



Road & Bridge Design Publications

Monthly Update – September 2026

Revisions for the month of **September** are listed and displayed below and will be included in projects submitted for the **January** letting. The special detail index for **July** will remain in effect.

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

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

Road Design Manual

Chapter 3:

Reformatted the full chapter to comply with ADA accessibility which includes changing from a two column format to a single column. Changes to chapter content are listed below.

3.08.01: General:

Updated the name of the organization formerly known as the “Surface Deployment and Distribution Command - Transportation Engineering Agency” (SDDCTEA) to the “Army Transportation Command – Transportation Engineering Agency” (ARTRANSTEA).

3.09.01A & B: Geometric Controlling Criteria:

Revised two links in each section (in the tables) to conform with the revisions made to the Bridge Design Manual this month.

3.11.01B5: Elevation of Guardrail and Bridge Railing:

Revised a link to conform with the revisions made to the Bridge Design Manual this month.

3.11.01D: Roadside Obstacles:

Updated a link which references the Clear Zone Distance Chart.

3.12: Guidelines for Passing Relief Lanes:

Revised the outline format of this subsection to current practice. (No change to content.)

6.03.11G: HMA Construction Considerations at Bridges:

Updated a link which references the bridge underclearance section.



Road & Bridge Design Publications

7.01.43: Guidelines for Bridge Railing Replacement and Attached Approach and Trailing Guardrails:

Revised a link to conform with the revisions made to the Bridge Design Manual this month.

7.01.44A3: Guardrail Upgrading on Local Roads:

Revised a link to conform with the revisions made to the Bridge Design Manual this month.

Chapter 12:

Reformatted the full chapter to comply with ADA accessibility which includes changing from a two column format to a single column. Changes to chapter content are listed below.

12.11.05: Railroad Grade Separations:

Revised a chapter link to conform with the Bridge Design Manual updates this month.

14.12.02: Underclearance Elevation:

Updated a link which references the bridge underclearance section.

Bridge Design Manual

Please Note:

The MDOT Bridge Design Manual has been reformatted to comply with the Web Content Accessibility Guidelines as recommended by the Americans with Disabilities Act (ADA), which includes changing from a two column format to a single column. Additionally, chapters have been reorganized to reflect recent content changes. Creation and revision dates have been moved to directly under Section and Subsection titles to match the format of the Road Design Manual. Chapters 6, 9, and 15 whose content was removed in October 2025, have now been fully removed or replaced. General changes throughout the manual include updating language to active voice, updating MDOT unit and position titles, and the removal of outdated information. All chapters that included references to the American Association of State Highway and Transportation Officials *A Policy on Geometric Design of Highways and Streets* (AASHTO Greenbook or GB7) have been updated from the 6th edition to the 7th edition. Further specific content changes to the manual will be discussed for each chapter in subsequent sections of this update publication.



Road & Bridge Design Publications

Chapter 1: Introduction:

Created Section 1.05 Abbreviations and Acronyms which includes a list of abbreviations and acronyms found throughout the Bridge Design Manual.

Created Section 1.06 References which includes a list of documents and publications that are referenced throughout the Bridge Design Manual or contain useful information for designers who are designing bridge projects in the State of Michigan.

Chapter 2: Steps in Producing Plans:

Removed section 2.01.01 and renumbered all subsequent subsections of 2.01 as required.

Added guidance to for the MDOT Right-of-Way to Section 2.01.05.

Created Section 2.01.07 to provide information on Design-Build projects.

Added references to the MDOT Scoping Manual and Michigan Division Risk Based Project Involvement Guidance documents.

Updated MDOT Peer Review and Peer Review Engineer definitions in Section 2.05.02.

Chapter 3: Plan Composition – New and Reconstruction Projects:

Chapter 3 has been updated to condensed sections to remove repetitious content with added references to the Road Design Manual.

Updated Section 3.01.01 to current Risk-Based Project Involvement plan guidance.

Updated Section 3.01.02 to include alternate cost-estimate methods.

Added Section 3.01.03 Study Write-Up to provide guidance for a write-up that is to be included to support any design alternatives developed during the structure feasibility study.

Updated Federal Aviation Administration and Federal Highway Administration guidelines throughout Section 3.02, along with revised plan composition guidance, simplified subsections, and updated recipient lists.

Bridge Project Reference Information Document file guidance expanded in Section 3.04.02 B. to include asbestos surveys.

Added additional information to Section 3.05 for guidance related to cost estimate differences.



Road & Bridge Design Publications

Chapter 4: Plan Composition – Rehabilitation Projects:

Updated the composition list contents and order in Section 4.02.01,

Updated the preliminary plan distribution list and the additional distribution list in Sections 4.02.03 A. and 4.02.03 B. respectively.

Removed section 4.03.01 and renumbered subsequent subsections of 4.03.

Chapter 5: Consultant Contracts:

Removed obsolete processes, and updated references to the MDOT Vendor and Consultant Services Website:

The MDOT Vendor and Consultant Services Website contains current guidance for Consultant contracts including the consultant selection process, advertisement for professional services, and the service prequalification process. The MDOT Vendor and Consultant Services Website also provides information on the MiLogin e-Proposal system and the requirements for proposal creation.

Section 5.03.03 has been revised to provide information on the Scope of Work of Consultant Projects.

Section 5.04.05 has been revised to provide information on MDOT's Design Milestone Review Process which is found on the MDOT Development Guide.

Section 5.04.06 has been removed as the plan review meeting is covered in the Design Milestone Review Process.

The section on Waterway Permits was renumbered to 5.04.07.

Sections 5.04.09 through 5.04.12 were removed because updated information related to these sections is located on the MDOT Vendor and Consultant Services Website.



Road & Bridge Design Publications

Chapter 6: Rehabilitation Projects (Formerly Chapter 12):

Content related to the design of rehabilitation projects in the State of Michigan, previously found in Chapter 12 of the Bridge Design Manual, has been relocated to Chapter 6.

Added reference to Road Design Manual Section 6.08 and Public Right-of-Way Accessibility Guidelines.

Removed reference to Appendix 6.01.01 (previously 12.01.01) which has been removed from the manual. Contact the Metro Region Project Development or Bridge Engineer for current limits to the metropolitan area of the Metro Region.

Updated Sections 6.03.01 A. Traffic Volumes and 6.03.01 B. Crash Histories to current analysis and request policies and added references to Road Design Manual 14.23 and 14.24 respectively.

Added additional guidance for shallow overlays to Section 6.04.06.

Updated Appendix 6.02 (formerly 12.02) to information in the AASHTO Green Book, removed tables that are located in the AASHTO Green Book, and revised references.

Chapter 7 - LRFD: Design Criteria – New and Reconstruction Projects:

Updated the design stress table and added a general information note on MDOT design stresses to Section 7.01.03.

Updated the name of the organization formerly known as the “Surface Deployment and Distribution Command – Transportation Engineering Agency” (SDDCTEA) to the “Army Transportation Command – Transportation Engineering Agency” (ARTRANSTEA) as well as updated the contact information for the organization in Section 7.01.08 B.

Added the requirement to perform a preliminary analysis and include special provisions for part width construction to Sections 7.01.17. and 7.03.04.

Revised references in Section 7.01.17 and 7.02.15 to the new section for Deck Replacement information 7.02.32.

Revised Figure numbers in Section 7.02.32.

Revised Section 7.03.02 B. to require spread footings to be proportioned to meet applicable strength and service limit states of AASHTO LRFD.

Added requirement to account for the hydrostatic pressures of anticipated artesian groundwater conditions in Sections 7.03.06 A & B.



Road & Bridge Design Publications

Chapter 7- LFD: Design Criteria – New and Reconstruction Projects:

Added disclaimer to the beginning of the Chapter to note that Chapter 7 - LFD: Design Criteria is for reference only and has not been updated since May 2022:

Current MDOT Design Criteria is AASHTO LRFD and represented in Chapter 7 – LRFD. Designers must use LRFD for all new and reconstruction projects, except for projects or project components that classify and are approved for LFD criteria. For those projects/components, designers must ensure all other current MDOT design policies are followed.

Chapter 8: Plan Notes:

Added note 8.10 B. to be included in project plans that use ChromX steel reinforcement that ChromX reinforcement cannot be in direct contact with dissimilar metals.

Chapter 9: Shop Drawings (Formerly Chapter 10):

Added additional shop drawing types that require MDOT review to Section 9.01.

Chapter 10: Plan Revisions (Formerly Chapter 11):

Updated and clarified plan revision instructions in Section 10.01.

Chapter 11: Railroad Crossings (Formerly Chapter 13):

Added additional information and guidance for projects involving railroad crossings to Section 11.00.

Added guidance for work completion requirements to Section 11.02.02.

Added guidance for pay items and railroad insurance requirements to Section 11.03.

Expanded on items that require special attention during plan preparation for projects involving railroad crossings in Section 11.04.

Added information prohibiting certain locations for deck drains to Section 11.04.02.

Revised cross section horizontal distance in Section 11.04.03.

Added sheet piling guidance to Sections 11.04.05 through 11.04.06.

Created new Section 11.04.10 to provide guidance on barrier, splashboards, and safety fences.

Expanded on plan distribution information in Section 11.05.



Road & Bridge Design Publications

Chapter 12: Permit Applications and Environmental Issues (Formerly Chapter 14):

Added additional references for information on Michigan's Natural and Scenic River Systems from the Michigan Department of Natural Resources, United States Fish and Wildlife Service, and United States Forest Service in Section 12.07.01.

Removed repetitious sections 12.12.01 and 12.12.02 related to Environmental Policy and sections 12.13.01-12.13.04 related to Project Environmental Classification and replaced with references to relevant sections of Chapter 10 and 14 of the Road Design Manual.

Bridge Design Guides

Please Note:

The Bridge Design Guides are currently being updated to use Arial font for compatibility with Bentley (GEOPAK) and Microsoft Office applications. In addition, sheet borders are being revised to align with current formatting standards. Titles that include symbols are also being revised to replace the symbols with words for increased accessibility. Reformatted guides are being issued as completed; however, they are not included in the Monthly Update publication unless substantive content changes are required. The original "Issued" and "Supersedes" dates are being retained for all reformatted guides in which the content has not changed.

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.

MICHIGAN DESIGN MANUAL ROAD DESIGN

3.07.02C Interchange Geometrics

3.07.02D Ramp Radii

3.07.02E Single Lane Ramp Widths

3.07.03 Speed Change Lanes and Transitions

3.07.04 Intersections

3.08 AASHTO GREEN BOOK (GB7) PROJECT TYPES

3.08.01 General

3.08.01A Definitions

3.08.01B General

3.08.01C Corridor Minimum Geometric Standards

3.08.01D Other Work Categories

3.08.01E Design Exceptions / Design Variances

3.08.01F Safety Review / Crash Analysis

3.08.01G National (Truck) Network (NN) Lane Widths

3.09 CONSTRUCTION ON EXISTING ROAD CONTROLLING CRITERIA (NON-FREEWAY)

3.09.01 Geometric Controlling Criteria

3.09.01A Non-Freeway, NHS

3.09.01B Non-Freeway, Non-NHS

3.09.02 Design Exceptions / Design Variances

3.10 NEW CONSTRUCTION AND RECONSTRUCTION CONTROLLING CRITERIA (NON-FREEWAY)

3.10.01 Geometric Controlling Criteria

3.10.02 Design Exceptions / Design Variances

3.11 ADDITIONAL NON-FREEWAY DESIGN CRITERIA

3.11.01 General

3.11.01A Signing

3.11.01B Elevation of Guardrail and Bridge Railing

3.11.01C Tree Removal

3.11.01D Roadside Obstacles

3.11.01E Cross Section Elements

3.12 GUIDELINES FOR PASSING RELIEF LANES

3.12.01 General

3.12.02 Truck Climbing Lanes

**MICHIGAN DESIGN MANUAL
ROAD DESIGN**

3.12.03 Passing Lane Sections (PLS)

3.13 CONSTRUCTION ON EXISTING ROAD CONTROLLING CRITERIA (FREEWAY)

3.13.01 Geometric Controlling Criteria

3.13.02 Design Exceptions / Design Variances

**3.14 NEW CONSTRUCTION AND RECONSTRUCTION CONTROLLING CRITERIA
(FREEWAY)**

3.14.01 Geometric Controlling Criteria

3.14.02 Design Exceptions / Design Variances

3.15 ADDITIONAL FREEWAY DESIGN CRITERIA

3.15.01 General

3.15.01A Signing

3.15.01B Ramp Geometrics, Acceleration/Deceleration Lanes, and Taper Lengths

3.15.01C Vertical Curbs

3.15.01D Crown Location/Pavement Cross Slope

3.15.01E Guardrail and Concrete Barrier

3.15.01F Attenuation

3.15.01G Clear Zones & Fixed Objects

3.15.01H Culvert End Treatments

3.15.01I Bridges

3.16 UNDERCLEARANCES - VERTICAL CLEARANCE ANALYSIS

3.17 PERFORMANCE BASED-PRACTICAL DESIGN

Appendix 3A Geometric Design Elements – New Construction / Reconstruction

Appendix 3B National Network – Federally-Designated Routes

MICHIGAN DESIGN MANUAL

ROAD DESIGN

3.08 AASHTO GREEN BOOK (GB7) PROJECT TYPES

(revised 9-22-2025)

3.08.01 General

(revised 9-28-2026)

3.08.01A Definitions

Basic Roadway Type: the general geometric character of an existing highway. The project objective may prompt changes to the basic roadway type, such as (but not limited to):

- Providing additional motor vehicle through lanes.
- Adding a raised or depressed median where none currently exists.
- Any change to vertical or horizontal alignment that requires a Design Exception or Design Variance.
- Any geometric change that results in a net decrease in safety performance.

Roadway improvements that can be accomplished without changes to the basic roadway type may include lane reconfigurations (road diets), adding turn lanes, adding channelizing islands, or adding median curbs for access management.

3.08.01B General

The 7th Edition of AASHTO's Policy on Geometric Design of Highways and Streets ("Green Book" or "GB7") categorizes projects into three different project types, with the historic 3R/4R classifications following in parentheses:

- New Construction (4R)
- Reconstruction (4R)
- Construction on Existing Roads (3R)

Previously, Title 23 of the Code of Federal Regulations (CFR) and the Road Design Manual (RDM) classified projects as being one of two types; resurfacing, restoring, or rehabilitating (3R) or resurfacing, restoring, rehabilitating, and reconstructing (4R). While these classifications are still used in multiple areas, the GB7 project types will determine the appropriate geometric design criteria to be applied.

Design projects which include multiple project types default to either the more conservative requirements or require the identification of the logical limits of each type on the project information sheet. A consistent corridor may be determined as a design priority when logical and appropriate for each GB7 project type; for example, establishing a constant lane width throughout a corridor to enhance the driver experience versus patchwork geometrics.

Consider Performance-Based Practical Design (refer to [Section 3.17](#)) initiatives for each project type given the needs of each user and transportation mode. Specific applications are provided as follows for each GB7 project type.

Refer to the Road and Bridge Project Classifications Table in this section for common projects and their associated project types.

MICHIGAN DESIGN MANUAL ROAD DESIGN

For underclearance, the following conditions apply:

- Underclearance requirements are located in the Bridge Design Manual [Chapter 7](#). For any projects that could potentially affect bridge underclearance, refer to the Bridge Design Manual as that contains requirements not included here.
- Thin HMA overlays, pavement grinding, concrete joint repair, slurry seal (shoulders only), and seal coat (shoulders only) can maintain the existing vertical clearance without a Design Exception.
- All proposed Design Exceptions pertaining to vertical clearance on Interstate routes (including shoulders) and all ramps and collector distributor roadways of Interstate-to-Interstate interchanges will be coordinated with the **Army Transportation Command - Transportation Engineering Agency (ARTTRANSTEA)** (formerly SDDCTEA) using MDOT [Form 0333](#). Refer to Bridge Design Manual [Section 7.01.08B](#).

Design Exception and Design Variance applicability is listed in the following table with their corresponding level of documentation and/or approval.

MICHIGAN DESIGN MANUAL ROAD DESIGN

3.09 CONSTRUCTION ON EXISTING ROAD CONTROLLING CRITERIA (NON-FREEWAY)

(revised 9-22-2025)

3.09.01 Geometric Controlling Criteria

(revised 9-28-2026)

The criteria present in this section provide the minimum dimensional targets for the geometric controlling criteria if existing geometrics are unable to be retained (Refer to [Section 3.08.01B](#)) for Non-Freeway Construction on Existing Road project types. Improve the necessary geometric elements; it is possible that projects may require a combination of improvements.

The geometric elements are divided into NHS and Non-NHS tables. Some geometric elements may be divided into Urban and Rural areas (Refer to [Section 3.02](#)). These definitions are provided as guidance; specific project context will be established by the Project Manager and project team.

MICHIGAN DESIGN MANUAL

ROAD DESIGN

3.09.01A Non-Freeway, NHS

Geometric Elements	Non-Freeway, NHS - Construction on Existing Road Project Types			
Design Speed (see Section 3.06)	Posted Speed Minimum			
Shoulder Width <i>Minimum shoulder widths apply for:</i> Rural: Posted speeds greater than 45 mph. Urban: Posted speeds greater than 45 mph where sufficient right-of-way exists to include shoulders. <i>At lower speeds minimum shoulder widths are desirable.</i>	Current ADT Two-Way		Inside Shoulder	Outside Shoulder
	Two Lane and Three Lane with a Center Left Turn Lane	<750		3 ft.-0 in. Gravel
		750 to 5000		6 ft.-0 in. (3 ft.-0 in. Paved)
		>5000 to 10,000		8 ft.-0 in. (3 ft.-0 in. Paved)
		>10,000		8 ft.-0 in. (7 ft.-0 in. Paved)
	Multilane Undivided	≤ 10,000 > 10,000		6 ft.-0 in. (3 ft.-0 in. Paved) 8 ft.-0 in. (3 ft.-0 in. Paved)
Multilane Divided	≤ 10,000 > 10,000	3 ft.-0 in. Paved 3 ft.-0 in. Paved	6 ft.-0 in. (3 ft.-0 in. Paved) 8 ft.-0 in. (3 ft.-0 in. Paved)	
Refer to Bridge Design Manual Appendix 6.02 for Bridge Widths				
Lane Width	ADT	Lane Width		
	≤750	10 ft.-0 in.		
	>750	11 ft.-0 in.		
	10 ft.-0 in. lanes may be considered in urban areas for multi-lane undivided (regardless of ADT) and multi-lane divided (ADT < 10,000). 12 ft.-0 in. lanes are desirable on the Priority Commercial Network (PCN). 12 ft.-0 in. lanes are required on the National Network (also known as the National Truck Network). Refer to 3.08.01G for retention or reduction of existing National Truck Network lane widths. Refer to the Truck Operator's Map for the Priority Commercial Network (Green) and National Truck Network (Gold) classifications.			
Design Loading Structural Capacity	Refer to Bridge Design Manual Appendix 6.02 . Design loading structural capacities are not evaluated on Construction on Existing Road (3R) projects.			
Horizontal Curve Radius	Refer to Standard Plan R-107-Series.			
Stopping Sight Distance	Refer to 2018 7 th Edition AASHTO Green Book or MDOT Sight Distance Guidelines .			
Maximum Grade	Refer to Appendix 3A .			
Cross Slopes	Traveled way: 1.5%-2%. Shoulder: 4% (6% allowed per Section 6.05.05)			
Superelevation Rate	Standard Plan R-107-Series or reduced maximum (6%) Straight Line Superelevation Chart.			
Vertical Clearance	Refer to Bridge Design Manual Chapter 7 .			

MICHIGAN DESIGN MANUAL

ROAD DESIGN

3.09.01B Non-Freeway, Non-NHS

Geometric Elements	Non-Freeway, Non-NHS - Construction on Existing Road Project Types			
Design Speed	Posted Speed Minimum			
Shoulder Width <i>Minimum shoulder widths apply for:</i> Rural: Posted speeds greater than 45 mph. Urban: Posted speeds greater than 45 mph where sufficient right-of-way exists to include shoulders. <i>At lower speeds minimum shoulder widths are desirable.</i>	Current ADT Two-Way	Inside and Outside Shoulder Width		
	≤750	2 ft.-0 in. (Gravel)		
	750 to 2000	3 ft.-0 in. (Paved)		
	> 2000	6 ft.-0 in. (3 ft.-0 in. Paved)		
	Multilane (Divided & Undivided)	Inside (Divided)	Outside (Both sides for undivided)	
		3 ft.-0 in. Paved	6 ft.-0 in. (3 ft.-0 in. Paved)	
Refer to Bridge Design Manual Appendix 6.02 for Bridge Widths				
Lane Width	ADT	Lane Width		
	≤750	10 ft.-0 in.		
	>750	11 ft.-0 in.		
	10 ft.-0 in. lanes may be considered in urban areas for multi-lane un-divided (regardless of ADT) and multi-lane divided (ADT < 10,000). 12 ft.-0 in. lanes are required for National Network (also known as the National Truck Network). Refer to 3.08.01G for retention or reduction of existing National Truck Network lane widths. Refer to the Truck Operator’s Map for the National Truck Network (Gold) classifications.			
Design Loading Structural Capacity	Refer to Bridge Design Manual Appendix 6.02 . Design loading structural capacities are not evaluated on Construction on Existing Road (3R) projects.			
Horizontal Curve Radius	Refer to Standard Plan R-107-Series.			
Stopping Sight Distance	Refer to 2018 7 th Edition AASHTO Green Book or MDOT Sight Distance Guidelines .			
Maximum Grade	Refer to Appendix 3A .			
Cross Slopes	Traveled way: 1.5%-2%. Shoulder: 4% (6% allowed per Section 6.05.05)			
Superelevation Rate	Standard Plan R-107-Series or reduced maximum (6%) Straight Line Superelevation Chart.			
Vertical Clearance	Refer to Bridge Design Manual Chapter 7 .			

MICHIGAN DESIGN MANUAL

ROAD DESIGN

3.11 ADDITIONAL NON-FREEWAY DESIGN CRITERIA

(revised 9-22-2025)

3.11.01 General

(revised 9-28-2026)

Deviation from the additional design criteria presented in this section does not require Design Exceptions and/or Design Variances, as these are not geometric controlling criteria.

3.11.01A Signing

Contact the Region/TSC Traffic and Safety Engineer to identify desirable enhancements and sign upgrading needs.

3.11.01B Elevation of Guardrail and Bridge Railing

1. Inspect height, length, and overall condition to determine if guardrail should be upgraded.
2. Upgrade existing Type A guardrail to current standards (refer to [Chapter 7](#)) at all locations, except that Type A guardrail in good condition may be used at cul-de-sacs, "T" intersections, and in front of the opening between twin overpassing structures.
3. Upgrade blunt ends and turned down endings to current standard terminals.
4. Connect or upgrade to current standards any unconnected guardrail to bridge railing transitions.
5. If existing bridge railing does not meet AASHTO static load requirements or has an unacceptable crash history, upgrade or retrofit the bridge railing with three-beam guardrail to current standards. (Refer to [Bridge Design Manual Section 6.05](#) for any new railing or complete railing replacement).
6. Remove all existing Breakaway Cable Terminals (BCT). Refer to [Section 7.01.41B](#) for upgrading guardrail terminal guidelines.

3.11.01C Tree Removal

The AASHTO Roadside Design Guide presents ideal clear zone distance criteria; however, these distances are not always practical in Michigan. Consequently, consider removing trees within the clear zone subject to the following criteria:

1. Where there is evidence of vehicle tree crashes either from actual crash reports or scarring of the trees.
2. Trees in target position on the outside of curves with a radius of 3000 feet or less.
3. Trees that are obstructing adequate sight distance or are particularly vulnerable to being hit at intersections or railroads.
4. Trees that break the continuity of a generally established tree line within the clear zone.
5. Refer to [Section 7.01.11B](#) for obstacles inside the calculated project clear zone. Review crash history for need of spot or corridor improvements.

MICHIGAN DESIGN MANUAL

ROAD DESIGN

3.11.01D Roadside Obstacles

Consider roadside improvements to enhance safety and mobility for all users. Improvements may include removal, relocation, redesign, or shielding of obstacles such as culvert headwalls, utility poles, and bridge supports that are within the clear zone as referenced in [Section 7.01.11C](#).

Review crash history for guidance on possible treatments. Include in the project those obstacles that are specifically related to crashes or can be economically justified to reduce future risk. Consider blending ends of culverts within the clear zone into the slope. Refer to the [MDOT Drainage Manual](#).

3.11.01E Cross Section Elements

1. For thru lanes, consider relocating the pavement crown to the standard location when the amount of resurfacing is four (4) inches or greater.
2. Consider modifying side slopes to be recoverable (1:6 preferred).

MICHIGAN DESIGN MANUAL

ROAD DESIGN

3.12 GUIDELINES FOR PASSING RELIEF LANES

(revised 9-28-2026)

3.12.01 General

The construction of Passing Relief Lanes (PRL) is not intended to connect existing multilane sections but to provide a safe opportunity to pass slower vehicles.

Contact the Geometric Design Unit to assist in project selection, location, and design.

3.12.02 Truck Climbing Lanes

The Highway Capacity Manual (HCM) states that the presence of heavy vehicles on two-way, two-lane highway grades can cause a problem because traffic is slowed and platoons form simultaneously as passing restrictions increase.

A. Warranting Criteria (TCL)

(For Information Only)

Use Design Hour Volumes (DHV) to identify candidate locations. Request specific classification counts when requiring more comprehensive analysis. Consider a combination of the following in identifying the need for a TCL:

1. Upgrade traffic flow rate exceeds 200 vph.
2. Upgrade truck flow rate exceeds 20 vph.
3. One of the following conditions exists:
 - a) Level of Service E or F exists on the grade.
 - b) A reduction of two or more levels of service is experienced when moving from the approach segment to the grade.
 - c) A typical heavy truck experiences a speed reduction of 10 mph or greater on the grade.

B. Location Consideration (TCL)

TCLs should be in areas:

1. On the upgrade side of “critical grades”.
2. Along sections relatively free from commercial or residential development (driveways) and away from major intersections.

MICHIGAN DESIGN MANUAL ROAD DESIGN

C. Design Consideration (TCL)

1. A TCL may be introduced beyond the beginning of the upgrade because the truck speed will not be reduced enough to create undesired conditions for following drivers until it has traveled a certain distance up the grade.
2. Extend TCLs beyond the crest to the point where a truck can attain a speed that is within 10 mph of the speed of other traffic and where decision sight distance is available when approaching the transition (taper) area.
3. The taper length L (feet) is approximately $W \times S$, where W is the shift in feet and S is the posted speed in mph.
4. TCLs should be 12 feet wide.
5. TCL shoulders should be as wide as the shoulders on the adjacent two-lane sections but no less than 4 feet (3 feet paved). Limit 4-foot shoulders to areas where wider shoulders are not feasible or environmental concerns prohibit wider shoulders.

3.12.03 Passing Lane Sections (PLS)

Passing Lane Sections (PLS) along two-way, two-lane rural routes can be desirable even in the absence of “critical grades” required for TCLs. PLSs are particularly advantageous where passing opportunities are limited because of traffic volumes with a mix of recreational vehicles and/or roadway alignment. It is preferable to have a four lane cross section for a PLS where right of way or environmental reviews permit.

A. Warranting Criteria (PLS)

(For Information Only)

Use design hour volumes (DHV) in identifying candidate locations. Request specific classification counts when required for comprehensive analysis. Consider a combination of the following in identifying the need for a PLS:

1. Combined recreational and commercial volumes exceed five percent of total traffic.
2. The level of service drops at least one level and is below Level B during seasonal, high-directional splits.
3. The two-way DHV does not exceed 1200 vph. In situations where volumes exceed 1200 vph, investigate other congestion mitigating measures.

MICHIGAN DESIGN MANUAL ROAD DESIGN

6.03.10G Unusual Conditions

When it is proposed or the designer is asked to incorporate construction that is outside the norm of generally accepted procedure, the Pavement Design Engineer and the Bituminous Section of the Construction Field Services Division should be consulted. The staff in these divisions may in turn elect to take the proposed treatment to the Pavement Committee for further comment and consideration.

6.03.10H Asphalt Usage Guidelines

MDOT adopted the use of Superpave HMA Designs in 1996. Superpave mixes resulted from the Strategic Highway Research Program (SHRP). The asphalt used in Superpave mixes are classified based on Performance Grade (PG). Performance Graded Asphalts are classified using the minimum and maximum temperatures that an HMA mix will experience at the location placed. The Department has monitored pavement temperatures around the state using temperature sensors. The data was used to determine which asphalt grades should be used in various regions of the state. Performance Graded Asphalts may or may not require an additive (Polymer) to meet the minimum and maximum temperature requirements specified. The MDOT 1996 Standard Specifications for Construction replace penetration grade asphalts with performance grade (PG) asphalt binders. Usage guidelines for PG asphalt binder grades are based on seasonal temperature variations and various traffic conditions. The EOC approved guidelines are shown in [Section 6.03.09A\(1d\)](#).

6.03.11 HMA Construction Considerations

(revised 9-28-2026)

6.03.11A Bond Coat

Bond coat is commonly an asphalt emulsion used to enhance the adhesion of an HMA surface to an underlying paved surface. Several factors affect its need; e.g., an old, polished asphalt surface on a 50° F day would probably need it, whereas the second lift on a clean new leveling course, on a hot day, would probably not need it. Thin applications (approximately 0.05 gal/syd) are frequently referred to as "fog" or "tack" coats.

Bond coat is no longer a pay item, although the contractor must use it when it is determined necessary on construction. It must therefore be shown on the HMA Application Estimate, with a rate of application of up to 0.15 gal/syd indicated. Quantities should not be shown on the plans or in the log.

6.03.11B Prime Coat

Prime coat was formerly a medium-curing asphalt used at a rate of 0.25 gal/syd to seal off a gravel surface preparatory to paving with HMA and to aid in stabilizing the aggregate base so that trucks could run on it. Construction experienced delays waiting for it to cure, and with the dense-graded aggregate mixtures in use, it was often determined that prime coat was unnecessary. If prime coat is needed, Construction will add it by authorization. Designers are instructed to omit any reference to it.

MICHIGAN DESIGN MANUAL ROAD DESIGN

6.03.11F “Paving Through”

There have been occasions in the past when a contractor, paving a shoulder ribbon or a full width shoulder prior to paving approaches, has paved through cross road approaches or freeway ramps in a continuous operation, coming back later to pave the approach or the ramp. At the least, this type of construction is unsightly, and it may lead to premature deterioration of the approach or of the ramp when the shoulder edge, now a transverse joint, opens up. The designer should give consideration to adding a note or detail to address this issue.

6.03.11G Bridges

When resurfacing projects include resurfacing on or under bridges, a standard form letter (available from the Bridge Management Unit) is to be sent to Bridge Management Unit for either a load analysis or a review of underclearance requirements, as appropriate. Minimum standard underclearance can be found in [Section 3.16](#). If the resurfacing will reduce the underclearance below minimum, it may be necessary to remove some of the existing surfacing under the bridge.

The preferred method is to remove old concrete pavement and replace with either concrete or HMA base course, and run the overlay under the bridge. This is done to improve the appearance and ride. In cases where the existing underclearance is adequate, the alternatives of thinning up the overlay or grinding the existing concrete pavement should be investigated.

If pavement removal is not cost effective, other methods such as gapping the section under the bridge may be used to retain existing underclearance within minimum standards. Measures must be taken to improve pavement integrity and ride. This may include pavement repair/rehabilitation within the gapped section. In all cases where the resurfacing is gapped, the final driving surface must be diamond ground to improve ride.

For cases where additional underclearance must be obtained, site by site studies will be required to determine the most economical method. To improve appearance and ride, the riding surface at the underpass should be the same material as the abutting section of the roadway.

6.03.11H Paving Over Neoprene-Sealed Joints

Concrete pavements to be overlaid with HMA require removal of the Neoprene Seals. The plans or proposal should note that the neoprene seals are to be removed prior to resurfacing. This is to avoid expansion of the seal in contact with the hot asphalt which will cause cracking of the new HMA overlay.

ROAD DESIGN MANUAL

ROAD DESIGN

7.01.41 (continued)

Upgrading and Replacement of Guardrail

F. Unpainted Corrosion Resistant Beam Elements

See [Section 7.01.14B](#). The Engineering Operations Committee meeting on January 20, 1989 decided that all existing corrosion resistant, or "rusty steel", guardrail encountered on proposed Interstate resurfacing or reconstruction projects should be removed and replaced as part of the project.

On projects involving bridges only, the nominal provisions of approach guardrail (guardrail anchorage to bridge and approach terminal) shall be replaced if the rail elements are rusty steel. Where guardrail at the bridge approaches is part of a more extensive installation, the decision to replace will be made on the merits of the specific project.

G. Thick Shoulder Lifts

Rehabilitation of rural freeways often entails placing a new concrete pavement on top of the old, or placing a thick HMA overlay. This procedure also raises the shoulder elevation, thus causing the existing guardrail to be too low. When this occurs, the designer is reminded that provisions should be made to either reconstruct or upgrade the guardrail.

If reconstruction of the guardrail must precede the pavement lift by a year or so; the designer may be tempted to call for longer than normal posts, leaving them with tops protruding so that they will be long enough to fit the ultimate installation. This should not be done; crash test films frequently show the impacting vehicle laying over on the rail and sliding along it. Protruding post tops would thus have a detrimental effect on smooth redirection of the vehicle.

7.01.41 (continued)

H. Type A Guardrail Parallel to Continuous Abutment, Twin Overpassing Structures

It was practice for a number of years to place Type A guardrail in front of the opening between twin overpassing structures, parallel to the continuous abutment and about 4'-0" in back of it. Current standards provide either a length or a configuration of guardrail that eliminates the need for this transverse section of barrier. On an updating project, if this transverse barrier is still in place and in good condition, it may be left as a deterrent to persons or animals who could accidentally fall over the backwall. If the condition of the barrier warrants removal, replacement is not necessary. However, replacement may be considered if deemed essential to provide positive protection for mowing operations and/or other maintenance purposes.

I. Replacing with Thrie Beam Guardrail

Even though guardrail Type T and Type MGS-8 are the current standards for use on freeways, other guardrail types do not need to be replaced unless physical deficiencies exist.

7.01.43 (revised 9-28-2026)

Guidelines for Bridge Railing Replacement and Attached Approach and Trailing Guardrails

See [Chapter 6](#) of the Bridge Design Manual.

ROAD DESIGN MANUAL

ROAD DESIGN

7.01.44 (revised 9-28-2026)

Guardrail Upgrading on Local Roads

A. Guardrail Upgrading Guidelines on Local Roads (In Conjunction with Freeway Work)

In conjunction with work programmed on a freeway, the Department may have occasion to upgrade guardrail on roads that are under local jurisdiction. Generally, the guardrail will be constructed to "trunkline standards" with respect to the type of guardrail and the type of ending. Depending on site conditions, the location and configuration of the guardrail used on local roads may not necessarily be to "trunkline standards".

The Department attempts to prevent errant local road traffic from encroaching on the freeway and its appurtenances. The following guidelines have been established for upgrading guardrail on local roads over and under freeways.

1. If the major work is on the crossroad, the approach guardrail will be upgraded. For ADT less than 2000 and the operating speed 50 mph or less, 200' of approach guardrail can be considered as satisfying the runout length (L_R) from the bridge railing end, pier or abutment. See table for runout length (L_R) in [Section 7.01.19](#). If the ADT on the crossroad exceeds 2,000 or the operating speed exceeds 50 mph, the type of guardrail shall be as specified in [Section 7.01.12](#) and the lengths computed using the worksheet in [Section 7.01.05F](#). If the total length of the existing run is not more than 100' longer than the computed length, then the entire run should be constructed. If the run is considerably longer, then simply connect the upgraded guardrail to the existing guardrail at the 200' cut-off point.

7.01.44A (continued)

2. If the major work is on the freeway, then no guardrail upgrading need be done on local roads, over or under, except in interchange areas. The limits of upgrading the guardrail in interchange areas should be between the crossroad ramp terminals.
3. When the major work is on the freeway, upgrading older local road bridge railings with guardrail retrofits or new railings will not be required. See [Chapter 6](#) of the Bridge Design Manual for instructions on bridge rail upgrading.
4. A typical urban depressed freeway will generally not require a guardrail installation or upgrading because the local street is probably at grade with the service streets on each side of the freeway and the bridge railing endings are a short distance from the edge of the intersecting service streets. These local streets are usually curbed and traffic is restricted to speeds less than 50 mph (usually 25 mph to 35 mph). In addition, low crash frequency and possible obstruction to vision also works against the use of guardrail in this situation. This is not to prohibit the use of a barrier at such approaches if different circumstances suggest the need.

MICHIGAN DESIGN MANUAL ROAD DESIGN

12.11.04G Traffic Control Devices (Railroad Signals and Gates)

The Railroad Coordination Unit – Office of Rail will locate the traffic control devices with respect to the road and tracks. These signal locations should be shown on the plans to assist in determining conflicts with utilities, drainage, driveways, etc.

Standard railroad pavement markings and signing should be included in the design of the crossing.

12.11.05 Railroad Grade Separations

(revised 9-28-2026)

On limited access highways, all at-grade Railroad-Highway crossings are to be eliminated per federal guidelines. Grade separations must be constructed at these locations unless the railroad can relocate or abandon their tracks.

On free access roads, grade separations must be economically justified by a benefit/cost ratio of 1.0 or more. Benefit/cost ratios will be calculated by the Economic Analysis Unit, Program Planning Division, Bureau of Transportation Planning. Ratios will divide the value of highway-user delay, operating cost and accident savings, by the Department's life-cycle cost, discounting to present value, over a period of 20 years.

For highway bridges over railroads a vertical clearance of 23 feet is required. When laying a preliminary road grade over a separated railroad, the designer should assume the road grade to be 28 feet above the top of rail elevation. This is generally adequate for a skew crossing of perhaps two sets of tracks. For a 90 degree crossing of a single track an allowance on the order of 27 feet will be close.

For railroad side clearances, see Bridge Design Guides 5.24.03 and 5.24.04.

See also [Chapter 11](#) of the Bridge Design Manual.

MICHIGAN DESIGN MANUAL ROAD DESIGN

Property Ties: Survey measurements that relate the location of existing property corners and or government corners to the alignment and horizontal coordinate system.

Riparian Owners: Property owners adjacent to a lake, stream or river that may have some rights to the bottom lands of such a body of water or stream. Riparian ownership and contact information is usually required for the four quadrants around a bridge over water.

Terrain Mapping: The act of mapping the surface of the earth to determine the location and elevation of the ground features. This results in the creation of a Digital Terrain Model (DTM) and/or Triangulated Irregular Network (TIN) from which cross sections may be calculated. Usually collected at the same time as the planimetric data.

Utilities: Public and privately owned structures in place to carry electric, telephone, water, sanitary sewers, etc. Utility information would typically include ownership, location, rim and flow line elevations and pipe directions.

Other: Any other miscellaneous information.

14.12.02 Bridge

(revised 9-28-2026)

Alignment: Same as Road but should include exact stationing of the reference points (intersection of abutment and pier reference lines with the as constructed alignment).

Angle of Crossing of Substructure: The angle at which the reference lines of the structure cross the as constructed roadway alignment.

Bench Marks: Same as Road. Bench Marks should be left in the vicinity of the bridge structure on both sides of the crossing.

Bridge Seat Elevation: Elevations of the top of the abutment/pier that supports bearing pads/bridge beams.

Bridge Survey: A survey of a bridge structure. This survey often requires sketches in plan and elevation view, and diagrams to illustrate all critical dimensions, in addition to Microstation planimetric and terrain mapping.

Dimension of Existing Sub-structure Elements: Physical measurements of the abutments, piers, wingwalls, etc. such as width, length, face to face and height above natural ground, amount of cover and so on. Specific needs should be noted by the requestor.

Dimensions of Existing Superstructure Elements: Physical measurements of deck width, and length thickness, sidewalk and curb dimensions (face-face, width, height, etc.), bridge railing type and dimensions.

Property Ties: Same as road.

Riparian Owners: Same as road.

MICHIGAN DESIGN MANUAL ROAD DESIGN

Top of Footing Elevation: Elevations of existing bridge footings. Usually requires probing and/or digging for location. Often difficult or impossible to find.

Topography: Typically describes planimetric and terrain features together. The planimetric detail should include the bridge deck as a feature. The terrain data should model the surface as though the deck did not exist. This should result in contours that accurately represent the surface of the ground.

Under clearance Elevation: Elevations of the bottom of the existing bridge beams. Normally taken over pavement edges and lane lines for grade separations. For design purposes, minimum vertical clearance must be maintained over the complete usable shoulder. See [Section 3.16](#). For stream crossings the elevations would typically be taken over the intersection of the ground with the sub-structure units and over the highest low beam. The underclearance is then the difference between the elevation of the beams and the elevation of the appropriate feature below them. Any special locations should be noted in the request.

Utilities: See Road. Any utilities attached to the structure itself should be noted.

Water Surface Elevation: Elevation of the exact surface of the water on a given date, taken at intervals up and down stream to determine stream gradient. The date each measurement is made must be recorded.

Other Elevations: Any other elevations required that are not covered above.