Road & Bridge Design Publications

Monthly Update – May 2014

Revisions for the month of **May** are listed and displayed below. The special detail index from **March** will remain in effect. Contact Wayne Pikka (pikkaw@michigan.gov) for questions related to the road changes. Contact Vladimir Zokvic (zokvicv@michigan.gov) for questions related to the bridge changes.

Road Design Manual

3.09.02B: Non-Freeway, Non-NHS Geometric Elements (Table): The section on Bridge Width, Structural Capacity, & Horizontal Clearances was revised such that the usable width for an ADT over 2000 is the width of traveled way, plus 2' on each side. (The usable width for ADTs over 4000 was removed since it was derived from an old source and it exceeded the standards for new construction.)

Bridge Design Manual

8.05 U. (LFD & LRFD): New note to use when thrie beam guardrail is attached to the culvert headwalls and/or return walls. Use with Standard Plan B-23-Series.

Bridge Design Guides

Index/Table of Contents: Deleted Guide 6.05.01

6.05.01: Deleted guide. Guide 6.05.01 A is now in effect. Two lane freeway shoulders shall be 14'-10".

6.05.01 A: Guide is now in effect (Post 2013 status is now permanent). Two lane freeway shoulders shall be 14'-10".

Updates to MDOT Cell Library, Bridge Auto Draw Program, etc., may be required in tandem with some of this month's updates. Until such updates to automated tools 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.

3.08.01E (continued)

General

When a bridge falls within a road project and no work is planned for the bridge, AASHTO "bridges to remain in place" criteria apply to the bridges. See AASHTO publication, ***A Policy on Design Standards-Interstate System,*** or ***A Policy on Geometric Design of Highways and Streets.*** If the bridge does not meet the criteria to "remain in place" the Road Designer shall be responsible for submitting any necessary design exceptions for the bridge.

F. Safety Review / Crash Analysis

A safety review is required for all 3R and 4R projects. The Project Manager should contact the TSC Traffic Engineer during scoping, so that a safety review can be performed throughout the project limits. On corridor projects only one analysis that includes roadways and bridges is required. This review should consist of an analysis of available crash data to determine where safety enhancements are warranted. Safety reviews more than 3 years old shall be updated to verify the original safety review.

A site specific crash analysis is required as justification for any design exception. It is also required in determining appropriate 3R design criteria according to Section 3.09.02A and 3.09.02B. Site specific crash analyses more than 3 years old shall be updated to verify the original crash analysis.

3.09

NON-FREEWAY RESURFACING, RESTORATION AND REHABILITATION (3R) MINIMUM DESIGN GUIDELINES

3.09.01 (revised 1-6-99)

General

The intent of the 3R guidelines is to extend the useful life of existing roadways and enhance safety while incurring minimal aesthetic and environmental disturbance and economic burden. Often, design guidelines used for new and major reconstruction are not cost effective on 3R projects. Where economically and physically practical, design guidelines should be according to AASHTO requirements to insure the greatest traffic service. The ultimate goal is to improve operating conditions and provide highways that are reasonably safe and fit for travel.

3R guidelines are divided into three categories that are addressed in subsequent sections of this chapter. These are NHS, Non-NHS and 3R Safety Considerations. They apply strictly to non-freeway applications. Guidelines for freeway 3R and 4R type work are addressed separately in Section 3.11.

3.09.02 (revised 5-27-2014)

3R Minimum Guidelines

Minimum guidelines for controlling design elements shall be according to the following:

3.09.02 (continued)

B. Non-Freeway, Non-NHS

Geometric Elements	Non-Freeway, Non-NHS 3R Minimum Guidelines		
Design Speed	Posted Speed Minimum		
Shoulder Width *NOTE: Minimum shoulder widths apply for posted speeds greater than 45 mph. Restrictions such as right of way and roadside context sensitivity issues may preclude the use of minimum shoulders within city, village or township limits with posted speeds of 45 mph and less.*	Current ADT Two-Way	Inside and Outside Shoulder Width	
	≤750 750 - 2000 > 2000	2'-0" (Gravel) 3'-0" (Paved) 6'-0" (3'-0" Paved)	
	Multi-Lane (Divided & Undivided)	Inside (Divided)	Outside (Both sides for un-divided)
		3'-0" Paved	6'-0" (3'-0" Paved)
Lane Width	ADT	Lane Width	
	≤750 >750	10'-0" 11'-0" 10'-0" lanes may be considered in urban areas for multi-lane un-divided (regardless of ADT) and multi-lane divided (ADT < 10,000). 12'-0" lanes are desirable on the Priority Commercial Network (PCN) and the National Network (also known as the National Truck Network). Existing narrower lanes may be retained without design exceptions. Reduction of existing lane widths on the National Network to less than 12-0" require a design exception request having a high burden of justification.	
Bridge Width, Structural Capacity & Horizontal Clearances **(Existing Bridges to remain in place)**	ADT (Design Year)	Minimum Design Loading	Usable Width
	0 - 750	H15	Width of traveled way.
	751 - 1500	HS15	Width of traveled way.
	1501 - 2000	HS15	Width of traveled way plus 1' each side.
	> 2000	HS15	Width of traveled way plus 2' each side.
Horizontal / Vertical Alignment and Stopping Sight Distance	Existing alignment and stopping sight distance may be retained if the design speed of the existing curve is not more than 15 mph (horizontal alignment) or 20 mph (vertical alignment) below the project design speed and there is no crash concentration. Otherwise standards for new construction apply. . See current AASHTO Green Book or MDOT Sight Distance Guidelines.		
Grade	Review crash data. Existing grade may be retained without crash concentration.		
Cross Slopes	Traveled way 1.5% - 2%, Shoulder see Section 6.05.05		
Superelevation	Standard Plan R-107-Series or reduced maximum (6%) Straight Line Superelevation Chart using the project design speed.		
Vertical Clearance	See Section 3.12.		

8.05 (continued)

GENERAL PLAN OF STRUCTURE SHEET

L. A cofferdam has not been provided for this structure. Other means of water control may be used, as approved by the Engineer, provided they do not disturb the stream bed. Water control, whether it be by cofferdam or other approved means, will be included in the bid item "Excavation, Fdn". [Use on stream crossings when water control measures other than a cofferdam are appropriate. See Subsection 7.03.04.] (12-5-2005)

M. The tremie seal design was based on a water surface at El. ____.

N. Placement of temporary barrier shall be according to Standard Plan R-126-Series or as approved by the Engineer. (Included in the pay item "Conc Barrier, Temp, Furn") [Use when the toe of temporary barrier on the traffic side is less than 4'-0" from a precipitous drop-off. Place note on staging sheet where applicable.] (12-5-2005)

O. The riprap quantity is based on the lateral dimensions of the area to be protected, regardless of the number of layers required. The estimated weight of riprap is _____ tons. (9-18-98)

P. Alternate methods of stream diversion shall be submitted to the Engineer for approval. [Use when stream diversion method is detailed on Plan Sheet.] (9-18-98)

Q. Place riprap from El _____ to El _____. [Place this note in the vicinity to which it applies, when lateral limits are not fixed.]

8.05 (continued)

R. False decking shall include the area bounded by (Reference Lines ___& __) (edges of shoulders) and outside flange fascias of Beams __& _. The estimated area is ____square feet during removal (and ____square feet during proposed construction). [Detail limits on the plans and include areas in note.] (12-5-2005)

S. Items cast into structural precast concrete to facilitate bridge construction (forming, finishing, etc.) shall be galvanized or epoxy coated. [Use for box and three-sided culverts, MSE walls, sound walls, precast bridge element systems, etc.] (6-17-2013)

T. Do not use wheeled, roller based or machine mounted compaction equipment to compact the subgrade, subbase, and base within 10' of the sleeper slab after it is built. Use only hand/plate compactors. Contact pressure of compaction equipment shall not exceed 10 psi. [Use on all projects with a sleeper slab.] (3-17-2014)

U. Design headwalls to develop an ultimate moment capacity (about the horizontal axis) to resist a horizontal load of 24 k (kips) distributed over 3.5 feet applied 32 inches above top of pavement, and to develop an ultimate moment capacity (about the vertical axis) of 16.7 kft (kip feet), per foot of headwall height. Design headwall connection to deck and/or other precast units to resist these loads. Space blockouts for thrie beam guardrail at a distance of 10'-7¾" or less, center to center, along headwall. [Use when thrie beam guardrail is attached to the culvert headwalls and/or return walls. Use with Standard Plan B-23-Series.] (5-27-2014)

8.05 (continued)

GENERAL PLAN OF STRUCTURE SHEET

U. Design headwalls to develop an ultimate moment capacity (about the horizontal axis) to resist a horizontal load of 24 k (kips) distributed over 3.5 feet applied 32 inches above top of pavement, and to develop an ultimate moment capacity (about the vertical axis) of 16.7 kft (kip feet), per foot of headwall height. Design headwall connection to deck and/or other precast units to resist these loads. Space blockouts for thrie beam guardrail at a distance of 10'-7¾" or less, center to center, along headwall. [Use when thrie beam guardrail is attached to the culvert headwalls and/or return walls. Use with Standard Plan B-23-Series.] (5-27-2014)

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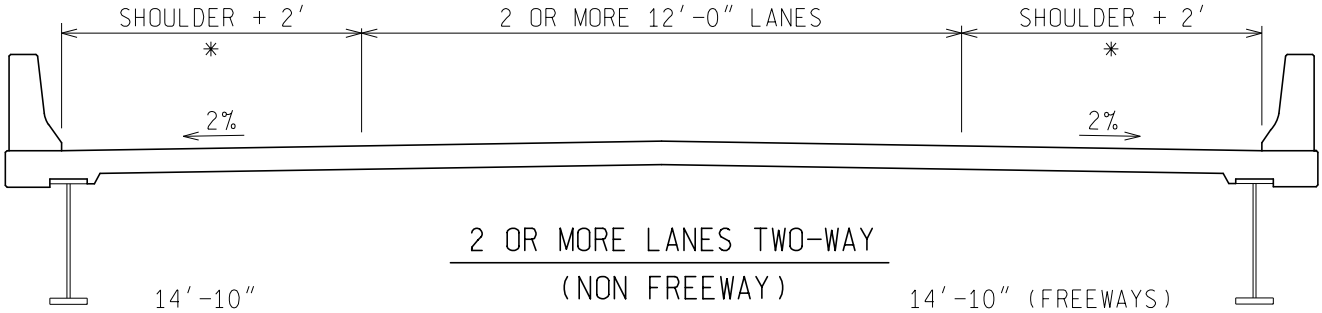
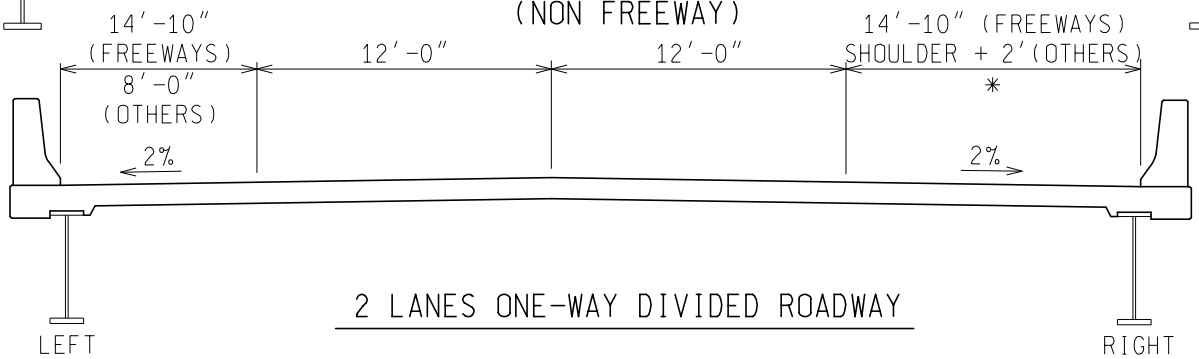
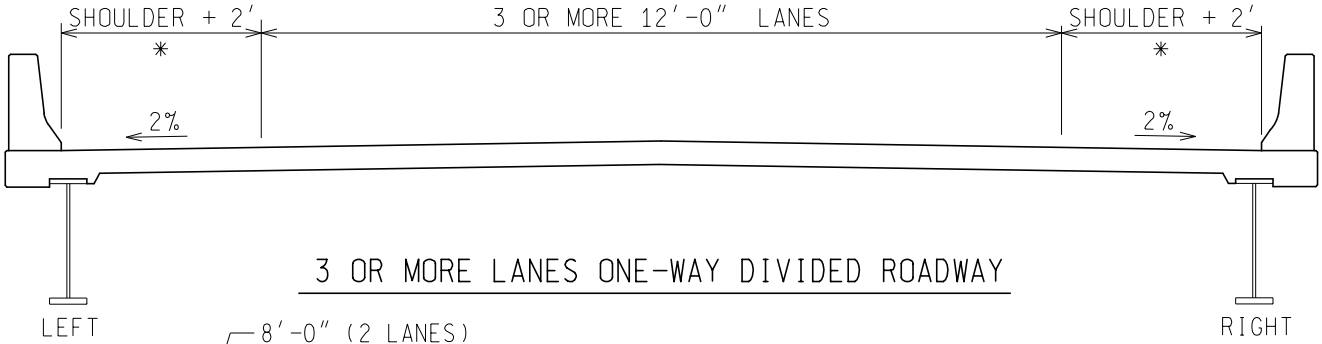
DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: TGF	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT BRIDGE CROSS SECTIONS NEW CONSTRUCTION/RECONSTRUCTION	ISSUED: 02/14/11 SUPERSEDES: / /



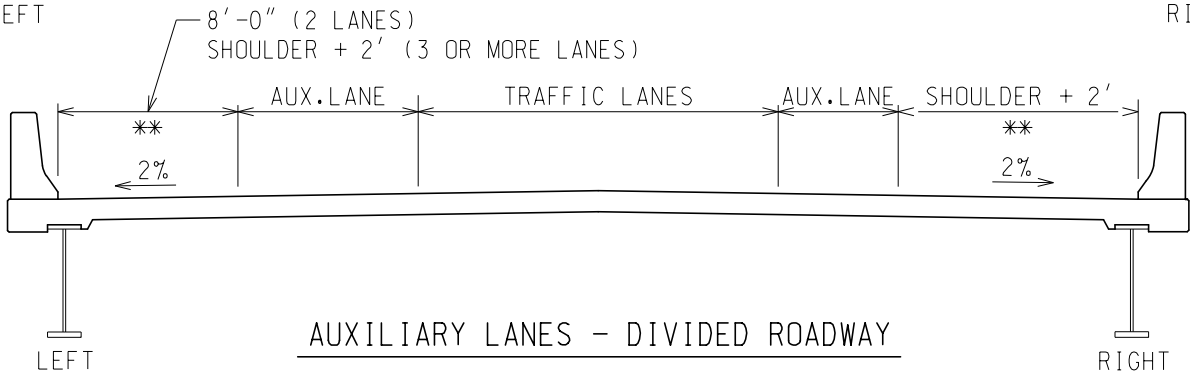
2 OR MORE LANES TWO-WAY
(NON FREEWAY)



2 LANES ONE-WAY DIVIDED ROADWAY



3 OR MORE LANES ONE-WAY DIVIDED ROADWAY



AUXILIARY LANES - DIVIDED ROADWAY

NOTES:

IF A PEDESTRIAN FACILITY IS REQUIRED, SEE GUIDE 6.05.02.

* SEE ROAD DESIGN MANUAL APPENDIX 6A FOR FREEWAY AND RAMP APPROACH SHOULDER MINIMUMS. MAXIMUM SHOULDER WIDTH IS 12′ ON ALL STRUCTURES, EXCEPT 14′-10″ ON 2 LANE FREEWAYS. NON FREEWAY STRUCTURE SHOULDERS SHALL MATCH APPROACH SHOULDER WIDTHS BUT NOT BE LESS THAN VALUE FROM TABLE BELOW:

ADT VEH/DAY	<400	400-2000	>2000
MIN. APPROACH SHLDR.	4′	6′	8′

** EXTEND THIS SHOULDER WIDTH TO RAMP GORE, THEN TRANSITION TO RAMP SHOULDER WIDTH ALONG RAMP. WHEN RAMP SHOULDER OR TRANSITION TO RAMP SHOULDER IS ON STRUCTURE ADD 2′ TO SHOULDER OR TRANSITION.

INTERSTATE SHOULDER = PAVED PORTION OF SHOULDER.

NON INTERSTATE SHOULDER = FULL SHOULDER INCLUDING PAVED AND AGGREGATE SHOULDER BUT NOT INCLUDING THE LAST 1′ OF AGGREGATE TO THE HINGE POINT.

DECK REPLACEMENTS CARRY ONLY THE SHOULDERS ACROSS THE BRIDGE. THE ADDITIONAL 2′ IS NOT REQUIRED, BUT PREFERRED.

PREPARED BY DESIGN DIVISION	6.05.01A