MONTANA
Department of Transportation

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Memorandum

To: Distribution

From: Dustin Rouse, P.E., Chief Engineer DCR

Date: April 3, 2023

Subject: Guidance on Signs, Sign Sheeting, Pavement Markings, and Delineation on Department Responsible Roadways

This design memo updates and consolidates guidance on sign retro-reflectivity, expected sign life, sign color and use, inlaid pavement markings, interim/temporary pavement markings, crosswalk markings as well as sign replacement and delineation on Federal 3R projects.

Design/Management Memo Changes

The following memos are rescinded as designated below; memo's rescinded are superseded by this memo:

Rescinded: *Sign Replacement to Maintain Minimum Retro-reflectivity & Sign Sheeting Policy 10-6-2010*

Rescinded: *Type XI Sign Sheeting – Application, Florescent Yellow for Curve, Pedestrian and no passing signs, Replacement schedule for signs 9-26-2017*

This memo is outdated as it discusses type IX sheeting being phased out and therefore dictates that type IV sheeting be used on guide signs while type XI be used for regulatory and warning signage. This also discusses replacement of signs on construction projects and sets the time limit for sign replacement of 10 years.

Rescinded: *Type XI Sign Sheeting – Updated Application Guidelines 1-11-2022*

This memo is the most current and recently published, but still maintains sign replacement at 10 years. This memo is being incorporated into this one.

Rescinded: *Delineation on Non-Interstate Roadways 2-7-2012*

This memo removed the minimum threshold for delineation on Montana's non-interstate roadway of 900 AADT and required the use of delineation on all Montana highways. Current detailed drawings have been updated to reflect these changes; future Traffic Design Manual updates will update this requirement as well.

Rescinded: *Temporary Pavement Markings 3-23-2006*

This memo discussed the lift thickness of plant mix and the subsequent calculation of temporary pavement markings. Due to changes in business practices and subsequent design memos this is not longer applicable and is being removed.

Rescinded: *Durable Interim Striping 11-30-2012*

This memo discussed when to use durable interim paint which is now part of the Standard Specifications. Applicable portions of this memo will be covered herein, and therefore this memo is being rescinded.

Rescinded: *Pavement Marking Removal 11/22/2016*

This memo discussed when to use the bid item pavement marking removal and when not to. Applicable portions of this memo are covered herein, and therefore this memo is being rescinded.

Rescinded: *Pavement Marking Quantities 6-26-2019*

This memo described a change for temporary and interim striping quantities. For Temporary Striping the change was from mile to LNFT of 4" stripe that Road Design Calculated, and for Interim quantities it was stated that Traffic would provide a quantity for a single application and Road Design would work with Construction to determine the number of applications.

The following management memo is being updated to meet current guidance and MDT practices for sign sheeting.

Rescinded: *Policy on Sign Sheeting Materials for Permanent Signs 9-29-2010 Management Memo: 10-02*

This memo is outdated and conflicts with the most recent guidance on sign sheeting type. Applicable provisions of this memo will be re-stated or updated in policy to minimize confusion and consolidate guidance.

The following Design Memos are still in force and are not being rescinded but are referenced here for continuity of guidance.

Centerline Pavement Markings for Rural Highways 6-18-2019

This memo describes the changes to all centerline pavement markings for a 4"-12"-4" spacing regardless of the presence of centerline rumble strips. This memo remains in force.

Centerline Rumble Strip Guidance 11-4-2022

This memo provides clarification and guidance in determining what projects include installation of Centerline Rumble Strips (CLRS) and what type to install.

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Guidance

Sign Sheeting Type:
Type XI (eleven) sign sheeting is to be specified for **all signage, excluding delineators**.

This change is mandatory to all projects with letting dates after November 1, 2022. This allows current type IV (four) sheeting inventories to be exhausted. Substitution of type IV sheeting for D-3 sign backgrounds may be allowed on contracts after the November 1, 2022, deadline on a case-by-case basis at the sole discretion of the Traffic Design Engineer. This is not intended to be a continuation of type IV sheeting for extensive use but only for inventory reduction. Existing stock of Type IV guide signs by State Forces may be deployed until exhausted.

Replacement Schedule:
In line with the industry's increased warranty period for type XI (eleven) sheeting the replacement schedule for sign faces shall be 15 (fifteen) years for all signs and is to be based on the date the sign was installed. When sign replacement is included in the scope of a construction project, replacement of all signs 13 years or older based on the ready date is required.

Maintenance is still responsible for verification of retro-reflectivity, inspections, and recordation of this information. It is very beneficial for this information to be available for design when determining sign face replacements during project scoping outside of the guidance provided herein.

Florescent Yellow (FY):
Florescent Yellow sheeting must be used for horizontal alignment signs (W1 series of signs), no passing zone pennants, pedestrian crossing signs, railroad crossing signs (a new addition, W10-1), and exit and ramp advisory speed signs. Reference the table below for commonly used signs that are FY.

W1-1	W1-1a	W1-2	W1-2a	W1-3
W1-4	W1-5	W1-6	W1-8	W1-10
W1-10a	W1-10b	W1-10c	Wc-10d	W1-10e
W1-11	W1-13	W1-15	W13-1P	W13-2
W13-3	W13-6	W13-7	W14-3	W11-2
W16-7P	W10-1	OM-3*		

*OM-3 style panels on the heads of Optional Terminal Sections may be supplied with either Florescent Yellow or Yellow on black.

Florescent Yellow-Green (FYG)
Florescent Yellow-Green sheeting must be used for all school crossing assembly and "school" related signage as is current MDT practice reference the MUTCD Figure 7B-1 for FYG signage.

PCCP Pavement Markings
To minimize the re-application of pavement markings on Portland Cement Concrete Pavement (PCCP) pavement markings are to be inlaid epoxy pavement markings or tape. This change is effective upon distribution of this memo. Following is more specific guidance on what conditions inlaid pavement markings of either epoxy or tape are to be used.

Longitudinal Pavement Markings (fog, center, TWLTL, median, and skip):
Rural: Longitudinal pavement markings are to be inlaid epoxy. This will be either detailed in the detailed drawings or via contract provisions depending on the needs of the project and as standards are updated. Contact Traffic and Safety Bureau for these details or contract provisions up until the time they are made standards.

Urban: Longitudinal pavement markings are to be inlaid high performance tape.

Perpendicular Pavement Markings and Words & Symbols:
Rural and Urban: Are to be inlaid epoxy.

Exceptions to this Guidance:
Consideration of high-performance tape where epoxy is generally used or epoxy where tape is generally used is to be based on sound engineering judgement and supported or requested by the Maintenance division. Some considerations to specify inlaid tape or inlaid epoxy could be, AADT, number of lanes, epoxy life, worker exposure, life-cycle costs, and tape performance.

Roundabout Inlaid Pavement Markings
All roundabouts must include inlaid pavement markings regardless of surfacing type. Exceptions are to be documented in a milestone report. The inlaid pavement markings include the approach legs out to the beginning of the splitter islands. This change is effective of all projects prior to Final Plan Review, changes after FPR to inlaid pavement markings can be made at the discretion of the design team.

Temporary and Interim Pavement Markings
Temporary Pavement Markings

Temporary Striping is measured and paid for by the foot (meter) to accurately capture the quantity paid for when stripe configurations are changed during construction. It is measured to the nearest foot (0.1 m) based on a 4" (100 mm) width. Stripes wider than 4" are to be converted to the equivalent linear feet of 4" wide stripe. Traffic Signing staff will provide the lineal feet of 4" striping required for centerline and other lane divider markings based on the final pavement marking configuration. Road Design will remain responsible for including temporary paint marking quantities and costs in their summary frames and estimate. For calculating the lengths of temporary striping that is different than the final configuration, use the following formulas for each application:

Length of rural skip stripes (feet) = length of roadway segment (feet) x 0.25
Length of urban skip stripes (feet) = length of roadway segment (feet) x 0.375
Length of no passing one direction (ft) = length of roadway segment (ft) x 1.25
Length of no passing both directions (ft) = length of roadway segment (ft) x 2
Length of 8" lane divider (ft) = length of roadway segment (ft) x 2

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Interim Pavement Markings
Interim Pavement Markings will continue to be calculated by Signing and will be for a single application. The project manager will coordinate with District Construction on the number of applications required for the project based on the anticipated construction sequencing.

To provide flexibility and a single point of contact throughout the design and construction process, Traffic Signing will provide one application of interim and one application of final PMQs for every project. Road Design will then work with Construction to determine the appropriate number of applications for each project and will include the total final gallons in the summary sheet and cost estimate. The number of applications will be noted at the bottom of the frame.

Subsection 401.03.18 directs that interim striping rather than temporary pavement markings is placed on top of a seal and cover. Due to the requirements that the final epoxy pavement markings cannot be applied for a minimum of 30 days after the completion of the seal and cover operations, the use of temporary pavement markings on the seal and cover is not practical. Consequently, and as current practice we will not provide temporary pavement markings for seal and cover projects.

Durable Interim Pavement Markings
Waterborne paint is divided into two categories in the current version of the Standard Specifications, waterborne paint (WP) and high durable waterborne paint (HDWP). WP and HDWP are both included in the Department's QPL. Of the paints on the QPL several meet the specification for both WP and HDWP. It is also noted that two Contractor's perform most of the Departments striping. Of these two contractors one uses HDWP for contract work and the other uses WP. Based on this Contractor practice and the fact that HDWP is approximately $1.00 more per gallon materially, the following changes are going to be made.

1. Specifications will be changed to require High Durable Waterborne Paint as Interim Striping.
2. The HDWP bid items will be removed from the MDT catalog.
3. The QPL will be updated in accordance with these changes.

This change will go into effect with the June 2023 letting or within the timeframe necessary for incorporation into the standard specifications.

In addition, for areas where interim striping has been difficult to last throughout the winter until the next season chip seal season, it is recommended that the application thickness be increased from 15 mils to 20 mils. This will be done by special provision. The additional thickness needs to be coordinated with District Construction prior to advertising. It is recommended that the District Questionnaire have this increase in application thickness be included as a check box to trigger the special provision and quantity adjustments.

<u>Pavement Marking Removal</u>
Include the bid item "Remove Pavement Marking" in the contract when:

- There is an estimated quantity of over 1000 linear feet
- New alignment(s) transitions into the PTW and the permanent markings need to be changed.

Do not include the bid item "Remove Pavement Marking" when the pavement marking removal is due to crossovers and the crossover special provision is included in the contract documents.

The crossover special will define that payment for pavement marking removal as included in the Crossover bid item.

Crosswalk Striping

The MDT Traffic Engineering Manual states in section 19.5.3 that "continental" style crosswalk pavement markings are to be reserved for school crossing only. The crosswalk markings consist of 2 ft. x 8 ft. white blocks spaced 2 ft. apart. Reference figure 19.5C for the layout of these markings. Over the course of the last decade this requirement has been relaxed without official documentation.

This standard is being re-iterated that the "continental" style crosswalk will be reserved for school crossings only as depicted in Figure 19.5C in the Traffic Engineering Manual.

To address situations where a higher visibility or enhanced pavement markings are warranted or desired an alternative pavement marking detail has been developed for use where the typical perpendicular 8-inch-wide stripes are used. The new enhanced crosswalk markings use the "continental" style crosswalk markings but remove 50% of the 2 ft. x 8 ft. white blocks. So instead of being spaced at 2 ft. they are spaced 4 ft. apart. This should minimize any template changes for Contractors and will provide an enhanced crosswalk with less paint and future maintenance. Reference the attached detail for the crosswalk layout.

It should be noted that crosswalks are still required to be reviewed/studied in accordance with the Design Memo: *Guidance for Determining Pedestrian Crossing Treatment at Uncontrolled Locations* dated November 1, 2019. This is typically coordinated with the Traffic Operations Section.

Delineation

Current MDT standard details indicate that type A delineators are to be used for continuous delineation on the right shoulder of all paved routes. This standard is to continue unless at the request of maintenance during project development type F delineators are requested. Type F use should be based on local operations and conditions. When type F delineators are requested, type F may replace type A delineators to provide continuous delineation for both shoulders of the roadway. Typically, this request is for limited visibility conditions experienced during winter storm events. No changes to the detail drawing 619-34 is necessary. Continuous Type F delineation should not be the sole reason for including delineation in projects. Reference the following guidance for when to include delineation upgrades in projects. Type F delineation is permitted under the MUTCD which indicates a white reflector on the left shoulder is allowed, Type F delineation satisfies this requirement.

3R Projects – Sign and Delineation

The 3R agreement between MDT and FHWA is the governing document on minimum or judgment related decisions on when to replace signage and delineation (pavement markings, delineators, linear delineation). Following is additional guidance, clarifications, and general rules based on the project type designations in the 3R agreement.

Light Pavement Preservation:
Signs:
Signage is not required to be upgraded unless there are obvious and significant deficiencies in sign retro-reflectivity, safety (breakaway), or a severe maintenance history (wind damage, exposure, crash history, etc.).

Delineation:
Like signing, delineation is typically not required to be upgraded on light pavement preservation projects.

However, if delineation is not present on a paved roadway, then delineation should be included in the project scope and documented in the SOW report. Coordination with the Traffic Design would be required if delineation is added to the scope of light pavement preservation projects.

Pavement Markings:
Pavement markings are to be included on projects that would impact existing markings. These quantities will be provided by the Traffic Design Section.

Medium Pavement Preservation:
Signs:
Sign face replacements and limited upgrades are typically included in the scope of medium pavement preservation projects, except for Microsurfacing and Cape Seal projects (seal and cover followed by a Microsurfacing treatment). Sign face replacements are not necessary if retro-reflectivity is good based on inspections. Otherwise, replacement should be in accordance with the replacement schedule stated above. Microsurfacing projects that have signs in the recommended replacement schedule should be considered for sign face replacement to maintain minimum retro-reflectivity. Inclusion of sign face replacements and minor upgrades on Microsurfacing or Cape Seal projects is to be documented in the SOW report.

Delineation:
Delineation should be included in all medium pavement preservation projects. Alternative treatments should be identified in the SOW report and coordinated with the Traffic Design Section.

Pavement Markings:
Pavement markings are to be included on projects that would impact existing markings. These quantities will be provided by the Traffic Design Section.

Heavy Pavement Preservation:
Signs:
Signage upgrades are typically included in the scope of heavy pavement preservation projects. In general, the pavement maintenance schedule should align with the sign replacement schedule as outlined above and therefore it is unlikely that signs would not be upgraded with a heavy pavement preservation scope project. If signs are not upgraded with these scope projects, documentation in the SOW report is necessary on why upgrades are not included.

Delineation:
Delineation should be included in all heavy pavement preservation projects. Alternative treatments should be identified in the SOW report and coordinated with the Traffic Design Section.

Pavement Markings:
Pavement markings are to be included on projects that would impact existing markings. These quantities will be provided by the Traffic Design Section.

Rehabilitation and Reconstruction:
No changes to current practices for Rehabilitation, Reconstruction, or New Construction projects. Signage, delineation, and pavement markings are to be included in these projects.

Exceptions
No guidance document can predict all situations that can be encountered on Montana's Highways or projects. Alternative treatments, omission of work, inclusion of work, and/or deviations from this document are to be coordinated with the Traffic & Safety Bureau, Design Section and documented accordingly most documentation will be included in the SOW report however other milestone documents may be appropriate.

Closing
The rescinding and coordination of the design guidance contained herein is intended to provide for clarification of existing guidance and more closely align with MDT current business needs.

If there are discrepancies between this memo and the Traffic Engineering Manual, this Design Memo will govern, until subsequent updates to the Traffic Engineering Manual are completed. Memos being rescinded will be archived and the links removed from MDT's internal/external website as they are no longer applicable. Questions regarding guidance contained in this memo should be referred to the MDT Traffic Design Engineer.

copies:

Engineering Bureau Chiefs
Planning staff
Consultants
Checkers
Design Project Managers
Design Supervisors
District Preconstruction Engineers
District Project Engineers
District Design Supervisor's
Maintenance Division Administrator
Maintenance Division Operations

TYPICAL ENHANCED PEDESTRIAN CROSSING - NON SIGNALIZED DETAIL

NOT TO SCALE

GENERAL NOTES:

REFER TO PART 3B-15 THROUGH 3B-18 IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES 2009 EDITION FOR ADDITIONAL GUIDANCE

DIMENSIONS ARE TYPICAL

