



Road & Bridge Design Publications

Monthly Update – March 2026

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

Email road related questions to MDOT-Road-Design-Standards@Michigan.gov.
Email bridge related questions to MDOT-Bridge-Design-Standards@Michigan.gov.

Special Details

Special Detail 21: Guardrail at Intersections:

Converted notes and callouts to active voice.

Special Detail 24: Guardrail Anchored in Backslope Types 4B, 4T, & MGS-8:

Converted notes and callouts to active voice.

Special Detail 99: Chain Link Fence with Wire Rope:

Converted notes and callouts to active voice.

Road Design Manual

Chapter 1: Plan Preparation:

Reformatted the full chapter to comply with ADA accessibility which includes changing from a two column format to a single column. Only sections with content changes are included in this update.

1.01.02: General (Plan Preparation), 1.02.01: Title Sheet, 1.02.01A: Project Location, 1.02.01B: Traffic Data, 1.02.01C: Project Identification, 1.02.01D: Length and Type of Work:

Made minor revisions to these sections with the majority of the changes being related to revising “should” conditions to “must” conditions.

1.02.01E: Project Signature & Plan Sign Off:

Updated the requirements for signatures on the project signature sheet. Major changes include plan sign off to be performed by the MDOT Project Manager and Consultants (if applicable), prime consultant responsibility for developing the project signature sheet for consultant designed projects, and signatories of the project signature sheet (both internal and external) required to be professionally licensed engineers in the State of Michigan. Additional instructions are included in the digital Project Signature Sheet.



Road & Bridge Design Publications

1.02.01F: Consultant Identification:

Deleted section with information combined into section 1.02.01E.

7.01.06: Guardrail Worksheet:

Removed the guardrail worksheet from the section in favor of placing it on the [MDOT Development Guide - Home](#) website to facilitate ADA accessibility.

7.07: Noise Barriers:

Updated section to current requirements and practices. Major revisions include adding the Bridge Design Manual and dates to existing references, expanding the history of the Noise Abatement Program, updating the table regarding Responsibilities for Noise Barrier Wall Planning and Design, updating the reference to 23 CFR 772 (to the most recent date) which requires highway noise to be considered for each federal or Federal-Aid highway project, updating the processes for the Type I and Type II projects, and adding a reference to the Bridge Design Manual for design considerations specific to bridge mounted noise barrier walls.

Chapter 14: Procedures:

Reformatted the full chapter to comply with ADA accessibility which includes changing from a two column format to a single column. Only sections with content changes are included in this update.

14.11: Design Exceptions/Design Variances:

Updated section to current practice to comply with the recently updated Design Exception Form (DE 26) and the changes adopted from the 2018 AASHTO Greenbook (A Policy on Geometric Design of Highways and Streets-7th Edition) (GB7).

14.31.01: Environmental Classification and 14.31.02: Environmental Certification:

Updated section to remove references to MDOT form 1775 and replace with the Environmental Classification/Certification which will be supplied by the Environmental Clearance Coordinator.

14.60.02: Requirements:

Updated to remove obsolete form 2911 (Structure Lump Sum Items Worksheet) from the list of all plan/proposal package and final supporting document submittals.



Road & Bridge Design Publications

Bridge Design Manual

Chapter 7: Table of Contents:

Added new section 7.02.30 Bridge Mounted Noise Walls. Renumbered sections 7.02.31 through 7.02.34 for the new section.

7.02.30: Bridge Mounted Noise Walls:

Added section. This is a new comprehensive section on Bridge Mounted Noise Walls that includes general considerations and design criteria when designing a bridge mounted noise wall in the State of Michigan.

7.02.31: Precast Box/Three Sided/Arch Culverts:

Changed section number from 7.02.30 to 7.02.31. No content of the section changed.

7.02.32: Deck Replacements:

Changed section number from 7.02.31 to 7.02.32. No content of the section changed.

7.02.33: Ride Quality:

Changed section number from 7.02.32 to 7.02.33. No content of the section changed.

7.02.34: Bridge Mounted Sign Connections:

Changed section number from 7.02.33 to 7.02.34. No content of the section changed.

14.12.02 A: Categorical Exclusion:

Updated section to remove references to MDOT form 1775 and replace with the Environmental Classification/Certification which will be supplied by the Environmental Clearance Coordinator.

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.

This document contains complex files, plans, and/or information. If you require assistance accessing this information or require it in an alternative format, contact the Michigan Department of Transportation's (MDOT) Americans with Disabilities Act (ADA) coordinator at www.Michigan.gov/MDOT-ADA.

Index to Road Special Details

⑥

3-23-2026

SPECIAL DETAIL NUMBER	NUMBER OF SHEETS	TITLE	PLAN DATE
*21	2	GUARDRAIL AT INTERSECTIONS	3-17-26
*24	8	GUARDRAIL ANCHORED IN BACKSLOPE TYPES 4B, 4T, 7 4MGS-8	3-17-26
*99	2	CHAIN LINK FENCE WITH WIRE ROPE	3-17-26
R-22-G	4	COVER V	4-14-25
R-23-F	3	COVER W	4-14-25
R-24-G	3	COVER VG (FOR USE WITH CONCRETE VALLEY GUTTER)	4-14-25
R-32-F	8	APPROACH CURB & GUTTER DOWNSPOUTS	12-5-25
R-32-SD	6	APPROACH CURB & GUTTER DOWNSPOUTS (FOR SAFETY SHAPES)	12-5-25
R-43-J	2	LOCATION OF TRANSVERSE JOINTS IN PLAIN CONCRETE PAVEMENT	2-23-26
R-44-G	7	CONCRETE PAVEMENT REPAIR	1-7-25
R-45-K	2	PAVEMENT REINFORCEMENT FOR BRIDGE APPROACH	1-4-22
R-50-H	6	LIGHT STANDARD FOUNDATION (CONCRETE BARRIER, DOUBLE FACE)	10-30-25
R-53-A	22	TEMPORARY CONCRETE BARRIER LIMITED DEFLECTION	8-14-15
R-54-J	5	CONCRETE BARRIER, SINGLE FACE	12-15-25
R-55-H	5	FILLER WALLS AT BRIDGE PIER COLUMNS	2-23-26
R-56-F	6	GUARDRAIL MEDIAN OBJECT PROTECTION	10-10-23
R-60-J	16	GUARDRAIL TYPES A, B, BD, T, TD, MGS-8, & MGS-8D	1-29-24
R-62-H	5	GUARDRAIL APPROACH TERMINAL TYPE 2M	2-23-26
R-63-C	3	GUARDRAIL APPROACH TERMINAL TYPE 3M	1-6-26
R-66-E	4	GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS	2-23-26
R-67-G	16	GUARDRAIL ANCHORAGE, BRIDGE, DETAILS	1-6-26
R-67-SD	6	GUARDRAIL ANCHORAGE, BRIDGE, DETAILS (FOR SAFETY SHAPES)	1-6-26
R-72-D	6	GUARDRAIL LONG SPAN INSTALLATIONS	4-25-25
R-73-F	3	GUARDRAIL OVER BOX OR SLAB CULVERTS	2-23-26
R-76-F	4	CONCRETE GLARE SCREEN	11-4-25
R-80-F	8	GRANULAR BLANKETS, UNDERDRAINS, OUTLET ENDINGS, & BULKHEADS	4-2-25
R-97-D	4	HIGH TENSILE EIGHT WIRE FENCE	1-7-25
R-100-I	4	SEEDING AND TREE PLANTING	11-1-24
R-126-I	5	PLACEMENT OF TEMPORARY CONCRETE & STEEL BARRIER	8-21-25
R-127-I	8	DELINEATOR AND DRAINAGE MARKER INSTALLATIONS	10-24-25
R-130-A	6	LIGHT STANDARD DETAILS	1-6-26
R-135-A	4	TOWER LIGHTING UNIT FOUNDATION	2-21-25

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

3-23-2026

⑦

SPECIAL DETAIL NUMBER	NUMBER OF SHEETS	TITLE	PLAN DATE
B-21-K	4	BRIDGE RAILING, 2 TUBE	9-10-24
B-25-L	8	BRIDGE RAILING, AESTHETIC PARAPET TUBE	9-9-24
B-26-G	8	BRIDGE RAILING, 4 TUBE	9-6-24
B-27-B	7	BRIDGE RAILING, 3 TUBE WITH PICKETS	9-11-24
B-28-A	7	BRIDGE BARRIER RAILING, TYPE 7	12-17-25
B-29-A	8	BRIDGE BARRIER RAILING, TYPE 6	12-17-25
B-41-D	3	FENCING FOR BRIDGE RAILING, AESTHETIC PARAPET TUBE	12-10-25
B-42-A	3	FENCING FOR BRIDGE RAILING, 3 TUBE WITH PICKETS	1-5-26
B-102-D	4	STANDARD SLOPE PAVING DETAILS	9-18-23
B-103-F	2	MOLDING, BEVEL, LIGHT STD. ANCHOR BOLT ASSEMBLY AND NAME PLATE DETAILS	12-8-23
EJ3AG	1 to 5	EXPANSION JOINT DETAILS (See Notes)	4-28-25
EJ4T	1 to 5	EXPANSION JOINT DETAILS (See Notes)	4-28-25
PC-1Q	2	PRESTRESSED CONCRETE I-BEAM DETAILS (See Notes)	12-22-25
PC-2L	2	70" PRESTRESSED CONCRETE I-BEAM DETAILS (See Notes)	12-22-25
PC-4J	2	PRESTRESSED CONCRETE 1800 BEAM DETAILS (See Notes)	12-22-25
PC-5D	2	PRESTRESSED CONCRETE BULB-TEE BEAM DETAILS (See Notes)	12-22-25

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

Notes:

Details EJ3AG & EJ4T 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(s). Add the sheet(s) to the plans as a normal plan sheets. Call out and designate the location of the expansion joint device and the end plate on the Superstructure Sheet in the plan set. Include Rail Splice Detail sheet with all plans including an Expansion Joint Device.

Details PC-1Q, PC-2L, PC-4J, and PC-5D 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.

TRUNKLINE

GUARDRAIL ANCHORAGE, BRIDGE
 GUARDRAIL, TYPE B
 GUARDRAIL, TYPE T
 GUARDRAIL, TYPE MGS-8 *

* 34'-4 1/2" HEIGHT TRANSITION REQUIRED. REFER TO HEIGHT TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL, TYPE B IN STANDARD PLAN R-60-SERIES.

CRT POSTS AT 6'-3" SPACING ALONG CURVED PORTION OF GUARDRAIL, TYPE B-CRT

GUARDRAIL RADIUS AS SPECIFIED ON PLANS

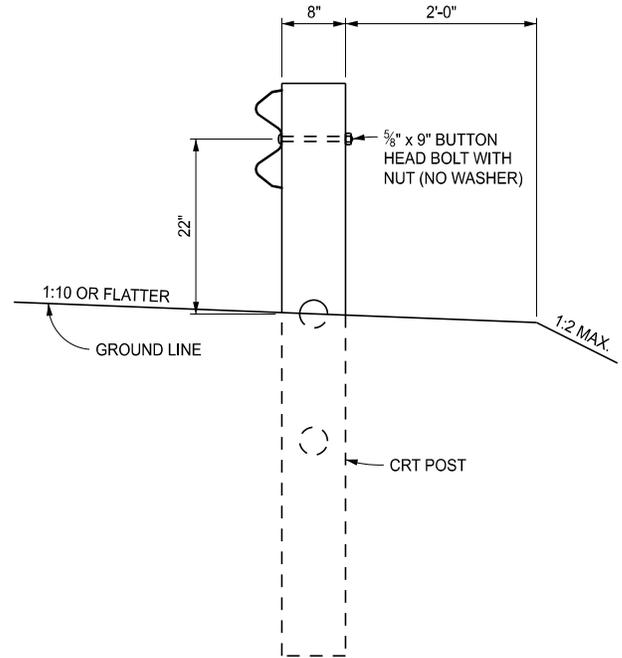
WIDTH EQUAL TO GUARDRAIL RADIUS SPECIFIED ON PLANS

LENGTH EQUAL TO GUARDRAIL RADIUS SPECIFIED ON PLANS

34'-4 1/2" HEIGHT TRANSITION (REFER TO HEIGHT TRANSITION FROM GUARDRAIL, TYPE B TO GUARDRAIL APPROACH TERMINAL, TYPE 2M IN STANDARD PLAN R-60-SERIES.)

GUARDRAIL APPROACH TERMINAL, TYPE 2M

CROSSROAD



TYPICAL SECTION AT CRT POST

NOTE:
 FOR DRIVEWAYS, IF R.O.W. ALLOWS, USE DEPARTING END TERMINAL. (SEE STANDARD PLAN R-66-SERIES). IF R.O.W. IS LIMITED SUCH THAT A TYPICAL DEPARTING END TERMINAL CANNOT BE FIT IN, DRILL 8 HOLES IN THE CURVED BEAM GUARDRAIL TO ACCOMMODATE AN ANCHOR PLATE AND INSTALL A CABLE ANCHOR SIMILAR TO THAT OF THE DEPARTING END TERMINAL ON STANDARD PLAN R-66-SERIES. THIS WILL BE PAID FOR AS GUARDRAIL, DEPARTING TERMINAL.

PLAN VIEW

APPROVED BY: _____
 DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
 DIRECTOR, BUREAU OF DEVELOPMENT



DEPARTMENT DIRECTOR
 BRADLEY C. WIEFERICH, PE

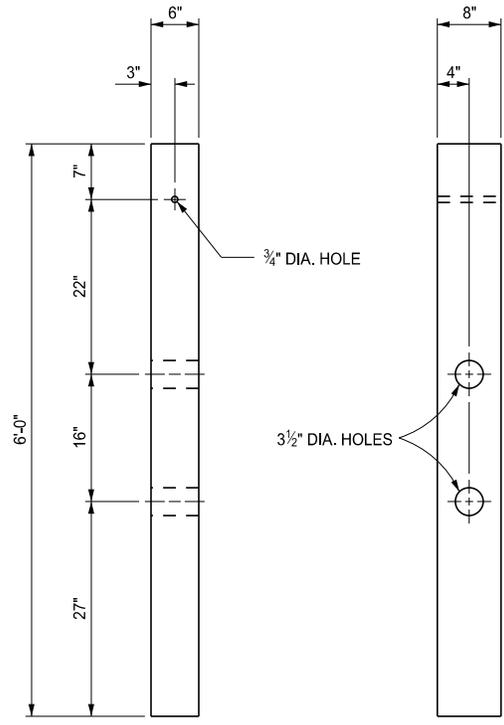
SPECIAL DETAIL FOR
 GUARDRAIL AT INTERSECTIONS

(SPECIAL DETAIL)
 FHWA APPROVAL

03/17/2026
 PLAN DATE

SPECIAL DETAIL 21

SHEET
 1 OF 2



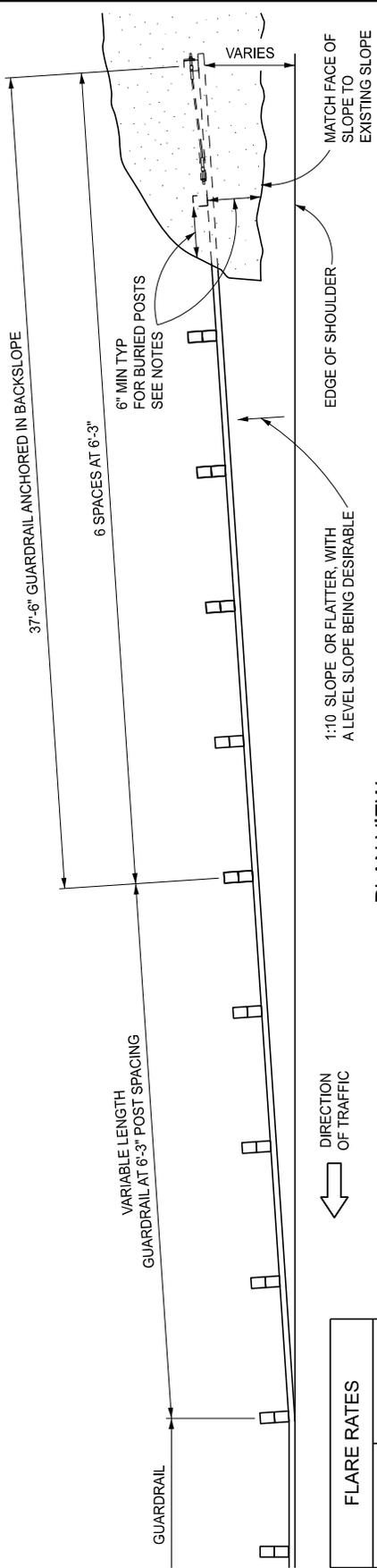
CONTROLLED RELEASING TERMINAL POST
(CRT)

NOTES:

DO NOT EXCEED A 1:10 SLOPE IN FRONT OF THE INSTALLATION AND UP TO 2'-0" BEYOND THE BACK OF THE GUARDRAIL POST. ENSURE A 1:2 OR FLATTER SLOPE BEYOND THIS HINGE LINE.

KEEP THE CROSS HATCHED AREA BEHIND THE CURVED GUARDRAIL FREE OF FIXED OBJECTS.

 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	SPECIAL DETAIL FOR GUARDRAIL AT INTERSECTIONS		
	(SPECIAL DETAIL) FHWA APPROVAL	03/17/2026 PLAN DATE	SPECIAL DETAIL 21



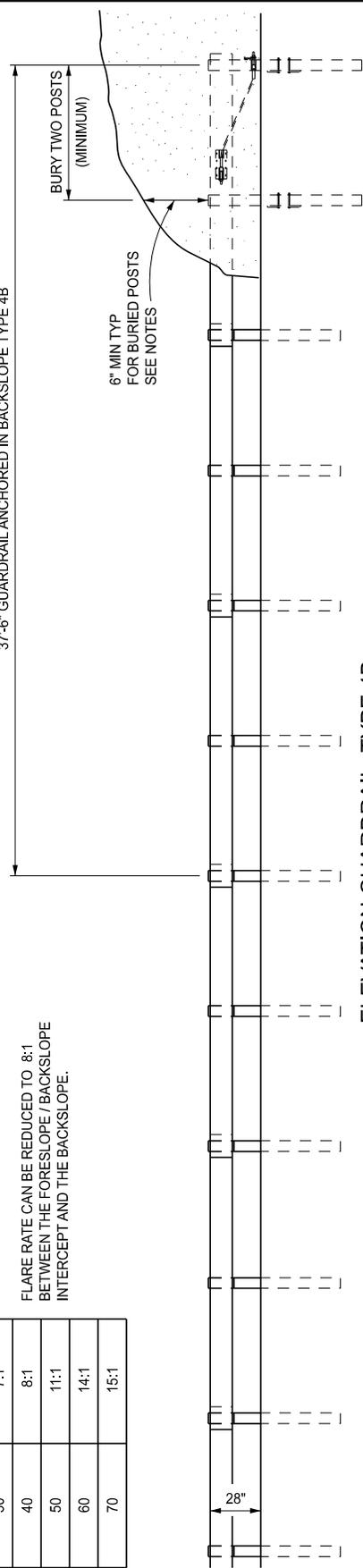
PLAN VIEW



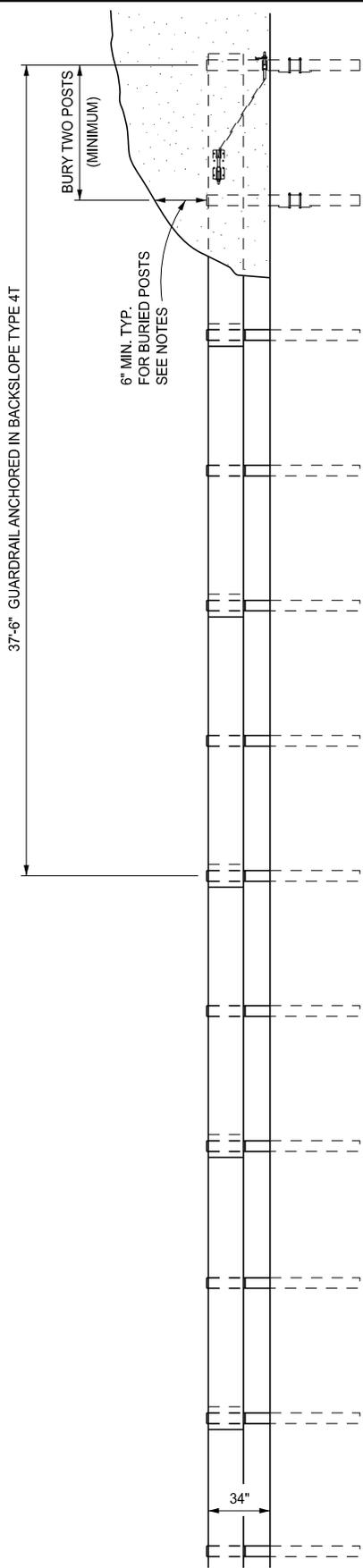
FLARE RATES	
DESIGN SPEED (mph)	FLARE
30	7:1
40	8:1
50	11:1
60	14:1
70	15:1

FLARE RATE CAN BE REDUCED TO 8:1 BETWEEN THE FORESLOPE / BACKSLOPE INTERCEPT AND THE BACKSLOPE.

ELEVATION GUARDRAIL, TYPE 4B



ELEVATION GUARDRAIL, TYPE 4T



APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT



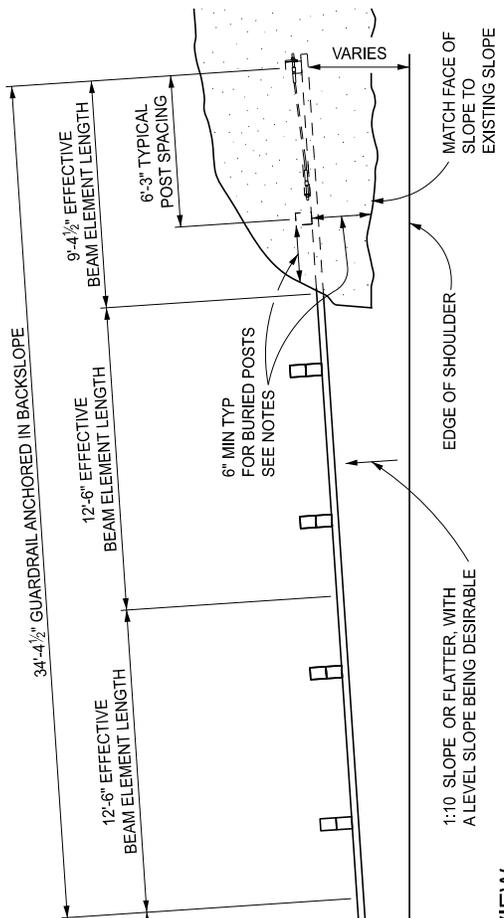
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

SPECIAL DETAIL FOR
GUARDRAIL ANCHORED IN BACKSLOPE
TYPES 4B, 4T, & 4MGS-8

(SPECIAL DETAIL) 03/17/2026
FHWA APPROVAL PLAN DATE

SPECIAL DETAIL 24

SHEET
1 OF 8

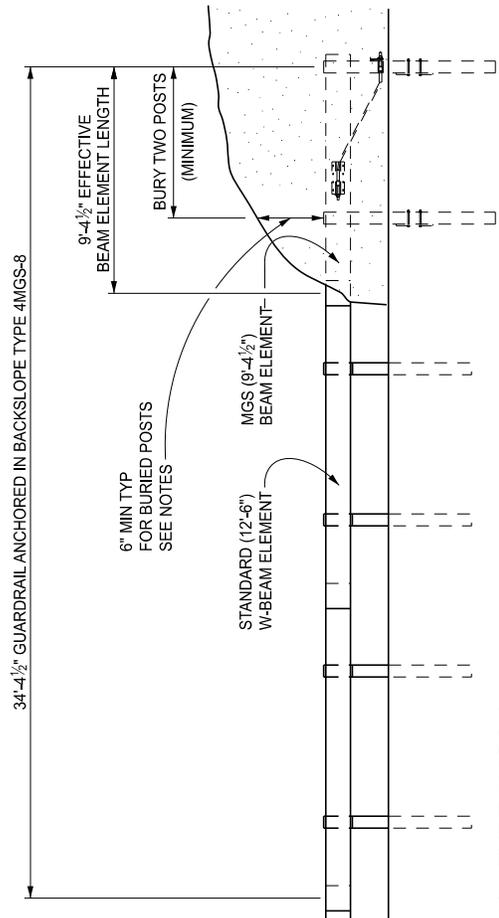


PLAN VIEW



FLARE RATES	
DESIGN SPEED (mph)	FLARE
30	7:1
40	8:1
50	11:1
60	14:1
70	15:1

FLARE RATE CAN BE REDUCED TO 8:1 BETWEEN THE FORESLOPE / BACKSLOPE INTERCEPT AND THE BACKSLOPE.



ELEVATION GUARDRAIL, TYPE 4MGS-8



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

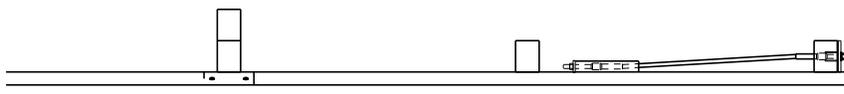
SPECIAL DETAIL FOR
GUARDRAIL ANCHORED IN BACKSLOPE
TYPES 4B, 4T, & 4MGS-8

(SPECIAL DETAIL)
FHWA APPROVAL

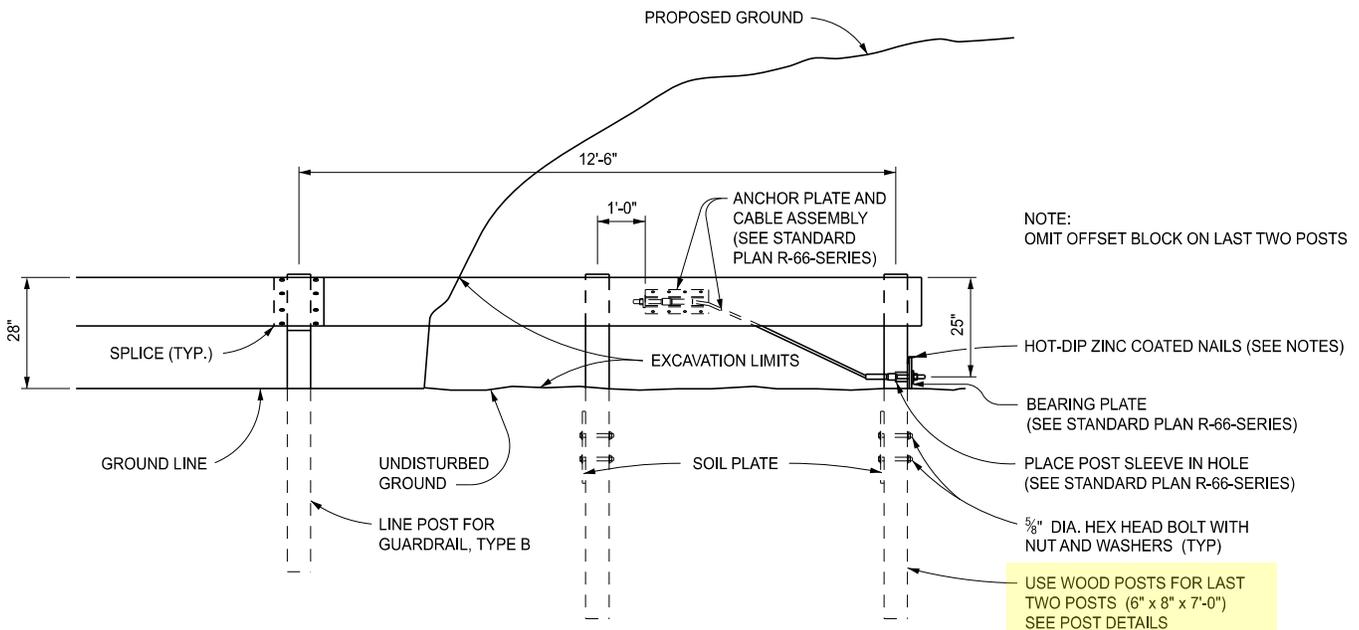
03/17/2026
PLAN DATE

SPECIAL DETAIL 24

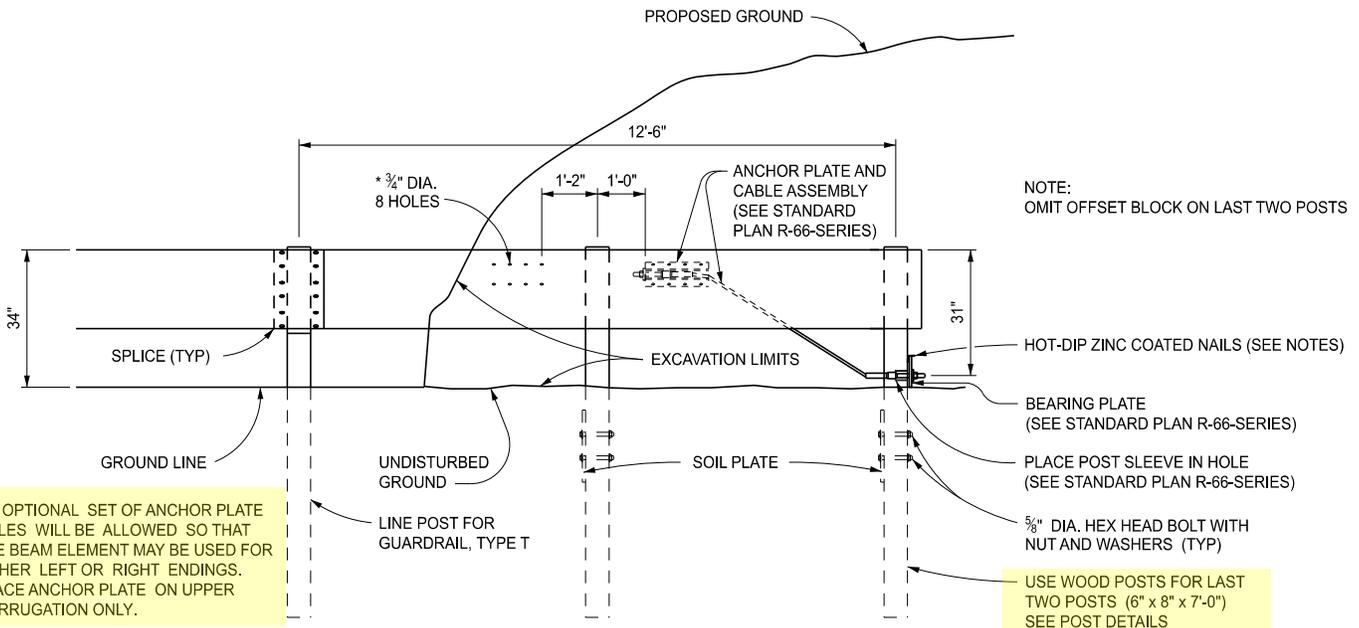
SHEET
2 OF 8



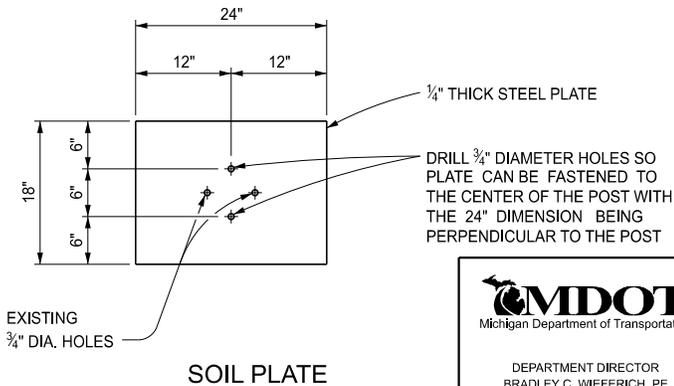
PLAN VIEW



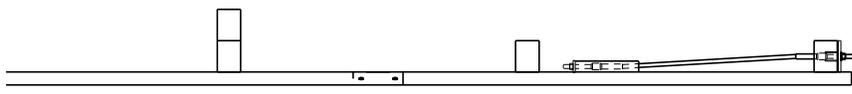
ELEVATION GUARDRAIL, TYPE 4B



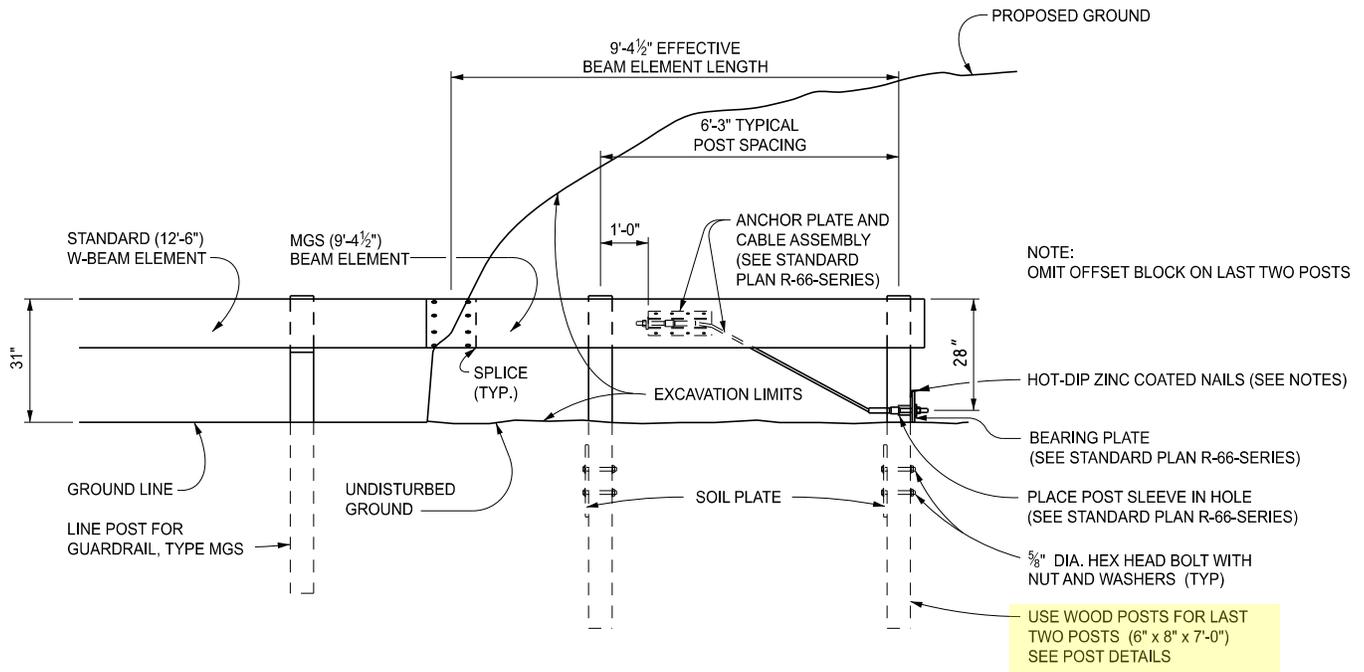
ELEVATION GUARDRAIL, TYPE 4T



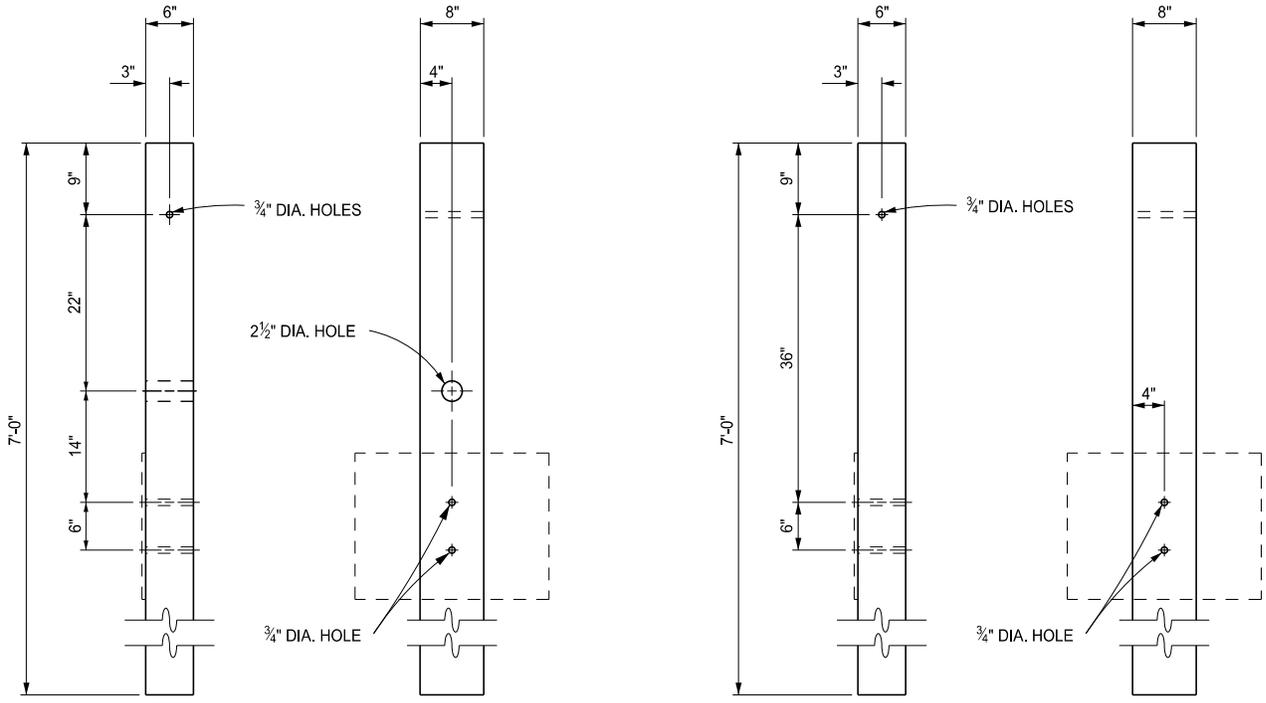
<p>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE</p>	<p>SPECIAL DETAIL FOR GUARDRAIL ANCHORED IN BACKSLOPE TYPES 4B, 4T, & 4MGS-8</p>		<p>SHEET 3 OF 8</p>
	<p>(SPECIAL DETAIL) FHWA APPROVAL</p>	<p>03/17/2026 PLAN DATE</p>	



PLAN VIEW



ELEVATION GUARDRAIL, TYPE 4MGS-8



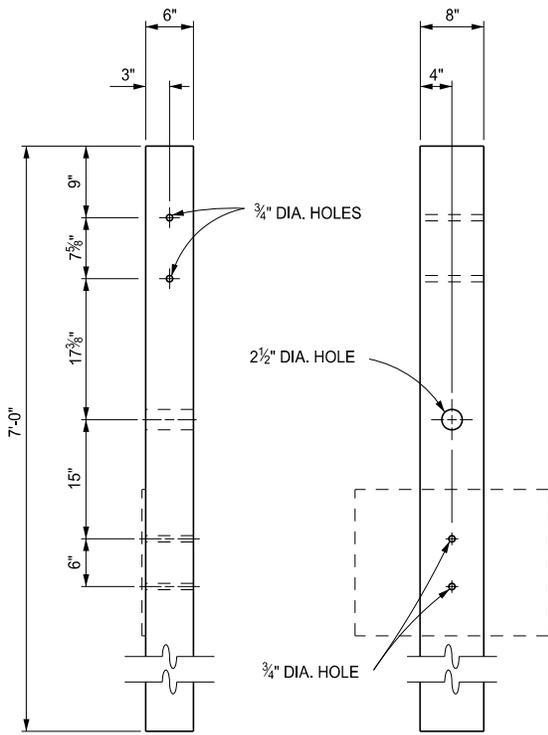
POST 1

POST 2

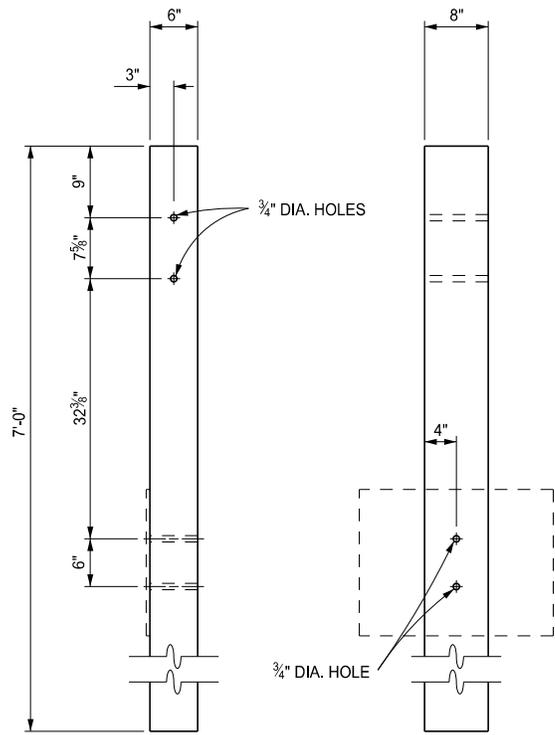
WOOD POST DETAILS

GUARDRAIL ANCHORED IN BACKSLOPE TYPE 4MGS-8

<p>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE</p>	<p>SPECIAL DETAIL FOR GUARDRAIL ANCHORED IN BACKSLOPE TYPES 4B, 4T, & 4MGS-8</p>		<p>SPECIAL DETAIL 24</p>	<p>SHEET 4 OF 8</p>
	<p>(SPECIAL DETAIL) FHWA APPROVAL</p>	<p>03/17/2026 PLAN DATE</p>		



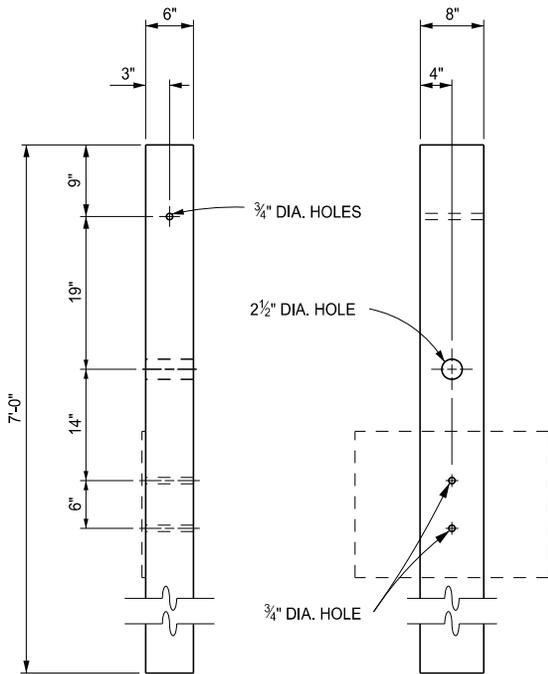
POST 1



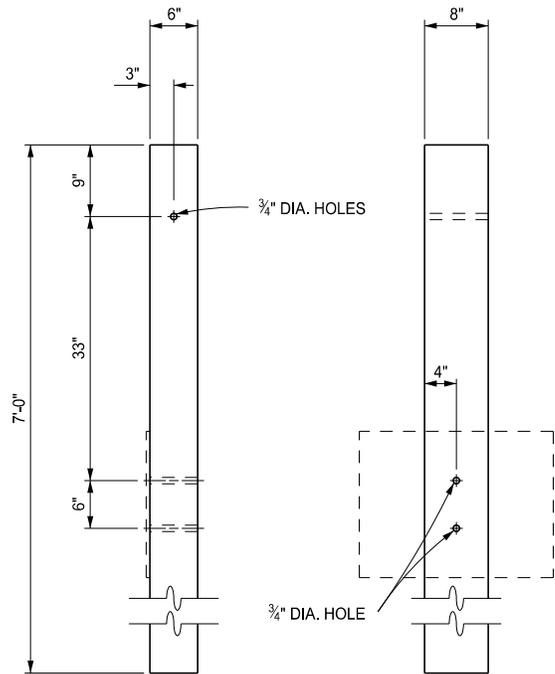
POST 2

WOOD POST DETAILS

GUARDRAIL ANCHORED IN BACKSLOPE TYPE 4T



POST 1



POST 2

WOOD POST DETAILS

GUARDRAIL ANCHORED IN BACKSLOPE TYPE 4B



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

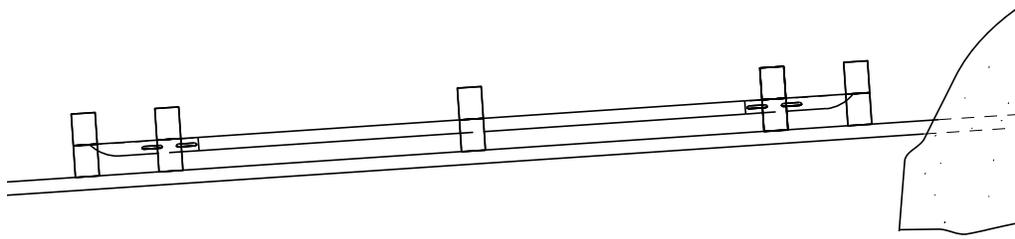
SPECIAL DETAIL FOR
GUARDRAIL ANCHORED IN BACKSLOPE
TYPES 4B, 4T, & 4MGS-8

(SPECIAL DETAIL)
FHWA APPROVAL

03/17/2026
PLAN DATE

SPECIAL DETAIL 24

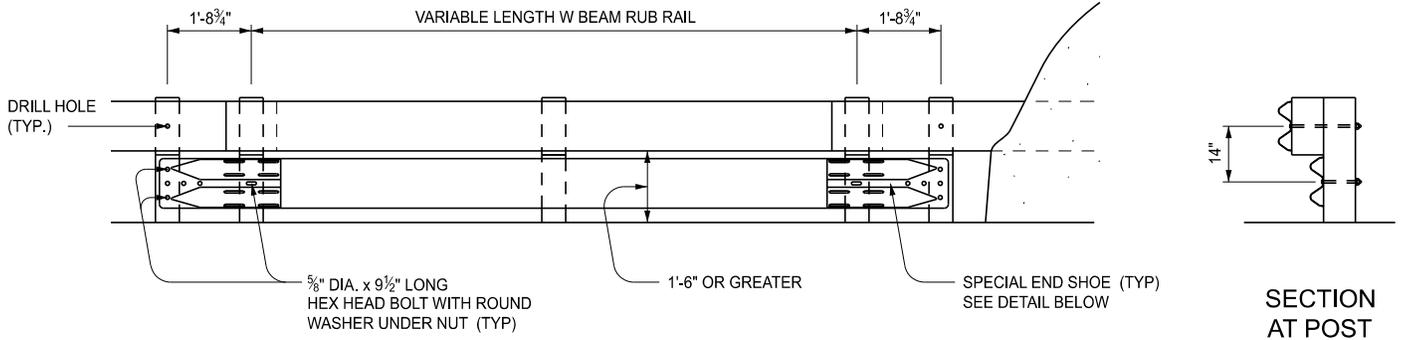
SHEET
5 OF 8



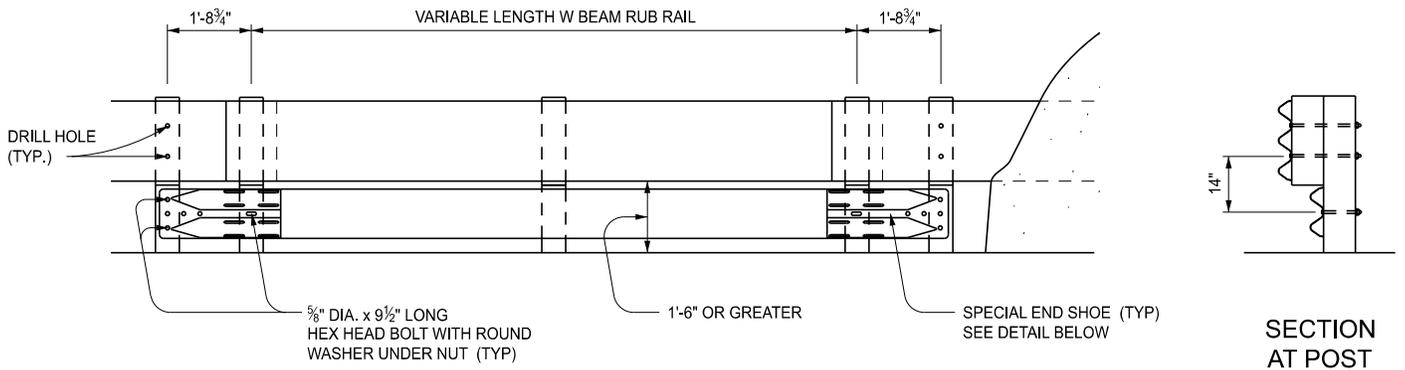
PLAN VIEW
WITH RUB RAIL

NOTE:

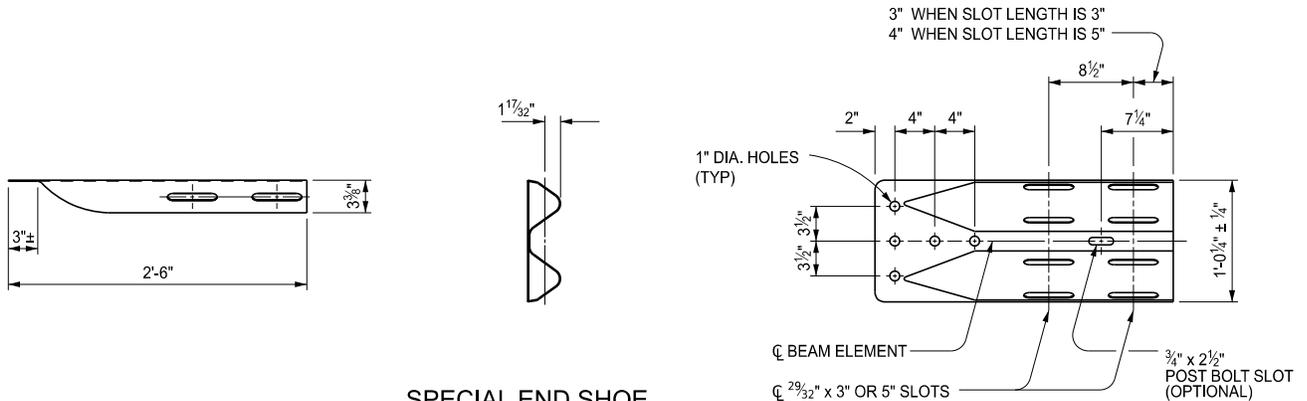
EXTRA POSTS, SPECIAL END SHOES, GUARDRAIL, HARDWARE AND ANY EXTRA WORK ARE INCLUDED IN THE BID ITEM GUARDRAIL ANCHORED IN BACKSLOPE TYPE 4B OR TYPE 4T.



ELEVATION GUARDRAIL, TYPE 4B
WITH RUB RAIL

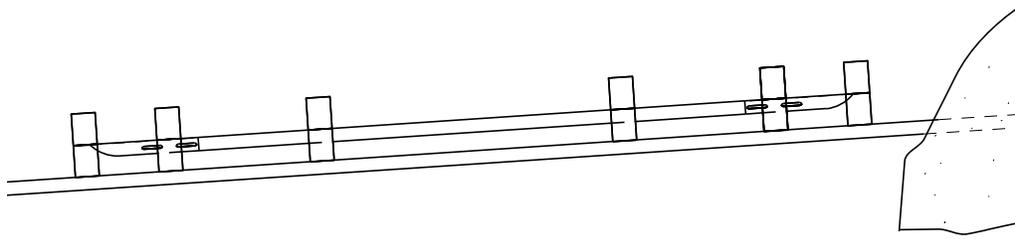


ELEVATION GUARDRAIL, TYPE 4T
WITH RUB RAIL

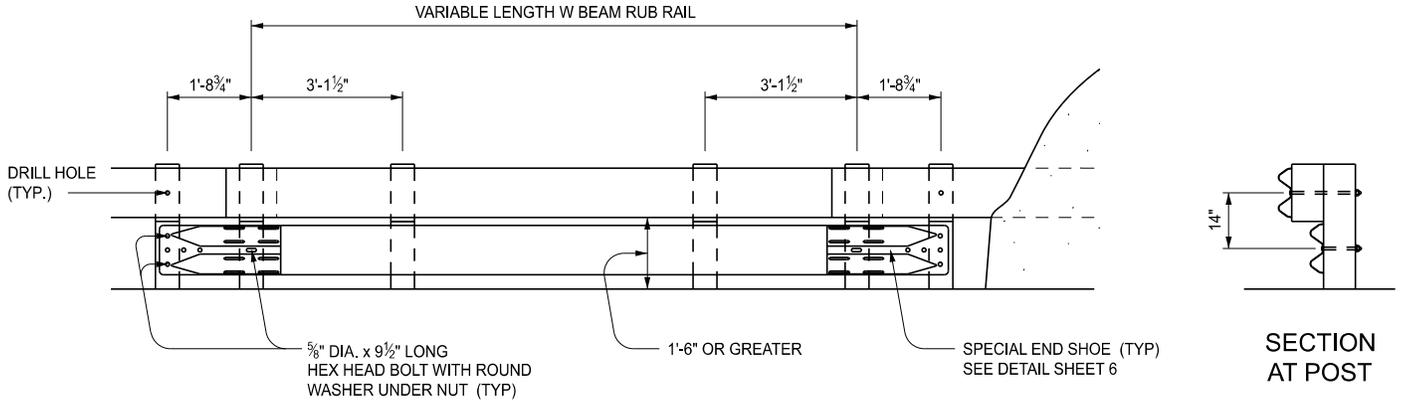


SPECIAL END SHOE
(3" OR 5" SLOT LENGTHS)

<p>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE</p>	<p>SPECIAL DETAIL FOR GUARDRAIL ANCHORED IN BACKSLOPE TYPES 4B, 4T, & 4MGS-8</p>		<p>SHEET 6 OF 8</p>
	<p>(SPECIAL DETAIL) FHWA APPROVAL</p>	<p>03/17/2026 PLAN DATE</p>	



PLAN VIEW GUARDRAIL, TYPE 4MGS-8
WITH RUB RAIL



ELEVATION GUARDRAIL, TYPE 4MGS-8
WITH RUB RAIL

NOTE:

EXTRA POSTS, SPECIAL END SHOES, GUARDRAIL, HARDWARE AND ANY EXTRA WORK ARE INCLUDED IN THE BID ITEM GUARDRAIL ANCHORED IN BACKSLOPE TYPE 4MGS-8



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

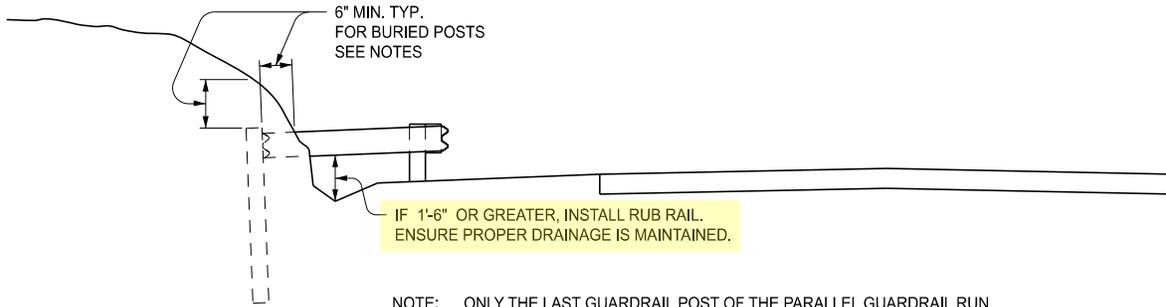
SPECIAL DETAIL FOR
GUARDRAIL ANCHORED IN BACKSLOPE
TYPES 4B, 4T, & 4MGS-8

(SPECIAL DETAIL)
FHWA APPROVAL

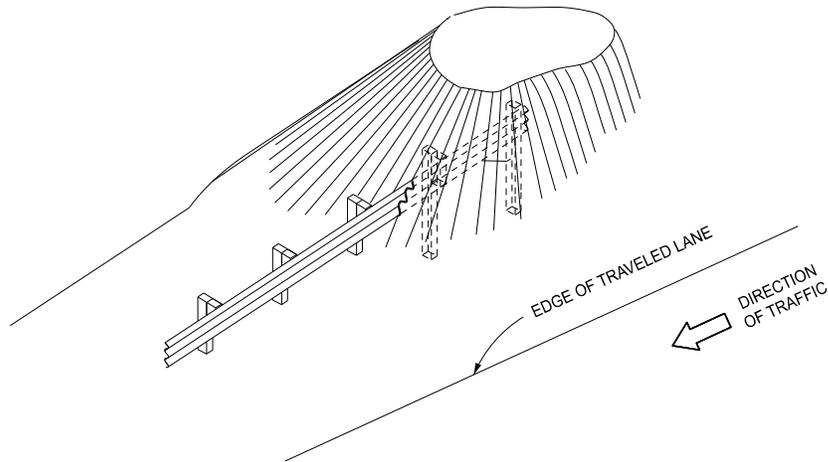
03/17/2026
PLAN DATE

SPECIAL DETAIL 24

SHEET
7 OF 8



NOTE: ONLY THE LAST GUARDRAIL POST OF THE PARALLEL GUARDRAIL RUN AND THE LAST BURIED GUARDRAIL POST ARE SHOWN. (OTHER POSTS ALONG THE FLARED GUARDRAIL RUN ARE NOT SHOWN)



BURIED ENDING SKETCHES

NOTES:

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

GRADE ALL 1:10 SLOPES TO CLASS A SLOPE TOLERANCES.

AFTER THE CABLE ASSEMBLY HAS BEEN TIGHTENED, INSTALL A SECOND NUT SO THE CABLE WILL NOT LOOSEN.

DRIVE TWO HOT-DIPPED ZINC COATED NAILS INTO THE WOOD POST AT THE TOP OF THE BEARING PLATE TO KEEP THE BEARING PLATE FROM ROTATING.

WHEN ADDITIONAL POST BOLT SLOTS ARE REQUIRED, DRILL OR PUNCH THE SLOTS, THEN RE-GALVANIZE. BURNING IS NOT ALLOWED.

SET THE TERMINAL A MINIMUM 6" INTO THE BACKSLOPE AND HAVE 6" OF COVER ON ALL SIDES TO LESSEN THE POSSIBILITY IT WILL BE EXPOSED BY EROSION AND SNAG AN IMPACTING VEHICLE.

ENSURE THE GUARDRAIL REMAINS AT A CONSTANT HEIGHT RELATIVE TO THE LOCAL GRADE. IF THE OPENING UNDER THE PRIMARY RAIL IS 1'-6" OR GREATER, USE A W-BEAM RUB-RAIL AS SHOWN ON THIS PLAN.



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

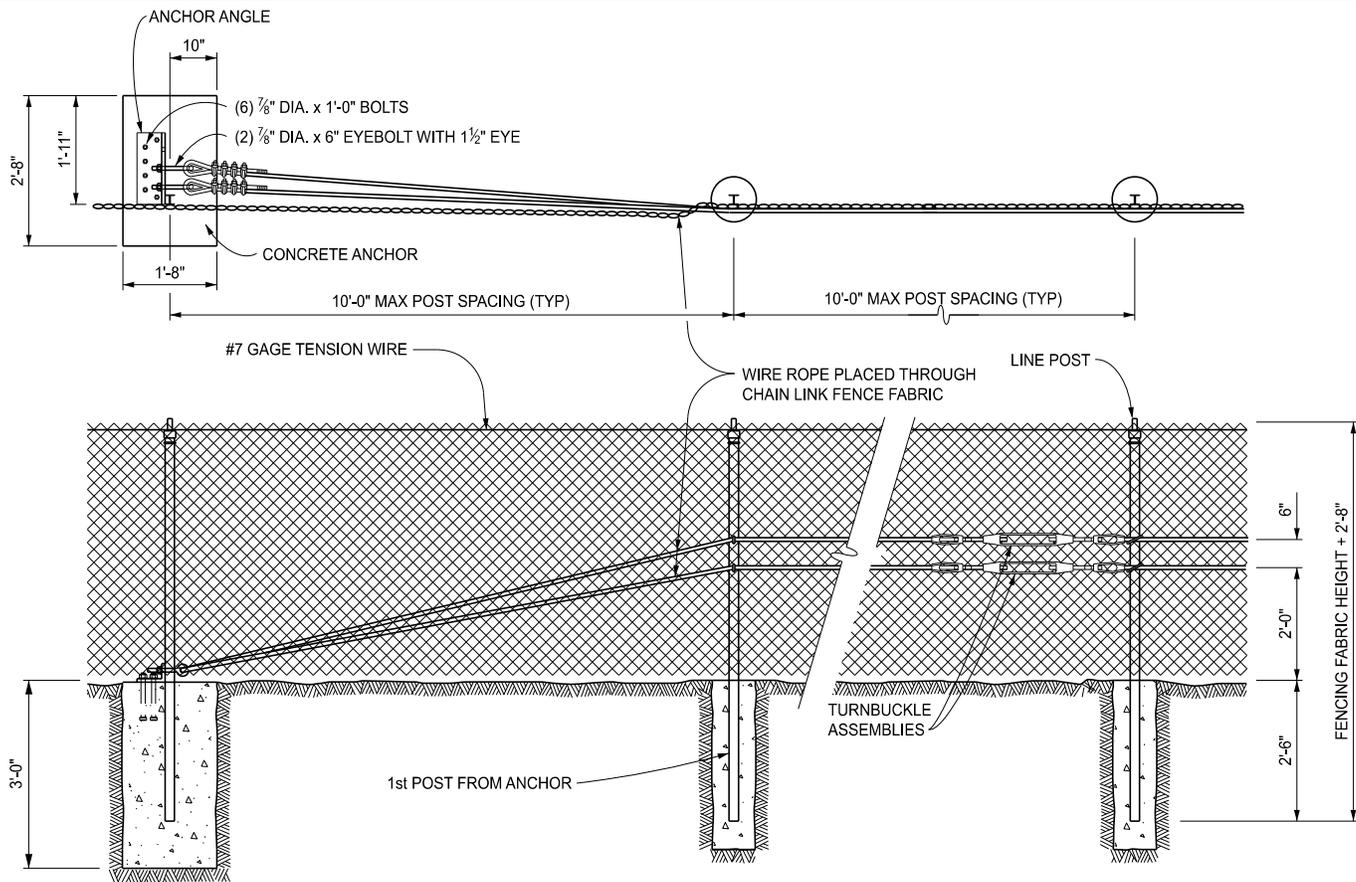
SPECIAL DETAIL FOR
GUARDRAIL ANCHORED IN BACKSLOPE
TYPES 4B, 4T, & 4MGS-8

(SPECIAL DETAIL)
FHWA APPROVAL

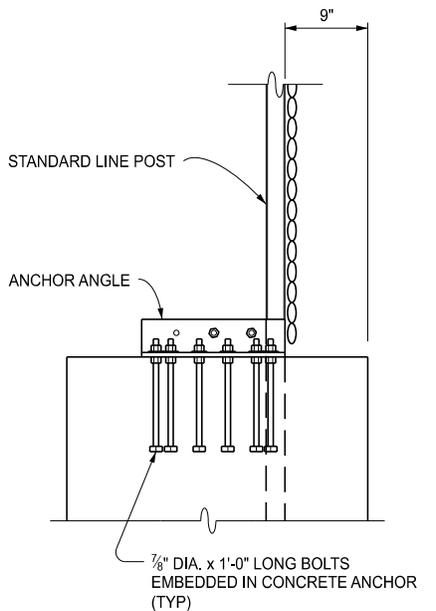
03/17/2026
PLAN DATE

SPECIAL DETAIL 24

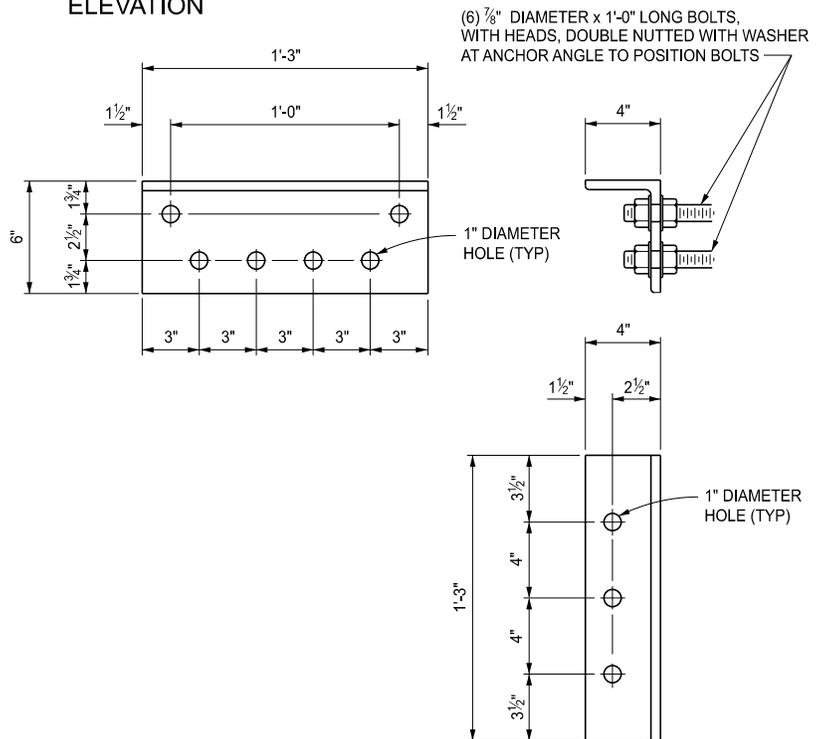
SHEET
8 OF 8



ELEVATION



END VIEW OF CONCRETE ANCHOR
CONCRETE QUANTITY FOR ANCHOR = 0.5 CYD



L6" x 4" x 1/2" x 1'-3" LONG
ANCHOR ANGLE

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

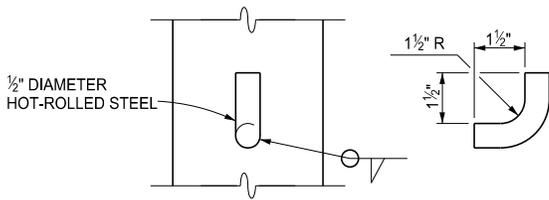
SPECIAL DETAIL FOR
CHAIN LINK FENCE WITH WIRE ROPE

(SPECIAL DETAIL)
FHWA APPROVAL

03/17/2026
PLAN DATE

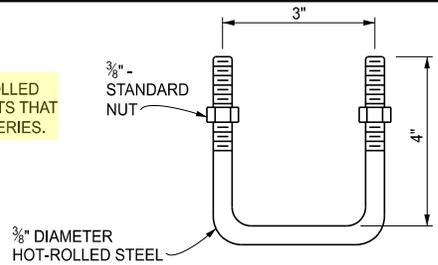
SPECIAL DETAIL 99

SHEET
1 OF 2

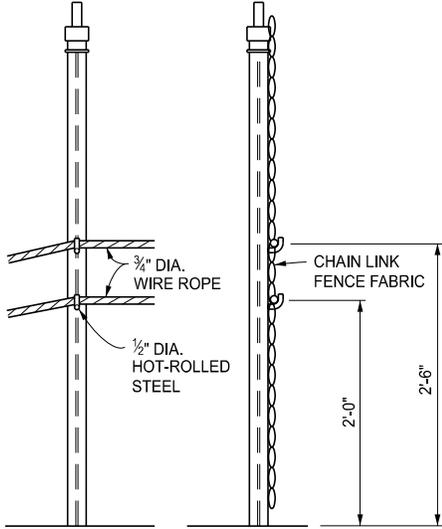


1/2" DIAMETER HOT ROLLED BAR

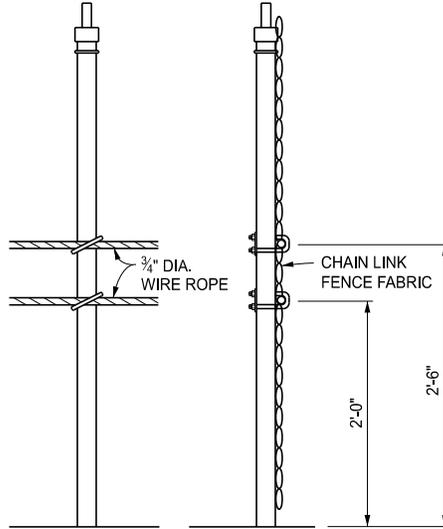
NOTE:
FASTEN THE WELDED 1/2" DIAMETER HOT-ROLLED BAR AND THE WIRE ROPE TO THE LINE POSTS THAT ARE SPECIFIED ON STANDARD PLAN R-98-SERIES.



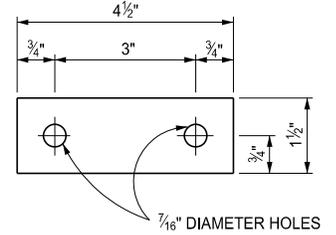
U-BOLT WITH NUTS



1st POST FROM ANCHOR



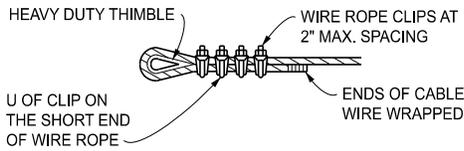
WIRE ROPE INSTALLED TO LINE POST WITH U-BOLTS



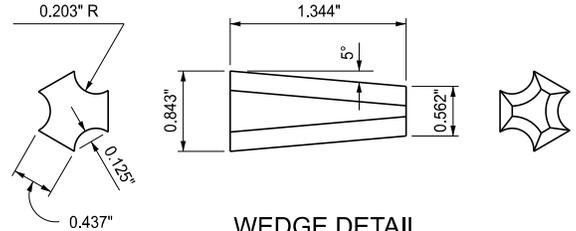
U-BOLT WASHER
1/4" THICK HOT-ROLLED STEEL



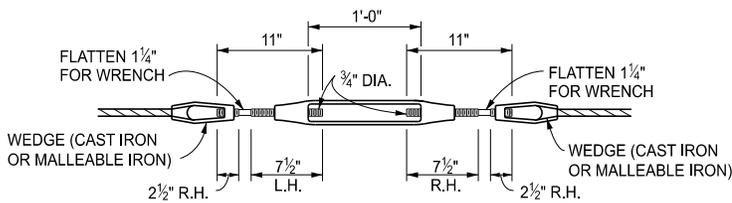
3/4" DIAMETER WIRE ROPE (3 x 7)



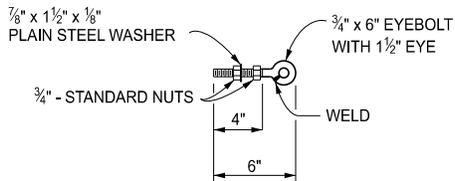
WIRE ROPE LOOP ENDING



WEDGE DETAIL



TURNBUCKLE WIRE ROPE ASSEMBLY



WELDED EYE-BOLT WITH NUTS & WASHER

NOTES:

INSTALL CHAIN LINK FENCE WITH WIRE ROPE ACCORDING TO THIS PLAN AND STANDARD PLAN R-98-SERIES. ANCHOR THE WIRE ROPE ACCORDING TO THIS PLAN AND INSTALL ON STANDARD FENCE POSTS FOR CHAIN LINK FENCE WITH CHAIN LINK FABRIC PLACED ON THE INSIDE OF WIRE ROPE. THE POST NEXT TO THE ANCHORAGE REQUIRES SPECIAL FABRICATION (SEE DETAIL). ALTERNATE DESIGNS MAY BE SUBMITTED TO THE ENGINEER FOR CONSIDERATION AND APPROVAL.

ENSURE ALL POSTS, WIRE ROPES, AND FITTINGS ARE GALVANIZED ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

ENSURE ALL WELDING IS ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION. USE TURNBUCKLES OF THE OPEN TYPE WHICH EACH PROVIDE A MINIMUM TAKEUP OF 1'-0".

PROVIDE ANCHORAGE ON EACH END OF CABLES WITH ONE TURNBUCKLE FOR EACH 500' RUN OF WIRE ROPE. ENSURE THE MAXIMUM DISTANCE BETWEEN ANCHORAGES IS 1000'. WHEN PLACING WIRE ROPE IN EXISTING FENCE, THE CONCRETE ANCHORS MAY BE PLACED 2'-0" BEYOND THE 10'-0" TYPICAL POST SPACING, LEAVING THE EXISTING POST IN PLACE.

STRETCH TENSION WIRE AND WIRE ROPES TAUT.

ENSURE A KNUCKLED FINISH ON THE TOP AND BOTTOM SELVAGES OF THE FENCE FABRIC.



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

SPECIAL DETAIL FOR
CHAIN LINK FENCE WITH WIRE ROPE

(SPECIAL DETAIL)
FHWA APPROVAL

03/17/2026
PLAN DATE

SPECIAL DETAIL 99

SHEET
2 OF 2

MICHIGAN DESIGN MANUAL ROAD DESIGN

CHAPTER 1 • PLAN PREPARATION

1.01 DEVELOPMENT METHODS

1.01.01 References

(revised 11-28-2011)

- 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 General

(revised 3-23-2026)

This chapter provides the information and details necessary to prepare a set of plans. The plans **must** 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 **must** be adaptable to the diverse requirements of the Design Division and Construction Field Services Division. At the same time the plans **must** be a functional reference, familiar to the users. A general format **must** be followed by all Designers.

1.01.03 Survey and Mapping Methods

(revised 12-28-2020)

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.

MICHIGAN DESIGN MANUAL

ROAD DESIGN

1.02 PLAN SHEETS

1.02.01 Title Sheet

(revised 3-23-2026)

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 **must** be neat in appearance and layout.

1.02.01A Project Location

The project **must** be located on the map and the limits (P.O.B. Stationing and P.O.E. Stationing) outlined to clearly show and stand out from the rest of the map. The map **must** be oriented with north to the top of the sheet and with a north arrow shown near the map.

The map must show the entire project limits and other features that will easily identify the location. Preferably, at least two trunklines, names of major **crossroads**, and an incorporated city or village, township, and county **must** be shown on the location map. The town, range and section numbers **must** also be shown on the map.

The point of beginning and the point of ending **must** be identified by control section, physical reference, job number, stationing, and control section mileposts. Station equations and stationing of major **crossroads must** also be shown.

The location map **must** also show bridge numbers, railroad crossing numbers, and railroad companies within the project limits for both existing and proposed crossings.

1.02.01B Traffic Data

Existing year traffic data and projected **20-year** traffic data **must** be located on the upper left part of the title sheet. Pertinent counts including ADT, DHV, percent commercial, and the year taken are shown in tabular form. For freeway projects, the commercial DDHV **must** also be listed. These counts are usually present counts and projected counts. Counts are obtained from the Bureau of Transportation Planning (see [Chapter 14](#) of this manual).

The design speed and posted speed **must** also be shown. If the design speed changes within a project, show the various limits by stationing, **crossroads**, or mile points.

**MICHIGAN DESIGN MANUAL
ROAD DESIGN**

1.02.01C Project Identification

The following format **must** be used for identifying projects:

MICHIGAN DEPARTMENT OF TRANSPORTATION

ROUTE: I-** & M-**

CITY OF *****

***** TOWNSHIP

***** COUNTY

_____ SECTION _____ CONTROL SEC _____ JOB NO. _____

For filing and reference purposes, both the control section and job numbers **must** be shown in the appropriate blocks in the bottom margin. If the project has multiple job numbers, show them in the title block. Projects with multiple control sections **must** show the major control section (as programmed) first with others following in parentheses.

1.02.01D Length and Type of Work

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

Example:

<p>MICHIGAN DEPARTMENT OF TRANSPORTATION XXXXX X. XXXXXX, P.E. - DIRECTOR</p>		
MILES: CONTRACT FOR:		
	DRAWING	SHEET
		SECT

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1.02.01E Project Signature and Plan Sign Off

To supplement the title sheet data, plan sign off must be performed by the MDOT Project Manager and Consultants (if applicable) using the [Project Signature Sheet](#). 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 delay the targeted letting date, as the plans would not be considered complete. All signatories of the [Project Signature Sheet](#), both internal and external, are required to be professionally licensed engineers in the State of Michigan; other licensed individuals can be added based on specific project needs.

It is important to note that the signatures on the Project Signature Sheet mean different things for internal and external Project Managers. Internal signatories are acting with their position's authority as a Department employee, and because the project was designed by, or for, the Department, the signature verifies that the plan development process was followed and that the project(s) are ready to be submitted to the MDOT Quality Assurance Section for letting.

Signatures and stamps from external consultants certify not only that the plan development process was followed, but also to certify design components within the plans. The Prime Consultant may choose to have additional signatories on the Project Signature Sheet upon reviewing which subconsultants created or contributed to specific plan sheets and the appropriate licensing requirements of their disciplines.

For consultant-designed projects, it is the responsibility of the Prime Consultant to develop the Project Signature Sheet utilizing the latest available version. The Prime Consultant will identify and populate the Project Signature Sheet with the appropriate signatories, file names, and sheet ranges of the external design team(s). All sheets in the plan set must be included in the Project Signature Sheet. Upon completion of the Microsoft Excel file, the Prime Consultant will submit the file to the MDOT Project Manager to facilitate obtaining all applicable digital signatures for the project. As part of the submittal, the Prime Consultant will also provide the email addresses of applicable external signatories to the MDOT Project Manager.

Consultants must place their company logo on the plan sheets that they were in responsible charge of, as well as denoting the sheets on the Project Signature Sheet.

For internal projects with only one Project Manager, the MDOT signatory of the Project Signature Sheet **must** match both the individual listed on the "Notice to Bidders – Inquiry" and the individual assigned to the Project Manager role in JobNet unless previously coordinated by the **MDOT** Quality Assurance Section. Please note that compliance with this requirement may require processing a Change Request in JobNet to reassign the MDOT Project Manager.

Packaged projects that contain multiple job numbers or internal projects containing both road and bridge disciplines **must** have the signatory of the Project Signature Sheet and the individual identified in the "Notice to Bidders – Inquiry" be the licensed MDOT Project Manager responsible for the job number or discipline type (road or bridge) representing the majority of the work.

Once all applicable valid digital signatures are obtained, place the final completed Project Signature Sheet (pdf) in the Letting Plans and Proposal folder in ProjectWise along with the corresponding project plans (as applicable) and proposal. Place the final Microsoft Excel file version of the Project Signature Sheet in the corresponding Supporting Documents folder.

MICHIGAN DESIGN MANUAL

ROAD DESIGN

Additional instructions are included in the digital [Project Signature Sheet](#).

1.02.01F Deleted

Section Deleted

1.02.02 Project Information Sheet

(revised 6-17-2013)

The purpose of the Project Information Sheet is to show, in a convenient location, the Utilities, Notes Applying to Standard Plans, and the Plan Index.

Information on the Project Information Sheet should be project specific, current, and complete.

1.02.02A Utilities

The preliminary utility list should be prefaced with and followed by the standard notes that best fit the project.

The preliminary utilities list should be from: a current survey, old plans, or the information retrieval system. It should be updated to the current date. Utility information can also be obtained from the field review section, the utility section, or the Region/TSC Utility/Permit Engineer. The final utility list shall be from the Region/TSC Utility/Permit Engineer.

The list should include the name and address of the utility, the type of utility, and a contact person, listing a phone number and address if available.

1.02.02B Notes Applying to Standard Plans

Current standard plans and special details that are applicable to the project are listed on the Project Information Sheet. Special details called for on the note sheet must also be physically attached to the construction plans.

Standard plans are engineering drawings showing standard details of various construction items which present the current policies of MDOT and are approved for repetitive use. In order for these drawings to become Standard Plans, they must first be approved by MDOT Administrators and have FHWA approval. The approved drawings are then made available on the MDOT Web site.

During the time these plans are being processed for approval, they are often included in the construction plans as special details.

Even though these plans are labeled "Standard Plan" in the title block, they are still considered special details when included in the construction plans. Do not change the "standard plan" label to "special detail" or remove the plan number and/or plan date on these plans. Special details are also available on the MDOT Web site.

1.02.02C Index

The index is always located on the right side of the Project information sheet. Plan sheets should be arranged in the order as shown in [Section 1.03.01](#). The index should show only the sheets included in the project. If bridges are included in the project (package project) they would be indexed "Section 2 - Bridge Plans" under the road sheets which would be referenced "Section 1 - Road Plans".

MICHIGAN DESIGN MANUAL ROAD DESIGN

7.01.05 (revised 4-24-2023)

Basic Concepts for Roadside Control

The following are basic concepts and design options for the use or non-use of roadside barriers. The primary sources of information for roadside control are found in the AASHTO documents listed in [Section 7.01.01](#), "References".

- A. A collision with a roadside barrier is considered a crash, because the barrier itself is a roadside obstacle.
- B. A roadside barrier may increase the frequency of crashes, therefore a barrier should only be installed if it will reduce the severity of potential crashes.
- C. When considering the design options for roadside treatment and the progression of design options basic concepts for roadside control should be as follows.
 1. Remove the obstacle or redesign it so it can be safely traversed.
 2. Relocate the obstacle to a point where it is less likely to be struck.
 3. Reduce impact severity by using an appropriate breakaway or traversable device.
 4. Redirect a vehicle by shielding the obstacle with a longitudinal traffic barrier and/or crash cushion.
 5. Delineate the obstacle if the above alternatives are not appropriate.
- D. Generally, a roadside barrier should be placed as far from the traveled way as conditions will permit. See [Section 7.01.30G](#).
- E. Compared to parallel guardrail installations, flared guardrail installations have the advantage of requiring less guardrail to effectively shield a hazard. However, guardrail installations have minimum grading requirements that must be met, and flared guardrail installations may not be economically feasible if extensive earthwork/slope flattening are required.

7.01.05 (continued)

Therefore, the decision to use a flared or parallel guardrail installation should be made on a case-by-case basis taking site-specific conditions into consideration.

- F. To uniformly compute the length of need for roadside barriers, a guardrail worksheet has been developed and should be used on both new and upgrading projects. Computation methods used on this worksheet complies with the guidelines described in the ***Roadside Design Guide***. It still remains important that all designers become familiar with the "Guide" to understand the design process. For determining the length of need when non traversable embankments are the only obstacles of concern, see [Section 7.01.30](#).

The worksheet shall be used by all designers, including consulting firms performing work for the Department, to compute guardrail length of needs.

The designer should fill in all data and compute each individual barrier run. This will assure proper compliance to standards and allow each barrier run calculation to be documented and checked for accuracy.

Construction field offices should be sent the completed worksheets for reference during project construction.

The worksheet does not cover all situations which may occur in the field, although it is expected to cover most installations. Any situation not covered by the worksheet shall be similarly documented, along with a sketch providing the details of the guardrail installation.

7.01.06 (revised 3-23-2026)

Guardrail Worksheet

The [Guardrail Worksheet](#) can be found on the [MDOT Development Guide](#) website published by the Design Services Section. To request access to the Development Guide, please contact MDOT-EngineeringSupportTraining@michigan.gov.

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ROAD DESIGN

7.07

NOISE BARRIERS

7.07.01 (revised 3-23-2026)

References

- A. 23 CFR 772, ***Procedures for Abatement of Highway Traffic Noise and Construction Noise***, FHWA, July 2010
- B. ***An Inventory of Traffic Noise Levels Along Limited Access Freeways in Michigan***, Revision of Research Report R-1013A, (formerly) Materials and Technology Division, July 1981.
- C. ***A Policy on Geometric Design of Highways and Streets***, AASHTO, 2018 7th Edition
- D. ***MDOT Highway Noise Analysis and Abatement Handbook***, January 2025
- E. ***Noise Barrier Wall Design Guidelines***, MDOT, 2024
- F. **Bridge Design Manual**, MDOT

7.07.02 (revised 3-23-2026)

General

The concept of traffic noise attenuation became an integral part of highway planning and design in 1976 when FHWA first issued ***Procedures for Abatement of Highway Traffic Noise and Construction Noise*** (currently 23 CFR 772). This regulation established two types of noise mitigation projects, which are continued to the present.

7.07.02 (continued)

Type I projects are for new highway construction, reconstruction of an existing highway, or the addition of one or more lanes to an existing highway. Guidelines for noise levels for residential, commercial, and special sites are listed in 23 CFR 772. If highway noise levels exceed the specified levels, on a regular basis, then noise mitigation must be considered. The warrants for noise barriers or other noise attenuation devices must include an economic cost-benefit analysis.

The State Transportation Commission (STC) established budgetary and road and bridge condition criteria in December 2007. These criteria were not met by Type II projects, which lead to the suspension of the Type II Noise Abatement Program from 2007 until the STC policy was revised in January 2025. The update removed the criteria and shifted the responsibility for determining the Type II program parameters to MDOT. Guidance from MDOT on the Type II program is anticipated to be available in 2026.

Type II projects are proposed Federal or Federal-Aid projects for noise abatement on an existing highway, with **no associated road project**. This is a voluntary program and states must meet certain requirements **to participate**. To be eligible for federal participation the Department had to establish a "Noise Barrier Policy", prepare an inventory of sites where highway noise levels exceed FHWA noise guidelines, and establish a priority system for treatment of the identified sites.

Noise attenuation is confined almost entirely to freeways, although there are one or two locations in the state where an earth mound sound barrier has been constructed along a free access route. Generally, the distance between access points, i.e., necessitating an opening in a barrier, are so close on a free access road that a barrier would not be practical.

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7.07.02 (continued)

Responsibilities for noise barrier investigation, evaluation, and design are generally divided as shown in the following chart:

Responsibilities for Noise Barrier Wall Planning and Design

Process	Responsible Unit
Technical investigation and analysis	Ancillary Structures Unit, Structure Program Division, Bureau of Bridges and Structures
Environmental documents	Environmental Services Section, Bureau of Development
Noise barrier aesthetics	Roadside Development Unit, Design Division
Noise barrier structural analysis	Special Structures Unit, Bureau of Bridges and Structures
Noise barrier design details	Road Design Unit, Region/TSC

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ROAD DESIGN

7.07.03 (revised 3-23-2026)

Technical Aspect of Sound Transmission

The sound pressure level (SPL) is equal to 20 times the logarithm of the ratio of the sound pressure measured to the reference sound pressure. The reference sound pressure is 20 x 10 Pascal. The unit of SPL is the decibel. The sound is also A weighted so that the measurement is similar to the frequency response of the human ear. The unit is abbreviated **db(A)**.

Because decibels are in logarithms, doubling the sound pressure only raises the decibel level 3 **db(A)**. Also, an apparent doubling of the sound level to the human ear occurs when the decibel level is increased by 10 **db(A)**. The human ear can perceive a difference at 1 **db(A)** when sound levels are presented on a comparative basis. However, the human ear cannot detect a change in highway noise level until the change amounts to about 3 **db(A)**. A 5 **db(A)** increase is considered readily perceptible.

7.07.04 (revised 3-23-2026)

Current Requirements and Practices

23 CFR 772 (July 2010) requires highway noise to be considered for each Federal or Federal-Aid Highway project. A noise study or noise analysis is required for Type I projects when noise sensitive land uses are present within the project area. If the predicted design year noise level is greater than the stated FHWA noise level guidelines, then the affected residential properties or special sites must be analyzed for possible noise abatement in conjunction with the highway improvement.

The Department has established noise guidelines for Type II noise barrier projects. These guidelines have received FHWA approval.

The Department was also instrumental in obtaining vehicle noise legislation. In 1978, Section 707 of the Michigan Vehicle Code was changed to limit the level of noise that a car, truck, or motorcycle can produce on a roadway. The Department assists local enforcement agencies in administering that law, and makes periodic noise measurements to ensure contractor compliance with construction noise specifications.

ROAD DESIGN MANUAL ROAD DESIGN

7.07.05 (revised 3-23-2026)

Process for Type I Projects

Type I projects are initiated by the environmental document prepared for each highway improvement project, whether it be an EIS, an EA, or a CE. The MDOT Noise Specialist, in coordination with the Noise Barrier Program Manager, oversees the noise study process. The noise study must look for traffic noise impacts at all noise sensitive locations within approximately 500 feet of the highway. Residential areas the most common noise sensitive land uses found along Michigan roadways. The threshold for a traffic noise impact at a residence is 66 dB(A) according to the MDOT Traffic Noise Handbook (2025). An impact also occurs if the project is expected to lead to an increase of 10 decibels or more from existing noise levels.

When noise impacts are identified, mitigation must be evaluated. Only noise mitigation measures that meet a set of criteria outlined in the MDOT Traffic Noise Handbook are recommended. The criteria consider if the mitigation measures effectively reduce traffic noise, if they are economical (cost/benefit), and if they are constructable (e.g. no major utility conflicts, sufficient ROW, safety factors, etc.).

If the mitigation measure meets all the above listed criteria, then those who will be most impacted by the mitigation measure will have the opportunity to vote on it. If at least half of the votes received are in favor of the mitigation measure, then it will move forward to construction, assuming no major conflicts are identified during design. If the wall is voted down by the impacted public, it will not be constructed.

7.07.06 (revised 3-23-2026)

Process for Type II Projects

The construction of Type II noise barrier projects is entirely dependent on if the program is active and, if so, the annual funding set aside in the program budget. The same federal funds that are used for Interstate preservation and capacity improvements also provide funding for noise abatement. There is more potential barrier construction classified as Type II than Type I, as Type II encompasses the entire trunkline system, not just new projects. A revised Type II process is being worked on and is expected to be completed in 2026.

ROAD DESIGN MANUAL ROAD DESIGN

7.07.07 (revised 3-23-2026)

Design Considerations for Noise Barriers

For information regarding noise barrier wall type selection, placement, plan preparation and other design considerations see the [Noise Barrier Wall Design Guidelines](#). The Roadside Development unit will work closely with the Road design unit in choosing details of the noise barrier.

For design considerations specific to bridge-mounted noise barrier walls, see the Bridge Design Manual Section 7.02.30.

7.07.08

Section deleted.

7.07.09

Section deleted.

MICHIGAN DESIGN MANUAL ROAD DESIGN

14.11 DESIGN EXCEPTIONS / DESIGN VARIANCES

(revised 3-23-2026)

After the scope verification meeting is held and the project scope has been agreed upon, the Project Manager should identify any Design Exceptions or Design Variances (DEs or DVs) that will be utilized in the design of the project (See [Section 3.08.01E](#)). Design Exceptions and Design Variances should be identified, and, ideally, completed during the scoping process using the Design Exception Form ([DE26](#)) or Design Variance Form ([DV26](#)). Consultation with the Geometrics Unit of the Design Division may be required to identify and develop justification for the exceptions or variances. Previously completed exceptions or variances should also be reviewed for accuracy at this time.

The Project Manager should request a folder be created for Design Exceptions or Design Variances in ProjectWise under the project number by e-mailing MDOT-ProjectWise@michigan.gov with a link to the project or by providing the TSC and the Job Number. Any consultant access to ProjectWise should also be requested at this time if it will be required. A DE folder and a DV folder will be created for each project. The folders will be located under "Supporting Documents" and "Design Exception-Design Variance".

For each Design Exception or Design Variance submitted, the Project Manager should place a single .pdf file containing the Design Exception or Design Variance Form, a predictive Highway Safety Manual (HSM) Crash Analysis, and other supporting documents in the proper folder. The Design Exception or Design Variance Form should be flattened or printed to a .pdf so it is no longer fillable. However, the Project Manager should also save a copy of the fillable form for future revisions. Changing the "state" of the document to "next" will shift control of the DE process to the Design Exception Coordinator or Chief Structure Design Engineer for comments (or to the Region Associate Engineer, Development for a DV). The Project Manager should address the e-mail that appears after changing state, to the appropriate recipient while maintaining the E-ProjectWise address to indicate that a Design Exception or Design Variance has been submitted for review. A similar return e-mail indicates that control has shifted back to the Project Manager with comments provided in the original document. Revised sheets should be inserted into the original document while eliminating the sheets with comments (Do not create an additional document in the folder for each round of comments that occur).

Once all indicated comments have been addressed, signatures are added to the package. The Crash Analysis and Crash Analysis Approval Memo (if necessary) can be hand signed, stamped, or electronically signed. Final signatures (electronic) are then added with OneSpan.

Design Exceptions are approved and signed by either the Engineer of Road Design or the Chief Structure Design Engineer. Design Variances are approved and signed by the Region Associate Engineer, Development. Once final signatures are obtained, the package is placed back into ProjectWise and the state advanced to "Approved" to complete the process. Design Exception/Variance forms are available on the MDOT website.

For additional information see Sections [3.09.02C](#), [3.10.03](#), [3.11.02D](#) and [3.11.03B](#).

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14.31 ENVIRONMENTAL REVIEW AND CLEARANCE

(revised 12-17-2018)

Environmental review and clearance is a two-step process: Environmental Classification (PPD Task 3150) and Environmental Certification (PPD Task 3155).

14.31.01 Environmental Classification

(PPD Task 3150)

(revised 3-23-2026)

Environmental Classification is required by the National Environmental Policy Act (NEPA). All projects must be reviewed for potential environmental impacts and classified according to the significance of those impacts. Class I Actions are those projects with significant environmental impacts and require the preparation of an Environmental Impact Statement (EIS). Class II Actions have minor or no environmental impacts and require Categorical Exclusion (CE) documentation **on the Environmental Classification/Certification (Supplied by Environmental Clearance Coordinator)**. Class III Actions are projects where the significance of the impacts is not known and require the preparation of an Environmental Assessment (EA).

Most projects are classified as CEs. However, environmental review is still required to identify non-significant environmental impacts, and establish measures to mitigate those impacts. Measures to mitigate can include avoidance, design changes, protective measures, or replacement. Establishing mitigation measures can be complex and require coordination with state, federal and local resource agencies. Often, mitigation measures can be developed through collaboration between the Project Manager (PM)/Cost and Scheduling Engineer and MDOT Environmental Staff.

The Environmental Clearance Coordinator (ECC) will contact the PM about one year prior to the Base Plan Date (BPD), or upon notification of project programming (JobNet) for projects of short development duration. The ECC will request information about the scope and location of the project. This information can include the extent of grading and filling, Right-of-Way requirements, detour information, etc., and is critical in assessing project environmental impacts. The project description, location, and other pertinent project information are put on the **Environmental Classification/Certification (Supplied by Environmental Clearance Coordinator)**. MDOT Environmental Staff may contact the PM for more details about the project in order to assess impacts.

Once impacts are assessed, collaboration occurs between the PM and MDOT Environmental Staff, to develop mitigation measures. The goal of collaboration is to develop measures that both allow the project to accomplish its transportation goal and minimize impacts to the environment. Once impacts are identified and mitigation measures established the project can be classified as a CE. The PM will be notified and the **Environmental Classification/Certification (Supplied by Environmental Clearance Coordinator)** and supporting documentation will be stored in ProjectWise under the Project Job Number. Classification is also recorded in JobNet. Classification is scheduled to occur on or before the completion of Base Plan Review (PPD Task 3380).

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14.31.01A Preliminary Design Activity

Prior to completions of the NEPA review process, preliminary engineering and other activities and analyses must not materially affect the objective consideration of alternatives in the NEPA review process. FHWA defines Preliminary Design as activities that define the general project location and design concepts. It includes, but is not limited to, preliminary engineering and other activities and analyses, such as environmental assessments, topographic surveys, metes and bounds surveys, geotechnical investigations, hydrologic analysis, hydraulic analysis, utility engineering, traffic studies, financial plans, revenue estimate, hazardous materials assessments, general estimates of the types and quantities of materials, and other work needed to establish parameters for the final design.

If the information required for classification requires engineering work or environmental coordination extending beyond the BPD, the PM must receive approval from the ECC to continue work limited to the following tasks:

Task	PPD Tasks	Task Extension	Approval
Preliminary Plan Preparation	3500 Series	Note 1	Note 3
Utilities/Railroad	3600 Series	Note 1	Note 3
Mitigation/Permits	3700 Series	Note 1	Note 3
Prepare/Review Final Traffic Signal Operations	3825	Note 1	Note 3
Early ROW Work	4100 Series	Note 1	Note 3
ROW Technical Work	4150 Series	Note 1	Note 3
ROW Appraisal Work	4350 Series	Note 1	Note 3
Safety and Mobility Peer Team Review	3800	Note 2	Note 4
Conduct Final Geometrics and Roadside Safety Reviews	3810	Note 2	Note 4
Geotechnical Design Review - Structures	3815	Note 2	Note 4
Prepare/Review Final Traffic Signal Design Plan	3821	Note 2	Note 4
Complete Permanent Pavement Marking Plan	3822	Note 2	Note 4
Complete Non-Freeway Signing Plan	3823	Note 2	Note 4
Prepare/Review Final Traffic Signal Operations	3824	Note 2	Note 4
Complete the Maintaining Traffic Plan	3830	Note 2	Note 4
Develop Final Plans and Specification	3840	Note 2	Note 4
Develop Structure Final Plans and Specifications	3850	Note 2	Note 4
Final Constructability Review	3860	Note 2	Note 4
Project Plan Quality Assurance Review	3865	Note 2	Note 4

1. Up to Plan Review
2. Up to Plan Completion
3. ECC notification of approval by Bureau of Development Environmental Manager
4. ECC notification of approval by FHWA and Bureau of Development Environmental Manager

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The Bureau of Development Environmental Manager will report to FHWA each quarter of the fiscal year the number of projects that have allowed any of the tasks noted above to be performed before the environmental classification.

Final design or Right-of-Way acquisition cannot proceed prior to classification. FHWA defines final design as any design activities following preliminary design and expressly includes the preparation of final construction plans and detailed specifications for the performance of construction work.

14.31.01B Mitigation Requirements

Between base plans and quality assurance review, environmental mitigation measures are to be fully developed and detailed in the plan package.

Development of the materials necessary to convey the environmental mitigation measures within the Environmental Classification/**Certification (Supplied by Environmental Clearance Coordinator)** will include but not be limited to:

- Project specific Plan Notes
- Notice to Bidders
- Unique Special Provisions

Design staff must take into account that individual pay items needing modification to meet the requirements of environmental mitigation measures require the inclusion of an appropriate unique or frequently used Special Provision to ensure proper construction.

The Environmental Classification/**Certification (Supplied by Environmental Clearance Coordinator)** filled out by the ECC will have highlighted mitigation measures in bold text to signify that those measures are to be transmitted directly to the TSC Construction Engineer for the project.

Design staff will prepare a Special Design Consideration Memo to be transmitted to the Construction Engineer for their use at the Pre-Construction meeting. The memo should highlight the specific environmental mitigation measures in the plans and proposal and include construction specific instructions related to environmental mitigation highlighted with bold text in the Environmental Classification/**Certification (Supplied by Environmental Clearance Coordinator)**.

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14.31.01C Special Design Considerations Memo

Preparation of the Special Design Considerations Memo (SDCM) if applicable to the project will be started in a draft form by the PM and in coordination with design personnel once the PM is in receipt of the Environmental Classification/**Certification (Supplied by Environmental Clearance Coordinator)** from the ECC. This draft will include the bolded items from the Environmental Classification/**Certification (Supplied by Environmental Clearance Coordinator)** and any other design issues that may need special consideration to include but not be limited to:

- Environmental mitigation and restrictions.
- Property Owner Agreements from negotiations involving the purchase of Right-of-Way.
- Unique design features that must not be modified in construction.

The DRAFT SDCM should be submitted with The Plan Review Meeting material submittal for review.

A final SDCM should be prepared and submitted with the FPC package and defined on the Design Plan Submittal Form (0303 – Comments Section) and noted on the Milestone Checklist – Supporting Documents Section – Environmental Classification/**Certification** Row. This final copy should be reviewed by the ECC and the Construction Engineer to resolve any potential conflicts with constructability.

Transmittal of the SDCM from the PM to the TSC Construction Engineer will occur between the FPC Meeting and the Pre-Construction Meeting. A potential reason to wait for final submittal of the SDCM would be to include any items of note that should be brought to the attention of the Construction staff and the Contractor due to plan revisions, addenda, and contractor inquiries that occurred during that time frame.

It will be the responsibility of the Project Manager and the ECC to ensure that all mitigation measures whether or not highlighted in bold on the Environmental Classification/**Certification (Supplied by Environmental Clearance Coordinator)** are incorporated into the project plans and proposal.

The Construction Engineer will be responsible for ensuring that the contractor is made aware of all environmental mitigation measures and the consequences of not meeting them.

The environmental section of the Pre-Con Boilerplate has been written to ensure this Memo is read at that meeting.

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14.31.02 Environmental Certification

(PPD Task 3155)
(revised 3-23-2026)

Environmental Certification is the final step in the Environmental Review and Clearance Process. This task takes place during Project Plan Quality Assurance Review (PPD Task 3865). During Certification, plans and other documents are reviewed to ensure that all areas of concern are avoided, all mitigation measures are in place, and all commitments adhered to. This review is conducted by the ECC and documented on the Environmental Classification/**Certification** (Supplied by **Environmental Clearance Coordinator**).

If all mitigation measures are in place and all commitments adhered to, the project will be certified. The PM will be notified and Environmental Classification/**Certification** (Supplied by **Environmental Clearance Coordinator**) and supporting documentation will be stored in ProjectWise under the Project Job Number. Certification is also recorded in JobNet.

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14.60 SUBMISSION OF COMPLETED PLANS

14.60.01 General

(revised 11-22-2021)

The final plan/proposal package should be submitted to the Specifications and Estimates Unit on or before the date listed in the calendar year's schedule of Letting and Board Dates. This date should not be confused with "Plan Completion Date." Plan completion date occurs after the FPC Meeting and is the date when 100% of the plans are completed. See [Section 14.54](#) for task timelines. A copy of the letting schedule is located on the Plan Development SharePoint site.

The Supervisor of the Specifications and Estimates Unit will determine which projects are candidates for letting with 3 or 4 week advertisements. Projects proposed for 3 week advertisements must have the approval of the Engineer of Design (except for Capital Preventive Maintenance, Non-Freeway Resurfacing Program and Pavement Marking projects). Projects proposed for a 6 week advertisement require notification with the Supervisor of the Specifications and Estimates Unit, and must be submitted one week prior to normal turn in. All other projects will utilize a 5 week advertisement period.

Once a project is submitted to the Specifications and Estimates Unit the Project Manager can check ProjectWise for the status of a project.

Upon receipt of the plan/proposal package for processing, the Specifications and Estimates Unit may ask to review the project with the Design Unit in order to gain an insight into the type of work involved to determine if any additional special provisions and/or supplemental specifications are required.

14.60.02 Requirements

(revised 3-23-2026)

Advertisement cannot occur until all projects within a contract have funding obligation. Funding obligation requests cannot occur without the following:

- All change requests in JobNet are approved
- Environmental Certification or Classification in JobNet is up to date
- ROW Certification or Conditional Certification is approved
- S/TIP CON phase is approved – if a JobNet change request increases the project budget significantly, a previously approved S/TIP phase may become pending, and will need to be approved again before obligation can occur
- FHWA has signed off on the CA Form, if necessary

Expedited or other projects requiring special attention should be brought to the attention of the Supervisor of the Specifications and Estimates Unit prior to submittal. This includes projects without all the material described above.

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All plan/proposal package and final supporting document submittals should include at least the following, in addition to the plans:

1. Title Sheet
2. Signed / Completed Project Signature Sheet
3. Milestone Checklist
4. Proposal level cost summary (AP Preconstruction)
5. Unique special provisions (approved for project use) including maintaining traffic
6. Frequently used supplemental specifications and special provisions (package and checklist)
7. Required permits
8. Utility Relocation Status Report ([Form 2286](#))
9. Utility Charge Estimate ([Form 0223](#)) - for bridge projects
10. ROW Certification for Advertising (Form 0725I or Form 0725N)
11. Coordination clauses
12. Signed / Completed Certification Acceptance File
13. Notices to Bidder
14. Progress schedule with any incentive/disincentive clauses
15. Project Cost Estimating Checklist ([Form 0268](#))
16. Exception with a memorandum signed by the Region Engineer acknowledging the risks and a completed Exception Risk Analysis ([Form 2912](#)).
17. Signed / Completed RBPI (Risk Based Project Involvement) Stewardship & Oversight Action Plan form (if applicable)

The Project Manager must get approval from the Supervisor of the Specifications and Estimates Unit prior to submitting a final package without **ALL** of the above items.

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CHAPTER 7 - LRFD

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7.02.31 Precast Box/Three Sided/Arch Culverts (2-22-2022)

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7.03.11 Concrete Sealers (5-1-2000)

7.03.12 Mechanically Stabilized Earth (MSE) Wall Requirements (8-20-2009)

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7.04 STEEL REINFORCEMENT (11-28-2011)

7.04.01 Steel Reinforcement

7.04.02 Stainless Steel Reinforcement

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7.02.28

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

Where bridge railing is to be installed, and no sidewalks are present or the sidewalk is located behind the railing, install one of the bridge railing types currently approved for use by MDOT. The only MDOT-approved bridge railing types are Type 6 Barrier (see Standard Plan B-29-Series), Type 7 Barrier (see Standard Plan B-28-Series), 2 Tube railing (see Standard Plan B-21-Series), 4 Tube railing (see Standard Plan B-26-series), Aesthetic Parapet Tube railing (see Standard Plan B-25-Series) and 3 Tube With Pickets (see Standard Plan B-27-Series).

Where bridge railing is to be installed on raised sidewalks, use only 4 Tube railing (see Standard Plan B-26-series), Aesthetic Parapet Tube railing (see Standard Plan B-25-Series), or 3 Tube with Pickets (see Standard Plan B-27-Series).

A. Railing Types and Their Use (9-2-2003) (11-25-2019) (10-24-2022)

In general, use Bridge Barrier Railing, Type 6, on all new structures and reconstruction (major rehabilitation) bridge projects without sidewalks (see Standard Plan B-29-Series). Substitute Type 7 Barrier on structures where sight distance or clear roadway width is a problem (see Standard Plan B-28-Series). Bridge Barrier Railing, Type 6 and Type 7 are preferred on freeways and interstate routes. At stream crossings or scenic areas, use Bridge Railing, 2 Tube, Aesthetic Parapet Tube, 4 Tube or 3 Tube with Pickets (see Standard Plan B-21-Series, B-25-Series, B-26-Series or B-27-Series). Do not use Bridge Railing, 2 Tube on freeways and interstate routes or adjacent to pedestrian traffic because the height is insufficient. On bridges where pedestrian or bicycle traffic is separated from vehicular traffic by a standard barrier, it is not necessary to provide a vehicular railing at the fascias. In such cases, pedestrian fencing is desirable.

For structures without sidewalks, but where some pedestrian traffic is likely, install a Bridge Railing, 4 Tube, Aesthetic Parapet Tube or 3 Tube with Pickets.

7.02.28 (continued)

B. Joints (6-27-2022)

To avoid cracking, an open joint is required in concrete railings at all deck joints where reinforcing steel is not continued through the joint. False joints are not required in barrier railing.

Use a 1" joint in all concrete railings over the piers of continuous decks, at midspan on all structures with a span greater than 100'-0" and cantilever decks where the cantilever is more than 10'-0" long. The joint must be perpendicular to the centerline even on skewed bridges. Use a 1" joint filler to fill the joint to ½" from the bevels of the railing. Seal the remaining ½" with a polyurethane or polyurethane hybrid sealant. (5-1-2000) (2-21-2017)

C. Median Barrier vs. Bridge Barrier Railing (5-6-99)

Criteria for use:

1. Concrete barrier on a bridge must be reinforced and attached to the structure.
2. Barriers that function as railings must be at least 3'-6" in height.
3. Barriers that function as median barriers must be at least 2'-8" in height.
4. Concrete glare screens required on approaches must be continued across structures.
5. When structures are spaced 150'-0" apart or less along the traveled roadway, install a concrete barrier (Concrete Barrier, Single Face or approved alternate) between the two structures, in lieu of guardrail, to provide continuity. Approval by the agency having jurisdiction of the approaches is required.

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7.02.29

Fencing

A. MDOT's Policy

For protective screening, follow AASHTO's A Guide for Protective Screening of Overpass Structures.

Consider protective screens under any of the following conditions:

1. Reported incidents of objects being dropped from an overpass.
2. On overpasses with walks where experience on nearby structures indicates a need for screens.
3. On overpasses in large urban areas used exclusively by pedestrians.
4. On overpasses near a school, a playground, or elsewhere where it would be expected that the overpass would be frequently used by children unaccompanied by adults.

B. Metro Region Criteria (9-2-2003)

Contact the Region Project Development or Bridge Engineer to determine if pedestrian screening/fencing must be added to projects. General criteria:

1. Include bridge screening when major bridge rehabilitation is scheduled for a structure.
2. Railroad structures must have bridge screening due to the presence of ballast and discarded rail spikes.
3. Screening is not required for structures without designated pedestrian access. This includes, but is not limited to, freeway to freeway connecting structures and all freeway ramp structures.

For additional information on pedestrian fencing, see Section 7.05 and Section 2.02.11.

7.02.30

Bridge Mounted Noise Walls (3-23-2026)

While the guidance provided herein is specific to bridge mounted noise walls, it may be relevant to noise walls mounted on other types of structures. Follow the guidance herein where relevant and consider all other applicable design criteria and structure-specific issues.

A. General Considerations

In addition to the guidance provided in this section, refer to the design criteria outlined in the **MDOT Noise Barrier Wall Design Guidelines** as it is applicable to bridge mounted noise walls or when specified herein.

1. Naming Bridge Mounted Noise Walls

Refer to the structure number naming convention in the **Michigan Ancillary Structures Inspection Manual (MiASIM)** when providing a name for bridge mounted noise walls on plans.

2. Wall Height

Avoid steps in the noise wall height. Designers must follow the requirements outlined in the **MDOT Noise Barrier Wall Design Guidelines Section 2.03.03**.

3. Zone of Intrusion

Place bridge mounted noise walls outside the zone of intrusion (ZOI) as defined by the **AASHTO Roadside Design Guide Section 5.5.2** when possible.

When designers must locate noise walls inside the ZOI, it is preferred to anchor posts to the back face of bridge barriers to better accommodate ZOI requirements.

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7.02.30 (continued)

4. Wall Endings

Avoid blunt ends by providing a sloped panel at the end of the bridge. If the noise wall must continue off of the bridge, then extend the bridge mounted wall onto the bridge approach in order to provide an overlap with the adjacent ground-mounted wall satisfying the 4D rule as defined in the **MDOT Noise Barrier Wall Design Guidelines Section 2.01.02**. This may require use of a moment slab to provide the required overlap. Provide a sloped panel at the end of the structure-mounted noise wall. Adhere to the **MDOT Noise Barrier Wall Design Guidelines Section 2.03.02** for crash protection beyond the extents of the bridge.

5. Expansion Joints

Bridge mounted noise walls and their connections must adequately accommodate the expansion, contraction, rotation, and increased stiffness of the bridge superstructure it is attached to. Determine locations of wall expansion joints according to **AASHTO LRFD Section 15.6**.

B. Wall Types

Coordinate the noise wall type selection with the project noise analysis and ensure the selected system provides the noise abatement used in the analysis. For example, the noise analysis may include use of absorptive noise barriers which must be considered in the selection of noise wall type.

Regardless of wall type, avoid gaps between the noise wall and bridge to prevent debris from falling onto traffic below. Include a joint in the noise wall wherever there is a joint in the barrier system, including expansion joints.

The most common bridge mounted noise walls include:

1. Metal post and concrete panel systems mounted to the back of concrete railings.

7.02.30 (continued)

2. Cast-In-Place concrete noise walls on top of concrete railings.

3. Metal post and composite or acrylic panel systems mounted to the back of concrete railings.

Various proprietary and non-proprietary systems of these noise wall types exist. If the designer uses a system with posts, they must detail the posts to be vertical.

Designers must only use systems that have successfully passed crash testing consistent with MASH criteria for both proprietary and non-proprietary systems. Crash testing documentation must consist of an FHWA letter or certified crash testing facility report. The MDOT Chief Structure Design Engineer must approve the crash testing documentation.

When roadway design speeds are 40 mph or less, design walls and their components for MASH TL-2 or higher. When design speeds are 45 mph or more, design walls and their components for MASH TL-4 or higher.

C. Non-Proprietary Wall Design Criteria

Design and detail non-proprietary noise walls and their connections per the requirements specified in **AASHTO LRFD Section 15**. Design and detail the associated bridge railing per the requirements specified in **AASHTO LRFD Section 13**.

See the **MDOT Noise Barrier Wall Design Guidelines Section 2.04.03** for guidance on handling, hauling, and lifting of precast wall elements.

The following information is supplemental to design guidance provided in **AASHTO LRFD**.

1. Wind Load

Designers should determine wind loading using **AASHTO LRFD Section 15**.

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7.02.30 (continued)

2. Snow and Ice Load

Designers do not need to consider horizontal or vertical snow and ice loading on the noise wall as vehicle collision and live loads will govern.

3. Fatigue

Avoid details with poor fatigue performance. Evaluate fatigue caused by wind loading using **Section 11 of AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.**

D. Proprietary Wall Design Criteria

If a proprietary system is used, it must meet the specifications provided in the previously approved special provision for Structure-Mounted Lightweight Noise Barrier Wall.

Designers must ensure that the bridge barrier is consistent with the barrier used during crash testing of the proprietary noise wall system.

E. Bridge Design Considerations

Designers must consider the effects bridge mounted noise walls have on the entire structure, both proposed and existing components, in particular but not limited to the deck and beams.

Designers may mount noise walls to existing bridges when the bridge is receiving a deck or superstructure replacement, or deck widening. Mounting noise walls to existing bridges outside of these circumstances is not permitted unless the designer replaces the existing bridge barrier. They must also remove and replace a portion of the existing bridge deck along the fascia to ensure applicable loads can be transferred accordingly. Determine the width of deck removal based on the beam spacing and the development length needed to provide adequate connection to the existing bridge deck reinforcement in accordance with **AASHTO LRFD 5.10.**

7.02.30 (continued)

Designers must consider the existing condition, original loading, and design criteria of the bridge's existing components to remain when attaching noise walls to existing bridges. If adding a noise wall to an existing bridge requires strengthening of the existing beams, consider other alternatives including but not limited to a superstructure replacement or beam replacement. See the following sections for additional considerations.

The following guidance applies to both existing and new bridges.

1. Dead Loads

When noise walls are mounted to bridges the increased dead load at the fascia requires the checking of various items:

a. Potential Negative Camber

Designers must account for the expected dead load of the noise wall when designing camber of steel members for new bridges. For prestressed members, negative camber must be checked in the final condition and avoided if possible.

With existing bridges, designers must check for negative camber. If present, consider issues including, but not limited to, whether vertical clearance is reduced below required limits and possible public perception of "sagging" beams. Consider lightweight wall types or superstructure strengthening to avoid negative camber.

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7.02.30 (continued)

b. Slab and Screed Adjustments

Designers must account for the weight of the noise wall system when calculating slab and screed elevations. Consider that contractors may set the screed machine to the cross-slope of the final slab surface when they construct the slab. When the wall and bridge barrier are placed after the deck is poured, the added weight may cause additional deflection or negative camber at the fascia beam. As a result, final deck cross slopes may vary producing potential ponding areas, and compromised ride quality. These issues may increase maintenance needs and shorten the service life of the bridge.

Evaluate the potential discrepancy in final cross-slopes and provide mitigation measures if the deviation from the proposed cross-slopes would exceed normal construction tolerances.

c. Dead Load Assumptions

Designers utilizing proprietary systems must estimate the noise wall dead load using the special provision requirements for the various noise wall components and include an allowance to address uncertainties in the actual provided weight of the system.

When proprietary noise wall system shop drawings are submitted, the designer must compare the actual dead load of the system with the assumed design load to confirm the actual load is less. Consider if any changes to slab and screed elevations are necessary given the actual weight of the provided system.

7.02.30 (continued)

d. Dead Load Distribution

Apply noise wall dead loads by distributing 75% of the load to the fascia beam and 25% to the first interior beam and apply this distribution to all bridge components impacted by the noise wall.

Use the least favorable loading cases, load factors, and combinations in all design checks.

2. Slab Overhang Design

Design slab overhangs for all loads induced by the noise wall as required by **AASHTO LRFD** and the provisions herein, including but not limited to dead load, wind load, and vehicular collision loads. Design slab overhangs per the requirements outlined in **Section 13** of **AASHTO LRFD**.

Additionally, consider the impacts on the first interior slab bay and the fascia rebar cut off lengths from all noise wall loadings. If the capacity is not adequate for an existing bridge, retrofit the interior slab bay to accommodate the increased load.

3. Uplift and Overturning

Bridge mounted noise walls can introduce unbalanced mass to the structure which can impact the load distribution across the girders and overall structural behavior.

Designers must consider overturning forces generated by horizontal wind loads on the wall in all applicable load combinations alongside vertical wind loads per **AASHTO LRFD Section 3.8.2**.

Ensure that all bridge components supporting either proprietary or non-proprietary noise wall systems resist the vehicular collision loads from **AASHTO LRFD Section 15.8.4**.

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7.02.30 (continued)

Bridges with horizontally curved girders or complex geometries may require refined analysis to accurately capture the distribution of overturning forces. Ensure that uplift at bearings does not occur under any load combination. Consider using a lightweight noise wall system or selectively increasing the size of components to act as a counterweight in order to eliminate uplift.

4. Torsionally Stiff Fascia Beams

Torsionally stiff fascia beams such as box beams are often assumed to resist minimal torsional loading and may not be explicitly checked for torsional effects. They may be required to resist significant torsional moments due to wind load effects when noise walls are mounted on bridges. Thus, designers must evaluate the torsional demand on the fascia beams and design them as specified in **AASHTO LRFD Sections 4.6, 5.7, and 6.11**. Consider a lighter noise wall system or provide additional load paths to distribute the torsion such as adding cross frames if beams are unable to be designed to resist the effects of torsion.

7.02.31 (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.

7.02.31 (continued)

- 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.
- 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.

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7.02.32 (11-28-2011)

Deck Replacements

With deck replacements or widening projects (or reconstruction projects), the structural adequacy of the entire structure shall be evaluated. In addition to the criteria listed below, deck replacements shall meet all requirements listed in this chapter (e.g. slopes, shoulder width, stay in place deck forms and approach items). Consider all modes of transportation and evaluate whether deck replacement or widening can accommodate all users. (12-16-2019)

A. Beams

1. On concrete T-Beam bridges the deck slab is an integral part of the support system and cannot be removed without dismantling the entire superstructure. The cost of deep chipping (or hydrodemolishing) combined with the installation of a cathodic protection system should be weighed against the cost of complete superstructure replacement.
2. On steel stringer bridges, the tops of beams shall be blast cleaned and coated with an organic zinc-rich primer. Shear connectors shall be placed to upgrade the capacity of existing non-composite decks. (12-5-2005)
3. On prestressed concrete side by side box beam decks, the existing wearing course is replaced with a 6" reinforced deck.
4. On older steel stringer bridges, lateral bracing was often added as a part of the original construction. If lateral bracing was removed subsequent to the original construction, consider whether the beams require temporary lateral bracing during the deck replacement. (6-27-2022)

B. Railings

Railings shall be upgraded when bridge deck replacements are planned. See section [7.02.28](#).

7.02.32 (continued)

C. Geometrics

Criteria for roadway widths and design loading have been established in ***A Policy on Design Standards - Interstate System***, 2016, and ***A Policy on Geometric Design of Highways and Streets, 2011, 6th Edition*** published by AASHTO. These criteria are based on the type of roadway carried by the structure and are summarized in this section. Non Interstate structures with deck replacements or widening projects (or reconstruction projects) shall adhere to ***A Policy on Geometric Design of Highways and Streets, 2011, 6th Edition*** design criteria (standards). Interstate structures shall adhere to ***A Policy on Design Standards - Interstate System***, 2016. MDOT policy has set bridge (shoulder) widths 2' (offset) greater than AASHTO widths for safety considerations of the traveling public. See Bridge Design Guides [6.05 Series](#) & [6.06 Series](#). (6-27-2022)

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7.02.32 Deck Replacements (Cont.)

CLEAR ROADWAY WIDTHS AND DESIGN LOADING FOR DECK REPLACEMENTS		
Type of Roadway	Minimum Clear Roadway Width	Minimum Design Loading
Non-Interstate Freeway	A, C	HL-93
Interstate Freeway	B, C	HL-93
Arterial (Non-Freeway Trunkline)	Rural	Table 7-3.
	Urban	D, C
Collector (Non-Trunkline)	Rural	Table 6-6.
	Urban	Table 6-5., E
Local (Non-Trunkline)	Rural	Table 5-6.
	Urban	Table 5-5., E

- (A) The minimum clear roadway provided shall accommodate the pavement and full shoulders of the approach roadway or the minimum AASHTO requirements for lane and shoulder widths, whichever is greater.
- (B) The minimum clear roadway provided shall accommodate the pavement and full shoulders of the approach roadway.
- (C) For bridges in excess of 200'-0" in length, where the nearest offset from the edge of traveled way to either curb or barrier is greater than 4'-0" on the approaches, the nearest offset on the bridge shall be at least 4'-0" on each side. (12-5-2005)
- (D) The minimum clear width on the bridge shall be the same as the curb-to-curb width of the street.
- (E) The minimum clear roadway shall be the traveled way plus 1'-0" to each curb face. However, consideration should be given to providing the same width as the curb-to-curb approach width if it is cost effective to do so.

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The tables shown below are derived from A Policy on Geometric Design of Highways and Streets, 2011, 6th Edition published by AASHTO and do not include clearances for bridge rail offset. See the Bridge Design Guides for MDOT offset criteria. (6-27-2022)

MINIMUM WIDTH OF TRAVELED WAY FOR RURAL ARTERIALS (FROM Table 7-3.)				
Design Speed(mph)	Design Traffic Volume (veh/day)			
	Under 400	400-1500	1500 -2000	over 2000
	Width of Traveled Way (ft) ^(a)			
40-45	22	22	22	24
50-55	22	22	24	24
60-75	24	24	24	24

^(a) On roadways to be reconstructed, a 22 ft traveled way may be retained where the alignment is satisfactory and there is no crash pattern suggesting the need for widening.

MINIMUM CLEAR ROADWAY WIDTHS FOR RURAL ARTERIAL BRIDGES BEING RECONSTRUCTED (FROM Table 7-3.)	
Design Traffic Volume(veh/day)	Min. Clear Roadway Width of Bridge
under 400	Traveled way + 4 ft (ea. side)
400-2000	Traveled way + 6 ft (ea. side) ^(b)
over 2000	Traveled way + 8 ft (ea. side) ^(b)

^(b) For bridges in excess of 200 ft in length, a minimum width of traveled way + 4 ft on each side will be acceptable.

MINIMUM WIDTH OF TRAVELED WAY FOR COLLECTOR ROADS (From Table 6-5)				
Design Speed(mph)	Design Traffic Volumes (veh/day)			
	Under 400	400-1500	1500 -2000	over 2000
	Width of Traveled Way (ft)			
20-30	20 ^(a)	20	22	24
35-40	20 ^(a)	22	22	24
45-50	20	22	22	24
55-60	22	22	24	24

On roadways to be reconstructed, a 22 ft traveled way may be retained where the alignment is satisfactory and there is no crash pattern suggesting the need for widening.

^(a) A 18 ft minimum width may be used for roadways with design volumes under 250 veh/day.

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MINIMUM ROADWAY WIDTHS FOR NEW AND RECONSTRUCTED BRIDGES CARRYING RURAL COLLECTOR ROADS (From Table 6-6)		
Design Traffic Volume(veh/day)	Minimum Roadway Width of Bridge	Design Loading Structural Capacity
400 and Under	Traveled way + 2 ft (each side)	HL-93
400 to 1500	Traveled way + 3 ft (each side)	HL-93
1500 to 2000	Traveled way + 4 ft (each side) ^(a)	HL-93
over 2000	Traveled way + shoulders ^(a)	HL-93
Where the approach roadway width (traveled way plus shoulders) is surfaced, that surface width should be carried across the structures.		
^(a) For bridges in excess of 100 ft in length, the minimum width of traveled way plus 3 ft on each side is acceptable.		

MINIMUM WIDTH OF TRAVELED WAY FOR LOCAL ROADS (from Table 5-5)				
Design Speed(mph)	Design Traffic Volumes (veh/day)			
	Under 400	400-1500	1500 -2000	over 2000
Width of Traveled Way (ft)				
15	18	20	20	22
20-40	18	20	22	24
45-50	20	22	22	24
55-60	22	22	24	24
Where the width of traveled way is shown as 24 ft, the width may remain 22 ft m on reconstructed highways where there is no crash pattern suggesting the need for widening.				

MINIMUM CLEAR ROADWAY WIDTHS AND DESIGN LOADINGS FOR NEW AND RECONSTRUCTED BRIDGES CARRYING RURAL LOCAL ROADS (From Table 5-6)		
Design Traffic Volume(veh/day)	Min. Clear Roadway Width of Bridge	Design Loading Structural Capacity
ADT 400 & under	Traveled way + 2 ft (ea. side)	HL -93
ADT 400-2000	Traveled way + 3 ft (ea. side)	HL -93
ADT over 2000	Traveled way + shoulders	HL -93

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7.02.32 Deck Replacements (Cont.)

D. Salvaging Shear Developers

(10-24-2022)

For full or partial deck replacements on steel superstructures with stud type shear developers, shear developers should be left in place and reused whenever possible to minimize the risk of damage (and associated delays) to the steel beams/girders. For steel superstructures with spiral/coil type shear developers, remove the spirals/coils and install stud type shear developers using the appropriate pay items included in the MDOT Standard Specifications for Construction. If shear developer type cannot be confirmed with existing plans, contact the MDOT Bridge Construction Engineer to request a field investigation to confirm existing shear developer type.

The removal, furnishing, and installation of the additional shear developers is included in the special pay items listed in the Frequently Used Special Provision for Bridge Deck Removal and Salvaging Shear Developers on Steel Beams. Include a quantity equal to approximately 5% of the original shear stud total to account for existing damaged or deteriorated studs that must be removed and replaced. If additional studs are needed to meet strength requirements per AASHTO and Section 7.02.15, add quantity and detail proposed studs in relation to the existing studs on the plans. The location of the additional shear developers must account for the minimum spacing and edge distance requirements specified in AASHTO LRFD. If additional beam lines are being added to the superstructure as part of the deck replacement project the studs required on the new beam are included in the pay items listed in the Frequently Used Special Provision. Detail the transverse spacing and longitudinal pitch as part of the structural steel details.

(3-27-20223)

Where the existing shear developers are not tall enough to extend sufficiently into the new bridge deck per Bridge Design Guide 8.07.01, add EA04, EW05, and EK05 bars to haunch, similar to Bridge Design Guide 6.42.03A.

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7.02.32 Deck Replacements (Cont.)

E. Pour Sequence for Superstructures with Pin and Hanger Assemblies (5-28-2024)

When replacing the bridge deck on superstructures with pin and hanger assemblies the pour sequence must be carefully considered. Generally, the sequence should call for the deck over the suspended spans to be poured first followed by the positive moment areas of the remaining spans. If the length of the cantilever (measured from the centerline of bearing at the pier to the centerline of the pin and hanger assembly) is relatively short, the negative moment areas over the piers and the cantilever can be poured with the positive moment area. If the length of the cantilever is relatively long, the negative moment area over the piers and the cantilever should be poured separate from the positive moment area of the cantilever span. Short cantilevers are considered 10 feet or less in length.

7.02.32 (continued)

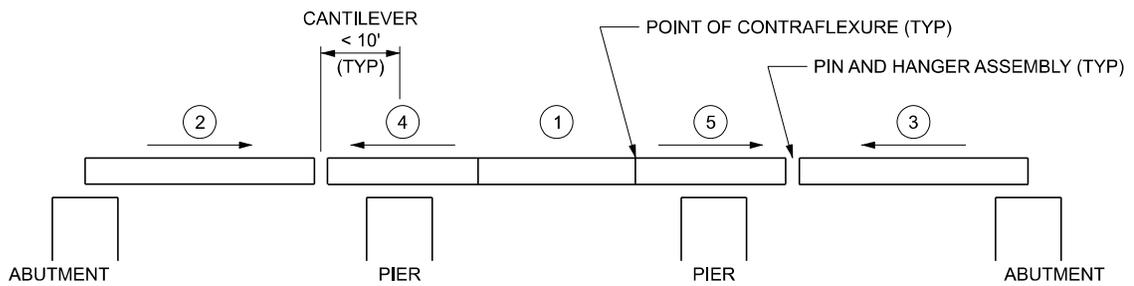
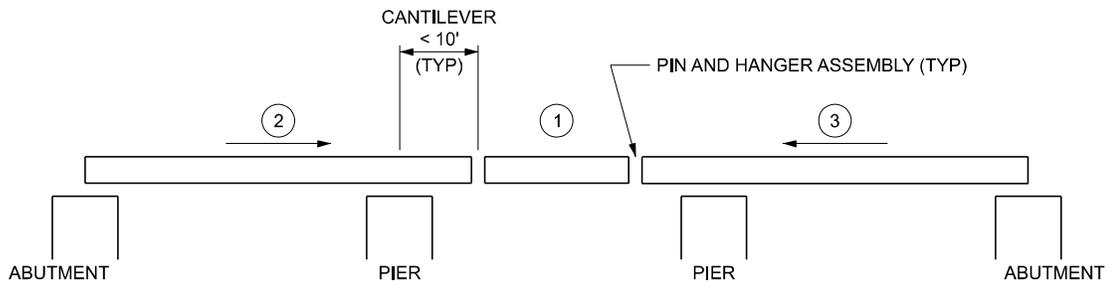
The direction of the pour must also be considered. Generally, the following pour directions should be called for on the plans:

1. Suspended spans with pin and hanger assemblies at both ends – the pour can progress in either direction and should be left to the Contractor to decide based on their preferred means and methods.
2. Suspended spans supported on one end by an abutment and on the other end by a pin and hanger assembly - the pour should progress from the abutment toward the pin and hanger assembly.
3. Positive moment areas of cantilever spans with one end supported by an abutment – the pour should progress from the abutment toward the cantilever.
4. Positive moment areas of cantilever spans with both ends supported by piers and with cantilevers on both ends – the pour can progress in either direction and should be left to the Contractor to decide based on their preferred means and methods.
5. Negative moment areas of cantilever spans – the pour should progress from the point of dead load contraflexure toward the pin and hanger assembly.

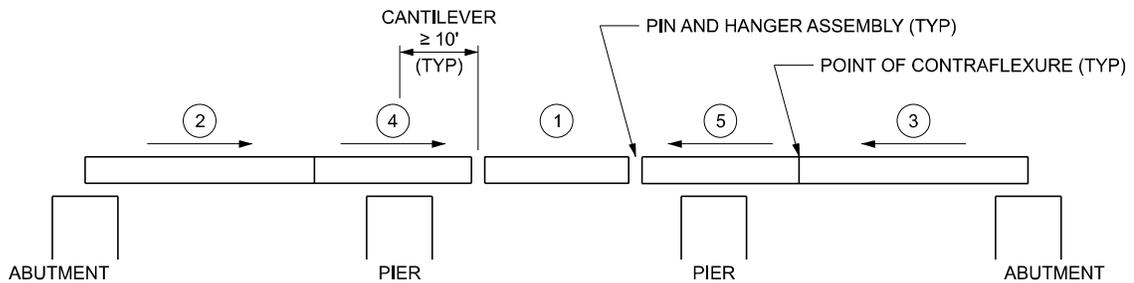
Diagrams illustrating the pour sequence and pour direction for different superstructure configuration can be found in Figures 7.02.31 E.-A & -B.

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Figure 7.02.31 E.-A

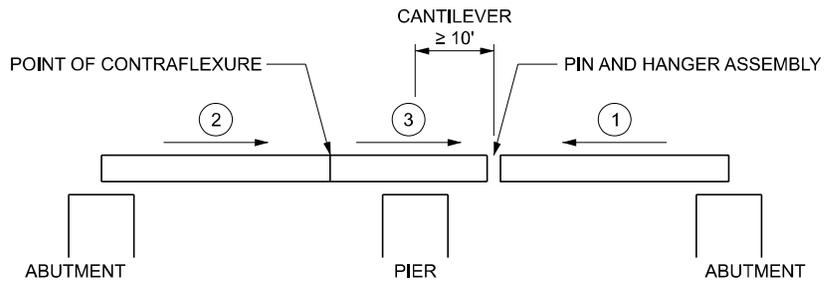
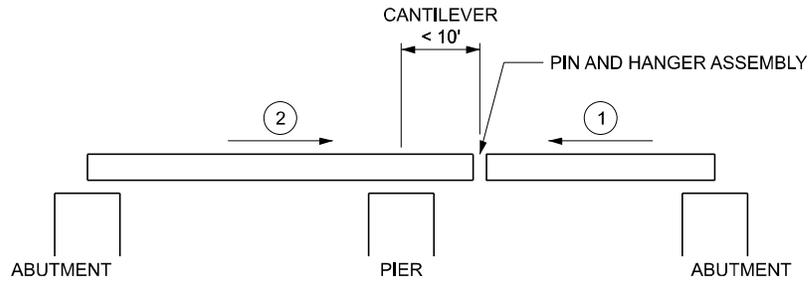


POUR ① FIRST, ② OR ③ IN ANY ORDER, THEN PIER POUR ④ CLOSEST TO POUR ② AND FINALLY REMAINING PIER POUR ⑤.



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Figure 7.02.31 E.-B



NOTES:

CONCRETE POURS WITHOUT A POUR DIRECTION ARROW MAY PROGRESS IN EITHER DIRECTION AND SHOULD BE LEFT TO THE CONTRACTOR TO DECIDE BASED ON THEIR PREFERRED MEANS AND METHODS.

LEGEND

② POUR SEQUENCE NUMBER
 → POUR DIRECTION

PIN AND HANGER ASSEMBLY POUR SEQUENCES

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7.02.33

Ride Quality

The purpose of a ride quality specification is to obtain a smoother riding pavement than is typically obtained with the traditional 10 foot straightedge smoothness requirements. Michigan first adopted a ride quality specification in 1979. The current specification prescribes classified levels of ride quality requirements described in subsequent paragraphs of this section.

Specific requirements for ride quality are identified by classification. Each classification (Class I, II, III & IV) specifies criteria for roughness, method of measurement, applicable incentives, disincentives, and corrective action. The matrix on the following page provides instructions for assigning ride quality classification based on scope of work, design speed, grade control and adaptability to production paving.

Ride quality requirements are not intended for application with stand-alone bridge projects. However, bridge deck replacements, and shallow or deep concrete bridge overlays included within the limits of a Class I ride quality section in a corridor project will be subject to ride quality requirements.

Using these criteria, the road designer will assign a ride quality classification to each applicable section of paving throughout the project. The locations and classifications are then tabulated for inclusion in the Notice to Bidders (generally done by the road designer).

The bridge designer will recommend if the bridge portions of a Class I section are to also be designated as Class I or are to be excluded by designation as Class II based on the type of work and adaptability to corrective deck grinding,

Within Class II, III, and IV areas, bridges are predetermined excluded areas from ride quality specifications between the two end reference lines or between the outermost limits of any structure expansion joint devices.

7.02.33 (continued)

The only pay item associated with ride quality is bump grinding. A small quantity should be included for each location where the contractor may be directed to grind *existing* pavement (i.e.: pavement not placed as part of the contract) in order to smooth the transition from old to new pavement. This includes the POB, the POE, and any *existing* bridge or railroad approaches within the project limits. 25 square yards for each lane at each of the above locations should suffice.

Bump grinding is normally not paid for in areas excluded from ride quality. Instead the pavement is accepted or rejected based on the 10 foot straightedge criteria. (**Standard Specifications for Construction**) If it does not meet the straightedge criteria, it is the contractor's responsibility to grind or replace at their cost.

For additional information on ride quality see the Road Design Manual section [6.04.05](#).

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7.02.33 (continued)

Ride Quality Classification Selection Matrix

How To Use This Matrix	Contractor has control over grades		Contractor has limited or no control ⁽²⁾ over grades				
	3R ⁽³⁾	4R ⁽³⁾	3R ⁽³⁾	4R ⁽³⁾	Single Course of Flexible Pavement (with/without milling)	Diamond Grinding Projects	Flexible Ultra Thin, Paver Placed Surface Seal
Section length allows for production paving ⁽⁴⁾	Class II	Class II	Class II	Class II	Class III	Class III	Class III
	Class I or II	Class I or II	Class II	Class II	Class III	Class III	Class III
Section length does not allow production paving ⁽⁴⁾	Class III	Class II	Class IV	Class IV	Class IV	N/A	Class IV
	Class II	Class I or II	Class IV	Class IV	Class IV	N/A	Class IV

Key:

Class I Ride Quality: Complete Projects (mainline only) where no excluded areas are allowed, a thresh hold IRI criteria must be met, and incentives and disincentives apply. Use Class I only on limited access roadway with design speeds 50 mph or greater and where most or all bridges include deck replacement, shallow concrete overlays, or deep concrete overlays. Investigate the feasibility of diamond grinding (at MDOT cost) any bridge decks not being replaced or overlaid. Where diamond grinding a bridge deck is not feasible, a limited section of the project can be designed as Class II Ride Quality such that the bridge would be a pre-determined excluded area within a project that would otherwise meet Class I ride Quality criteria.

Class II Ride Quality: Sections where threshold IRI criteria must be met, but incentives and disincentives do not apply. (Use Class II if all of the above requirements for Class I are not met.)

Class III Ride Quality: Sections where the pre-construction IRI must be maintained or improved by a certain percentage. Disincentives may apply.

Class IV Ride Quality: Sections where acceptance is based on a 10 foot straightedge criteria. Incentives and disincentives do not apply.

N/A = Not Applicable

Footnotes:

- (1) A Section is defined as a length of paving which has the same characteristics (grade control, type of work, design speed).
- (2) Locations where a contractor might not have control of grades include locations where they must pave adjacent to an existing lane with marginal ride quality, locations where there are existing curbs to match, and locations where there are frequent existing manholes or structures to meet.
- (3) 3R means resurfacing, restoration, and rehabilitation. Primary examples include multiple course resurfacing, milling or profiling, concrete overlays and inlays (without removing subbase). 4R means new construction or reconstruction. A primary example is complete removal and replacement of pavement (including subbase). See Chapter 3 for further definition and examples including projects with combined 3R and 4R work for classifications purposes on projects with multiple fixes.
- (4) Production paving means a slipform paver can be used for concrete paving and that a HMA paver can be used without frequent stopping and starting and there is room for a haul truck to unload directly into the paver or a material transfer device while in motion. MDOT imposed construction staging requirements should be considered when making this determination

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7.02.34

Bridge Mounted Sign Connections (2-24-2025)

On all projects that include the installation of a traffic sign supported by a bridge, the Bridge Engineer must confirm that the additional loading will not result in overstresses in the beam/girder based on AASHTO LRFD. If the analysis finds that the bridge beam/girder will be overstressed, design modifications to the bridge superstructure to keep the applied stresses below the allowable limits. This may include, but is not limited to installing stiffeners, installing additional diaphragms or cross frames, or installing lateral bracing.

The [MDOT Sign Support Standard Plans](#) for bridge sign connections with a plan date of 01/10/2024 or later have considered the capacity of the beam/girder and include any modifications required to keep the applied stresses below the allowable limits for the following conditions:

1. One sign is attached to the bridge beam/girder at any location along the span of the bridge.
2. For steel beams/girders the thickness of the web is equal to or greater than the minimum thickness specified in the MDOT Sign Support Standard Plans.
3. For concrete beams the concrete compressive strength of the deck and beam is greater than the minimum strength specified in the MDOT Sign Support Standard Plans.
4. The size of the sign falls within the maximum limits included in the applicable MDOT Sign Support Standard Plan.

7.02.34 (continued)

Any conditions outside of those listed above have not been considered in the development of the MDOT Sign Support Standard Plans and must be analyzed by the Bridge Engineer.

Generally, a traffic sign attached to a bridge will have a minor impact on the overall superstructure and on the substructure and it is typically not necessary to investigate the global effect of the bridge sign connection. The Bridge Engineer must determine whether project specific conditions outside of those listed above warrant a more detailed review that includes an analysis of the overall superstructure and the substructure.

For rehabilitation projects, see Section [12.07.11](#), Existing Bridge Sign Connections.

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14.12.02

Documents / Definitions

There are three levels of analysis: Categorical Exclusion (CE), Environmental Assessment (EA), and Environmental Impact Statement (EIS).

A. Categorical Exclusion

Most projects are cleared through the Categorical Exclusion (CE) process. This process consists of a cursory examination of the proposed scope of work by specialists in the Environmental Section of the Environmental Services Section of the Bureau of Highway Development. If there are no apparent “significant” long term negative environmental impacts, “substantial” controversy on environmental grounds, or significant impacts upon public parks, recreation areas, refuges, or other natural and cultural resources, the project receives an environmental clearance to proceed.

Documentation of compliance with the NEPA process is coordinated by the Region’s Environmental Clearance Coordinator (ECC). The ECC will provide the Environmental Classification/Certification, which will often include mitigation measures such as limitations on areas where work can occur, or compensation such as replacement trees in order to avoid or minimize environmental impacts. These mitigation measures must be incorporated into the design of the project.

(3-23-2026)

14.12.02 (continued)

B. Environmental Assessment

When it is uncertain whether or not a project may have a “significant” impact upon the environment, an Environmental Assessment (EA) is prepared. The purpose of the EA is to conduct a more in-depth analysis of the project and to determine either that there is a “Finding of No Significant Impact” (FONSI) or that there is significant impact. If it is determined that there is significant impact, an Environmental Impact Statement will be required.

C. Environmental Impact Statement

When it is obvious that a significant impact upon the environment will result from a project, or when an Environmental Assessment determines that a significant impact will result, an Environmental Impact Statement (EIS) must be prepared. The main purpose of the EIS is to ensure that all considerations and deliberations required by NEPA are carried out and that the decision making process is documented.