



# Road & Bridge Design Publications

Monthly Update – January 2016

Revisions for the month of **January** are listed and displayed below. The special detail index from November will remain in effect. E-mail questions related to these changes to [MDOT-Road-Design-Standards@michigan.gov](mailto:MDOT-Road-Design-Standards@michigan.gov).

## Road Design Manual

1.02.18: Pavement Marking Plans: Updated the section with the major changes being information added on callouts and quantity locations on plan sheets.

7.04.01: General: Minor wording revisions were made.

7.04.02: Temporary Pavement Markings: Updated the section by detailing the types of temporary pavement markings and their use.

7.04.03: Pavement Marking Quantities: This section was deleted with revised information shifted to chapter one as noted above.

7.04.04: Removing Permanent Pavement Markings: Added a three day limit for the retention of inappropriate permanent pavement markings when there is a change in traffic patterns. Also, updated the procedures allowed for the removal of permanent pavement markings and added information on covering existing markings with black “Type R” tape.

7.04.06: Plan Sheets, Standards Referencing, and Witness, Log and Layout: Updated the section with information regarding the use of pavement marking standards, plan sheets, and Witness, Log, Layout (WLL) for pavement marking layout.

7.04.07: Recessing Permanent Pavement Markings: This is a new section covering recessed pavement markings.

**Note: Recessed markings will be required for all permanent longitudinal pavement markings (except where exempted in 7.04.07) on all 3R/4R projects beginning with the May letting.**

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.

# MICHIGAN DESIGN MANUAL

## ROAD DESIGN

### 1.02.17 (revised 11-28-2011)

#### Signing Plans

Occasionally, as part of the contract, construction projects will include permanent signing along a relocated highway or upgraded signing along an existing highway.

The Design Division - Traffic Sign Unit is responsible for preparing permanent signing plans. Working together, the designer and a representative from the Traffic Sign Unit, will determine sign types (ground mount, cantilever, truss, etc.), size, location, legend, and other details. These details will be shown on base plan sheets, usually prepared as strip plans on a small scale, i.e., such as a 200 scale. Standard signing plans from Traffic and Safety are then added to the plans. The signing standards show the details necessary to fabricate and construct the permanent signing.

### 1.02.18 (revised 1-19-2016)

#### Pavement Marking Plans

Pavement marking plans show the details of the permanent markings for lane lines, edge lines, and special markings such as: stop bars, directional arrows, turning guide lines, and cross hatching.

Pavement marking plans are prepared at a suitable scale that will show individual longitudinal lines and special markings. All markings shall be drawn representative of their patterns and shapes. There must also be a clear differentiation between existing and proposed markings through line styles and/or labeling.

A callout should be shown for each non-continuous section of a longitudinal line. Callouts for longitudinal lines consist of the following format:

PAVT MRKG, [material], [width], [color]  
[pattern], [cycle]

### 1.02.18 (continued)

Patterns include: solid, double solid, broken, solid and broken, and dotted. Cycle is indicated for broken, solid and broken, and dotted lines in the form: [length]' mark, [length]' gap

Callouts for special markings are shown in the following format:

PAVT MRKG, [material], [pay item name or similar description]

When a special marking type appears on the same plan sheet multiple times, it is acceptable to label a single instance of each type and add "(TYP)" at the end of the callout rather than label each instance separately.

Recessing of longitudinal lines or special markings must be indicated in the callouts or via a general note on each plan sheet.

Quantities are to be shown per plan sheet with a grand total shown on the final plan sheet. If there are no pavement marking plan sheets or the plan sheets do not cover all markings, such as when using Witness, Log, Layout, place the quantities not associated with a pavement marking plan sheet on the Miscellaneous Quantities plan sheet under the heading "Permanent Pavement Markings".

Again, close coordination with the Design Division – Pavement Markings Unit is needed to prepare detailed and complete pavement marking plans. *The Michigan Manual of Uniform Traffic Control Devices* and the current PAVE series of standard plans gives details for pavement markings. Also see [Section 7.04](#) Pavement Markings.

# MICHIGAN DESIGN MANUAL ROAD DESIGN

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### 7.05 TRAFFIC SIGNS AND ROADWAY DELINEATORS

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### 7.06 FENCING

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  - A. Woven Wire Fence
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# ROAD DESIGN MANUAL

## ROAD DESIGN

### 7.04

#### PAVEMENT MARKINGS

##### 7.04.01 (revised 1-19-2016)

###### General

Pavement markings, both permanent and temporary, are included in most trunkline projects. The inclusion of pavement markings on the remaining projects will be determined by the Region/TSC. The only type of project not required to include pavement markings (either by contract or by work order) are projects where the existing markings are not altered or obliterated.

When there are no construction projects scheduled, placement of pavement markings is accomplished through the annual Region-wide contracts.

##### 7.04.02 (revised 1-19-2016)

###### Temporary Pavement Markings

Temporary Type R pavement markings usually consist of 4" wide strips of reflectorized, white or yellow, adhesive-backed tape, 4'-0" long with 46' gaps. There are two types designated in the pay items, "R" and "NR," standing for Removable and Non-Removable. Temporary Type R Tape and Type NR Paint pavement markings are all to be wet retroreflective. Temporary markings must be removable if they are applied to the pavement surface course unless the lines are painted in the final configuration and the final marking is not a durable marking; Type NR paint or tape need not be removed if they are applied to a lower course of HMA pavement that will be covered by another course of material. Type R tape should not be used on courses other than the surface course unless the marking is removed prior to paving.

### 7.04.02 (continued)

Removable Type R markings are to be placed on tapers and shifts on surface courses when possible. When shifting traffic out of its normal lane of travel, an 8" wide solid white line 300' in length must be placed prior to and immediately after the taper marking transitioning across the travel lane. This provides advance delineation to the motoring public as they maneuver through and after the shift into the appropriate lane. Reflectorized tape does not adhere well to rough surfaces, such as chip sealed surface or micro-surface. Paint is used in these cases to replace the reflectorized tape. If wet reflective paint is used for temporary marking, the pay item should reflect the word "temporary," e.g., "Pavt Mrkg, Wet Reflective, Type NR, Paint, 4 inch (color), Temp."

Temporary Raised Pavement Markers (TRPM) consist of either flexible retro-reflective strips (with or without a plastic shield) or a solid plastic device with a retro-reflective face. TRPM's are commonly used on chip seal projects until final markings are placed. Types of TRPMs and their applications are listed in the current Standard Specifications for Construction.

### 7.04.03

Section deleted.

## ROAD DESIGN MANUAL ROAD DESIGN

### 7.04.04

#### Removing Permanent Pavement Markings

Inappropriate permanent pavement markings must be removed before making any changes in the traffic pattern that will last longer than 3 days. This may be done using air or water blasting, or grinding. Painting over is not considered to meet the requirements for removal. Covering existing markings with black Type R tape is allowable when specified in the contract documents or as directed by the Engineer. Payment for removing pavement markings, when necessary, will only be made for Type NR markings.

### 7.04.05

#### Statutory Participating Cities

Statutory participating cities are exempt from participating in the cost of permanent pavement markings.

### 7.04.06 (revised 1-19-2016)

#### Plan Sheets, Standards Referencing, and Witness, Log and Layout

Most projects call for the placement and/or replacement of permanent pavement markings. To ensure the markings are laid out properly the Designer must include information in the plans or proposal to allow a Contractor to do so.

Markings are placed or replaced using one or a combination of the following methods:

- A log of previously witnessed markings
- Reference to standard plans (only if the standard can be placed in the field)
- Pavement marking plan sheets

When the roadway will not be geometrically or functionally altered by construction (no addition or removal of turn lanes, no change in passing and no passing zones, no addition or removal of signals, etc.) and the markings should be returned to their pre-construction configuration, marking layout can be addressed through the use of the pay item for Witness, Log, Layout (WLL). Use of WLL requires the Contractor to witness and log any existing pavement markings prior to the markings or pavement being removed, and to lay the markings back out after construction. The Engineer should have the opportunity to review the pavement marking layout prior to placement and make any necessary changes, however if changes are anticipated plan sheets should be included in the project documents.

## ROAD DESIGN MANUAL ROAD DESIGN

### 7.04.06 (continued)

While the applicable pavement marking standard plans should be listed in all contracts with markings, use of solely the standards for pavement marking establishment is only acceptable in a few situations. The standards do not address lane and shoulder widths, turn lane storage lengths, precise stop bar setbacks, and many other variables needed for marking layout, so virtually all projects should include either plan sheets or Witness, Log, Layout. Some of the exceptions to this where referencing the standards would be sufficient are bridge-specific projects (deck and/or approach work) and pavement patching projects, where the Contractor is only being asked to reconnect lines that they can see both ends of.

Plan sheets should be included if neither of the above options will adequately address the pavement marking layout needs of a project. When only a portion of a project will require changes from the existing pavement marking configuration (addition of a turn lane, correcting a section of markings that do not meet standards, etc.) it is acceptable to include plan sheets for only the portion requiring changes and utilize Witness, Log, Layout for the remainder of the project.

### 7.04.07 (added 1-19-2016)

#### Recessing Permanent Pavement Markings

To increase life expectancy pavement markings can be placed in a recess (groove) rather than on the pavement surface. Recessing provides protection from snowplow blades and also resistance to shearing forces from traffic passing over the markings.

All longitudinal permanent pavement markings placed with 3R/4R construction projects must be recessed, regardless of the pavement marking material used. Areas of exception are bridge decks, markings placed in a rumble strip, roadway sections that are candidates for road diets, and where markings are placed in pilot configurations (e.g. – where a road diet is installed but may be reversed). Recessing for special markings and on project types other than 3R/4R is at the discretion of the Engineer.

While recessing does aid the durability of all marking types, careful consideration must be given when recessing many styles of special markings. The groove created for the material can trap water and debris, resulting in potential hazards where motorcycles, bicycles, and pedestrians cross over the markings. As a result recessing is generally not recommended for symbols and legends, and when considering recessing for stop bars and crosswalks the Engineer should evaluate marking durability concerns against user types and volumes.

Recessing for lane lines, edge lines, centerlines, and gore markings falls under the longitudinal recessing pay item. All special markings, including line-style markings such as stop bars, crosswalks, and cross hatching, utilize the transverse recessing pay item. Turning guide lines (also referred to as lane line extensions, “blips”, or “chicken tracks”) have a separate recessing pay item due to the work and machinery involved.