



Road & Bridge Design Publications

Monthly Update – January 2015

Revisions for the month of **January** are listed and displayed below. The special detail index from October will remain in effect. E-mail questions related to the road changes to MDOT-Road-Design-Standards@michigan.gov. E-mail bridge related questions to MDOT-Bridge-Design-Standards@michigan.gov.

Road Design Manual

1.02.12C2: Sheet Breaks: Added 50 scale as a sheet break option. (600' per sheet - 6 stations)

Bridge Design Manual

12.04 & 12.04.06 B: Added criteria/option for deep overlays to use Grade D concrete that replaces 25 to 40% of the required cement content with slag cement. This is used when 2/3 or more of the deck will be greater than 4" thick.

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

1.02.12 (revised 1-20-2015)

Removal, Construction Plan, and Profile Sheets

A. Removal

Separate Removal Sheets should be considered depending on the type, location, and complexity of the project. Removal Sheets are almost always needed for projects in congested urban areas.

An early determination should be made whether or not to include removal items on the construction plan sheets. If this would cause the plans to become cluttered and difficult to read, then separate Removal Sheets should be used. The Removal Sheets should show all existing topography within the project limits.

All items for removal will be indicated on these sheets. Once it has been determined that an item is to be removed and it has been indicated on the Removal Sheet, the item should no longer appear on the construction plan sheet. Slope stake lines should be shown to determine removal limits. The edges of proposed pavement or back of curb may also be beneficial in determining removals.

Subdivision plat information shall be shown on the Removal Sheets.

The Removal Sheets shall only show the alignment required to construct the project.

1.02.12

B. General

Construction plan and profile sheets are the "meat" of a set of plans. Plan sheets are "overhead" maps or pictorial representations of the project to be constructed. Plan sheets indicate what items need to be removed, replaced, relocated, reconstructed, constructed, or adjusted. Plan sheets must be clear, complete, correct, and uniform to convey to the contractor how to construct the project and what materials will be needed.

P.C., P.I., and P.T. Station labels shall be shown for the alignment required to construct the project.

If the scope of work involves a significant amount of drainage and utility renovation or removal, separate plan sheets may be required for each phase of construction (removal, utility and drainage, and construction).

Profile sheets show existing elevations and proposed elevations of the finished construction project. They also show drainage details including existing and proposed ditch elevation, top of curbs, drainage structures, sewers, and other utility information. Profile sheets should also show grading information, such as front and back slopes, peat location and treatment, and excavation and embankment quantities.

Profile sheets may not be required on all projects, such as when the grade is not changing, or it is changing at a uniform rate.

MICHIGAN DESIGN MANUAL ROAD DESIGN

1.02.12 (continued)

Removal, Construction Plan, and Profile Sheets

C. Guidelines

1. Plan and Profile Scale

Rural Projects

Plan 1" = 100' (1" = 80' for reconstruction)

Profile 1" = 100' horizontal
1" = 10' vertical

Urban Projects

	Preferred	Acceptable
Plan	1" = 80'	1" = 100'
Profile	1" = 80' horizontal 1" = 8' vertical	1" = 100' horizontal 1" = 10' vertical

A scale of 1"=40' can be used for congested areas and for detailed grades. Reduced scales, 1"=200' or smaller, can be used for staging plans, pavement markings, vicinity or drainage maps and interchange drawings so that the entire project or interchange can be shown on one plan sheet.

2. Sheet Breaks

Preferred sheet breaks are as follows:

- 200 Scale: 2400' per sheet (24 stations)
- 100 Scale: 1200' per sheet (12 stations)
- 80 Scale: 1000' per sheet (10 stations)
- 50 Scale: 600' per sheet (6 stations)**
- 40 Scale: 500' per sheet (5 stations)

1.02.12C (continued)

3. Information

Plan sheets should include the following, except for the noted items which may be shown on separate sheets.

1. North orientation arrow.
2. City limits.
3. Township, range, and section.
4. Existing pavement description including width and type (indicate limits of milling or surfacing).
5. ROW, (existing and proposed) including cross roads.
6. Slope stake lines.
7. House numbers on urban projects and rural projects, if available.
8. Property owners names on rural projects, when available.
9. Existing drainage, direction of flow, size, and type of all existing culverts and sewers.
10. Pay items and leaders to specific work types.
11. "This Sheet" quantity listings shall include only items that are not included elsewhere on the sheet.
12. Detail of guardrail installation(s).
13. Existing utilities – NOTE: Flag all gas, oil & underground electric power lines as "hazardous or flammable material". Flag all underground telephone, water transmission, and fiber optics as "caution critical utility". All other underground private and municipal utilities should be shown in standard line coding with the type of utility, size, type of pipe (if known) and flow arrows (if applicable). Generally, overhead utilities (excluding overhead high voltage transmission lines) are not shown on the plans, unless these utilities are in the vicinity of structures such as bridges or culverts where cranes are in operation.
14. Existing Driveways.
15. Streets and Crossroads - name, width, surface, etc.
16. Soil survey boundaries identified with soil series.

MICHIGAN DESIGN MANUAL BRIDGE DESIGN

12.04

STRUCTURE RESURFACING(9-2-2003)

Where the scope of work indicates an overlay, it will be for one of the following types:

- Shallow concrete overlay
- Deep concrete overlay
- Hot mix asphalt (HMA) wearing course

Shallow concrete overlays are either latex or silica fume. Use this option when additional deck work is anticipated in 10 to 15 years.

Deep overlays are silica fume modified mixes or Grade D concrete with slag cement replacement. Use this option where the underside of the deck is sound and additional deck work is not anticipated for 25 to 30 years. See Section 12.04.06 B. (1-20-2015)

Use an HMA wearing course on a waterproofing barrier - where additional deck work is anticipated within 5 to 10 years. (12-5-2005)

With all types of overlays, an existing thrie beam retrofit height of 34" to top of rail shall be maintained. (12-5-2005)

See the Bridge Deck Preservation Matrix (Section 12.09.02) for further clarification.

See section 7.02.19 G when superelevations and parabolic crowns are encountered on an overlay project. (12-5-2005) (3-26-2012)

If feasible overlays should be done to a 2 % cross slope, otherwise a 1.5 % slope is acceptable. A check of the structural adequacy of the superstructure shall be done and composite action of shallow and deep concrete overlays according to AASHTO Bridge Specifications shall also be considered. (8-20-2009)

12.04.01

Origin of Projects

Resurfacing projects usually originate from the bridge maintenance programs of the Region/TSC. They may also originate from a road resurfacing project, since the FHWA requires all structures within the limits of such projects be considered for upgrading if there is a need.

12.04.02

Bridges Within Road Project Limits

(9-2-2003) Concrete decks that are in good condition and that have no existing hot mix asphalt(HMA) overlay will be gapped out of road resurfacing projects. If the deck condition is poor or there is an HMA overlay, they shall be treated as follows:

- A. If the deck is scheduled for a concrete overlay, it shall be included in the project as a concrete overlay.
- B. If the deck is scheduled for replacement within two years, the deck may be overlaid with HMA. Any existing HMA shall be removed.
- C. Gapping out the HMA overlay is not cost effective for very short structures. For these structures, the HMA overlay will be continued across the structure after placing a waterproofing barrier.

12.04.03

Concrete Removal

(5-1-2000) Decks which are to be overlaid with a concrete surfacing mixture will be prepared by scarification followed by two passes of hydrodemolition.

MICHIGAN DESIGN MANUAL BRIDGE DESIGN

12.04 (continued)

12.04.06

Concrete Overlays (5-1-2000)

MDOT uses the following two strategies for concrete overlays (also see Section 12.09.02 and the Bridge Deck Preservation Matrix):

A. Shallow Overlays

Shallow overlays are a medium term fix. They are designed to last approximately 10 to 15 years.

Shallow overlays consist of a latex modified, or silica fume modified concrete overlay mixture placed a minimum of 1½" in thickness. This is placed after the existing deck has been scarified (¼") and hydrodemolished (¾").

B. Deep Overlays

Deep overlays are a long term fix. They are designed to last 20 to 30 years depending on the condition of the existing deck.

Deep overlays consist of a concrete overlay made of either silica fume modified concrete or Grade D concrete with slag cement replacement. It is placed on the existing deck after it has been scarified and hydrodemolished. (1-20-2015)

It is desirable to completely encapsulate the top mat of reinforcing steel in the deep overlay. However, it is difficult to know the precise location of the mat before hydrodemolishing the deck. In addition, the thickness of the existing deck will influence the amount of concrete removed.

The deep overlay thickness and procedures varies depending on the thickness of the existing bridge deck (excluding any existing overlay).

12.04.06 B. (continued)

For decks 7½" or less in thickness, the deck is scarified ¼" and hydrodemolished 2¾" or to ¾" below the top mat of steel, whichever is less. The overlay is a minimum of 3" in thickness. (10-24-2001)

For decks greater than 7½" in thickness, the deck is scarified ¼" and hydrodemolished 3¾" or to ¾" below the top mat of steel, whichever is less. The standard concrete overlay should use silica fume modified concrete with a minimum thickness of 4". (10-24-2001) (1-20-2015)

Deep overlays for which 2/3 or more of the deck will be greater than 4" in thickness should use a Grade D concrete that replaces 25 to 40 percent of the required cement content with slag cement. These overlays shall not become shallower than 2". Additional chipping at the gutter line (toe of barrier or curb) may be detailed to accommodate this requirement. See the Special Provision for Deep Concrete Bridge Deck Overlays. (1-20-2015)

12.04.07

Hot Mix Asphalt (HMA) Overlays and Caps (12-5-2005)

In general, an HMA overlay or cap is not a preferred treatment for bridge decks. Where a bridge is scheduled for a deck replacement within two years, an HMA cap is an acceptable means of obtaining rideability.

Where HMA is used for a longer term overlay (five years or more) the designer must incorporate a waterproofing membrane in the design (see the Standard Specifications). Also see Section 12.04.

Where an HMA mix has not been specified as part of a road project, the project manager should consult the Construction Field Services Bituminous Pavement Unit for an acceptable HMA. (3-26-2012)