MDOT
Michigan Department of Transportation

Road & Bridge Design Publications

Monthly Update – December 2023

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

Standard Plans

R-56-F: Guardrail Median Object Protection: Revised the details to include the use of the new Type 3M terminals instead of the Type 3B & Type 3T terminals. Also revised the median grading requirements (regardless of width) to slopes between 1:10 & 1:25.

R-60-J: Guardrail Types A, B, BD, T, TD, MGS-8, & MGS-8D: Modified the transition details on sheet 10 to specify attaching Type B or Type T guardrail to both Type 2M terminals and the new Type 3M terminals.

R-63-C: Guardrail Approach Terminal, Type 3M: Eliminated the Type 3B & 3T terminals in favor of two MASH approved (Type 3M) terminals. The information contained on this detail will supplement what is contained in a recently released FUSP and the manufacturer's drawings for this terminal type. Designers will need to call for both the special detail and the FUSP when a Type 3M terminal is required.

R-100-I: Seeding and Tree Planting: Revised the excavation area from 1.5 times the size of the root ball per side to 2 times the size of the root ball in total.

Road Design Manual

14.57 & 14.57.01: Plan Completion & Design Plan Submittal-Certification Acceptance: Revised section to current practice to comply with plan completion requirements & updated certification acceptance forms and procedures, including the use of stamps instead of signatures.

Bridge Design Manual

7.03.01 B. 4. g. & h.**:** Updated lap and development requirements at integral and semi-integral abutment deck slabs and approach slabs according to Guide 7.14.02 Series.

Bridge Design Guides

Table of Contents: Deleted Guides 7.14.01 and 7.14.01 A. Guides were for uncoated reinforcement. MDOT currently uses epoxy coated reinforcement in bridges and structures. Old Guide 7.14.02 now becomes 7.14.02A and old Guide 7.14.02A now becomes 7.14.02B. New Guide showing clear distance and clear cover (spacing thresholds) becomes Guide 7.14.02. Updated titles of all guides in 7.14.02 Series.

Michigan Department of Transportation

Road & Bridge Design Publications

Monthly Update – December 2023

5.16.01, 5.16.01A, 5.18.01, 5.18.01A, 5.27.03, 6.20.03, 6.20.03A, 6.20.03B, 6.20.04, 6.20.04A, 6.20.04B, 6.20.05, 6.20.05A, 6.60.12: Updated guides for lap development and modified development lengths (for hooks) according to AASHTO LRFD Bridge Design Specifications. Values will be determined from Guides 7.14.02 Series and 7.14.03 based on the bridge/structure element, reinforcement spacing and clear cover.

7.14.01 & 7.14.01A: Uncoated reinforcement guides are deleted/not updated.

7.14.02, .02A & .02B: Updated guides for lap and development lengths according to AASHTO LRFD Bridge Design Specifications. Added details and notes for clarity as to how values were derived and to allow for other options if projects don't exactly fall into all the categories of the tables. Guides were moved (given new designations), see description above in "Table of Contents".

7.14.03: Updated guide for modified development lengths (for hooks) according to AASHTO LRFD Bridge Design Specifications. Updated details and notes for clarity as to how values were derived and to allow for other options if projects don't exactly fall into all the categories of the tables.

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

12-26-2023

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-53-A	22	TEMPORARY CONCRETE BARRIER LIMITED DEFLECTION	8-14-15
*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	10-4-23
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	12-6-22
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

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

12-26-2023

⑦

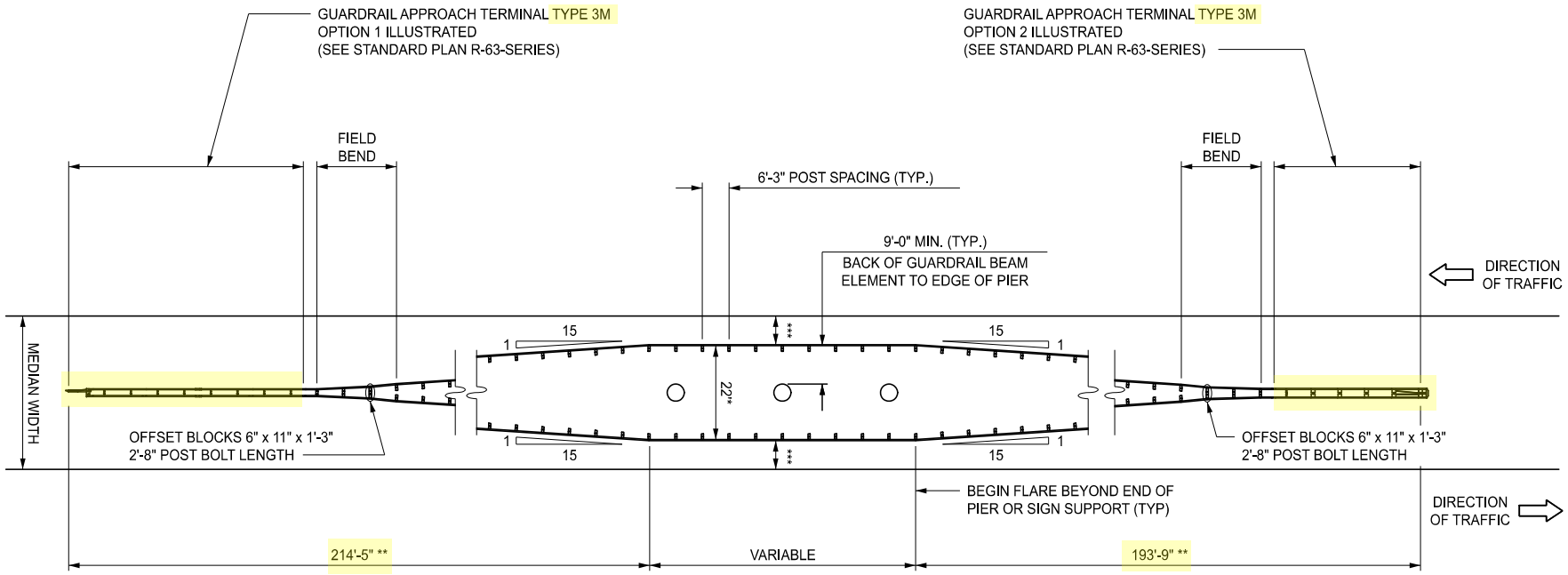
DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE
B-25-L	8	BRIDGE RAILING, AESTHETIC PARAPET TUBE	11-15-23
B-27-B	7	BRIDGE RAILING, 3 TUBE WITH PICKETS	11-17-23
B-28-A	7	BRIDGE BARRIER RAILING, TYPE 7	9-2-20
B-29-A	8	BRIDGE BARRIER RAILING, TYPE 6	9-2-20
B-102-D	4	STANDARD SLOPE PAVING DETAILS	9-18-23
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

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

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.



TYPICAL LAYOUT AT PIERS AND SIGN SUPPORTS USING GUARDRAIL TYPE MGS-8

* THE 22' DIMENSION IS CENTERED ON THE PIER OR MEDIAN FROM BACK OF GUARDRAIL TO BACK OF GUARDRAIL. FOR PIERS GREATER THAN 4' IN WIDTH/DIAMETER, INCREASE THE 22' DIMENSION TO PIER WIDTH/DIAMETER + 18'.

** INCREASE LENGTH BY 7.5' FOR EACH FOOT OF PIER WIDTH/DIAMETER ABOVE 4'.

*** ENSURE NO PORTION OF GUARDRAIL ENCROACHES ON SHOULDER.

FOR MEDIANS 36' WIDE TO MEDIANS LESS THAN 70' WIDE USING GUARDRAIL TYPE MGS-8

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BRADLEY C. WIEFERICH, PE

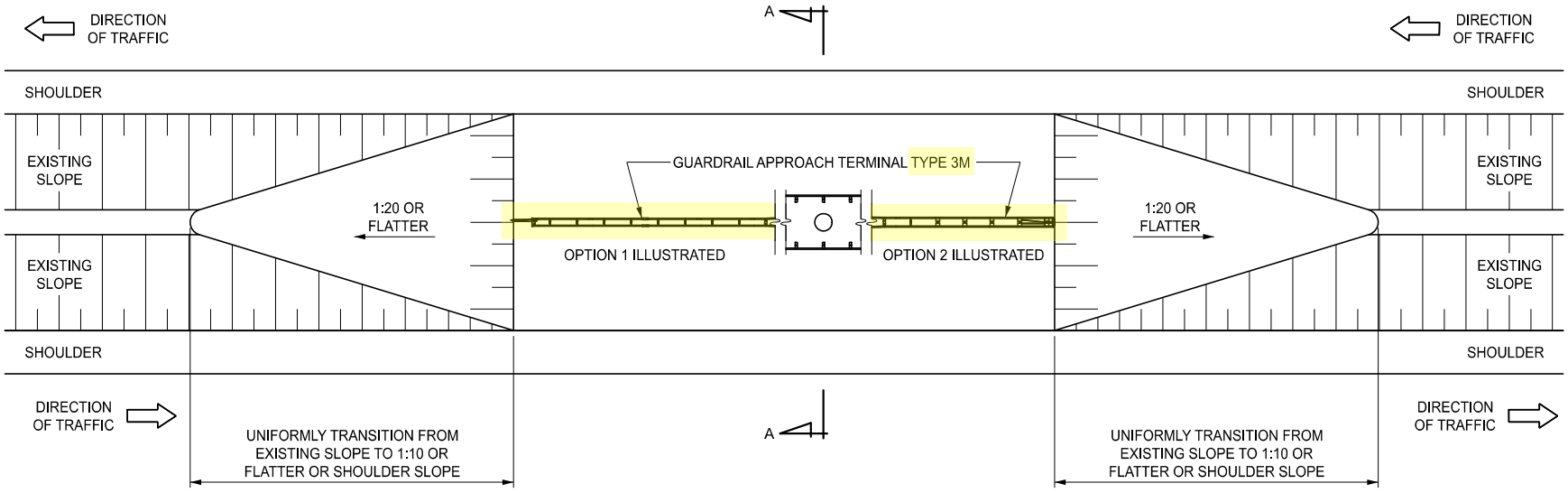
(SPECIAL DETAIL)
FHWA APPROVAL

10/10/2023
PLAN DATE

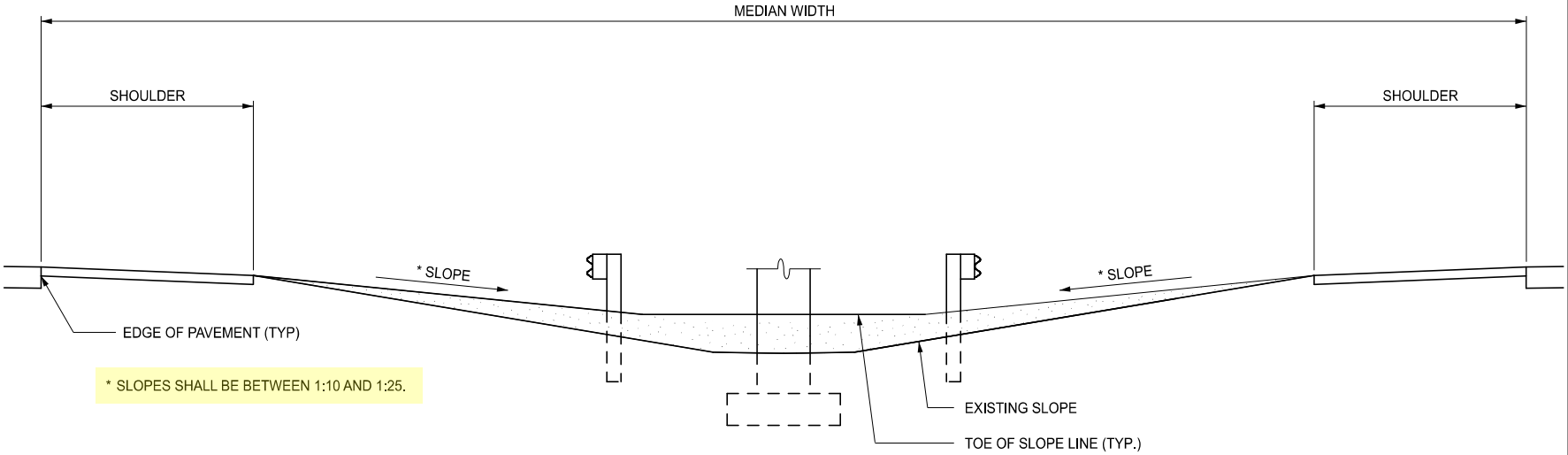
STANDARD PLAN FOR
GUARDRAIL MEDIAN OBJECT PROTECTION

R-56-F

SHEET
1 OF 6



GRADING OF SLOPES AT PIERS



SECTION A-A

GRADING IN MEDIANS FROM 36' TO LESS THAN 70' IN WIDTH USING GUARDRAIL TYPE MGS-8

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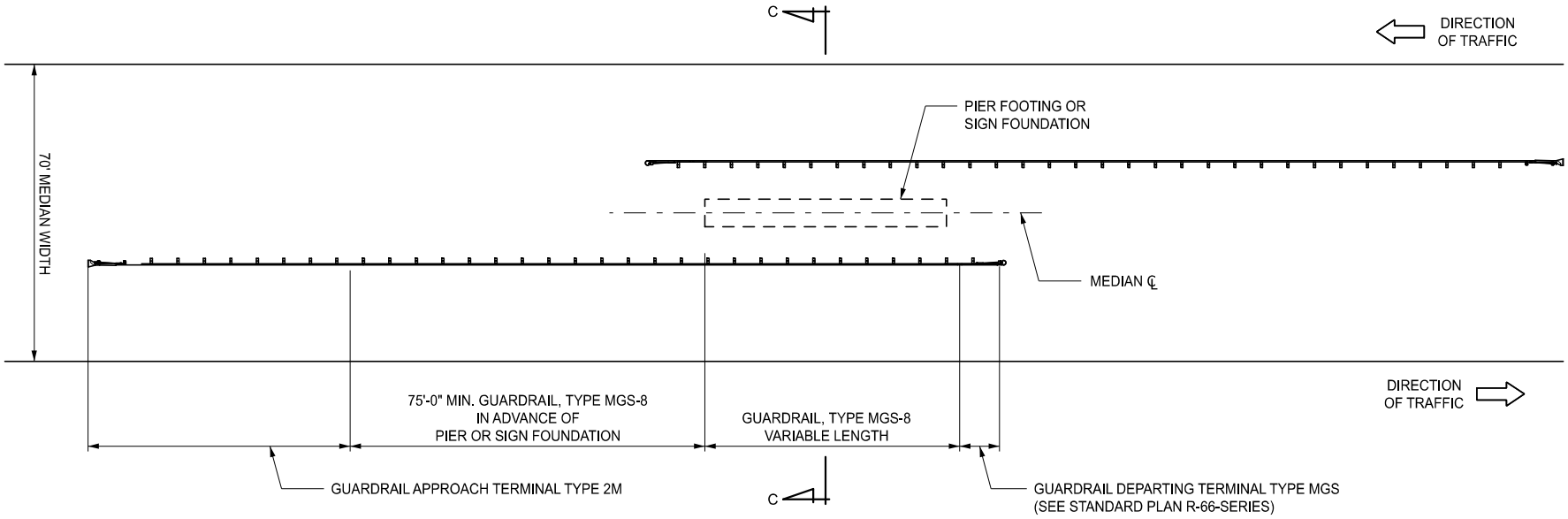
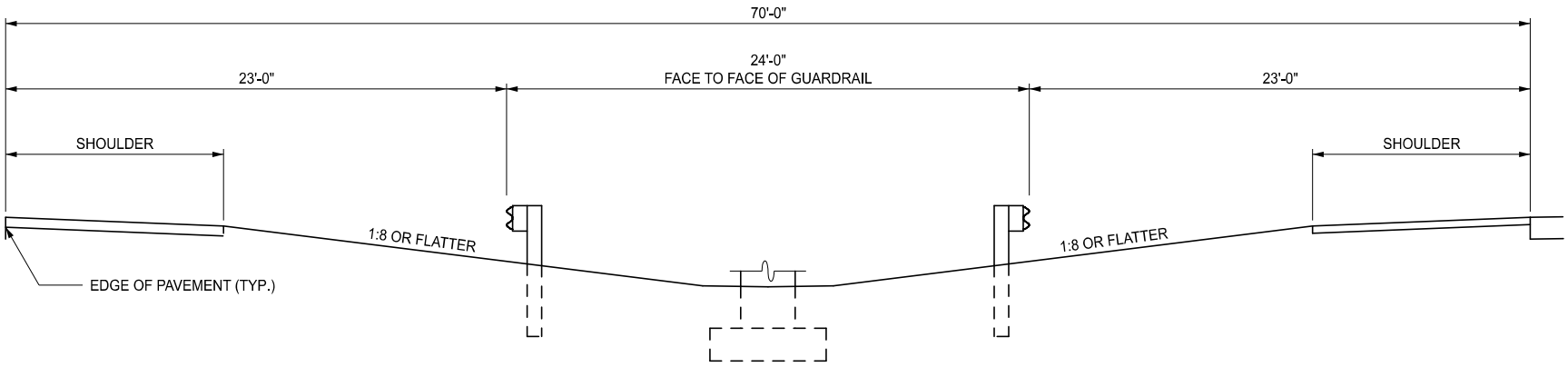
PLAN DATE

STANDARD PLAN FOR
GUARDRAIL MEDIAN OBJECT PROTECTION

R-56-F



TWIN PARALLEL GUARDRAIL RUNS USING GUARDRAIL TYPE MGS-8



SECTION C-C

MEDIANS 70' IN WIDTH USING GUARDRAIL TYPE MGS-8

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PLAN DATE

R-56-F

STANDARD PLAN FOR
GUARDRAIL MEDIAN OBJECT PROTECTION

GUARDRAIL AT TWIN BRIDGE APPROACH USING GUARDRAIL TYPE MGS-8

DRAINAGE RESTRICTION

NOTES:

ALL 1:10 OR FLATTER SLOPES SHALL BE GRADED TO CLASS A SLOPE TOLERANCES.

GUARDRAIL ANCHORAGE, BRIDGE SHALL BE CONSTRUCTED ACCORDING TO STANDARD PLAN R-67-SERIES.

UNLESS INDICATED BY A RADIUS, ALL CURVED GUARDRAIL SHALL BE FIELD BENT.

ANY EXISTING CURB OVER 4" IN HEIGHT SHALL BE REMOVED 150' IN ADVANCE OF THE GUARDRAIL APPROACH TERMINAL OF THE MEDIAN GUARDRAIL INSTALLATION. WHEN IT BECOMES NECESSARY TO USE CURB AND GUTTER IN CONJUNCTION WITH MEDIAN GUARDRAIL INSTALLATIONS, CONTACT THE GEOMETRIC DESIGN UNIT OF THE DESIGN DIVISION.

SLOPES SPECIFIED ON THIS PLAN ARE FOR TYPICAL MEDIAN GUARDRAIL INSTALLATIONS. THE PLACEMENT OF DRAINAGE CULVERTS AND END SECTIONS, WHEN REQUIRED, SHALL BE AS DETAILED ON PLANS OR AS DIRECTED BY THE ENGINEER.

IF THE SPECIFIED MINIMUM OFFSETS FROM THE EDGE OF PIER OR MEDIAN OBJECT TO THE GUARDRAIL CANNOT BE ACHIEVED, EITHER STIFFEN THE GUARDRAIL SYSTEM, AS NEEDED, BY DECREASING THE POST SPACING OR USE CONCRETE BARRIER TO SHIELD THE PIER(S)/MEDIAN OBJECT(S). CONTACT THE GEOMETRIC DESIGN UNIT OF THE DESIGN DIVISION FOR GUIDANCE.

MEDIAN GUARDRAIL INSTALLATIONS ARE NOT REQUIRED IN MEDIANS THAT ARE GREATER THAN 70' IN WIDTH, UNLESS THE OBJECT BEING PROTECTED IS IN THE TARGET PATH OF A CURVE.

WHEN MEDIAN GUARDRAIL INSTALLATIONS ARE TO BE PLACED ON CURVES, CONTACT THE GEOMETRIC DESIGN UNIT OF THE DESIGN DIVISION.

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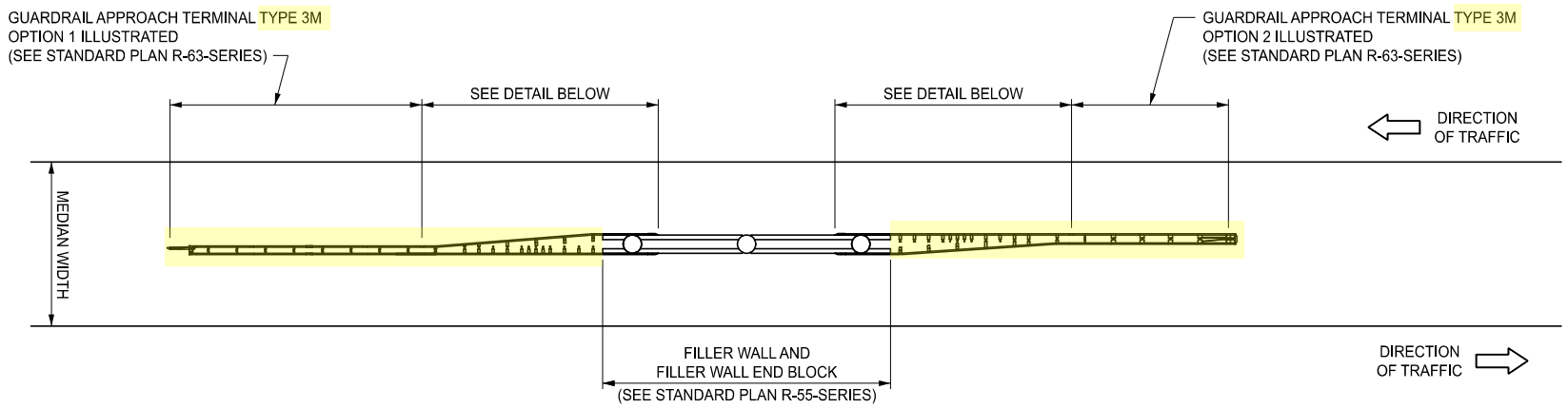
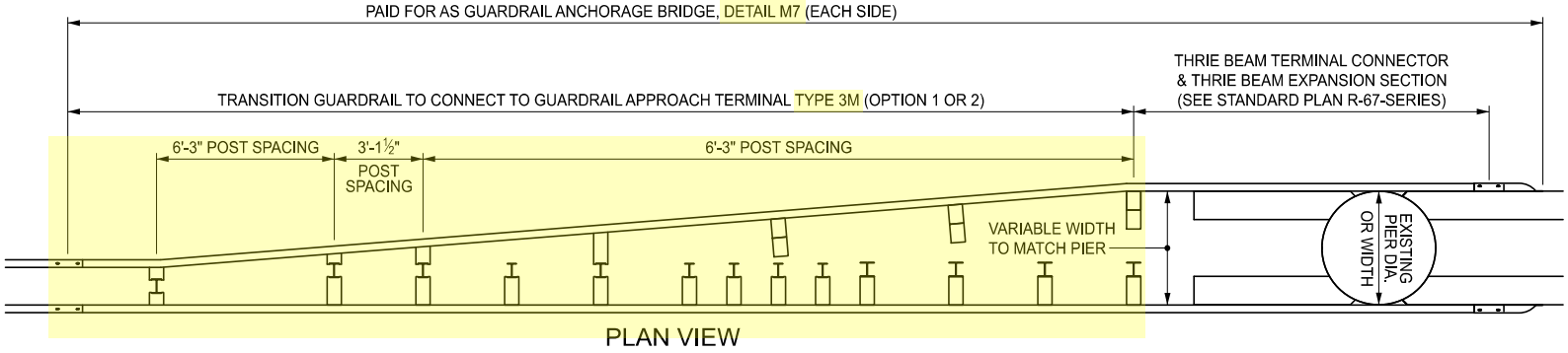
STANDARD PLAN FOR
GUARDRAIL MEDIAN OBJECT PROTECTION

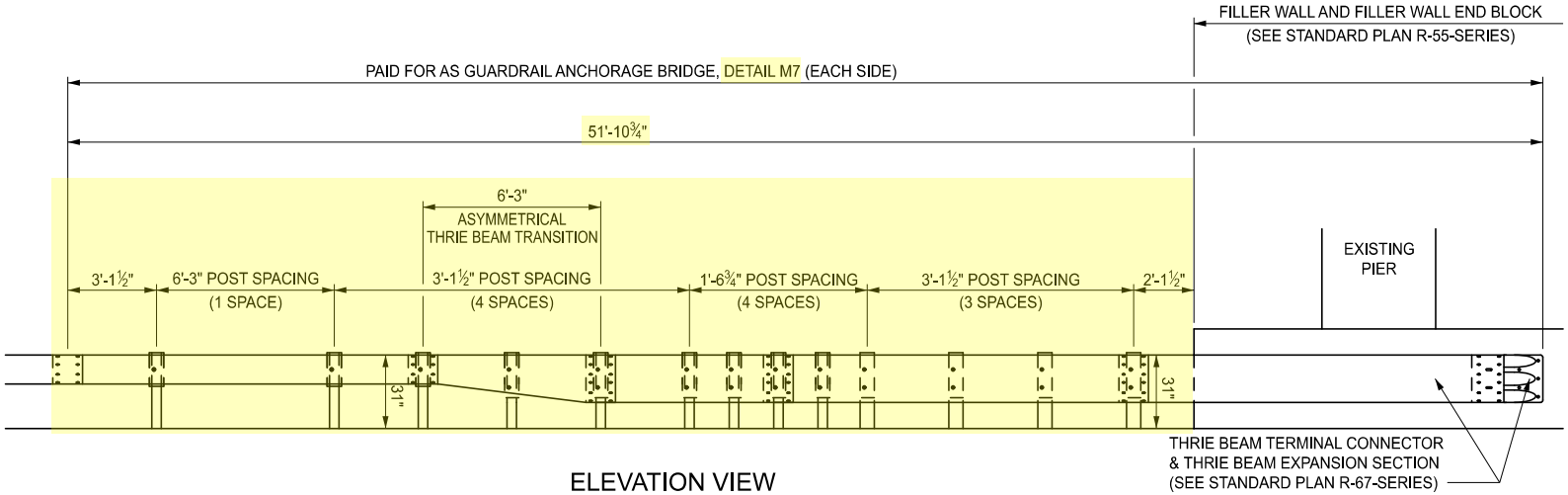
(SPECIAL DETAIL) FHWA APPROVAL	10/10/2023 PLAN DATE	R-56-F	SHEET 4 OF 6



TYPICAL LAYOUT



PLAN VIEW



ELEVATION VIEW

GUARDRAIL WITH DIRECT CONNECTION TO PIER

SEE STANDARD PLAN R-67-SERIES FOR COMPLETE DETAIL OF GUARDRAIL ANCHORAGE BRIDGE, DETAIL M7

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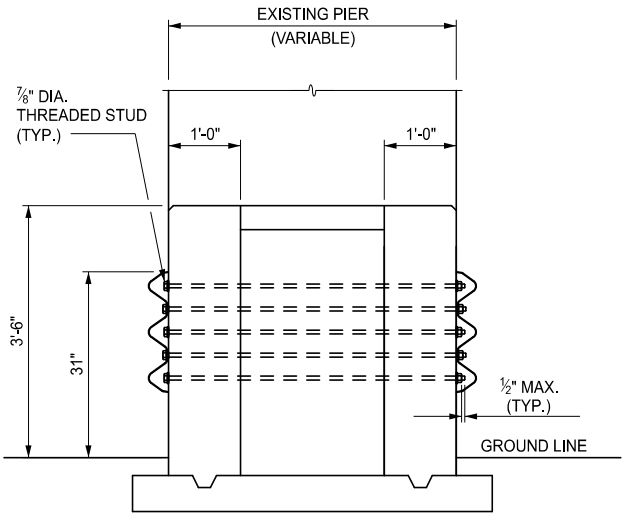
FHWA APPROVAL

10/10/2023
PLAN DATE

STANDARD PLAN FOR
GUARDRAIL MEDIAN OBJECT PROTECTION

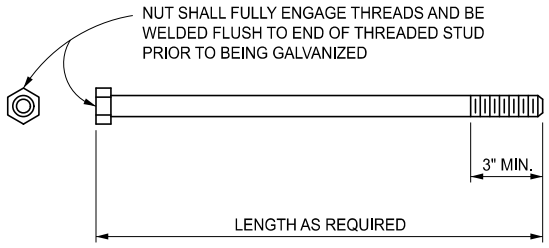
R-56-F

SHEET
5 OF 6

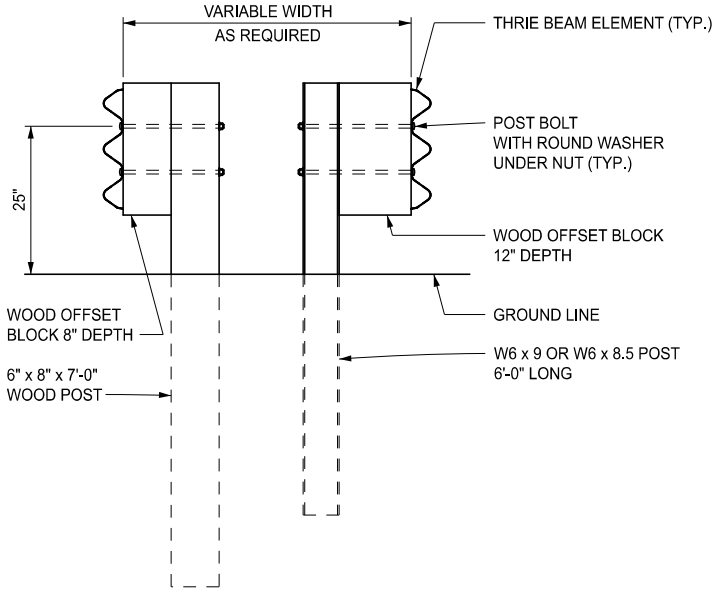


GUARDRAIL CONNECTION AT FILLER WALL

(FOR FILLER WALL DETAILS SEE STANDARD PLAN R-55-SERIES)

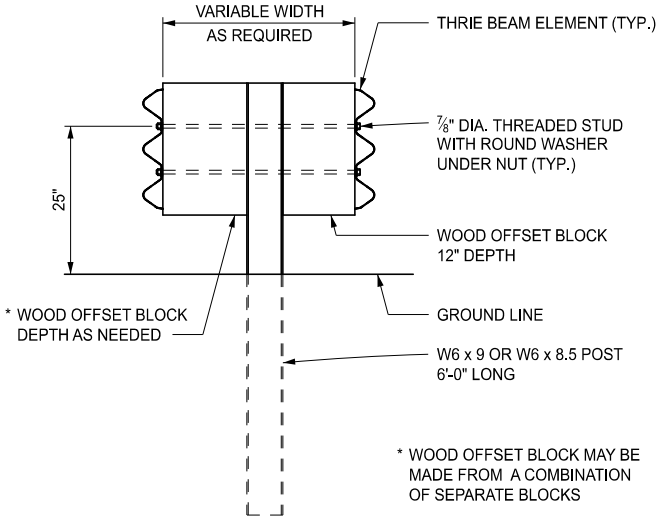


⅞" DIA. THREADED STUD



POST DETAIL

WHEN WIDTH CAN ACCOMMODATE
TWO GUARDRAIL POSTS



POST DETAIL

WHEN WIDTH CAN ACCOMMODATE
ONLY ONE GUARDRAIL POST

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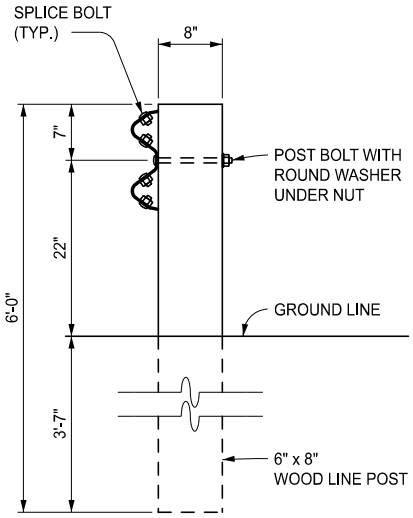
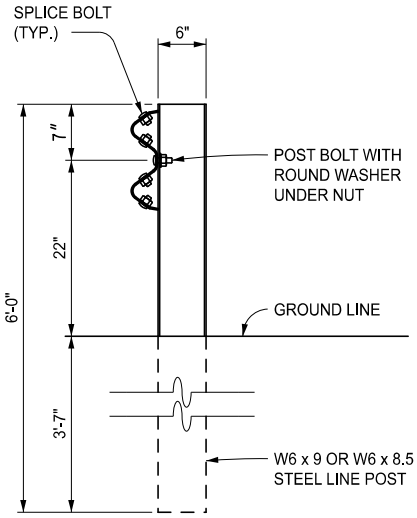
STANDARD PLAN FOR
GUARDRAIL MEDIAN OBJECT PROTECTION

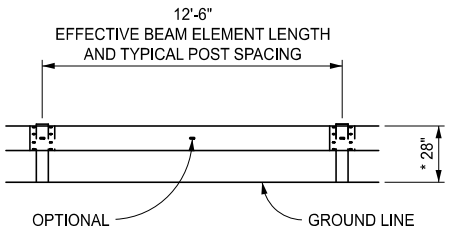
(SPECIAL DETAIL) / FHWA APPROVAL	10/10/2023 / PLAN DATE	R-56-F	SHEET 6 OF 6



WOOD POST



STEEL POST



ELEVATION SHOWING POST SPACING

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

GUARDRAIL, TYPE A

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

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DEPARTMENT DIRECTOR
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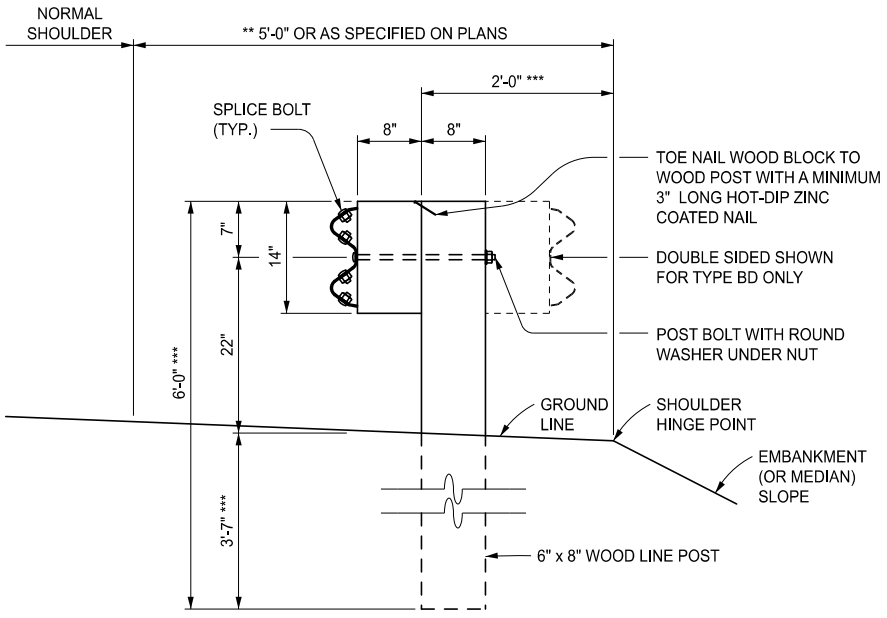
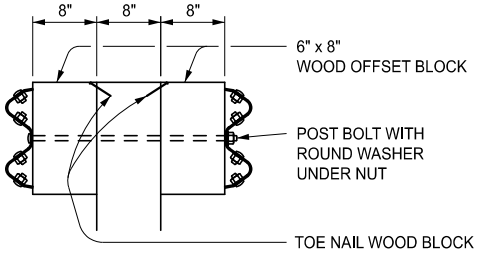
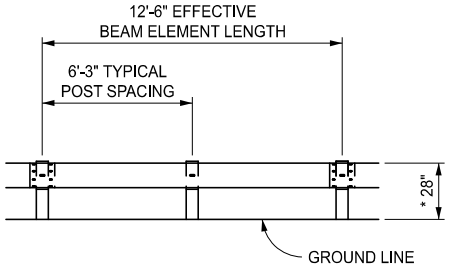
STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL) FHWA APPROVAL	10/04/2023 PLAN DATE	R-60-J	SHEET 1 OF 16





TYPE BD



ELEVATION SHOWING POST SPACING

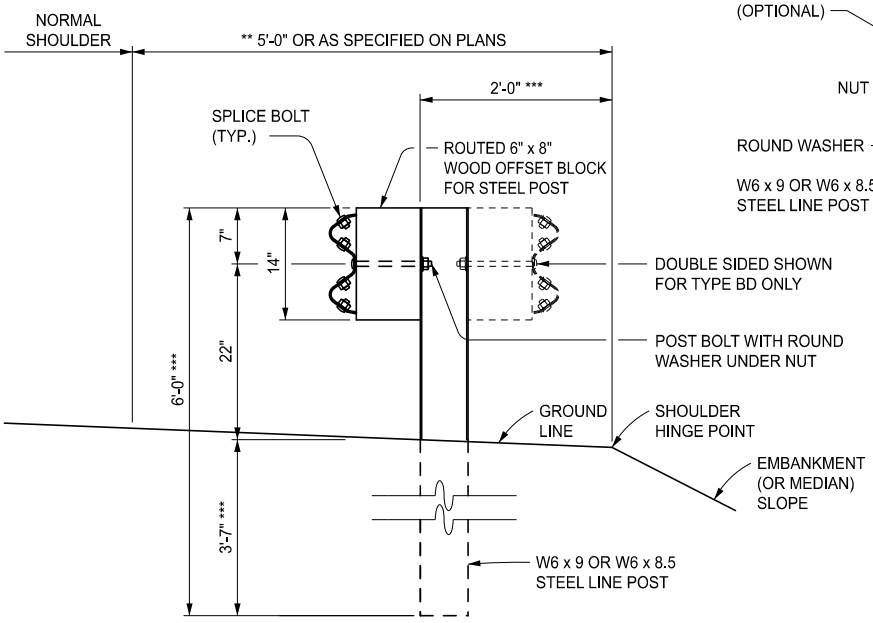
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

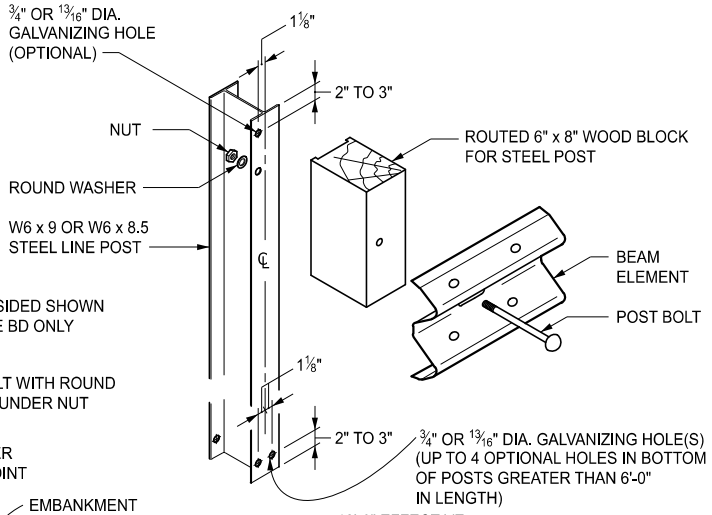
** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

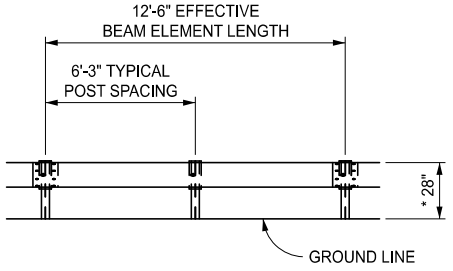
*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-0" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 8'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

GUARDRAIL, TYPE B (OR BD)

(WOOD POST)







ELEVATION SHOWING POST SPACING

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-0" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 8'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

GUARDRAIL, TYPE B (OR BD)

(STEEL POST)

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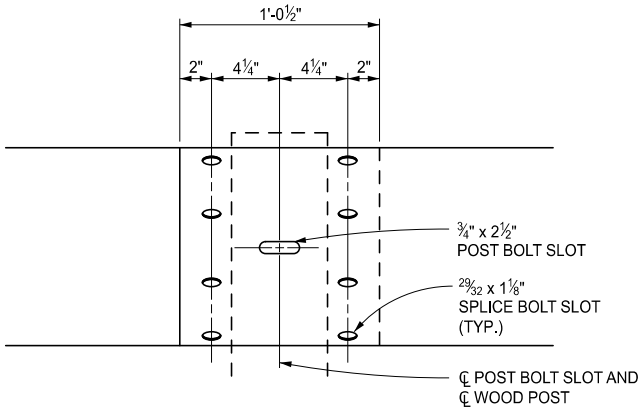
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

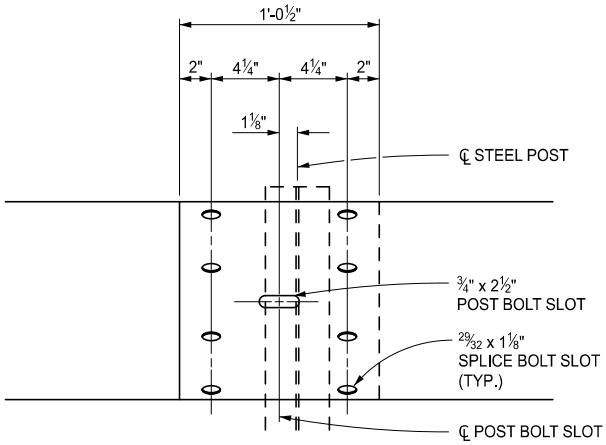
STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL)	10/04/2023	R-60-J	SHEET
FHWA APPROVAL	PLAN DATE		2 OF 16

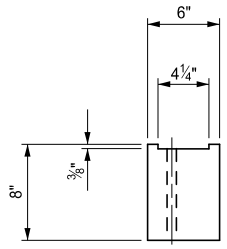


WOOD POST



STEEL POST

BEAM ELEMENT SPLICE DETAILS



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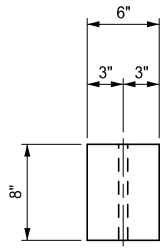

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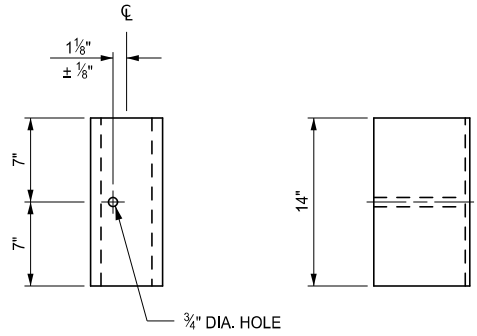
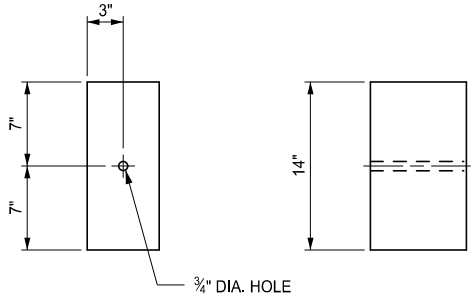


FRONT SIDE

FOR USE ON STEEL POSTS



FRONT SIDE

FOR USE ON WOOD POSTS

(SEE NOTES ON SHEET 16 OF 16)

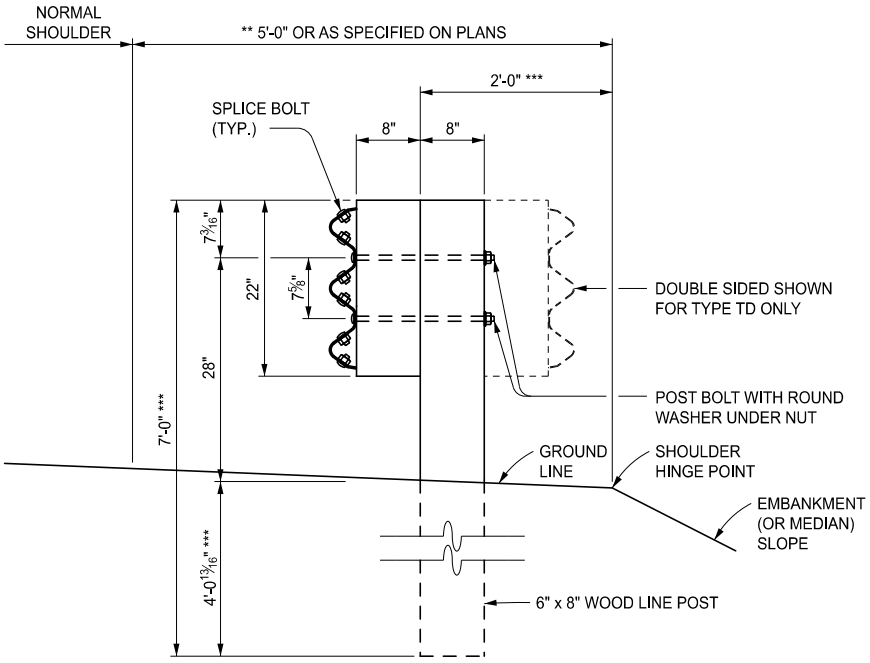
WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE B AND TYPE BD

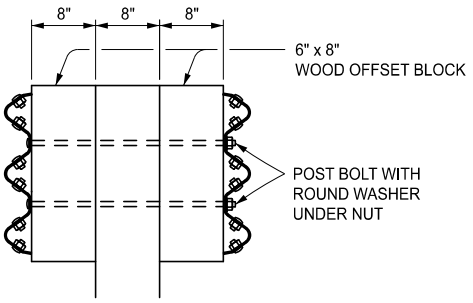
MDOT Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

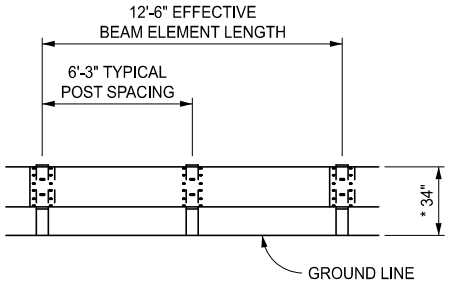
STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL) / FHWA APPROVAL	10/04/2023 / PLAN DATE	R-60-J	SHEET 3 OF 16





TYPE TD



ELEVATION SHOWING POST SPACING

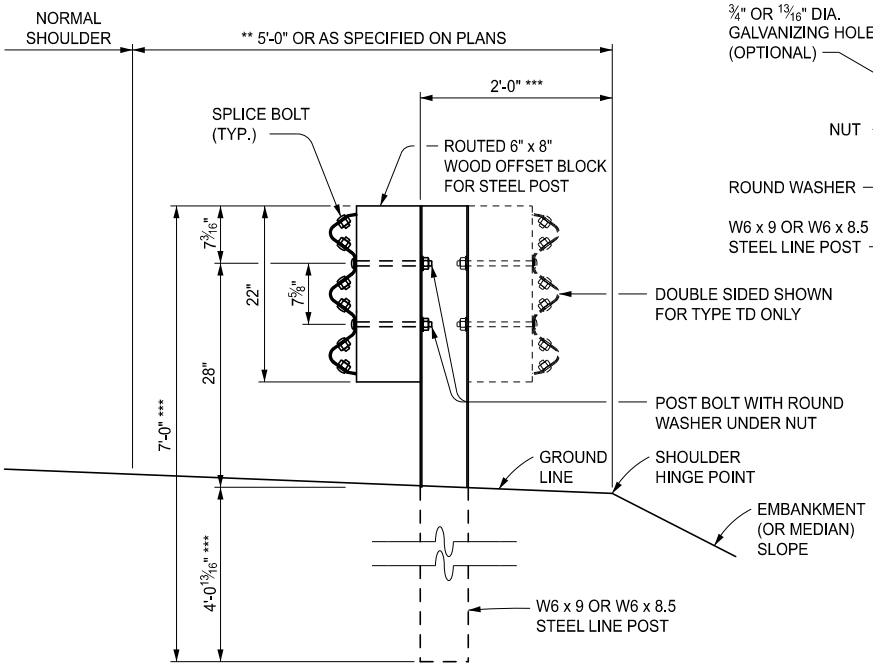
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

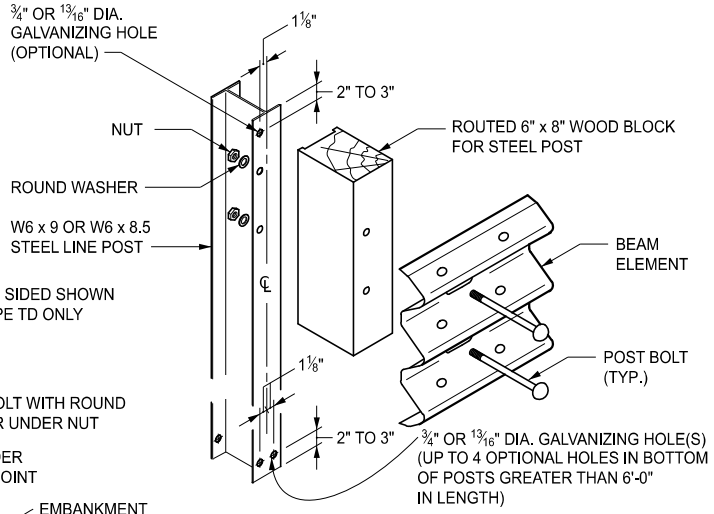
** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

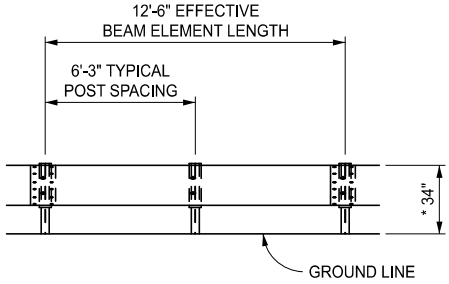
*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-0" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 8'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

GUARDRAIL, TYPE T (OR TD)

(WOOD POST)







ELEVATION SHOWING POST SPACING

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-0" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 8'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

GUARDRAIL, TYPE T OR TD

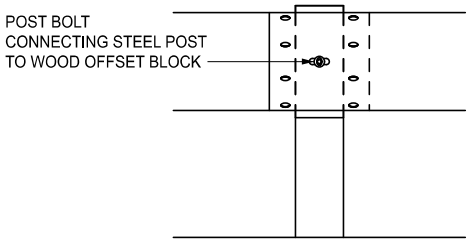
(STEEL POST)

MDOT Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

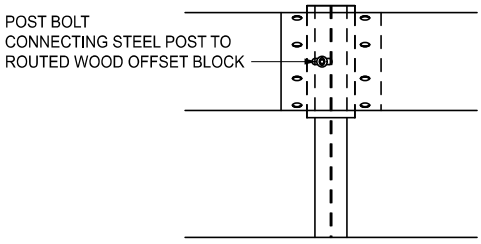
STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL) / FHWA APPROVAL	10/04/2023 / PLAN DATE	R-60-J	SHEET 4 OF 16



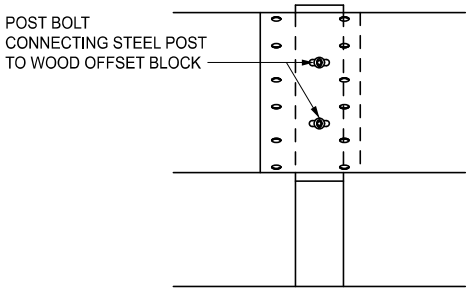
GUARDRAIL, TYPE B

WOOD POST



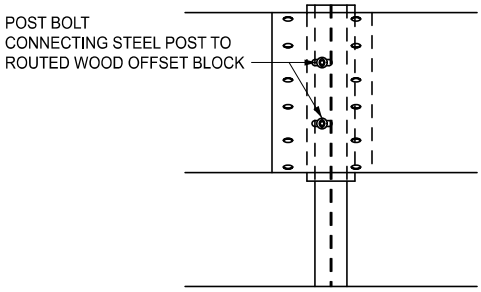
GUARDRAIL, TYPE B

STEEL POST



GUARDRAIL, TYPE T

WOOD POST



GUARDRAIL, TYPE T

STEEL POST

BLOCK AND POST CONNECTION DETAILS

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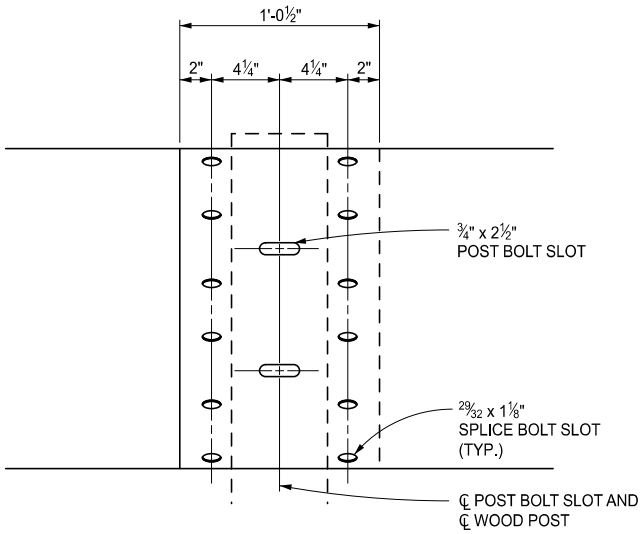
Michigan Department of Transportation

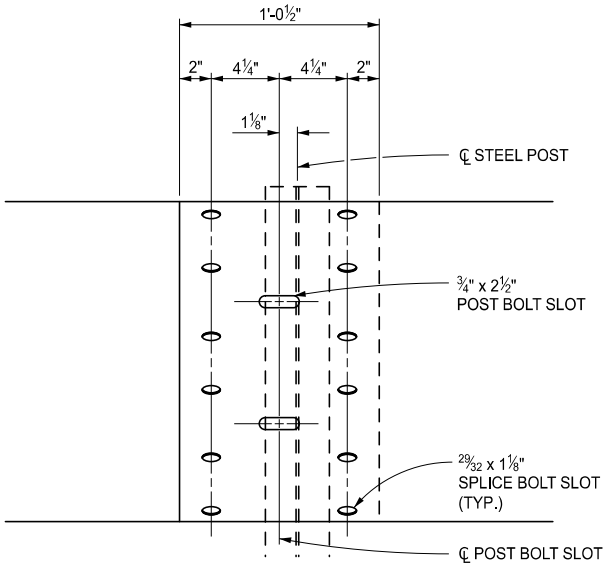
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL)	10/04/2023	R-60-J	SHEET
FHWA APPROVAL	PLAN DATE		5 OF 16

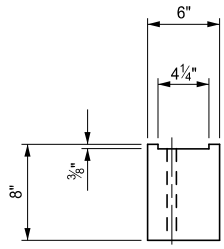


WOOD POST

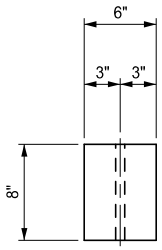


STEEL POST

THRIE BEAM ELEMENT SPLICE DETAILS



TOP



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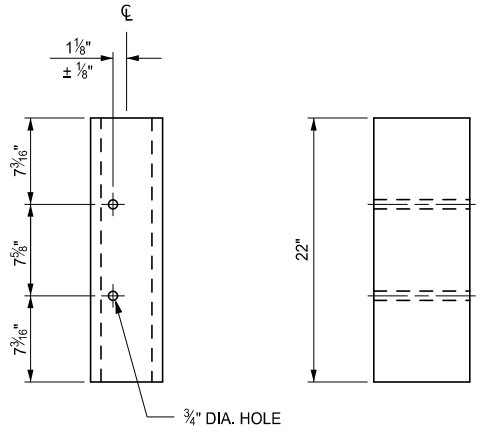
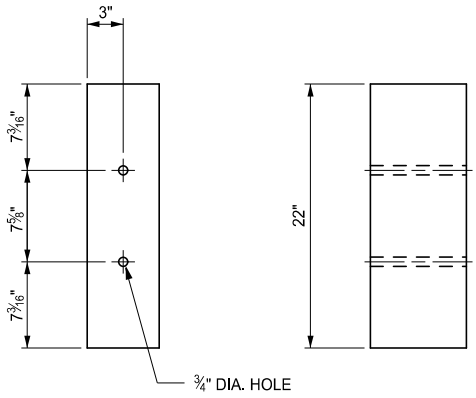


FRONT SIDE

FOR USE ON STEEL POSTS



FRONT SIDE

FOR USE ON WOOD POSTS
(SEE NOTES ON SHEET 16 OF 16)

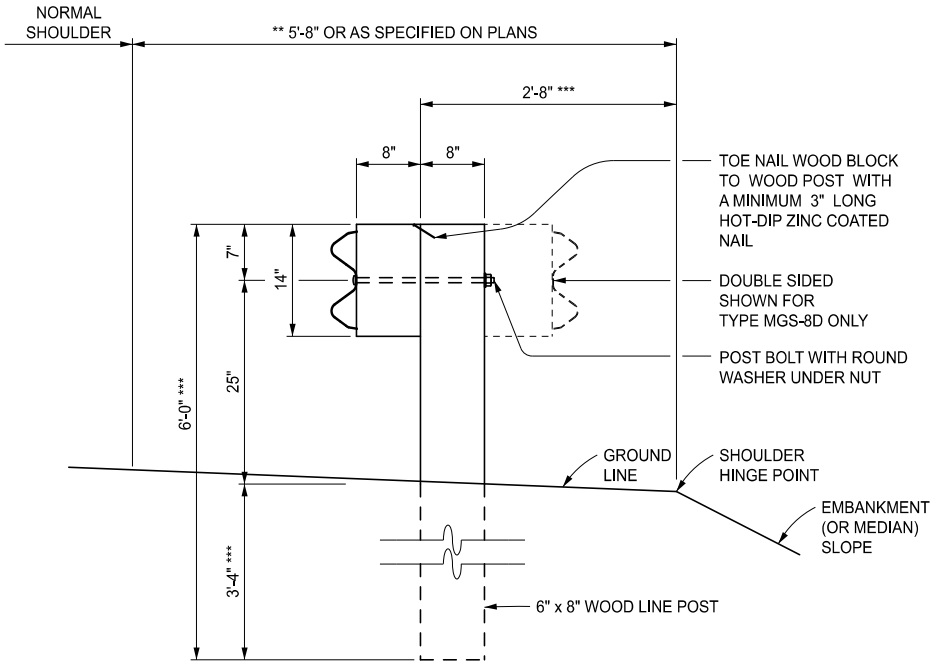
WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE T AND TYPE TD

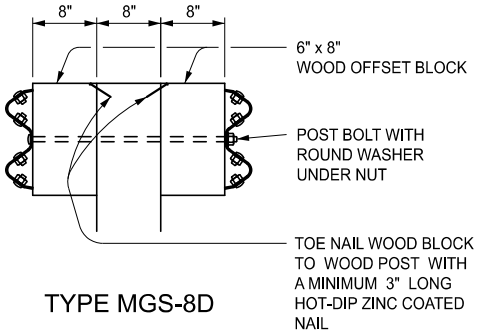
MDOT Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL) / FHWA APPROVAL	10/04/2023 / PLAN DATE	R-60-J	SHEET 6 OF 16





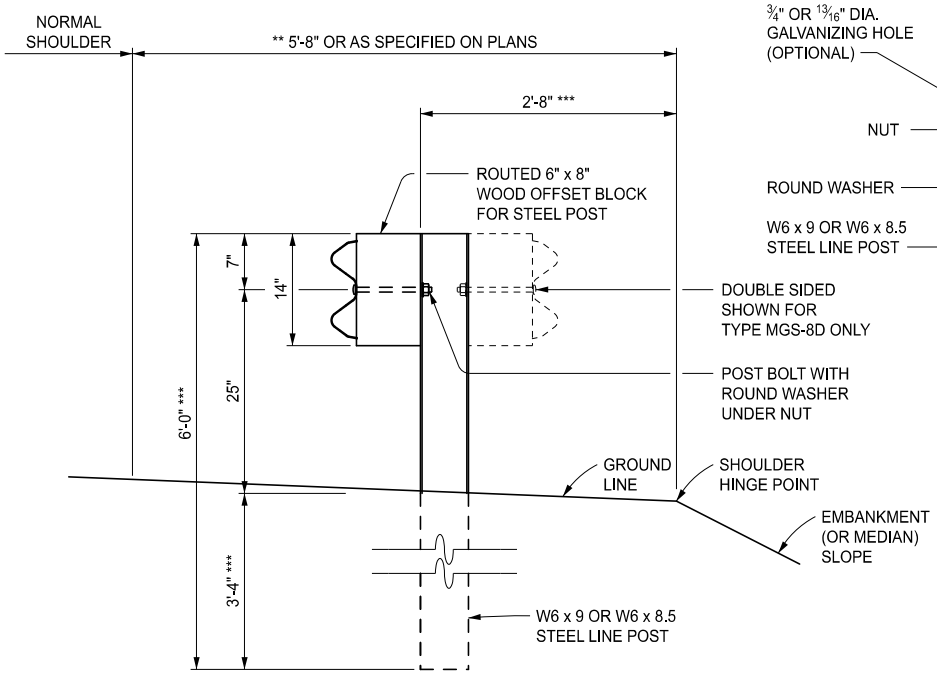
TYPE MGS-8D

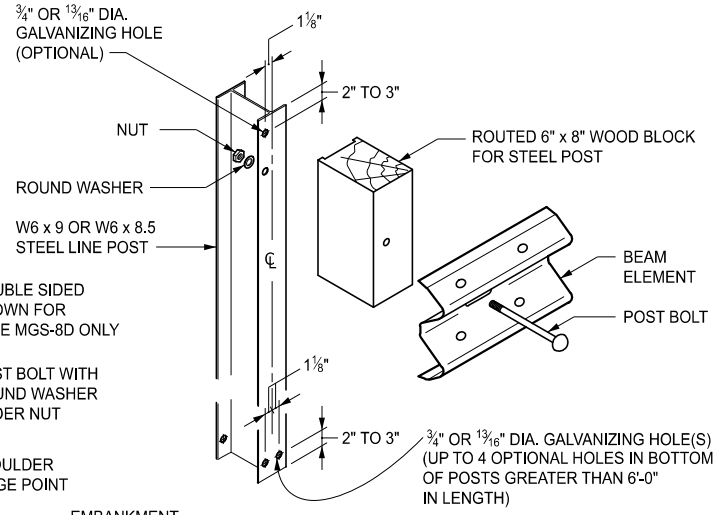
** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-8".

*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-8" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 9'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

GUARDRAIL, TYPE MGS-8 (OR MGS-8D)

(WOOD POST)





** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-8".

*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-8" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 9'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

GUARDRAIL, TYPE MGS-8 (OR MGS-8D)

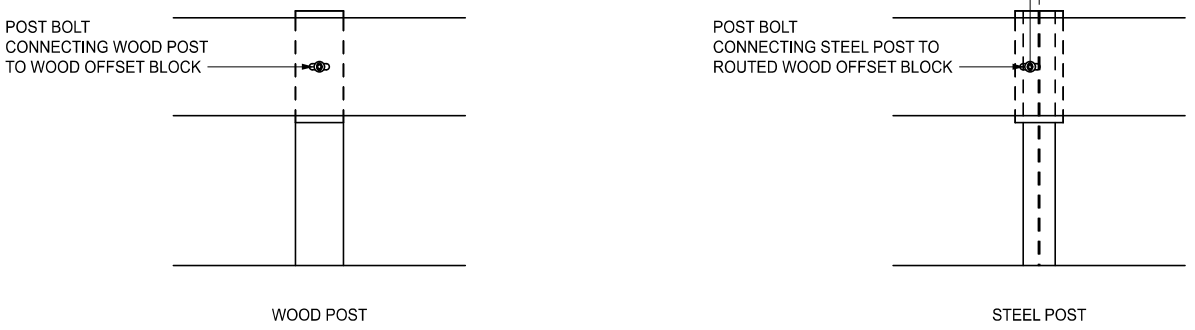
(STEEL POST)

MDOT Michigan Department of Transportation

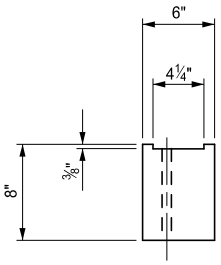
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

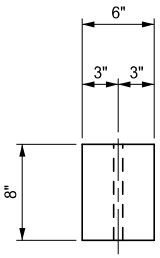
(SPECIAL DETAIL) / FHWA APPROVAL	10/04/2023 / PLAN DATE	R-60-J	SHEET 7 OF 16



BLOCK AND POST CONNECTION DETAILS



TOP



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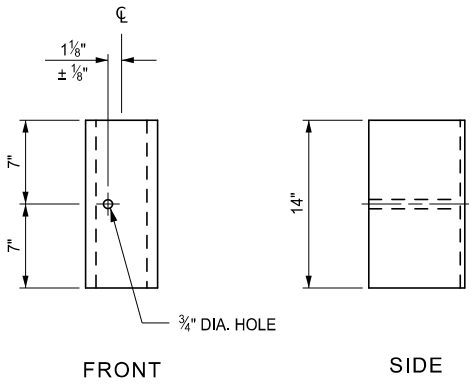
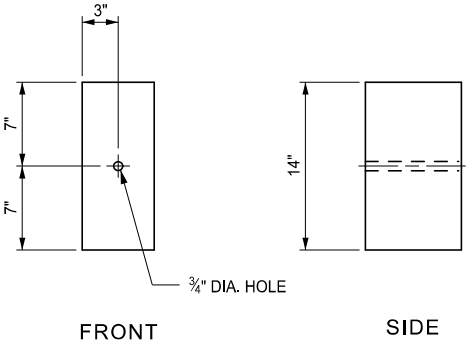


FRONT SIDE

FOR USE ON STEEL POSTS



FRONT SIDE

FOR USE ON WOOD POSTS

(SEE NOTES ON SHEET 16 OF 16)

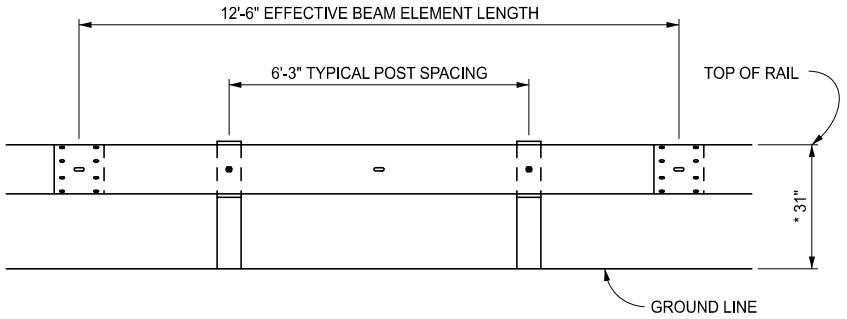
WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE MGS-8 AND TYPE MGS-8D

MDOT Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

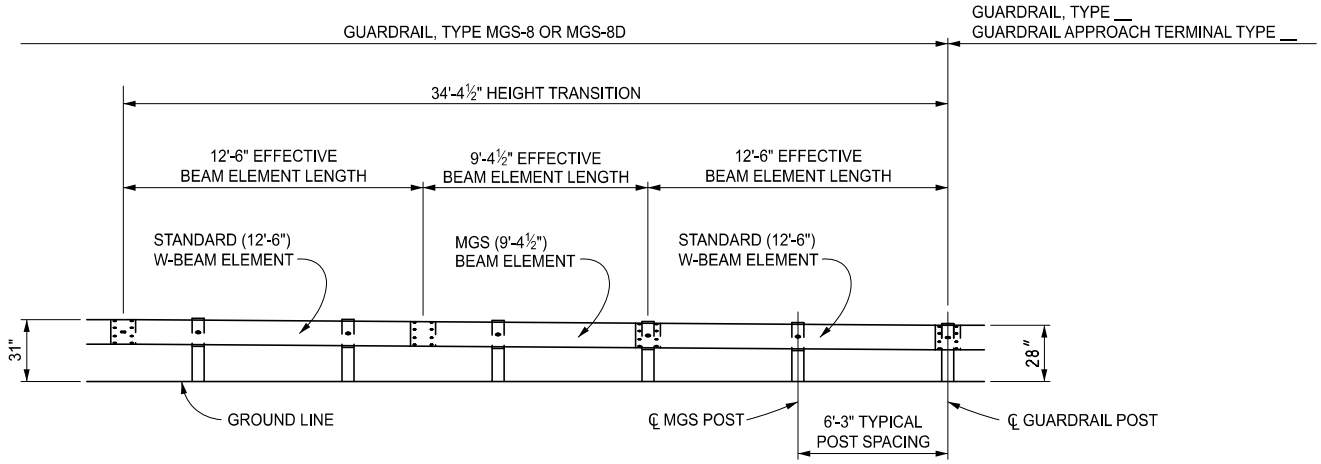
STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL) / FHWA APPROVAL	10/04/2023 / PLAN DATE	R-60-J	SHEET 8 OF 16

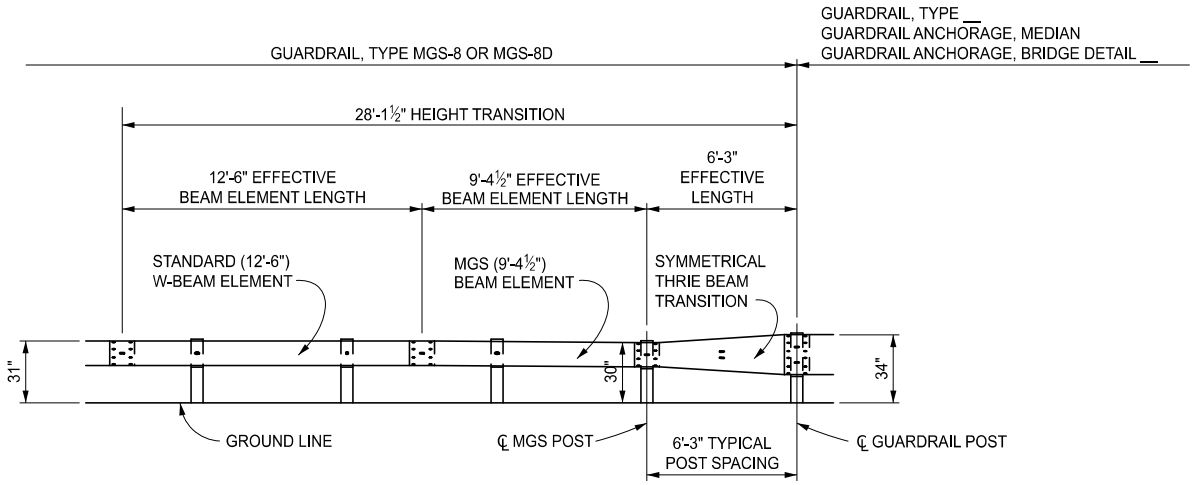


ELEVATION SHOWING POST SPACING FOR
GUARDRAIL, TYPE MGS-8 OR MGS-8D

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB



ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE MGS-8 OR MGS-8D TO
GUARDRAIL, TYPE B, GUARDRAIL, TYPE BD, OR
GUARDRAIL APPROACH TERMINAL TYPE 1B, 2B, OR 3B



ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE MGS-8 OR MGS-8D TO
GUARDRAIL, TYPE T, GUARDRAIL, TYPE TD,
GUARDRAIL ANCHORAGE, MEDIAN,
GUARDRAIL ANCHORAGE, BRIDGE DETAIL A1, T1, T4 OR T6

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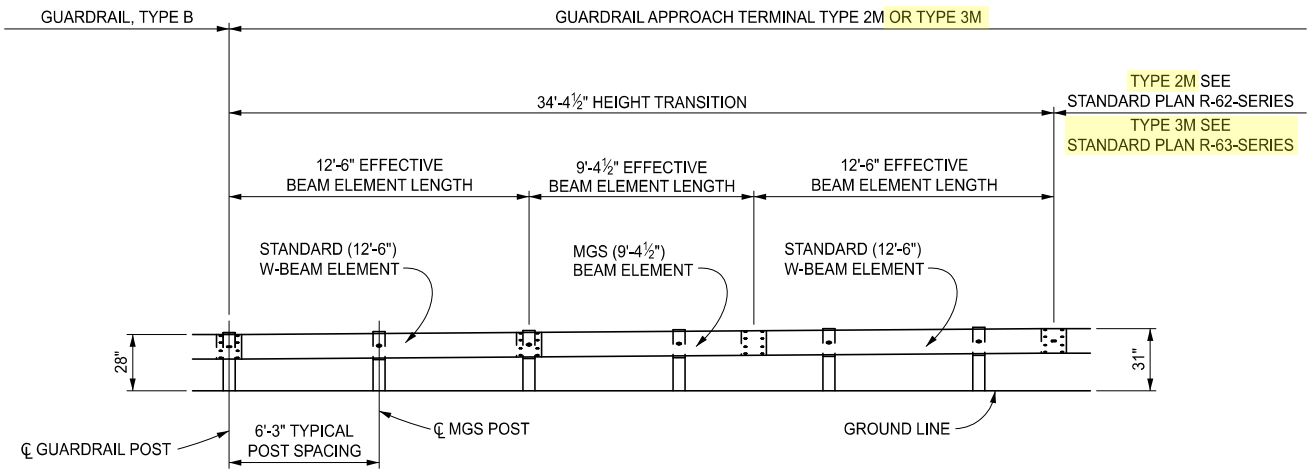
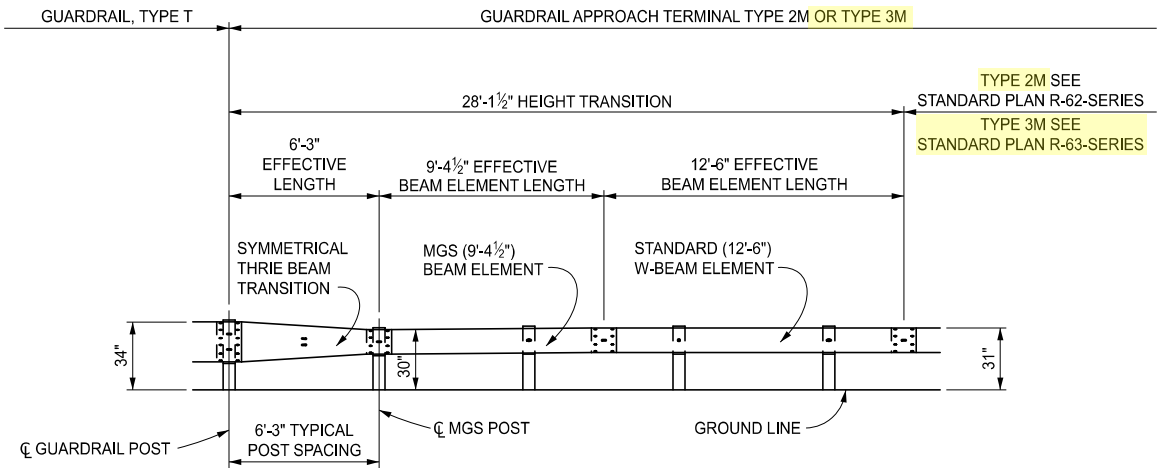
STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL) FHWA APPROVAL	10/04/2023 PLAN DATE	R-60-J	SHEET 9 OF 16



ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE B TO
GUARDRAIL APPROACH TERMINAL TYPE 2M OR TYPE 3M



ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE T TO
GUARDRAIL APPROACH TERMINAL TYPE 2M OR TYPE 3M

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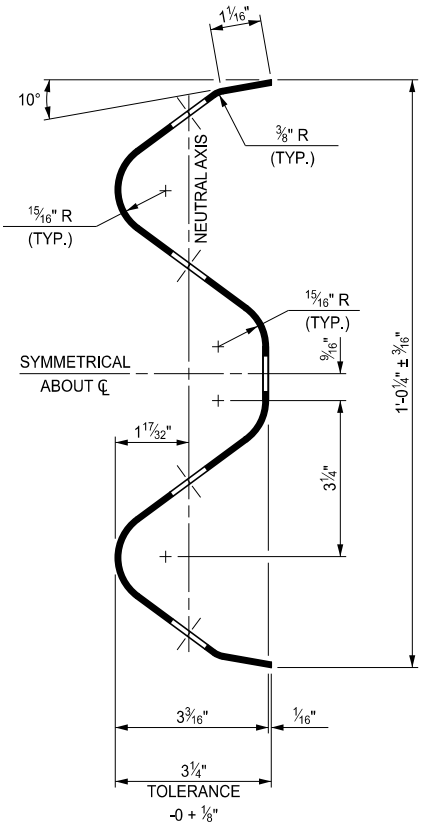
Michigan Department of Transportation

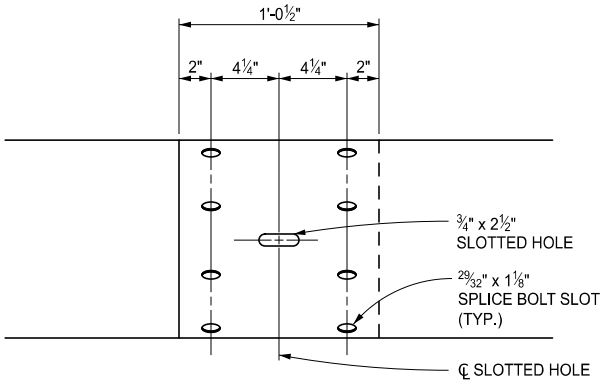
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

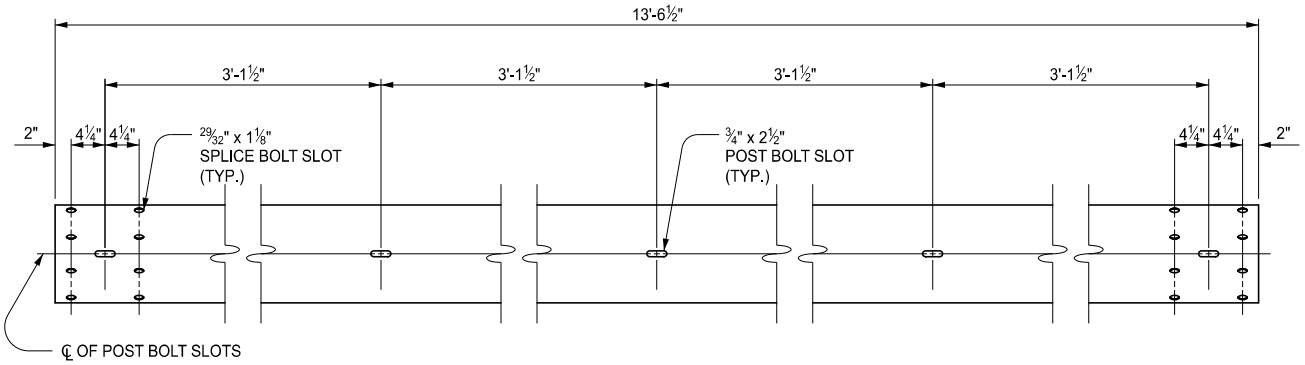
(SPECIAL DETAIL) FHWA APPROVAL	10/04/2023 PLAN DATE	R-60-J	SHEET 10 OF 16



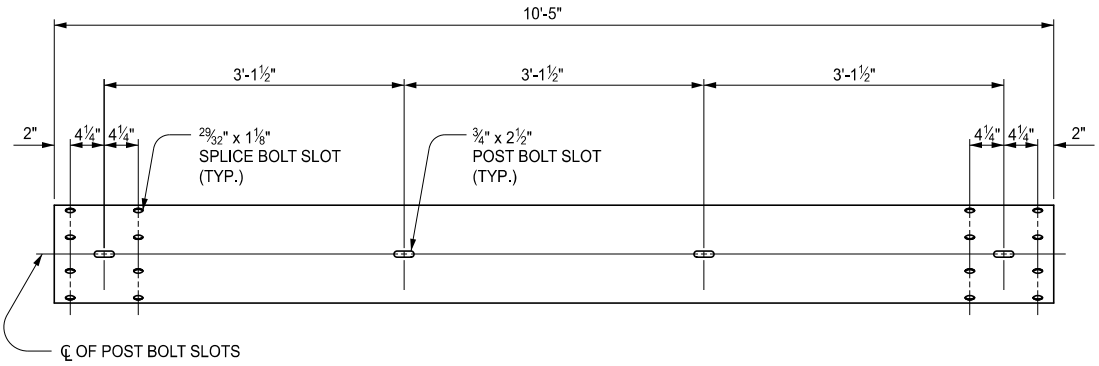
SECTION THROUGH BEAM ELEMENT



BEAM ELEMENT SPLICE DETAILS



FRONT ELEVATION OF BEAM ELEMENT



FRONT ELEVATION OF MGS (9'-4 1/2") BEAM ELEMENT

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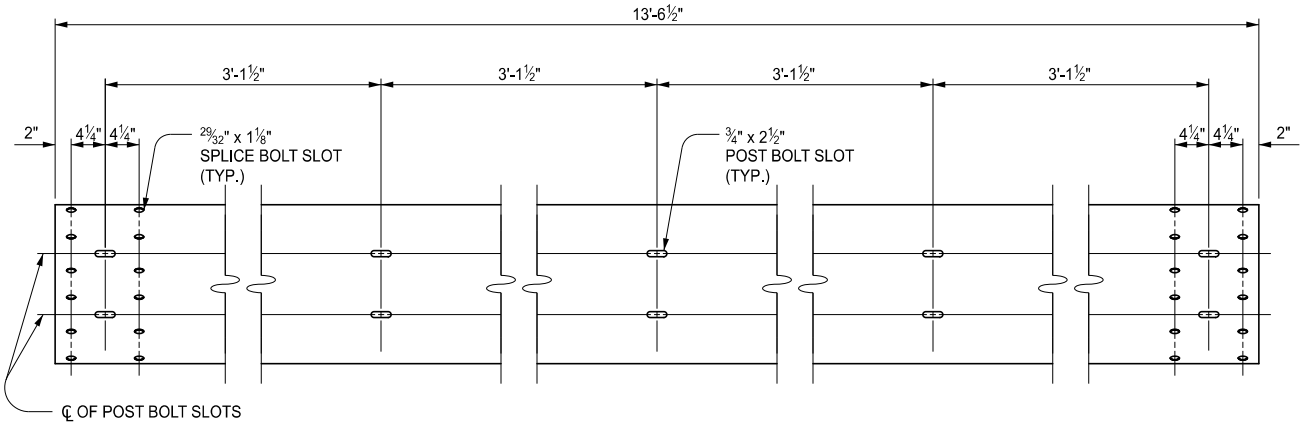
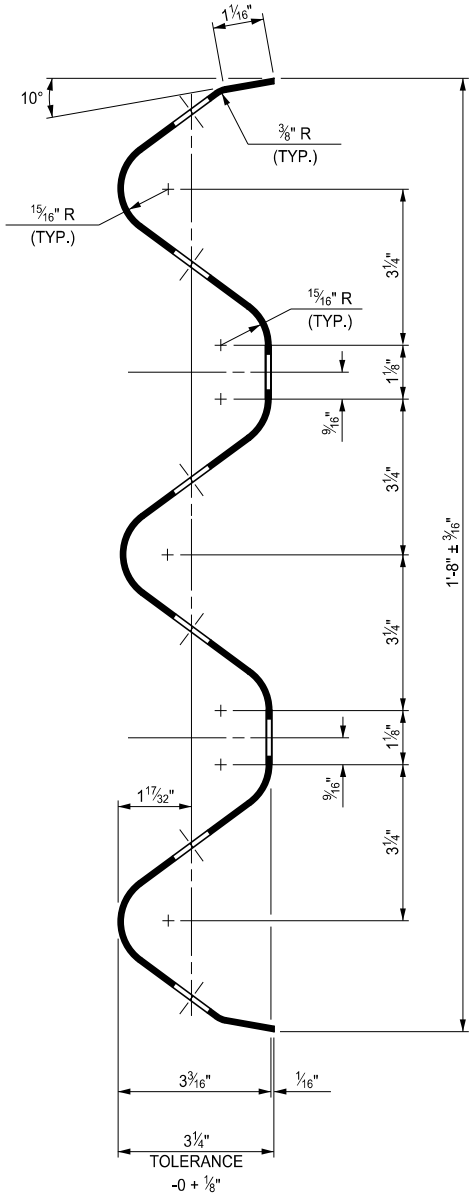
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL)	10/04/2023	R-60-J	SHEET
FHWA APPROVAL	PLAN DATE		11 OF 16



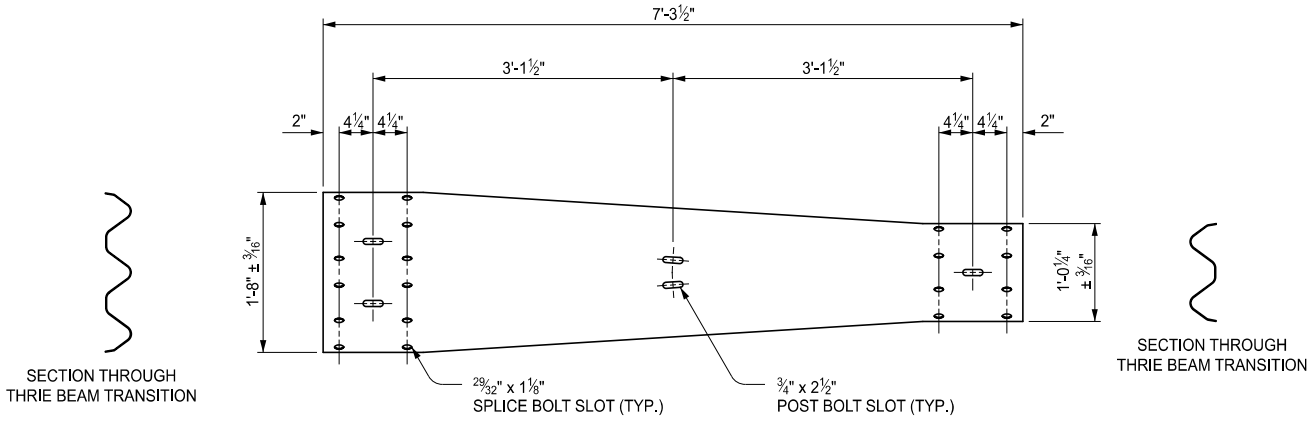
FRONT ELEVATION OF THRIE BEAM ELEMENT



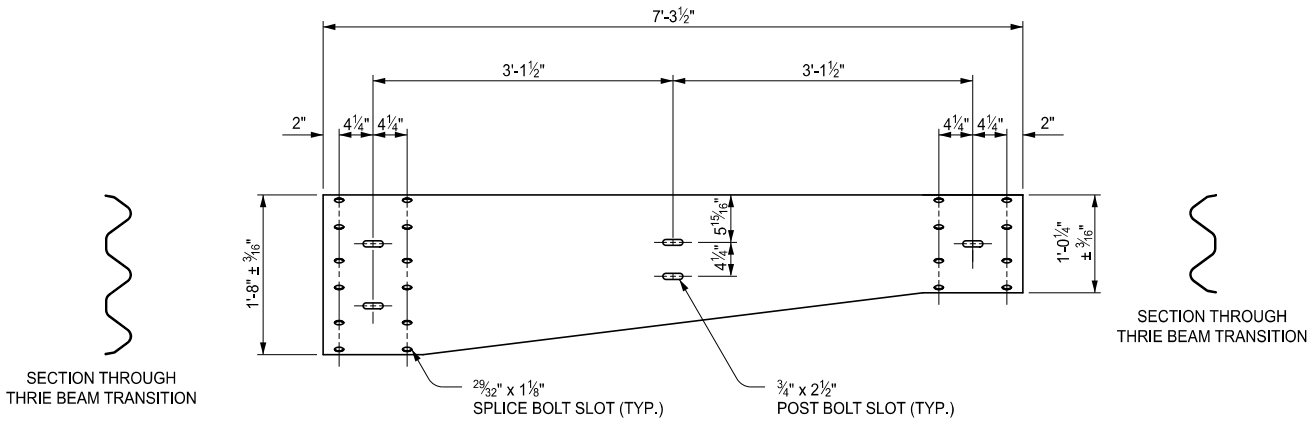
SECTION THROUGH THRIE BEAM ELEMENT

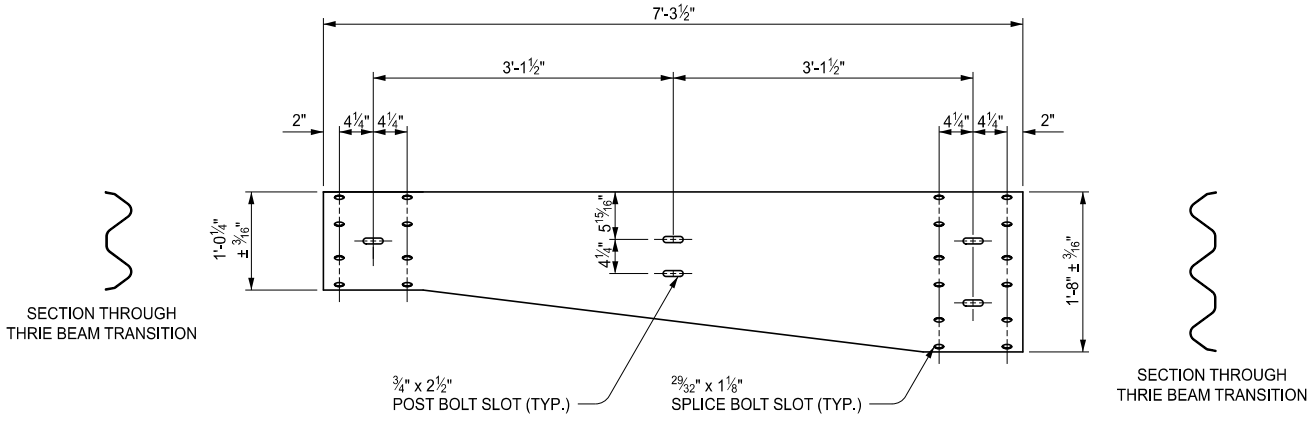
(FOR GUARDRAIL, TYPE T AND TD)

MDOT Michigan Department of Transportation DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D			
	(SPECIAL DETAIL) FHWA APPROVAL	10/04/2023 PLAN DATE	R-60-J	SHEET 12 OF 16



SYMMETRICAL THRIE BEAM TRANSITIONS





ASYMMETRICAL THRIE BEAM TRANSITIONS

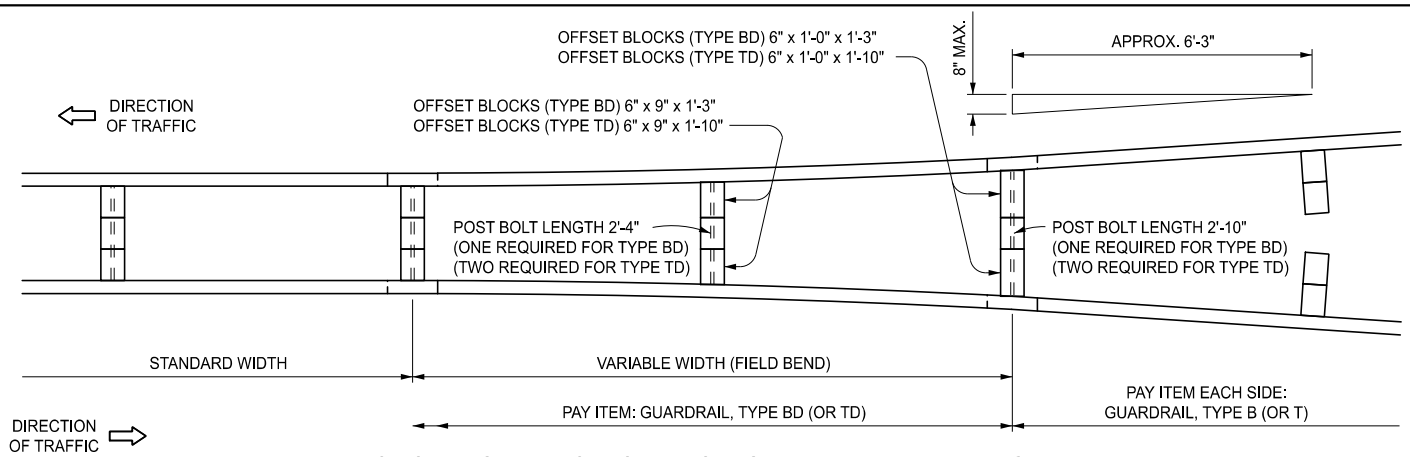
NOTE: ASYMMETRICAL TRANSITION TYPE WILL VARY BY LOCATION DEPENDING ON GUARDRAIL LAYOUT

MDOT Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL) FHWA APPROVAL	10/04/2023 PLAN DATE	R-60-J	SHEET 13 OF 16



DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE B (OR TYPE T) TO GUARDRAIL, TYPE BD (OR TYPE TD)

POST BOLTS, SPLICE BOLTS AND WASHERS AT BEAM ELEMENT SPLICE POSTS AND AT INTERMEDIATE POSTS

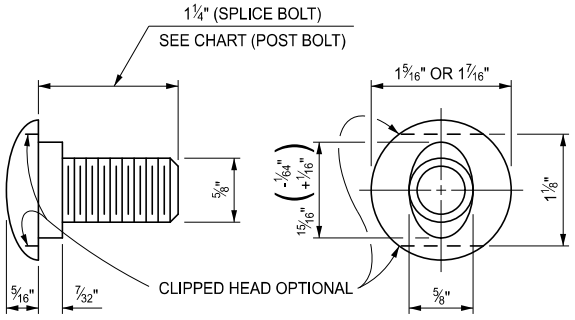
GUARDRAIL TYPE	POST	OFFSET BLOCK	POST BOLTS		SPLICE BOLTS (1¼" LONG) (NO. REQ'D)		WASHERS (ROUND) (NO. REQ'D)
			NO. REQ'D	LENGTH			
A	WOOD	N/A	1	9½"	8	NOT NEEDED AT INTERMEDIATE POSTS	1
	STEEL	N/A	1	2"			1
B	WOOD	WOOD	1	18"	8		1
	STEEL	WOOD	1	9½"			1
BD	WOOD	WOOD	1	* 26½"	16		———
	STEEL	WOOD	2	9½"			2
T	WOOD	WOOD	2	18"	12		2
	STEEL	WOOD	2	9½"			2
TD	WOOD	WOOD	2	* 26½"	24		———
	STEEL	WOOD	4	9½"			4

THRIE BEAM TRANSITIONS REQUIRE 20 SPLICE BOLTS EACH (12 0N TYPE T END AND 8 ON TYPE B END).

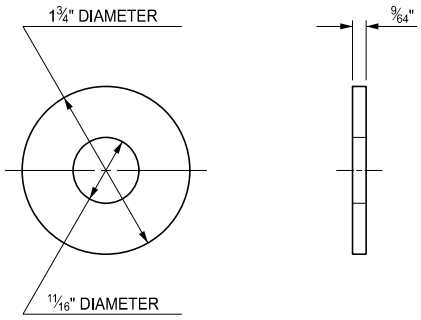
* EXCEPT AS SPECIFIED ON DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE B (OR TYPE T) TO GUARDRAIL, TYPE BD (OR TYPE TD). POST BOLTS SHALL NOT EXTEND MORE THAN ½" BEYOND NUT.

MINIMUM POST BOLT THREAD LENGTH

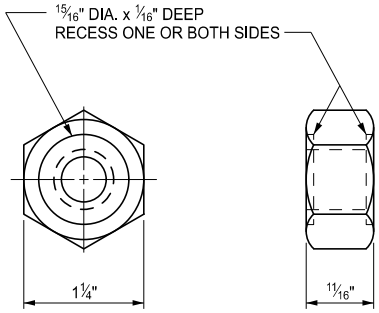
BOLT LENGTH	MINIMUM THREAD LENGTH
9½"	1¾"
18"	2½"
26½"	3"



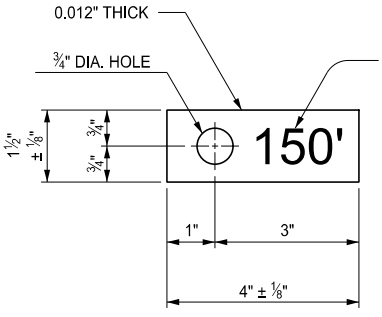
SPLICE BOLT AND POST BOLT



ROUND WASHER



NUT



METAL TAG
FOR CURVED GUARDRAIL WITH RADIUS OF 150' OR LESS

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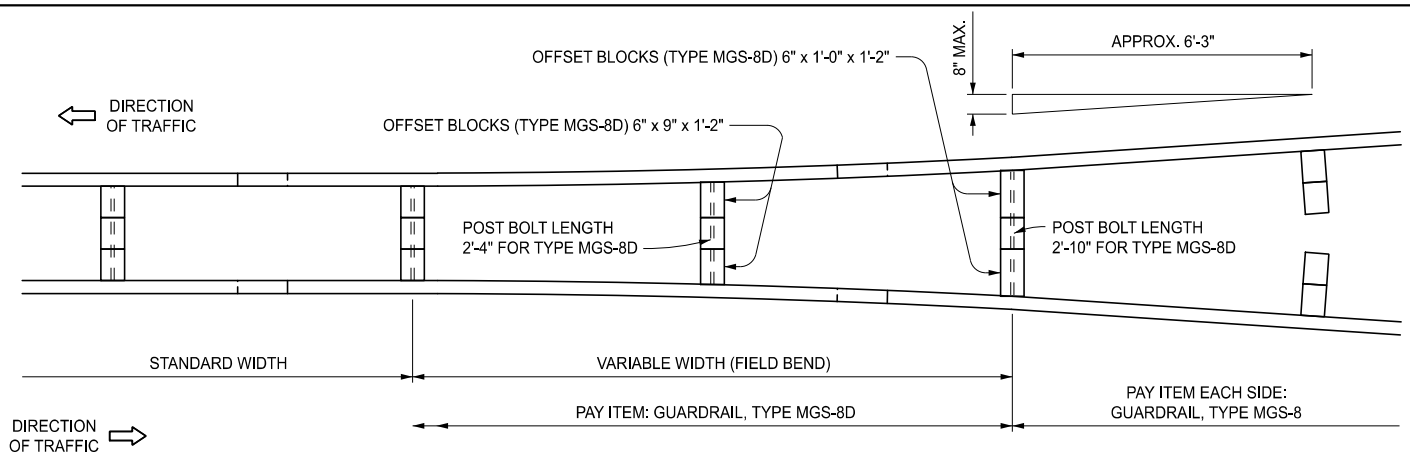
STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL) FHWA APPROVAL	10/04/2023 PLAN DATE	R-60-J	SHEET 14 OF 16



DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL, TYPE MGS-8D

POST BOLTS, SPLICE BOLTS AND WASHERS AT BEAM ELEMENT SPLICE POSTS AND AT INTERMEDIATE POSTS						
GUARDRAIL TYPE	POST	OFFSET BLOCK	POST BOLTS		SPLICE BOLTS	WASHERS
			NO. REQ'D	LENGTH	(1¼" LONG) (NO. REQ'D)	(ROUND) (NO. REQ'D)
MGS-8	WOOD	WOOD	1	18"	8	1
	STEEL	WOOD	1	9½"		1
MGS-8D	WOOD	WOOD	1	* 26½"	16	———
	STEEL	WOOD	2	9½"		2

THRIE BEAM TRANSITIONS REQUIRE 20 SPLICE BOLTS EACH (12 0N TYPE T END AND 8 ON TYPE MGS END).

* EXCEPT AS SPECIFIED ON DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL, TYPE MGS-8D POST BOLTS SHALL NOT EXTEND MORE THAN ½" BEYOND NUT.

MINIMUM POST BOLT THREAD LENGTH	
BOLT LENGTH	MINIMUM THREAD LENGTH
9½"	1¾"
18"	2½"
26½"	3"

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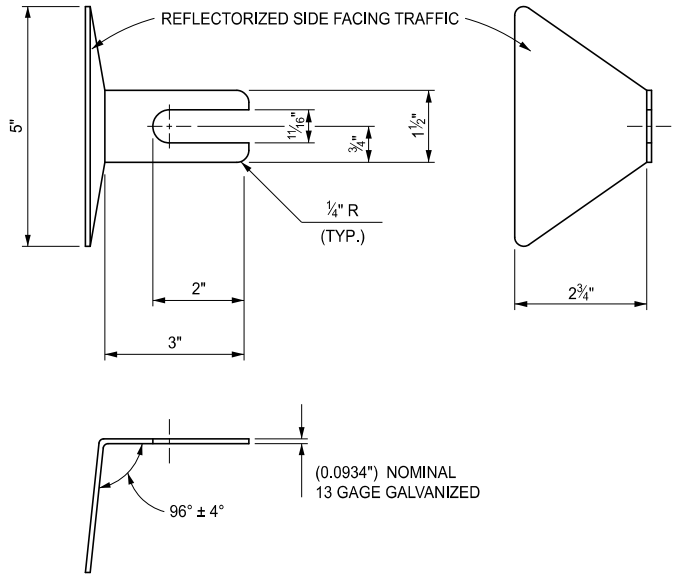
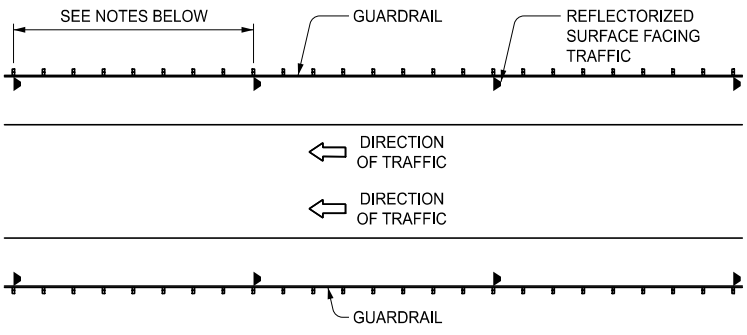
STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

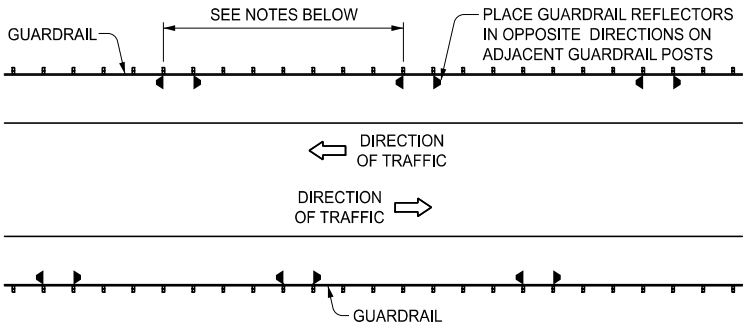
(SPECIAL DETAIL) FHWA APPROVAL	10/04/2023 PLAN DATE	R-60-J	SHEET 15 OF 16



GUARDRAIL REFLECTOR



ONE-WAY TRAFFIC

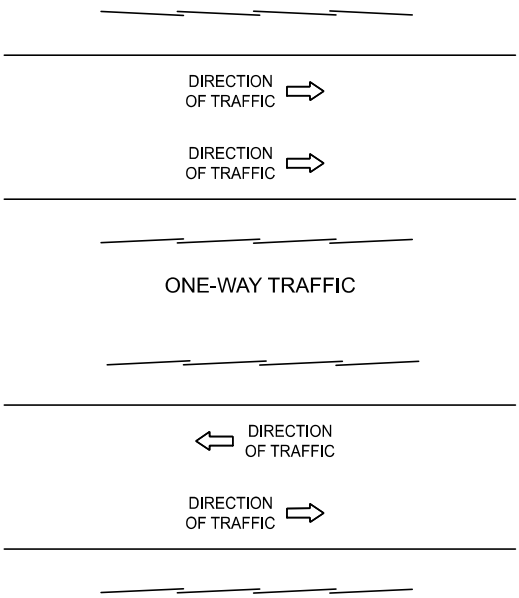


TWO-WAY TRAFFIC

PLACEMENT OF GUARDRAIL REFLECTORS

NOTES GOVERNING THE USE OF GUARDRAIL REFLECTORS

1. GUARDRAIL REFLECTORS SHALL BE USED ON ALL STANDARD GUARDRAIL RUNS, REGARDLESS OF ROADWAY LIGHTING.
2. GUARDRAIL REFLECTORS ARE TO BE SPACED AT THE FOLLOWING INTERVALS:
   a) 50'-0" ON TANGENT SECTIONS AND CURVES WITH A RADIUS OF 1150' OR MORE.
   b) 25'-0" ON CURVES WITH A RADIUS LESS THAN 1150'.
3. FOR GUARDRAIL REFLECTOR PLACEMENT ON APPROACH TERMINALS, SEE THE APPROPRIATE GUARDRAIL APPROACH TERMINAL STANDARD PLAN.
4. A GUARDRAIL REFLECTOR IS TO BE PLACED ON THE SECOND POST FROM THE GUARDRAIL DEPARTING TERMINAL.
5. ON GUARDRAIL, TYPE T AND TYPE TD GUARDRAIL REFLECTORS ARE TO BE PLACED ON THE UPPER POST BOLT.
6. GUARDRAIL REFLECTORS SHALL MATCH COLOR OF EDGE LINE.



TWO-WAY TRAFFIC

DIRECTION OF RAIL LAP

NOTES:

DETAILS SPECIFIED ON THIS STANDARD ARE ACCORDING TO THE AASHTO-AGC-ARTBA JOINT COMMITTEE, TASK FORCE 13 PUBLICATION TITLED "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE."

BEAM ELEMENTS SHALL BE SHOP BENT TO PLAN RADIUS FOR CURVE RADII 150' OR LESS. A TAG IDENTIFYING THE CURVATURE OF THE SHOP BENT SECTION WILL BE REQUIRED FOR EACH CURVED ELEMENT.

SEE STANDARD PLAN R-62-SERIES OR R-63-SERIES FOR GUARDRAIL APPROACH TERMINALS, STANDARD PLAN R-66-SERIES FOR GUARDRAIL DEPARTING TERMINALS AND STANDARD PLAN R-67-SERIES FOR GUARDRAIL ANCHORAGE, BRIDGE.

WOOD POSTS WITH ½" BEVELS AT THE TOP MAY BE USED IN LIEU OF WOOD POSTS WITHOUT BEVELS SPECIFIED. THE LENGTH, WIDTH AND DEPTH OF THE POST SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT.

WOOD OFFSET BLOCKS WITH ½" BEVELS AT THE TOP AND BOTTOM OR A 1" BEVELED TOP MAY BE USED IN LIEU OF WOOD BLOCKS WITHOUT BEVELS SPECIFIED. THE LENGTH (FRONT AND BACK FACE), WIDTH AND DEPTH OF THE BLOCK SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT AND COMPATIBILITY WITH POST HOLES.

WHEN THE FACE OF GUARDRAIL IS PLACED FLUSH WITH FACE OF CURB, THE RAIL HEIGHT SHOULD BE MEASURED FROM THE FRONT EDGE OF THE GUTTER PAN, WHICH IS THE POINT ON THE GUTTER PAN THAT IS CLOSEST TO THE EDGE OF THE TRAVELED LANE. WHEN THE FACE OF THE GUARDRAIL PANEL IS LOCATED BEHIND THE CURB THE RAIL HEIGHT SHOULD BE MEASURED FROM THE GROUND JUST IN FRONT OF THE GUARDRAIL.

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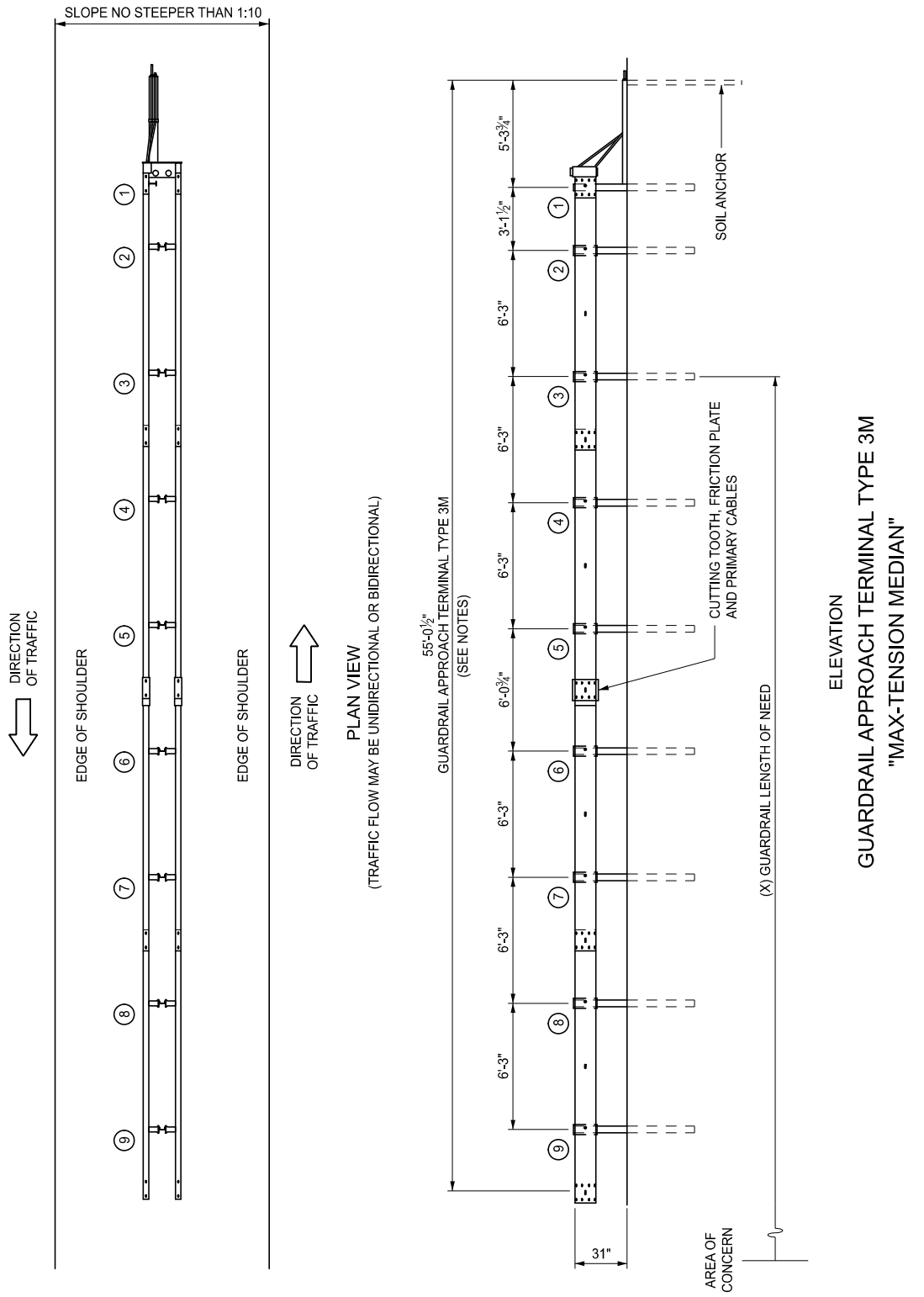
STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

(SPECIAL DETAIL) / FHWA APPROVAL	10/04/2023 / PLAN DATE	R-60-J	SHEET 16 OF 16



OPTION 1

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

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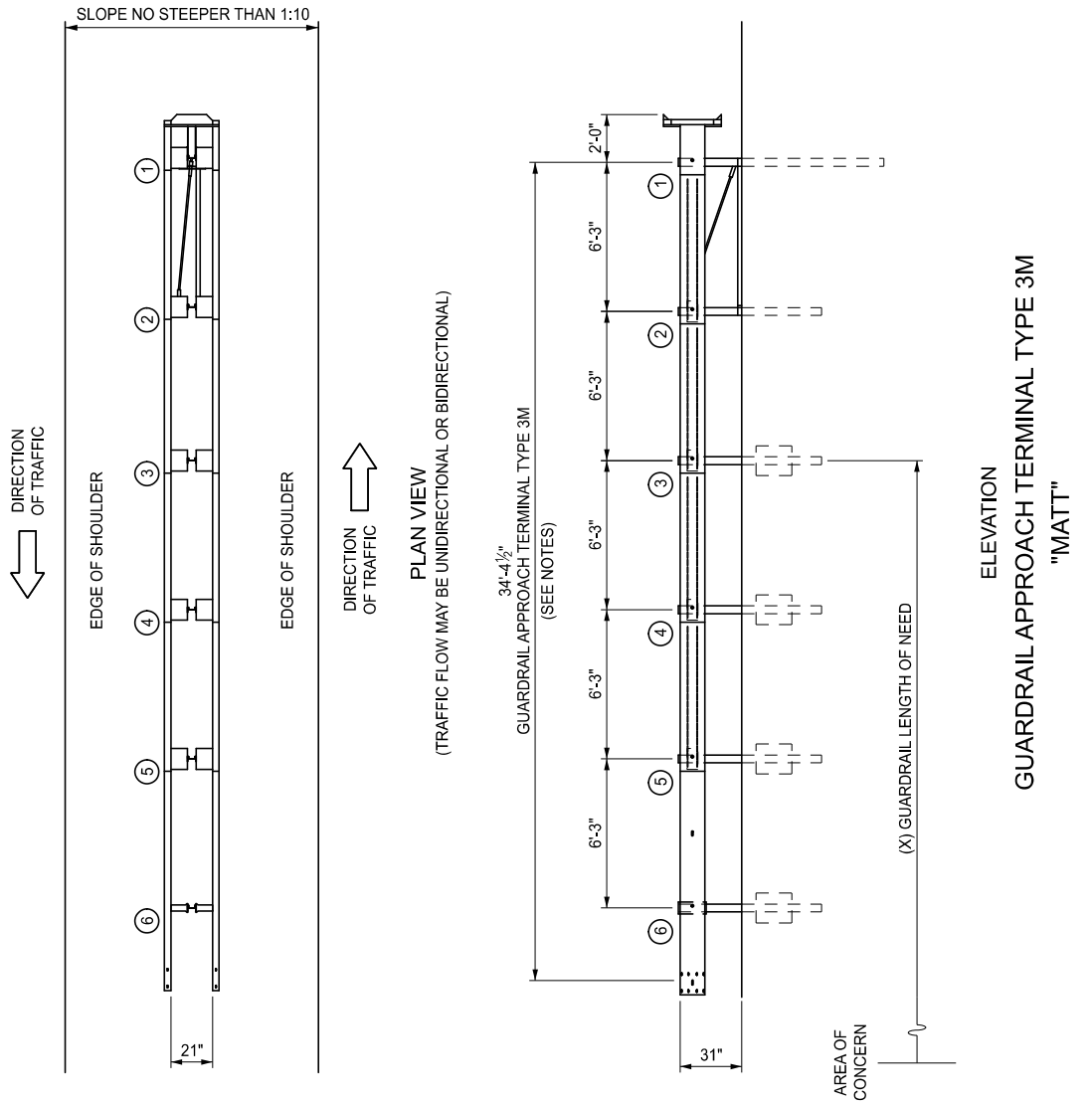
STANDARD PLAN FOR
GUARDRAIL APPROACH TERMINAL TYPE 3M

(SPECIAL DETAIL) FHWA APPROVAL	10/02/2023 PLAN DATE	R-63-C	SHEET 1 OF 3



OPTION 2

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STANDARD PLAN FOR
GUARDRAIL APPROACH TERMINAL TYPE 3M

(SPECIAL DETAIL) FHWA APPROVAL	10/02/2023 PLAN DATE	R-63-C	SHEET 2 OF 3

NOTES:

SEE STANDARD PLAN R-60-SERIES FOR ADDITIONAL TRANSITION LENGTHS WHEN ATTACHING TERMINALS TO OTHER THAN TYPE MGS-8 GUARDRAIL.

ALL POSTS, OFFSET BLOCKS, BEAM ELEMENTS, AND HARDWARE (INCLUDING BOLTS, NUTS, AND WASHERS) SHALL CONFORM TO THE MANUFACTURE'S DETAILS AND SPECIFICATIONS.

ALL 1:10 OR FLATTER SLOPES SHALL BE GRADED TO CLASS A SLOPE TOLERANCES.

GUARDRAIL REFLECTORS AND OTHER ATTACHEMENTS ARE NOT TO BE USED ON THE GUARDRAIL APPROACH TERMINAL. PLACE RELECTORS BEGINNING ON STANDARD RUN OF GUARDRAIL.

USE REFLECTIVE SHEETING ACCORDING TO THE FOLLOWING TRAFFIC CONDITIONS: (NOTE: ALTERNATE 3" BLACK AND 3" YELLOW STRIPES ON A 45° ANGLE)

TRAFFIC PASSING ON THE LEFT SIDE

TRAFFIC PASSING ON BOTH SIDES

TRAFFIC PASSING ON THE RIGHT SIDE

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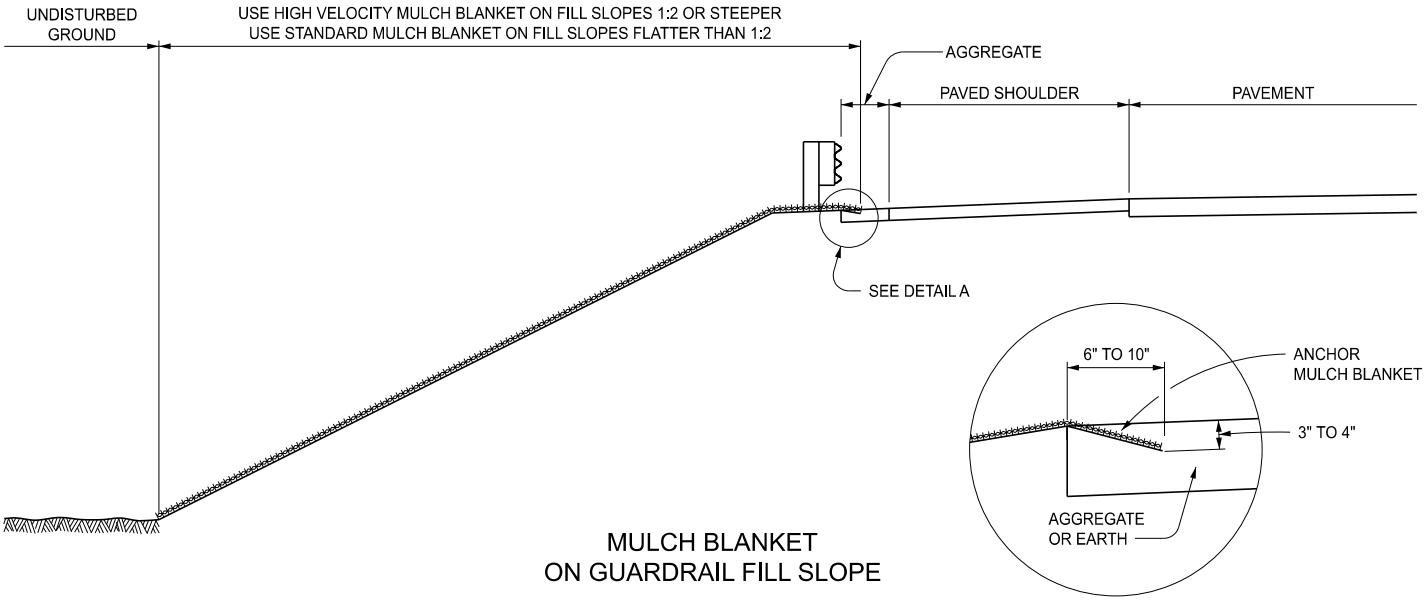
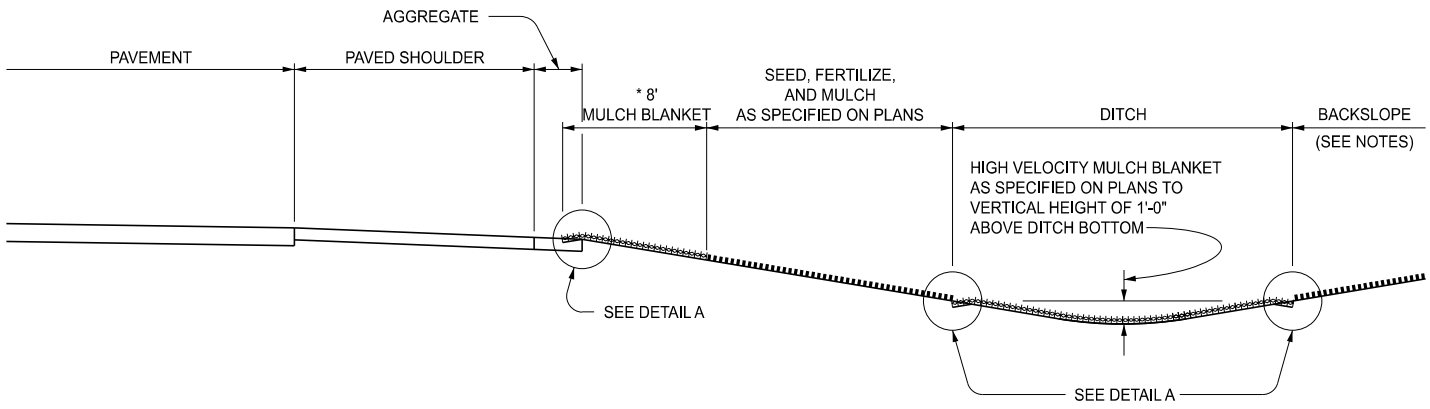
STANDARD PLAN FOR
GUARDRAIL APPROACH TERMINAL TYPE 3M

(SPECIAL DETAIL) / FHWA APPROVAL	10/02/2023 / PLAN DATE	R-63-C	SHEET 3 OF 3

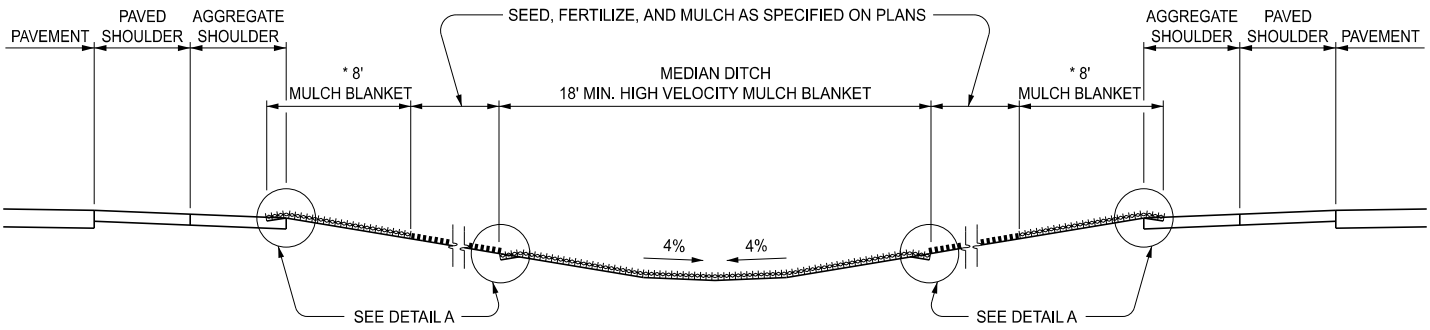


MULCH BLANKET
ON GUARDRAIL FILL SLOPE

DETAIL A



TYPICAL SLOPE AND DITCH PROTECTION



MULCH BLANKET SPILLWAY DITCH

* NOTE:

MULCH BLANKET SHALL BE USED ON BOTH SIDES OF NORMAL SECTIONS, HIGH SIDES OF ALL SUPERELEVATED SECTIONS, AND LOW SIDES OF PAVEMENTS HAVING A SUPERELEVATION OF 5% OR LESS. HIGH VELOCITY MULCH BLANKET SHALL BE USED ON THE LOW SIDE OF PAVEMENTS HAVING A RATE OF SUPERELEVATION GREATER THAN 5%.

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

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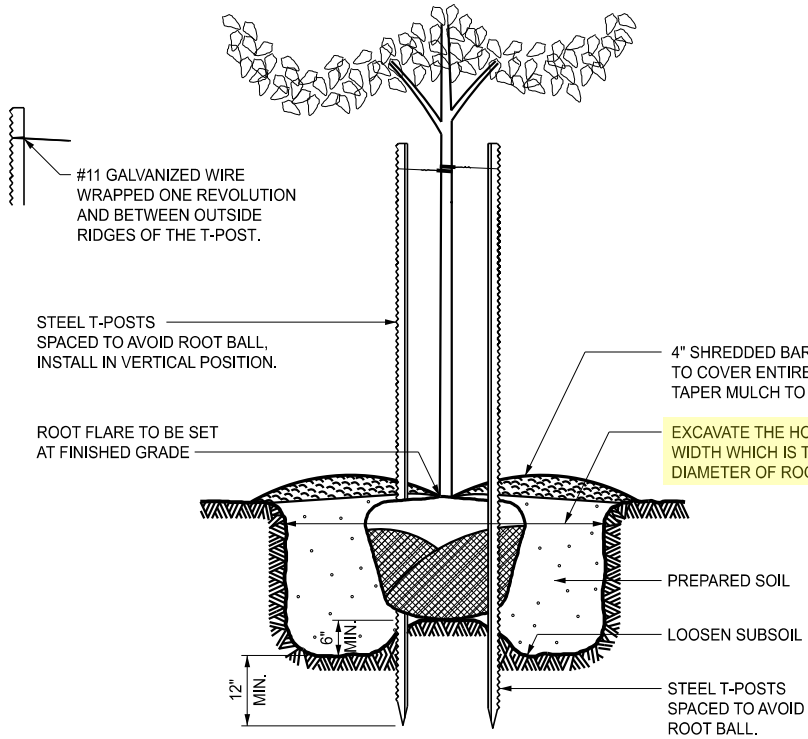
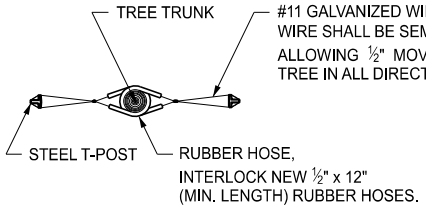
STANDARD PLAN FOR
SEEDING AND TREE PLANTING

(SPECIAL DETAIL) FHWA APPROVAL	12/08/2023 PLAN DATE	R-100-I	SHEET 1 OF 4



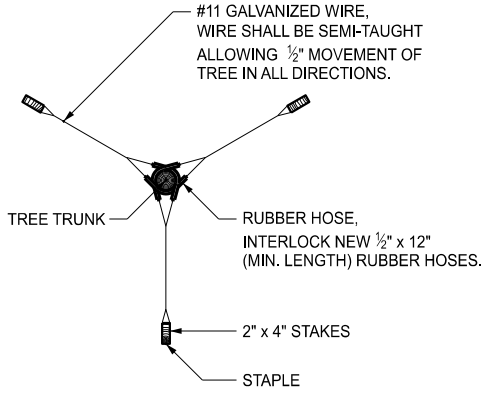
BRACING - VERTICAL STAKES



BRACING DETAIL

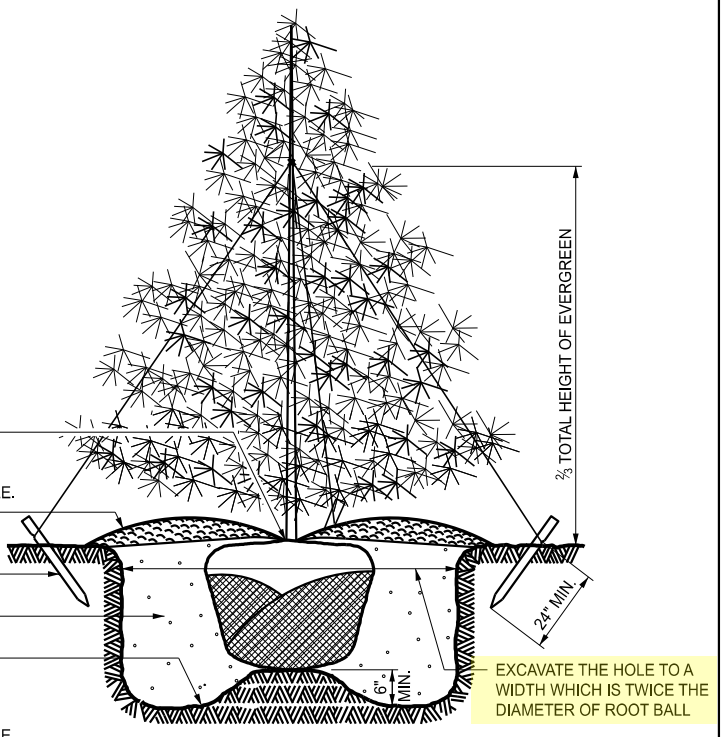
BRACE DECIDUOUS TREES 2" TO 4" IN CALIPER OR 8' OR MORE IN HEIGHT WITH TWO STAKES.

BRACE DECIDUOUS TREES LESS THAN 2" IN CALIPER OR 8' IN HEIGHT WITH ONE STAKE ON THE WESTERLY SIDE OF THE PLANT.

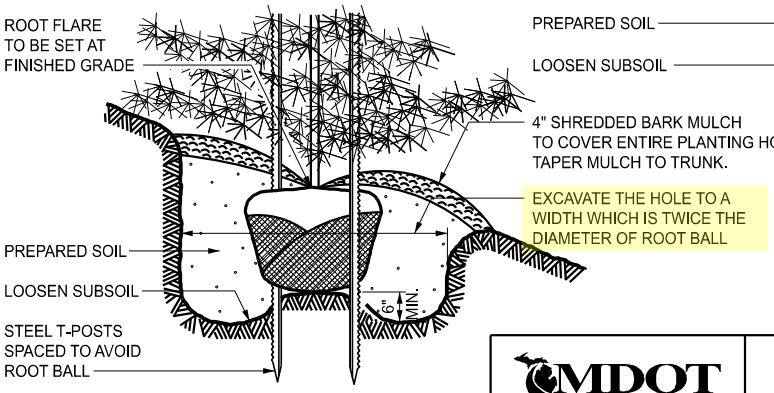


TRIPOD GUYING DETAIL

GUY EVERGREENS OVER 4" IN CALIPER OR 6' IN HEIGHT WITH THE TRIPOD METHOD AND UNDER 6' IN HEIGHT WITH TWO STAKES.



GUYING - TRIPOD METHOD



SLOPE PLANTING

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STANDARD PLAN FOR
SEEDING AND TREE PLANTING

(SPECIAL DETAIL)	12/08/2023	R-100-I	SHEET
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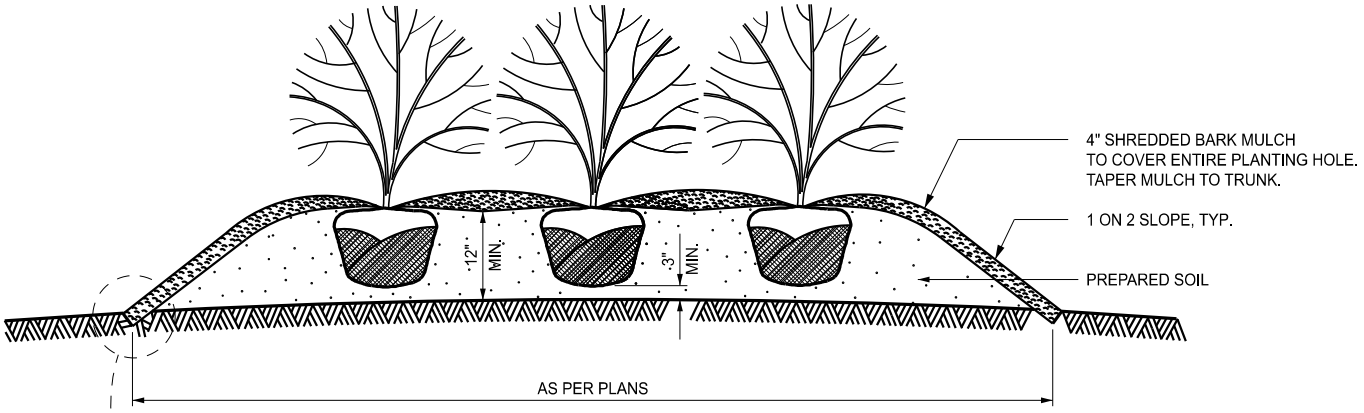
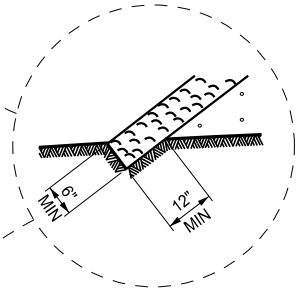


RAISED SHRUB BED DETAIL



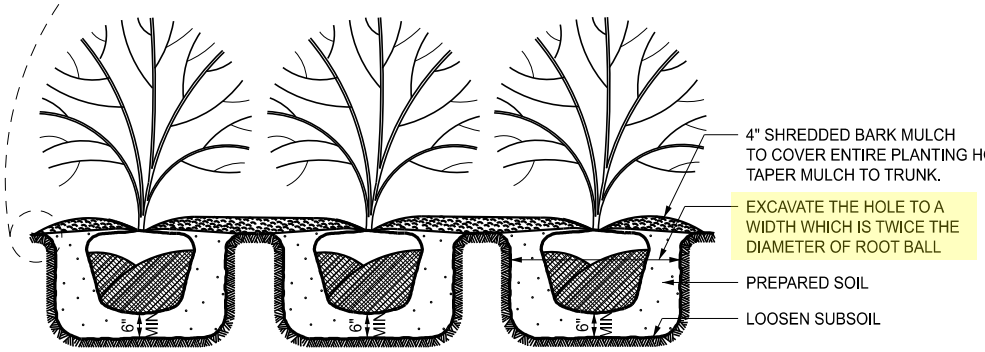
SHRUB BED EDGING DETAIL

FIRST AND SECOND WATERING AND CULTIVATION SHALL INCLUDE SHRUB BEDS.

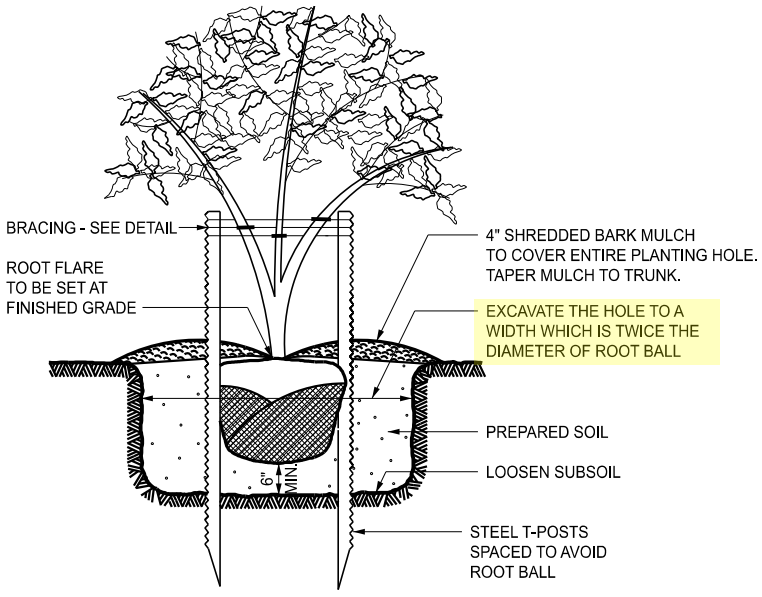
CUT 6" x 12" (MIN.) EDGING AROUND THE PERIMETER OF ALL SHRUB BEDS SHOWN ON THE PLANS. SPRAY A NON-PERSISTANT GLYPHOSATE HERBICIDE TO ENTIRE SHRUB BEDS PRIOR TO PLANTING AND BARK PLACEMENT.

SHRUB BEDS ARE TO BE PAID FOR BY THE PAY ITEM 'SITE PREPARATION'.

ALL PLANTS SHALL BE SET PLUMB AND HAVE THE BEST SIDE OF PLANT FACING THE MAIN VIEWING DIRECTION.



SHRUB BED DETAIL



MULTIPLE STEM TREES

PLANTING NOTES:

ALL EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE - IMMEDIATELY.

LOOSEN SUBSOIL TO A DEPTH OF 4". LOOSEN EARTH ON SIDES OF PLANT POCKET TO BREAK ANY GLAZING CAUSED BY DIGGING.

FILL PREPARED SOIL TO ½ THE DEPTH OF THE ROOT BALL, PACK FIRMLY, AND PUDDLE WITH WATER.

BACKFILL WITH PREPARED SOIL WHICH, AFTER COMPACTION, IS FLUSH WITH SURROUNDING GROUND LEVEL.

COVER ENTIRE PLANT POCKET AREA WITH 4" MULCH. PRUNE AND BRACE AND GUY.

WHEN PLANTS ARE FURNISHED IN CONTAINERS, CONTAINERS SHALL BE COMPLETELY REMOVED AT THE TIME OF PLANTING.

TREE HEIGHTS ARE SHOWN BEFORE PRUNING. TREE PLANTING DEPTHS ARE SHOWN AFTER SETTLING.

TREES AND SHRUBS SHALL NOT BE PLANTED WITHIN 50' AND 30' RESPECTIVELY OF THE NEAREST EDGE OF METAL - EXCEPT WHERE INACCESSIBLE TO VEHICLES.

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STANDARD PLAN FOR
SEEDING AND TREE PLANTING

(SPECIAL DETAIL)	12/08/2023	R-100-I	SHEET
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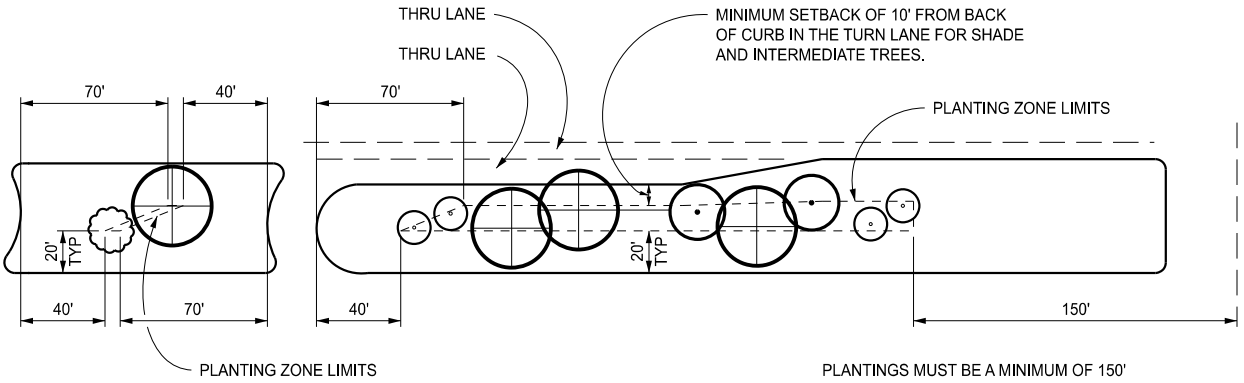
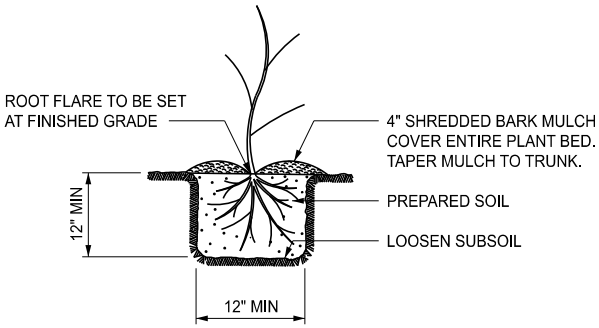
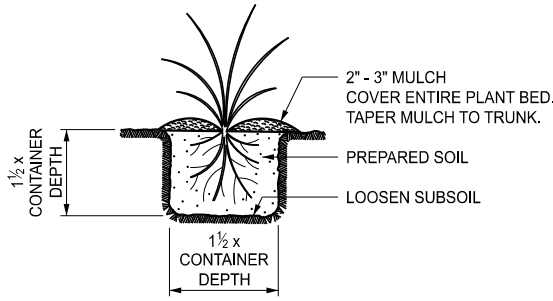


MEDIAN PLANTING
NOT TO SCALE



BARE ROOT PLANTS



PERENNIAL PLANTS

PLANTING BARE ROOT PLANT MATERIAL

REFER TO THE "SPECIAL PROVISIONS FOR BARE ROOT PLANTING" FOR SHIPPING, STORAGE AND HANDLING REQUIREMENTS.

MAINTAIN ROOT MOISTURE BY KEEPING ROOTS IMMERSED IN WATER PRIOR TO PLANTING.

ROOT PRUNE AS NECESSARY TO REMOVE ALL DAMAGED OR BROKEN ROOTS, AND AS REQUIRED BY THE DISTRICT FORESTER OR RESOURCE SPECIALIST.

DIG PLANTING HOLES AT LEAST 12" WIDE AND 12" DEEP TO ACCOMODATE ROOT MASS.

SET PLANTS PLUMB WITH THE ROOTS SPREAD PUT IN A NATURAL POSITION AT A DEPTH EQUAL TO THE DEPTH AT THE NURSERY.

HOLD PLANT FIRMLY AND PUDDLE (NOT TAMP) THE BACKFILL AROUND THE ROOTS WITH WATER. SUFFICIENT WATER SHALL BE USED TO ENSURE SATURATION OF THE BACKFILL, BUT CARE SHOULD BE TAKEN NOT TO OVERWATER, CAUSING A FLOATING SOIL MASS THAT PREVENTS COMPACTION AND MAY RESULT IN AIR POCKETS ADJACENT TO THE ROOTS. BACKFILL SHOULD BE FLUSH WITH THE GROUND AFTER COMPACTION.

COVER ENTIRE PLANT POCKET AREA WITH 4" MULCH AS SHOWN.

FIRST AND SECOND WATERING AND CULTIVATION SHALL INCLUDE PERENNIAL BEDS.

PERENNIALS ARE TO BE FULLY DEVELOPED TWO YEAR #2 CONTAINER PLANTS.

ENTIRE PERENNIAL BED SHALL BE EXCAVATED DOWN 12" AND REPLACED WITH 12" OF PREPARED SOIL.

PERENNIAL BEDS ARE TO BE PAID FOR BY THE PAY ITEM 'SITE PREPARATION'.

SEEDING NOTES:

THIS STANDARD ILLUSTRATES THE TYPICAL USE OF SEEDING WITH MULCH, AS THESE ITEMS RELATE TO ROADWAY CONSTRUCTION. THE ACTUAL DESIGN AND MATERIALS USED TO CONSTRUCT THE COMPLETE SECTION, WHICH INCLUDES SEEDING WITH MULCHING, WILL BE ACCORDING TO THE PLANS AND THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

ITEMS CALLED FOR ON THIS STANDARD MAY ALSO BE USED DURING CONSTRUCTION AS AN EROSION CONTROL MEASURE. SEE STANDARD PLAN R-96-SERIES.

ALL DITCHES SHOULD HAVE HIGH VELOCITY MULCH BLANKET FOR EROSION CONTROL.

THE FIRST 8' BEHIND THE CURB OR SHOULDER IN URBAN MEDIAN AREAS WILL BE SEEDED, FERTILIZED, AND MULCHED WITH MULCH BLANKET. THE REMAINING AREAS WILL BE SEEDED, FERTILIZED, AND MULCHED WITH MULCH BLANKET OR STANDARD MULCH ANCHORED IN PLACE WITH A MULCH ADHESIVE OR WITH A MULCH NET.

ALL AREAS WHERE MULCH BLANKET IS CALLED FOR SHALL BE SEEDED, FERTILIZED, AND TOPSOILED AS SPECIFIED ON PLANS. NO MULCH OR ANCHORING MULCH IS REQUIRED WHERE MULCH BLANKET IS INSTALLED.

BACKSLOPE RESTORATION TREATMENT SHALL BE THE SAME AS THE FRONT SLOPE.

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STANDARD PLAN FOR
SEEDING AND TREE PLANTING

(SPECIAL DETAIL)	12/08/2023	R-100-I	SHEET
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CHAPTER 14 PROCEDURES FOR PLAN PREPARATION INDEX (continued)

14.49 Section Deleted

14.50 FINAL CONSTRUCTABILITY REVIEW

14.51 INCENTIVE AND LIQUIDATED DAMAGES CLAUSES

14.51.01 Guidelines

14.51.02 Applications

14.51.03 Procedure

14.52 REVIEW OF PROJECT SCOPE, COST AND SCHEDULE

14.53 Section Deleted

14.54 FINAL PROJECT COORDINATION (FPC)

14.54.01 Requirements

14.54.02 Procedure

14.54.03 Attendees

14.55 CONTRACT SELECTION TEAM (DBE PROGRAM)

14.56 PACKAGING OR CONSOLIDATING PROJECTS

14.57 PLAN COMPLETION & DESIGN PLAN SUBMITTAL-CERTIFICATION ACCEPTANCE

14.57.01 Procedure

14.58 APPROVAL OF SPECIAL PROVISION

14.59 SHELF PROJECTS

14.60 SUBMISSION OF COMPLETED PLANS

14.60.01 General

14.60.02 Requirements

14.60.03 Exceptions

14.60.04 QA/QC Review

14.60.05 AASHTOWare Project (AP) Preconstruction Files

14.57 (revised 12-26-2023)

PLAN COMPLETION & DESIGN PLAN SUBMITTAL - CERTIFICATION ACCEPTANCE

(PPD Milestone 380M)
(PPD Milestone 391M)
(PPD Milestone 389M)

The Plan Completion date indicates 100% completion of the plans, proposal and supporting documents.

As part of the stewardship agreement with the FHWA, MDOT developed a procedure involving a system of checks/reviews to verify all requirements of the agreement are met. The Department also made the decision to use the majority of the process (completion of the Design Plan Submittal-Certification Acceptance (DPS-CA Form) on all projects (Federal and/or State funded), including those classified with FHWA Oversight (Risk Based Project Involvement (RBPI)). The verification is accomplished by completing the Certification Acceptance portion of the DPS-CA form. The form includes reviews (with confirmation utilizing dynamic Reviewed stamps) by several divisions and sections within MDOT. Once the DPS-CA form is completed with all applicable stamps, and stored in the ProjectWise Supporting Documents folder, it is submitted to the Specifications and Estimates Unit at final turn-in. The required stamps are listed below:

14.57 (continued)

- Bridge Design Unit (as applicable)
- Project Manager Licensed in the State of Michigan
- Quality Assurance Engineer
- Specifications and Estimates Engineer
- Utility Coordination and Permits (as applicable)
- Governmental Coordination and Engineering
- Office of Rail (as applicable)
- Force Account Work (as applicable)
- Geometric Design Engineer (pending CA form type and as applicable)
- Traffic Signs and Delineation (as applicable)
- Freeway Lighting (as applicable)
- Pavement Markings (as applicable)
- Traffic Signals (as applicable)
- Region/TSC Traffic and Safety
- Construction Engineer

14.57 (continued)

The following documentation must be completed and stored in the applicable ProjectWise location prior to the final turn-in submittal to the Specifications and Estimate Unit **as it pertains to the project**.

- Environmental Classification (Form 1775)
  Special Design Considerations Memo
- Milestone Checklist
- Form 0334 – Exception to the Plan Review/FPC Meeting Process
- AASHTOWare Project Preconstruction Documents as noted on the Milestone Checklist
- Form 0268 – Project Cost Estimating Checklist
- Mitigation measures required in the environmental document (EIS, FONSI)
- Permits
- Environmental Classification/Certification
- ROW Certification
- PACS Report
- Proprietary Item Documentation
- Copies of Scope Verification and The Plan Review Meeting minutes.
- Design Exceptions / Variances
- Waiver-Planting Wildflower Expenditures
- Checklists for Supplemental Specifications, Notice to Bidders, and Special Provisions
- Constructability Review Checklist(s) (Form 1961 or 1960)
- Build America Buy America (BABA) Documentation
- Buy America Documentation
- Innovative Contracting Work Plans
- Warranties or Waivers for Warranties from applicable authorizing groups
- Pavement Selection Review Committee Approval Letter
- Contract Time Determination (CTD) and/or Critical Path Method Documentation
- Crash Analysis and Safety Review
- Value Engineering Results
- Interstate Access Change Request (IACR) Documentation
- 20 Yr Capacity Analysis

14.57 (continued)

- ITS Conformance Document (Form 2560)
- Incentive/Disincentive Project Documentation
- Guardrail Worksheets
- Exception Risk Analysis (Form 2912)
- Exception Risk Analysis – Special Provisions (Form 2908)
- Transportation Management Plan (TMP)
- Special Approval Documentation (i.e. Cold milling concrete pavement email or scope change approval email)
- Progress Clause
- MOT Special Provision
- Traffic Typicals and Work Zone Device Special Details
- Frequently Used Special Provisions (FUSPs)
- Notice to Bidders (standard or unique)
- Project Coordination Clause
- Railroad Coordination Clause
- Utility Coordination Clause
- Supplemental Specifications
- Log of Plans
- Notice to Bidder Contact Information Sheet
- Approved Unique Special Provisions
- Stamped Completed
  Certification Acceptance File
- Digitally Signed / Completed
  Project Signature Sheet
- Completed/Packaged Plan Set
- Completed/Packaged Proposal

On FHWA Oversight projects, in addition to the Certification Acceptance Form being **complete,** the corresponding signed Risk Based Project Involvement Stewardship & Oversight Plan (RBPI S&O) form must also be obtained from FHWA, completed/signed, and placed in the ProjectWise Supporting Documents folder prior to submitting the final plan/proposal files to the Specifications and Estimates Unit.

Note – the applicable FHWA Area Engineer will supply the RBPI Stewardship & Oversight Plan form on applicable projects with FHWA Oversight.

14.57.01 (revised 12-26-2023)

Procedure

1. Following the Final Project Coordination (FPC) Meeting, the design team will incorporate the accepted review comments and complete the final plans and proposal package.

2. When plans are 100% complete (Plan Completion – PPD Milestone 380M) the packaged plan and proposal files are placed in folder 6 – Letting Plans and Proposal in ProjectWise. The design team advances the file state to "PM Review in Progress". The Project Manager is responsible for verifying all the agreed-upon revisions are incorporated into the plans.

3. The reviewers from the Omission and Errors Check (OEC) Review (PPD Task 3900) and those required to stamp the Certification Acceptance (CA) Form are notified with the file state change to "CA Sign Off" in ProjectWise. The OEC reviewers are responsible for verifying that their concerns have been resolved with the final plans. Certification Acceptance reviewers will stamp the CA form with the Licensed Project Manager stamping the CA form last (PPD Milestone 391M).

4. The Project Manager advances the completed files state to "Initiate Final Project Review" to submit the completed final turn-in plans to Specifications and Estimates (PPD Milestone 389M).

5. The Project Manager will also submit the Supporting Documents by selecting all files in that folder and changing state to "e-Prop – Initial Final Project Review – Supporting Documents" (PPD Milestone 389M).

14.58 (revised 1-23-2023)

APPROVAL OF SPECIAL PROVISIONS

In order to clarify terminology surrounding this subject, the following definitions are provided:

1. Standard Specifications.- The book of specifications approved for general application and repetitive use.

2. Supplemental Specifications.- Detailed specifications that add to or supersede the Standard Specifications.

3. Special Provisions.- Revisions or additions to the Standard and Supplemental Specifications applicable to an individual project.

4. Frequently Used Special Provisions.- An approved special provision with stable requirements applicable to a number of projects used on a regular basis.

5. Addendum - a change, addition and/or deletion to the contract documents occurring after a project is advertised but before the letting date.

Occasionally, information in the plan/proposal package may differ or conflict. To help in resolving such conflicts, the following order of preference has been established per the Standard Specifications for Construction:

1. All proposal material except those listed in subsections 104.06B through 104.06F
2. Special Provisions
3. Supplemental Specifications
4. Project Plans and Drawings
5. Standard Plans
6. Standard Specifications

7.03.01 (continued)

Abutment Design

B. Types

4. Integral and Semi-Integral Abutments

f. (1-24-2022) Approach slabs are 20'-0" in length whenever possible.

Approach slabs 20’-0” in length are based on a longitudinal unsupported length of 10 feet measured along the centerline of the roadway, a slab thickness of 12” and a maximum concrete cover to the centerline of the bottom longitudinal reinforcement of 3”. Deviation from these design parameters for specific projects requires a complete redesign of the approach slab.

Approach slabs with independent backwalls can be 6’-6” minimum length. For design speeds greater than 45 mph (posted > 40 mph) approach slabs may be up to 20’ in length (measured along roadway centerline) as project and geometric limitations allow. Use shorter approach slab length (6’-6” min) if service road is in close proximity to the bridge abutment. (12-28-2015)

Abutments a with skew angle maintain the same skew angle at the end of the bridge approach slab and at the sleeper slab. Standard Plan R-45-Series reinforced approach pavements are cast perpendicular (90°) to the roadway centerline on the opposite end of the sleeper slab. See Standard Plan R-43-Series. (12-28-2015)

Cast 12” minimum thickness (9” for independent backwalls) bridge approach slab from sleeper slab towards reference lines at night with “Superstructure Conc, Night Casting (,High Performance)” and match the road approach thickness (9" minimum). (9-27-2021

Use a 20’ concrete approach pavement as detailed on Standard Plan R-43 & R-45 - Series located on the road approach side of the sleeper slab.(10-22-2012)

7.03.01 B. 4. f. (continued)

Designate approach slabs as separate pours in the pour sequence of the superstructure. (9-21-2015)

See Bridge Design Guide 6.20.03A, .03B, 6.20.04 & .04B for approach slab details. (12-28-2015)

g. Continue bottom mat of deck reinforcement past reference joint into the approach slab with independent backwalls. See Bridge Design Guides 6.20.03A & .03B. For dependent backwalls lap or develop EA bars from deck slab to bridge approach slab. See Bridge Design Guides 6.20.04 & .04B. Provide adequate lap/development according to Bridge Guide 7.14.02 Series. (12-26-2023).

h. Add extra reinforcement over beams at the reference joint that extend into the approach slab and into the bridge deck slab. Lap or develop extra EA bars over beams according to Bridge Guide 7.14.02 Series. (12-26-2023)

i. Attach approach curb and gutter to the approach slab with bottom mat transverse reinforcement and to the bridge deck with bottom mat longitudinal reinforcement. Do not attach curb and gutter to the approach slab or the bridge deck on structures with return wingwalls. Using a bond breaker and sliding the approach slab over the return wingwalls is a design consideration. The extension of bridge railing to the sleeper slab will eliminate the need for curb and gutter in the bridge approach slab area. (1-24-2022)

j. A n inverted “T” sleeper slab shall be used with all approach slabs (except when Standard Plan R-45-Series approach is used by itself). Concrete to concrete slabs shall have an EJ3 (or EJ4) joint on the bridge side of the stub and an E3 joint on the road side. Place R-45-Series reinforced concrete slab on the road side of the inverted “T” sleeper slab. Provide elevations along stub of sleeper slab at construction centerline, lane lines and edge of metal. Provide elevations at toe of curb/barrier and top of curb if present. (1-24-2022)

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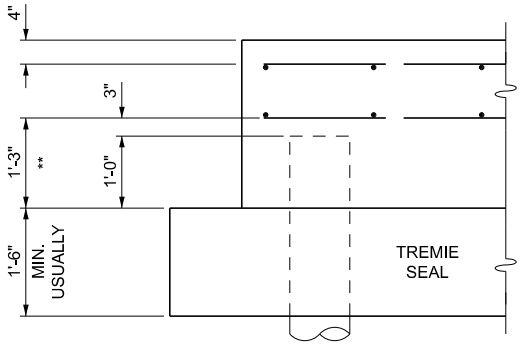
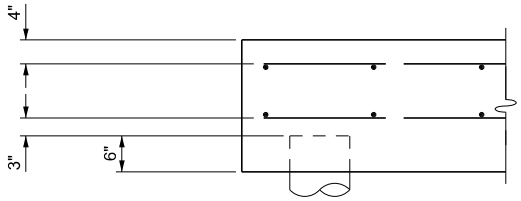
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	CANTILEVER ABUTMENT REINFORCING	SUPERSEDES: 05/04/06
APPROVED BY: KCK		



FOOTING WITH TREMIE SEAL

** 9" WHEN PILES NOT USED



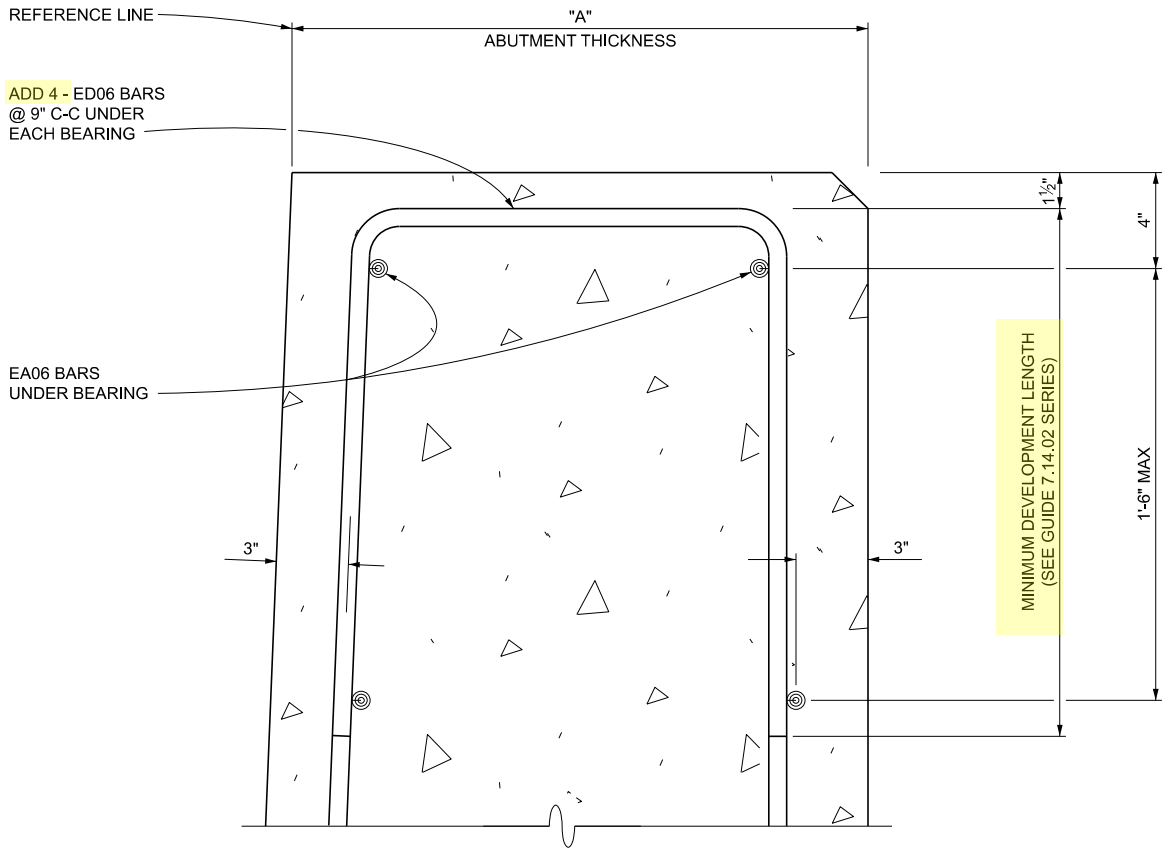
FOOTING ON PILES

(1) - SEE GUIDE 7.14.02 SERIES FOR MINIMUM DEVELOPMENT LENGTHS
(2) - SEE GUIDE 7.14.03 FOR MINIMUM DIMENSIONS FOR STANDARD HOOKS IN TENSION
(3) - IF LAPPING TENSION REINFORCEMENT EXTENDING OUT OF THE FOOTING WITH A SMALLER BAR IN THE ABUTMENT WALL, EXTEND THE TENSION REINFORCEMENT FROM THE FOOTING BEYOND THE POINT AT WHICH IT IS NO LONGER REQUIRED TO RESIST FLEXURE FOR A DISTANCE NOT LESS THAN WHAT IS REQUIRED IN AASHTO LRFD 5.10.8.1.2a.

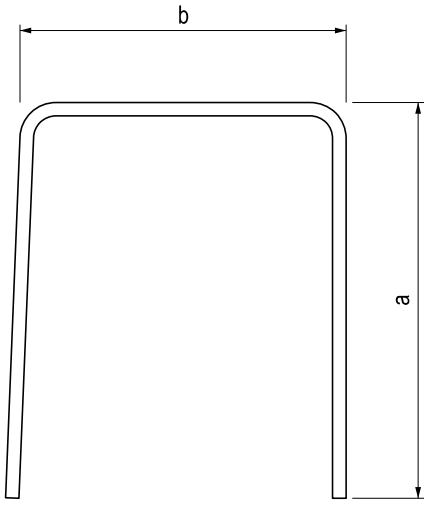
NOTES:
THE DETAILED REINFORCEMENT IN THE ABUTMENT IS THE MINIMUM. THE DESIGN OF THE ABUTMENT MAY REQUIRE ADDITIONAL REINFORCEMENT OR INCREASING THE REINFORCEMENT AREA (DIAMETER) SHOWN TO MEET THE REQUIREMENTS IN AASHTO LRFD FOR FLEXURAL REINFORCEMENT AND FOR RESISTING SHRINKAGE AND TEMPERATURE STRESSES.

PREPARED BY DESIGN DIVISION	5.16.01

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	CANTILEVER ABUTMENT REINFORCING	SUPERSEDES: 05/04/06
APPROVED BY: KCK		



DETAIL A



EA06 BAR

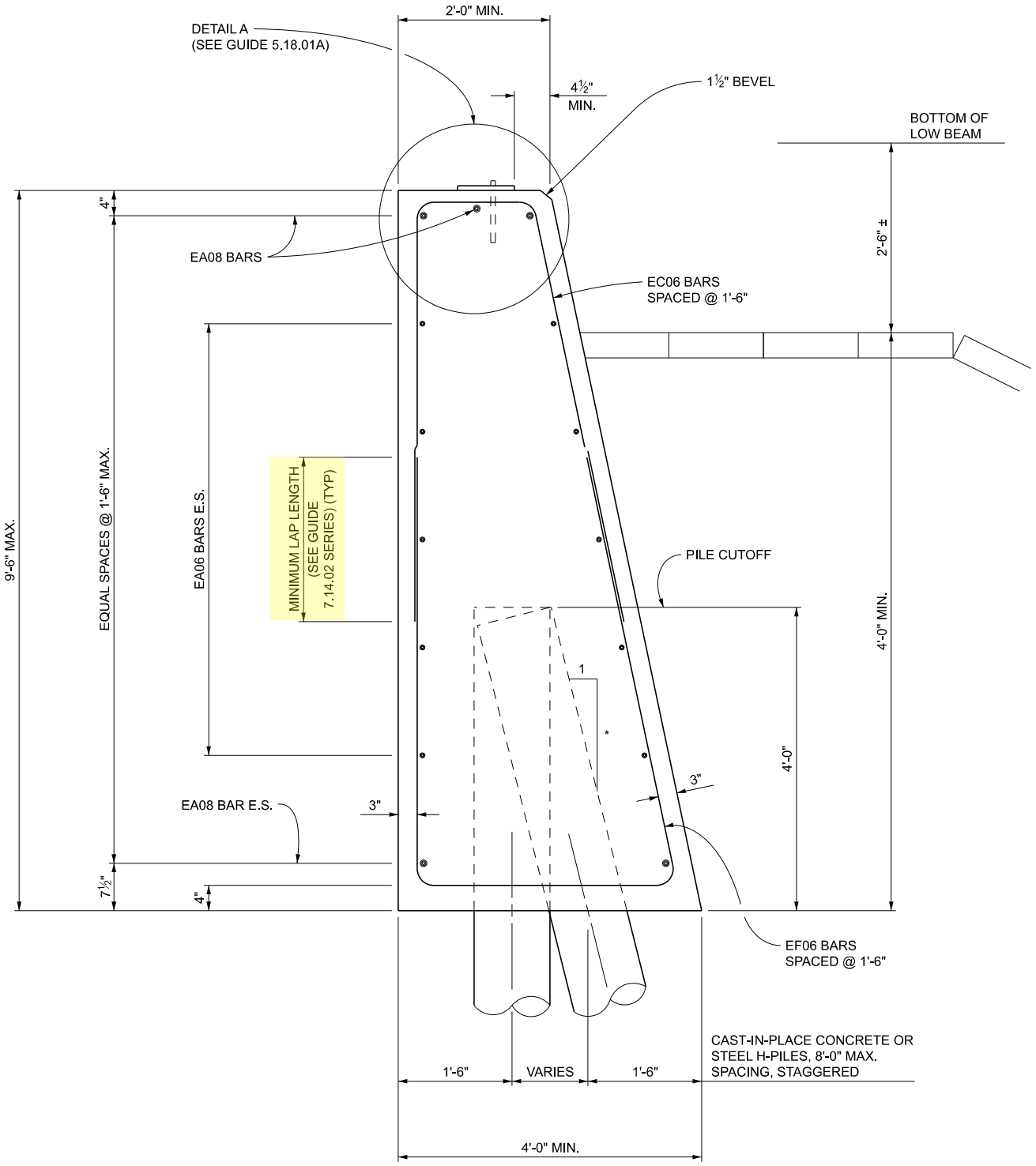
a = MINIMUM DEVELOPMENT LENGTH
(SEE GUIDE 7.14.02 SERIES)

b = A - 5⅞"

USE THESE DETAILS FOR STEEL BEAM BRIDGES ONLY WITH EITHER DEPENDENT OR INDEPENDENT BACKWALLS.

PREPARED BY DESIGN DIVISION	5.16.01A

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT CURTAINWALL ABUTMENT	ISSUED: 12/26/23 SUPERSEDES: 11/27/01

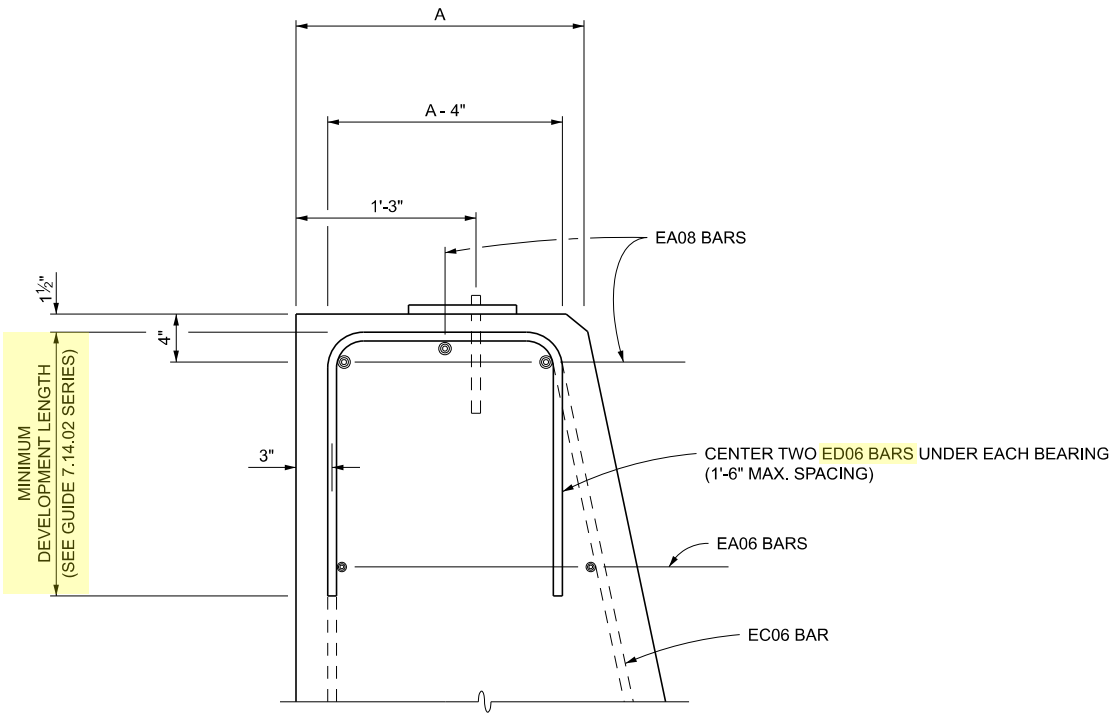


* FOR PILE BATTER, SEE BRIDGE DESIGN MANUAL 7.03.09

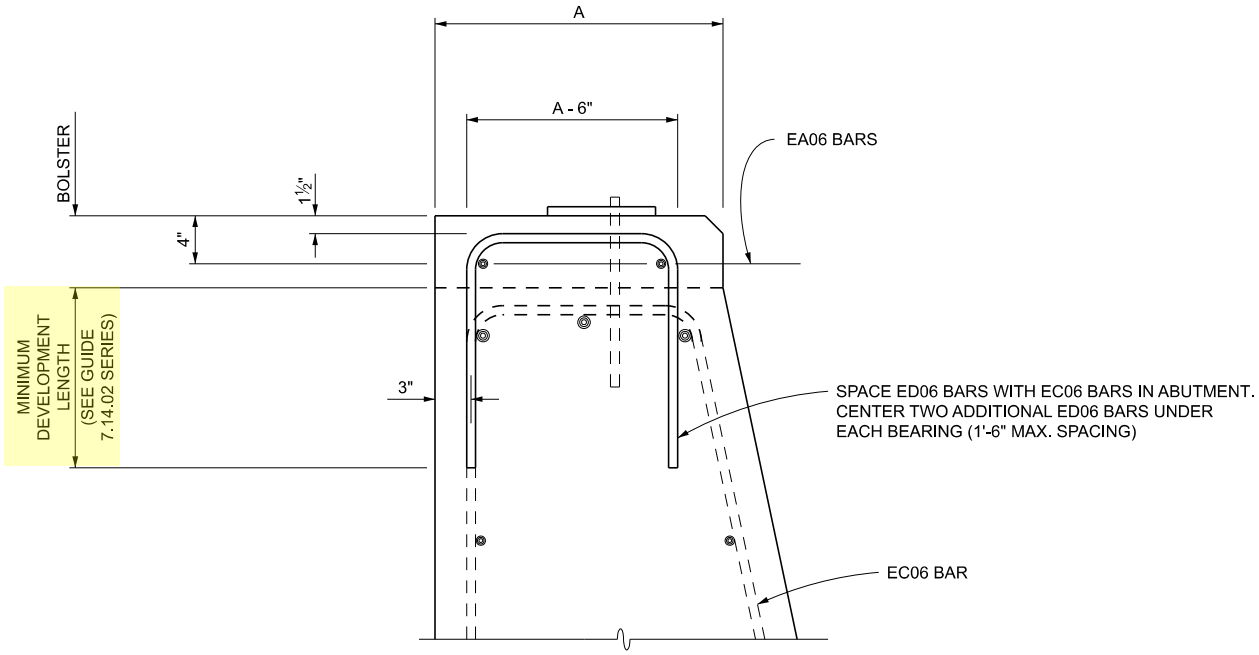
FOR ADDITIONAL REINFORCING DETAILS, SEE GUIDES 6.20.01 AND 6.20.03.

PREPARED BY DESIGN DIVISION	5.18.01

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	CURTAINWALL ABUTMENT REINFORCEMENT	SUPERSEDES: 11/27/01
APPROVED BY: KCK		



DETAIL A

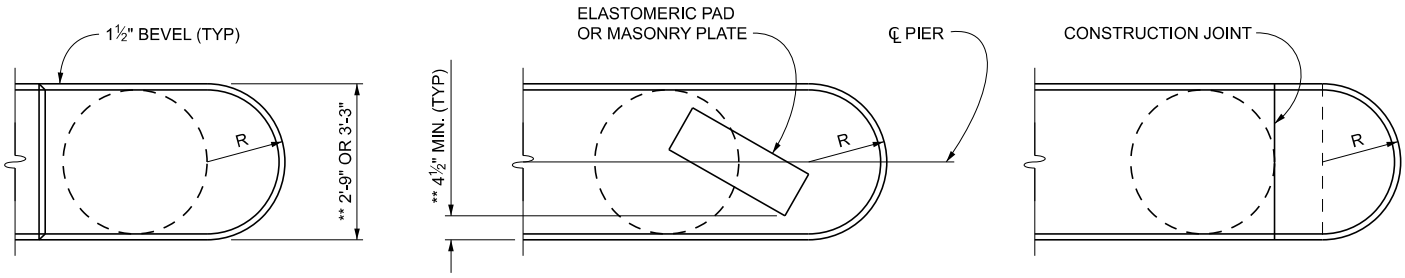


DETAIL A
(AT BOLSTER)

NOTE:
USE THESE DETAILS FOR STEEL BEAM BRIDGES WITH EITHER DEPENDENT OR INDEPENDENT BACKWALLS.

PREPARED BY DESIGN DIVISION	5.18.01A

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	PIER CAP DETAILS ROUND COLUMN PIERS	SUPERSEDES: 11/27/01
APPROVED BY: KCK		



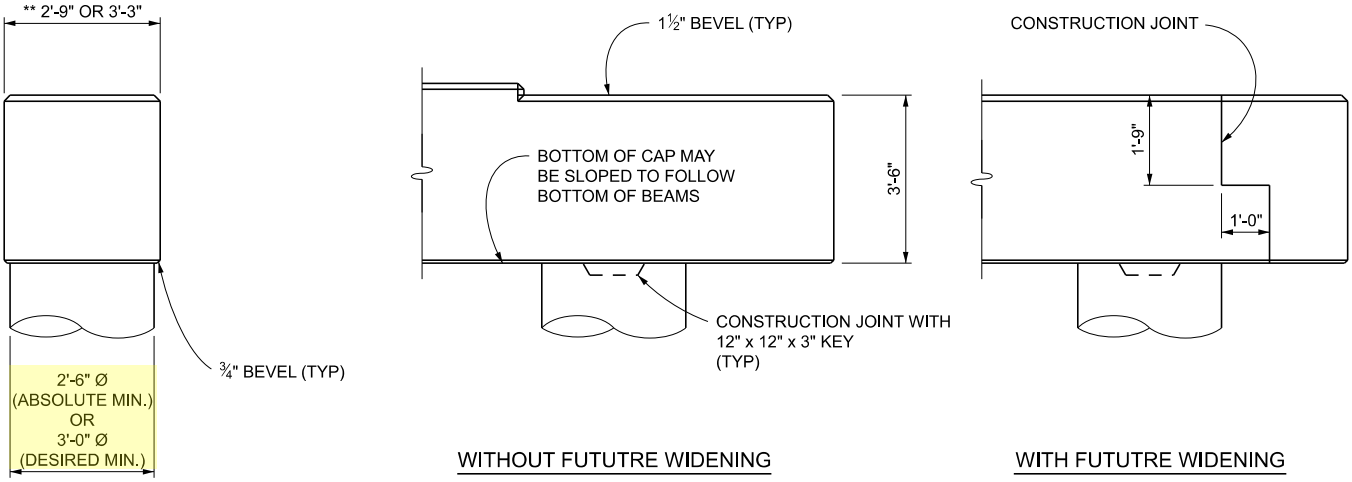
MIN. CANTILEVER WITHOUT FUTURE WIDENING

MIN. CANTILEVER WITH STRINGER ON CANTILEVER

MIN. CANTILEVER WITH FUTURE WIDENING

** INCREASE WIDTH AS REQUIRED TO PROVIDE 4½" CLEARANCE

PLAN OF CAP

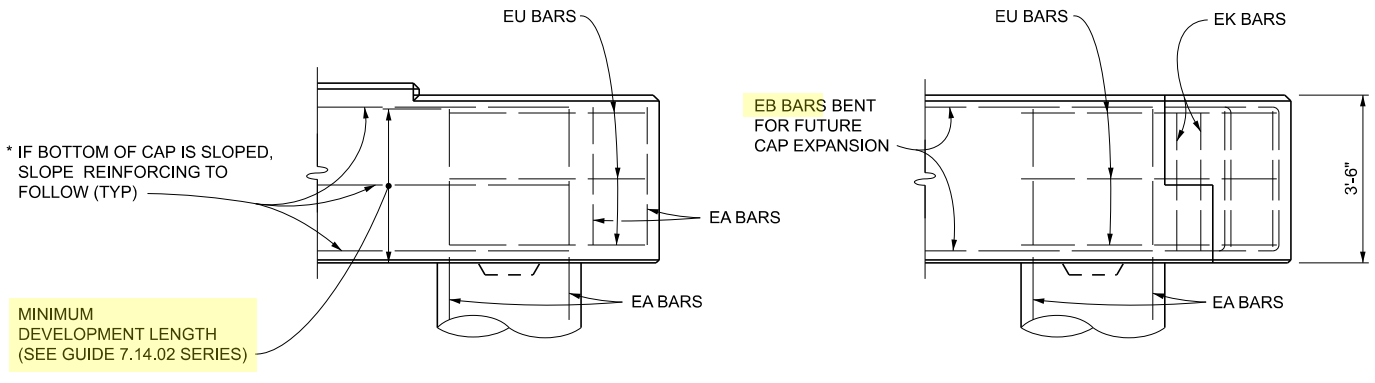


END VIEW

WITHOUT FUTUTRE WIDENING

WITH FUTUTRE WIDENING

SIDE VIEW AT END OF CAP



* 1'-0" MAXIMUM SPACING

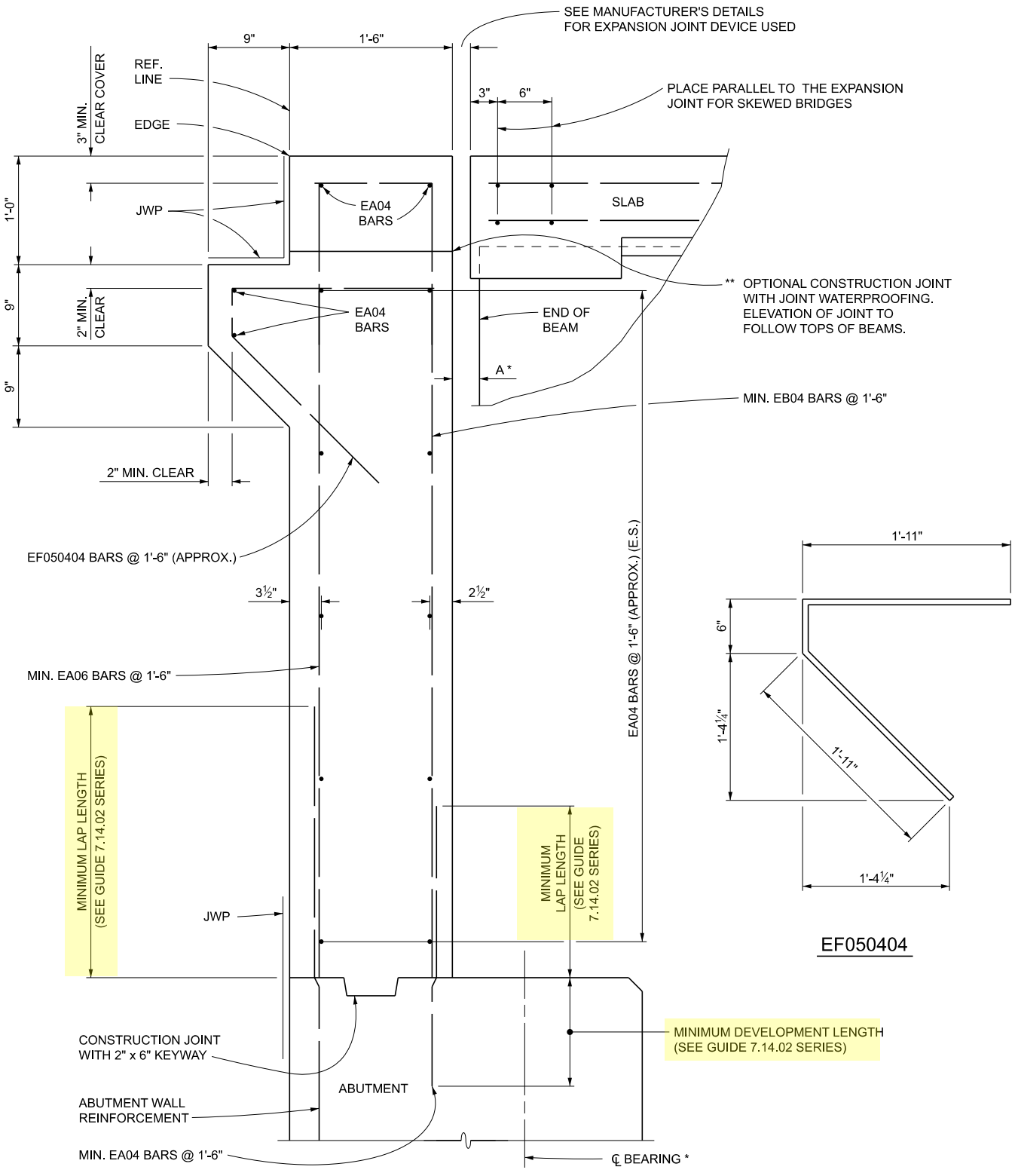
WITHOUT FUTURE WIDENING

WITH FUTURE WIDENING

CAP REINFORCEMENT

PREPARED BY DESIGN DIVISION	5.27.03

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	TYPICAL SECTION THRU INDEPENDENT BACKWALL	SUPERSEDES: 11/28/22
APPROVED BY: KCK		



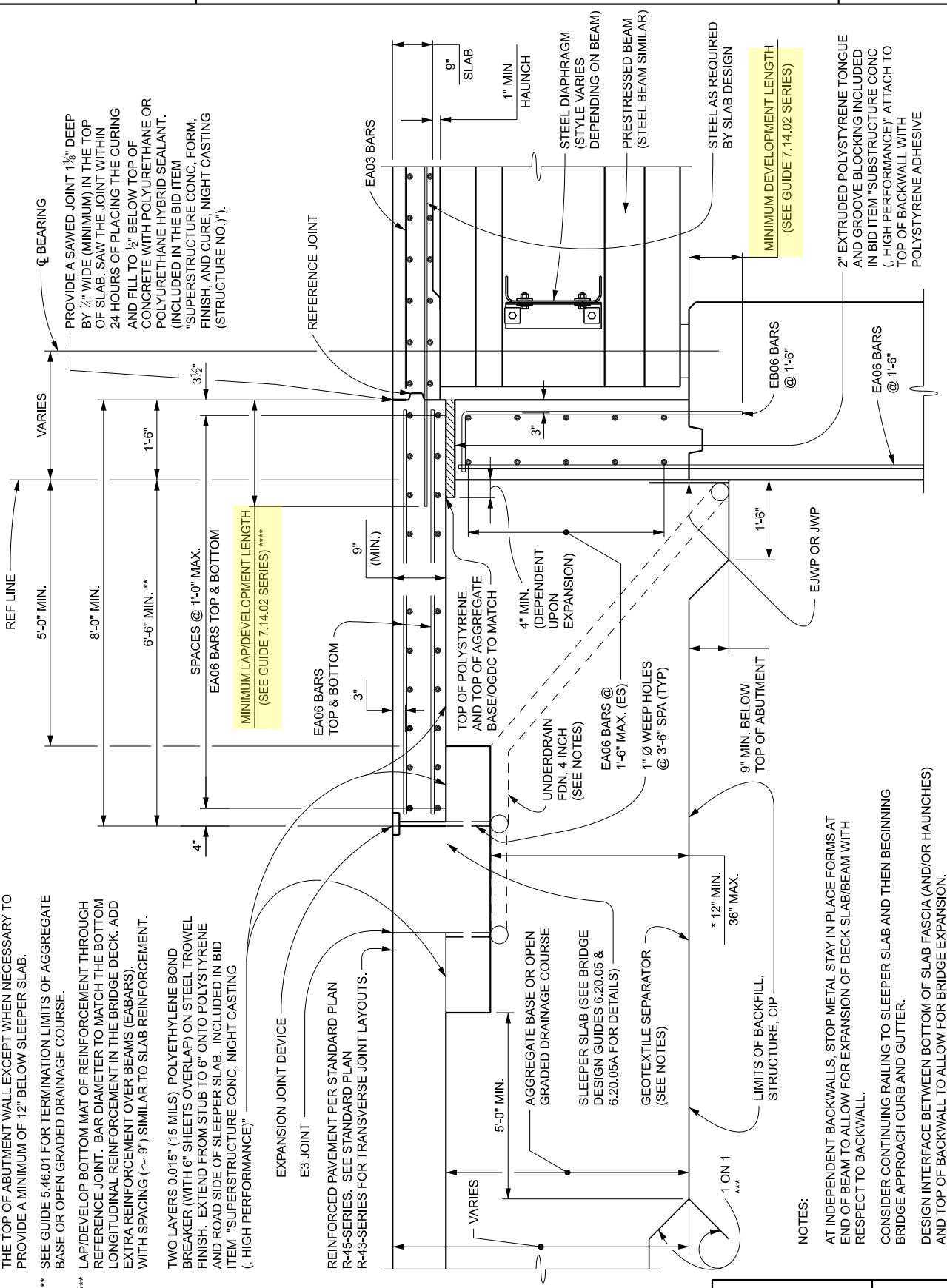
NOTE:
BARS WITH PREFIX "E" ARE TO BE EPOXY COATED.

PLAN NOTE:
** IF CONSTRUCTION JOINT IS USED, THERE WILL BE NO PAYMENT FOR THE REQUIRED JOINT WATERPROOFING.

* TO ESTABLISH ℄ BEARING, USE "A"= ½ TOTAL MOVEMENT PARALLEL TO ℄ BEAM PLUS 1". FOR SKEWED BRIDGES, "A" IS MEASURED AT CORNER OF FLANGE.

PREPARED BY DESIGN DIVISION	6.20.03

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	TYPICAL SECTION THRU	SUPERSEDES: 09/25/26
APPROVED BY: KCK	INDEPENDENT BACKWALL WITH SLIDING SLAB	



* EXTEND OGDC OR AGGREGATE BASE FROM BOTTOM OF SLEEPER SLAB FOR A DEPTH OF 36" MAX., NOT TO EXTEND BELOW THE TOP OF ABUTMENT WALL EXCEPT WHEN NECESSARY TO PROVIDE A MINIMUM OF 12" BELOW SLEEPER SLAB.

*** SEE GUIDE 5.46.01 FOR TERMINATION LIMITS OF AGGREGATE BASE OR OPEN GRADED DRAINAGE COURSE.

**** LAP/DEVELOP BOTTOM MAT OF REINFORCEMENT THROUGH REFERENCE JOINT. BAR DIAMETER TO MATCH THE BOTTOM LONGITUDINAL REINFORCEMENT IN THE BRIDGE DECK. ADD EXTRA REINFORCEMENT OVER BEAMS (EABARS). WITH SPACING (~ 9") SIMILAR TO SLAB REINFORCEMENT.

TWO LAYERS 0.015" (15 MILS) POLYETHYLENE BOND BREAKER (WITH 6" SHEETS OVERLAP) ON STEEL TROWEL FINISH. EXTEND FROM STUB TO 6" ONTO POLYSTYRENE AND ROAD SIDE OF SLEEPER SLAB. INCLUDED IN BID ITEM "SUPERSTRUCTURE CONC, NIGHT CASTING (, HIGH PERFORMANCE)"

NOTES:

AT INDEPENDENT BACKWALLS, STOP METAL STAY IN PLACE FORMS AT END OF BEAM TO ALLOW FOR EXPANSION OF DECK SLAB/BEAM WITH RESPECT TO BACKWALL.

CONSIDER CONTINUING RAILING TO SLEEPER SLAB AND THEN BEGINNING BRIDGE APPROACH CURB AND GUTTER.

DESIGN INTERFACE BETWEEN BOTTOM OF SLAB FASCIA (AND/OR HAUNCHES) AND TOP OF BACKWALL TO ALLOW FOR BRIDGE EXPANSION.

OMIT UNDERDRAIN UNDER SLEEPER SLAB IF OPEN GRADED DRAINAGE COURSE IS USED INSTEAD OF AGGREGATE BASE. MAINTAIN UNDERDRAIN AT ABUTMENT.

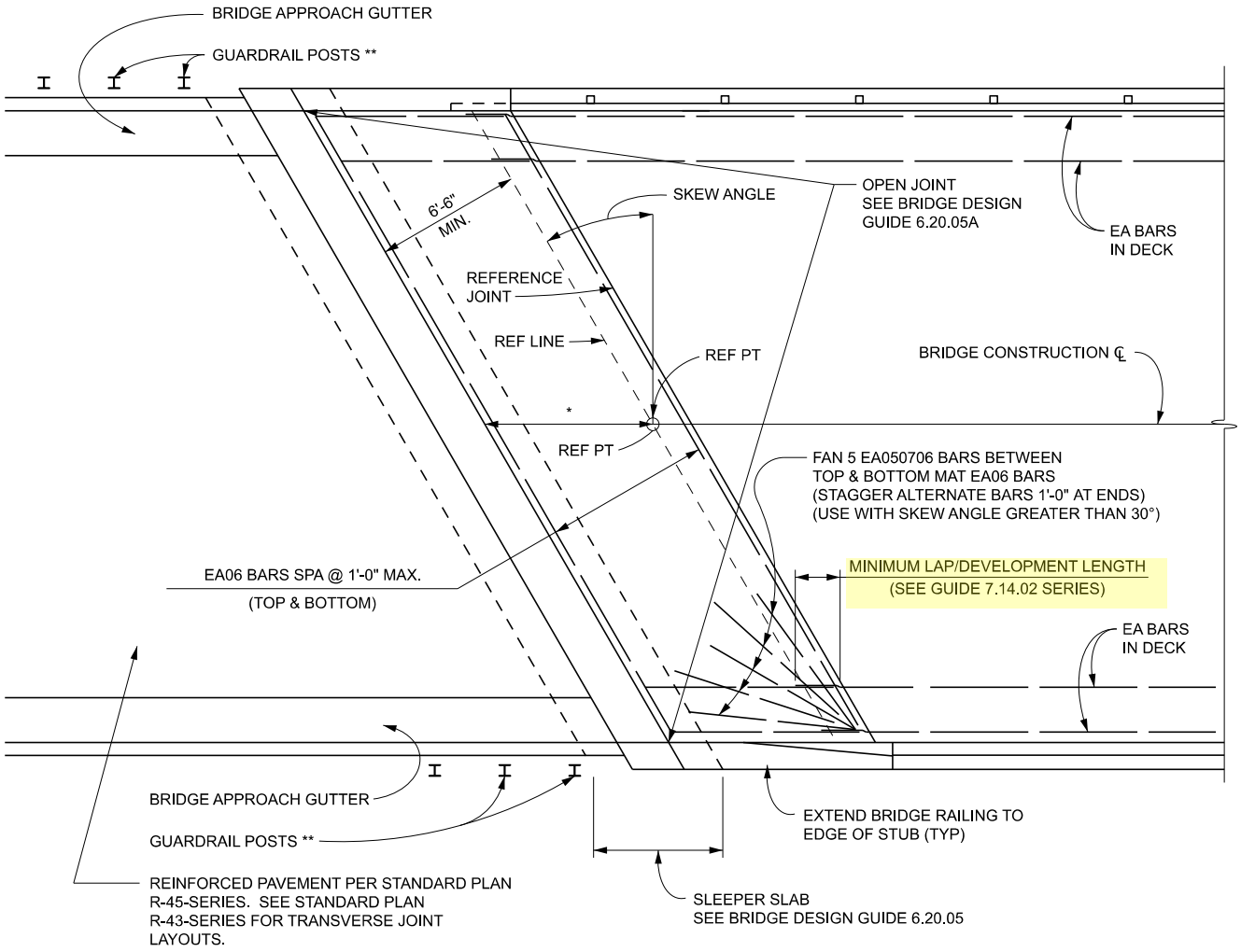
USE GEOTEXTILE SEPARATOR ONLY WITH OPEN GRADED DRAINAGE COURSE.

** SEE BRIDGE DESIGN GUIDE 6.20.03B FOR APPROACH SLAB ORIENTATION, REINFORCEMENT, AND DESIRED SLAB LENGTHS.

PREPARED BY DESIGN DIVISION	6.20.03A

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	INDEPENDENT BACKWALL SLIDING SLAB DETAILS	SUPERSEDES: 07/25/22
APPROVED BY: KCK		

* FOR DESIGN SPEEDS GREATER THAN 45 MPH (POSTED > 40 MPH), THE DESIGNER MAY CONSIDER LENGTHS UP TO 20 FEET IN LENGTH (MEASURED ALONG ℄) AS PROJECT AND GEOMETRIC LIMITATIONS ALLOW.



PLAN OF APPROACH

NOTES:

POUR APPROACH SLABS FROM EXPANSION LOCATION TOWARD REFERENCE LINE (JOINT).

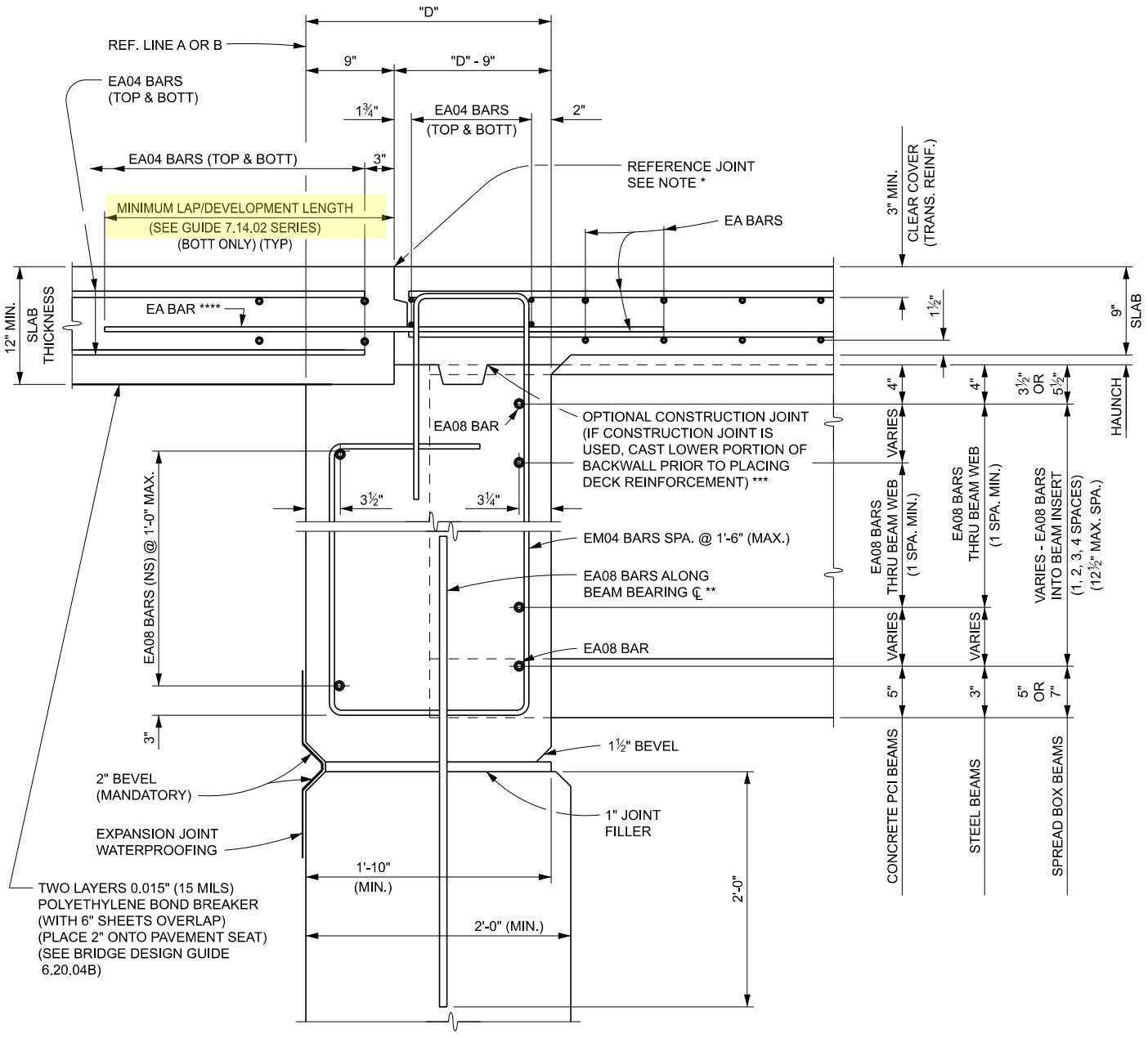
CAST APPROACH SLABS AT NIGHT WITH NIGHT TIME CASTING OF SUPERSTRUCTURE CONCRETE.

** USE GUARDRAIL ANCHORAGE, BRIDGE, DETAIL M4, M5 OR M6 PER STANDARD PLAN R-67-SERIES.

PLAN NOTE:
DO NOT USE WHEELED, ROLLER BASED OR MACHINE MOUNTED COMPACTION EQUIPMENT TO COMPACT THE SUBGRADE, SUBBASE, AND BASE WITHIN 10' OF THE SLEEPER SLAB AFTER IT IS BUILT. USE ONLY HAND/PLATE COMPACTORS. CONTACT PRESSURE OF COMPACTION EQUIPMENT SHALL NOT EXCEED 10 PSI.

PREPARED BY DESIGN DIVISION	6.20.03B

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	INTEGRAL AND SEMI-INTEGRAL ABUTMENT BACKWALL	SUPERSEDES: 06/26/23
APPROVED BY: KCK		



PLAN NOTES:

*** WHERE OPTIONAL CONSTRUCTION JOINTS ARE USED, THERE WILL BE NO PAYMENT FOR THE REQUIRED JOINT WATERPROOFING.

* PROVIDE A SAWED JOINT 1⅛" DEEP BY ¼" WIDE (MINIMUM) IN THE TOP OF SLAB. SAW THE JOINT WITHIN 24 HOURS OF PLACING THE CURING AND FILL TO ½" BELOW TOP OF CONCRETE WITH POLYURETHANE OR POLYURETHANE HYBRID SEALANT. (INCLUDED IN THE BID ITEM "SUPERSTRUCTURE CONC, FORM, FINISH, AND CURE, NIGHT CASTING (STRUCTURE NO.)").

NOTES:

USE INTEGRAL OR SEMI-INTERGRAL ABUTMENTS FOR STEEL BRIDGES LESS THAN 300' AND CONCRETE BRIDGES LESS THAN 400' IN LENGTH.

**** LAP/DEVELOP BOTTOM MAT OF REINFORCEMENT THROUGH REFERENCE JOINT. BAR DIAMETER TO MATCH THE BOTTOM LONGITUDINAL REINFORCEMENT IN THE BRIDGE DECK. ADD EXTRA REINFORCEMENT OVER BEAMS (EABARS).

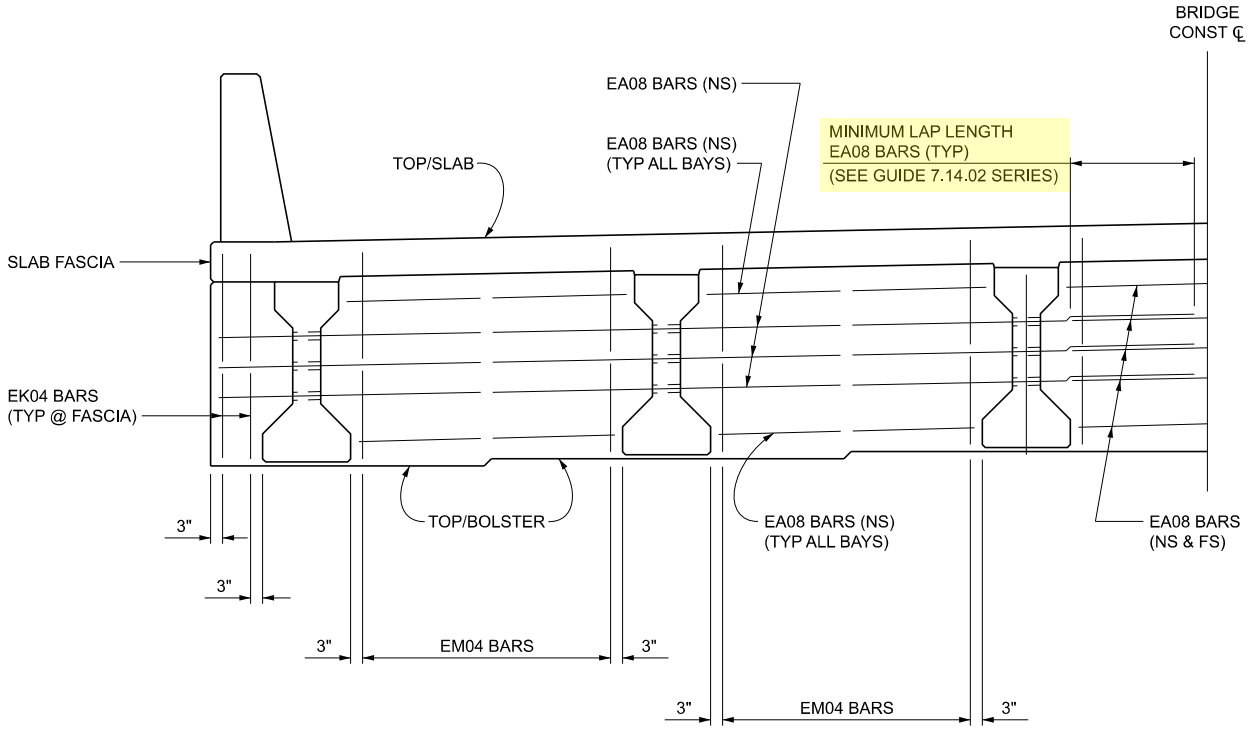
** USE FOR INTEGRAL ABUTMENT BRIDGES ONLY.

SEMI-INTEGRAL ABUTMENTS SHOULD BE USED AT STREAM CROSSINGS.

D = BACKWALL THICKNESS. SEE GUIDE 6.20.01 FOR DEFINITION.

PREPARED BY DESIGN DIVISION	6.20.04

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	INTEGRAL AND SEMI-INTEGRAL ABUTMENT PARTIAL BACKWALL DETAILS	SUPERSEDES: 01/27/20
APPROVED BY: KCK		



PARTIAL BACKWALL ELEVATION

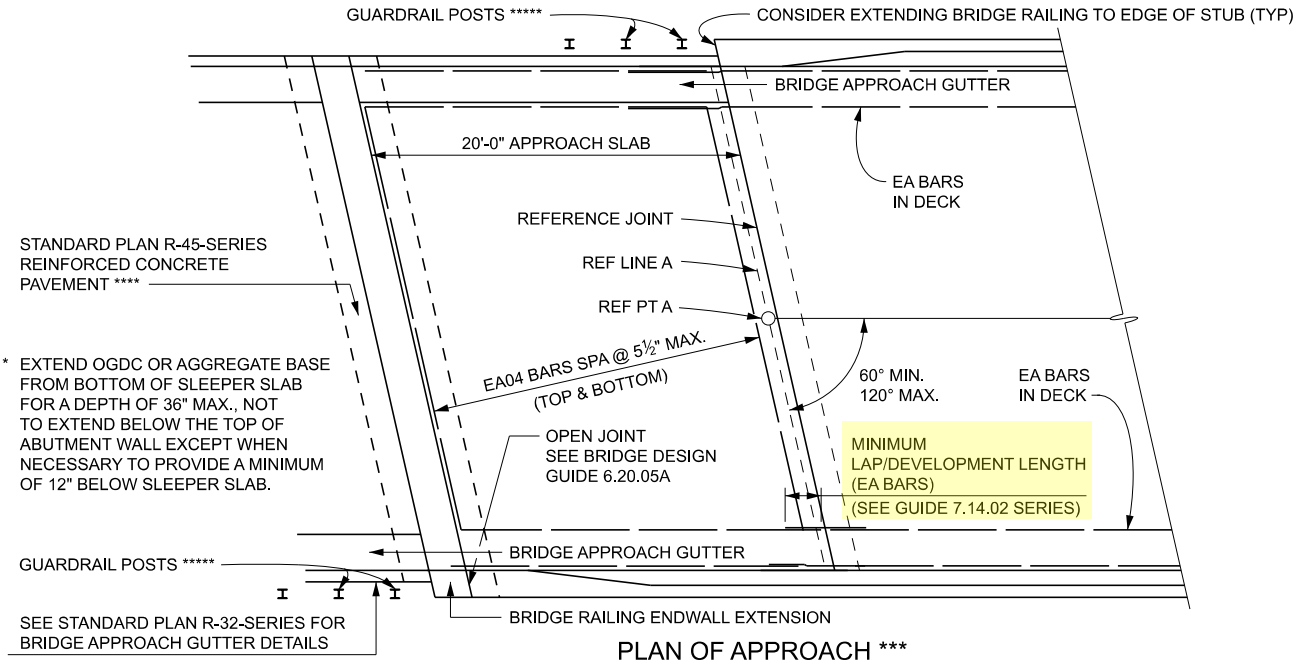
SIMILAR FOR STEEL BEAM BRIDGES

NOTE:

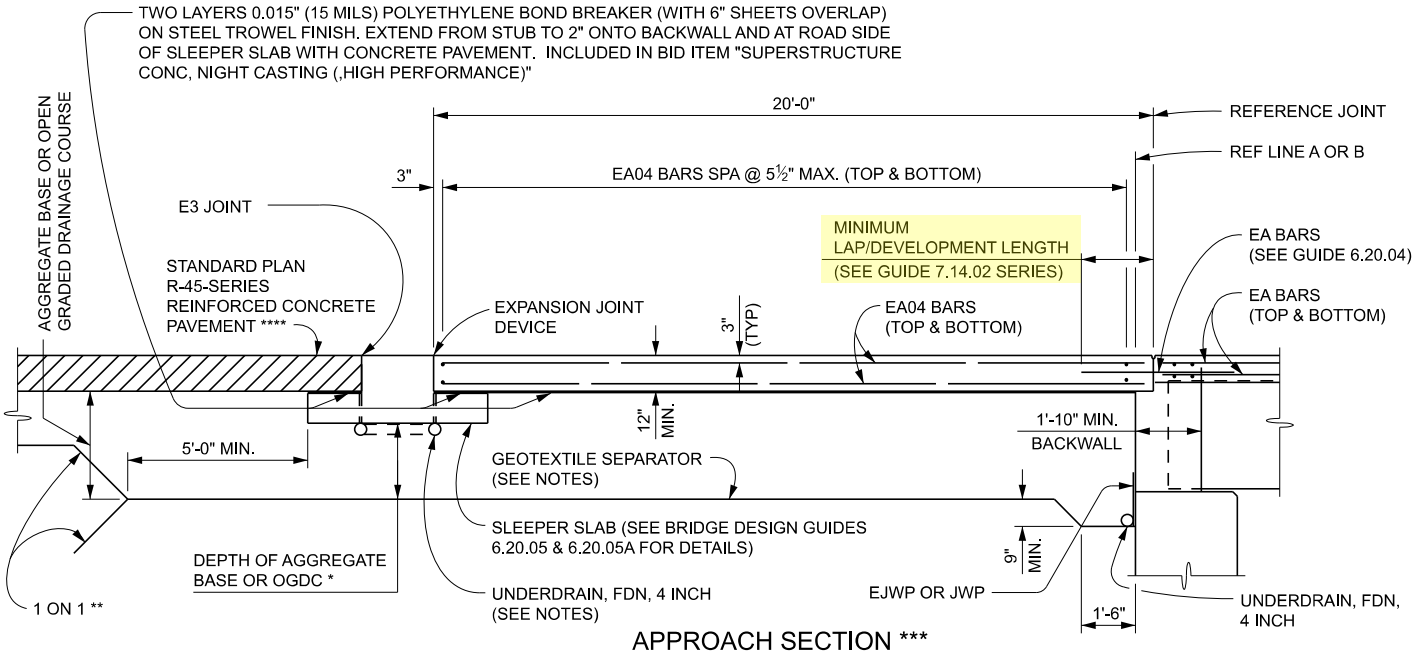
GROUT BARS IN BEAMS PRIOR TO CASTING BACKWALL, ALL GROUT AND MATERIALS, LABOR AND EQUIPMENT REQUIRED TO PLACE THE GROUT ARE INCLUDED IN THE BID ITEM "SUPERSTRUCTURE CONC, NIGHT CASTING".

PREPARED BY DESIGN DIVISION	6.20.04A

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT INTEGRAL AND SEMI-INTEGRAL ABUTMENT EMPIRICAL APPROACH SLAB DETAILS	ISSUED: 12/26/23 SUPERSEDES: 07/25/22



PLAN OF APPROACH ***



APPROACH SECTION ***

NOTES:

ATTACH APPROACH CURB AND GUTTER TO THE APPROACH SLAB WITH BOTTOM MAT TRANSVERSE REINFORCEMENT AND TO THE BRIDGE DECK WITH BOTTOM MAT LONGITUDINAL REINFORCEMENT.

POUR APPROACH SLABS FROM EXPANSION LOCATION TOWARD REFERENCE JOINT.

CAST APPROACH SLABS AT NIGHT WITH NIGHT TIME CASTING OF SUPERSTRUCTURE CONCRETE.

USE GEOTEXTILE SEPARATOR ONLY WITH OPEN GRADED DRAINAGE COURSE.

OMIT UNDERDRAIN UNDER SLEEPER SLAB IF OPEN GRADED DRAINAGE COURSE IS USED INSTEAD OF AGGREGATE BASE.

EMPIRICAL APPROACH SLABS (AS DETAILED ON THIS GUIDE) ARE NOT REQUIRED AT THE ENDS OF BRIDGES WITH A LENGTH CONTRIBUTING TO EXPANSION OF LESS THAN 50' FOR CONCRETE BEAM BRIDGES AND LESS THAN 25' FOR STEEL BEAM BRIDGES. INSTEAD, USE A PAVEMENT SEAT WITH STANDARD PLAN R-45-SERIES REINFORCED CONCRETE PAVEMENT.

** SEE GUIDE 5.46.01 FOR TERMINATION LIMITS OF AGGREGATE BASE OR OPEN GRADED DRAINAGE COURSE.

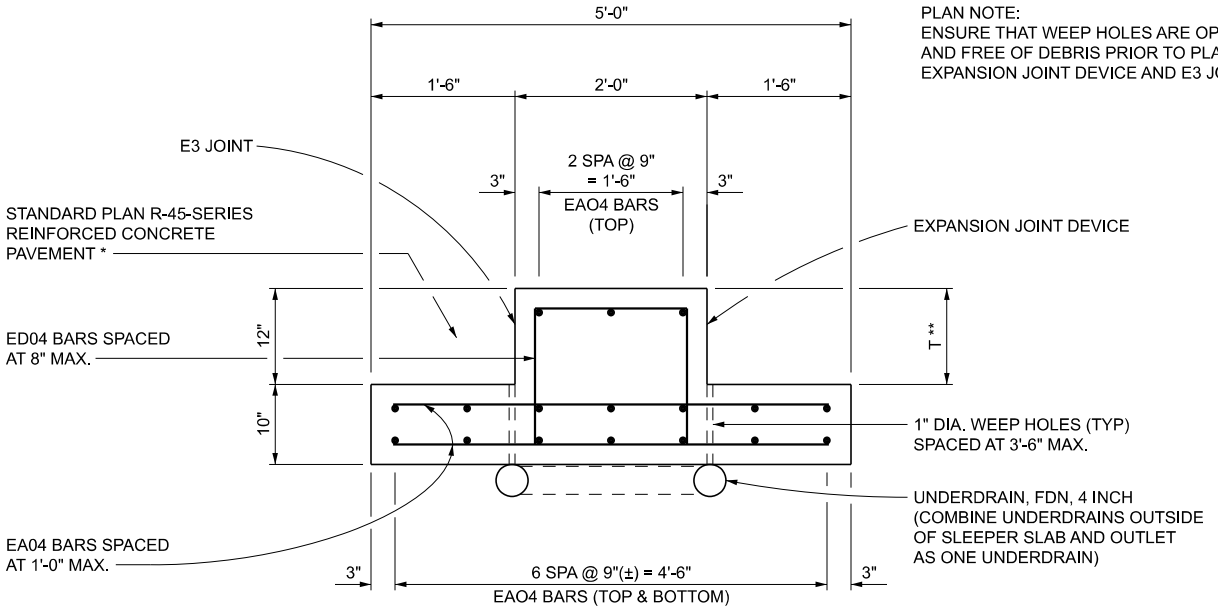
*** THE DETAILED BRIDGE APPROACH SLAB IS BASED ON A LONGITUDINAL UNSUPPORTED LENGTH OF 10 FEET MEASURED ALONG THE CENTERLINE OF THE ROADWAY, A SLAB THICKNESS OF 12" AND A MAXIMUM CONCRETE COVER TO THE CENTERLINE OF THE BOTTOM LONGITUDINAL REINFORCEMENT OF 3". DEVIATION FROM THESE DESIGN PARAMETERS FOR SPECIFIC PROJECTS REQUIRES A COMPLETE REDESIGN OF THE BRIDGE APPROACH SLAB.

**** USE INVERTED "T" SLEEPER SLAB FOR CONCRETE AND HMA ROAD APPROACH PAVEMENT. PLACE STANDARD PLAN R-45-SERIES REINFORCED CONCRETE PAVEMENT THEN CONCRETE OR HMA ROAD APPROACH PAVEMENT.

***** USE GUARDRAIL ANCHORAGE, BRIDGE, DETAIL M4, M5 OR M6 PER STANDARD PLAN R-67-SERIES.

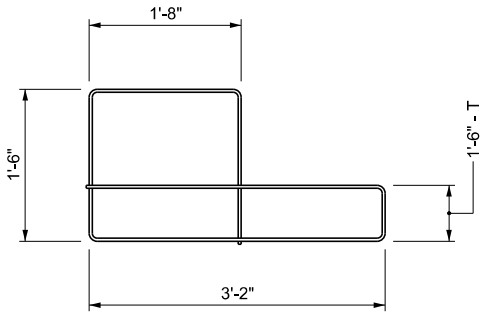
PREPARED BY DESIGN DIVISION	6.20.04B

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	SLEEPER SLAB DETAILS	SUPERSEDES: 07/25/22
APPROVED BY: KCK		



PLAN NOTE:
ENSURE THAT WEEP HOLES ARE OPEN AND FREE OF DEBRIS PRIOR TO PLACING EXPANSION JOINT DEVICE AND E3 JOINT.

TYPICAL SECTION THRU SLEEPER SLAB



EM04 BAR
L = 12'-6" - T

TYPICAL SECTION THRU END OF SLEEPER SLAB BELOW BRIDGE RAILING ENDWALL EXTENSION

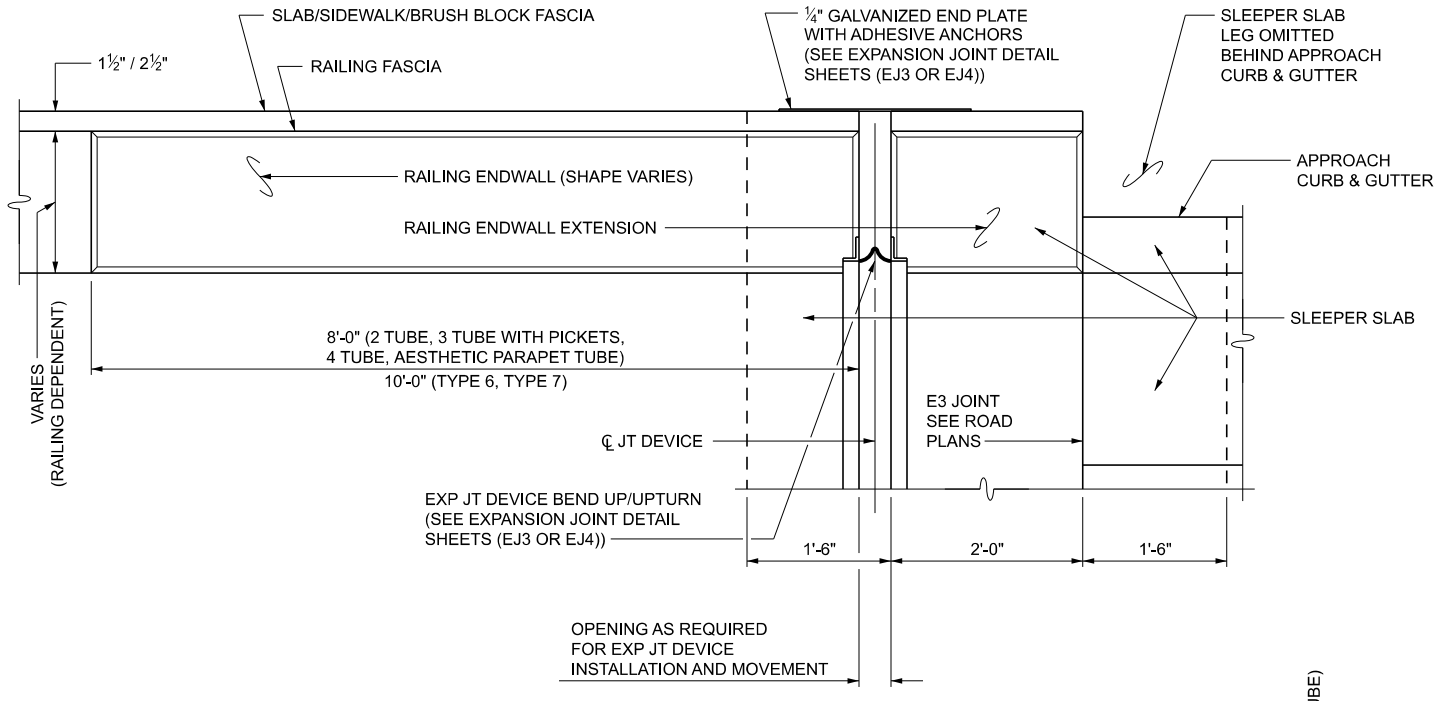
NOTES:
OMIT UNDERDRAIN UNDER SLEEPER SLAB IF OPEN GRADED DRAINAGE COURSE IS USED INSTEAD OF AGGREGATE BASE.

* USE STANDARD PLAN R-45-SERIES REINFORCED CONCRETE PAVEMENT WITH CONCRETE AND HMA ROAD APPROACHES. SEE STANDARD PLAN R-43-SERIES FOR TRANSVERSE JOINT LOCATIONS.

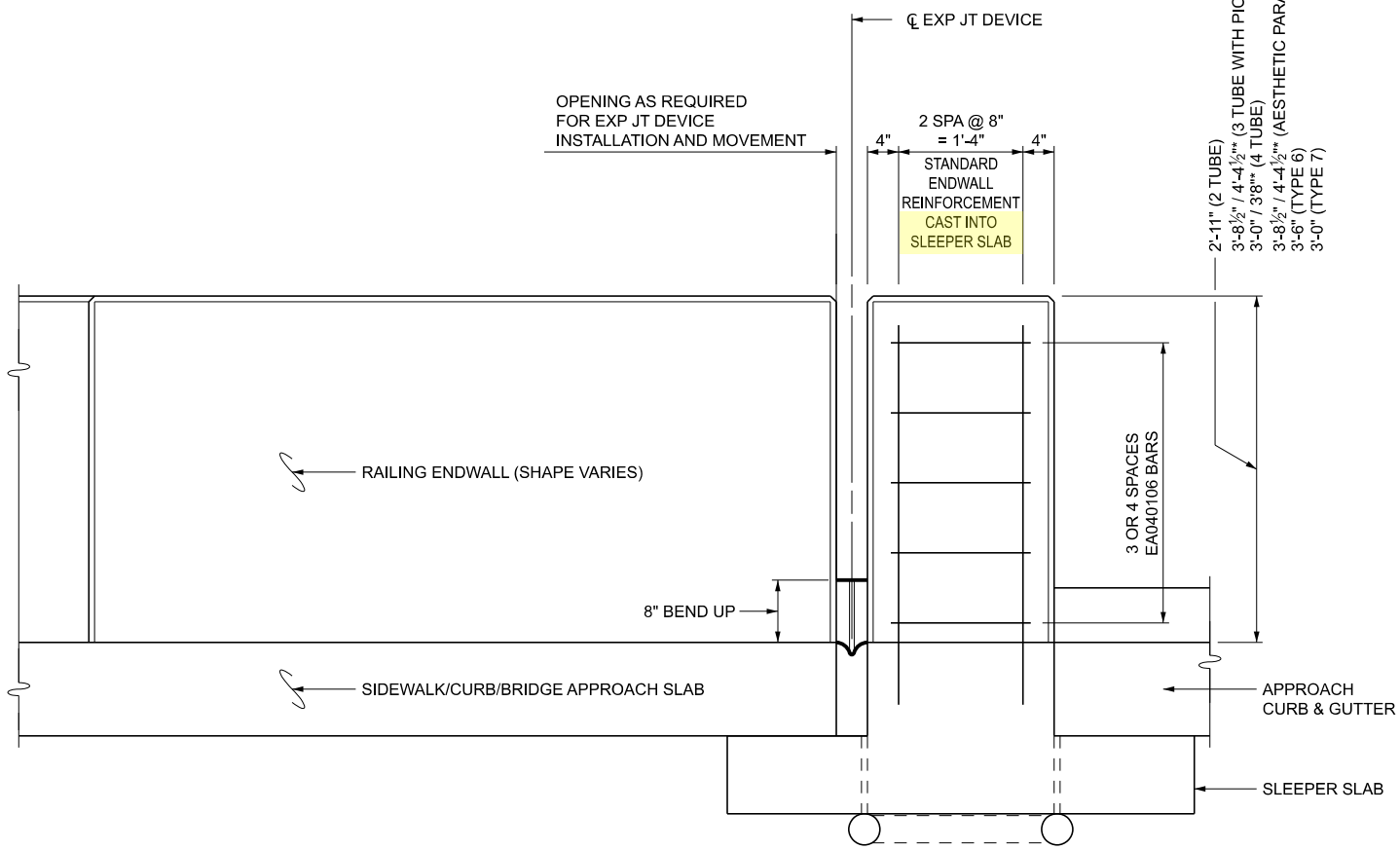
** T = APPROACH SLAB THICKNESS.
12" MINIMUM FOR DEPENDENT BACKWALL.
9" MINIMUM FOR INDEPENDENT BACKWALL.

PREPARED BY DESIGN DIVISION	6.20.05

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	SLEEPER SLAB DETAILS	SUPERSEDES: 07/25/22
APPROVED BY: KCK		



PLAN - ENDWALL EXTENSION DETAIL

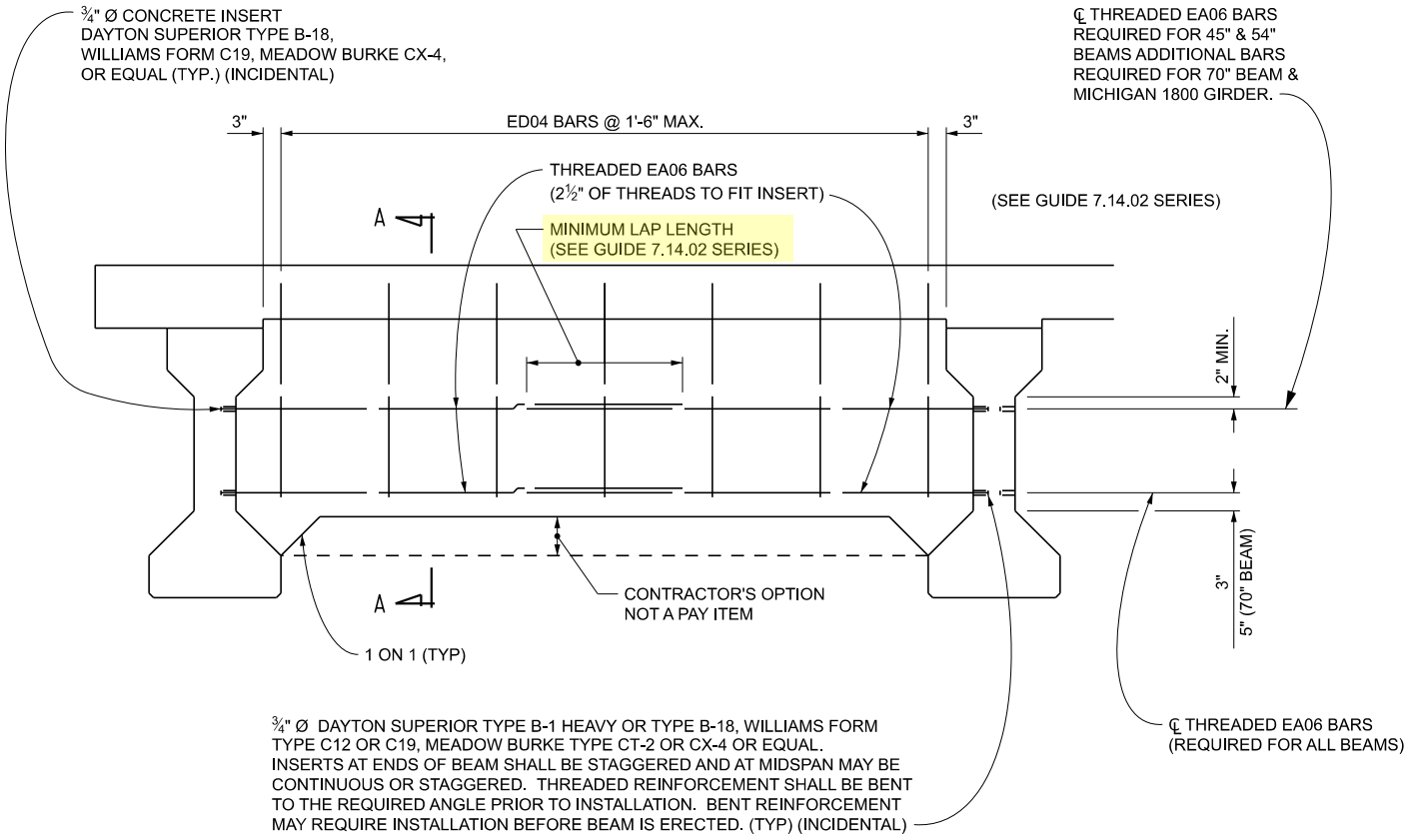


ENDWALL EXTENSION DETAIL

* HEIGHT WITH SIDEWALK

PREPARED BY DESIGN DIVISION	6.20.05A

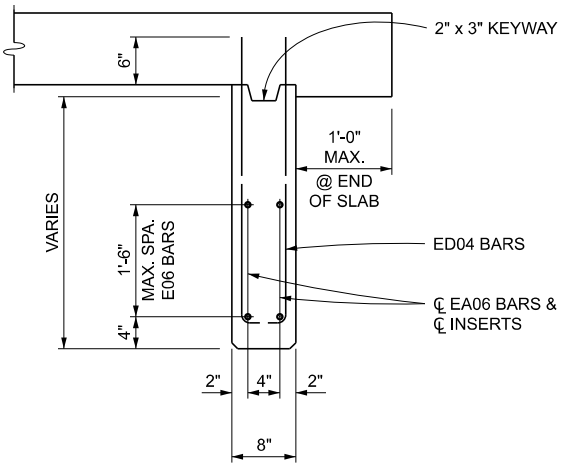
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	CONCRETE DIAPHRAGMS FOR PRESTRESSED CONCRETE BEAMS/GIRDERS	SUPERSEDES: 08/27/18
APPROVED BY: KCK		



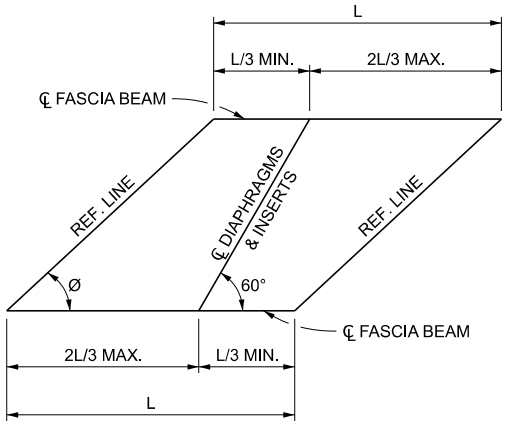
CONCRETE DIAPHRAGM ELEVATION

NOTES:

1. USE WHEN CONCRETE DIAPHRAGMS PREFERRED. USE WITH SIMPLE SPANS (NOT CONTINUOUS FOR LIVE LOAD) AT PIERS AND INDEPENDENT BACKWALLS WITH NO SLIDING SLAB. PLACE DIAPHRAGMS PARALLEL TO REF. LINE.
2. USE ONE INTERMEDIATE DIAPHRAGM AT MID-POINT.
3. FOR 60° ≤ Ø ≤ 90°, PLACE INTERMEDIATE DIAPHRAGMS PARALLEL TO REF. LINE.
4. FOR ANGLE OF CROSSING < 60°, SEE PLAN.
5. DO NOT POUR DECK UNTIL DIAPHRAGM CONCRETE ATTAINS A COMPRESSIVE STRENGTH OF 3000 PSI.



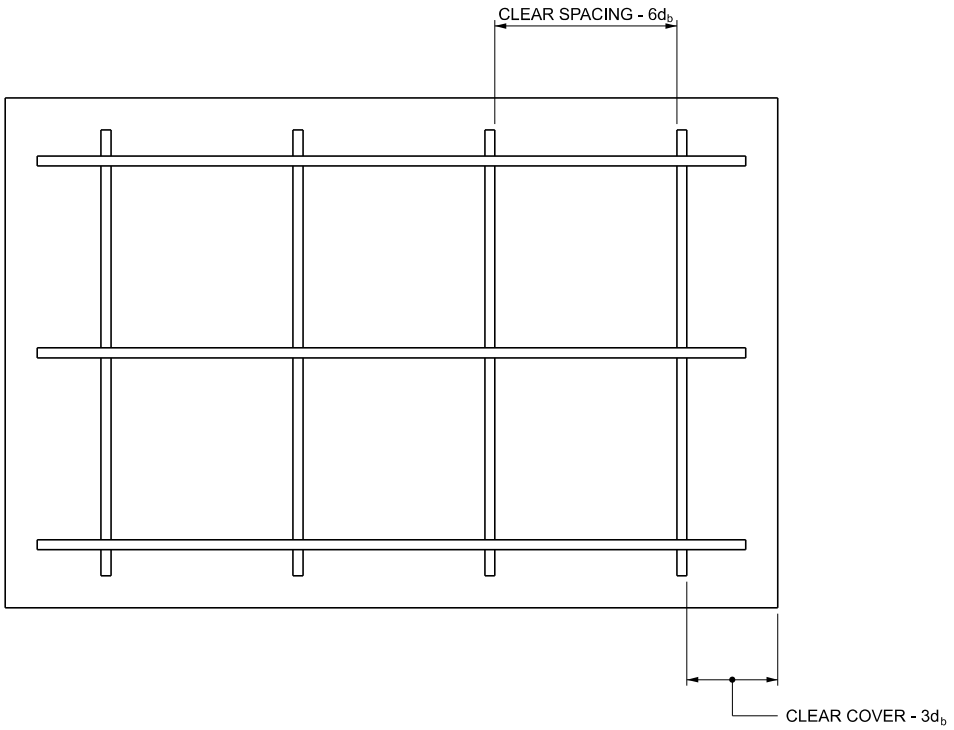
SECTION A-A

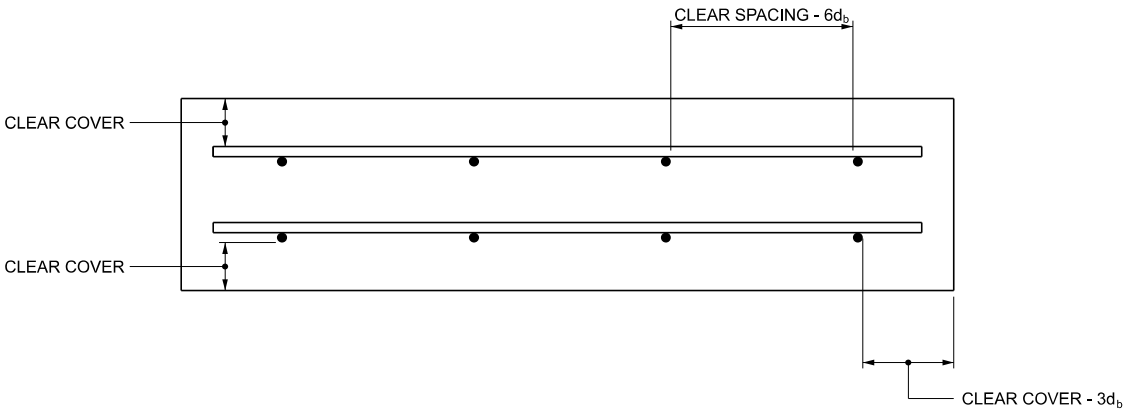


PLAN

PREPARED BY DESIGN DIVISION	6.60.12

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	TENSION DEVELOPMENT AND LAP SPLICE LENGTHS SPACING THRESHOLDS	SUPERSEDES:
APPROVED BY: KCK		





d_b = DIAMETER OF REINFORCING BAR

CLEAR SPACING = CENTER TO CENTER SPACING - DIAMETER OF REINFORCING BAR

PREPARED BY DESIGN DIVISION	7.14.02

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	TENSION DEVELOPMENT AND LAP SPLICE LENGTHS FOR SUBSTRUCTURE	SUPERSEDES: 11/27/01
APPROVED BY: KCK		

EPOXY COATED REINFORCEMENT
F'_c = 3.0 ksi
F_y = 60.0 ksi

BAR SIZE	SPACING THRESHOLD *		TENSION DEVELOPMENT LENGTH				
				≤ 12" OF CONCRETE BELOW		> 12" OF CONCRETE BELOW	
	$3d_b$ (in)	$6d_b$ (in)	BASIC DEVELOPMENT LENGTH (in) **	CLEAR COVER ≥ $3d_b$ & CLEAR SPACING ≥ $6b_d$ (in)	ALL OTHER CASES (in)	CLEAR COVER ≥ $3d_b$ & CLEAR SPACING ≥ $6b_d$ (in)	ALL OTHER CASES (in)
3	1⅛	2¼	32	16	20	20	22
4	1½	3	42	21	26	27	29
5	1⅞	3¾	52	25	32	33	36
6	2¼	4½	63	31	38	40	43
7	2⅝	5¼	73	36	44	46	50
8	3	6	84	41	51	53	58
9	3⅜	6¾	94	46	57	59	64
10	3¾	7½	104	50	63	65	71
11	4⅛	8¼	115	56	69	72	79

BAR SIZE	SPACING THRESHOLD *		TENSION LAP LENGTH			
			≤ 12" OF CONCRETE BELOW		> 12" OF CONCRETE BELOW	
	$3d_b$ (in)	$6d_b$ (in)	CLEAR COVER ≥ $3d_b$ & CLEAR SPACING ≥ $6b_d$ (in)	ALL OTHER CASES (in)	CLEAR COVER ≥ $3d_b$ & CLEAR SPACING ≥ $6b_d$ (in)	ALL OTHER CASES (in)
3	1⅛	2¼	20	26	26	29
4	1½	3	27	33	35	38
5	1⅞	3¾	33	41	43	46
6	2¼	4½	40	50	52	56
7	2⅝	5¼	46	57	60	65
8	3	6	53	66	69	75
9	3⅜	6¾	59	74	77	84
10	3¾	7½	65	82	85	92
11	4⅛	8¼	72	90	94	102

* USE SPACING THRESHOLD VALUES IN DETERMINING THE APPROPRIATE COLUMN FROM WHICH TO SELECT THE DEVELOPMENT AND LAP LENGTH.

** IF THE PROJECT SPECIFIC CONDITIONS DO NOT FALL INTO ONE OF THE COLUMNS INCLUDED IN THE TABLE ABOVE OR ARE NOT IN ALIGNMENT WITH THE NOTES ON THIS BRIDGE DESIGN GUIDE CALCULATE THE TENSION DEVELOPMENT AND LAP LENGTHS USING THE BASIC DEVELOPMENT LENGTH FROM THE TABLE ABOVE AND THE APPROPRIATE MODIFICATION FACTORS OUTLINED IN AASHTO LRFD 5.10.8.

NOTES:

THE VALUES IN THE TABLE ABOVE ARE BASED ON THE REQUIREMENTS OUTLINED IN AASHTO LRFD 5.10.8.

THE VALUES IN THE TABLE ABOVE ASSUME THE AREA OF REINFORCEMENT PROVIDED IS EQUAL TO THE AREA OF REINFORCEMENT REQUIRED BY THE DESIGN (λ_{er} = 1.0).

THE VALUES IN THE TABLE ABOVE ACCOUNT FOR THE TYPICAL CONFINEMENT REINFORCEMENT DETAILED IN THE MDOT BRIDGE DESIGN GUIDES (λ_{rc} = 0.4).

LAP LENGTHS ARE BASED ON CLASS B LAP SPLICES IN ACCORDANCE WITH AASHTO LRFD 5.10.8.4.3a.

DEVELOPMENT AND LAP LENGTHS IN THE TABLES ABOVE WILL BE CONSERVATIVE FOR UNCOATED REINFORCEMENT.

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	TENSION DEVELOPMENT AND LAP SPLICE LENGTHS FOR SUPERSTRUCTURE	SUPERSEDES: 11/27/01
APPROVED BY: KCK		

EPOXY COATED REINFORCEMENT
F'_c = 4.0 ksi
F_y = 60.0 ksi

BAR SIZE	SPACING THRESHOLD *		TENSION DEVELOPMENT LENGTH				
				≤ 12" OF CONCRETE BELOW		> 12" OF CONCRETE BELOW	
	$3d_b$ (in)	$6d_b$ (in)	BASIC DEVELOPMENT LENGTH (in) **	CLEAR COVER ≥ $3d_b$ & CLEAR SPACING ≥ $6b_d$ (in)	ALL OTHER CASES (in)	CLEAR COVER ≥ $3d_b$ & CLEAR SPACING ≥ $6b_d$ (in)	ALL OTHER CASES (in)
3	1⅛	2¼	27	13	17	17	19
4	1½	3	36	18	22	23	25
5	1⅞	3¾	45	22	27	29	31
6	2¼	4½	54	26	33	34	37
7	2⅝	5¼	63	31	38	40	43
8	3	6	72	35	44	45	49
9	3⅜	6¾	81	39	49	51	56
10	3¾	7½	90	46	57	59	65
11	4⅛	8¼	99	55	69	72	78

BAR SIZE	SPACING THRESHOLD *		TENSION LAP LENGTH			
			≤ 12" OF CONCRETE BELOW		> 12" OF CONCRETE BELOW	
	$3d_b$ (in)	$6d_b$ (in)	CLEAR COVER ≥ $3d_b$ & CLEAR SPACING ≥ $6b_d$ (in)	ALL OTHER CASES (in)	CLEAR COVER ≥ $3d_b$ & CLEAR SPACING ≥ $6b_d$ (in)	ALL OTHER CASES (in)
3	1⅛	2¼	17	22	22	24
4	1½	3	23	29	30	32
5	1⅞	3¾	29	36	37	40
6	2¼	4½	34	43	44	48
7	2⅝	5¼	40	50	52	56
8	3	6	45	57	59	64
9	3⅜	6¾	51	64	66	72
10	3¾	7½	59	74	77	84
11	4⅛	8¼	72	89	93	101

* USE SPACING THRESHOLD VALUES IN DETERMINING THE APPROPRIATE COLUMN FROM WHICH TO SELECT THE DEVELOPMENT AND LAP LENGTH.

** IF THE PROJECT SPECIFIC CONDITIONS DO NOT FALL INTO ONE OF THE COLUMNS INCLUDED IN THE TABLE ABOVE OR ARE NOT IN ALIGNMENT WITH THE NOTES ON THIS BRIDGE DESIGN GUIDE CALCULATE THE TENSION DEVELOPMENT AND LAP LENGTHS USING THE BASIC DEVELOPMENT LENGTH FROM THE TABLE ABOVE AND THE APPROPRIATE MODIFICATION FACTORS OUTLINED IN AASHTO LRFD 5.10.8.

NOTES:

THE VALUES IN THE TABLE ABOVE ARE BASED ON THE REQUIREMENTS OUTLINED IN AASHTO LRFD 5.10.8.

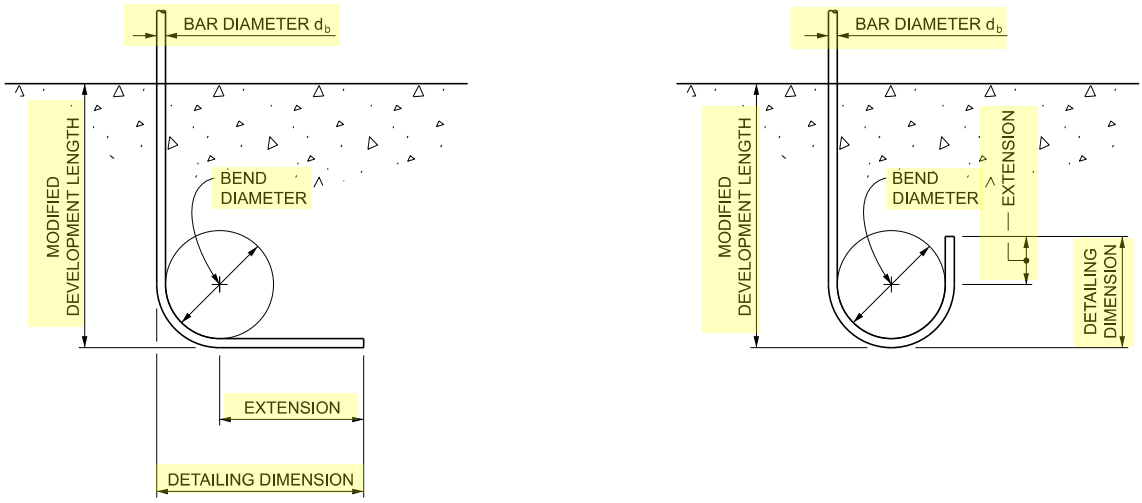
THE VALUES IN THE TABLE ABOVE ASSUME THE AREA OF REINFORCEMENT PROVIDED IS EQUAL TO THE AREA OF REINFORCEMENT REQUIRED BY THE DESIGN (λ_{er} = 1.0).

THE VALUES IN THE TABLE ABOVE ACCOUNT FOR THE TYPICAL CONFINEMENT REINFORCEMENT DETAILED IN THE MDOT BRIDGE DESIGN GUIDES (λ_{rc} = 0.4).

LAP LENGTHS ARE BASED ON CLASS B LAP SPLICES IN ACCORDANCE WITH AASHTO LRFD 5.10.8.4.3a.

DEVELOPMENT AND LAP LENGTHS IN THE TABLES ABOVE WILL BE CONSERVATIVE FOR UNCOATED REINFORCEMENT.

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/23
CHECKED BY: VZ	MINIMUM DIMENSIONS FOR STANDARD HOOKS IN TENSION	SUPERSEDES: 11/27/01
APPROVED BY: KCK		



90 DEGREE HOOK END LENGTHS		
BAR NO.	EXTENSION LENGTH	DETAILING DIMENSION
3	5"	7"
4	6"	8"
5	8"	11"
6	9"	12"
7	11"	15"
8	12"	16"
9	14"	20"
10	16"	23"
11	17"	25"
14	21"	32"
18	28"	42"

180 DEGREE HOOK END LENGTHS		
BAR NO.	EXTENSION LENGTH	DETAILING DIMENSION
3	3"	5"
4	3"	5"
5	3"	6"
6	3"	6"
7	4"	8"
8	4"	8"
9	5"	11"
10	6"	13"
11	6"	14"
14	7"	18"
18	10"	24"

MINIMUM DIMENSIONS FOR STANDARD HOOKS IN TENSION						
BAR NO.	CLEAR SIDE COVER ≥ 2½"			CLEAR SIDE COVER ≤ 2½"		
	3 KSI CONCRETE	4 KSI CONCRETE	5 KSI CONCRETE	3 KSI CONCRETE	4 KSI CONCRETE	5 KSI CONCRETE
3	8"	7"	7"	10"	9"	8"
4	11"	10"	9"	14"	12"	11"
5	14"	12"	11"	17"	15"	13"
6	16"	14"	13"	20"	18"	16"
7	19"	16"	15"	24"	20"	18"
8	22"	19"	17"	27"	23"	21"
9	24"	21"	19"	30"	26"	24"
10	27"	24"	21"	34"	29"	26"
11	30"	26"	24"	38"	33"	29"
14	45"	39"	35"	45"	39"	35"
18	60"	52"	47"	60"	52"	47"

NOTES:

MODIFIED DEVELOPMENT LENGTHS ARE BASED ON THE REQUIREMENTS OUTLINED IN AASHTO LRFD 5.10.8.2.4 FOR STANDARD HOOKS IN TENSION WITHOUT CONFINEMENT OF STIRRUPS OR TIES.

THE DETAILING DIMENSION IS CALCULATED USING THE MINIMUM INSIDE BEND DIAMETERS OUTLINED IN AASHTO LRFD 5.10.2.1

THE MODIFIED DEVELOPMENT LENGTHS UTILIZE THE SPECIFIED CONCRETE COMPRESSIVE STRENGTHS AND A YIELD STRENGTH OF 60.0 KSI FOR THE STEEL REINFORCEMENT.

FOR ALL BAR SIZES WITH 90 DEGREE HOOKS, THE REQUIRED CLEAR COVER AT THE END OF THE EXTENSION BEYOND THE HOOK IS NOT LESS THAN 2 INCHES.

MODIFIED DEVELOPMENT LENGTHS WILL BE CONSERVATIVE FOR UNCOATED STEEL REINFORCEMENT.

THE MODIFIED DEVELOPMENT LENGTHS ASSUME THE AREA OF REINFORCEMENT PROVIDED IS EQUAL TO THE AREA OF REINFORCEMENT REQUIRED BY THE DESIGN (λ_{er} = 1.0).

PREPARED BY DESIGN DIVISION	7.14.03