Road & Bridge Design Publications

Monthly Update – January 2023

Revisions for the month of **January** are listed and displayed below and will be included in projects submitted for the **May** 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

EJ3AF & EJ4S: Added criteria for cover plates greater than 11 feet. Provide and detail two plates with joint at centerline of sidewalk or path. This will ease fabrication and installation of long plates.

EJ3AC & EJ4P: These expansion joint sheets have been retired. They were used with the 2012 Standard Specifications for Construction. Projects using those sheets should have included those sheets in the project plans and those projects should have been let by now. If one of those sheets is needed in the future one can be requested from the Design Standards Unit.

Road Design Manual

1.02.01D: Length and Type of Work: In the approval block, revised the name of the MDOT Director to a generic term.

3.03, 3.06, 6.05.13, 9.03.01A, 10.04.04A, 12.05.03, & 14.28: Minor wording changes were made to remind the designer to consider the needs of multi-modal users.

6.03.09: HMA Mix Selection Guidelines & Appendix 6.03.09: Eliminated the appendix and a reference to the appendix for projects using the 2012 Standard Specifications for Construction. For any projects that still require this information, contact the Design Standards Unit.

14.58: Approval of Special Provisions: Revised a reference to the Standard Specifications for Construction to eliminate the publication date.

Bridge Design Manual

7.02.18 C.3: Beam top flanges can be shortened or clipped to provide additional clearance for pavement seats and to decrease substructure unit widths. See also Bridge Design Guide 6.60.03 Series.

7.02.27, 12.01.01 & 12.06.01: Added criteria for expansion joint device cover plates greater than 11 feet long and added reference to Bridge Design Guide 6.28.06 for retrofit situations.

Road & Bridge Design Publications

Monthly Update – January 2023

Bridge Design Guides

Table of Contents: Added guide 6.60.03D related to Bulb-Tee beam shortening, clipping and abutment layout.

6.20.01: Increased the pavement seat width to 9”. Added minimum clearance from masonry plate/elastomeric pad to front face of abutment.

6.28.06: Added criteria for expansion joint device cover plates greater than 11 feet long for retrofit situations.

6.60.03A: Added top flange reinforcement criteria when the top flange is shortened/clipped.

6.60.03C: Entire guide is redone. Beam ends are to be made square regardless of angle of skew (see Bridge Manual Section 7.02.18 C.3.). Beam top flanges can be shortened or clipped to provide additional clearance for pavement seats and to decrease substructure unit widths.

6.60.03D: New Guide for beam shortening, clipping and abutment layout.

6.60.13: Added minimum clearance from masonry plate/elastomeric pad to front face of abutment. See also Bridge Manual Section 7.03.01 C.1.

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

1-23-2023

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-32-F	8	APPROACH CURB & GUTTER DOWNSPOUTS	9-20-22
R-32-SD	6	APPROACH CURB & GUTTER DOWNSPOUTS (FOR EXISTING RAILINGS)	12-6-22
R-43-J	2	LOCATION OF TRANSVERSE JOINTS IN PLAIN CONCRETE PAVEMENT	1-4-22
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	2-5-19
R-60-J	17	GUARDRAIL TYPES A, B, BD, T, TD, MGS-8, & MGS-8D	12-3-21
R-62-H	4	GUARDRAIL APPROACH TERMINAL TYPE 2M	6-16-22
R-63-C	16	GUARDRAIL APPROACH TERMINAL TYPES 3B & 3T	2-5-19
R-66-E	4	GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS	9-28-18
R-67-G	16	GUARDRAIL ANCHORAGE, BRIDGE, DETAILS	12-6-22
R-67-SD	7	GUARDRAIL ANCHORAGE, BRIDGE, DETAILS (FOR EXISTING RAILINGS)	12-6-22
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-100-I	4	SEEDING AND TREE PLANTING	8-3-21
R-110-B	3	PAVEMENT SAFETY EDGE	6-14-21
R-112-J	10	SHOULDER AND CENTER LINE CORRUGATIONS	9-7-22
R-126-I	5	PLACEMENT OF TEMPORARY CONCRETE & STEEL BARRIER	8-25-15

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

1-23-2023

⑦

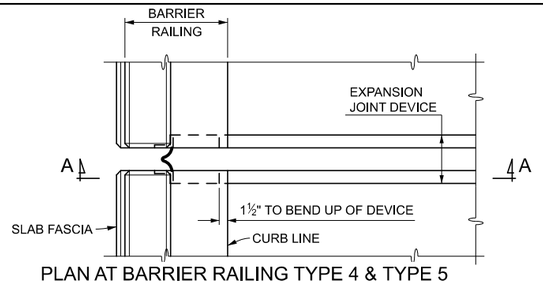
DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE
B-28-A	7	BRIDGE BARRIER RAILING, TYPE 7	9-2-20
B-29-A	8	BRIDGE BARRIER RAILING, TYPE 6	9-2-20
*EJ3AF	1 to 4	EXPANSION JOINT DETAILS (See Notes)	1-23-23
*EJ4S	1 to 4	EXPANSION JOINT DETAILS (See Notes)	1-23-23
PC-1N	2	PRESTRESSED CONCRETE I-BEAM DETAILS (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 May letting.**

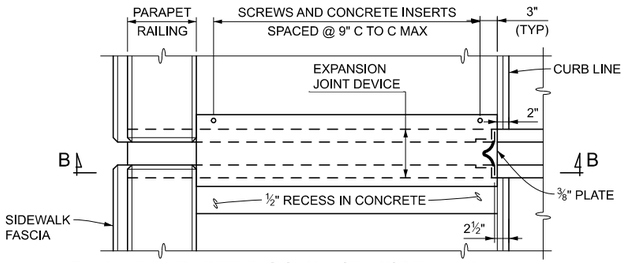
Notes:

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.

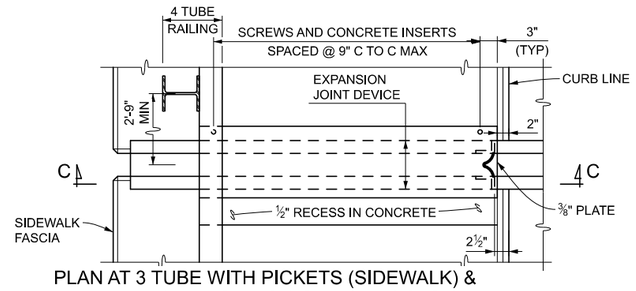
Details PC-1N, PC-2I, PC-4G, and PC-5A shall have structure specific information and quantities added to the sheet. The sheet shall then be added to the plans as a normal plan sheet.



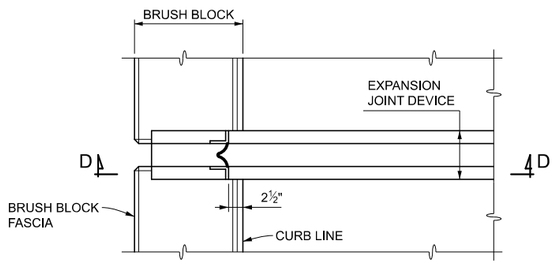
PLAN AT BARRIER RAILING TYPE 4 & TYPE 5



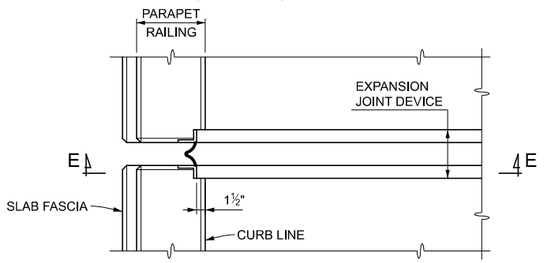
PLAN AT PARAPET RAILING WITH SIDEWALK



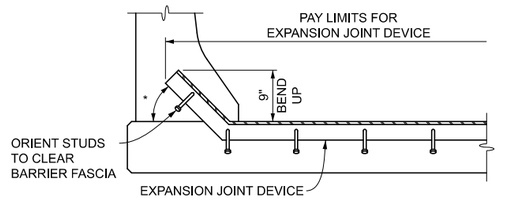
PLAN AT 3 TUBE WITH PICKETS (SIDEWALK) &
4 TUBE (PEDESTRAIN) STEEL RAILING



PLAN AT 2 TUBE, 3 TUBE WITH PICKETS (BRUSH BLOCK)
& 4 TUBE (BICYCLE) STEEL RAILING

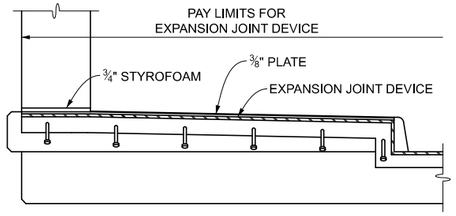


PLAN AT FLUSH MOUNT PARAPET RAILING

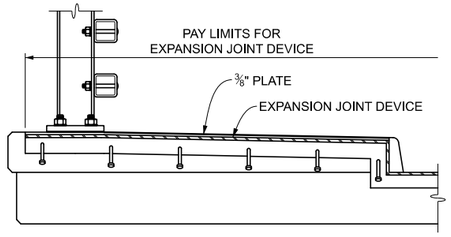


SECTION A - A

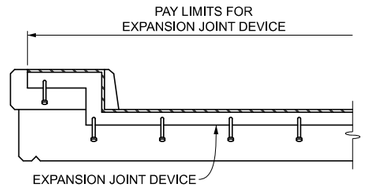
* BEND ANCHORAGE UP 45° ALONG ℄ OF EXPANSION JOINT.



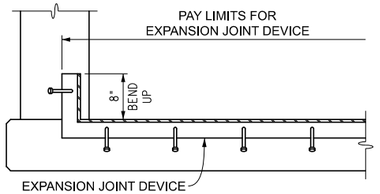
SECTION B - B



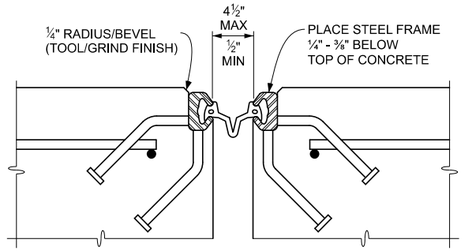
SECTION C - C



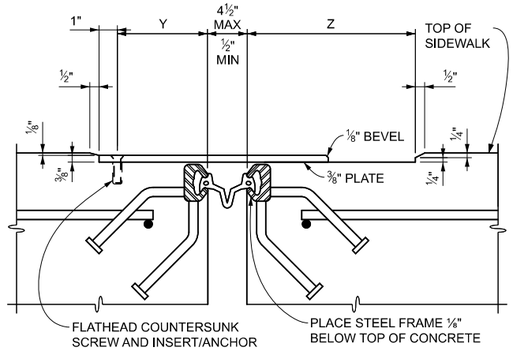
SECTION D - D



SECTION E - E



SECTION THROUGH EXPANSION JOINT

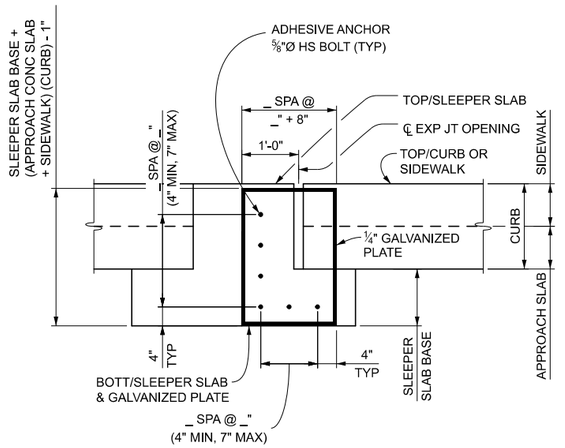


SECTION THROUGH EXPANSION JOINT
AND COVER PLATE

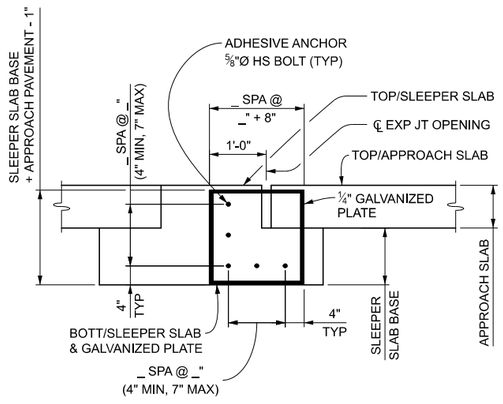
WABO STRIP SEAL TYPE M			
TOTAL TRAVEL *	PLATE WIDTH	Y	Z
< 1"	10"	3¾"	5¾"
1" - 2"	11"	3¾"	6¾"
2" - 3"	12"	3¾"	7¾"
> 3"	13"	3¾"	8¾"

ALL OTHER DEVICES			
TOTAL TRAVEL *	PLATE WIDTH	Y	Z
< 1½"	8"	2½"	5"
1½" - 3½"	10"	2½"	7"
> 3½"	12"	2½"	9"

* SEE TABLE FOR MINIMUM TOTAL TRAVEL ALONG CENTERLINE OF BRIDGE



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB AND SIDEWALK OR CURB)



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB/PAVEMENT)

NOTES:

JOINT TYPES

PROVIDE AN EXPANSION JOINT DEVICE THAT INCLUDES A CONTINUOUS NEOPRENE (OR EQUIVALENT) SEAL ACROSS THE DECK. UNLESS OTHERWISE NOTED, ANY OF THE DEVICES LISTED BELOW THAT MEET THAT ARE SUITABLE TO MEET THE TOTAL MOVEMENT NOTED ON THE PLANS ARE PERMITTED:

DEVICE	MANUFACTURER
WABO STRIP SEAL - TYPE M	WATSON-BOWMAN & ACME, INC.
WABO STRIP SEAL - TYPE A	WATSON-BOWMAN & ACME, INC.
STEELFLEX-SSA2	D.S. BROWN
STEELFLEX-SSCM	D.S. BROWN
ONFLEX 40 SS	STRUCTURAL RUBBER PRODUCTS CO.
ONFLEX 40 SSA	STRUCTURAL RUBBER PRODUCTS CO.

DETAILS AT CURBS OR BARRIERS

THE DETAILS ON THIS SHEET SHOW AN APPROVED MEANS OF TERMINATING THE EXPANSION JOINT DEVICE AT CURBS OR BARRIERS. VARIATIONS OR ALTERNATIVE SCHEMES WILL BE CONSIDERED AND MAY BE USED IF APPROVED BY THE ENGINEER.

COVER PLATE LENGTHS

COVER PLATES WITH A LENGTH GREATER THAN 11' MAY BE FABRICATED FROM TWO EQUAL LENGTH PIECES WITH A JOINT LOCATED AT THE CENTERLINE OF THE SIDEWALK OR PATH. PROVIDE A ¼" WIDE GAP AT THE JOINT THAT IS PARALLEL TO THE CENTERLINE OF THE SIDEWALK OR PATH.

STRUCTURE NUMBER	ANGLE OF CROSSING TO NEAREST 10°	LOCATION OF JOINT	MIN. TOT. TRAVEL ALONG CENTERLINE OF BRIDGE *	REQUIRED LENGTH OF EXPANSION JOINT DEVICE

QUANTITY		
ITEM	UNIT	AMOUNT
Expansion Joint Device	Ft	
Expansion Joint Device, Cover Plate	Ft	

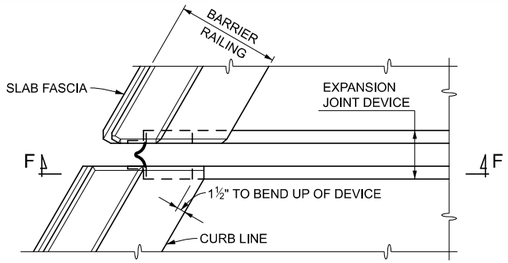
END PLATE TABLE	
STRUCTURE NUMBER	SIZE

FINAL ROW PLAN REVISIONS SUBMITTAL DATE:							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

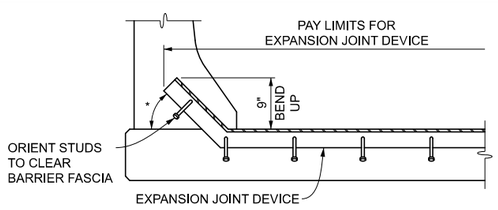
MDOT Michigan Department of Transportation

NO SCALE

	DATE:	CS:	EXPANSION JOINT DETAILS	DRAWING	SHEET
	DESIGN UNIT:	JN:	EJ3AF (01-23-2023)		SECT
FILE:	TSC:				

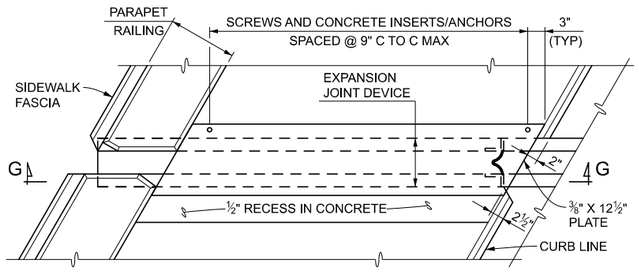


PLAN AT BARRIER RAILING TYPE 4 & TYPE 5

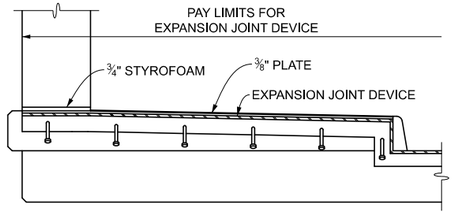


SECTION F - F

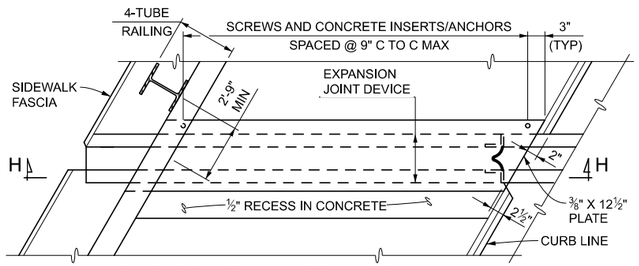
* FOR ANGLES OF CROSSING FROM 69° TO 45° INCLUSIVE, BEND ANCHORAGE UP 45° ALONG ℄ OF EXPANSION JOINT. FOR ANGLES OF CROSSING LESS THAN 45°, A SPECIAL ENDING MAY BE REQUIRED.



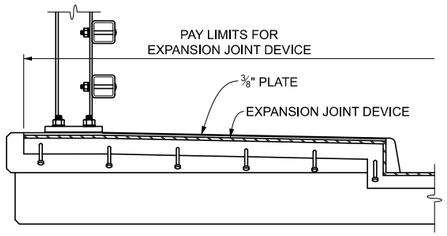
PLAN AT PARAPET RAILING WITH SIDEWALK



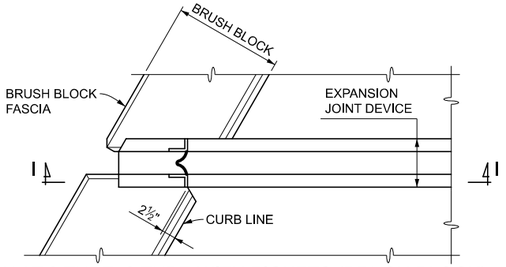
SECTION G - G



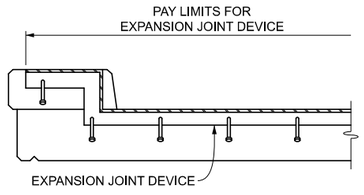
PLAN AT 3 TUBE WITH PICKETS (SIDEWALK) & 4 TUBE (PEDESTRAIN) STEEL RAILING



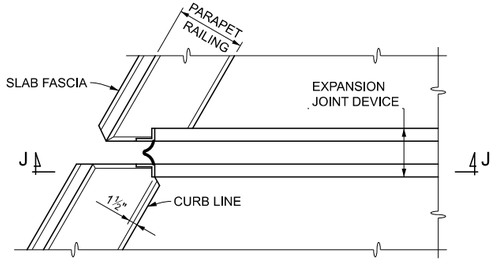
SECTION H - H



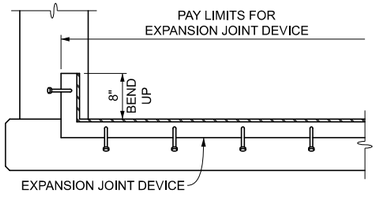
PLAN AT 2 TUBE, 3 TUBE WITH PICKETS (BRUSH BLOCK) & 4 TUBE (BICYCLE) STEEL RAILING



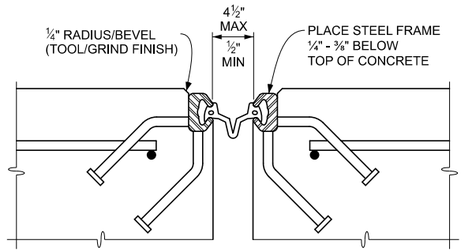
SECTION I - I



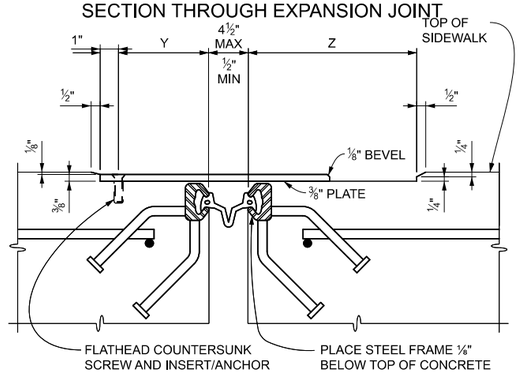
PLAN AT FLUSH MOUNT PARAPET RAILING



SECTION J - J



SECTION THROUGH EXPANSION JOINT



SECTION THROUGH EXPANSION JOINT AND COVER PLATE

WABO STRIP SEAL TYPE M			
TOTAL TRAVEL *	PLATE WIDTH	Y	Z
< 1"	10"	3¾"	5¾"
1" - 2"	11"	3¾"	6¾"
2" - 3"	12"	3¾"	7¾"
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ALL OTHER DEVICES			
TOTAL TRAVEL *	PLATE WIDTH	Y	Z
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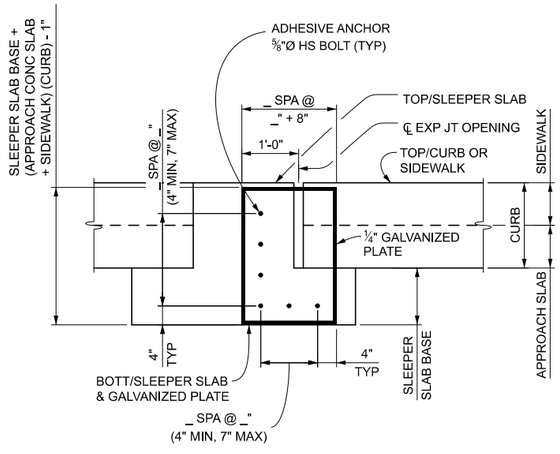
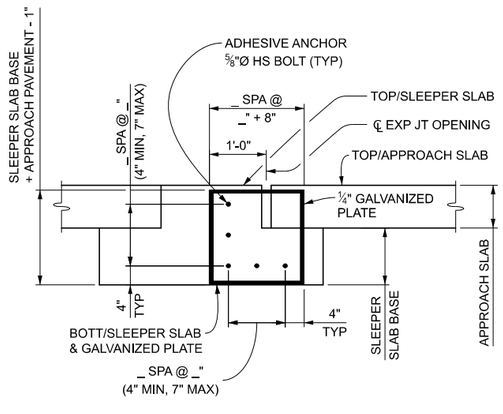
* SEE TABLE FOR MINIMUM TOTAL TRAVEL ALONG CENTERLINE OF BRIDGE



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB AND SIDEWALK OR CURB)



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB/PAVEMENT)

NOTES:

JOINT TYPES

PROVIDE AN EXPANSION JOINT DEVICE THAT INCLUDES A CONTINUOUS NEOPRENE (OR EQUIVALENT) SEAL ACROSS THE DECK. UNLESS OTHERWISE NOTED, ANY OF THE DEVICES LISTED BELOW THAT MEET THAT ARE SUITABLE TO MEET THE TOTAL MOVEMENT NOTED ON THE PLANS ARE PERMITTED:

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WABO STRIP SEAL - TYPE A	WATSON-BOWMAN & ACME, INC.
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STEELFLEX-SSCM	D.S. BROWN
ONFLEX 40 SS	STRUCTURAL RUBBER PRODUCTS CO.
ONFLEX 40 SSA	STRUCTURAL RUBBER PRODUCTS CO.

DETAILS AT CURBS OR BARRIERS

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COVER PLATE LENGTHS

COVER PLATES WITH A LENGTH GREATER THAN 11' MAY BE FABRICATED FROM TWO EQUAL LENGTH PIECES WITH A JOINT LOCATED AT THE CENTERLINE OF THE SIDEWALK OR PATH. PROVIDE A ¼" WIDE GAP AT THE JOINT THAT IS PARALLEL TO THE CENTERLINE OF THE SIDEWALK OR PATH.

STRUCTURE NUMBER	ANGLE OF CROSSING TO NEAREST 10°	LOCATION OF JOINT	MIN. TOT. TRAVEL ALONG CENTERLINE OF BRIDGE *	REQUIRED LENGTH OF EXPANSION JOINT DEVICE

QUANTITY		
ITEM	UNIT	AMOUNT
Expansion Joint Device	Ft	
Expansion Joint Device, Cover Plate	Ft	

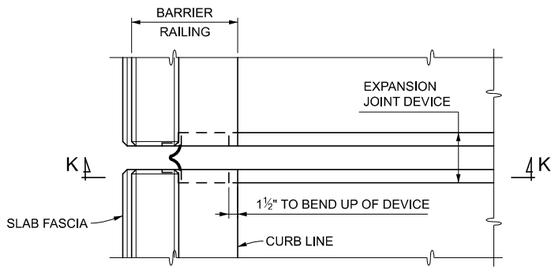
END PLATE TABLE	
STRUCTURE NUMBER	SIZE

FINAL ROW PLAN REVISIONS SUBMITTAL DATE:							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

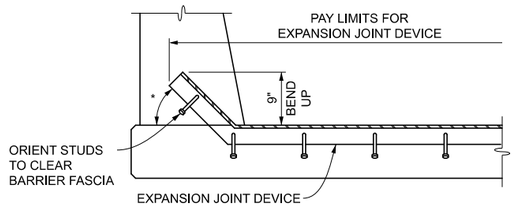
MDOT Michigan Department of Transportation

NO SCALE

	DATE:	CS:	EXPANSION JOINT DETAILS	DRAWING	SHEET
	DESIGN UNIT:	JN:	EJ3AF (01-23-2023)		SECT
FILE:	TSC:				

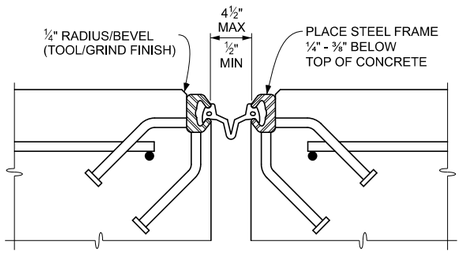


PLAN AT BARRIER RAILING TYPE 6 & TYPE 7

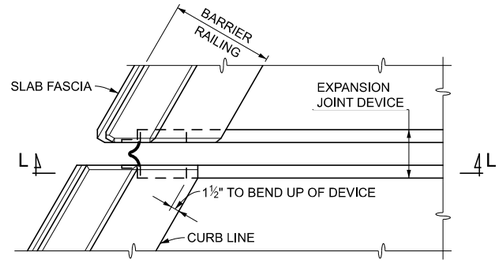


SECTION K - K

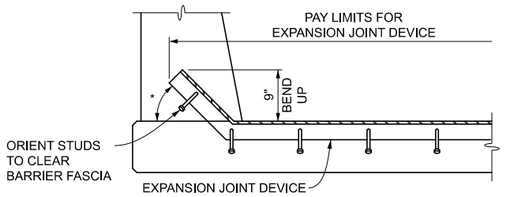
* BEND ANCHORAGE UP 45° ALONG ℄ OF EXPANSION JOINT.



SECTION THROUGH EXPANSION JOINT



PLAN AT BARRIER RAILING TYPE 6 & TYPE 7



SECTION L - L

* FOR ANGLES OF CROSSING FROM 69° TO 45° INCLUSIVE, BEND ANCHORAGE UP 45° ALONG ℄ OF EXPANSION JOINT. FOR ANGLES OF CROSSING LESS THAN 45°, A SPECIAL ENDING MAY BE REQUIRED.

NOTES:

JOINT TYPES

PROVIDE AN EXPANSION JOINT DEVICE THAT INCLUDES A CONTINUOUS NEOPRENE (OR EQUIVALENT) SEAL ACROSS THE DECK. UNLESS OTHERWISE NOTED, ANY OF THE DEVICES LISTED BELOW THAT MEET THAT ARE SUITABLE TO MEET THE TOTAL MOVEMENT NOTED ON THE PLANS ARE PERMITTED:

DEVICE	MANUFACTURER
WABO STRIP SEAL - TYPE M	WATSON-BOWMAN & ACME, INC.
WABO STRIP SEAL - TYPE A	WATSON-BOWMAN & ACME, INC.
STEELFLEX-SSA2	D.S. BROWN
STEELFLEX-SSCM	D.S. BROWN
ONFLEX 40 SS	STRUCTURAL RUBBER PRODUCTS CO.
ONFLEX 40 SSA	STRUCTURAL RUBBER PRODUCTS CO.

DETAILS AT CURBS OR BARRIERS

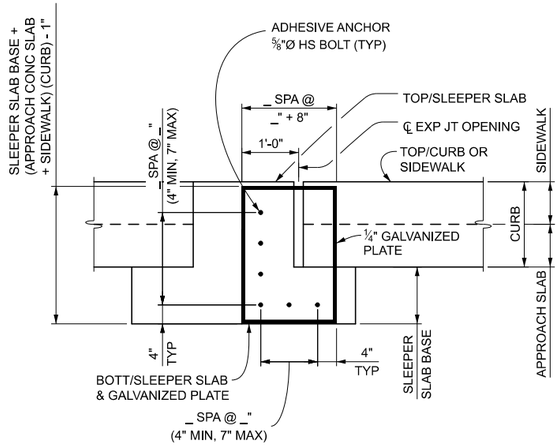
THE DETAILS ON THIS SHEET SHOW AN APPROVED MEANS OF TERMINATING THE EXPANSION JOINT DEVICE AT CURBS OR BARRIERS. VARIATIONS OR ALTERNATIVE SCHEMES WILL BE CONSIDERED AND MAY BE USED IF APPROVED BY THE ENGINEER.

COVER PLATE LENGTHS

COVER PLATES WITH A LENGTH GREATER THAN 11' MAY BE FABRICATED FROM TWO EQUAL LENGTH PIECES WITH A JOINT LOCATED AT THE CENTERLINE OF THE SIDEWALK OR PATH. PROVIDE A ¼" WIDE GAP AT THE JOINT THAT IS PARALLEL TO THE CENTERLINE OF THE SIDEWALK OR PATH.

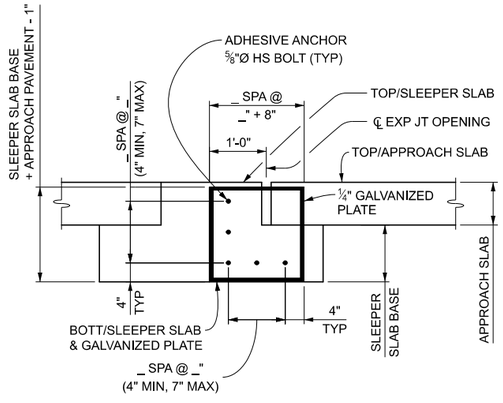
STRUCTURE NUMBER	ANGLE OF CROSSING TO NEAREST 10°	LOCATION OF JOINT	MIN. TOT. TRAVEL ALONG CENTERLINE OF BRIDGE *	REQUIRED LENGTH OF EXPANSION JOINT DEVICE

QUANTITY		
ITEM	UNIT	AMOUNT
Expansion Joint Device	Ft	
Expansion Joint Device, Cover Plate	Ft	



END PLATE DETAIL

(SLEEPER SLAB WITH APPROACH SLAB AND SIDEWALK OR CURB)



END PLATE DETAIL

(SLEEPER SLAB WITH APPROACH SLAB/PAVEMENT)

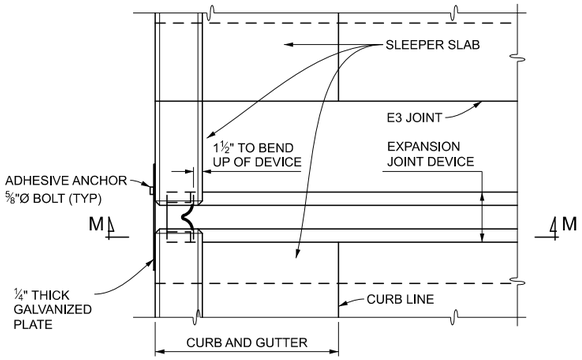
END PLATE TABLE	
STRUCTURE NUMBER	SIZE

FINAL ROW PLAN REVISIONS SUBMITTAL DATE:							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

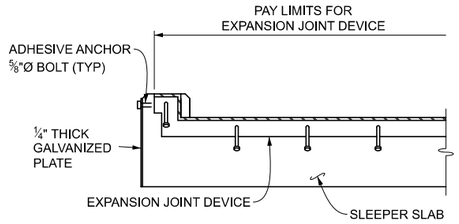
MDOT Michigan Department of Transportation

NO SCALE

	DATE:	CS:	EXPANSION JOINT DETAILS	DRAWING SHEET
	DESIGN UNIT:	JN:	EJ3AF (01-23-2023)	SECT
FILE:	TSC:			

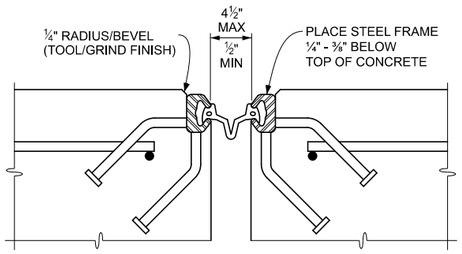


PLAN AT SLEEPER SLAB WITH CURB & GUTTER

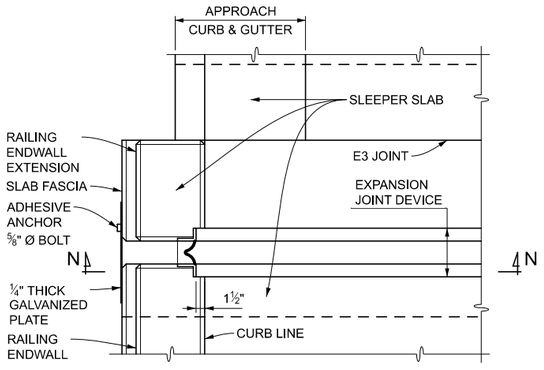


SECTION M - M

(MODIFY CURB HEIGHT/DETAIL AS NECESSARY)

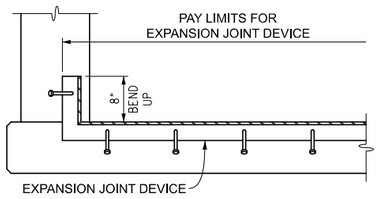


SECTION THROUGH EXPANSION JOINT

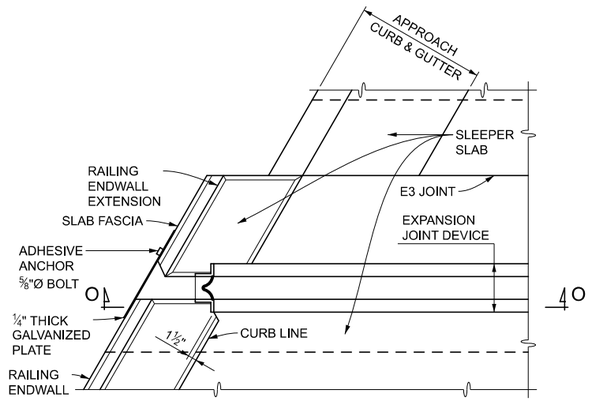


PLAN AT SLEEPER SLAB WITH RAILING ENDWALL

(RAILING ENDING AT SLEEPER SLAB)

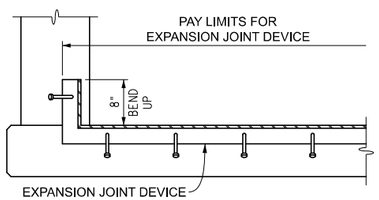


SECTION N - N

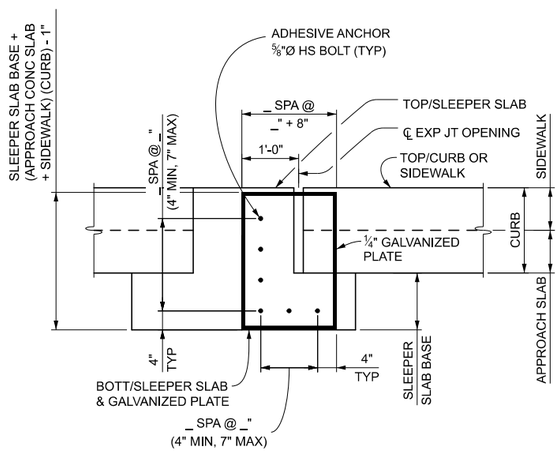


PLAN AT SLEEPER SLAB WITH RAILING ENDWALL

(RAILING ENDING AT SLEEPER SLAB)

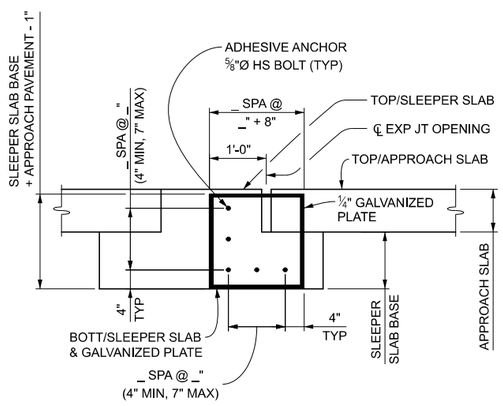


SECTION O - O



END PLATE DETAIL

(SLEEPER SLAB WITH APPROACH SLAB AND SIDEWALK OR CURB)



END PLATE DETAIL

(SLEEPER SLAB WITH APPROACH SLAB/PAVEMENT)

NOTES:

JOINT TYPES

PROVIDE AN EXPANSION JOINT DEVICE THAT INCLUDES A CONTINUOUS NEOPRENE (OR EQUIVALENT) SEAL ACROSS THE DECK. UNLESS OTHERWISE NOTED, ANY OF THE DEVICES LISTED BELOW THAT MEET THAT ARE SUITABLE TO MEET THE TOTAL MOVEMENT NOTED ON THE PLANS ARE PERMITTED:

DEVICE	MANUFACTURER
WABO STRIP SEAL - TYPE M	WATSON-BOWMAN & ACME, INC.
WABO STRIP SEAL - TYPE A	WATSON-BOWMAN & ACME, INC.
STEELFLEX-SSA2	D.S. BROWN
STEELFLEX-SSCM	D.S. BROWN
ONFLEX 40 SS	STRUCTURAL RUBBER PRODUCTS CO.
ONFLEX 40 SSA	STRUCTURAL RUBBER PRODUCTS CO.

DETAILS AT CURBS OR BARRIERS

THE DETAILS ON THIS SHEET SHOW AN APPROVED MEANS OF TERMINATING THE EXPANSION JOINT DEVICE AT CURBS OR BARRIERS. VARIATIONS OR ALTERNATIVE SCHEMES WILL BE CONSIDERED AND MAY BE USED IF APPROVED BY THE ENGINEER.

COVER PLATE LENGTHS

COVER PLATES WITH A LENGTH GREATER THAN 11' MAY BE FABRICATED FROM TWO EQUAL LENGTH PIECES WITH A JOINT LOCATED AT THE CENTERLINE OF THE SIDEWALK OR PATH. PROVIDE A ¼" WIDE GAP AT THE JOINT THAT IS PARALLEL TO THE CENTERLINE OF THE SIDEWALK OR PATH.

STRUCTURE NUMBER	ANGLE OF CROSSING TO NEAREST 10°	LOCATION OF JOINT	MIN. TOT. TRAVEL ALONG CENTERLINE OF BRIDGE *	REQUIRED LENGTH OF EXPANSION JOINT DEVICE

QUANTITY		
ITEM	UNIT	AMOUNT
Expansion Joint Device	Ft	
Expansion Joint Device, Cover Plate	Ft	

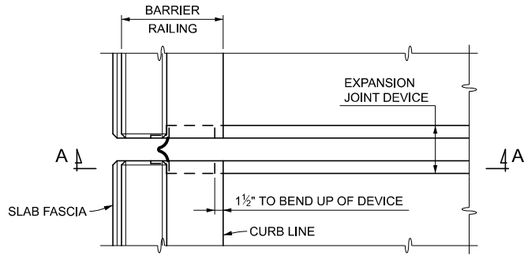
END PLATE TABLE	
STRUCTURE NUMBER	SIZE

FINAL ROW PLAN REVISIONS SUBMITTAL DATE:							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

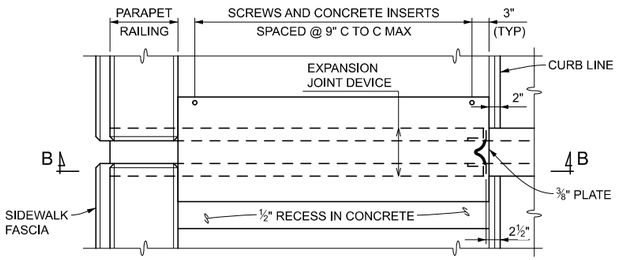
MDOT Michigan Department of Transportation

NO SCALE

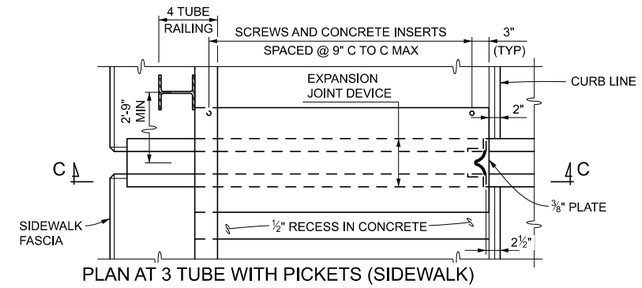
	DATE:	CS:	EXPANSION JOINT DETAILS	DRAWING	SHEET
	DESIGN UNIT:	JN:	EJ3AF (01-23-2023)		SECT
FILE:	TSC:				



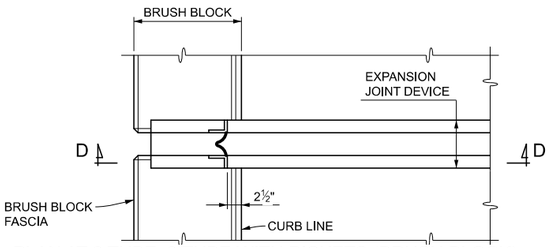
PLAN AT BARRIER RAILING TYPE 4 & TYPE 5



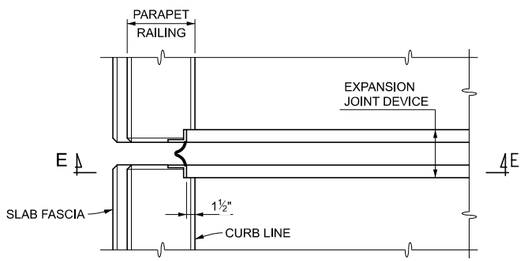
PLAN AT PARAPET RAILING WITH SIDEWALK



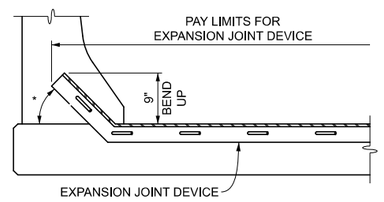
PLAN AT 3 TUBE WITH PICKETS (SIDEWALK)
& 4 TUBE (PEDESTRIAN) STEEL RAILING



PLAN AT 2 TUBE, 3 TUBE WITH PICKETS (BRUSH BLOCK)
& 4 TUBE (BICYCLE) STEEL RAILING

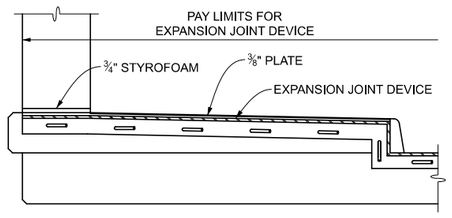


PLAN AT FLUSH MOUNT PARAPET RAILING

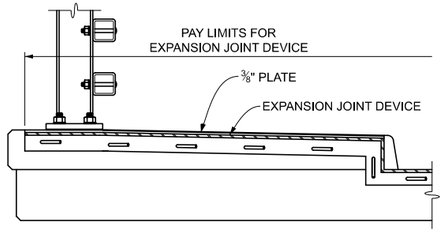


SECTION A - A

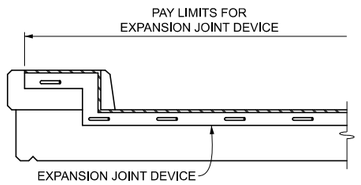
* BEND ANCHORAGE UP 45° ALONG ℄ OF EXPANSION JOINT.



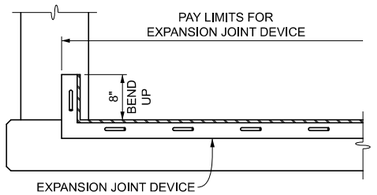
SECTION B - B



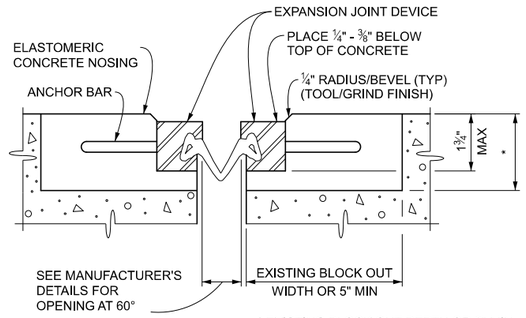
SECTION C - C



SECTION D - D



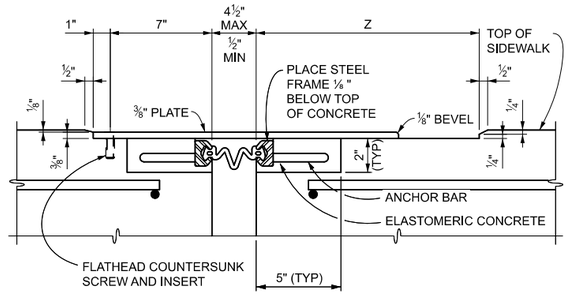
SECTION E - E



* EXISTING BLOCK OUT DEPTH OR 2" MIN.

SECTION THROUGH EXPANSION JOINT

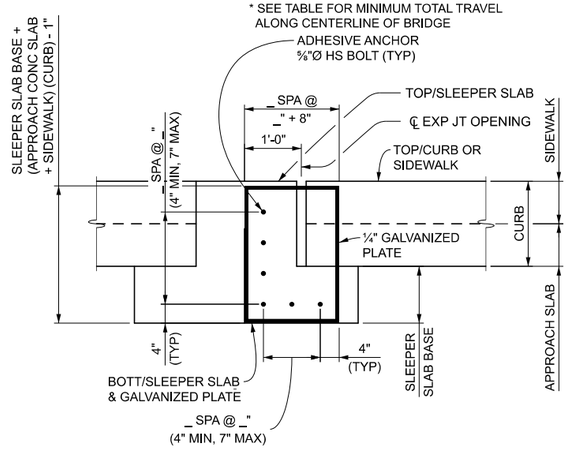
THE MINIMUM BLOCK OUT DIMENSIONS SHOWN ARE
APPLICABLE FOR DEVICES WITH STRIP SEALS ONLY.



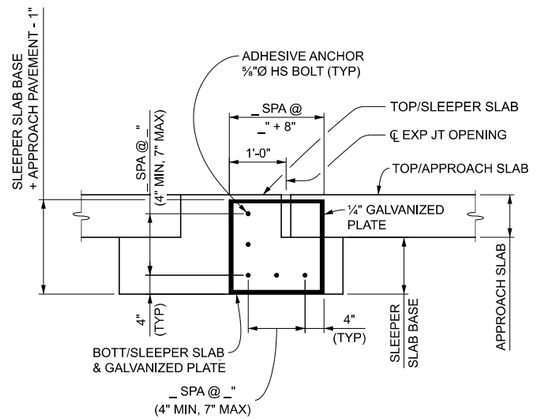
SECTION THROUGH EXPANSION JOINT
AND COVER PLATE

TOTAL TRAVEL *	PLATE WIDTH	Z
≤ 1"	15"	7"
1" - 2"	16"	8"
2" - 3"	17"	9"
≥ 3"	18"	10"

* SEE TABLE FOR MINIMUM TOTAL TRAVEL
ALONG CENTERLINE OF BRIDGE



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB AND SIDEWALK OR CURB)



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB/PAVEMENT)

NOTES:

JOINT TYPES

PROVIDE AN EXPANSION JOINT DEVICE THAT INCLUDES A CONTINUOUS NEOPRENE (OR EQUIVALENT) SEAL ACROSS THE DECK. UNLESS OTHERWISE NOTED, ANY OF THE DEVICES LISTED BELOW THAT MEET THAT ARE SUITABLE TO MEET THE TOTAL MOVEMENT NOTED ON THE PLANS ARE PERMITTED:

DEVICE	MANUFACTURER
STEELFLEX-SSE2	D.S. BROWN CO..
WABO STRIP SEAL - TYPE E	WATSON-BOWMAN & ACME, INC.

DETAILS AT CURBS OR BARRIERS

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COVER PLATE LENGTHS

COVER PLATES WITH A LENGTH GREATER THAN 11' MAY BE FABRICATED FROM TWO EQUAL LENGTH PIECES WITH A JOINT LOCATED AT THE CENTERLINE OF THE SIDEWALK OR PATH. PROVIDE A ¼" WIDE GAP AT THE JOINT THAT IS PARALLEL TO THE CENTERLINE OF THE SIDEWALK OR PATH.

STRUCTURE NUMBER	ANGLE OF CROSSING TO NEAREST 10°	LOCATION OF JOINT	MIN. TOT. TRAVEL ALONG CENTERLINE OF BRIDGE *	REQUIRED LENGTH OF EXPANSION JOINT DEVICE

QUANTITY		
ITEM	UNIT	AMOUNT
Expansion Joint Device	Ft	
Expansion Joint Device, Cover Plate	Ft	

END PLATE TABLE	
STRUCTURE NUMBER	SIZE

FINAL ROW PLAN REVISIONS SUBMITTAL DATE:							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

MDOT Michigan Department of Transportation

NO SCALE

	DATE:	CS:	EXPANSION JOINT DETAILS	DRAWING	SHEET
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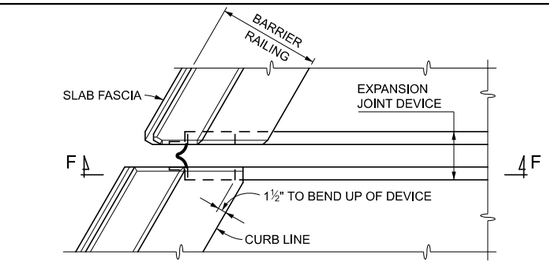
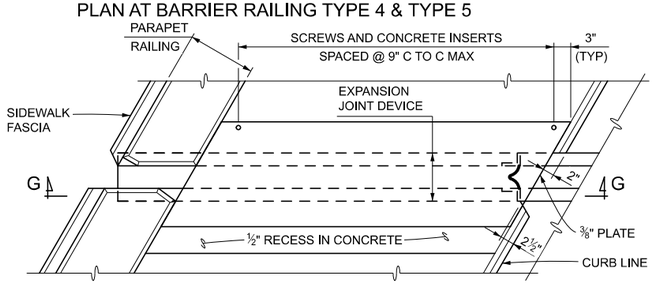
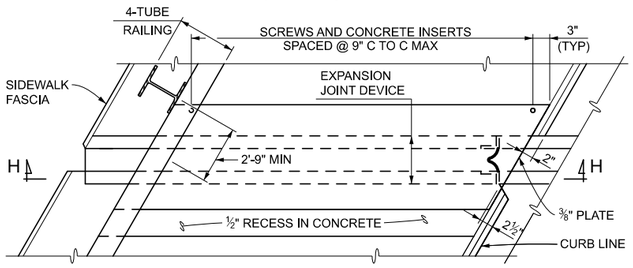


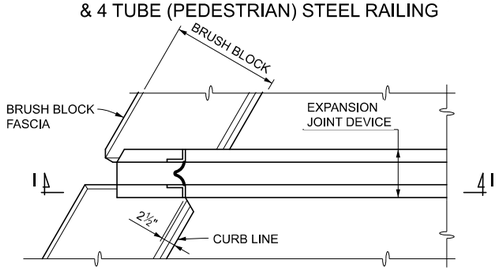
PLAN AT BARRIER RAILING TYPE 4 & TYPE 5



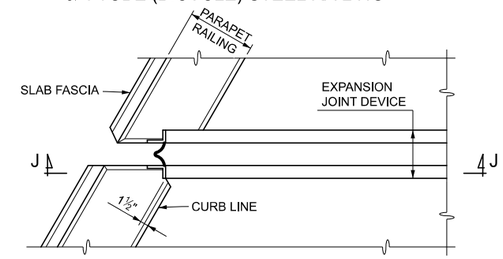
PLAN AT PARAPET RAILING WITH SIDEWALK



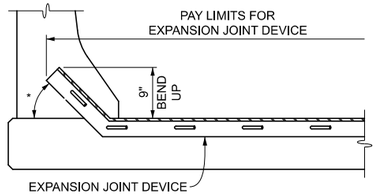
PLAN AT 3 TUBE WITH PICKETS (SIDEWALK)
& 4 TUBE (PEDESTRIAN) STEEL RAILING



PLAN AT 2 TUBE, 3 TUBE WITH PICKETS (BRUSH BLOCK)
& 4 TUBE (BICYCLE) STEEL RAILING

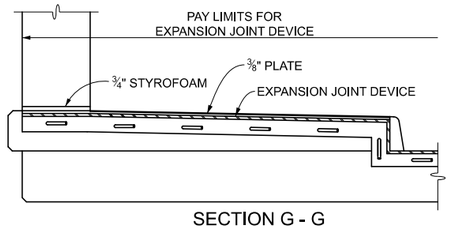


PLAN AT FLUSH MOUNT PARAPET RAILING

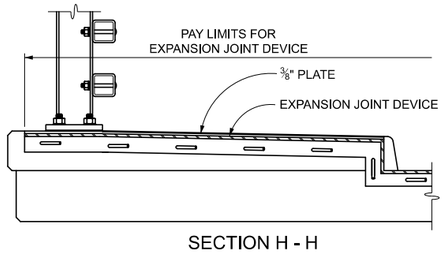


SECTION F - F

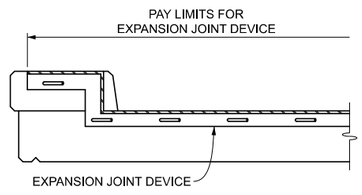
* FOR ANGLES OF CROSSING FROM 69° TO 45° INCLUSIVE, BEND ANCHORAGE UP 45° ALONG ℄ OF EXPANSION JOINT. FOR ANGLES OF CROSSING LESS THAN 45°, A SPECIAL ENDING MAY BE REQUIRED.



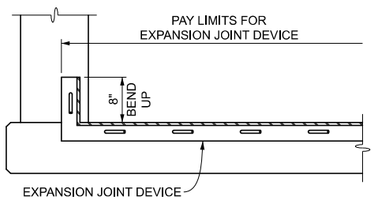
SECTION G - G



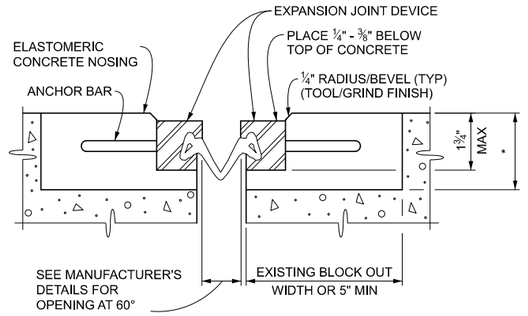
SECTION H - H



SECTION I - I



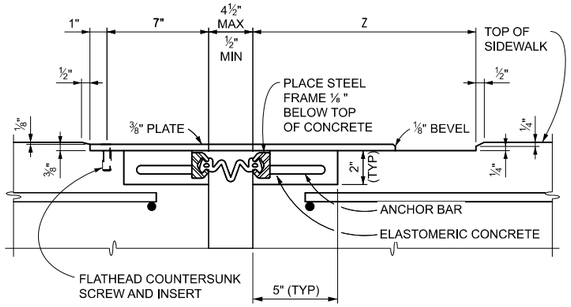
SECTION J - J



* EXISTING BLOCK OUT DEPTH OR 2" MIN.

SECTION THROUGH EXPANSION JOINT

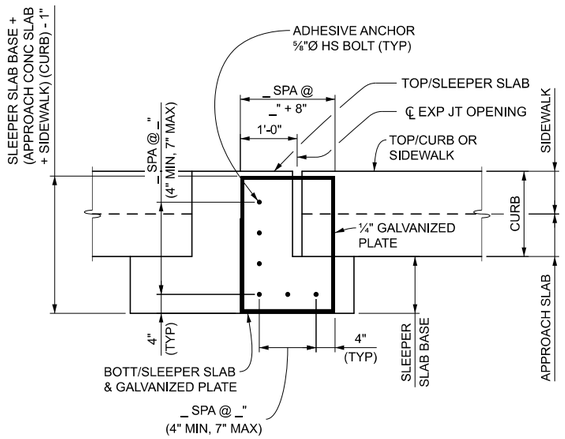
THE MINIMUM BLOCK OUT DIMENSIONS SHOWN ARE APPLICABLE FOR DEVICES WITH STRIP SEALS ONLY.



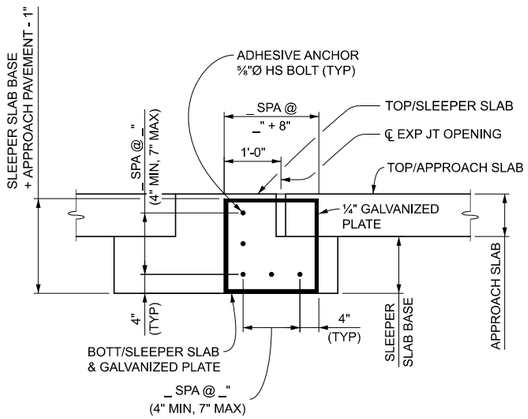
SECTION THROUGH EXPANSION JOINT AND COVER PLATE

TOTAL TRAVEL *	PLATE WIDTH	Z
≤ 1"	15"	7"
1" - 2"	16"	8"
2" - 3"	17"	9"
≥ 3"	18"	10"

* SEE TABLE FOR MINIMUM TOTAL TRAVEL ALONG CENTERLINE OF BRIDGE



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB AND SIDEWALK OR CURB)



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB/PAVEMENT)

END PLATE TABLE	
STRUCTURE NUMBER	SIZE

NOTES:

JOINT TYPES

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WABO STRIP SEAL - TYPE E	WATSON-BOWMAN & ACME, INC.

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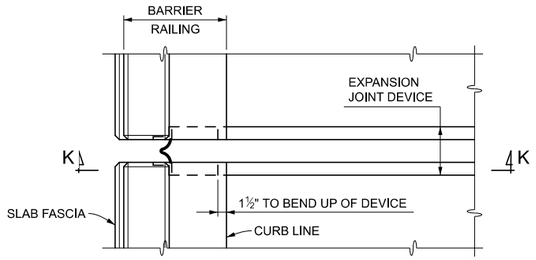
QUANTITY		
ITEM	UNIT	AMOUNT
Expansion Joint Device	Ft	
Expansion Joint Device, Cover Plate	Ft	

FINAL ROW PLAN REVISIONS SUBMITTAL DATE:							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

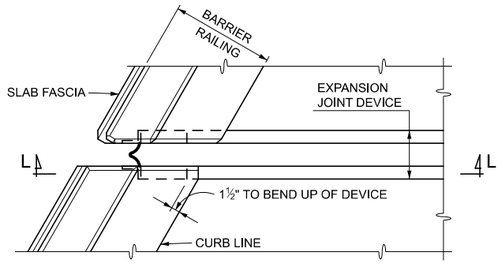
MDOT Michigan Department of Transportation

NO SCALE

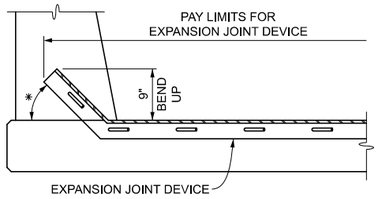
	DATE:	CS:	EXPANSION JOINT DETAILS	DRAWING	SHEET
	DESIGN UNIT:	JN:	EJ4S (01-23-2023)		SECT
FILE:	TSC:				



PLAN AT BARRIER RAILING TYPE 6 & TYPE 7

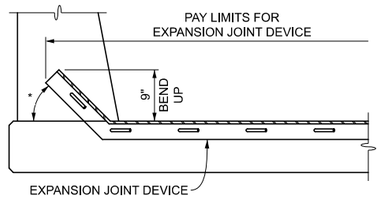


PLAN AT BARRIER RAILING TYPE 6 & TYPE 7



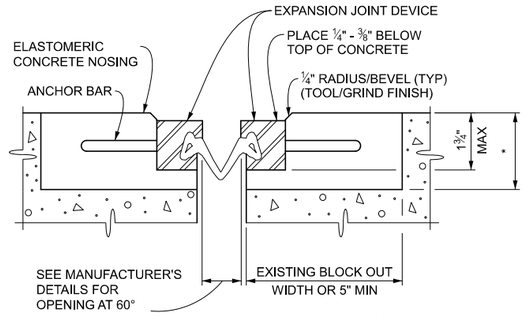
SECTION K - K

* BEND ANCHORAGE UP 45° ALONG ℄ OF EXPANSION JOINT.



SECTION L - L

* FOR ANGLES OF CROSSING FROM 69° TO 45° INCLUSIVE, BEND ANCHORAGE UP 45° ALONG ℄ OF EXPANSION JOINT. FOR ANGLES OF CROSSING LESS THAN 45°, A SPECIAL ENDING MAY BE REQUIRED.



* EXISTING BLOCK OUT DEPTH OR 2" MIN.

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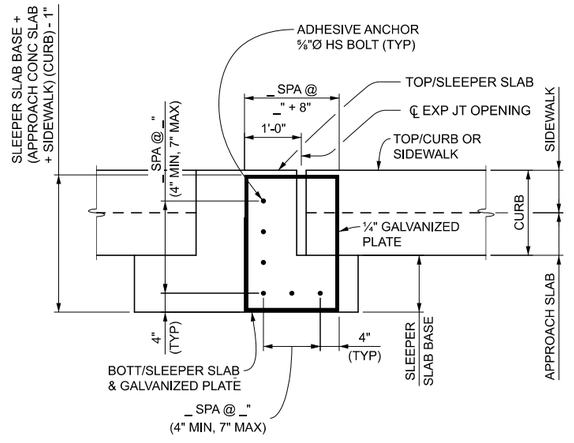
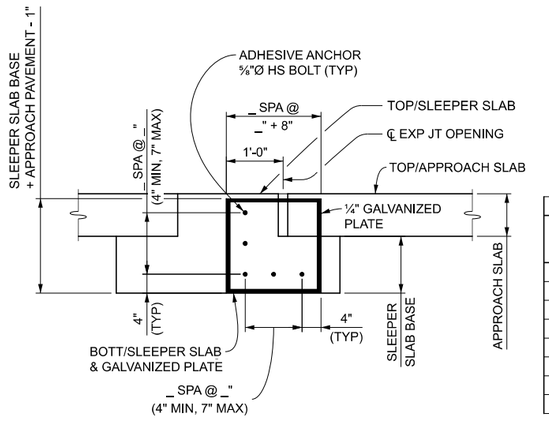
QUANTITY		
ITEM	UNIT	AMOUNT
Expansion Joint Device	Ft	
Expansion Joint Device, Cover Plate	Ft	



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB AND SIDEWALK OR CURB)



END PLATE DETAIL
(SLEEPER SLAB WITH APPROACH SLAB/PAVEMENT)

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STRUCTURE NUMBER	SIZE

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MDOT Michigan Department of Transportation

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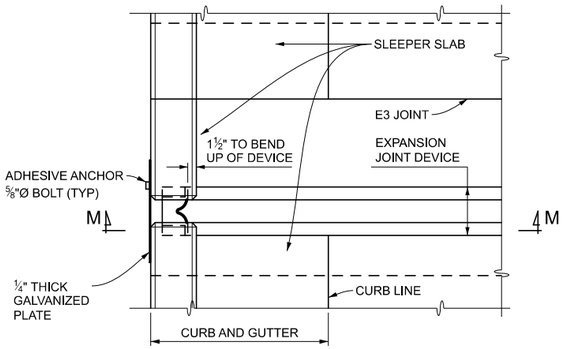
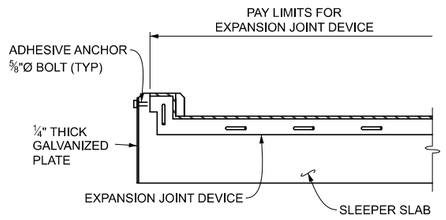
	DESIGN UNIT:	JN:	EJ4S (01-23-2023)		SECT
FILE:	TSC:				

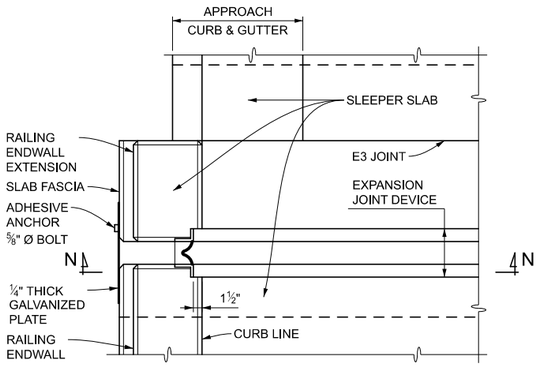


PLAN AT SLEEPER SLAB WITH CURB & GUTTER



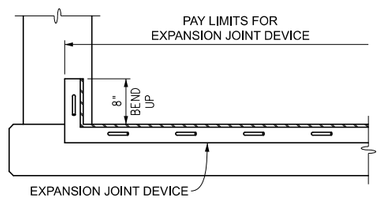
SECTION M - M

(MODIFY CURB HEIGHT/DETAIL AS NECESSARY)

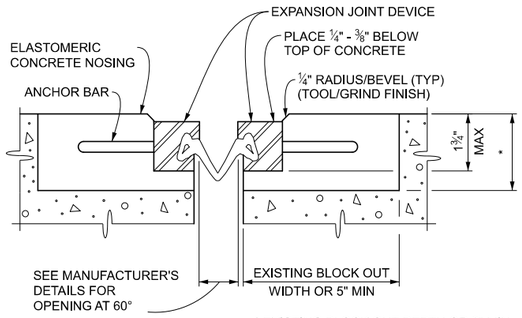


PLAN AT SLEEPER SLAB WITH RAILING ENDWALL

(RAILING ENDING AT SLEEPER SLAB)



SECTION N - N



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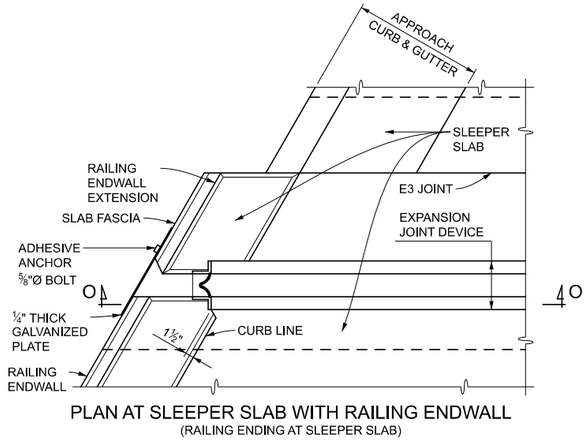
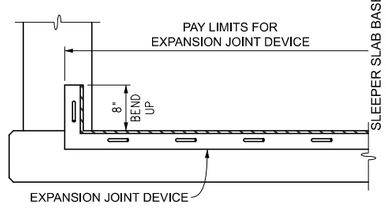
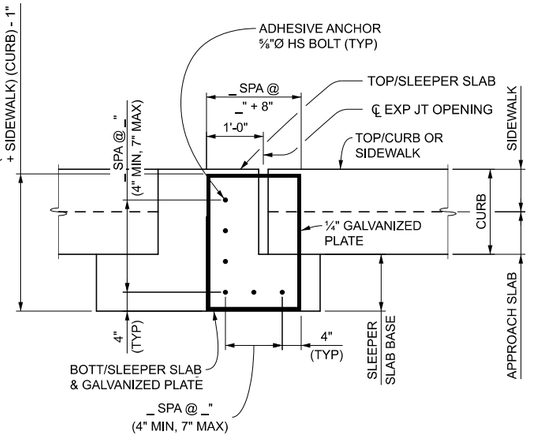


PLAN AT SLEEPER SLAB WITH RAILING ENDWALL

(RAILING ENDING AT SLEEPER SLAB)

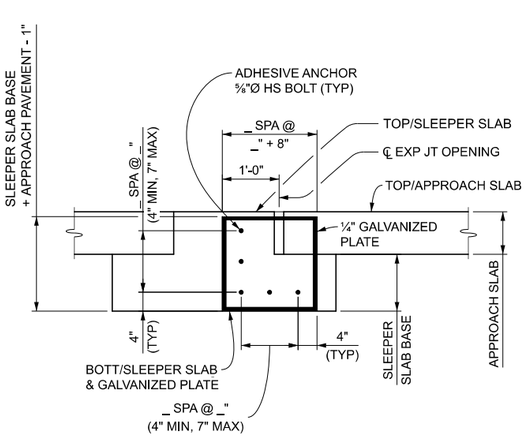


SECTION O - O



END PLATE DETAIL

(SLEEPER SLAB WITH APPROACH SLAB AND SIDEWALK OR CURB)



END PLATE DETAIL

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FILE:	TSC:				

CHAPTER 1

PLAN PREPARATION

1.01

DEVELOPMENT METHODS

1.01.01 (revised 11-28-2011)

References

A. Geometric Design Guides - Design Division

B. Guidelines for Plan Preparation – Design Division

C. ***Michigan Manual on Uniform Traffic Control Devices,*** Current Edition

D. Standard Plans and Special Details – Design Division

E. ***Standard Specifications for Construction,*** Current Edition

Existing plans for a recent project, similar in nature to the proposed project, are an excellent reference.

1.01.02 (revised 11-28-2011)

General

This chapter provides the information and details necessary to prepare a set of plans. The plans should contain all the information essential for bidding and constructing the project. Although innovation and creativity are encouraged in the preparation of plans, the importance of general uniformity must be emphasized. Plans should be adaptable to the diverse requirements of the Design Division and Construction Field Services Division. At the same time the plans should be a functional reference, familiar to the users. A general format should be followed by all Designers.

1.01.03 (revised 12-28-2020)

Survey and Mapping Methods

The choice between a ground survey, an aerial survey, a laser scanning survey (LiDAR), or a combination depends in part on the type and length of project, the information required, and the time schedule.

Some projects may not require a survey or may require only a minor pick up survey. Old plans are valuable sources of information on these projects.

Refer to Chapter 14, Procedures for Plan Preparation, for more information on surveys and mapping.

1.02

PLAN SHEETS

1.02.01 (revised 1-23-2023)

Title Sheet

The location map shown on the title sheet will generally be obtained from either county or city maps which are available in ProjectWise in the Reference Documents. For a particular project, a suitable map or section of one is chosen and incorporated on a standard title sheet cell. Because first impressions often sell the product, the title sheet should be neat in appearance and layout.

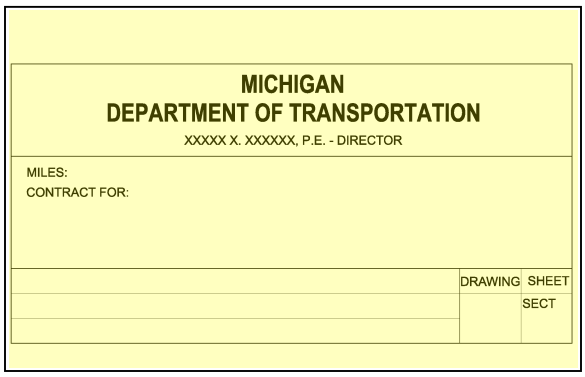
1.02.01 (continued)

Title Sheet

D. Length and Type of Work

The length of the project, in hundredths of a mile, and the type of work should be shown in the bottom of the approval block.

Example:



E. Project Signature and Plan Sign Off

In supplement to the title sheet data, plan sign off must also be coordinated between all applicable parties involved both internally and with Consultant involvement. Project managers must utilize the latest version of the Project Signature sheet to implement digital signature approvals of plans and process.

The instructions tab of the Project Signature sheet overviews the steps required to implement digital signatures denoting completion of plans. Failure to collect the necessary signatures via the Project Signature sheet may move back the target letting, as the plans would not be considered complete.

Once all signatures are obtained, the final Project Signature sheet must be placed in Folder 6 in Projectwise along with the corresponding project plans (if applicable) and proposal.

1.02.01 (continued)

F. Consultant Identification

If plans are being prepared by a consulting firm (prime consultant), their company logo and professional engineer's electronic signature (seal format) should be placed per the instructions tab of the digital project signature sheet. Sub-consultants must also have their logo on the plan sheets they are responsible for.

If plans are being designed primarily by MDOT, but with some consultant inclusions, the consultant must list the applicable sheets they are responsible for, on the designated block of the project signature sheet as described in the instructions tab of the digital project signature sheet. They must also provide their corresponding company logo and electronic signature seal on the project signature sheet in the designated block area(s) for their applicable sheets.

3.03 (revised 1-23-2023)

ALIGNMENT-GENERAL

The geometric design of a roadway consists of horizontal alignment, vertical alignment, and a combination of the two. A properly designed alignment (horizontal and vertical) leads to the safe and efficient movement of all modes of travel.

A. Horizontal Alignment

Horizontal alignment is a major factor in determining safety, driving comfort, and capacity of a highway.

Some important factors to consider when designing for horizontal alignment:

1. Passing sight distance on two-lane, two-way roadways should be maximized.

2. Curves should be as flat as physical conditions permit. Abrupt changes in alignment introduce the element of surprise to the driver and should be avoided.

3. Broken back curves should be avoided because they are unsightly and drivers do not expect succeeding curves to be in the same direction.

4. If possible, the minimum distance between reverse curves should be the sum of the superelevation transitions, outside the curves, plus the crown runout lengths. The crown runout can be eliminated in some situations. See the Geometrics Unit (Design Division) for additional guidance. When it isn't possible to obtain the desired distance between reverse curves, up to 40% of the transition may be placed in the curves.

3.03 (continued)

B. Vertical Alignment

Vertical alignment establishes the profile grade of a proposed road construction project. The grade can be over virgin land as in the case of a relocation project or along an existing roadway, as in the case of a resurfacing project. In either case and in most proposed construction projects, a profile grade should be established.

Obviously a profile grade must always be established for new construction or relocation projects. Most reconstruction and rehabilitation projects will require new profile grades if improvements for sight distance, superelevation, and drainage are included. A simple resurfacing project can usually be constructed without establishing a new vertical alignment.

Establishing the vertical alignment is based on many factors, including terrain, existing conditions, soils, drainage, coordination with the horizontal alignment, location of bridges, culverts, crossroads, design speed, earthwork balance, etc. The Designer must work with available resources such as the Geometrics Unit of the Design Division to provide the best possible vertical alignment. The final product should be safe, functional, aesthetically pleasing, and economical.

3.05

Section deleted.

3.06 (revised 1-23-2023)

DESIGN SPEED

Design speed is a selected speed used to determine the various geometric design features of the roadway for all modes of travel. Once selected, all of the pertinent design features of the highway should be related to the design speed to obtain a balanced design.

4R projects:

Where practical, it is MDOT desirable practice to design roadway geometrics for new construction or reconstruction based on a recommended project design speed 5 mph greater than the posted speed. This practice is founded in research that shows actual operating speeds are typically greater than the posted speeds. Design speeds shown in Appendix 3A are applicable for 4R projects.

3R projects:

For freeway 3R projects, the minimum design speed is the design speed approved at the time of original construction or reconstruction, whichever is most recent.

Design speeds used for non-freeway 3R projects are shown in Section 3.09.02. However, if the original posted speed has been raised, the designer may use the design speed approved at the time of original construction or reconstruction, whichever is most recent.

Also See Section 3.08.01C for information on combined 3R and 4R work.

3.06 (continued)

The project design speed to be recorded on the title sheet is the predominant selected design speed. This will be either the MDOT recommended design speed (Appendix 3A or Section 3.09.02A & 3.09.02B) or if applicable, the matched original construction/latest preceding 4R design speed allowed for 3R projects.

If the highest attainable design corresponds to criteria for speeds less than the minimum design speed, a design exception or variance must be submitted for approval. For additional information see Section 14.11.

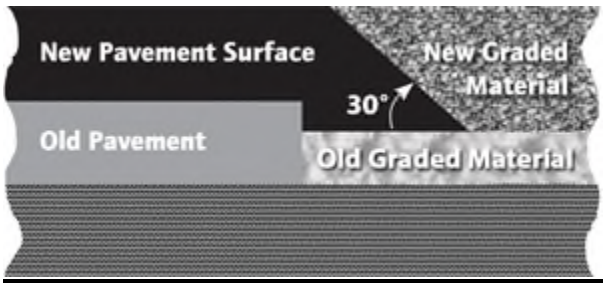
Documentation must be for each geometric element and not a blanket statement applying to all geometric elements. A design speed reduction for individual geometric elements does not redefine the overall “project design speed”.

6.05.13 (revised 1-23-2023)

Safety Edge

The safety edge is a beveled pavement edge designed to reduce the severity of vehicle roadway departures and provides increased driver control on re-entry. It is a safer design for motorcyclists and bicyclists, as well as motorists.

On February 6, 2013 the Engineering Operations Committee adopted a policy to incorporate the safety edge.



The safety edge will be applied as follows for all pavement types:

Temporary Pavements - All newly constructed temporary pavements will be constructed with a safety edge. This includes permanent shoulders that are newly constructed, resurfaced (1½" minimum) or widened, and fully or partially used in the course of the same project as temporary lanes with construction speeds of 45 mph or greater. When a safety edge is installed in conjunction with temporary widening that is subsequently staged for removal, construction of a replaced safety edge against the remaining finished shoulder is not required.

Confined Edges - The safety edge should be omitted in those locations where the shoulder is terminated or separated by curb and gutter or valley gutter.

6.05.13 (continued)

Freeway Ramps - Freeway to freeway ramp shoulders constructed, resurfaced (1½" minimum), or widened without shoulder corrugations will be constructed, resurfaced or widened with a safety edge. Regular freeway off and on ramps should not incorporate the safety edge.

Narrow freeway shoulders (4' paved or less) that are constructed, resurfaced (1½" minimum), or widened will be constructed, resurfaced or widened with a safety edge.

Rural Trunkline – Trunkline shoulders that are newly constructed, resurfaced (1½" minimum) or widened without shoulder corrugations will be constructed, resurfaced or widened with a safety edge where the posted speed is 45 mph or greater .

The safety edge may be omitted in developed rural areas where driveway density exceeds 30 access points within ½ mile.

Safety Application - If safety concerns are known, the Safety Edge can be considered for use on any roadway or ramp.

Details of the safety edge are shown on Standard Plan R-110-Series. Specifications require that the safety edge be constructed monolithically with the shoulder pavement and that there will be no separate payment for constructing it. Designers should provide additional concrete pay item quantities used for concrete shoulder to construct the safety edge adjacent to concrete shoulder. The locations where the safety edge applies should be identified where appropriate on the typical cross sections or maintaining traffic details.

The designer should review existing field conditions to identify areas where berming may have developed that would impede positive drainage. Additional details and sperate payment such as station grading modified may be needed to remove the berm.

9.03

DESIGN GUIDES

9.03.01 (revised 1-23-2023)

Utility Poles and Light Standards

These guidelines apply to the location of utility poles and light standards on free access roadway construction projects and all trunkline, utility, and roadway lighting construction. Where reconstruction of a roadway is included in the project, every effort should be pursued to ensure that adjacent poles meet the recommended location criteria. However, if the project does not impact the location of existing poles, a specific pole relocation is dependent on a concentration of fixed-object crashes or the clear potential for crashes.

When placed within trunkline ROW, light standards and utility poles should be located to provide a safe recovery area for motorists.

A. General Considerations

Individual cases may arise that require special treatment such as: traffic signal installations; locations demonstrating fixed-object crash patterns; and locations with unique design problems, sight distance restrictions, higher multi-modal activity, or unique environmental conditions.

Certain trunkline geometrics warrant special consideration for placement of light standards and utility poles. Target positions to traffic flow should be avoided if possible. Such locations are: opposite T-intersections; outside of curves; beyond lane drops; and locations not conducive to safe traffic operation. Where guardrails or barriers are in place specifically for shielding other roadside obstacles, light standards and utility poles should be placed behind the guardrail or barrier and outside of the deflection zone of the guardrail/barrier. The number of light standards and utility poles should be kept to a practical minimum. Consideration should be given to utilizing joint-use construction where possible.

9.03.01 (continued)

B. Authorization

1. The Development Services Division processes permit applications to place light standards or utility poles. These applications will be made on forms furnished by the Department and shall be accompanied by a sketch showing the proposed locations in relation to the pavement edge or curb face and ROW and should also include the posted speed limits and the widths and locations of any sidewalks.

C. Clarifications of Terms Used in Guidelines

1. The placement of light standards and utility poles includes all related appurtenances.

2. All lateral distances are measured from traffic side of the utility pole or light standard to lane edge or curb face.

D. Lateral Offset Guideline

Light standards and utility poles should always be placed as far from the roadway as feasible.

1. Where posted speeds are less than 35 mph:

    a. In areas with curb types F or C (as specified on Standard Plan R-30-Series) or their equivalent, light standards and utility poles should be a minimum of six feet from the back of curb.

    b. In areas with curb types B or D or their equivalent, light standards and utility poles should be a minimum of 15 feet from the edge of pavement

MICHIGAN DESIGN MANUAL
ROAD DESIGN

CHAPTER 10 ENVIRONMENTAL INDEX (continued)

10.04 DESIGN CONSIDERATIONS

10.04.01 General

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- A. Social Impacts
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- D. Impacts to Community Facilities and Services
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- B. Floodplains
- C. Inland Lakes and Streams
- D. Threatened / Endangered Species
- E. Natural, Wild and Scenic Rivers
- F. Air Quality Impacts
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- A. Maintenance of Multi-Modal Traffic
- B. Drainage and NPDES Runoff Controls
- C. Soil Erosion and Sedimentation Control
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10.05 MISCELLANEOUS

10.05.01 Changes Affecting Environmental Clearance and Required Permits

10.05.02 Historic Bridges

10.04.03 (continued)

Natural Environment

I. County Drains

When a project involves drainage to a county drain, it is the responsibility of the Project Manager to coordinate the submittal of plans (required by law under the Drain Code) to the County Drain Commissioner or Drainage Board, with the MDOT Drainage Coordinator (Supervising Engineer, Utilities, Drainage, and Roadside Section) and the respective Region/TSC Drainage Coordinator.

Any project that may change the amount of storm water flow to a county drain will require a hydrologic and hydraulic design analysis. See Section 2.5.5 of the ***MDOT Drainage Manual*** for "Intracounty and Intercounty Drainage Systems for State Trunkline Stormwater".

10.04.04 (revised 1-23-2023)

Mitigation of Impacts During Construction

A. Maintenance of Multi-Modal Traffic

Disruption of traffic in the construction area must be minimized to the extent possible. Although prevention of all construction related inconveniences is not possible, multi-modal safety will be ensured by signing of all construction areas. Access will be maintained to properties adjacent to the construction area to the maximum extent possible. Traffic will be maintained using part-width construction techniques; e.g., maintaining traffic on one half of the roadway while the other half is being reconstructed, or by use of a detour route. Consideration should also be given to maintaining pedestrian and/or non-motorized travel as needed.

10.04.04 (continued)

B. Drainage and NPDES Runoff Controls

Drainage - All drainage within the project area must be controlled in terms of velocity and volume. No increase in volume of water (above the pre-existing level) leaving the site is allowed. Water velocities must be maintained at non-erosive levels to reduce the potential for off-site erosion and sedimentation. Controlling runoff velocity and volume can be accomplished using standard soil erosion and sedimentation controls. (See Section 2.05)

The Federal Water Pollution Control Act requires that on-site personnel, certified as Storm Water Operators under the National Pollutant Discharge Elimination System (NPDES) program, inspect these soil erosion and sedimentation measures on a weekly basis and after storm events. Any measures which are inadequate or which have failed require immediate corrective action. A written report of each inspection must be made and kept on file for every inspection. The reports must be made available to the MDEGLE or U.S. EPA staff upon request. (See Section 10.04.04C)

C. Soil Erosion and Sedimentation Control

The erosion and sedimentation control quantities and locations are set up on the plans for the contractor to install and maintain. Failure by the contractor to install and maintain adequate soil erosion/sedimentation controls may result in project shutdown and/or possible fines from MDEGLE for MDOT and the contractor. Refer to Section 2.05 for detailed information on this topic.

12.05

DETOURS

12.05.01

Reference

Department regulation 5200.01, "Maintaining Traffic in Construction Zones."

12.05.02 (revised 12-15-97)

General

The Department's definition of "detour" is the utilization of existing roads to carry trunkline traffic during construction. Lane closures, weekend shutdowns, or the use of a temporary road are not considered detours. The need for a detour must be considered and finalized during the scoping process so that the detour route can be reviewed during the preliminary design. If local roads are to be utilized, the local agency should be informed early by the Region/TSC of the Department's proposed use of its facility, and there should be agreement as to the extent and character of the route improvements or restoration that will be needed.

When a detour is recommended, a public hearing may be required. Approval of the detour route by local officials does not always satisfy "public hearing requirements". The final detour should be submitted, as soon as possible, to the Public Involvement Section even though the Environmental Impact Statement may contain references to the detour. If a public hearing is required, the Public Involvement Section will take care of the details. Also, the Federal Highway Administration should be kept informed on non-exempt projects.

12.05.03 (revised 1-23-2023)

Design Considerations

All aspects of the detour should be considered during the design stage. The detour quantities and the plans for detour signing should be included in the project plans.

The detour route should be shown on the title sheet project location map with small directional arrows. (Formerly the route was labeled "possible detour," but the word "possible" should not be used because of its connotation of uncertainty as to where the detour route will be located.)

If the detour is along local roads and the existing facility is adequate to handle the diverted trunkline traffic, the local agency will often agree to rehabilitation ***after*** the detour is taken out of use. This is preferable to upgrading the detour before use because it enables an accurate assessment, after project construction, as to what repairs are needed. The local agency also has the advantage of a renovated facility rather than one that has suffered the wear and tear of detour traffic.

An important consideration when comparing the merits of a detour versus a temporary road is the residual value of any improvements made to the detour.

Ensure the needs of pedestrians, other non-motorized, and transit users are incorporated in the detour process. When providing a pedestrian detour route, the detour route should have a level of accessibility consistent with the original route being closed. See the Work Zone Safety and Mobility Manual for more information.

14.28 (revised 1-23-2023)

REQUEST FOR PRELIMINARY MAINTAINING TRAFFIC
(PPD Task Description 3390, 3540 & 3550)

Once the design has proceeded to a point where the proposed scope of work has been defined (typicals with existing and proposed dimensions, plan sheets with existing and proposed curb lines, etc.), the Project Manager should request a preliminary maintaining traffic scheme from the Region/TSC Traffic and Safety representative. This may include such items as:

- a detour route with any required work to accommodate the proposed traffic, including non-motorized users. See the Work Zone Safety and Mobility Manual for more information
- identification of local special events that may influence traffic during construction or that may be substantial enough to require scheduling the project around the activity
- the use of temporary traffic signals
- the use of temporary cross-overs or a runaround
- preliminary maintaining traffic special provision
- temporary and or permanent pavement markings
- construction staging plans/typicals

It is at this stage when critical construction staging issues may be identified that may significantly influence the proposed scope of work and the corresponding project cost. Situations such as a proposed reconstructed section not wide enough to maintain traffic that has no available detour route or a structure on a detour route with load restrictions often are not identified until this stage. It is essential that a preliminary maintaining traffic scheme be included for review at The Plan Review Meeting.

14.29 (revised 12-17-2018)

PRELIMINARY GEOMETRIC REVIEW FOR NON-FREEWAY RECONSTRUCTION / NEW CONSTRUCTION (4R) AND FREEWAY RESURFACING, RESTORATION, REHABILITATION AND RECONSTRUCTION / NEW CONSTRUCTION (3R/4R)
(PPD Task Description 3560)

During preliminary design on Non-Freeway Reconstruction/New Construction (4R) and Freeway Resurfacing, Restoration, Rehabilitation and Reconstruction/New Construction (3R/4R) projects, it is necessary to have a review by the Geometrics Section of the Design Division. For further discussions on these classifications see Sections 3.08, 3.10 and 3.11. This review will evaluate such areas as:

- sight distance
- design speeds
- curve and interchange placement
- turning radii
- exit and entrance ramps
- driveways
- turn lanes
- roadside safety
- intersection design

Once the design elements have been identified and included in the plans, a memo with a set of plans (or appropriate plan sheets) should be sent to the Supervisor of the Geometrics Unit requesting a review and recommendations by a specified date. This should be done when base plans are available to allow any revisions/additions to be incorporated into the plans prior to The Plan Review. The memo should indicate the classification (3R or 4R) of the project in general (see Section 3.08.01C for combined work types).

Non-Freeway Resurfacing, Restoration and Rehabilitation (3R) projects (see Section 3.09) may be coordinated during plan development on an informal basis.

Regardless of the type of work, all outstanding geometric issues should be resolved prior to submitting for The Plan Review.

CHAPTER 6 SURFACING AND SHOULDERS INDEX (continued)

6.03.09 (revised 1-23-2023)

Hot Mix Asphalt (HMA) Mixture Selection Guidelines

This guide is to aid in the selection of Hot Mix Asphalt (HMA) mixtures, asphalt binders and Aggregate Wear Index values. It is the ultimate responsibility of the Region Soils/Materials Engineer to provide appropriate hot mix asphalt and thickness recommendations. Any questions regarding these guidelines should be addressed to either the HMA Unit or the Pavement Design Engineer in the Construction Field Services Division.

A. Rehabilitation, Reconstruction (R&R) and New Construction Projects

1. Mainline Paving

a) Mixture Selection

All mainline paving shall be composed of Superpave mixtures.

Computed Design BESALs (HMA Equivalent Single Axle Load) will be used to identify the appropriate Superpave mixture type.

6.03.09A1a (continued)

Superpave Mix Type	Design BESAL (millions)
EL	Less than 0.3
EML	Between 0.3 and 3.0
EMH	Between 3.0 and 30.0
EH	Between 30.0 and 100.0
SMA	Between 10.0 and 100.0

SMA is to only be used as a top course mixture.

Design BESALs are calculated using the following information:

- Commercial Traffic
- Traffic Growth Rate
- Lane Distribution of Commercial Traffic
- BESAL Axle Load Equivalency for Flexible Pavement
- Total accumulated BESALs for 20 year design

The method for calculating ESALs for flexible pavements (BESALs) is explained in the ***AASHTO Guide for Design of Pavement Structures,*** 1993. Design BESALs should be requested from the Project Planning Section of the Project Planning Division. The Pavement Design Engineer of the Pavement Management Section of the Construction Field Services Division can provide an approximate BESAL value (for estimating purposes only). Show the 20 year design BESALs on the design plans.

b) Superpave Mixture Number Designation and Thickness Guidelines

After mixture selection has been determined, based on design BESALs, the mixture number for use in the various pavement courses can be determined**.** The mixture number will be 2, 3, 4 or 5 depending on the nominal maximum size aggregate. Following are the mixture numbers, minimum/maximum application rates and course type application:

14.57.01

Procedure

1. Following the Final Project Coordination 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) the plan and proposal files are placed in folder 6 – Letting Plans and Proposal. The design team advances the 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 FPC and those required to sign the Certification Acceptance are notified with the state change to “CA Sign Off”. The reviewers and signers are responsible for verifying that their concerns have been resolved with the final plans. Certification Acceptance signers will e-sign the CA form.

4. The Project Manager advances the state to “Initiate Final Project Review” to submit the completed plans to Specifications and Estimates.

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”.

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

7.02.18 (continued)

Prestressed Concrete Design

C. Prestressed Concrete Bulb Tee and I-Beam Design (6-27-2022)

1. Bearing Pads

   For single-span structures 40'-0" or less in length, use dependent backwalls with 1" elastomeric pads under the beams and joint filler under the backwall.

   For single- and multiple-span structures with spans over 40'-0", allowance for expansion is required in designing the bearing pads.

2. Sole Plates

   Sole plates (3/4" generally) are to be cast in all beams and shall be tilted as required when the calculated bevel exceeds 1%. (11-24-2014)

3. Skew Bridges

   On skewed structures, the ends of the beams shall be made square regardless of the angle of skew. The top corners may be clipped in order to accommodate a straight expansion joint across the structure.

   One flange at each end of a Bulb-Tee beam can be shortened and/or clipped to accommodate a large skew and minimum clearances to a pavement seat. See Bridge Design Guide 6.60.03 Series and 6.60.13. (1-23-2023)

4. Concrete Diaphragms

   End diaphragms are to be set back 10" to 12" from the end of beam in order to permit the removal of the forms after the diaphragms are poured.

   The bottoms of all diaphragms are to bear on the bottom of the lower beam fillet.

   All diaphragms are to be cast separately from slab except with continuous for live load structures (optional construction joint). (5-6-99)

7.02.18 (continued)

5. Steel Diaphragms

   Steel intermediate diaphragms and steel end diaphragms at independent backwalls with a sliding slab are preferred over concrete diaphragms due to shorter construction duration. (8-27-2018)

   Use details from Bridge Design Guide 6.60.12 A. - H. and include Special Provision in proposal. (11-26-2012)

7.02.25

Pavement Seats

Pavement seats are to be provided on all bridges except integral and semi-integral structures with continuous pour over reference lines (also see Section 7.03.01 C). (5-6-99)

7.02.26

Drain Castings

A. Location

Drain castings in bridge decks should be avoided where practicable. Where drain castings are necessary, they are to be spaced as required but located so as not to allow water to fall on slopes and/or roadways below. Design is to be based on Hydraulic Engineering Circular No. 21 (HEC 21), "Design of Bridge Deck Drainage", or an equal. (5-6-99)

B. Special Reinforcement Steel

Where drain castings are called for in bridge decks, plans are to show that two epoxy coated reinforcing bars are to be placed diagonally at each corner of the drain casting (one top, one bottom). (5-6-99)

7.02.27

Sidewalks (9-2-2003) (11-25-2019)

In general, on a bridge where pedestrians must be accommodated and where maximum posted speed is 40 mph or less, a raised sidewalk should be provided if there is a raised sidewalk on the approach. Where posted speed is greater than 40 mph or there is no raised sidewalk on the approach, a walkway at roadway level should be provided and protected from traffic by an MDOT approved bridge railing.

Where sidewalks are required, they should be 5'-2" or greater in width. However, in circumstances where a 5'-2" width is not achievable a 4'-2" minimum width is permissible if crash tests allow. (8-20-2009)

7.02.27 (continued)

When the bridge railing length is greater than 200 feet, to adhere to Americans with Disabilities Act (ADA), the sidewalk must be 5'-0" wide (@ 2% slope) or a 5' square passing space shall be located at intervals not exceeding 200 feet. The requirement is valid with a raised sidewalk as on Standard Plan B-25-Series, B-26-Series or B-27-Series and anywhere where the sidewalk is located behind a railing that separates pedestrians from traffic. For railing lengths less than 200 feet the sidewalk width may be 4'-2" if crash tests allow and does not require passing spaces. (8-20-2009)

Expansion joints located on sidewalks shall be fitted with cover plates to eliminate vertical depressions caused by the joint. See Expansion Joint sheets (EJ3 or EJ4). Detail cover plates that require a length greater than 11' to be fabricated from two equal length pieces with a joint located at the centerline of the sidewalk or path. Provide a ¼" wide gap at the joint that is parallel to the centerline of the sidewalk or path. (1-23-2023)

For additional information refer to Bridge Design Guides 6.05.02, 6.29.10C, 6.29.17E and Road Design Manual Section 6.08.

Where a shared (multi) – use path or other mode of transportation is anticipated or proposed for the bridge, verify that all users have been accommodated and refer to appropriate specifications for design criteria. (12-16-2019)

A. Sidewalk Joints

Space sidewalk joints to match any joints in the slab. (9-25-2017)

B. Independent Sidewalk

If the sidewalk is independent of the roadway slab, the sidewalk is to be designed for maximum wheel loading for the bridge with overstressing as allowed by the current AASHTO Standard Specifications for Highway Bridges.

12.01.01

Structures Carrying Pedestrian or Other Mode of Transportation (12-16-2019)

Where pedestrian traffic exists across a structure having sidewalks less than 4'-0" wide, an evaluation must be made to determine the hazard involved and to consider practical improvements.

All structures carrying pedestrians need to be evaluated for conformance with the Americans with Disabilities Act (ADA) requirements.

Regardless of project work type, expansion joints located on sidewalks shall be fitted with cover plates to eliminate vertical depressions caused by the joint. Cover plates may be galvanized steel (AASHTO M270, Grade 36) or steel encapsulated in EPDM rubber or neoprene (polychloroprene). Cover plates shall meet all the requirements set forth by ADA. See Section 7.02.27 & 12.06.01, EJ3 & EJ4 Sheets and Bridge Design Guide 6.28.06. Detail cover plates that require a length greater than 11' to be fabricated from two equal length pieces with a joint located at the centerline of the sidewalk or path. Provide a ¼" wide gap at the joint that is parallel to the centerline of the sidewalk or path. (1-23-2023)

Where recommended by the Region Project Development or Bridge Engineer, rehabilitation projects should include pedestrian fencing. In Metro Detroit, all rehabilitation projects, including painting projects, over freeways should include pedestrian fencing.

For limits of the metropolitan area see Appendix 12.01.01. (8-6-92)

For information regarding MDOT fencing policy and design criteria see Section 7.02.29 and Section 7.05.

Where other modes of transportation (pedestrian, bicycle, multi-use paths, etc.) exist across a structure, an evaluation must be made to consider practical improvements.(12-16-2019)

12.01.02

Historic Bridges

Consideration must be given to preserving structures designated as "historic bridges." The project engineer can find a bridge's historical significance from MiBRIDGE (web based structure management application) . (5-28-2013) (2-21-2017)

Designers rehabilitating historically designated bridges shall contact the Cultural Resource Coordinator in the Environmental Services Section of the Bureau of Highway Development to determine what measures are practical and justified to preserve the historical value. Where projects are insufficiently scoped for the proposed work, adding significantly to the cost of the project, the designer shall request the Region Project Development Engineer to appropriate the additional funds from their bridge budget.

12.06

JOINT REPLACEMENT

Deck joints of various types have proven ineffective and may require replacement on projects where other rehabilitation has been scheduled. Because of their poor performance, joints should be eliminated whenever possible. On painting contracts, leaking joints should be sealed. On overlay projects, even joints in good condition should be replaced to match the new deck grade.

A common treatment for the expansion joints at the abutments of continuous concrete T-Beam bridges built in the 1940s and 1950s was to support the sidewalk on a sliding steel plate over the independent backwall. On projects of this type, plans should call for removal of the plates at the independent backwall and the installation of the new expansion joint from fascia to fascia. Where existing railing is to remain in place, provision should be made for replacement of the end posts. (8-6-92)

Generally, joint replacement should include replacement of the deck from fascia to fascia (including portions of the barriers) to ensure consistent opening for the entire width of the bridge. If sufficient opening exists, and barrier ends and fascias are in good condition, joint replacement may be terminated at the barrier. (3-20-2017)

12.06.01

Expansion Joint Devices

(5-1-2000) Where expansion joints require replacement, the deck concrete should be removed and replaced for the full depth, 1'-6" either side of the joint. (See Bridge Detail EJ3)

Where expansion joint replacement is the only substantial work on the existing deck, and the deck concrete is sound, some proprietary joints can be replaced using the procedure shown on Bridge Detail EJ4. This replacement removes only enough concrete to remove the existing joint and to permit the casting of polymer or elastomeric concrete headers. Shallow depth strip seal anchorages are then embedded in the header material. This allows a fast joint replacement.(5-1-2000)

12.06.01 (continued)

The expansion device shall be replaced with a proprietary expansion joint currently approved by MDOT and having no single opening wider than 4". Where openings greater than 4" are required, a modular expansion joint may be used. (See the Special Provision for Modular Expansion Joints.)

When an expansion joint device is used on a sidewalk it shall be fitted with a cover plate as described and detailed in Section 7.02.27, 12.01.01, EJ3 and EJ4 Sheets and Bridge Design Guide 6.28.06. (1-23-2023)

12.06.02

Felt - Type Joints

Where felt - type joints ("Joint Filler") are to be removed, deck concrete should be removed and replaced for the full depth, 1'-6" either side of the joint. Replacement will be with an expansion joint device, or, where possible, the joint eliminated.

12.06.03

Revisions to Deck Joints (5-1-2000)

When removing curbs or sidewalks from decks, it will be necessary to rehabilitate the existing deck joints.

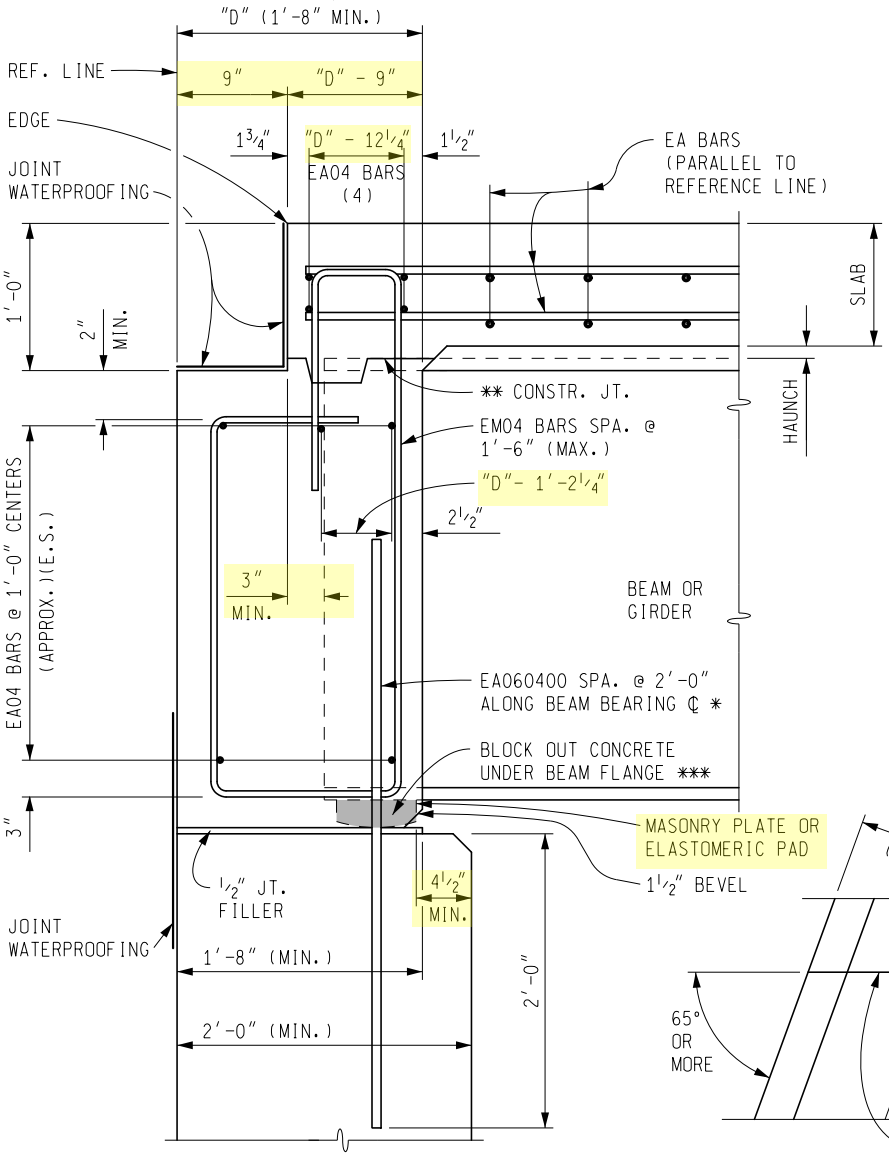
A. Metal Expansion Joints. Where it is necessary to extend an existing metal floor joint or an expansion joint device after removal of the curbs, the plans shall include a bid item for “Bridge Joint, Revise Expansion Device”.

B. Felt -Type Joints. Where it is necessary to extend a felt-type joint, either an expansion or a construction joint, after removal of the curb, the plans shall include a bid item for “Bridge Joint, Revise Compression Seal”.

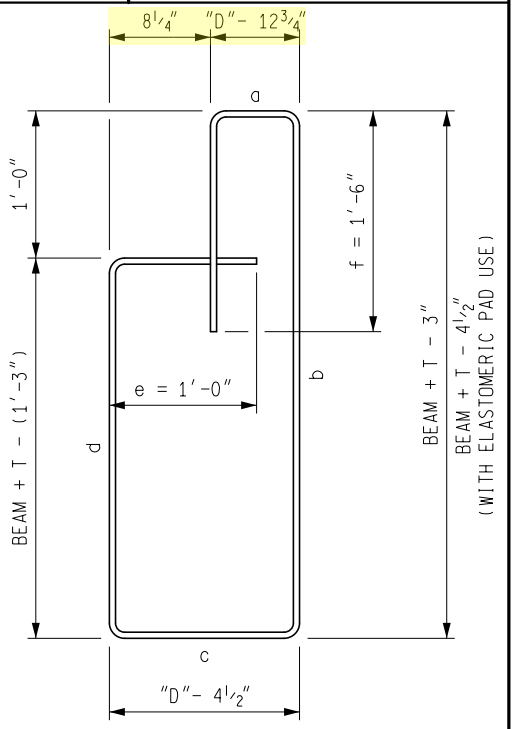
CONTENTS

SECTION 6 - SUPERSTRUCTURE (cont)

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT TYP. SECTION THRU DEPENDENT BACKWALL	ISSUED: 01/23/23 SUPERSEDES: 01/27/20

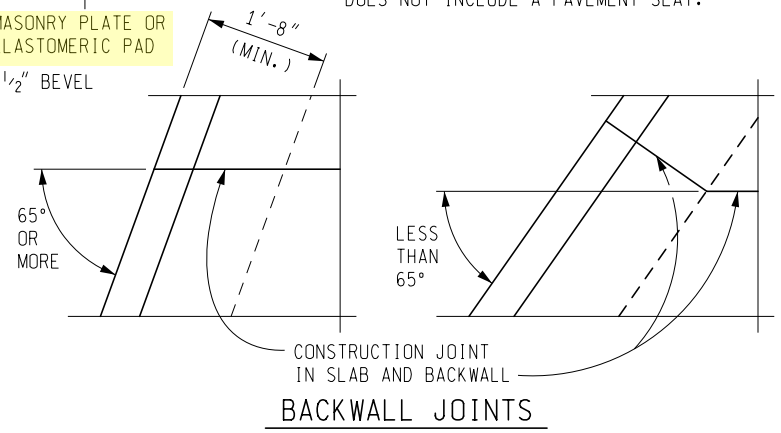


BACKWALL SECTION



EM04 BAR

NOTE: USE AN EK04 BAR WHERE THE BACKWALL DOES NOT INCLUDE A PAVEMENT SEAT.



BACKWALL JOINTS

PLAN NOTES:

CAST LOWER PORTION OF THE BACKWALL PRIOR TO PLACING DECK REINFORCEMENT. (USE WITH MANDATORY JOINT) (JOINT WATERPROOFING IS A PAY ITEM WHEN A CONSTRUCTION JOINT IS MANDATORY)

IF A CONSTRUCTION JOINT IS USED, CAST THE LOWER PORTION OF THE BACKWALL PRIOR TO PLACING DECK REINFORCEMENT. THERE WILL BE NO PAYMENT FOR THE REQUIRED JOINT WATERPROOFING. (USE WITH OPTIONAL JOINT).

NOTE:

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

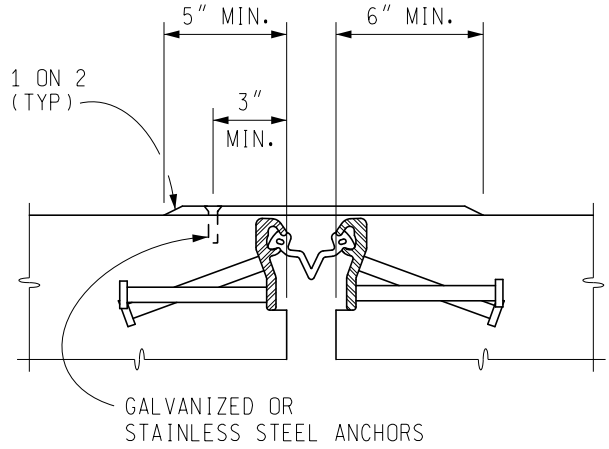
THE BACKWALL THICKNESS "D" IS THE GREATER OF:
1) 1'-8" OR THE BEARING DIMENSION PLUS ½ THE BEARING WIDTH --(FOR 90° CROSSINGS).
2) 1'-8" OR THE BEARING DIMENSION PLUS THE PRODUCT OF ½ FLANGE WIDTH AND COSINE ANGLE OF CROSSING --- (FOR SKEWED CROSSINGS)

HOLES IN WEB OF STRINGERS FOR BACKWALL REINFORCEMENT ON 90° JOBS SHOULD BE 1"Ø. INCREASE HOLE SIZE TO ACCOMMODATE REINFORCEMENT IN SKEWED BACKWALLS.

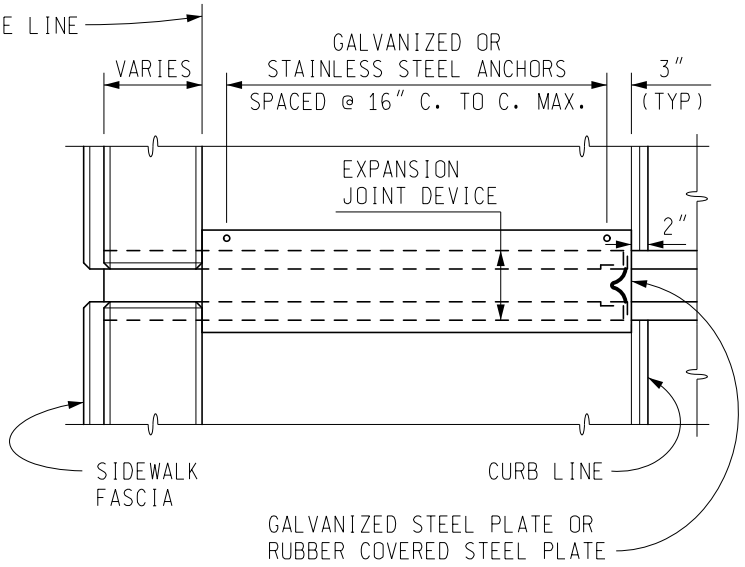
* USE FOR STEEL BEAM BRIDGES ONLY.
** THIS JOINT IS MANDATORY WHEN PLATE GIRDERS WITHOUT BEARING STIFFENERS ARE USED.OTHERWISE THE JOINT IS OPTIONAL.
*** USE FOR SKEWED BRIDGES.

PREPARED BY DESIGN DIVISION	6.20.01

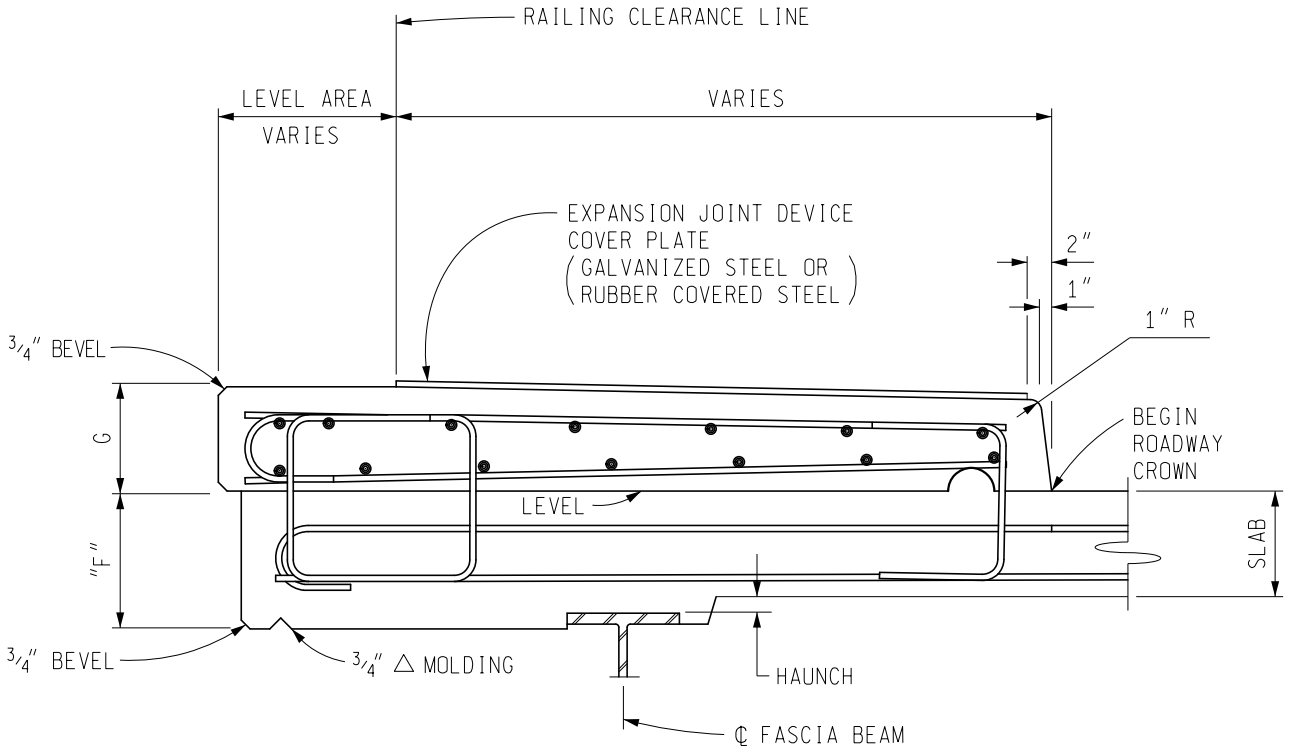
DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT EXPANSION JOINT COVER RETROFIT	ISSUED: 01/23/23 SUPERSEDES: 12/24/11



SECTION THROUGH EXPANSION JOINT
(DEVICE TYPE VARIES)



PLAN VIEW



NOTES:

PROVIDE GALVANIZED STEEL PLATES (MINIMUM THICKNESS OF $^{3}/_{8}$") OR RUBBER COVERED STEEL PLATES (MINIMUM THICKNESS OF $^{3}/_{16}$" AND BLAST CLEANED).

PROVIDE STAINLESS STEEL OR GALVANIZED CONCRETE ANCHORS WITH A MINIMUM DIAMETER OF $^{3}/_{8}$".

DETAIL COVER PLATES THAT REQUIRE A LENGTH GREATER THAN 11' TO BE FABRICATED FROM TWO EQUAL LENGTH PIECES WITH A JOINT LOCATED AT THE CENTERLINE OF THE SIDEWALK OR PATH. PROVIDE A $^{1}/_{4}$" WIDE GAP AT THE JOINT THAT IS PARALLEL TO THE CENTERLINE OF THE SIDEWALK OR PATH.

PLAN NOTES:

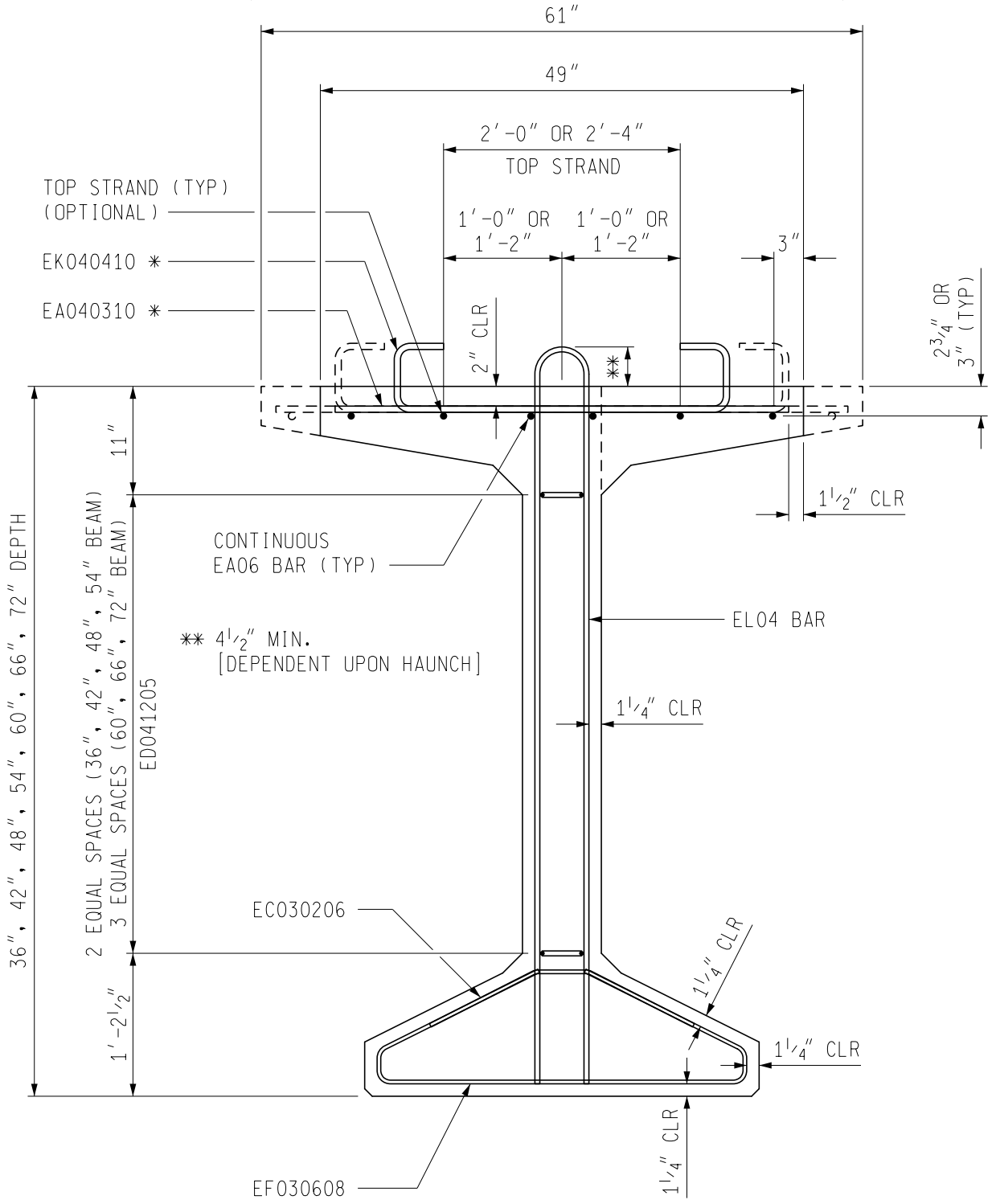
INSTALL PLATES SO THAT THE ANCHORS ARE SET ON THE HIGH SIDE OF LONGITUDINAL SIDEWALK GRADE,

CLEAN EXPOSED ELASTOMERIC COVER SYSTEM SURFACES WITH A CLEANER AS RECOMMENDED BY THE MANUFACTURE. REPAIR DAMAGE TO GALVANIZED SURFACES ACCORDING TO SECTION 7.16 OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

SPACE ANCHORS TO AVOID CONDUITS, CLAY TILE VOIDS OR OTHER OBJECTS IN SIDEWALKS.

PREPARED BY DESIGN DIVISION	6.28.06

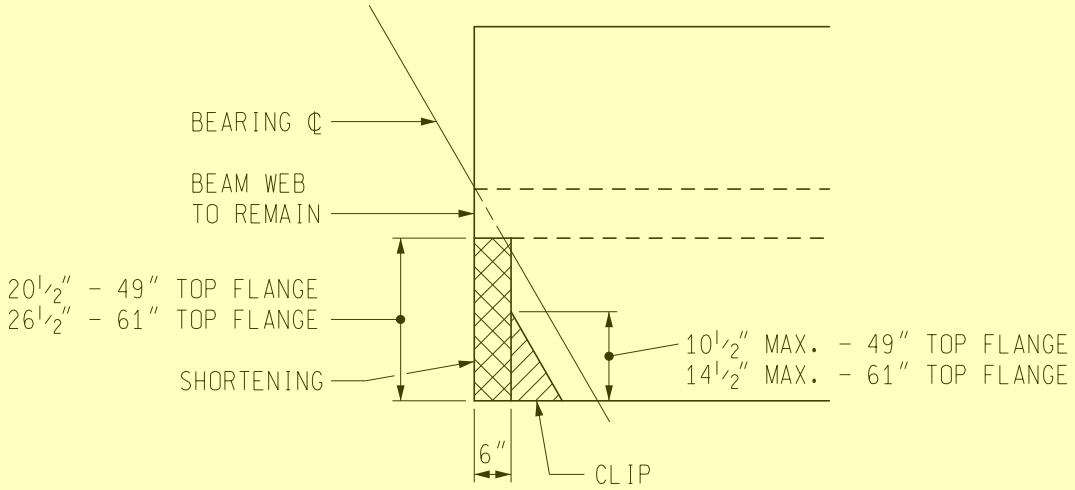
DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT BULB TEE BEAM REINFORCEMENT	ISSUED: 01/23/23 SUPERSEDES: 09/26/22



NOTE:
EC030206 AND EF030608 BARS COMBINE TO FORM STIRRUP.

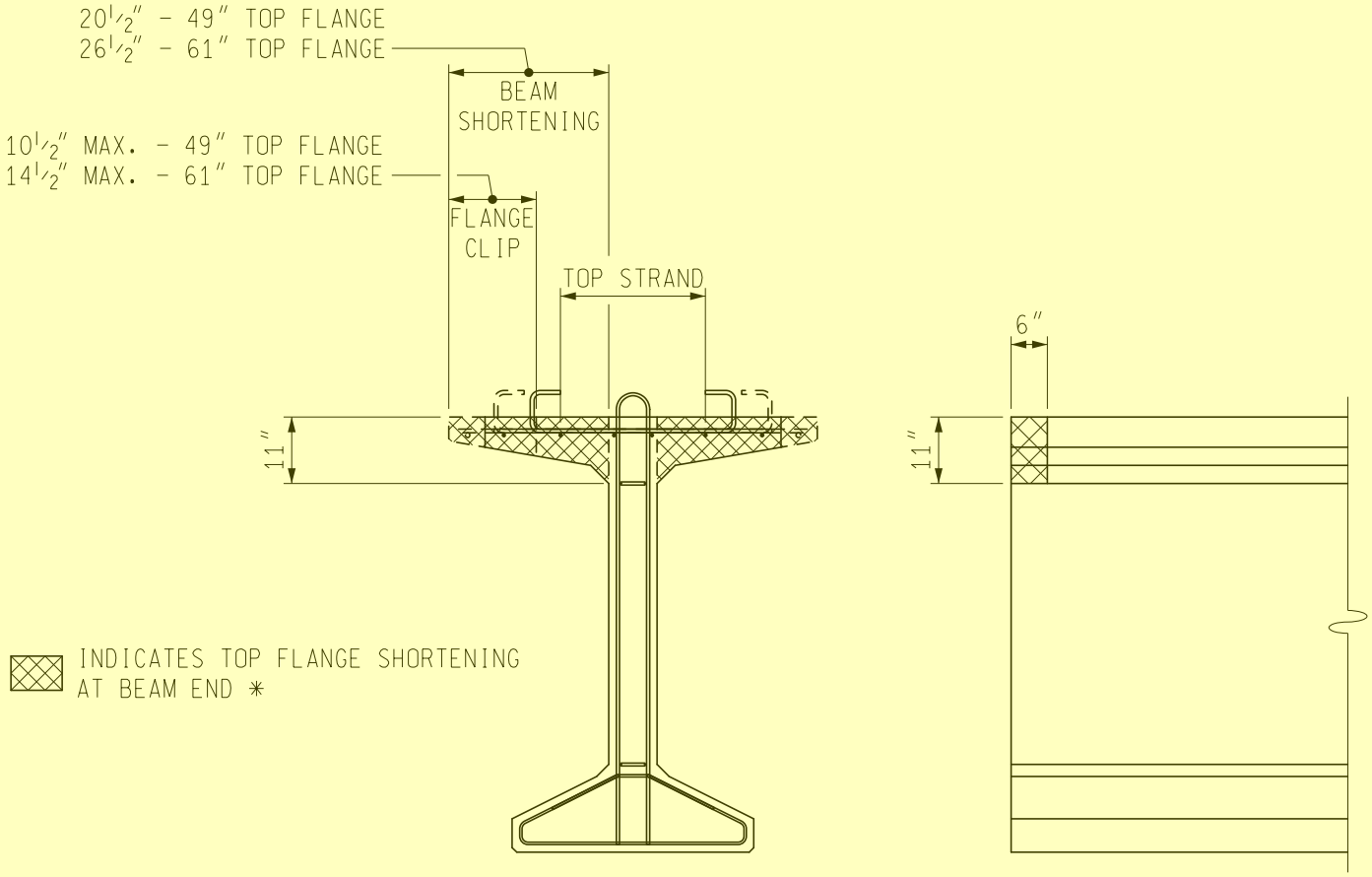
* ALTERNATE EK04 WITH EA04 BARS IF REQUIRED FOR SHEAR/COMPOSITE ACTION. USE EA040410 AND EK040510 WITH BLOCKOUT REMOVAL / 61″ TOP FLANGE, SEE GUIDE 6.60.03B. DECREASE EA04 BAR LENGTHS AT SHORTENED AND/OR CLIPPED TOP FLANGE AND START ALTERNATING EA04 AND EK04 PAST SHORTENING/CLIP. SEE GUIDE 6.60.03C FOR BEAM FLANGE SHORTENING/CLIP DETAILS.

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT BULB TEE BEAM FLANGE SHORTENING & CLIP DETAILS	ISSUED: 01/23/23 SUPERSEDES: 04/17/17



SHORTEN APPROPRIATE FLANGE WITH RESPECT TO CENTERLINE BEARING. CLIP SHORTENED FLANGE AS REQUIRED TO PROVIDE ADDITIONAL CLEARANCE FOR PAVEMENT SEAT.

TOP FLANGE



BEAM ELEVATION WITH SHORTENING/CLIP

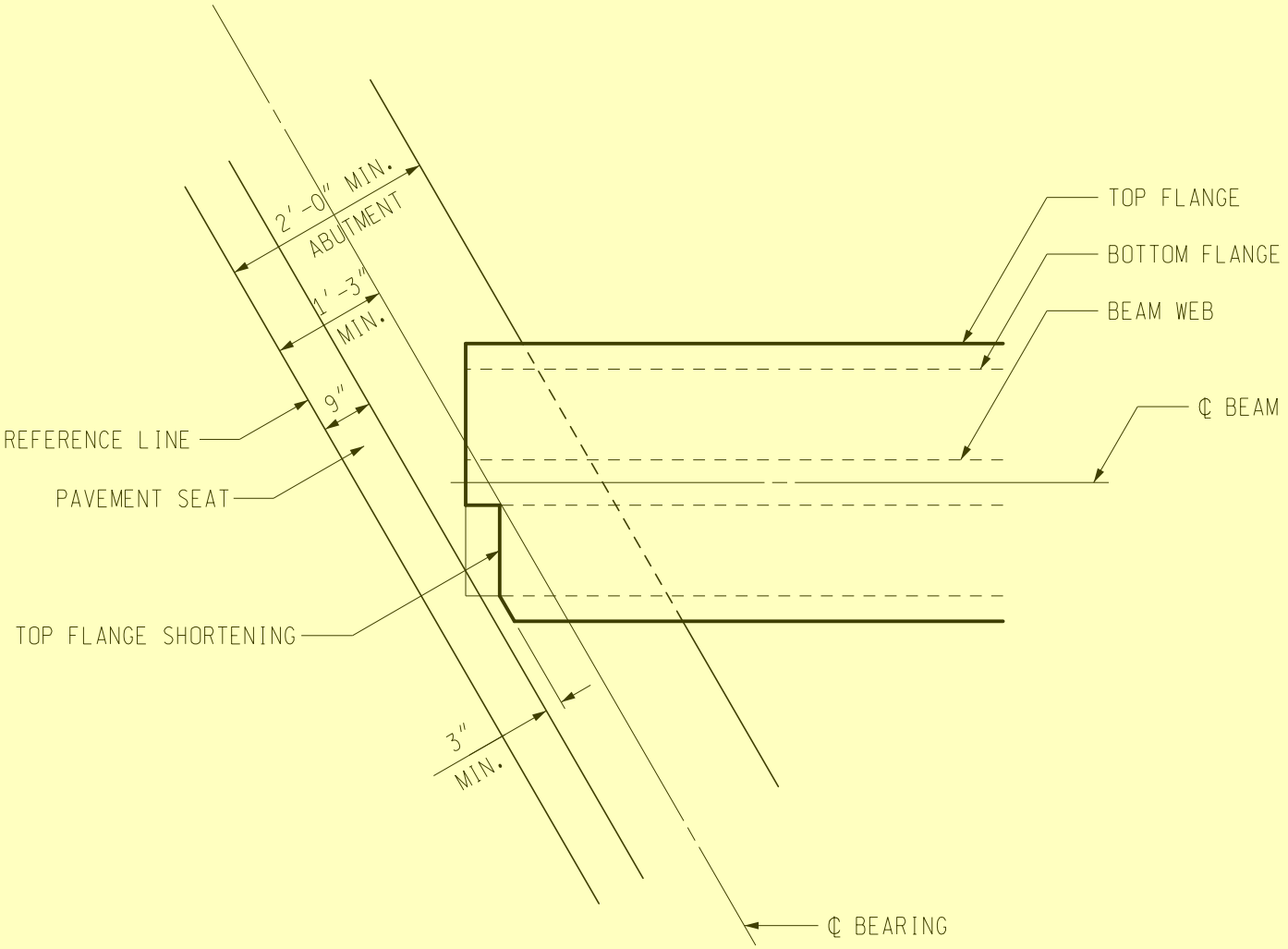
NOTES:

* WHEN NEEDED SHORTEN THE BEAM FLANGE FROM THE EDGE OF THE FLANGE TO THE WEB OF THE BEAM. SHORTENING OR NOTCHING THE BEAM WEB IS NOT ALLOWED. SHORTEN AND OR CLIP TO PROVIDE CLEARANCE FROM PAVEMENT SEAT AND TO DECREASE SUBSTRUCTURE UNIT WIDTH.

FOR BEAM AND BEARING CLEARANCE SEE BGRIDGE DESIGN GUIDES 6.60.03D & 6.60.13.

PREPARED BY DESIGN DIVISION	6.60.03C

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT BULB TEE BEAM END SHORTENING & CLIP AT ABUTMENT DETAILS	ISSUED: 01/23/23 SUPERSEDES: / /



ABUTMENT WIDTH AND BEAM SHORTENING/CLIP LAYOUT DETAIL

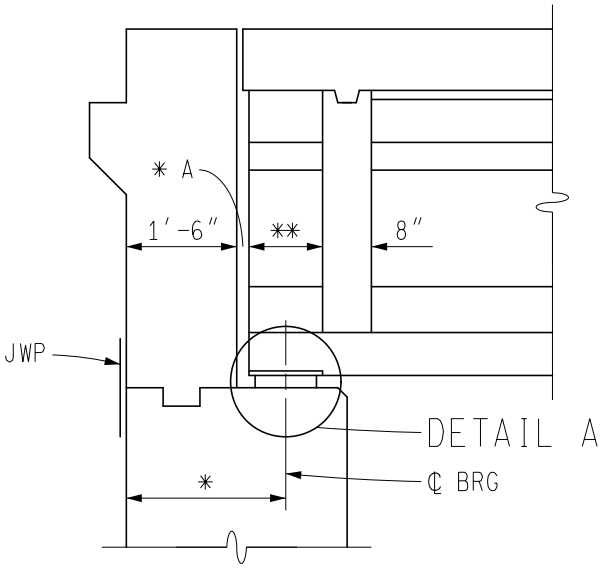
(49" TOP FLANGE SHOWN, 61" SIMILAR)

FOR SHORTENING AND CLIP DETAILS SEE BRIDGE DESIGN GUIDE 6.30.03C.

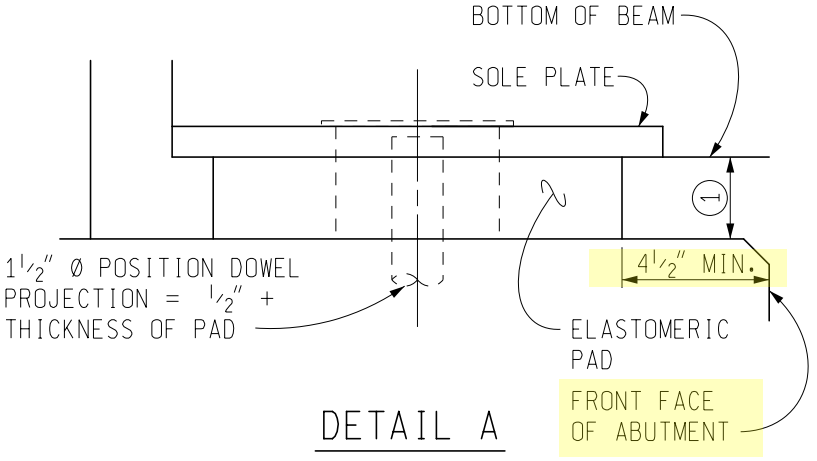
FOR BEARING CLEARANCES SEE BRIDGE DESIGN GUIDE 6.60.13.

PREPARED BY DESIGN DIVISION	6.60.03D

DRAWN BY: BLT APPROVED BY: VZ CHECKED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT DETAILS AT ABUTMENTS FOR PRESTRESSED CONCRETE I-BEAMS	ISSUED: 01/23/23 SUPERSEDES: 11/27/01



INDEPENDENT BACKWALL

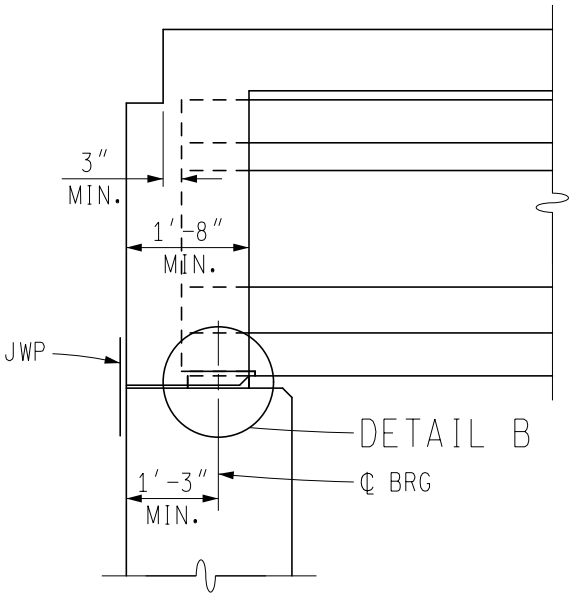


DETAIL A

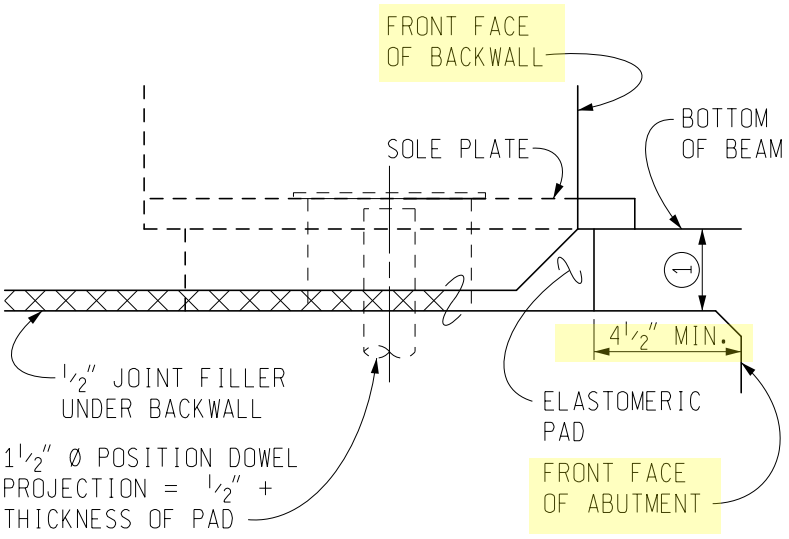
ALSO APPLIES AT PIERS

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

** 10" TO 1′-0"



DEPENDENT BACKWALL



DETAIL B

(1) INCREASE ELASTOMERIC PAD THICKNESS AS REQUIRED TO PROVIDE CLEARANCE FOR STRUCTURES ON GRADE AND/OR SKEW.

FOR ADDITIONAL BACKWALL DETAILS AND NOTES, SEE DESIGN GUIDES 6.20.01, 6.20.03 SERIES AND 6.20.04 SERIES.

FOR BEARING DETAILS SEE DESIGN GUIDE 8.43.01.

PREPARED BY DESIGN DIVISION	6.60.13