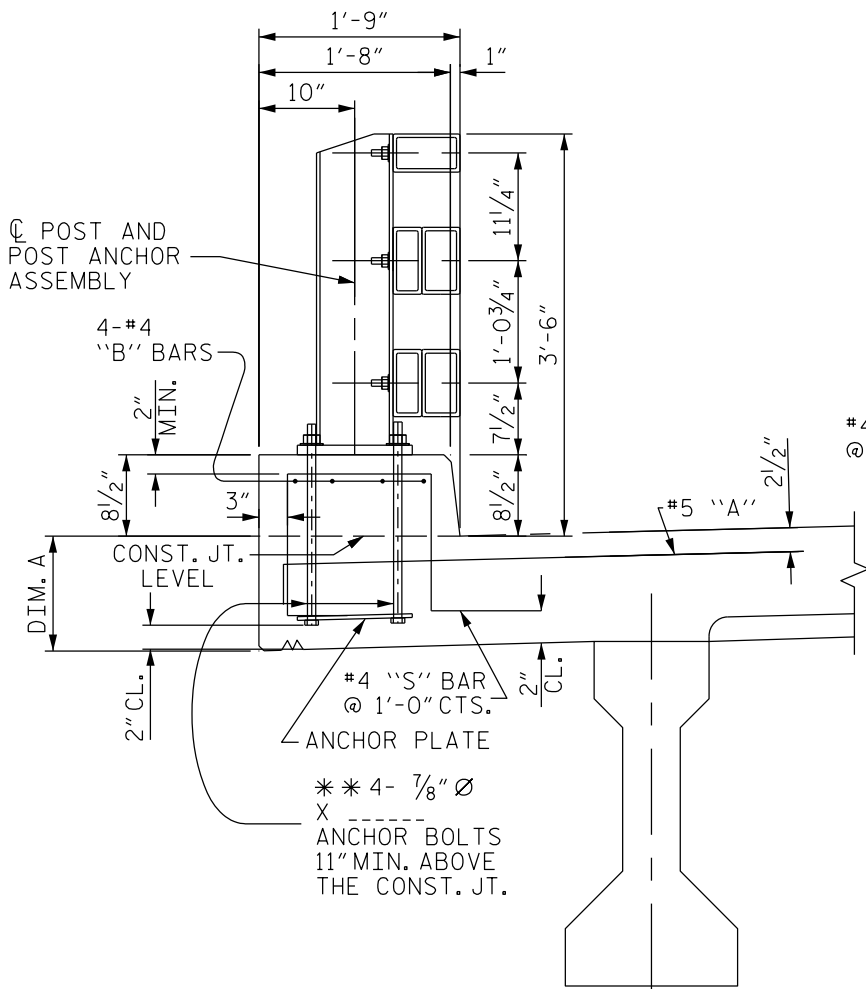
The metal rail pay item for the 32" Alaska Rail and 42" Oregon Rail shall be "32" Alaska Rail" and "42" Oregon Rail", respectively, and paid for per linear foot. The concrete curb and end post pay item for the 32" Alaska Rail and 42" Oregon Rail shall be "1'-___ x ___" Concrete Curb" and paid for per linear foot.

TKK/TMG/kaw

Attachments:

Figure 6-35a
Figure 6-35b
Figure 6-35c
Figure 6-35d
Figure 6-37a
Figure 6-37b
Figure 6-81b
Figure 6-88a

Cc: B. C. Hanks, P. E.
E. B. Nelson, P. E.
G. Muchane, P. E.
G. W. Mumford, P. E.
D. S. Chang, P. E.
C. A. Peoples, P. E.
R. A. Hancock, P. E.; Attn.: K. G. Bowen, P. E.
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R. E. Greene, Jr., P. E.
G. R. Perfetti, P. E.
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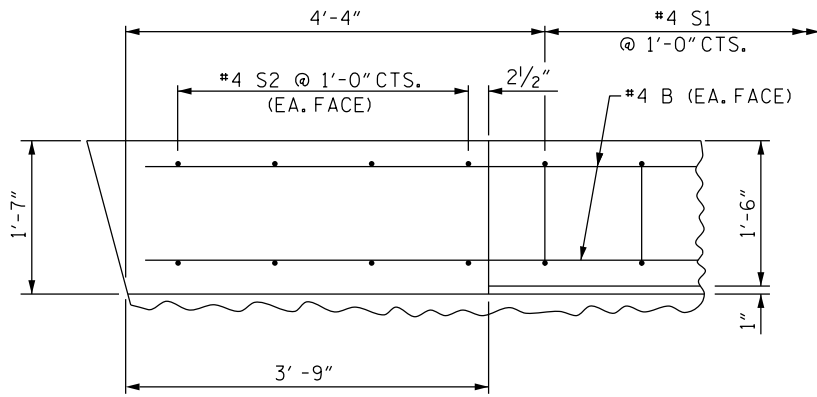


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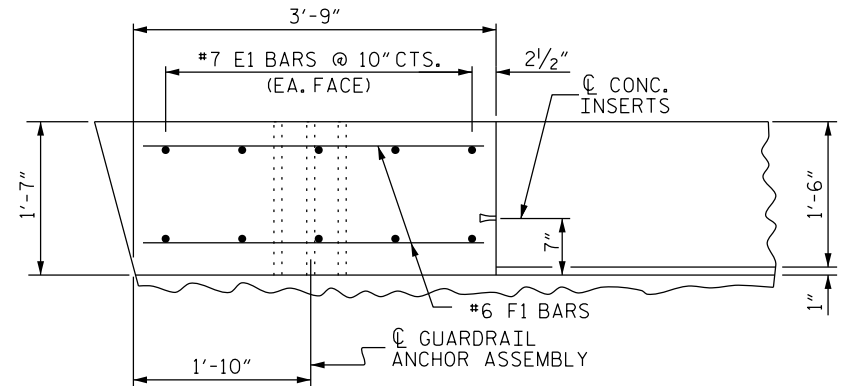
- * DIMENSION = DIM. A + 2 1/2"
- ** BOLT LENGTH = DIM. A + 9"

42" OREGON RAIL ON A DECK SLAB

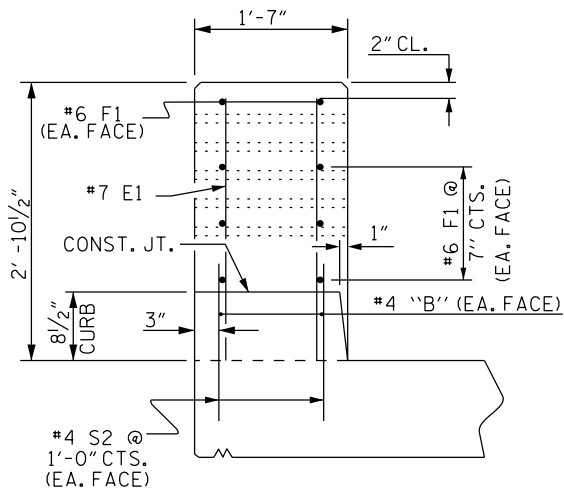
FIGURE 6 - 35b



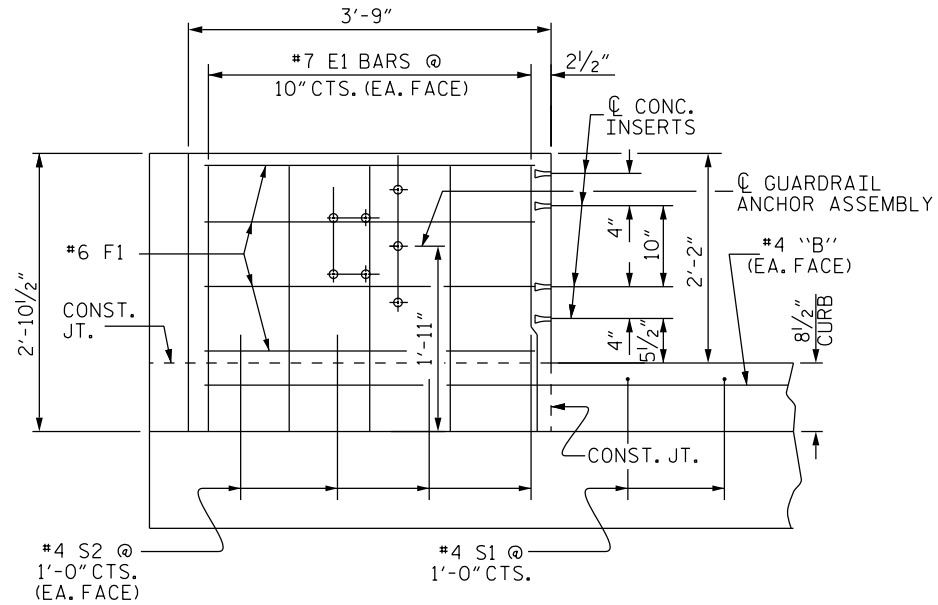
PLAN OF CURB



PLAN OF END POST

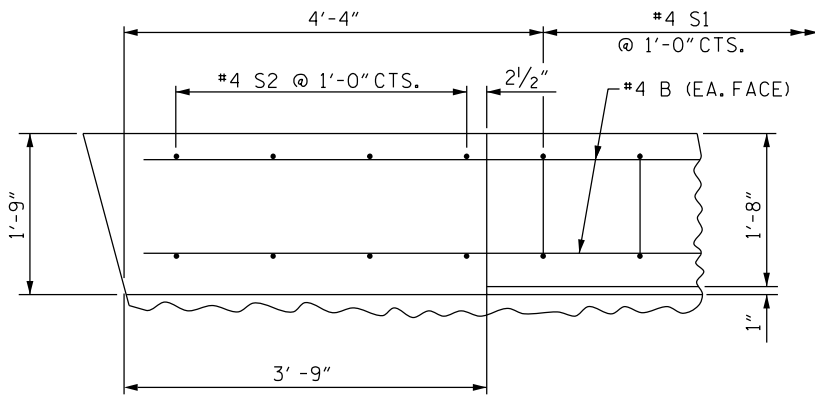


END VIEW

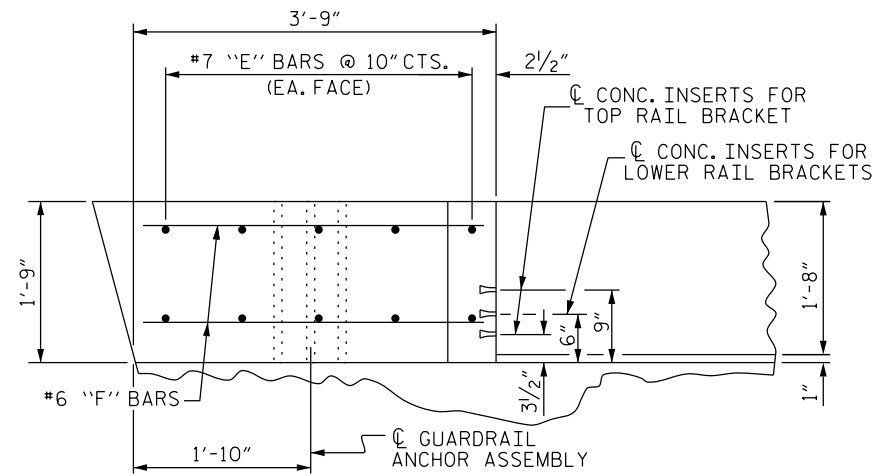


ELEVATION

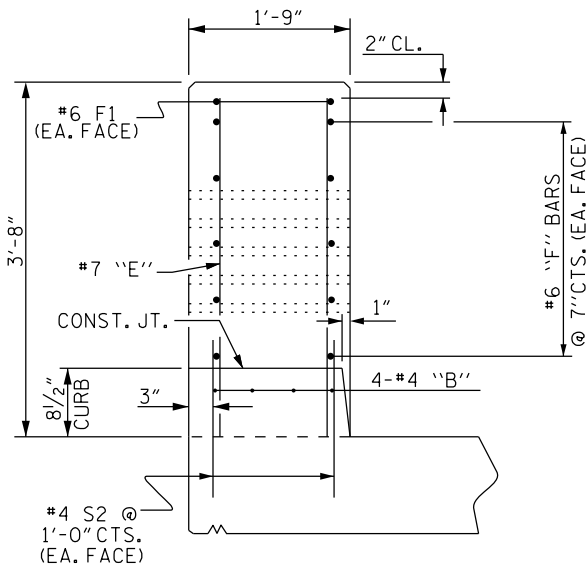
CURB AND END POST FOR 32" ALASKA RAIL



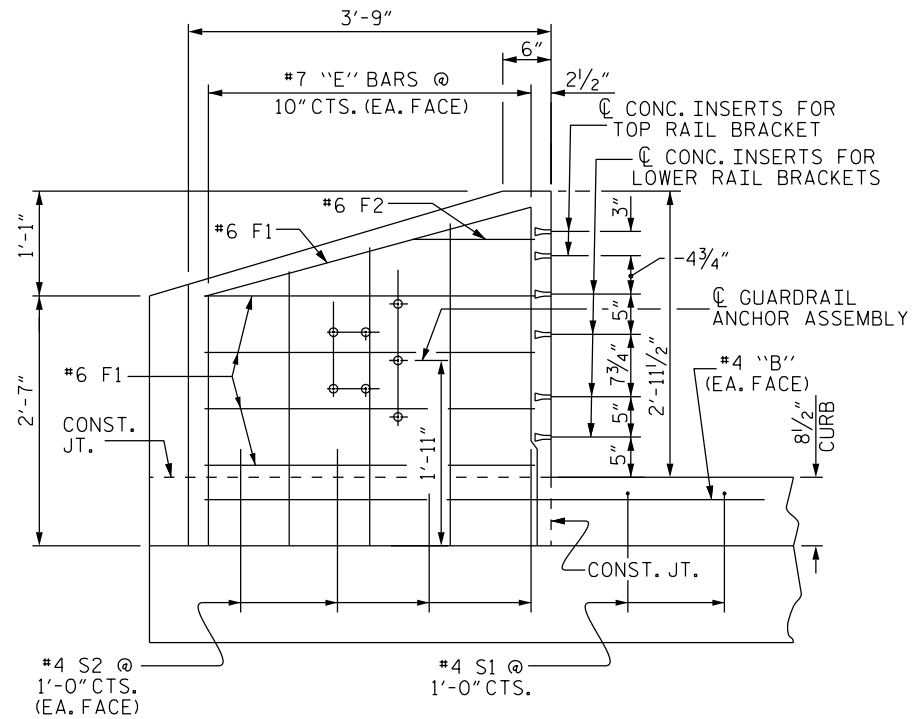
PLAN OF CURB



PLAN OF END POST

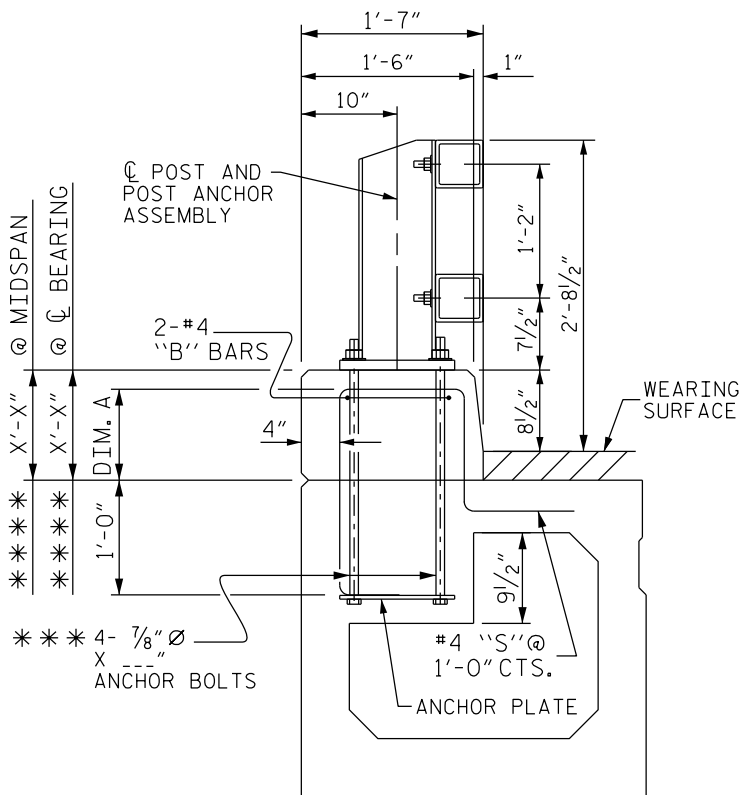


END VIEW

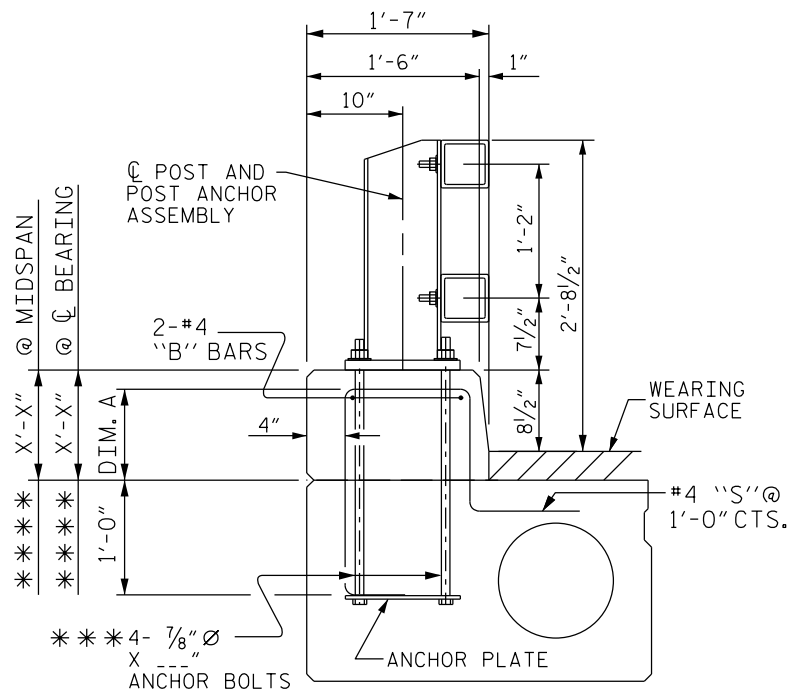


ELEVATION

CURB AND END POST FOR 42" OREGON RAIL



SECTION THRU RAIL

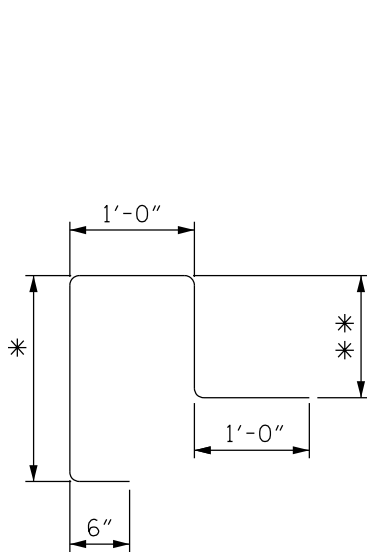


SECTION THRU RAIL

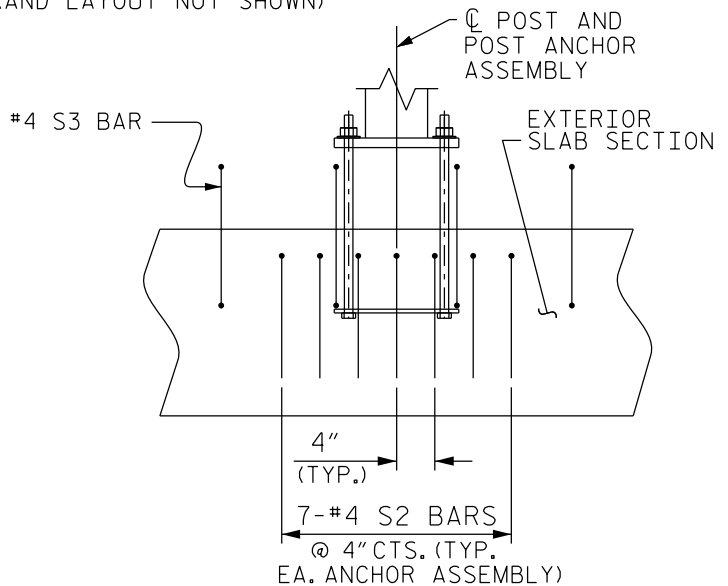
DIM. A = WEARING SURFACE @ MIDSPAN + 6 1/2"

EXTERIOR CORED SLAB AND BOX BEAM SECTION

(STRAND LAYOUT NOT SHOWN)



'S' BAR DETAIL



SIDE VIEW AT POST LOCATION

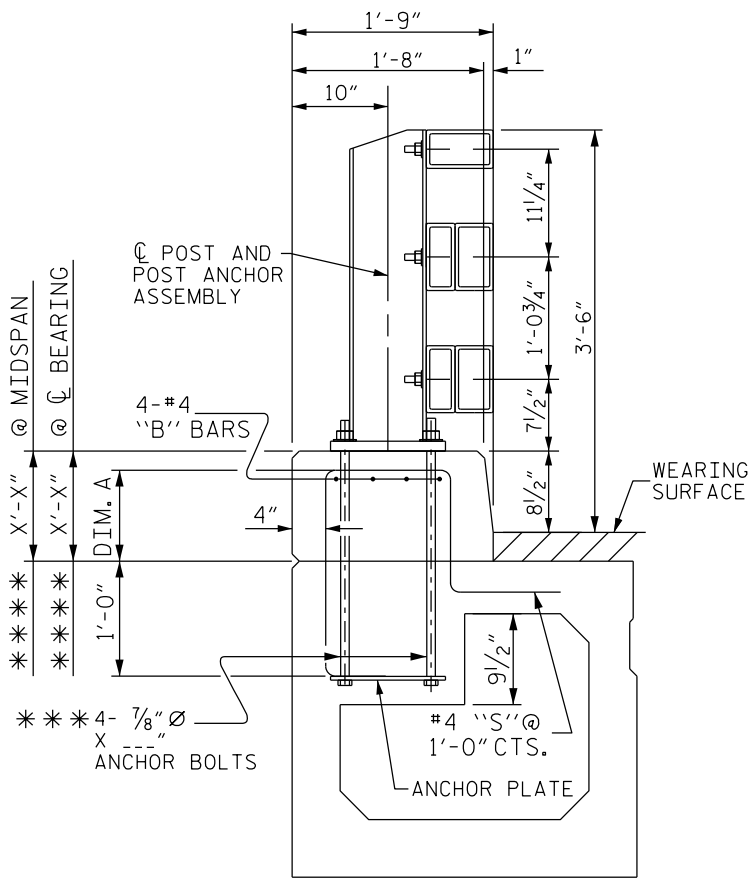
(SHOWING ADDITIONAL S2 BARS AT EACH POST ASSEMBLY)

NOTE TO DETAILER:

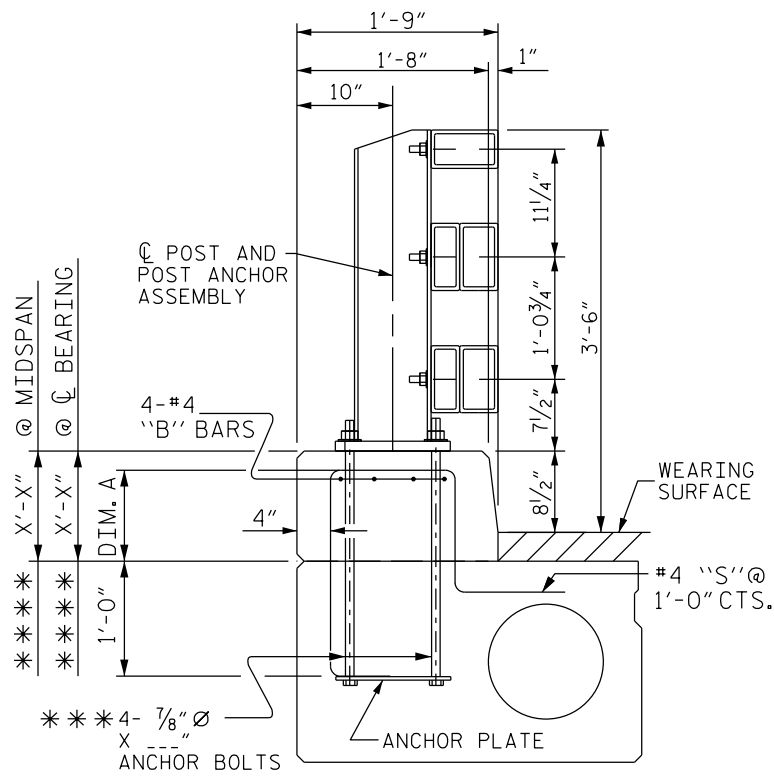
- * DIMENSION = WEARING SURFACE @ MIDSPAN + 1'-6 1/2"
- ** DIMENSION = WEARING SURFACE @ MIDSPAN + 9 1/2"
- *** BOLT LENGTH = WEARING SURFACE @ CL BEARING + 2'-0"
- **** DIMENSION = WEARING SURFACE @ MIDSPAN OR CL BEARING + 8 1/2"

32" ALASKA RAIL ON CORED SLABS AND BOX BEAMS

FIGURE 6 - 37a



SECTION THRU RAIL

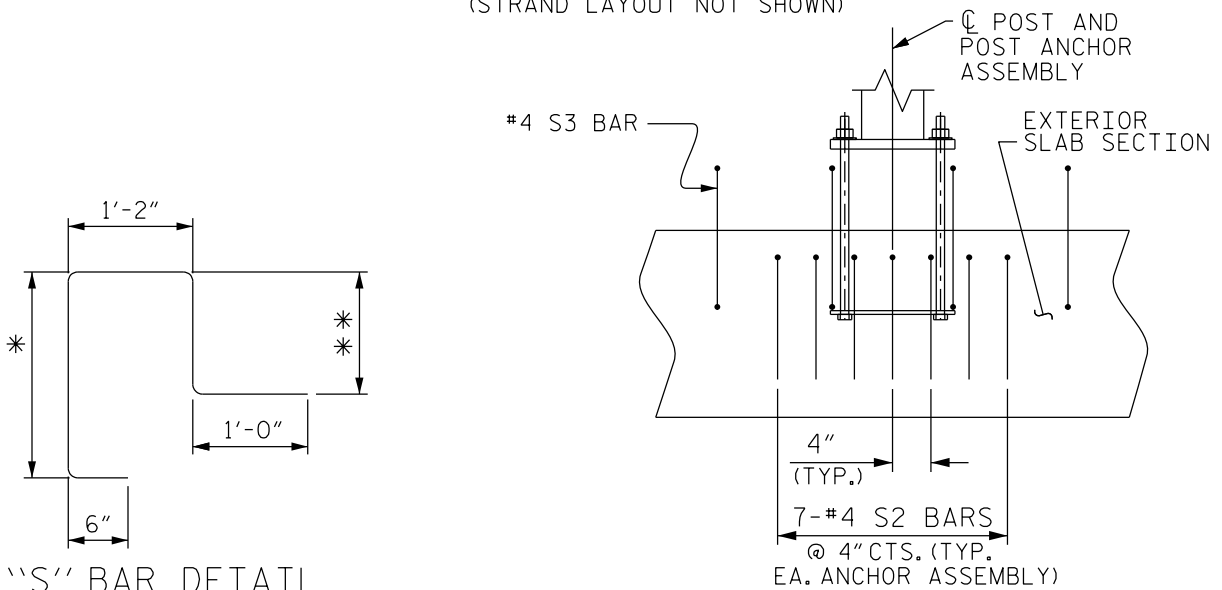


SECTION THRU RAIL

DIM. A = WEARING SURFACE @ MIDSPAN + 6 1/2"

EXTERIOR CORED SLAB AND BOX BEAM SECTION

(STRAND LAYOUT NOT SHOWN)



"S" BAR DETAIL

SIDE VIEW AT POST LOCATION

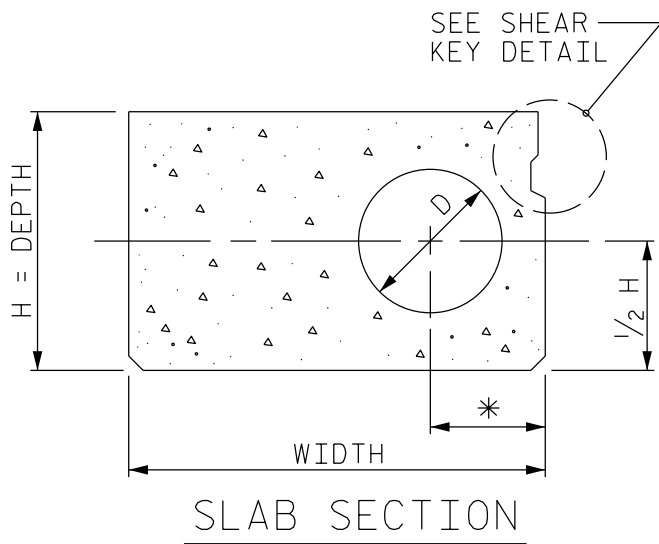
(SHOWING ADDITIONAL S2 BARS AT EACH POST ASSEMBLY)

NOTE TO DETAILER:

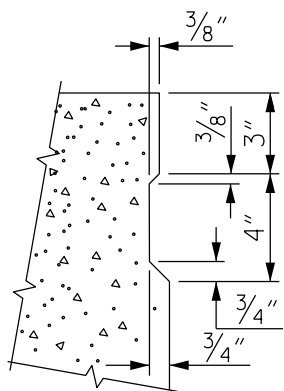
- * DIMENSION = WEARING SURFACE @ MIDSPAN + 1'-6 1/2"
- ** DIMENSION = WEARING SURFACE @ MIDSPAN + 9 1/2"
- *** BOLT LENGTH = WEARING SURFACE @ CL BEARING + 2'-0"
- **** DIMENSION = WEARING SURFACE @ MIDSPAN OR CL BEARING + 8 1/2"

42" OREGON RAIL ON CORED SLABS AND BOX BEAMS

FIGURE 6 - 37b



21" CORED SLAB	
AREA: 639.1 in. ² 4.438 ft. ²	
WEIGHT: 4.438 X 150 = 666 lbs/ft.	
$I_{xx} = 26585 \text{ in.}^4$	$I_{yy} = 70733 \text{ in.}^4$
$W = 3.00 \text{ ft.}$	$C_T = 10.539 \text{ in.}$
$* = 10.00 \text{ in.}$	$C_B = 10.461 \text{ in.}$
$H = 21.00 \text{ in.}$	$S_T = 2522 \text{ in.}^3$
$D = 12.00 \text{ in.}$	$S_B = 2541 \text{ in.}^3$



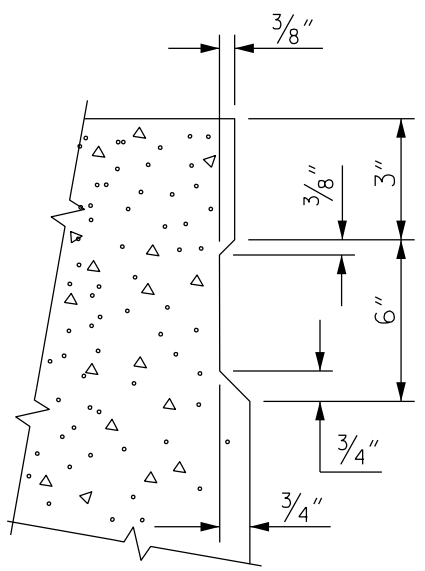
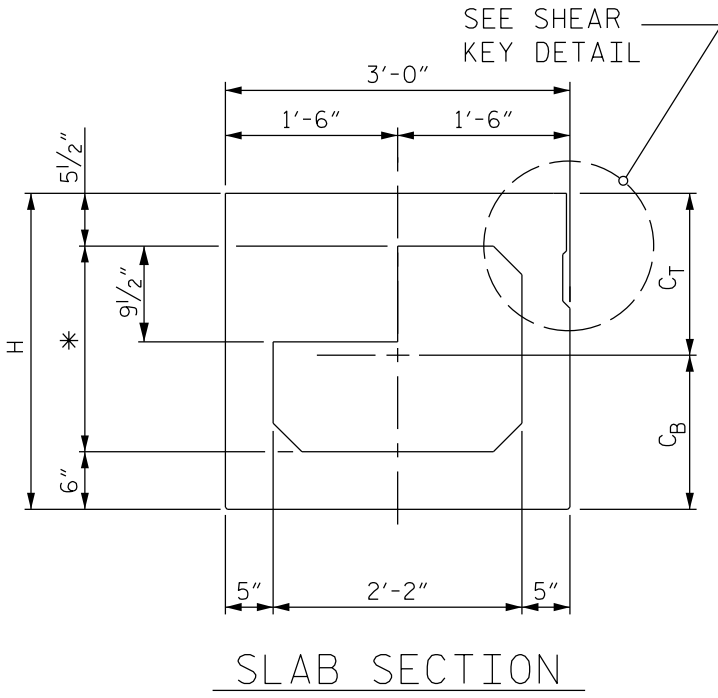
SHEAR KEY DETAIL

24" CORED SLAB	
AREA: 747.1 in. ² 5.188 ft. ²	
WEIGHT: 5.188 X 150 = 778 lbs/ft.	
$I_{xx} = 40190 \text{ in.}^4$	$I_{yy} = 82611 \text{ in.}^4$
$W = 3.00 \text{ ft.}$	$C_T = 12.041 \text{ in.}$
$* = 10.00 \text{ in.}$	$C_B = 11.959 \text{ in.}$
$H = 24.00 \text{ in.}$	$S_T = 3338 \text{ in.}^3$
$D = 12.00 \text{ in.}$	$S_B = 3361 \text{ in.}^3$

CORED SLAB PROPERTIES

(FOR USE WHEN 32" ALASKA OR 42" OREGON
RAIL IS ATTACHED; EXTERIOR UNITS ONLY)

FIGURE 6 - 81b



27" BOX BEAM	
AREA: 699.6 in. ² 4.858 ft. ²	
WEIGHT: 4.858 X 150 = 729 lbs/ft.	
I _{xx} = 53365 in. ⁴	I _{yy} = 88115 in. ⁴
C _T = 13.170 in.	* = 15.50 in.
C _B = 13.830 in.	H = 27.00 in.
S _T = 4052 in. ³	
S _B = 3859 in. ³	

33" BOX BEAM	
AREA: 759.6 in. ² 5.275 ft. ²	
WEIGHT: 5.275 X 150 = 791 lbs/ft.	
I _{xx} = 92226 in. ⁴	I _{yy} = 102739 in. ⁴
C _T = 15.803 in.	* = 21.50 in.
C _B = 17.197 in.	H = 33.00 in.
S _T = 5836 in. ³	
S _B = 5363 in. ³	

39" BOX BEAM	
AREA: 819.6 in. ² 5.692 ft. ²	
WEIGHT: 5.692 X 150 = 854 lbs/ft.	
I _{xx} = 144585 in. ⁴	I _{yy} = 117350 in. ⁴
C _T = 18.489 in.	* = 27.50 in.
C _B = 20.511 in.	H = 39.00 in.
S _T = 7820 in. ³	
S _B = 7049 in. ³	

BOX BEAM PROPERTIES
(FOR USE WHEN 32" ALASKA OR 42" OREGON RAIL IS ATTACHED; EXTERIOR UNITS ONLY)

FIGURE 6 - 88a