

GUIDELINES FOR NOMINATION AND DEVELOPMENT OF PAVEMENT PROJECTS (PREVENTATIVE MAINTENANCE ← RECONSTRUCTION)

**MONTANA DEPARTMENT OF TRANSPORTATION
MONTANA DIVISION, FEDERAL HIGHWAY ADMINISTRATION**



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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 scheduled 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 by FHWA division office on the National Highway System (NHS); by MDT on non-NHS routes (normally funded by the Surface Transportation Program (STP)); or the project can be a state-funded project.

Preventative Maintenance

Preventative Maintenance is 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 increasing the structural capacity. Design exception approval is not required for substandard design elements, but these elements must be documented in the Scope of Work Report. Preventative maintenance is considered in two categories: scheduled maintenance and pavement preservation. These are shown on the enclosed matrix and described below.

Scheduled Maintenance

Intent:

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.

Consideration For All Funding Categories:

Eligible Funding:

Federal aid, state construction funds and state maintenance funds could all be used for these types of projects.

Environmental Document:

Follow the appropriate NEPA/MEPA process.

Development Time:

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 change, they lend themselves to a simplified design catalogue approach. It is anticipated that the time from conception to construction would be within a year.

Americans with Disabilities Act:

Install curb ramps wherever curb, gutter and sidewalk are adjacent to the project. These improvements are typically not required on crack sealing, seal and covers or other routine maintenance treatment projects. However, they are required on all overlays and mill/fill projects. Evaluate existing and potential pedestrian use to determine ramp locations. Coordinate proposed improvements and any necessary exceptions with the ADA coordinator.

Bridge:

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

Pavement Width:

Not a required consideration. Projects in this category have been recently rehabilitated or reconstructed.

Pavement Age

Projects generally should have been on a scheduled maintenance program from their original inception. These projects should result from an established sequence developed from past performance and MDT experience supported by PvMS data.

Consideration for Federal Aid Funding

These projects are to prevent pavement deterioration and maximize the return on their investment. The following should be considered when submitting a project for federal aid participation.

Roadside Slopes and Geometric Alignment:

Only a consideration if identified as a cluster through accident analysis and if it is cost effective.

Safety:

Overlay and mill/fill projects should include a crash analysis to identify crash clusters. Any treatable clusters with cost effective treatments should be addressed as part of the project. Identified crash clusters may also be evaluated through the Safety Management benefit-cost process and addressed as a safety project if they meet the established criteria. In addition to cluster sites, the following safety items should also be considered when submitting preventative maintenance projects.

Guardrail:

Only a consideration if identified as a cluster through crash analysis and if it is cost effective.

Clear Zone:

Only a consideration if identified as a cluster through crash analysis and if it is cost effective.

Miscellaneous Safety Features:

Miscellaneous features such as mailboxes, signing, delineation and others will not be required to be upgraded as part of these projects unless identified as a cluster site by Safety Management and if it is cost effective.

Pavement Preservation

Intent:

The intent of these projects is to extend the useful life of pavements based upon observed pavement distress rather than on a scheduled basis.

Considerations for All Funding Categories:

Eligible Funding

Federal aid, state construction funds and state maintenance funds could all be used for these types of projects.

Environmental Document:

Follow the appropriate NEPA/MEPA process.

Development time:

Since the intent of these projects is to preserve the investment in the pavement structure, the project development time should be relatively short, with projects being let within one to two years from conception.

Americans With Disabilities Act:

Install curb ramps wherever curb, gutter and sidewalk are adjacent to the project. These improvements are typically not required on crack sealing, seal and covers or other routine maintenance treatment projects. However, they are required on all overlays and mill/fill projects. Evaluate existing and potential pedestrian use to determine ramp locations. Coordinate proposed improvements and any necessary exceptions with the ADA coordinator.

Pavement Management Analysis:

Pavement management analysis should be considered when selecting pavement preservation projects. If the proposed project treatment is the same, or one category different (above or below in the preventative maintenance category) than what is recommended by the Pavement Management System (PvMS) in their annual treatment and condition reports, no further review is necessary. For example, if PvMS recommends that a particular section of roadway be crack sealed, then if the crack sealing or crack seal and seal and cover (the next higher category) is selected, no further review will be required. But if PvMS recommends crack sealing and an overlay is proposed, further review and justification will be needed.

A more in-depth review and justification is also needed if the proposed project treatment moves the treatment from preventative maintenance to rehabilitation or vice versa even if it is only one category different from what is recommended by the PvMS.

On projects that include milling, the total thickness of new plant mix placed, including replacement of milled material should not exceed 0.20 ft.

Leveling quantities in tons/mile should not exceed 25% of the typical quantity for the planned overlay. (e.g. a 0.20' overlay 28 feet wide requires 2216 tons/mile x 25% = 554 → 550 tons/mile).

Bridge:

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

Pavement Age:

Since these projects should extend the useable pavement life, they should have had some type of pavement rehabilitation in the recent past. Depending on the strategy 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 selections can be submitted, but will be considered on a project-by-project basis.

Considerations for Federal Aid Funding:

Although these projects are mainly to address pavement deficiencies, the following should be considered when submitting a project for federal aid participation.

Pavement Width: The width of the roadway will only be a consideration on projects that have an overlay applied as part of the preventative maintenance project. For these types of projects the following applies:

Interstate – Provide no less than 38 ft width w/5:1 surfacing inslopes. In mountainous terrain, a reduced shoulder width resulting in an overall top width of 36 ft w/5:1 surfacing inslopes may be considered.

NHS – If the existing width exceeds the width described in the “Design Guidelines” memo dated August 5, 2008 (these widths are equal to the AASHTO roadway widths for arterials), reduce the top width to accommodate the overlay. If the resulting width will be less than the “Design Guidelines” width, steepen surfacing inslopes to no steeper than 4:1 before reducing the width. If the overlay cannot be accommodated by steepening the surfacing inslopes reduce the width to a minimum of 28 ft. If the placement of the overlay will result in a top width less than 28 ft., employ the Roadway Width Decision Process to determine if a lesser width can be utilized.

STP (Primary) - If the existing width exceeds the width described in the “Design Guidelines” memo dated August 5, 2008 (note that these widths are different than the AASHTO roadway widths for collectors), reduce the top width to accommodate the overlay. If the resulting width will be less than the “Design Guidelines” width, steepen surfacing inslopes to no steeper than 4:1 before reducing the width. If the overlay cannot be accommodated by steepening the surfacing inslopes reduce the width to a minimum of 28 ft for ADT \geq 300, or a minimum of 24 ft. for ADT < 300. If the placement of the overlay will result in a top width less than 28 ft., employ the Roadway Width Decision Process to determine if a lesser width can be utilized. Widths less than 24 ft are not acceptable.

STP (Secondary) – Maintain the applicable Geometric Design Standards width with no steeper than 4:1 inslopes. If the existing width is less than standard, provide a minimum width of 28 feet or a minimum of 24 ft. for ADT < 300, with no steeper than 4:1 inslopes.

For all routes, the use of a roadway width narrower than the widths described above must be approved through the formal design exception process.

Safety:

Although the intent of Pavement Preservation Projects is to optimize the existing investment in the pavement structure, safety still needs to be a consideration. To accomplish this, on projects other than seal & cover, crack seals, or other routine maintenance, an analysis should be run by Safety Management to determine if crash cluster sites are contained with the project limits or if the crash rate is higher than the statewide average. Any treatable trends or clusters with cost effective treatments will have to be addressed as part of the project. Identified crash clusters may also be evaluated through the Safety Management benefit-cost process and addressed as a safety project if they meet the established criteria. In addition, the following safety items should be considered when submitting and developing pavement preservation projects:

Guardrail:

Upgrading of substandard guardrail should be considered on overlay projects. Some examples of deficiencies that should be considered for upgrading, but will not be mandatory include:

- Incorrect guardrail height (18 inch minimum)
- Inadequate length of need
- No rail at locations that meet warrants

Some examples of deficiencies that will require upgrading:

- Blunt ends (including BCTs and Texas Twists)
- 12' post spacing
- Unconnected or no bridge approach rail

Deficiencies will require further review and consideration before federal funds can be used. Where cost effective, these may be able to be addressed on separate projects such as the district-wide guardrail upgrade projects, but will need to be examined on a project-by-project basis and the timing of the upgrade will have to be discussed. Decisions must be documented in the Scope of Work Report.

Clear Zone:

The clear zone should be checked to determine if any substantial obstacles exist that could be removed, relocated or shielded with the project. Decisions must be documented in the Scope of Work Report.

Signing:

All warning and regulatory signs should be replaced with a pavement preservation project. All other signs such as guide signs could be included on a project by project basis.

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 to current standards all facilities with deteriorating pavements. Engineering judgment is applied on individual rehabilitation projects to achieve appropriate levels of safety and operational characteristics, given the existing conditions and constraints. Rehabilitation is considered in two categories: major and minor. These are shown on the attached matrix and described below.

Minor Rehabilitation

Intent:

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. The existing width of pavement is to be maintained if it is greater than or equal to 28 ft. (24 ft for Secondary highways with ADT < 300). Milling operations will be ≤ 0.20 ft without exposing base gravel. All slope work and other features are usually accomplished within the existing right-of-way.

Considerations:

Eligible Funding:

Federal aid and state construction funds are eligible funding sources.

Environmental Document:

Follow the appropriate NEPA/MEPA process.

Development Time:

Appropriate soil survey work, subsurface analysis, traffic data and accident data must be collected. The preliminary surfacing recommendation using a minimum design life of 10 years will confirm the level of rehabilitation (minor or major). 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.

Americans With Disabilities Act:

Install curb ramps wherever curb, gutter and sidewalk are adjacent to the project. 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 ADA coordinator.

Pavement Width:

Interstate – Provide no less than 38 ft width w/5:1 surfacing inslopes. In mountainous terrain, a reduced shoulder width resulting in an overall top width of 36 ft w/5:1 surfacing inslopes may be considered.

NHS – If the existing width exceeds the width described in the “Design Guidelines” memo dated August 5, 2008 (these widths are equal to the AASHTO roadway widths for arterials), reduce the top width to accommodate the overlay. If the resulting width will be less than the “Design Guidelines” width, steepen surfacing inslopes to no steeper than 4:1 before reducing the width. If the overlay cannot be accommodated by steepening the surfacing inslopes reduce the width to a minimum of 28 ft. If the placement of the overlay will result in a top width less than 28 ft., employ the Roadway Width Decision Process to determine if a lesser width can be utilized.

STP (Primary) - If the existing width exceeds the width described in the “Design Guidelines” memo dated August 5, 2008 (note that these widths are different than the AASHTO roadway widths for collectors), reduce the top width to accommodate the overlay. If the resulting width will be less than the “Design Guidelines” width, steepen surfacing inslopes to no steeper than 4:1 before reducing the width. If the overlay cannot be accommodated by steepening the surfacing inslopes reduce the width to a minimum of 28 ft for ADT \geq 300, or a minimum of 24 ft. for ADT < 300. If the placement of the overlay will result in a top width less than 28 ft., employ the Roadway Width Decision Process to determine if a lesser width can be utilized. Widths less than 24 ft are not acceptable.

STP (Secondary) – Maintain the applicable Geometric Design Standards width with no steeper than 4:1 surfacing inslopes. If the existing width is less than standard, provide a minimum width of 28 feet or a minimum of 24 ft. for ADT < 300, with no steeper than 4:1 surfacing inslopes.

Pavement Management Analysis:

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 preventative maintenance.

Bridge:

Minor bridge rehabilitation should be considered, given the constraints of the project development schedule.

Slopes:

Minor slope work can be considered to address crash trends or clusters identified by Safety Management.

Safety:

Include cost-effective safety treatments identified by Safety Management. Other safety features, such as mailbox turnouts, approach slope flattening and upgraded signing should also be included. If extensive new right-of-way is needed to accomplish any of this work, the project will ordinarily be considered major rehabilitation.

Guardrail:

Upgrading of substandard guardrail should be considered on all minor rehabilitation projects. Some examples of deficiencies that should be considered for upgrading, but are not mandatory include:

- Incorrect guardrail height (18 inch, 457 mm minimum)
- Inadequate length of need
- No rail at locations that meet warrants

Some examples of deficiencies that will require upgrading:

- Blunt ends (including BCTs)
- 12' post spacing
- Unconnected or no bridge approach rail

Where cost effective, guardrail deficiencies may be able to be addressed on separate projects such as the district-wide guardrail upgrade projects, but will need to be examined on a project-by-project basis and the timing of the upgrade will have to be discussed. Decisions must be documented in the Scope of Work Report.

Geometrics: (Non-Interstate)

ΔV denotes the difference between the design speed of a given design element and the design speed required for that element to meet current MDT reconstruction standards.

Vertical Curves:

A design exception is required if ΔV exceeds 20 mph and there is an accident cluster or trend associated with the design element.

Horizontal Curves:

A design exception is required if ΔV exceeds 15 mph and there is an accident cluster or trend associated with the design element.

Clear Zone:

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 Management cost effectiveness of treatment, the scope and time constraints of the project and available funding. Decisions to not provide an adequate clear zone must be documented in the Scope of Work Report and supported by an approved design exception.

Signing:

Signing upgrades are mandatory for all rehabilitation projects.

Drainage:

Drainage issues, such as severe pipe corrosion or erosion that could adversely impact the roadway, that are identified during the preliminary field review or by MDT Maintenance will be considered for treatment. 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.

Major Rehabilitation**Intent:**

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 be > 0.20 ft (60 mm) and 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.

Considerations:**Eligible Funding:**

Major Rehabilitation projects will be funded with Federal Aid funds.

Environmental Process:

Follow the NEPA process.

Development time:

Appropriate soil survey work, subsurface analysis, traffic data and accident data must be collected. The preliminary surfacing recommendation a 20-year design life will confirm the level of rehabilitation (minor or major). 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.

Americans With Disabilities Act:

Install curb ramps wherever curb, gutter and sidewalk are adjacent to the project. 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 ADA coordinator.

Pavement Width:

Interstate – Provide no less than 38 ft width w/5:1 surfacing inslopes. In mountainous terrain, a reduced shoulder width resulting in an overall top width of 36 ft w/5:1 surfacing inslopes may be considered.

NHS, STPP & STPS - The width of the roadway will be the prime consideration on major rehabilitation projects. The roadway width will be determined by the

roadway width decision process. The width decisions must be documented in the Scope of Work Report.

Pavement Management Analysis:

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 the roadway width determined through the roadway width decision process outlined in the “Design Guidelines” memo, which was effective August 5, 2008

Bridge:

Bridge work up to and including major rehabilitation should be considered, given the constraints of the project development schedule.

Slopes:

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.

Surfacing Inslopes:

Construct surfacing inslopes to current design standards.

Safety:

Safety considerations should be assessed and analyzed by Safety Management on each project to determine if accident cluster sites are contained within the project limits or if the project’s accident rate is higher than the statewide average. Any treatable trends or clusters, which can be addressed with cost-effective treatments will be included in the project (may require rebuilding non-compliant vertical and horizontal curves as long as the rebuilding portion is less than 25% of the project. (See current Geometric Design Standards)

Guardrail:

Upgrade all guardrail to current MDT standards. A complete guardrail inventory should be collected and all deficiencies corrected. Upgrade existing concrete median barrier in accordance with the “Concrete Barrier Installation” guidelines.

Geometrics: (Non-Interstate)

ΔV denotes the difference between the design speed of a given design element and the design speed required for that element to meet current MDT reconstruction standards.

Vertical Curves:

A design exception is required if ΔV exceeds 20 mph.

Horizontal Curves:

A design exception is required if ΔV exceeds 15 mph.

Clear Zone:

The clear zone should be checked on each project to determine if any obstacles exist that could be removed, relocated or shielded. Decisions to not provide clear zone must be documented in the Scope of Work Report and supported by an approved design exception.

Operational Improvements:

Capacity improvements will usually be limited to spot improvements to add auxiliary lanes at major intersections.

Signing:

Signing upgrades are mandatory for all rehabilitation projects.

Drainage:

Drainage issues, such as severe pipe corrosion or erosion that could adversely impact the roadway, that are identified during the preliminary field review or by MDT Maintenance will be considered for treatment. 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. Culvert inspections are required on all major rehabilitation projects.

Where the rehabilitation project includes widening, the remaining service life of the existing culverts needs to be assessed to determine if the culverts should be replaced rather than lengthened.

Reconstruction

Intent:

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.