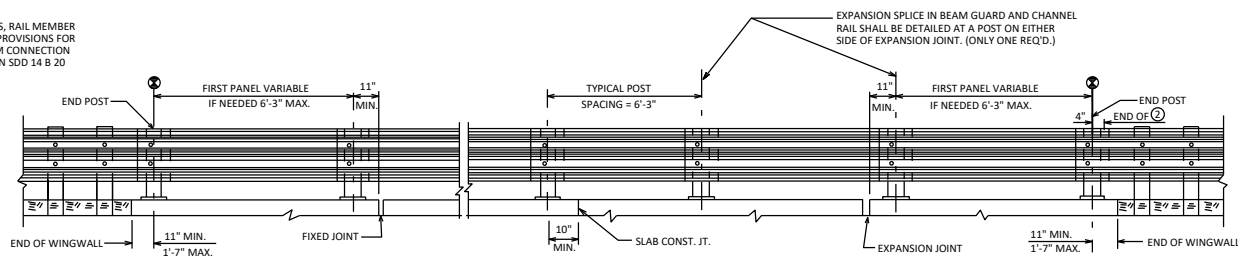
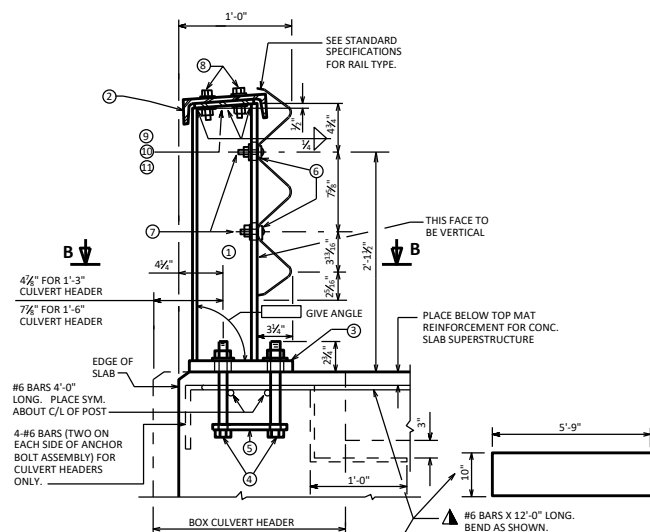


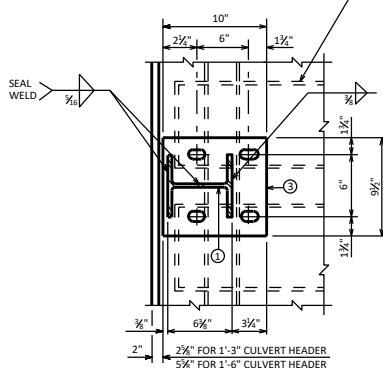
AT END POSTS, RAIL MEMBER SHALL HAVE PROVISIONS FOR A THREE BEAM CONNECTION AS SHOWN ON SDD 14 B 20 STANDARDS.



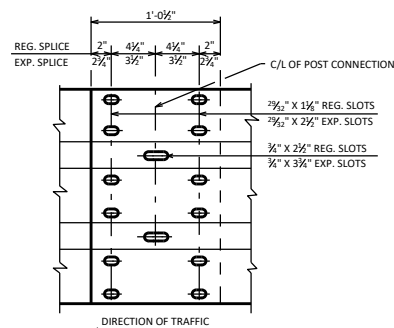
ELEVATION OF RAILING



SECTION THRU RAILING

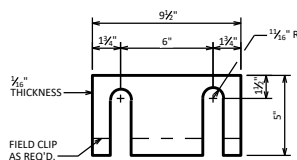


SECTION B-B



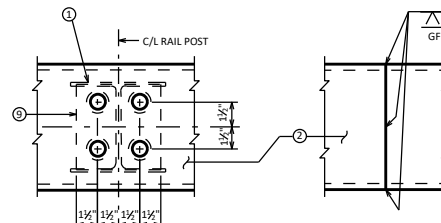
RAIL MEMBER SPLICE

$\frac{1}{2}$ " DIA. BUTTON HEAD OVAL SHOULDER BOLTS WITH HEX NUTS AT ALL SLOTS.



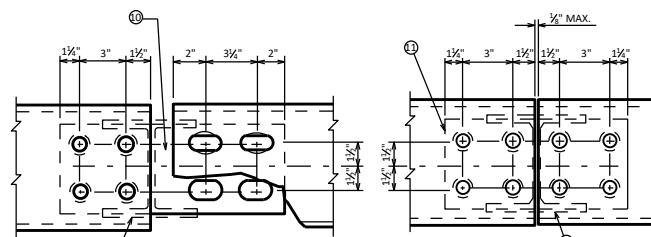
POST SHIM DETAIL

4 PER POST



BASIC POST CONNECTION

OPTIONAL SHOP SPLICE



EXPANSION SPLICE

TYPICAL SPLICE

CHANNEL MEMBER DETAILS

SHIM PLATES 6" X $\frac{1}{2}$ " X 6" MAY BE USED BETWEEN TOP OF POST AND CHANNEL MEMBER TO ACHIEVE VERT. ALIGNMENT.

LEGEND

- W6x25 WITH 2 - $\frac{1}{2}$ " X 2 1/2" VERT. SLOTS IN FLG. (SLOT ON OTHER SIDE OF WEB IS OPTIONAL) FOR NO.7 CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POSTS VERTICAL AND NORMAL TO GRADE LINE.
- C8x11.5 WITH $\frac{1}{4}$ " DIA. HOLES FOR NO. 8.
- BASE PLATE 1" X 9 1/2" X 10" WITH 1 1/2" X 1 1/2" SLOTTED HOLES FOR ANCHOR BOLTS NO.4 WELD TO NO.1 AS SHOWN.
- A325 - $\frac{1}{2}$ " HEX BOLTS (GALVANIZED) WITH A325 NUT AND WASHER. 14" LONG AT END POSTS AND AT POSTS ON CONCRETE SLAB SUPERSTRUCTURES WHERE THE SLAB THICKNESS IS ≥ 15 ". USE 8" LONG AT ALL OTHER LOCATIONS. 4 REQ'D. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO.3 CHAMFER TOP OF BOLTS BEFORE THREADING.
- $\frac{1}{2}$ " X 8" X 8" FLAT BAR WITH $\frac{1}{4}$ " DIA. HOLES FOR ANCHOR BOLTS NO.4.
- 1 1/2" X 3" MOUNTING BOLT WASHER (GALVANIZED).
- $\frac{1}{4}$ " DIA. BUTTON HEAD POST MOUNTING BOLT WITH ROUND WASHER AND NUT.
- $\frac{1}{2}$ " DIA. X 2" HEX BOLTS WITH NUT AND TWO WASHERS EACH.
- PLATE $\frac{1}{2}$ " X 5 1/2" X 6" AT BASIC POST CONNECTION. 1 1/2" DIA. HOLES IN PLATE. 1 1/2" DIA. HOLES IN CHANNEL.
- PLATE $\frac{1}{2}$ " X 5 1/2" X 11 1/2". 1 1/2" DIA. HOLES IN PLATE. 1 1/2" DIA. HOLES IN CHANNEL. (AT EXPANSION SPLICE.)

NOTES

BID ITEM SHALL BE "RAILING STEEL TYPE W" WHICH INCLUDES ALL ITEMS SHOWN.

POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.

ALL MATERIAL EXCEPT ANCHORAGE DETAIL NO. 5 SHALL BE GALVANIZED AFTER FABRICATION.

PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS AND CHANNELS SHALL BE GIVEN A NO. 6 COMMERCIAL BLAST CLEANING BY SSPC SPECS.

ALL MATERIAL USED IN FABRICATION SHALL BE MADE FROM MATERIALS CONFORMING TO ASTM DESIGNATION A709 GRADE 36 UNLESS NOTED OTHERWISE.

FILL BOLT SLOT OPENINGS IN POST SHIMS & PLATE NO. 3 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

SEE STANDARD SPECIFICATIONS FOR RAIL TYPE.

CHANNEL MEMBER SHALL BE ATTACHED CONTINUOUSLY TO A MINIMUM OF FOUR POSTS AND A MAXIMUM OF EIGHT (EXCEPT AT ABUTMENTS).

AT EXPANSION SLOTS IN RAIL AND CHANNEL MEMBERS, TIGHTEN BOLTS, BACK OFF ONE HALF TURN AND BURR THREADS. RAIL MEMBERS SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC AND THE UPPER RAIL SHALL LAP THE LOWER RAIL.

STEEL POST SHIMS MAY BE USED UNDER POSTS WHERE REQ'D. FOR ALIGNMENT.

SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

▲ TIE TO TOP MAT OF STEEL. PUT THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE. NOT REQ'D. FOR BOX CULVERT HEADERS.

⊗ PAY LIMITS FOR TYPE "W" STEEL RAILING.

WEIGHT = 45 LB/FT

STEEL RAILING TYPE 'W'



APPROVED: *Laura Shadewald*

DATE:
1-24

TOP RAIL SEAT PLATE

LAYOUT OF BOTTOM

RAIL SEAT PL.

**LAYOUT OF TOP
RAIL SEAT PL.**

STEEL POST DETAILS

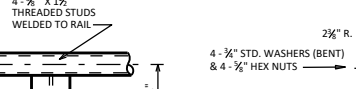


Diagram illustrating the Rail to Post Connection. The diagram shows two horizontal rails connected by a vertical post. The connection is secured by 4 - 3/4" x 1 1/2" threaded studs welded to the rail, 4 - 3/4" STD. WASHERS (BENT) & 4 - 3/8" HEX NUTS, and 2 3/8" R. (Radius). The vertical post is labeled with dimensions 11" and 7 1/2". A note states: "ALL SLEEVE DETAILS SAME AS 'FIELD ERECTION JOINT DETAIL' UNLESS SHOWN OTHERWISE".

RAIL TO POST CONN.

Technical drawing of a 12' x 12' x 12' inch cube. The drawing shows a perspective view of the cube with dimensions and material specifications. The dimensions are: 12' x 12' x 12' (overall size), 12' x 12' (top face), 12' x 12' (front face), and 12' x 12' (side face). The material specifications are: 1/2" DIA. STD. PIPE (TYP.) for the edges and 3/4" x 1/2" x 1/2" (TYP.) for the corner braces. The corner braces are labeled with dimensions: 12' x 12' (overall size), 12' x 12' (top face), 12' x 12' (front face), and 12' x 12' (side face). The corner braces are also labeled with dimensions: 12' x 12' (overall size), 12' x 12' (top face), 12' x 12' (front face), and 12' x 12' (side face).

3 1/2" DIA. STANDARD PIPE

4" DIA. EXTRA STRONG PIPE

1/2" TYP.

11" TYP.

3" MIN.

11" TYP.

1" 8" 4" 8" 1"

FIELD ERECTION JOINT DETAIL

**DETAIL AT RAIL
OPENING**

The diagram illustrates the elevation of a railing system. Key dimensions include a maximum height of 8'-0" and a maximum spacing of 8'-0" between posts. The railing is composed of three horizontal rails. The top rail is 1 1/2" high, and the bottom rail is 4" high. The railing is supported by a base that is 4'-0" wide. The railing is shown in a deflected state, with a deflection of 4'-0" at the top and 5'-0" at the bottom. The railing is labeled "EXP. JT. @ ABUT." and "DEFLECTION JT. @ PIER".

PLAN
VERTICAL FACE PARAPET 'A'

6" C/L OF TOP RAIL
6 1/4" C/L OF END PLATE
6 1/4" C/L OF BOTTOM RAIL
1 1/2"
1'-3 3/4"
END PLATE
DRILL 1/2" DIA. DRAIN HOLES IN RAILS AT END PLATE (OUTSIDE ELEVATION).
FRONT FACE OF RAIL
FRONT FACE OF PARAPET
1/4"

PLAN
VERTICAL FACE PARAPET 'A'

6 1/2" C/O OF TOP RAIL
7 1/4" C/O OF END PLATE
7" C/O OF BOTTOM RAIL

DRILL 1/2" DIA. DRAIN HOLES IN RAILS AT END PLATE (OUTSIDE ELEVATION).

END PLATE

FRONT FACE OF PARAPET

FRONT FACE OF RAIL

PLAN
SLOPED FACE PARAPETS '1F', '32SS', OR '36SS'

DETAIL OF RAIL BEND AT ABUTMENTS

Technical drawing of a 2' x 10" steel plate. The plate is 1/2" thick. It features four 1 1/2" diameter drilled holes for pre-set anchor bolts, arranged in two rows of two. The overall dimensions are 2'-7" in height and 2'-10" in width. The drawing includes various offset dimensions: 7 1/4" and 3 3/4" for the top edge; 3 3/4" and 2 3/4" for the bottom edge; 1 1/2" for the left edge; and 1 1/2" for the right edge. The center-to-center distance between the two rows of holes is 2'-7".

END PLATE

ANCHOR BOLTS AT END PLATE

SHIM $\frac{3}{4}$ " X $\frac{3}{4}$ " X 2'-9 $\frac{1}{2}$ "

SHIM $\frac{3}{4}$ " X $\frac{3}{4}$ " X 1'-3 $\frac{1}{4}$ " 2 PER END PLATE

END PLATE SHIM DETAILS

POST SHIM DETAILS

NOTES

BID ITEM SHALL BE "RAILING TUBULAR TYPE H"
WHICH INCLUDES ALL ITEMS SHOWN.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM A307. IF A307 IS USED ELECTRO-GALVANIZE NUTS, WASHERS & TOP 3½" OF ANCHOR BOLTS.

CLOSURE ENDS ON STEEL RAILING SHALL BE 3/4" PLATE.
WELD AND GRIND SMOOTH.

RAILINGS SHALL BE FABRICATED IN 2 AND 3 PANEL LENGTHS.

RAILING POSTS SHALL BE SET NORMAL TO GRADE LINE.

ALL POST SPACINGS ARE MEASURED HORIZONTALLY
ALONG CENTERLINE OF THE POST BASE.

SHIMS SHALL BE USED UNDER POSTS AND END PLATES WHERE REQ'D. FOR ALIGNMENT.

FILL ALL EXPOSED OPENINGS BETWEEN SHIMS AND POST ANCHOR BOLT HOLES WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

RAILS, POSTS & SHIMS SHALL BE MADE FROM MATERIALS CONFORMING TO ASTM DESIGNATION A709, GRADE 36.

ALL MATERIALS, EXCEPT ANCHORAGES, SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL SHALL BE GIVEN A NO. 6 BLAST CLEANING BY SSPC SPECIFICATIONS.

RAILS SHALL BE BUILT STRAIGHT AND SPRUNG INTO PLACE FOR STRUCTURES CURVED UP TO 3°. FOR STRUCTURES CURVED GREATER THAN 3°, RAILS SHALL BE CURVED TO FIT.

RAILING WEIGHT = 30 LB/FT

LEGEND

- $\frac{5}{16}'' \times \frac{3}{8}''$ WELDED STUDS
- ⬡ 3" DIA. STD. PIPE X 1'-10" LONG
- 3" DIA. EXTRA STRONG PIPE X 1'-10" LONG
- △ $\frac{1}{2}''$ DIA. WELD BEADS AT 1/3 PTS. ON PIPE
11" CIRCUMF. GRIND BEADS SO THAT
SLEEVE FITS FREELY IN THE I.D. OF 4" DIA.
EXTRA STRONG PIPE.

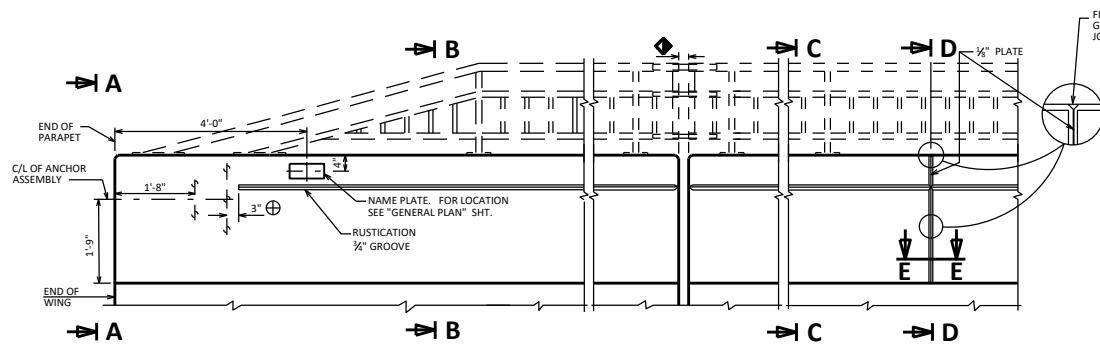
**TUBULAR RAILING
TYPE 'H' (STEEL)**



**BUREAU OF
STRUCTURES**

APPROVED: *Laura Shadewald*

DATE:
7-19



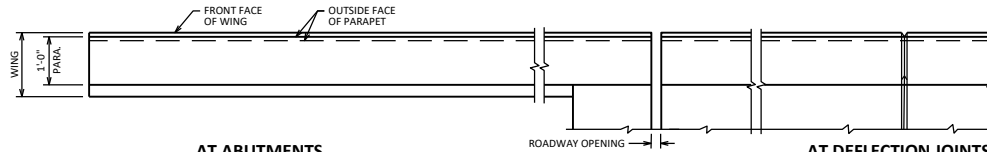
AT ABUTMENTS

ELEVATION OF PARAPET

AT DEFLECTION JOINTS

⊕ EXTEND 3/4" GROOVE TO END OF PARAPET WHEN ANCHOR ASSEMBLY IS NOT USED

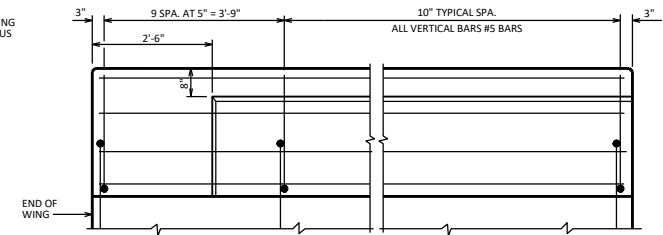
◆ ROADWAY OPENING OR 2 1/2" MIN. FOR EXPANSION JOINT. USE 1/2" OPENING WITH FILLER FOR A1 ABUTMENTS



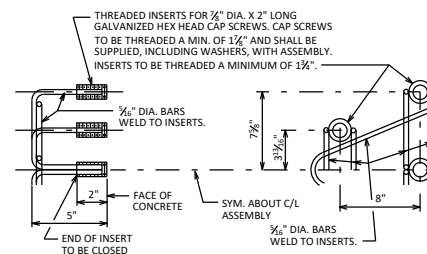
AT ABUTMENTS

PLAN OF PARAPET

(RAILING NOT SHOWN FOR CLARITY)



VIEW SHOWING OUTSIDE FACE OF PARAPET & REINF.



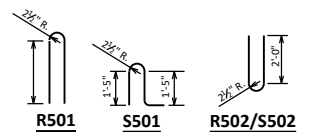
DETAIL OF ANCHOR ASSEMBLY

NOTE: HEX. HEAD CAP SCREWS & WASHERS TO BE GALVANIZED IN ACCORDANCE WITH ASTM F2329.

ASSEMBLY BID ITEM SHALL BE "ANCHOR ASSEMBLIES FOR STEEL PLATE BEAM GUARD", EACH.

BILL OF BARS

BAR MARK	CON.	NO. REQ'D.	LENGTH	BENT	BAR SERIES	LOCATION
RS01	X			X		PARAPET VERT.
RS02	X		4'-9"	X		PARAPET VERT.
SS01	X		4'-4"	X		PARAPET VERT.
SS02	X		4'-9"	X		PARAPET VERT.



NOTE

WHEN PARAPETS ARE POURED CONTINUOUSLY FROM END TO END, THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF 3/4" ZINC OR PLASTIC PLATE CUT AS SHOWN IN SECTION "D" BY SHADED AREA. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED AT THE DEFLECTION JOINTS, ONE SIDE OF JOINT SHALL BE COATED WITH AN APPROVED LIQUID BOND BEAKER AND PLATE SEPARATORS MAY BE OMITTED.

LEGEND

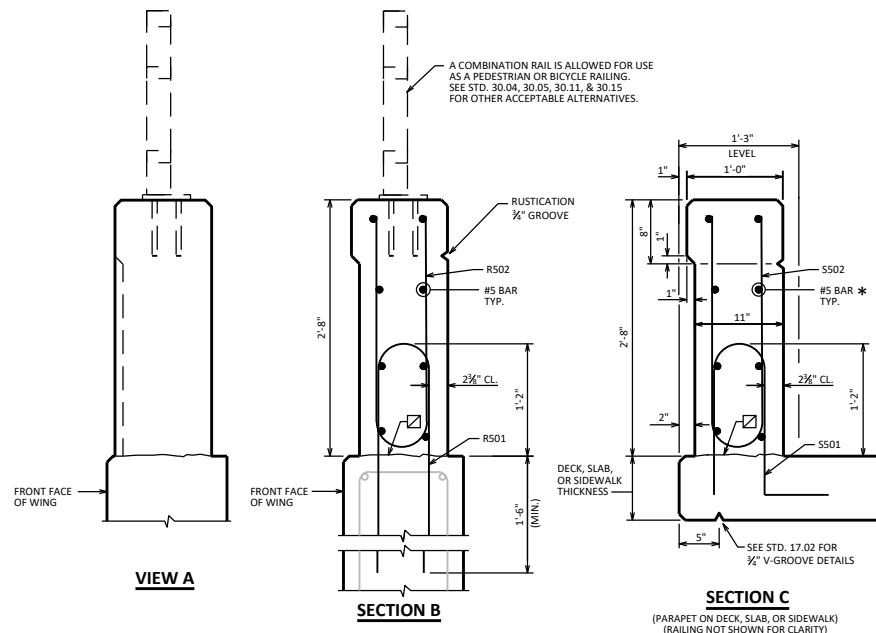
☑ HORIZ. CONST. JOINT-STRIKE OFF AS SHOWN AND LEAVE ROUGH.

* OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT, LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 8'-0". DEFINE CONST. JOINT WITH A 3/4" - 'V' GROOVE.

DESIGNER NOTE

A S501 BAR MAY BE USED IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

	PARAPET
AREA	2.50 SF
WEIGHT	375 LB/FT

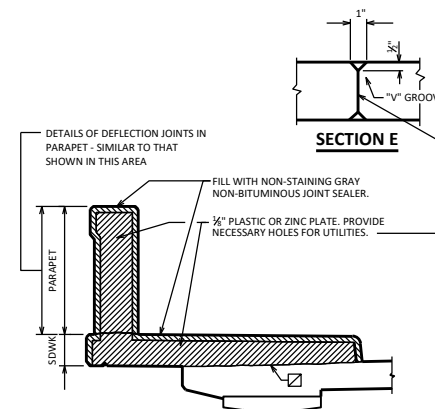


VIEW A

SECTION B

SECTION C

(PARAPET ON DECK, SLAB, OR SIDEWALK)
(RAILING NOT SHOWN FOR CLARITY)



SECTION D

SHOWING DEFLECTION JOINT IN PARAPET OR SIDEWALK USING THE FOLLOWING CRITERIA:

1. GIRDER STRUCTURES AND SLAB STRUCTURES WITH A SIDEWALK SHOULD HAVE A DEFLECTION JOINT IN THE SIDEWALK AND PARAPET OVER THE PIER.

IF THERE IS A LIGHT STANDARD AT THE PIER, PLACE A DEFLECTION JOINT APPROX. 4'-0" EACH SIDE OF PIER, WITH NONE DIRECTLY OVER THE PIER.

2. GIRDER STRUCTURES AND SLAB STRUCTURES WITHOUT SIDEWALKS SHOULD HAVE NO DEFLECTION JOINTS IN THE PARAPETS.

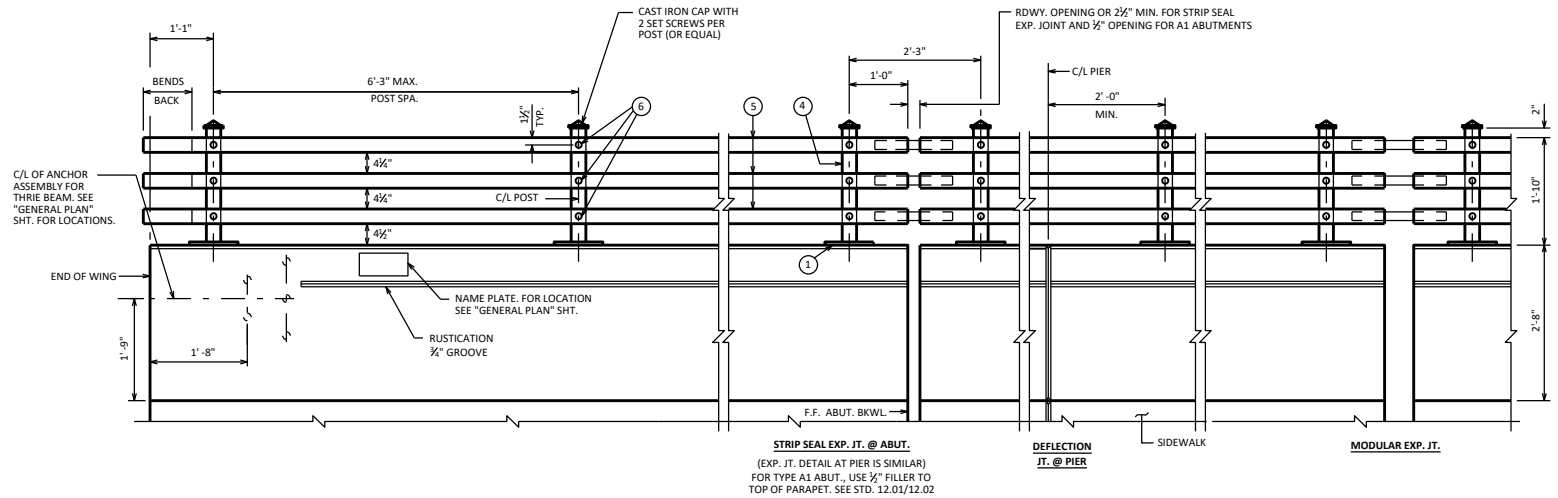
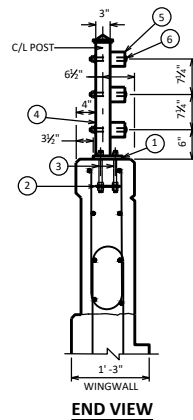
VERTICAL FACE PARAPET 'A'



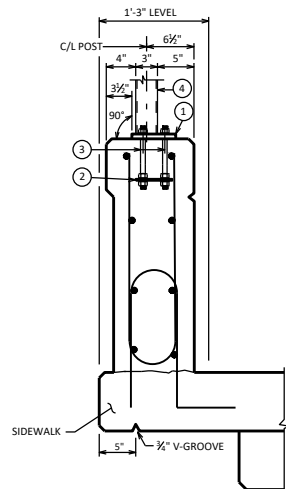
BUREAU OF STRUCTURES

APPROVED: *Laura Shadewald*

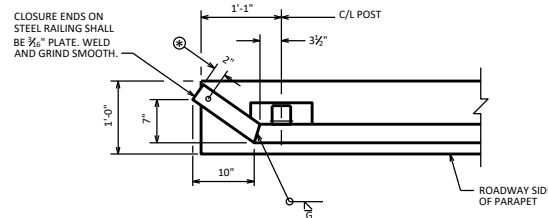
DATE:
1-24



OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED.
RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9".
MIN. JOINT SPACING OF 80'-0". DEFINE CONSTR. JT. WITH A 3/4" "V"-GROOVE.



*ADJUST LOCATIONS OF BARS TO ALLOW
PLACEMENT OF ANCHOR ASSEMBLY FOR
RAILING AND BEAM GUARD.



② 3/8" DIA. DRILL HOLE IN
BOTTOM OF ALL TUBES.

DESIGNER NOTES

SEE STANDARD 30.09 FOR ADDITIONAL RAILING DETAILS

SEE STANDARD 30.07 FOR:

- DEFLECTION JOINT DETAILS AND NOTES
- BEAM GUARD ANCHOR ASSEMBLY DETAILS
- SIDEWALK REINFORCEMENT AND DETAILS
- PARAPET REINFORCING BAR SIZE AND SPACING

STEEL RAILING WEIGHT ~ 25 LB/FT
BASED ON 6'-3" POST SPA.

COMBINATION RAILING TYPE '3T'

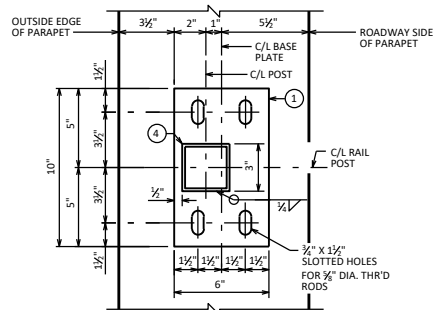


**BUREAU OF
STRUCTURES**

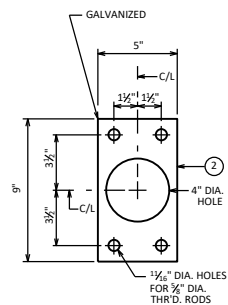
APPROVED: *Laura Shadewald*

DATE:
1-19

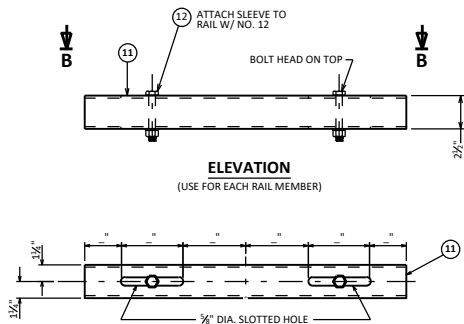
STANDARD 30.08



TYPICAL RAIL POST BASE PLATE



ANCHOR PLATE

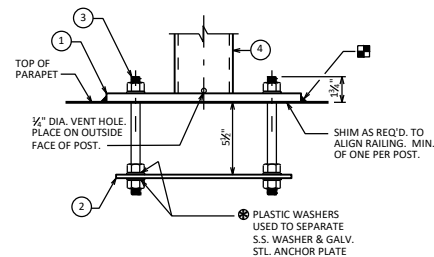


ELEVATION
(USE FOR EACH RAIL MEMBER)

SECTION B-B

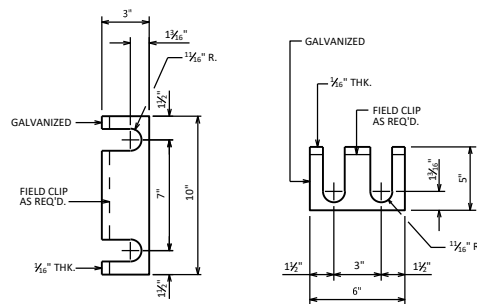
SLEEVE DETAIL
(AT MODULAR EXP. ITS.)

NOTE: CONSTRUCT BOTTOM RAIL AND SLEEVE CONNECTION FIRST, THEN MIDDLE RAIL, AND THEN TOP RAIL, TO ALLOW EASE IN PLACEMENT OF BOLT NO. 12.



ANCHORAGE FOR RAIL POSTS

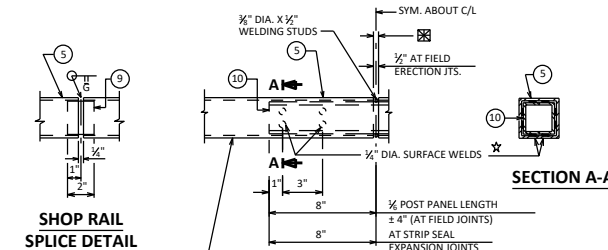
★NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.



RAIL POST SHIM DETAIL

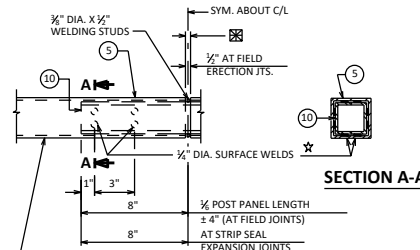
(2 SETS PER POST)

⊠ RDWY. OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT AND 1/2" OPENING FOR A1 ABUTMENTS



SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



FIELD ERECTION JOINT DETAIL

★MIN. 1/2" FLAT SURFACE DIA. PUNCHINGS OR STUDS MAY BE USED AS AN ALTERNATE.

PROVIDE 1/2" DIA. DRAIN HOLES IN LOW END OF ALL RAILS, CLEAR OF SPLICE SLEEVE.

LEGEND

- 1 BASE PLATE 3/4" X 6" X 10" WITH 3/4" X 1 1/2" SLOTTED HOLES FOR THR'D RODS NO.3 WELD TO NO.4 AS SHOWN. SLOTS PARALLEL TO LONG SIDE OF PLATE.
- 2 3/4" X 5" X 9" ANCHOR PLATE (GALVANIZED) WITH 1 1/2" DIA. HOLES FOR THR'D. RODS NO.3.
- 3 3/4" DIA. X 9" LONG, TYPE 316 STAINLESS STEEL THREADED RODS (MIN. TENSILE STRENGTH = 70 KSI) WITH NUT AND WASHERS OF SAME ALLOY GROUP. ★
- 4 STRUCTURAL TUBING 3" X 3" X 3/16" POSTS, PLACE VERTICAL, WELD TO NO.1, AND USE 1" DIA. HOLES (FRONT AND BACK) FOR BOLT NO.6.
- 5 STRUCTURAL TUBING 3" X 3" X 3/16" RAILS, WITH 1/2" DIA. HOLES (FRONT AND BACK) FOR BOLT NO.6. BOLT TO NO.4.
- 6 3/4" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/4" X 1 1/2" X 1 1/2" WASHER, AND LOCK WASHER.
- 9 RECTANGULAR SLEEVE FABRICATED FROM 3/16" PLATES. PROVIDE "SLIDING FIT".
- 10 RECTANGULAR SLEEVE FABRICATED FROM 3/16" PLATES. (1'-4" @ FIELD ERECTION ITS.) (1'-4" @ STRIP SEAL EXP. ITS.)
- 11 SLEEVE FABRICATED FROM STRUCTURAL TUBING 2 1/2" X 2 1/2" X 3/16" X ' ' LONG. SLOTTED HOLES IN TOP AND BOTTOM.
- 12 3/4" DIA. STAINLESS STEEL BOLT WITH NUT AND LOCK WASHER.

★ ALTERNATIVE ANCHORAGE: 4 EQUIVALENT STAINLESS STEEL CONCRETE ADHESIVE ANCHORS 3/8" - INCH. EMBED 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 502.2.12 AND 502.3.14 OF THE STANDARD SPECIFICATIONS.

NOTES

BID ITEM SHALL BE "RAILING STEEL TYPE 3T", WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWN.

POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT, AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.

ENDS OF STRUCTURAL TUBING SHALL BE SAWED. GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE TRUE AND SMOOTH.

ALL PLATES, AND RECTANGULAR SLEEVES SHALL CONFORM TO ASTM A709 GRADE 36. ALL STRUCTURAL TUBING SHALL CONFORM TO ASTM A500 GRADE B.

ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. SET NORMAL TO GRADE.

CUT BOTTOM OF POST TO MAKE POST VERTICAL IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTION.

STEEL SHIMS SHALL BE PROVIDED & USED UNDER BASE PLATE NO. 1, WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.

⊠ CAULK AROUND PERIMETER OF BASE PLATES, NO. 1, AND FILL BOLT SLOT OPENINGS IN SHIMS AND BASE PLATES WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

ALL JOINTS IN CONCRETE PARAPET ARE TO BE VERTICAL.

ALL MATERIAL (EXCEPT NO. 3 & 12) SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, THE STEEL RAILING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS.

VENT HOLES SHALL BE DRILLED IN POST AND RAIL MEMBERS AS REQUIRED TO FACILITATE GALVANIZING AND DRAINAGE.

RAILING SHALL BE FABRICATED IN LENGTHS THAT INCLUDE 3 OR 4 POSTS.

WHEN PAINTING REQ'D: (ADD)

PAINTE OVER GALVANIZING (EXCEPT NO. 2) WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. () (FILL IN COLOR NAME).

INSIDE OF TUBES TO BE PAINTED AT ALL FIELD ERECTION AND EXPANSION JOINTS.

TOUCH-UP PAINTING TO BE DONE AT COMPLETION OF STEEL RAILING INSTALLATION TO THE SATISFACTION OF THE ENGINEER AT NO EXTRA COST.

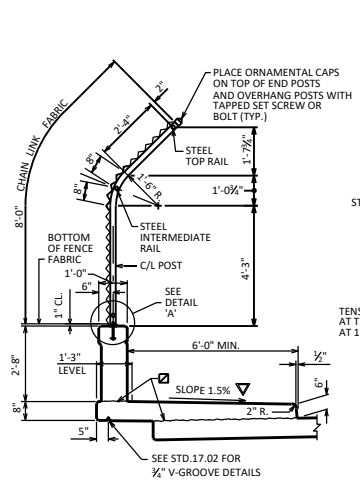
COMBINATION RAILING TYPE '3T' DETAILS



**BUREAU OF
STRUCTURES**

APPROVED: *Laura Shadewald*

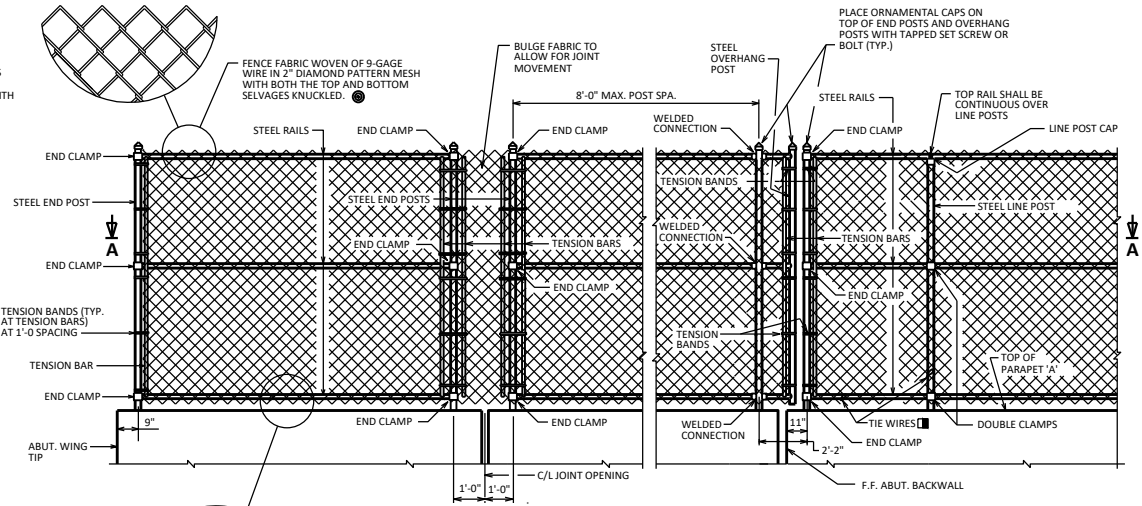
DATE:
1-20



SECTION THRU FENCE ON PARAPET 'A'

PROTECTIVE SCREENING MAY BE BENT OR STRAIGHT FOR RAISED SIDEWALKS OR SIDEWALKS SEPARATED FROM TRAFFIC BY A BARRIER. SEE BRIDGE MANUAL 30.3 (14) FOR ADDITIONAL GUIDANCE. SEE STD. 30.07 FOR PARAPET REINFORCEMENT AND DETAILS. SEE STD. 17.01 FOR SIDEWALK REINFORCEMENT AND DETAILS.

- CONST. JOINT - STRIKE OFF & LEAVE ROUGH
- ± 0.5% CONSTRUCTION TOLERANCE IN SIDEWALK CROSS SLOPE. THE SIDEWALK CROSS SLOPE SHALL NOT EXCEED 2% WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

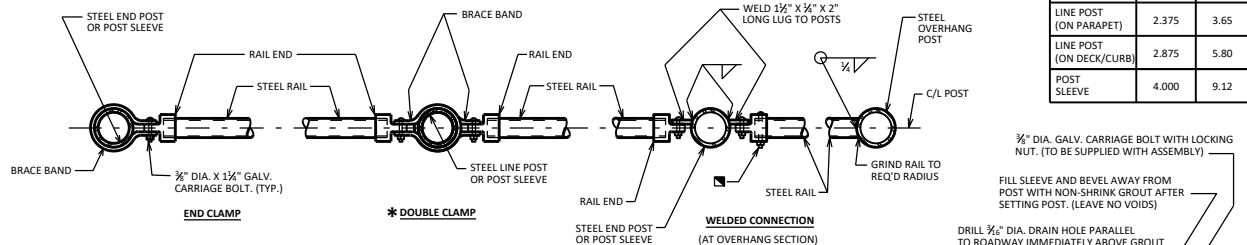


FENCE PART ELEVATION

(OUTSIDE VIEW OF PARAPET 'A')

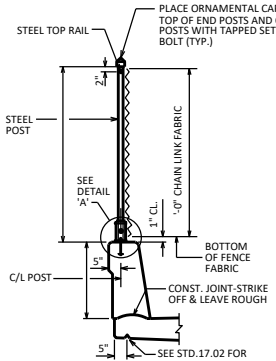
FENCE MEMBER SIZE & WEIGHT

STEEL FENCE MEMBER	OUTSIDE DIAMETER (INCHES)	WEIGHT (LB/FT)
RAILS	1.660	2.27
END POST	2.875	5.80
OVERHANG POST	2.875	5.80
LINE POST (ON PARAPET)	2.375	3.65
LINE POST (ON DECK/CURB)	2.875	5.80
POST SLEEVE	4.000	9.12



SECTION A-A

NOTE: PLACE ALL BOLT HEADS ON SIDE OF FENCE ADJACENT TO PEDESTRIANS



SECTION THRU FENCE ON SINGLE SLOPE PARAPET

FOR TRAFFIC BARRIER APPLICATION, USE STRAIGHT POSTS (NOT BENT POSTS)

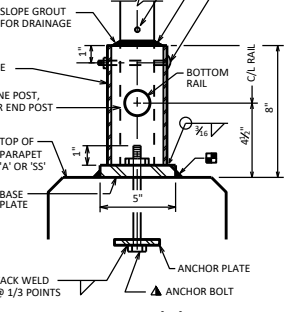
POST SHIM DETAILS

SHIMS REQUIRED ONLY WHEN END POSTS AND LINE POSTS ARE WELDED TO BASE PLATES. PROVIDE 4 SHIMS PER POST. USE WHERE REQUIRED FOR ALIGNMENT.

ANCHOR PLATE

NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.

BASE PLATE



DETAIL 'A'

UNIT SHALL BE GALVANIZED AFTER FABRICATION
NOTE: IN LIEU OF USING THE POST SLEEVE, THE FENCE POST MAY BE WELDED TO THE BASE PLATE.

NOTES

- POSTS ARE TO BE SET VERTICAL.
- METALLIC-COATED FENCE SYSTEM:**
ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL, EXCEPT THE FENCE FABRIC WHICH MAY BE ALUMINUM-COATED STEEL OR GALVANIZED STEEL.
FABRIC SHALL CONFORM TO ASTM A491, OR A392, CLASS 2. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40). FITTINGS SHALL CONFORM TO ASTM F626.
THE BID ITEM SHALL BE "FENCE CHAIN LINK - FT."
- POLYMER-COATED FENCE SYSTEM:**
ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL WITH A COLORED POLYMER-COATING ON THE OUTSIDE.
FABRIC SHALL CONFORM TO ASTM F668, CLASS 2B. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40). FITTINGS SHALL CONFORM TO ASTM F626. SEE THE "BRIDGE SPECIAL PROVISIONS" FOR ADDITIONAL DETAILS.
THE COLOR OF POLYMER-COATING FOR THIS STRUCTURE SHALL BE (SPECIFY: DARK GREEN, BROWN OR BLACK) IN ACCORDANCE WITH ASTM F934.
THE BID ITEM SHALL BE "FENCE CHAIN LINK POLYMER - COATED - FT. B - FT."
- COMPLETE ANY REQUIRED WELDING OF COMPONENTS BEFORE GALVANIZING.
- POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.
- BASE PLATES, ANCHOR PLATES AND SHIMS SHALL BE ASTM A709, GRADE 36.
- ALL POST SPACINGS ARE MEASURED HORIZONTALLY ALONG THE C/L OF THE POST.
- CAULK AROUND PERIMETER OF BASE PLATE AND FILL PORTION OF SLOTTED HOLE AROUND ANCHOR BOLT IN SHIM WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.
- ALTERNATE TO DOUBLE CLAMP: USE LINE RAIL CLAMP (BOULEVARD) OR 180° BRACE BAND, WHICH MAY BE USED WHEN THE POSTS ARE EITHER BOLTED TO THE POST SLEEVES OR DIRECTLY WELDED TO THE BASE PLATE.
- ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM 307. IF 307 IS USED, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.
- ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS 1/2"-INCH EMBED 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 502.2.12 AND 502.3.14 OF THE STANDARD SPECIFICATIONS.
- ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH THE WIRES (ROUND, 9-GAGE) SPACED AT 1'-0".
- WELD RAIL TO RAIL END TO SECURE OVERHANG SECTION. ALTERNATE IS TO WELD RAIL DIRECTLY TO END POST.
- MINIMUM LENGTH OF TOP RAIL BETWEEN SPICES SHALL BE 20'-0". LOCATE SPICES NEAR 1/2 POINT OF POST SPACING.

DESIGNER NOTES

- THIS STANDARD MAY BE USED ON STRUCTURES WITH A 45 M.P.H. DESIGN SPEED OR LESS, OR WHEN THE SIDEWALK IS SEPARATED FROM THE ROADWAY BY A PARAPET. 8'-0" MAXIMUM POST SPACING WITH 8'-0" MAXIMUM FENCE FABRIC HEIGHT WHEN MOUNTED ON PARAPET.
- SEE STANDARD 30.40 WHEN MOUNTED ON CURB OR DECK.
- THE CHAIN LINK FENCE SYSTEM SELECTED FOR THE STRUCTURE SHALL BE A "METALLIC-COATED FENCE SYSTEM" OR A "POLYMER-COATED FENCE SYSTEM".
- A 1" MESH MAY BE USED ON PROTECTIVE SCREENING IN HIGHLY VULNERABLE AREAS, OR AS STATED IN FDM PROCEDURE 11-35-1 FOR PROTECTIVE SCREENING.
- PEDESTRIAN RAILING MAY BE USED ON WINGWALL PARAPETS IF CHAIN LINK FENCE DOES NOT CONTINUE BEYOND BRIDGE.
- HANDRAILS SHALL BE USED ALONG BRIDGE SIDEWALKS WHERE THE SLOPE OF THE SIDEWALK IS GREATER THAN 5%. TOP OF HANDRAIL GRIPPING SURFACES SHALL BE MOUNTED BETWEEN 30" & 34" ABOVE SIDEWALK SURFACE. USE 30" NEAR SCHOOL ZONES, IF FEASIBLE. HANDRAILS SHALL BE PROVIDED ALONG BOTH SIDES OF SIDEWALK. FOR HANDRAIL DETAILS SEE STANDARD 37.02.
- FOR DEAD LOAD PURPOSES, THE SUPERSTRUCTURE DESIGN SHALL ACCOUNT FOR A MAXIMUM 2% SIDEWALK CROSS SLOPE.

CHAIN LINK FENCE DETAILS



BUREAU OF STRUCTURES

APPROVED: *Laura Shadewald*

DATE: 1-25

NOTES

POSTS ARE TO BE SET VERTICAL.

METALLIC-COATED FENCE SYSTEM:

ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL, EXCEPT THE FENCE FABRIC WHICH MAY BE ALUMINUM-COATED STEEL OR GALVANIZED STEEL.

FABRIC SHALL CONFORM TO ASTM A491, OR A392, CLASS 2. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40). FITTINGS SHALL CONFORM TO ASTM F626.

THE BID ITEM SHALL BE "FENCE CHAIN LINK _ - FT."

POLYMER-COATED FENCE SYSTEM:

ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL WITH A COLORED POLYMER-COATING ON THE OUTSIDE.

FABRIC SHALL CONFORM TO ASTM F668, CLASS 2B. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40). FITTINGS SHALL CONFORM TO ASTM F626. SEE THE "BRIDGE SPECIAL PROVISIONS" FOR ADDITIONAL DETAILS.

THE COLOR OF POLYMER-COATING FOR THIS STRUCTURE SHALL BE [SPECIFY: DARK GREEN, BROWN OR BLACK] IN ACCORDANCE WITH ASTM F934.

THE BID ITEM SHALL BE "FENCE CHAIN LINK POLYMER-COATED _ - FT. B _ - _"

ALL POST SPACINGS ARE MEASURED HORIZONTALLY ALONG THE C/L OF THE POST.

ANCHOR RODS SHALL BE F1554 GRADE 36. BOLTS SHALL BE ASTM A307, NUTS SHALL BE ASTM A563, AND WASHERS SHALL BE ASTM A436. POST CLAMPS AND POST CLAMP SPACERS SHALL BE ASTM A709, GRADE 36. TENSION WIRE SHALL BE 7 GAGE STEEL WIRE COATED IN ACCORDANCE WITH ASTM A824 AND A817 AS EITHER TYPE I (ALUMINUMIZED) OR TYPE II, CLASS 4 (GALVANIZED).

ANCHOR RODS, BOLTS, NUTS, POST CLAMPS, POST CLAMP SPACERS AND WASHERS SHALL BE GALVANIZED.

COMPLETE ANY REQUIRED WELDING OF COMPONENTS BEFORE GALVANIZING.

▲ CONCRETE ADHESIVE ANCHORS $\frac{3}{8}$ "-INCH. EMBED 5" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 502.2.12 AND 502.3.14 OF THE STANDARD SPECIFICATIONS.

■ ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH TIE WIRES (ROUND, 9-GAGE) SPACED AT 1'-0".

PROVIDE TENSION POST AND BRACE RAILS TO LIMIT TENSION WIRE RUNS TO LESS THAN 500 FEET.

DESIGNER NOTES

THE SIDE-MOUNTED CHAIN LINK FENCE SHOULD ONLY BE USED WHEN THE DESIGN SPEED EXCEEDS 45 MPH AND PROTECTIVE SCREENING IS WARRANTED. 8'-0" MAXIMUM POST SPACING WITH 8'-0" MAXIMUM FENCE FABRIC HEIGHT WHEN MOUNTED ON PARAPET. FOR DESIGN SPEEDS 45 MPH OR LESS, THE TOP-MOUNTED CHAIN LINK FENCE (STANDARD 30.11) SHOULD BE USED.

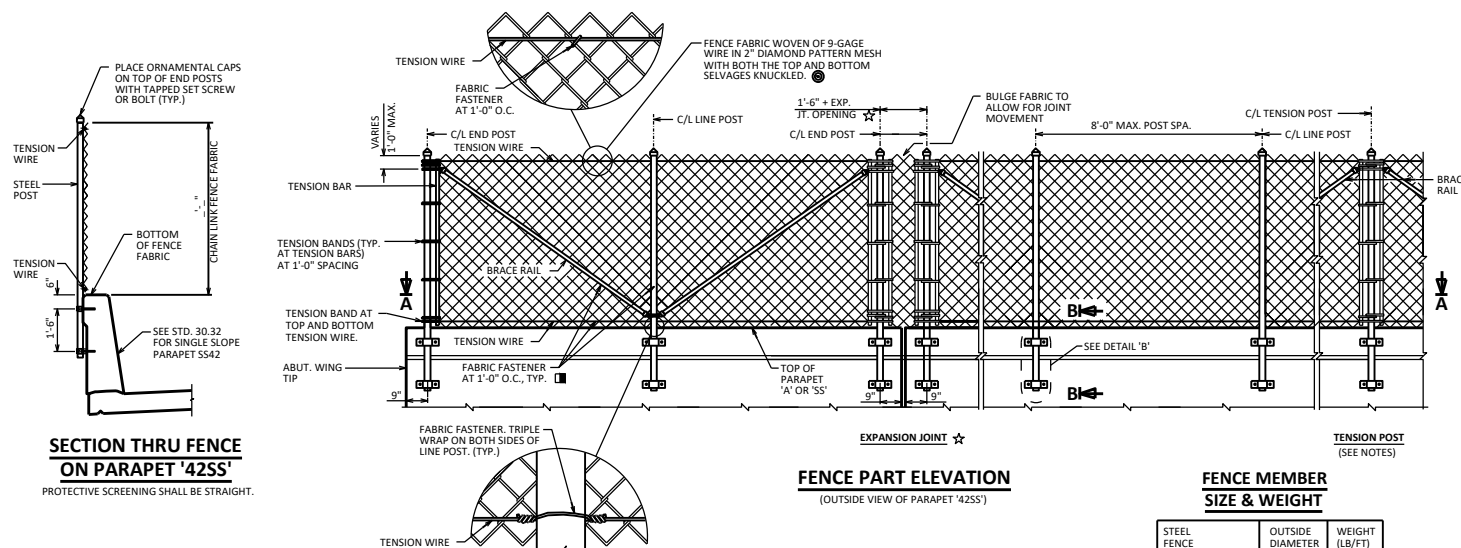
THE CHAIN LINK FENCE SYSTEM SELECTED FOR THE STRUCTURE SHALL BE A "METALLIC-COATED FENCE SYSTEM" OR A "POLYMER-COATED FENCE SYSTEM".

PROVIDE 6'-0" CHAIN LINK FENCE FABRIC, UNLESS DIRECTED OTHERWISE. SEE BRIDGE MANUAL 30.9 FOR ADDITIONAL INFORMATION.

● A 1" MESH MAY BE USED ON PROTECTIVE SCREENING IN HIGHLY VULNERABLE AREAS, OR AS STATED IN FDM PROCEDURE 11-35-1 FOR PROTECTIVE SCREENING.

★ EXPANSION JOINT OPENING \leq 6" OF MOVEMENT. FOR FIXED JOINTS MAINTAIN TYP. VERT. POST SPA. ACROSS JOINT AND PLACE TENSION BAR ON END POST. FOR JOINT OPENINGS $>$ 6" REFER TO STD. 30.11.

WEIGHT OF CHAIN LINK FENCE:
(BASED ON 8 FT. POST SPACING)
6 FT. HIGH FENCE = 18 LB / FT
8 FT. HIGH FENCE = 21 LB / FT



SECTION THRU FENCE ON PARAPET '42SS'

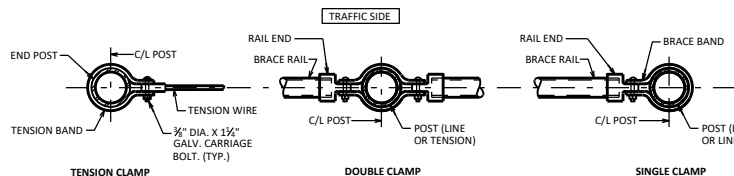
PROTECTIVE SCREENING SHALL BE STRAIGHT.

FENCE PART ELEVATION

(OUTSIDE VIEW OF PARAPET '42SS')

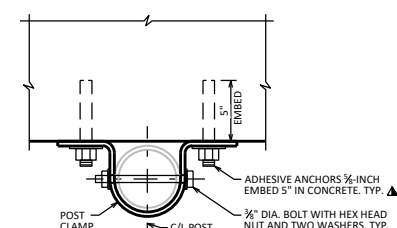
FENCE MEMBER SIZE & WEIGHT

STEEL FENCE MEMBER	OUTSIDE DIAMETER (INCHES)	WEIGHT (LB/FT)
POST (END, LINE, OR TENSION)	3.50	7.576
BRACE RAIL	1.66	2.273

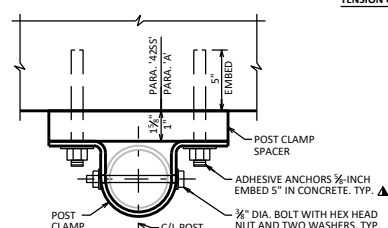


SECTION A-A

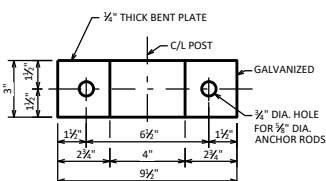
NOTE: PLACE ALL BOLT HEADS ON THE TRAFFIC SIDE



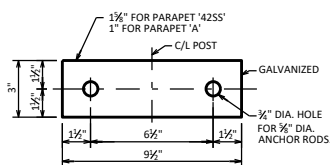
SECTION C-C



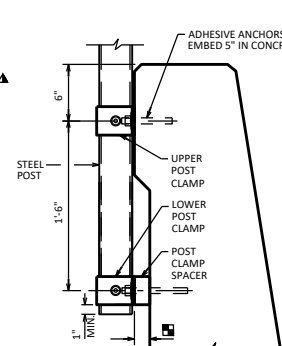
SECTION D-D



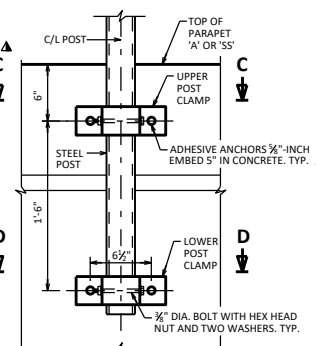
POST CLAMP DETAIL



POST CLAMP SPACER DETAIL



SECTION B-B



DETAIL 'B'

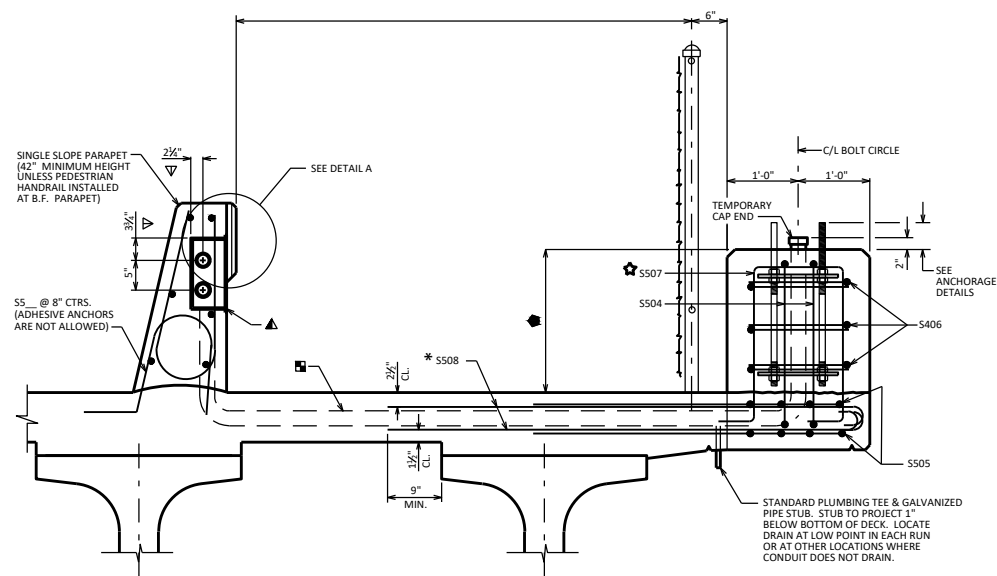
CHAIN LINK FENCE SIDE-MOUNTED DETAILS



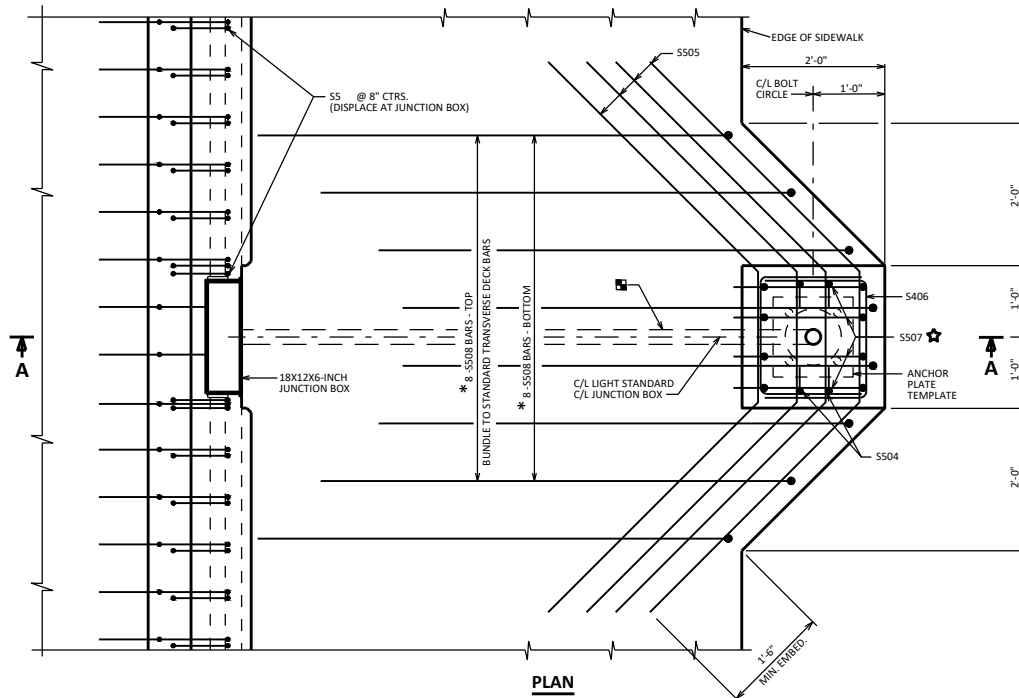
BUREAU OF
STRUCTURES

APPROVED: *Laura Shadewald*

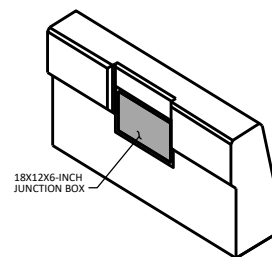
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SECTION A-A

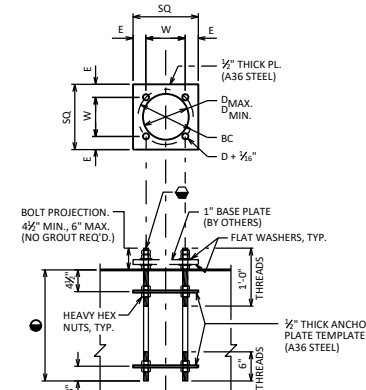


PLAN



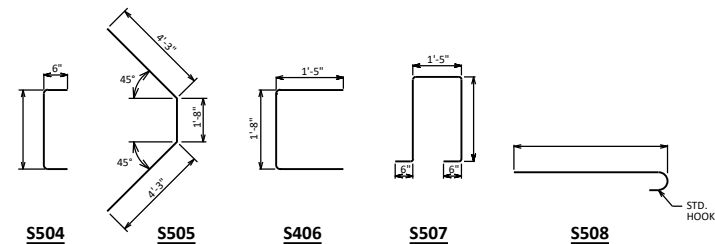
DETAIL A

SHOWING B.F. OF PARAPET WITH BLOCK OUT FOR JUNCTION BOX.



ANCHOR ROD ASSEMBLY DETAILS

SINGLE ASSEMBLY SHOWN
(4) - RODS REQUIRED PER ASSEMBLY



- ANCHOR RODS
- 1" DIA. ANCHOR RODS ASTM F1554 GR 55, HEAVY HEX NUTS ASTM A563, AND WASHERS ASTM F436. ANCHOR ASSEMBLIES SHALL BE GALVANIZED PER SECTION 531 OF THE STANDARD SPECIFICATION. PROVIDE (2) WASHERS AND (7) NUTS PER ANCHOR ROD.
- STAND-ALONE PEDESTAL
- 1" DIA. ANCHOR BOLTS = 2'-0"
- < 1" DIA. ANCHOR BOLTS = 1'-3"
- STAND-ALONE PEDESTAL
- 1" DIA. ANCHOR BOLTS = 1'-11"
- < 1" DIA. ANCHOR BOLTS = 1'-2"
- PARAPET BLISTER
- SEE STANDARD 30.21
- CUT OUT ± 1" OF GASKET AT BOTTOM OF JUNCTION BOX COVER TO ALLOW FOR DRAINAGE.
- LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE OF JUNCTION BOX.
- TIE IN PLACE AFTER ANCHOR BOLT ASSEMBLY LOCATED.
- THESE BARS ARE IN ADDITION TO STANDARD TRANSVERSE BARS IN DECK.
- CONDUIT SIZE (SELECT ONE):
FOR DECK THICKNESS ≤ 8 1/2" - 1 1/2" DIA. RIGID NONMETALLIC CONDUIT. (DESIGNER TO VERIFY CONDUIT SIZE BASED ON SERVICE NEEDS)
FOR DECK THICKNESS > 8 1/2" - 2" DIA. RIGID NONMETALLIC CONDUIT.

NOTE

BID ITEM SHALL BE "ANCHOR ASSEMBLY POLES ON STRUCTURES", EACH

DESIGNER NOTES

ANCHORAGE DETAIL FOR "TYPE 5 LIGHT POLE". ANCHORAGE FOR OTHER LIGHT POLE TYPES MUST BE DESIGNED.

SEE STD. 30.11 FOR FENCE DETAILS.

SEE STD. 30.21 FOR
- ADDITIONAL NOTES
- END OF BRIDGE DETAILS

THIS STANDARD IS NOT INTENDED TO BE USED WITH TRANSFORMER BASES.

THIS STANDARD ACCOMMODATES A MAXIMUM 15" DIA. BOLT HOLE CIRCLE AND A MAXIMUM 15" X 15" SQUARE ANCHOR PLATE WITH (4) - 1" DIA. ANCHOR BOLTS. THIS STANDARD IS BASED ON A 8" MIN. DECK THICKNESS.

BILL OF BARS

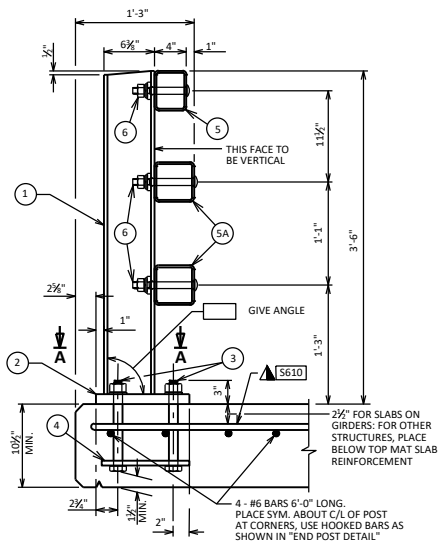
BAR MARK	CO.	NO. REQ'D.	LENGTH	BOLT	LOCATION
SS04	X			X	LIGHT STD., VERT.
SS05	X	10-2		X	LIGHT STD., HORIZ. IN DECK
S406	X	4-4		X	LIGHT STD., HORIZ.
SS07	X			X	LIGHT STD., VERT.
SS08	X			X	LIGHT STD., TRANSV. IN DECK

LIGHTING DETAIL

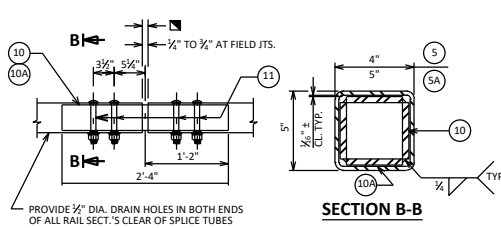


APPROVED: *Laura Shadewald*

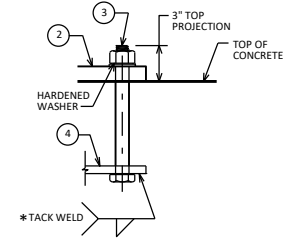
DATE:
7-20



SECTION THRU RAILING ON DECK

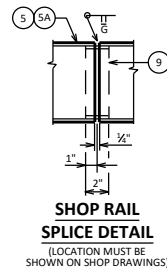


FIELD ERECTION JOINT DETAIL



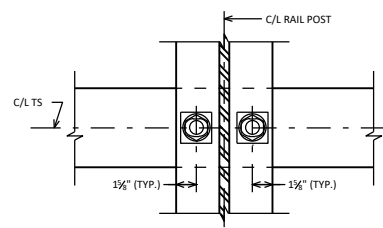
ANCHOR BOLTS

*ANCHOR BOLT ASSEMBLY MAY BE TACK WELDED, EITHER IN THE SHOP, OR IN THE FIELD AFTER THE ANCHOR PLATE IS PLACED.

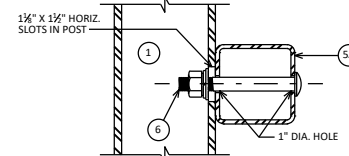


SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



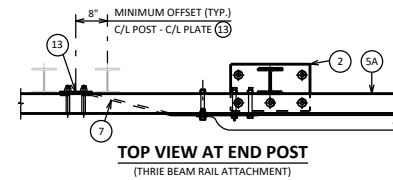
SECTION THRU POST WEB



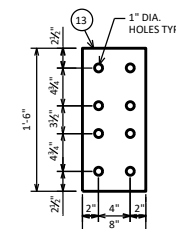
SECTION THRU RAIL

NOTE: CONNECTIONS AT LOWER RAILS SHOWN. CONNECTIONS AT TOP RAIL SIMILAR.

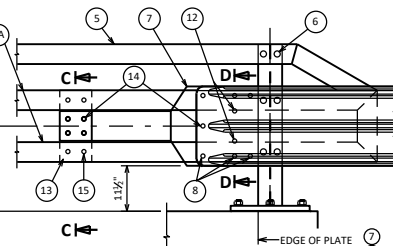
TYPICAL RAIL TO POST CONNECTIONS



TOP VIEW AT END POST
(THIRIE BEAM RAIL ATTACHMENT)

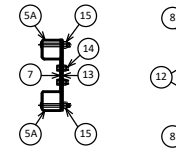


ANCHOR PLATE
AT BEAM GUARD ATTACHMENT

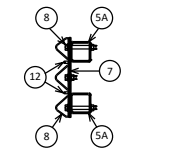


DETAIL AT END POST
(THIRIE BEAM RAIL ATTACHMENT)

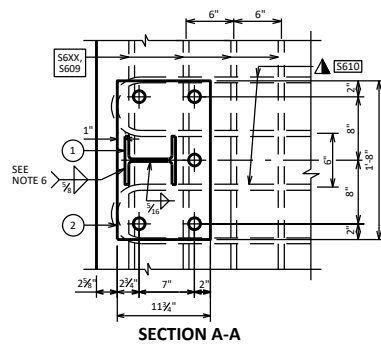
● FIRST POST SPA. MEASURED FROM END POST SHALL NOT BE BETWEEN 3'-5" TO 4'-9"



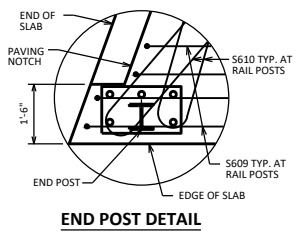
SECTION C-C



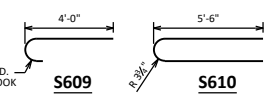
SECTION D-D



SECTION A-A

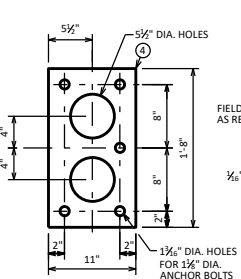


END POST DETAIL

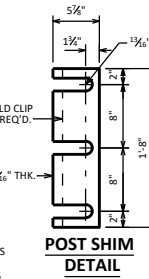


S609
S610

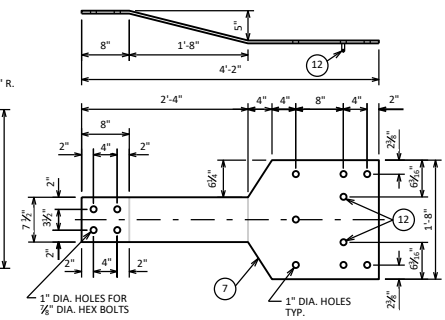
▲ TIE TO TOP MAT OF STEEL.
■ RDWY. OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT & (3/4" TO 1/2") OPENING FOR A1 ABUTMENT.



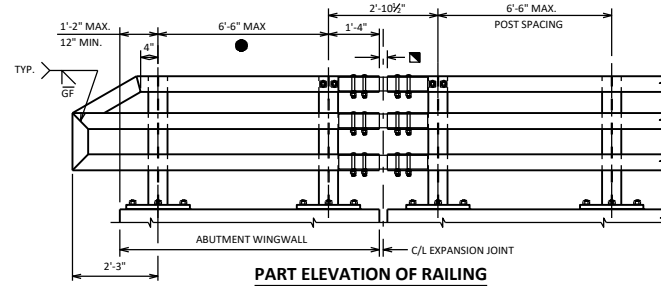
ANCHOR PLATE
AT RAIL TO DECK CONNECTION



POST SHIM DETAIL



BACK-UP PLATE DETAIL
AT BEAM GUARD ATTACHMENT



PART ELEVATION OF RAILING

LEGEND

- W6 X 25 WITH 1 1/2" X 1 1/2" HORIZONTAL SLOTS ON EACH SIDE OF POST FOR BOLT NO. 6. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.
- PLATE 1 1/2" X 11 1/2" X 1'-8" WITH 1 1/2" DIA. OVERSIZED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN.
- ASTM A449 - 1 1/2" DIA. ANCHOR BOLTS WITH NUT AND HARDENED WASHER (ALL GALVANIZED), 5 REQ'D. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 1'-9" LONG IN ABUTMENT WINGS. AT POSTS ON CONCRETE SLAB SUPERSTRUCTURES WHERE THE SLAB THICKNESS IS > 16" USE 1'-3" LONG. USE 10 1/2" LONG AT ALL OTHER LOCATIONS. (AN EQUIVALENT THREADED ROD WITH NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQ'D. FOR CONSTRUCTABILITY.)
- 1/2" X 11" X 1'-8" ANCHOR PLATE (GALVANIZED) WITH 1 1/2" DIA HOLES FOR ANCHOR BOLTS NO.3
- TS 5 X 4 X 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.
- TS 5 X 5 X 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.
- 1/2" DIA. A325 SLOTTED ROUND HEAD BOLT WITH NUT, 1/4" X 1 1/2" X 1 1/2" MIN. WASHER, AND LOCK WASHER (2 REQ'D. AT EACH RAIL TO POST LOCATION.)
- 1/2" THK. BACK-UP PLATE WITH 2 - 7/8" X 1 1/2" THREADED SHOP WELDED STUDS (NO.12). BOLT TO RAIL AS SHOWN IN DETAIL. REQUIRED AT THIRIE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO.5A.
- 1" DIA. HOLES IN PLATE NO.7 & TUBES NO.5A FOR 1/2" DIA. A325 BOLTS WITH HEX NUTS AND WASHERS. 6 HOLES IN TUBES AND PLATE NO.7.
- SPLICE SLEEVE FABRICATED FROM 1/2" PLATE. PROVIDE "SLIDING FIT".
- 1/2" X 3 1/2" X 2'-4" PLATE. 2 PER RAIL. USED IN NO.5 & 5A.
- 1/2" X 2 1/2" X 2'-4" PLATE USED IN NO.5, 1/2" X 3 1/2" X 2'-4" PLATE USED IN NO.5A. 2 PER RAIL.
- 1/2" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER. USE 1 1/2" X 1 1/2" LONGIT. SLOTTED HOLES IN PLATE NO. 10A. AT FIELD JOINTS AND 1 1/2" X 2 1/2" MIN. LONGIT. SLOTTED HOLES AT EXP. JOINTS IN PLATE NO. 10A. PROVIDE 1 1/2" DIA. ROUND HOLES IN TUBES NO. 5 AND NO. 5A.
- 1/2" DIA. X 1 1/2" LONG THREADED SHOP WELDED STUDS (2 REQ'D.)
- 1/2" X 8" X 1'-6" PLATE. BOLT TO RAIL AS SHOWN IN DETAIL. REQUIRED AT THIRIE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO. 5A.
- 1" DIA. HOLES IN TUBES NO. 5A FOR 1/2" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER (4 REQ'D.). 4 HOLES IN TUBES.

NOTES

- BID ITEM SHALL BE "RAILING TUBULAR TYPE M" WHICH INCLUDES ALL ITEMS SHOWN.
- RAIL POST AND BASE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50. HOLLOW RAILING STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED PY = 50 KSI. ANCHOR PLATES, AND SPLICE TUBE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 36.
- THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/2 TURN.
- RAILS SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE. RAILS SHALL BE SPICED IN A PANEL OVER EXPANSION JOINTS.
- ENDS OF TUBE SECTIONS SHALL BE SAWED. GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE FLAT AND SMOOTH.
- WELD IS THE SAME ON BOTH FLANGES. FLANGE WELD DOES NOT REQUIRE MAGNETIC PARTICLE TESTING.
- FILL BOLT SLOT OPENINGS IN POST SHIMS AND PLATE NO. 2 AND CAULK AROUND PERIMETER OF PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. STEEL POST SHIMS MAY BE USED UNDER POSTS WHERE REQ'D. FOR ALIGNMENT.
- POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH. STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.
- ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS & STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING BY SSPC SPECIFICATIONS.
- WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & 4) SHALL BE PAINTED OVER GALVANIZING WITH AN APPROVED TOP COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. 1 (FILL IN COLOR NAME).
- SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

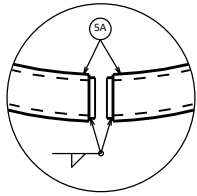
RAILING WEIGHT = 75 LB/FT (BASED ON 6'-6" POST SPACING.)

TUBULAR STEEL RAILING TYPE 'M'

BUREAU OF STRUCTURES

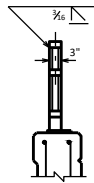
APPROVED: *Laura Shadewald*

DATE: 7-21

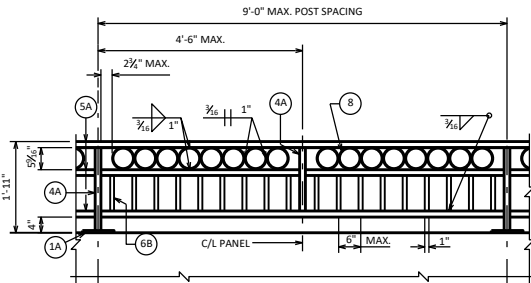
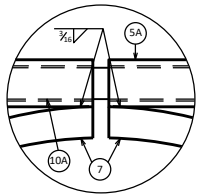


DETAIL A

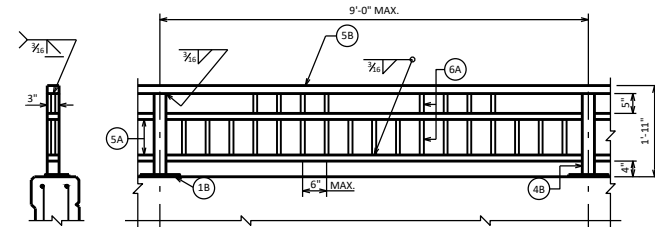
SEAL ENDS ON CURVED
STRUCTURAL TUBING WITH
1/2" PLATE, WELD AND
GRIND SMOOTH.



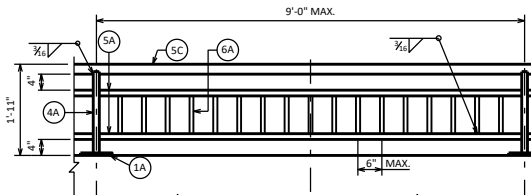
DETAIL B



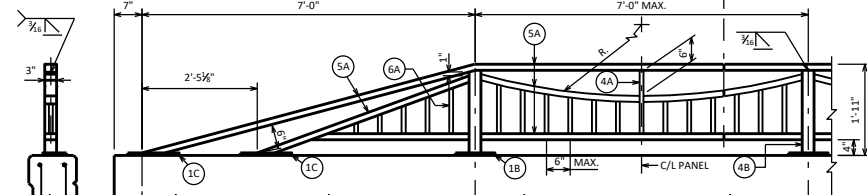
TYPE C1



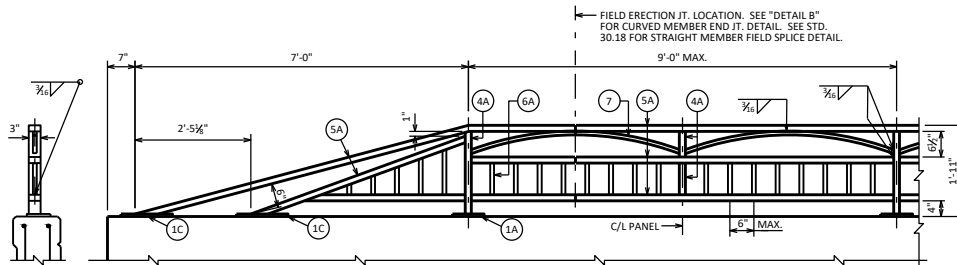
TYPE C4



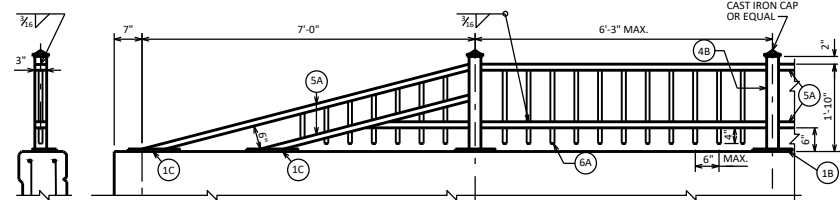
TYPE C2



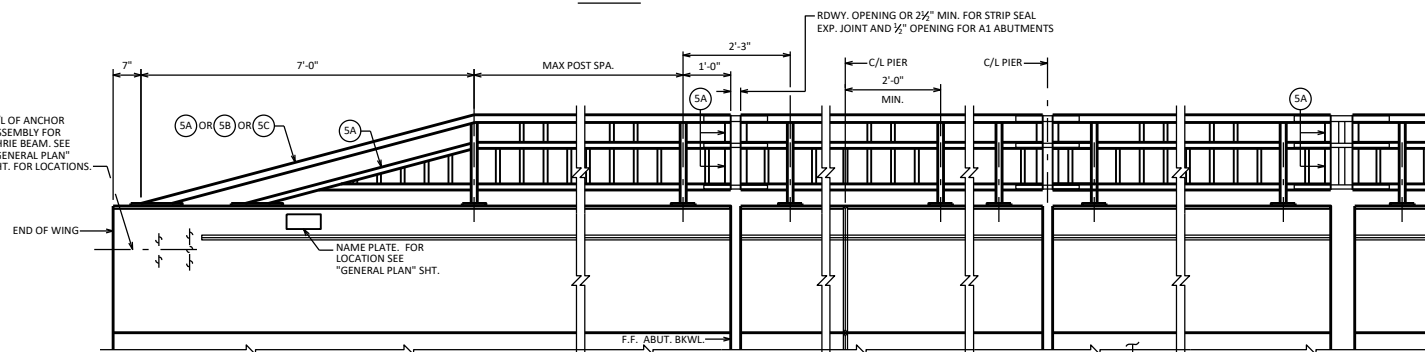
TYPE C5



TYPE C3



TYPE C6



INSIDE ELEVATION

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED.
RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-5".
MIN. JOINT SPACING OF 80'-0". DEFINE CONSTR. JT. WITH A 3/4" ~V~ GROOVE.

RAILING WEIGHT = 22 LB/FT

DESIGNER NOTES

SEE STANDARD 30.40 FOR PEDESTRIAN RAILING MOUNTED ON CURB OR DECK. COMBINATION RAILINGS TYPE C1-C6 MAY BE MODIFIED AS A PEDESTRIAN RAIL MOUNTED DIRECTLY TO A BRIDGE CURB OR DECK BY INCREASING THE RAILING HEIGHT TO A MINIMUM OF 3'-6" AND A MAXIMUM OF 4'-6". USE A MINIMUM POST SIZE OF 3" X 3" X 1/2" WITH A 9'-0" MAXIMUM POST SPACING. WHEN USED AS A PEDESTRIAN RAIL, A TRAFFIC BARRIER IS REQUIRED BETWEEN THE ROADWAY AND THE SIDEWALK. FOR THIS PEDESTRIAN RAILING, BID ITEM SHALL BE "RAILING STEEL PEDESTRIAN TYPE C(1-6)". THE CLEAR SPACE BETWEEN THE TOP TWO RAILS MAY BE INCREASED TO A 6" MAXIMUM EXCEPT FOR "TYPE C1" RAILING.

A MINIMUM 12'-0" WING LENGTH IS RECOMMENDED TO ACCOMMODATE THE RAIL END TRANSITION AND PROVIDE A POST SPACING ON THE WING THAT WILL MAINTAIN THE RAIL AESTHETICS.

SEE STANDARD 30.18 FOR ADDITIONAL RAILING DETAILS.

SEE STANDARD 30.07 FOR:

- DEFLECTION JOINT DETAILS AND NOTES
- BEAM GUARD ANCHOR ASSEMBLY DETAILS
- PARAPET REINFORCING BAR SIZE AND SPACING

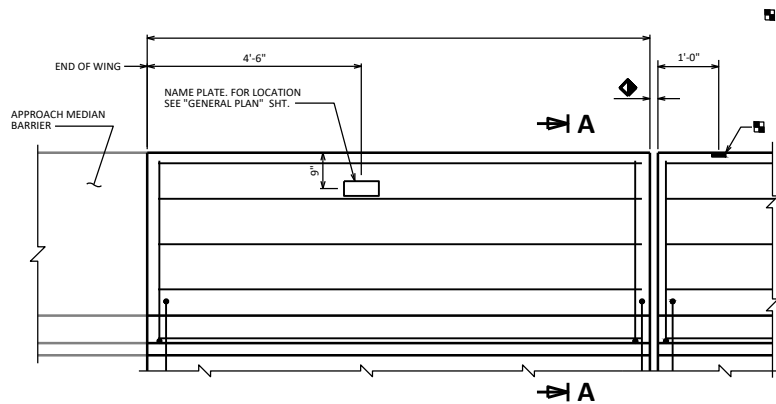
**COMBINATION
RAILING TYPES 'C1 - C6'**



**BUREAU OF
STRUCTURES**

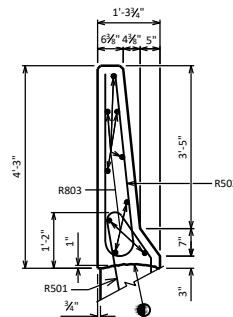
APPROVED: *Laura Shadewald*

DATE:
1-25

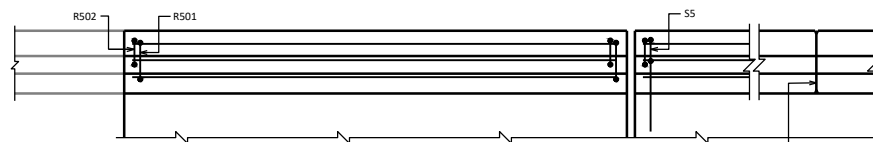


INSIDE ELEVATION

◆ ROADWAY OPENING OR $2\frac{1}{2}$ " MIN. FOR EXPANSION JOINT. USE $\frac{1}{2}$ " OPENING WITH FILLER FOR A1 ABUTMENTS



SECTION A

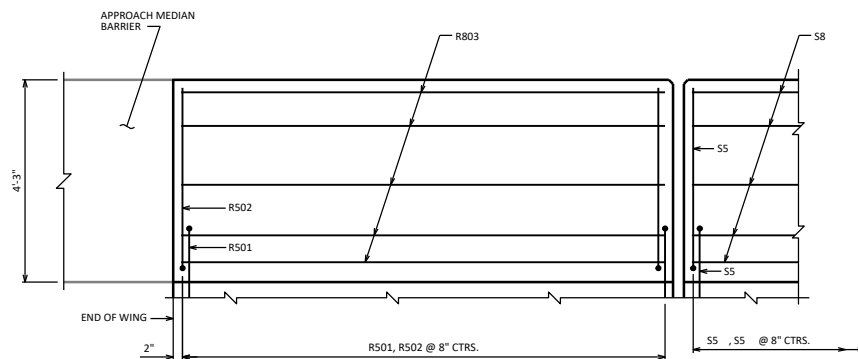


PLAN

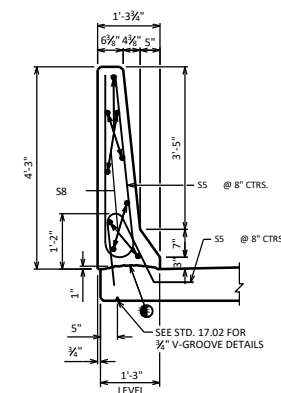
EXPANSION JOINT @ ABUT.
0' SKEW SHOWN. MATCH EXP. JT. OPENING.

FOR TYPE A1 ABUT., USE $\frac{1}{2}$ " FILLER TO TOP OF PARAPET. SEE STD. 12.01.

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 3'-5" MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A $\frac{1}{2}$ " - 'V' GROOVE.



OUTSIDE ELEVATION

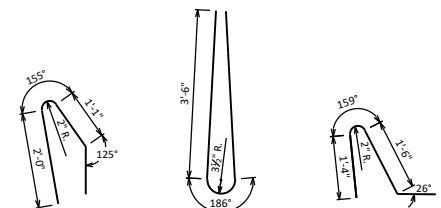


SECTION THRU PARAPET ON BRIDGE

BILL OF BARS

FOR ABUTMENT PARAPETS

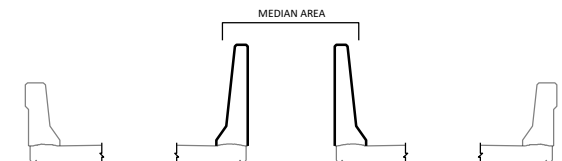
BAR MARK	CONC.	ABUT.	ABUT.	LENGTH	REIN.	LOCATION
R501	X			4'-6"	X	PARAPET VERT.
R502	X			7'-11"	X	PARAPET VERT.
R803	X					PARAPET HORIZ.
S5	X			4'-2"	X	PARAPET VERT.
S5	X			7'-11"	X	PARAPET VERT.
S8	X					PARAPET HORIZ.



R501

R502/S5

S5



SLOPED FACE PARAPET "51F" MAY BE USED IN MEDIAN AREA OF ADJACENT STRUCTURES WHEN HIGHWAY MEDIAN APPROACH CONCRETE BARRIER IS 51" HIGH

① CONST. JOINT - STRIKE OFF AS SHOWN.

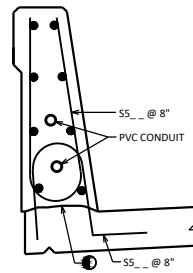
A R501 BAR MAY BE USED IN LIEU OF A TYPICAL S5 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.
AREA = 3.41 FT.²
WEIGHT = 512 LBS./FT.

SLOPED FACE PARAPET '51F'

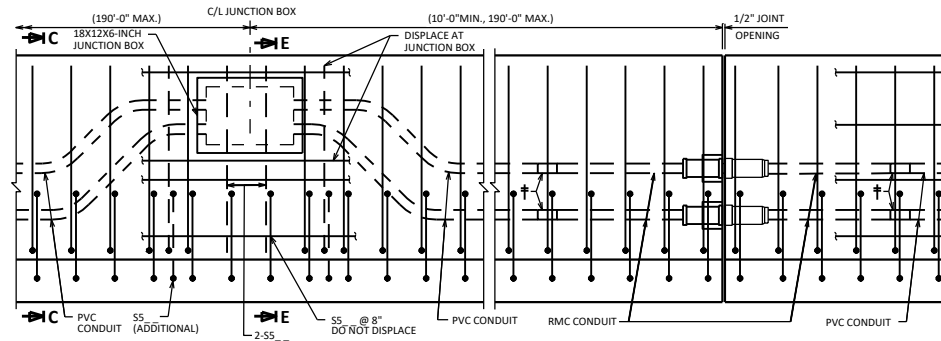


APPROVED: *Laura Shadewald*

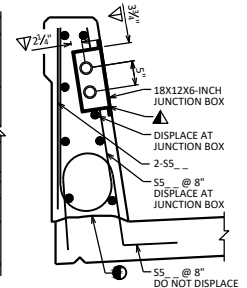
DATE:
7-25



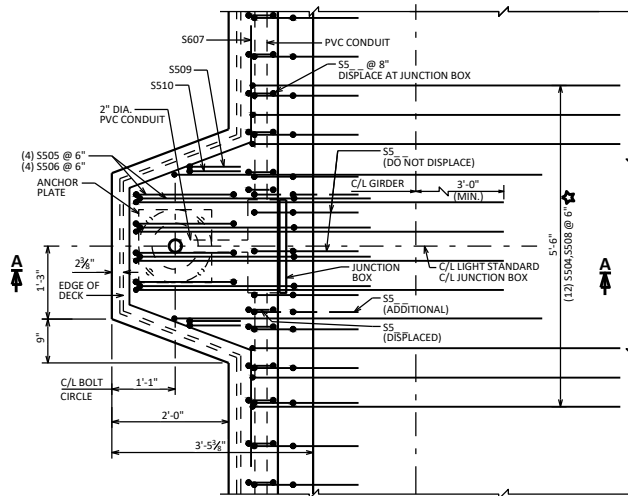
SECTION C-C



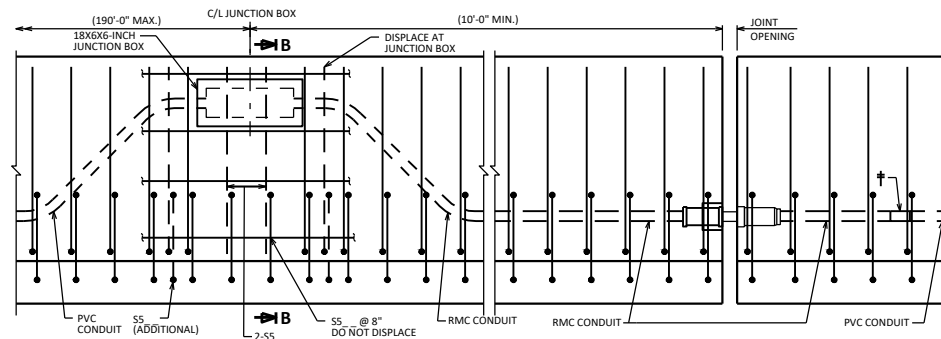
INSIDE ELEVATION AT JUNCTION BOX AT SEMI-EXP. JOINT
(DECK STEEL NOT SHOWN FOR CLARITY)



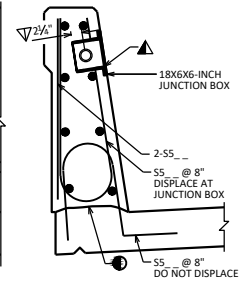
SECTION E-E



PLAN AT LIGHT STANDARD
(DECK STEEL NOT SHOWN FOR CLARITY)



INSIDE ELEVATION AT JUNCTION BOX AT EXP. JOINT
(DECK STEEL NOT SHOWN FOR CLARITY)



SECTION B-B

DESIGNER NOTES

THIS STANDARD ACCOMMODATES ELECTRICAL SERVICE TO LIGHTS STANDARDS MOUNTED ON STRUCTURES. ADDITIONAL REQUIREMENTS MAY BE REQUIRED FOR OTHER SYSTEMS. SEE BRIDGE MANUAL SECTION 32.6 FOR ADDITIONAL INFORMATION.

POSSIBLE BID ITEMS:
"JUNCTION BOXES 18X12X6-INCH", EACH
"CONDUIT RIGID NONMETALLIC SCHEDULE 40 2-INCH"
"CONDUIT RIGID METALLIC 2-INCH"
"ANCHOR ASSEMBLIES LIGHT POLES ON STRUCTURE"

SEE STD. 30.14 FOR ANCHORAGE DETAIL AND LIMITATIONS.

SEE STD. 30.22 FOR CONDUIT DETAILS AND NOTES.

THIS STANDARD ACCOMMODATES A MAXIMUM 15" DIA. BOLT HOLE CIRCLE AND A MAXIMUM 15" X 15" SQUARE ANCHOR PLATE WITH (4) 1" DIA. ANCHOR BOLTS. THIS STANDARD IS BASED ON A 8" MIN. DECK THICKNESS AND A MAXIMUM OVERHANG OF 3'-7" FROM C/L GIRDER TO EDGE OF DECK.

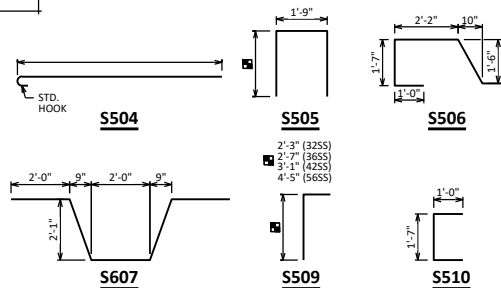
★ THESE BARS ARE IN ADDITION TO STANDARD TRANSVERSE BARS IN DECK. FOR CONC. SLAB STRUCTURES, REPLACE S504 & S508 BARS W/ S404 BARS @ 6" SPA. (W/O HOOK @ ENDS, 5'-6" LONG).

CONDUIT REQUIREMENTS:

- USE (1) - 2" DIA. CONDUIT TO PROVIDE ELECTRICAL SERVICE TO LIGHTS MOUNTED ON TOP OF THE PARAPET.
- USE (1) - 2" DIA. CONDUITS IF AN ADDITIONAL ELECTRICAL SERVICE IS REQUIRED.

JUNCTION BOX REQUIREMENTS:

- USE A JUNCTION BOX TO KEEP A CONTINUOUS RUN OF CONDUIT (PULL LENGTH) TO A MAXIMUM OF 190 FT. USE A 18" X 6" X 6" JUNCTION BOX WHEN (1) - 2" DIA. CONDUIT IS USED.
- USE A 18" X 12" X 6" JUNCTION BOX WHEN (2) - 2" DIA. CONDUITS ARE USED.
- USE A 18" X 12" X 6" JUNCTION BOX AT EACH LIGHT STANDARD (CENTERED ON LIGHT C/L).
- USE A JUNCTION BOX AT EACH EXPANSION JOINT. LOCATE 10'-0" MINIMUM FROM EACH EXPANSION JOINT. (NOT REQUIRED AT SEMI-EXP. OR FIXED JOINTS)



BILL OF BARS

BAR MARK	CO. REQ'D	NO.	LENGTH	BENT	LOCATION
S504	X	3255	6'-0"	X	LIGHT STD. - TRANS. - DECK - TOP
S505	X	3655	6'-8"	X	LIGHT STD. - VERT. - PARAPET
S506	X	4255	7'-0"	X	LIGHT STD. - VERT. - PARAPET
S507	X	5655	10'-0"	X	LIGHT STD. - HORIZ. - PARAPET
S508	X				LIGHT STD. - TRANS. - DECK - BOT.
S509	X	3'-2"	3'-6"	X	LIGHT STD. - VERT. - PARAPET
S510	X	3'-4"	3'-4"	X	LIGHT STD. - VERT. - PARAPET

LEGEND

① CONSTRUCTION JOINT, STRIKE OFF AS SHOWN.

▲ CUT OUT ± 1" OF GASKET AT BOTTOM OF JUNCTION BOX COVER TO ALLOW FOR DRAINAGE.

▽ LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE OF JUNCTION BOX.

† NONMETALLIC CONDUIT TO METALLIC CONDUIT ADAPTER FITTING (UL OR NRTL LISTED FOR ELECTRICAL USE SHALL BE USED).

PVC = POLYVINYL CHLORIDE (RIGID NONMETALLIC) CONDUIT

RMC = RIGID METALLIC CONDUIT

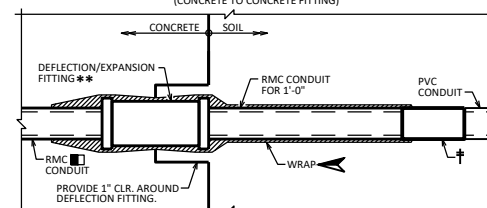
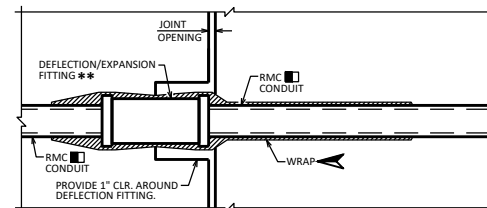
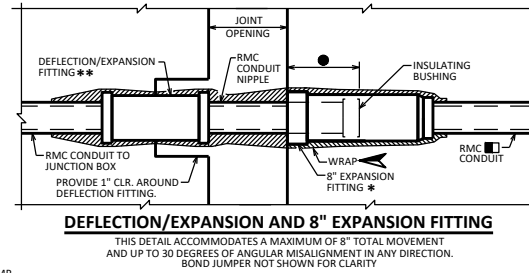
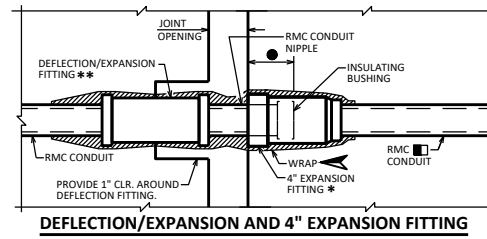
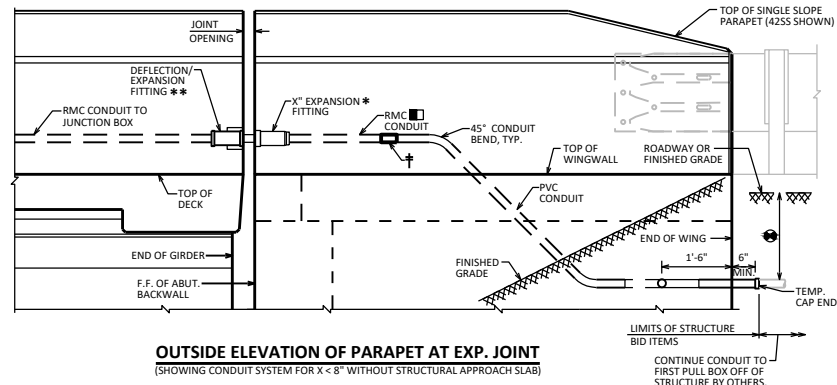
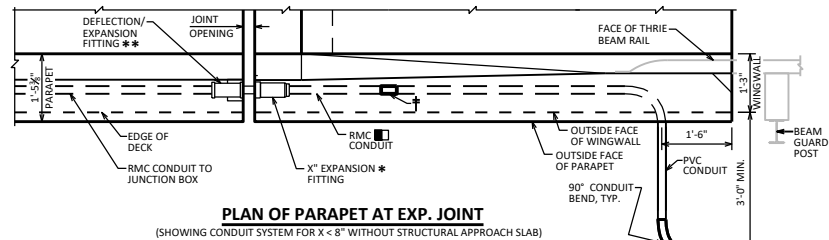
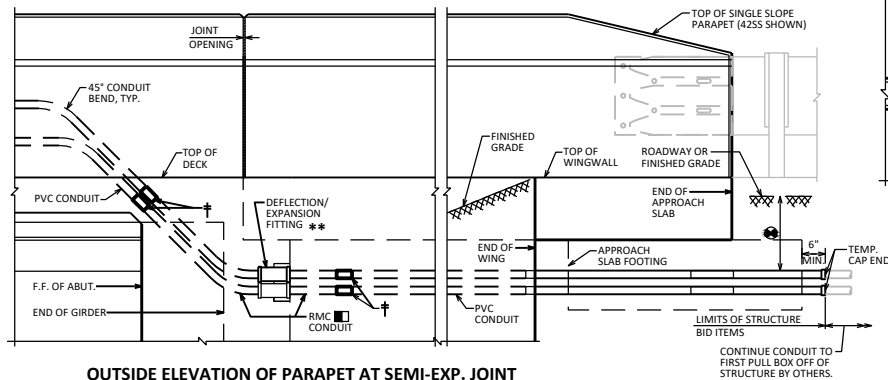
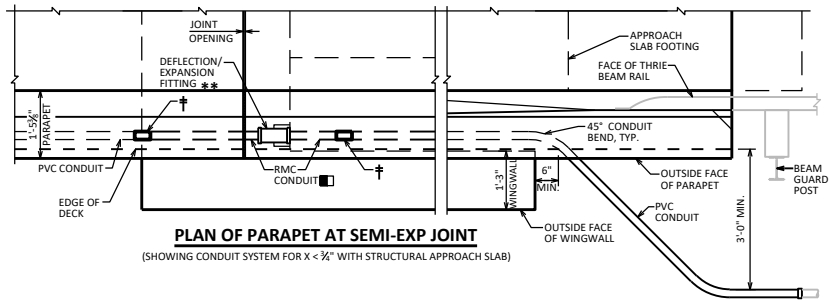
LIGHT STANDARD AND JUNCTION BOX FOR PARAPETS



BUREAU OF STRUCTURES

APPROVED: *Laura Shadewald*

DATE:
7-18



NOTES

CONDUIT SHALL BE EMBEDDED 2" CLEAR.

USE 2" DIA. RIGID NONMETALLIC CONDUIT (PVC) UNLESS NOTED OTHERWISE.

CONDUIT FITTINGS, CONDUIT BENDS, AND ADAPTER FITTINGS INCIDENTAL TO CONDUIT WORK.

CONDUIT BENDS SHALL CONFORM TO THE NATIONAL ELECTRIC CODE.

3" Ø MIN. CONDUIT COVER UNDER ROADWAYS, 1'-6" OTHERWISE. CONDUIT COVER SHOULD NOT EXCEED 3'-0".

PROVIDE JUNCTION BOXES FROM THE APPROVED PRODUCTS LIST.

DESIGNER NOTES

THIS STANDARD ACCOMMODATES A MAXIMUM 8" TOTAL MOVEMENT AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION. SEE BRIDGE MANUAL SECTION 32.6 FOR ADDITIONAL INFORMATION.

PLANS SHALL SPECIFY SIZE, TYPE, AND LOCATION FOR CONDUIT, JUNCTION BOXES, AND FITTINGS. SEE TABLE BELOW FOR CONDUIT FITTING RECOMMENDATIONS.

LEGEND

■ USE 2" DIA. RIGID METALLIC (RMC) CONDUIT AT FITTINGS. PROVIDE RMC FOR 3'-0" MIN. ON EACH SIDE OF JOINT OPENINGS UNLESS NOTED OTHERWISE.

† NONMETALLIC CONDUIT TO METALLIC CONDUIT ADAPTER FITTING (UL OR NRTL LISTED FOR ELECTRICAL USE SHALL BE USED)

◀ SPONGE RUBBER WRAP TO BE AASHTO M153, TYPE 1 OR EQUIVALENT - 1/2" MINIMUM THICKNESS. PROVIDE WRAP FOR THE ENTIRE LENGTH OF THE FITTING OR AS SHOWN. SPONGE RUBBER WRAP INCIDENTAL TO "CONDUIT RIGID METALLIC 2-INCH".

● POSITION MOVABLE END OF CONDUIT INSIDE EXPANSION FITTING, SUCH THAT IT WILL HAVE THE SAME ALLOWANCE FOR MOVEMENT (EXPANSION/CONTRACTION) AS THE EXPANSION DEVICE SET IN PLACE IN THE DECK BELOW IT. TAKE CARE TO INSTALL EXPANSION FITTING AND CONDUIT EXACTLY PARALLEL TO BRIDGE MOVEMENT.

* EXPANSION FITTING REQUIREMENTS (IF USED):

● 4" TOTAL CONDUIT MOVEMENT WITH BONDING JUMPER

● 8" TOTAL CONDUIT MOVEMENT WITH BONDING JUMPER

** DEFLECTION/EXPANSION FITTING REQUIREMENTS (IF USED):

● UP TO 3/4" CONDUIT CONTRACTION OR EXPANSION AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION WITH BONDING JUMPER

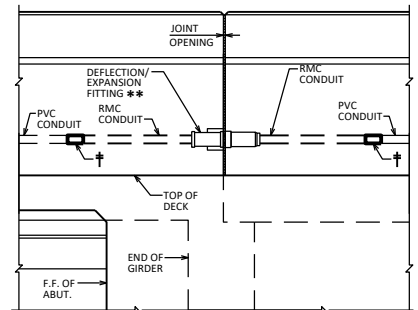
CONDUIT FITTING RECOMMENDATIONS TABLE:

LOCATION	JOINT TYPE	REQUIREMENT	FITTING TYPE
BRIDGE	FIXED	NONE	NONE - RUN PVC CONDUIT THRU JOINT
	SEMI-EXP.	$X < 3/4"$	DEFL./EXP. FITTING
		$3/4" \leq X < 4"$	4" EXP. FITTING
		$S < 30'$	DEFL./EXP. AND 4" EXP. FITTING
	EXPANSION	$X < 4"$	DEFL./EXP. AND 4" EXP. FITTING
		$4" \leq X < 8"$	DEFL./EXP. AND 8" EXP. FITTING
WALL	CONTRACTION	NONE	NONE - RUN PVC CONDUIT THRU JOINT
	EXPANSION	$L < 90$ FEET	DEFL./EXP. FITTING
		$X \geq 8"$	CONSIDER FLEXIBLE METAL CONDUIT SYSTEM (NOT SHOWN)

X = TOTAL ANTICIPATED LONGITUDINAL JOINT MOVEMENT

L = DISTANCE BETWEEN EXPANSION JOINTS

S = SKEW



OUTSIDE ELEVATION OF PARAPET AT SEMI-EXP JOINT (SHOWING CONDUIT SYSTEM FOR $X \geq 3/4"$ WITHOUT STRUCTURAL APPROACH SLAB)

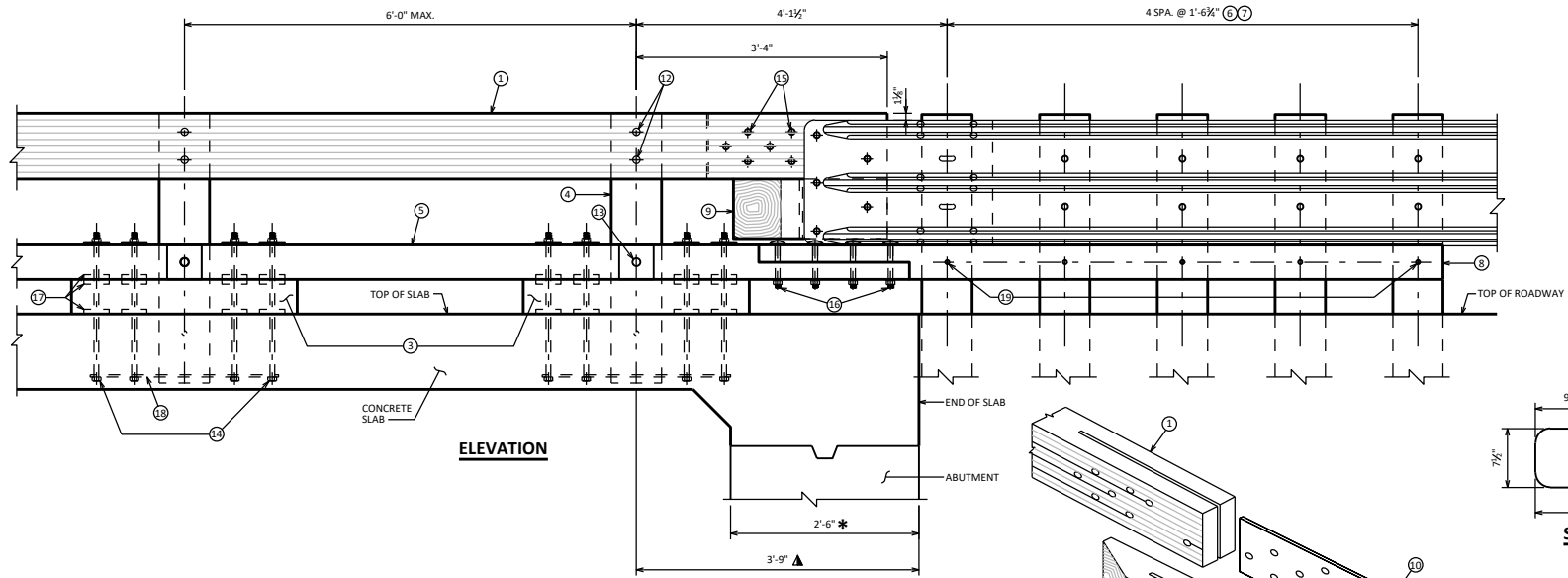
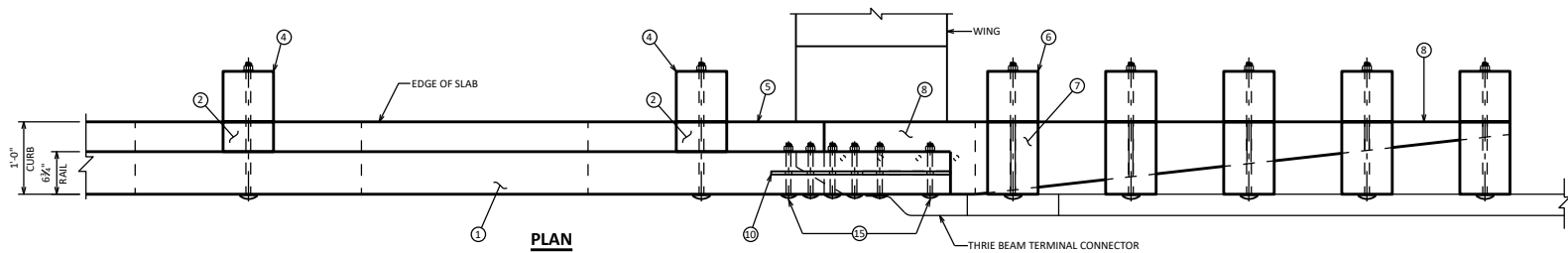
CONDUIT DETAILS AND NOTES



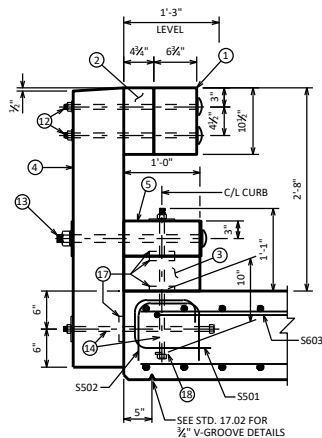
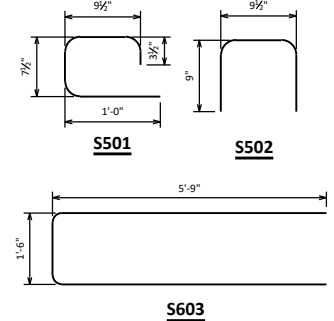
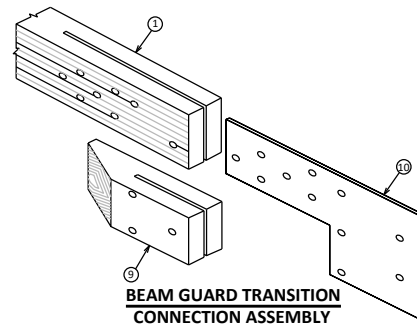
**BUREAU OF
STRUCTURES**

APPROVED: *Laura Shadewald*

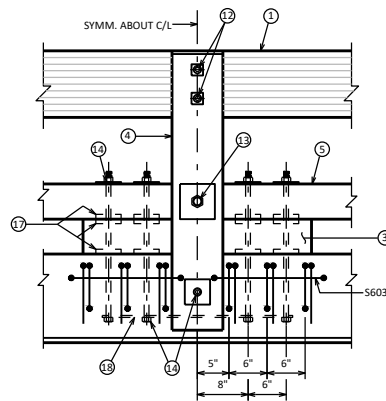
DATE:
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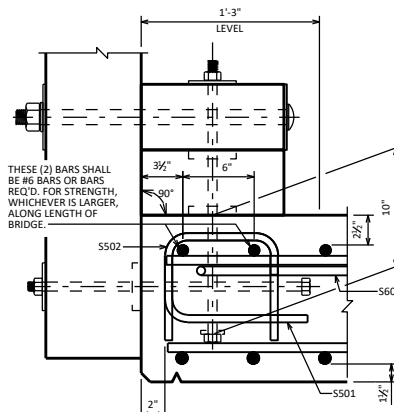
* DIMENSION IS TAKEN NORMAL TO C/L SUBSTRUCTURE.
 ▲ DIMENSION IS TAKEN ALONG EDGE OF SLAB.



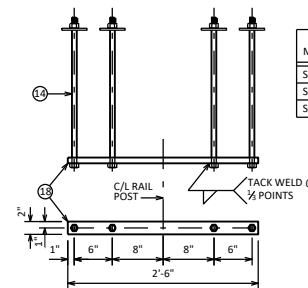
SECTION THRU RAIL
 ALSO SEE "EDGE OF SLAB DETAILS"



BACK ELEVATION



EDGE OF SLAB DETAILS



ANCHORAGE DETAIL

BILL OF BARS

BAR MARK	COY.	NO. REQ'D.	LENGTH	REMARKS	LOCATION
S501	X	2-4	X	RAIL POST VERTICAL	
S502	X	2-1	X	RAIL POST VERTICAL	
S603	X	12-9	X	RAIL POST HORIZONTAL	

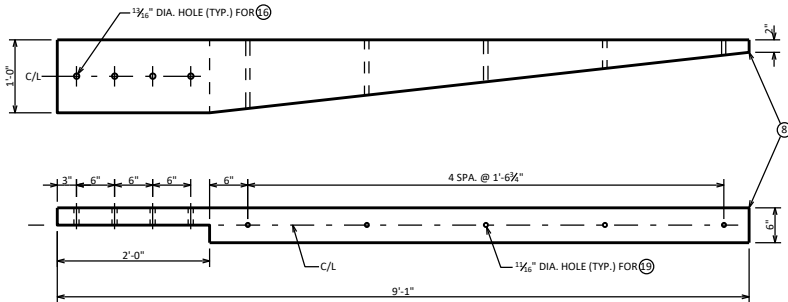
SEE STANDARD 30.25 FOR RAILING DETAILS

TIMBER RAILING ATTACHED TO CONCRETE SLAB

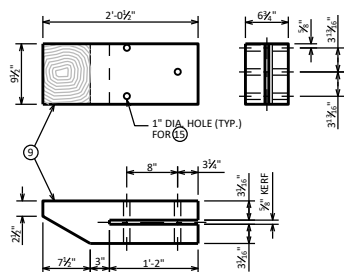


APPROVED: *Laura Shadewald*

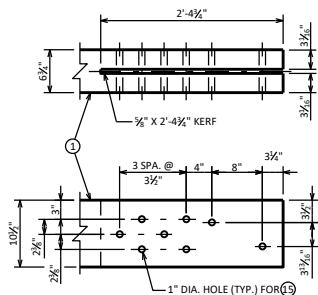
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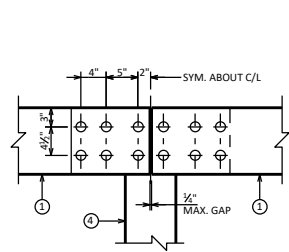
CURB TRANSITION



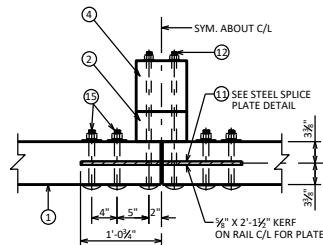
TRANSITION BLOCK



TRANSITION GLULAM RAIL BORING DETAIL

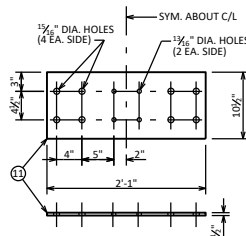


ELEVATION



PLAN VIEW

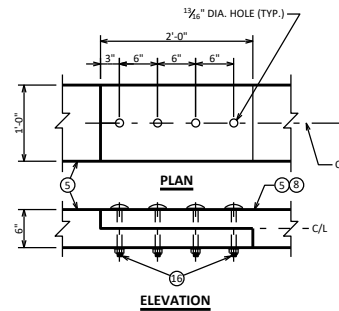
RAIL SPLICE DETAILS



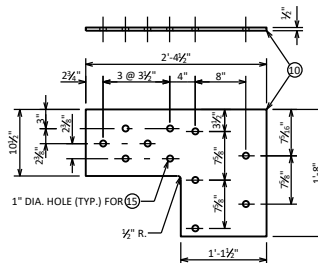
STEEL SPLICE PLATE

BILL OF TREATED LUMBER

ITEM	NO. REQ'D.	SIZE	LENGTH	MBM
GLULAM RAIL		6 3/4" X 10 1/2"		
RAIL SPACER BLOCK		8" X 4 1/2"	10 1/2"	
SCUPPER BLOCK		6" X 12"	3'-0"	
RAIL POST		8" X 8"		
CURB		6" X 12"		
CURB TRANSITION				
TRANSITION BLOCK				
TOTAL MBM				



CURB SPLICE DETAIL



STEEL TRANSITION PLATE

LEGEND

- ① GLULAM RAIL 6 3/4" X 10 1/2"
- ② RAIL SPACER BLOCK 8" X 4 1/2" X 10 1/2"
- ③ SCUPPER BLOCK 6" X 12" X 3'-0"
- ④ RAIL POST @ STRUCTURE 8" X 8" X 3'-8"
- ⑤ CURB 6" X 12"
- ⑥ RAIL POST @ BEAM GUARD 8" X 8"
- ⑦ RAIL SPACER BLOCK @ BEAM GUARD 8" X 1 1/2" X 1'-10 1/2"
- ⑧ CURB TRANSITION @ BEAM GUARD
- ⑨ TRANSITION BLOCK @ BEAM GUARD
- ⑩ STEEL TRANSITION PLATE, ASTM A36.
- ⑪ STEEL SPLICE PLATE, ASTM A36.
- ⑫ 1/2" DIA. X 1'-10" LONG ASTM A307, GRADE 2, DOME-HEAD BOLT W/ 1-PLATE WASHER PER BOLT. (2 REQ'D. @ EACH RAIL TO POST CONNECTION, 4 REQ'D. @ EACH RAIL SPLICE).
- ⑬ 1 1/4" DIA. X 1'-10" LONG ASTM A325, DOME-HEAD BOLT W/ 2 - 5/8" X 5/8" X 1/2" PLATE WASHERS, W/ 1 1/4" DIA. HOLE. (1 REQ'D. @ EACH CURB TO POST CONNECTION).
- ⑭ 1/2" DIA. X 1'-11" LONG ASTM A325 BOLT. 1 - 4" X 4" X 1/4" PLATE WASHER REQ'D. AT CURB TO SLAB CONNECTION. 1 - 4" X 4" X 1/4" PLATE WASHER REQ'D. AT POST TO SLAB CONNECTION.
- ⑮ 1/2" DIA. X 9" LONG ASTM A307, GRADE 2, DOME HEAD BOLT AT RAIL SPLICE DETAIL AND AT BEAM GUARD ATTACHMENT.
- ⑯ 3/4" DIA. X 8" LONG ASTM A307, GRADE 2, DOME-HEAD BOLT (4 REQ'D. @ EACH CURB SPLICE DETAIL).
- ⑰ 4" DIA. SHEAR PLATE (8 REQ'D. @ EACH CURB TO SCUPPER CONNECTION, 4 REQ'D. @ SCUPPER TO SLAB CONNECTION AND 1 REQ'D. @ EACH POST TO SLAB CONNECTION). MALLEABLE IRON MEETING REQUIREMENTS OF ASTM A47, GRADE 32510.
- ⑱ 2" X 2'-6" X 1/4" ANCHOR PLATE WITH 4 - 1 1/4" DIA. HOLES FOR ANCHOR BOLTS NO. 14 (CURB TO SLAB CONNECTION).
- ⑲ 1/2" DIA. ASTM A325 DOME-HEAD BOLT W/ 1-PLATE WASHER PER BOLT. (1 REQ'D. @ EACH THIRIE BEAM POST TO CURB TRANSITION CONNECTION.)

NOTES

1. BID ITEM SHALL BE "TREATED LUMBER AND TIMBER" WHICH INCLUDES ALL ITEMS SHOWN EXCEPT ITEMS NO 6, 7 AND THIRIE BEAM TERMINAL CONNECTOR.
2. DIMENSIONS GIVEN FOR GLUED-LAMINATED (GLULAM) TIMBER RAILS ARE ACTUAL DIMENSIONS.
3. DIMENSIONS FOR WOOD POSTS, CURBS AND SCUPPERS ARE GIVEN AS NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY BE A MAXIMUM OF 1/2 INCH LESS THAN THE STATED NOMINAL DIMENSIONS. DIMENSION FOR SPACER BLOCK DEPTH ARE ACTUAL DIMENSIONS.
4. CURB AND RAIL SPLICES SHALL BE LOCATED SO THAT CURB AND RAIL MEMBERS ARE CONTINUOUS OVER NOT LESS THAN TWO POSTS. CURB SPLICES SHALL BE LOCATED A MINIMUM OF 1.5 POST SPACINGS AWAY FROM RAIL SPLICES. IT IS RECOMMENDED THAT GLULAM RAILS BE CONTINUOUS OVER THE LENGTH OF THE BRIDGE.
5. SAWN LUMBER AND GLULAM SHALL COMPLY WITH THE REQUIREMENTS OF AASHTO M168 AND SHALL BE PRESSURE TREATED WITH WOOD PRESERVATIVES IN ACCORDANCE WITH AASHTO M133 AND STANDARD SPECIFICATIONS.
6. BRIDGE RAIL SHALL BE HORIZONTALLY LAMINATED GLULAM, VISUALLY GRADED WESTERN SPECIES COMBINATION NO. 2 OR VISUALLY GRADED SOUTHERN PINE COMBINATION NO. 48. OTHER SPECIES AND GRADES OF GLULAM MAY BE USED, PROVIDED THE MINIMUM TABULATED VALUES ARE NOT LESS THAN THE FOLLOWING:
 $F_{bry} = 1,800 \text{ LB/IN}^2$ $E = 1,800,000 \text{ LB/IN}^2$
7. POSTS, CURBS, SCUPPERS, TRANSITION BLOCKS AND SPACER BLOCKS MAY BE SAWN LUMBER OR GLULAM. WHEN SAWN LUMBER IS USED, MATERIAL SHALL BE VISUALLY GRADED NO. 1 SOUTHERN PINE OR VISUALLY GRADED NO 1 DOUGLAS FIR-LARCH. GLULAM AND OTHER SPECIES AND GRADES OF SAWN LUMBER MAY BE USED, PROVIDED THE MINIMUM TABULATED VALUES ARE NO LESS THAN THE FOLLOWING:
 $F_b = 1,350 \text{ LB/IN}^2$ $E = 1,500,000 \text{ LB/IN}^2$
8. ALL STEEL COMPONENTS AND FASTENERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232.
9. TO THE EXTENT POSSIBLE, ALL WOOD SHALL BE CUT, DRILLED, AND COMPLETELY FABRICATED PRIOR TO PRESSURE TREATMENT WITH PRESERVATIVES. WHEN FIELD FABRICATION OF WOOD IS REQUIRED OR IF WOOD IS DAMAGED, ALL CUTS, BORE HOLES, AND DAMAGE SHALL BE IMMEDIATELY TREATED WITH WOOD PRESERVATIVE IN ACCORDANCE WITH AASHTO M133 AND STANDARD SPECIFICATIONS.
10. UNLESS NOTED, MALLEABLE IRON WASHERS SHALL BE PROVIDED UNDER BOLT HEADS AND UNDER NUTS THAT ARE IN CONTACT WITH WOOD. WHEN THE SIZE AND STRENGTH OF THE HEAD ARE SUFFICIENT TO DEVELOP CONNECTION STRENGTH WITHOUT WOOD CRUSHING, WASHERS MAY BE OMITTED UNDER HEADS OF DOME-HEAD TIMBER BOLTS.
11. TOPS OF RAIL POSTS AND TOP OF THE RAIL SPLICE PLATE KERF SHALL BE SEALED WITH ROOFING CEMENT OR OTHERWISE PROTECTED FROM DIRECT EXPOSURE TO WEATHER.
12. DESTROY THREADS ON ALL BOLTS WITH A CENTER PUNCH AFTER TIGHTENING NUT. EXPOSED BOLT PROJECTION OVER 1" SHALL BE CUT OFF. REPAIR END OF BOLT BY PAINTING WITH ZINC RICH PRIMER.
13. WHEN PLACING OVERLAY (FWS) ON TOP OF EXISTING SLAB, THE THICKNESS OF THE OVERLAY MUST BE TAPERED NEAR THE VICINITY OF THE RAILING TO MAINTAIN THE REQ'D. (CRASH TESTED) DISTANCE FROM TOP OF SLAB TO TOP OF RAIL TO 32 INCHES.
14. THIS RAILING MEETS NCHRP REPORT 350 EVALUATION CRITERIA FOR TEST LEVEL 2 (TL-2).

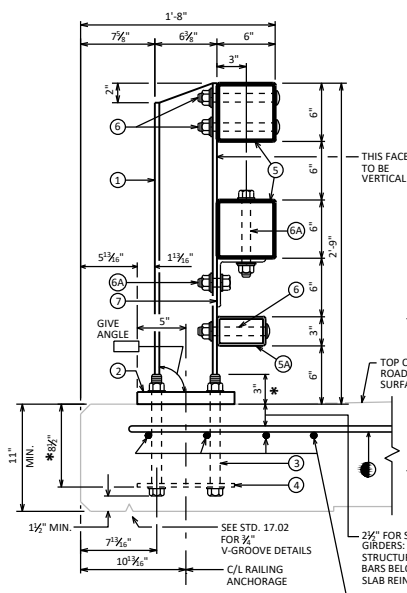
TIMBER RAILING ATTACHED TO CONCRETE SLAB DETAILS



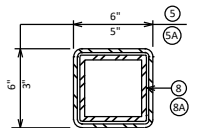
BUREAU OF STRUCTURES

APPROVED: *Laura Shadewald*

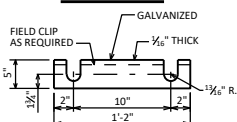
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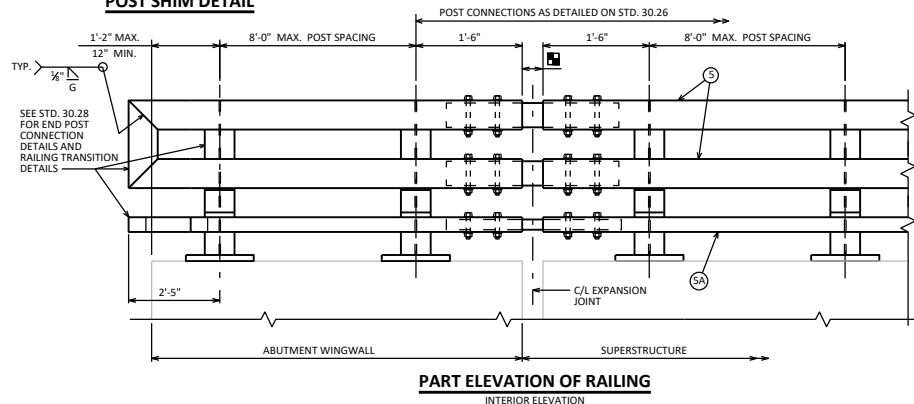
SECTION THRU RAILING ON DECK
*NORMAL TO BASE PLATE



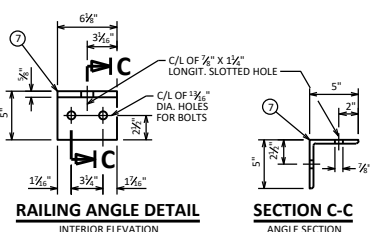
SECTION D-D



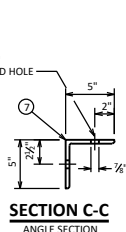
POST SHIM DETAIL



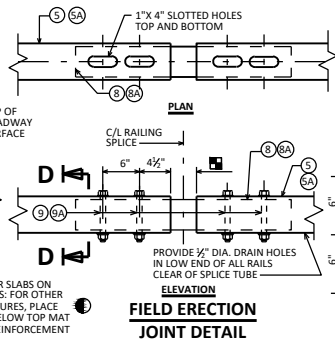
PART ELEVATION OF RAILING
INTERIOR ELEVATION



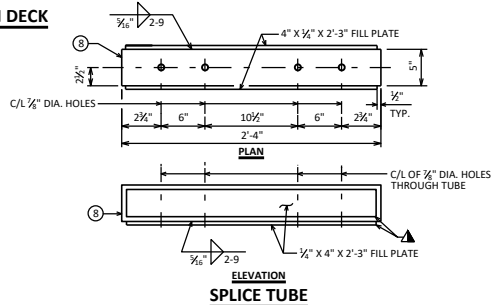
RAILING ANGLE DETAIL
INTERIOR ELEVATION



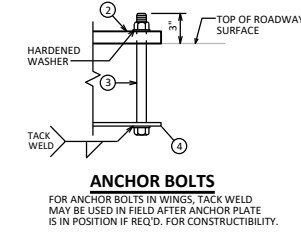
SECTION C-C
ANGLE SECTION



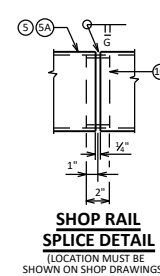
FIELD ERECTION JOINT DETAIL



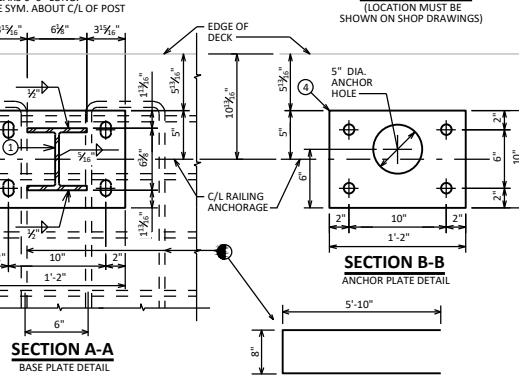
SPLICE TUBE



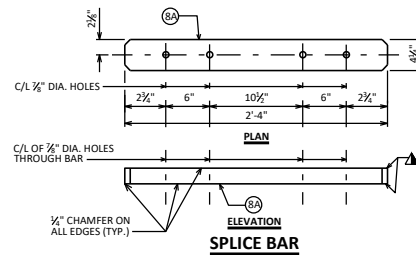
ANCHOR BOLTS
FOR ANCHOR BOLTS IN WINGS, TACK WELD MAY BE USED IN FIELD AFTER ANCHOR PLATE IS IN POSITION IF REQ'D. FOR CONSTRUCTIBILITY.



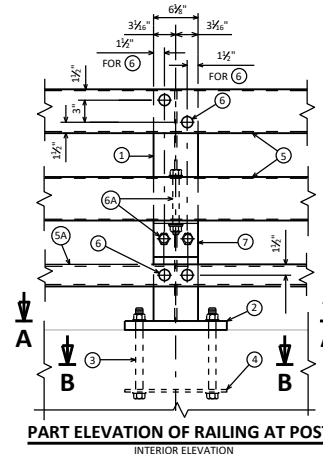
SHOP RAIL SPLICE DETAIL
(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



SECTION A-A
BASE PLATE DETAIL



SPLICE BAR



PART ELEVATION OF RAILING AT POST
INTERIOR ELEVATION

LEGEND

- W6 X 25 WITH 1 1/2" X 1 1/2" HORIZONTAL SLOTTED HOLES ON EACH SIDE OF POST FOR BOLT NO. 6 AT NO. 5. USE 1" DIA. HOLES FOR BOLT NO. 6 AT NO. 5A AND FOR BOLT NO. 6A AT NO. 7. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.
- PLATE 1 1/2" X 10" X 1/2" WITH 1 1/2" X 1 1/2" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
- ASTM A449 - 1" DIA. ANCHOR BOLTS WITH HEAVY HEX NUT AND 2" O.D. HARDENED WASHER (ALL GALVANIZED). 4 REQUIRED PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 1 1/2" LONG BOLT FOR CONCRETE DECKS. ON CONCRETE SLAB SUPERSTRUCTURES, USE 1' 3" LONG BOLT FOR SLAB THICKNESS > 16" AND 1 1/2' LONG FOR THICKNESS ≤ 16". USE 1' 9" LONG IN ABUTMENT WINGS. (AN EQUIVALENT THREADED ROD WITH HEAVY HEX NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQUIRED FOR CONSTRUCTIBILITY.)
- 1/2" X 10" X 1/2" ANCHOR PLATE (GALVANIZED) WITH 1 1/2" DIA. HOLES FOR ANCHOR BOLTS NO. 3.
- T5 6 X 6 X 1/2" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & 3/4" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).
- T5 5 X 3 X 3/4" STRUCTURAL TUBING. USE 1 1/2" X 1 1/2" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
- 1/2" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 1/2" X 1 1/2" X 1 1/2" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).
- 1/2" DIA. A325 BOLT WITH HEX NUT & SPRING LOCK WASHER (1 REQUIRED AT RAIL TO ANGLE & 2 REQUIRED AT ANGLE TO POST LOCATIONS SHOWN WITH 1/2" X 1 1/2" X 1 1/2" WASHER).
- L 5 X 5 X 3/8" STRUCTURAL ANGLE. ATTACH TO NO. 1 AND NO. 5 AS SHOWN.
- T5 5 X 5 X 3/8" X 2'-4" LONG SPLICE TUBE. 1 PER RAIL. USED IN NO. 5.
- 4 1/2" X 2 1/2" X 2'-4" LONG SPLICE BAR. 1 PER RAIL. USED IN NO. 5A.
- 1/2" DIA. A325 FULLY THREADED BOLTS, 7 1/2" LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5.
- 3/4" DIA. A325 FULLY THREADED BOLTS, 4 1/2" LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5A.
- SPLICE SLEEVE FABRICATED FROM 1/2" PLATE. PROVIDE "SLIDING FIT".
- ROADWAY OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT & 1/2" OPENING FOR A1 ABUTMENT. 1/2" AT FIXED JOINTS. SPLICES ARE REQUIRED IN ANY RAILING SPAN BETWEEN POSTS THAT CONTAINS A SUPERSTRUCTURE EXPANSION JOINT.
- PROTRUSIONS CAUSED BY WELDING OR GALVANIZING ARE NOT PERMITTED ON THE ADJOINING SURFACES OF THE RAILS, SPLICE TUBES AND FILL PLATES.
- #6 BARS X 12'-0" LONG. BEND AS SHOWN, TIE TO TOP MAT OF STEEL. (DESIGNER TO PLACE THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE.)

NOTES

- BID ITEM SHALL BE "RAILING STEEL TYPE NY3", WHICH INCLUDES ALL ITEMS SHOWN.
- RAILING SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE.
- POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT, AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.
- ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS, ANGLES, SPLICE TUBES, SPLICE BARS AND STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS.
- WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & NO. 4) SHALL BE PAINTED OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. [] (FILL IN COLOR NAME).
- RAIL POST, BASE PLATES, SPLICE BAR, ANGLES, AND SPLICE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50. STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED $f_y = 50$ KSI. ANCHOR PLATES & SHIMS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 36.
- THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/4 TURN.
- FILL BOLT SLOT OPENINGS IN POST SHIMS AND PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. CAULK AROUND PERIMETER OF NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.
- STEEL SHIMS SHALL BE PROVIDED & USED UNDER PLATE NO. 2 WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.
- SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.
- RAILING WEIGHT = 60 LB/LF (BASED ON 8'-0" POST SPACING)

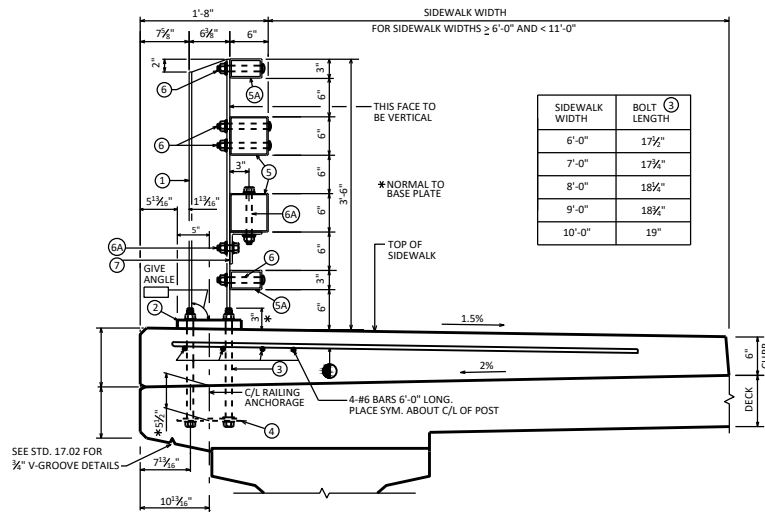
TUBULAR STEEL RAILING TYPE NY3



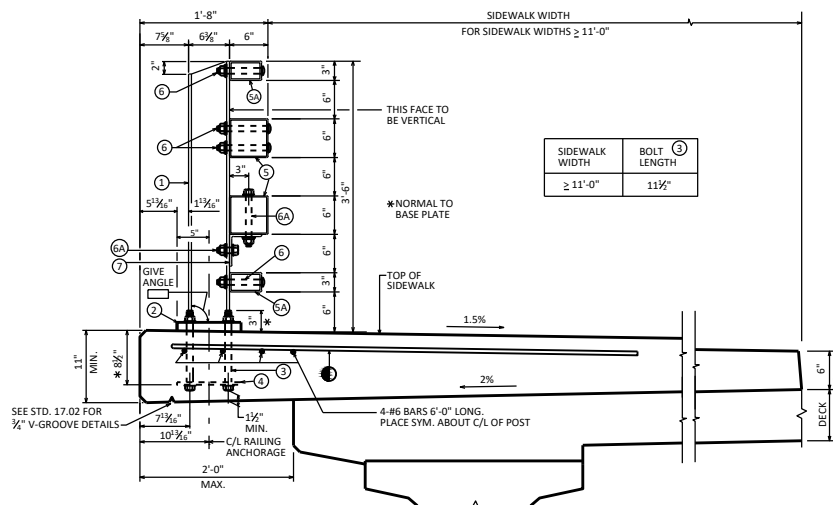
BUREAU OF STRUCTURES

APPROVED: *Laura Shadewald*

DATE: 7-19



SECTION THRU RAILING ON SIDEWALK



SECTION THRU RAILING ON SIDEWALK

LEGEND

- ① W6 X 25 WITH 1 1/2" X 1 1/2" HORIZONTAL SLOTTED HOLES ON EACH SIDE OF POST FOR BOLT NO. 6 AT TOP TWO RAILS. USE 1" DIA. HOLES FOR BOLT NO. 6 AT BOTTOM NO. 5A & FOR BOLT NO. 6A AT NO. 7. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.
- ② PLATE 1 1/2" X 10" X 1'-2" WITH 1 1/2" X 1 1/2" SLOTTED HOLES FOR ANCHORS BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
- ③ ASTM A449 - 1" DIA. ANCHOR BOLTS WITH HEAVY HEX NUT AND 2" O.D. HARDENED WASHER (ALL GALVANIZED). 4 REQUIRED PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 1 1/2" LONG BOLT FOR CONCRETE SIDEWALKS ≥ 11'-0" WIDE AND SEE TABLE TO THE LEFT FOR CONCRETE SIDEWALKS ≥ 6'-0" AND < 11'-0". WIDE FOR PROPER BOLT LENGTHS. USE 1'-9" LONG IN ABUTMENT WINGS. (AN EQUIVALENT THREADED ROD WITH HEAVY HEX NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQUIRED FOR CONSTRUCTABILITY.)
- ④ 3/8" X 10" X 1'-2" ANCHOR PLATE (GALVANIZED) WITH 1 1/8" DIA. HOLES FOR ANCHOR BOLTS NO. 3.
- ⑤ TS 6 X 6 X 3/8" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & 3/8" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).
- ⑤A TS 5 X 3 X 3/8" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 IN TOP RAIL (FRONT & BACK). USE 1 1/2" X 1 1/2" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 IN BOTTOM RAIL (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
- ⑥ 3/4" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" X 1 1/2" X 1 1/2" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).
- ⑥A 3/8" DIA. A325 BOLT WITH HEX NUT AND SPRING LOCK WASHER (1 REQUIRED AT RAIL TO ANGLE AND 2 REQUIRED AT ANGLE TO POST LOCATIONS SHOWN WITH 3/8" X 1 1/2" X 1 1/2" WASHER).
- ⑦ L 5 X 5 X 3/8" STRUCTURAL ANGLE. ATTACH TO NO. 1 AND NO. 5 AS SHOWN.
- ⑧ #6 BARS X 12'-0" LONG. BEND AS SHOWN. TIE TO TOP OF MAT OF STEEL. (DESIGNER TO PLACE THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE.)

FOR ALL TUBULAR STEEL RAILING TYPE NY4 DETAILS SEE STD. 30.27.

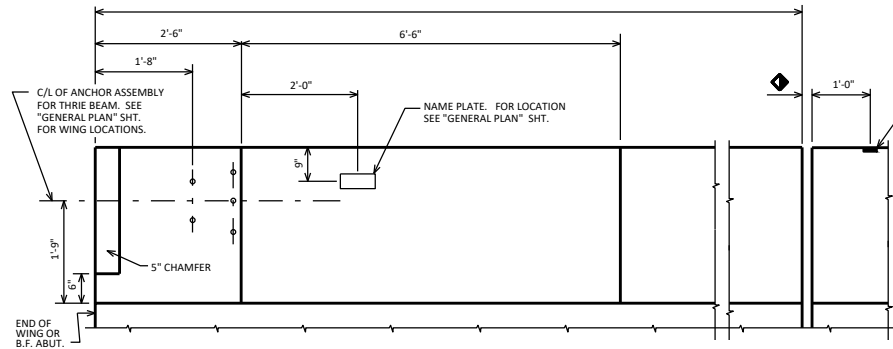
SIDEWALK DETAILS FOR TUBULAR STEEL RAILING TYPE NY4



**BUREAU OF
STRUCTURES**

APPROVED: *Laura Shadewald*

DATE:
7-16

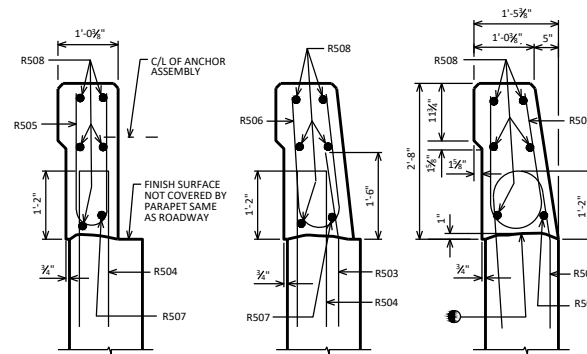


INSIDE ELEVATION

◆ ROADWAY OPENING OR $2\frac{1}{2}$ " MIN. FOR EXPANSION JOINT.
USE $\frac{1}{2}$ " OPENING WITH FILLER FOR A1 ABUTMENTS

■ BENCHMARK (WHEN SUPPLIED). AVOID PLACING BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

NOTE: FOR SECTIONS A, B & C ONLY THE PARAPET TERMINATING ON A WING IS SHOWN. TERMINATION ON A DECK IS SIMILAR.



SECTION A

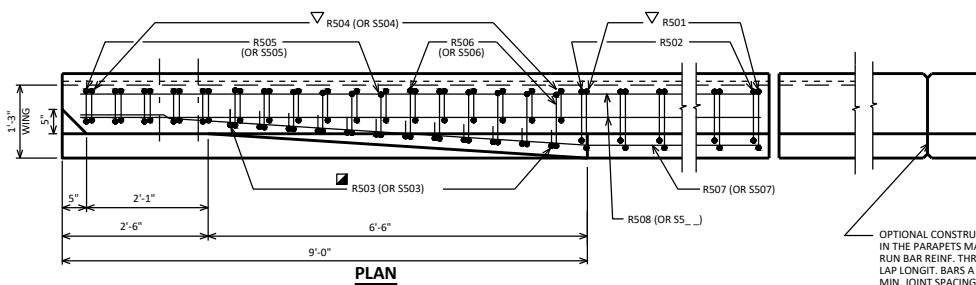
SECTION B

SECTION C

BILL OF BARS

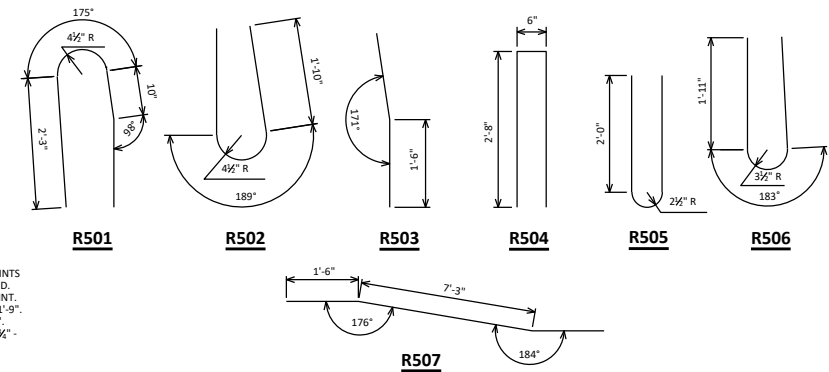
FOR ABUTMENT PARAPETS

BAR MARK	QTY	ABUT.	ABUT.	LENGTH	REIN.	LOCATION
R501	X			5-10	X	PARAPET-VERT.
R502	X			5-0	X	PARAPET-VERT.
R503	X			3-0	X	PARAPET-VERT.
R504	X			5-7	X	PARAPET-VERT.
R505	X			4-9	X	PARAPET-VERT.
R506	X			4-10	X	PARAPET-VERT.
R507	X				X	PARAPET-HORIZ.
R508	X					PARAPET-HORIZ.
S501	X			4-5	X	PARAPET-VERT.
S503	X			2-9	X	PARAPET-VERT.
S504	X			4-4	X	PARAPET-VERT.



PLAN

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A $\frac{1}{4}$ " V-GROOVE.



R501

R502

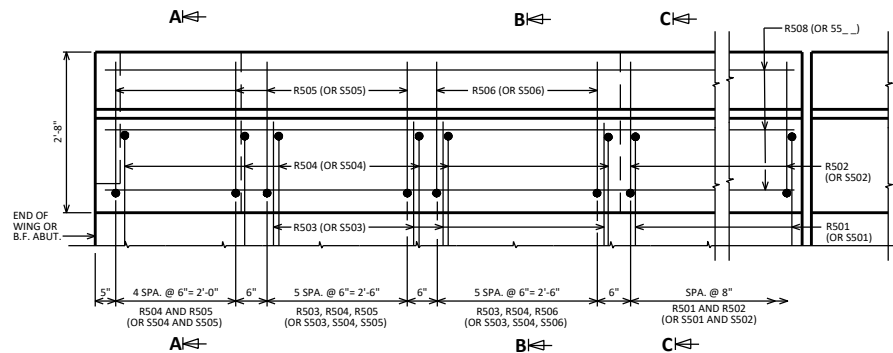
R503

R504

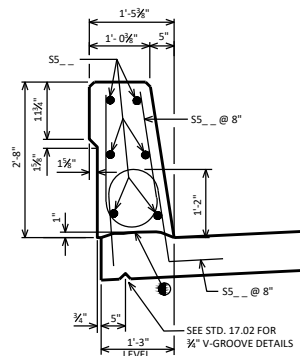
R505

R506

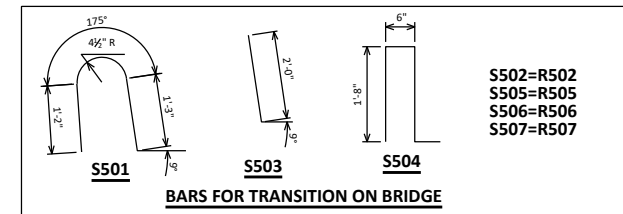
R507



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



AREA = 3.09 SF
WEIGHT = 464 LB/FT

① CONST. JOINT - STRIKE OFF AS SHOWN.

■ R502 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R503 OR S503 BARS CORRECTLY LONG TRANSITION OF PARAPET.

▽ R501 AND R504 BARS TO BE TIED TO WING STEEL BEFORE BEING POURED. DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

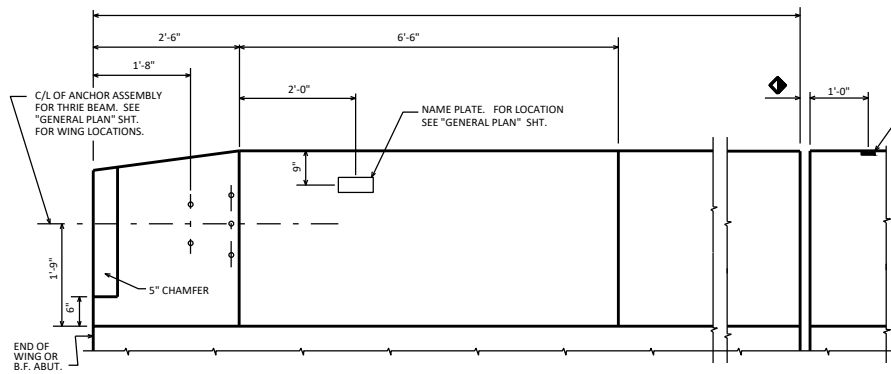
SINGLE SLOPE PARAPET 32SS



BUREAU OF
STRUCTURES

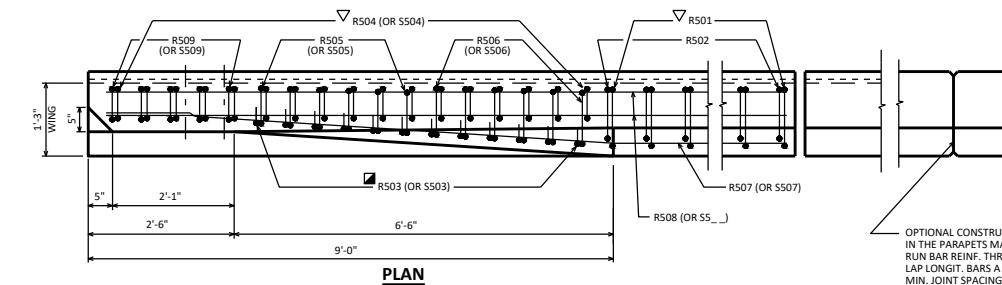
APPROVED: *Laura Shadewald*

DATE:
7-19

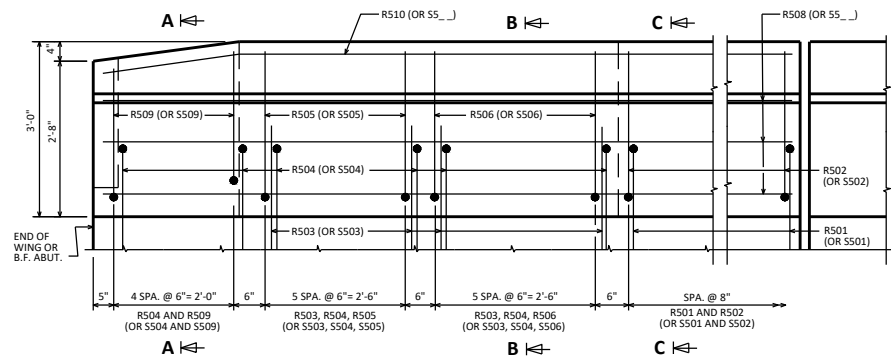


INSIDE ELEVATION

◆ ROADWAY OPENING OR $2\frac{1}{2}$ " MIN. FOR EXPANSION JOINT. USE $\frac{1}{2}$ " OPENING WITH FILLER FOR A1 ABUTMENTS



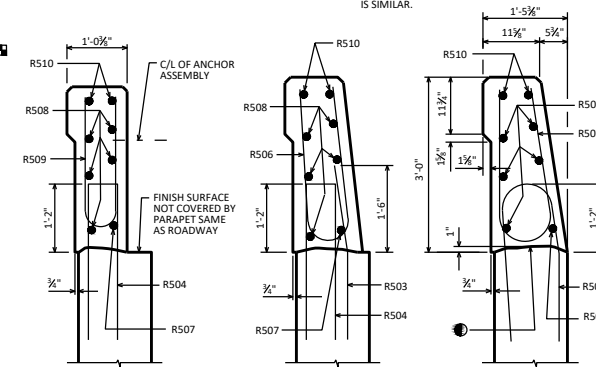
PLAN



OUTSIDE ELEVATION

◆ BENCHMARK (WHEN SUPPLIED). AVOID PLACING BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

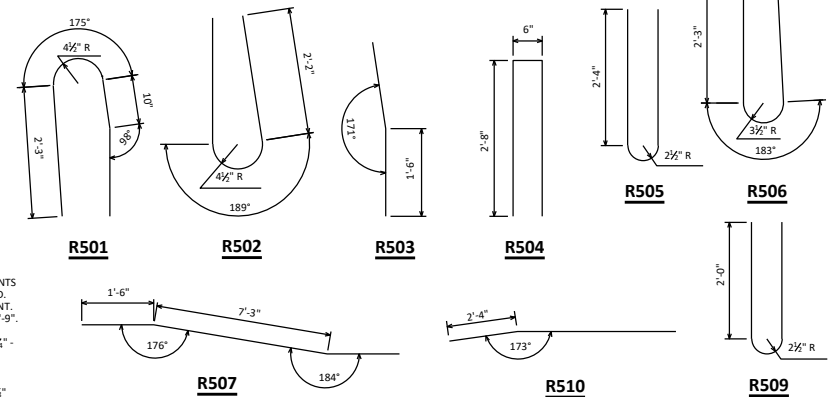
NOTE: FOR SECTIONS A, B & C ONLY THE PARAPET TERMINATING ON A WING IS SHOWN. TERMINATION ON A DECK IS SIMILAR.



SECTION A

SECTION B

SECTION C



R501

R502

R503

R504

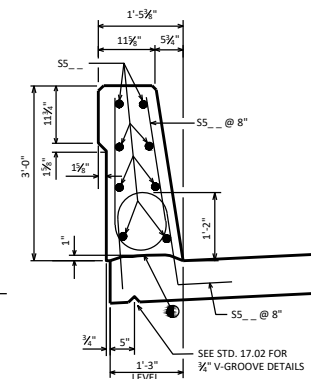
R505

R506

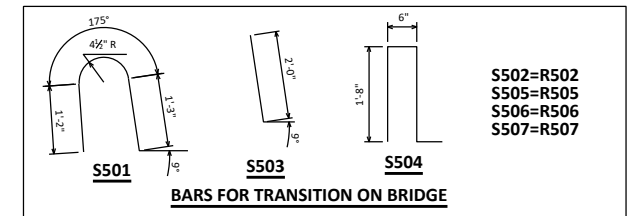
R507

R510

R509



SECTION THRU PARAPET ON BRIDGE



AREA = 3.36 SF
WEIGHT = 504 LB/FT

◆ CONST. JOINT - STRIKE OFF AS SHOWN.

◆ R502 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R503 OR S503 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

▽ R501 AND R504 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED. DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

BILL OF BARS

FOR ABUTMENT PARAPETS

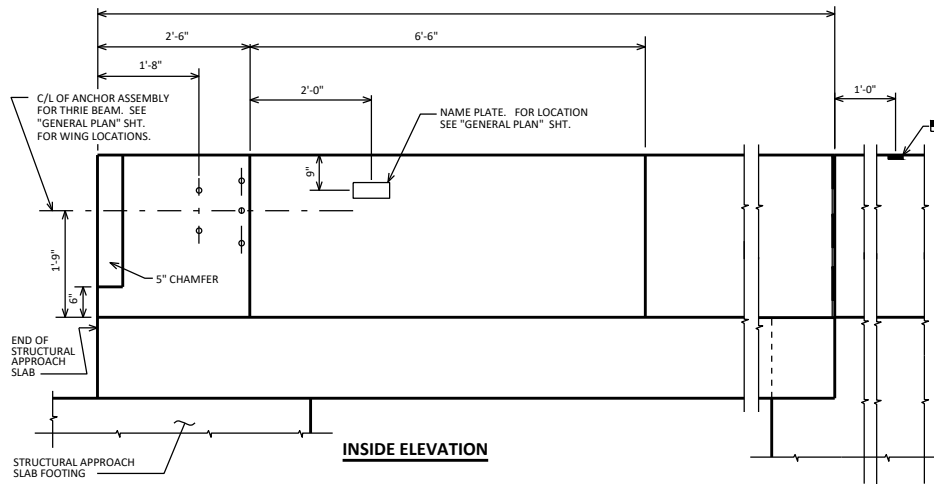
BAR MARK	CO ₂	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			5-10	X	PARAPET-VERT.
R502	X			5-8	X	PARAPET-VERT.
R503	X			3-0	X	PARAPET-VERT.
R504	X			5-7	X	PARAPET-VERT.
R505	X			5-5	X	PARAPET-VERT.
R506	X			5-6	X	PARAPET-VERT.
R507	X				X	PARAPET-HORIZ.
R508	X					PARAPET-HORIZ.
R509	X			4-9	X	PARAPET-VERT.
R510	X				X	PARAPET-HORIZ.
S501	X			4-5	X	PARAPET-VERT.
S503	X			2-9	X	PARAPET-VERT.
S504	X			4-4	X	PARAPET-VERT.

SINGLE SLOPE PARAPET 36SS

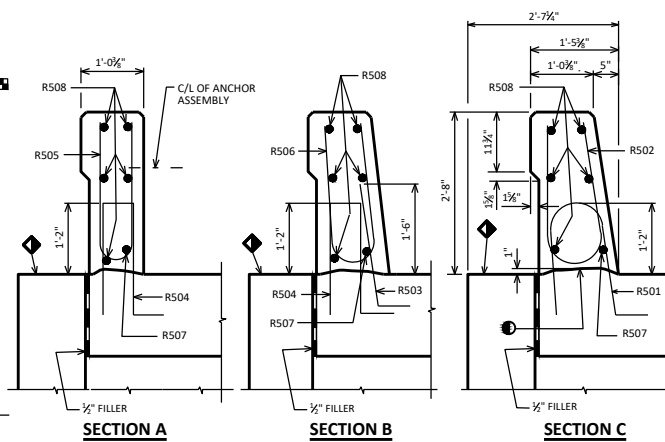


APPROVED: *Laura Shadewald*

DATE: 7-19



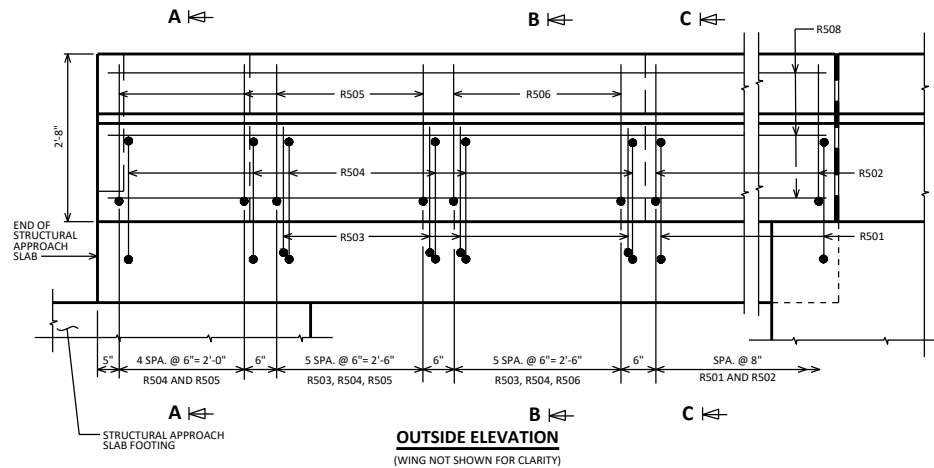
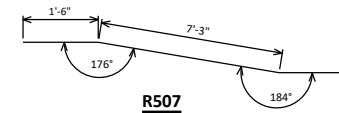
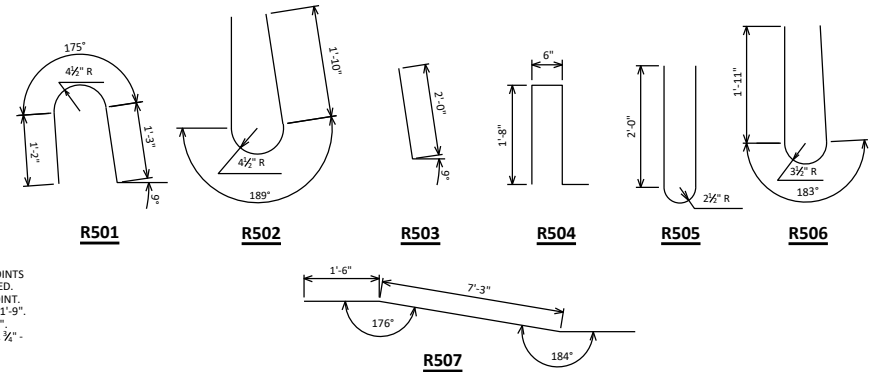
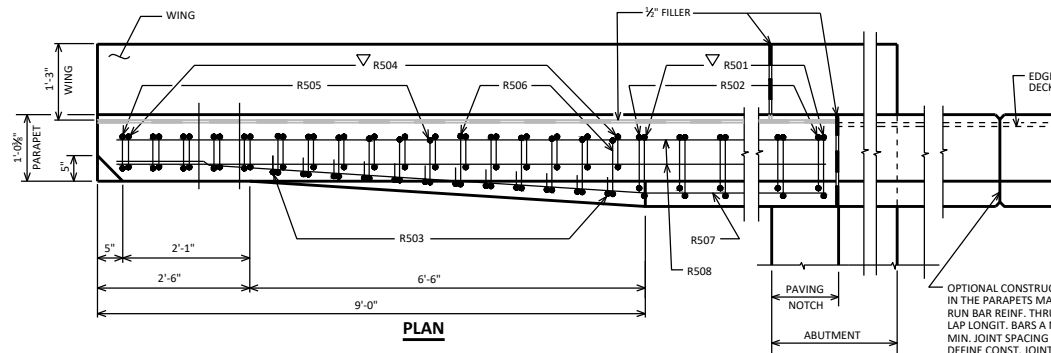
BENCHMARK (WHEN SUPPLIED), AVOID PLACING BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.



BILL OF BARS

FOR STRUCTURAL APPROACH SLAB PARAPETS

BAR MARK	COYT	ABUT.	ABUT.	LENGTH	BEHUT	LOCATION
R501	X			4-5	X	PARAPET-VERT.
R502	X			5-0	X	PARAPET-VERT.
R503	X			2-9	X	PARAPET-VERT.
R504	X			4-4	X	PARAPET-VERT.
R505	X			4-9	X	PARAPET-VERT.
R506	X			4-10	X	PARAPET-VERT.
R507	X				X	PARAPET-HORIZ.
R508	X					PARAPET-HORIZ.



DESIGNER NOTES

- SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR APPROACH SLAB INFORMATION.
- A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS.
- SEE STANDARD 30.30 FOR DETAILS OF 32SS PARAPET ON BRIDGE.

AREA = 3.09 SF
WEIGHT = 464 LB/FT

CONST. JOINT - STRIKE OFF AS SHOWN.

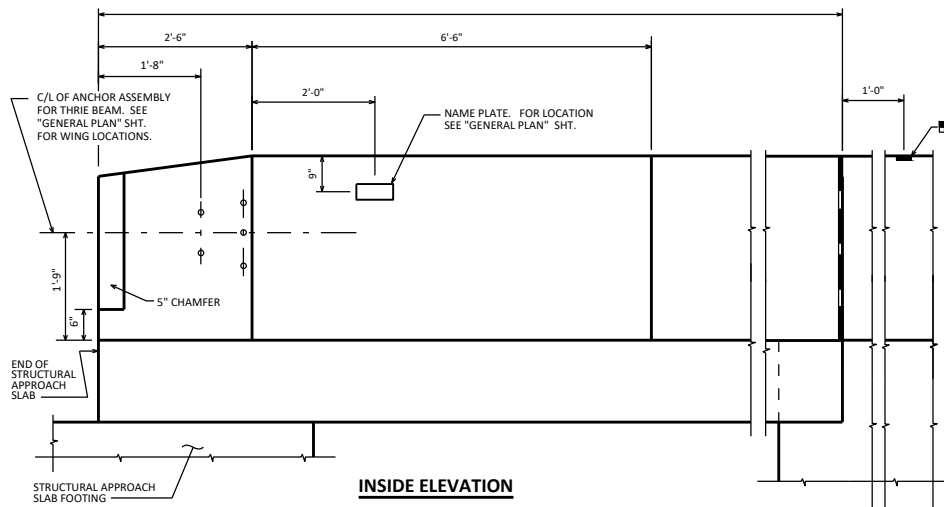
SLOPE FOR DRAINAGE

R501 AND R504 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.

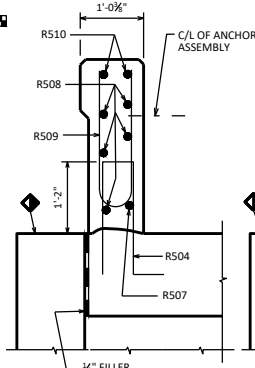
SINGLE SLOPE PARAPET 32SS WITH STRUCTURAL APPROACH SLAB



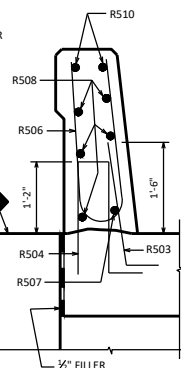
APPROVED: *Laura Shadewald* DATE: 7-19



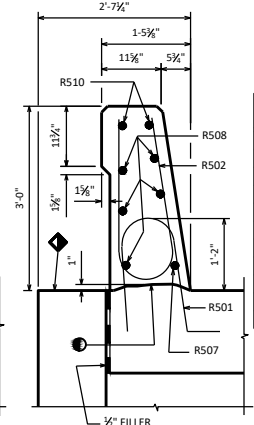
■ BENCHMARK (WHEN SUPPLIED). AVOID PLACING BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.



SECTION A



SECTION B

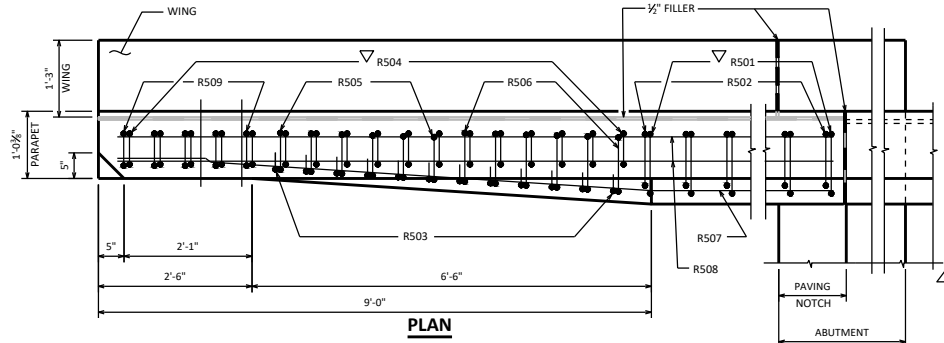


SECTION C

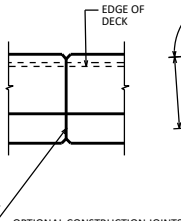
BILL OF BARS

FOR STRUCTURAL APPROACH SLAB PARAPETS

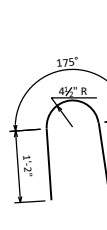
BAR MARK	CO.	ABUT.	ABUT.	LENGTH	REIN.	LOCATION
R501	X			4-5	X	PARAPET-VERT.
R502	X			5-8	X	PARAPET-VERT.
R503	X			2-9	X	PARAPET-VERT.
R504	X			4-4	X	PARAPET-VERT.
R505	X			5-5	X	PARAPET-VERT.
R506	X			5-6	X	PARAPET-VERT.
R507	X				X	PARAPET-HORIZ.
R508	X				X	PARAPET-HORIZ.
R509	X			4-9	X	PARAPET-VERT.
R510	X				X	PARAPET-HORIZ.



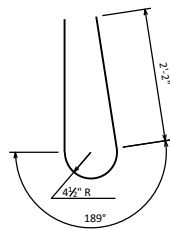
PLAN



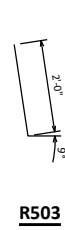
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A 1/4" - 'V' GROOVE.



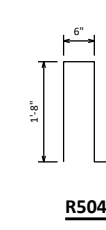
R501



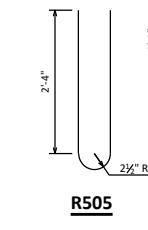
R502



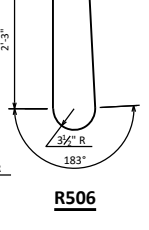
R503



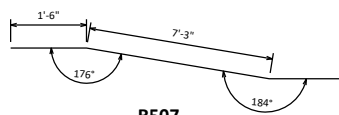
R504



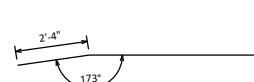
R505



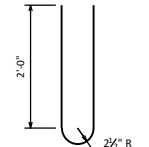
R506



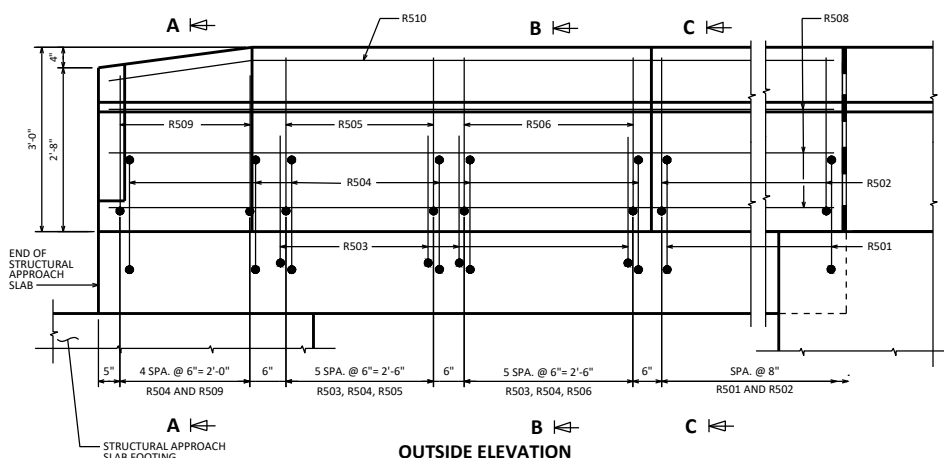
R507



R510



R509



OUTSIDE ELEVATION

(WING NOT SHOWN FOR CLARITY)

DESIGNER NOTES

SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR APPROACH SLAB INFORMATION.

A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS.

SEE STANDARD 30.31 FOR DETAILS OF 36SS PARAPET ON BRIDGE.

AREA = 3.36 SF
WEIGHT = 504 LB/FT

● CONST. JOINT - STRIKE OFF AS SHOWN.

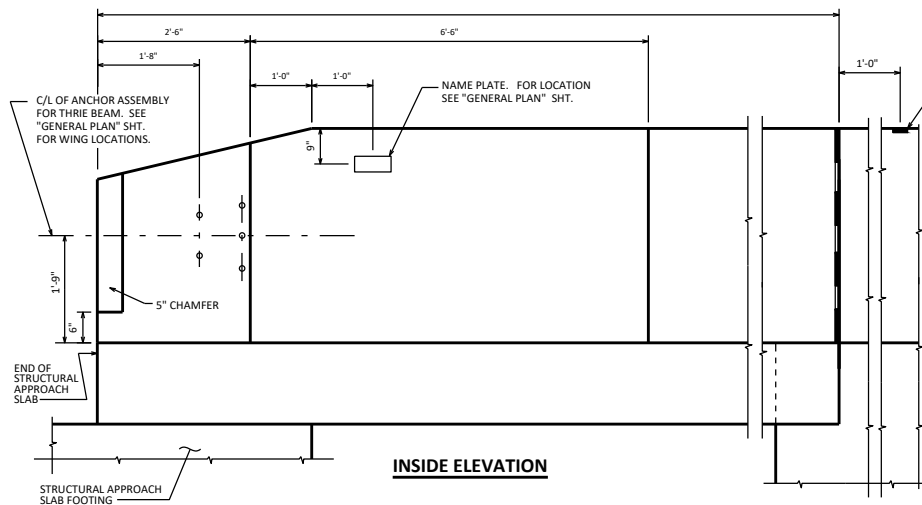
◆ SLOPE FOR DRAINAGE

▽ R501 AND R504 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.

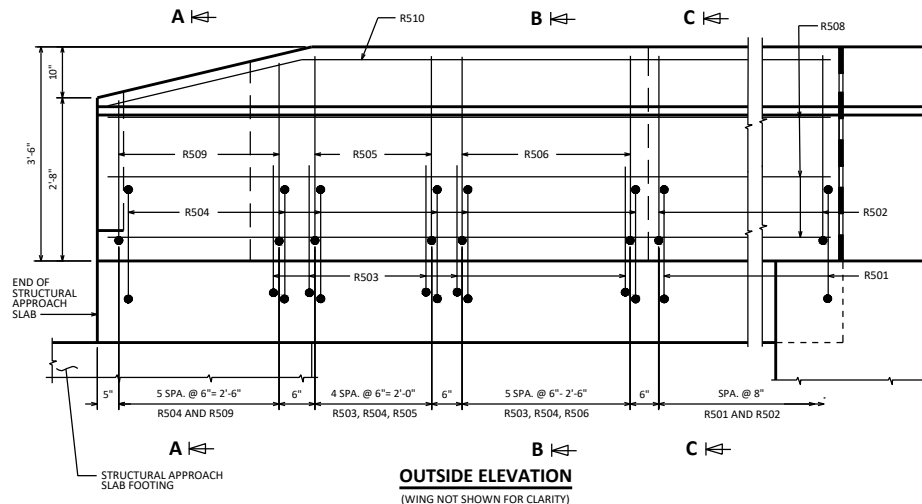
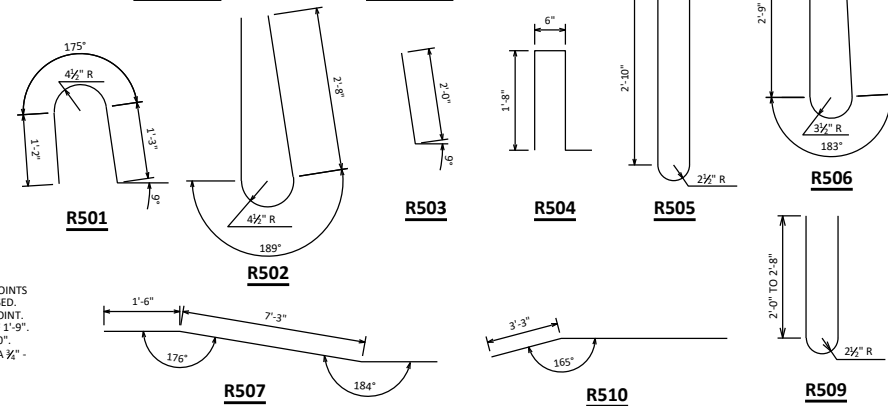
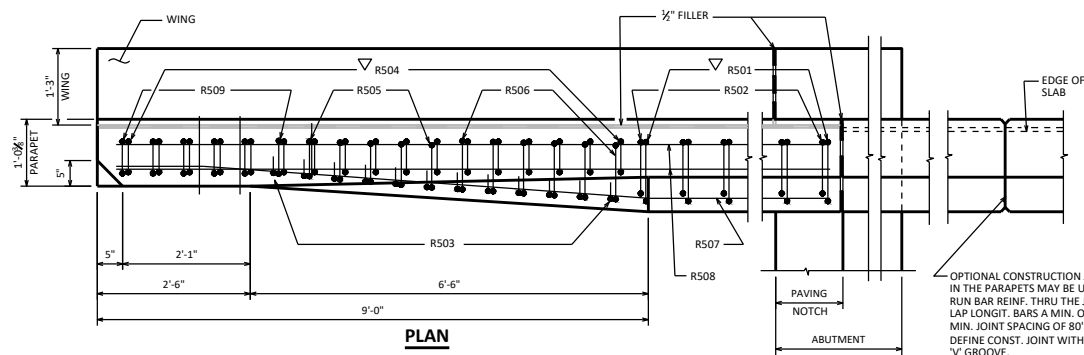
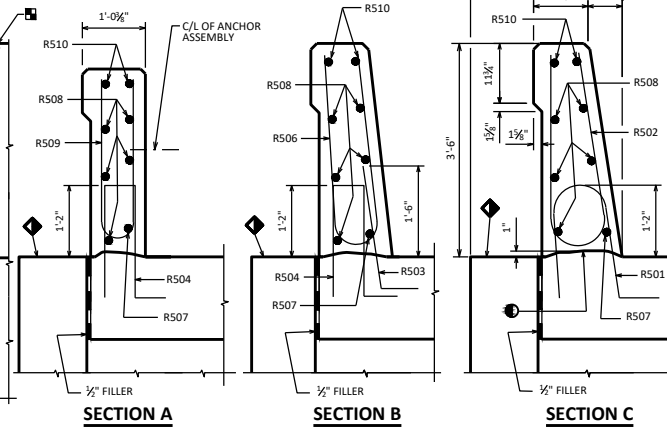
SINGLE SLOPE PARAPET 36SS WITH STRUCTURAL APPROACH SLAB



APPROVED: *Laura Shadewald* DATE: 7-19



■ BENCHMARK (WHEN SUPPLIED), AVOID PLACING BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.



BILL OF MATERIALS

FOR STRUCTURAL APPROACH SLAB PARAPETS

BAR MARK	QTY	ABUT.	ABUT.	LENGTH	REIN.	BAR SERIES	LOCATION
R501	X			4'-5"	X		PARAPET-VERT.
R502	X			6'-8"	X		PARAPET-VERT.
R503	X			2'-9"	X		PARAPET-VERT.
R504	X			4'-4"	X		PARAPET-VERT.
R505	X			6'-5"	X		PARAPET-VERT.
R506	X			6'-6"	X		PARAPET-VERT.
R507	X				X		PARAPET-HORIZ.
R508	X				X		PARAPET-HORIZ.
R509	X			5'-5"	X	▲	PARAPET-VERT.
R510	X				X		PARAPET-HORIZ.

▲ LENGTH SHOWN FOR BAR IS AN AVERAGE LENGTH AND SHOULD ONLY BE USED FOR BAR WEIGHT CALCULATIONS. SEE BAR SERIES TABLE FOR ACTUAL LENGTHS.

BAR SERIES TABLE

MARK	NO. REQD.	LENGTH
R509	4 SERIES OF 6	4'-9" TO 6'-1"

BUNDLE AND TAG EACH SERIES SEPARATELY.

DESIGNER NOTES

SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR APPROACH SLAB INFORMATION.

A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS.

SEE STANDARD 30.32 FOR DETAILS OF 42SS PARAPET ON BRIDGE.

AREA = 3.75 SF
WEIGHT = 563 LB/FT

● CONST. JOINT - STRIKE OFF AS SHOWN.

◆ SLOPE FOR DRAINAGE

▽ R501 AND R504 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.

SINGLE SLOPE PARAPET 42SS WITH STRUCTURAL APPROACH SLAB

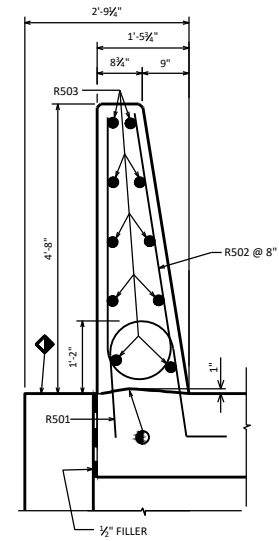
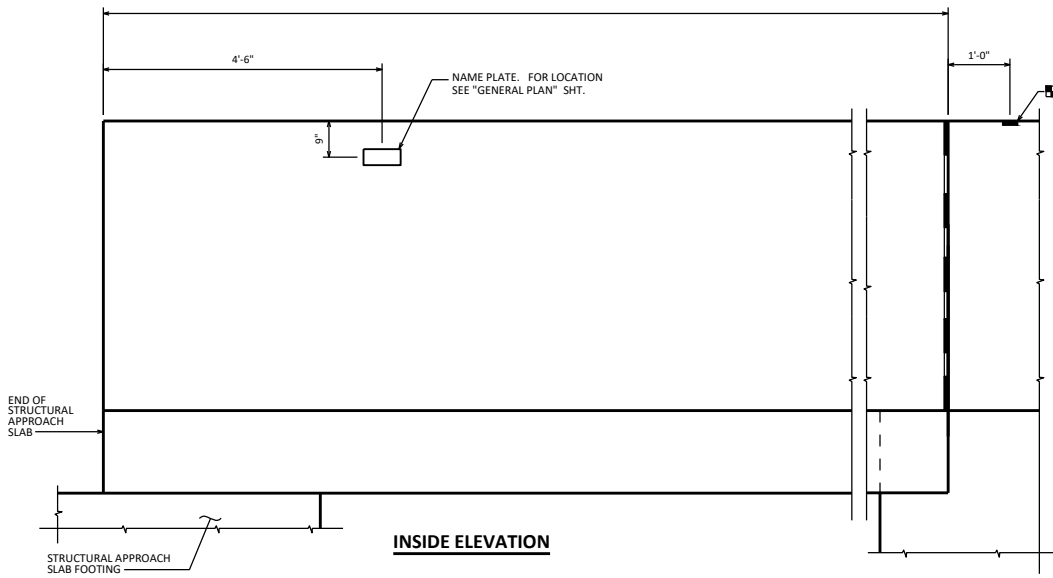


BUREAU OF STRUCTURES

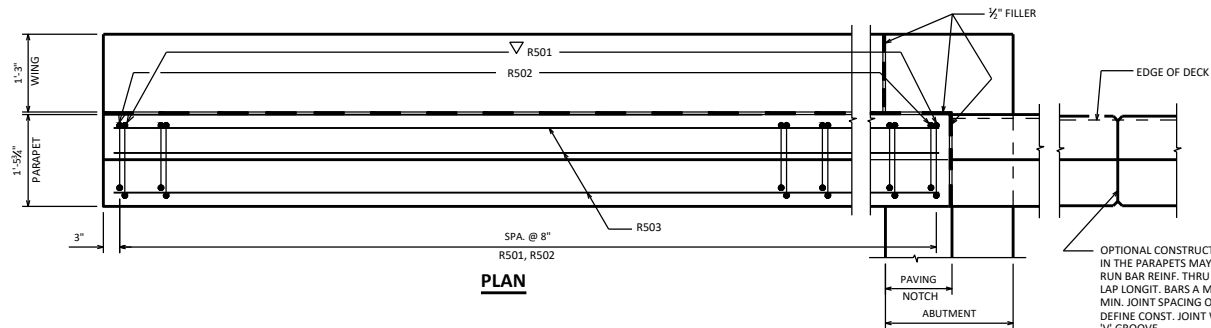
APPROVED: *Laura Shadewald*

DATE:
7-19

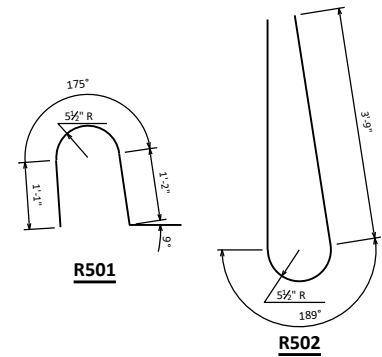
BENCHMARK (WHEN SUPPLIED). AVOID PLACING BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.



SECTION A



OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¼" - "V" GROOVE.



R501

R502

DESIGNER NOTES

THE '56SS' PARAPET IS ONLY TO BE USED IF A 'TYPE S56'
SINGLE SLOPE CONCRETE ROADWAY BARRIER ADJOINS THE END OF
THE '56SS' PARAPET.

SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11
FOR APPROACH SLAB INFORMATION.


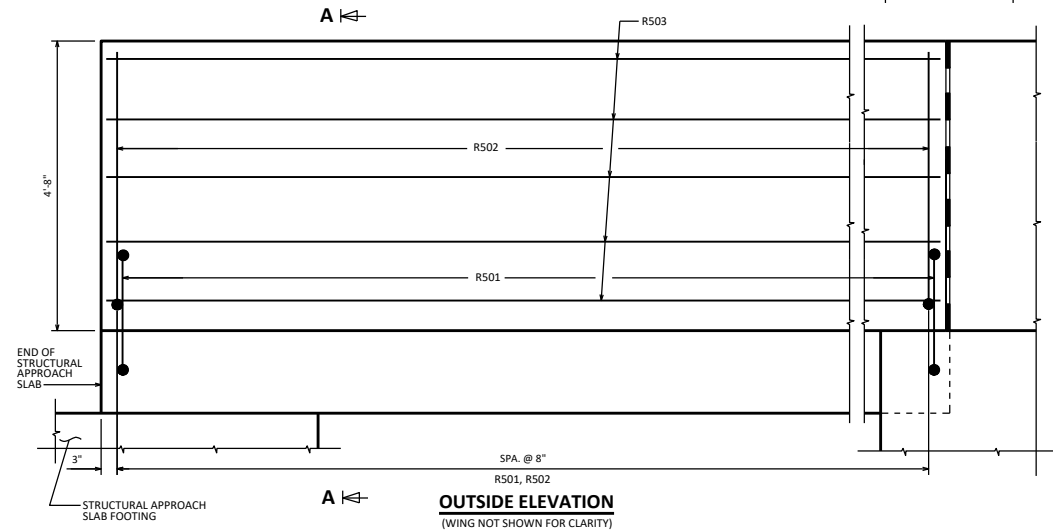
A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS.

SEE STANDARD 30.33 FOR DETAILS OF 56SS PARAPET ON BRIDGE.

AREA = 5.16 SF
WEIGHT = 774 LB/FT

● CONST. JOINT - STRIKE OFF AS SHOWN.

▽ R501 BARS TO BE TIED TO
STRUCTURAL APPROACH SLAB STEEL
BEFORE STRUCTURAL APPROACH SLAB
IS POURED.

 SLOPE FOR DRAINAGE

OUTSIDE ELEVATION
(WING NOT SHOWN FOR CLARITY)

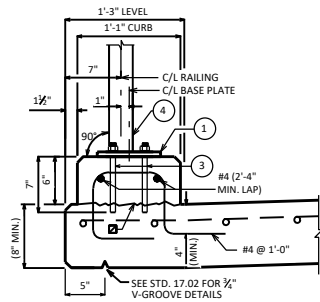
**SINGLE SLOPE PARAPET
56SS WITH STRUCTURAL
APPROACH SLAB**



BUREAU OF STRUCTURES

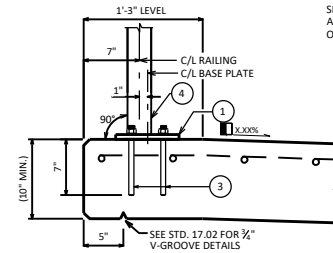
APPROVED: *Laura Shadewald*

DATE:
7-25

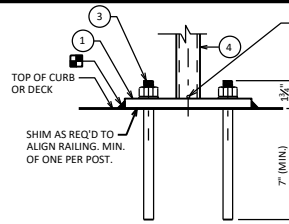


CURB MOUNTED PEDESTRIAN RAILING

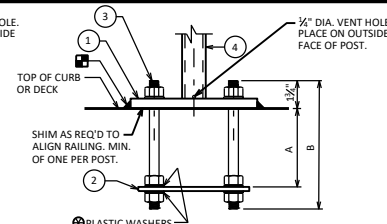
☑ CONST. JOINT-STRIKE OFF AS SHOWN AND LEAVE ROUGH.



DECK MOUNTED PEDESTRIAN RAILING



ADHESIVE ANCHORS



CAST-IN-PLACE ANCHORS

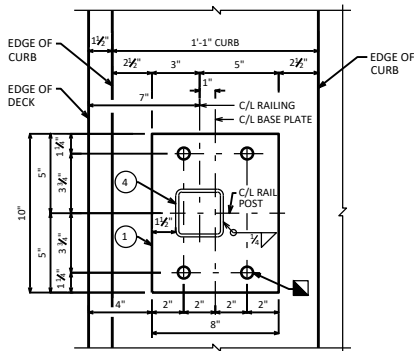
ANCHORAGE FOR RAIL POSTS

NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.

APPLICATION	A	B
CURB MOUNTED	7"	10 1/2"
DECK MOUNTED	5 1/2"	9"

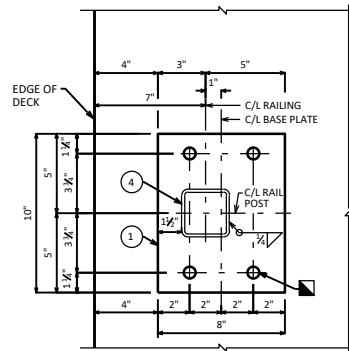
LEGEND

- 1 PLATE 3/8" X 8" X 10" WITH 3/4" HOLES.
- 2 3/4" X 6" X 9 3/4" ANCHOR PLATE WITH 1/2" DIA. HOLES FOR THRD. RODS NO.3.
- 3 3/4" DIA. X 10 3/4" LONG, TYPE 316 STAINLESS STEEL THREADED RODS (MIN. TENSILE STRENGTH = 70 KSI) WITH NUT AND WASHERS OF SAME ALLOY GROUP. ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS 3/4"-INCH. EMBED 7" IN CONCRETE FOR RAIL POSTS. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 502.2.12 AND 502.3.14 OF THE STANDARD SPECIFICATIONS.
- 4 3/4" DIA. X 9" LONG, TYPE 316 STAINLESS STEEL THREADED RODS (MIN. TENSILE STRENGTH = 70 KSI) WITH NUT AND WASHERS OF SAME ALLOY GROUP. ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS 3/4"-INCH. EMBED 7" IN CONCRETE FOR RAIL POSTS. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 502.2.12 AND 502.3.14 OF THE STANDARD SPECIFICATIONS.
- STD. 30.11 4 4" O.D. POST SLEEVE. PLACE VERTICAL WELD TO NO.1. (2.875" O.D. POSTS)
- STD. 30.15 4 STRUCTURAL TUBING 4" X 4" X 3/16". PLACE VERTICAL WELD TO NO.1.
- STD. 30.17 4 STRUCTURAL TUBING 3" X 3" X 3/16". PLACE VERTICAL WELD TO NO.1.



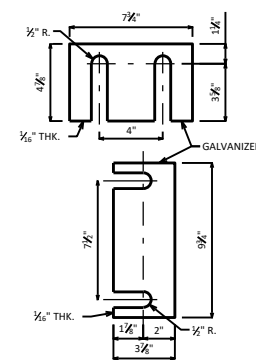
RAIL POST BASE PLATE - CURB MOUNTED

- 1 1/2" DIA. HOLES FOR ADHESIVE ANCHORS
- 2 3/4" DIA. X 1 1/2" SLOTTED HOLES FOR CAST-IN-PLACE ANCHORS. PLACE SLOTTED HOLES PARALLEL TO C/L RAILING.



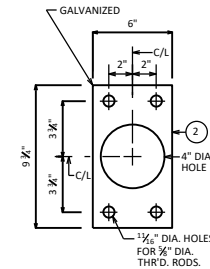
RAIL POST BASE PLATE - DECK MOUNTED

- 1 1/2" DIA. HOLES FOR ADHESIVE ANCHORS
- 2 3/4" DIA. X 1 1/2" SLOTTED HOLES FOR CAST-IN-PLACE ANCHORS. PLACE SLOTTED HOLES PARALLEL TO C/L RAILING.



SHIM PLATE DETAILS

TWO SHIMS OF EACH SIZE REQUIRED PER POSTS



ANCHOR PLATE

NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.

NOTES

BID ITEM SHALL BE "RAILING STEEL PEDESTRIAN TYPE C(1-6)", WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWN.

- ☑ CAULK AROUND PERIMETER OF BASE PLATES, NO. 1, AND FILL BOLT SLOT OPENINGS IN SHIMS AND BASE PLATES WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

DESIGNER NOTES

STANDARD 30.17 RAILING DETAILS SHOWN. STANDARDS 30.11 AND 30.15 RAILING DETAILS SIMILAR. SEE TABLE FOR MAXIMUM POST SPACING (WHEN USING THIS STANDARD).

THIS STANDARD MAY BE USED WHEN THE SIDEWALK IS SEPARATED FROM THE ROADWAY BY A TRAFFIC BARRIER. DETAILS SHOWN ON THIS STANDARD PROVIDE PEDESTRIAN RAILING ANCHORAGE DETAILS FOR A REINFORCED CONCRETE CURB AND A REINFORCED CONCRETE DECK. THIS STANDARD MEETS THE REQUIREMENTS OF LRFD 13.8.2 FOR PEDESTRIAN RAILINGS.

REFER TO STANDARD REFERENCES FOR POST CONNECTIONS AND ADDITIONAL DETAILS.

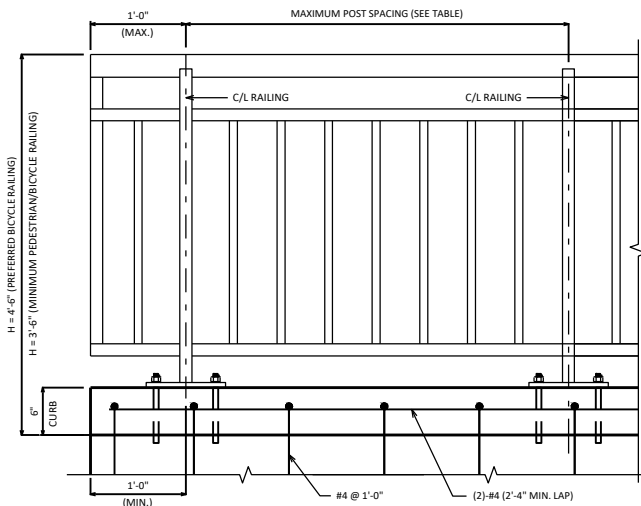
- ☑ FOR DECK MOUNTED APPLICATIONS, SLOPE AWAY FROM EDGE OF DECK. USE CURB MOUNTED DETAILS WHEN SLOPED TOWARDS EDGE OF DECK IS REQUIRED.

DESIGN DATA

CONCRETE STRENGTH, f'_c : 3,500 P.S.I.

REQUIRED CHARACTERISTIC BOND STRESS, $\lambda_{u\text{min}}$: 970 P.S.I. (MIN.)

RAILING HEIGHT "H"	MAXIMUM POST SPACING	STANDARD REFERENCES
≤ 4'-6"	9'-0"	30.17
> 4'-6"	8'-0"	30.11 & 30.15



PARTIAL ELEVATION FOR PEDESTRIAN RAIL ON CURB

(SEE STD. 30.17 FOR RAILING DETAILS. DECK REINFORCEMENT NOT SHOWN FOR CLARITY)

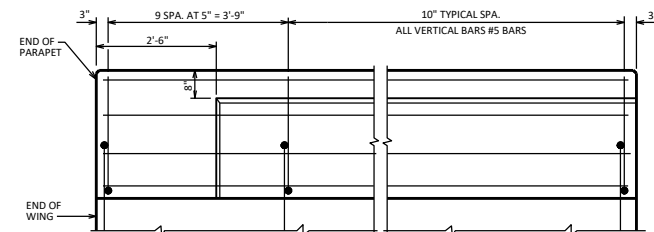
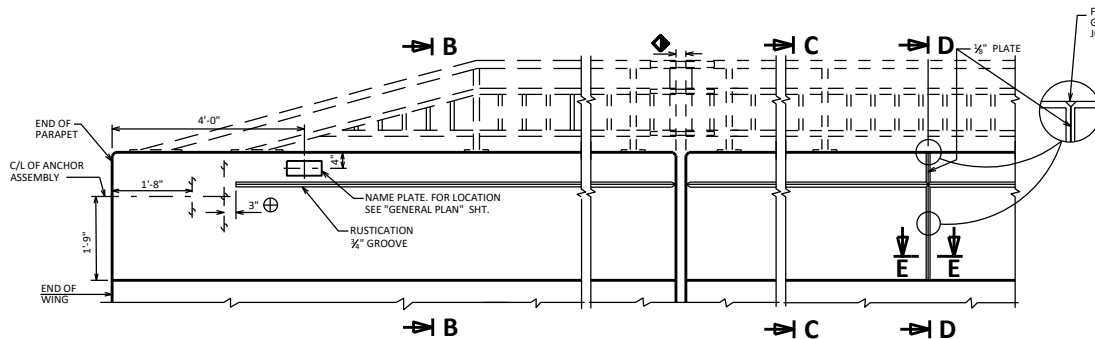
PEDESTRIAN RAILING



**BUREAU OF
STRUCTURES**

APPROVED: *Laura Shadewald*

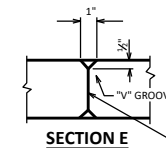
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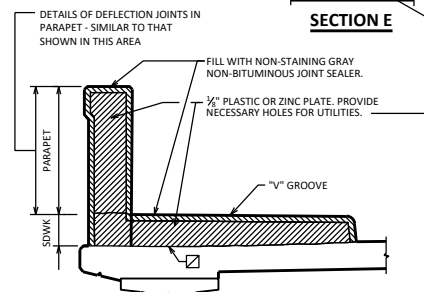
VIEW SHOWING OUTSIDE FACE OF PARAPET & REINF.
(RAILING NOT SHOWN FOR CLARITY)

BILL OF BARS

BAR MARK	QTY	NO. REQ'D.	LENGTH	BEND	BAR SERIES	LOCATION
R501	X			X		PARAPET VERT.
R502	X			X		PARAPET VERT.
S501	X		4'-4"	X		PARAPET VERT.
S502	X			X		PARAPET VERT.



SECTION E



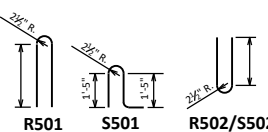
SECTION D

SHOWING DEFLECTION JOINT IN PARAPET OR SIDEWALK USING THE FOLLOWING CRITERIA:

1. GIRDER STRUCTURES AND SLAB STRUCTURES WITH A RAISED SIDEWALK SHOULD HAVE A DEFLECTION JOINT IN THE SIDEWALK AND PARAPET OVER THE PIER. FOR SKEWS GREATER THAN 20-DEG., DETAIL THE JOINT NORMAL TO THE SIDEWALK AND PARAPET WITH THE JOINT APPROX. CENTERED OVER C/L PIER.

IF THERE IS A LIGHT STANDARD AT THE PIER, PLACE A DEFLECTION JOINT APPROX. 4'-0" EACH SIDE OF PIER, WITH NONE DIRECTLY OVER THE PIER.

2. GIRDER STRUCTURES AND SLAB STRUCTURES WITHOUT SIDEWALKS SHOULD HAVE NO DEFLECTION JOINTS IN THE PARAPETS.



R501

S501

R502/S502

NOTE

WHEN PARAPETS ARE POURED CONTINUOUSLY FROM END TO END, THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF 1/2" ZINC OR PLASTIC PLATE CUT AS SHOWN IN SECTION "D" BY SHADED AREA. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED AT THE DEFLECTION JOINTS, ONE SIDE OF JOINT SHALL BE COATED WITH AN APPROVED LIQUID BOND BREAKER AND PLATE SEPARATORS MAY BE OMITTED.

CLEAN ALL LOOSE MATERIAL ON THE DECK AT THE SIDEWALK LOCATION PRIOR TO SIDEWALK PLACEMENT USING HIGH PRESSURE WATER OR AIR, ENSURING ALL FREE-STANDING WATER IS REMOVED PRIOR TO SIDEWALK PLACEMENT. NEAT CEMENT IS REQUIRED AS PER 509.3.9.2 OF THE STANDARD SPECIFICATIONS UNLESS THE SIDEWALK IS POURED WITHIN 45 DAYS OF COMPLETING THE DECK POUR.

DESIGNER NOTES

THIS STANDARD MEETS MASH TL-2 REQUIREMENTS.

THIS STANDARD MAY BE USED ON STRUCTURES WITH A 45 M.P.H. DESIGN SPEED OR LESS, OR WHEN THE SIDEWALK IS SEPARATED FROM THE ROADWAY BY A PARAPET. THIS STANDARD IS AN ALTERNATIVE TO STANDARD 17.01 WITH NO OVERHANG OR MAY BE USED FOR STRUCTURAL APPROACH SLABS.

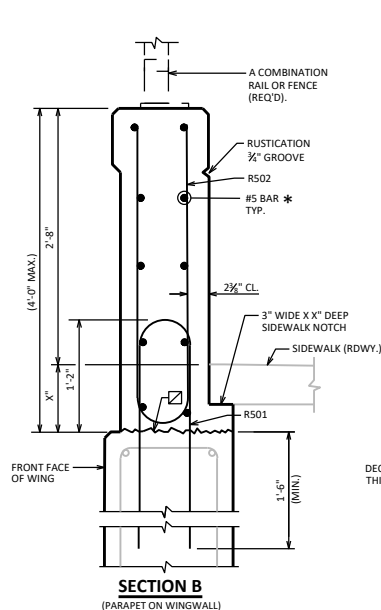
PROVIDE COMBINATION RAIL OR FENCE FOR PEDESTRIAN PROTECTION (3'-6" MINIMUM TOTAL HEIGHT MEASURED FROM TOP OF SIDEWALK).

FOR DEAD LOAD PURPOSES, THE SUPERSTRUCTURE DESIGN SHALL ACCOUNT FOR A MAXIMUM 2% SIDEWALK CROSS SLOPE.

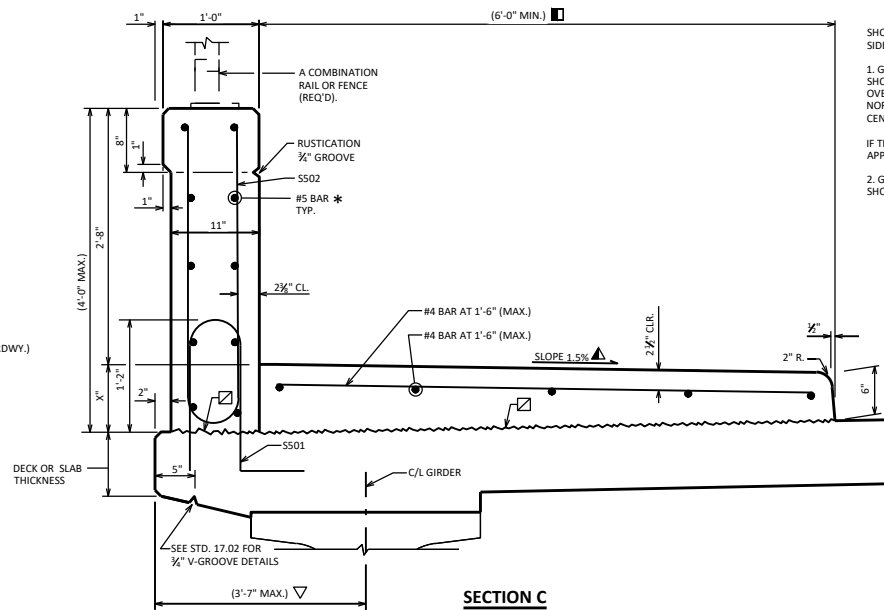
ANCHORAGE TO DECK NOT REQUIRED FOR WIDTHS > 3'-0", EXCEPT ALL SIDEWALK SECTIONS ON TOP OF PAVING BLOCK MUST BE ANCHORED.

FOR EXTREME SIDEWALK WIDTHS AND/OR SUPERELEVATIONS THE DECK MAY BE LEVEL BENEATH THE SIDEWALK (MAINTAIN CONSTANT DECK THICKNESS) TO REDUCE EXCESSIVE SIDEWALK THICKNESS.

PROVIDE ADDITIONAL DECK REINFORCEMENT ACCORDING TO CHAPTER 17 FOR DECK OVERHANGS.



SECTION B
(PARAPET ON WINGWALL)



SECTION C
(PARAPET ON DECK)

LEGEND

☑ HORIZ. CONST. JOINT-STRIKE OFF AS SHOWN AND LEAVE ROUGH.

* OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT, LAP LONGIT. BARS A MIN. OF 1'-0". MIN. JOINT SPACING OF 8'-0". DEFINE CONST. JOINT WITH A 3/4" - V" GROOVE.

▲ ±0.5% CONSTRUCTION TOLERANCE IN SIDEWALK CROSS SLOPE. THE SIDEWALK CROSS SLOPE SHALL NOT EXCEED 2% WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

**VERTICAL FACE
PARAPET 'A' WITH
RAISED SIDEWALK**

BUREAU OF
STRUCTURES

APPROVED: *Laura Shadewald*

DATE:
7-25