Road & Bridge Design Publications

Monthly Update – April 2024

Revisions for the month of **April** are listed and displayed below and will be included in projects submitted for the **August** letting.

E-mail road related questions to MDOT-Road-Design-Standards@michigan.gov.
E-mail bridge related questions to MDOT-Bridge-Design-Standards@michigan.gov.

Special Details

R-67-G: Guardrail Anchorage, Bridge, Details: Added Pier Base Walls and Pier Struts as connection options. Also allowed the alternate construction method (adhesive anchored) for pier base walls and pier struts.

B-21-K: Bridge Railing, 2 Tube, B-25-L: Bridge Railing, Aesthetic Parapet Tube, B-26-G: Bridge Railing, 4 Tube & B-27-B: Bridge Railing, 3 Tube with Pickets: Clarified the use of "1/8" Elastomeric Leveling Pad". Use this update with the Special Provision for bridge railings (update/issuance coming soon), which modifies(clarifies) MDOT's Standard Specifications for Construction. Elastomeric leveling pads meet the requirements of subsection 914.12.B.

Bridge Design Manual

7.01.03 & 8.02 J.: Updated use statement/criteria for concrete grades. High performance grades of structural concrete should be specified on all MDOT projects. The ability to obtain the required materials for the high performance concrete mixes is becoming more prevalent across the state, and specifying high performance concrete helps to improve the performance and durability of the concrete used to construct bridges.

Bridge Design Guides

4.23.01, 4.23.02, 5.17.01, 5.17.05, 5.17.06 & 5.17.07: Updated the offset from the hinge point to the front face of concrete (or back of guardrail). MGS-8 guardrail/anchorages (used for new construction) at the end of the bridge railings will use a 3'-6" offset. The offset at the anchorage retains the minimum required offset, but the offset at the guardrail itself will be greater than what is required so a straight line of barrier/guardrail is maintained (assuming a constant hinge line).

Updates to the MDOT Cell Library, Sample Plans, and other automated tools may be required in tandem with some of this month's updates. Until such updates can be made, it is the designer's/detailer's responsibility to manually incorporate any necessary revisions to notes and plan details to reflect these revisions.

Index to Special Details

4-22-2024

⑥

SPECIAL DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE
21	2	GUARDRAIL AT INTERSECTIONS	6-6-22
24	8	GUARDRAIL ANCHORED IN BACKSLOPE TYPES 4B, 4T, & 4MGS-8	12-6-22
99	2	CHAIN LINK FENCE WITH WIRE ROPE	12-6-22
R-28-K	7	CURB RAMP AND DETECTABLE WARNING DETAILS	11-8-23
R-29-J	4	DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK	11-8-23
R-32-F	8	APPROACH CURB & GUTTER DOWNSPOUTS	9-20-22
R-32-SD	6	APPROACH CURB & GUTTER DOWNSPOUTS (FOR SAFETY SHAPES)	4-24-23
R-43-J	2	LOCATION OF TRANSVERSE JOINTS IN PLAIN CONCRETE PAVEMENT	1-4-22
R-44-G	7	CONCRETE PAVEMENT REPAIR	9-18-23
R-45-K	2	PAVEMENT REINFORCEMENT FOR BRIDGE APPROACH	1-4-22
R-50-H	6	LIGHT STANDARD FOUNDATION (CONCRETE BARRIER, DOUBLE FACE)	12-12-23
R-53-A	22	TEMPORARY CONCRETE BARRIER LIMITED DEFLECTION	8-14-15
R-55-H	5	FILLER WALLS AT BRIDGE PIER COLUMNS	3-13-24
R-56-F	6	GUARDRAIL MEDIAN OBJECT PROTECTION	10-10-23
R-60-J	16	GUARDRAIL TYPES A, B, BD, T, TD, MGS-8, & MGS-8D	1-29-24
R-62-H	4	GUARDRAIL APPROACH TERMINAL TYPE 2M	6-16-22
R-63-C	3	GUARDRAIL APPROACH TERMINAL TYPE 3M	10-2-23
R-66-E	4	GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS	9-14-23
*R-67-G	16	GUARDRAIL ANCHORAGE, BRIDGE, DETAILS	4-3-24
R-67-SD	6	GUARDRAIL ANCHORAGE, BRIDGE, DETAILS (FOR SAFETY SHAPES)	4-4-23
R-72-D	6	GUARDRAIL LONG SPAN INSTALLATIONS	8-23-22
R-73-F	3	GUARDRAIL OVER BOX OR SLAB CULVERTS	8-1-19
R-80-F	8	GRANULAR BLANKETS, UNDERDRAINS, OUTLET ENDINGS, & BULKHEADS	6-28-21
R-88-E	4	STEEL END SECTION	3-7-23
R-100-I	4	SEEDING AND TREE PLANTING	12-8-23
R-110-B	3	PAVEMENT SAFETY EDGE	6-14-21
R-112-J	10	SHOULDER AND CENTER LINE CORRUGATIONS	8-2-23
R-126-I	5	PLACEMENT OF TEMPORARY CONCRETE & STEEL BARRIER	8-25-15
R-127-H	8	DELINEATOR INSTALLATIONS	8-11-23
R-130-A	6	LIGHT STANDARD DETAILS	1-4-24

*** Denotes New or Revised Special Detail to be included in projects for (beginning with) the August letting.**

Notes:

Former Standard Plans IV-87, IV-89, IV-90, and IV-91 Series, used for building cast-in-place concrete head walls for elliptical and circular pipe culverts, are now being replaced with plans that detail each specific size. The Bureau of Bridges & Structures, Structure Design Section, Special Structures Unit will provide special details for inclusion in construction plans for MDOT jobs. To assure prompt delivery, requests ***must*** **be made in advance.** Contact: MDOT-TriezenbergSquad@Michigan.gov

Former Standard Plans IV-93 and IV-94 series have been replaced with precast concrete box & three-sided culverts as per the 2020 Standard Specifications for Construction.

Index to Bridge Detail Sheets

4-22-2024

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DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE
*B-21-K	4	BRIDGE RAILING, 2 TUBE	4-16-24
*B-25-L	8	BRIDGE RAILING, AESTHETIC PARAPET TUBE	4-16-24
*B-26-G	8	BRIDGE RAILING, 4 TUBE	4-16-24
*B-27-B	7	BRIDGE RAILING, 3 TUBE WITH PICKETS	4-16-24
B-28-A	7	BRIDGE BARRIER RAILING, TYPE 7	1-22-24
B-29-A	8	BRIDGE BARRIER RAILING, TYPE 6	1-22-24
B-102-D	4	STANDARD SLOPE PAVING DETAILS	9-18-23
B-103-F	2	MOLDING, BEVEL, LIGHT STD. ANCHOR BOLT ASSEMBLY AND NAME PLATE DETAILS	12-8-23
EJ3AF	1 to 4	EXPANSION JOINT DETAILS (See Notes)	1-23-23
EJ4S	1 to 4	EXPANSION JOINT DETAILS (See Notes)	1-23-23
PC-1N	2	PRESTRESSED CONCRETE I-BEAM DETAILS (See Notes)	11-28-22
PC-2I	2	70" PRESTRESSED CONCRETE I-BEAM DETAILS (See Notes)	11-28-22
PC-4G	2	PRESTRESSED CONCRETE 1800 BEAM DETAILS (See Notes)	11-28-22
PC-5A	2	PRESTRESSED CONCRETE BULB-TEE BEAM DETAILS (See Notes)	11-28-22

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Notes:

Details EJ3AF & EJ4S are interactive, i.e., designers and detailers choose details based upon railing type and angle of crossing and fill in the project specific dimensions for the end plate. Place all details appropriate for the project (including the end plate), structure specific information, and the Expansion Joint Device quantity on the sheet. Add the sheet to the plans as a normal plan sheet. Call out and designate the location of the expansion joint device and the end plate on the Superstructure Sheet in the plan set.

Details PC-1N, PC-2I, PC-4G, and PC-5A shall have structure specific information and quantities added to the sheet. The sheet shall then be added to the plans as a normal plan sheet.

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MDOT
Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

(SPECIAL DETAIL)
FHWA APPROVAL

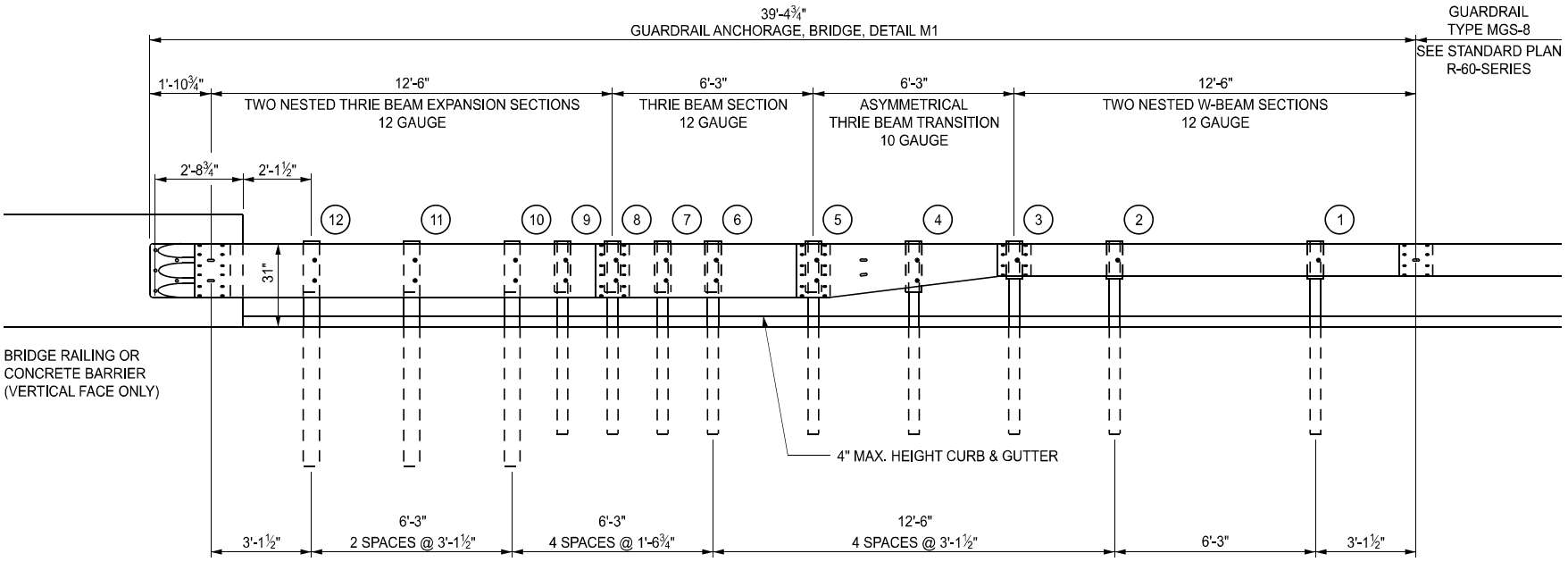
04/03/2024
PLAN DATE

R-67-G

SHEET
1 OF 16

STANDARD PLAN FOR

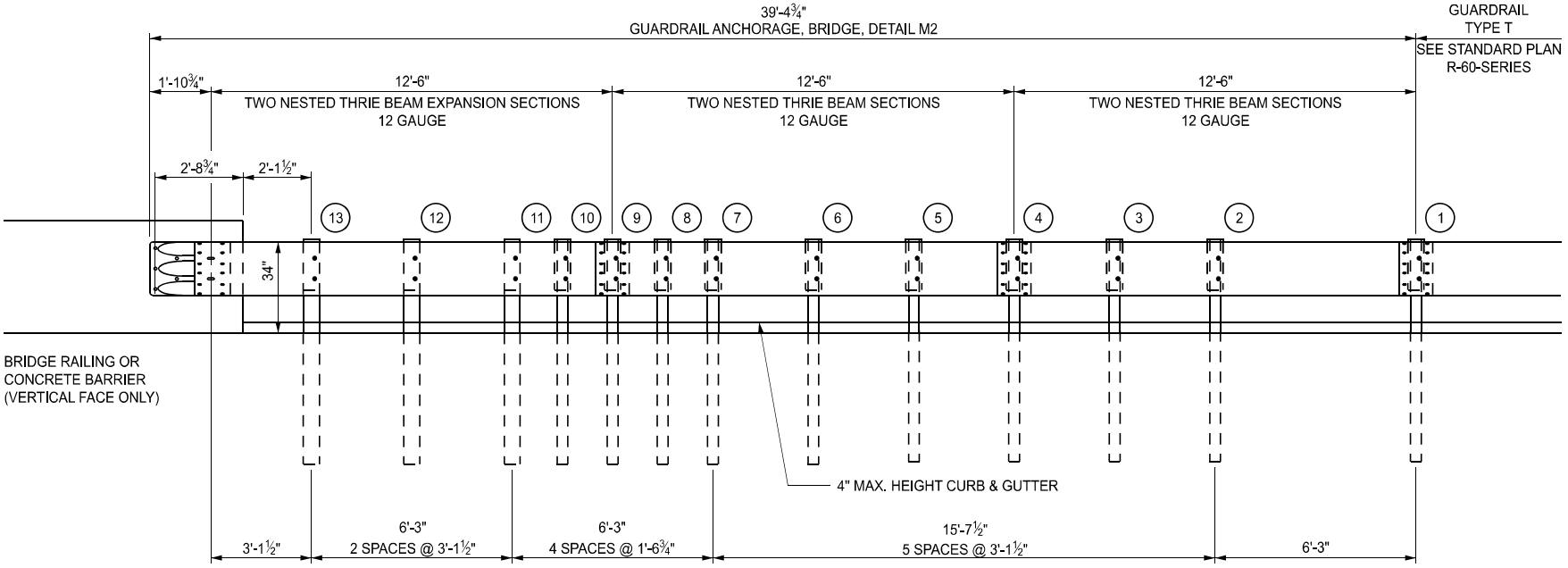
GUARDRAIL ANCHORAGE, BRIDGE, DETAILS



POST 1 THROUGH 9 - W6 x 9 OR W6 x 8.5 POST (6'-0" LONG) WITH 12" OFFSET BLOCK
POST 10 THROUGH 12 - W6 x 15 POST (7'-0" LONG) WITH 12" OFFSET BLOCK

DETAILS FOR CONNECTING GUARDRAIL TYPE MGS-8 TO 2-TUBE, 4-TUBE, AESTHETIC PARAPET TUBE, 3 TUBE WITH PICKETS, CONCRETE BLOCK RETROFIT, PIER BASE WALL, TYPE 6*, TYPE 7*, OR SINGLE FACE CONCRETE BARRIER* (WITHOUT EXPANSION AT BACKWALL)

* BARRIER ENDING MUST TRANSITION FROM SINGLE-SLOPE TO VERTICAL FACE IN ADVANCE OF END SHOE. ATTACHMENT TO VERTICAL FACE IS REQUIRED.



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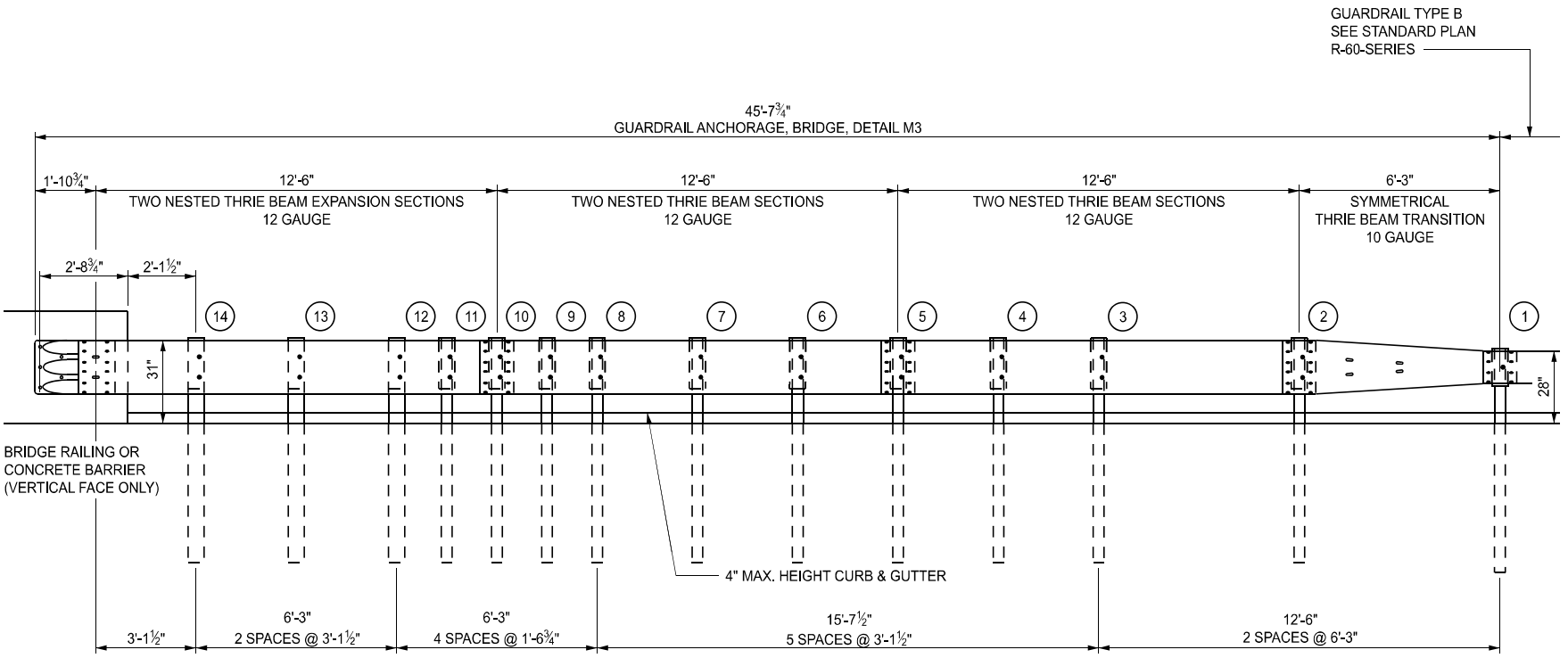
SHEET
3 OF 16

STANDARD PLAN FOR

GUARDRAIL ANCHORAGE, BRIDGE, DETAILS



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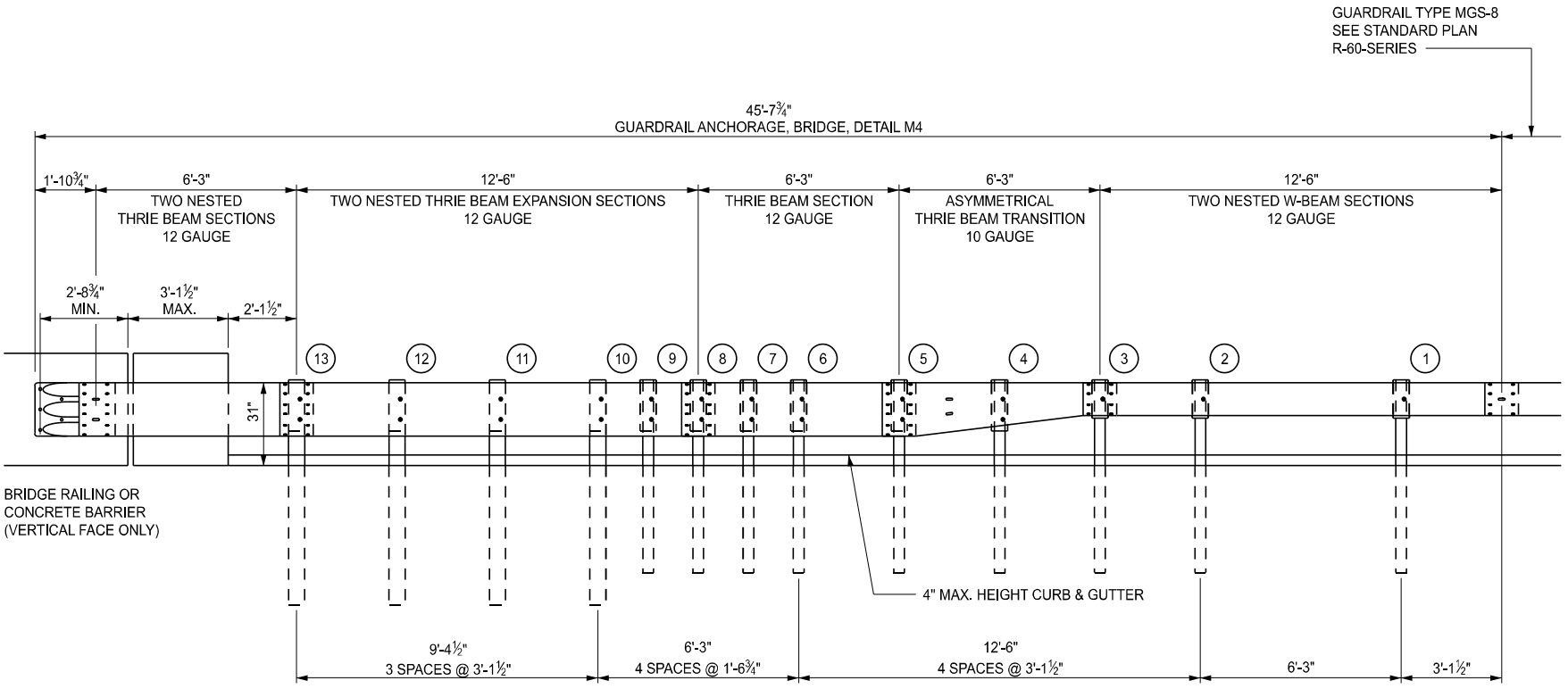

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04/03/2024
PLAN DATE

R-67-G

SHEET
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STANDARD PLAN FOR
GUARDRAIL ANCHORAGE, BRIDGE, DETAILS

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04/03/2024
PLAN DATE

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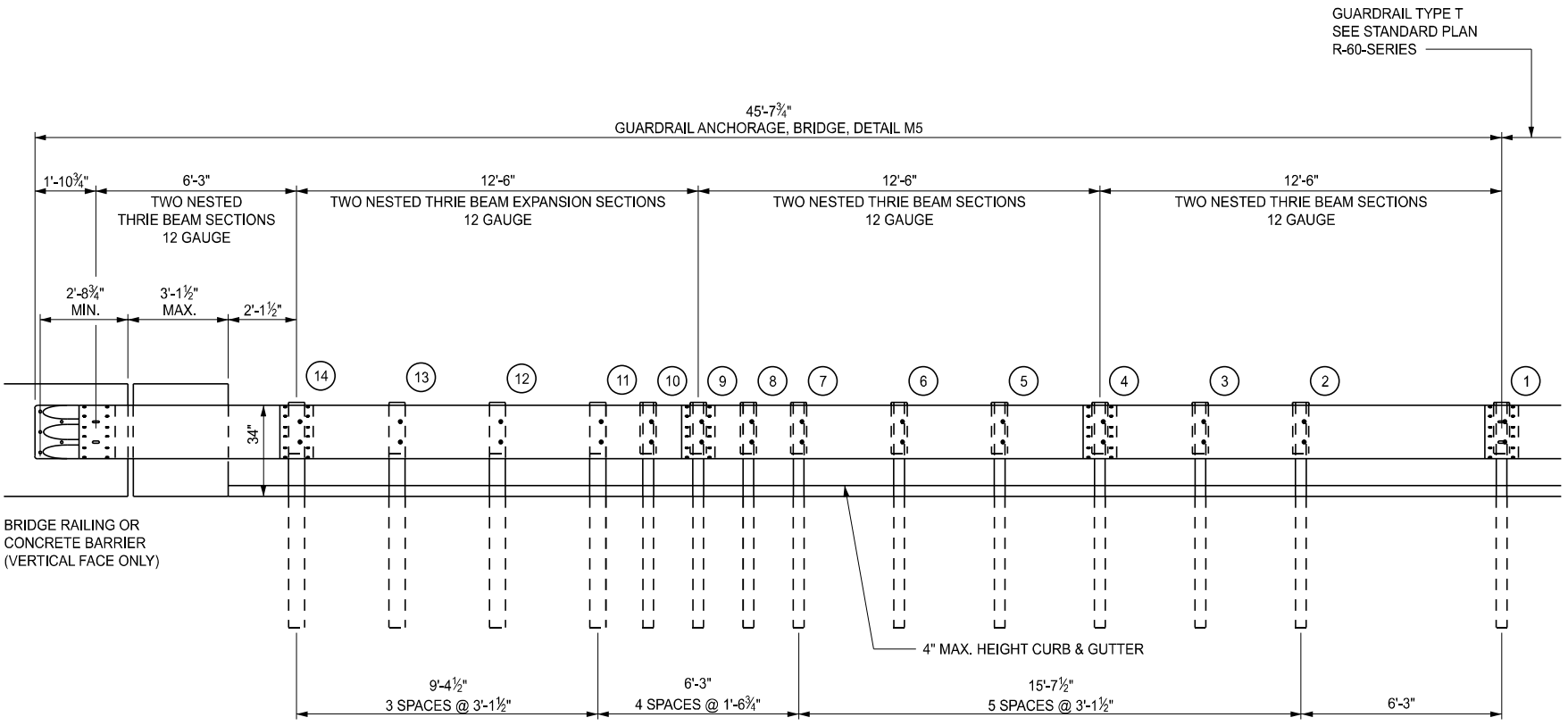
SHEET
5 OF 16

STANDARD PLAN FOR

GUARDRAIL ANCHORAGE, BRIDGE, DETAILS



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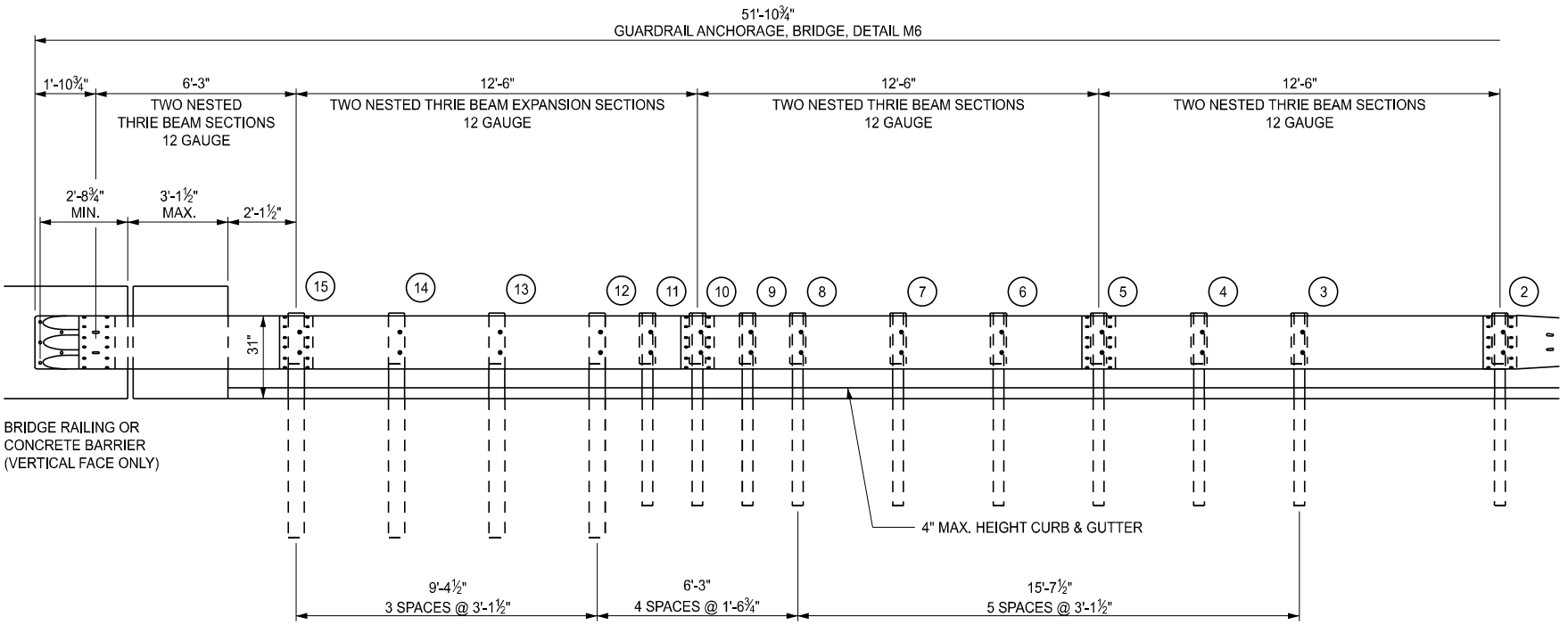

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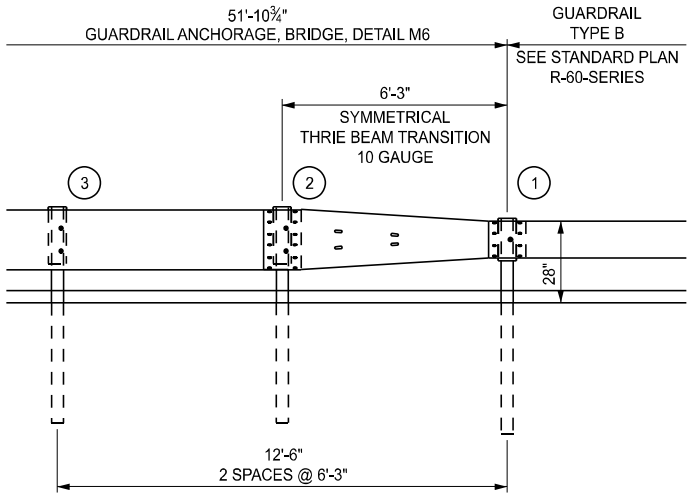

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04/03/2024
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STANDARD PLAN FOR
GUARDRAIL ANCHORAGE, BRIDGE, DETAILS

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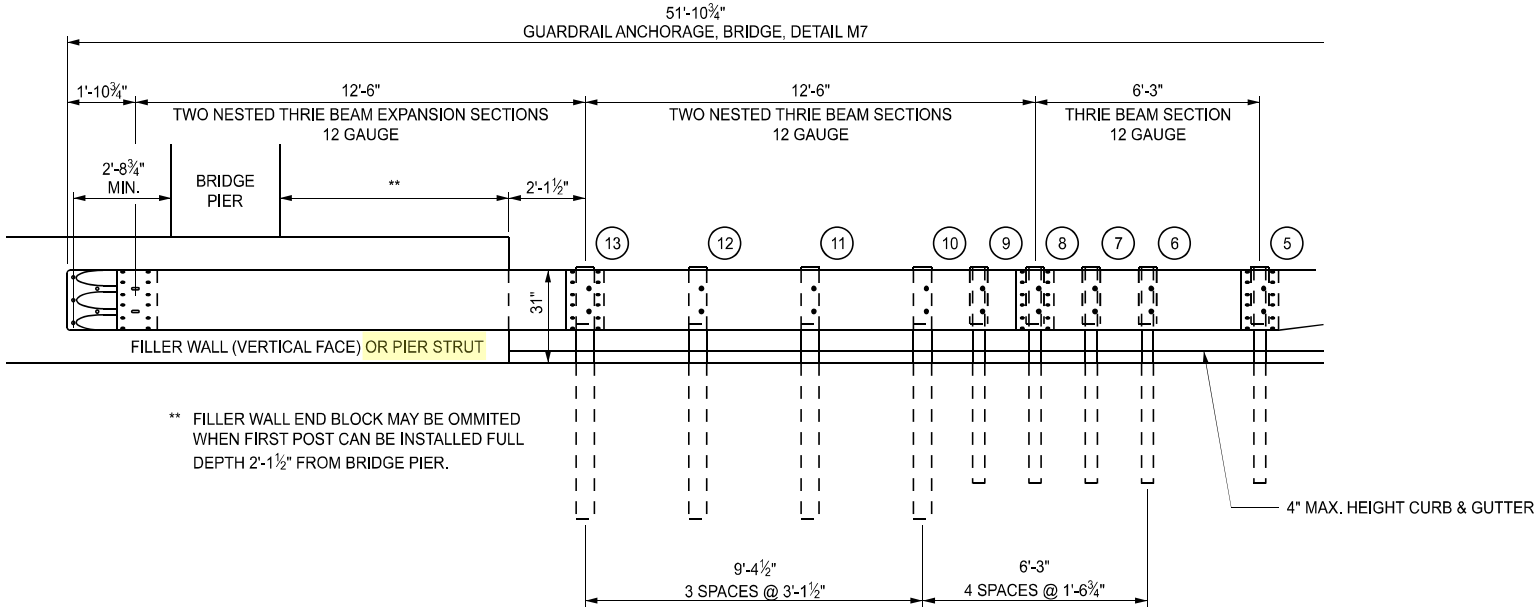

** FILLER WALL END BLOCK MAY BE OMMITED WHEN FIRST POST CAN BE INSTALLED FULL DEPTH 2'-1½" FROM BRIDGE PIER.

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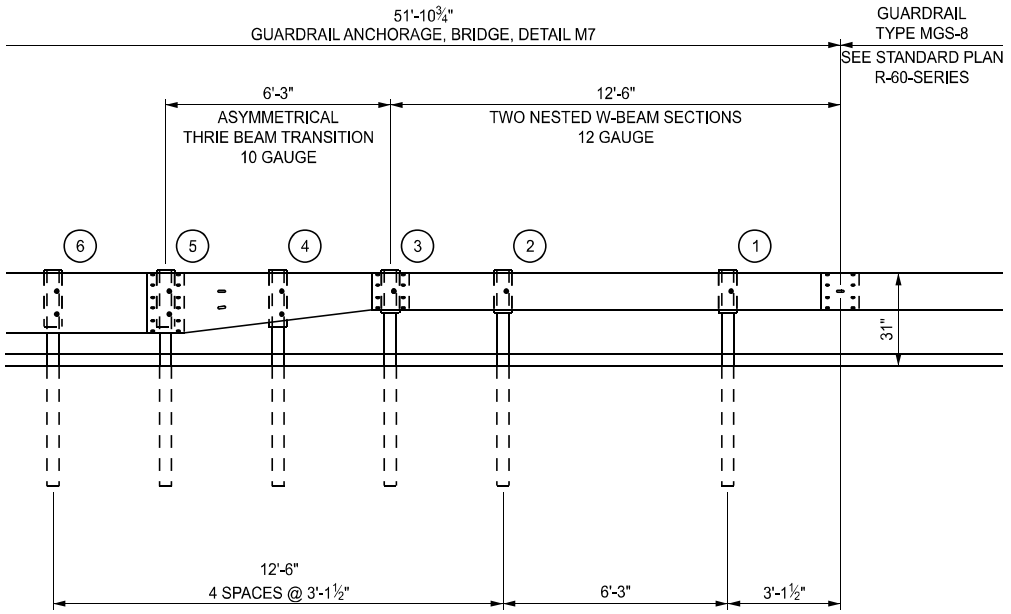

DETAILS FOR CONNECTING GUARDRAIL TYPE MGS-8 TO FILLER WALL OR PIER STRUT

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04/03/2024
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STANDARD PLAN FOR
GUARDRAIL ANCHORAGE, BRIDGE, DETAILS

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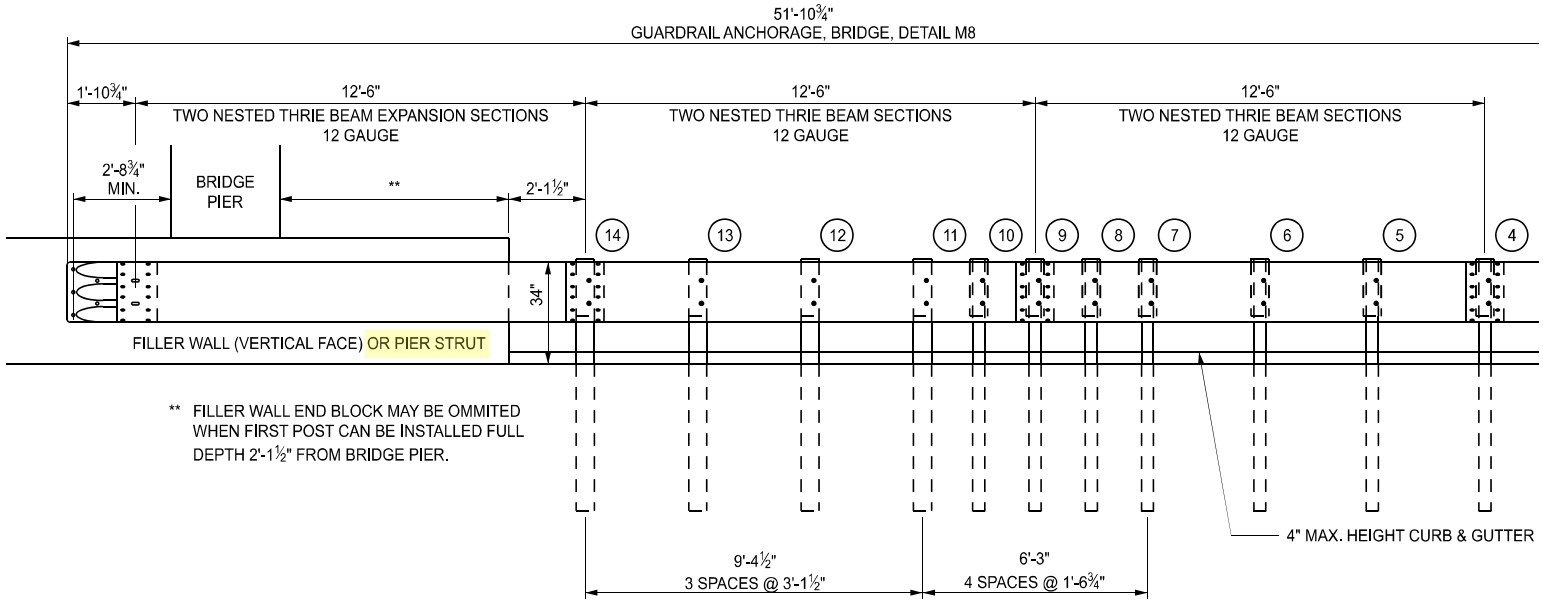

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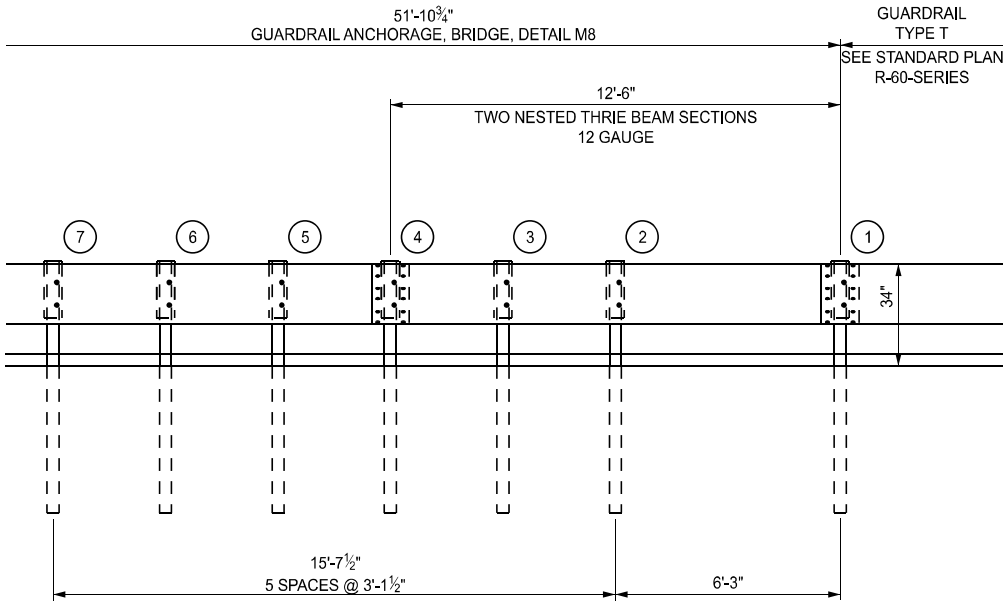

DETAILS FOR CONNECTING GUARDRAIL TYPE T TO FILLER WALL OR PIER STRUT

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04/03/2024
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R-67-G

STANDARD PLAN FOR
GUARDRAIL ANCHORAGE, BRIDGE, DETAILS

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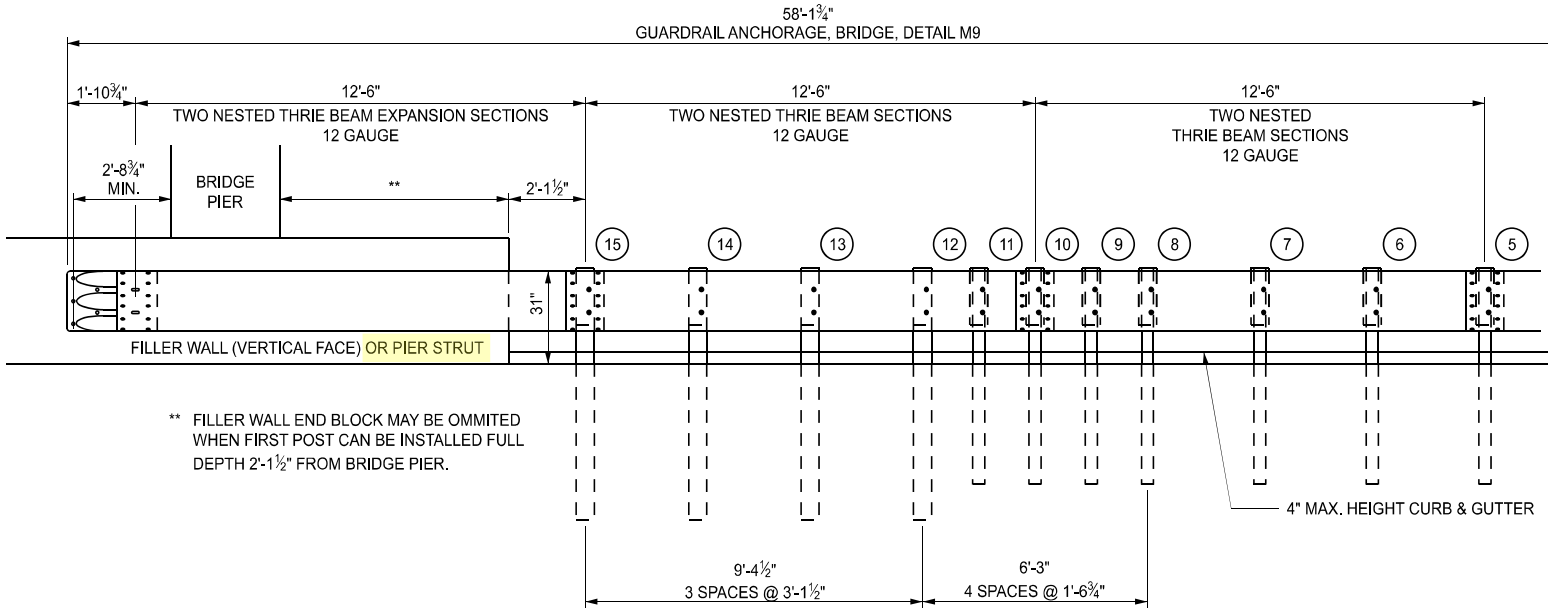

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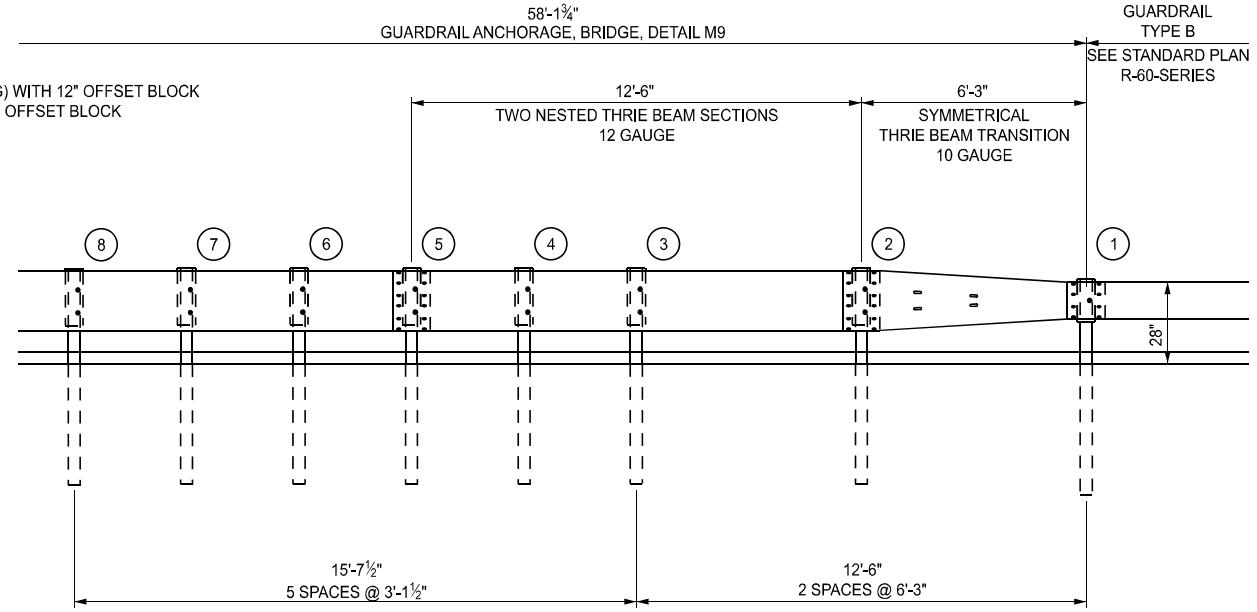

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DETAILS FOR CONNECTING GUARDRAIL TYPE B TO FILLER WALL OR PIER STRUT

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(SPECIAL DETAIL)
FHWA APPROVAL

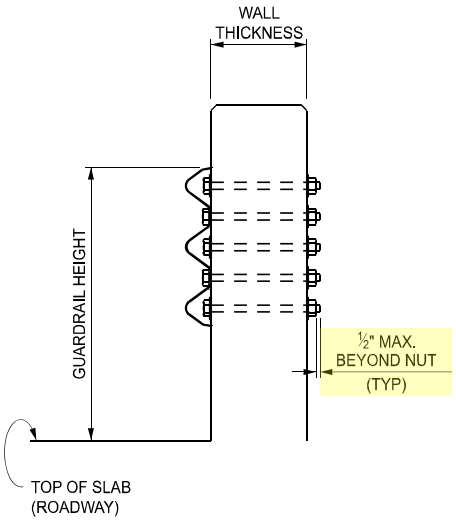
04/03/2024
PLAN DATE

R-67-G

STANDARD PLAN FOR
GUARDRAIL ANCHORAGE, BRIDGE, DETAILS

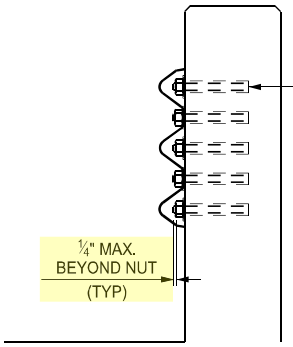
SHEET
9 OF 16

REFER TO GUARDRAIL ANCHORAGE BRIDGE, DETAIL M1 THROUGH M9 FOR GUARDRAIL HEIGHT.



BRIDGE RAILING & FILLER WALL

HIGH STRENGTH ⅞" DIA. HEX HEAD BOLT AND NUTS SHALL BE USED TO CONNECT GUARDRAIL TO BRIDGE RAILINGS WITH ROUND WASHERS ON FRONT AND SQUARE WASHERS ON BACK. (SEE CHART BELOW FOR BOLT LENGTH REQUIRED.) WASHER DETAILS ARE SHOWN ON SHEET 11.



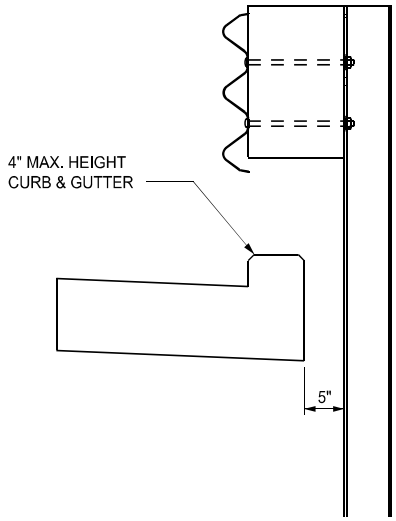
USE ⅞" DIA. ADHESIVE ANCHORED BOLTS EMBEDDED 8" TO ATTACH GUARDRAIL TO PIER BASE WALLS AND PIER STRUTS.

** USE ⅞" DIA. ADHESIVE ANCHORED BOLTS EMBEDDED 8" INSTEAD OF BOLTING THROUGH THE FILLER WALL UNDER THE FOLLOWING CONDITIONS:

1. AT OR NEAR THE JOINT LINE WHEN A FILLER WALL IS A DIFFERENT THICKNESS THAN THE FILLER WALL EXTENSION
2. IN EXISTING FILLER WALLS THICKER THAN 1'-6"
3. WHEN CONDITIONS PROHIBIT THE USE OF BOLTS

ALTERNATE CONSTRUCTION METHOD

APPLICABLE TO PIER BASE WALLS, PIER STRUTS AND FILLER WALLS MEETING CERTAIN CONDITIONS



POST DETAIL

BOLT REQUIREMENTS FOR CONNECTING GUARDRAIL TO BRIDGE RAILINGS			
BRIDGE RAILING	WALL THICKNESS	BOLT LENGTH	MINIMUM THREAD LENGTH
2 TUBE	1'-5½"	1'-7½"	4"
4 TUBE	1'-7"	1'-9"	4"
AESTHETIC PARAPET TUBE	1'-0"	1'-2"	4"
3 TUBE WITH PICKETS	1'-4½"	1'-6½"	4"
TYPE 6	1'-5¾" / 1'-6¾" ***	1'-7¾" / 1'-8¾" ***	4"
TYPE 7	1'-2½" / 1'-3½" ***	1'-4½" / 1'-5½" ***	4"
CONCRETE BLOCK RETROFIT	1'-3¾"	1'-5¾"	4"
FILLER WALL (WITH THROUGH BOLTS) **	VARIES	WALL THK + 2"	4"
PIER BASE WALL, PIER STRUT, FILLER WALL (WITH ADHESIVE ANCHORED BOLTS) **	VARIES	****	4"

SHORTER BOLT LENGTHS MAY BE USED PROVIDED THE BOLT EXTENDS ¼" BEYOND THE NUT WHEN TIGHTENED.

** REFER TO APPLICABLE NOTES UNDER ALTERNATE CONSTUCTION METHOD TO DETERMINE APPLICABLE BOLTING METHOD FOR FILLER WALL

*** THICKNESS/LENGTH DEPENDENT UPON AESTHETIC TREATMENT ON RAILING

**** LENGTH TO PROVIDE 8" EMBEDMENT AND BOLT EXTENDING ¼" MAXIMUM BEYOND NUT WHEN FULLY ENGAGED

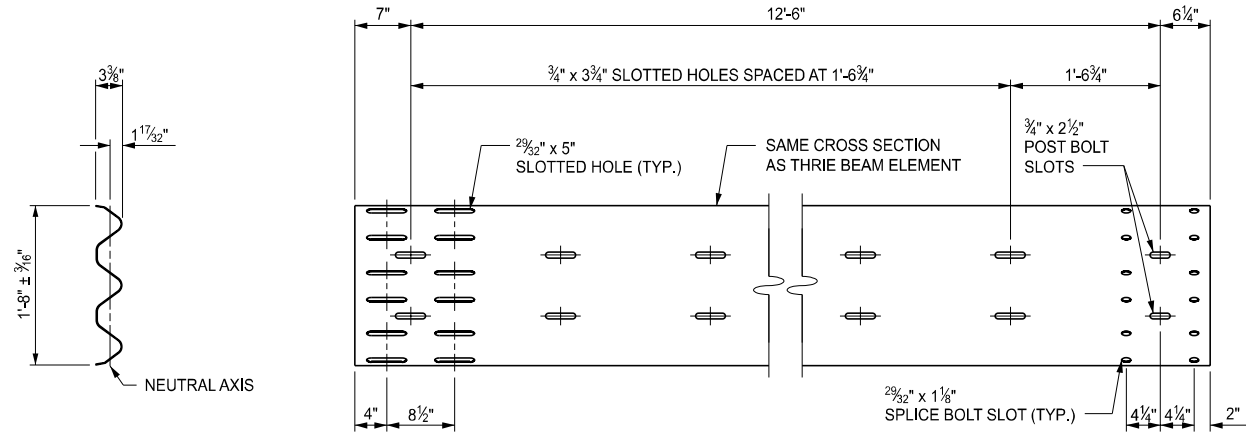
GUARDRAIL POST SECTIONS FOR GUARDRAIL ANCHORAGE, BRIDGE, DETAIL M1 THROUGH M9

MDOT Michigan Department of Transportation

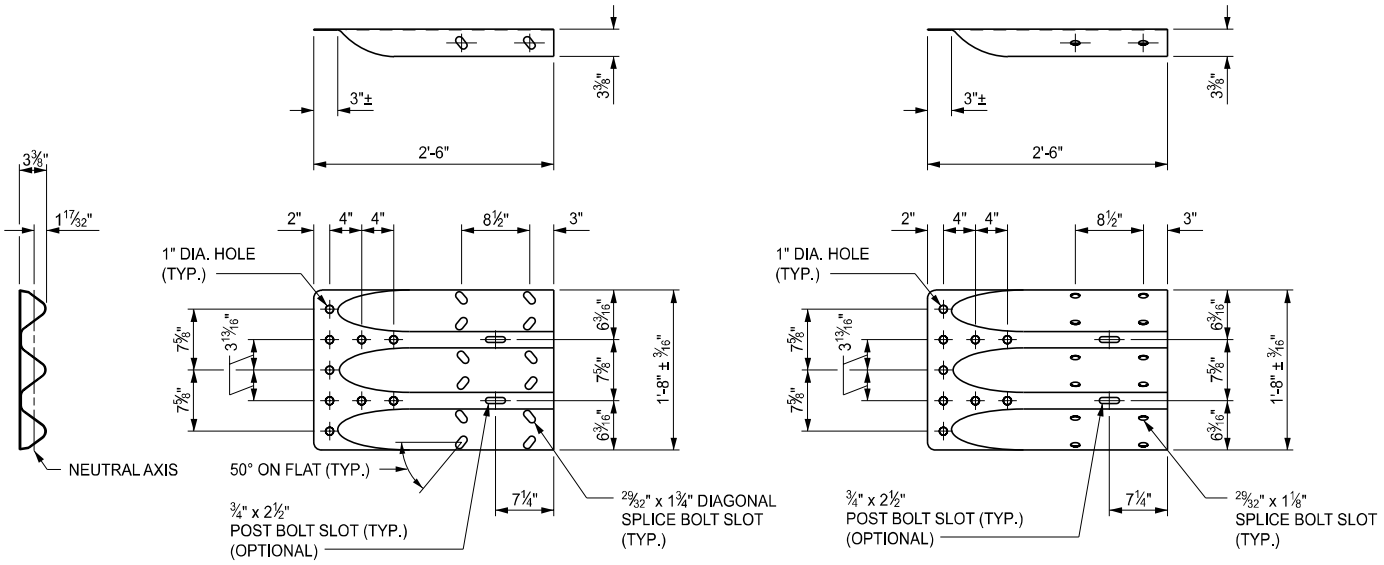
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL ANCHORAGE, BRIDGE, DETAILS

(SPECIAL DETAIL) / FHWA APPROVAL	04/03/2024 / PLAN DATE	R-67-G	SHEET 10 OF 16

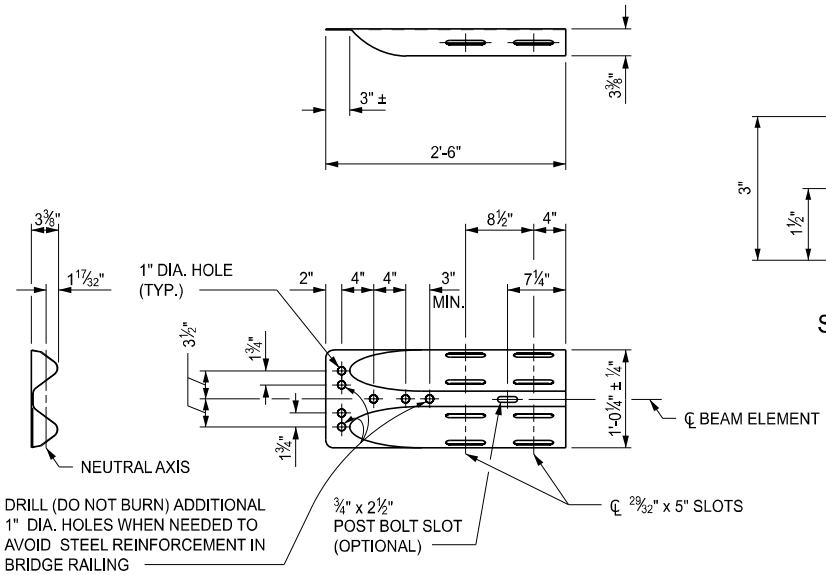


THRIE BEAM EXPANSION SECTION

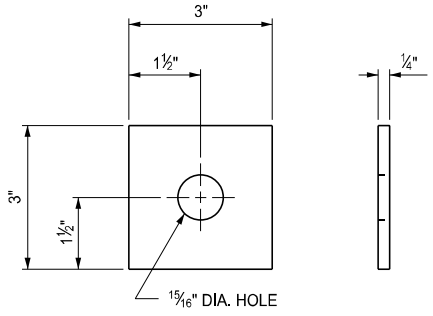


OPTION 1 OPTION 2

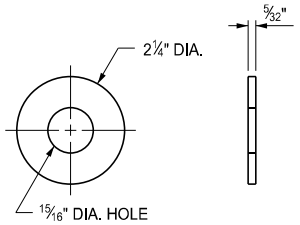
THRIE BEAM TERMINAL CONNECTOR



SPECIAL END SHOE



SQUARE WASHER FOR ⅞" DIA. BOLTS



ROUND WASHER FOR ⅞" DIA. BOLTS

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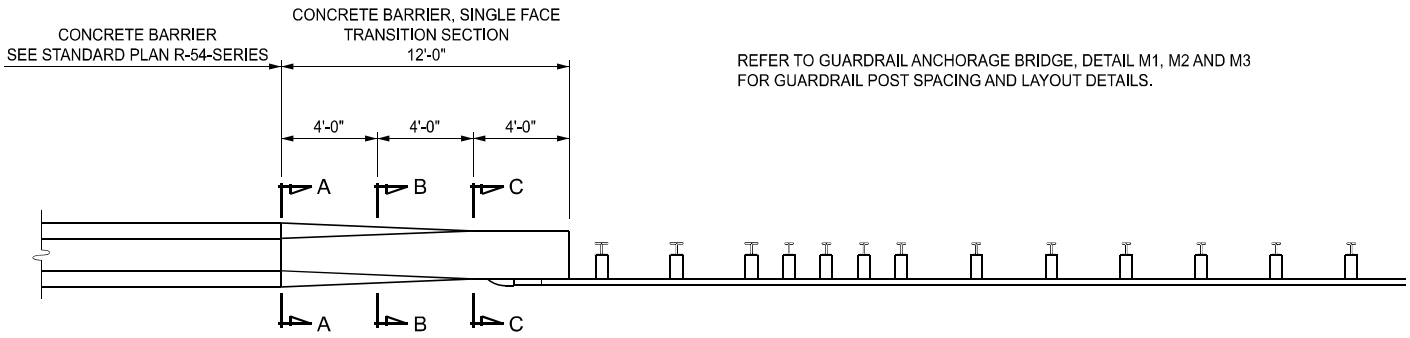
STANDARD PLAN FOR
GUARDRAIL ANCHORAGE, BRIDGE, DETAILS

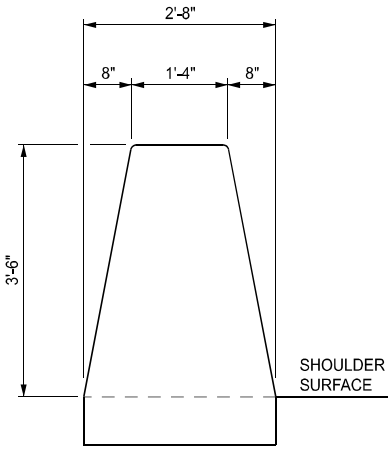
(SPECIAL DETAIL) FHWA APPROVAL	04/03/2024 PLAN DATE	R-67-G	SHEET 11 OF 16



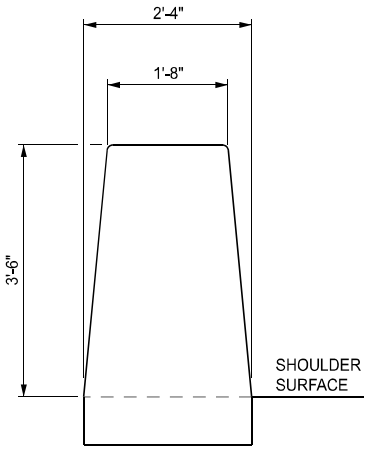
REFER TO GUARDRAIL ANCHORAGE BRIDGE, DETAIL M1, M2 AND M3 FOR GUARDRAIL POST SPACING AND LAYOUT DETAILS.

PLAN VIEW

* REFER TO GUARDRAIL ANCHORAGE BRIDGE, DETAIL M1, M2, AND M3 FOR GUARDRAIL HEIGHT.

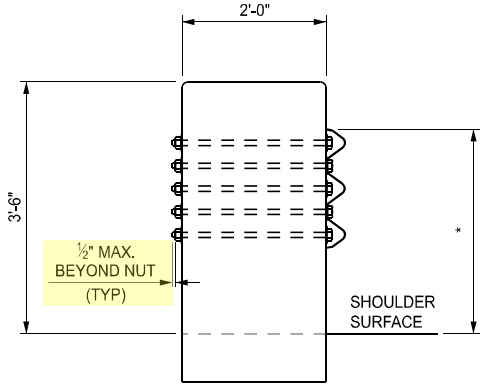


SECTION A-A



SECTION B-B

UNIFORMLY TRANSITION THE BARRIER FACES FROM SINGLE SLOPE SHAPE TO VERTICAL WALL



SECTION C-C

HIGH STRENGTH ⅞" DIAMETER x 26" LONG HEX HEAD BOLTS WITH 2" MINIMUM THREAD LENGTH AND NUTS WITH ROUND WASHERS FRONT AND BACK SHALL BE USED TO CONNECT GUARDRAIL TO CONCRETE BARRIER, SINGLE FACE TRANSITION SECTION.

DETAILS FOR CONNECTING GUARDRAIL TO CONCRETE BARRIER, SINGLE FACE

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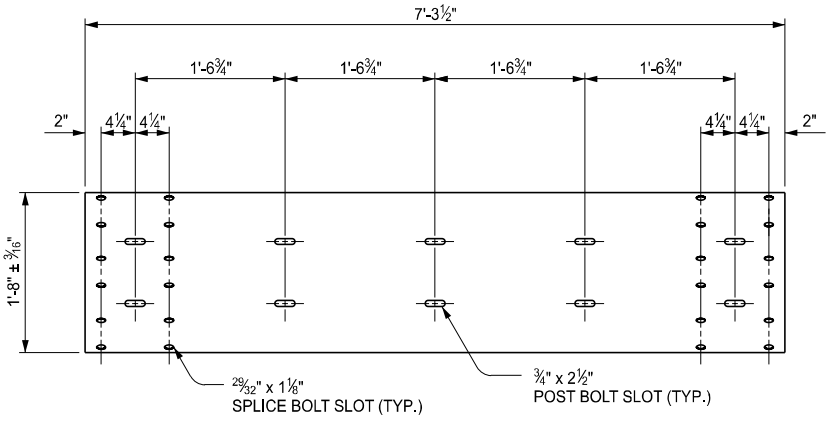
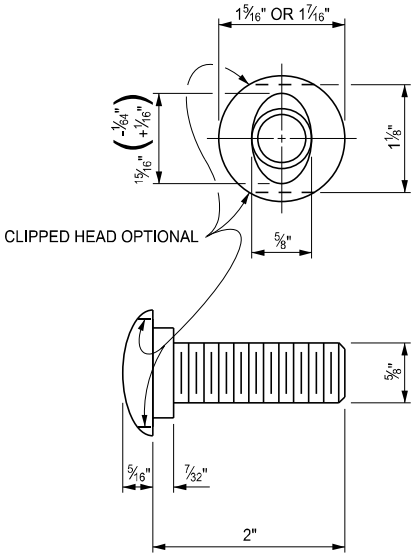
	(SPECIAL DETAIL) FHWA APPROVAL	04/03/2024 PLAN DATE	R-67-G	SHEET 12 OF 16

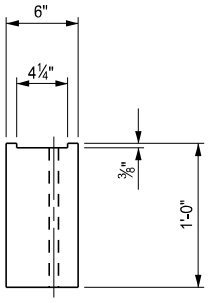


6'-3" THRIE BEAM SECTION

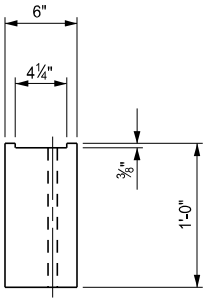


SPLICE BOLT

FOR USE WITH NESTED
GUARDRAIL BEAM ELEMENTS



TOP



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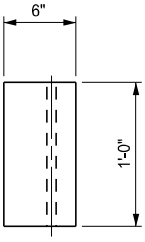
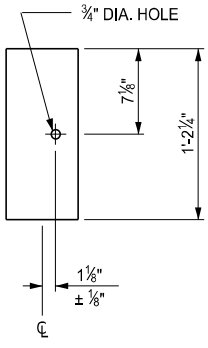
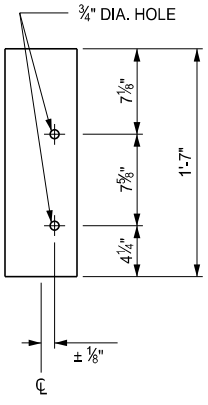


TOP



FRONT

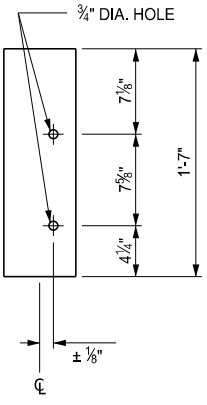
OFFSET BLOCK FOR
W BEAM GUARDRAIL



FRONT

OFFSET BLOCK FOR
THRIE BEAM GUARDRAIL

FOR USE WITH W6 x 8.5 OR W6 x 9 POSTS



FRONT

OFFSET BLOCK FOR
THRIE BEAM GUARDRAIL

FOR USE WITH W6 x 15 POSTS

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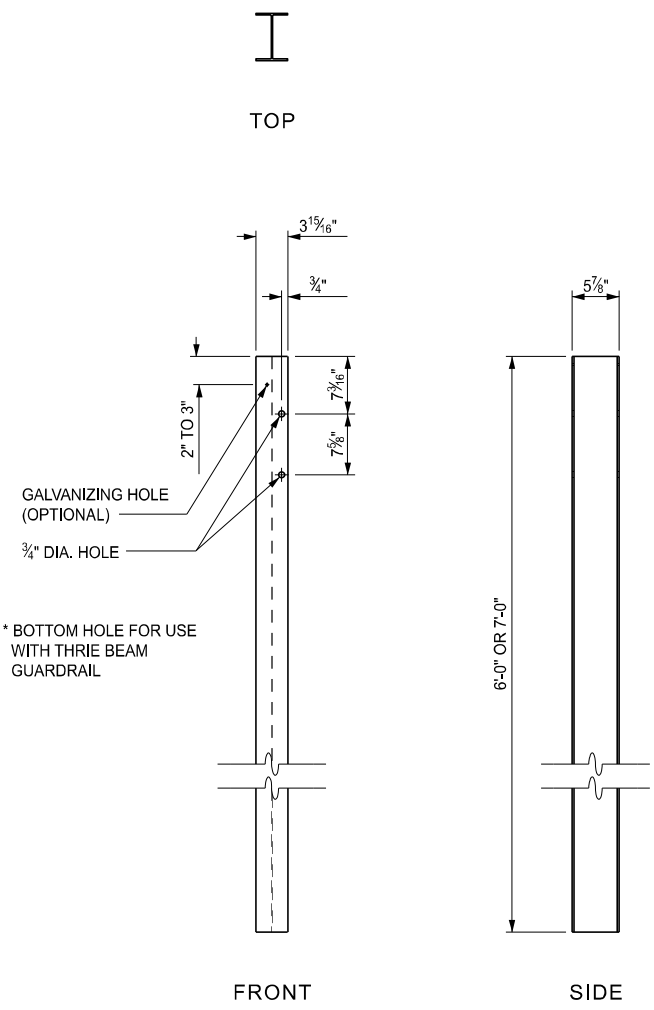
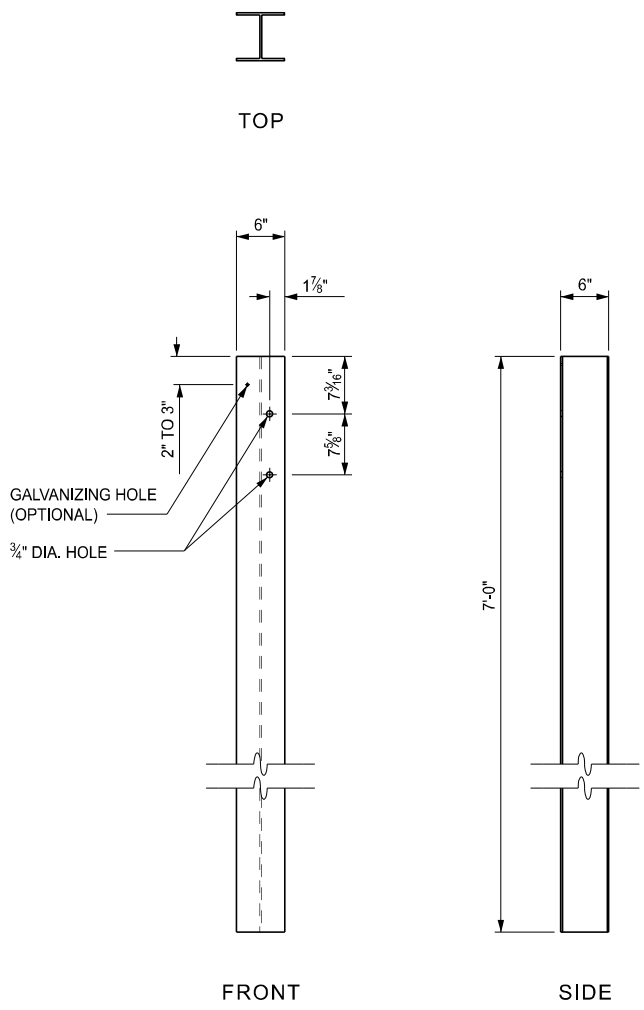


W6 x 9 OR
W6 x 8.5 POST



W6 x 15 POST

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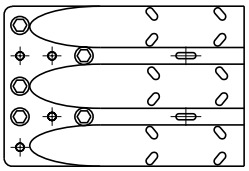
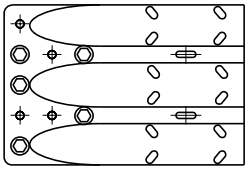
	(SPECIAL DETAIL) FHWA APPROVAL	04/03/2024 PLAN DATE	R-67-G	SHEET 14 OF 16



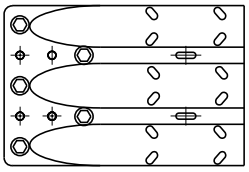
THRIE BEAM TERMINAL CONNECTOR
BOLT LOCATION FOR
GUARDRAIL ANCHORAGE TYPE M1, M3, M4, M6

◎ = REQUIRED BOLT LOCATION TO ANCHOR INTO CONCRETE



THRIE BEAM TERMINAL CONNECTOR
BOLT LOCATION FOR
GUARDRAIL ANCHORAGE TYPE M2, M5

◎ = REQUIRED BOLT LOCATION TO ANCHOR INTO CONCRETE



THRIE BEAM TERMINAL CONNECTOR
BOLT LOCATION FOR
GUARDRAIL ANCHORAGE TYPE M7, M8, M9

◎ = REQUIRED BOLT LOCATION TO ANCHOR INTO CONCRETE

NOTES:

ALL POSTS, OFFSET BLOCKS, BEAM ELEMENTS, REFLECTORS, AND HARDWARE, (INCLUDING BOLTS, NUTS, AND WASHERS) SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION AND TO STANDARD PLAN R-60-SERIES, WHERE APPLICABLE, EXCEPT AS SPECIFIED ON THIS STANDARD.

BEAM ELEMENTS IDENTIFIED AS 12 GAUGE MUST MEET CLASS A REQUIREMENTS PER AASHTO M 180. BEAM ELEMENTS IDENTIFIED AS 10 GAUGE MUST MEET CLASS B REQUIREMENTS PER AASHTO M 180.

THE THRIE BEAM TERMINAL CONNECTOR AND SPECIAL END SHOE SHALL BE THE SAME MATERIAL AS ADJACENT RUN OF GUARDRAIL, AND SHALL NOT BE LIGHTER THAN 10 GAUGE (0.138").

SECTIONS OF THE THRIE BEAM ELEMENT REQUIRED TO BE TWISTED FOR USE IN ANCHORAGE SHALL BE FIELD BENT.

GUARDRAIL BEAM ELEMENTS SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC, EXCEPT FOR THE THRIE BEAM TERMINAL CONNECTOR WHICH MAY BE LAPPED IN EITHER DIRECTION.

SPLICE BOLTS SHALL BE USED WHEN SPLICING THE THRIE BEAM TERMINAL CONNECTOR TO THE THRIE BEAM EXPANSION SECTION AND WHEN SPLICING THE SPECIAL END SHOE TO THE TRANSITION SECTION. THE SPLICE BOLT NUT SHALL BE INSTALLED FINGER-TIGHT AND SHALL FULLY ENGAGE THE SPLICE BOLT WITH A MINIMUM OF ONE THREAD EXTENDING BEYOND THE NUT. THIS SHALL BE FOLLOWED UP BY UPSETTING THE FIRST THREAD ON THE OUTSIDE OF THE NUT WITH A CENTER PUNCH OR COLD CHISEL, SO THAT IT WILL NOT LOOSEN.

SEE STANDARD PLAN R-32-SERIES FOR APPROACH CURB AND GUTTER AND DOWNSPOUT HEADER.

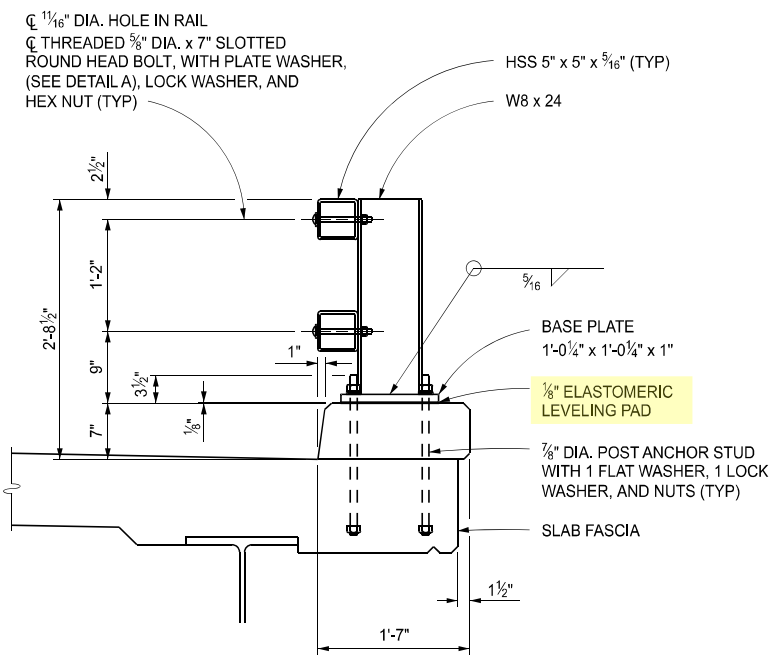
SEE APPROPRIATE PLANS TO DETERMINE WHETHER GUARDRAIL ANCHORAGE, BRIDGE SPANS A BRIDGE EXPANSION JOINT.

SEE APPROPRIATE PLANS FOR PIER BASE WALL OR PIER STRUT.

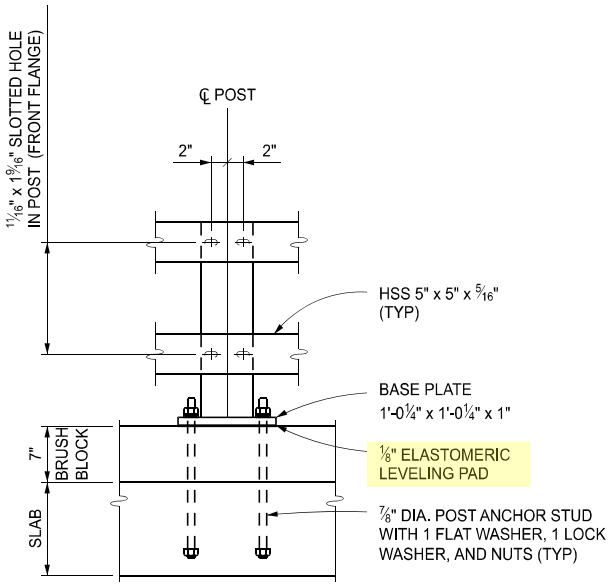
SEE STANDARD PLAN R-55-SERIES FOR FILLER WALLS AND FILLER WALL END BLOCK.

SEE STANDARD PLAN R-54-SERIES FOR CONCRETE BARRIER, SINGLE FACE, TYPE __.

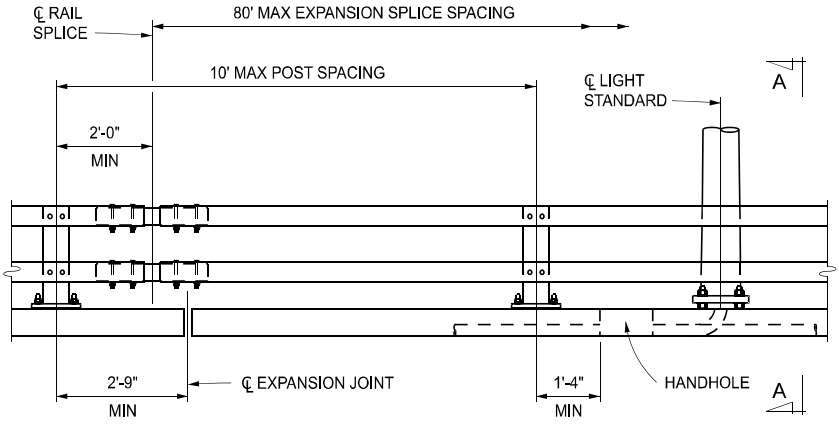
CONCRETE BARRIER, SINGLE FACE TRANSITION SECTION SHALL BE INCLUDED IN THE PAY ITEM "CONC BARRIER, SINGLE FACE, TYPE __".



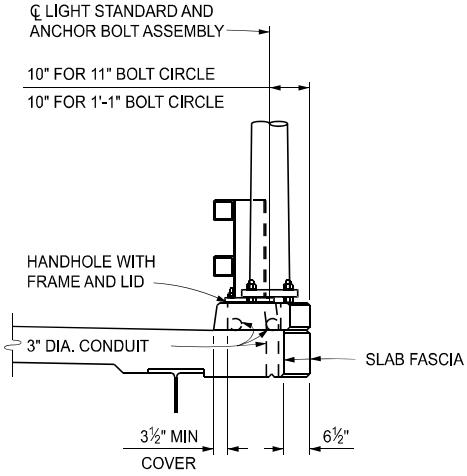
SECTION THROUGH
BRUSH BLOCK AND RAILING



POST ELEVATION



RAILING ELEVATION



SECTION A-A

APPROVED BY: _____
DIRECTOR, BUREAU OF BRIDGES AND STRUCTURES

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

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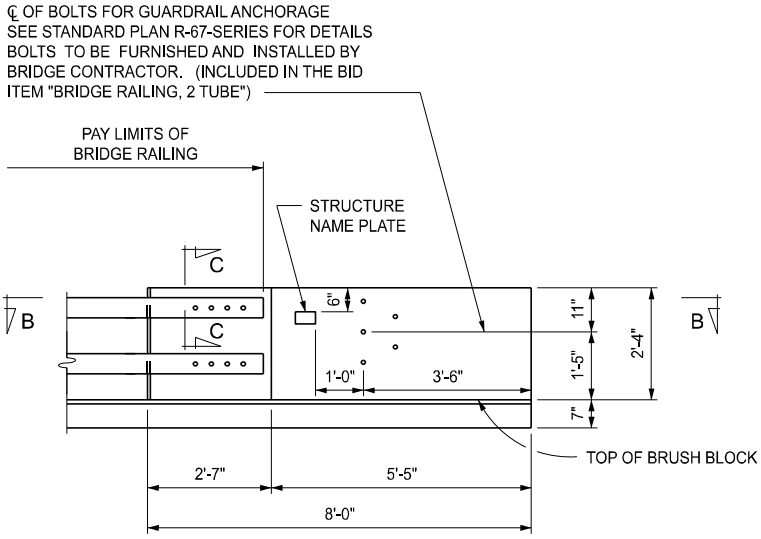
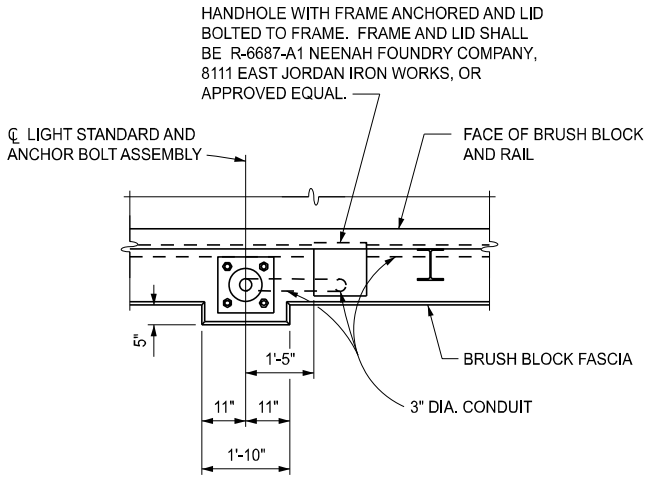
STANDARD PLAN FOR
BRIDGE RAILING, 2 TUBE

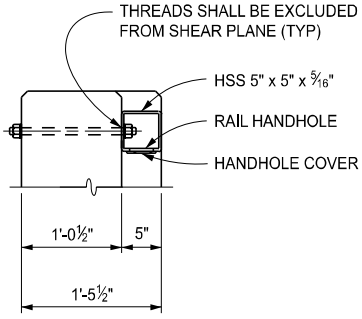
(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-21-K	SHEET 1 OF 4



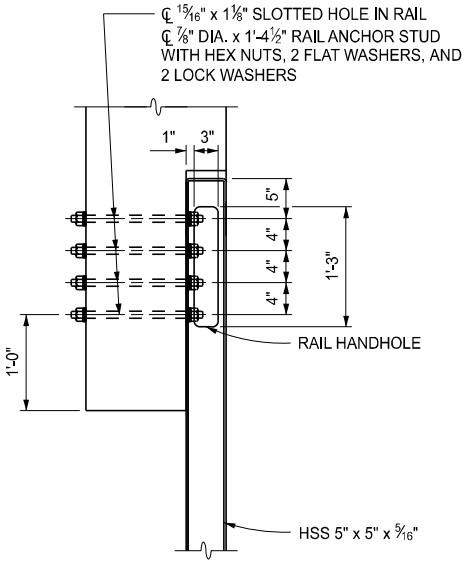
END WALL ELEVATION



PLAN VIEW AT LIGHT STANDARD



SECTION C-C



SECTION B-B

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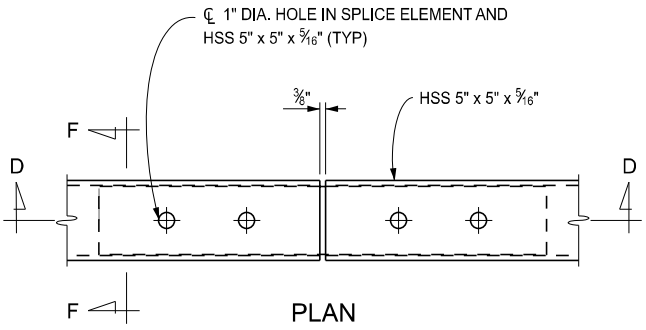
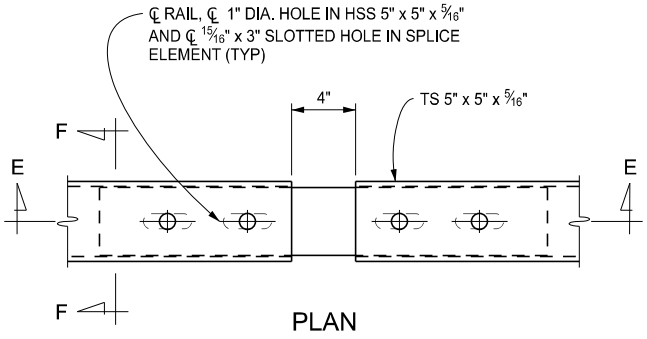
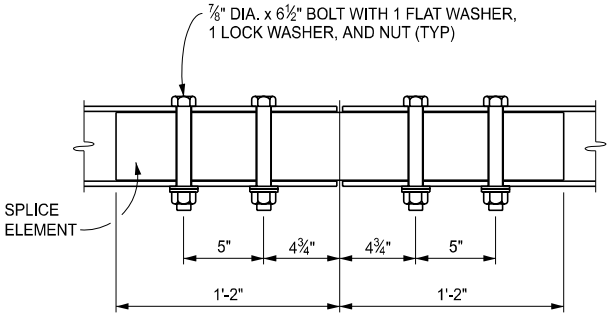
STANDARD PLAN FOR
BRIDGE RAILING, 2 TUBE

(SPECIAL DETAIL) / FHWA APPROVAL	04/16/2024 / PLAN DATE	B-21-K	SHEET 2 OF 4

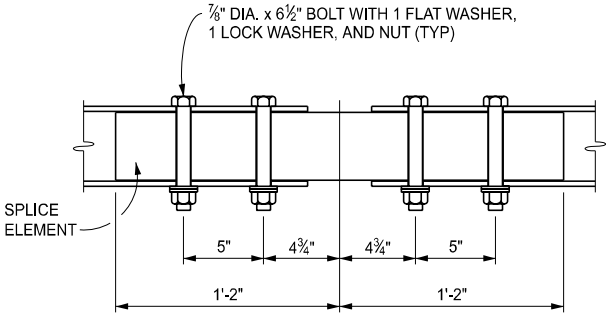






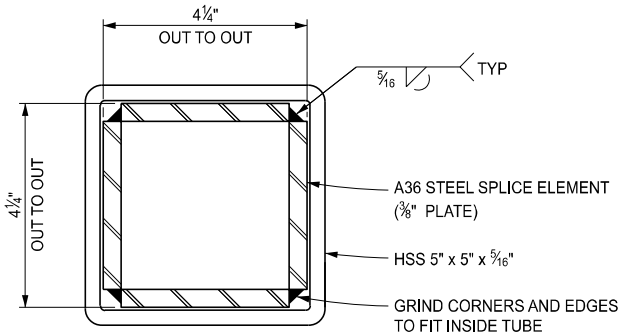
SECTION D-D

FIXED SPLICE DETAILS



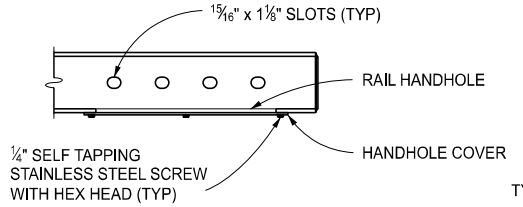
SECTION E-E

EXPANSION SPLICE DETAILS

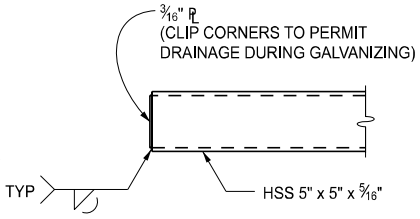


SECTION F-F

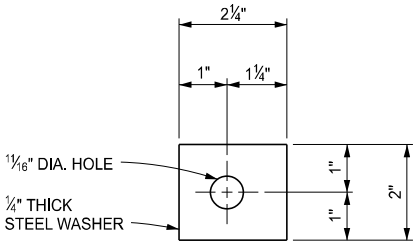
MDOT Michigan Department of Transportation DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR BRIDGE RAILING, 2 TUBE			
	(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-21-K	SHEET 3 OF 4



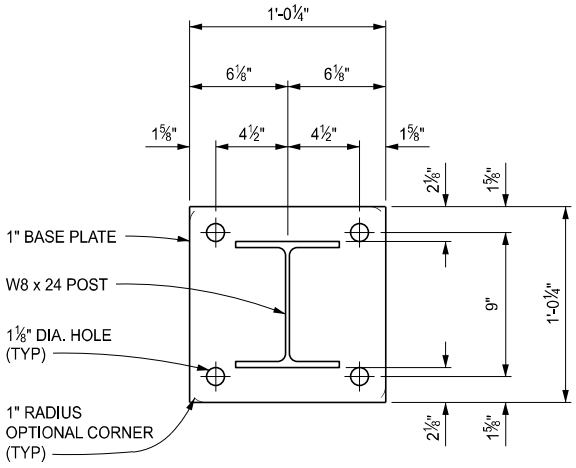
END OF RAIL SECTION



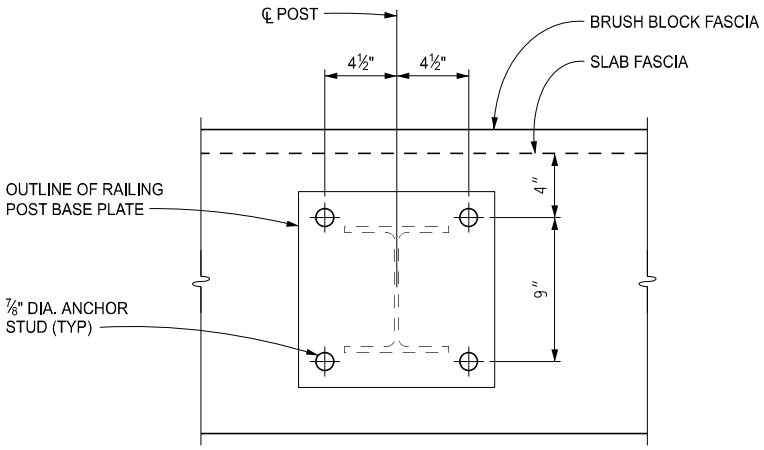
END OF RAIL



DETAIL A

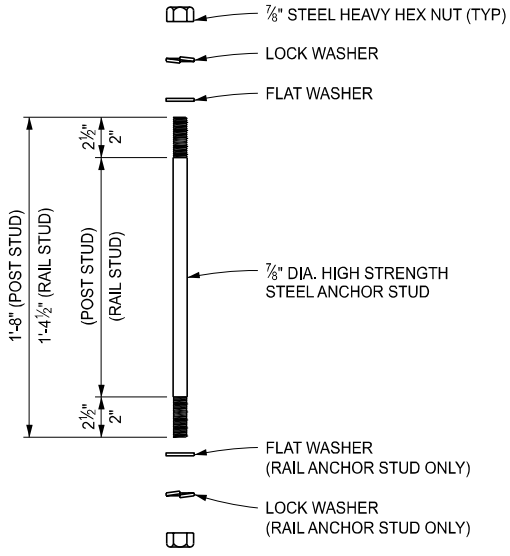


BASE PLATE DETAIL



ANCHOR STUD LAYOUT

NOTE: SURFACE UNDER POST IS
TO BE FINISHED LEVEL



ANCHOR STUD DETAIL

NOTES:

DETAILS SHOWN ARE IN ACCORDANCE WITH CURRENT AASHTO SPECIFICATIONS.

ALL WORK AND MATERIAL SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

THIS RAILING SHALL BE USED ONLY WITH THE BRUSH BLOCK SHOWN ON THIS SHEET.

FOR LIGHT STANDARD ANCHOR BOLT ASSEMBLY DETAILS, SEE STANDARD PLAN B-103-SERIES.

FENCING MAY BE ATTACHED TO THE NON-TRAFFIC SIDE OF THE 2 TUBE RAILING TO PROTECT PEDESTRIANS

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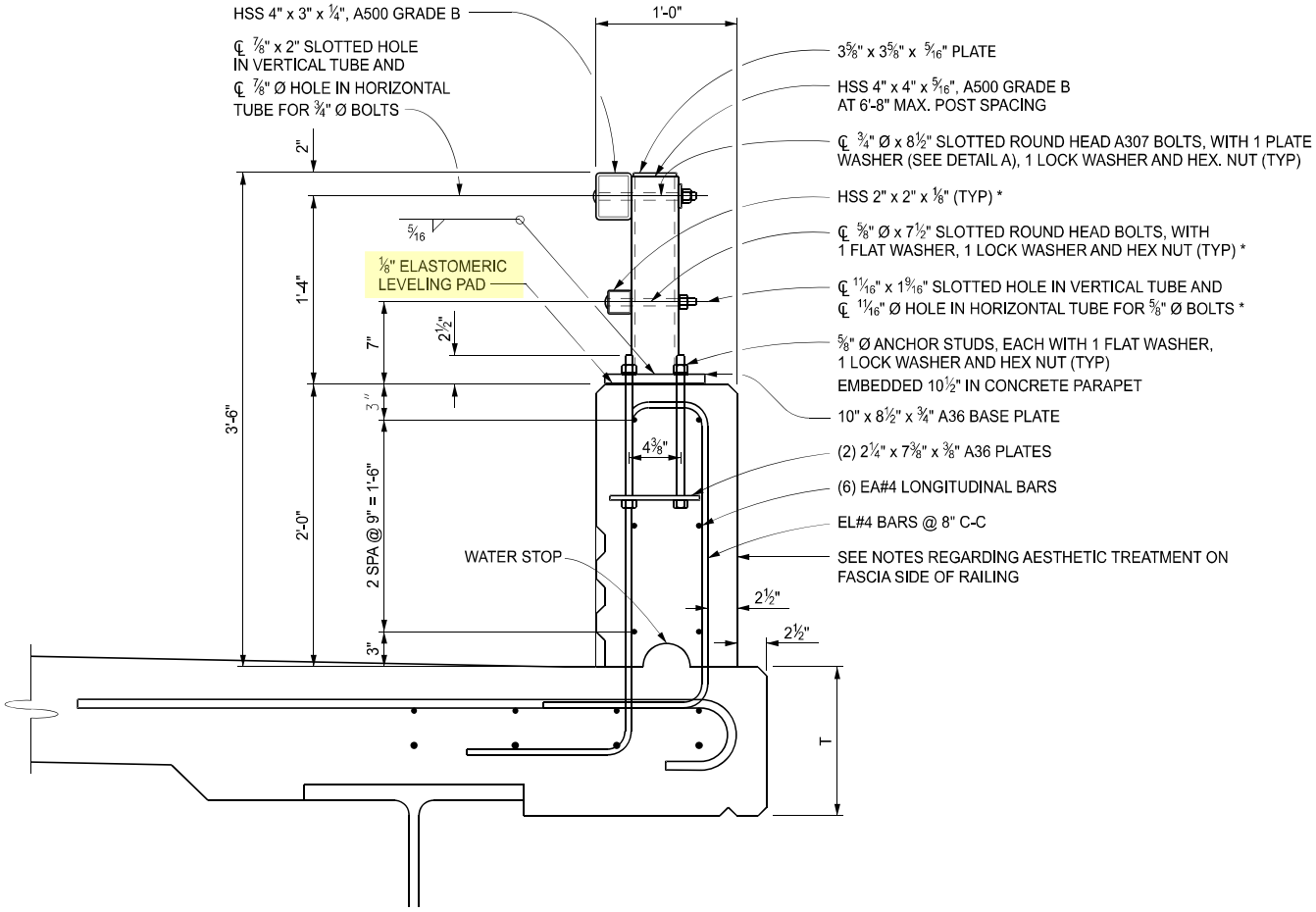
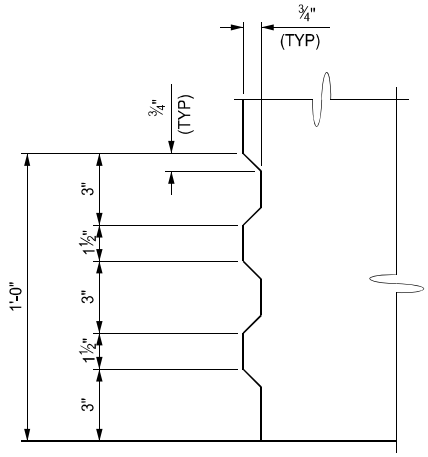


FLUSH MOUNT BRIDGE RAILING



AESTHETIC TREATMENT DETAIL

NOTES:

ALL WORK AND MATERIAL SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

DETAILS SHOWN ARE IN ACCORDANCE WITH AASHTO SPECIFICATIONS.

BRIDGE RAILING USED WITH SIDEWALK SHALL BE USED ONLY WITH THE SIDEWALK CONFIGURATION (PROFILE) SHOWN ON THIS STANDARD PLAN.

NO SLIP FORMING OF "BRIDGE RAILING, AESTHETIC PARAPET TUBE" SHALL BE ALLOWED. RAILING SHALL BE CAST IN PLACE.

THE LIGHT STANDARD ANCHOR BOLT ASSEMBLY IS INCLUDED IN THE BID ITEM "BRIDGE RAILING, AESTHETIC PARAPET TUBE". SEE STANDARD PLAN B-103-SERIES.

FOR LIGHT STANDARD ANCHOR BOLT ASSEMBLY DETAILS, IF BRIDGE RAILING, AESTHETIC PARAPET TUBE IS PLACED FLUSH ON THE BRIDGE DECK (WITHOUT SIDEWALK), THE LIGHTING CONDUIT SHALL NOT BE PLACED IN THE RAILING.

A RUBBED FINISH ON THE VERTICAL AND TOP CONCRETE SURFACES OF THE PARAPET RAILING IS REQUIRED.

AESTHETIC TREATMENT AS DETAILED ON THIS SHEET SHALL BE ADDED TO THE FASCIA SIDE OF RAILING IF NO AESTHETIC TREATMENT IS DETAILED ON THE PLAN SHEETS AND SHALL BE INCLUDED IN THE BID ITEM "BRIDGE RAILING, AESTHETIC PARAPET TUBE". AESTHETIC TREATMENT DETAILED ON THE PLAN SHEETS MAY BE UP TO 1" IN CONCRETE DEPTH WITHOUT MODIFICATION TO THE RAILING WIDTH AND SHALL BE INCLUDED IN THE BID ITEM "BRIDGE RAILING, AESTHETIC PARAPET TUBE". AESTHETIC TREATMENT REQUIRING ADDITIONAL RAILING WIDTH OR THE USE OF ELASTOMERIC FORM LINERS SHALL BE PAID FOR SEPARATELY.

* THE HSS 2" x 2" x ⅛" RAIL, SLOTTED HOLE, AND ⅝" BOLT ARE NOT REQUIRED WHEN RAILING IS USED IN COMBINATION WITH PEDESTRIAN FENCING (SEE STANDARD PLAN B-41-SERIES).

APPROVED BY: _____
DIRECTOR, BUREAU OF BRIDGES AND STRUCTURES

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

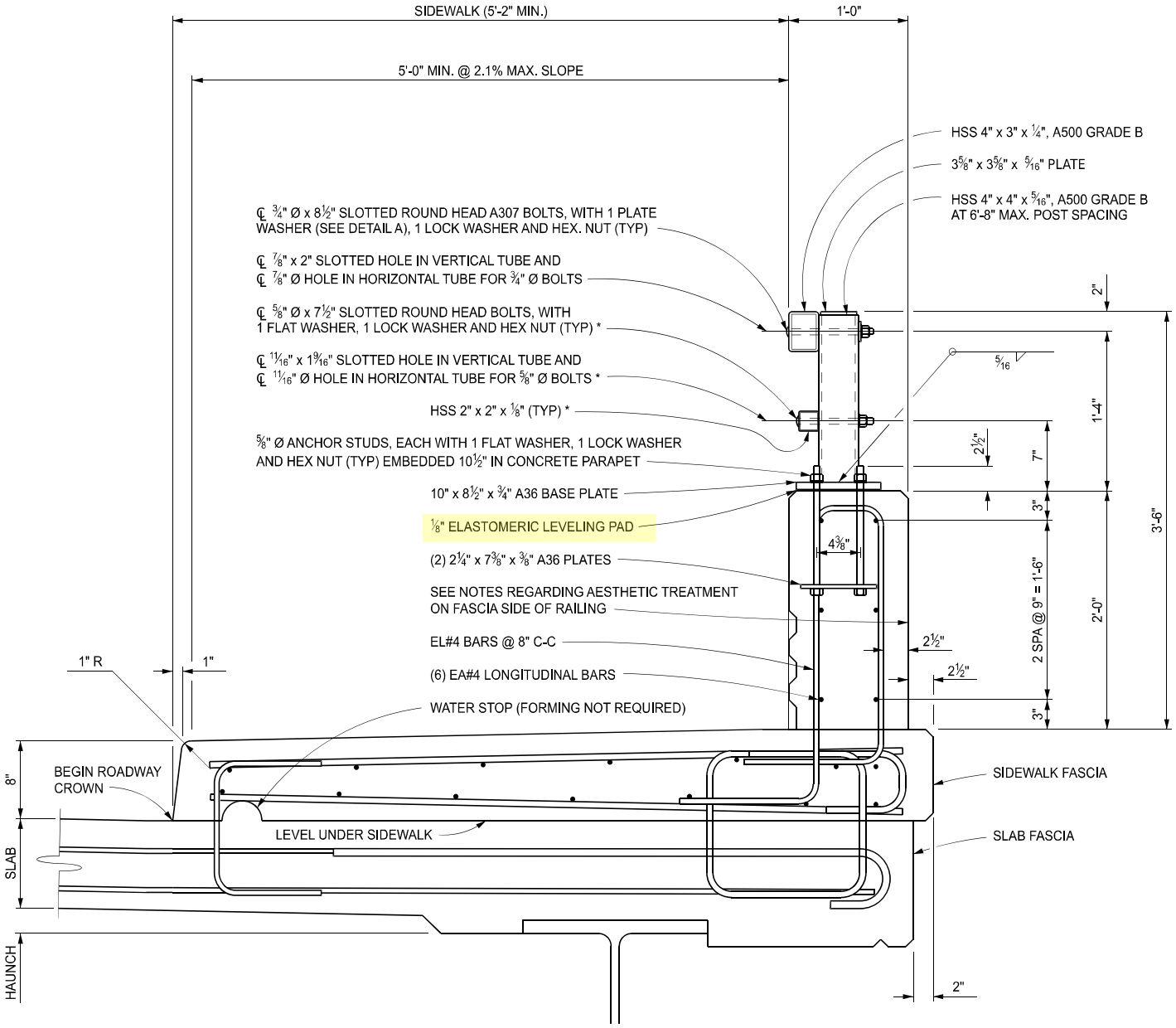
APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MDOT
Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING, AESTHETIC PARAPET TUBE

(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-25-L	SHEET 1 OF 8



BRIDGE RAILING WITH SIDEWALK

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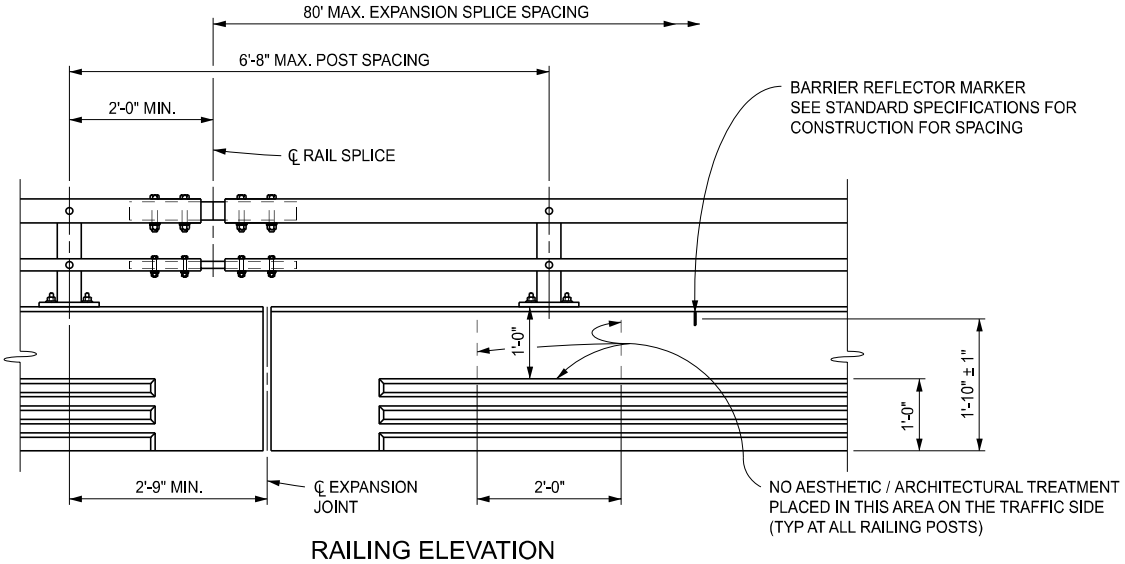
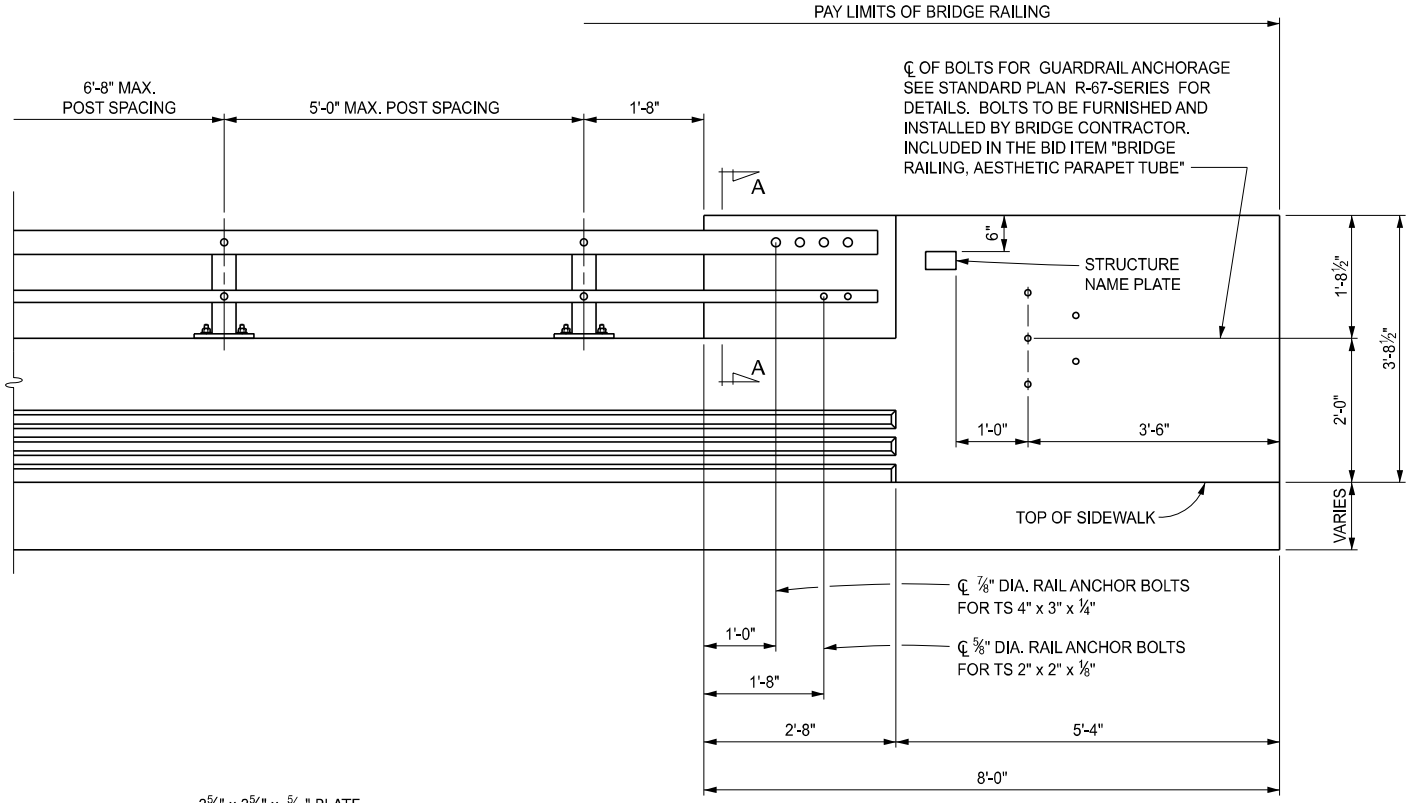
STANDARD PLAN FOR
BRIDGE RAILING, AESTHETIC PARAPET TUBE

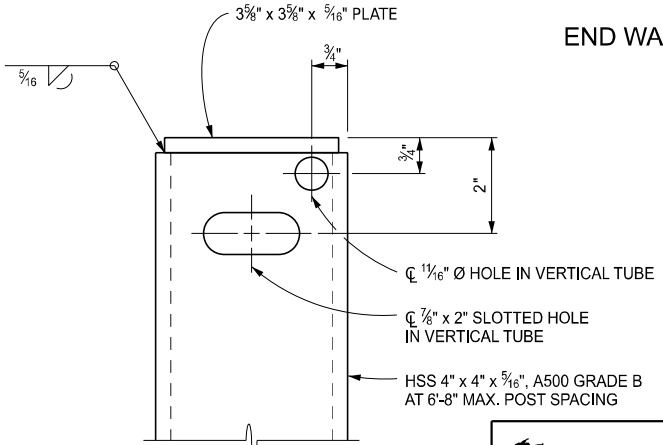
(SPECIAL DETAIL)	04/16/2024	B-25-L	SHEET
FHWA APPROVAL	PLAN DATE		2 OF 8



RAILING ELEVATION



END WALL ELEVATION



VERTICAL TUBE DETAIL
FRONT VIEW

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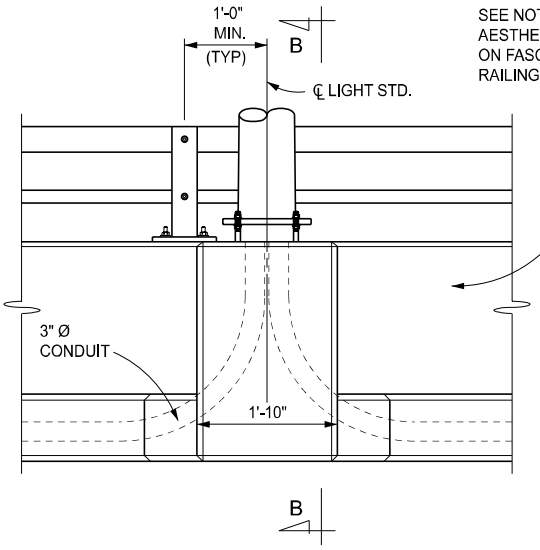
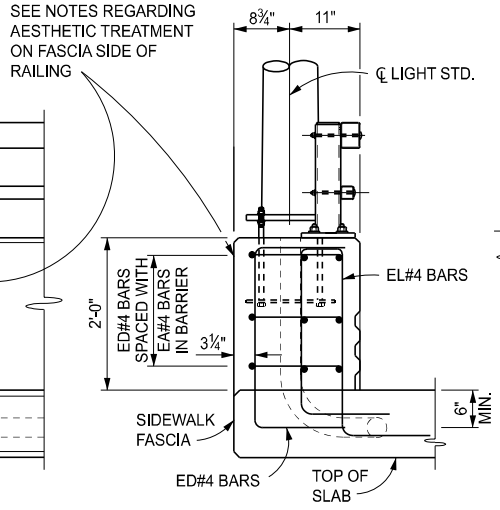
STANDARD PLAN FOR
BRIDGE RAILING, AESTHETIC PARAPET TUBE

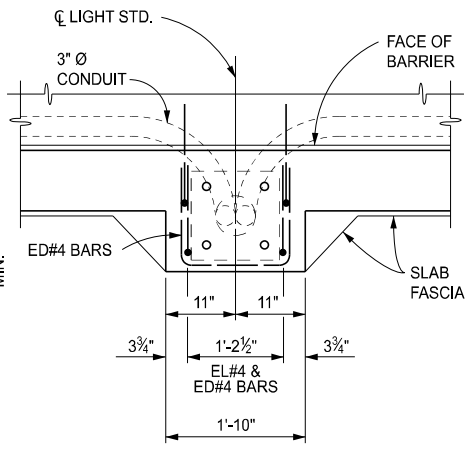
(SPECIAL DETAIL)	04/16/2024	B-25-L	SHEET
FHWA APPROVAL	PLAN DATE		3 OF 8



ELEVATION VIEW

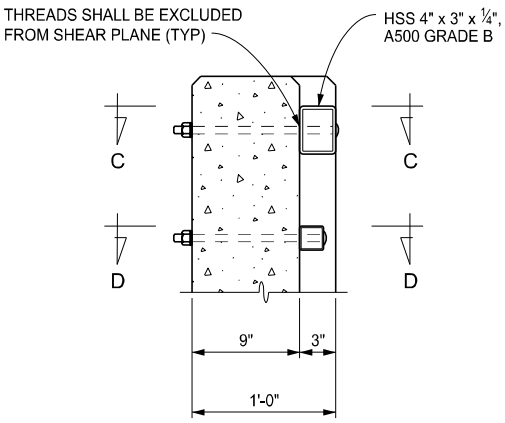


SECTION B-B

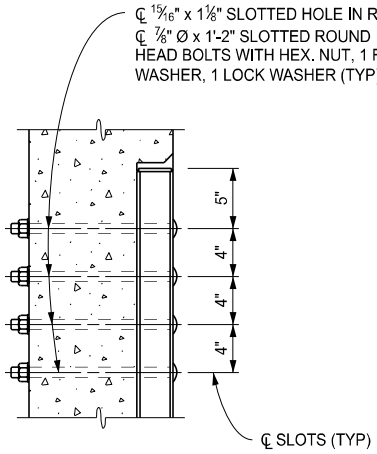


PLAN VIEW

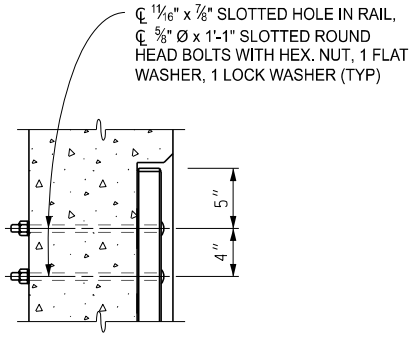
LIGHT STANDARD DETAILS



SECTION A-A



SECTION C-C



SECTION D-D

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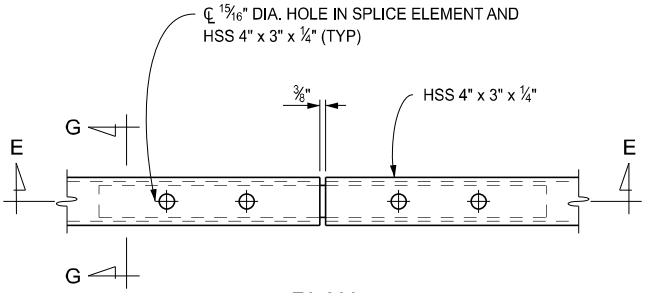
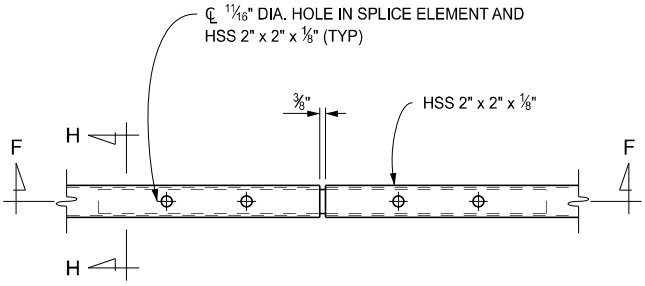
STANDARD PLAN FOR
BRIDGE RAILING, AESTHETIC PARAPET TUBE

(SPECIAL DETAIL)	04/16/2024	B-25-L	SHEET
FHWA APPROVAL	PLAN DATE		4 OF 8



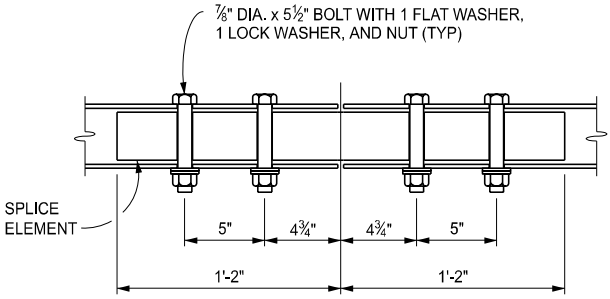
PLAN

HSS 4" x 3" x ¼"



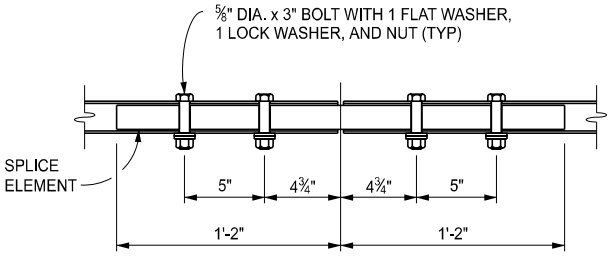
PLAN

HSS 2" x 2" x ⅛"



SECTION E-E

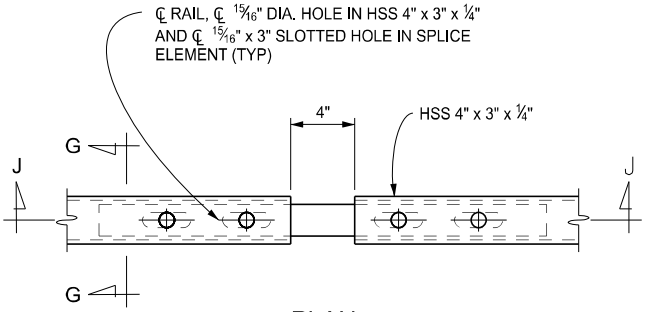
HSS 4" x 3" x ¼"



SECTION F-F

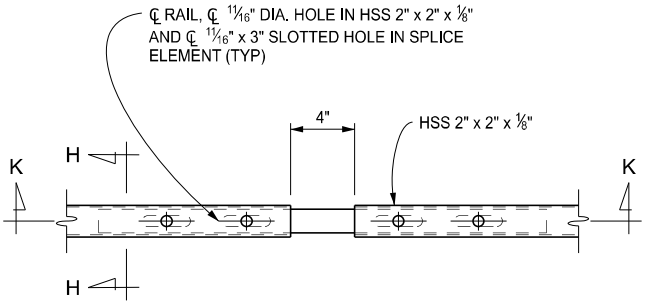
HSS 2" x 2" x ⅛"

FIXED SPLICE DETAILS



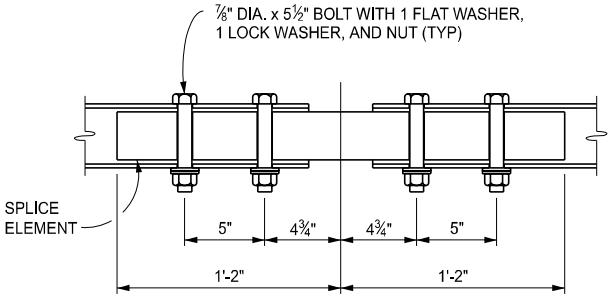
PLAN

HSS 4" x 3" x ¼"



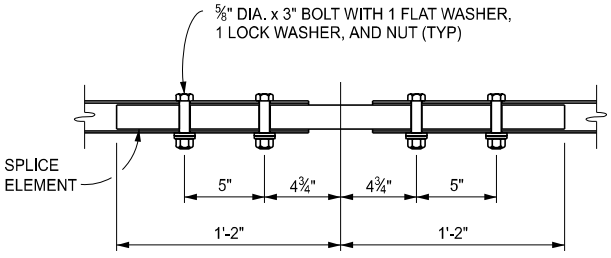
PLAN

HSS 2" x 2" x ⅛"



SECTION J-J

HSS 4" x 3" x ¼"



SECTION K-K

HSS 2" x 2" x ⅛"

EXPANSION SPLICE DETAILS

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DEPARTMENT DIRECTOR
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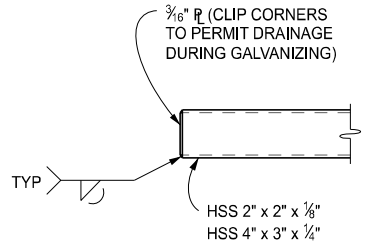
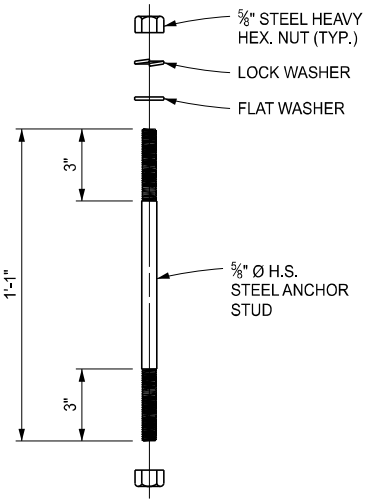
STANDARD PLAN FOR
BRIDGE RAILING, AESTHETIC PARAPET TUBE

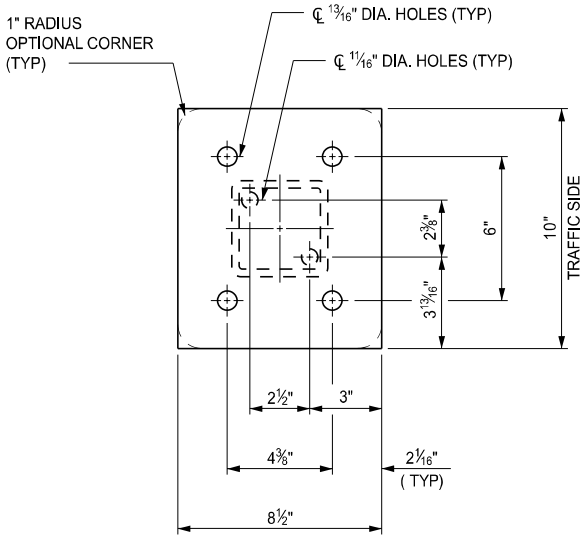
(SPECIAL DETAIL)	04/16/2024	B-25-L	SHEET
FHWA APPROVAL	PLAN DATE		5 OF 8



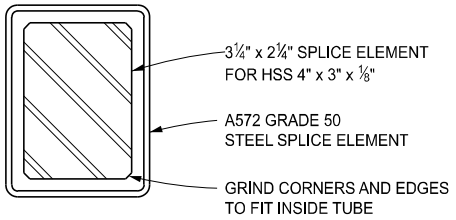
END OF RAIL



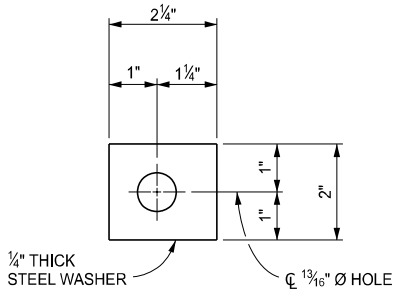
ANCHOR STUD DETAIL



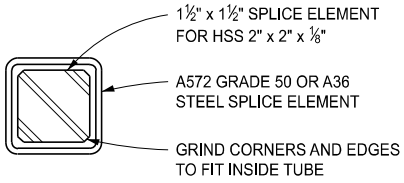
EXTERIOR BASE PLATE



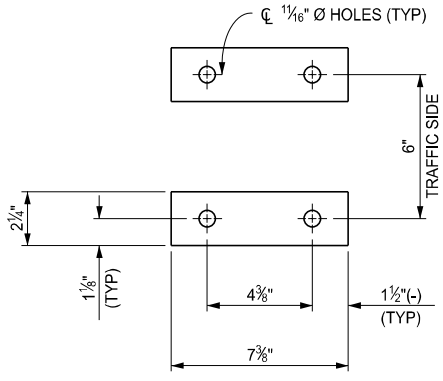
SECTION G-G



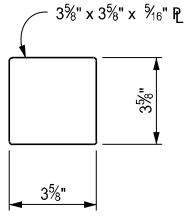
DETAIL A



SECTION H-H



EMBEDDED ANCHOR STUD PLATES



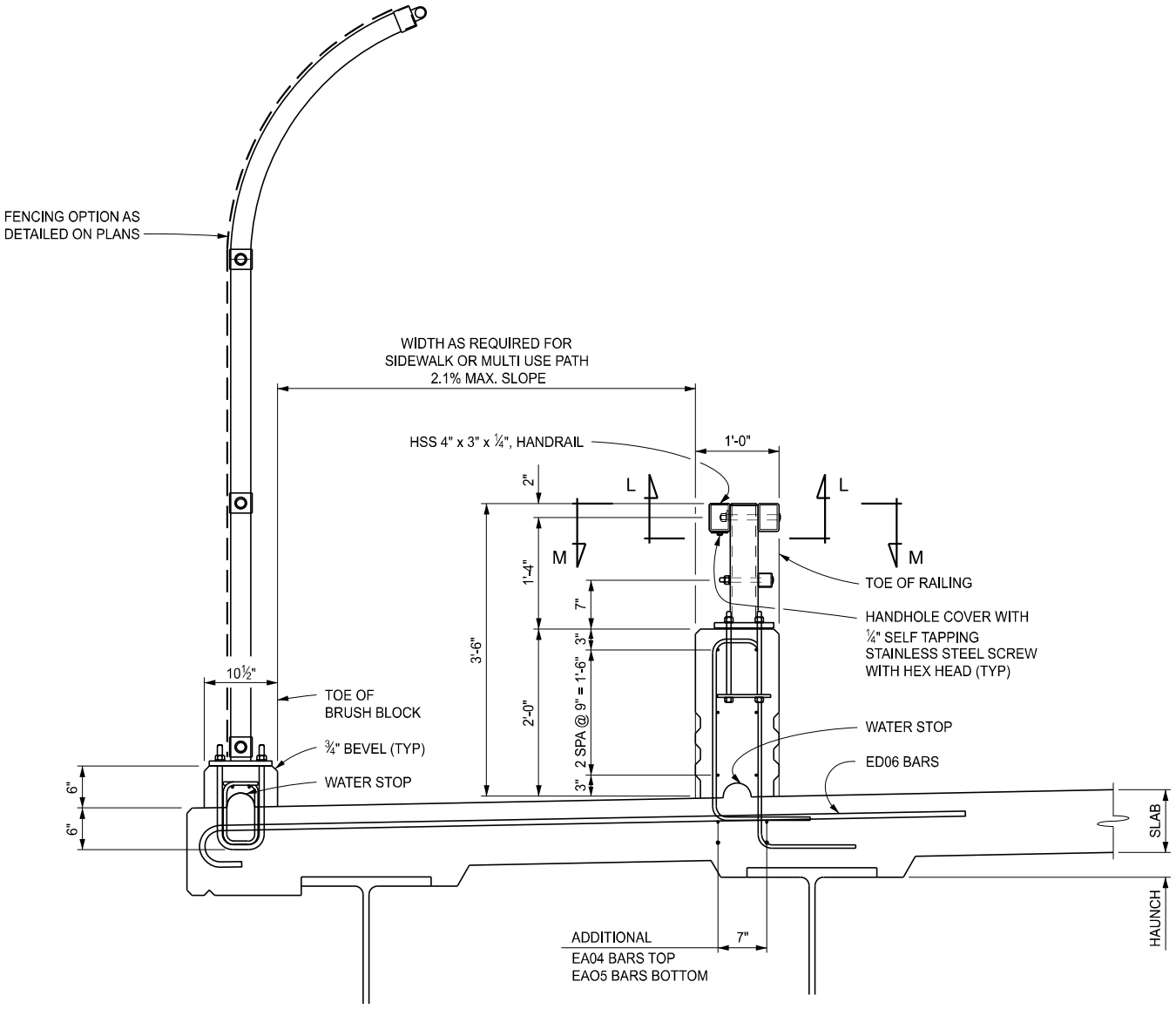
POST COVER PLATE

MDOT Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING, AESTHETIC PARAPET TUBE

(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-25-L	SHEET 6 OF 8



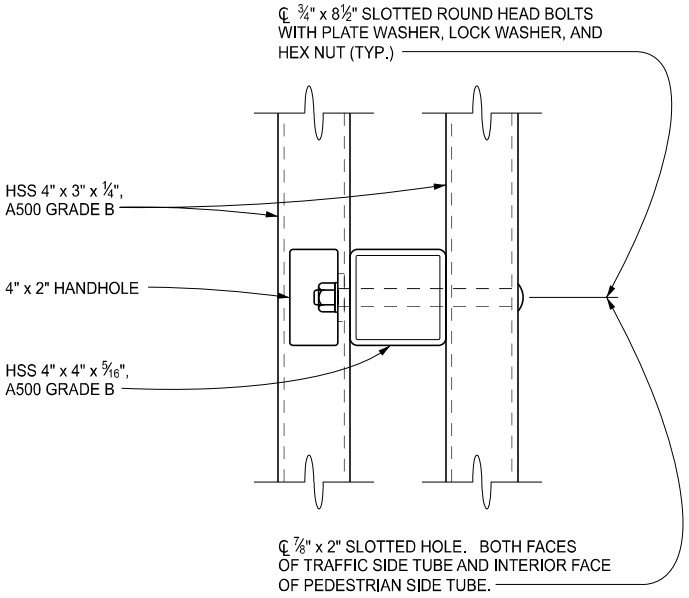
SECTION WITH PEDESTRIAN / MULTI USE PATH

MDOT
Michigan Department of Transportation

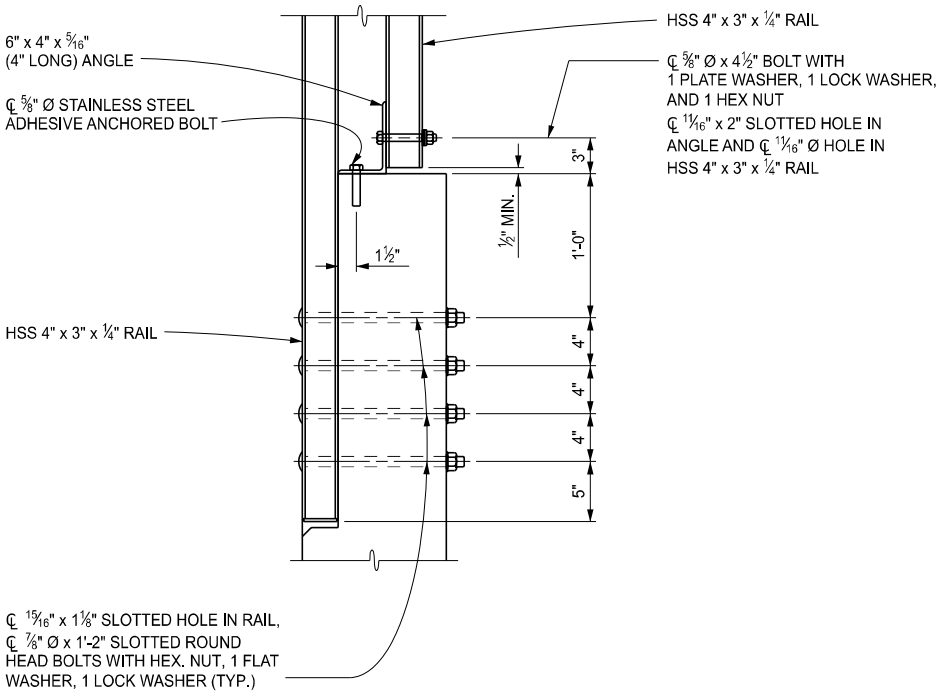
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

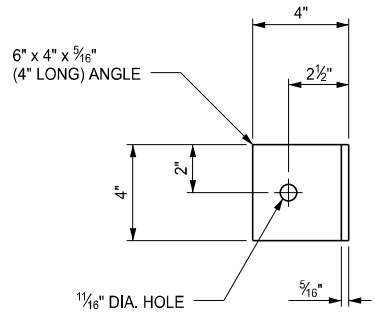
STANDARD PLAN FOR
BRIDGE RAILING, AESTHETIC PARAPET TUBE

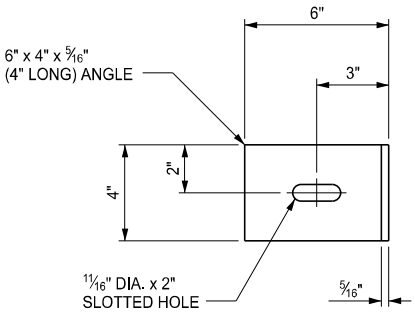
(SPECIAL DETAIL)	04/16/2024	B-25-L	SHEET
FHWA APPROVAL	PLAN DATE		7 OF 8



SECTION L-L

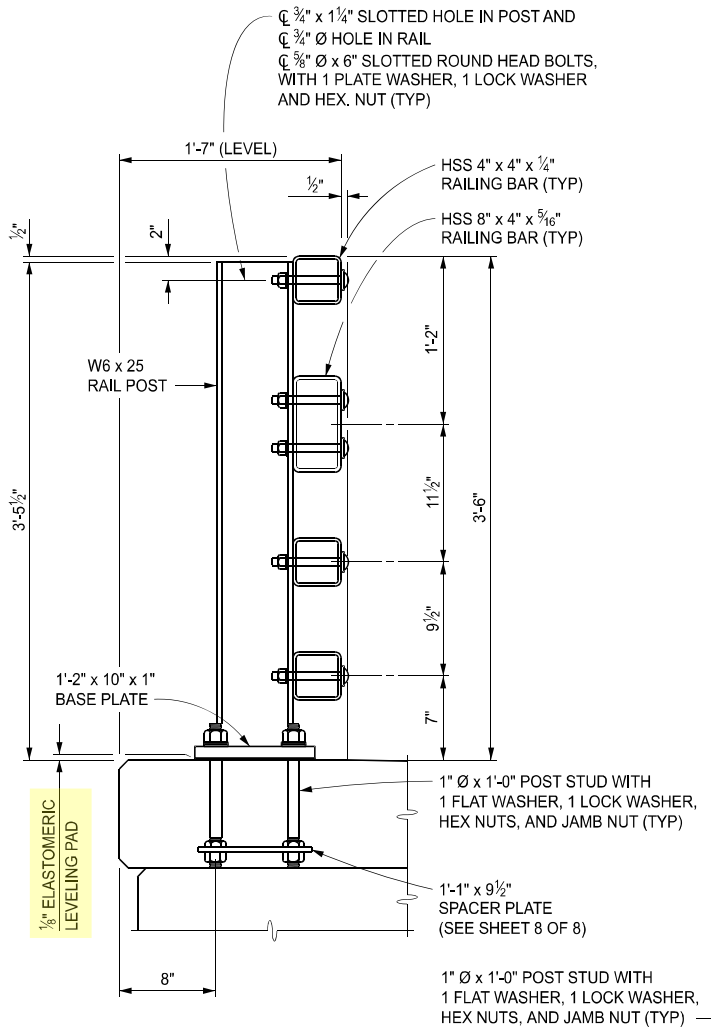




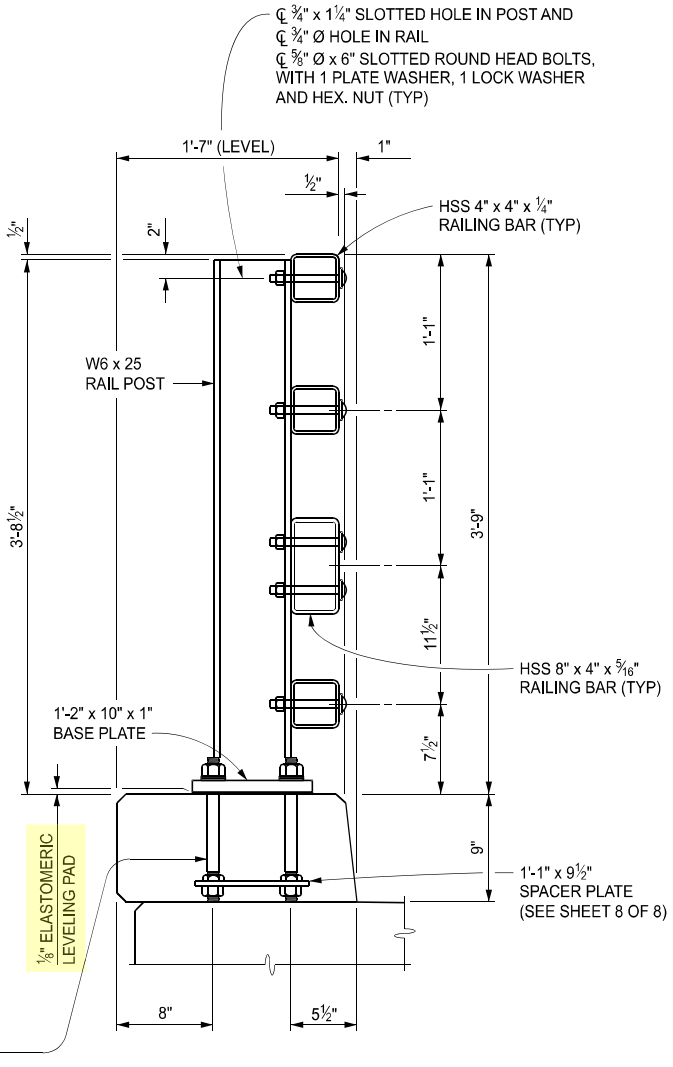


SECTION M-M

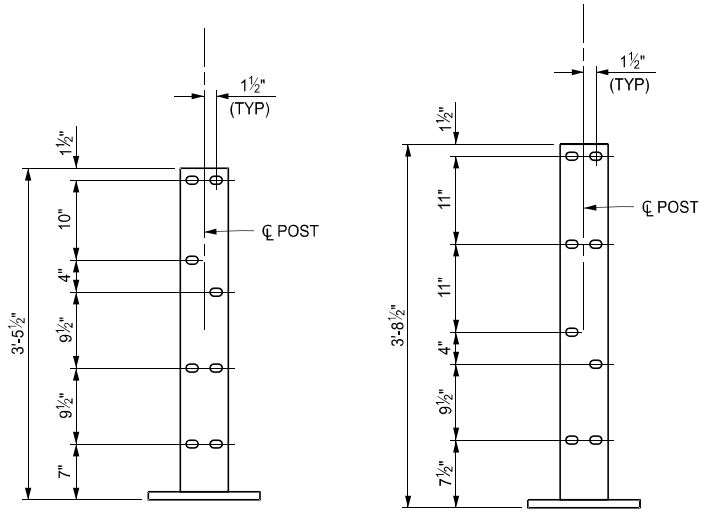
MDOT Michigan Department of Transportation DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR BRIDGE RAILING, AESTHETIC PARAPET TUBE		
(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-25-L	SHEET 8 OF 8



PEDESTRIAN BRIDGE RAILING



BICYCLE BRIDGE RAILING



POST DETAILS

NOTES:

DETAILS SHOWN ARE ACCORDING TO CURRENT AASHTO SPECIFICATIONS.

ALL WORK AND MATERIALS SHALL BE ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

THE BICYCLE BRIDGE RAILING SHALL BE USED ONLY WITH THE BRUSH BLOCK SHOWN ON THIS SHEET.

FOR LIGHT STANDARD ANCHOR BOLT ASSEMBLY DETAILS, SEE STANDARD PLAN B-103-SERIES.

USE THE HSS 2" x 2" x ⅛" RAIL AND CORRESPONDING DETAILS ONLY WHEN A SIDEWALK IS LOCATED BEHIND THE 4 TUBE RAILING. SEE SHEETS 2, 3 AND 4.

ALL LABOR, MATERIALS AND EQUIPMENT REQUIRED TO INSTALL THE HSS 2" x 2" x ⅛" RAIL SHALL BE INCLUDED IN THE BID ITEM "BRIDGE RAILING, 4 TUBE".

APPROVED BY: _____
DIRECTOR, BUREAU OF BRIDGES AND STRUCTURES

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

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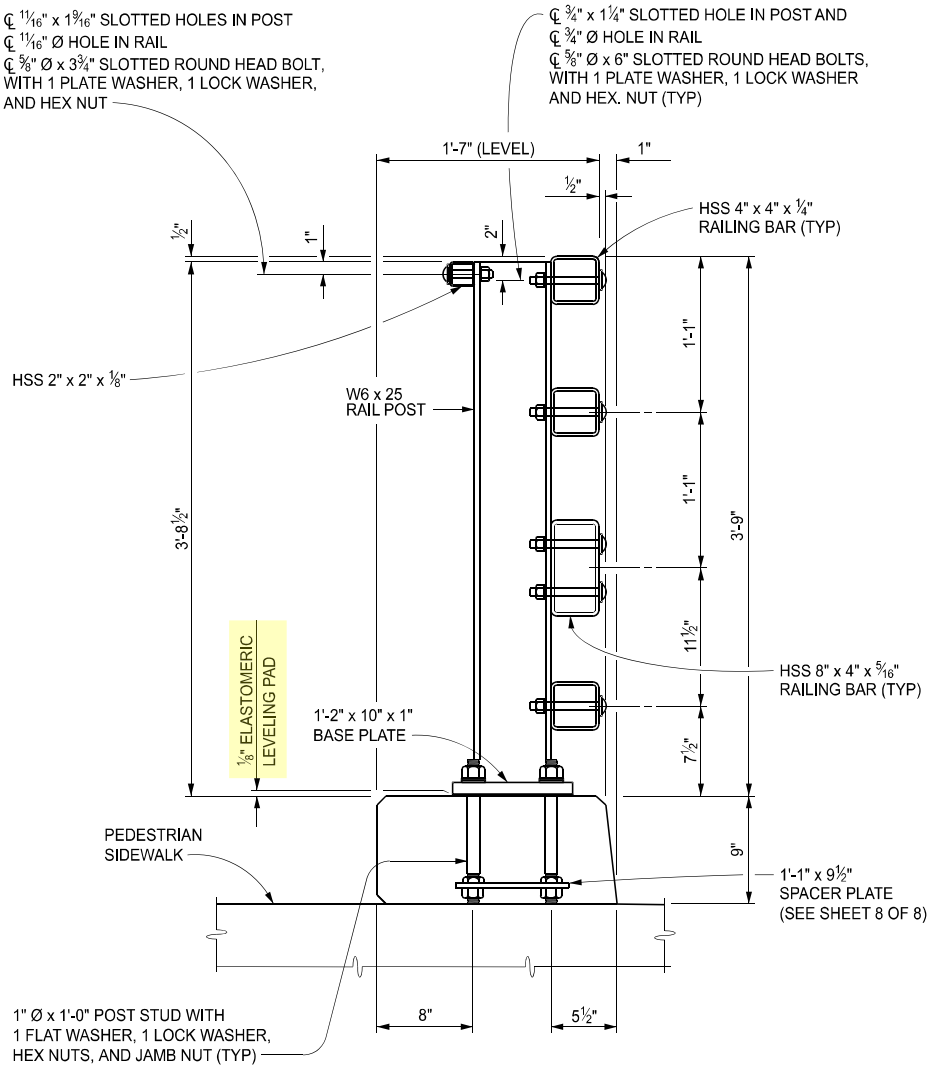
Michigan Department of Transportation

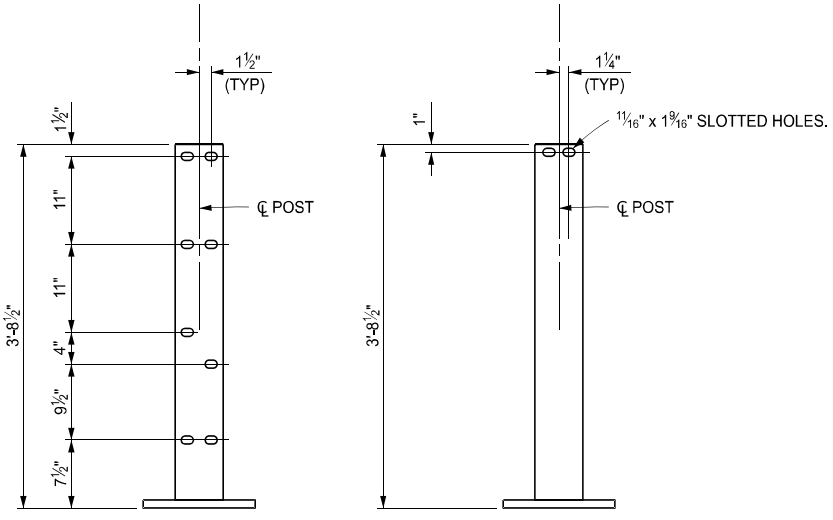
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING, 4 TUBE

(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-26-G	SHEET 1 OF 8



BICYCLE BRIDGE RAILING
WITH SIDEWALK



FRONT FLANGE BACK FLANGE

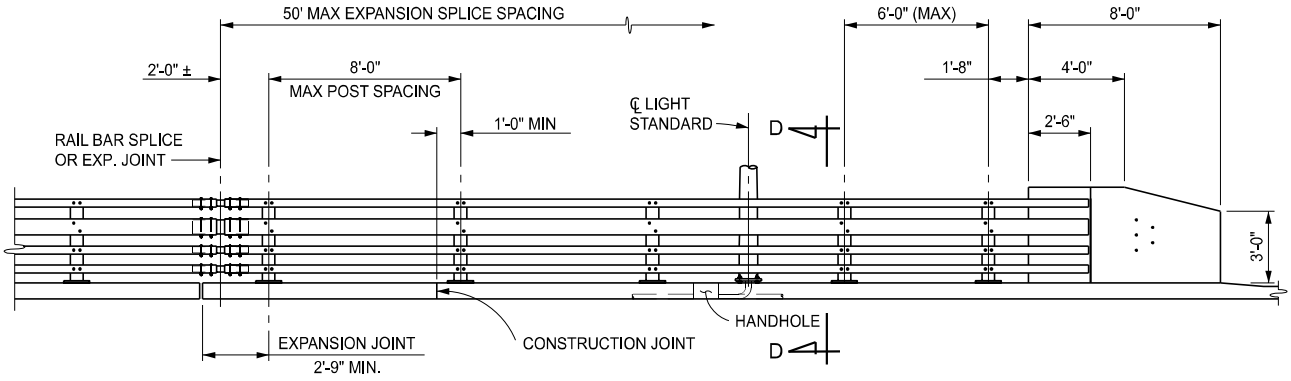
POST DETAILS

MDOT Michigan Department of Transportation

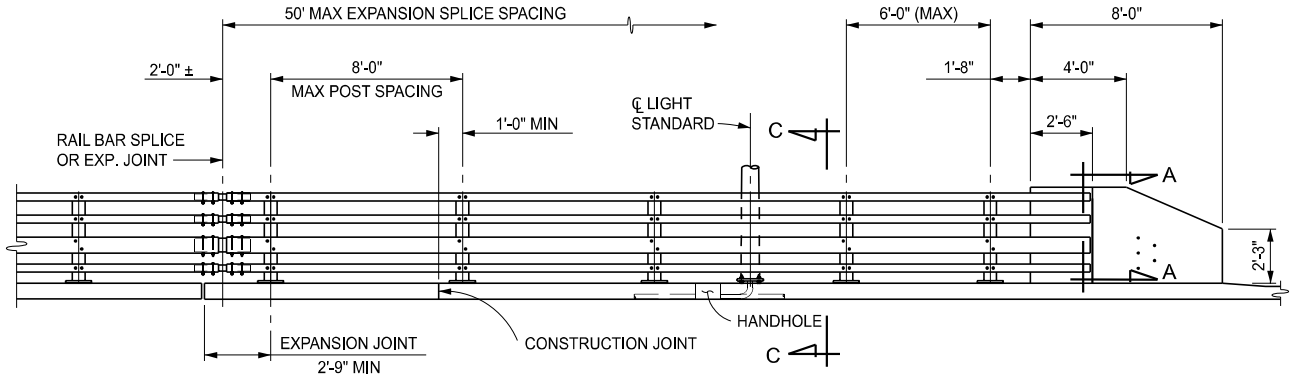
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING, 4 TUBE

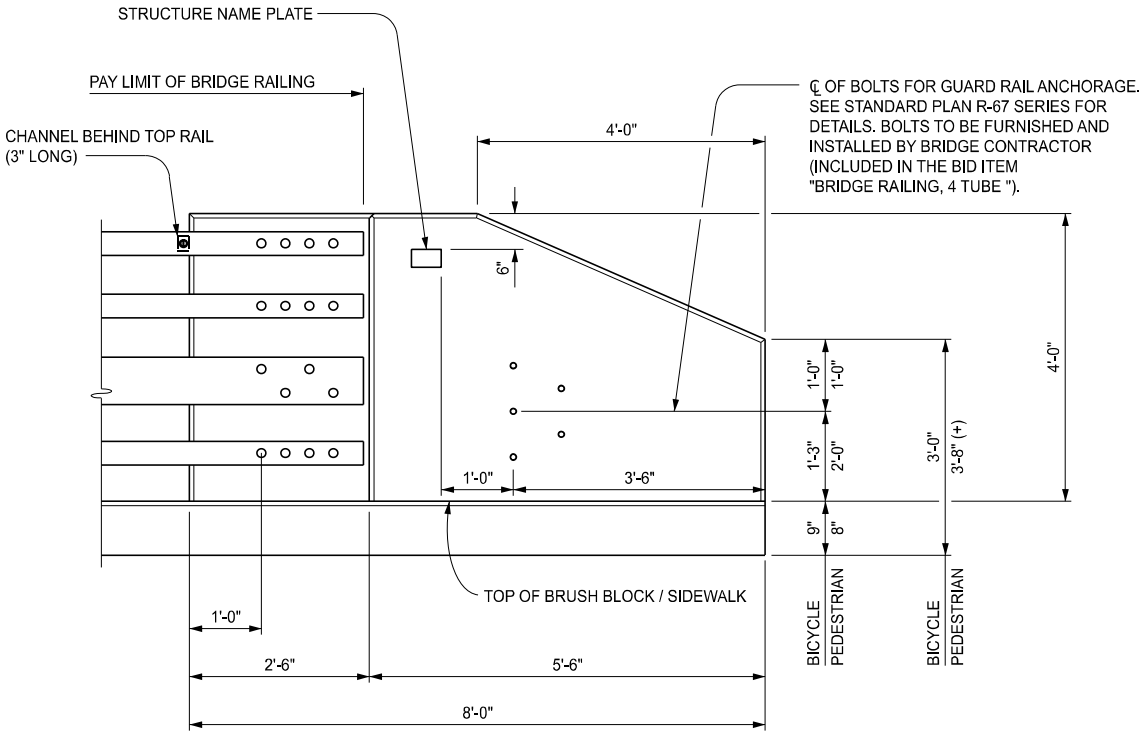
(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-26-G	SHEET 2 OF 8



PEDESTRIAN RAILING



BICYCLE RAILING



END WALL ELEVATIONS

BICYCLE RAILING SHOWN
PEDESTRIAN RAILING SIMILAR

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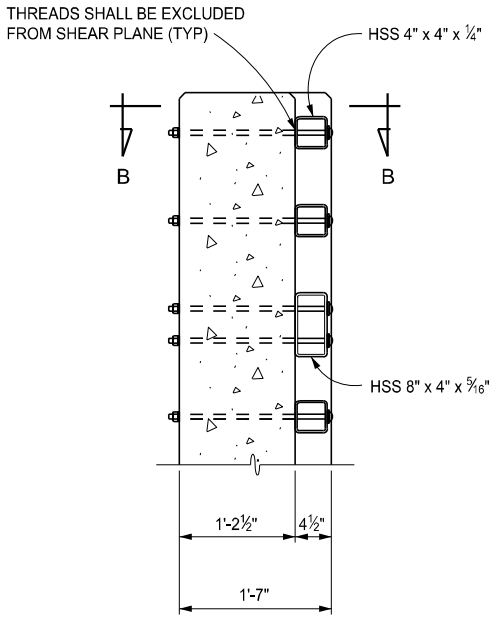
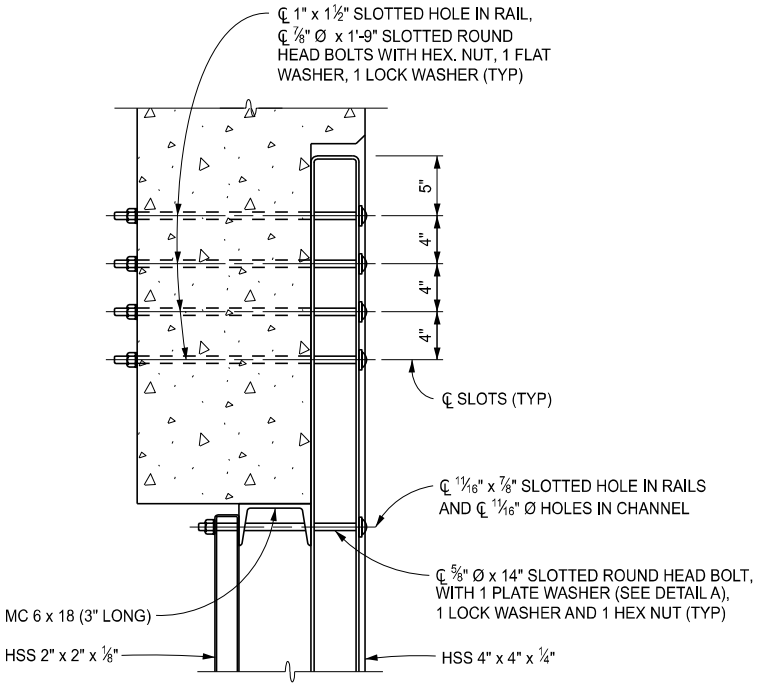
STANDARD PLAN FOR
BRIDGE RAILING, 4 TUBE

(SPECIAL DETAIL)	04/16/2024	B-26-G	SHEET
FHWA APPROVAL	PLAN DATE		3 OF 8

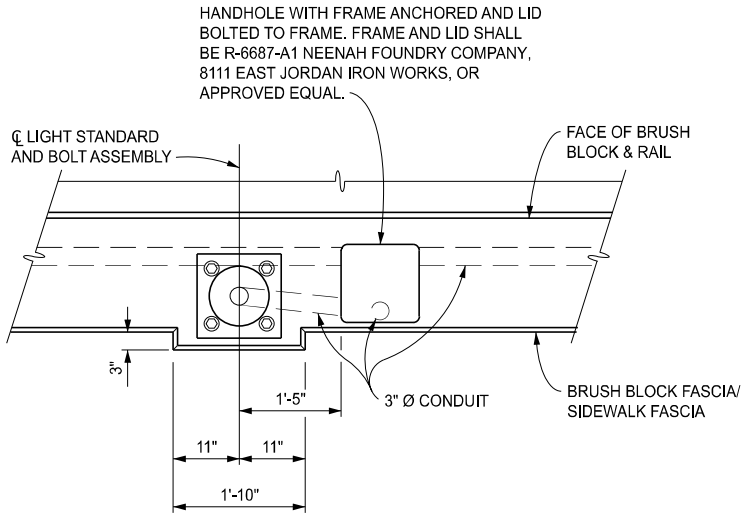


SECTION A-A

BICYCLE RAILING SHOWN
PEDESTRIAN RAILING SIMILAR

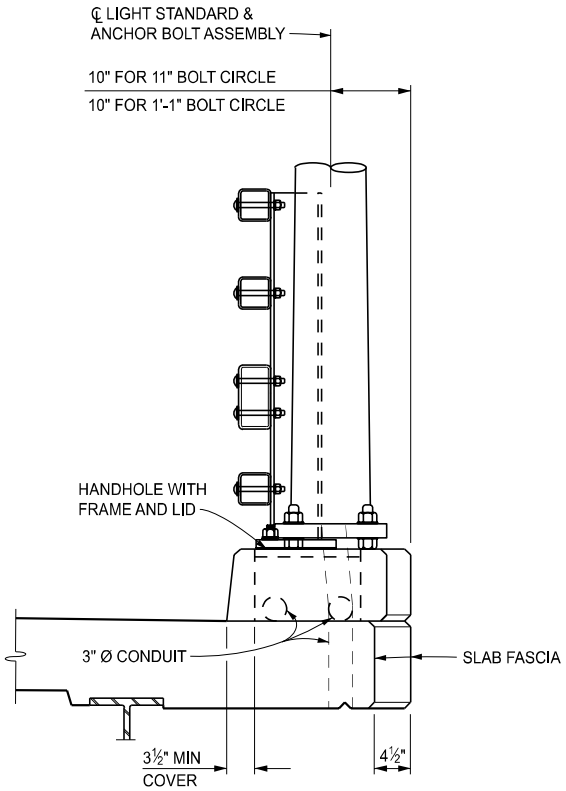


SECTION B-B



PLAN VIEW AT LIGHT STANDARD

BICYCLE RAILING



SECTION C-C

BICYCLE RAILING

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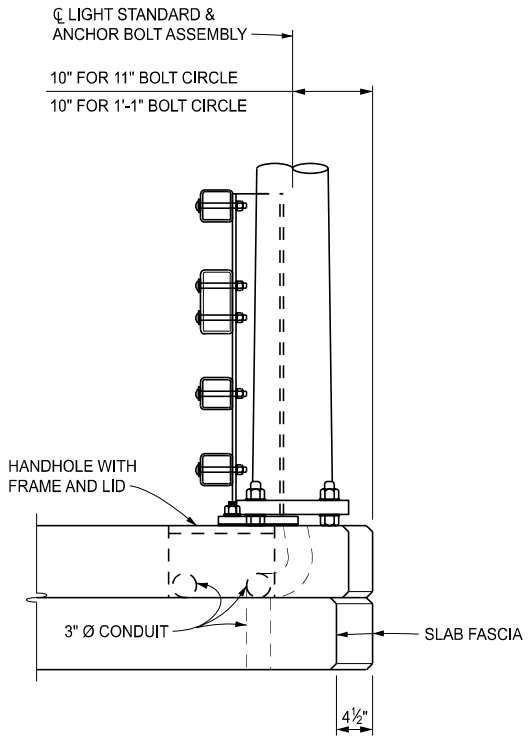
BRADLEY C. WIEFERICH, PE

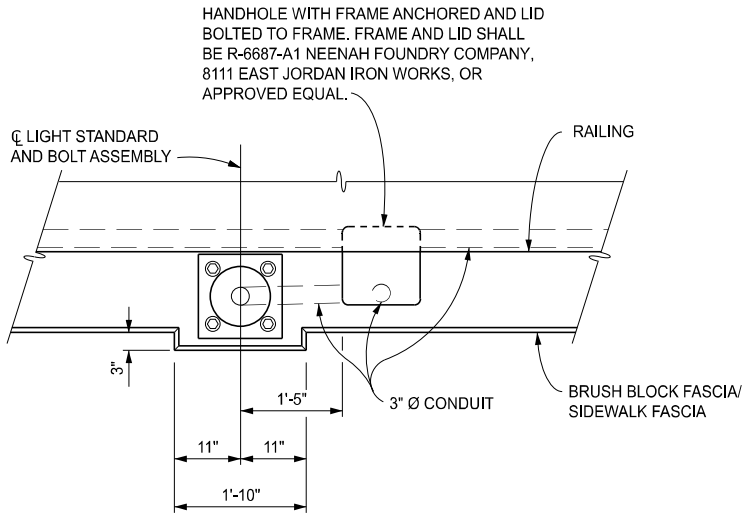
STANDARD PLAN FOR
BRIDGE RAILING, 4 TUBE

(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-26-G	SHEET 4 OF 8



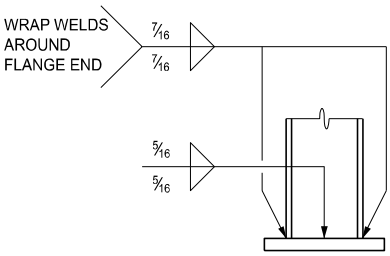
SECTION D-D

PEDESTRIAN RAILING



PLAN VIEW AT LIGHT STANDARD

PEDESTRIAN RAILING



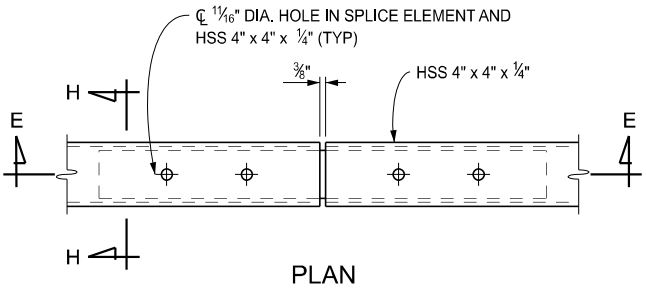
BASE WELD DETAIL

MDOT
Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

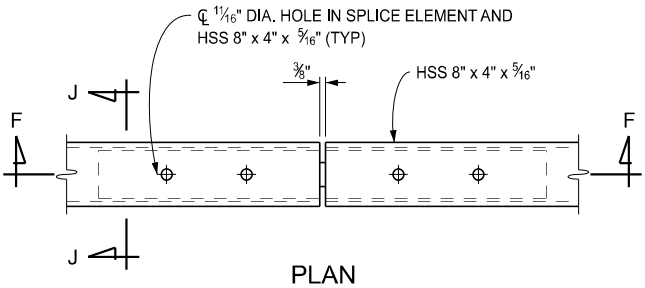
STANDARD PLAN FOR
BRIDGE RAILING, 4 TUBE

(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-26-G	SHEET 5 OF 8



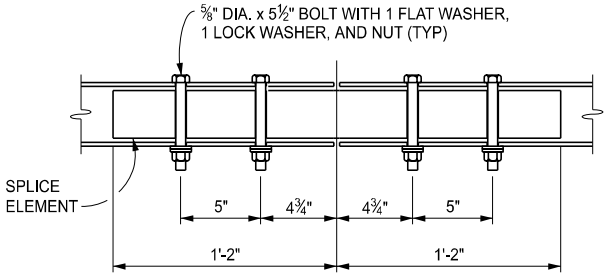
PLAN

HSS 4" x 4" x 1/4"



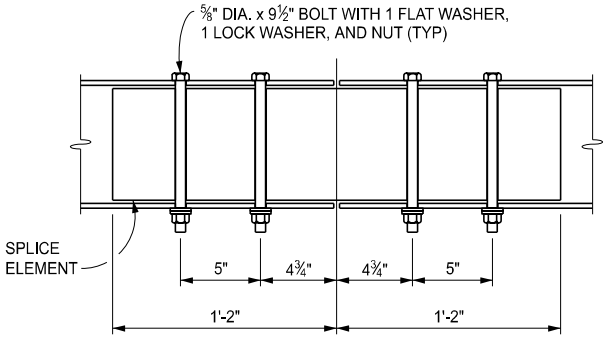
PLAN

HSS 8" x 4" x 5/16"



SECTION E-E

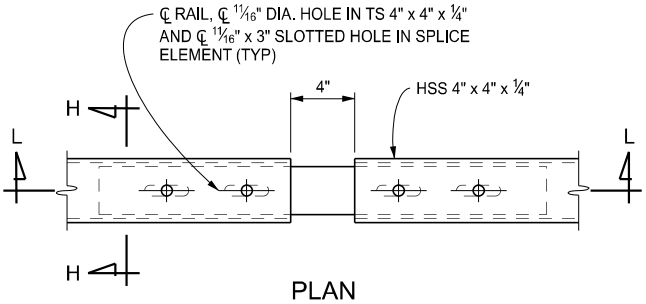
HSS 4" x 4" x 1/4"



SECTION F-F

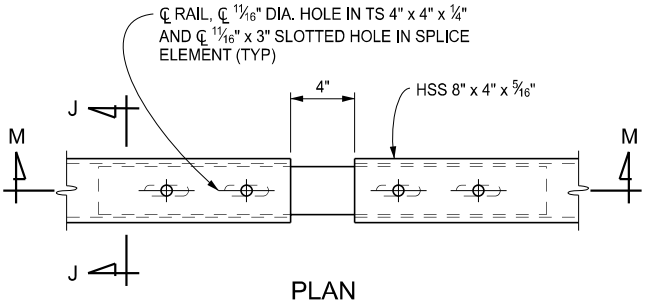
HSS 8" x 4" x 5/16"

FIXED SPLICE DETAILS



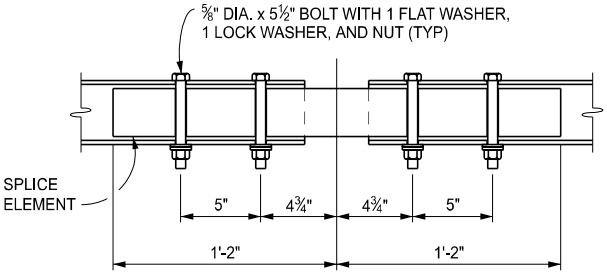
PLAN

HSS 4" x 4" x 1/4"



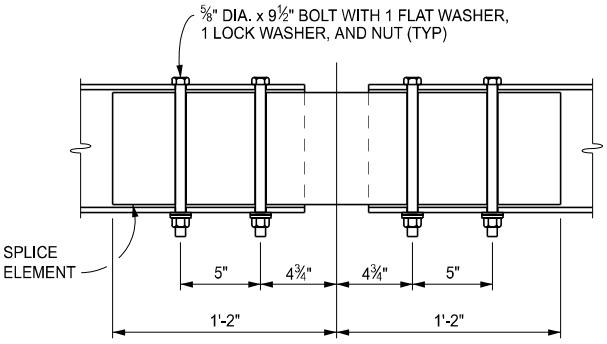
PLAN

HSS 8" x 4" x 5/16"



SECTION L-L

HSS 4" x 4" x 1/4"



SECTION M-M

HSS 8" x 4" x 5/16"

EXPANSION SPLICE DETAILS

MDOT
Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING, 4 TUBE

(SPECIAL DETAIL)	04/16/2024	B-26-G	SHEET
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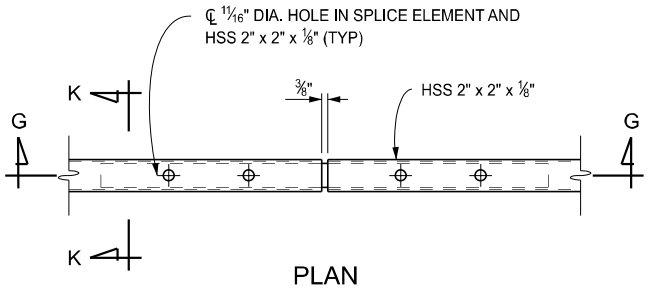
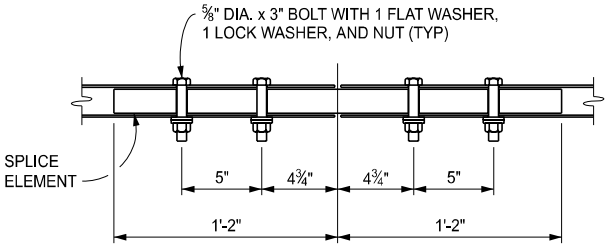


PLAN

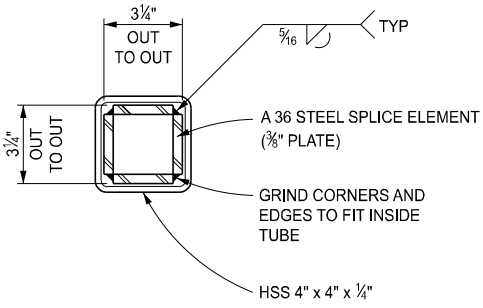
HSS 2" x 2" x 1/8"



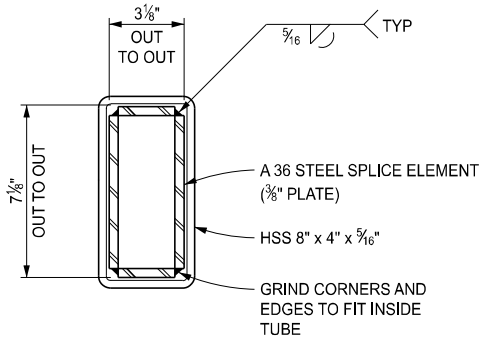
SECTION G-G

HSS 2" x 2" x 1/8"

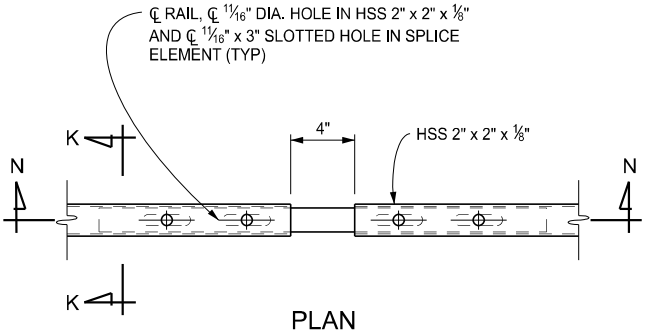
FIXED SPLICE DETAILS



SECTION H-H

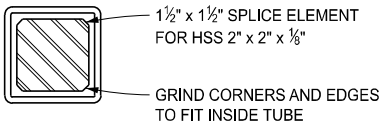


SECTION J-J

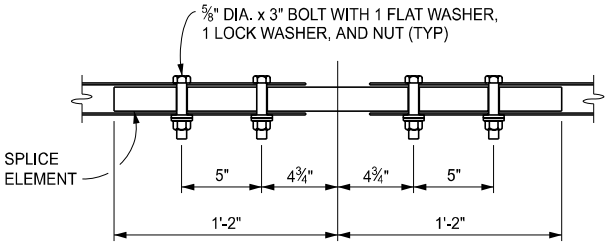


PLAN

HSS 2" x 2" x 1/8"



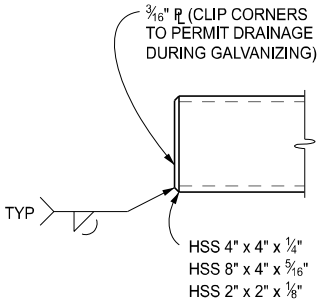
SECTION K-K



SECTION N-N

HSS 2" x 2" x 1/8"

EXPANSION SPLICE DETAILS



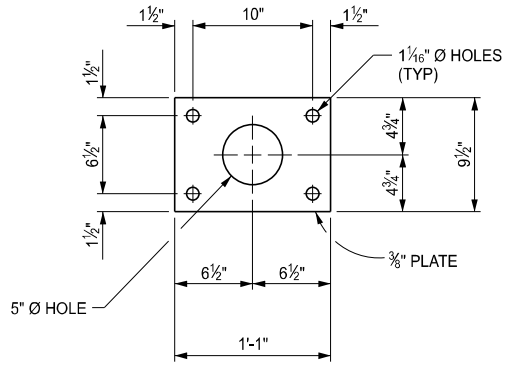
END OF RAIL

MDOT
Michigan Department of Transportation

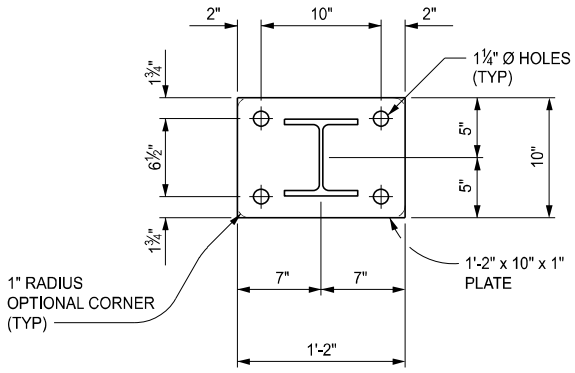
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING, 4 TUBE

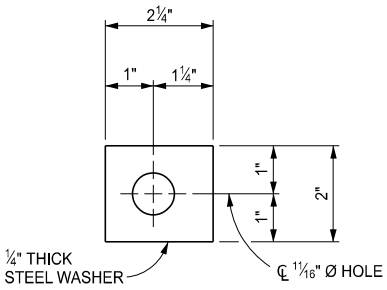
(SPECIAL DETAIL)	04/16/2024	B-26-G	SHEET
FHWA APPROVAL	PLAN DATE		7 OF 8



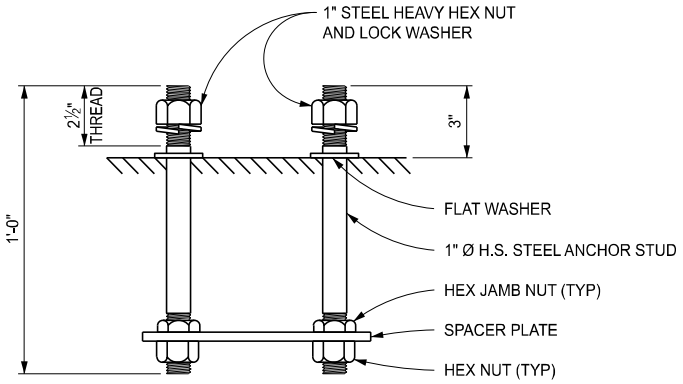
SPACER PLATE PLAN



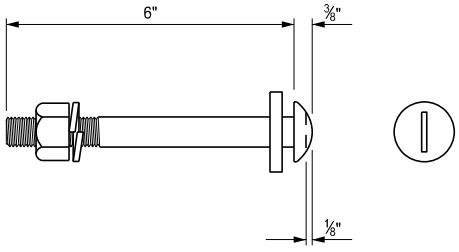
POST & BASE PLATE PLAN



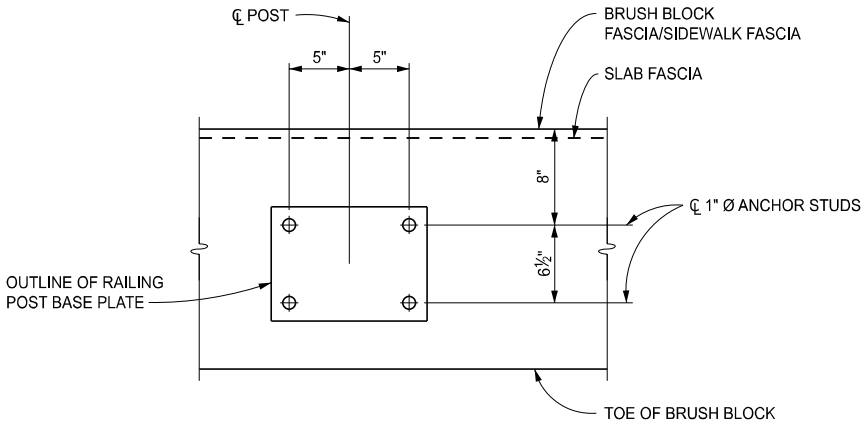
DETAIL A



POST STUD ANCHORAGE



⅝" Ø ROUND HEAD BOLT
WITH PLATE WASHER (SEE DETAIL A), LOCK WASHER AND HEX NUT



ANCHOR STUD LAYOUT
NOTE: SURFACE UNDER POST IS TO BE FINISHED LEVEL

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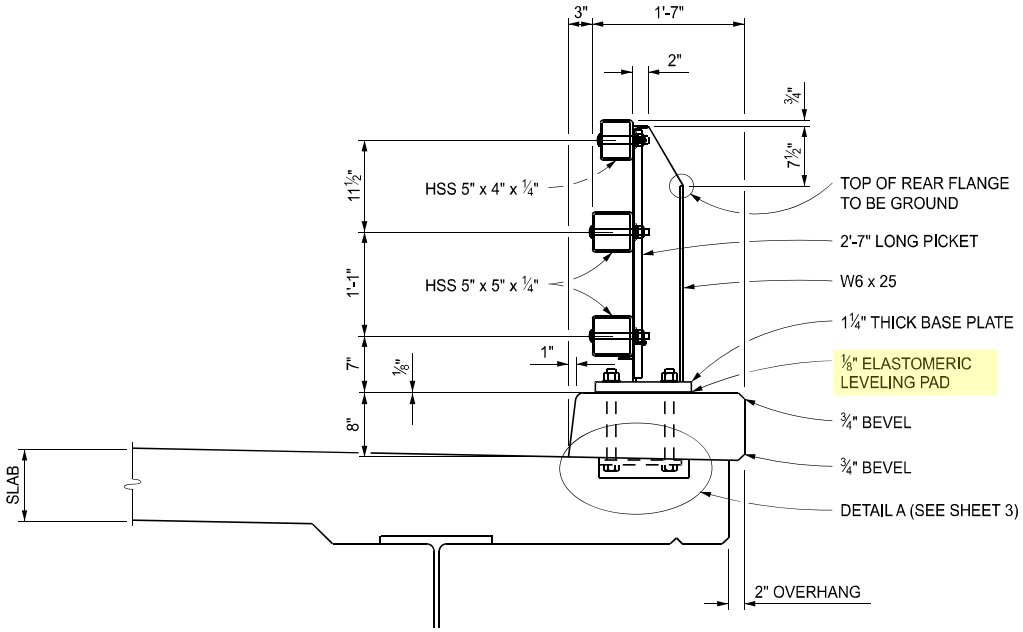
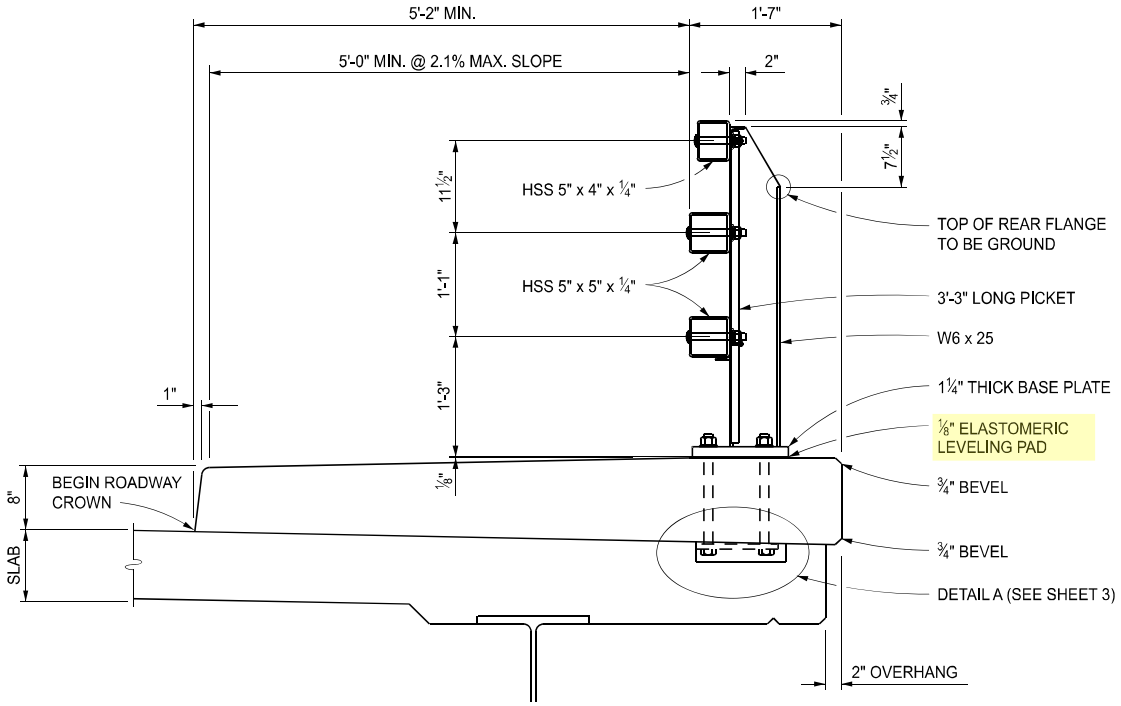
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING, 4 TUBE

(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-26-G	SHEET 8 OF 8



SECTION THROUGH RAILING WITH BRUSH BLOCK



SECTION THROUGH RAILING WITH SIDEWALK

APPROVED BY: _____
DIRECTOR, BUREAU OF BRIDGES AND STRUCTURES

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

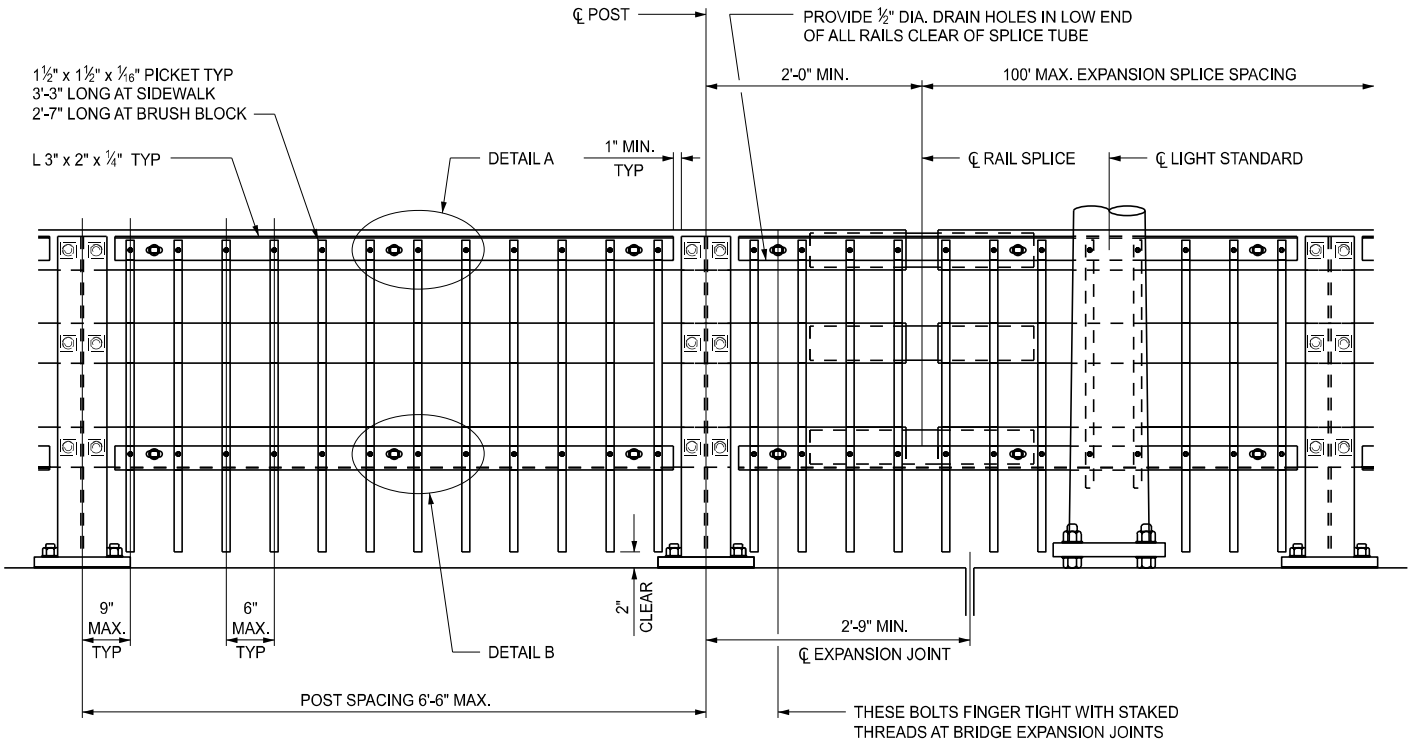
APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MDOT
Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

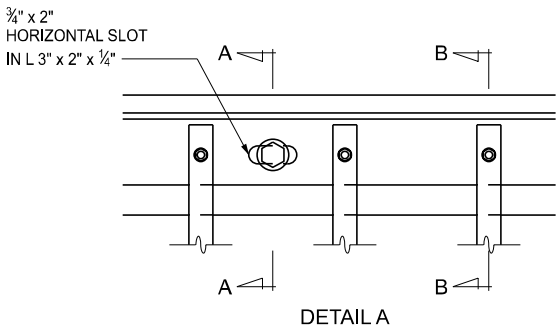
STANDARD PLAN FOR
BRIDGE RAILING,
3 TUBE WITH PICKETS

(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-27-B	SHEET 1 OF 7

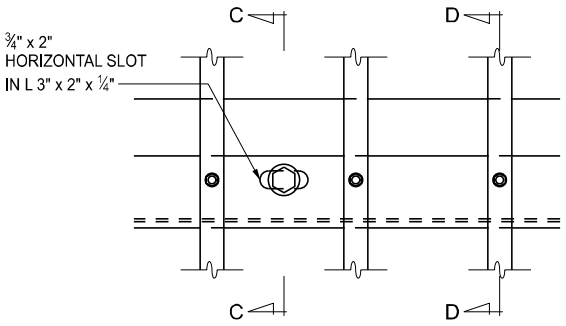


RAILING ELEVATION

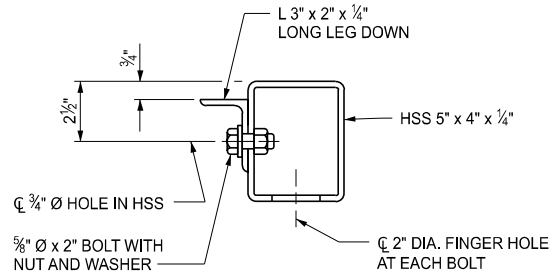
(AT SIDEWALK SHOWN)



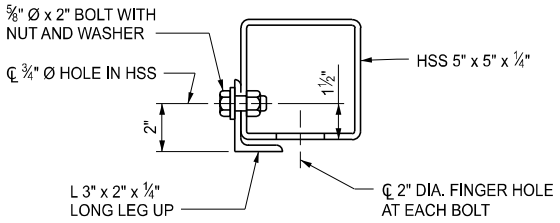
DETAIL A



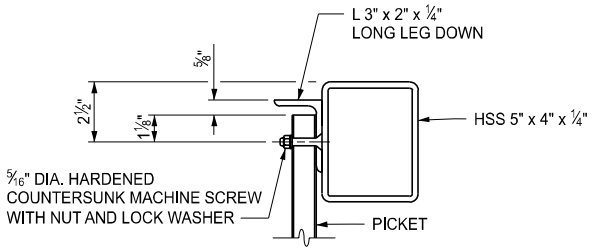
DETAIL B



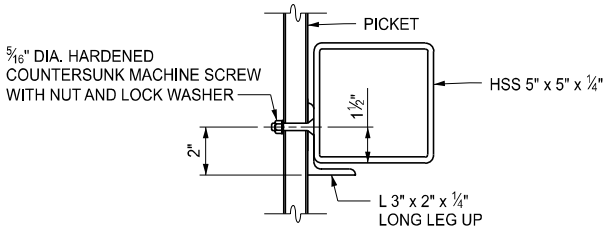
SECTION A - A



SECTION C - C



SECTION B - B



SECTION D - D

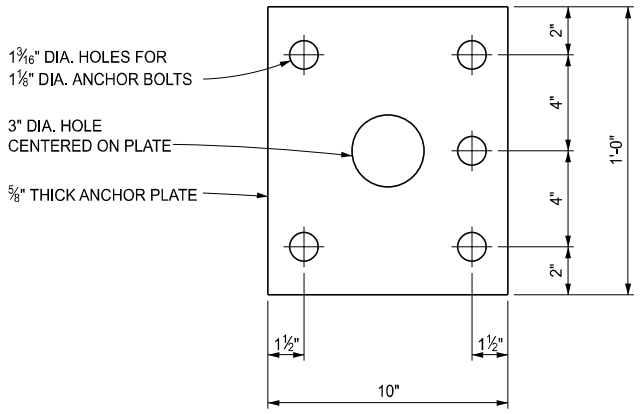
PICKET TO RAIL DETAILS

MDOT Michigan Department of Transportation

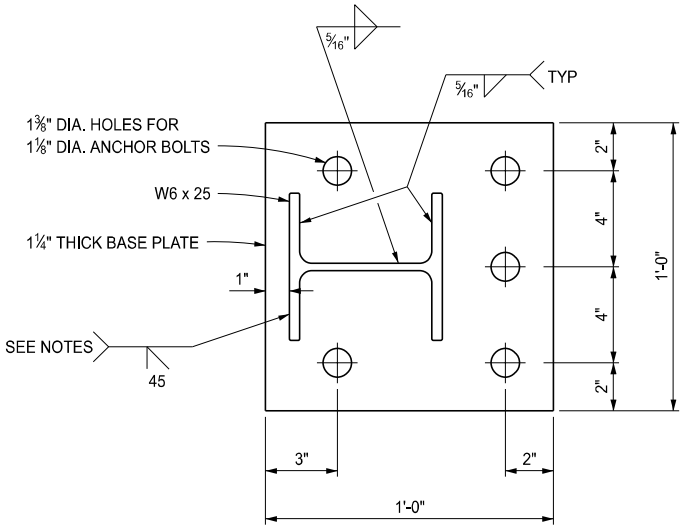
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING,
3 TUBE WITH PICKETS

(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-27-B	SHEET 2 OF 7

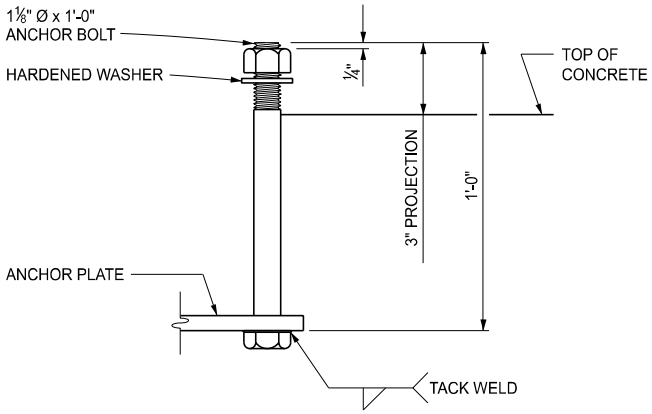


ANCHOR PLATE

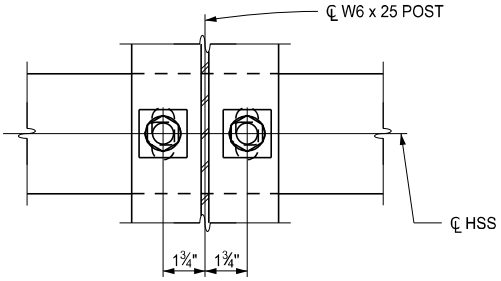


BASE PLATE

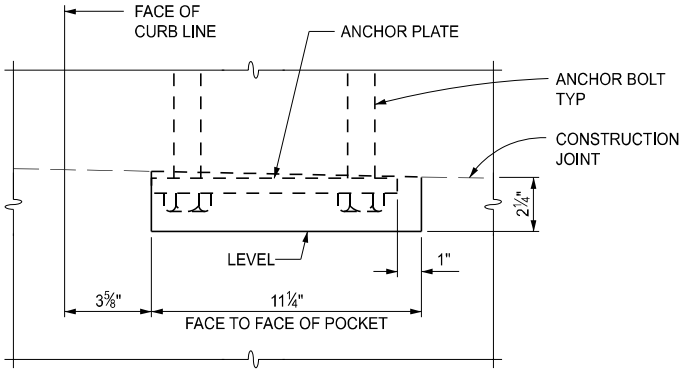
NOTE:
POST FLANGE WELD DOES NOT REQUIRE MAGNETIC PARTICLE TESTING. WELD SHALL BE BACK-GOUGED ON BACK SIDE EXCEPT AT WEB. WELD IS THE SAME ON BOTH FLANGES.



ANCHOR BOLT

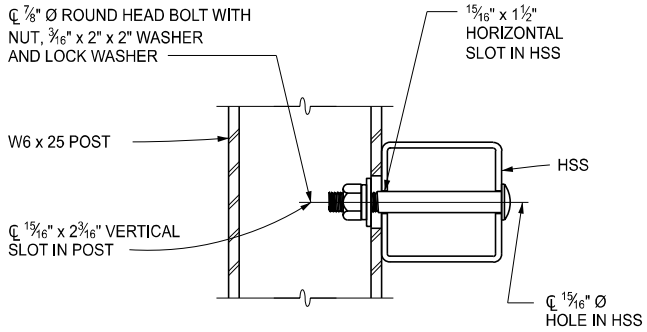


SECTION THROUGH POST WEB



DETAIL A

NOTE:
PROVIDE 15 3/4" LONG x 11 1/4" WIDE x 2 1/4" DEEP POCKET IN THE DECK SLAB AT THE LOCATION OF EACH RAIL POST. USE AT BRUSH BLOCK SECTION AND AT SIDEWALK FASCIA LESS THAN 10".



SECTION THROUGH RAIL

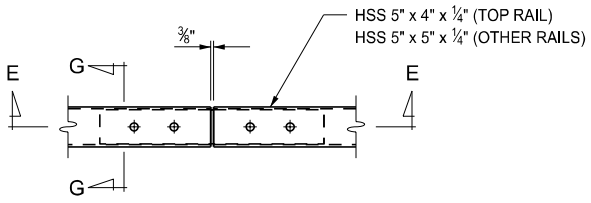
RAIL TO POST CONNECTIONS

MDOT
Michigan Department of Transportation

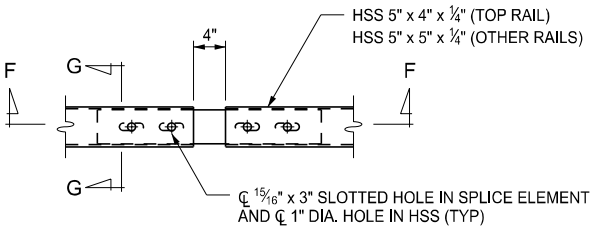
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING,
3 TUBE WITH PICKETS

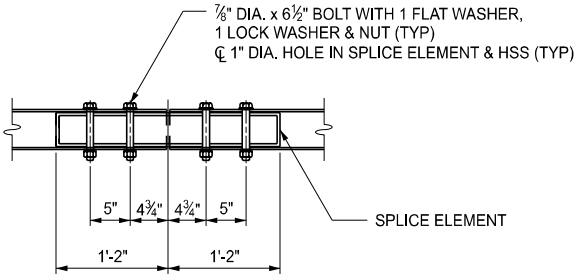
(SPECIAL DETAIL)	04/16/2024	B-27-B	SHEET
FHWA APPROVAL	PLAN DATE		3 OF 7



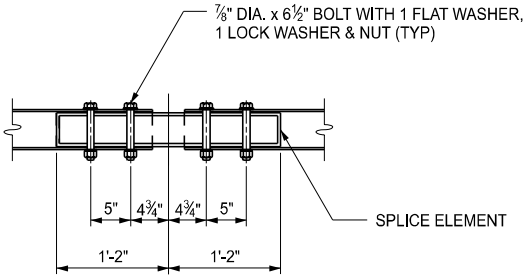
FIXED SPLICE PLAN



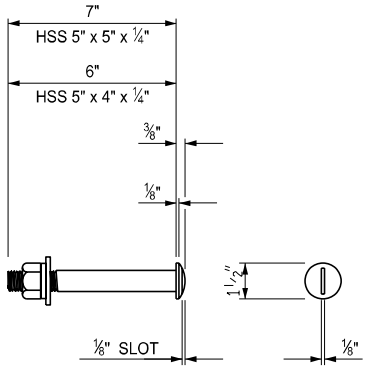
EXPANSION SPLICE PLAN



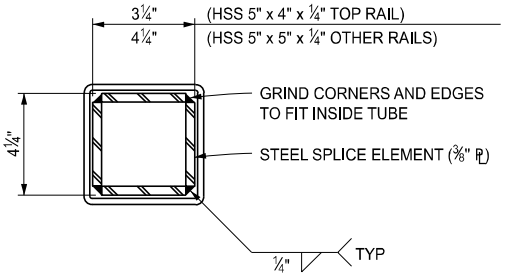
SECTION E - E



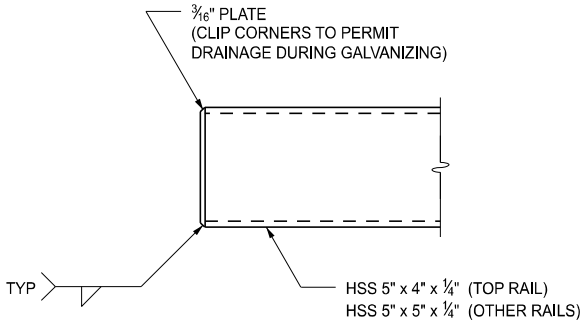
SECTION F - F



⅞" Ø ROUND HEAD BOLT



SECTION G - G



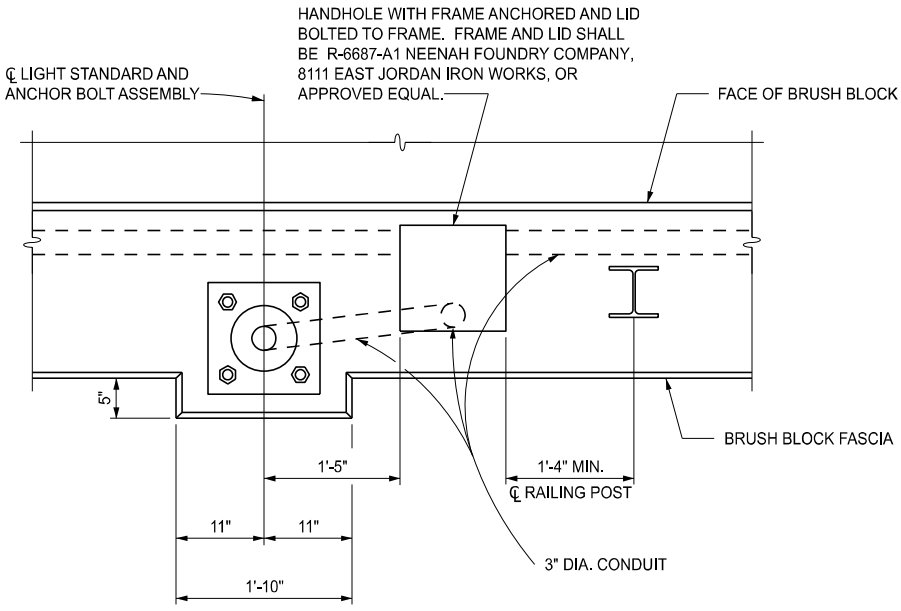
END OF RAIL DETAIL

MDOT
Michigan Department of Transportation

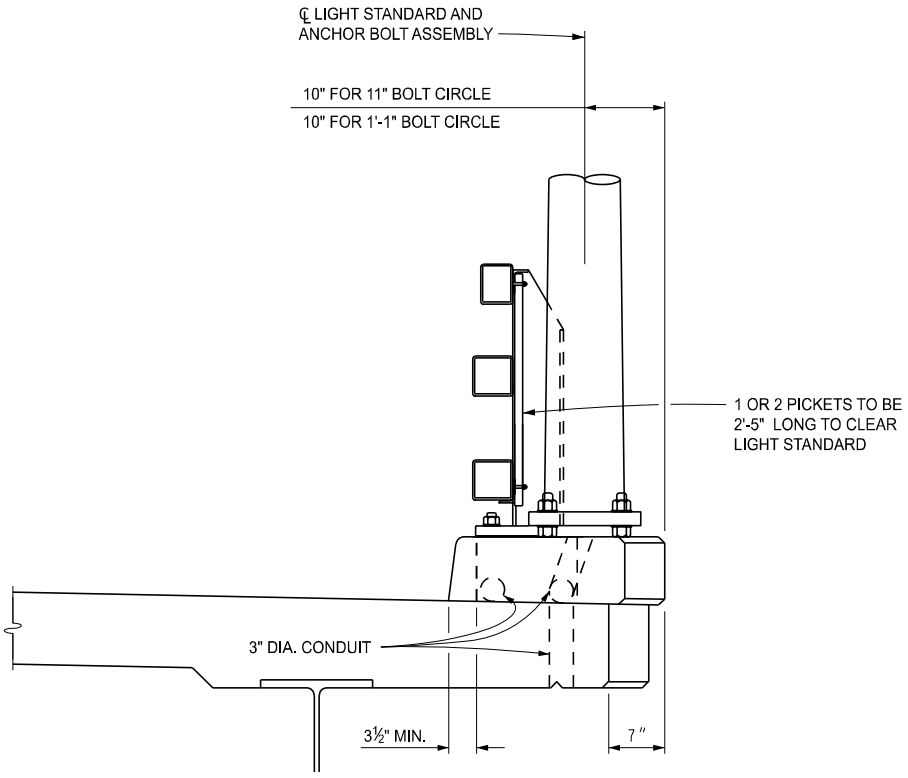
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING,
3 TUBE WITH PICKETS

(SPECIAL DETAIL)	04/16/2024	B-27-B	SHEET
FHWA APPROVAL	PLAN DATE		4 OF 7



PLAN VIEW AT LIGHT STANDARD WITH BRUSH BLOCK



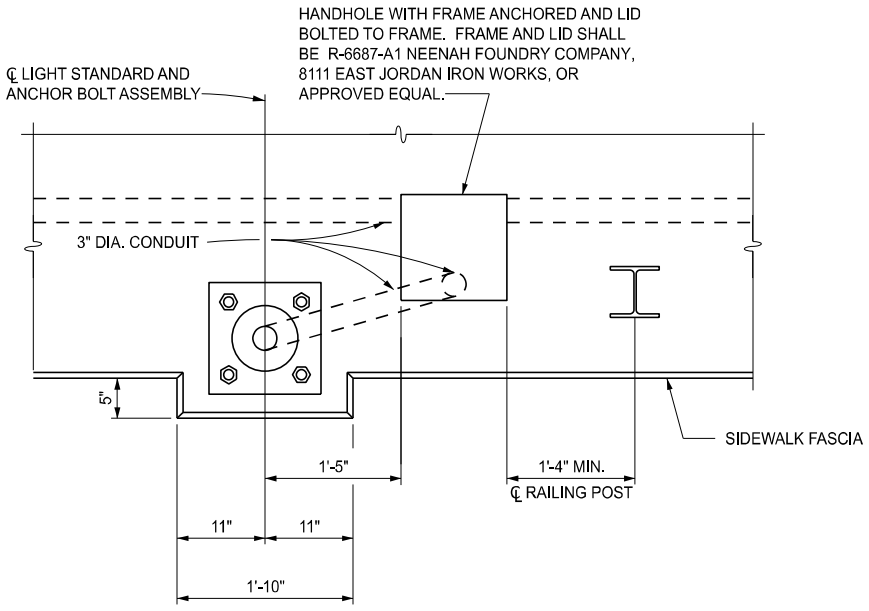
SECTION AT LIGHT STANDARD WITH BRUSH BLOCK

MDOT Michigan Department of Transportation

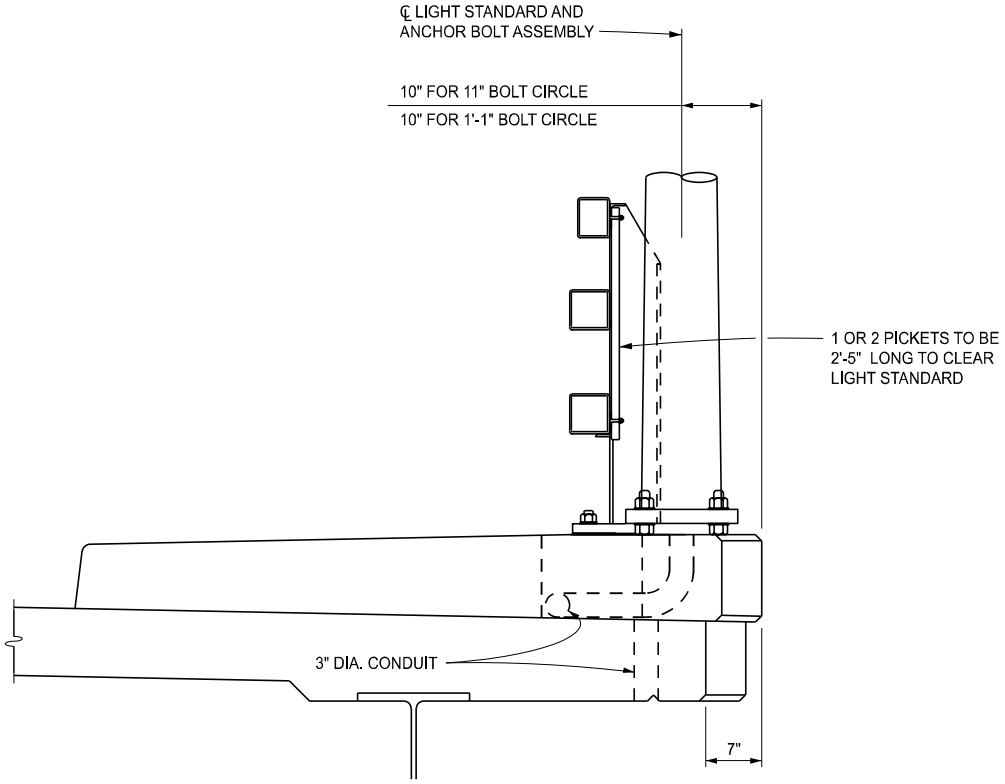
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING,
3 TUBE WITH PICKETS

(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-27-B	SHEET 5 OF 7

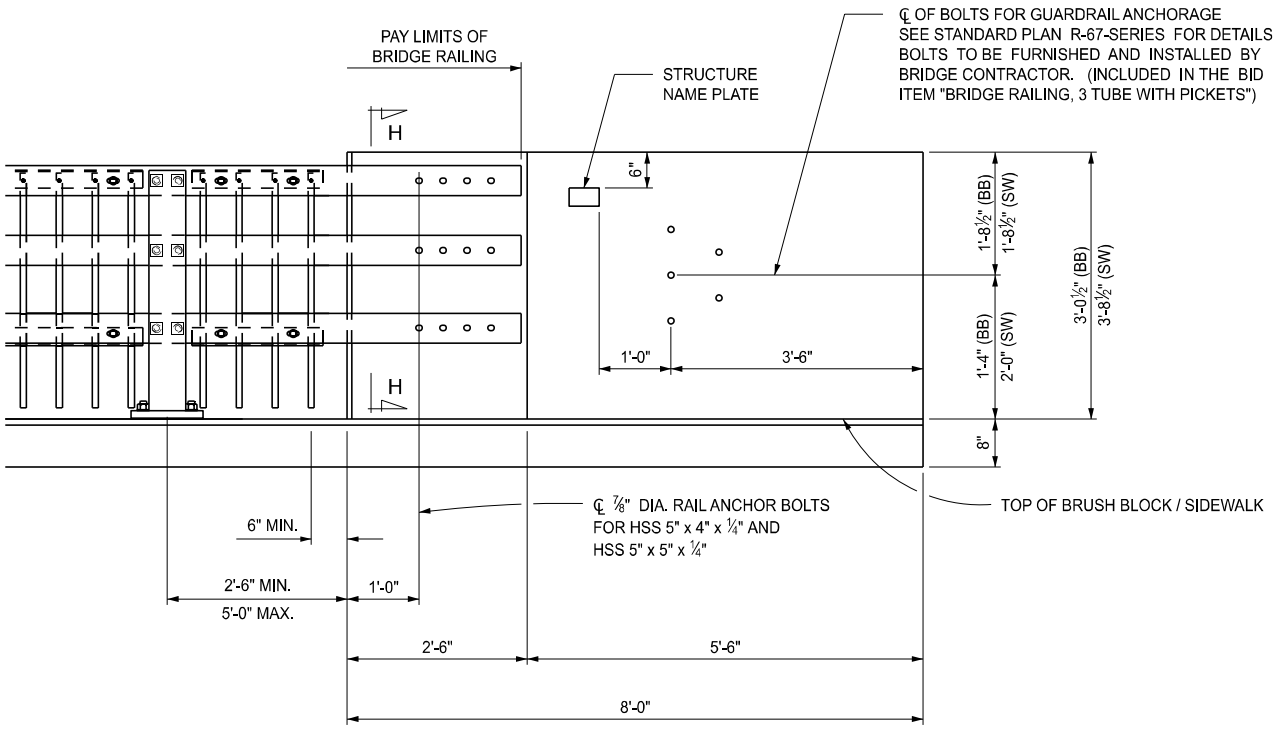


PLAN VIEW AT LIGHT STANDARD WITH SIDEWALK



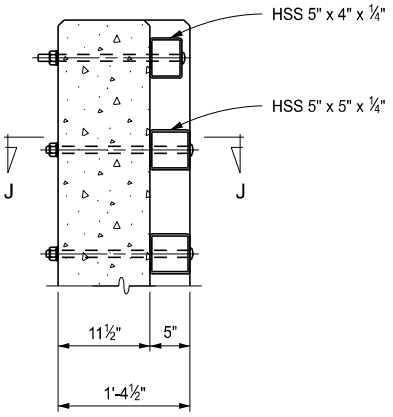
SECTION THROUGH RAILING WITH SIDEWALK

MDOT Michigan Department of Transportation DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR BRIDGE RAILING, 3 TUBE WITH PICKETS		
(SPECIAL DETAIL) FHWA APPROVAL	04/16/2024 PLAN DATE	B-27-B	SHEET 6 OF 7

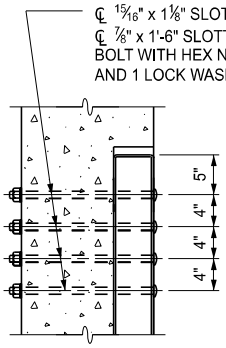


END WALL ELEVATION

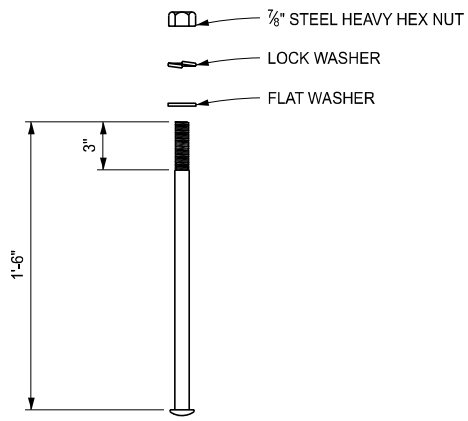
BB = BRUSH BLOCK
SW = SIDEWALK



SECTION H - H



SECTION J - J



⅞" Ø ROUND HEAD BOLT

NOTES:

RAILS SHALL BE CONTINUOUS OVER A MINIMUM OF FOUR (4) POSTS WITHOUT SPLICES WHERE POSSIBLE. RAILS SHALL BE SPLICED IN A PANEL OVER EXPANSION JOINTS.

DETAILS SHOWN ARE ACCORDING TO THE AASHTO SPECIFICATIONS.

ALL WORK AND MATERIAL SHALL BE ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION UNLESS OTHERWISE NOTED ON THIS PLAN.

MDOT
Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
BRIDGE RAILING,
3 TUBE WITH PICKETS

(SPECIAL DETAIL)	04/16/2024	B-27-B	SHEET
FHWA APPROVAL	PLAN DATE		7 OF 7

7.01.03

Design Stresses (12-27-2021)

Concrete: Grade 3500, 3500HP* f'_c = 3000 psi
Concrete: Grade 4000, f'_c = 3500 psi
Concrete: Grade 4500, 4500HP* f'_c = 4000 psi
Steel Reinforcement f_y = 60,000 psi
Steel Reinforcement:
Stirrups for Prestressed Beams
(including stainless steel (SD) bars)
f_y = 60,000 psi
Stirrups for 17" & 21" Box Beams
(including stainless steel (SD) bars)
f_y = 40,000 psi
Structural Steel:
AASHTO M270
Grade 36 F_y = 36,000 psi
Structural Steel (including H-Piles, splices and pile points):
AASHTO M270
Grade 50 F_y = 50,000 psi
Grade 50W F_y = 50,000 psi
Structural Steel Pins:
ASTM A276
UNS Designation
S20161 or S21800 F_y = 50,000 psi
Temp Support Hanger Rods:
ASTM A193 Grade B7 (AISI 4140)
2 ½" and under F_u =125,000psi
F_y =105,000 psi
Over 2 ½" to 4" F_u =115,000psi
F_y = 95,000 psi
Over 4" to 7" F_u =100,000psi
F_y = 75,000 psi
Prestressed Concrete ** f'_c = 6000 - 8000 psi
Prestressed Concrete Compressive
Strength at Release f'_{ci} = 7000 psi (max)
Prestressing Strands f_{pu} = 270,000 psi
Foundation Piling (Steel Shells):
ASTM A252
Grade 3 F_y = 45,000 psi
Grade 3 Modified F_y = 50,000 psi
Foundation Piling (Timber) F_{CO} = 900 psi
High Strength Bolts:***
Organic zinc rich primer (Class B)
(Type 4 coating system) F_s = 32,000 psi

* Use Grade 3500HP and 4500HP on all MDOT projects. Grade 3500 and 4500 may be used on Local Agency projects if desired by the Owner. (4-22-2024)

** See Subsection 7.02.03.

*** Value of F_s is Design Slip Resistance for Slip-Critical Connections with faying surfaces coated.

8.02 (continued)

TITLE SHEET

G. The stationing as shown on these plans for the intersection of the centerline of bridge and the (roadway) (railroad) centerline is believed to be correct. Check stationing at the time of starting construction. If the stationing shown on the plans is incorrect, notify the Engineer, and stake out the structure using the actual intersection of the centerline of bridge and the (roadway) (railroad) centerline as the control point. [Use when the project includes proposed survey stationing.]

H. This contract is for "Structural Steel, ____, Furn and Fab" only. Other items of work indicated on these plans are not a part of this contract. [Use when structural steel furnishing and fabricating must be done early in project to ensure timely delivery for construction.] (12-5-2005)

I. The Regulated Waste Activity Identification Numbers for this project are as follows:

Control Section Number

_____ _____

[Use when hazardous material removal, cleaning or working on painted steel structure constructed prior to 1978 or when hydrodemolition is part of the project work. Place note directly above title block and use lettering twice the size of the other notes.] (1-27-2020)

8.02 (continued)

J. The design of the structural members is based on material of the following grades and stresses:

Concrete:
- Grade 3500, 3500HP* f'_c = 3,000 psi
- Grade 4000 f'_c = 3,500 psi
- Grade 4500, 4500HP* f'_c = 4,000 psi

Steel Reinforcement f_y = 60,000 psi

Steel Reinforcement:
- (Stirrups for Prestressed Beams (including stainless steel (SD) bars) f_y = 60,000 psi)
- (Stirrups for (17") (21") Box Beams (including stainless steel (SD) bars) f_y = 40,000 psi)

Structural Steel:
- AASHTO M270
- Grade 36 F_y = 36,000 psi

Structural Steel (including H-Piles, splices and pile points):
- AASHTO M270
- Grade 50, 50W F_y = 50,000 psi

Structural Steel Pins:
- ASTM A276
- UNS Designation
- S20161 or S21800 F_y = 50,000 psi

Temp Support Hanger Rods:
- ASTM A193 Grade B7 (AISI 4140)
- 2½" and under F_u =125,000 psi, F_y =105,000 psi
- Over 2½" to 4" F_u =115,000 psi, F_y = 95,000 psi
- Over 4" to 7" F_u =100,000 psi, F_y = 75,000 psi

Prestressed Concrete f'_c = _____ psi

Prestressed Concrete Compressive Strength at Release f'_{ci} = _____ psi

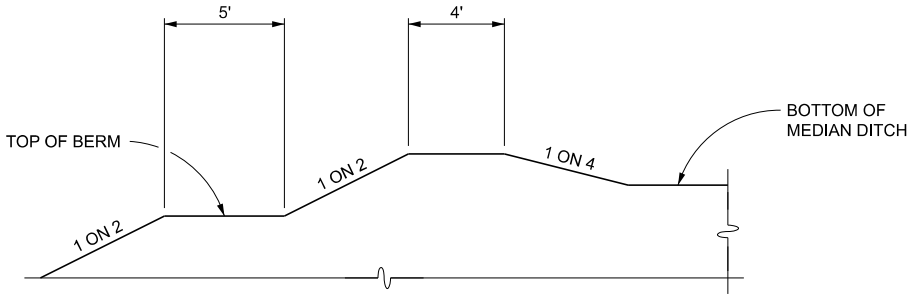
Prestressing Strands f_{pu} = 270,000 psi

Foundation Piling (Steel Shells):
- ASTM A252
- Grade 3 F_y = 45,000 psi
- Grade 3 Modified F_y = 50,000 psi

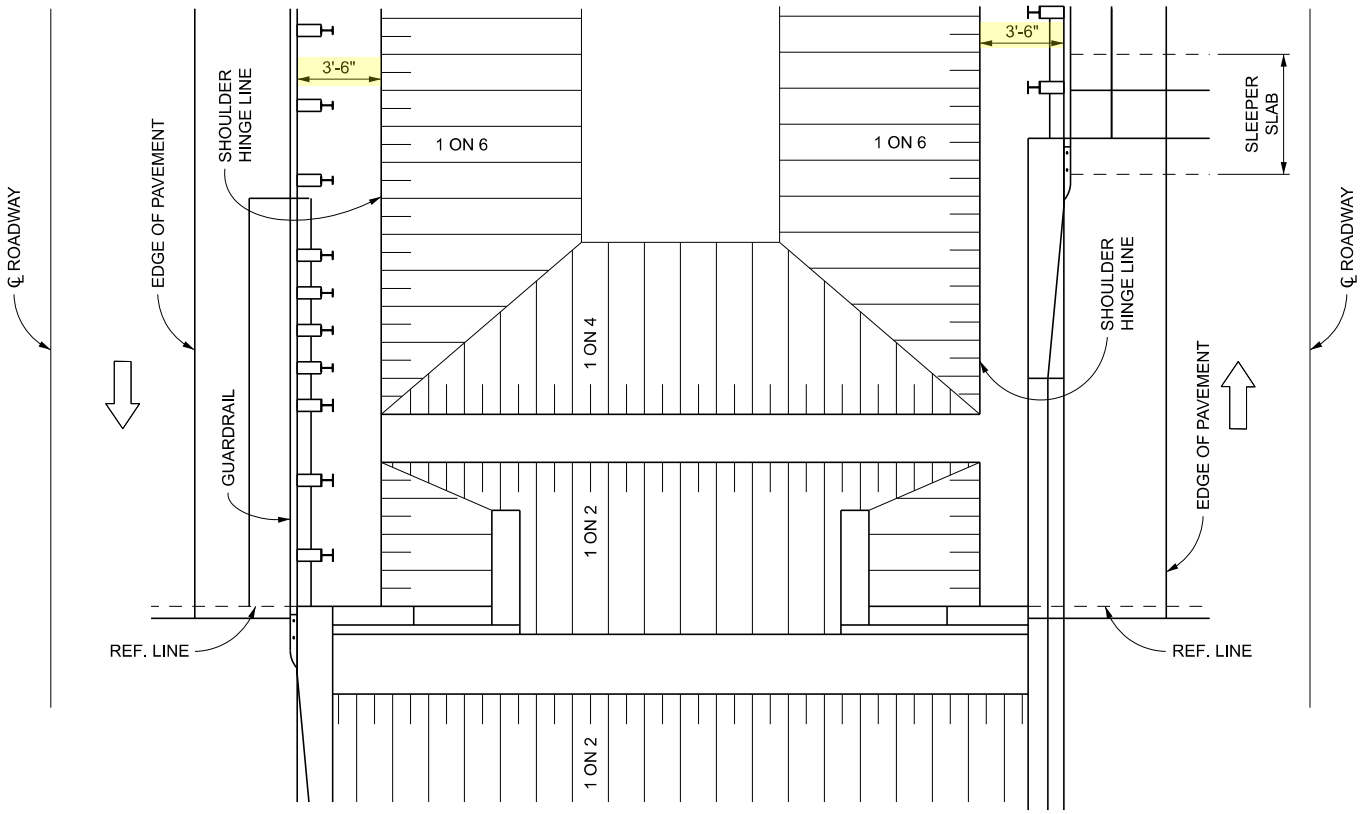
Foundation Piling (Timber) F_{CO} = 900 psi

[* Use Grade 3500HP and 4500HP on all MDOT projects. Grade 3500 and 4500 may be used on Local Agency projects if desired by the Owner.] (4-22-2024)

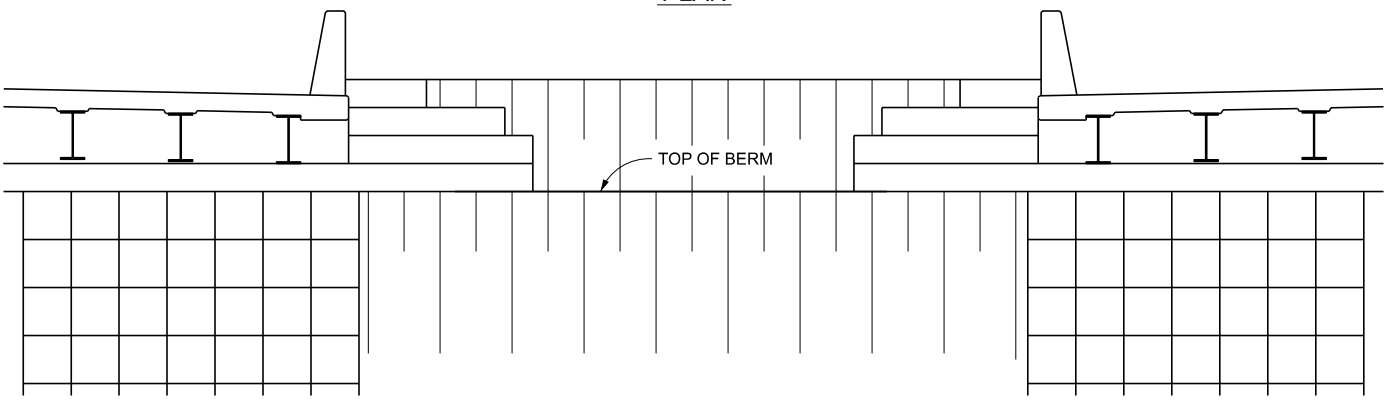
DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT MEDIAN TREATMENT AT DUAL STRUCTURES WITH SEPARATE ABUTMENTS	ISSUED: 04/22/24 SUPERSEDES: 12/16/19



LONGITUDINAL APPROACH SECTION



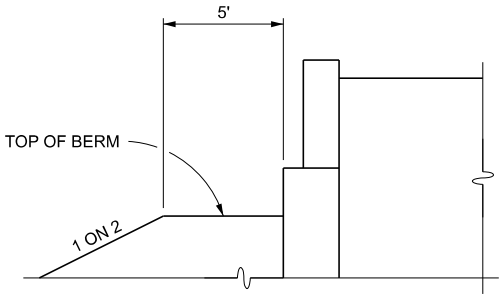
PLAN



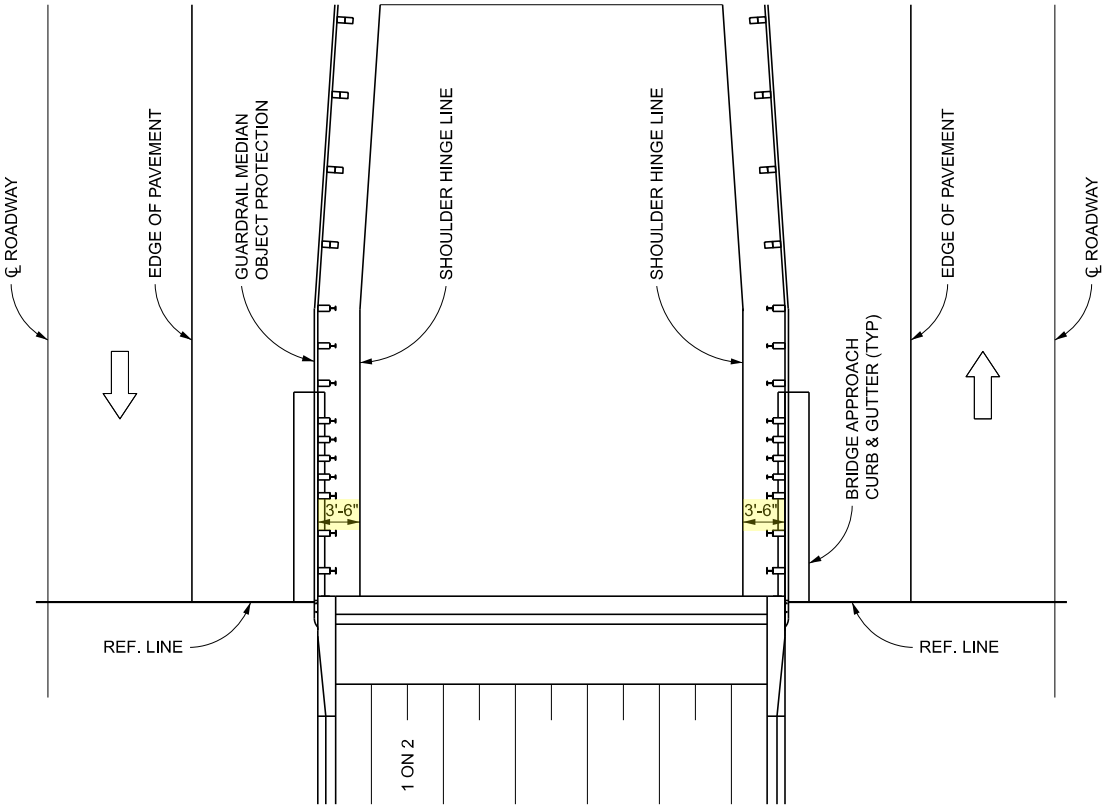
ELEVATION

PREPARED BY DESIGN DIVISION	4.23.01

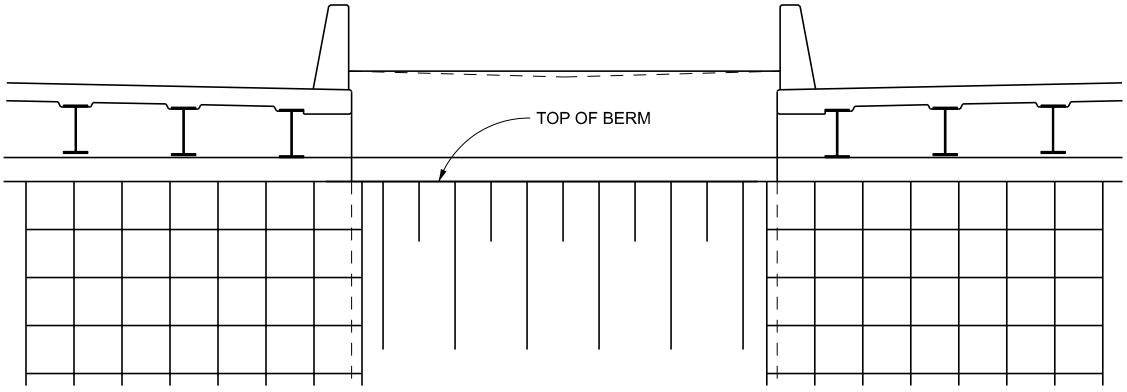
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 04/22/24
CHECKED BY: VZ	INTEGRAL AND SEMI-INTEGRAL ABUTMENT PARTIAL BACKWALL DETAILS	SUPERSEDES: 01/27/20
APPROVED BY: KCK		



LONGITUDINAL APPROACH SECTION



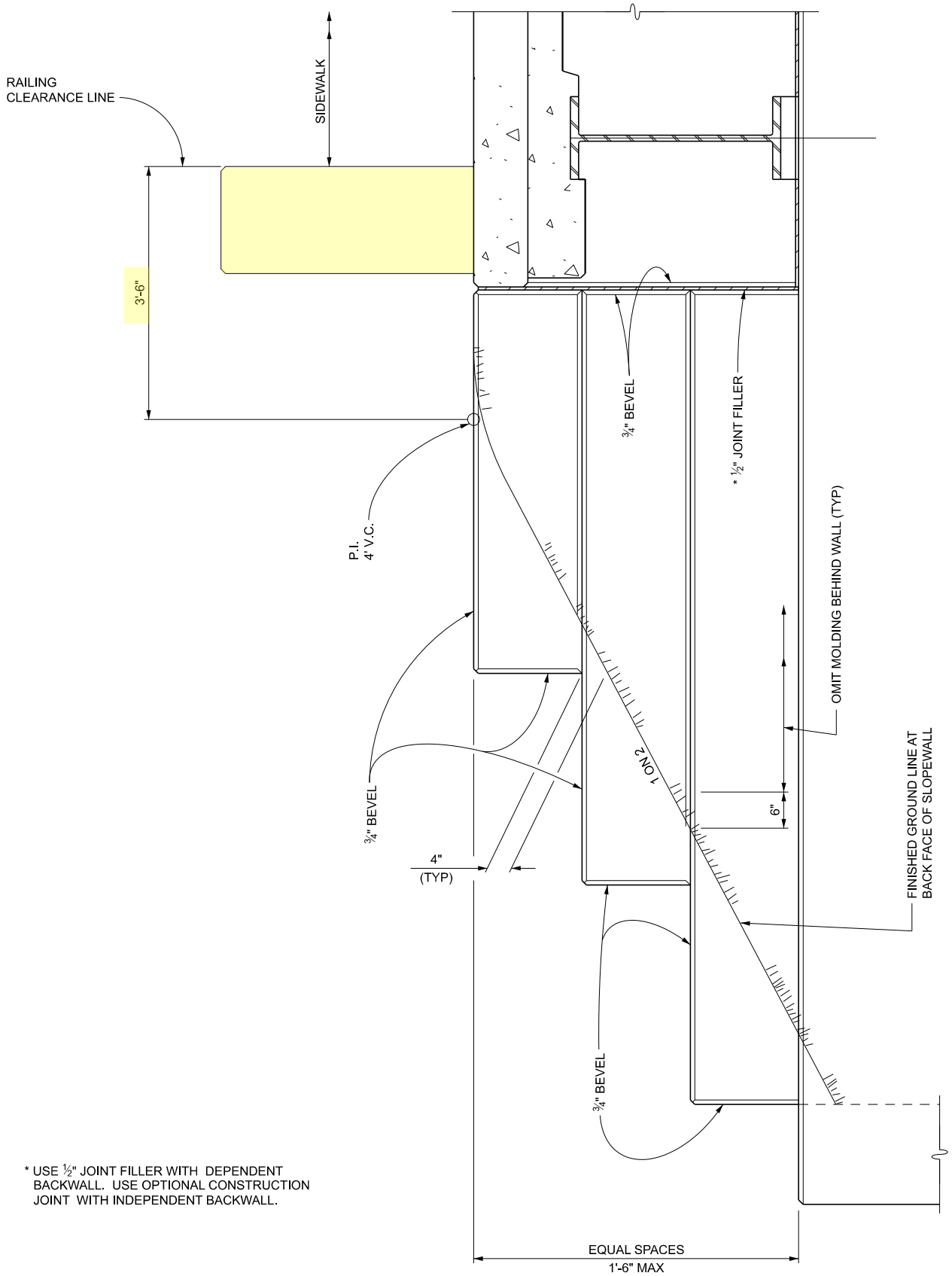
PLAN



ELEVATION

PREPARED BY DESIGN DIVISION	4.23.02

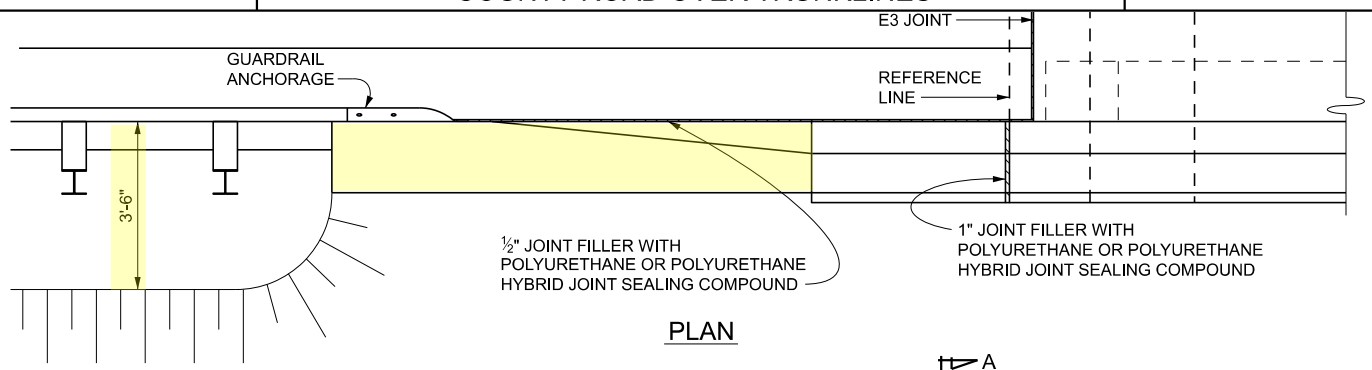
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 04/22/24
CHECKED BY: VZ	SLOPEWALL DETAILS	SUPERSEDES: 11/27/01
APPROVED BY: KCK		



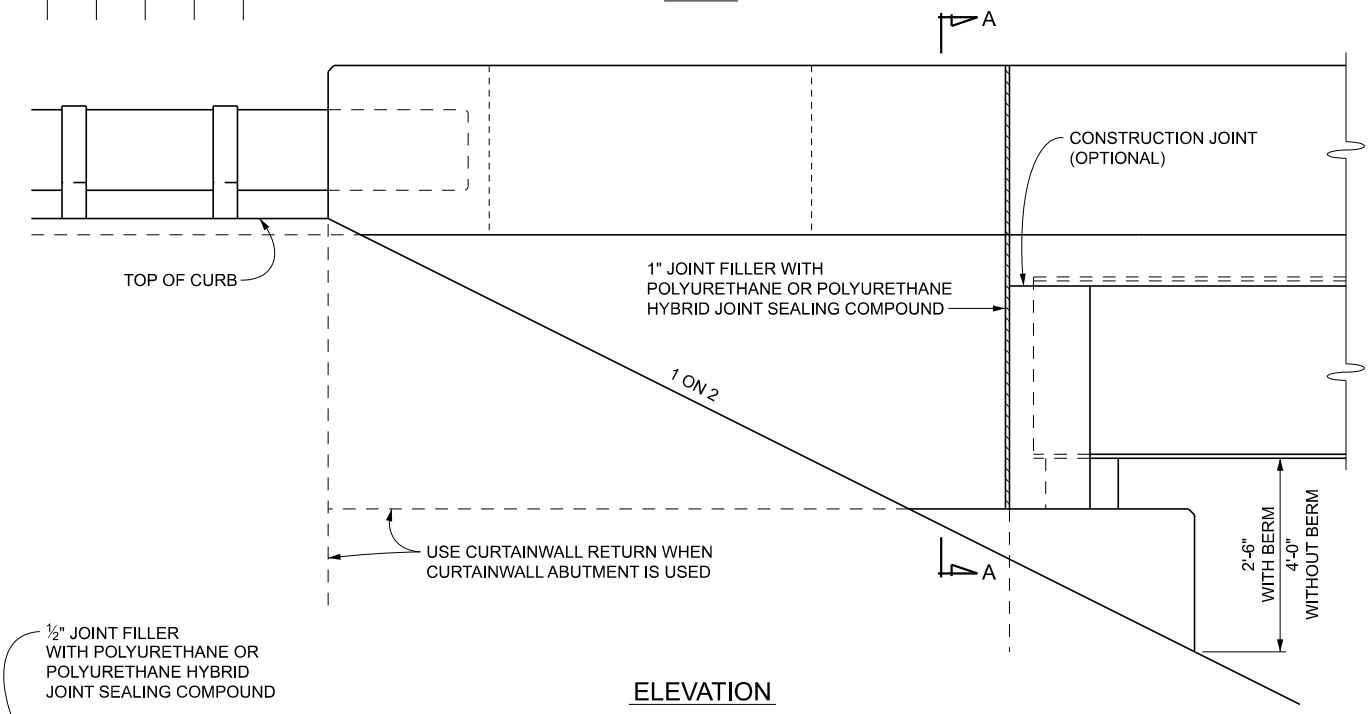
* USE ½" JOINT FILLER WITH DEPENDENT BACKWALL. USE OPTIONAL CONSTRUCTION JOINT WITH INDEPENDENT BACKWALL.

PREPARED BY DESIGN DIVISION	5.17.01

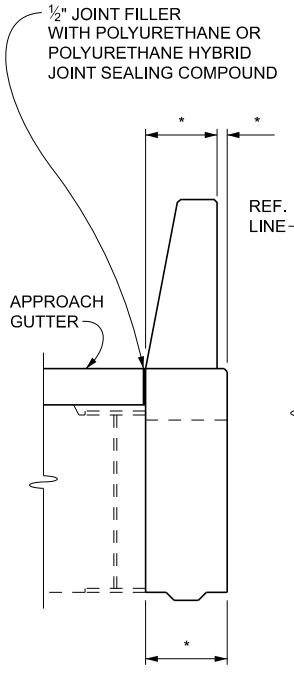
DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT RETURN WALL DETAILS COUNTY ROAD OVER TRUNKLINES	ISSUED: 04/22/24 SUPERSEDES: 01/27/20



PLAN

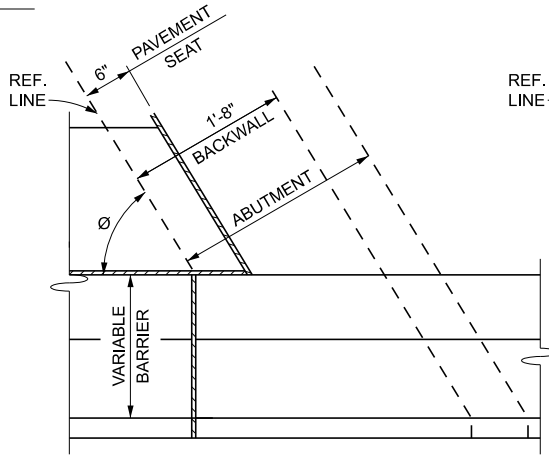


ELEVATION



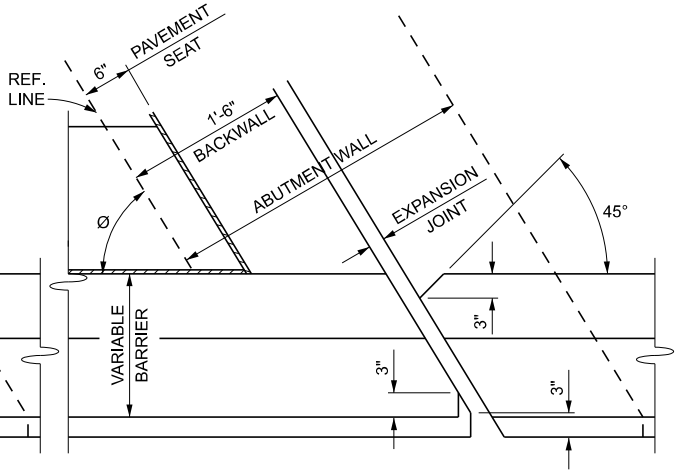
SECTION A-A

* DIMENSIONS VARIABLE, DEPENDENT UPON BARRIER TYPE AND AESTHETIC TREATMENT



DETAIL - SHOWING DEPENDENT BACKWALL

WHEN 70° < Ø < 110°, CARRY JOINT STRAIGHT THROUGH BARRIER

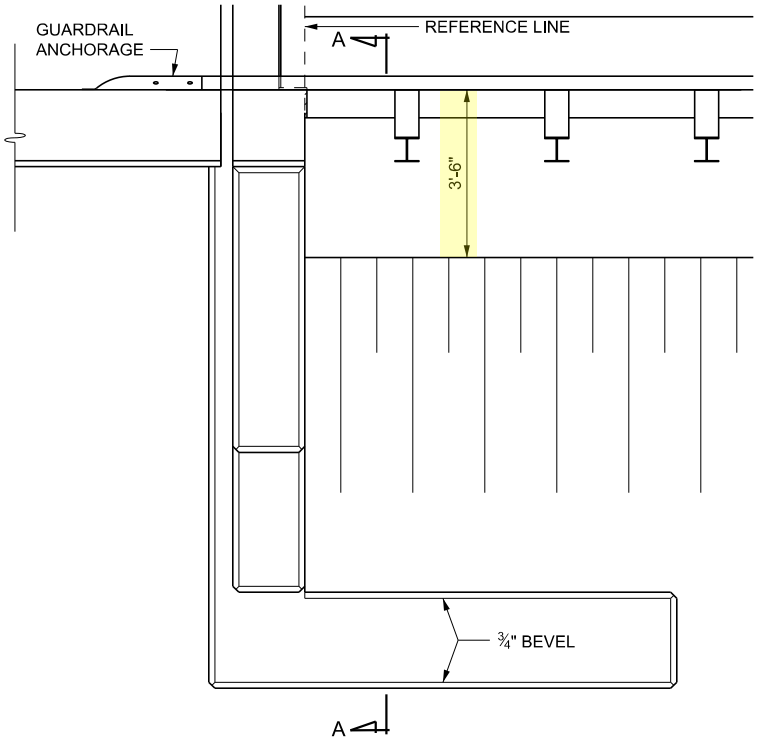


DETAIL - SHOWING INDEPENDENT BACKWALL

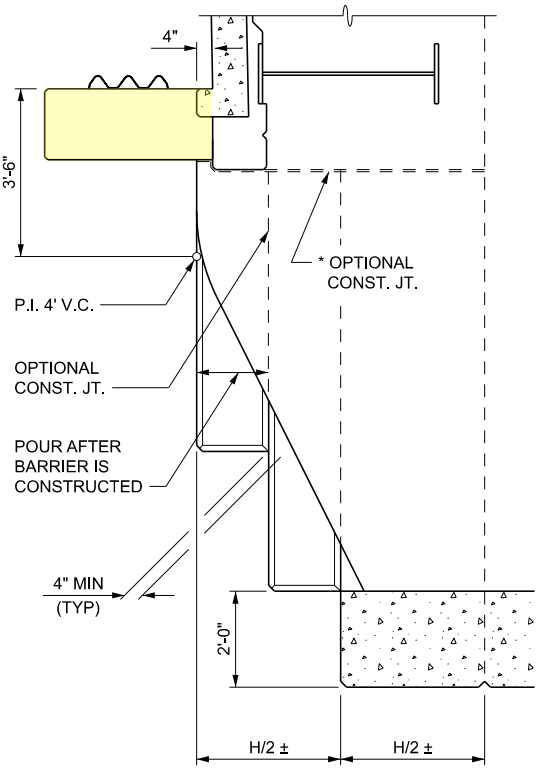
WHEN 70° < Ø < 110° OMIT 3" BEVELS

PREPARED BY DESIGN DIVISION	5.17.05

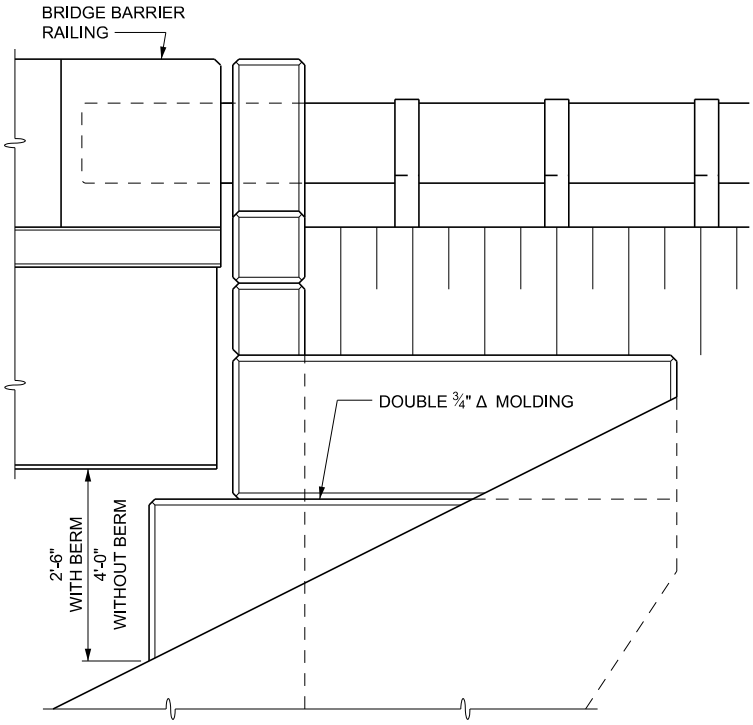
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 04/22/24
CHECKED BY: VZ	WINGWALL TREATMENT - TRUNKLINE OVER (SECTION THRU STUB ABUTMENT)	SUPERSEDES: 12/16/19
APPROVED BY: KCK		



PLAN VIEW



SECTION A-A



ELEVATION

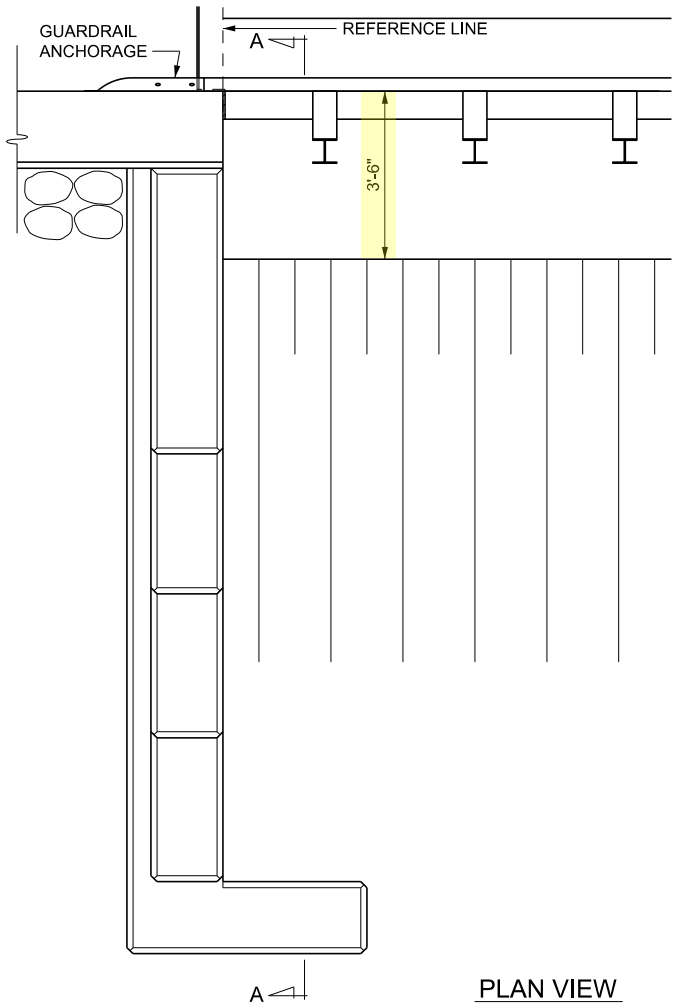
NOTES:

FOR ADDITIONAL SLOPE WALL DETAILS, SEE GUIDE 5.17.01.

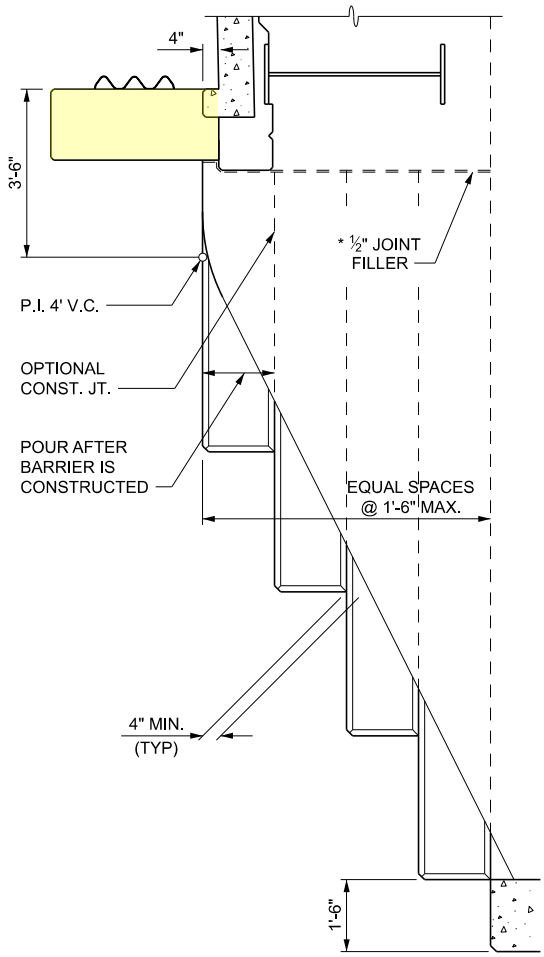
* USE WITH INDEPENDENT BACKWALL ONLY; USE ½" JOINT FILLER WITH DEPENDENT BACKWALL.

PREPARED BY DESIGN DIVISION	5.17.06

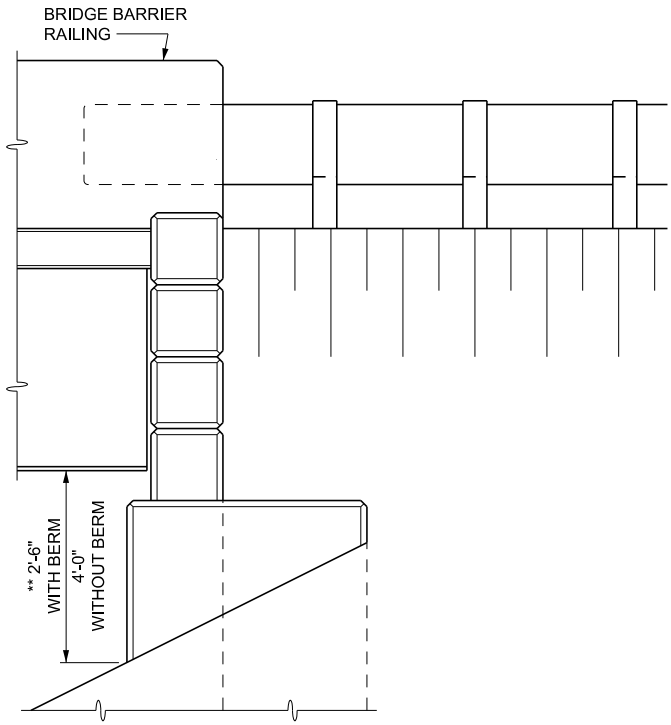
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 04/22/24
CHECKED BY: VZ	WINGWALL TREATMENT STREAM CROSSING	SUPERSEDES: 12/16/19
APPROVED BY: KCK		



PLAN VIEW



SECTION A-A



ELEVATION

NOTES:

DELETE RETURN WALL WHEN CURTAINWALL TYPE ABUTMENT IS USED.

FOR ADDITIONAL SLOPEWALL DETAILS, SEE GUIDE 5.17.01.

* USE WITH DEPENDENT BACKWALL ONLY; USE OPTIONAL CONSTRUCTION JOINT WITH INDEPENDENT BACKWALL.

** USE A BERM ONLY WHEN LONGER TAIL SPANS ARE REQUIRED FOR STRUCTURAL OR AESTHETIC REASONS.

PREPARED BY DESIGN DIVISION	5.17.07