

## MICHIGAN DESIGN MANUAL ROAD DESIGN

**3.09.03** (revised 8-26-2019)

### **3R Non-Freeway Safety Considerations**

The following additional information serves as guidance for the review of existing and proposed roadside features. Policies on roadside features are not standards and therefore do not require formal design exceptions / variances. When deviations are necessary, a note should be written for the project file. This would not be subject to formal review or approval, however, a note to the design file shall provide the rationale for appropriate alternatives to these guidelines.

#### **A. Signing**

Consideration should be given to upgrading sign reflectivity, supports, and locations.

#### **B. Evaluation of Guardrail and Bridge Rail**

1. An onsite inspection of height, length, and overall condition should be done to determine guardrail upgrading needs
2. Existing Type A guardrail will be upgraded to current standards (see [Chapter 7](#)) at all locations, except as follows. Type A guardrail which is in good condition may be retained at cul-de-sacs, "T" intersections, and in front of the opening between twin overpassing structures.
3. Blunt ends and turned down endings shall be upgraded to current standard terminals.
4. Unconnected guardrail to bridge rail transitions shall be connected or upgraded to current standards.
5. Existing bridge rail may remain in place if it meets AASHTO static load requirements and has an acceptable crash history. Otherwise, the bridge rail shall be upgraded or retrofitted with three beam guardrail. Note that new rail or complete rail replacement shall meet current standards. See Bridge Design Manual [Section 12.05](#).
6. By Federal mandate, existing Breakaway Cable Terminals (BCT) must be removed on 3R projects on the National Highway System (NHS). See [Section 7.01.41B](#) for upgrading guardrail terminal guidelines.

**3.09.03 (continued)**

#### **C. Tree Removal**

Tree removal will be selective and generally "fit" conditions within the existing right-of-way and character of the road. The 2002 AASHTO *Roadside Design Guide* presents ideal clear zone distance criteria, however, these distances are not always practical in Michigan. Consequently, trees within the clear zone should be considered for removal subject to the following criteria:

##### **1. Crash Frequency**

Where there is evidence of vehicle-tree crashes either from actual crash reports or scarring of the trees.

##### **2. Outside of Horizontal Curves**

Trees in target position on the outside of curves with a radius of 3000 feet or less.

##### **3. Intersections and Railroad**

Trees that are obstructing adequate sight distance or are particularly vulnerable to being hit.

##### **4. Volunteer Tree Growth**

Consider removal of volunteer trees within the originally intended tree line. Volunteer trees are those that have naturally occurred since original construction of the road.

##### **5. Maintain Consistent Tree Line**

Where a generally established tree line exists, consider removing trees that break the continuity of this line within the clear zone.

##### **6. Clear Zone**

See [Section 7.01.11B](#) for Treatment / consideration of obstacles inside the calculated project clear zone. Review crash history for need for spot improvements.

## MICHIGAN DESIGN MANUAL ROAD DESIGN

### 3.09.03 (continued)

#### D. Roadside Obstacles

Roadside improvements should be considered 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 3.09.03C](#).

A review of crash history will provide guidance for possible treatments. However, treatment of some obstacles, such as large culverts, can add significantly, perhaps prohibitively, to the cost of a project. This means that in most instances only those obstacles that can be cited as specifically related to crashes or can be improved at low-cost should be included in the project. Ends of culverts that are within the clear zone should be considered for blending into the slope. See *MDOT Drainage Manual*, Section 5.3.5 and Table 5-1.

### 3.09.03D (continued)

Region Development or the requestor of the project shall address these items in the scope of the project to assure adequate funding for the project. These considerations need to be made at the scoping stage to allow the project to progress smoothly through the design process.

#### E. Cross Section Elements

##### 1. Crown Location

Existing pavement crown point location may be retained on a project where the rate of resurfacing is less than 4" in thickness. Otherwise, standard crown location should be used.

##### 2. Side Slopes

Use the following chart for side slope rates:

Side Slopes	Review crash history for improvement needs.		Current ADT Two-Way	Foreslope
		Two-Lane	≤ 750 > 750	1:3 1:4
		Multi-Lane Undivided	≤ 10,000 > 10,000	1:3 1:4
		Multi-Lane Divided	All	1:4

##### 3. Shoulder Cross Slopes

See [Section 6.05.05](#).

### 3.09.04

#### Bridges

In most cases, bridge improvements will include upgrading approach guardrail, guardrail connections, and bridge rails to current Department practices. See [chapter 12](#) of the Bridge Design Manual.