GUIDELINES FOR NOMINATION AND DEVELOPMENT OF PAVEMENT PROJECTS

(CORRECTIVE MAINTENANCE TO RECONSTRUCTION)

MONTANA DEPARTMENT OF TRANSPORTATION
MONTANA DIVISION, FEDERAL HIGHWAY ADMINISTRATION

Joint Agreement

This agreement constitutes a commitment by the Montana Department of Transportation (MDT) and the Montana Division of the Federal Highway Administration (FHWA) to provide guidelines to nominate and develop projects consistent with criteria for projects in different funding and roadway treatment categories. This agreement supplements the Department's geometric design standards in the categories of corrective maintenance, pavement preservation, minor and major rehabilitation, and reconstruction. It also establishes guidelines for federal aid participation. This agreement provides guidelines for all state maintenance, state construction, and federal aid projects. Projects that fall within the parameters of this agreement will be considered eligible for federal aid by the Division. Projects that do not meet one or more of the parameters can still be considered for federal aid, but further review will be necessary in accordance with the Stewardship and Oversight Agreement on the National Highway System (NHS); by MDT on non-NHS routes (normally funded by the Surface Transportation Program (STP); or the project may be a state-funded project. All projects will receive the appropriate level of environmental documentation as required by NEPA and MEPA.

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12/14/17
Date

MONTANA MDT DEPARTMENT OF TRANSPORTATION

U.S. Department of Transportation Federal Highway Administration

Acronym Guide

Acronym	Meaning
AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
BCT	Breakaway Cable Terminal
CCPR	Cold Central Plant Recycling
CIR	Cold-in-Place Recycle
DBR	Dowel Bar Retrofit
DCE	District Construction Engineer
EPM	Engineering Project Manager
FHWA	Federal Highway Administration
HIR	Hot-in-Place Recycle
ISD	Intersection Sight Distance
LOSS	Level of Service of Safety
MASH	Manual for Assessing Safety Hardware
MDT	Montana Department of Transportation
MELT	Modified Eccentric Loader Terminal
MEPA	Montana Environmental Policy Act
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHS	National Highway System
OSOW	Oversize/Overweight
PFR	Preliminary Field Review
PROWAG	Public Right of Way Accessibility Guidelines
PvMS	Pavement Management System
QPL	Qualified Products List
RDM	Road Design Manual
RRR	Resurfacing, Restoration, or Rehabilitation
SOW	Scope of Work
STP	Surface Transportation Program
TCP	Tentative Construction Plan/Program
TI	Technical Infeasibility
US DOT	United States Department of Transportation

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Zero (0) copies of this public document were published at an estimated cost of $00.00 per copy, for a total cost of $00.00, which includes $00.00 for printing and $00.00 for distribution.

Maintenance

Maintenance describes work that is performed to maintain the condition of the transportation system or to respond to specific conditions or events that restore the highway system to a functional state of operation. Maintenance is a critical component of an asset management plan that is comprised of both corrective maintenance and pavement preservation.

Corrective Maintenance

Corrective maintenance encompasses work that is performed in reaction to an event, season, or over-all deterioration of the transportation asset. Corrective maintenance work may be re-occurring as necessary until such time as the asset can be otherwise preserved, rehabilitated or reconstructed. Federal-aid funds cannot be used to perform corrective or reactive maintenance. Corrective maintenance is subject to the appropriate NEPA/MEPA process and the ADA Transition Plan. Other guidelines of this Agreement are encouraged but not required for corrective maintenance.

Pavement Preservation

Pavement preservation is a cost-effective means of extending the useful life of the highway. For MDT, this includes the planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system without intentionally increasing the structural capacity. Pavement Management should be consulted to ensure the treatment is appropriate if the project is advanced a year or more ahead of planned letting.

Pavement Preservation plugs

Pavement preservation projects address observed pavement distress, condition and/or age. These projects have relatively short development time and are typically let to contract within one to two years from conception. Each district identifies potential preservation candidates. Depending on the strategy selected, the age of the pavement will vary, but projects of less than 20 years in age will be considered the most appropriate candidates. Other selections can be submitted but will be considered on a project-by-project basis. The process for nominating Federal aid projects begins with identification of preservation plugs in the TCP **two (2)** years out from the nominating year. It is important Districts do not nominate more than two years out. MDT's Pavement Preservation Program and PvMS Annual Report are set up to recommend projects within two years. Nominating beyond two years has the potential to provide premature treatment when a project is let to contract early. Each District identifies its candidates and contacts the Pavement Management unit to do an office review to determine if a nomination field review is necessary with Pavement Management and the District personnel. Pavement Management will schedule a field review for affected project nominations. After the review(s), Pavement Management confirms the nominations with Project Analysis or the District modifies the nomination from the field review determination and submits to Project Analysis.

Pavement Preservation (Core Program)

There are circumstances that may justify nomination of additional pavement preservation projects. Projects nominated more than two years out should come from the core program. Pavement nominations beyond two years from the core program may utilized to balance due to redistribution.

There are three levels (Light, Medium and Heavy) of pavement preservation.

Light Pavement Preservation
Light pavement preservation includes minor pavement treatments that do not change the existing roadway width or add structural capacity. The intent of these projects is to extend the useful life of pavements through scheduled projects. This may include work on roadway surfaces in advance of various levels of observable deterioration. Project scope of work must be a cost-effective means of extending the useful life of the highway to meet Federal-aid funding requirements.

These projects are intended to be designed quickly with minimal plans, since they entail similar work regardless of location. While quantities and minor details may vary, they lend themselves to a simplified design approach. It is anticipated that the time from conception to construction would be within one year.

Light Pavement Preservation projects include:

Crack seal / joint seal	**Concrete panel repair/replacement
Seal and cover (chip seal)	Diamond grinding
Fog seal	Dowel bar retrofit
Sand seal	*Bridge deck seal
Scrub seal	*Bridge deck seal/high friction treatment

* can be included if the cost is ≤ 10% of the total estimate

** if ≤ 10% of the total panels

Hazard Mitigation:
Specific safety analysis is not required. Crash analysis can be requested if there is site evidence or known safety performance concerns. Cost-effective safety countermeasures should be considered if recommended by Safety Engineering analysis or identified by the District.

Design Exceptions:
Design exceptions are not required.

Design Criteria:

Americans with Disabilities Act:
ADA improvements are typically not required on crack sealing, seal and covers or other similar light pavement preservation treatment projects. However, they may be included in the project as indicated in the ADA Transition Plan, the Technical Infeasibility Determination (See Appendix A) and if cost effective within the project scope. Coordinate with the Traffic Operations Unit if ADA improvements are being considered at signalized locations.

Pavement Width and Condition:
Pavement width is not a required consideration. These road segments generally should have been on a scheduled maintenance program from their original construction. These projects should result from an established pavement treatment sequence developed from past performance and MDT experience supported by Pavement Management System (PvMS) data.

Surfacing Design:
Specific surfacing design recommendations are not necessary for these non-engineered treatments. However, the Surfacing Design Unit should be involved in all surfacing treatment decisions.

Signing and Delineation:
Replacement of signing is not required but is encouraged per the "Sign Replacement to Maintain Minimum Sign Retroreflectivity & Sign Sheeting Policy" memo dated 10/6/2010. Delineation is one or a combination of devices that regulate, warn or otherwise provide roadway tracking information and guidance (e.g. pavement markings, delineators, lineal delineation, etc.). Consider replacing damaged or worn sign faces and delineation. Replace impacted pavement markings.

Roadside Safety Hardware:
Upgrade all guardrail end treatments that don't meet NCHRP 350 criteria. (See table 3).

Operational Improvements:
Not required.

Bridge Considerations:
Scheduled bridge maintenance commensurate with the level of work will be considered.

Medium and Heavy Pavement Preservation
Preservation consists of work that is planned and performed to improve or sustain the condition of the transportation facility in a state of good repair. Preservation activities generally do not add capacity or structural value, but do restore the overall condition of the transportation facility. Medium and heavy pavement preservation treatments may impact the surfacing width. The intent of these projects is to extend the useful life of pavements based upon pavement condition, age or observed pavement distress. Projects must be a cost-effective means of extending the useful life of the highway to meet Federal-aid funding requirements.

Since the intent of pavement preservation projects is to preserve the investment in the pavement structure, the project development time should be relatively short. Anticipated letting time for projects is within one to two years from conception.

Medium pavement preservation treatments include:

- Mill Fill ≤ 0.2 ft (replace in kind)
- HIR ≤ 0.2 ft w/chip seal
- Leveling course
- Cape Seal (microsurfacing over chip seal)
- Microsurfacing
- CIR ≤ 0.3 ft w/chip seal
- White topping

Heavy pavement preservation treatments include:

- Overlay ≤ 0.2 ft
- Mill fill + overlay thickness ≤ 0.2 ft
- HIR ≤ 0.2 ft w/overlay ≤ 0.2 ft
- CIR ≤ 0.3 ft w/overlay ≤ 0.2 ft

Hazard Mitigation:
Although the intent of Pavement Preservation Projects is to optimize the existing investment in the pavement structure, safety still needs to be considered. A Safety Engineering review or

crash analysis is required for medium and heavy treatments. Safety Engineering crash analysis recommendations should be included with the project. Crash analysis recommendations that are not included should be documented in the Scope of Work report with supporting justification. Features to mitigate correctable hazards identified by the design team may be included. Consider project scope, schedule, cost-effectiveness and benefit-cost when evaluating hazard mitigation features. Below are some roadway elements to consider for hazard mitigation:

No change in overall surfacing elevation	Overall increase in surfacing elevation
Superelevation rate[1]	Superelevation rate[1]
Vertical clearance (if used by OSOW vehicles)	Vertical clearance
Clear zone obstacles[2]	Clear zone obstacles[2]
	Cross slope
	Clear zone approach slope flattening
	Intersection Sight Distance[2]

Design Exceptions:
Design exceptions are required for the design control elements below if the treatment results in reduced road width or vertical clearance:

Design speed
Lane and shoulder width
Vertical Clearance

Design Criteria:

Americans with Disabilities Act:
Install or upgrade curb ramps wherever a prepared surface for pedestrian use is altered by the project. Review the current ADA Transition Plan, ADA Technical Infeasibility Determination (See Appendix A) and Local Transportation Plans and evaluate existing and potential pedestrian use to determine ramp locations.

- Coordinate proposed improvements and any necessary exceptions with the external ADA coordinator. Design to PROWAG to the greatest extent feasible.
- Consult with Traffic Operations Units to determine if signal work is appropriate to be coordinated or accommodated.

Pavement Width and Condition:
Lane and shoulder widths will only be a consideration if the treatment will result in a reduction in width. The following apply only if the treatment will result in a width reduction:

Interstate –See MDT Geometric Design Standards for lane and shoulder width standards. The following treatments are in order of preference if the resulting reduced lane or shoulder widths are less than the standard widths;

- Provide the flattest surfacing inslopes steeper than a 6:1 but no steeper than 4:1 that will meet the shoulder width standard. Document the steepened slopes in the SOW report.

[1] Not typically included, but can be included if within the normal scope of project and based on a safety recommendation.
[2] Not typically included, but can be included if within the normal scope of project work and on the basis of a safety recommendation.

- The Roadway Width and Rumble Strip Committee will determine the roadway width if shoulder and lane width standards cannot be achieved using 4:1 or flatter surfacing inslope. Use the short format design exception template to describe and justify the reduced width. This design exception can be included in the SOW or can be a stand-alone approval document.

NHS and STP (Primary and Secondary) –See MDT Geometric Design Standards for lane and shoulder width standards. The following treatments are in order of preference if the combined travel lane and shoulder widths will be less than the combined standard lane and shoulder widths:

- Provide the flattest surfacing inslope steeper than 6:1 but no steeper than 4:1 that will meet the combined lane and shoulder width standards. Document the steepened slopes in the SOW report.
- The Roadway Width and Rumble Strip Committee will determine the roadway width if the combined standard lane and shoulder widths cannot be achieved using 4:1 or flatter surfacing inslope. Use the short format design exception template to describe and justify the reduced width.

Off-system and local roads- Apply MDT Geometric Design Standards for off-system and local roads. The preferred treatment is to steepen the surfacing inslopes to 4:1 or flatter if the resulting roadway width will be less than the applicable standard. The Roadway Width and Rumble Strip Committee will determine the roadway width if the standard width cannot be achieved with 4:1 or flatter surfacing inslopes. Document the standards reference being applied, surfacing inslopes steeper than 6:1 and roadway widths less than the standard in the SOW report.

Since these projects should extend the useable pavement life, some type of pavement rehabilitation has likely been completed in the recent past. Depending on the treatment selected, the age of the pavement will vary, but projects of less than 20 years in age will be considered as the most appropriate candidates. Other treatments can be submitted, but will be considered on a project-by-project basis.

Surfacing Design:
Pavement management analysis should be considered when nominating pavement preservation projects. If the proposed project treatment is the same, or one category different (one up or down) as identified in the treatment list in the PvMS pavement condition report, no further review is necessary.

A more in-depth review and justification is needed if the proposed project treatment moves the treatment from pavement preservation to rehabilitation or vice versa even if it is only one category different from what is recommended by the PvMS pavement condition report. Contact the Pavement Management Unit to discuss additional review and justification. Provide documentation in the SOW report.

On projects that include milling, the total thickness of new plant mix placed, including replacement of milled material should not exceed 0.20 ft. Cold-in-Place Recycle (CIR) and Hot-in-Place Recycle (HIR) with or without an overlay are the exception. A CIR or HIR project may have an overlay not exceeding 0.20 ft and still be considered a pavement preservation project.

Leveling quantities in tons/mile should not exceed 25% of the typical quantity for the planned overlay. Example:

28' wide overlay with 6:1 surfacing inslopes, 0.20' thick requires 2216 tons/mi
2216 x 0.25 = 554 tons/mi, for a maximum leveling course of 555 tons/mi maximum leveling quantity

Signing and Delineation:
Replace signing per the "Sign Replacement to Maintain Minimum Sign Retroreflectivity & Sign Sheeting Policy" memo dated 10/6/2010. Delineation is one or a combination of devices that regulate, warn or otherwise provide roadway tracking information and guidance (e.g. pavement markings, delineators, lineal delineation, etc.). Replace damaged or worn sign faces. Replace delineation.

Roadside Safety Hardware:
Consider upgrading roadside safety hardware to successfully tested MASH hardware per MDT "Roadside Safety Hardware Upgrades Policy" number POL 5.03.002 when safety analysis identifies addressable crash trends or if identified by the District as needed. Approved MASH devices may not be available to accommodate all circumstances. Provide MASH devices from the MDT QPL list and MDT Detailed Drawings or per a Public Interest Finding. Upgrade non-NCHRP 350 systems as shown in Table 3 per POL 5.03.002. Consider addressing low barrier on medium pavement preservation treatment projects. Correct low barrier on heavy pavement preservation treatment projects. Consider replacement of bridge rail, approach sections and longitudinal barrier based on the condition. Guardrail warrants are not required for pavement preservation projects.

Operational Improvements:
Not required

Bridge Considerations:
Scheduled bridge maintenance commensurate with the level of work will be considered. Bridge Design Loading Structural Capacity must be evaluated when a structure is overlaid. Obtain a design exception, if necessary, through the Bridge Engineer.

Consider addressing non-350 bridge rail per the "Roadside Safety Hardware Upgrades Policy".

Rehabilitation

Rehabilitation is a strategy to extend the useful life of a highway through pavement structure improvement, safety enhancement, and operational improvements, without necessarily improving geometrics. On a statewide basis, it is not cost effective to reconstruct all facilities with deteriorating pavements to current standards. Engineering judgment is applied on individual rehabilitation projects to achieve appropriate levels of safety and operational characteristics, given the existing conditions and constraints. Reconstruction work is < 25% of the project length. Rehabilitation is considered in two categories: Minor and Major. These are shown in the attached matrix and described below.

Minor Rehabilitation

Minor rehabilitation improves pavement structure without exposing the base gravel. The intent of these projects is to rehabilitate the existing pavement surface through an engineered approach that considers the observed pavement distress and in-place materials. Milling operations will be ≤ 0.30 ft. without exposing base gravel. Slope work and other features are usually accomplished within the existing right-of-way.

Appropriate soil survey work, subsurface analysis, traffic data and crash data must be collected. The preliminary surfacing recommendation using a minimum design life of 10 years will be used. The data collection and engineering required to determine the level of rehabilitation should take six to nine months. Additional development time for a minor rehabilitation should be one and one half to two years, given the possible inclusion of other features.

Minor rehab treatments include:

0.2 ft ≤ overlay ≤ 0.3 ft	CIR < 0.4 ft w/overlay ≤ 0.3 ft
0.2 ft ≤ mill fill + overlay ≤ 0.3 ft	CCPR ≤ 0.3 ft and overlay ≤ 0.3 ft

Complete concrete treatment: DBR, Diamond Grind, Joint Seal, slab replacement, bituminous overlay

Hazard Mitigation:

A Safety Engineering review or crash analysis is required. Cost-effective hazard mitigation treatments identified in the crash analysis and safety recommendations should be included. Crash analysis recommendations that are not included should be documented in the Scope of Work report with supporting justification. Features to mitigate correctable hazards identified by the design team may be included. Consider project scope, schedule, cost-effectiveness and benefit-cost when evaluating hazard mitigation features. Below are some roadway elements to consider for hazard mitigation.

- Lane and shoulder widths
- Cross slope
- Side slopes (when design changes necessitate modifications)
- Horizontal alignment elements (radii, spirals, stopping sight distance)
- Superelevation rates[3]
- Vertical alignment elements (stopping sight distance and maximum grade)
- Vertical clearance
- Roadside clear zone obstacles to be removed, relocated, or shielded[4]
- Roadside clear zone approach slope flattening
- Mailbox turnouts
- Intersection sight distance[3]

Design Exceptions:

Design exceptions are required for:

- Design speed
- Lane and shoulder widths

[3] Not typically included, but can be included if within the normal scope of project work and on the basis of a safety recommendation.

[4] Consider the removal, relocation or shielding of obstacles within the clear zone. The decision to address these issues will depend on the degree of severity of the problem, accident clusters or trends identified by Safety Engineering, cost effectiveness of treatment, the scope and time constraints of the project, and available funding.

Horizontal alignment elements (when ΔV exceeds 15 mph and safety crash analysis includes recommendations)
Vertical clearance

Note that ΔV denotes the difference between an element's existing functional design speed and the design speed required to meet current MDT reconstruction standards.

Design Criteria:

Americans with Disabilities Act:

Install or upgrade curb ramps wherever a prepared surface for pedestrian use is altered by the project. Review the ADA Transition Plan, ADA Technical Infeasibility Determination (see Appendix A) and Local Agency Transportation Plans and evaluate existing and potential pedestrian use to determine ramp locations, the need for sidewalk improvements, and the installation of additional sidewalk.

- Coordinate proposed improvements and any necessary exceptions with the external ADA coordinator. Design to PROWAG to the greatest extent feasible.
- Consult with Traffic Operations Units to determine if signal work is appropriate to be coordinated or accommodated.

Pavement Width and Condition

Pavement width is an important consideration for rehabilitation projects. The following conditions apply:

Interstate –See MDT Geometric Design Standards for lane and shoulder width standards. The following treatments are in order of preference if the resulting reduced lane or shoulder widths are less than the standard widths;

- Provide the flattest surfacing inslopes steeper than a 6:1 but no steeper than 4:1 that will meet the shoulder width standard. Document the steepened slopes in the SOW report.
- The Roadway Width and Rumble Strip Committee will determine the roadway width if shoulder and lane width standards cannot be achieved using 4:1 or flatter surfacing inslope. Use the short format design exception template to describe and justify the reduced width. This design exception can be included in the SOW of can be a stand-alone approval document.

NHS and STP (Primary and Secondary) –See MDT Geometric Design Standards for lane and shoulder width standards. The following treatments are in order of preference if the combined travel lane and shoulder widths will be less than the combined standard lane and shoulder widths:

- Provide the flattest surfacing inslope steeper than 6:1 but no steeper than 4:1 that will meet the combined lane and shoulder width standards. Document the steepened slopes in the SOW report.
- The Roadway Width and Rumble Strip Committee will determine the roadway width if the combined standard lane and shoulder widths cannot be achieved using 4:1 or flatter surfacing inslope. Use the short format design exception template to describe and justify the reduced width.

Off-system and local roads- Apply MDT Geometric Design Standards for off-system and local roads. The preferred treatment is to steepen surfacing inslopes to 4:1 or flatter if the proposed roadway width is less than the applicable

standard. The Roadway Width and Rumble Strip Committee will determine the roadway width if the standard width cannot be achieved with 4:1 or flatter surfacing inslopes. Document the standards reference applied, surfacing inslopes steeper than a 6:1 and roadway widths less than the standard in the SOW report.

Consider pavement management analysis when selecting minor rehabilitation projects. If the proposed rehabilitation strategy is the same, or one category above or below what is recommended by the Pavement Management System (PvMS) in their annual treatment and condition reports, no further review is needed. However, an in-depth review and justification is needed if the proposed project treatment moves the treatment from rehabilitation to pavement preservation. Contact the Pavement Management Unit to discuss additional review and justification. Document thoroughly in the SOW report.

Hydraulics Design:
Drainage issues that are identified during the preliminary field review or by MDT Maintenance will be considered for treatment, including severe pipe corrosion or erosion that could adversely impact the roadway. The decision to address these issues will depend on the degree of severity of the problem, cost effectiveness of treatment, the scope and time constraints of the project, and available funding.

Surfacing Design:
Surface engineering analysis is required for rehabilitation projects.

Signing and Delineation:
Upgrade signing and delineation to meet MUTCD and MDT retro-reflectivity requirements. Consider upgrading non-conforming breakaway sign posts on the basis of safety recommendations.

Roadside Safety Hardware:
Consider upgrading roadside safety hardware to MASH per MDT “Roadside Safety Hardware Upgrades Policy” number POL 5.03.002 when safety analysis identifies crash trends or if identified by the District as needed. Approved MASH devices may not be available to accommodate all circumstances. Provide MASH devices from the MDT QPL list and MDT Detailed Drawings or per a Public Interest Finding. Longitudinal barrier, bridge rail and approach sections should be upgraded when indicated by poor condition regardless of MASH implementation date. Upgrade non-NCHRP 350 systems as shown in Table 3 per POL 5.03.002. Correct low barrier. Guardrail warrants are not required for minor rehabilitation projects. They should be considered when safety analysis identifies crash trends or if identified by the District as needed and documented in the Scope of Work report.

Operational Improvements:
Not required.

Bridge Considerations:
Bridge rehabilitation should be considered, given the constraints of the project development schedule.[5] Evaluate Bridge Design Loading Structural Capacity and obtain a design exception, if necessary, through the Bridge Engineer.

Consider addressing non-NCHRP 350 bridge rail per the "Roadside Safety Hardware Upgrades Policy".

Major Rehabilitation

Major rehabilitation improves pavement structure, typically exposing base gravel. These projects may include grading and/or widening. The intent of these projects is to rehabilitate the existing pavement structure through an engineered approach that considers the observed pavement distress, the in-place material, and roadway geometrics. Milling operations may expose base gravel which can then be treated or modified. New right-of-way and utility relocation may be required to improve geometrics, to flatten slopes and enhance safety. Reconstruction work should be limited to less than 25% of the project length.

Appropriate soil survey work, subsurface analysis, traffic data and crash data must be collected. The preliminary surfacing recommendation for a 20-year design life will be used. The data collection and engineering required to determine the level of rehabilitation should take six to nine months. Additional development time for a major rehabilitation should be three to four years, given the probable inclusion of other features.

Major rehabilitation treatments include:

- Overlay > 0.3 ft
- Full depth reclamation
- Pulverize w/overlay
- Grading beyond the surfacing section and/or widening
- Exposure of base gravel
- CCPR > 0.3 ft
- Crack and seat w/overlay
- Concrete overlay unbonded or bonded

Hazard Mitigation:

A Safety Engineering review or crash analysis is required. Safety Engineering crash analysis recommendations should be included with the project. Crash analysis recommendations that are not included should be documented in the Scope of Work report with supporting justification. Features to mitigate correctable hazards identified by the design team may be included. Consider project scope, schedule, cost-effectiveness and benefit-cost when evaluating hazard mitigation features.

[5] Bridge comments are per FHWA Technical Advisory T5040.28 6e which states "Whenever possible, RRR projects should include other anticipated work in or adjacent to the project area. While the need for RRR and other type improvements may originate from separate and distinct processes for identifying deficiencies, they should be coordinated, as the implementation of projects in one area of concern may influence priorities in another. Experience indicates that cost savings may be achieved and needless duplication of construction and traffic disruption can be avoided when separate projects in the same area are combined into a single contract."

Major rehabilitation projects should consider addressing the following design features that don't meet current MDT standards:

- Lane and shoulder widths
- Cross slope
- Side slopes[6]
- Surfacing inslopes
- Horizontal alignment elements (radii, spirals, stopping sight distance)
- Superelevation rates
- Vertical alignment elements
- Vertical clearance
- Roadside clear zone obstacles to be removed, relocated, or shielded[7]
- Roadside clear zone approach slope flattening

Intersection sight distance and mailbox turnouts should also be considered if supported by a crash analysis or a District recommendation.

Design Exceptions:

Design exceptions are required for:

- Design speed
- Lane and shoulder widths
- Cross slope
- Side slopes
- Horizontal alignment elements (when ΔV exceeds 15 mph)
- Superelevation rates
- Vertical alignment elements (when ΔV exceeds 20 mph)
- Vertical clearance
- Roadside clear zone

Note that ΔV denotes the difference between an element's existing functional design speed and the design speed required to meet current MDT reconstruction standards.

Design Criteria:

Americans with Disabilities Act:

Install or upgrade curb ramps wherever a prepared surface for pedestrian use is altered by the project. Review the ADA Transition Plan, ADA Technical Infeasibility Determination (see Appendix A) and local agency transportation plans and evaluate existing and potential pedestrian use to determine ramp locations, the need for sidewalk improvements, and the installation of additional non-motorized facilities.

- Coordinate proposed improvements and any necessary exceptions with the external ADA coordinator. Design to PROWAG to the greatest extent feasible.
- Consult with Traffic Operations Units to determine if signal work is appropriate to be coordinated or accommodated.

[6] Where widening will be included in the project construct the slopes to current design standards. Where widening is not needed to accommodate the rehabilitation, consider slope flattening embankments to comply with current MDT standards and acquire right-of-way if needed. The decision to flatten slopes should be based on an evaluation of safety issues, costs and potential environmental, right-of-way and utility impacts.

[7] The clear zone should be checked on each project to determine if any obstacles exist that could be removed, relocated, or shielded.

Pavement Width and Condition:
Pavement width is an important consideration for rehabilitation projects. Apply MDT Geometric Design Standards for lane and shoulder width to all on-system, off-system and local roads. Lane and shoulder widths less than applicable standards will be determined by the Roadway Width and Rumble Strip Committee.

Consider pavement management analysis when selecting major rehabilitation projects. The system can be used as a tool to identify potential rehabilitation strategies that do not require subgrade reconstruction. A 20-year design life of the pavement should be engineered. Widening may or may not be needed to provide adequate roadway width.

Hydraulics Design:
In addition, drainage issues that are identified during the preliminary field review or by MDT Maintenance will be considered for treatment, including severe pipe corrosion or erosion that could adversely impact the roadway. The decision to address these issues will depend on the degree of severity of the problem, cost effectiveness of treatment, the scope and time constraints of the project, and available funding. For projects that include widening, the decision to extend or replace culverts should be based on evaluation of remaining service life.

Surfacing Design:
Surface engineering analysis is required for rehabilitation projects.

Signing and Delineation:
Upgrade signing and delineation to meet MUTCD and MDT retroreflectivity requirements as well as upgrade non-conforming breakaway sign posts.

Roadside Safety Hardware:
Upgrade all longitudinal barriers (except concrete median barriers) and appurtenances to current MDT criteria. A complete guardrail inventory should be collected and all deficiencies corrected. Upgrade existing concrete median barrier in accordance with the most current roadside barrier design memo. Upgrade roadside safety hardware to MASH per MDT “Roadside Safety Hardware Upgrades Policy” number POL 5.03.002. Approved MASH devices may not be available to accommodate all circumstances. Provide MASH devices from the MDT QPL list and MDT detailed drawings or per a public interest finding. Guardrail warrants should be evaluated and designed for accordingly unless otherwise approved in a design exception.

Operational Improvements:
Consider improving traffic operations at major intersections if practical and cost-effective within the project scope.

Bridge Considerations:
Bridge rehabilitation should be considered, given the constraints of the project development schedule.[8] Evaluate Bridge Design Loading Structural Capacity and obtain a design exception, if necessary, through the Bridge Engineer.

Non-NCHRP 350 bridge rail should be replaced. There may be circumstances where upgrading non-NCHRP 350 bridge rail is impractical due to cost, schedule or scope of work constraints. A design exception through the Bridge Engineer is required if a decision is made to leave non-NCHRP 350 bridge rail in place.

Reconstruction

The need for roadway reconstruction may be indicated by various conditions that are not limited to pavement condition. Project needs identified by District or Planning staff, or through public involvement may include roadway deterioration, crash trends or operational deficiencies, or other conditions that can only be addressed with reconstruction. The intent is to reconstruct the facility in accordance with the appropriate geometric design criteria, as presented in the Road Design Manual and Geometric Design Standards.

[8] Bridge comments are per FHWA Technical Advisory T5040.28 6e which states "Whenever possible, RRR projects should include other anticipated work in or adjacent to the project area. While the need for RRR and other type improvements may originate from separate and distinct processes for identifying deficiencies, they should be coordinated, as the implementation of projects in one area of concern may influence priorities in another. Experience indicates that cost savings may be achieved and needless duplication of construction and traffic disruption can be avoided when separate projects in the same area are combined into a single contract."

Appendix A

ADA Technical Infeasibility Determination

Introduction

US DOT policy requires the consideration of pedestrian needs in all new construction, reconstruction, restoration and rehabilitation projects. If pedestrian facilities are provided, those facilities must be accessible to persons with disabilities. Additionally, Section 504 of the Rehabilitation Act and the Americans with Disabilities Act of 1990 (ADA) require pedestrian facilities to be designed and constructed so they are readily accessible to and usable by persons with disabilities.

This document provides guidance to designers and engineering project managers (EPMs) in determining what ADA improvements need to be included in infrastructure improvement projects.

ADA Design Standards

MDT has adopted the Public Rights-of-Way Accessibility Guidelines (PROWAG) as its design guideline for ADA facilities. The design guidelines are incorporated in MDT's Detailed Drawings. The Draft 2011 PROWAG[1] is located on the U.S. Access Board's website and can be accessed by clicking on the following link: https://www.access-board.gov/attachments/article/743/nprm.pdf

The elements of an accessible design include curb ramps with detectable warnings and accessible sidewalks (if provided). When pedestrian features (sidewalks, ramps, etc.) are provided, there is also an obligation to maintain these features in an accessible condition.

Designers and EPMs should work to meet accessibility requirements throughout the life of the project. Issues surrounding pedestrian accessibility should be addressed at the earliest stage possible to reduce or prevent conflicts with right-of-way and other existing facilities and planned improvements. Include details for removing barriers at specific locations in the plans package as early as possible.

Pedestrian Facilities

Public agencies are encouraged but not required to provide pedestrian facilities where none exist. When a public agency does provide a pedestrian facility, it must be accessible to persons with disabilities to the extent technically feasible. Every project that alters pedestrian facilities should be considered an opportunity to achieve PROWAG compliance and further the implementation of the MDT ADA Transition Plan[2].

The determination to include pedestrian facilities in a project location where none exist is made during the planning and scoping phases based on: access control of the highway; local transportation plans, comprehensive plans and other plans (such as Walk Route Plans developed by schools and school districts); the roadside environment; pedestrian volumes; user age group(s); and the continuity of local walkways or paths along or across the roadway. When developing pedestrian facilities within a limited amount of right-of-way, designers can be faced with multiple challenges. It is important that designers become familiar with the PROWAG

accessibility criteria in order to appropriately balance intersection design with the often competing needs of pedestrians and other roadway users.

If a project alters any aspect of a pedestrian route, it must be replaced with accessible facilities. MDT's ADA Tracking Application[4] includes an inventory and assessment of ADA facilities on MDT-maintained routes. This inventory should be reviewed at the project nomination stage to ensure that the project is scoped appropriately. Additional work outside of the scope and limits of the project altering a facility is at the discretion of MDT project development personnel. However, any features not conforming to ADA requirements adjacent to the project but outside the project scope should be communicated to the External ADA Coordinator for addition to the MDT ADA Transition Plan.

At the preliminary field review (PFR), verify that current conditions still match the inventory. Document any locations which are out-of-compliance and all proposed ADA work in the PFR report. An assessment[3] must be conducted for off-system projects (the level of detail depends on the number of features that will be left in place). Summarize the results in the PFR report.

Definition of an Alteration

An alteration[5] is a change to a facility in the public right-of-way that affects or could affect access, circulation, or use. Projects altering the use of the public right-of-way must incorporate pedestrian access improvements within the scope of the project to meet the requirements of the ADA and Section 504. These projects have the potential to affect the structure, grade, or use of the roadway. Examples of alterations that trigger the requirement of upgrading curb ramps to meet PROWAG include:

- Reconstruction/Rehabilitation
- Open-graded surface course
- Microsurfacing
- Thin lift overlays
- Mill/fill projects
- In-place asphalt recycling
- Signal installations

ADA features need not be addressed on corrective maintenance or light pavement preservation treatments such as:

- Crack filling and sealing
- Surface sealing
- Chip seals
- Slurry seals
- Fog seals
- Scrub sealing
- Joint crack seals
- Joint repairs
- Dowel retrofit
- Spot high-friction treatments
- Diamond grinding
- Pavement patching

(See Guidelines for Nomination and Development of Pavement Projects for a complete listing.)

Scope of an Alteration Project

The scope of an alteration project is determined by the extent the alteration project directly changes or affects the public right-of-way within the project limits. Accessibility must be improved for only that portion of the public right-of-way changed or affected by the alteration. For example, if a project resurfaces a roadway, for accessibility purposes the curbs and pavement of that roadway are within the scope of the project, but existing parallel sidewalks are not. Pedestrian features on side streets that are not being resurfaced at the locations of those features are not required to be within the scope of the project. Only those features that are directly disturbed by the construction must be replaced to comply with PROWAG.

While the existing sidewalks are not required to be in the scope of the project in this example, it is an opportunity to bring existing facilities up to current standards to provide a compliant path of travel for persons with disabilities. During the project scoping phase, the sidewalks should be inspected for compliance with PROWAG and any deficiencies noted. The MDT ADA transition plan should also be referenced to prioritize deficiencies and to aid in development of the scope of work. If the sidewalk improvements cannot be added to the scope of the project, the deficiencies should be communicated to the External ADA Coordinator for incorporation into the transition plan. (The External ADA Coordinator is responsible for ADA issues that are related to MDT construction projects.)

The use of transition panels to transition from the newly installed PROWAG compliant ramp/landing area to the existing sidewalk is allowed. The transition panels should follow PROWAG if feasible; however, when connecting to an existing sidewalk that exceeds PROWAG tolerances, transition panels are allowed to exceed PROWAG tolerances to provide a gradual transition.

The length of transition panels from the ramp/landing area to the existing sidewalk is not required to exceed 15 feet; however, it should be sufficiently long to ensure a reasonably safe transition for all users. All transitions should be made outside the ramp/landing area to ensure all ramp/landing area features are compliant. Transition panels exceeding PROWAG tolerances should be labeled “Transition” in the design plans and as-built plan sets and should be included in the ADA transition plan.

Considerations for Scoping Alteration Projects

The MDT ADA Transition Plan should be reviewed and any non-compliant features should be addressed in the scope of work for alteration projects. The Transition Plan will provide indication of non-compliant features and any other prioritized needs within the project vicinity. The following provides assistance in defining the scope of work for accessible design for the various types of alteration projects.

Pavement Preservation

The following information should be used to define the scope of work and evaluate existing ADA features on pavement preservation projects. Decisions should be documented in the appropriate report.

1) Install curb ramps where sidewalks are present and no curb ramps exist;

2) Modify existing ramps as needed to meet current PROWAG design guidelines;

If the answer to any of the following questions is "yes", the existing facility should be upgraded if technically feasible:

- Is the existing landing slope or landing cross slope steeper than 50:1?
- Are the existing detectable warning devices out of compliance with PROWAG?
- Is the longitudinal curb ramp slope steeper than 12:1?
- Are the cross slopes of the curb ramp steeper than 50:1?
- Are there additional ramp features that do not meet PROWAG?

The complete guidance for assessment[3] of right-of-way accessibility is attached to this document.

This determination involves an assessment of project scope, right-of-way, and utility impacts, and if the modification will provide an improvement in functionality of the curb ramp. Even if a curb ramp cannot be made fully compliant, technically feasible alterations should be incorporated that improve accessibility (e.g. adding detectable warning devices). Refer to the Substantial Conformance with PROWAG section below for more discussion.

3) Although sidewalk repair is not required for pavement preservation projects, sidewalks should be reviewed to determine if sidewalk upgrades should be included in the project or recommended for inclusion in the ADA transition plan. Factors to be considered include:

- Condition of existing sidewalk
- Existence of a continuous path of travel between intersections free of trip and tipping hazards
- Required right-of-way acquisition or construction permits
- Relocation of utilities
- Proximity to a high pedestrian traffic generator such as a school or bus stop

Minor Rehabilitation

Since minor rehabilitation projects often differ from pavement preservation projects only in the level of surfacing structure, a process similar to the one described above should be used in the evaluation of ADA facilities. Sidewalk repair and the installation of new sidewalk should be more readily included in a minor rehabilitation project. Right-of-way acquisition and utility relocation should also be given greater consideration, even though the remainder of the project does not include these items. If right-of-way acquisition and utility relocation are required for other project features, they must also be considered as necessary to modify existing non-compliant PROWAG curb ramps.

Reconstruction and Major Rehabilitation

All ADA features (curb ramps and sidewalks) should be constructed to current PROWAG for reconstruction and major rehabilitation projects to the maximum extent feasible. In addition, the installation of new pedestrian facilities to provide an improved path of travel is recommended if it is technically feasible.

Technical Feasibility and Cost

When constructing a new transportation facility or altering an existing transportation facility, the design team should consider what is included within the scope of the project. For elements that are within the scope of the project, any features of a facility that are being altered and can be made accessible shall be made accessible within the scope of the alteration without regard to cost.

The only exception to this rule is where conformity with PROWAG is technically infeasible, meaning that existing structural conditions would require removing or altering a load-bearing member which is an essential part of the structural frame; or because other existing physical or site constraints prohibit modification or addition of elements, spaces, or features which are in full and strict compliance with the minimum requirements for new construction and which are necessary to provide accessibility.

Right-of-Way Considerations

Many PROWAG accessibility features can be constructed within the confines of existing right-of-way. In those instances where more right-of-way is required to provide accessible features for persons with disabilities, the designer should work jointly with all other stakeholders with an interest in the highway, street, or walkway to ensure that pedestrian access improvements occur at the same time as any alteration or new construction project. All pedestrian access upgrades within the scope of the project must occur at the same time as the alteration.

Substantial Conformance with PROWAG

Engineering judgment should be used when considering if constructed improvements meet PROWAG and when they fail to meet PROWAG. Any improvement that does not meet PROWAG that is explicitly approved by design or construction personnel must be documented using the Technical Infeasibility process. This approach should be the same during the scoping/design phase of a project as well as during the construction and acceptance phase of a project. **Any improvements identified as being technically infeasible must be communicated to the External ADA Coordinator for addition to the MDT's ADA Tracking Application Inventory[4].**

Procedure for Documenting Technical Infeasibility

The documentation for Technical Infeasibility should include considerations of site conditions and constraints, as well as other options considered.

Design

Designers shall contact their Design Supervisor and Design Project Manager when features are encountered that cannot be made compliant. The Design Project Manager shall notify the District Preconstruction Engineer or Road Design Engineer of the issue prior to contacting the External ADA Coordinator.

The Design Project Manager, Designer and External ADA Coordinator shall work together to determine if there are design modifications that could be made to meet requirements. If it is determined that meeting accessibility requirements is technically infeasible, the designer must ensure that the improvement provides accessibility to the maximum extent feasible. The

Designer must document all non-compliant elements and this documentation (ADA Statement of Technical Infeasibility[6]) should be kept in the project file and conveyed to the External ADA coordinator.

If consensus regarding feasibility cannot be reached, the Engineering Administrator will ultimately decide whether a feature must be removed and replaced to comply with PROWAG. The reasons for the decision shall be documented in the project file. Denote Technical Infeasibility on the appropriate ADA Curb Ramp Detail Sheets with the designation "TI".

Construction

During construction, field personnel will complete an ADA documentation worksheet[7] for each ramp. Within that worksheet, all widths and slopes will be entered to document that it was constructed to minimum standards. There is a place to indicate if it was identified in the design phase as TI so that it is known that standards will likely not be met.

When features are identified in the field that cannot be made compliant and were not identified as TI in the design plans, the Engineering Project Manager (EPM) will contact the External ADA Coordinator to see if there are any alternatives that could be done to meet requirements. If there are no solutions, the EPM must complete the Technical Infeasibility Form (ADA Statement of Technical Infeasibility[6]) and submit it to the External ADA Coordinator for approval. This will then be indicated in the ADA documentation worksheet. The District Construction Engineer (DCE) needs to be included in the decision process to remove and replace any feature that is not constructed to minimum requirements.

REFERENCES

1. U.S. Access Board. (2011 Draft) *Proposed Accessibility Guidelines for Pedestrian Facilities* in the Public Right-of Way. https://www.access-board.gov/attachments/article/743/nprm.pdf
2. MDT, DOWL/HKM. (2012) *Montana Department of Transportation ADA Transition Plan*. http://www.mdt.mt.gov/business/contracting/civil/external-ada.shtml
3. MDT. (2015) ADA Site Assessment. See Montana Department of Transportation ADA Transition Plan Appendix G
4. MDT. (2015) MDT ADA Self-Assessment and Inventory. See Montana Department of Transportation ADA Transition Plan Method 11.
5. U.S. Access Board. (2011 Draft) *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of Way*. (R202).
6. MDT. (2015) ADA Statement of Technical Infeasibility Form. http://www.mdt.mt.gov/publications/forms.shtml
7. ADA Documentation Worksheets http://www.mdt.mt.gov/publications/forms.shtml

Appendix B

Route Segment Plan Map

The Route Segment Plan map was updated concurrently and is part of this Agreement. The updated map reflects shoulder widths for the rural non-Interstate NHS, Primary and Secondary systems. The map was updated to capture the following:

- Some routes have changed systems.
- The 2011 AASHTO A Policy on Geometric Design of Highways and Streets (the "Green Book") is required by Federal Code as the standard with respect to lane and shoulder widths for the National Highway System.
- Uniform criteria are applied to the rural Primary and Secondary Systems. Design year traffic volumes is used to determine the shoulder width.

The 2011 Green Book roadway characteristics influencing lane and shoulder width are design speed and design year traffic volume. Route Segment Plan map widths are based on year 2035 design volume. The design volumes were established by applying year 2015 planning growth rates to 2015 traffic data for 20 years. The map should be updated every 5 years to reflect the most current planning growth rates and traffic data, and system changes.

Route Segment Plan map NHS routes reflect the 2011 Green Book shoulder width guidance for rural arterials. Primary and Secondary shoulder widths are determined based on application of criteria different from the NHS criteria but the same for both systems. The 2011 Green Book is not a required standard for these systems. The fundamental criteria applied to develop the map are application of MDT September 2016 Geometric Design Standards Table 2.4 Current AADT traffic volume ranges and associated roadway widths. For the Route Segment Plan Map, Table 2.4 roadway widths were modified to reflect shoulder widths based on 2-12' lanes and traffic volumes modified to the 20-year design life as discussed above (Table B-1). District Preconstruction Engineering staff reviewed the applied fundamental criteria and made change recommendations. Some segments have been modified accordingly with proper justification. Changes were based mostly on route consistency and more realistic planning growth rates.

Design AADT	0 – 299	300 – 999	1,000 – 1,999	2,000-3,000	> 3000
Shoulder width	0	2 ft	4 ft	6 ft	8 ft

Table B-1

The Route Segment Plan map applies to rural highways and is not intended to establish shoulder width standards. It is intended to be used as a beginning reference to apply uniform shoulder widths on corridor segments and across different corridors with similar roadway characteristics. Refer to the MDT Geometric Design Standards to determine lane and shoulder width standards for project-specific design.

Consider lane and shoulder widths on NHS, Primary and Secondary systems in accordance with the following and other sections of this Agreement on all projects that include a crash analysis.

1. Review the Route Segment Plan map for uniform application of shoulder widths.
2. See MDT Geometric Design Standards for lane and shoulder width standards.
3. Review the crash analysis for Road Departure LOSS, pattern recognition, trends and recommendations relative to roadway width.
4. See further guidance for each system project type above. Schedule the Roadway Width and Rumble Strip Committee to evaluate and determine roadway widths as prescribed in other sections of this Agreement. Provide the committee members with the PFR report and crash analysis for consideration. The PFR report, crash analysis and Route Segment Plan map will be considered by the committee to establish lane and shoulder widths, along with information from the AASHTO Highway Safety Manual. Widths determined by the committee may require design exceptions as noted for the project types characterized in this Agreement.

Treatments Category	MDT Standards for which design exceptions are required on all capital improvements projects under the jurisdiction of MDT (See MDT RDM 2.9 for additional guidance) Note: Design Speed and Design Loading Structural Capacity apply to all NHS facilities. The remaining 8 apply to "high-speed" NHS roadways where the design speed is greater than or equal to 50mph.										
	Design Speed	Lane & Shoulder Width	Cross Slope	Slopes	Horizontal Alignment Elements	Superelevation Rate	Vertical Alignment Elements	Vertical Clearance	Clear Zones	Intersection Sight Distance	Bridge Design Loading Structural Capacity
Corrective Maintenance	N/A	No	No	No	No	No	No	No	No	No	No
Pavement Preservation - Light	N/A	No	No	No	No	No	No	No	No	No	No
Pavement Preservation - Medium	N/A	No	No	No	No	No*	No	No*, consider when OSOW are present	No*	No	Yes*, when bridge structure is overlaid
Pavement Preservation - Heavy	Yes*	Yes*	No*	No	No	No*	No	Yes*	No*, consider for approach slopes, obstacles	No*	Yes*, when bridge structure is overlaid
Minor Rehabilitation	Yes*	Yes*	No*	No*	Yes* when ΔV exceeds 15 mph and per crash analysis recommendation	No*	No*	Yes*	No*	No*	Yes*
Major Rehabilitation	Yes	Yes	Yes	Yes	Yes when ΔV exceeds 15 mph	Yes	Yes when ΔV exceeds 20 mph	Yes	Yes	No*	Yes
Reconstruction	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Yes = Design Exception required

Yes* = Design Exception required; short version is acceptable

No = Formal documentation of exception not required. This agreement with FHWA allows this exception with documentation in SOW report.

No* = Consider addressing the design deficiency with this project. Otherwise, document the exception in SOW report.

Table 1

Treatments Category	Design features and other considerations (Document decisions to include or not include features in the SOW Report)												
	Surface Engineering Analysis	**Safety Reviews/ Crash Analysis**	**Non-conforming breakaway sign posts**	**Retro-reflective Sign Sheeting Upgrades or non-conforming MUTCD signs**	**Delineation**	**Bridge Rail, Bridge Approach Sections and Longitudinal Barrier Condition**	**Guardrail Post Spacing and Unconnected Rail**	**Guardrail Warrants**	**Mailbox Turnouts**	**Bridge (super-structure or sub-structure)**	**Drainage**	**Operational Improve-ments**	**ADA**
Corrective Maintenance	No	No	No	No	No	No	No	No	No	No	No	No	No
Pavement Preservation - Light	No	No	No	No	No	No	No	No	No	Consider	No	No	No
Pavement Preservation - Medium	No	Yes	No	See 10/6/10 memo	Yes	Consider	Yes	No	No	Consider	No	No	Yes
Pavement Preservation - Heavy	No	Yes	No	See 10/6/10 memo	Yes	Consider	Yes	No	No	Consider	No	No	Yes
Minor Rehabilitation	Yes	Yes	*Consider	Yes	Yes	Yes	Yes	*Consider	Consider	Consider	Consider	No	Yes
Major Rehabilitation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Consider	Consider	Consider	Consider	Yes

*Can be included if within the normal scope of project work and on the basis of a safety recommendation.

Table 2

Treatments Category	Non 350 Barrier Systems									
	BCT	Texas twist	Median bullnose	MELT (if design speed > 45mph)	Concrete barrier rail terminals *	Unconnected Rail (including absent bridge approach transitions)	post spacing > 6'3" (except as shown in detailed drawings)	W-beam Height < 26.5"	W-beam posts other than wood or steel	W-beam barrier w/o blockouts (except for as shown in MDT detailed drawings)
Corrective Maintenance	Yes	Yes	Yes	Yes	Yes	Yes	Consider	Consider	Consider	Consider
Pavement Preservation - Light	Yes	Yes	Yes	Yes	Yes	Yes	Consider	Consider	Consider	Consider
Pavement Preservation - Medium	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Consider	Consider	Consider
Pavement Preservation - Heavy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Consider	Consider
Minor Rehabilitation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Major Rehabilitation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* See “Concrete Barrier Compliance” design memo dated January 5, 2012 for treatment of 2 loop concrete barrier.

Table 3