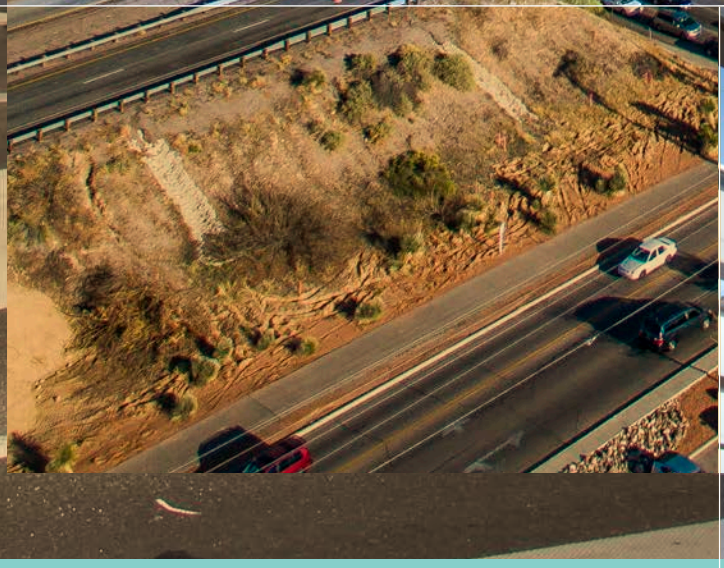
April 2018

New Mexico Department of Transportation

Delivering Asset Performance



Transportation Asset Management Plan

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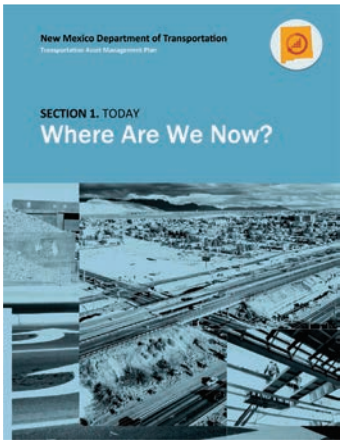
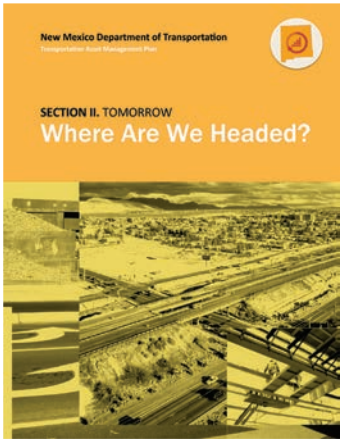


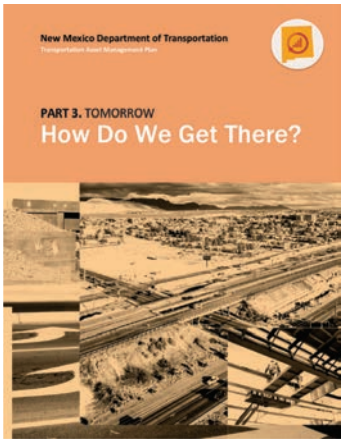
Section I

Today: Where Are We Now? This section provides a snapshot view of NMDOT's major infrastructure assets today – inventory, condition, and financial value.



Section II

Tomorrow: Where Are We Headed? This section looks at the future of NMDOT's pavement and bridge assets. It presents ten-year projections of asset condition.



Section III

Tomorrow: How Do We Get There? This section describes a set of initiatives planned or underway at NMDOT to improve asset management business practices.

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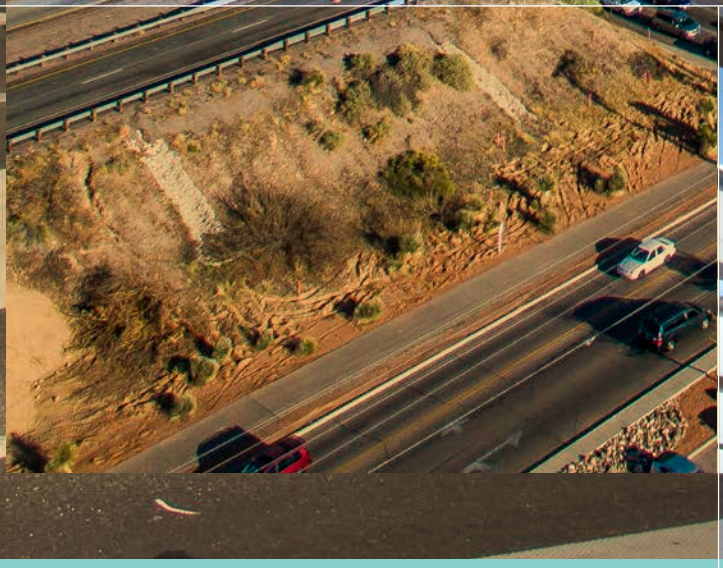


Transportation Asset Management Plan

Executive Summary

NEW MEXICO TRANSPORTATION NETWORK AT A GLANCE

25,062

Highway Lane Miles
Owned by NMDOT

2,978

Bridges
Owned by NMDOT

NEW MEXICO DOT VISION

NMDOT STRIVES TO CREATE A SAFE AND SUSTAINABLE MULTIMODAL TRANSPORTATION SYSTEM THAT SUPPORTS A ROBUST ECONOMY, FOSTERS HEALTHY COMMUNITIES, PROTECTS THE ENVIRONMENT, AND PRESERVES THE STATE'S UNIQUE CULTURAL HERITAGE.

ASSET MANAGEMENT : A strategic and systematic process of operating, maintaining, and improving physical assets effectively throughout their life cycles. Asset management involves moving beyond reactive repairs to a proactive approach that anticipates costs and maximizes investments.

NEW MEXICO DOT
DELIVERING ASSET PERFORMANCE

New Mexico's Transportation Asset Management Plan (TAMP) establishes the condition of highway and bridge assets across the state and provides a strategy for efficiently maintaining these assets in good condition over the long term. This document provides an introduction to the key elements of the TAMP.

Transportation Asset Management (TAM) utilizes business, economic, and engineering practices to help guide data-driven decisions for resource allocation and project selection.

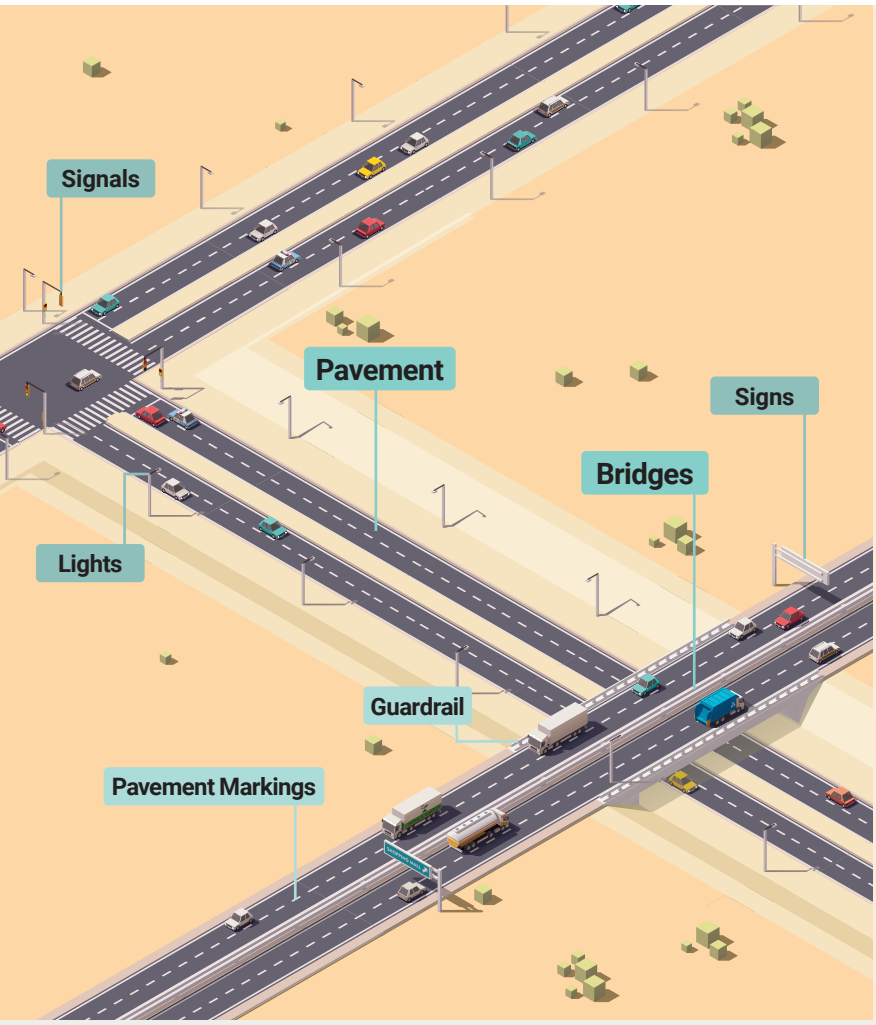
For New Mexico DOT (NMDOT), TAM ensures better operation, increased maintenance, and overall improvement of physical assets trough a process of continuous improvement – for example by better locating and understanding performance gaps, prioritizing and programming asset needs, and streamlining business processes.

In practice, these capabilities allow NMDOT to identify and execute the right projects in the right locations at the right time. Today these capabilities are more critical than ever before, as the agency seeks to maximize the use of limited public resources and strengthen the state's transportation infrastructure.

Together with the right investment levels to maintain and improve bridge and pavement conditions, TAM helps ensure a healthy transportation system that supports the mobility, safety, and economic development of New Mexico and of all New Mexicans.

New Mexico's TAMP complies with the Federal Highway Administration's requirements for National Highway System (NHS) TAMPs. It is also a living document that will be reviewed and updated regularly.

ROADWAY ASSETS: This plan reports on NMDOT's pavement and bridge assets, which together comprise the most significant share of the infrastructure assets managed by the agency. The illustration shows some of the wide variety of roadway assets maintained by NMDOT.



BUILDING A STRONG FOUNDATION

A healthy transportation system is critical to forging a strong economy and improving the quality of life in New Mexico. The transportation system managed by NMDOT connects people to jobs, schools, healthcare, recreation and their communities, as well as to the rest of the world.

WHERE ARE WE TODAY?

New Mexico's economy has strong ties to its transportation assets. It is crucial that all assets are well-maintained and the agency receives funds to meet all improvement needs.

Utilization of New Mexico's transportation assets is increasing.

Vehicle miles traveled in New Mexico is expected to increase to 33.3B miles annually by 2030. With this increase in usage, pavement condition needs to be monitored and maintained to ensure safe and efficient travel throughout the state.

Continued urbanization poses a challenge for asset management.

Assets in urban environments are experiencing increased use, and thus increased deterioration. As a result, assets in rural areas are not receiving the maintenance funds necessary to preserve good conditions. New Mexico needs a plan to balance the infrastructure demands of urban growth while also providing support for its rural communities.

Freight traffic is growing.

New Mexico is quickly growing as an important entry point for Mexican goods. There are currently two border crossings that support commercial traffic and the state must ensure that their assets can support the continued increase in freight traffic moving forward.

Tourism is one of New Mexico's largest industries.

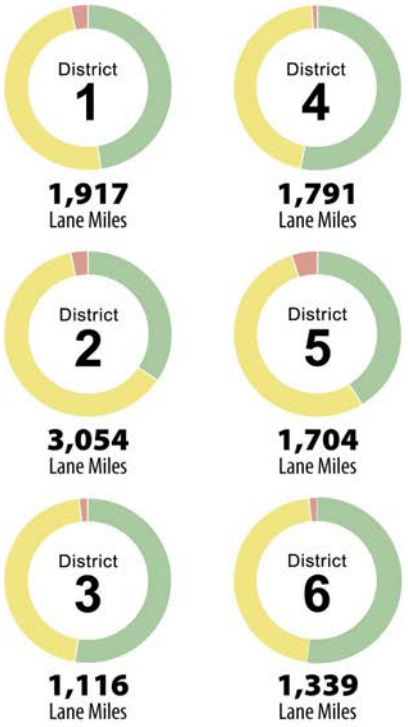
Over 30 million people come to New Mexico every year to visit national parks, forests, historical sites, and to attend festivals, sporting events, and Native American events. Tourism in New Mexico is growing 20% above the national average and with this growth comes an increase in tourism-related jobs. New Mexico must continue to maintain its transportation assets in order to support the travel of its residents and the visitors that come to enjoy all the state has to offer.

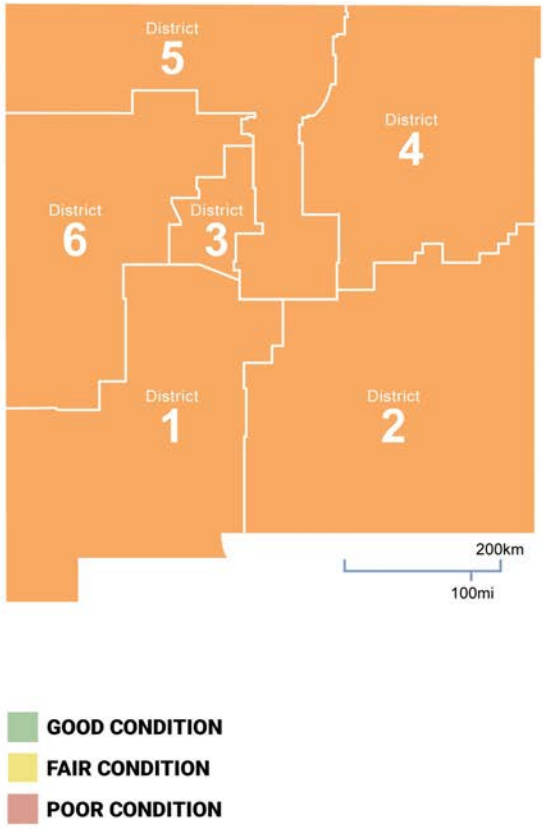
PAVEMENT AND BRIDGE ASSETS ON THE NHS

CURRENT CONDITION BY DISTRICT

NHS PAVEMENT

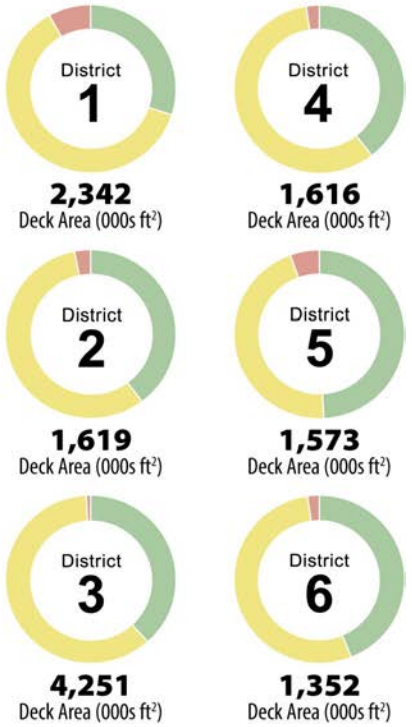
Condition and total NMDOT-owned lane miles by district.





NHS BRIDGES

Condition and total NMDOT-owned bridge deck area by district



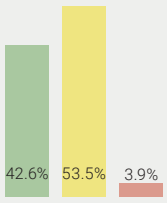
Pavement condition is measured on a scale from 1 (worst) to 100 (best). These ratings are used to establish whether a section of pavement is in good, fair or poor condition. Pavement in good condition is smooth and free from ruts and cracks.

TOTAL NHS LANE MILES

11,743

There are over 30,000 lane miles of pavement in New Mexico. Of this total, 11,743 are on the NHS.

Statewide percentage of good/fair/poor NHS pavement lane miles.



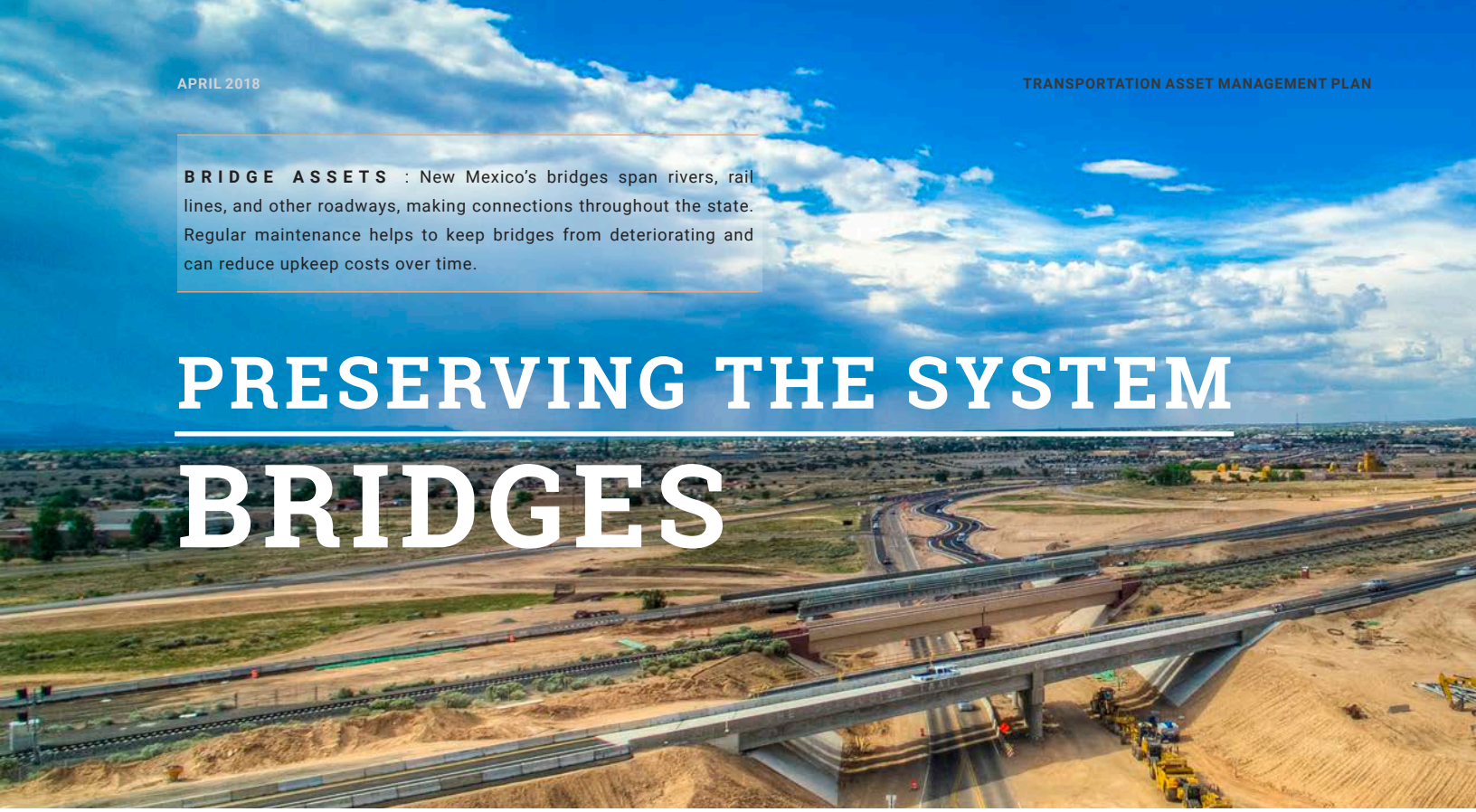
Bridge condition is measured on a scale from 0 (worst condition) to 9 (best condition). These ratings are used to establish whether a bridge is in good, fair or poor condition. A bridge in good condition is free from corrosion and rust.

TOTAL NHS BRIDGES

1,750

There are nearly 4,000 bridges in New Mexico. Of these, 1,750 are on the NHS.

Statewide percentage of good/fair/poor NHS bridges by deck area.



BRIDGE ASSETS : New Mexico's bridges span rivers, rail lines, and other roadways, making connections throughout the state. Regular maintenance helps to keep bridges from deteriorating and can reduce upkeep costs over time.

PRESERVING THE SYSTEM

BRIDGES

MAKING THE INVESTMENT

Bridges provide road network connectivity, spanning water bodies and other natural features, rail lines, and other roadways. New Mexico's bridge inventory includes a number of landmark structures, such as the Rio Grande Gorge Bridge on Highway 64, as well as many smaller structures such as overpasses on the Interstate system.

New bridges are designed to last at least 75 years, and in practice, many bridges remain in service for much longer. However, bridges require periodic maintenance to replace individual components (such as decks) that have a shorter life than the bridge as a whole. If maintenance work on a bridge is deferred, the deterioration may accelerate to the point where more costly repairs are needed. In extreme cases deteriorated conditions may require restricting the loads the bridge can carry or closing the bridge until needed repairs are complete – which can mean costly detours for road users. Thus, it is in NMDOT's interest to maintain bridges in good condition as it can result in the lowest long-term costs both to NMDOT and road users.

DELIVERING RESULTS

Bridges have a finite lifespan and deteriorate over time. However, preventative maintenance strategies can greatly extend the life of a bridge and keep it in good condition. Sweeping and washing a bridge on a yearly basis, as well as painting and deck patching, are cost-effective ways to maintain a bridge in its current condition.

NMDOT chooses which treatment to apply to a bridge based on its condition. Basic maintenance is feasible for a bridge with a deck condition of 5 or 6 out of 9. Rehabilitation is feasible for a bridge with a deck condition of 4. Replacement is required for a bridge with a deck condition lower than 4.

Bridges in poor condition require more drastic rehabilitation and replacement efforts that are costly to implement. A major challenge in addressing the overall condition of the state's bridges is how to prioritize the major repairs required for the bridges in poor condition with the ongoing preventative maintenance activities for other bridges.

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MAINTAINING THE SYSTEM

Two different funding scenarios forecast bridge conditions over the next ten years. $24.5M per year is the minimum needed to keep the portion of NHS bridges in poor condition from exceeding 10% in 10 years. Alternatively, if $40M per year were invested in NHS bridges over 10 years, bridges in poor condition could be held to 5%.

$24.5M

PLANNING FOR TOMORROW

A bridge in poor condition is also considered structurally deficient (SD). Over the past 10 years, New Mexico has made significant progress in reducing the number of structurally deficient, or poor condition, bridges. The percentage of total bridge deck area that is structurally deficient has decreased from 16% in 2004 to 5% in 2016. It is important to note that while a bridge may be classified as SD, this does not mean that the bridge is unsafe. Rather, it means deficiencies have been identified that require maintenance, rehabilitation or replacement.

NMDOT's practices contributing to improvement in bridge conditions include:

- Steady investments in bridge replacement and rehabilitation
- Performing work on bridges in fair condition to prevent them from becoming structurally deficient
- Creating a preventative maintenance program with dedicated funding

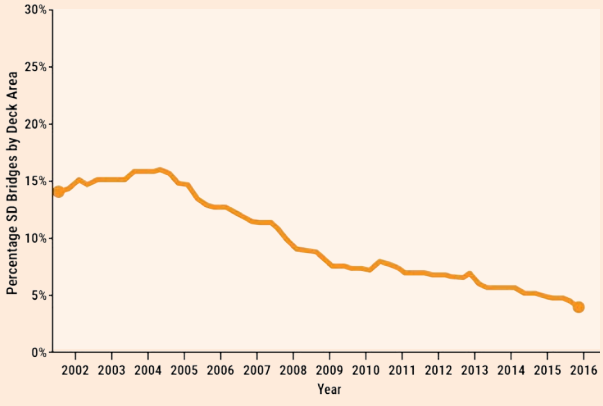
FUNDING SCENARIOS FOR NHS BRIDGES

A $40M AVERAGE ANNUAL INVESTMENT WOULD REDUCE BRIDGES IN POOR CONDITION BY AN ADDITIONAL 5%

NHS BRIDGES

	2026		
	GOOD	FAIR	POOR
$40M AVERAGE ANNUAL INVESTMENT	26%	69%	5%
$24.5M AVERAGE ANNUAL INVESTMENT	19%	71%	10%
IMPACT OF ADDED INVESTMENT	+7%	-2%	-5%

Decline In Percentage of NMDOT Bridge Deck Area Classified as Structurally Deficient



PAVEMENT ASSETS : Well-maintained roads keep traffic flowing, reducing the cost and delays associated with poor quality pavement.

PRESERVING THE SYSTEM

ROADS

MAKING THE INVESTMENT

Roads get people where they need to go. They connect people in New Mexico to jobs, schools, healthcare, and recreation. They unite our communities, and also promote connections beyond. Businesses depend on the road network to move goods and deliver services.

Over time, pavement breaks down due to factors such as weather and traffic, which directly impacts drivers. Pavements in poor condition are rough and bumpy and show ruts and cracks. These roads offer an uncomfortable driving experience and contribute to increased wear and tear on vehicles. Severe deterioration can even increase risks to travelers' safety.

Delays and inefficiencies in the network can also be heightened by poor pavement conditions. Drivers face increased maintenance costs on their vehicles and they can spend more time in congested conditions. Businesses that depend on roads for shipping can see increased costs as well.

Pavement in good condition provides a smooth and comfortable driving experience. Instead of increasing costs and delays, pavement in good condition can help eliminate inefficiencies and improve consistency in journey time.

DELIVERING RESULTS

Highway pavements are designed to support anticipated traffic loads and provide a safe and relatively smooth driving surface. Most of the state highway system pavement is classified as "flexible" – hot mix asphalt or other bituminous-treated surface over a subgrade. A small portion of the inventory is "rigid" – constructed from concrete with no asphalt overlay. Pavement life varies based on a variety of design properties, construction practices, the traffic loads to which the pavement is subjected, and environmental conditions such as freeze-thaw cycles.

While flexible and rigid pavements deteriorate differently, in general pavements become rougher with age and exhibit cracking and other signs of distress. Flexible pavements may develop ruts. Keeping pavements in good condition lengthens their life, enhances safety, and helps reduce road users' operating costs. Numerous studies have shown that rough roads cause more wear and tear on vehicles and may result in decreased vehicle speeds.

MAINTAINING THE SYSTEM

In order to maintain the good sections of NHS at current conditions, $62M per year for Interstate pavements and $68M per year for non-Interstate NHS pavements (for a total of $130M per year) is needed.

PLANNING FOR TOMORROW

If funding on the NHS were $81.5M per year for Interstate pavements and $212.5M per year for non-Interstate NHS pavements (for a total of $294M per year), conditions would improve. At this level of investment, pavements on the non-Interstate NHS in good condition would increase 20%, and pavements in poor condition would drop 13% relative to expected performance at current investment levels.

To put these numbers in context, the replacement value of NMDOT's NHS pavements is estimated at over $10.8B.

FUNDING SCENARIOS FOR NHS PAVEMENTS

A $294M AVERAGE ANNUAL INVESTMENT WOULD REDUCE INTERSTATE PAVEMENTS IN POOR CONDITION BY AN ADDITIONAL 6% AND NON-INTERSTATE NHS PAVEMENTS BY 13%

INTERSTATE PAVEMENTS

	2026		
	GOOD	FAIR	POOR
$81.5M AVERAGE ANNUAL INVESTMENT	51%	47%	2%
$62M AVERAGE ANNUAL INVESTMENT	60%	32%	8%
IMPACT OF ADDED INVESTMENT	-9%	+15%	-6%

NON-INTERSTATE NHS PAVEMENTS

	2026		
	GOOD	FAIR	POOR
$212.5M AVERAGE ANNUAL INVESTMENT	54%	42%	4%
$68M AVERAGE ANNUAL INVESTMENT	34%	49%	17%
IMPACT OF ADDED INVESTMENT	+20%	-7%	-13%

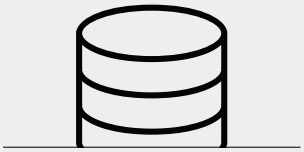
TAM PROCESS : Asset management is an ever-improving process. Modifying and streamlining the process over time produces efficiencies and better results.

IMPLEMENTATION MISSION

PRIORITIES

In December 2015, the TAM Working Group and representatives in several NMDOT districts participated in a series of workshops, helping tell the department's TAM story. Staff underscored the prominence of the state's bridges and highways in the TAMP. Additionally, six priority action items were developed in order to guide the next phase of asset management in New Mexico.

BETTER DATA



STRENGTHEN DATA GOVERNANCE

Clarify roles to ensure data quality.

IMPROVE DATA AND MAPPING

Maintain a web-centric TAMP integrated with asset management systems.

STRONGER PROCESSES

STREAMLINE PROCESSES

Streamline business processes to facilitate coordination and track progress on project delivery.

LINK PLANS

Develop a Program Management Plan linking a long range plan to capital programs and budgets.

LOWER RISK

ENHANCE ASSET MODELS

Improve asset models to better predict asset deterioration and risk.

MITIGATE RISKS

Quantify risk in a risk register that can help inform project prioritization.

TAM IN ACTION

Effective Transportation Asset Management can reduce the cost and frequency of major re-construction activities by setting a regular maintenance schedule over the lifetime of an asset. Regular maintenance can reduce the expense of major reconstruction and the inconvenience to the public. By projecting asset conditions into the future, NMDOT can optimize limited funding by prioritizing the most cost-effective maintenance treatments.

MAXIMIZING THE IMPACT OF TRANSPORTATION INVESTMENT

The implementation of these six strategic priorities will ensure that scarce public resources will be used with maximum efficiency and effectiveness. Each initiative has identified champions, key objectives, and a target completion date for the initial set of activities. Each initiative has also been categorized by the level of progress made towards it using a crawl/walk/run designation, where early-stage initiatives are a crawl, mid-stage initiatives are a walk, and well-developed initiatives are a run. These categorizations allow for easy identification of progress towards implementing NMDOT's strategic priorities.

TAM FRAMEWORK AND LEADERSHIP

To ensure a successful TAM program, the TAMP building process has included a focus on NMDOT's leadership structure and organizational framework as well as the alignment of these components needed to define improved business processes and guide the change that is inherent in the TAMP development and implementation process. Leadership for TAM at NMDOT is guided by a TAM Executive Steering Committee, led by a TAM champion. Primary stakeholders included in TAM oversight are designed to be broad and inclusive across departments, with participation from planning, programs, asset management, engineering, operations, and districts.

NEW MEXICO'S TRANSPORTATION ASSET MANAGEMENT PLAN

NMDOT's TAMP establishes the current condition of the highway and bridge assets in the state and provides a strategy for maintaining these assets in a state of good repair. The TAMP specifically addresses NMDOT's plan to achieve the performance goals set forth in recent federal legislation.

This executive-level report outlines the key elements of the plan, describes the investments needed to reach performance targets, and highlights the top priorities on the path to implementation. Once complete the three volumes of the TAMP will published online at: http://dot.state.nm.us.

Section I. Today: Where Are We Now? This section provides a snapshot view of NMDOTs major infrastructure assets today – inventory, condition and financial value.

Section II. Tomorrow: Where Are We Headed? This section looks at the future of NMDOTs pavement and bridge assets. It presents ten-year projections of asset condition.

Section III. Tomorrow: How Do We Get There? This section describes a set of initiatives planned or underway at NMDOT to improve asset management business practices.

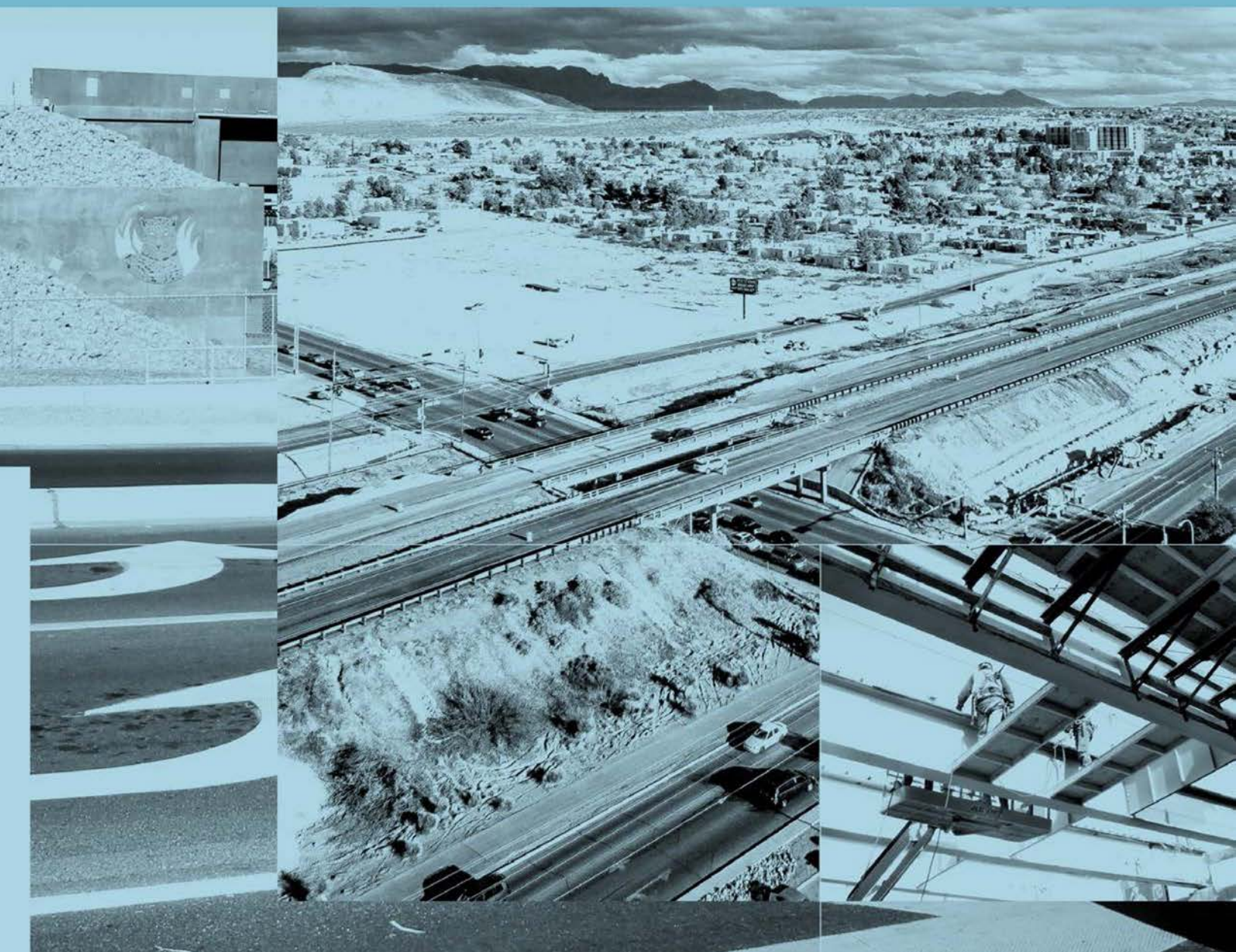
ON THE COVER: The original **Missouri Avenue Bridge** was built in 1968. By 2014 it was in need of repair. The reconstruction, completed in 2016, included widened bridges, improved embankments, and colorful artwork celebrating the Organ Mountains, Desert Peaks National Monument and the restoration of habitats for endangered species such as the American Jaguar.

New Mexico Department of Transportation

Transportation Asset Management Plan

SECTION I. TODAY

Where Are We Now?



Section I of the transportation asset management plan (TAMP) describes the context and current condition of New Mexico's transportation assets. Chapter 1 is an introduction to the TAMP document and an overview of how the content is organized. Chapter 2 provides a description of the context for the TAMP including the TAM vision, goals, and mission. A key component of this section is the presentation of the current inventories and condition for pavements and bridges both for the National Highway System (NHS) and for the state-owned assets. Chapter 3 includes two different methodologies for asset valuations – replacement value and depreciated value.

Section I Contents:

Chapter 1: Introduction

A healthy transportation system is essential in forging a strong economy and improving the quality of life in New Mexico. The transportation system managed by the New Mexico Department of Transportation (NMDOT) connects people to jobs, schools, healthcare, recreation and their communities, as well as to the rest of the world. NMDOT is responsible for operating, managing, maintaining and improving this transportation system to provide safe and convenient travel for citizens, visitors and carriers.

Maintenance and preservation of infrastructure is a critical aspect of NMDOT's responsibilities. Infrastructure requires continual investment to remain in a safe and serviceable condition. Deferring investments for infrastructure preservation can result in higher long-term costs for repair and rehabilitation and can mean added costs and delays for travelers due to poor pavement conditions and posted bridges. Realities of limited funding mean that NMDOT must balance multiple competing needs for infrastructure preservation and system improvement and ensure that available dollars are invested in the most effective way possible. To this end, NMDOT uses Transportation Asset Management (TAM), a strategic and systematic process of operating, maintaining, and improving physical assets effectively throughout their life cycles. Figure I-1 illustrates the different elements of a transportation asset management program.

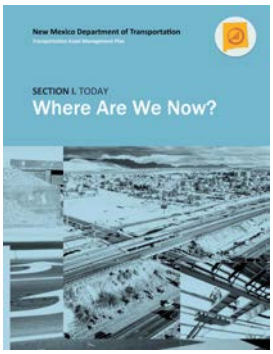
Figure I-1 Asset Management Elements

This Transportation Asset Management Plan (TAMP) describes how NMDOT intends to maintain its major infrastructure assets in a state of good repair. It describes the current state of the assets, projects future asset conditions and expenditures, and provides a roadmap for making continued improvements to NMDOT's asset management business processes and capabilities. The Plan presents measurable objectives and concrete strategies for maximizing the benefit of New Mexico's investments in its transportation infrastructure assets.

The TAMP is a living document prepared by NMDOT's Asset Management & Planning Division. It will be reviewed and updated regularly.

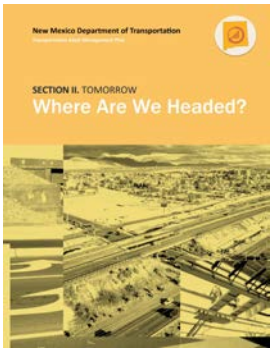
Overview of the TAMP

The plan is organized into three sections, detailed below.



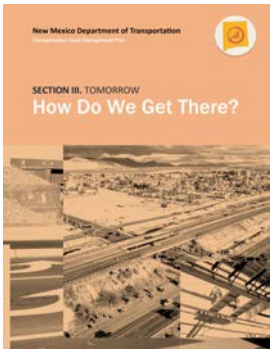
Section I. Today: Where Are We Now? This section provides a current snapshot of NMDOT's major infrastructure assets – inventory, condition and financial value. It includes three chapters:

- **Chapter 1: Introduction** – discusses the scope of the TAMP, the reasons it was created and how the TAMP fits with other NMDOT plans.
- **Chapter 2: Maintaining Our System** – describes New Mexico's current pavement and bridge asset inventory and looks at trends in asset condition and performance.
- **Chapter 3: Asset Valuation** – presents estimates of the current value of NMDOT's pavement and bridge assets.



Section II. Tomorrow: Where Are We Headed? This section looks at the future of NMDOT's pavement and bridge assets. It presents 10-year projections of asset condition based on varying revenue and allocation assumptions and recommends performance targets based on these analysis results. It also presents NMDOT's asset investment and risk management strategies.

- **Chapter 1: Asset Performance Targets** – presents NMDOT's 10-year pavement and bridge performance targets, reflecting likely available funding.
- **Chapter 2: Life Cycle Planning** – describes NMDOT's strategies for managing pavements and bridges over their life cycles to enable the agency to achieve the performance targets while minimizing life cycle costs.
- **Chapter 3: Performance Scenarios** – presents alternative performance scenarios over a 10-year timeframe and compares these to the targets detailed in Chapter 1 of this section.
- **Chapter 4: Revenues and Financial Projections** –presents NMDOT's projections of revenues available for asset management over a 10-year timeframe.
- **Chapter 5: Investment Strategies** – describes how NMDOT makes specific investment decisions to achieve agency goals and objectives given available funding.
- **Chapter 6: Risk Management** – describes risks to meeting NMDOT's performance targets and NMDOT's associated risk mitigation strategies, focusing on asset management risks not otherwise addressed through pre-existing systems and processes.



Section III. Tomorrow: How Do We Get There? This section describes a set of initiatives planned or underway at NMDOT that aim to improve asset management business practices and support a more efficient and effective organization in the future.

- **Chapter 1: TAM Framework and Leadership** –describes NMDOT's leadership structure and TAM organizational framework.
- **Chapter 2: Implementation Plan / Priority Action Items / Process Improvements** – discusses the process for assessing and improving TAM practices in the future and presents a set of six priority action items.

The contents of this plan comply with Federal Highway Administration (FHWA) requirements adopted in 2016 for National Highway System (NHS) TAMPs. Table I-1 shows where each of the required elements can be found.

Table I-1 FHWA TAMP Requirements Cross Reference to TAMP Sections and Chapters

Requirement (per 23 CFR Part 515)	Section	Chapter
Asset Inventory and Condition. A summary listing of the pavement and bridge assets on the NHS in the State (regardless of ownership), including a description of the condition of those assets based on the performance measures established under 23 U.S.C. 150(c)(3)(A)(ii) for condition. The description of condition should be informed by evaluations required under 23 CFR part 667 of facilities repeatedly damaged by emergency events.	I	2
Objectives. Asset management objectives that align with the State DOT mission and are consistent with the purpose of asset management, which is to achieve and sustain the desired state of good repair over the life cycle of the assets at a minimum practicable cost.	II	1
Measures and Targets. Asset management measures and State DOT targets for asset condition, consistent with asset management objectives and including those (measures and targets) established pursuant to 23 U.S.C. 150, for NHS pavements and bridges.	II	1
Gap Analysis. Analysis of performance gaps that affect NHS pavements and bridges regardless of physical condition or ownership. These include gaps between the current asset condition and State DOT targets for asset condition, and the gaps in system performance effectiveness that are best addressed by improving the physical assets.	II	3
Life Cycle Planning. A description of the DOT's life cycle planning process used to estimate the cost of managing an asset class, or asset sub-group over its whole life with consideration for minimizing cost while preserving or improving the condition. This process is to include (1) targets, (2) deterioration models, (3) potential work types and their relative unit costs, and (4) A strategy for managing each asset class or asset sub-group by minimizing its life-cycle costs, while achieving the State DOT targets for asset condition for NHS pavements and bridges under 23 U.S.C. 150(d).	II	2
Financial Plan. A description of the DOT's long-term (10+ years) plan that presents estimates of projected available financial resources and predicted expenditures in major asset categories that can be used to achieve State DOT targets for asset condition during the plan period and highlights how resources are expected to be allocated based on asset strategies, needs, shortfalls, and agency policies.	II	4

Requirement (per 23 CFR Part 515)	Section	Chapter
Investment Strategies. A description of strategies that result from evaluating various levels of funding to achieve State DOT targets for asset condition and system performance effectiveness at a minimum practicable cost while managing risks - including a discussion of how these strategies would support progress toward (1) Achieving and sustaining a desired state of good repair over the life cycle of the assets, (2) Improving or preserving the condition of the assets and the performance of the NHS relating to physical assets, (3) Achieving the State DOT targets for asset condition and performance of the NHS in accordance with 23 U.S.C. 150(d), and (4) Achieving the national goals identified in 23 U.S.C. 150(b). A description of how the analyses pertaining to life cycle planning, risk management, and performance gaps support the plan investment strategies.	II	5
Risk Management Analysis. A description of the DOT's process for identifying, analyzing, evaluating and addressing risks to asset and system performance, including the results for NHS pavements and bridges, of the periodic evaluations under 23 U.S.C part 667 of facilities repeatedly damaged by emergency events.	II	6

Section III of this plan addresses the recommended process in *23 U.S.C. § 515.19* to assess and improve organizational integration of asset management considering:

- the adequacy of the State DOT's strategic goals and policies with respect to asset management;
- whether asset management is considered in the agency's planning and programming of resources, including development of the STIP;
- whether the agency is implementing appropriate program delivery processes, such as consideration of alternative project delivery mechanisms, effective program management, and cost tracking and estimating; and
- whether the agency is implementing adequate data collection and analysis policies to support an effective asset management program.

This recommended process involves the following steps:

1) Determine the level of organizational performance effort needed to achieve the objectives of asset management;
2) Determine the performance gaps between the existing level of performance effort and the needed level of performance effort; and
3) Develop strategies to close the identified organizational performance gaps and define the period of time over which the gap is to be closed.

Context for Transportation Asset Management at NMDOT

NMDOTs vision and goals provide the umbrella policy context for TAM – emphasizing the importance of maintaining existing assets as part of a balanced program to improve safety and mobility, foster economic vitality and provide excellent customer service.

Telling the Story: Data for Decision Making

Tom Church, New Mexico Transportation Cabinet Secretary

"Performance-based decision-making makes sense and we should get there," says Cabinet Secretary Tom Church. "We are on our way. We need to be managing by the asset and by the performance measure."

"The major purpose of the TAMP is to show the impacts of various investment levels on system performance," Tom says. "This will enable policy makers to better understand predicted impacts of funding options they may be considering. It will also allow our public to clearly see the benefits of investment."

Using data, NMDOT can connect strategic goals – safety, mobility, preservation, and economic enhancement – to resource allocation and budgeting decisions. It can determine how to best use taxpayers' investment. It can work to balance important issues such as geographic equity, historic funding, and risk mitigation strategies.

NMDOT Vision & Goals

NMDOT's vision is for a safe and sustainable multimodal transportation system that supports a robust economy, fosters healthy communities, and protects New Mexico's environment and unique cultural heritage. Its four goals are to:

- Improve and enhance safety
- Preserve and maintain the infrastructure
- Enhance mobility
- Enhance economic development and customer response

Transportation Asset Management (TAM) at NMDOT focuses on the second goal: "Preserve and maintain the infrastructure." NMDOT uses a data-driven, performance-based approach to make the best use of available resources to preserve its infrastructure assets over the long term.

NMDOT Transportation Asset Management Mission

NMDOT's TAM Mission is to use data-driven asset management to maximize the use of limited public resources and maintain the state's transportation infrastructure in the best possible condition.

The implementation of the TAMP will allow NMDOT to:

- Manage assets better over the long term
- Locate and understand gaps in performance
- Prioritize gaps and asset needs
- Streamline business processes
- Meet MAP-21 and FAST Act TAM and TAMP requirements.

Key elements of this mission are reflected in this Transportation Asset Management Plan:

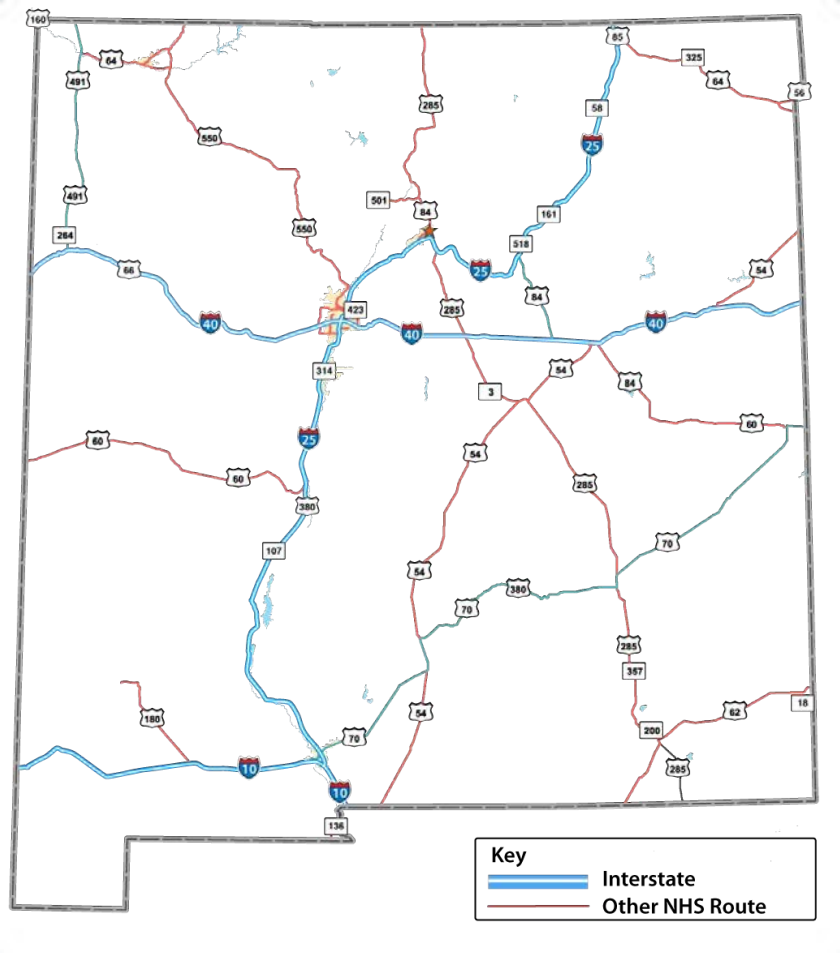
- **A data-driven approach** – using sound information on pavement and bridge condition to assess current performance, identify gaps to be addressed and set priorities for improvement considering risk;
- **A long-term approach** – employing scenario analysis and best available information about future revenues and asset life cycles to predict future needs, set realistic performance targets and plan for the most cost-effective set of strategies to meet these targets;
- **An integrated approach** – involving a connected process of policy formulation, planning, program development, implementation, and performance analysis;
- **A transparent approach** – establishing clear goals, objectives, and performance targets, and reporting on progress in a manner that tells a clear story about which targets have been met, which have not, and what obstacles have prevented target achievement; and
- **A continuous improvement approach** – regularly taking stock of current asset management business practices, data and information systems and moving forward with priority initiatives for strengthening the data-driven, performance-based approach.

Scope of the Plan

This initial version of NMDOT's TAMP focuses on pavement and bridge assets which are the foundation infrastructure for New Mexico's highway system. The plan covers all of the state-owned and maintained pavement and bridge assets, as well as the non-state-owned pavement and bridge assets in New Mexico that are on the NHS. Future updates of the TAMP may cover other asset classes, such as signs, signals, Intelligent Transportation Systems (ITS), and drainage assets.

The National Highway System

The NHS is a national network of 223,000 miles of the nation's most important roads including the Interstate Highway System and major freeways and arterials such as Interstate 40 and Highway 84. The NHS comprises only 5.4% of the nation's road miles but carries 58% of total highway traffic and at least 97% of total truck volume. The New Mexico portion of the NHS is depicted below.



Source: http://www.fhwa.dot.gov/planning/national_highway_system/nhs_maps/new_mexico/nm_newmexico.pdf

Relationship to Other Documents

New Mexico's transportation system extends well beyond the scope of this TAMP. It includes additional roadways owned by localities and others, as well as transit, rail, and aviation systems, all with a mix of publicly and privately owned assets. The agency periodically prepares a Long-Range Transportation Plan (LRTP) that describes the full extent of the state's transportation system and includes projections of the future use of the system. The most recent LRTP, *The New Mexico 2040 Plan*, was published in September 2015. Additional documents, such as the Statewide Transportation Improvement Plan (STIP), the New Mexico Freight Plan, New Mexico State Rail Plan, and the New Mexico Highway Safety Improvement Plan, detail various aspects of the system, its use, and investment needs. This document complements these other important resources.

Chapter 2: Maintaining Our System

Asset inventory and condition data are the foundation for managing transportation assets. Inventory and condition data are essential for communicating the extent of New Mexico's transportation assets and their current state. This data is one of the building blocks for other asset management processes such as life cycle planning, projecting funding needs, prioritizing projects, and monitoring asset performance.

This chapter presents summary information on asset inventory and conditions. While pavement and bridge assets are the focus of this TAMP, it is important to recognize that the highway system consists of a wide variety of physical assets, as depicted in Figure I-2. While these other assets are not specifically inventoried or itemized in this plan, in many cases replacement or rehabilitation of roads and bridges includes replacement or upgrades to ancillary assets. For instance, the cost of reconstructing or replacing a bridge includes the cost of guardrail, and pavement projects often include upgrades to associated traffic and safety assets. Where applicable, costs associated with these ancillary assets are included in the costs of maintaining bridges and pavement.

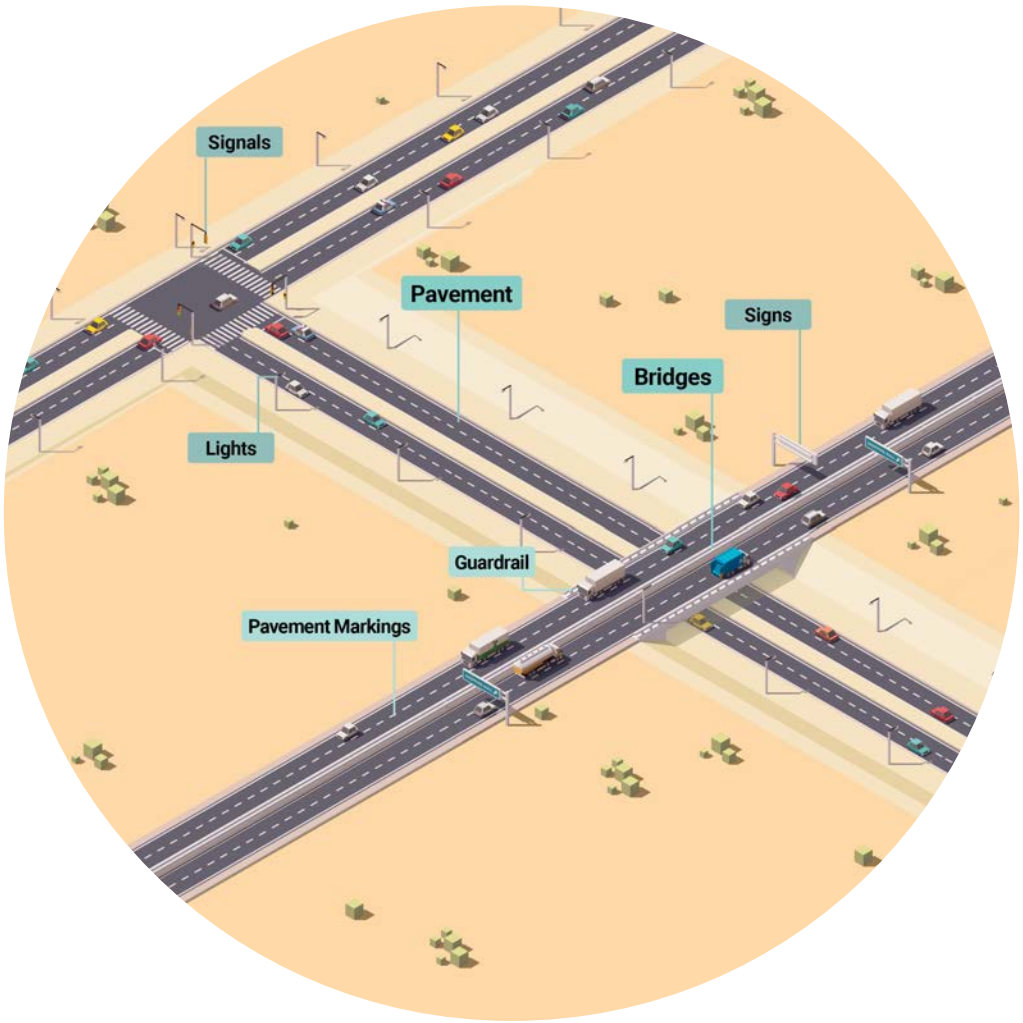


Figure I-2 Typical Roadway Assets

Overview

In this plan, asset information is summarized in two ways: 1) for the entire NMDOT-maintained system (portions of which are on the NHS), and 2) for the entire NHS (covering both state and non-state-maintained facilities). The first view focuses on assets that are under NMDOTs direct control; the second view is consistent with federal requirements for the TAMP.

The New Mexico state-maintained highway system encompasses 12,321 centerline miles (25,062 lane miles) of pavement and 2,978 bridges (with 18,888,000 square feet of deck area). Over 95% of NMDOT-maintained bridges (by deck area) are in good or fair condition while 94% of NMDOT-maintained pavements are in good or fair condition.

The NHS consists of 5,583 centerline miles (11,743 lane miles) of pavement and 1,750 bridges (with 13,754,000 square feet of deck area). Over 96% of New Mexico NHS bridges (by deck area) are in good or fair condition while over 96% of New Mexico NHS pavements are in good or fair condition.

Figure I-3 below provides a summary of NMDOT-maintained NHS and total NMDOT-maintained bridge and pavement inventory and conditions by district. Further details are provided on bridges and pavement in the following sections.

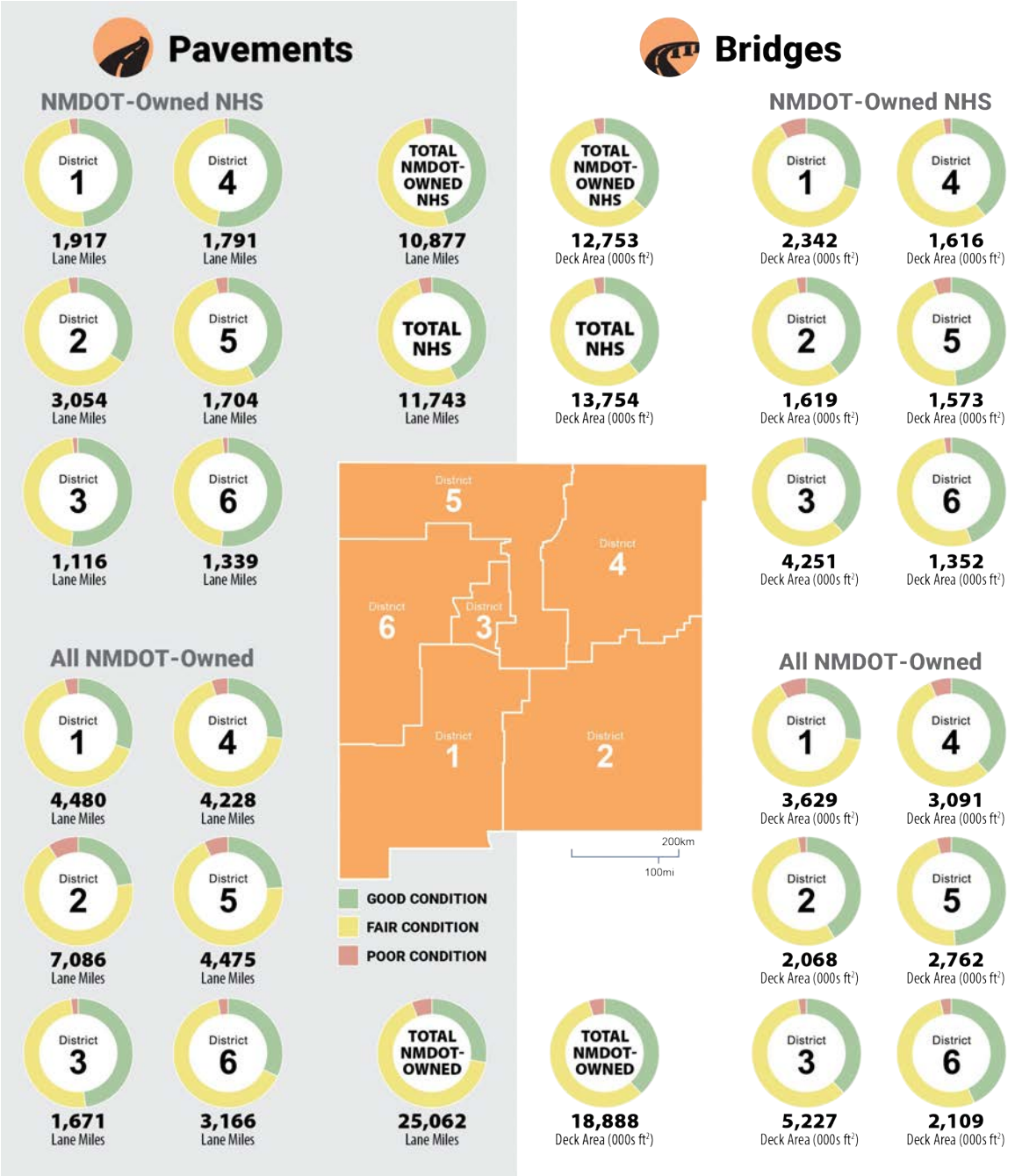


Figure I-3 Summary NMDOT-Owned and all NHS Asset Conditions

Bridges

Bridges provide road network connectivity, spanning water bodies and other natural features, rail lines, and other roadways. New Mexico's bridge inventory includes a number of landmark structures, such as the Rio Grande Gorge Bridge on Highway 64, as well as many smaller structures such as overpasses on the Interstate system.

Today's bridges are designed to last at least 75 years. Many bridges remain in service for much longer. However, bridges require periodic maintenance to maintain or replace individual components (such as deck joints) that have a shorter life than the major components of the bridge. If maintenance work on a bridge is deferred, the deterioration may accelerate to the point where more costly repairs are needed. In extreme cases deteriorated conditions may require restricting the loads the bridge can carry or closing the bridge until needed repairs are completed – which can lead to costly detours for road users. Thus, it is in NMDOT's interest to maintain bridges in good condition as it can result in the lowest long-term costs both to NMDOT and to road users.

Bridge Inventory

Table I-2 summarizes New Mexico's highway bridge inventory by whether the bridge is state-maintained (combined for both NHS and non-NHS bridges) or on the NHS network (combined for both state and locally maintained bridges). The table shows the number and the deck area of these bridges. Inclusion of the deck area is beneficial for estimating required future resources as bridge rehabilitation and replacement costs are usually a function of bridge size.

NMDOT manages 2,978 bridges, 1,674 of which are on the NHS. There are 1,750 bridges on the NHS, including bridges owned and maintained by other agencies – predominantly cities and towns. Note, that not included in the table below are 951 non-state-owned, non-NHS bridges included in New Mexico's bridge inventory that are subject to FHWA National Bridge Inventory (NBI) inspection standards.

Table I-2 New Mexico Bridge Inventory

	Bridge Count	Deck Area (thousands of square feet)
All State-maintained Highway Bridges	2,978	18,888
All NHS Bridges	1,750	13,968

2016 inventory and conditions report in the 2017 NBI submittal

Bridge Performance Measures

NMDOT follows FHWA NBI standards for inspecting all bridges on public routes in New Mexico except for federally owned bridges. Inspectors record overall ratings for a bridge's deck, superstructure, and substructure on a scale from 0 (failed) to 9 (excellent condition). Structures classified as culverts are included in the inventory if they are longer than 20 feet. For these structures, a single culvert rating is recorded using the same 0-9 scale.

Bridge condition ratings are used to classify the bridge as being in good, fair or poor condition. The lowest of the three ratings for deck, superstructure and substructure determines the rating. If this value is 7 or greater the bridge is classified as being in good condition. If it is 5 or 6 the bridge is classified as being in fair condition, and if it is 4 or less the bridge is classified as being in poor condition. A bridge in poor condition is considered Structurally Deficient (SD)[1]. While a bridge may be classified as SD, this does not mean that the bridge is unsafe, rather that deficiencies have been identified that require maintenance, rehabilitation or replacement.

NMDOT also performs element-level inspections that provide additional detail on individual components of a bridge. Element-level information is not factored into designation of SD or good-fair-poor condition ratings.

Bridge Condition

Table I-3 summarizes the condition of the NMDOT-owned NHS and non-NHS bridge inventory and the locally owned NHS bridge inventory. The conditions are summarized by the percent of bridges in good, fair and poor condition, weighted by deck area. 95.5% of NMDOT's bridges (weighted by deck area) are in good or fair condition and 4.5% are in poor condition.

Table I-3 New Mexico Bridge Conditions

Owner	NHS Designation	Percent of Deck Area		
		Good	Fair	Poor
NMDOT	NHS	39.2%	57.5%	3.3%
	Non-NHS	37.4%	55.6%	7.0%
	Total	38.6%	56.9%	4.5%
Locally Owned	NHS	8.8%	89.8%	1.4%
NMDOT + Locally Owned	NHS	37.0 %	59.9%	3.1%

2016 inventory and conditions report in the 2017 NBI submittal

As shown in Figure I-4, New Mexico bridge condition has been steadily improving since 2004. The percentage of NMDOT bridges (weighted by deck area) classified as poor or SD has decreased from a high of over 16% in 2004 to less than 5% today. During this time, NMDOT has made a considerable investment in bridge preservation by funding rehabilitation projects to address bridges in poor condition and preventive maintenance projects to extend the service life of bridges in fair or good condition.

[1] Other factors besides condition ratings may result an SD classification (e.g., waterway adequacy).

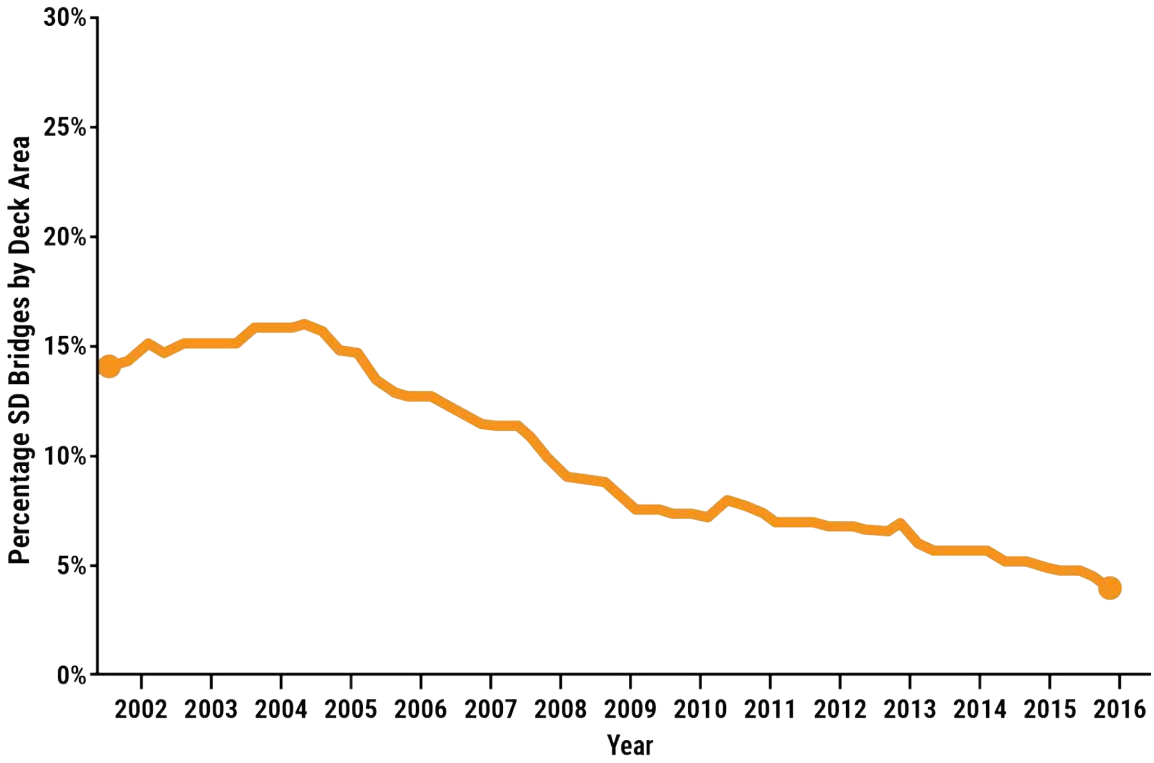


Figure I-4 Percent of NMDOT Bridge Deck Area Classified as Structurally Deficient

Telling the Story: Balancing Network Preservation Needs

Jeff Vigil, Bridge Management Engineer

With the average age of NMDOT's bridges approaching 50 years, the Department faces a challenge in balancing its priorities between urban and rural routes and on roadway and bridge work. "We would like to remain at the same level of condition or even further decrease our level of structurally deficient bridges," says Jeff Vigil, Bridge Management Engineer. To help make it happen, the Department has set aside $13 million annually to develop bridge rehabilitation and bridge preventive maintenance projects.

While federal regulations emphasize the performance of the NHS system, New Mexico's vast rural areas require an extensive roadway network connecting urban areas and providing access to the rural areas. Many of New Mexico's natural resource industries are found in outlying areas of the state.

"Being able to predict our future bridge conditions and bridge needs is critical in prioritizing limited funding and limited resources", Jeff says, "as the Department faces the challenge of determining where to spend these limited funds, more life cycle cost analysis will need to be performed to ensure that these funds are spent effectively and efficiently."

Pavements

Highway pavements are designed to support anticipated traffic loads and provide a safe and relatively smooth driving surface. Most of the state highway system pavement is classified as "flexible" – hot mix asphalt or other bituminous-treated surface over a subgrade. A small portion of the inventory is "rigid" – constructed from concrete with no asphalt overlay. Pavement life varies based on a variety of design properties, construction practices, the traffic loads to which the pavement is subjected, and environmental conditions (e.g. freeze-thaw cycles.)

While flexible and rigid pavements deteriorate differently, in general pavements become rougher with age and exhibit cracking and other signs of distress. Flexible pavements may develop ruts. Keeping pavements in good condition lengthens their life, enhances safety and helps reduce road users' operating costs. Numerous studies have shown that rough roads cause more wear and tear on vehicles and may result in decreased vehicle speeds.

Pavement Inventory

NMDOT manages a pavement network of over 12,000 centerline miles, or slightly over 25,000 lane miles. Forty-three percent (10,878 lane miles) of the state-maintained lane miles are on the NHS, including 4,076 Interstate lane miles. Other agencies maintain an additional 865 NHS lane miles in New Mexico. Table I-4 summarizes the inventory of NMDOT and NHS roads owned by other agencies. Table I-5 summarizes the pavement inventory by District.

Table I-4 NMDOT and NHS Pavement Inventory

Source: NMDOT PMS 2016 data, 2017 reporting

Owner	Functional Classification	Centerline Miles	Lane Miles
NMDOT	Interstate	1,971	4,076
	Non-Interstate NHS	3,263	6,802
	Non-NHS	7,088	14,185
	Total	12,321	25,062
Other	NHS	350	865
NMDOT + Other	Non-Interstate NHS	3,613	7,667
	All NHS	5,583	11,743

Table I-5 NMDOT Pavement Inventory by District
Source: NMDOT PMS 2016 data, 2017 reporting

	Interstate		Non-Interstate NHS		Non-NHS		Total	
District #	Lane Miles	Centerline Miles	Lane Miles	Centerline Miles	Lane Miles	Centerline Miles	Lane Miles	Centerline Miles
District 1	1,426	695	519	240	2,563	1,278	4,480	2,199
District 2	0	0	3,054	1,487	4,032	2,016	7,086	3,503
District 3	617	259	499	235	555	277	1,671	771
District 4	1,187	594	604	275	2,437	1,219	4,228	2,088
District 5	356	178	1,347	645	2,771	1,385	4,475	2,208
District 6	522	261	817	400	1,827	913	3,166	1,574
Total	4,108	1,987	6,840	3,282	14,185	7,088	25,106	12,343

Pavement Performance Measures

In 2013, NMDOT began collecting pavement condition data through the use of an automated collection process. A consultant is responsible for collecting pavement condition data that meets the FHWA requirements included in 23 CFR 490 on the entire NMDOT-owned pavement network. The Interstate and non-Interstate NHS pavement condition data is collected on an annual basis and approximately 50% of the non-NHS pavement condition data is collected each year in order to have data that is no more than two years old. NMDOT collects pavement condition data on the NHS that is not maintained by NMDOT. Additional data are collected for other roadways consistent with the requirements of the FHWA Highway Performance Monitoring System (HPMS).

Data collected on NMDOT flexible pavements includes details on the following types of distresses:

- Roughness (measurements used to calculate the International Roughness Index or IRI)
- Alligator cracking
- Edge cracking
- Patch deterioration
- Transverse cracking
- Block cracking
- Weathering and raveling
- Skid resistance
- Bleeding
- Rutting

For rigid pavements NMDOT collects data on:

- Roughness
- Corner breaks
- Longitudinal cracking
- Mid-slab cracking
- Patch deterioration
- Joint seal damage
- Joint spalling
- Faulting
- Lane to shoulder drop off/separation
- Skid resistance

These different distresses are combined into an NMDOT-specific composite measure termed Pavement Condition Rating (PCR). NMDOT has defined the following five pavement condition categories based on PCR.

This plan utilizes condition categories for pavement based on the PCR and the definitions shown in Table I-6. The PCR is then translated to the federal performance measure as described below.

Table I-6 NMDOT PCR Ranges

PCR Range	Condition	Suggested Treatment
100-86	**Very Good**	Monitor to minor preservation - fog seals or other surface coats
85-66	**Good**	Major preservation to minor rehabilitation – overlays to thin mill and inlay
65-46	**Fair**	Minor to major rehabilitation – mill and inlay between 2.5 and 5 inches
45-26	**Poor**	Major rehabilitation – mill and inlay 5 inches deep to PPC, FDR
25-0	**Very Poor**	Reconstruction

FHWA Pavement Performance Analysis

One of the primary purposes of the MAP-21 and Performance Management 2 (PM2) rules with respect to pavements is to provide the FHWA with a nationally consistent, network-level analysis of NHS pavement conditions. While each agency has historically submitted reasonably similar data via the HPMS, the data were not captured or computed using a consistent nationally defined methodology. The final rules and subsequent changes to the requirements defined by the HPMS accomplish this objective.

The FHWA has selected four pavement performance measures to determine the network condition level of the NHS pavements. The pavement data supporting these measures will be reported to the HPMS. The four measures are calculated using quantitative data based on the following metrics:

- **Pavement roughness** is an indicator of discomfort experienced by road users traveling over the pavement, measured using the International Roughness Index (IRI).
- **Rutting** is quantified for asphalt pavement by measuring the depth of ruts along the wheel path. Rutting is commonly caused by a combination of heavy traffic and heavy vehicles.
- **Cracking** is measured in terms of the percentage of cracked pavement surface. Cracks can be caused or accelerated by excessive loading, poor drainage, frost heaves or temperature changes, and construction flaws.
- **Faulting** is quantified for concrete pavements. Faulting occurs when adjacent pavement slabs are vertically misaligned. It can be caused by slab settlement, curling, and warping.

For each of these metrics, depending on the pavement type, the FHWA has established criteria for each metric to measure good, fair and poor condition (see Figure I-5). FHWA uses these pavement condition metrics to determine the pavement condition for each one-tenth mile pavement section.

Federal Pavement Condition Criteria				
Metric		**Good**	**Fair**	**Poor**
IRI (inches/mile)		<95	95 – 170	> 170
Cracking (%)	Asphalt	<5	5 – 20	> 20
	Jointed Concrete	<5	5 – 15	>15
	Continuously Reinforced Concrete	<5	5 – 10	>10
Rutting Asphalt (inches)		<0.20	0.20 – 0.40	>0.40
Faulting Concrete (inches)		<0.10	0.10 – 0.15	>0.15

Figure I-5 Federal Pavement Measure Criteria

An individual section is rated as being in good overall condition if all of the metrics are rated as good and poor when two or more are rated as poor. All other combinations are rated as fair. The overall performance of the network is summarized as the percentage of total lane miles in each of the three good, fair and poor condition categories.

NMDOT and FHWA Pavement Performance Measures

NMDOT has had its current Pavement Management System (PMS) in place since 2016. A key function of the PMS is to forecast pavement performance using the state's pavement condition measure, PCR, anticipated funding levels, and detailed analytical models developed based on historical pavement condition and treatment performance data.

NMDOT can apply this approach to develop network-level estimates of future performance against state performance measures. However, it is not possible to directly report federal performance from these analysis results due to the differences between the state and federal measures.

The detailed information required to directly calculate federal performance ratings are not available as output from NMDOT's PMS. As a result, a process for mapping New Mexico's PCR to federal good and poor pavement ratings was developed to support the TAMP performance targeting and gap analysis requirements.

NMDOT developed mapping process leverages results of a comparison of individual subsection PCR with overall federal good, fair, and poor ratings from associated 0.10-mile data. The analysis allowed NMDOT to correlate the PCR of the NMDOT inventory subsection to the percentage of associated 0.10-mile sections that would be rated in federal good, fair or poor condition. With this correlation, NMDOT is able to leverage output from PMS investment optimization and condition forecasting analysis to predict future federal performance. Table I-7 below provides a breakdown of assumed 0.10-mile federal performance (as a percentage of section lane mileage) by PCR range.

Table I-7 NMDOT to FHWA Pavement Performance Measure Alignment

PCR Range	% Federal Good	% Federal Fair	% Federal Poor
PCR ≤ 30	0%	56%	44%
30 < PCR ≤ 40	1%	60%	39%
40 < PCR ≤ 50	6%	86%	8%
50 < PCR ≤ 60	22%	74%	4%
60 < PCR ≤ 70	45%	54%	1%
70 < PCR ≤ 80	70%	29%	1%
80 < PCR ≤ 90	90%	10%	0%
90 < PCR ≤ 100	99%	1%	0%

NMDOT will have to closely monitor the federal measures each year and compare the PMS projections against the actual outcomes to determine the adequacy of this process to meet federal TAMP and performance targeting requirements.

Telling the Story: Risk

David Trujillo, District 4 Engineer, on the risks affecting the lower tiers of the network.

In New Mexico, public travel demand and district management practices have historically directed a disproportionate amount of funding to the Interstate and NHS.

New Mexico District 4 has a uniquely stratified road network with about 300 miles of Interstate and US routes out of 6,400 lane miles. David Trujillo, District 4 Engineer, notes that "My concern is for the rural routes," as many of these routes can have particular maintenance needs. This concern stems from District 4 being "one of the few districts that still has gravel roads." Gravel roads are difficult to maintain because weather and usage tend to erode gravel away faster than other pavement treatments.

Because of these maintenance needs and the department's history of prioritizing local routes behind NHS or Interstates, David says, "We're behind…we're constantly battling lack of funding on the state routes." If the lowest tiered roadways are underrepresented in the prioritization process, leaving segments untouched for up to five years, some routes could severely degrade and be lost from the system," he warns. David believes that addressing this funding issue for rural routes must include continued collaboration with executive management and that the NMDOT TAMP offers an opportunity to build on prioritization processes.

Pavement Condition

Table I-8 below summarizes the condition of NMDOT and NHS pavement in terms of the percent of pavement in good (NMDOT PCR condition of very good or good), fair (NMDOT PCR condition of fair) and poor (NMDOT PCR condition of very poor or poor) condition, weighted by lane miles. As indicated in the table, 42.6% of the NHS is in good condition, 53.5% is in fair condition, and 3.9% is in poor condition. 28% of the NMDOT-owned system is in good condition, 66% is in fair condition, and 6% is in poor condition. Of the NHS not owned by NMDOT, 8.1% is in good condition, 69.4% is in fair condition, and 22.5% is in poor condition.

Table I-8 NMDOT Pavement Conditions – Federal Measure

Owner	Functional Classification	Percent of Lane Miles (2016) – Federal Measure		
		Good	Fair	Poor
NMDOT	Interstate	58.5%	40.6%	0.8%
	Non-Interstate NHS	37.4%	59.3%	3.4%
	Non-NHS	14.8%	77.0%	8.2%
	Total	28.0%	66.0%	6.0%
Other	NHS	8.1%	69.4%	22.5%
NMDOT + Other	Non-Interstate NHS	34.1%	60.4%	5.5%
	All NHS	42.6%	53.5%	3.9%

Figure I-6 shows pavement conditions on the NHS in New Mexico from 2013 to 2016. As the figure shows, Interstate highways have been maintained at a PCR above 65, and U.S. route conditions have improved from a PCR of 54 to above 60. Other state-maintained roads have held at fairly constant PCR conditions.

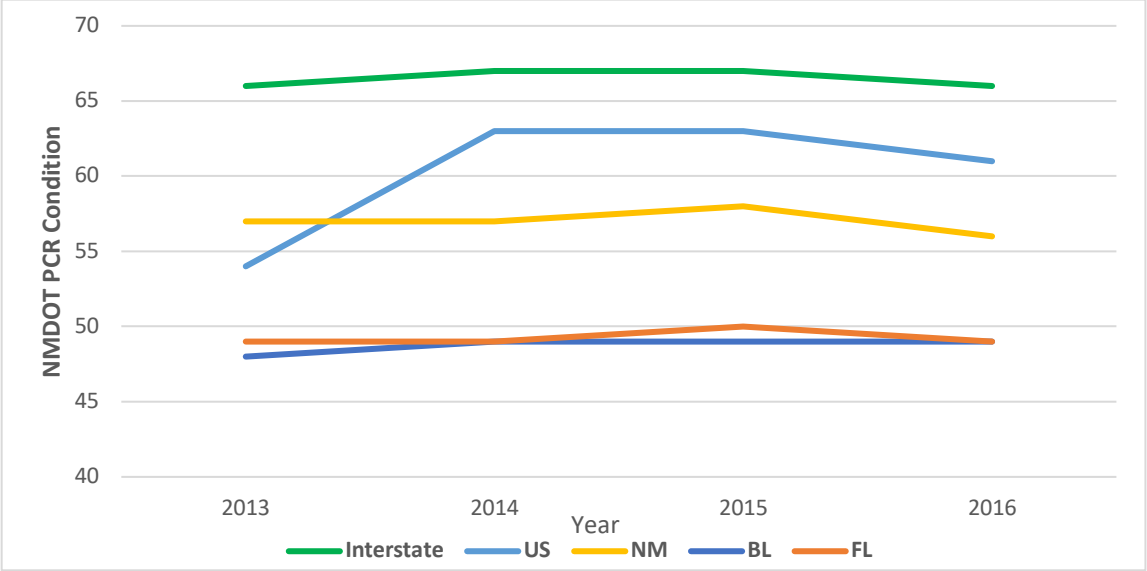


Figure I-6 NHS Pavement Condition from 2013 to 2016

Transportation Assets Repeatedly Damaged by Emergency Events

State DOTs are required to perform periodic evaluation of facilities that require repeated repair and reconstruction due to emergency events, including most projects that used Emergency Relief funds, per the federal Fiscal Management Information System (FMIS), to resolve the emergency. The regulations require that state DOTs conduct statewide evaluations to determine if there are reasonable alternatives to pavements or bridges that have required repair or reconstruction more than once due to emergency events. Agencies are required to perform "an analysis that includes identification and consideration of any alternative that will mitigate, or partially or fully resolve, the root cause of the recurring damage, the costs of achieving the solution, and the likely duration of the solution."

Reasonable alternatives are defined as options that could partially or fully achieve the following:

1. Reduce the need for federal funds to be expended on emergency repair and reconstruction activities
2. Better protect public safety and health and the human and natural environment
3. Meet transportation needs as described in applicable federal, state, local, and tribal plans and programs

While the requirement for evaluation of assets that have repeat damage due to emergency events is a separate rule from the TAMP, the TAMP rules require that the risk management process include a summary of the evaluations for NHS bridges and pavements. NMDOT uses their Agile Assets Maintenance Management System (MMS) to track Emergency Events. When the Governor of New Mexico or the President declares a disaster, the emergency event is created in MMS to identify the repairs that need to be completed and the expenditures during the event in order to prepare a request for Federal Emergency Relief Funds. This data was reviewed to determine NHS routes that have been damaged due to a natural disaster or catastrophic event since January 1, 1997. Based on an analysis of the disaster declarations and data in MMS, there are no locations on the NHS that have required repair or reconstruction on two or more occasions.

Chapter 3: Asset Valuation

Estimates of asset value provide a basis for summarizing quantities of different types of infrastructure assets on a single scale – dollars – and for evaluating planned investments in the system. This section presents asset value calculations based on two commonly used methods – replacement value and depreciated asset value. However, it is important to keep in mind that these methods do not account for the full economic value provided by strengthening connections between New Mexico's communities and neighboring states.

Replacement Value

The first approach to asset valuation is based on estimating the costs of complete asset replacement. Replacement cost does not vary by asset condition – i.e. the replacement cost for a new bridge is the same as that for a 70-year-old, deteriorated bridge of similar size, location and design. This method is similar to the way the value of a house is established for insurance purposes. It provides a measure of the overall size of the system. The replacement value changes only as changes in the asset inventory and/or construction costs occur.

Table I-9 summarizes the replacement value of NMDOT bridges and pavements and the replacement value of all New Mexico NHS bridges and pavement. The estimates on this table are based on unit replacement costs of $308 per square foot of deck area for bridges and $1,000,000 per lane mile for pavement. The unit replacement costs are calculated based on Average Unit Bid (AUB) Price Listing maintained by the NMDOT Plans, Specifications and Estimates Bureau.

Table I-9 Estimated Highway Replacement Costs

Owner	System	Asset Quantity		Replacement Value ($ million)		
		Bridge Deck Area (000 sq. ft.)	Pavement (lane miles)	Bridge	Pavement	Total
NMDOT	NHS	12,753	10,877	$3,927	$10,877	$14,804
	Total	18,888	25,062	$5,817	$25,062	$30,879
Locally Owned	NHS	994	865	$306	$865	$1,171
NMDOT +Locally Owned	NHS	13,747	11,743	$4,233	$11,743	$15,975

As detailed in the table, the replacement value of NMDOT's bridge and pavement inventory is approximately $30.9 billion. The replacement value of NHS bridges and pavement is approximately $16 billion.

Depreciated Value

A second approach to valuing assets uses the depreciated value reported in NMDOT's annual financial statements. NMDOT calculates the value of its capital assets for these statements following Generally Accepted Accounting Principles (GAAP), consistent with Government

Accounting Standards Board (GASB) Statement 34. GASB Statement 34 was published in 1999 and restructured much of the way government agencies present financial information.

Its goal was for the public to "understand the extent to which the government has invested in capital assets, including roads, bridges, and other infrastructure assets." Statement 34 offers guidance on establishing a "book value" for infrastructure, though specific calculation methods vary across states.

Since 2002 NMDOT has valued its assets using the "straight line depreciation method" described in GASB Statement 34. This involves calculating the cost of asset acquisition or construction and then depreciating that cost based on the life of the asset. For instance, an asset with a 30-year life is assumed to have depreciated to half of its initial value when it reaches 15 years.

Because NMDOT did not possess the records of all past costs for highways and bridges, the agency initially estimated construction costs using the replacement cost of the asset and then deflated these estimates to the year of construction using the historic Consumer Price Index. Subsequently actual costs of assets were captured and depreciated using a straight-line method over a 25 to 30-year lifespan (30 years for Interstate roadway, bridges, culverts, etc.; 25 years for non-Interstate assets).

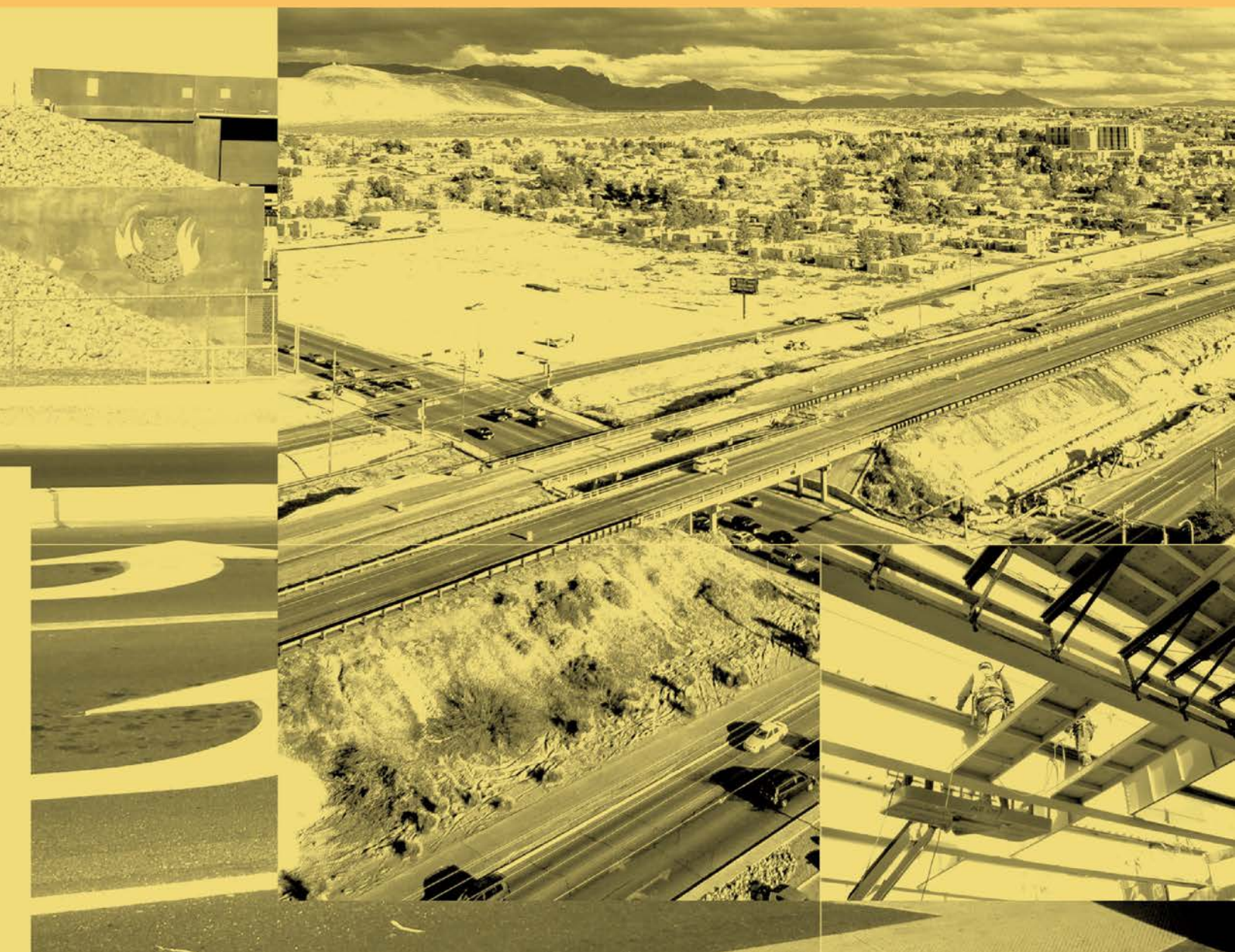
As of June 30, 2015, NMDOT reported a gross value of $14.5 billion for its infrastructure assets. Other assets such as land, right of way, library, and buildings are accounted for separately. Total accumulated depreciation for all NMDOT assets is $9.6 billion. An estimated $8.9 billion of that figure can be attributed to infrastructure based on infrastructure's proportion of gross asset value. Thus, the depreciated book value of NMDOT's infrastructure assets is estimated to be $5.6 billion ($14.5 billion less $8.9 billion). This figure is significantly lower than the replacement value described above, as the gross value is calculated in year of expenditure dollars, rather than using today's replacement cost, and the replacement cost does not incorporate depreciation.

New Mexico Department of Transportation

Transportation Asset Management Plan

SECTION II. TOMORROW

Where Are We Headed?



Section II of the TAMP covers NMDOT's 10-year plan for preserving and maintaining pavement and bridge assets. It begins with NMDOT's 10-year performance targets, set to support agency goals and objectives, and discusses how the agency will optimize treatment selection and timing in order to follow established life cycle management practices. Then, it presents a financial plan and investment strategies for NMDOT to achieve the targets while optimizing available funds. This section concludes with a discussion of the risks NMDOT may encounter when executing this TAMP and how these risks will be monitored and managed.

Section II Contents:

Chapter 1: Asset Performance Targets

Asset Management best practices emphasize the use of performance management for transportation programs, shifting the decision-making framework towards data driven, proactive, goal-oriented investment choices. The Federal Highway Administration (FHWA) defines transportation performance management as "a strategic approach that uses system information to make investment and policy decisions to achieve national performance goals."

The cornerstone of FHWA's highway program transformation is the transition to a performance and outcome-based program. States now must measure condition and set performance targets for their transportation assets. These targets should be aligned with state goals and objectives, as well as national goals. Following the targets will help states make investment decisions that achieve individual targets while making progress toward national goals.

Overview

Federal Requirements

FHWA requires states to include asset management measures and State DOT targets for asset condition for National Highway System (NHS) bridges and pavements in their TAMPs as defined in 23 CFR 490.313. States may choose to include additional measures as well. Any asset included in the TAMP must have accompanying measures and targets. Using the measures of condition defined by FHWA, State DOTs must specify their desired "state of good repair" for the 10-year analysis period of the TAMP consistent with state asset management objectives. The desired state of good repair is the desired asset condition over the 10-year period of the TAMP. The desired state of good repair must also support progress towards achieving national goals.

As part of a separate FHWA rule on performance management, states must set 2 and 4-year asset condition performance targets. These targets shall be included in the TAMP but will also be reported separately to FHWA. As part of this performance management rule, states are also required to maintain NHS pavements and bridges to meet federally established minimum condition levels:

- States must maintain bridges on the NHS so that the percentage of deck area of bridges classified as Structurally Deficient (SD) does not exceed 10 percent of the overall deck area in a state. (Note that according to FHWA NBI standards for bridge inspection, a bridge in poor condition is considered SD.)
- States must ensure that no more than 5 percent of pavement lanes miles on the interstate system are in poor condition using the federal performance measure for pavement condition.

Asset Performance

Performance measures are critical to actively manage the service life of an asset. By understanding the impact of investment on that performance measure, policy makers are able to establish funding priorities and set targets they can reasonably achieve. In this TAMP, asset performance refers to asset condition.

NMDOT uses performance measures to report condition for pavements and bridges. The condition information is presented in Section I, Chapter 2, Maintaining Our System, in Tables I-3 and I-8.

Asset Performance Targets

Asset performance targets specify conditions NMDOT seeks to achieve and sustain over a 10-year period to support agency goals and objectives and meet federal requirements.

As mentioned previously, federal regulation requires 2 and 4-year performance targets. The 2 and 4-year targets are not required for the initial TAMP submittal in April 2018 but will be included in the final TAMP submitted in June 2019. The implied 2 and 4-year targets from the 10-year projected condition based on expected funding are included in this TAMP. Additional coordination and collaboration with Metropolitan Planning Organizations will occur as targets are established.

The targets presented in this chapter serve as fixed benchmarks against which past, present, and future performance can be evaluated. These targets are consistent with federal and state performance requirements and were developed based on analysis of what can be achieved for different levels of funding over the next ten years, assuming application of effective asset lifecycle management strategies.

Tables II-1 and II-2 show NMDOT's 10-year projections for NHS bridge and pavement condition respectively based on current funding. Each table also presents the current (2016) value of the measure.

Table II-1 New Mexico's Bridge Performance Measures and Targets

Performance Measure	Current (2016)	10 Year Projected Condition
Percentage of bridges on the NHS in Good condition	37.0%	26.3%
Percentage of bridges on the NHS in Poor condition	3.1%	5.1%

Table II-2 New Mexico's Pavement Performance Measures and Targets

Performance Measure	Current (2016)	10 Year Projected Condition
Percentage of pavements on the Interstate System in Good condition	58.5%	60.0%
Percentage of pavements on the Interstate System in Poor condition	0.8%	8.3%
Percentage of pavements on the non-Interstate NHS in Good condition	34.1%	33.8%
Percentage of pavements on the non-Interstate NHS in Poor condition	5.5%	17.0%

These targets indicate that there is not enough funding to keep bridge and pavement condition at current performance levels. Of note, at the end of the ten-year forecast, the Interstate pavements

would decline to be more than the 5% poor threshold set in the federal rules. The non-Interstate NHS pavements will also decline significantly from its current state of 5.5% poor to 17% poor. It is clear from these forecasts that an aggressive funding strategy combined with a commitment to established life cycle strategies described in more detail in the following chapters is needed.

2 and 4 Year Performance Targets

Table II-3 shows the implied 2 and 4-year targets for bridges and pavements on the NHS based on the analyses conducted to determine the 10-year current funding projections.

Table II-3 Implied 2 and 4 Year Targets for the NHS

Performance Measure	2 Year (2019)	4 Year (2021)
Percentage of bridges on the NHS in Good condition	36.0%	30.0%
Percentage of bridges on the NHS in Poor condition	3.3%	2.5%
Percentage of Interstate pavements on the NHS in Good condition	57.3%	59.1%
Percentage of Interstate pavements on the NHS in Poor condition	4.5%	6.3%
Percentage of Non-Interstate pavements on the NHS in Good condition	35.6%	34.2%
Percentage of Non-Interstate pavements on the NHS in Poor condition	9.0%	12.0%

Chapter 2: Life Cycle Planning

One of the core principles of asset management is making investment decisions that consider the full life cycle and associated costs of an asset or system of assets. Transportation asset management involves developing life cycle plans for pavements, bridges, and other assets included in the TAMP. A life cycle plan is a strategy for managing an asset to achieve a target level of performance while minimizing costs over the asset's life cycle. Life cycle planning can provide guidance for identifying the best sequence of maintenance and rehabilitation treatments to apply throughout the life of the asset to maximize the return on investments.

Overview

This chapter describes NMDOT's life cycle strategies for managing its bridge and pavement assets.

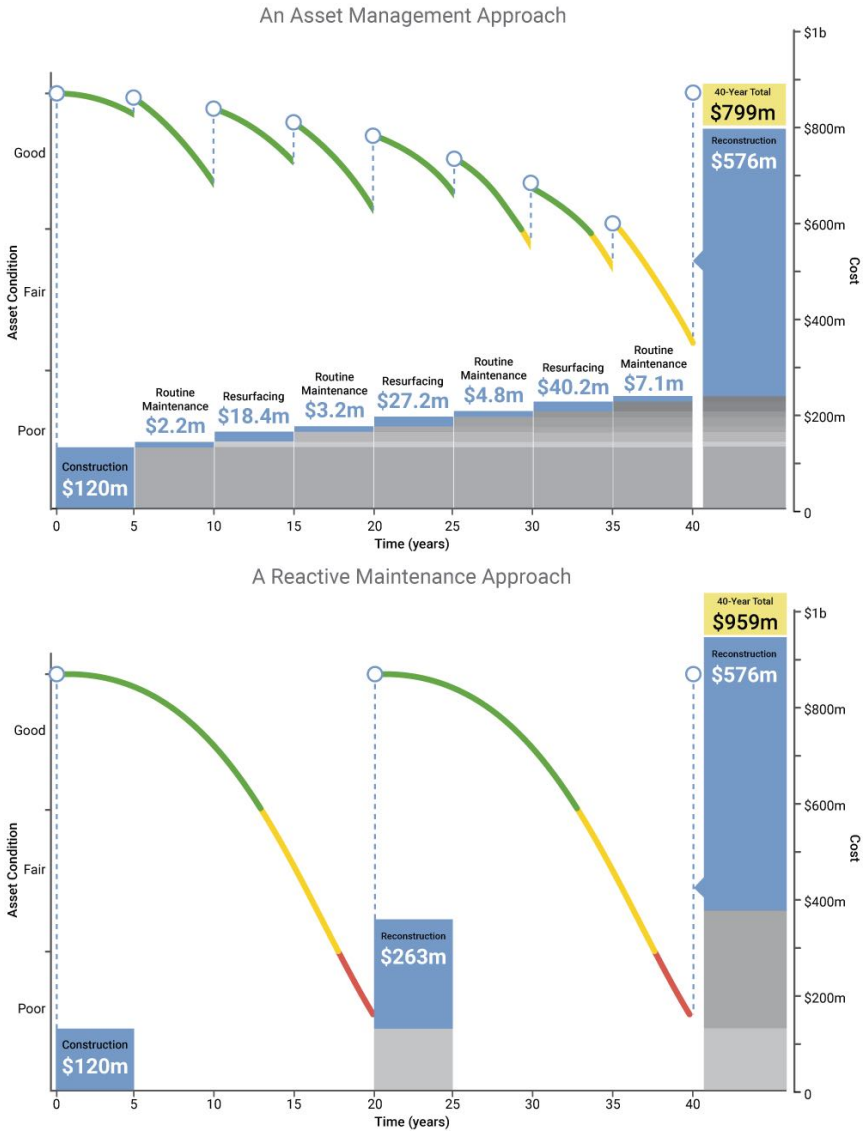
Federal Requirements

FHWA requires that State DOTs establish a process for conducting life cycle planning at the network level for NHS pavements and bridges. FHWA defines life cycle planning as "a process to estimate the cost of managing an asset class, or asset sub-group over its whole life with consideration for minimizing cost while preserving or improving the condition." The following elements must be included in a life cycle planning process:

- Identification of deterioration models
- Potential work types, including treatment options and unit costs
- A strategy for minimizing lifecycle costs and achieving performance targets
- Asset performance targets

Life Cycle Strategies

Life cycle strategies encompass both life cycle planning and Life Cycle Cost Analysis (LCCA). Life cycle planning focuses on general network-level asset management strategies – the best sequence of maintenance and rehabilitation treatments for a given asset type, for example. Complementarily, LCCA can be utilized for project level decisions to select the design option that minimizes the initial cost discounted future agency costs, user costs and any other relevant costs over the analysis period. The basic principle underlying both life cycle planning and LCCA is that timely investments in an asset can result in improved condition and lower cumulative costs over the long term. This principle is illustrated by the graphs in Figure II-1 below. The graphs show condition and costs over time for two example scenarios: an asset management approach of regular preventive maintenance (top panel) and a costlier reactive approach (bottom panel).



Asset Management saves money: Performing preventive maintenance keeps assets in better condition – at a lower cost over the long term.

Deferring maintenance costs more: Higher-cost reconstruction or replacement is needed when assets are not maintained in a state of good repair.

Figure II-1 Proactive Maintenance vs. Reactive Maintenance

Source: Rhode Island DOT, Investing in Rhode Island's Future: A 10-Year Plan to Strengthen Our State's Transportation Systems. 2014. Based on an analysis published by TXDOT. Texas DOT, Typical Life Cycle Costs of a Highway, 2014. http://ftp.dot.state.tx.us/pub/txdot-info/tpp/2040/life-cycle-costs-of-a-highway.pdf

In order to optimize the life of an asset, the agency should understand costs and benefits of different treatment types. Life cycle planning involves the use of predictive asset deterioration models for different treatment types. Ideally these models are developed based on the applied treatments and measured conditions over several years. In practice, these models are typically based on a combination of data and expert judgment.

Current NMDOT practices for bridge and pavement life cycle planning are described below. For each asset, NMDOT has well-established processes for inspection and condition assessment, assignment of appropriate treatments (including LCCA for pavements), modeling of future asset condition based on realistic funding assumptions, and program monitoring to track the progress of asset preservation and gather information needed to improve modeling assumptions over time.

Bridge Life Cycle Planning

Life cycle planning for bridges requires an evaluation of the least cost design and management strategies that minimize initial and lifecycle costs required to maintain the bridge in a state of good repair. It requires the development of deterioration models for bridge components, service life benefits of preventive maintenance and rehabilitation activities and the costs associated with the preventive maintenance and rehabilitation efforts.

A Bridge Management System is a tool used by DOTs for strategic planning and decision making using factors such as designed life expectancy, observed component and element conditions, construction material of the bridge, traffic volume and type and environmental conditions. They rely on bridge inspection data gathered at the component and element levels as required for the National Bridge Inventory (NBI) program. The most robust models may recommend treatments across a wide range of treatments for the deck, superstructure and substructure elements such as deck sealing, joint replacement, painting of steel elements, and concrete repair. Under constrained budgetary environments, they will prioritize recommendations once the system managers or modelers define their agency rules considering such factors as functional classification, load restrictions, preventative maintenance cycles and rehabilitation or replacement thresholds.

Bridge Inspection

NMDOT uses data from its bridge inspection program to establish overall bridge conditions and identify those bridges that require preventative maintenance rehabilitation or replacement. NMDOT's Bridge Management Section, located within the General Office (GO) Bridge Bureau, is tasked with overseeing the inspection and management of bridges at NMDOT. Bridge management capabilities and functions within the Districts vary based on staffing. Three of the Districts have a bridge engineer while the remaining Districts delegate bridge management responsibilities to an engineer coordinator or other designated staff that work under the supervision of the Assistant District Engineer. Figure II-2 on the following page summarizes NMDOT processes for collecting inspection data, verifying data quality, and calculating bridge load ratings.

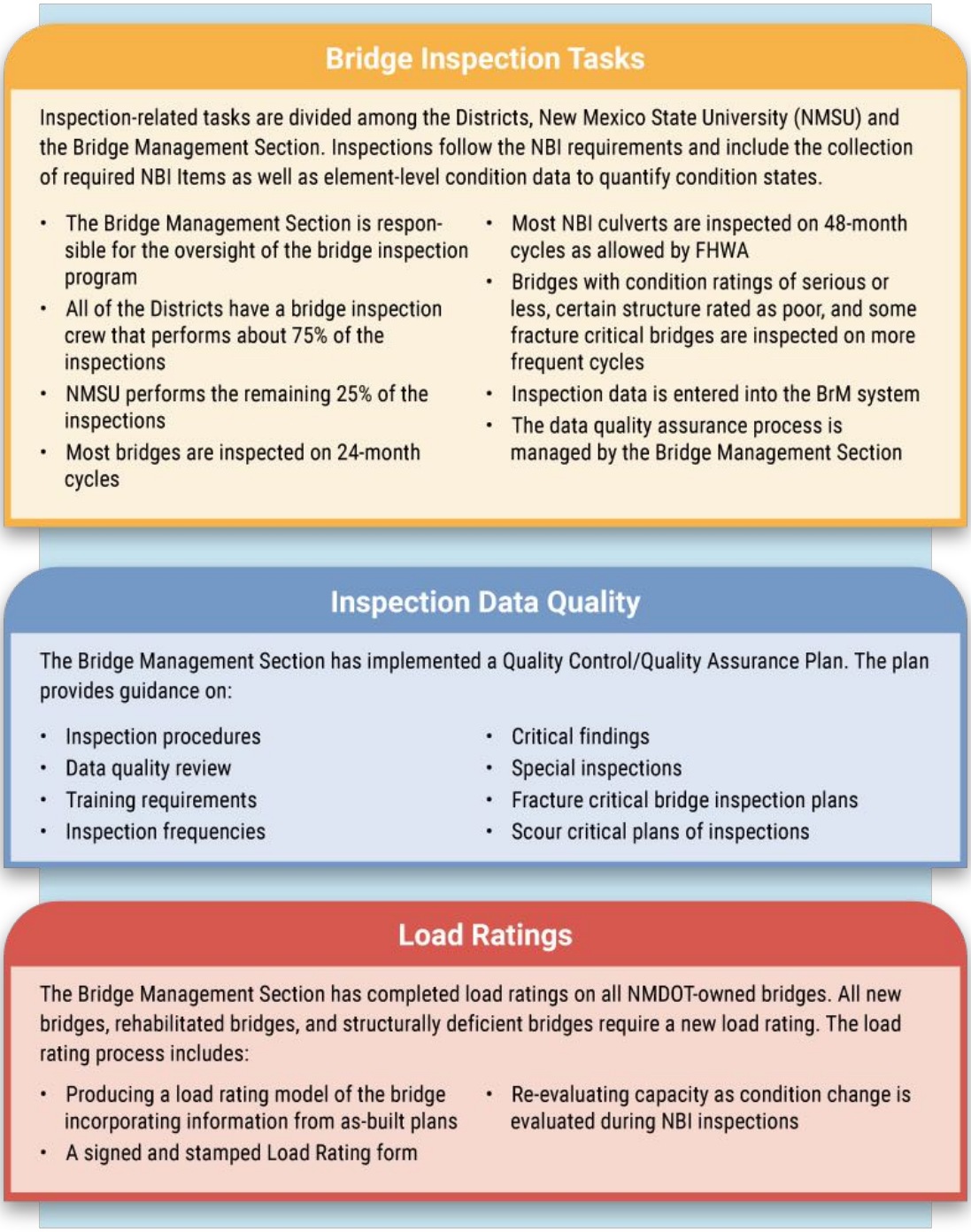


Figure II-2 Information on Bridge Inspection, Data Quality, and Load Ratings

Bridge Modeling

NMDOT developed and currently uses a spreadsheet model to predict future bridge conditions given the available budget and feasible treatments.

The model simulates the conditions of bridge decks, superstructures, substructures and culverts using New Mexico-specific bridge deterioration rates recently published in National Cooperative Highway Research Program (NCHRP) Report 713. The model uses a Markov approach to determine which treatment to select given the current condition of the bridge and the objective of minimizing long-term costs. The model predicts conditions, treatments and their effects for each individual bridge, and summarizes results for the entire system.

Bridge Treatments

NMDOT supplements federally required NBI inspections with more detailed inspections of individual structural elements to establish the condition of its bridges and determine optimal treatments. While decisions about specific treatments required for a bridge are made on a case-by-case basis, generally NMDOT uses the following strategy for determining when work is needed and what work to perform:

- **Maintenance** activities are usually performed when the bridge components are in a condition of fair or better. Maintenance costs vary with the work items applied and are currently estimated to cost $31 per square foot. All components are assumed to be restored to a condition level of good.
- **Rehabilitation** is often feasible when the deck is in poor condition and the superstructure and the substructure are in a fair or better condition. Performing rehabilitation is currently estimated to cost $130 per square foot of deck area and restores all condition ratings to a condition level of good.
- **Replacement** is often required if the superstructure or substructure conditions reach a poor condition level. Replacement costs are currently estimated to be $308 per square foot.

Bridge Program Monitoring

The Bridge Management Section tracks the status of bridge projects and performs analysis of spending on bridges in the State Transportation Improvement Program (STIP). In addition, Districts track project completion status. The need for additional follow up and tracking of work completion and associated spending on rehabilitation and preventive maintenance work is under discussion.

Pavement Life Cycle Planning

Life cycle planning for pavements has similar elements to those for bridges – predictive models for how pavements will deteriorate following different types of treatments and calculation of life cycle costs associated with alternative treatment strategies.

For pavements, application of preventive maintenance early in a pavement's life when it is still in relatively good condition can delay the need for rehabilitation or reconstruction and result in an overall lower life cycle cost. In addition, preventive maintenance can yield a higher level of pavement condition over time.

Pavement Data Collection

Each year NMDOT collects data on all NHS roads. In addition, it collects data on approximately half of non-NHS, NMDOT-owned roads and other Highway Performance Monitoring System sample sections.

Thus, pavement conditions for each road are updated on at least a two-year cycle, as required by FHWA. Figure II-3 summarizes the pavement data collection process and steps in obtaining a summary condition rating.

As described in Section I, NMDOT collects data for several different pavement distresses, and the distresses are combined to obtain an overall Pavement Condition Rating (PCR).

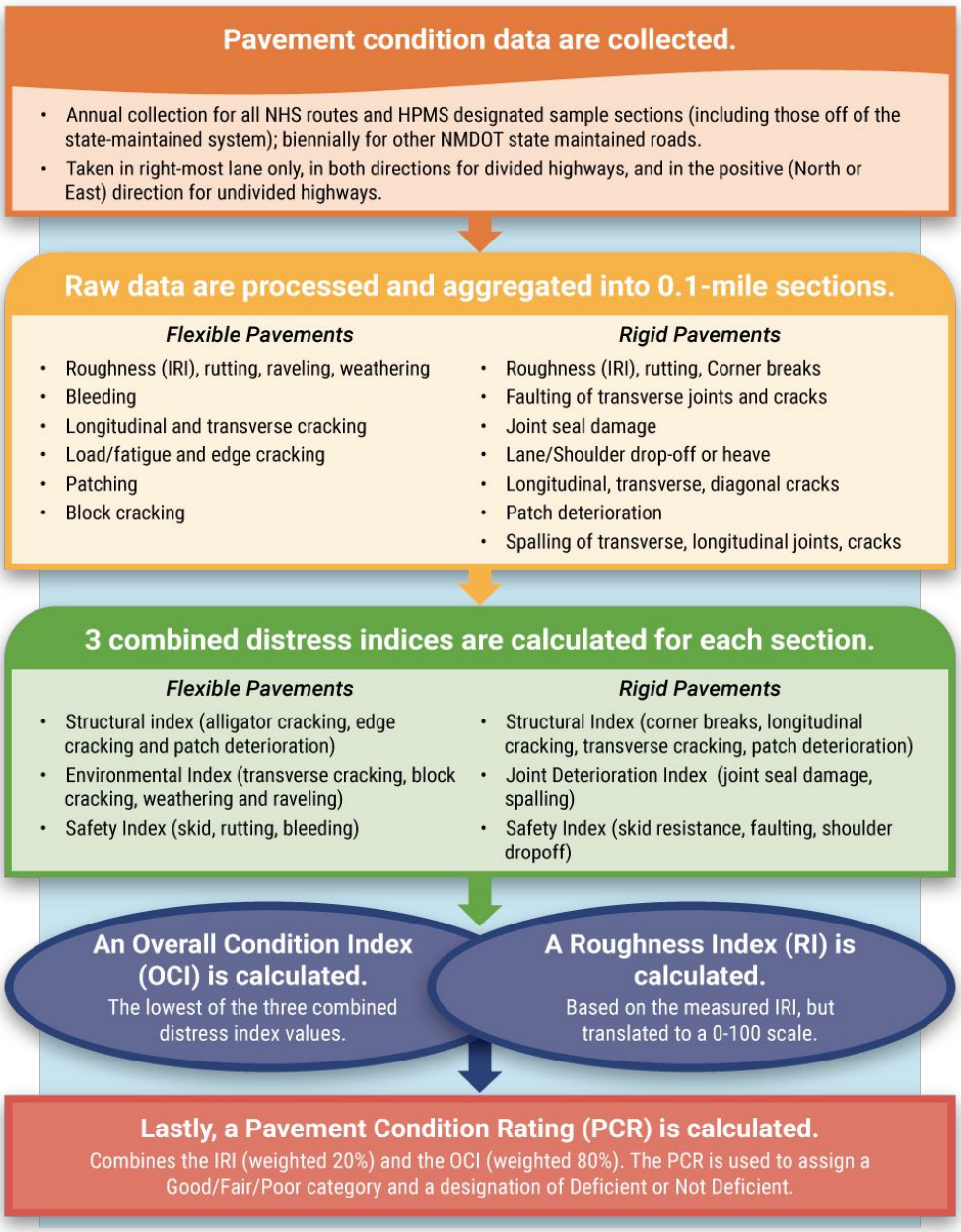


Figure II-3 Pavement Data Processes

Pavement Modeling

NMDOT uses the Agile Assets Pavement Management System (PMS) to summarize pavement conditions, recommend treatment priorities and predict future conditions given budget constraints and treatment strategies. Specifically, PMS inputs include current pavement conditions, deterioration models, feasible treatments and budget constraints (specified by year, type of system and road network). The PMS then identifies those treatments that maximize the pavement condition within a given budget constraint. Figure II-4 shows an example of the results generated by the system, in this case summarizing lane miles by recommended treatment category for Interstate routes (I), New Mexico state routes (NM), and U.S. routes (US).

NMDOT has configured its PMS to project pavement deterioration and analyze impacts of alternative budget scenarios on future network pavement condition.

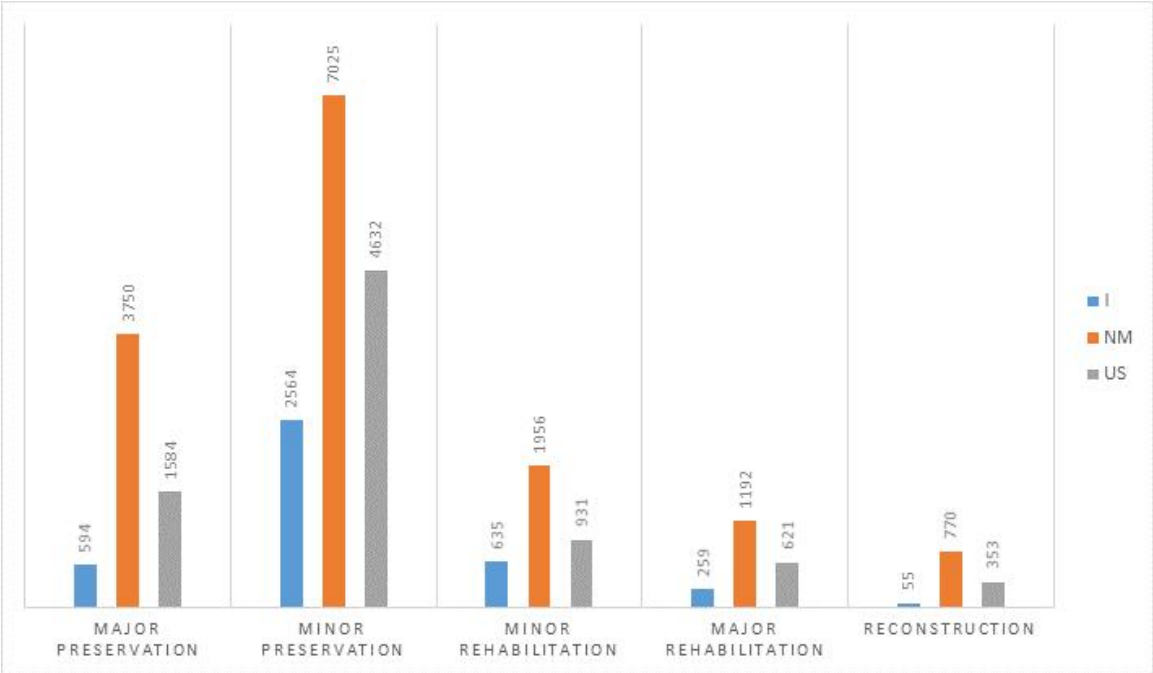


Figure II-4 Lane Miles by Treatment Category (FY16)

Source: Maintenance Report Data Totals, 2015 Cycle

Pavement Treatments

In its PMS, NMDOT established recommended treatments for flexible and rigid pavements and criteria for when each treatment is feasible. Table II-4 summarizes example treatments for flexible pavement. These treatments are modeled in NMDOT's PMS, discussed below, though final treatment selection for a given pavement section are made on a case-by-case basis.

Districts are encouraged to consider life cycle costs of different strategies when making project-level decisions.

Table II-4 Pavement Treatment Categories

Treatment Category	Example
Monitor	No treatment required
Preventive Maintenance	Crack sealing and patching
Minor Preservation	E.g. fog seals, chip seals, Nova Chip
Major Preservation	1.5" – 2.5" overlay
Minor Rehabilitation	2.5" – 4.0" overlay
Major Rehabilitation	>4.0" overlay, full depth reclamation
Reconstruction	Full rebuild

Pavement Program Monitoring

NMDOT monitors its pavements by tracking condition performance and reporting preservation work quarterly. In addition, Districts monitor their budgets monthly, with a focus on delivering projects on-time and on-budget. Several Districts also schedule regular meetings with their operational staff to track the progress of project selection and delivery.

Districts reported the need for a more systematic process of tracking pavement maintenance activities in order to provide an understanding of work and expenditures by location. Currently, records for active construction projects are maintained in the AASHTO SiteManager system.

Telling the Story: Life Cycle Planning

Jeff Mann, Pavement Engineer

When managing pavement life cycles, "the hardest thing for a pavement engineer is treatment type selection," says Jeff Mann, NMDOT's Pavement Engineer. NMDOT's PMS now assists with finding the best match between pavement condition and treatment type. "In many cases, the data validate our recommendations based on raw data from the field," Jeff says, "but in others it might find a better life cycle approach…[and] show another treatment as more cost-effective."

The PMS has greatly enhanced understanding of pavement life cycle processes. Jeff notes, "A lot of the minimal treatments are difficult to quantify but ultimately extend asset life…Continual maintenance is part of the life cycle."

Chapter 3: Performance Scenarios

Managing transportation assets throughout their life cycle requires looking to the future and projecting asset performance. Performance scenario analysis is a useful technique for examining the implications of different funding levels and allocations. It enables NMDOT to predict future conditions, compare these against targets, define funding gaps, and inform resource allocation decisions.

Overview

This chapter presents results of scenario analysis for bridge and pavement performance over a 10-year period. A range of funding scenarios for both pavement and bridge were modeled in order to understand the sensitivity of performance to investment. Then, two combined scenarios were constructed based on these results – one representing current practice – continuation of current funding and historical budget allocations, and a second representing an increase in total funding.

Federal Requirements

FHWA requires that states establish a performance gap analysis process for transportation asset management plans. As part of the gap analysis, states must compare current asset performance to target performance levels, using FHWA's performance measures. They may also compare projected asset performance to target performance to calculate an expected gap. States are also required to discuss alternative strategies to close or address the gaps.

The gap analysis is presented following the discussion of performance scenarios in this chapter.

Pavement Scenarios

Table II-5 shows the 10-year projected pavement conditions that would result from the current funding scenario, where NMDOT would spend an average of $62 million per year on Interstate pavements and $68 million per year on non-Interstate NHS pavements, for a total annual NHS pavement budget of $130 million. In the current funding scenario, Interstate pavements in good condition would increase slightly from 58.5% to 60.0%, while non-Interstate NHS pavements in good condition would decrease slightly from 34.1% to 33.8%. Interstate pavements in poor condition would increase from 0.8% to 8.3%, while non-Interstate NHS pavements in poor condition would increase from 5.5% to 17.0%.

Table II-5 also shows the 10-year projected pavement conditions that would result from the desired state funding scenario, where NMDOT would spend an average of $81.5 million per year on Interstate pavements and $212.5 million per year on non-Interstate NHS pavements, for a total annual NHS pavement budget of $294 million. In the desired state funding scenario, Interstate pavements in good condition would decrease slightly from 58.5% to 51.0%, while non-Interstate NHS pavements in good condition would increase from 34.1% to 54.1%. Interstate pavements in poor condition would increase from 0.8% to 2.4%, while non-Interstate NHS pavements in poor condition would decrease from 5.5% to 3.9%.

Note that the results for Non-Interstate NHS pavements represent only the NMDOT-maintained portion of the NHS, which accounts for 87% of the system mileage. Data for the non-state-owned portions of the NHS pavements is being collected and modeled in the NMDOT PMS. The funding projections for the non-state-owned NHS for the ten-year horizon is not known. An estimate of this funding will be developed in the coming year so that the performance projections will include non-state-owned NHS portions. The June 2019 complete TAMP will include the full NHS in the scenario.

Bridge Scenarios

Table II-5 shows the 10-year projected bridge conditions that would result from the current funding scenario, where NMDOT would spend an average of $40 million per year on NHS bridges. In the current funding scenario, NHS bridges in good condition would decrease from 37.0% to 26.3%, while NHS bridges in poor condition would increase from 3.1% to 5.1%.

Table II-5 also shows the 10-year projected bridge conditions that would result from the desired state funding scenario, where NMDOT would spend an average of $24.5 million per year on NHS bridges. In the desired state funding scenario, NHS bridges in good condition would decrease from 37.0% to 18.7%, while NHS bridges in poor condition would increase from 3.1% to 10.0%.

Investment Scenarios

Two combined scenarios were constructed based on the pavement and bridge scenario results presented above:

- A current funding scenario that models future asset performance based on historical budget allocations
- A desired state scenario that represents an optimistic picture of what could be achieved with an 87% increase in funding for NHS pavements including a shifting of funds from bridge assets. NHS bridges will get decreased funding from $40 million to $24.5 million to allow for needed performance improvements in pavements. This decrease in funding is based on the current exemplary conditions of NHS bridges going from a target of 5.1% poor bridges in ten years under the current funding scenario to an increase in poor bridges to the 10% poor threshold level in the federal rules.

The current funding scenario is consistent with current estimates of revenues likely to be available for transportation asset management (as described in Chapter 4). It assumed that:

- Future revenue growth keeps pace with construction cost inflation
- Funding allocations made by staff in FY 2017 would be carried forward through FY 2026
- Debt service payments would be smoothed over the 10-year period
- $390 million is currently available for asset management on an annual basis before debt service ($241 million after debt service)

The current funding scenario assumes that of this $241 million, $60 million is allocated to bridges ($40 million for NHS bridges and $20 million for non-NHS bridges) and the remaining $181 million is allocated to pavement ($130 million for NHS pavements and $51 million for non-NHS pavements).

The desired state scenario assumes an 87% increase in total funding from $170 million to $318.5 million resulting in a 126% increase in funding for NHS pavements – from $130 million to $294 million – with $24.5 million allocated to NHS bridges. Results for the two scenarios are shown in Table II-5.

Performance Gap Analysis

Transportation asset management plans developed under MAP-21/FAST Act are expected to establish targets, articulate strategies, link agency processes to asset management and other performance strategies, and impact performance. Performance measures and targets are used to track progress and guide agencies towards short, medium, and long-term goals.

State DOTs are required to establish a process for conducting a gap analysis, evaluating any gaps between current and target condition and suggesting strategies to close the gaps. The FHWA defines a performance gap as "the gaps between the current asset condition and State DOT targets for asset condition, and the gaps in system performance effectiveness that are best addressed by improving the physical assets."

Performance gaps are defined for both percent Good and percent Poor asset condition. Table II-5 shows two types of performance gaps:

- A **current gap** is the difference between the 10-year desired state projection and the current performance. The gap quantifies the amount by which the 10-year desired state projection exceeds current performance. If current performance exceeds the 10-year desired state, the gap is shown as a negative number (in parentheses).
- A **10-year projected gap** is the difference between the 10-year desired state projection and the 10-year current funding projection. The gap quantifies the amount by which the 10-year desired state projection exceeds the 10-year current funding projection. If the 10-year current funding projection exceeds the desired state projection, the gap is shown as a negative number (in parentheses).

Table II-5 10-Year Desired State Performance Projections and Performance Gaps

	Good	Fair	Poor	
Interstate Pavements (Lane Miles)				
10-Year Desired State Projection	51.0%	46.6%	2.4%	
Current Performance	58.5%	40.6%	0.8%	
Current Gap	(-7.5%)	–	(-1.6%)	
10-Year Current Funding Projection	60.0%	31.7%	8.3%	
10-Year Projected Gap	(-9.0%)	–	**5.9%**	

	Good	Fair	Poor	
Non-Interstate NHS Pavements (Lane Miles)				
10-Year Desired State Projection	54.1%	42.0%	3.9%	
Current Performance	34.1%	60.4%	5.5%	
Current Gap	**20.0%**	–	**1.6%**	
10-Year Current Funding Projection	33.8%	49.2%	17.0%	
10-Year Projected Gap	**20.3%**	–	**13.1%**	
NHS Bridges (Deck Area)				
10-Year Desired State Projection	18.7%	71.3%	10.0%	
Current Performance	37.0%	59.9%	3.1%	
Current Gap	(-18.3%)	–	(-6.9%)	
10-Year Current Funding Projection	26.3%	68.6%	5.1%	
10-Year Projected Gap	(-7.6%)	–	(-4.9%)	

Note that the gap analysis reflects only the state-maintained NHS. For pavement, this accounts for 6,802 of the total 7,667 non-Interstate NHS Lane Miles in the state, or roughly 89%. For bridges, this accounts for 93% of the NHS deck area.

Chapter 4: Revenues and Financial Projections

Achieving the targets presented in Chapter 1 will depend on the level of future revenues that can be used for maintenance, repair, rehabilitation and replacement of pavements and bridges. This chapter describes NMDOT's current revenues and its assumptions regarding future revenues available for asset preservation.

Overview

New Mexico's transportation funding has historically been split 50-50 between federal and state sources. The majority of state and federal transportation funding is collected through fuel taxes. New Mexico's State Road Fund (SRF) is the main source of state funding and is used primarily to provide federal match and fund highway operations, DOT administrative costs and other non-federally eligible expenses. A Local Government Road Fund (LGRF) is funded from many of the same sources as the SRF.

The following subsections present the TAMP financial plan, summarizing funding sources and uses and detailing the projected funding available for asset management uses over the next ten years. The financial plan is an estimate of projected revenue, detailing the resources available for helping meet the condition targets presented previously. Note that the financial plan is focused on funds available for pavement and bridges on the NMDOT-maintained highway system and the NHS.

Federal Requirements

FHWA requires each state DOT to include a financial plan that spans at least ten years and identifies funding and costs over that time in their TAMP. FHWA defines financial plan as "a long-term plan spanning 10 years or longer, presenting a State DOT's estimates of projected available financial resources and predicted expenditures in major asset categories that can be used to achieve State DOT targets for asset condition during the plan period, and highlighting how resources are expected to be allocated based on asset strategies, needs, shortfalls, and agency policies." The plan should provide a summary of financial resources and needs for pursuing asset management objectives and achieving performance targets.

FHWA also requires that states establish a process for developing a financial plan as part of the transportation asset management plan. Specific requirements for the process are:

- Estimated cost of expected future work to implement the investment strategies of the asset management plan, by fiscal year and work type
- Estimated funding levels to address the costs of future work types, by fiscal year
- Identification of anticipated funding sources
- Asset valuation estimate for NHS pavements and bridges assets and the needed annual investment to maintain asset value (Note: asset valuation is included in Section 1, Chapter 3.)

Revenue Sources

State Funding Sources

The main source of state funding is the SRF. Because of this, NMDOT does not typically receive appropriations from the state's general fund. The SRF receives the majority of its funds from the following four main revenue sources: the gasoline tax, motor vehicle registration fees, the special fuel (diesel) tax and weight distance taxes. Other state revenue sources also contribute to the SRF.

In addition to the SRF, NMDOT uses the Highway Infrastructure Fund (HIF) for specific corridors. The HIF's revenues are derived from a tax on tires.

While not a state funding source, the LGRF receives revenue from many of the same sources as the SRF. However, the use of the LGRF is restricted to local governments only.

Figure II-5 below illustrates the funds available in the SRF since 2007 and a projection of the availability of future funds. As depicted, SRF revenues declined and stagnated between 2007 and 2014. This was due to several major factors, including lower vehicle miles traveled (VMT) during the recession and the adoption of more fuel-efficient vehicles. In fact, average miles per gallon (MPG) for all light vehicles on the road improved over ten percent over the past five years, and according to the Road Fund 101 document created by NMDOT in October 2014, average MPG for new light vehicles has increased from about 20 MPG to over 25 MPG in the years since 2007. Overall, NMDOT revenues have returned to Fiscal Year 2007 levels and are expected to remain at that level with minimal growth projected at 0.4% per year.

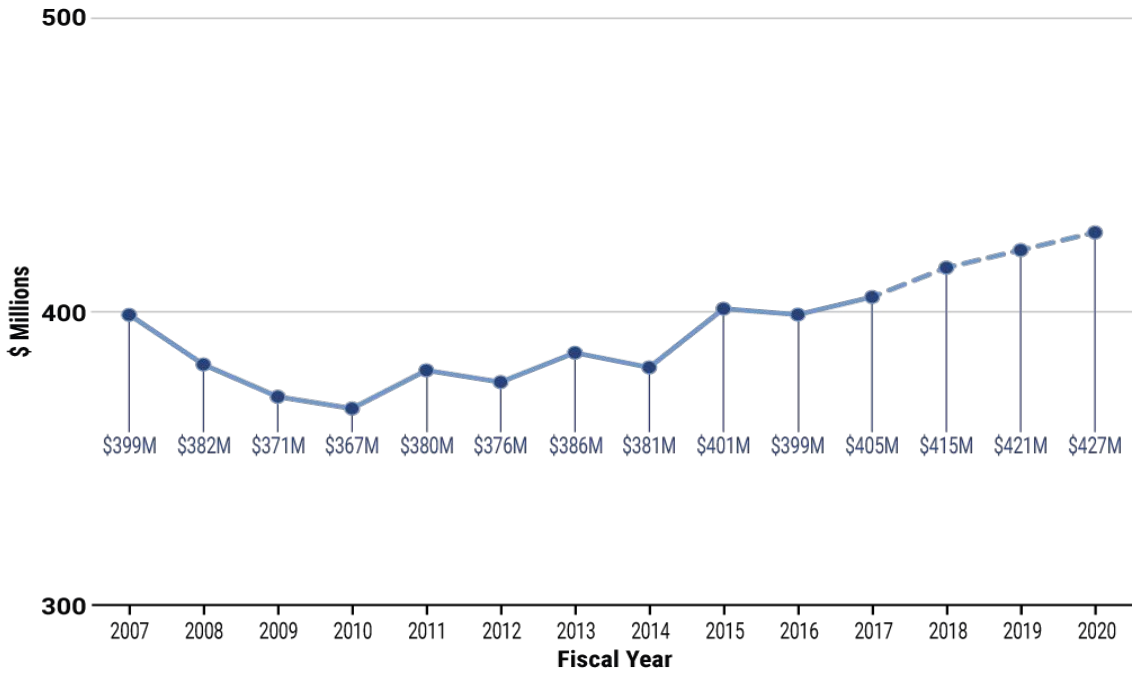


Figure II-5 State Road Fund ($M) since 2007

Federal Funding Sources

A large portion of funding for NMDOT's annual budget comes from federal surface transportation legislation.

MAP-21 was signed into law in 2012 in an effort to streamline and consolidate over 70 federal programs that often overlapped and created additional administrative burden. MAP-21 provides transportation agencies with greater flexibility to meet specific needs across the United States while increasing transparency and accountability.

The FAST Act, signed into law in 2015, supplements MAP-21 by stabilizing funding levels for state transportation agencies. As such, this authorization provides New Mexico with $1.9B in secure funding over a five-year period, ending in 2020.

NMDOT receives federal funds through the following programs:

- National Highway Performance Program (NHPP)
- Surface Transportation Block Grant Program (STBGP)
- Highway Safety Improvement Program (HSIP)
- Congestion Mitigation and Air Quality (CMAQ) funds

The National Highway Performance Program (NHPP) represents the single largest category of federal revenues for New Mexico and the majority of funding available for preservation of the state's highway and bridge assets. Portions of the Surface Transportation Block Grant Program (STBGP) also fall within the statewide discretion of NMDOT and are therefore considered eligible for asset management spending.

Funding Uses

NMDOT's budget is structured into four programs. Figure II-6 illustrates how the budget is allocated among Project Design and Construction, Highway Operations, Business Support and Modal. The figures shown are for the FY17 budget, totaling $867M.

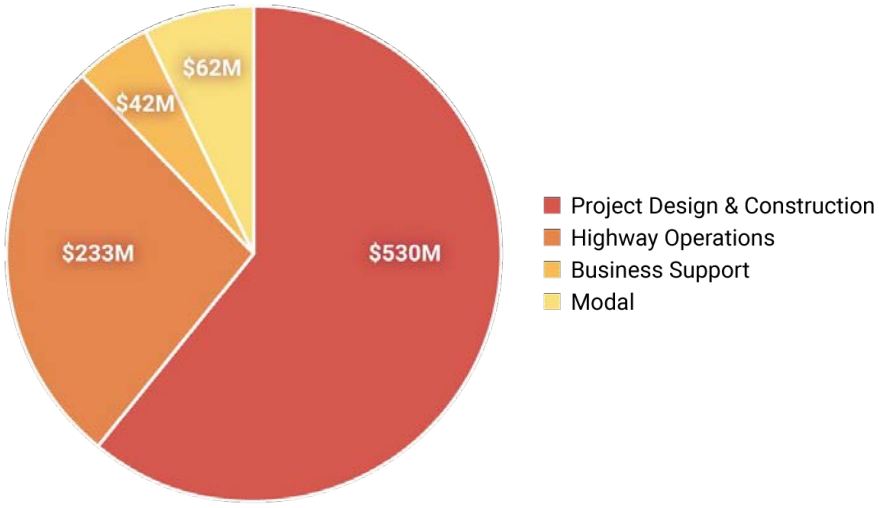


Figure II-6 Breakdown of NMDOT FY17 budget into four programs

Capital projects, including most pavement preservation, rehabilitation and reconstruction, are funded from the Road Betterments portion of the Project Design and Construction budget. With a significant outlay for debt service and other programs (such as grants and pass-through activities) only $314M (59%) of the Project Design and Construction Budget was available for Road Betterments in FY17, as evidenced below in Figure II-7.

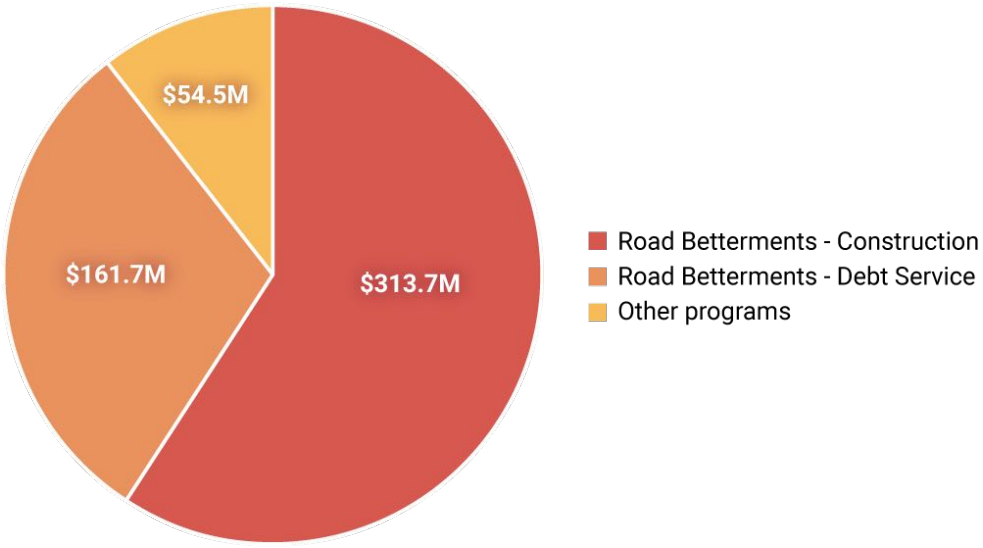


Figure II-7 Breakdown of the $529.9M FY17 Project Design and Construction Budget

Relative state and federal contributions vary by program. For FY17:

- **Project Design and Construction is approximately 30% state-funded.** Project Design and Construction covers NMDOT's construction program (100% federal with state funds used as match) as well as planning, research, and local government road fund programs. Debt service represents a significant portion of this budget and is discussed further below.
- **Highway Operations is almost 99% state-funded.** Highway Operations covers routine pavement, bridge, and right-of-way maintenance activities performed by NMDOT's maintenance crews and contractors via established statewide price agreements. Most of NMDOT's 2,487 employees perform these maintenance activities. The DOT currently operates at a 12.7% vacancy rate, though it is budgeted to operate at a 10% vacancy rate and therefore retains some hiring capacity.
- **Business Support is 100% state-funded.** This includes administrative activities such as Human Resources, Accounting and Finance, Public Relations, Information Technology, Training and Buildings and Grounds.
- **Modal is 50% state-funded.** This includes Transit and Rail, Aviation, Traffic Safety (National Highway Traffic Safety Administration) and Ports of Entry. This program was established in State Fiscal Year 2017 as a new program area. The funds for this program are restricted to very specific purposes and equally split between federal and state sources.

Telling the Story: Preserving the System

Trent Doolittle, District 1 Engineer, on the role of the District Engineer in TAM

At the District level, the impact of asset management elements, such as improved data management and prioritization strategies, start to impact work on the ground. Trent Doolittle of District 1 has a unique understanding of the dynamic between local and state priorities, and he believes that improved analysis data capabilities have aided state and local give and take.

District Engineers like Trent advocate for the needs of their individual Districts while also having the responsibility of contributing to and supporting statewide priorities. Trent believes that implementing TAMP with good communication and participation from the Districts will ensure that the system-wide priorities will serve the districts as much as possible within funding constraints.

Each District receives an allocation of available federal NHPP funds based on a formula that considers lane miles and vehicle miles traveled. Meanwhile, Surface Transportation Block Grant Program (STBGP) funds are allocated to Districts based on centerline miles and population. Districts can use NHPP and STBGP funds for pavement preservation and bridge replacement, rehabilitation and preventive maintenance projects.

Districts have discretion about how they allocate their available funds across different assets and types of needs – within the confines of funding eligibility restrictions. District spending targets are specified by funding source rather than by asset or route type.

In order to encourage bridge preventive maintenance, NMDOT has dedicated funding annually to a Bridge Preventive Maintenance Program. This program has been funded at an average of $13 million per year. Of this amount, roughly $12 million is from the NHPP for bridges on the NHS and $2 million is from the STBGP. These funds are distributed across the Districts based on a call for projects and cover approximately 40-50 projects per year.

Future Changes

Future Revenues

Overall budgets have fluctuated only slightly in recent years. However, accounting for inflation equates to a loss in buying power. Looking forward, there are numerous factors complicating revenue projections including:

- **Inflation**: In recent years, the rate of inflation has been low relative to historic trends, but it is unclear if inflation will remain low or gradually increase. Any increases in inflation amount to effective reductions in revenues.
- **Trends in fuel consumption**: Increased fuel efficiency is good for the environment and saves road users money, but results in reduced revenues.

- **Future federal allocations**: Predicting future federal allocations has been challenging under expiring authorizations, continuing resolutions, and periodic general fund appropriations. However, over time the trend in federal revenues has increased slightly.

Taking all of these factors into account, NMDOT is assuming the budget available for asset management purposes will remain flat on a constant dollar basis. That is, revenues will grow modestly to offset increases in inflation (2% per year). Table II-6 shows the sources and uses of funding for pavement and bridge assets over the next ten years.

Table II-6 Baseline Revenue Scenario (2% Growth) ($000,000)

Description	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Sources										
Federal Funds (NHPP+STP)	$266	$271	$277	$282	$288	$294	$300	$306	$312	$318
State Funds (SRF+HIF)	$91	$93	$95	$97	$99	$101	$103	$105	$107	$109
Maintenance (Bridges & Pavement)	$42	$43	$44	$45	$46	$47	$48	$49	$50	$51
Federal Debt	-$110	-$110	-$110	-$110	-$110	-$110	-$110	-$110	-$33	-$27
State Debt - SRF	-$49	-$40	-$40	-$40	-$40	-$40	-$40	-$40	-$112	-$113
Total	**$241**	**$257**	**$266**	**$274**	**$282**	**$291**	**$300**	**$309**	**$323**	**$338**
Uses										
Maintenance Bridge	$2	$2	$2	$2	$2	$3	$3	$3	$3	$3
Maintenance Pavement	$40	$23	$23	$24	$24	$25	$25	$26	$26	$27
Bridge Program	$58	$94	$97	$100	$103	$106	$106	$104	$120	$126
Pavement Preservation	$141	$99	$103	$106	$109	$112	$112	$110	$127	$133
Total	**$241**	**$257**	**$266**	**$274**	**$282**	**$291**	**$300**	**$309**	**$323**	**$338**

Debt Service

Figure II-8 shows anticipated debt service payments through 2027. In 2027, the department will make its final debt service payment on currently outstanding bonds and will in 2028 have at its discretion an additional $150 million over current programmatic budget allocations. Some of this debt is paid with federal dollars already included in the federal revenue calculations. The balance is paid with SRF and the state's Highway Infrastructure Fund (HIF). Because the HIF is dedicated for certain bonded projects, its annual amount was not included in the TAMP-eligible revenues. However, $31.3 million of SRF is included in estimates of TAMP-eligible revenues as these funds will become available again to NMDOT at payoff. For purposes of simplifying the analysis, the large state contribution to debt service in FYs 2025 and 2026 was not factored into 10-year asset management revenues and expenditures.

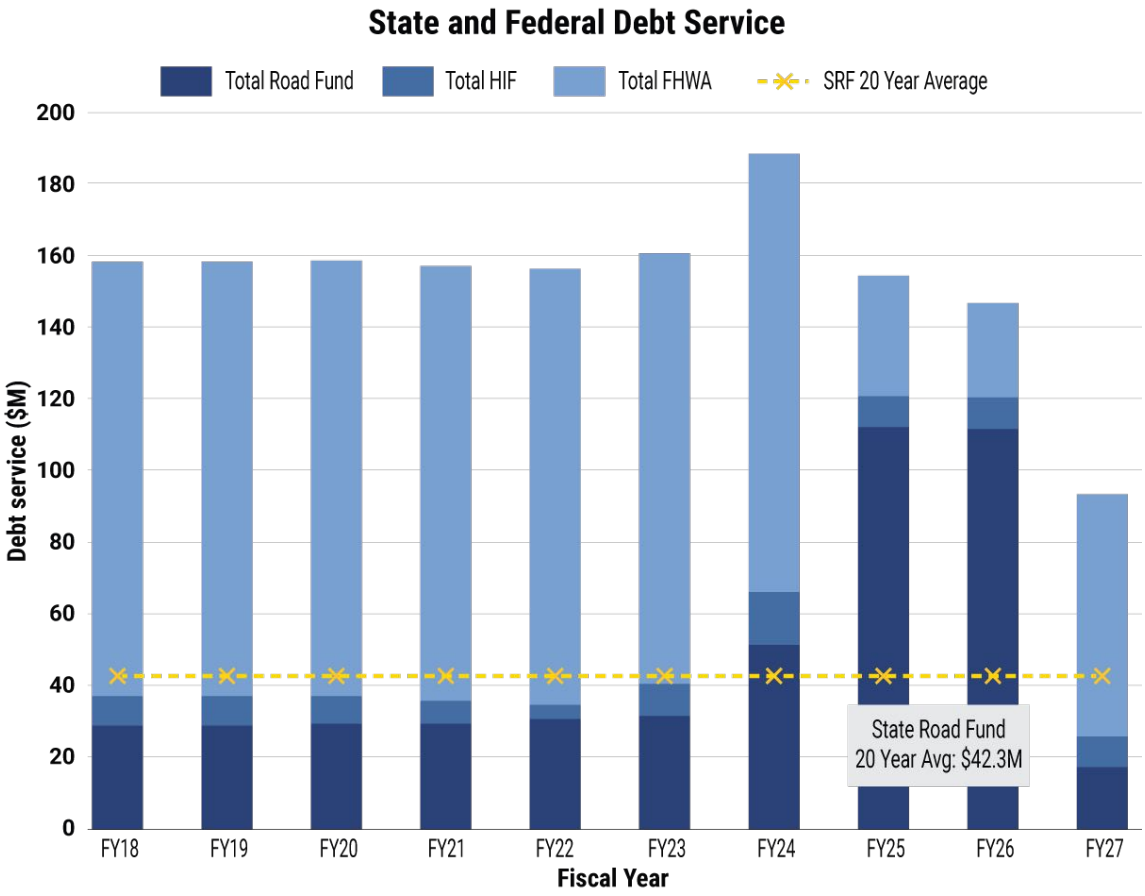


Figure II-8 NMDOT Annual Debt Service through FY 2027

The final element of TAM-eligible revenues in Table II-6 is the state-funded maintenance program. Since maintenance to the state's roads and structures helps extend the lives of assets, the funds expended for those activities are being factored into asset management performance forecasts.

Revenue Estimates

Table II-7 summarizes revenues available for transportation asset management, as described in the foregoing subsections.

Table II-7 TAM Eligible Revenues in FY16 (millions)

Federal Revenues	
$185.8	National Highway Performance Program
$88.2	Surface Transportation Block Grant Program
$274.0	NHPP+STP = Federal TAMP-Eligible before Debt Service
State Revenues	
$59.9	State Road Fund - Programs & Infrastructure State Match
$31.3	State Road Fund - Debt Service
$0.0	Hwy Infrastructure Fund - Debt Service
$91.2	SRF+HIF = State TAMP-Eligible before Debt Service
Federal + State Revenues	
$365.2	Total TAMP-Eligible before Debt Service
$24.7	Total Maintenance Bridges & Pavement (avg. FY13-15)
$389.9	Total TAMP-Eligible including Maintenance (before Debt Service)

Baseline Revenue Scenario

$389.9	Total TAMP-Eligible including Maintenance (before Debt Service)
-$149	Debt Service
$241	Total TAMP-Eligible including Maintenance (after Debt Service)

Total revenues available for transportation asset management in FY 2015 were calculated at $241 million, after the payment of all debt service. $241 million provides a baseline revenue scenario for asset management.

Chapter 5: Investment Strategies

Asset management investment strategies are the policies for resource allocation that will deliver the best asset performance given available funds and the goals and objectives of state and local agencies. Generating an asset management investment strategy involves assessing various funding scenarios designed to achieve and sustain a desired state of good repair and deliver the program efficiently.

Federal Requirements

FHWA requires that states include investment strategies as part of their transportation asset management plan. FHWA defines investment strategies as *"a set of strategies that result from evaluating various levels of funding to achieve State DOT targets for asset condition and system performance effectiveness at a minimum practicable cost while managing risks."* The asset management plan must discuss how the investment strategies make progress towards achieving a desired state of good repair over the life cycle of the assets in the plan, improving or preserving asset condition, achieving two and four-year state DOT targets for NHS asset condition and performance, and achieving national performance goals.

NMDOT's Investment Strategies

NMDOT's asset investment strategies are based on high level policies for emphasizing preservation and ensuring minimum standards based on different tiers of the transportation network. Available funds are allocated based on review of objective data about asset condition at network and asset-specific levels. Underlying the investment strategies are the performance targets and projections, life cycle planning, risk management analysis, and anticipated funding and cost of future work described in other chapters of this TAMP. The performance gap analysis, enabled by life cycle planning, helps define the investment needs of the system. Life cycle plans use the estimated cost of future work to establish network level strategies for managing assets. Available funding is a constraint for performance modeling, allowing New Mexico to more accurately predict future scenarios. Risk management tempers the analysis, adjusting potential outcomes based on positive and negative risks.

Goals, Objectives and Strategies: The New Mexico 2040 Plan

NMDOT recently undertook a long-range planning activity for the next 25 years, with the New Mexico 2040 Plan, adopted in September 2015. The Vision, Goals, Strategies, and Performance Measures in this plan guide the development of the TAMP. Specifically, Goal 3 of the long-range plan is to *Preserve and Maintain our Transportation Assets for the Long Term.* Four strategies were defined for this goal:

- 3.1 Asset management. Develop and implement a "preservation-first" asset management strategy to ensure that NMDOT will maintain all existing and future elements of the state's transportation system in a state of good repair.

- **3.2 Consider life cycle cost in all capacity expansion decisions.** Apply life cycle cost analysis techniques (consistent with best national practices) as one of several factors for evaluating and prioritizing capacity expansion activities.
- **3.3 Priority tiers and minimum standards.** Prioritize investment of funds by "tier" to achieve minimum standards for design, maintenance, and efficient operations.
- **3.4 Address legacy challenges.** Ensure that NMDOT can affordably meet the minimum condition standards for each roadway tier by right sizing the state-owned network to provide the needed capacity to support statewide connectivity standards.

Overview of Resource Allocation and Prioritization

Allocation and prioritization of available funding emphasizes preservation of existing assets to maintain them in a state of good repair. NMDOT policy has been to dedicate a significant portion of flexible spending to preservation of the existing system. Allocations to preservation are balanced against needs to replace assets that have reached the end of their service life or require improvement to meet important safety and mobility needs.

Given realities of limited resources, NMDOT prioritizes investments in elements of the transportation system that are most critical for movement of people and goods. NMDOT has defined four "tiers" of the system, illustrated in Figure II-9. For the highway mode, Interstates are the top tier, with remaining tiers defined based on population, traffic volumes, freight routes, and inclusion within the NHS.

Tier	Roads	Freight	Bus/Rail	Pedestrian	Bicycle	Aviation
1	Interstates	Interstates Transcontinental Railroads	Demand for >35 scheduled trips per week in each direction	Urban highway routes … with population concentrations	High demand on-system routes	Primary commercial airports (e.g., Sunport)
2	Cities 20k+ Demand > 10k High tourist demand destinations	Remainder of priority truck network High demand shortline railroads	Demand for 20-34 scheduled trips per week in each direction	… with pedestrian generating land use	Medium demand on-system routes	Non primary commercial airports
3	Cities 10k+ Demand > 5k Rest of NHS Tourist destinations	Remainder of active short line railroads, regionally significant freight network	Demand for 5-19 scheduled trips per week in each direction	… all other segments	Low demand on-system routes	Reliever airports
4	All others	Abandoned railroads	Demand for 1-4 trips per week in each direction	Non-urban highways, no ped accommodation	Routes that appropriately prohibit bicycles	General aviation airports

"Gold Standard" Highest performance targets | "Silver Standard" Mid-level performance targets | "Bronze Standard" Lowest performance targets | Not appropriate for investment

Figure II-9 Priority Tiers (New Mexico 2040 Plan)

Resource Allocation within NMDOT today refers mostly to the process of distributing dedicated budgets to the appropriate programs and discretionary budgets among the six NM Districts. Discretionary funds are derived principally from the National Highway Performance Program (NHPP) at the federal level and State Road Fund (SRF) at the state level.

Similar to many states, New Mexico District Engineers have substantial discretion over the allocation of funds once the funds are divided among the six districts. While districts vary in their approach to prioritizing assets, many are working to incorporate preventive maintenance activities

to extend asset life. However, tight budgets and the need to act responsively, whether to address deterioration or to respond to emergency needs with direct driver impacts limits their ability to take on more preventative maintenance work.

NMDOTs State Transportation Improvement Program (STIP) contains the results of the resource allocation and prioritization process. The STIP is a four-year program of projects. It is fiscally constrained for the first four years – funding is identified for each project from available sources. FHWA approves the STIP every two years, and it is amended quarterly.

The remainder of this chapter describes current processes for identifying and prioritizing pavement and bridge projects and assigning funds to programs and projects in the STIP. It should be noted that these processes are expected to evolve as NMDOT works to improve its data and analysis capabilities – providing a firmer foundation for data-driven investments. A shift from district-based resource allocation decision-making to a needs-based and target driven decision-making at both a statewide and district level is expected.

Telling the Story: Funding

Heather Sandoval, Assistant District Engineer

In order to maintain a well-connected system, New Mexico must maintain many miles of rural routes, balancing those needs with those of the National Highway System (NHS) and of urban roadways. Rural roads often have different traffic characteristics that drive their preservation needs. Heavy truck traffic can make up a high proportion of use, often on surfaces that weren't necessarily built to withstand this kind of traffic. "We get trucks that bypass I-40 and come across the little roads, cutting across Texas on smaller routes," Heather Sandoval, Assistant District Engineer in District 4, explains. That rural truck traffic may further increase due to industry, according to Heather. In District 4, Heather notes that Routes 39 and 402 see heavy truck traffic due to the oil and gas industry. Major roadways are also affected, with Heather also seeing more and more truck traffic on the District's portion of Interstate 25.

When a large project arises, the funding challenge increases, since rural areas typically do not command the large requests more common to urban areas, and funds must stretch over both the large and small project needs. As an example, Heather says, "the Canadian River Bridge on US 54 immediately southwest of Logan will take two years to fund. We're estimating that job to be about $21 million in bridge and roadway." The true scale of the project for the district comes into focus when remembering that the annual district federal funding target is just $26 million.

Heather gets weekly requests from the public regarding maintenance needs and often must explain the tradeoffs given the scale of the District's budget versus its needs. She says that during the most recent STIP amendment process, she received 17 comments on the state of Route 39 alone, which is a chip-sealed scenic byway that many wish could be rehabilitated to top tier condition. "I had to explain to them that we get $6 million to address about 6,400 lane miles," she says.

Identification of Bridge and Pavement Projects

Prioritization of capital bridge projects for the STIP is conducted through a collaborative process between the GO and the Districts. Figure II-10 illustrates the basic process for bridges.

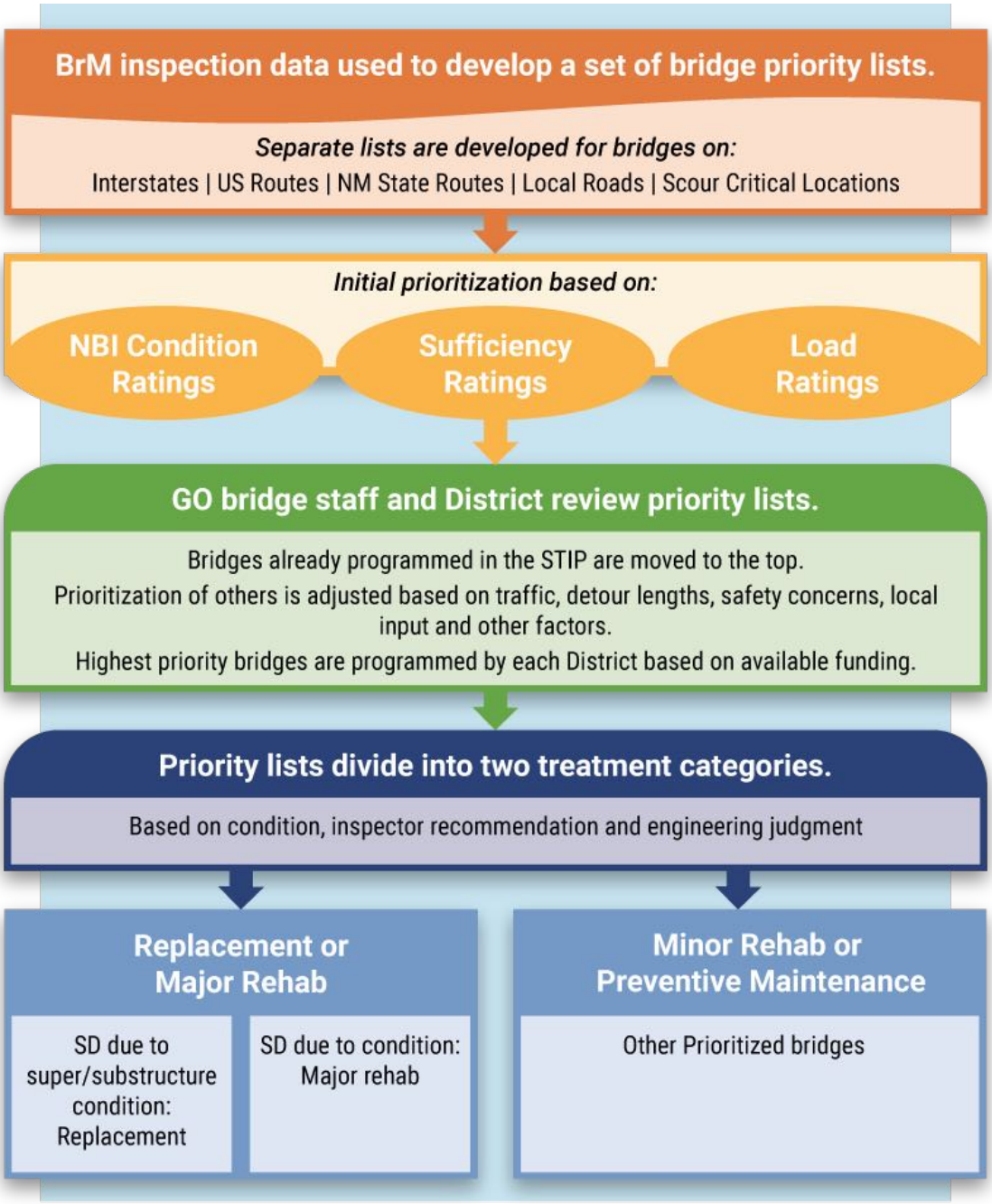


Figure II-10 Bridge Project Prioritization Process

While there is variation across Districts in how paving projects are identified, prioritized and programmed, the following steps in Figure II-11 are typical.

The GO provides pavement condition data to the Districts. In addition, Districts do their own monitoring of pavement conditions via road patrols.

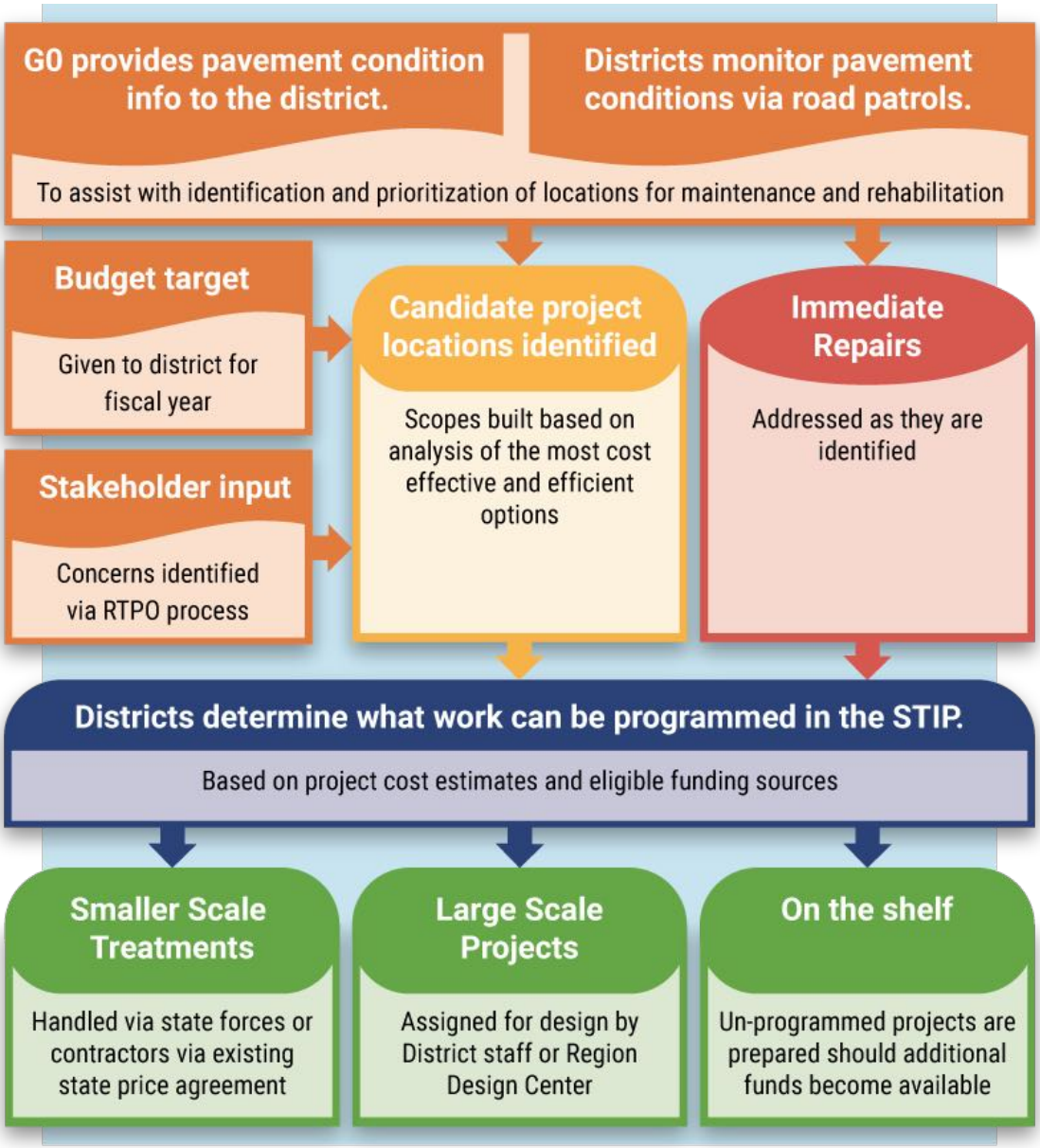


Figure II-11 Pavement Project Prioritization Process

Programming Process

Resource allocation or programming at NMDOT follows the process in Figure II-12. Dedicated resources are first programmed to debt service and obligatory budgets such as Congestion Mitigation and Air Quality (CMAQ). Depending on the year, the set-asides for dedicated programs leave approximately half of the annual budget for discretionary expenses including asset management.

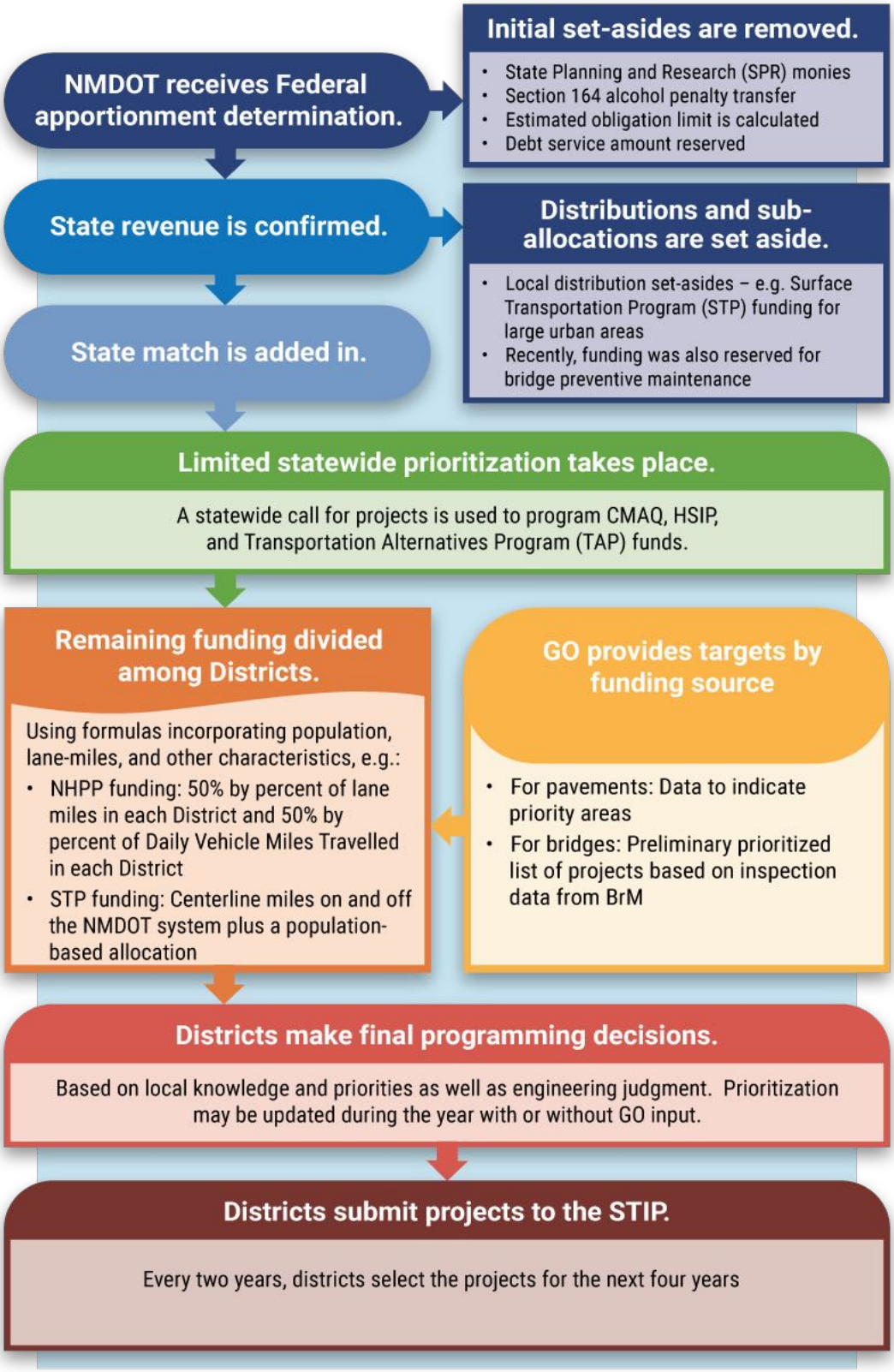


Figure II-12 Programming Process

Telling the Story: Life Cycle Planning

Leo Montoya, District 1 Maintenance Support Engineer, on the current use of life cycle tools for pavement and bridge

Leo Montoya, is a proponent and frequent user of NMDOT's Pavement Management System (PMS). He notes that NMDOT's PMS "Recommends what would have been recommended in the field; so far it's fairly accurate."

Leo cites the example of the I-10, I-25, and US-70- fog seal treatments under consideration. In order to verify whether the work made sense, it was analyzed using Production 7 of the PMS. "We applied the constraints in the system and we verified in the field." However, Leo notes that he still has to consider a time lag between the data and the condition – the most recently completed work may not yet be reflected in the system, since it relies on inspection data.

Being able to analyze needs the same way for bridge is an intriguing possibility. "If we get this capability with the bridge system, it will be another tool in the toolbox," Leo says. Right now, bridges are prioritized by sufficiency ratings, and the system recommends a bridge rehab, replacement, or preservation based on these ratings. However, Leo notes, "It does not get specific to the component level or element level or recommend dollars" in the way that the pavement system already does.

With the assistance of the PMS, District 1 has received enough money for this year's pavement work and is ready now to move funds to routes with needs in the following year. According to Leo, "District 1 gets the money by showing it has a need, has a plan, and can fit additional funding within that plan."

Chapter 6: Risk Management

NMDOT defines risk as the positive or negative effects of uncertainty or variability upon agency objectives. Risk management involves the cultures, processes and structures that are directed towards the effective management of potential opportunities and threats. This chapter discusses NMDOT's risk management approach, identifies risks to transportation systems, and discusses NMDOT's initial risk assessment, evaluation and prioritization. It explains what uncertainties, threats, and opportunities NMDOT faces over the 10-year horizon of this plan. Note that NMDOT has established processes for managing a variety of types of risks, such as risks of project cost and schedule overruns. The risk management plan for the TAMP addresses risks not otherwise addressed through existing programs and processes. Figure II-13 illustrates that risk is a key element of NMDOTs Strategic Framework.

To achieve an asset condition target and sustain it for the 10-year horizon of the Asset Management Plan requires the agency to identify and manage many risks or uncertainties. The intent of risk management is to support performance, to manage threats to objectives, and to capitalize upon opportunities presented. Risks to the NMDOT highway system are inevitable, and as such they cannot be ignored. Performance cannot be achieved if the risks to that performance are not addressed. The more ambitious and long-term the performance goals, the more risks those goals face.

Figure II-13 Risk Within the Strategic Framework

Risk management strengthens asset management by explicitly recognizing that any objective faces uncertainty and determining what strategies can be made to address this uncertainty. By being proactive rather than reactive and avoiding "management by crisis," NMDOT can further build public trust by managing expectations and addressing concerns. Being proactive also allows NMDOT to capitalize on opportunities that may arise from risk management strategies like those described at the conclusion of this chapter.

To develop this TAMP, several types of risk to NMDOT's assets and related processes were considered, including:

- Risks to achieving and sustaining asset conditions in New Mexico
- Risks to information to support decision making: management systems and inventories
- Program risks (bridges, pavements and other assets)
- Financial risks such as inflation, funding at federal and state level

Risk Register

NMDOT seeks to manage risks to current and future users of the transportation system, keeping in mind that a key concern is higher future costs based on decisions made in the present. These decisions can impact long-term performance as well as short-term performance. As part of the development of the TAMP, NMDOT has developed an initial risk register identifying potential risks and classifying them by their likelihood and potential impact. These are listed in order of greatest risk. Figure II-14 presents the risk matrix used to categorize risks.

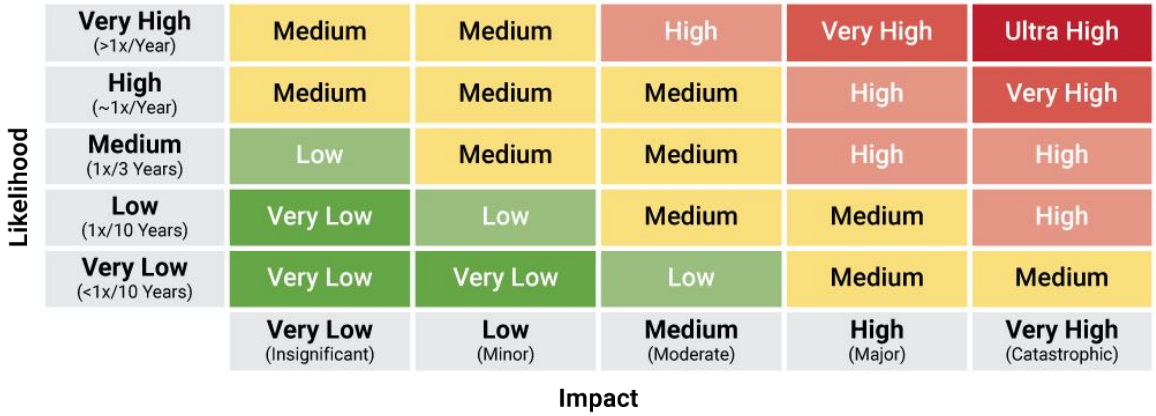


Figure II-14 Risk Matrix

Table II-8 lists the key risks identified by NMDOT staff. As indicated in the table, two major types of risk are perceived as the greatest risks to achieving targets for asset condition: financial/funding related risks and risks to information which supports decision making.

As described in Chapter 3, projected performance is expected to fall short of NMDOT's targets given available funding. Further, there is great uncertainty about what funds will actually be available over a 10-year period.

Table II-8: Risk Register

Identified Risks	Rating *(where applicable)*
Financial Risks	
Uncertain budget allocations between asset classes and between tiers of the highway network, such as between the Interstate Highways and other tiers	Very High
If the average annual construction inflation rate is greater than 5 percent and not the equal-to-or-less-than 2 percent estimate, then the agency's financial assumptions about the adequacy of its asset management budgets will be at risk	High
If the agency receives a decline in real, or inflation-adjusted funding, then its asset conditions will be at risk	Medium
The risk that NMDOT cannot overcome "data doubts" and its forecasts and prioritization recommendations will not be credible	Medium
Gaps in data required to support decision making	
NMDOT may not be able to collect the data needed in a timely or acceptable fashion for decision making	High
If the agency lacks complete information on asset conditions then projects can be scoped incorrectly leading to scope creep and not using funds cost-effectively	High
Making wrong decisions and redirecting resources to the wrong assets because of inaccurate asset condition data	Medium
If those working on both projects and maintenance activities do not have an understanding of budget amounts, budget limitations, and the true cost of the projects and activities they run the risk of overspending on projects and maintenance activities and consume resources that are needed elsewhere	Medium
Limitations in use of pavement model	
The risk that the pavement model does not consider climate, geographical location, average daily traffic or truck loadings in its deterioration forecasts resulting in inaccurate forecasts	Very High
Extreme events – natural and man-made	
The risk from disasters such as flooding, fires, slope failure and potential man-made disasters	Medium
Risks to the TAMP Program	
Continued political support is required to ensure the Asset Management Plan can be implemented as intended	High
The risk of management buy-in to preventive maintenance which is important to sustaining asset conditions over the long term	Medium
The risk that asset management will not continue in the future to receive the executive support it now receives	Medium

Identified Risks	Rating *(where applicable)*
The risk that federal requirements will abruptly change	Medium
Loss of institutional knowledge	
The risk of inadequate training and knowledge in the workforce caused by staffing levels and the loss of expertise as staff retire or leave	Medium

Regarding risk to information, there is a risk that NMDOT may not have the necessary data management and analytical capabilities to make the best asset management decisions. NMDOT noted a lack of critical data in many areas such as pavement inventories and inventories for other key assets such as signs, overhead sign trusses, intelligent transportation system (ITS) components, culverts and other drainage assets, guardrail, pavement markings and other assets which puts at risk the ability to identify needed investments in these assets. Similarly, there is a need for good forecasting ability to determine needed investment in expensive bridge and pavement assets, without which the confidence decreases in estimates of how much revenue will be needed to sustain asset targets.

Inefficiencies in resource allocation can result in a diminished ability to pursue the right improvement and negative public perception of the department. Similarly, inefficiencies in allocating staff efforts can result in poor employee morale and necessary reduction in other initiatives. Together, these inefficiencies could have impacts on asset condition and safety and could lead to increased agency liability and negative public perception of the agency.

Strategies for Addressing Risks in the Risk Register

Following identification of highest priority risks, NMDOT staff evaluated potential risk mitigation options. Staff concluded that over and above existing programs and processes, the greatest potential for risk mitigation lies in strengthening NMDOT's commitment to asset management and increasing education within NMDOT. The following specific strategies are recommended:

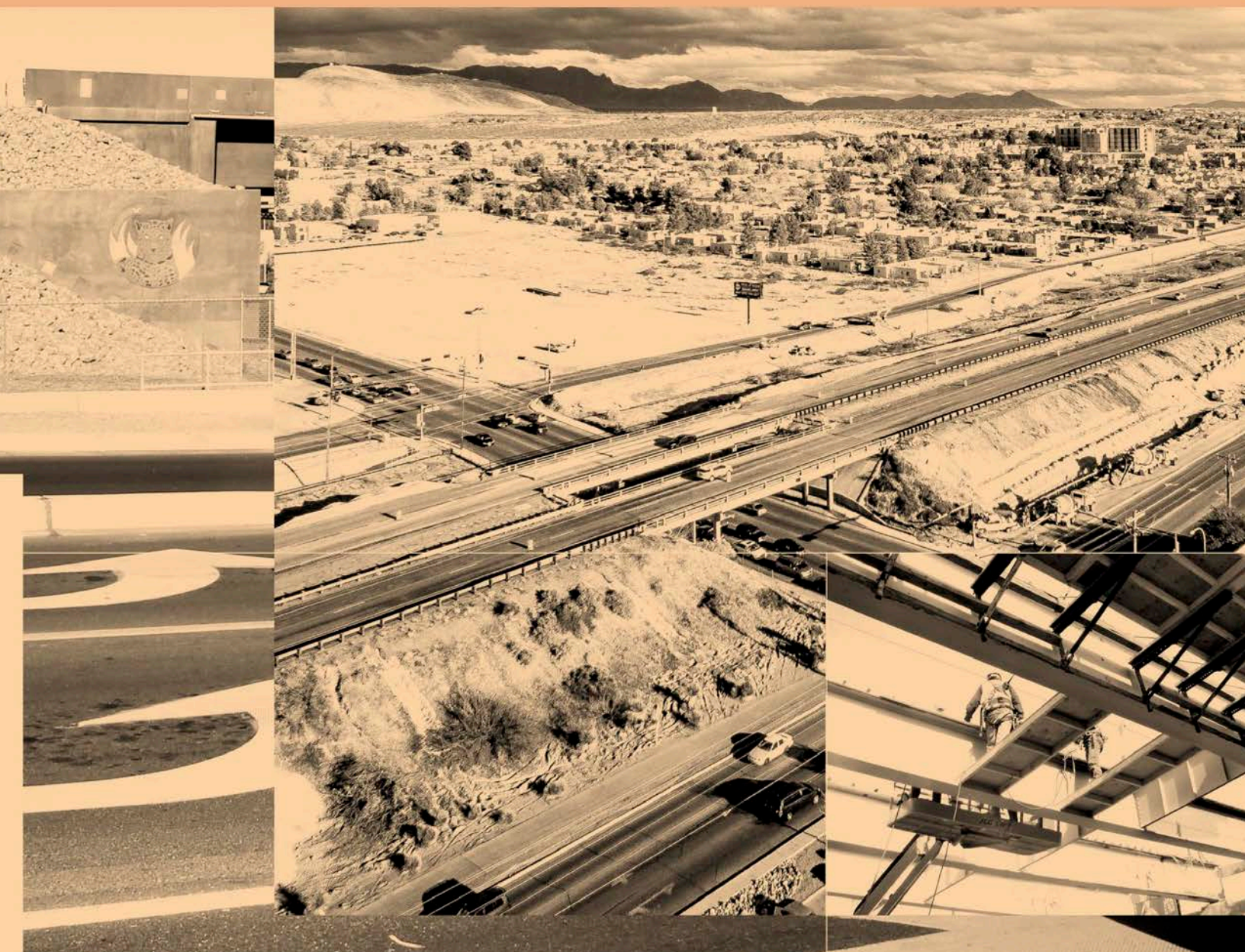
- Have senior leadership commit to transportation asset management
- Have senior leadership commit to developing data for better decision making
- Establish policies that will outlast terms of elected/appointed officials
- Communicate the commitment to asset management strategies
- Mandate a communications plan around the commitment to asset management
- Tie training plans to managing employee performance (MEP) reviews
- Develop an IT plan for knowledge retention
- Develop a SharePoint site detailing asset management plans and strategies
- Develop a communication plan to support understanding of asset management
- Implement further asset management training

New Mexico Department of Transportation

Transportation Asset Management Plan

SECTION III. TOMORROW

How Do We Get There?



While the prior section described where NMDOT wants to be for asset management, this section details specific, actionable steps that individuals and teams within the department can lead to help achieve that desired state. This final section of the TAMP is not the end of NMDOT's TAM journey, but rather the transition from planning to implementation.

Section III Contents:

Chapter 1: TAM Framework and Leadership

To ensure a successful Transportation Asset Management (TAM) program, the TAMP building process has included a focus on NMDOT's leadership structure and organizational framework as well as the alignment of these components needed to define improved business processes and guide the change that is inherent in the TAMP development and implementation process. Figure III-1 represents the basic TAM relationships at NMDOT, with more details following.

Figure III-1 TAM Relationships

TAM Leadership

Leadership for TAM at NMDOT is guided by a TAM Executive Steering Committee, led by a TAM champion. Primary stakeholders included in the TAM oversight are designed to be broad and inclusive across departments, with participation from planning, programs, asset management, engineering, operations, and districts.

The Executive Steering Committee oversees the development of the TAMP. This team sets the direction of the plan considering transportation goals and objectives to move the NMDOT into a Performance-Based decision-making organization. Further, the committee is responsible for

aligning the organization, developing the TAMP, and verifying the necessary processes, tools, and systems are in place to support TAMP implementation.

Ensuring district engagement in the TAM process is a key element of success. TAM leadership is collaborating with districts that have typically operated independently of each other in an effort to gain district participation, integrate business processes, align performance standards, and establish standard data management principles.

TAM Working Group

The TAM Working Group works collaboratively with the TAM leadership and the Executive Steering Committee to provide feedback and improve the TAM implementation process. This team, similar to the TAM Executive Steering Committee, consists of a diverse representation of NMDOT personnel, including members from design, data management, bridge management, pavement management, maintenance, information technology, and the districts. They are tasked with providing consistent and timely input during the TAMP development and ensuring that it is delivered on schedule.

Decision Making Structure for TAM

The current structure for TAM-related decisions is spread across NMDOT, with the program and project development process predominantly managed by each district. The General Office (GO) provides guidance for bridge and pavement decisions to the districts by sharing analysis results from the pavement and bridge management systems. The implementation of this TAMP will result in improved decision-making processes from a statewide perspective in order to assist the districts with prioritizing the most impactful projects and meeting the established targets.

Relationship with Other Initiatives at NMDOT

TAM and New Mexico 2040 Plan (2040 Plan) activities will require coordination given that asset management and long-range planning are closely related. Both should contain state of good repair performance targets and should identify future investment needs by asset type to meet those targets. In order for NMDOT to derive the maximum benefit from the 2040 Plan and the TAMP, it is important that the two plans provide compatible recommendations. Figure III-2 provides an overview of the asset management planning process and how the different plans and programs fit together to work towards NMDOT's vision.

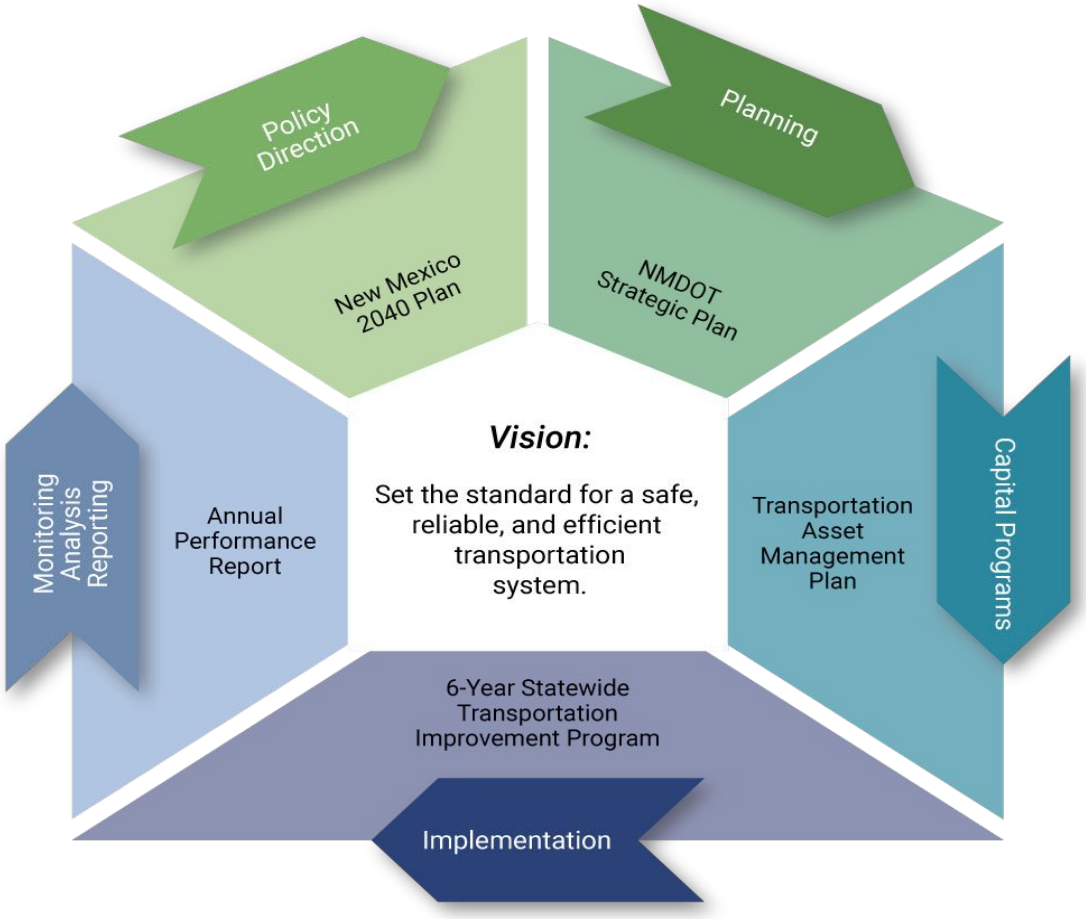


Figure III-2 NMDOT Asset Management Planning Process

Data-Driven Decision Making

NMDOT is responsible for the management of all state-owned assets, with the largest asset classes being bridges and pavements. These assets are the lead actors in this TAM story. The primary plot of NMDOT's TAMP is the directive to implement data-driven decision making throughout NMDOT's business practices. Data-driven decisions provides NMDOT a framework to make the best decisions with the available resources to maximize benefits to its customers.

In implementing this TAMP, NMDOT will:

- Develop and implement policies focusing on the use of data to make transportation infrastructure decisions
- Collect and utilize reliable, accurate, and timely data on the condition of pavement and bridge assets in the state transportation system
- Determine the correct treatment at the right time to maintain the existing statewide infrastructure in the best condition over time within constrained resources
- Maintain condition and reduce deterioration of the state's infrastructure through innovation and engineering
- Improve access to NMDOT information

Implementation of the TAMP is dependent on accurate information and advanced data analysis capabilities. Data-driven decision making utilizes a range of data types including granular asset condition details; locations of crash sites, rumble strips, and centerlines; maintenance schedules; and location referencing data. NMDOT's information vision drives the imperative to improve data in order to make better decisions, link related information, and ultimately provide better outcomes. Improved data vision is aimed at enabling a "one-stop shop" for asset information for better communication with the public as well as sharing data across NMDOT units.

Telling the Story: Creating NMDOT's Asset Management and Planning Division

Tammy Haas, Director of Asset Management and Planning

After the passage of MAP-21, NMDOT's executive leadership determined that an Asset Management and Planning division was needed in order to best comply with the new regulations and improve TAM in New Mexico. With extensive knowledge of NMDOT, strategic planning, and performance measures, Tammy transitioned from being a District Engineer for district 3 to spearheading the Asset Management and Planning Division and leading the TAMP development.

After the Asset Management and Planning Division was formed, one of the first improvements was assisting the maintenance division with improving its capabilities. Tammy stated, "After we participated in webinars with AASHTO and others, we could see the improvements we could make, so we initiated an effort to implement our new maintenance management system (MMS)."

Tammy's vision for improved asset management includes new ideas for the programming process. "When we can run the pavement and bridge models to understand how our assets will perform under a constrained budget, we can support the districts in making better decisions. Districts can see the projects that will deliver the best value." Tammy envisions a process where funds are made available for ready-to-go projects.

"We want to make sure that our metrics and how we track them are helpful in strengthening the linkage between other plans, such as the Statewide Long-Range Transportation Plan, the Strategic Highway Safety Plan, and the Statewide Transportation Improvement Plan. We want to implement asset management in a comprehensive manner that leverages those plans and allocates resources efficiently."

Figure III-3, below, illustrates the objective of creating a data-driven decisions environment.

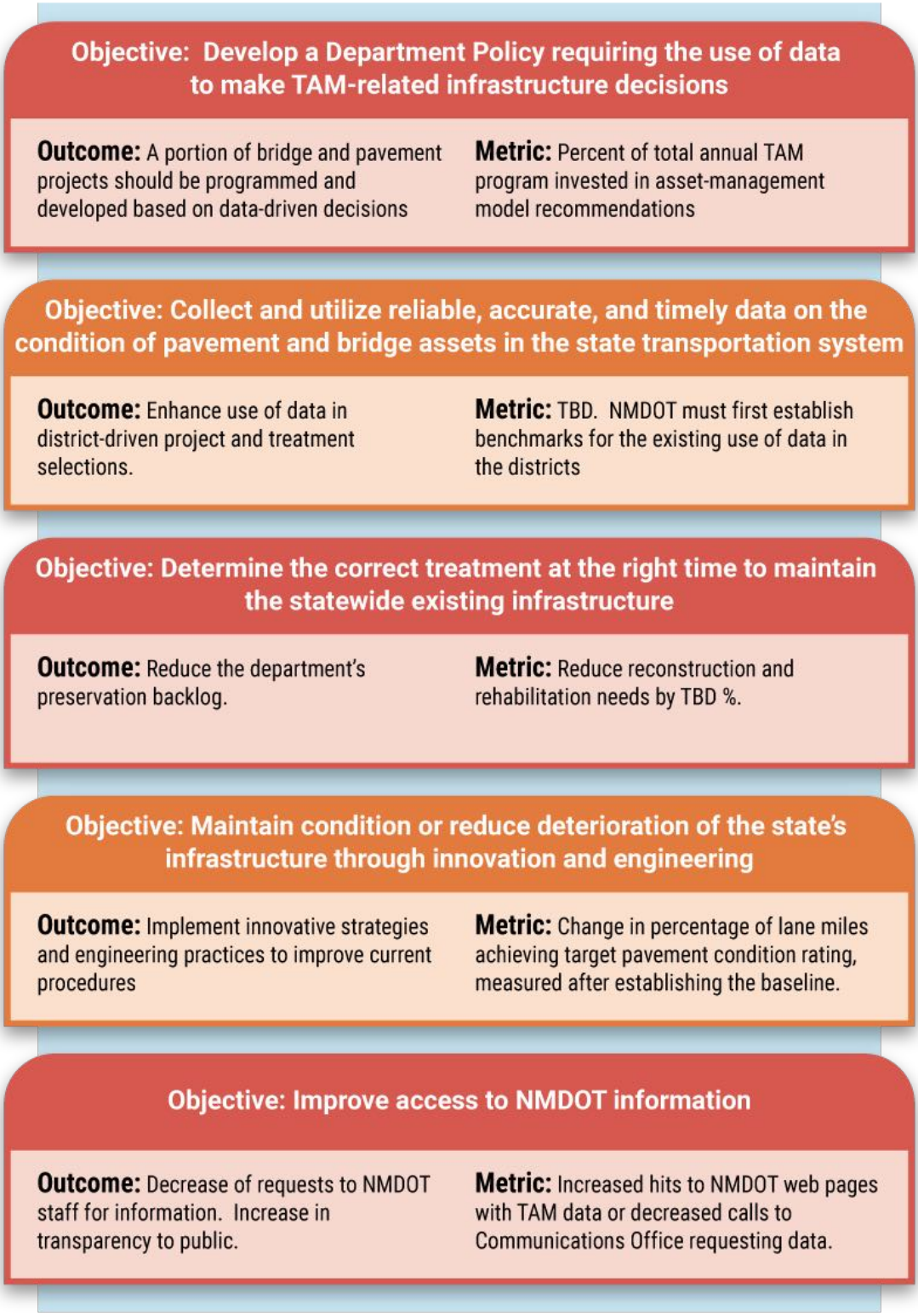


Figure III-3 NMDOT Objectives, Outcomes and Metrics

Chapter 2: Priority Action Items

The TAM Working Group and representatives from several NMDOT districts participated in a series of workshops that resulted in the identification of process improvements to the TAM program that should ultimately improve the performance of NMDOT assets. Below is a list of the highest priority improvement actions. Each action item is described in greater detail in the following section.

Each initiative has identified champions, the key objectives, and a target completion date for the initial set of activities. A status diagram of three stages is included with each action item.

- Stage A: Crawl (indicates being in the earliest stage of implementation and maturity)
- Stage B: Walk (indicates that the action area is well underway)
- Stage C: Run (indicates a high level of maturity and impact in the action area)

A stage is indicated for each action to highlight the level of progress towards delivering the action. In addition to this status indication, a description of the progress is included.

Priority Action Item 1: Enhance Asset Models

Champions: Jeff Vigil and Jeff Mann

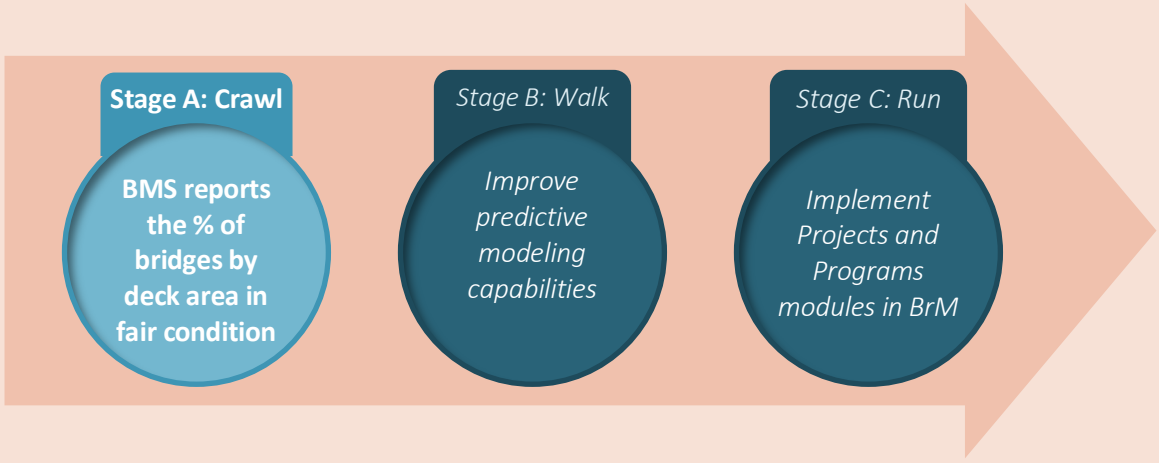
Objectives: **Bridge –** Use the latest version of the AASHTO BrM software to improve predictive modeling capabilities to determine future conditions for Interstate, non-Interstate NHS, and NMDOT owned non-NHS bridges at various funding levels. Implement Projects and Programs modules in BrM to ensure data driven decisions.

Pavement – Continue to refine decision trees, unit costs, and other pavement model elements to strengthen the accuracy of NMDOT's pavement performance forecasting. This will be done by monitoring and providing feedback on project and other preservation results.

Bridge and Pavement – Develop statewide technical committees for each asset comprised of General Office (GO) asset managers, district representatives, data managers, and others that convene quarterly to guide model enhancement and improve GO-district coordination.

Target Date: June 30, 2019

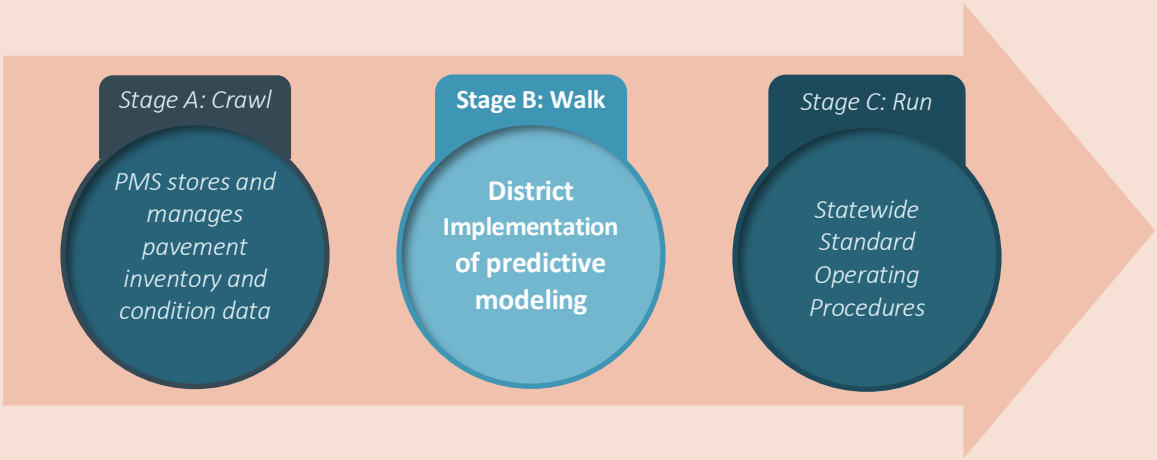
Bridge Status



Implementation Plan Recommendation:
Incorporate life cycle cost considerations when selecting asset management projects

NMDOT performs rehabilitation and preventive maintenance activities on its bridges. However, decisions on funding these activities are difficult because NMDOT is working in an environment in which the current backlog of work on structurally deficient bridges significantly exceeds current funding levels.

Pavement Status



Implementation Plan Recommendation:
Incorporate life cycle cost considerations when selecting asset management projects

In 2017, NMDOT established a Pavement Technical Steering Committee consisting of District technical and maintenance engineers and General Office Pavement, Maintenance and Materials engineers. Tasked with providing guidance and overall implementation of pavement management principles for use at NMDOT, the Pavement Technical Steering Committee will drive decision making pertaining to pavement management database process improvements including development of statewide operating procedures, establishing pavement State of Good Repair metrics, and establishing pavement management budget scenarios and pavement performance forecasting. Pavement projects are identified and selected by NMDOT district officials based on their knowledge of local conditions and engineering judgment. There is a general desire to be more proactive and less reactive when it comes to projects and strategies.

Priority Action Item 2: Improve Data Integration and Enhance Mapping

NMDOT's leadership has established a vision to use data-driven decisions to achieve the agency's goals. Better data enables better decisions, better relationships, and better outcomes. Data is a key component supporting NMDOT's TAM program and implementing the actions needed to deliver the targets in the TAMP and meet New Mexico's transportation goals.

NMDOT has identified gaps for bridge, pavement, and other asset data, plus road inventory information. A framework is needed for addressing these gaps and developing a collective understanding of what each of the data efforts should look like.

Champion: Yolanda Duran

Objectives: Maintain web-centric TAM Program integrated with asset management systems.

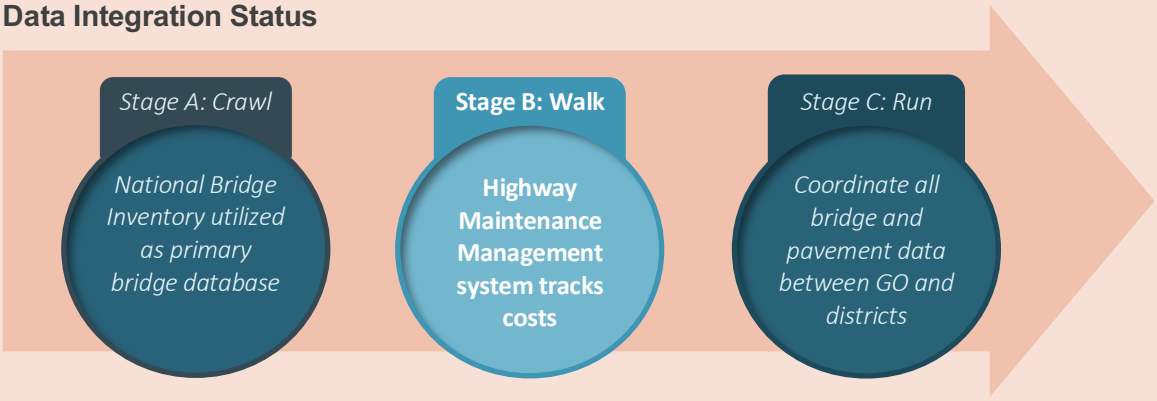
Improve accessibility of data through development of a map-based information portal as a one-stop shop for spatially organized information and a customer-oriented web portal with apps for tablets and mobile devices.

Improve data coordination between GO and districts by holding quarterly meetings of bridge and pavement technical committees in order to:

- Promote enhanced understanding and use of project and treatment selection through the pavement model
- Develop and implement improved decision trees for bridge projects based on inspection scores and BrM recommendations

Target Date: June 30, 2019

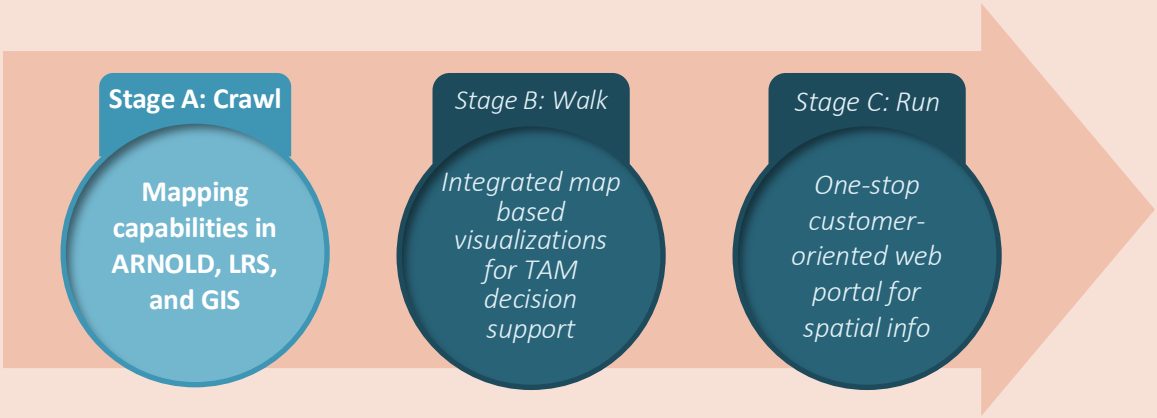
Data Integration Status



Implementation Plan Recommendation:
Have access to historic condition information at both the network and asset levels

NMDOT staff identified the need to improve access to bridge and pavement data. In order to provide the data to staff, a performance dashboard will be used in order to provide current pavement and bridge condition data through a map-based portal as well as provide historical condition data through a tabular format. The dashboard will include summary condition data at the statewide level as well as district level that is linked to Brm and PMS datasets. In addition, maintenance data will be accessible to allow the user to determine costs associated with various work activities done with state as well as contract forces.

Enhanced Mapping Status



Implementation Plan Recommendation:
Improve data access, sharing, and mapping

NMDOT has made recent advances in data and information systems related to asset management. There are several ongoing efforts aimed at further improving these resources. NMDOT intends to build on these efforts to ensure that decision makers can easily access data and information needed to support asset management decisions. NMDOT is implementing ESRI's Roads & Highways database in order to link all data spatially. The Linear Referencing System (LRS) that meets Federal requirements for an All Roads Network of Linear Referenced Data (ARNOLD) is complete and calibrated. The LRS will be utilized in the Pavement Management System and Maintenance Management System as well as the Bridge Management System in order to link assets spatially that will provide the foundation for the one-stop customer-oriented web portal.

Priority Action Item 3: Improve Resource Allocation

Champion: Tammy Haas

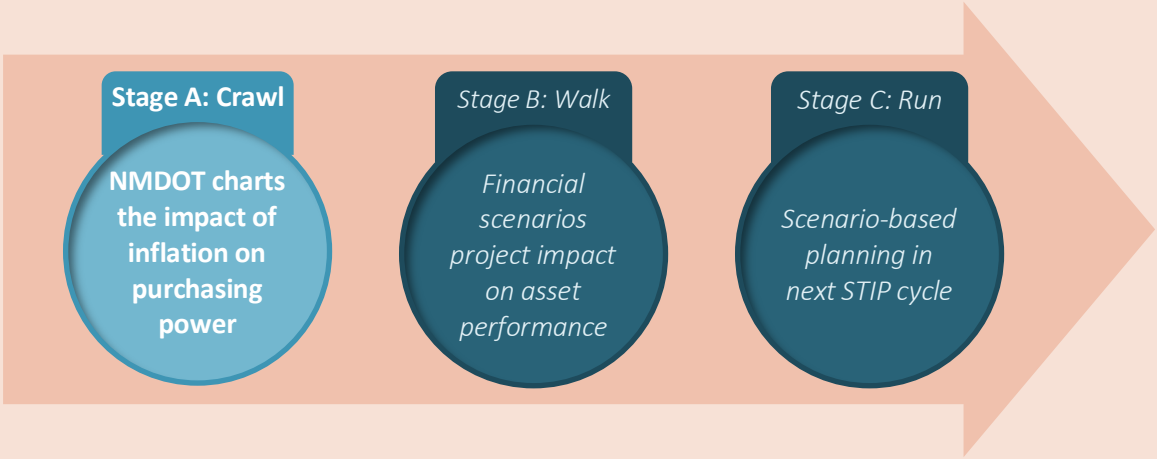
Objectives: Develop Integrated Resource Allocation Plan that links long-range plan, 10-year asset management and capital improvement programs, STIP, and the annual budget.

Incorporate financial scenario-based planning into next STIP cycle.

With districts, build project pipeline model of future construction projects that schedules various project phases (environmental, design, construction, etc.) through the next STIP.

Target Date: June 30, 2019

Improve Resource Allocation Status



Implementation Plan Recommendation:
Build access to complete and accurate information regarding historic expenditures at the project, work type, and program levels

Allocate the available funds to program areas based on agency objectives, public perception, performance implications, life cycle cost considerations, and risk mitigation strategies. NMDOT will develop a process to evaluate construction cost data for pavements, bridges and other assets from information obtained at construction bid openings and from statewide price agreement bids in order to determine increases in construction and maintenance items and to update the costs used in the pavement and bridge models. Tracking construction and maintenance costs will allow NMDOT to evaluate inflation on purchasing power and to predict future funding needs for asset management related to life cycle planning. This data will allow NMDOT to evaluate various scenarios and their impact on asset performance using scenario-based planning.

Telling the Story: Enhanced Financial Planning

Larry Maynard, District 6 Engineer, Support for a Baseline District Budget Blended with Statewide Prioritization

Inconsistent funding is a risk to preservation efforts across NMDOT's districts. While funding is always a constraint, being unable to plan for the degree of constraint and make tradeoff decisions in advance decreases efficiency and hampers proactive preservation efforts. Larry Maynard, District 6 Engineer, sees this as a key challenge to NMDOT achieving its goals. He shares his experience that while the agency is better prepared to manage this risk than in previous years, challenges remain. In order to achieve consistency, NMDOT desires an established baseline budget for the districts in combination with statewide prioritization.

As Larry explains, "If our funding is inconsistent, then our planning is inconsistent." Costs for preserving bridges or pavements can vary considerably by project, and so there is a complex variety of pieces to fit into the budget. "We have preservation that costs $7,000 a mile, and we have preservation that costs $1 million a mile," Larry notes. The districts have a minimum funding level to achieve the baseline condition required for the system, as Larry explains: "There's a minimum funding level that just keeps our heads above water." But, this minimum level isn't necessarily enough to embark on proactive preservation efforts that may save work and money down the line. "If we have only the minimum amount available, we have very little that extends the life of the roadway," Larry says, "While if funding drops below that minimum level, we have roadways that begin to fall apart, and the public will think we have a failed program." This is what could occur at the low tide of inconsistent funding.

Most years, the funding does meet the minimum needed level. "When our (surface treatment) budget went from $19 million to $5 million, we had roads in bad shape. As we got back up to $19 million, we've been fine ever since."

Funding can sometimes exceed expectations, presenting other challenges. "Every once in a while we get a big infiltration of money, and we can do a bunch of reconstruction." This might sound like a good thing, but it is difficult to make the most of a surprise windfall given the timeline needed to program, contract, and ensure the right manpower and equipment. Lining this up takes considerable effort, and doing so reactively is less efficient.

"Just scheduling manpower and equipment is difficult," says Larry. "If you throw a lot of money at us, we have to overpay to find other ways to get that money invested on the road." Instead, "With a consistent budget, we can plan strategically and be proactive instead of reactive. The taxpayers benefit greatly from the stability in funding."

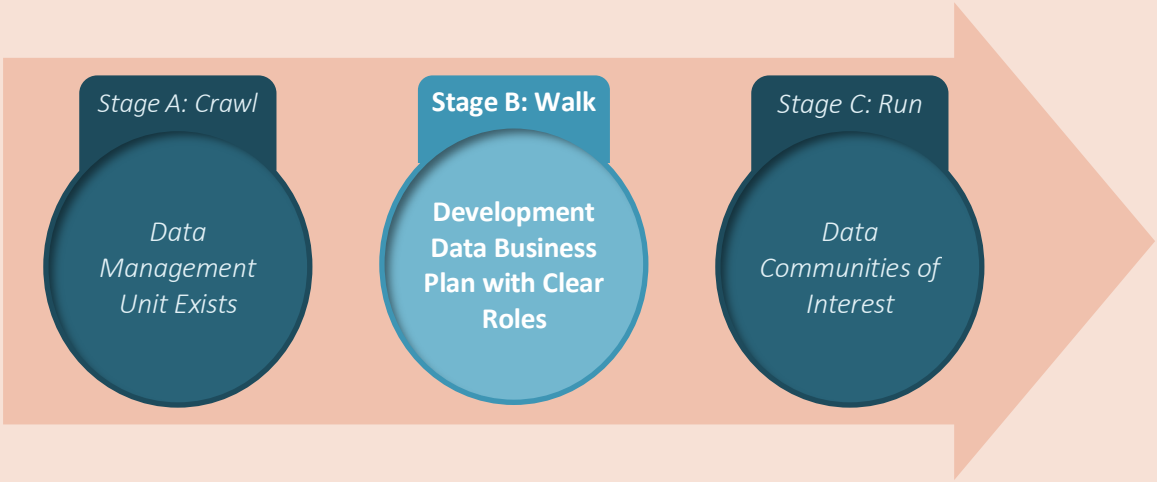
Priority Action Item 4: Clarify Data Governance

Champion: Anthony Lujan

Objectives: Develop Data Business Plan that includes a Data Governance Plan for use in the ongoing coordination needs across organizational units and concurrently implement data Communities of Interest for ongoing stewardship of priority data.

Target Date: December 31, 2018

Data Governance Status



Implementation Plan Recommendation:
Develop an enterprise-wide data business plan with clear roles identified. This will be followed by the creation of data Communities of Interest.

Data is understood as an important element of NMDOT's asset management program and is managed to both improve and perform at a desired level. Communities of people who are involved in the full cycle of data management from acquisition, conversion, quality assurance, use, and support form to manage the data set over its life cycle. A data business plan is currently being developed for safety data that includes components on data governance and processes. The product of this effort will be a foundation that asset data will build on within NMDOT's coordinated data management program.

Priority Action Item 5: TAM Processes Integration and Improvement

Business processes related to TAM include:

- Project selection
- Project delivery
- Performance management
- Communications with internal and external stakeholders

The TAMP building process revealed new ideas to streamline these processes while implementing enhanced asset management procedures.

Champions: TAM Working Group Members

Objectives: Develop and use project prioritization and management system to track progress on project delivery, such as on-time contracting, on-time completion, and percentage of projects prioritized by the model completed.

Clarify treatment selection processes to help guide heavier versus lighter treatments and their impacts.

Coordinate migration from district to statewide modeling and prioritization while preserving district concerns such as funding for state and local roads versus NHS.

- Measure progress in each district, coordinating district and statewide targets
- Compare district funding to needs

Enhance coordination between engineering and maintenance by examining maintenance spending and impact on overall needs; develop proactive rather than reactive scheduling and budgeting for maintenance.

Clarify the distinction between federal and state programs and projects to enhance understanding of sources and uses of funding and increase transparency and accountability.

Target Date: June 30, 2019

Telling the Story: Enhanced Capital Programming

Connecting the Long-Range Plan to Asset Management and Financial Planning

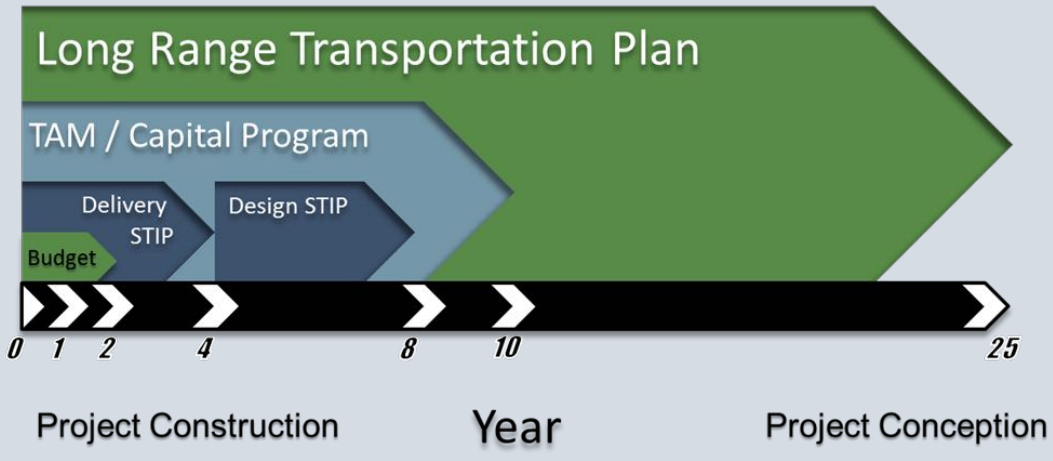
For the past several authorization bills, state DOTs have been required to develop 25+ year long-range plans (LRPs) and 4+ year statewide transportation improvement programs (STIPs). LRPs are not required to contain discreet projects that one would find in a STIP, so the two plans are often only loosely connected. NMDOT aims to bridge the many gaps in disparate documents by connecting financial elements of the LRP, the STIP, the 10-year TAMP, and the annual budgeting process.

The financial planning activities required of the TAMP will help integrate activities across the plans – not only investment in bridges and highways, but the ways of prioritizing the allocation of resources across programs.

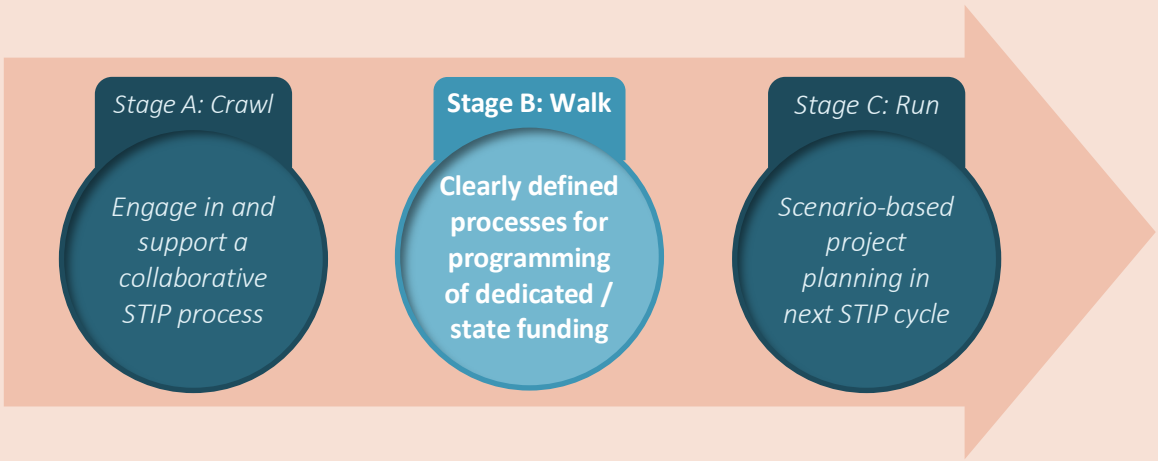
As part of TAMP implementation, the Asset Management and Planning Division will develop a 10-year capital program that helps the DOT's districts and GO evaluate project needs and scopes against reasonably anticipated revenues, pulling conceptual projects from the LRP into prioritized capital projects with some certainty around project delivery risks.

The budget will be allocated for the prioritized needs of the project. With an actively managed 10-year TAMP, NMDOT can begin to program projects in the later years of the STIP, move them through design, and have them obligated as they head into Year 1 of the STIP.

The capital programming and project selection initiative will be strengthened during TAMP implementation through development of a single-source data portal. The goal of every project that gets prioritized is that it uses the same set of data. Data will be available in an easy-to-use interface so users can access data as needed for planning and scoping projects.



TAM Process Integration Status



Implementation Plan Recommendation:
Incorporate management systems results into planning and programming processes

Districts consider tradeoffs during the current programming and budgeting process. There is a desire on the part of NMDOT staff to better understand and formally connect this relationship and to work to streamline the programming, planning, and budgeting processes from both a statewide view and having coordinated practices across districts. Efforts have started in the safety area to prioritize projects and conduct tradeoffs within the Highway Safety Improvement Program (HSIP). This approach will be an element of the process improvements that NMDOT will initiate for asset planning and programming. An initiative of the TAM program has been to document the current processes for asset-related project programming in districts and develop recommendations for improved coordinated programming statewide and across districts. These recommendations will be piloted in the next fiscal year's programming cycle.

Priority Action Item 6: Mitigate Risks

Champions: Tom Church

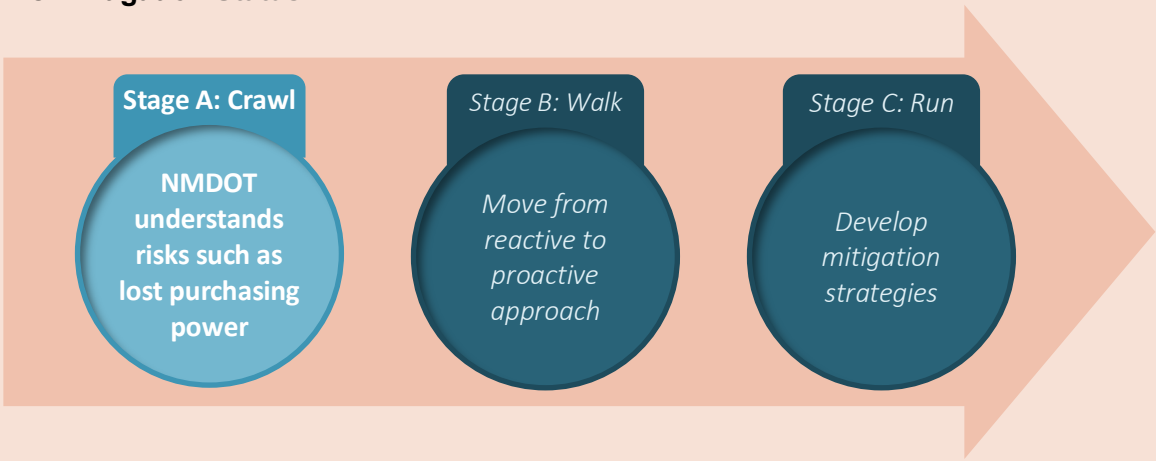
Objectives: Use the TAMP's Risk Register, quantify Likelihood and Impact.

Conduct a department workshop to develop mitigation strategies using the (Tolerate, Treat, Transfer, Terminate, and Take Advantage Of) model developed during the TAMP Risk Workshop.

Integrate risk mitigation strategies into NMDOT decision-making processes including modifying project prioritization models to add risk elements or develop task forces to implement mitigation strategies. Implement processes for risk mitigation in 2018 and 2019, with creation of an enterprise risk management program in early 2020.

Target Date: December 31, 2018

Risk Mitigation Status



Implementation Plan Recommendation:
Identify strategies for mitigating the highest priority risks

NMDOT staff considers risk informally as part of the project development process. However, there is no systematic formal process for evaluating risks associated with the asset management program. In preparation for the Complete TAMP in June 2019 and to establish a risk management program and raise understanding and commitment to integrating risk management into NMDOT's asset management decision-making, the Secretary of Transportation at NMDOT will champion the commitment to make progress on TAM risk management at NMDOT.

Priority Action Items Progress Report

The following is an example of a progress report that will be generated regularly to monitor activities related to the priority actions in the TAMP.

Priority Action Items

#	Item	Champion	Description	Status
1	Enhance Asset Models	Jeff Vigil Jeff Mann	Develop statewide technical committee Develop predictive modeling capabilities	Backlog of structurally deficient bridges continues to exceed funding capacity Pavement project identification is moving towards predictive modeling
2	Improve Data Integration and Enhance Mapping	Yolanda Duran	Develop statewide technical committee Refine decision trees and process maps, enhance mapping capabilities, connect modeled projects to actual projects, and incorporate Guiding Principles into business processes	FHWA is providing NMDOT with Technical support to develop a Data Integration Plan. The plan will include the following components: Identify Key Stake Holders Conduct a Data Integration gap analysis Data Management and Governance Assistance Data Collection and Integration Plan Identification of Training Needs associated with data integration. Finalize a Data Business Plan by September 2018
3	Improve Resource Allocation	Tammy Haas		
4	Clarify Data Governance	Anthony Lujan		
5	TAM Process Integration and Improvement	TAM Working Group		
6	Mitigate Risks	Tom Church		