

Road & Bridge Design Publications

Monthly Update – January 2024

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 <u>MDOT-Road-Design-Standards@michigan.gov</u>. E-mail bridge related questions to <u>MDOT-Bridge-Design-Standards@michigan.gov</u>.

Special Details

<u>R-50-H: Light Standard Foundation:</u> Increased the size of the footing to meet LRFD requirements. (Note that the maximum difference in elevation between the two directions of travel at the light standard foundation is 6".)

<u>R-60-J: Guardrail, Types A, B, BD, T, TD, MSG-8, & MGS-8D:</u> On sheet 10, added Type BD and TD guardrail to the types that connect to the Type 2M or 3M guardrail ending terminals. Revised other text in this detail to provide better consistency. (No change in content.)

R-130-A: Light Standard Details: New Special Detail.

<u>B-28-A & B-29-A: Bridge Barrier Railing, Type 7 & 6:</u> Updated lap lengths per AASHTO and Lap and Development lengths updated in Bridge Design Guides in December 2023. Updated railing width (protrusion) at light standard attached to bridge railings (B-28-A, Sheet 3) (B-29-A, Sheet 4).

<u>B-103-F: Molding, Bevel, Light STD. Anchor Bolt Assembly and Name Plate Details:</u> Updated anchor bolt assembly dimensions (plate, bolt circle, bolt diameter, bolt length, stud length, stud projection, etc.) according to AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

Road Design Manual

1.03.05: Design File Sharing: New section.

<u>7.1.06: Guardrail Worksheet:</u> Added 3M Terminals to the Deduction Table on sheet 2.

Bridge Design Manual

7.02.22 A. & 8.07.04 D.: For the deck screed finishing equipment orientation, the minimum skew angle to finish parallel to the reference line was reduced from a 45-degree skew down to a 15-degree skew. This update provides a more balanced loading along the girder lengths and consequently reduces the potential for differential deflections between girders and the risk of thinned areas in the deck. These measures are aimed at reducing the need for preloading the girders.



Road & Bridge Design Publications

Monthly Update – January 2024

<u>7.02.30 E.</u>: The limits of the PVC liner on precast culvert projects are being modified to better account for the typical construction sequence used to construct the structure and to prevent the PVC liner from interfering with temporary MSE wall and temporary geotextile walls required at the stage line of part width construction projects.

Bridge Design Guides

<u>6.29.13 & 6.29.13A</u>: Updated railing width (protrusion) at light standard when attached to Type 6 and Type 7 bridge railings.

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 1-29-2024



SPECIAL DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE	
21	2	GUARDRAIL AT INTERSECTIONS	6-6-22	
24	8	GUARDRAIL ANCHORED IN BACKSLOPE TYPES 4B, 4T, & 4MGS-8	12-6-22	
99	2	CHAIN LINK FENCE WITH WIRE ROPE	12-6-22	
R-28-K	7	CURB RAMP AND DETECTABLE WARNING DETAILS	11-8-23	
R-29-J	4	DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK	11-8-23	
R-32-F	8	APPROACH CURB & GUTTER DOWNSPOUTS	9-20-22	
R-32-SD	6	APPROACH CURB & GUTTER DOWNSPOUTS (FOR SAFETY SHAPES)	4-24-23	
R-43-J	2	LOCATION OF TRANSVERSE JOINTS IN PLAIN CONCRETE PAVEMENT	1-4-22	
R-44-G	7	CONCRETE PAVEMENT REPAIR	9-18-23	
R-45-K	2	PAVEMENT REINFORCEMENT FOR BRIDGE APPROACH	1-4-22	
<mark>*R-50-Н</mark>	<mark>6</mark>	LIGHT STANDARD FOUNDATION (CONCRETE BARRIER, DOUBLE FACE)	<mark>12-12-23</mark>	
R-53-A	22	TEMPORARY CONCRETE BARRIER LIMITED DEFLECTION	8-14-15	
R-56-F	6	GUARDRAIL MEDIAN OBJECT PROTECTION	10-10-23	
<mark>*R-60-J</mark>	<mark>16</mark>	GUARDRAIL TYPES A, B, BD, T, TD, MGS-8, & MGS-8D	<mark>1-29-24</mark>	
R-62-H	4	GUARDRAIL APPROACH TERMINAL TYPE 2M	6-16-22	
R-63-C	3	GUARDRAIL APPROACH TERMINAL TYPE 3M	10-2-23	
R-66-E	4	GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS	9-14-23	
R-67-G	16	GUARDRAIL ANCHORAGE, BRIDGE, DETAILS	12-6-22	
R-67-SD	6	GUARDRAIL ANCHORAGE, BRIDGE, DETAILS (FOR SAFETY SHAPES)	4-4-23	
R-72-D	6	GUARDRAIL LONG SPAN INSTALLATIONS	8-23-22	
R-73-F	3	GUARDRAIL OVER BOX OR SLAB CULVERTS	8-1-19	
R-80-F	8	GRANULAR BLANKETS, UNDERDRAINS, OUTLET ENDINGS, & BULKHEADS	6-28-21	
R-88-E	4	STEEL END SECTION	3-7-23	
R-100-I	4	SEEDING AND TREE PLANTING	12-8-23	
R-110-B	3	PAVEMENT SAFETY EDGE	6-14-21	
R-112-J	10	SHOULDER AND CENTER LINE CORRUGATIONS	8-2-23	
R-126-I	5	PLACEMENT OF TEMPORARY CONCRETE & STEEL BARRIER	8-25-15	
R-127-H	8	DELINEATOR INSTALLATIONS	8-11-23	
<mark>*R-130-A</mark>	<mark>6</mark>	LIGHT STANDARD DETAILS	<mark>1-4-24</mark>	
	* Denoto (beginni	es New or Revised Special Detail to be included in projects for ing 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 <i>must</i> 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 on par the 2020 Standard Specifications for Construction				

Index to Bridge Detail Sheets 1-29-2024

DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE			
B-25-L	8	BRIDGE RAILING, AESTHETIC PARAPET TUBE	11-15-23			
B-27-B	7	BRIDGE RAILING, 3 TUBE WITH PICKETS	11-17-23			
* <mark>B-28-A</mark>	7	BRIDGE BARRIER RAILING, TYPE 7	<mark>1-22-24</mark>			
*B-29-A	8	BRIDGE BARRIER RAILING, TYPE 6	<mark>1-22-24</mark>			
B-102-D	4	STANDARD SLOPE PAVING DETAILS	9-18-23			
* <mark>B-103-F</mark>	2	MOLDING, BEVEL, LIGHT STD. ANCHOR BOLT ASSEMBLY AND NAME PLATE DETAILS	<mark>12-8-23</mark>			
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						

* 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.



























GUARDRAIL, TYPE T STEEL POST









GUARDRAIL, TYPE T WOOD POST

BLOCK AND POST CONNECTION DETAILS

Michigan Department of Transportation	STANDARD PLAN FOR GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D					
DEPARTMENT DIRECTOR	(SPECIAL DETAIL)	01/29/2024		SHEET		
BRADLEY C. WIEFERICH, PE	FHWA APPROVAL	PLAN DATE	K-00-J	5 OF 16		







BLOCK AND POST CONNECTION DETAILS





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

Michigan Department of Transportation	STANDARD PLAN FOR GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D					
DEPARTMENT DIRECTOR	(SPECIAL DETAIL)	01/29/2024		SHEET		
BRADLEY C. WIEFERICH, PE	FHWA APPROVAL	PLAN DATE	K-00-J	8 OF 16		















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

POST BOLTS, SPLICE BOLTS AND WASHERS AT BEAM ELEMENT SPLICE POSTS AND AT INTERMEDIATE POSTS								
			POS	ST BOLTS	SPLICE BOLTS	WASHERS		
GUARDRAIL TYPE	POST	OFFSET BLOCK	NO. REQ'D	LENGTH	(1¼" LONG) (NO. REQ'D)	(ROUND) (NO. REQ'D)		
MCC 9	WOOD	WOOD	1	18"	0	1		
MGS-8	STEEL	WOOD	1	9½"	0	1		
MGS-8D	WOOD	WOOD	1	* 26½"	16			
	STEEL	WOOD	2	9½"	10	2		

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

* EXCEPT AS SPECIFIED ON DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL, TYPE MGS-8D POST BOLTS SHALL NOT EXTEND MORE THAN $\frac{1}{2}^{\rm o}$ BEYOND NUT.

MINIMUM POST BOLT THREAD LENGTH

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

Michigan Department of Transportation	GUARD	STA RAIL, TYPES A	NDARD PLAN FOR A, B, BD, T, TD, MGS-8, & MGS-	8D
DEPARTMENT DIRECTOR	(SPECIAL DETAIL)	01/29/2024		SHEET
BRADLEY C. WIEFERICH, PE	FHWA APPROVAL	PLAN DATE	N-00-J	15 OF 16







LUMINAIRE CLAMP DETAILS

4" x 6" HAND HOLE DETAIL

NOTES:

ALL MATERIALS AND WORKMANSHIP MUST BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

EACH BRACKET ARM MUST BE SUPPLIED WITH ITS OWN POLE CONNECTION WITH STAINLESS STEEL HARDWARE. HARWARE MUST INCLUDE LOCK WASHERS, MEETING ANSI B18.21.1.

BOLT CIRCLE DIMENSION MUST BE EXACT. ANCHOR BOLTS MUST BE SET BY A TEMPLATE AND CENTERED ON THE FOUNDATION.

IF FOUNDATION IS WITHIN 30 FEET OF HANDHOLE, CONDUIT MAY BE RUN DIRECTLY TO HANDHOLE.

HANDHOLE TO FACE AWAY FROM TRAFFIC, EXCEPT IT MUST FACE ROADWAY WHEN MOUNTED ON BRIDGE OR MEDIAN WALL. USE STAINLESS STEEL HEX HEAD MACHINE SCREWS. THE HANDHOLES MUST BE PLACED SO THEY DO NOT INTERSECT THE LONGITUDINAL SEAM WELD ON THE POLE.

NUT COVERS ARE NOT ALLOWED.

WHEN A FRANGIBLE TRANSFORMER BASE IS CALLED FOR ON THE PLANS, NO LEVELING NUT IS TO BE USED. FRANGIBLE TRANSFORMER BASES SHALL BE MOUNTED FLUSH WITH TOP OF FOUNDATION.

LIGHT STANDARDS MOUNTED ON FRANGIBLE TRANSFORMER BASES MUST HAVE THE SAME DIMENSIONS AS OTHER BASE TYPES, EXCEPT SHAFT LENGTH.

THE FOUNDATION LENGTHS PROVIDED ARE BASED ON TWO SOIL TYPES: LOOSE COHESIONLESS SOILS WITH A MINIMUM BLOW COUNT OF 5 BLOWS/FT, AND MEDIUM STIFF COHESIVE SOILS WITH A MINIMUM UNDRAINED SHEAR STRENGTH OF 750 PSF. THE CONTRACTOR SHALL VERIFY THE SOIL STRENGTH DURING DRILLING FOR THE SHAFT FOUNDATIONS. SHOULD VERY LOOSE COHESIONLESS SOILS OR SOFT TO VERY SOFT COHESIVE SOILS WITH UNDRAINED SHEAR STRENGTH LESS THAN 750 PSF BE ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

THIS STRUCTURE IS DESIGNED FOR THE SPECIFIED LUMINAIRE ONLY. DEVIATIONS FROM THIS STANDARD REQUIRE ADDITIONAL ANALYSIS.

THIS STRUCTURE IS DESIGNED FOR A HEIGHT ABOVE GROUND EQUAL TO THE STRUCTURE'S MOUNTING HEIGHT. STRUCTURES PLACED AT A HIGHER ELEVATION REQUIRE A UNIQUE DESIGN.

FOUNDATIONS SHALL NOT BE BURIED AND SHALL BE REMOVED IF NO LONGER IN USE.

THE DESIGN OF THIS STRUCTURE IS BASED ON THE CATEGORY I FATIGUE REQUIREMENTS FOUND IN AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 1ST EDITION, WITH INTERIM REVISIONS THROUGH 2022.

SHAFT LENGTHS MOUNTED ON TRANSFORMER BASES MUST BE ALTERED TO COMPENSATE FOR THE HEIGHT OF THE TRANSFORMER BASE. THE BOLT CIRCLE ON TOP OF THE TRANSFORMER BASE MUST BE THE SAME AS THE BOLT CIRCLE OF THE LIGHT STANDARD ANCHOR BASE.

THE ENTIRE BOTTOM OF THE FRANGIBLE TRANSFORMER BASE MUST BE SEATED ON THE FOUNDATION. THE DIAMETER OF THE FOUNDATION MAY BE ALTERED TO MEET THIS REQUIREMENT.

ALL HARDWARE COMPONENTS (INCLUDING FLAT AND LOCK WASHERS) MUST BE INSTALLED AS SHOWN IN THE DETAILS ON THIS SHEET.

FRANGIBLE TRANSFORMER BASES SHALL MATCH DARK BRONZE LUMINAIRE ASSEMBLY COLOR.

Michigan Department of Transportation	STANDARD PLAN FOR LIGHT STANDARD DETAILS					
DEPARTMENT DIRECTOR	(SPECIAL DETAIL)	01/04/2024	R-130-A	SHEET		
BRADLEY C. WIEFERICH, PE	FHWA APPROVAL	PLAN DATE		2 OF 6		





BASE AND POLE DATA TABLE

LIGHT STANDARD FOR	A	в	с	D	E	STEEL POLES GAGE (MIN)	** F	ALUM. POLES GAGE (MIN)	POLE DIAMETER AT BASE	G
20 FT NOMINAL MOUNTING HEIGHT (WITHOUT TRANSFORMER BASE)	11"	7¾"			2"		1" Ø x 3'-4"	0.188"		12.2"
20 FT NOMINAL MOUNTING HEIGHT (WITH TRANSFORMER BASE)	* 11"	7¾"			2"		1" Ø x 3'-4"	0.188"		12.2"
30 FT MOUNTING HEIGHT WITH 4 OR 6 FT SINGLE OR DOUBLE BRACKET ARM	1'-3" (A) 1'-0" (S)	10 ⁵ / ₈ " (A) 8 ¹ / ₂ " (S)	5%"	11 ⁷ ⁄ ₈ " (A) 9 ³ ⁄ ₄ " (S)	2"	7	1¼" Ø x 3'-4"	0.188"	9" ±½"	15.38" (A) *** 13.26" (S)
30 FT MOUNTING HEIGHT WITH 8, 10 OR 12 FT SINGLE OR DOUBLE BRACKET ARM	1'-3" (A) 1'-0" (S)	10%" (A) 8½" (S)	5%"	11 ⁷ ⁄8" (A) 9 ³ ⁄4" (S)	2"	7	1¼" Ø x 5'-0"	0.188"	9" <u>±</u> ½"	15.38" (A) *** 13.26" (S)
30 FT MOUNTING HEIGHT WITH 15 FT SINGLE OR DOUBLE BRACKET ARM	1'-3" (A) 1'-0" (S)	10 [%] " (A) 8 ¹ ⁄ ₂ " (S)	6¾"	1'-0 ¹ ⁄ ₈ " (A) 10" (S)	2"	7	1½" Ø x 5'-0"	0.25"	9" ±½"	15.73" (A) *** 13.61" (S)
30 FT MOUNTING HEIGHT WITH 17 FT SINGLE OR DOUBLE BRACKET ARM	1'-3" (A) 1'-0" (S)	10 ⁵ / ₈ " (A) 8 ¹ / ₂ " (S)	6¾"	1'-0 ¹ ⁄ ₈ " (A) 10" (S)	2"	7	1½" Ø x 5'-0"	0.25"	9" ±½"	15.73" (A) *** 13.61" (S)
40 FT MOUNTING HEIGHT WITH 4, 6, 8, 10, 12, 15 OR 17 FT SINGLE OR DOUBLE BRACKET ARM	1'-4" (A) 1'-3" (S)	11 ³ / ₈ " (A) 10 ⁵ / ₈ " (S)	7%"	1'-1 ¹ ⁄8" (A) 1'-0¾" (S)	2"	7	1¾" Ø x 5'-0"	0.313"	10" ±½"	16.79" (A) *** 16.09" (S)
45 FT MOUNTING HEIGHT WITH 4, 6, 8, 10, 12, 15 OR 17 FT SINGLE OR DOUBLE BRACKET ARM	1'-5" (A) 1'-6" (S)	1'-0" (A) 1'-0¾" (S)	7%"	1'-1¾" (A) 1'-2½" (S)	2" (A) 2 [%] " (S)	7	1¾" Ø x 5'-0"	0.375"	11" ±½" (A) 10" ±½" (S)	17.5" (A) *** 18.21" (S)

* THE 11" BOLT CIRCLE SHALL APPLY FOR BOTH THE POLE TO TRANSFORMER BASE AND FOR THE TRANSFORMER BASE TO FOUNDATION.

THE 11" BOLT CIRCLE SHALL APPLY FOR BOTH THE POLE TO TRANSFORMER BASE AI
 LENGTH GIVEN IS LENGTH PRIOR TO BENDING.
 FINAL BASEPLATE WIDTHS FOR ALUMINUM STRUCTURES ARE PER MANUFACTURER
 (A) = DIMENSION CORRESPONDS TO ALUMINUM
 (S) = DIMENSION CORRESPONDS TO STEEL

FOUNDATION DATA TABLE

	SINGLE ARM MAXIMUM	30 FT MOUNTING HEIGHT, 6 FT ARM	30 FT MOUNTING HEIGHT, 17 FT ARM	45 FT MOUNTING HEIGHT, 17 FT ARM
	LUMINAIRE STRUCTURE SIZE	L (FT)	L (FT)	L (FT)
UND	HORIZONTAL	8.5	9	10
GRO SLC	SLOPED	16.5	17.5	18.5

	DOUBLE ARM MAXIMUM	30 FT MOUNTING HEIGHT, 6 FT ARM	30 FT MOUNTING HEIGHT, 17 FT ARM	45 FT MOUNTING HEIGHT, 17 FT ARM
	LUMINAIRE STRUCTURE SIZE	L (FT)	L (FT)	L (FT)
GROUND SLOPE *	HORIZONTAL	9	10	11

L = EMBEDDED LENGTH OF THE SHAFT FOUNDATION * SLOPED GROUND SLOPE CASE NOT TO BE USED FOR DOUBLE ARM LUMINAIRE STRUCTURE.

BRACKET ARM TABLE

	BRACKET LENGTH, L	6'-0"	12'-0"	15'-0"	17'-0"
STEEL	TOP MEMBER O.D.	2" DIA.	2½" DIA.	2½" DIA.	3¼" DIA.
	BOTTOM MEMBER O.D.	1½" DIA.	1½" DIA.	2" DIA.	2" DIA.
ALUMINUM	TOP MEMBER O.D.	2" DIA.	3" DIA.	3" DIA.	3" DIA.
	BOTTOM MEMBER O.D.	1½" DIA.	2" DIA.	2¼" DIA.	2 ¹ 4" DIA.

Michigan Department of Transportation		STA LIGHT SI	NDARD PLAN FOR FANDARD DETAILS	
DEPARTMENT DIRECTOR	(SPECIAL DETAIL)	01/04/2024	R-130-A	SHEET
BRADLEY C. WIEFERICH, PE	FHWA APPROVAL	PLAN DATE		5 OF 6

REINFORCEMENT DATA TABLE

MAXIMUM	FOUNDATION	VERTICAL REINFORCEMENT				CONFINEMENT REINFORCEMENT			
STRUCTURE SIZE	DIAMETER (IN)	BAR	NUMBER	BAR LENG	ſH	BAR	BAR	BAR	BAR
		SIZE	OF BARS	HORIZONTAL	SLOPED	RADIUS	SIZE	SPACING	LENGTH
30 FT MOUNTING HEIGHT, 6 FT ARM				8'-0" (SINGLE ARM) 8'-6" (DOUBLE ARM)	16'-0"				
30 FT MOUNTING HEIGHT, 17 FT ARM	30	7	12	8'-6" (SINGLE ARM) 9'-6" (DOUBLE ARM)	17'-0"	12"	5	12" (MAX)	6'-4"
45 FT MOUNTING HEIGHT, 17 FT ARM				9'-6" (SINGLE ARM) 10'-6" (DOUBLE ARM)	18'-0"				

PROVIDE A 2'-8" LAP FOR #5 BAR CIRCLES.

MATERIALS TABLE (ANCHOR BASE)

MATERIAL	SPECIFICATION	DIMENSIONS	QUANTITY (PER FOUNDATION)
ANCHOR BOLTS	MDOT 908.14	DETERMINED BY LIGHT STANDARD CHART	4
ANCHOR NUTS	MDOT 908.14	DETERMINED BY ANCHOR BOLT DIAMETER	8
FLAT WASHERS **** (1¼" DIA. ANCHOR BOLT)	MDOT 908.14	2¾" O.D. x 1 $5\!\!\!^{1}_{16}$ " I.D. x $1\!\!^{1}_{2}$ " THICK	8 (IF REQUIRED ****)
FLAT WASHERS **** (1½" DIA. ANCHOR BOLT)	MDOT 908.14	2¾" O.D. x 1 $^{5}\!$	8 (IF REQUIRED ****)
FLAT WASHERS **** (1 ³ ⁄ ₄ " DIA. ANCHOR BOLT)	MDOT 908.14	4" O.D. x 1 ⁷ ⁄ ₈ " I.D. x ¹ ⁄ ₂ " THICK	8 (IF REQUIRED ****)
PLATE WASHERS **** (1 ¹ / ₄ " DIA. ANCHOR BOLT)	ASTM A1018	15⁄16" I.D. x ½" THICK	8 (IF REQUIRED ****)
PLATE WASHERS **** (1 ¹ / ₂ " DIA. ANCHOR BOLT)	ASTM A1018	15⁄16" I.D. x ½" THICK	8 (IF REQUIRED ****)
PLATE WASHERS **** (1 ³ / ₄ " DIA. ANCHOR BOLT)	ASTM A1018	1 ⁷ %" I.D. x ½" THICK	8 (IF REQUIRED ****)

MATERIALS TABLE (FRANGIBLE BASE)

MATERIAL	SPECIFICATION	DIMENSIONS	QUANTITY (PER FOUNDATION)
ANCHOR BOLTS	MDOT 908.14	DETERMINED BY LIGHT STANDARD CHART	4
ANCHOR NUTS	MDOT 908.14	DETERMINED BY ANCHOR BOLT DIAMETER	4
FLAT WASHERS **** (1 ¹ / ₄ " DIA. ANCHOR BOLT)	MDOT 908.14	2¾" O.D. x 1 $^{5}_{16}$ " I.D. x $^{1}_{2}$ " THICK	12 OR 14 (****)
FLAT WASHERS **** (1 ¹ / ₂ " DIA. ANCHOR BOLT)	MDOT 908.14	2¾" O.D. x 1⁵16" I.D. x ½" THICK	12 OR 14 (****)
FLAT WASHERS **** (1¾" DIA. ANCHOR BOLT)	MDOT 908.14	4" O.D. x 1 ⁷ %" I.D. x ½" THICK	12 OR 14 (****)
LOCK WASHERS	ANSI B18.21.1	½" THICK	8
HIGH STRENGTH BOLTS	MDOT 906.07	LENGTH DETERMINED BY THE CONTRACTOR DIAMETER TO BE SAME AS ANCHOR BOLT	4
CONNECTING NUTS	MDOT 906.07	DETERMINED BY HIGH STRENGTH BOLT DIAMETER	4
PLATE WASHERS **** (1 ¹ / ₄ " DIA. ANCHOR BOLT)	ASTM A1018	15⁄16" І.Д. х ½" ТНІСК	8 (IF REQUIRED)
PLATE WASHERS **** (1½" DIA. ANCHOR BOLT)	ASTM A1018	1 $5\!\!\!/_{16}$ " I.D. x $1\!\!\!/_2$ " THICK	8 (IF REQUIRED)
PLATE WASHERS **** (1 ³ / ₄ " DIA. ANCHOR BOLT)	ASTM A1018	1 ⁷ %" I.D. x ½" THICK	8 (IF REQUIRED)
FRANGIBLE TRANSFORMER BASE	SELECT FROM THE MDOT QUALIFIED PRODUCTS LIST	ACCESS DOOR OPENING: 8½" x 9" x 11"	1

**** IF LIGHT STANDARDS BASE PLATE HAS SLOTTED HOLES, PLATE WASHERS ARE REQUIRED IN LIEU OF CIRCULAR WASHERS AND MUST COVER ENTIRE SLOT.

ALL ANCHOR BOLTS, NUTS, WASHERS AND PLATE WASHERS MUST BE HOT DIP GALVANIZED ACCORDING TO AASHTO M232.

Michigan Department of Transportation		STA LIGHT ST	NDARD PLAN FOR FANDARD DETAILS	
DEPARTMENT DIRECTOR	(SPECIAL DETAIL)	01/04/2024	R-130-A	SHEET
BRADLEY C. WIEFERICH, PE	FHWA APPROVAL	PLAN DATE		6 OF 6











 Standard Plan For BRIDGE BARRIER RAILING, TYPE 7

 DEPARTMENT DIRECTOR BRADLEY C, WIEFERICH, PE
 (SPECIAL DETAIL) FHWA APPROVAL
 01/22/2024 PLAN DATE
 B-28-A
 SHEET 5 OF 7





ENDWALL TRANSITION SECTION BARS								
	# of bars	С	b	а	g	j		
EA1	1	-	-	11'-11"			EA041111	
EW1	1	3'-0"	5'-6"	3'-5"	5'-6"	17⁄8"	EW041111	
EW2	1	3'-0"	5'-6"	3'-5%"	5'-6 ¹ ⁄8"	3%"	EW041200	
EW3	1	3'-0"	5'-6"	3'-6¾"	5'-6¼"	5¾"	EW041201	

L = c + a + g

BARRIER SECTION BARS									
	# of bars	а	b	с	е	g	h	h-a	
EZ1		1'-5"	7 ³ ⁄8"	1'-8 ³ ⁄8"	11¼"	3%"	1'-8"	3"	EZ040408
			L=;	a+b+c+e					

ENDWALL TRANSITION SECTION BARS								
# of bars	а	b	С	е	g	h	h-a	
3	1'-5"	7%"	1'-8 [%] "	11¼"	3%"	1'-8"	3"	EZ040408
4	1'-5"	7%"	1'-8¼"	10 ⁷ ⁄8"	2%"	1'-8"	3"	EZ040408
4	1'-5"	8¾"	1'-8"	10¼"	1½"	1'-8"	3"	EZ040408
9	1'-5"	10½"	1'-8"	10½"	-	1'-8"	3"	EZ040410
	# of bars 3 4 4 9	# of bars a 3 1'-5" 4 1'-5" 4 1'-5" 9 1'-5"	# of bars a b 3 1'-5" 7%" 4 1'-5" 7%" 4 1'-5" 8¾" 9 1'-5" 10½"	# of bars a b c 3 1'-5" 7%" 1'-8%" 4 1'-5" 7%" 1'-8¼" 4 1'-5" 8¾" 1'-8" 9 1'-5" 10½" 1'-8"	# of bars a b c e 3 1'-5" 7¾" 1'-8¾" 11¼" 4 1'-5" 7½" 1'-8¼" 10 ⁷ ⁄ ₈ " 4 1'-5" 8¾" 1'-8" 10¼" 9 1'-5" 10½" 1'-8" 10½"	ENDWALL TRANSITION SECTION BARS # of bars a b c e g 3 1'-5" 7%" 1'-8%" 11¼" 35%" 4 1'-5" 7%" 1'-8¼" 10%" 2%" 4 1'-5" 8¾" 1'-8" 10¼" 1½" 9 1'-5" 10½" 1'-8" 10½" -	ENDWALL TRANSITION SECTION BARS # of bars a b c e g h 3 1'-5" 7%" 1'-8%" 11¼" 3%" 1'-8" 4 1'-5" 7%" 1'-8¼" 10%" 2%" 1'-8" 4 1'-5" 8¾" 1'-8" 10¼" 1½" 1'-8" 9 1'-5" 10½" 1'-8" 10½" - 1'-8"	ENDWALL TRANSITION SECTION BARS # of bars a b c e g h h-a 3 1'-5" 7%" 1'-8%" 11¼" 35%" 1'-8" 3" 4 1'-5" 7%" 1'-8¼" 10%" 2%" 1'-8" 3" 4 1'-5" 8¾" 1'-8" 10½" 1½" 3" 9 1'-5" 10½" 1'-8" 10½" - 1'-8" 3"

L = a + b + c + e





#ofbars a b c			
	e	g	
EP1 – 2'-10 ¹ / ₄ " 4 ³ / ₄ " 2'-11"	11"	6¼"	EP040602

L=a+b+c

ENDWALL TRANSITION SECTION BARS							
	# of bars	а	b	с	е	g	
EP1	3	2'-10¼"	4¾"	2'-11"	11"	6¼"	EP040602
EP2	4	2'-9%"	6¼"	2'-10%"	11"	4¾"	EP040603
EP3	4	2'-10 ¹ %"	8¼"	2'-10%"	11"	2¾"	EP040605
EP4	9	2'-10½"	11"	2'-10½"	11"		EP040608

L = a + b + c

NOTES:

DETAILS SHOWN ARE IN ACCORDANCE WITH CURRENT AASHTO SPECIFICATIONS.

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

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

+ BACK OF BARRIER TO SLAB FASCIA MAY BE DECREASED TO $1\frac{1}{2}^{\prime\prime\prime}$ (FROM $2\frac{1}{2}^{\prime\prime\prime}$) AND TOE OF BARRIER SHIFTED ACCORDINGLY TO ACCOMMODATE THE NEED FOR INCREASED OR MAINTAINING SHOULDER WIDTHS. DISTANCE TO BE DETAILED ON THE PLANS.

++ BRIDGE BARRIER ORIENTATION :

PERPENDICULAR TO PLANE OF SLAB ON NORMAL CROWN SECTION AND HIGH SIDE OF SUPERELEVATION SECTION. VERTICAL ON LOW SIDE OF SUPERELEVATED SECTION.

Michigan Department of Transportation		STA BRIDGE BAR	NDARD PLAN FOR RIER RAILING, TYPE 7	
DEPARTMENT DIRECTOR	(SPECIAL DETAIL)	01/22/2024		SHEET
BRADLEY C. WIEFERICH, PE	FHWA APPROVAL	PLAN DATE	D-20-A	7 OF 7







SHEET

3 OF 8





	° 3'-4" ENDWALL	6'-8" TRANSITION	EW#5 BARS EA#5 BARS	
	10'-0" ENDWALL TRANSIT	TION SECTION	NORMAL BARRIER SECTION	
	PLAN	VIEW		
E E		LOCATION OF STRUCTURE NAME PLATE D	Y TRANSITION BARRIER FACE FROM SINGLE APE TO VERTICAL WALL. TOP TRANSITIONS (10¾") TO 17¾" (18¾") DEPENDENT UPON C TREATMENT. SEE SECTION D-D ON SHEET 7.	
		♀ OF BOLTS FOR GUARDRAIL ANCH SEE STANDARD PLAN R-67-SERIES DETAILS. BOLTS TO BE FURNISHED INSTALLED BY THE BRIDGE CONTRA INCLUDED IN THE BID ITEM "BRIDG BARRIER RAILING, TYPE 6".	IORAGE FOR AND ACTOR. SE	
	ELEVATI	ON VIEW		
	Michigan Department of Transportation	s BRIDGE BA	TANDARD PLAN FOR RRIER RAILING, TYPE 6	
	DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	(SPECIAL DETAIL) 01/22/2024 FHWA APPROVAL PLAN DATE	- B-29-A	SHEET 6 OF 8







	ENDWALL TRANSITION SECTION BARS								
	# of bars	С	b	а	g	f			
EW1	3	2'-2"	2'-8"	7'-6"	2'-8"	1%"	EW051204		
EW2	1	2'-2"	6'-0"	4'-2 ⁷ ⁄8"	6'-0 ¹ ⁄8"	4¼"	EW051205		
EW3	1	2'-2"	6'-0"	4'-3¾"	6'-0¼"	5¾"	EW051206		
EW4	1	2'-2"	6'-0"	4'-4%"	6'-0%"	67⁄8"	EW051207		

L = c + a + g



BARRIER SECTION BARS								
	#ofbars a b c e g h							
EZ1		1'-8 ¹ ⁄8"	10 ³ ⁄4"	1'-11 ¹ %"	1'-3"	4¼"	1'-10¾"	EZ040509
L=a+b+c+e								

ENDWALL TRANSITION SECTION BARS								
	# of bars	а	b	С	е	g	h	
EZ3	2	1'-8"	10 [%] "	1'-11 ¹ %"	1'-2½"	4 ¹ %"	1'-10¾"	EZ040508
EZ5	3	1'-7¾"	11"	1'-11"	1'-2¼"	3¼"	1'-10¾"	EZ040508
EZ7	4	1'-7½"	11 ³ ⁄4"	1'-10 ⁷ ⁄8"	1'-1%"	2%"	1'-10 ³ ⁄4"	EZ040508
EZ9	6	1'-7¾"	1'-1¾"	1'-10¾"	1'-1¾"		1'-10¾"	EZ040510

L=a+b+c+e

BARRIER SECTION BARS									
	#ofbars a b c e f g h								
EZ2		2'-3%"	6 ¹ ⁄8"	3'-2 ¹ ⁄4"	1'-1¼"	2'-3"	7%"	3'-1%"	EZ040904
L=a+b+c+e+f									

ENDWALL TRANSITION SECTION BARS									
	#ofbars a b c e f g h								
EZ4	2	2'-3½"	6½"	3'-2"	1'-1"	2'-3"	6½"	3'-1½"	EZ040904
EZ6	3	2'-3%"	8 ¹ ⁄8"	3'-1 ⁷ ⁄8"	1'-1 ¹ ⁄8"	2'-3"	5"	3'-1½"	EZ040906
EZ8	4	2'-3%"	10½"	3'-1%"	1'-1¼"	2'-3"	2¾"	3'-1½"	EZ040908
EZ10	6	2'-3½"	1'-1½"	3'-1½"	1'-1½"	2'-3"		3'-1½"	EZ040911

L = a + b + c + e + f

NOTES:

DETAILS SHOWN ARE IN ACCORDANCE WITH CURRENT AASHTO SPECIFICATIONS.

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

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

+ BACK OF BARRIER TO SLAB FASCIA MAY BE DECREASED TO $1\frac{1}{2}^{\prime\prime\prime}$ (FROM $2\frac{1}{2}^{\prime\prime\prime}$) AND TOE OF BARRIER SHIFTED ACCORDINGLY TO ACCOMMODATE THE NEED FOR INCREASED OR MAINTAINING SHOULDER WIDTHS. DISTANCE TO BE DETAILED ON THE PLANS.

++ BRIDGE BARRIER ORIENTATION :

PERPENDICULAR TO PLANE OF SLAB ON NORMAL CROWN SECTION AND HIGH SIDE OF SUPERELEVATION SECTION. VERTICAL ON LOW SIDE OF SUPERELEVATED SECTION.

Contraction Contraction	STANDARD PLAN FOR BRIDGE BARRIER RAILING, TYPE 6						
DEPARTMENT DIRECTOR	(SPECIAL DETAIL)	01/22/2024		SHEET			
BRADLEY C. WIEFERICH, PE	FHWA APPROVAL	PLAN DATE	D-29-A	8 OF 8			



	ANCHOR BOLT ASSEMBLY DIMENSIONS									
LIGHT STANDARD MOUNTING HEIGHT	BOLT CIRCLE "A"	"B"	ANCHOR BOLT DIAMETER "F"	"H"	"J"	STUD PROJECTION "K"	STUD LENGTH "L"	"M"		
201 *	1'-3" (A)	10 ⁵ ⁄ ₈ " (A)	1½"	1'-9¾"	2¾"	5½"	7¼"	1'-3¾" (A)		
	1'-0" (S)	8½" (S)						1'-1¼" (S)		
20! **	1'-3" (A)	10 ⁵ ⁄ ₈ " (A)	a 1/ "	1'-10½"	2 ³ ⁄8"	5½"	8"	1'-3¾" (A)		
	1'-0" (S)	8½" (S)	172"					1'-1¼" (S)		
40' **	1'-4" (A)	11%" (A)	43/11	41.401/1	2%"	5½"	8"	1'-5 ¹ ⁄8" (A)		
40	1'-3" (S)	10'5⁄8" (S)	174	1-10/2				1'-4¾" (S)		
45' **	1'-5" (A)	1'-0" (A)	43/11	41.401/1	07/1	=1/ "	0"	1'-5¾" (A)		
45' **	1'-6" (S)	1'-0¾" (S)	174"	1'-10½"	2%"	5½"	8"	1'-6½" (S)		

* UP TO 15' SINGLE OR DOUBLE BRACKET ARM

** UP TO 17' SINGLE OR DOUBLE BRACKET ARM

ANCHOR BOLTS (4 REQUIRED): "F" DIA. x 1'-2" THREADED ROD AND "F" DIA. x "L" STUD WITH 4 NUTS, 4 WASHERS, AND ONE COUPLING.

(A) = DIMENSION CORRESPONDS TO ALUMINUM (S) = DIMENSION CORRESPONDS TO STEEL







DETAIL B

LIGHT STANDARD ANCHOR BOLT ASSEMBLY

APPROVED BY:					
APPROVED BY:	Michigan Department of Transportation	STANDARD PLAN FOR MOLDING, BEVEL, LIGHT STD. ANCHOR BOLT ASSEMBLY AND NAME PLATE DETAILS			
APPROVED BY:	DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	(SPECIAL DETAIL) FHWA APPROVAL	12/08/2023 PLAN DATE	B-103-F	SHEET 1 OF 2



NOTES:

DIE STAMP - ¼" MINIMUM

LETTERS AND NUMBERS SHALL BE 1/4" MINIMUM OR 3/4" MAXIMUM HEIGHT.

DATE SHALL BE YEAR THAT SUPERSTRUCTURE WAS COMPLETED.





DOUBLE ³/₄" Δ MOLDING



¾" ∆ MOLDING

MOLDING DETAILS

NOTES:

FHWA APPROVAL

DETAILS SHOWN ARE ACCORDING TO THE AASHTO SPECIFICATIONS.

LIGHT STANDARD ANCHOR BOLT ASSEMBLY STEEL PLATE SHALL BE ASTM A36.

ALL STEEL SHALL BE HOT-DIP GALVANIZED ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

ANCHOR BOLTS, WASHERS, COUPLINGS AND NUTS FOR LIGHT STANDARDS SHALL BE ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

THE COUPLING SHALL BE RETAPPED AFTER GALVANIZING IN THE SAME MANNER AS SPECIFIED FOR NUTS.

B-103-F

2 OF 2

ALUMINUM PLATE SHALL MEET THE REQUIREMENTS OF ASTM B209.

ALUMINUM BOLT SHALL MEET THE REQUIREMENTS OF ASTM F468.

INTERNAL DAMPENER FOR LIGHT STANDARDS SHALL BE INCLUDED AS RECOMMENDED BY THE MANUFACTURER.



PLAN DATE

DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE

MICHIGAN DESIGN MANUAL ROAD DESIGN

CHAPTER 1 PLAN PREPARATION INDEX (continued)

- 1.02.12 Removal, Construction Plan, and Profile Sheets
 - A. Removal
 - B. General
 - C. Guidelines
 - 1. Plan and Profile Scale
 - 2. Sheet Breaks
 - 3. Information
 - 4. Sheet Orientation and Stationing
 - D. Quantities
- 1.02.13 Interchange Ramp Plan and Profile
- 1.02.14 Crossroad Plan and Profile
- 1.02.15 Detail Grades
 - A. General
 - B. Guidelines
- 1.02.16 Maintaining Traffic/Stage Construction
- 1.02.17 Signing Plans
- 1.02.18 Pavement Marking Plans
- 1.02.19 Miscellaneous Plans
- 1.02.20 Log of Borings
- 1.02.21 Special Details

1.03 MISCELLANEOUS

- 1.03.01 Order of Plan Sheets
- 1.03.02 Plan Preparation Conventions A. Drafting
 - B. File Naming Conventions
- 1.03.03 Contract Time Determination (CTD)
- 1.03.04 Roadway Cross Section
- 1.03.05 Design File Sharing

1.04 LOG PROJECTS

- 1.04.01 Preparing a Log Project
- 1.04.02 Earth Disturbances

MICHIGAN DESIGN MANUAL ROAD DESIGN

1.03.05 (added 1-29-2024)

Design File Sharing

As part of the plan development process, the Department may be solicited to provide design files to outside entities before the design has been completed. These may be requested from utility companies in response to the Request for Utility Information (refer to Section 14.16), coordination with outside entities who desire to participate on the project, or others.

If files are requested because of necessary coordination with a Department project, a separate data-sharing agreement is not required. However, because shared files may not be reflective of the final design and are not the official reference information documents (refer to Section 14.65), it is important to disclaim for any reviewers that the design illustrated on the shared files is subject to change.

Before any files are shared, the Department must receive a signed copy of the "Design File Sharing Disclaimer" from the recipient. A template has been created to facilitate this transaction in OneSpan. A signed version of this document must be placed in ProjectWise in the Pre-Construction -> Correspondence folder. Please contact the Engineer of Road Design in the Design Division for additional details.



	PROPOSED TRE	ΑΤΜΕΝΤ	(REV. 01-2024)
CALCULA	TIONS OR NOTES		
	PAY IIEMS		
Ft *	Guardrail, Type , inch Post	1B 1T 2B 2T 2M	3B 3T 3M
Ea	Guardrail Anch, Bridge, Det	25' 31.25' 37.5' 43.75' 34.3' 1	2.5' 31.25' 21.8'
F†	Bridge Railing, Thrie Beam Retrofit	PAY IENGTHS MUST BE DIVISIBLE	BY 12.5'.
Ea	Guardrail Approach Terminal, Type	ROUND TO NEXT HIGHEST RAIL LE WHEN TYPE MGS-8 OR TYPE MGS-	NGTH, EXCEPT 8D GUARDRAII
Ea	Guardrail Departing Terminal, Type	IS ATTACHED TO A GUARDRAIL FE A HEIGHT TRANSITION (e.g., GUAF	ATURE REQUIRING RDRAIL APPROACH
E a	Guardrail Reflector	TERMINAL TYPES 1B, 2B, OR 3B; GUARDRAIL BRIDGE ANCHORAGE; e	A T-SERIES tc.)
Cyd	Embankment, LM		
* FOR THIS TERMINAL NEED (X	PAY ITEM, THE GUARDRAIL APPROACH , TYPE PORTION OF LENGTH OF) MUST BE DEDUCTED		

MICHIGAN DESIGN MANUAL BRIDGE DESIGN - CHAPTER 7: LRFD

7.02.22

Screeding

A. Transverse Screeding (1-29-2024)

Transverse screeding shall be used for finishing all bridge decks.

When the skew angle is greater than or equal to 15° , the strike equipment is placed parallel to the reference lines.

For spans with different skew angles at each end, use the greater skew angle for equipment orientation.

B. Screed Elevations

In computing screed elevations, the specified camber should be used.

The following dead loads should be used in computing beam deflection for screed elevations:

10 LBS/SFT for formwork 10 LBS/SFT for reinforcing steel 145 LBS/CFT for plain concrete 150 LBS/CFT for reinforced concrete

Screed elevations for suspended spans are to be figured for the case of no deck concrete having been poured in any span.

Screed elevations for prestressed concrete beams are to account for long term effects by modifying the beam deflections using the following factors:

Factor applied to prestressing force at release = $1.9+0.6(I_{Girder} / I_{Composite})$

Factor applied to beam self-weight at release = $2.1+0.7(I_{Girder} / I_{Composite})$

Factor applied to slab when poured (including SIP forms, diaphragms and utility loads) = $1.0+1.1(I_{Girder}/I_{Composite})$

Factor applied to barrier and sidewalk when poured = 2.3

 I_{Girder} = moment of inertia of girder $I_{Composite}$ = moment of inertia of composite section

7.02.23

Stay-In-Place Forms

A. Use (9-2-2003)

Because of the design accommodations, any need for stay-in-place forms should be anticipated in the Contract Plans and Specifications.

The criteria for the use of metal stay-in-place forms are safety and economy in construction. Where practical, they should be included as a contractor option.

The use of concrete stay-in-place forms is not allowed.

B. Design (5-6-99) (9-21-2015)

The design of metal stay-in-place forms is the responsibility of the contractor. The corrugations for all stay-in-place forms should be filled with polystyrene. Use note 8.07.01 G. (6-27-2022)

When the use of stay-in-place forms cannot be economically justified the designer shall prohibit their use by including note 8.07.01 H. on the plans. (9-2-2003) (8-23-2021)

Detail steel beam tension zones on plans. Welding or mechanically fastening permanent metal deck forms or accessories to structural steel is prohibited. (6-16-2014) (3-26-2018)

MICHIGAN DESIGN MANUAL BRIDGE DESIGN - CHAPTER 7: LRFD

7.02.30 (8-23-2021)

Precast Box/Three Sided/Arch Culverts

Design criteria and considerations:

- A. Verify with manufacturers the maximum span length available.
- B. The number of manufacturers of the specified span length needs to be at least two.
- C. When selecting culvert rise, consider all users of the waterway, along with normal water surface under clearance and freeboard at high water.
- D. For structure (culvert) lengths that can accommodate a clear span between guardrail posts of 25'-0" or less use "Guardrail Long Span, Detail MGS-1, MGS-2 or MGS-3" (Standard Plan R-72-Series) to span the culvert. Ensure that the requirements of Standard Plan R-72-Series (e.g., headwall location and size, guardrail post locations, etc.) are met prior to specifying the use of the standard. Otherwise, extend height of headwalls to 36" above plan grade elevation and attach guardrail to headwall as detailed on the plans.

7.02.30 (continued)

E. Add a PVC (polyvinyl chloride) liner that covers entire top and sides of all buried culverts. For precast boxes, extend the liner to the top of the culvert bedding and turn out 6" horizontally across the top of the culvert bedding. For three sided and arch culverts, extend the liner down the leg of the culvert, horizontally across the top of the pedestal wall, and down the vertical face of the pedestal wall 18" or to the top of the footing, whichever is less. Extend the liner a minimum of 3 feet beyond the construction joint between culvert and wingwalls and turn up at back side of headwalls. At the ends of the culvert, adhere the perimeter of the liner with an adhesive as recommended by the PVC liner manufacturer. (1-29-2024)

Where staged construction is used to install the culvert and a temporary MSE wall is required at the stage line, stop the PVC liner a horizontal distance equal to the temporary MSE wall height away from the temporary MSE wall face and adhere the perimeter of the liner with an adhesive as recommended by the PVC liner manufacturer. If a temporary MSE wall is not required at the stage line, the PVC liner may be installed across the stage line joint, or two pieces of PVC liner may be welded together as recommended by the PVC liner manufacturer. (1-29-2024)

Include Special Provision for Polyvinyl Chloride Liner in proposal.

(2-22-2022)

Additional information and criteria are included in the current Standard Specifications.

MICHIGAN DESIGN MANUAL BRIDGE DESIGN

8.07.04

Screed Notes

- A. Bottom of slab elevations (are at right angles to the beam centerline and*) are based on the condition that the beams and diaphragms are completely erected with no other loads applied. (No temporary supports are allowed at this time.) These elevations include allowance for vertical curve and deflection due to forms, steel reinforcement, concrete slab, (sidewalks, railing) (barrier) and utilities. [*Use when dual bottom of slab elevations are shown.]
- B. If screeds are affected by loads in other spans, set to the elevations shown before casting any concrete. Cast concrete in the suspended span(s) before the concrete in the anchor spans.
- C. Screed elevations are based on the condition that no slab concrete has been cast and that formwork (shear developers) and steel reinforcement are in place (and the temporary supports are brought to a snug fit under each beam).
- D. (On span(s) _____,) provide transverse finishing parallel to reference lines. [Use when the angle of crossing is less than or equal to 75° or greater than or equal to 105° (skew angle greater than or equal to 15°).] (1-29-2024)
- E. Locate (outer*) screed rails for finishing of structural concrete over fascia beams (and over the beam adjacent to the open joint**).
 - * Omit the word "outer" on narrow decks, one pour wide.
 - ** Add this where diaphragms are not continuous across wide decks.

8.07.04 (continued)

- F. Stage A is beams and diaphragms erected with no other loads applied. [For use with top of beam elevations.] (9-1-1988)
- G. Stage B is forms and steel reinforcement in place (all spans complete). [For use with top of beam and bulkhead elevations.] (9-1-1988)

8.07.05

Deck Replacement Notes (4-19-2021)

- A. Obtain the Engineer's written approval for proposed sequence and methods of removal before removing portions of the bridge superstructure according to Subsection 712.03 of the Standard Specifications.
- B. If removal operations result in damage to the retained portions of the structure, submit a corrective action plan to the Engineer according to Subsection 712.03 C. of the Standard Specifications. (9-18-1998)



