



A REPORT
TO THE
MONTANA
LEGISLATURE

PERFORMANCE AUDIT

Funding Montana's Highway Infrastructure

*Montana Department of
Transportation*

JUNE 2018

LEGISLATIVE AUDIT
DIVISION

17P-06

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PERFORMANCE AUDITS

Performance audits conducted by the Legislative Audit Division are designed to assess state government operations. From the audit work, a determination is made as to whether agencies and programs are accomplishing their purposes, and whether they can do so with greater efficiency and economy.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. Members of the performance audit staff hold degrees in disciplines appropriate to the audit process.

Performance audits are conducted at the request of the Legislative Audit Committee which is a bicameral and bipartisan standing committee of the Montana Legislature. The committee consists of six members of the Senate and six members of the House of Representatives.

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June 2018

The Legislative Audit Committee
of the Montana State Legislature:

This is our performance audit of Montana Department of Transportation (MDT) infrastructure funding operations with comparisons to other state and provincial Departments of Transportation.

This report provides information about MDT's processes related to infrastructure funding. This includes a review of MDT compared to other state Departments of Transportation in accordance with House Bill 473, nomination of future construction projects, and distribution of funding to MDT districts and road systems. This report includes recommendations for implementing consistent and transparent project nomination and funding distribution processes based on accurate data at MDT. A written response from MDT is included at the end of the report.

We wish to express our appreciation to MDT personnel for their cooperation and assistance during the audit.

Respectfully submitted,

/s/ Angus Maciver

Angus Maciver
Legislative Auditor

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- Montana Department of Transportation A-1

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APPOINTED AND ADMINISTRATIVE OFFICIALS

| | | | <u>Term Expires</u> |
|--|---------------------|-------------|---------------------|
| Montana Transportation Commission | Barb Skelton, Chair | Billings | 2021 |
| | Daniel Belcourt | Missoula | 2019 |
| | Greg Jergeson | Great Falls | 2021 |
| | Carol Lambert | Glendive | 2019 |
| | District 2 | Butte | Open |

Montana Department of Transportation

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 Dwane Kailey, Engineering Division Administrator
 Jim Skinner, Policy, Program, and Performance Analysis Bureau Chief

District Administrators

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 Jeff Ebert - Butte
 Doug Wilmot - Great Falls
 Stefan Streeter - Billings
 Shane Mintz - Glendive



MONTANA LEGISLATIVE AUDIT DIVISION

PERFORMANCE AUDIT

Funding Montana's Highway Infrastructure

Montana Department of Transportation

JUNE 2018

17P-06

REPORT SUMMARY

Prioritization and distribution processes do not ensure transparency and do not fully support the use of over \$230 million in federal fiscal year 2017 infrastructure funding. Comparison of Montana Department of Transportation to other Departments of Transportation showed MDT operations are conducted at similar costs.

Context

The 65th Legislature passed House Bill (HB) 473, which required a performance audit of Montana Department of Transportation (MDT) compared to other state and provincial Departments of Transportation (DOTs). Along with HB 473 audit areas, we reviewed other MDT processes related to infrastructure funding. MDT is responsible for determining the funding availability to prioritize projects. We reviewed MDT's Performance Programming Process (P3) used to distribute funding, and a sample of 25 projects from the districts to determine how projects are nominated. P3 is based on determining distributions based on attaining the best future performance. We also reviewed the Pavement Management System (PvMS), which stores the data used in prioritization and distribution decisions.

Results

Work related to HB 473 audit requirements found MDT was generally comparable to other DOTs, with the exception of higher levels of privatization at some DOTs we reviewed. However, other states did not have studies or data to support privatization

decisions, or indicated the information they had was no longer up-to-date.

MDT uses P3 to determine the percentage of funding going to the road systems and districts. Our review found P3 business practices are not defined by the department, limiting MDT staff's understanding of the process. Current statute outlines a primary highway system distribution process that does not align with P3 used by MDT. We also found PvMS data did not have proper review to ensure its accuracy when used in P3 and nomination decisions.

We reviewed 25 projects from federal fiscal year (FFY) 2017 with an estimated cost of over \$168.5 million. We found that none of the five MDT districts had a formalized and documented project nomination process. There was no justification for why the projects we reviewed were nominated for construction over other potential projects in the districts, due to a lack of centralized criteria and review. This contributes to the department's lack of consistency in how projects are nominated.

The audit report makes five recommendations to improve MDT project nomination and funding distribution processes. These recommendations relate to enhancing clarity and accountability of these processes by:

- ◆ Implementing procedure that includes formalized roles for MDT staff in P3, decision-making processes for determining inputs in PvMS, and formal business processes for P3.
- ◆ Pursuing statutory change to align primary highway system distribution with industry best practices.
- ◆ Implementing data controls for PvMS data to ensure accuracy.
- ◆ Creating a system to better justify nomination decisions by establishing nomination criteria, determining how to apply nomination criteria to potential projects, and requiring documentation supporting nomination decisions.
- ◆ Developing a centralized review of nomination decisions made at the district level to ensure consistency.

| Recommendation Concurrence | |
|--|---|
| Concur | 5 |
| Partially Concur | 0 |
| Do Not Concur | 0 |
| Source: Agency audit response included in final report. | |

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Chapter I – Introduction and Background

Introduction

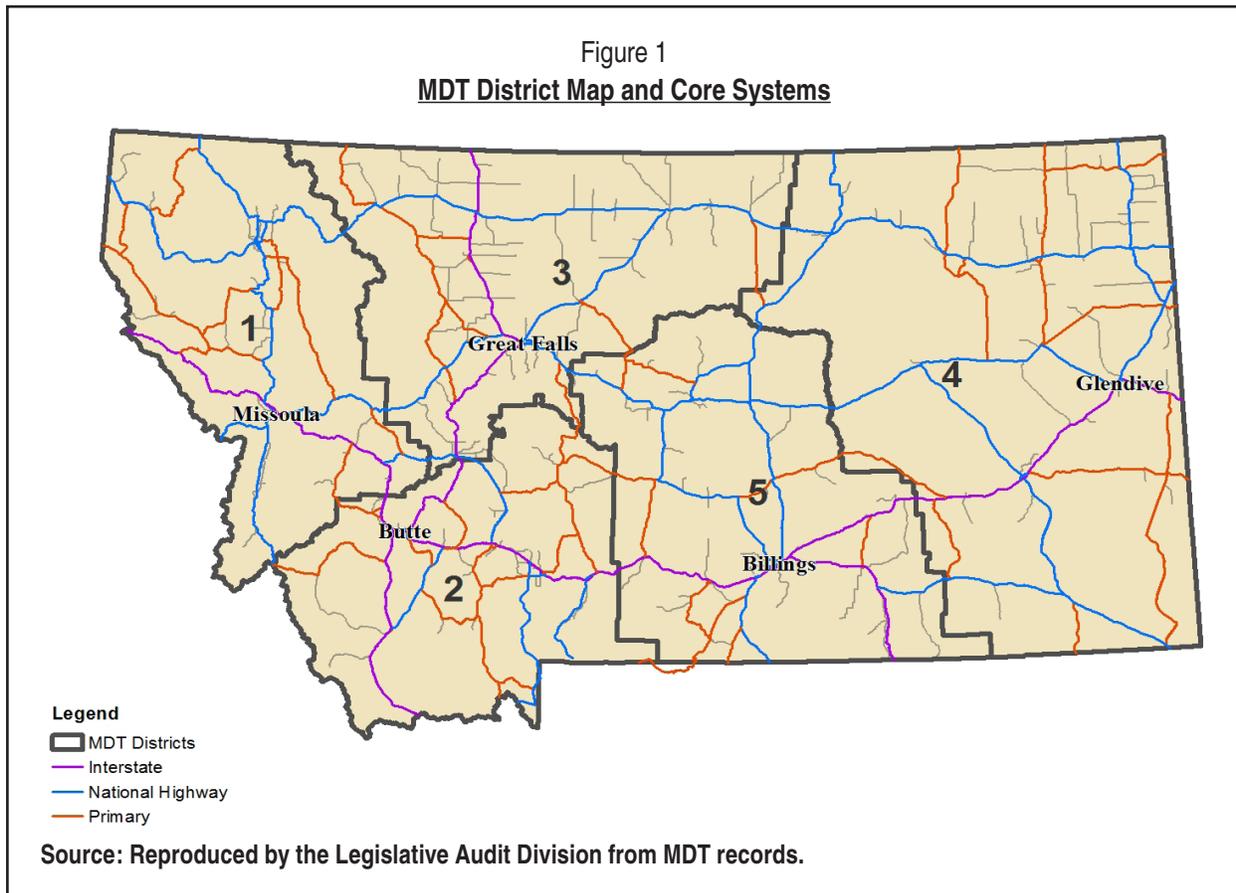
Questions regarding the sufficiency and use of infrastructure funding in Montana led the legislature to request more information on Montana Department of Transportation (MDT) operations during the 2017 Legislative Session. This includes the audit requirement in House Bill (HB) 473, which requires a comparison of specific areas of MDT operations to other state and provincial Departments of Transportation (DOTs). Information requested also includes the performance audit the Legislative Audit Committee prioritized on MDT's infrastructure project nomination and federal funding distribution.

MDT is responsible for the distribution of funding from the federal Fixing America's Surface Transportation (FAST) Act. The FAST Act authorized \$305 billion in funding over federal fiscal years (FFY) 2016 through 2020 for transportation-related activities for states and local governments. Federal fuel taxes provide a majority of the funding distributed to states through various programs and grants. Federal funding from these programs requires state matching funds ranging from 8.76 percent to 13.42 percent, depending on the program and road system. MDT estimated state matching funds to be over \$41 million in FFY 2017 and are paid for using state fuel tax funding. This chapter discusses the background and scope of our audit on infrastructure funding.

Background

Within MDT, the Rail, Transit, and Planning Division (Planning Division) is in place to support MDT's efforts to plan for and manage Montana's multimodal transportation system. MDT's TranPlanMT, required by the Federal Highway Administration, provides information on what MDT defines as proper management. TranPlanMT outlines MDT goals based on stakeholder and public input. Top goals identified are safety and the preservation of current conditions on MDT-managed roadways. These goals are largely dependent on prioritizing projects within established funding availability that will best benefit the system, and that are being constructed at the correct time to extend the life of the roadway. The process focuses heavily on the nomination of pavement preservation treatments. Pavement preservation treatments extend the life of a roadway prior to the need for major rehabilitation or reconstruction of the roadway. According to MDT, for every dollar not spent on pavement preservation, between four and eight dollars will need to be spent on reconstruction in the future. While the Planning Division is centrally responsible for the distribution of funding for major infrastructure projects, project nomination decisions are made in the five districts, located in Missoula, Butte, Great Falls, Glendive, and Billings. The following

figure illustrates the five districts, and the interstate, national highway, and primary highway systems (core systems).



While the districts and the central staff are responsible for nomination and distribution decisions, these decisions are subject to final approval by the Transportation Commission. The Transportation Commission is an appointed five-member board that receives project nominations from the districts to make construction project prioritization and approval decisions based on information and recommendations made by department staff. In general, projects nominated by the districts are approved and prioritized by the commission. The commission also approves funding distributions provided by the Planning Division.

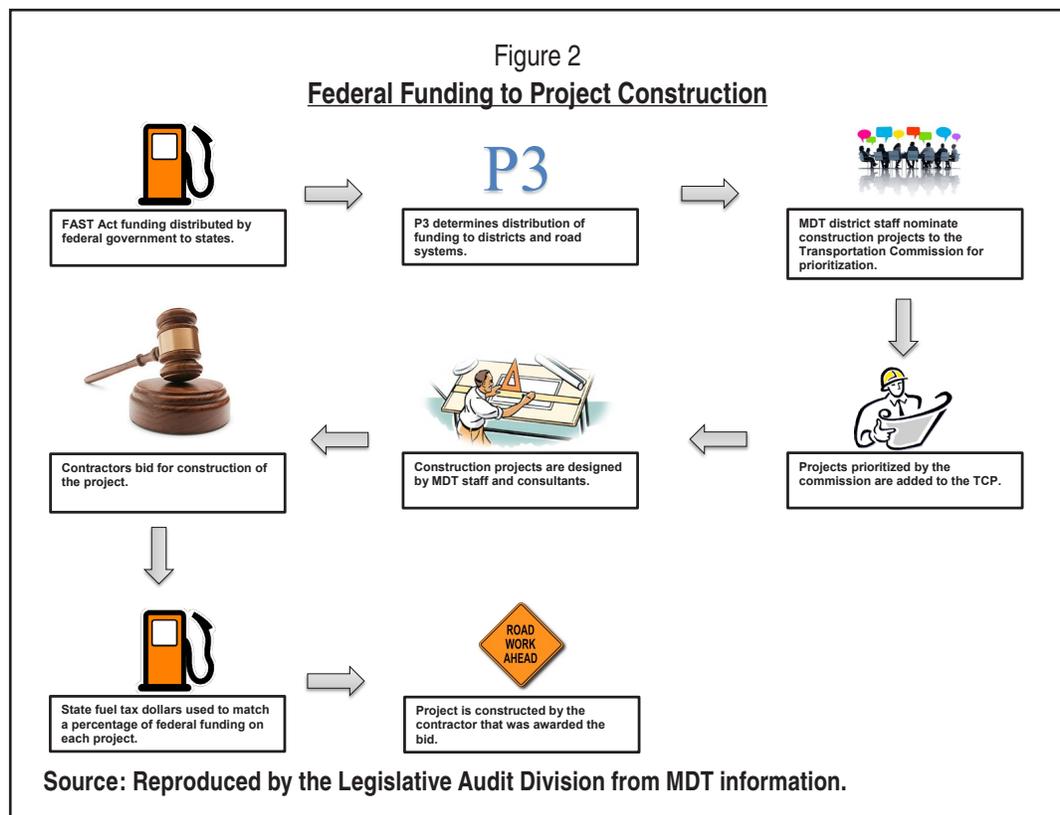
How Is Funding Distributed?

Federal funding is distributed to the states through grants and programs to improve the quality of the core systems in each state. MDT has to determine how much of the federal funding provided to Montana gets distributed to each district and road system to attain its goals of maintaining current system performance. Distributions are decided by the Performance Programming Process (P3). P3 uses Pavement Management System (PvMS) and historical performance data to estimate funding distributions to the core systems and the districts based on attaining the best anticipated future performance

possible within anticipated future funding. District staff nominate projects within the funding allocation recommended by Planning Division staff through P3. MDT's stated P3 goals include accountability through predicted system performance, demonstrating future performance based on funding scenarios, and linking policy goals in TranPlanMT to specific investments.

How Are Construction Projects Prioritized?

The Tentative Construction Plan (TCP) is a five-year planning document that tracks funding availability and construction scheduling. The TCP includes estimated federal obligations for core systems in each of the five districts for its 5-year period. P3 determines the funding availability for the core systems and serves as the parameters for districts when prioritizing construction projects into the TCP. Each district office has engineering and maintenance staff who are responsible for understanding current conditions and system needs in each of their districts. These staff determine what projects should be nominated to the Transportation Commission for prioritization. Once projects are prioritized, they can be scheduled for construction. These projects are generally larger federally funded construction projects on the core systems. Each year MDT has a meeting between Helena and district staff responsible for the various sections of the TCP to reach an agreement on the current year's 5-year TCP. In FFY 2017, of the TCP there was an estimated \$237 million in planned construction, made up of 46 individual projects on the core systems. The following figure gives a general outline of the process from funding to construction.



Audit Scope

As part of its duties, MDT is responsible for the administration and oversight of considerable state and federal resources used for the construction of and improvements to roadways in Montana. HB 473 provided increased infrastructure funding, but also showed the legislature wants greater transparency in MDT use of infrastructure funding. HB 473 included project reporting requirements for MDT and required a performance audit comparing MDT to other DOTs. The Legislative Audit Committee prioritized a performance audit mirroring the desire for more information by requiring review of construction project nomination and infrastructure funding distribution processes at MDT. As a result of this legislative interest, we focused audit work on a comparison of MDT operations to other state and provincial DOTs, P3 used by MDT to distribute funding, and MDT nomination of construction projects.

Audit Objectives

Based on the requirements of HB 473 and audit assessment work, we developed the following three objectives for examining and providing information on MDT:

1. How do the operations of MDT compare with similar transportation agencies in other states and provinces, including opportunities for privatization?
2. Does MDT distribute fuel tax dollars based on accurate and complete road condition data and industry best practices?
3. Does MDT have a process for nominating state infrastructure projects statewide and between districts according to state and federal requirements and industry best practices?

HB 473 Comparison Requirements

In accordance with HB 473, we included a comparison of MDT infrastructure related operations to other DOTs in areas including number of full time equivalent employees (FTE), federal highway dollars received, cost of engineering services, whether engineering services were performed by department staff or a private firm, and privatization opportunities. The DOTs selected for comparison were North Dakota, South Dakota, Wyoming, Colorado, Utah, and Alberta. We chose these DOTs due to their regional proximity, similarities in geography, and population. Information in the review areas was primarily presented per lane mile or per FTE to make comparison between MDT and other DOTs more meaningful. Our privatization review included evaluating research other DOTs conducted to make the decision to privatize at their current level. HB 473 also required analysis of MDT FTE counts and expenditures over time. We reviewed these areas over a 10-year period from 2007 through 2016 in order to gather information on MDT staffing trends over time.

Funding Distribution

Funding distributions on the interstate, national highway, and primary highway systems are determined by the P3 process. As outlined in the background section, P3 is MDT's method to develop an optimal investment plan and to measure progress in moving toward strategic transportation system goals. P3 determines distributions based on the level of future road performance those distributions are estimated to achieve. We reviewed this system and the associated documentation supporting distribution percentages for road systems and the districts. We also reviewed the nomination and distribution processes and found the Pavement Management System (PvMS) generated information that was used in both processes. This system stores roadway condition data and provides recommended construction treatments based on that data for road segments in the state. Due to this information being widely used at MDT, data accuracy and the procedures in place to ensure data accuracy were both reviewed. We reviewed distribution processes to determine if MDT based funding decisions on accurate data that ensured the best possible system performances.

Project Nomination

We determined MDT districts have significant autonomy in nomination decisions on the interstate, national highway, and primary highway systems. State statute does not speak directly to project nomination on these systems. This leaves nomination responsibility almost completely in the hands of staff located in one of MDT's five districts. District staff are responsible for determining which construction projects are needed the most in their district, and nominating those projects for future construction. As a result, we reviewed the nomination of 25 total projects that were scheduled for construction in FFY 2017 from the five MDT districts in the state. This included reviewing the processes in place for determining nomination decisions, and how districts supported nominating selected projects over other potential projects in the districts. This review examined if MDT has a statewide system in place to ensure nomination decisions are based on consistent criteria.

Audit Methodologies

To address these objectives, we completed the following methodologies:

- ◆ Gathered information through interviews and online resources regarding various aspects of MDT and other DOTs' operations in order to determine how MDT compared to similar DOTs in areas including number of FTE, federal funding received, and privatization.
- ◆ Interviewed stakeholder groups and other DOTs to determine potential privatization opportunities.
- ◆ Examined cost per FTE trends for MDT operations from 2007 through 2016 to determine expenditure trends.

- ◆ Obtained and reviewed relevant state and federal law, MDT policy, and Transportation Commission policy to determine requirements for the prioritization and funding distributions.
- ◆ Reviewed a sample of 25 projects from the five MDT districts from FFY 2017 in the tentative construction plan to review documented support for nomination decisions.
- ◆ Reviewed the nomination process in each of the five districts to determine what criteria is used to advance and support nominated projects. We gathered this information through interview and construction project file review.
- ◆ Interviewed Helena MDT staff to determine centralized review processes for nomination decisions.
- ◆ Reviewed Transportation Commission meeting proceedings and interviewed committee members to understand their role in prioritization and funding distribution decision-making.
- ◆ Interviewed other states and industry groups to gather best practices for nomination and funding distribution decisions.
- ◆ Reviewed the FFY 2017 P3 to determine how distribution decisions are made and who is involved in decision-making points throughout the process.
- ◆ Reviewed documentation of the FFY 2016 P3 to determine how funding distribution decisions are supported.
- ◆ Conducted on-site review of PvMS road segment data with district staff to assess the accuracy of PvMS data used to inform nomination and funding distribution decisions.

Report Contents

The remainder of this report includes chapters detailing our findings, conclusions, and recommendations. It is organized into three additional chapters:

- ◆ Chapter II compares MDT operations to other DOTs based on HB 473 requirements.
- ◆ Chapter III reviews how the department distributes funding for roadway infrastructure projects and the need for greater definitions and transparency in the P3 process.
- ◆ Chapter IV discusses how MDT nominates roadway infrastructure projects and the need for a more defined nomination process based on established criteria.

Chapter II- HB 473 MDT Operations Comparison to Other DOTs

Introduction

Historically, there has been significant public interest in infrastructure funding. This included issues such as state gas tax funding not being sufficient to cover the match rate for federal funding, local government infrastructure funding, and the ways transportation funding was being used to improve infrastructure conditions. Consequently, the legislature passed House Bill (HB) 473 in the 2017 session, raising the gas tax to better meet the state's transportation needs. This legislation required a performance audit of the Montana Department of Transportation (MDT). The audit requirements consisted of a review of MDT operations and a comparison to other state and provincial Departments of Transportation (DOTs). Areas of specific interest identified in the legislation included the following areas:

- ◆ Number of full-time equivalent employees (FTE)
- ◆ Inventory of equipment owned by the department
- ◆ Federal highway dollars received
- ◆ Cost of engineering services and whether engineering services were performed by department staff or a private firm
- ◆ Level of privatization
- ◆ Examination of MDT costs over time

A performance audit of MDT's Maintenance Division was conducted simultaneously with this audit. Therefore, a comparison of Montana highway maintenance activities compared to other states, and information regarding the inventory of equipment owned by MDT, is presented in that audit. Within this audit, we reviewed transportation data related to the other categories in HB 473 for five states' and one Canadian province's DOTs. The other DOTs were Wyoming, North Dakota, South Dakota, Colorado, Utah, and Alberta. We chose these DOTs due to their regional proximity, similarities in geography, and population. This chapter provides and discusses information requested by the legislature in HB 473, regarding key operational aspects of MDT compared with those same aspects in the other DOTs we reviewed.

Limitations in Comparisons With Other DOTs

We gathered information required by HB 473 on MDT operations and extended the same data requests to the other DOTs we reviewed. We looked at most of the information per lane mile or per FTE, because DOTs are responsible for vastly different amounts of lane miles, and have different scopes of operation based on the

size of the state and structure of the state's transportation system. All of the data gathered or requested was for federal fiscal year (FFY) 2016. A review of other state transportation functions presents unique challenges. In many cases, the structure of the other DOTs limited the ability for a direct comparison with MDT operations. For example, other states have different road system categories, construction types, and organizational structures. In Colorado the engineering function is broken into four branches that cover slightly different areas than MDT's engineering functions. In some cases comparison situations were limited by the other DOTs' ability or willingness to provide the information requested. Each of the review areas will have a description of any data limitations faced during audit work.

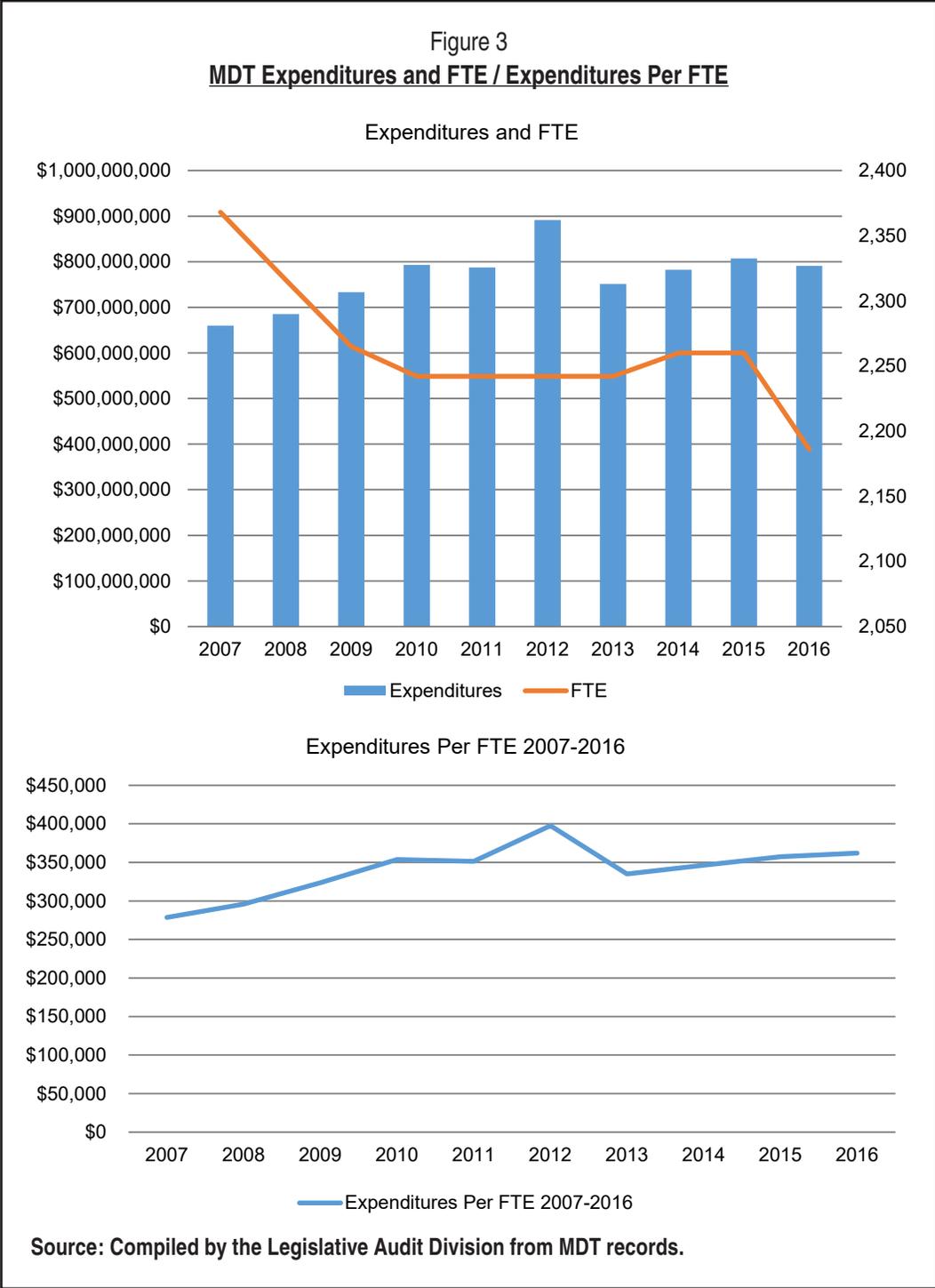
MDT Operations Comparable to Other DOTs

In general, MDT operations were closest to the average of the costs or size of operations of the other DOTs reviewed in almost all of the areas of operation that were reviewed. We conducted interviews with various staff in the other DOTs, reviewed DOT websites, and gathered information provided by transportation industry organizations such as the American Association of State Highway and Transportation Officials to conduct these comparisons. However, in some cases the completeness of the data provided by other DOTs influenced the results. In order to determine functions that could be performed at the same quality for a lower cost by a private entity, we asked each DOT reviewed to explain how they determined their current level of privatization. We did not find any DOT had established that level based on current analysis. However, MDT had a lower level of privatization in its operations compared to most of the other DOTs reviewed. We reviewed MDT staff size and expenditure information from 2007 through 2016 to determine if there were trends related to these areas. This analysis showed an increase of expenditures while FTE levels decreased. The following represents each of the areas for which we compared MDT operations to other DOTs. Each section is accompanied by a figure showing the results of the analysis in the areas required by HB 473.

MDT Expenditures Per FTE Increased by 29 Percent From 2007 Through 2016

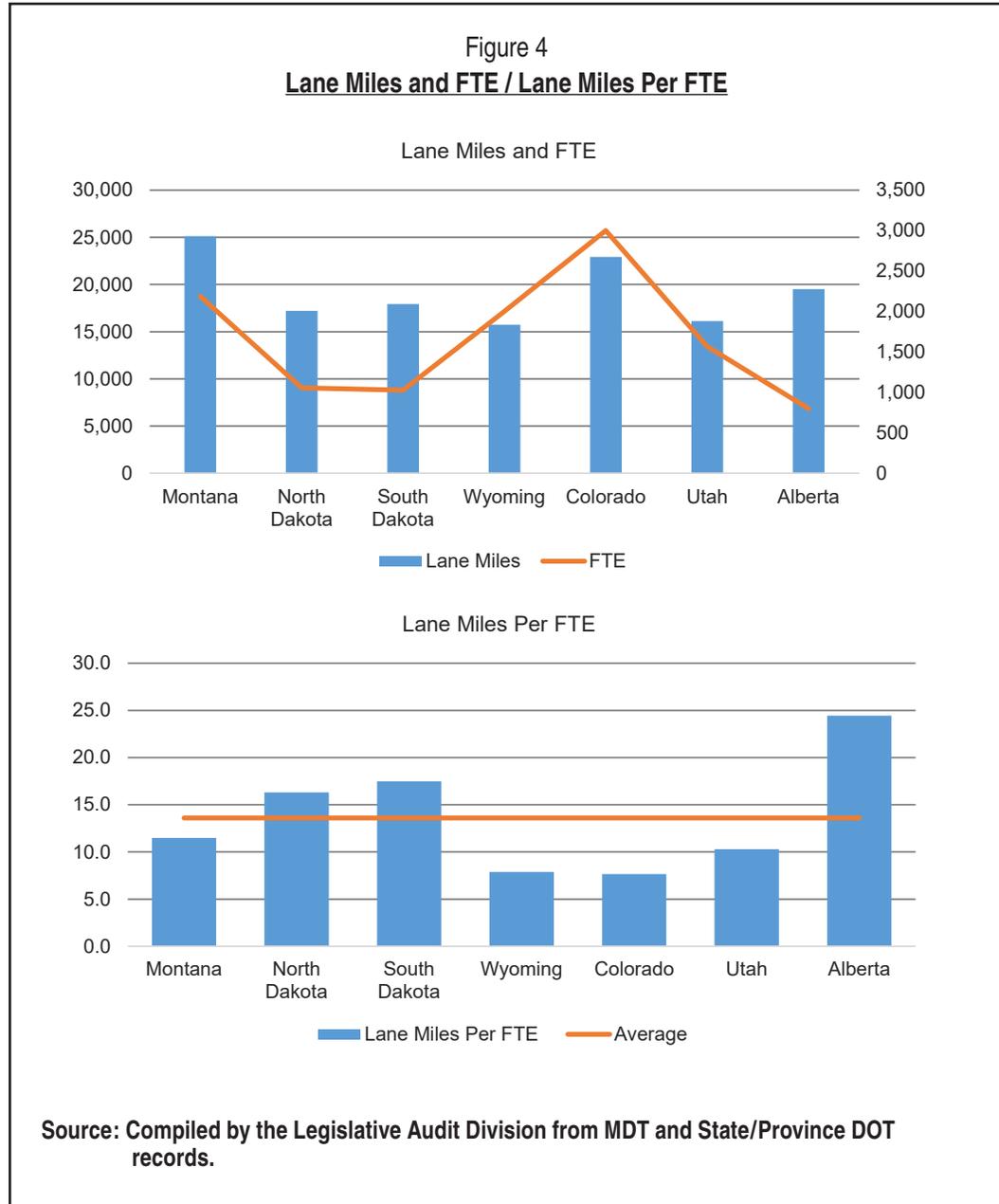
We reviewed FTE and expenditures levels over the last 10-year period that data was available. This allowed for review of expenditures per FTE in order to assess any trends related to these areas over that time. The analysis showed a trend of decreasing FTE, while expenditures increased. It is important to remember most expenditures at MDT are going toward contracted construction work that increases over time due to inflation. According to MDT, construction costs increased by 25 percent from 2007 through 2016. The following figures show the changes in expenditures, FTE, and expenditures per FTE over that 10-year period. As illustrated in the figures, expenditures rose by 20 percent while FTE counts decreased by 7.6 percent. Expenditures per FTE rose by

over 29 percent over the 10-year period reviewed. MDT staff attributed this to shrinking FTE counts while maintaining an increasing workload. The rising construction costs account for a large portion of increased expenditures, due to contracted construction making up a large part of MDT’s expenditures.



MDT Staffing Levels Comparable to Other DOTs

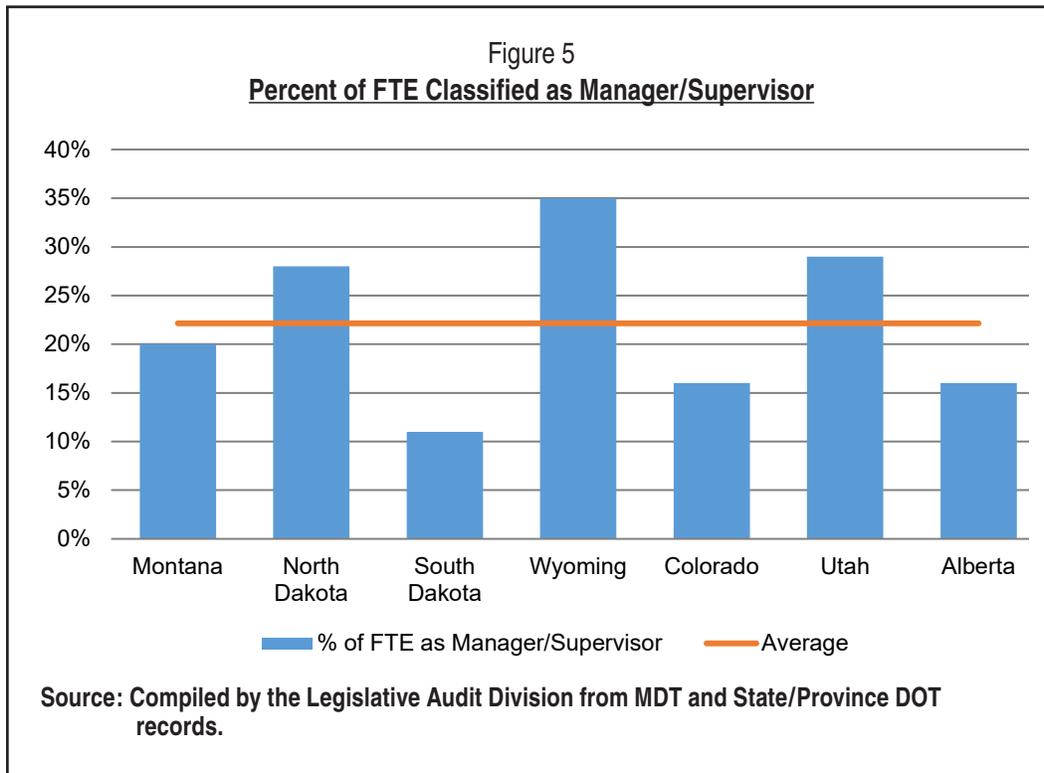
Lane miles per FTE looks at the staffing levels of MDT compared to the other DOTs reviewed based on the lane miles they are responsible for maintaining. Lane miles measure the total length of the roads multiplied by the number of lanes each has. We used lane miles to take into account the amount of roads each DOT was responsible for. MDT was responsible for more lane miles compared to the other DOTs. For FTE, there was significant variability between the DOTs reviewed. MDT again was comparable to the other DOTs with outliers above and below MDT's FTE count. It should be noted that FTE counts can be affected by the operations performed by the DOT and the level of privatization at each DOT. Alberta had significantly higher lane miles per FTE. This means Alberta has relatively fewer employees compared to the number of lane miles their DOT was responsible for maintaining. This is likely due to their high level of privatization. In contrast, Wyoming and Colorado had relatively lower lane miles per FTE. However, Wyoming has its highway patrol function under the state DOT. This was the only DOT reviewed with this structure. This will naturally lead to fewer lane miles per FTE due to the greater number of employees that are not doing work directly related to traditional DOT functions. As illustrated by Figure 4 (see page 11), the average lane miles per FTE for DOTs reviewed was 14, with MDT close to the average at 11.5 lane miles per FTE.



MDT Managerial/Supervisor Rates Are Comparable With Other DOTs

HB 473 required a review of FTE counts at MDT compared to other DOTs. This provides a more specific comparison of management levels by looking at the percentage of FTE that are classified as a manager or a supervisor. This was an effort to determine if MDT’s management/supervisor rates were proportionate to other DOTs. MDT staff indicated staffing cuts experienced by MDT might lead to a higher rate of management/supervisors. We asked human resource staff in other DOTs to provide information on

their total FTE and the number of those employees that were classified as managers or supervisors. Management at MDT had some concern with this comparison because they believe in the past some staff at MDT are classified as supervisors in order to boost pay to a level that is more equitable with the private sector, even though supervisory responsibilities are only a small fraction of their responsibilities. Management added this is not representative of current pay practices. The following represents the percentage of employees in manager or supervisor positions for all of the DOTs reviewed. As illustrated by the figure, MDT defined 20 percent of its employees as managers and supervisors. According to MDT management, this rate is higher than in the past, but it is currently lower than the average of the DOTs reviewed.



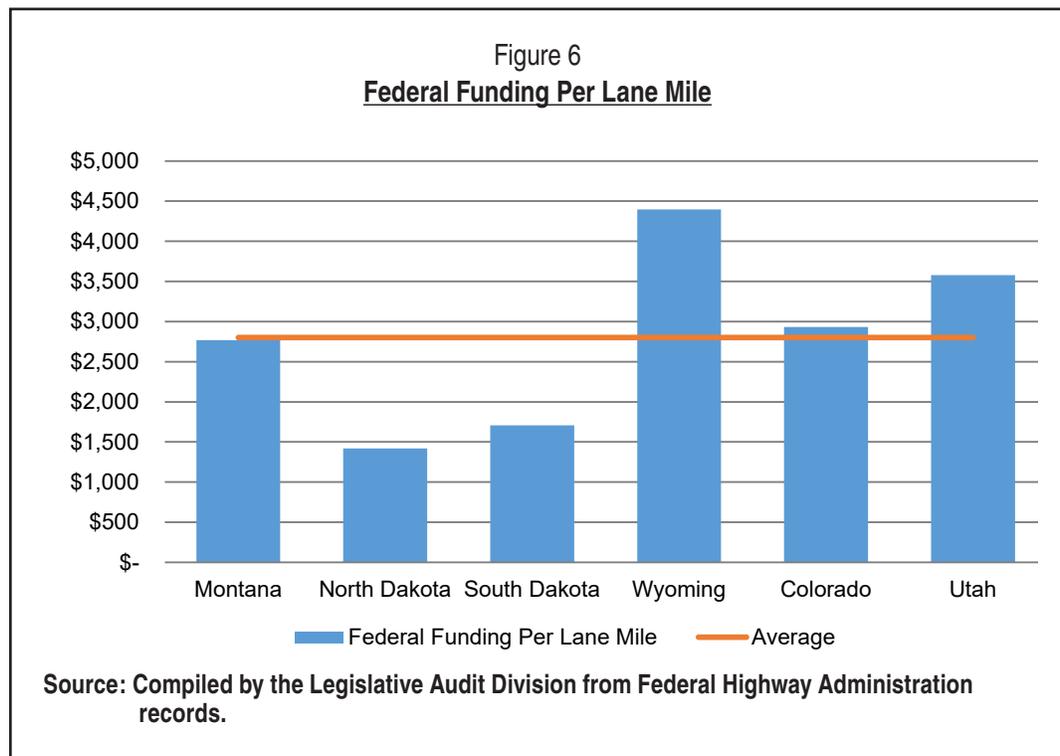
MDT Receives Federal Funding Comparable to Other States

Federal transportation funding is distributed based on federal funding formulas that calculate an initial lump sum amount for each state and then divide that amount amongst the different federal aid programs based on percentages defined in law. Federal funding formulas were previously based on factors including the following:

- ◆ Lane miles
- ◆ Vehicle miles travelled
- ◆ Contributions to the Highway Trust Fund

- ◆ Minimum allocations (states cannot receive less than a certain percentage of overall funds)
- ◆ Minimum returns guarantee on a state's contributions made to the Highway Trust Fund

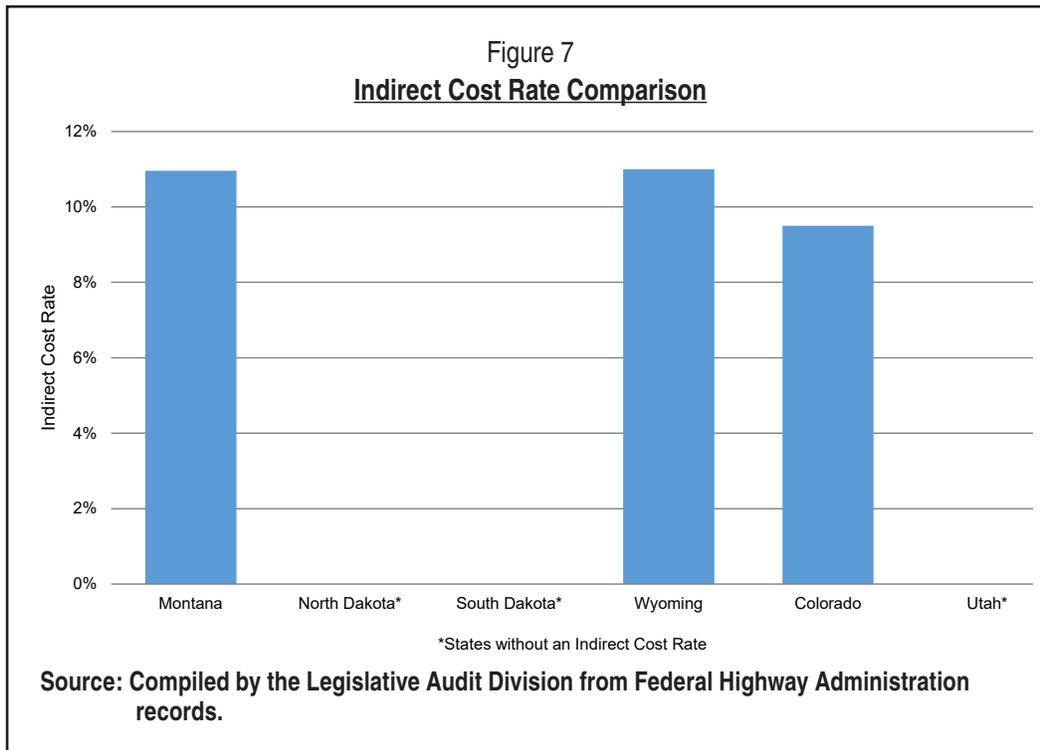
However, since 2009, the state's share based on these factors has been carried forward and not recalculated. This comparison could not be done for Alberta due to difference in Canada's funding structure. As illustrated by the figure, MDT was the closest to the average of \$2,801 per lane mile, with federal funding of \$2,769 per lane mile. There were significant outliers above and below the average federal distribution. This is a result of the structure of the federal funding formulas. In some cases MDT staff indicated that distributions vary based on who is in positions of power in Congress when distributions are decided. MDT staff noted other states such as North Dakota and Utah have large shares of their transportation operations funded by state revenue, unlike MDT, which is predominately federally funded.



States Vary on Application of Indirect Cost Rates to Federal Funding

Indirect costs are those a state DOT incurs for common or joint purposes that are not readily or easily assignable to the programs benefitted. The federal government allows MDT, and other state DOTs, to recover a portion of these costs from the federal

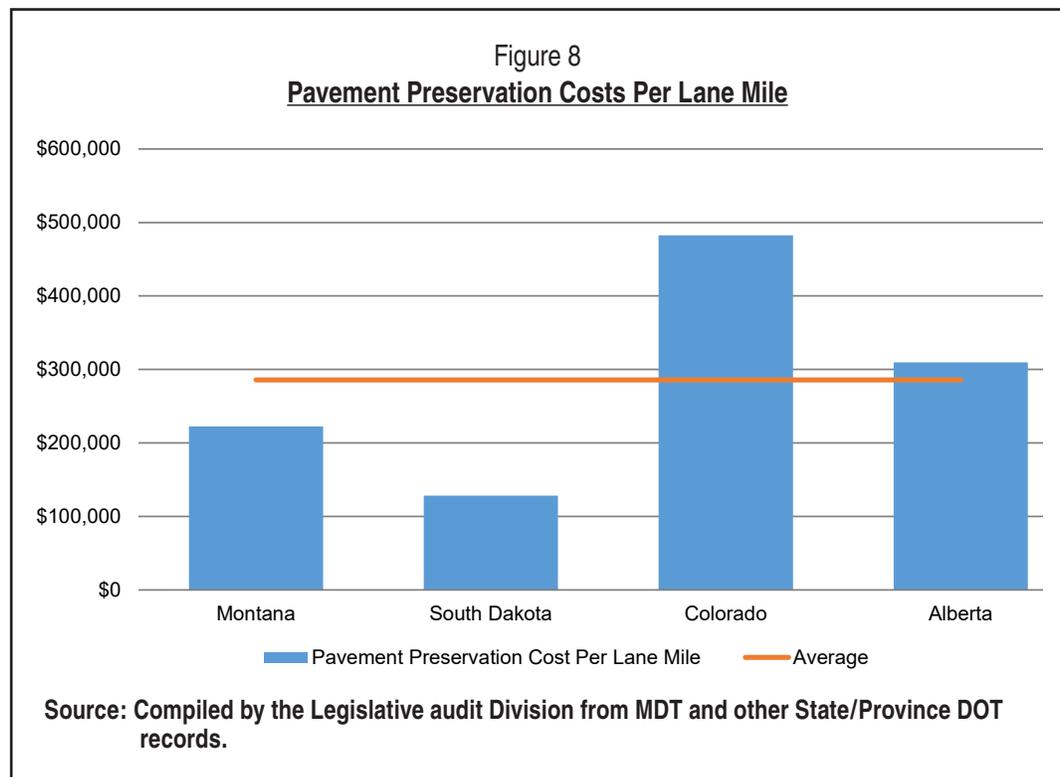
government through the use of an indirect cost rate. MDT's indirect cost rate is applied to every dollar of direct expenditures it charges to federal transportation funding. This allows MDT and other DOTs to pay for some of their operating expenses with federal funding. South Dakota, North Dakota, and Utah did not have an indirect cost rate. Alberta was not applicable to this analysis due to the different funding structure in Canada. The states without an indirect cost rate had state funding in addition to their gas tax, such as sales tax and general fund revenues, that MDT does not receive. Funding outside the gas tax provides these states with higher levels of state funding to cover costs MDT covers with the indirect cost rate. In general, states that do not apply indirect cost rates to federal funding are able to use that money to fund transportation projects. However, Montana statute requires MDT to fully recover indirect costs from the federal government. The following figure provides a comparison of MDT's indirect cost rate to the other states we reviewed. As illustrated by the figure, MDT's indirect cost rate was consistent with the other states with established indirect cost rates.



Pavement Preservation Costs Varied

Pavement preservation is a construction treatment type that is designed to extend the life of an already constructed roadway. These projects come at a substantially lower cost than reconstructing a roadway, and there has been a push nationwide to implement pavement preservation practices to lower roadway construction costs. Examples of construction types considered pavement preservation include crack seal,

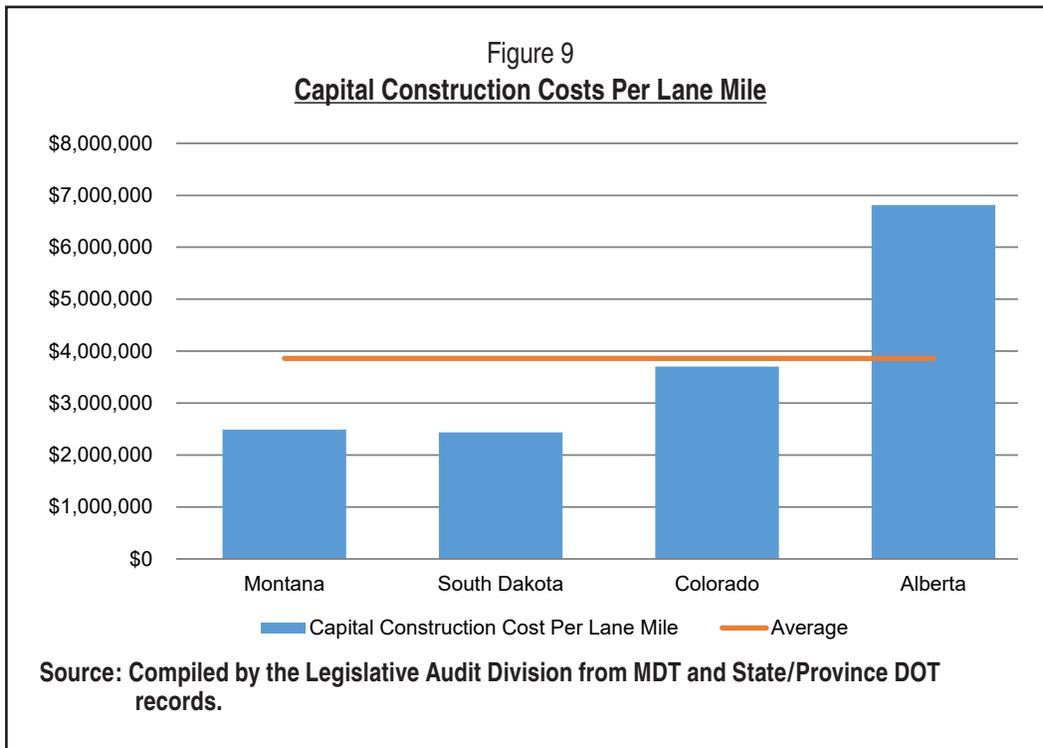
microsurfacing, overlays, and seal and cover. These treatments improve the existing roadway typically by filling cracks or applying a new thin layer of pavement over the existing road. The request for pavement preservation project costs to other DOTs explained these treatment types, and focused on treatments on the interstate, national highway, and primary highway systems. There were issues regarding different treatment types and road system definitions in other DOTs, and a lack of data provided by some DOTs. For example MDT's road systems are defined as interstate, national highway, and primary highway systems, while other states systems were defined as urban or rural. Due to these complications, MDT was only compared to Alberta, Colorado, and South Dakota. This was a comparison of total project costs for pavement preservation treatments. MDT staff assisted in determining what treatment types provided by other states would constitute pavement preservation in Montana. This helped ensure we were making a fair comparison by using similar pavement preservation data. As illustrated by the figure, costs varied widely. It was unclear why these fluctuations occurred based on the information provide by other DOTs and discussions with officials from other DOTs.



Cost of Capital Construction

Capital construction projects are major projects that are designed to replace the current roadway. These projects come with significant costs due to the amount of

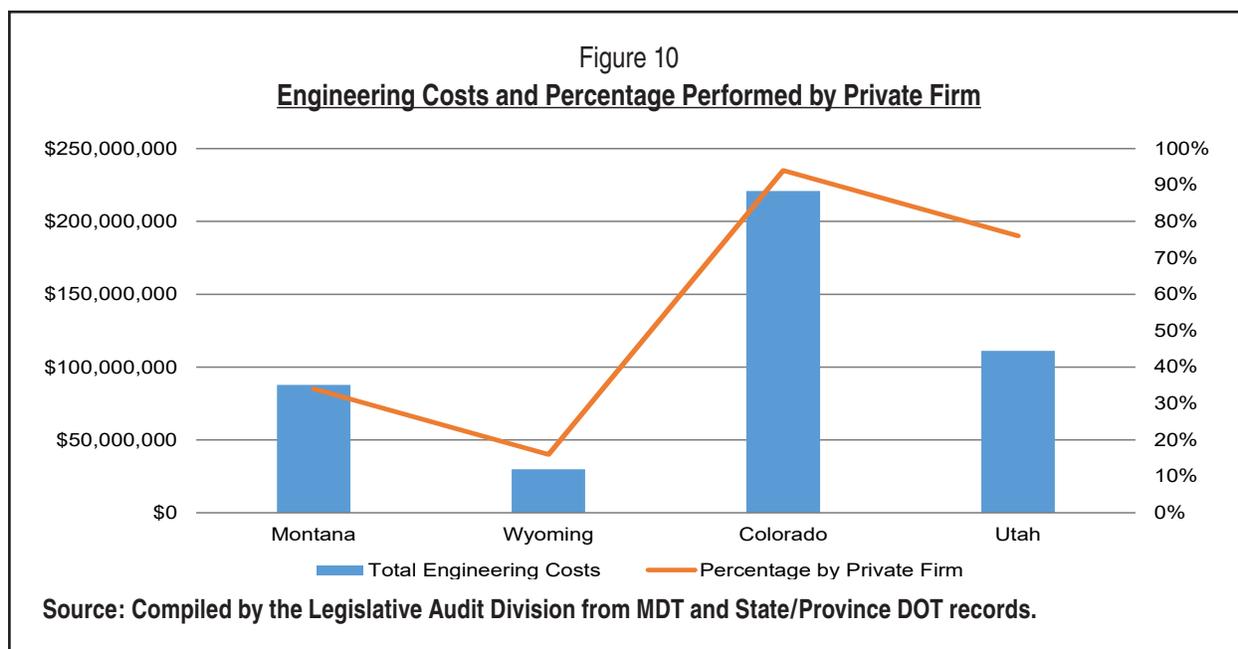
work that is done. Examples of projects considered capital construction include major rehabilitation of the road, reconstruction of the roadway, and bridge reconstruction and rehabilitation. Again, Alberta, Colorado, and South Dakota were the only DOTs able to provide enough information to make a comparison with MDT possible. Similar to pavement preservation analysis, capital construction costs were reviewed on a per mile basis. Many factors can influence the costs per mile of capital construction including the completeness of the data received from DOTs, types of treatments in the data, and the environment where the project is being done. Projects in urban areas often have a higher cost than projects in rural areas, or mountainous terrain compared to flat terrain. The capital construction data provided by Alberta was very limited. They only included four projects, which could have influenced their higher costs. As illustrated by the following figure, the results were similar to pavement preservation with MDT having lower cost per mile than Colorado and Alberta, but slightly higher costs than South Dakota. It was unclear why the cost per mile varied so widely outside of the potential reasons discussed above.



Engineering Divisions Vary in Structure and Responsibilities

The Engineering Division at MDT is split into the Preconstruction and Construction functions. Preconstruction handles areas including bridge, consultant design, and right-of-way. Construction's areas include construction engineering, contract plans,

and pavement analysis. The functions covered by other DOTs' engineering divisions varied considerably when compared to MDT. The information received from other DOTs on costs associated with their engineering functions also varied widely. For those reasons, engineering functions were compared as a whole. HB 473 also asked for a review to determine if engineering services were performed by department staff or a private firm. We were able to obtain and review information on engineering costs and the percentage of engineering costs performed by a private firm to compare with MDT for DOTs in Wyoming, Colorado, and Utah. As illustrate by the following figure, the engineering cost information provided by the other states varied widely. Higher costs in Colorado and Utah could be attributed to their urban areas with higher project design costs. However, it is generally unclear why the cost varied. The percentage of engineering costs performed by a private firm or consultant also varied widely. Utah and Colorado described their in-house engineering staff's role as primarily oversight of consultants. Alberta did not provide funding information for its engineering division, but described it as operated by private firms with in-house oversight provided by staff. The figure shows the total engineering costs and a line representing the percentage of those costs that go to private firms.



Design Work Is Primary Privatization Opportunity for MDT

As part of HB 473, the legislature expressed interest in the potential for privatization opportunities at MDT. As a result, we examined the levels of privatization at the other DOTs reviewed. We determined that other DOTs privatized their functions

to varying degrees. We also determined MDT did not have a specific standard for why it privatizes at its current level. Staff indicated decisions to hire consultants for design work were typically based on staffing considerations or the result of the loss of FTE. For example, MDT staff said they strive for a level of staffing that is sufficient for less busy times of the year, and can use consultants when design workloads exceed their capacity. We did not find other state DOTs had completely privatized any functions of their operations. There were varying levels of privatization, with a focus on the engineering functions related to project design work for upcoming projects. For example, Utah and Colorado have privatized their project design work to an extent that only a small portion is done by DOT staff. Staff in these cases are serving more of an oversight role for consultants doing design work. Wyoming indicated they strived for a rate of 20 percent of project design work being privatized. However, MDT has privatized its project design work (34 percent) to a greater degree than Wyoming. Alberta has privatized areas of its operation, including its engineering function. They also maintain staff to review consultant work. Alberta indicated its follow-up studies showed cost savings while maintaining a similar level of service. However, Alberta has taken on responsibility for a greater number of roads since the original studies, and does not have information regarding if those savings are still being realized. In general, Alberta maintains significantly fewer lane miles than the other DOTs reviewed. Other DOTs could not provide data with any rationale for their levels of privatization. Consequently, we were unable to determine if specific areas could be privatized at a lower cost at the same quality due to the lack of data and research on privatization of operations. State DOTs indicated their level of privatization was not in specific policy or statute, but primarily related to political pressure to increase the amount of services they contracted out to private industry.

MDT and Other DOTs Do Not Justify Privatization Levels

Review of MDT operations from 2007 through 2016 showed that expenditures have increased and have been handled by a slightly decreased staff. When comparing to other DOTs, we determined that MDT operations generally align in the areas reviewed. However, there were limitations such as DOT operational structure, construction treatment types used, and information provided by other DOTs that did not allow for a direct comparison. Two of the three DOTs that provided consultant cost information privatized their engineering functions to a greater degree than MDT. DOTs reviewed, including MDT, could not provide support for their current levels of privatization. MDT could not provide data or research to support its current level of privatization. MDT also does not have a process in place to determine which activities could be done at lower costs with similar quality by a private firm. The primary justification for DOTs privatizing at a higher level than they have in the past was political pressure. No DOT reviewed could provide specific policy or legislation that mandated a greater level of privatization.

Chapter III – Project Funding Distribution

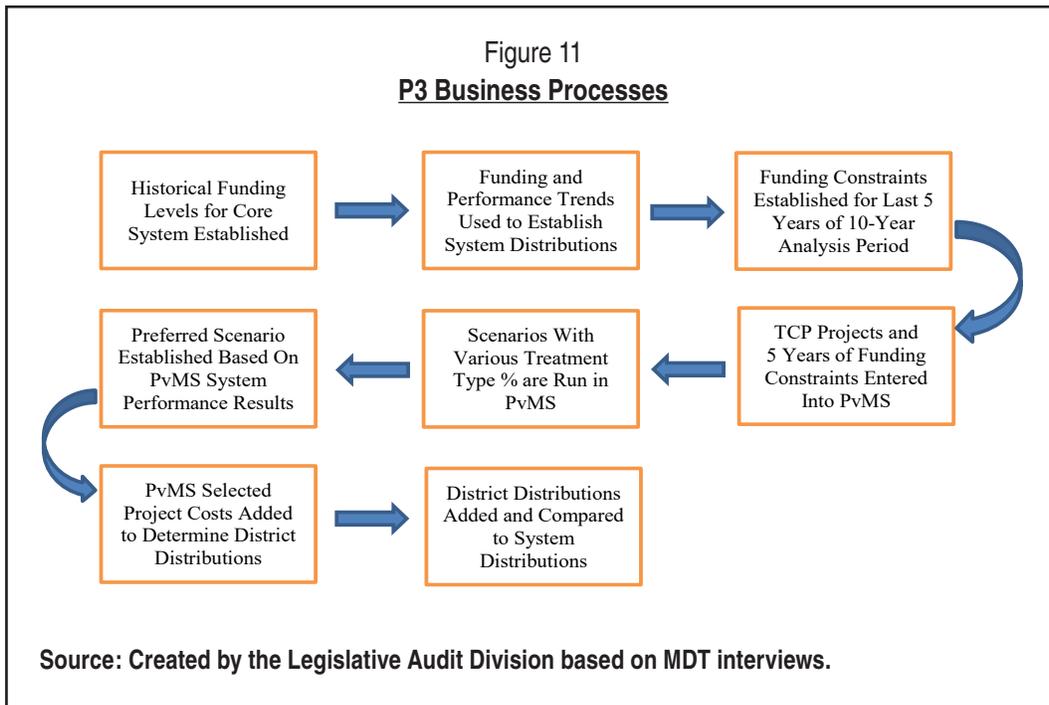
Introduction

Fuel tax funding has been an ongoing concern for the legislature. This led to the passage of HB 473, which raised fuel taxes to provide greater levels of infrastructure funding to localities and Montana Department of Transportation (MDT). As part of our second objective, we assessed if fuel tax dollars are distributed based on accurate data and industry best practices in order to ensure funding will lead to the best possible performance on Montana roadways. Federal and state fuel tax funding for construction is distributed to the interstate, national highway, and primary highway systems (core systems) and the five MDT districts according to the Performance Programming Processes (P3). The Rail, Transit, and Planning Division (Planning Division) within MDT is responsible for conducting P3. P3 uses the Pavement Management System (PvMS) to establish distributions based on attaining the best future performance of the roads. PvMS is a system that stores road condition information gathered by collection vans that travel the roads and gather the data. This data and other tools built into the system allow it to predict future performance and select potential construction projects. The distributions establish the funding allocations district staff use to make construction project prioritization decisions discussed in the next chapter. Our review of P3 found it was not well understood by MDT staff outside those who conduct the process, and did not involve staff who manage PvMS. This led to questions regarding the roles of MDT staff in P3, and what the processes are at critical decision points that affect the distribution of funding. Review of state statute brought into question whether P3 was appropriate for deciding funding distributions on the primary highway system. The interstate and national highway system distribution processes are not outlined in state statute. This chapter discusses P3 and the role of current staff in the process and includes findings and recommendations to improve transparency in P3 through clear policy and defined roles in the process for MDT staff.

What Is the Performance Programming Process?

P3 is a distribution system that determines the percentages of funding that will go to the core systems and the districts based on expected future condition of the roadways. P3 distributes the funding based on getting the best expected future performance from the distributions. P3 is used to determine the distribution of funding for the federal fiscal year (FFY) that is six years away. For example, in 2017 the Planning Division was using P3 to determine distribution percentages for FFY 2022. The reason for this is the length of time projects can take to develop. A large capital construction project can take five-plus years to develop. The Tentative Construction Plan (TCP) is a 5-year plan for tracking construction. P3 establishes how much funding districts will have, and thus must be done every year to establish the funding levels for the incoming year to

the TCP. This gives district staff funding estimates to base their nomination decisions on. The distribution for each district is based on the percentage of funding the district has for each of the core systems. The following figure shows how the P3 processes establishes the core systems distribution and the district distribution based on PvMS data and historical funding.



Core Systems Distribution

As illustrated by Figure 11, P3 starts by determining the distribution percentages to the core system. This is largely based on historical distributions to these systems and monitoring the resulting performance. For example, MDT has gradually reduced the percentage of core system funding given to the interstate. This is due to MDT staff identifying a trend where they can gradually reduce the funding over time and not decrease the performance on the system. Staff attribute this to a smaller demand for expensive reconstruction projects on the interstate with greater levels of less expensive pavement preservation projects. Table 1 (see page 21) illustrates the generally decreasing percentage of funding that MDT staff believe will still maintain current interstate conditions.

Table 1
Interstate System Distribution Over Time and as a Percentage of Total Core System Funding

| Interstate System | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Anticipate Future Performance and Funding | | | | |
|-----------------------------------|------|------|------|------|------|------|---|------|------|------|------|
| | | | | | | | 2018 | 2019 | 2020 | 2021 | 2022 |
| Ride Index | 81.4 | 81.2 | 81.6 | 81.9 | 81.9 | 82 | 80+ | 80+ | 80+ | 80+ | 80+ |
| Level of Investment (\$M) | 60 | 68.9 | 64.6 | 57.8 | 59 | 54 | 54.4 | 55.3 | 56.5 | 59.2 | ? |
| Percentage of Core System Funding | 25% | 34% | 28% | 24% | 24% | 23% | 22% | 22% | 22% | 21% | ? |

Source: Reproduced by the Legislative Audit Division from MDT records.

As illustrated by the figure, distribution decisions are based on expected performance and include five years in which actual performance cannot be determined because P3 establishes funding percentages for the sixth year out. Performance is measured by the ride index, which represents the overall condition of the roadway. The performance goals for the systems are to maintain the current level of performance with the performance of the interstate being the top priority, then national highway, and maintaining primary highway system performance levels being the lowest priority. The interstate receives top priority because it is the focus of the federal transportation program and the most traveled. Road system distribution percentages are verified against the district distribution percentages after they are calculated. The distribution percentages to the five districts for each road system must add up to the total distribution percentage for that system.

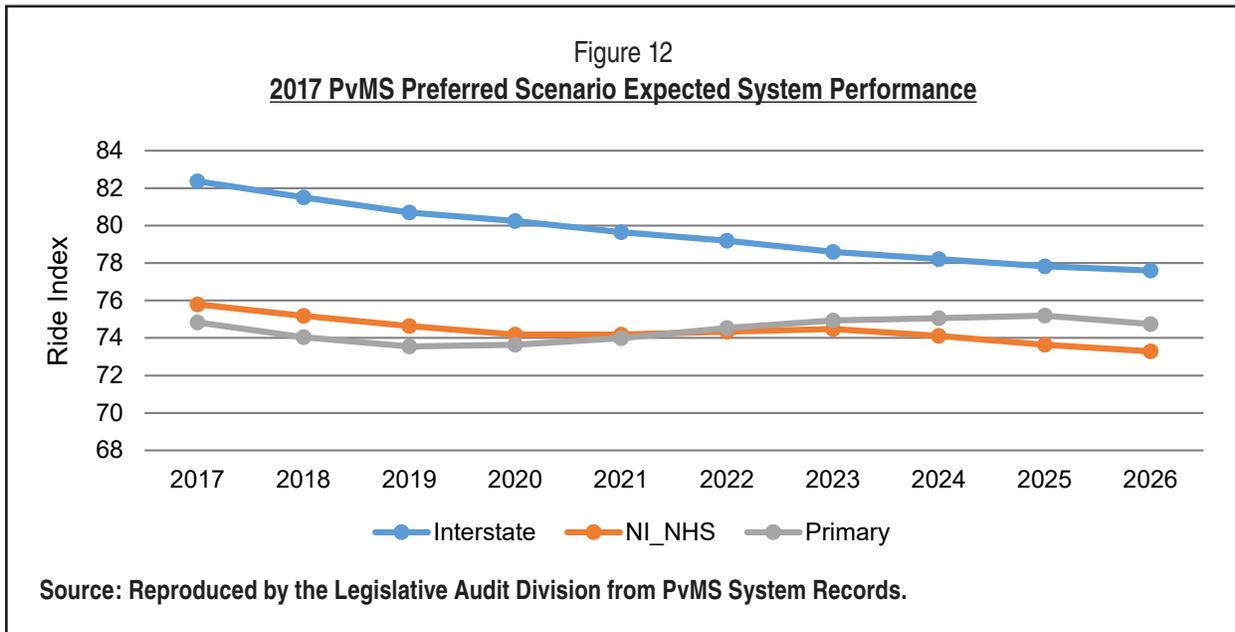
District Distribution

As illustrated by Figure 11, there is a more detailed process for establishing the distributions to the districts. District distributions are determined through PvMS. This is done by taking the average of the system needs over the next 10 years based on funding availability entered into PvMS. Five of those 10 years are in the TCP, and thus projects have primarily been selected, and funding availability does not need to be established in PvMS. Funding availability has to be established for the final 5 years of the 10-year needs analysis to be entered into PvMS. This is difficult to calculate because the current federal infrastructure funding bill only runs until FFY 2020. MDT staff make several assumptions regarding inflation, future funding, and nonconstruction-related costs to get an estimate of future funding for the last 5-year period.

Once the funding availability is established for the 5-year period after the TCP, it is entered into PvMS along with the projects that are already in the TCP. This provides PvMS with information regarding which projects will have been done in the 5 years of the TCP when calculating what funding needs will be in the sixth year. PvMS picks

the projects that it would do based on road condition, anticipated degradation of the roads over the analysis period, and funding availability for the last 5 years. A 10-year analysis is used to average out the distribution percentages over a period of time so funding levels do not have large fluctuations from year to year.

The other input into PvMS is the percentages of reconstruction, rehabilitation, and resurfacing work the system should select. These are the only three types of pavement treatments in PvMS for P3 analysis. MDT staff described the percentages of each treatment type as the main variable that can be manipulated in PvMS. However, these percentages do not have an effect on the actual percentages of treatment types expected to be constructed in the districts. Several different treatment type percentage scenarios are run with the anticipated funding availability to determine what the resulting pavement conditions will be for the core systems. The system condition in P3 is measured by ride. MDT staff responsible for P3 indicated they look for the scenario with the best resulting core system performance, but do not believe that performance curves generated are accurate. For example, the following is the preferred scenario from the 2017 P3 analysis that illustrates the anticipated resulting performance from the preferred scenario’s funding distribution.



As illustrated by the figure, PvMS predicts a decline in interstate performance that MDT staff do not believe will happen. The difference between PvMS anticipated performance and staff’s anticipated performance is discussed in the next section. The preferred scenario in PvMS leads to anticipated performance based on the construction projects PvMS selects during the P3 analysis. Department staff export the list of costs of the selected projects onto a spreadsheet, and the costs are separated by system and

district. This shows the percentage of funding PvMS recommends for each district on each system. The percentages for each district on the core systems are added up in order to determine if they match the previously determined system distributions. MDT staff described this as a check to make sure the core system needs determined by PvMS are similar to what they would anticipate the core system needs to be based on historical funding levels. If they do not exactly align, MDT staff said they would tweak the district percentages to make them fit the system distribution percentages. MDT staff stressed the importance of remembering the resulting distribution percentages are estimates. By FFY 2022, the funding levels will presumably have changed, but the percentages should still represent the best distribution. This is needed five years in advance for planning purposes, because projects take so long to develop.

P3 Is Not Outlined in Policy, Creating Confusion Amongst Staff

Currently, P3 policy does not clearly define which parties should be involved at the various decision-making points in the process. P3 is heavily reliant on the PvMS system. However, MDT staff that manage the PvMS system do not currently have a role in P3. They indicated they were not aware of how P3 was conducted, or how the final distributions were determined. This confusion was stated by other MDT staff in the districts and in Helena. P3 could not be reproduced based on current policy because of the lack of specificity.

MDT staff responsible for P3 do not believe system performance will behave as shown in Figure 12 above from PvMS. For example, they believe the funding availability in PvMS should lead to maintained interstate performance, contrary to what is shown in the preferred scenario in Figure 12. MDT staff responsible for P3 had several other issues regarding the functionality of PvMS in the P3 process. This included the following issues:

- ◆ Degradation curves showing roadways degrading too fast after treatments.
- ◆ Decision trees that determine when PvMS recommends a treatment do not mimic engineering decision-making.
- ◆ System does not generate the correct treatment needs based on condition.

MDT staff responsible for managing PvMS did not agree with this assessment of PvMS functionality. They indicated the current conditions on the interstate are too high and thus not efficient to maintain. Due to that fact, they believe PvMS will not choose construction projects on the interstate until the performance has gone down. This leads to the anticipated reduction in interstate performance shown in Figure 12. MDT staff responsible for managing PvMS also disagreed with the other issues raised

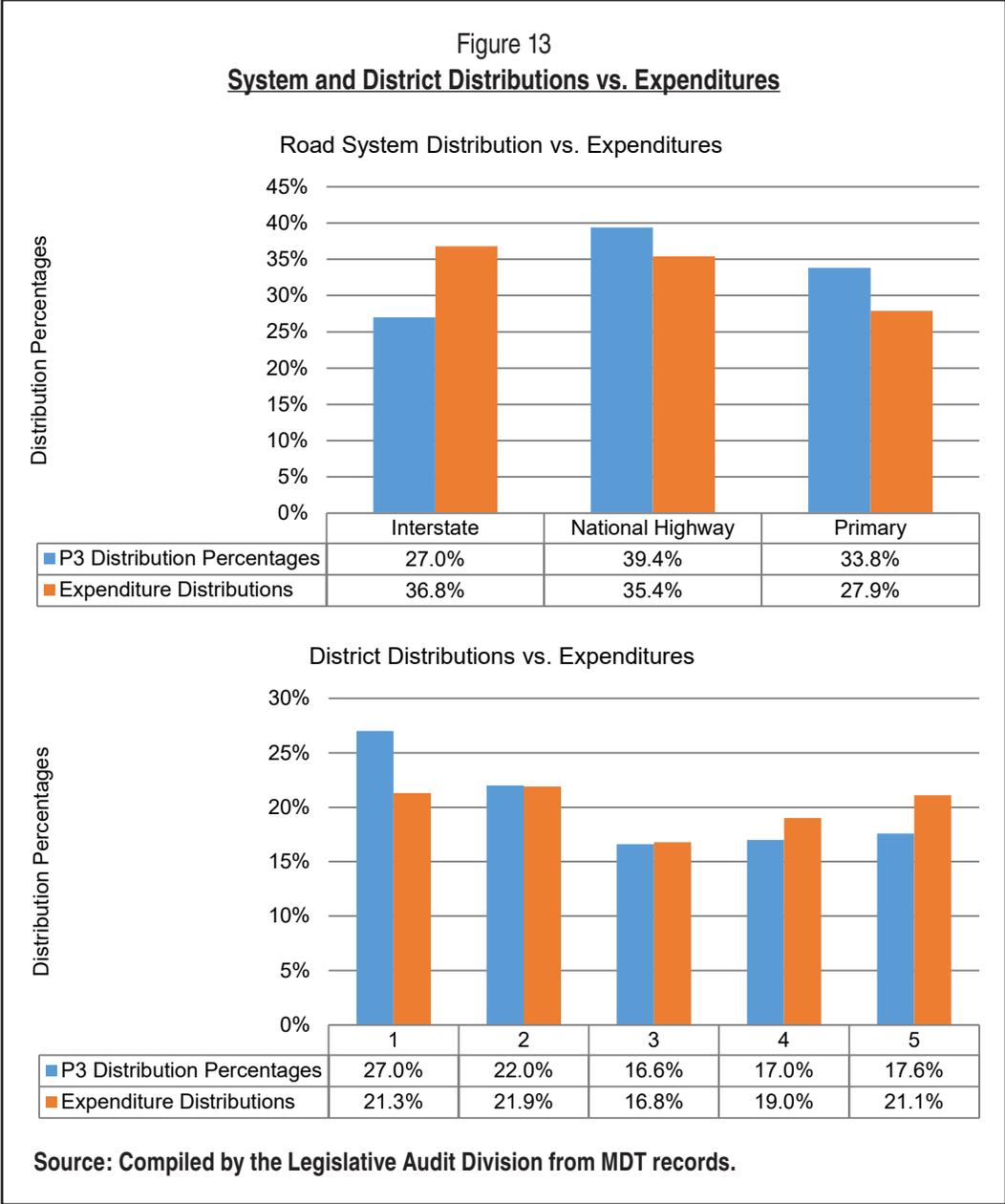
about PvMS system limitations. This confusion and disagreement regarding P3 shows a lack of communication and involvement in P3 decision-making by many MDT staff.

Improper Distribution Can Lead to Lower Performance on Roadways

P3 has many decision-making points that affect the eventual distribution of millions of construction dollars across the state. However, current policy does not describe this process. There is only one employee at MDT who understands this process in its entirety. Without that employee, this process would be very difficult to reproduce. The calculation of funding availability, inputs into the PvMS system, and determination of the preferred distribution scenarios are important decisions that greatly affect the distribution of funding. Current policy does not outline which points of P3 need to receive consensus agreement. Department staff present results to the Transportation Commission for approval, but the information presented does not discuss the many assumptions and decisions that were made to get to the distributions. MDT staff generally lacking understanding and involvement in P3 could lead to reduced performance on the roadways due to distributions not aligning with established needs.

Distributions Do Not Align With Expenditures

P3 establishes percentages of funding that should be distributed to the five districts and the core systems. In order for the distribution of funding to be effective, the expenditure of those funds must closely resemble the original distribution percentages. Our work showed there was no verification by MDT to determine if expenditures were lining up with the distributions determined in P3. It is important to remember that these distributions were determined by MDT staff to be the most efficient, and lead to the best anticipated future performance. In an effort to understand how expenditures lined up to distributions, we gathered the expenditure data from MDT and calculated the percentages that were expended in each district on each of the core systems. MDT staff had concerns regarding year-to-year information lining up because projects can take more than one year (causing expenditures to be spread over multiple years). In order to account for this issue, we took a 5-year average of distributions and expenditures. The distributions were from FFY 2012-2016 and the expenditures were from FFY 2013-2017. The expenditures were started a year later in order to capture projects that took multiple years to construct. Figure 13 (see page 25) shows the results of that comparison.



As illustrated in the figure, there are some considerable differences between the distribution percentages and the expenditures. These differences amount to significant funding alterations. For example, the 2016 distribution establishing FFY 2021 funding availability for the core systems was \$281.9 million. Based on the percentages in the figure the distribution to the interstate would be \$76.1 million while the expenditure would be \$103.7 million. This level of expenditure on the interstate system would leave significantly less money for the national highway and primary highway systems. However, MDT staff indicated they were comfortable with the differences between distribution and expenditures shown in the figure, based on the variables involved in determining future distributions. In the analysis, system distributions were generally

further off than district distributions. Although these figures were based on the best information available, MDT staff had concerns regarding the analysis. They indicated that distributions often differ from expenditures due to a variety of factors such as bids below estimates and more obligation (spendable funding) than anticipated. MDT does not review if expenditures align with distributions, and has not discussed tracking this information, nor is it clear if they believe expenditures should align with distributions.

MDT Should Have Clear Policy in Place to Manage P3

State policy and best management practices require management to implement procedures in order for the department to achieve its desired objective, which in this case is the most efficient distribution of funding to the districts and core systems. Establishing clear procedure will allow for better understanding of P3, and the associated risks. Best management practices indicate management should internally communicate the necessary quality information to achieve an entity's objectives with appropriate methods for communication. The managers of PvMS and the end users of the system should be involved in P3 in order to understand what the capabilities of PvMS are, and how to properly use the system. Interagency communication regarding PvMS allows system managers to better understand how end users are using the data in the system, and what functionality they are not getting out of the system. Greater transparency through procedure and formalized involvement by all staff in functions related to P3 would allow all staff to understand potential risks related to the system.

RECOMMENDATION #1

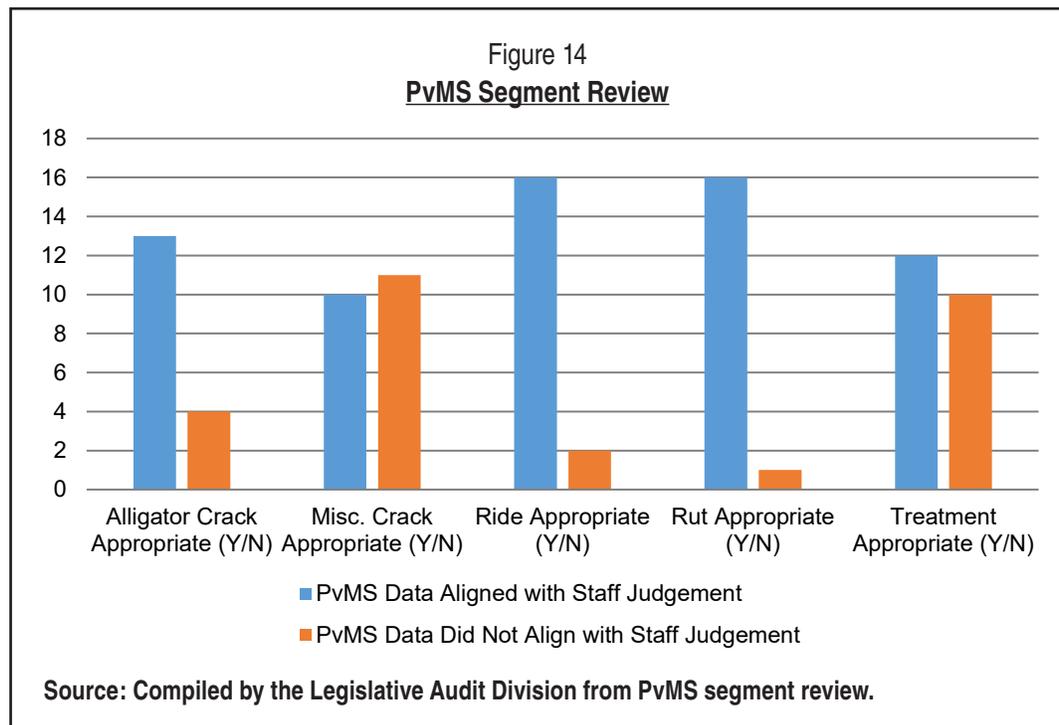
We recommend the Department of Transportation create and implement procedure that includes:

- A. *Defining roles and level of involvement for department staff responsible for the Performance Programming Process,*
- B. *Outlining decision making processes for determining inputs into the Pavement Management System that influence funding distributions, and*
- C. *Formalizing business processes for the entire Performance Programming Process.*

PvMS Data Does Not Have Proper Oversight

As discussed above, PvMS data provides information for the districts' nomination processes and calculates funding distributions. If PvMS data does not have proper oversight, this has the potential to lead to improper distribution and nomination decisions that will hurt the overall performance of Montana's roadways. PvMS information is collected by data collection vans that drive all interstate, national

highway, and primary highway systems in the state. The data gathered is used in both the construction project nomination and funding distribution processes as described in the report. PvMS use in the nomination process will be described in the next chapter. Based on audit work, MDT staff responsible for managing PvMS do not currently have a process in place for the verification of PvMS data after it is gathered. MDT staff indicated they conducted reviews in the past, but they were informal and undocumented. There are several checks in place regarding the accuracy of the data collection vans prior to them gathering the data. However, district staff who use PvMS data after it is gathered to assist in the nomination process expressed concerns regarding the accuracy of the data in some cases. As part of the audit work, district engineering staff were asked to provide their judgement of a sample of PvMS segment data based on an on-site review of the conditions. District and audit staff drove a sample of 25 total road segments on the core systems in the five districts. In some cases the review was not applicable because a treatment had been done on the road segment since the annual readings for PvMS, or district staff were not willing to offer a judgement on the PvMS data. We compared PvMS data to the engineers observations for alligator cracking (load associated), miscellaneous cracking (nonload associated), ride, rut, and treatment recommendation. The ride measures the pavement’s functional performance in terms of smoothness, and is used as an overall judgement of the road’s quality. Rut is a measure of the rut depth in the roadway. Cracking identifies the level of alligator cracking (load associated cracking) and miscellaneous cracking (nonload associated cracking). Figure 14 represents the results of that review and shows whether PvMS information aligned with district engineering staff’s professional judgement or not when applicable for each category on each sample segment.



The results determined 22 percent of the PvMS segment readings in our sample did not align with district engineering staff's professional judgment based on the site review. District staff indicated there are a number of reasons this information could be incorrect, including rapidly changing road conditions, collection van errors, or certain pavement preservation treatments that are picked up as cracking in the system. The quality of this information is paramount to the accuracy of nomination and funding distribution decisions. Efficient nomination and distribution drives the overall performance of Montana's roadways.

Best Practices Require Annual Database Checks

The Federal Highway Administration (FHWA) provided a guidance document that describes best practices from other states for database checks. Other states take a sample of between 2 and 10 percent of the PvMS routes in the state and review them for accuracy. The annual review for accuracy is described as field checks to determine rating accuracy, review to determine segments are within a standard deviation from the previous year's readings, and reviews of all new construction segments to make sure data is reflecting the new construction. Federal policy also list data accuracy checks as appropriate types of control activities.

RECOMMENDATION #2

We recommend Department of Transportation develop and implement policy requiring an annual review process of Pavement Management System road segments to determine data accuracy.

Primary Highway System Distribution Processes Do Not Align With State Statute

In contrast to P3, state law outlines a process for distributing funding to the primary highway system that is not based on industry best practices. P3 is based on the concept of establishing funding levels for the interstate, national highway, and primary highway systems based on the distribution that will lead to the best anticipated future performance results, and historical distribution data. However, current statute describes a specific system for distribution on the primary highway system. This system is based on highway sufficiency (road condition) ratings developed by the department. Per state law, the Transportation Commission is tasked with determining a level of sufficiency considered adequate and a lesser level of sufficiency considered critical. Distributions to the districts are based off calculations of the mileage rated below adequate and below

critical sufficiency. Sufficiency determinations would be based on the quality of each roadway.

Current Statute for Primary Highway System Distributions Is Outdated

Current statutory language was added in 1983. The most recent distributions established by P3 were over \$100 million for 2022. The statutory system would not distribute the funding in the same percentages as P3. This affects which projects each district is able to do on their primary highway system, and the resulting system performance. Distribution based on statute could lead to funding distributions that would result in lower performance of Montana's primary highway system. Distribution decisions of that scale need to be determined by a process that is relevant based on today's standards. The P3 system that is currently used was adopted in 2009. MDT staff indicated this was in response to FHWA's move to performance-based asset management. In interviews with FHWA staff, they said they were in full support of P3 and believed it was a good system that aligned with current best practices. MDT has not pursued statutory change in the past to align statute with current distribution processes. In review of other states, they generally based their distributions on desired outcomes, or were in the process of switching to a system that aligned with the concept of P3.

RECOMMENDATION #3

We recommend the Department of Transportation pursue statutory change to align the statutory guidance for primary highway system funding distribution with current industry best practices.

Chapter IV – Construction Project Nomination

Introduction

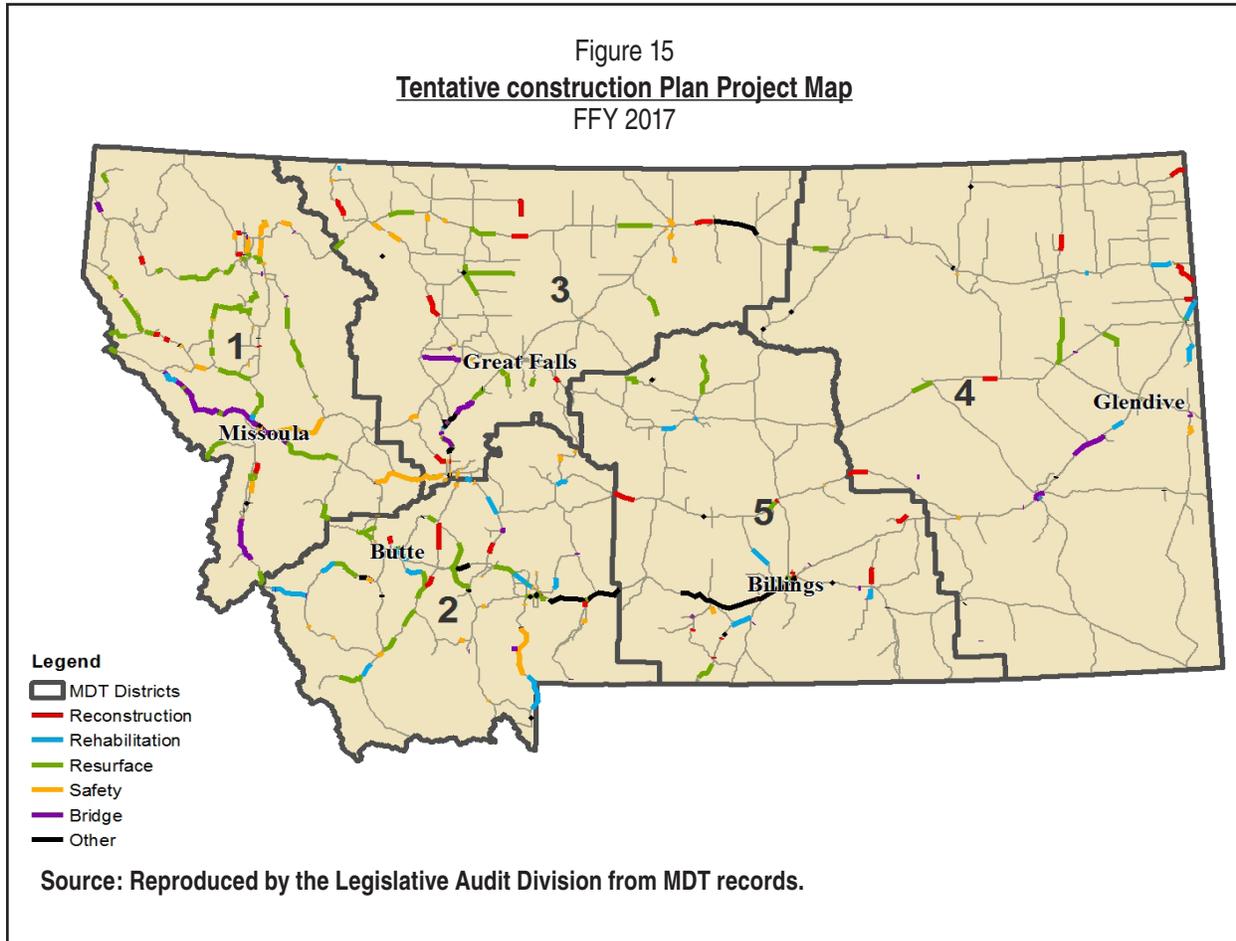
Construction project nomination determines how state and federal fuel tax dollars will be spent. As part of our third objective, we reviewed what processes are in place for nominating construction projects statewide consistently and according to best practices. Initial audit work identified a decentralized process to nominate construction projects taking place in each of the five districts. This level of decentralization led to concerns regarding the consistency of nomination decision-making processes in each of the districts. Review of the documentation associated with nomination decisions in each of the districts found there was no established process outlining the criteria that should be factored into nomination decisions, or documentation describing why the projects were nominated for construction over other possible options in the district. This made it unclear if the projects selected in the districts were the best possible choices for maximizing the overall performance of the road systems in the district. We reviewed the role of centralized Montana Department of Transportation (MDT) staff in ensuring consistency of nomination decisions and found there was no centralized review process examining why nominated projects were selected over other potential projects to ensure highest need projects were funded. This chapter provides information on how projects are nominated and presents findings and recommendations to improve support and consistency for nomination decisions.

District Nomination Processes

Staff in each of the department's five districts are responsible for the nomination of projects on the interstate, national highway, and primary highway systems (core systems). Nomination decisions can be made based on several factors, such as safety and public input. Nominated projects can range from minor treatments, such as overlays that resurface the pavement (called pavement preservation treatments), to complete reconstruction of the roadway (called capital construction). These projects commonly cost in the millions to tens of millions of dollars to complete. This limits the number of projects that can be done in the state each year. MDT estimates transportation needs in Montana are outpacing funding at a rate of 3:1, making proper nomination decision-making increasingly important. It is the responsibility of the districts to use any information available to them to nominate the best possible projects. However, we found district staff did not have a consistent process for determining which projects were nominated over other potential projects in the district.

Projects are nominated by the districts and sent to the Transportation Commission for prioritization. Projects prioritized by the Commission based on the district nomination are added to the Tentative Construction Plan (TCP). The TCP is a 5-year

management tool used by district staff to schedule when a project will be constructed. In federal fiscal year (FFY) 2017, TCP estimates showed MDT planned to spend over \$237 million on construction projects on the core systems in the five districts. The following figure shows the current projects in the TCP.



Projects in the TCP are separated into pavement preservation and capital construction projects. The sample of projects reviewed by audit staff included both pavement preservation and capital construction projects from FFY 2017 in the TCP. This was a sample of 25 projects, with 2 projects selected from each of the core systems in each of the districts. In some cases, a district did not have two projects scheduled in FFY 2017 on a core system. In these cases, all of the FFY 2017 projects were reviewed for that system. We conducted interviews with district staff to determine how the projects in our sample were nominated, and what each district's nomination process was. We also reviewed documentation in the project files for each of the projects in our sample to determine if documented support for nomination decisions is part of district business processes. The nomination decision-making process for pavement preservation and capital construction projects in the district was described fairly consistently in each of the districts as a meeting between district engineering and maintenance staff

discussing the needs in the district and deciding which projects need to be completed. This decision-making process was undocumented with little indication of exactly how various conditions and data related to a project compared to other potential projects in the district. As discussed below, the data and information used in nomination decisions in the districts had some constants, but it was unclear what emphasis should be placed on the possible criteria for nominating a project. District staff indicated the criteria used to nominate pavement preservation projects differs from capital construction projects due to the nature of the project's complexity.

Projects Are Nominated Based on Inconsistent Information

We found the districts have processes in place to nominate projects based on varying data and tools used to determine which roads are in the most need of improvement. We reviewed a sample of 25 projects from FFY 2017 in the TCP across the state to determine what information was used to make nomination decisions in each district. This sample included two projects on each of the core systems in each district when available. In some cases, districts had less than two projects on one of the systems in FFY 2017, so all FFY 2017 projects were reviewed on that system. We visited each of the five districts to conduct on-site review of district documentation related to the projects in our sample and to interview staff. Based on our review, information used for nomination differed between pavement preservation projects and capital construction. Districts considered some similar information used in nomination decisions, but often differed on what data and criteria should be considered. The following sections discuss the data used in district nomination decisions.

Pavement Preservation Nomination Data Used in Each District

District staff described some information that all districts used to make pavement preservation nomination decisions including:

- ◆ Pavement Management System Data (PvMS)
- ◆ Maintenance Work Schedules
- ◆ MDT Road Log
- ◆ Public Comment
- ◆ On-site Review

Pavement preservation nomination decisions are based primarily on the condition of the roadway. PvMS stores road condition data gathered by collection vans that drive all of the core system routes in the state. District staff said this information serves as a good starting point in determining which road segments to consider for nomination of a pavement preservation project, but cannot be used to make decisions exclusively.

The data is given to each of the districts in pavement condition and recommended treatment reports that contain the department route (road), section length, roadway width, district, maintenance division, and pavement condition data shown in the table below.

Table 2
PvMS Condition and Recommended Treatment Data Example

| Department Route | Beginning Mp | Ending Mp | Width | District | Maintenance Division | Ride | Rut | Alligator Cracking | Miscellaneous Cracking | 2017 Construction Recommendation |
|------------------|--------------|-----------|-------|----------|----------------------|------|------|--------------------|------------------------|----------------------------------|
| N-14 | 130.42 | 137.55 | 39 | 5 | 53 | 83.3 | 76.9 | 96.1 | 99.8 | Do Nothing |
| N-14 | 137.55 | 146.06 | 28 | 5 | 53 | 78.2 | 66.6 | 98.4 | 99.5 | Do Nothing |
| P-14 | 146.06 | 155.16 | 25 | 5 | 53 | 69.7 | 61.2 | 77.5 | 97.9 | C_AC Thin Overlay |
| P-14 | 155.16 | 160.46 | 24 | 5 | 53 | 81.7 | 68.6 | 97.5 | 99.1 | C_AC Crack Seal & Cover |
| P-14 | 160.46 | 167.44 | 22 | 5 | 53 | 68.7 | 61.1 | 94.7 | 98 | C_AC Thin Overlay |
| N-14 | 167.44 | 168.67 | 32 | 5 | 53 | 78.2 | 77.6 | 85.6 | 99.5 | C_AC Crack Seal & Cover |
| N-14 | 168.67 | 169.48 | 44 | 5 | 53 | 65.9 | 75.7 | 64.7 | 97 | C_AC Major Rehabilitation |
| P-14 | 169.48 | 181.5 | 28 | 5 | 53 | 75.2 | 71.2 | 97.3 | 98.3 | Do Nothing |
| P-14 | 181.5 | 189.4 | 28 | 5 | 53 | 76.5 | 72.2 | 98.1 | 98.6 | Do Nothing |
| P-14 | 189.4 | 195.9 | 28 | 5 | 53 | 80.1 | 85.1 | 93.5 | 99.3 | Do Nothing |
| P-14 | 195.9 | 206.7 | 30 | 5 | 53 | 76.6 | 76.3 | 93 | 99.6 | Do Nothing |
| P-14 | 206.7 | 217.15 | 21 | 5 | 53 | 68.5 | 68 | 90.8 | 97.4 | C_AC Thin Overlay |

Source: Compiled by the Legislative Audit Division from PvMS records.

As illustrated by the table, pavement condition data is presented in ride, rut, cracking, and recommended treatment. The ride measures the pavement's functional performance in terms of smoothness, and is used as an overall judgement of road quality. Rut is a measure of the rut depth in the roadway. Cracking identifies the level of alligator cracking (load associated cracking) and miscellaneous cracking (nonload associated cracking). Recommended treatments from PvMS are based on engineering logic that is built into the system. PvMS makes treatment type recommendations based on the road segment condition data in the system. District staff questioned the reliability of PvMS data in some cases such as rapidly changing road conditions, new construction, or data errors by the collection van. District engineers also use information provided by maintenance staff and their work schedules to determine what work the Maintenance Division has done. Districts did not describe a formal review of this information, but instead an informal check to ensure they did not duplicate efforts. Another tool for identifying potential pavement preservation projects is the road log, which provides information regarding when the road segment was constructed, when the last treatment on the road segment was done, and geometric information on the design of the road. District staff consistently went back to the importance of on-site observation of any segment that was being considered for nomination in order to confirm any information from PvMS or the other tools described above. These informational tools supplement engineering judgement based on observation and public comment provided by citizens.

Inconsistent Pavement Preservation Nomination Data

Districts varied in the other information they considered in the nomination of pavement preservation projects. The following is a list of different information that was used in the districts to inform nomination decisions according to staff interviews:

- ◆ Maps of individual road segments that included data on roadways that went beyond information in the road log.
- ◆ A spreadsheet with cost estimates and potential future projects.
- ◆ Information such as average daily traffic (ADT), Safety, and Crash Clusters when the district needed to separate two pavement preservation projects that have similar need. This information is typically reserved for capital construction nomination.
- ◆ A spreadsheet created by the district engineer in order to keep road information beyond what is in the road log, as well as their personal observations of the road segments. This district also indicated they use ADT information to nominate potential national highway project needs, while focusing on PvMS information on the interstate.
- ◆ ADT information to determine which roads will break up quicker because of heavier traffic flows, and thus need treatments sooner.
- ◆ In some cases little data was used to assist pavement preservation decisions outside of PvMS and undocumented observation of the roads.

These examples show a lack of uniformity in information districts are using to drive nomination decisions. The information districts consider was not documented as part of the project file for individual projects. District staff provided information on the sources of information described above, which they considered when making nomination decisions. However, they could not provide project specific documentation to show how this information was used to nominate the projects in our sample over other potential projects in their districts. This limited documentation created questions regarding how projects in the sample compared to other needs in the districts. Without that information, it cannot be determined that these projects will lead to the best possible future roadway condition.

Capital Construction Nomination Data Used in Each District

Documentation practices in the districts limited district staff's ability to explain what factors were used in the nomination of the projects in our sample over other potential projects in the district. However, like pavement preservation, districts had some similar factors they considered for the nomination of capital construction projects. They included the following:

- ◆ Roadway geometrics
- ◆ Road log
- ◆ ADT
- ◆ Safety information
- ◆ Corridor studies
- ◆ Public comment

Capital construction projects are on a much larger scale than pavement preservation work. These projects are rarely based on road condition factors alone. According to staff, capital construction projects often include other factors such as those listed above. Safety information is gathered by MDT to provide crash data on the roads in each district, and determine where future improvements are needed for crash prevention. Capacity information is typically gathered through studies that highlight areas that will experience roadway capacity issues in the future due to traffic and population growth. Roadway geometrics involve layout of the roads, and are often closely related to safety issues due to bad curves or line of sight issues. Another driver of capital construction projects is corridor studies. These studies are completed on a section of road prior to a treatment being done. The corridor study allows MDT to look at a project area, and determine possible solutions and alternatives for a project without committing itself to any specific work in that area. Since capital construction projects are on such a large scale, the investment necessary to complete them is often in the tens

of millions of dollars. Therefore it is important to determine those resources are spent on the most appropriate projects.

Inconsistent Capital Construction Nomination Data

While district staff considered some similar factors in their decisions, there were several key differences in the information the districts use to inform capital construction nomination decisions. In many cases the information was unique to special circumstances in the district. The wide variety of reasons that can drive a capital construction project makes the nomination processes different from pavement preservation. Unique information that drove district nomination includes the following:

- ◆ A spreadsheet that actively tracked all past pavement preservation needs where the condition of the road had gone past a pavement preservation project into a capital construction project.
- ◆ Traffic studies and environmental assessments that obligated the department to do many projects in the district.
- ◆ A scoring sheet for projects already in the TCP in order to determine which projects needed to be constructed first.
- ◆ District staff indicated that political and public pressure could influence decision making.
- ◆ A nomination matrix used when there are several projects that are of similar need. This allows MDT to justify how it nominated one project over another. Staff indicated this was only used in special circumstances when projects are very close in need.
- ◆ A major focus on safety. This district considered the safety implications in project selection to a greater extent than other districts.
- ◆ Several of the districts had a number of projects in the TCP, but not scheduled for construction in a specific year. District staff indicated this limited their ability to nominate projects, because MDT had already made a commitment to do those projects. However, with projects that have been in the TCP for many years, priority needs may have changed over time.

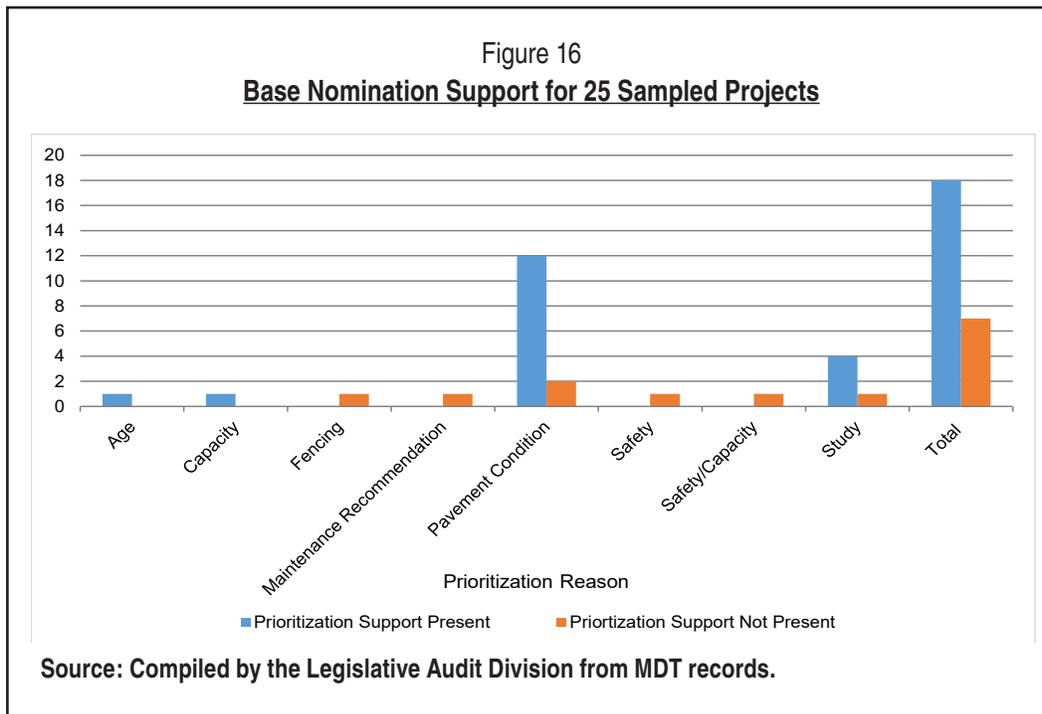
For pavement preservation and capital construction there are sources of best practices in individual districts that could be standardized in all districts. This could include the project rating system or the informational spreadsheets described above. This would help create consistency in what information is used in nomination decisions across the state.

CONCLUSION

MDT does not have a consistent statewide process in place for nominating construction projects based on established criteria. This can result in an inability to support nomination decisions.

TCP Project Sample Review Showed Inconsistent Nomination

During review of the project sample from the TCP, we determined that documentation was not included with each project to support why projects in our sample were nominated over other potential projects in the district. This led us to review if there was support for the main reason projects in our sample were nominated according to district staff. This included reasons such as corridor studies, pavement condition, or capacity issues. This review did not consider how the projects in our sample compared to other potential projects in the district. It only determined if documentation existed to support the main reason MDT gave for the nomination of the projects in our sample. The following figure shows the reasons district staff gave for nominating each of the projects in our sample, and whether or not documentation was present that verified the reason for nomination (i.e., If a project in our sample was prioritized based on a corridor study, there was a corridor study that recommended that project.).



As illustrated by the figure, 7 of the 25 projects in our sample did not have basic support for why the project was nominated, even without consideration of other potential projects in the district. There was no common road system, reason for nomination, or district that could be linked to the projects that lacked supporting documentation. The following are examples of issues that led us to determine there was inconsistent support for the nomination decisions:

- ◆ A national highway reconstruction project was nominated due to safety and increased traffic flow issues. Documentation could not be produced to support this claim. District staff indicated this might be due to this project being nominated a long time ago. However, the project was constructed in 2017.
- ◆ A turning lane on a national highway route was nominated due to a corridor study. After reviewing the corridor study, there was no recommendation for a turning lane in this area. Staff indicated a resident that lived along the roadway requested a turning lane in this area.
- ◆ A project was nominated on the national highway due to road condition. Staff indicated this was the worst road conditions on the national highway system in their district. The PvMS data did not back up this assertion, and personal observations from district staff of the conditions were not available due to lack of documentation.
- ◆ A project was nominated based on safety concerns related to an overpass. Documentation indicated that a de-icing system had been put in place to mitigate the problem. However, a new overpass started construction in 2017 without information regarding the effectiveness of the de-icing system.

Inconsistent Process Could Lead to Inefficient Project Nomination

Our review of base project nomination documentation allowed us to present information on the support for nomination decisions made in the district. Again, this was without consideration of other potential projects in the districts. The projects in our sample had significant costs for construction. The cost of our sampled projects was over \$168 million based on TCP construction cost estimates. The seven projects for which we could not find documented nomination support had an estimated cost of over \$47 million. This highlights the importance of having a consistent process for making and supporting nomination decisions.

Nomination decisions justify major expenditures. While there were mixed results, the fact that nomination decision processes are not documented at the district level creates concern regarding whether the projects selected were the most efficient choices. MDT staff consistently conveyed the importance of having district engineering staff making nomination decisions due to their knowledge of their districts. However, without

support for these decisions, this could lead to a lack of public and stakeholder trust that public tax dollars are being spent in the most efficient manner.

No Established Criteria for District Nomination Decisions

Our review of MDT and district policy found there was no policy providing guidance on what information should be considered when projects are nominated at the district level. Earlier in this chapter there was discussion regarding the information that district staff described as influencing nomination decisions. It was clear this information should be considered when determining which projects to move forward toward construction. However, there is no indication of how these various factors should be weighed when making nomination decisions. Safety, road condition, public pressure, etc., can all be factors in several potential projects in a district. There is no current guidance on how to weigh these factors in the decision-making process, or if each should be considered equally. Furthermore, policy does not lay out a system for potential projects to be evaluated against the many needs on each system in each district. District staff often commented they have considerably more need in their districts than resources. This increases the importance of guidance providing district staff information regarding how the many potential projects should be nominated and compared to each other.

Other States Have Defined Nomination Processes

As part of our work, we reviewed how other states nominate projects. Other states generally had more defined systems in place for making nomination decisions. For example, Utah had a scoring system in place for project nomination based on weighting factors that affect the selection of a project for construction. These factors included average daily traffic, safety, and benefit cost ratios for each potential project. Each factor had a different level of importance based on the specific situations surrounding the potential projects. MDT staff expressed concern regarding a rigid system for nomination, citing unique environmental and political conditions in the different districts across the state. Any system put in place would have to be cognizant of those concerns. However, even in cases where the top-rated project is not nominated due to a unique circumstance, a structured system provides an opportunity to justify those decisions to stakeholders. Alberta also explained having a scoring system in place for making nomination decisions. They also had a Rationalization Optimization Decision Application that used pavement management system data and conducted benefit cost ratios of potential treatments. This benefit cost ratio included consideration of public user costs such as vehicle operation (fuel, oil, tire, maintenance), value of time, and safety costs. A structured system for nomination would give district staff more guidance regarding what information should be considered in prioritization decisions and how that information should be weighed against each other. This would provide stakeholders with clear information regarding why nominated projects were selected

over other potential projects in the district, creating greater transparency in the project selection process.

RECOMMENDATION #4

We recommend the Department of Transportation develop and implement policy establishing:

- A. Criteria upon which project construction nomination decisions should be based,*
 - B. How nomination criteria should be applied to potential projects, and*
 - C. Required documented support of nomination decisions.*
-

Lack of Centralized Review Has Contributed to Nomination Inconsistency

We reviewed the current role of MDT staff in Helena and determined a lack of centralized review for nomination decisions contributed to the inconsistency found in the districts. Although nomination decisions are made at the district level, they are all nominated to MDT Planning Division prior to Transportation Commission prioritization and inclusion in the TCP. Review of the nomination process for the projects in our sample determined that MDT Planning Division's current role is to determine that projects nominated by the districts fit the funding types and funding scenarios established by the Performance Programming Process. The current process does not include a review of why nominated projects are selected over other projects in the districts. The districts do not provide information with their project nomination regarding how the project compared to the other needs in the district. This information will be provided by the districts' descriptions of why their nominated projects were needed for construction based on the criteria established by the department. MDT staff described the need for nomination decisions to be made by district staff most familiar with the district's needs. However, MDT lists statewide road system performance consistency as one of their goals in the TranPlanMT. TranPlanMT is a federally required document that documents MDT's road system performance goals.

Project nominations are also submitted to the Transportation Commission for approval. The Transportation Commission is an appointed board charged with the prioritization of projects for construction. However, MDT Planning Division staff possess the expertise for a meaningful review prior to the submission to the Transportation

Commission. This would provide the Transportation Commission more information when making its final decisions to support or deny projects nominated by the districts.

No Established Nomination Criteria Limits MDT's Ability to Conduct Centralized Review

Lack of policy creating a structured nomination process has limited the ability to create a meaningful centralized review of all nominated projects from the districts. There are currently no standards to determine what proper justification of district nomination would consist of. Due to the lack of policy, the districts do not have documentation of nomination decisions as part of their current business practices. Without documentation supporting what criteria were considered to justify the nomination of a project, it is not possible to determine if the project nomination decision was correct. Once expectations are established for project nomination this will create an opportunity for a meaningful centralized review that will serve as a check on district nomination decisions and help create consistency across the districts.

Other States Have Centralized Review of Nomination Decisions

It is common practice in other states to have a centralized nomination meeting as part of the state department of transportation's nomination process to ensure consistent application of their established nomination criteria. This helps to ensure there is a consistent understanding on a statewide level of what factors are most important when considering potential projects for construction. Centralized review provides a meaningful check to determine if districts are making effective project choices for the overall performance of the system. For example, Utah has a central planning group that meets to review and gain a consensus on all capital construction projects. Other states reviewed also had a centralized nomination decision-making process, where determinations were made regarding what projects would be moved forward for construction. A centralized review process would maintain the current structure of nomination decisions being made in the districts, while allowing for greater consistency. It would also assure nomination decisions were being made for the benefit of the state road systems as a whole.

RECOMMENDATION #5

We recommend the Department of Transportation develop and implement policy requiring a centralized review of project construction nomination decisions made at the district level to ensure consistency in the nomination of pavement preservation and capital construction projects.

MONTANA DEPARTMENT
OF TRANSPORTATION

DEPARTMENT RESPONSE

**Montana Department of Transportation**

2701 Prospect
PO Box 201001
Helena MT 59620-1001

Michael T. Tooley, Director

Steve Bullock, Governor

RECEIVED

JUN 13 2018

LEGISLATIVE AUDIT DIV.

June 11, 2018

Angus Maciver, Legislative Auditor
Legislative Audit Division
State Capitol Rm 160
PO Box 201705
Helena, MT 59620-1705

Subject: Funding Montana's Highway Infrastructure Audit Report

Dear Mr. Maciver:

We appreciate the opportunity to respond to the audit recommendations in the Funding Montana's Highway Infrastructure Audit Report (17P-06). We have attached our response, including the timeline for implementing the recommendations.

We appreciate your staff's hard work and professionalism during the audit. MDT is committed to complying with state and federal laws, implementing and monitoring effective internal controls, and maintaining the transportation system. MDT views the audit process as an opportunity for improvement and appreciates your input. We look forward to working with your office in the future.

Sincerely,

Mike Tooley
Director

Attachment



**Corrective Action Plan
Funding Montana's Highway Infrastructure (17P-06)**

| Audit Recommendation # | Management View | Corrective Action Plan | Responsible Area | Initial Target Date |
|---|------------------------|---|---|---|
| <p>RECOMMENDATION #1 We recommend the Department of Transportation create and implement procedure that includes: A - Defining roles and level of involvement for MDT staff responsible for the Performance Programming Process. B - Outlining decision making processes for determining inputs into the Pavement Management System that influences funding distributions, and C - Formalizing business processes for the entire Performance Programming Process.</p> | <p>Concur</p> | <p>MDT will document the procedures involved in the P3 process. We will identify the various roles within the process and the steps that need to be performed. MDT will add a training requirement to the MDT training policy for all staff associated with the P3 process, to attend P3 training every 2 years to ensure they are familiar with the entire process.</p> | <p>Transportation Planning Transportation Planning</p> | <p>June 30, 2019 June 30, 2019</p> |
| <p>Recommendation #2 We recommend MDT develop and implement policy requiring an annual review process of Pavement Management System road segments to determine accuracy.</p> | <p>Concur</p> | <p>MDT hired a consultant to assist us in identifying known issues with the cracking algorithm. MDT will formalize a process for reviewing system data and documenting disagreements so this information can be reviewed annually to determine if adjustments need to be made or addressed.</p> | <p>Engineering Division Engineering Division</p> | <p>December 31, 2018 June 30, 2019</p> |
| <p>Recommendation #3 We recommend the Department of Transportation pursue statutory change to adjust the statutory guidance for primary road funding distribution with current industry best practices.</p> | <p>Concur</p> | <p>MDT will seek legislation during the 2019 Legislative Session to update the MCA.</p> | <p>Director's Office</p> | <p>April 30, 2019</p> |



**Corrective Action Plan
Funding Montana's Highway Infrastructure (17P-06)**

| Audit Recommendation # | Management View | Corrective Action Plan | Responsible Area | Initial Target Date |
|--|-----------------|---|--|--------------------------|
| <p>Recommendation #4 We recommend the Department of Transportation develop and implement policy establishing: A - Criteria upon which project construction nomination decisions should be based, B - How nomination criteria should be applied to potential projects, and C - Required documented support for nomination decisions.</p> | <p>Concur</p> | <p>MDT will develop a form that will identify the various criteria that should be used in the decision making process. This form will be used during the nomination process to ensure the decision process is documented for each project that is sent to the commission for prioritization and approval.</p> | <p>Transportation Planning Director's Office District Administrators</p> | <p>December 31, 2018</p> |
| <p>Recommendation #5 We recommend the Department of Transportation develop and implement policy requiring a centralized review of project construction nomination decisions made at the district level to ensure consistency in the nomination of pavement preservation and capital construction projects.</p> | <p>Concur</p> | <p>MDT will develop a process to review the forms submitted by each district to ensure the documentation is consistent and meets the requirements for pavement preservation or capital construction projects.</p> | <p>Transportation Planning Director's Office</p> | <p>December 31, 2018</p> |