

MnDOT'S ASSET MANAGEMENT STRATEGIC IMPLEMENTATION PLAN

March 2021

Contents

- MnDOT’s Asset Management Strategic Implementation Plan..... 1**
 - Overview 1
- MnDOT’s Asset Management Vision and Objectives 2**
 - MnDOT’s Asset Management Vision..... 2
 - Vision Development 2
 - Strategic Objectives..... 3
 - Strategic Objective 1* 4
 - Strategic Objective 2* 4
 - Strategic Objective 3* 5
- Taking Steps to Achieve the Vision 6**
 - Work Group Formation 6
 - Work Group 1*..... 6
 - Work Group 2*..... 7
 - Work Group 3*..... 7
 - Work Group 4*..... 8
 - Work Group 5*..... 8
 - Work Group Activities and Approaches 9
 - Work Group 1*..... 9
 - Work Group 2*..... 12
 - Work Group 3*..... 13
 - Work Group 4*..... 14
 - Work Group 5*..... 18
- Asset Data Action Plan 19**
- Life Cycle Strategy Action Plan..... 22**
 - Recommendation 1 22
 - Preventive Maintenance Measures and Targets* 22
 - Recommendation 2 24
 - Recommendation 3 25
- Communication Action Plan 28**
 - Information Needs By Audience 28
 - Executive Leadership*..... 28

<i>Senior Leadership Team</i>	30
<i>Central Office Management</i>	31
<i>District Management</i>	33
<i>Central Office Staff</i>	34
<i>District Staff</i>	36
Implementation Recommendations	37
<i>Recommendation 1</i>	37
<i>Recommendation 2</i>	38
<i>Recommendation 3</i>	38
<i>Recommendation 4</i>	38
<i>Recommendation 5</i>	39
Communications Materials	39
<i>Slides</i>	39
<i>Handouts and Flyers</i>	41
<i>Videos</i>	41
<i>Other Materials</i>	42
TAMP Implementation Action Plan	43
<i>Recommendation 1</i>	43
<i>Recommendation 2</i>	44
<i>Recommendation 3</i>	45
<i>Recommendation 4</i>	46
<i>Recommendation 5</i>	47
Closing	49

MnDOT's Asset Management Strategic Implementation Plan

Overview

The Minnesota DOT (MnDOT) is recognized nationally as a leader in the asset management efforts due to its commitment to asset management principles as evidenced by the alignment of the agency's long-term planning processes with its Asset Management Plan, the broad inclusion of assets in its Asset Management Plan that exceed federally-established minimum requirements, its enterprise approach to managing risks, and its continued investment in business processes and analysis tools to support its asset management efforts. In 2019, MnDOT furthered its commitment to asset management by initiating the development of an Asset Management Strategic Implementation Plan (AMSIP) to guide the direction for asset management over the next 5 years.

The development of the AMSIP began with an assessment of current asset management practices and the identification of factors that have hindered the implementation of asset management practices at the District level. The results from these activities were summarized and considered at a virtual workshop with Project Management Team (PMT) and Asset Management Steering Committee (AMSC) members on April 23, 2020. The workshop participants provided feedback on a vision for asset management at MnDOT and established expectations for integrating asset management with other MnDOT planning processes, using asset management to manage ancillary assets, and overcoming challenges that hinder the implementation of asset life-cycle strategies. Four virtual web meetings were also conducted with District Maintenance and Operations staff to address key issues related to asset inventories, asset prioritization and performance, and pavement preservation.

Following those activities, five work groups were identified to address specific issues raised during the workshops. Leaders and participants representing a broad cross-section of the agency were assigned to each work group and charged with identifying recommendations for addressing challenges that hindered the consistent use of asset management strategies in the agency. The results of those work groups and the previously established vision for asset management, served as the basis for the 5-year strategy presented in this document.

This document presents the 5-year vision for asset management and the strategic objectives that led to the creation of the five work groups. It concludes with the following four action plans to guide enhancements in asset management over the next 5 years:

- Data Action Plan.
- Life Cycle Strategy Action Plan.
- Communication Action Plan.
- TAMP Implementation Action Plan.

MnDOT's Asset Management Vision and Objectives

MnDOT's Asset Management Vision

At MnDOT, transportation assets are managed effectively based on risk and return on investment, using the best available information and tools. (April 2020)

Vision Development

The vision for asset management emerged based on information provided by participants in a virtual workshop that took place in April 2020. Participants were asked to identify key considerations that should be incorporated into the vision for asset management. The largest number of responses suggested that:

- The eventual goal should consider all maintenance, operational, and capital needs in asset management. (15 responses)
- Roles and responsibilities for asset management should be more clearly defined to eliminate gap areas. (8 responses)
- Asset management should help MnDOT place more of a focus on preventive maintenance and preservation than rehabilitation and replacement. (6 responses)
- The strategies should address the divide between doing asset management, providing funding to implement asset management, and evaluating the return on investment for the effort expended. (6 responses)

Break-out groups were held in which participants were asked to further explore characteristics that should be reflected in the vision. These activities resulted in several additional features as identified below.

- The vision should have an outward focus towards managing assets effectively.
- It should still be applicable beyond the 5-year period that will be covered in the AMSIP.
- It should encourage behaviors that:



- ◆ Are more transparent using data-driven decisions.
- ◆ Are strategic, proactive, and holistic in reducing life-cycle costs for MnDOT's most critical assets.
- ◆ Realize a long-term value from transportation assets.
- ◆ Integrate operational and capital decisions.
- ◆ Consider trade-offs between asset classes and programs (e.g., safety, mobility), recognizing that what is best for an individual asset may not be best for the system.
- ◆ Ensure the data, tools, and measures needed to support asset management are available.
- ◆ Clearly establish reasonable expectations for performance based on expected resources.

To enable MnDOT to implement the vision, participants also described the steps that will need to be addressed, including:

- Having a clear set of expected accomplishments and performance measures to take asset management to the next level within a 5-year period.
- Strategically guiding the use of available resources to meet asset management business needs.
- Establishing clear processes that can be used to manage asset effectively.
- Building communication channels to ensure a widespread understanding of asset management.
- Describing roles and responsibilities for asset management implementation.
- Building individual and agency capacity in asset management.

Strategic Objectives

To achieve the vision, the following three strategic objectives were developed. These objectives served as the foundation for establishing several work groups, each charged with identifying actions that would enable MnDOT to achieve the vision within the next 5 years. As presented, the strategic objectives address the four fundamental elements of a successful asset management implementation: data, systems, processes, and people.



STRATEGIC OBJECTIVE 1

Use data effectively to strategically manage investments and assets, within available resources, in a proactive and wholistic way to reduce life-cycle costs and maintain the value of our most critical assets.

This involves:

- Balancing the resources required to obtain and manage asset data with the associated risks and return on investment.
- Providing tools that supply the information needed in a useful format to make well-informed decisions.

To achieve this objective, the following actions were identified:

- Develop a prioritized list of data needs for the assets MnDOT manages.
- Recommend data collection procedures roles and responsibilities for obtaining the information, keeping in mind available resources, risks, and return on investment.
- Address legislated requirements for managing geotechnical assets.
- Develop strategies to ensure an adequate level of proactive preventive treatments are being used to lower life-cycle costs where appropriate.

STRATEGIC OBJECTIVE 2

Improve the ability to evaluate trade-offs between investment options in a consistent and transparent way that maximizes system performance.

This involves:

- Integrating operational and capital considerations to improve efficiency.
- Evaluating trade-offs between asset classes and programs, recognizing that what is best for an individual asset may not be best for the system.

To achieve this objective, the following actions were identified:

- Identify objectives for integrating operational and capital decisions that use available data and analysis tools to the greatest extent possible.
- Address factors that prevent planned investments from being implemented at the District level, including competing priorities, lack of familiarity with the TAMP, and fragmented responsibilities for asset management.
- Develop a strategy for the holistic and transparent management of transportation assets and performance measures for monitoring progress towards the most strategic use of available resources.

STRATEGIC OBJECTIVE 3

Integrate asset management into MnDOT's culture through effective communication and a workforce with the skills needed to successfully fulfill their asset management duties and responsibilities.

This involves:

- Advancing the understanding of asset management at MnDOT.
- Defining asset management roles and responsibilities.
- Building individual and agency capabilities.
- Establishing succession plans for key positions.

To achieve this objective, the following actions were identified:

- Develop a communication plan with prioritized recommendations for informing internal and external stakeholders about asset management's role at MnDOT.
- Define asset management roles, responsibilities, and needed competencies for internal stakeholders.
- Develop a strategy for building and sustaining needed competencies.

Taking Steps to Achieve the Vision

Work Group Formation

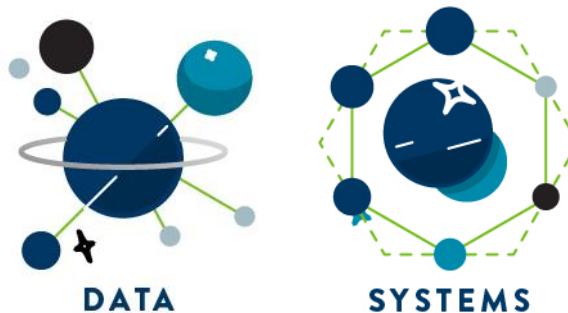
Armed with a clear vision and three strategic objectives, work groups were identified to address gaps between current and desired objectives. Five work groups were established and charged with developing an approach and plan to address the gaps and meet objectives. The work groups met on a weekly or bi-weekly basis over a 3-month period, resulting in the planned actions reflected in this document. A description of each of the work groups, the challenges they were asked to address, and their assignments are provided.

WORK GROUP 1

Asset Matrix Development

Charge

Establish a prioritized approach for managing assets that considers the different ways that assets are maintained, their importance to the agency, and the risks associated with their failure. Where appropriate, evaluate options by analyzing the Return on Investment. Specify roles and responsibilities for owning and updating the asset inventory over time so the information can be incorporated into the Transportation Asset Management System (TAMS).



Membership

Chair: Trisha Stefanski

Members: Jay Heitpas, Mike Ginnaty, Mark Schoenfelder, Mike Barnes, Bill Pirkl, Susan Kamowski, Paul Czech, Brad Utecht, Perry Collins, Todd Stevens, Mitch Webster, Michael Cremin, Dave Solsrud

Lead Facilitator: Brad Allen and Katie Zimmerman (APTech)

Expected Outcomes

A summary in matrix form that outlines asset classes by tier along with information related to the way each asset class is managed, the data required to manage the assets, responsibilities for collecting and maintain the data, and a schedule for acquiring the necessary data.

WORK GROUP 2

Geotechnical Assets

Charge

Evaluate options for MnDOT's response to meet the legislative mandate to manage geotechnical assets. Consider resource requirements for each option in developing recommendations. Incorporate the recommended strategy into the asset matrix being developed by Work Group 1.

Membership

Chair: Brad Skow

Members: Shiloh Wahl, Pat Huston, Steve Kirsch, Mary Safgren, Dustin Thomas, Doug Maki, Micah Holzbauer, Paul Rowekamp, Charlie Kremer, Amy Thorson, Michael Cremin, Dave Solsrud.

Facilitators: Bill Robert (Spy Pond Partners) and Brad Allen (APTech)

Expected Outcomes

A summary of the information needed to effectively manage geotechnical assets incorporated into the asset matrix developed by Work Group 1. Include the data require, responsibility for collecting and maintaining the data, and a schedule for obtaining the recommended information.



WORK GROUP 3

Pavement Preservation

Charge

Establish a plan for increasing the reliable use of pro-active preventive maintenance treatments to preserve asset conditions and reduce the life-cycle cost of managing assets. Include a timeline for the implementation of suggested activities and roles and responsibilities for ensuring pro-active treatments are reliably determined, programmed, implemented, and tracked.

Membership

Chair: Glenn Engstrom

Members: Mark Gieseke, Greg Ous, Greg Paulson, Rhonda Allis, Josh Pearson, Patrick Weidemann, Jamie Hukriede, Mike Leegaard, Curt Turgeon, Tom Meath, Dave VanDuesen, Tom Zimmerman, Dave Solsrud

Facilitators: Brad Allen (APTech) and Bill Robert (Spy Pond Partners)



Expected Outcomes

Recommendations for planned and on-going changes to promote the use of proactive preservation and preventive maintenance treatments. Include roles and responsibilities as well as a timeline for implementation.

WORK GROUP 4

Communication

Charge

Suggest ways to build support for MnDOT's asset management program through outreach activities that build stakeholder knowledge and support for asset management, develop internal competency in asset management practices, and promote the understanding and use of asset management principles.

Membership

Chair: JT Anderson

Members: Jon Huseby, Sheila Kauppi, Jon Mason, Jed Falgren, Jeff Perkins, Domingo Aguilar, John Bieniek, Steve Lund, Mike Dougherty, Christina Joyce, Dave Solsrud

Facilitators: Katie Zimmerman (APTech) and Hyun-A Park (Spy Pond Partners)

Expected Outcomes

A comprehensive Communications Plan that identifies key stakeholders, messaging strategies, and frequency, and resources that can be used to increase familiarity with asset management throughout the agency and convey roles and responsibilities in support of asset management implementation.



WORK GROUP 5

TAMP Implementation

Charge

Provide recommendations to the TAMP PMT for changes to the TAMP that:

1. Improve the consideration of life-cycle management techniques in MnDOT's plans and programs.
2. Enhance its usefulness to a wider audience at MnDOT.
3. Strengthen the interrelationships and dependencies with MnSHIP.



Membership

Chair: Shannon Foss

Members: Jean Wallace, Duane Hill, Todd Campbell, Lynn Clarkowski, Lindsey Bruer, Sahker Rabban, Josh Pearson, Philip Schaffner, Mark Panek, Sheila Johnson, Sara Sondag, Trisha Stefanski, Dave Solsrud, Pete Eakman (FHWA)

Facilitators: Katie Zimmerman and Brad Allen (APTech)

Expected Outcomes

Recommendations for any changes to the 2022 TAMP related to format and/or the assets included that enhance its usefulness to the agency. Suggestions for strengthening the consideration of asset maintenance and operational expenditures in MnSHIP to take advantage of the information becoming available in the TAMS software.

Work Group Activities and Approaches

The five work groups met regularly during the period from August through November 2020 to address their assignments. This section describes the approach each work group took and presents a high-level summary of the achievements they made. More detail on the recommendations provided by each work group is provided in the Appendices.

WORK GROUP 1

Asset Matrix Development

This work group defined, analyzed, and categorized the data needs for 72 infrastructure assets to determine gaps between desired and current practices. Using a process built on national best practices, and considering MnDOT's resources and unique circumstances, the work resulted in six management categories, four levels of asset tiers, and a concise list of data gaps with strategic solutions and costs.

In developing its recommendations, the work group considered the eight criteria shown in the figure in a linear progression. The assets considered by the work group were primarily physical assets, such as pavements and sign panels, but non-physical assets (such as plow routes and unstable slopes) were also

considered. The primary factors used to identify asset classes were a) whether it was located on the highway system and whether there is a need to assign work directly to the item, rather than to the highway segment along which the item is located.

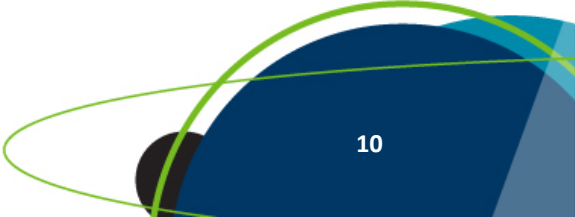


Internal or external factors that drive the need to collect and manage data for an asset class were identified as “drivers.” These factors included regulations and mandates, customer needs, the value of the asset, and budget allocations. Benefits were also qualitatively assessed to recognize the role the asset played in compliance issues, safety, risk reduction, or new technology.

For each asset class included in the matrix this work group developed, the desired and actual maintenance approaches were identified. Where there were gaps between the desired and current approach, the work group identified data, system, and resource gaps that would need to be addressed. The following maintenance approaches were considered.

Maintenance Approaches

Approach	Definition
Condition-based PLUS management	These assets use forecasts from performance modeling to establish cost-effective long-term strategies for achieving agency goals and reducing whole life costs. Assets in this category tend to be complex assets with multiple elements or components that typically have a high value, represent a significant investment to MnDOT, and are major contributors to economic vitality, public safety, and mobility. The failure of an asset in this category could have regional or statewide implications. These assets benefit from the application of different types of maintenance, preservation, and rehabilitation actions over their life cycle.
Condition-based management	Assets in this category are managed using condition data that is collected on a risk-based schedule. These assets tend to be less complex and have a lower value than the previous

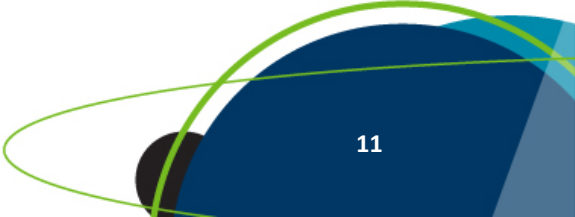


Approach	Definition
	asset category, but they still represent significant economic, safety, and mobility risks should one or more fail. To manage this risk, MnDOT regularly monitors the condition of these assets and used the condition data to direct maintenance and capital program resources.
Cyclical-PLUS management	For some assets that are managed on a cyclical basis, especially those that represent significant safety risk or financial investment by MnDOT, condition data is collected and used to optimize the preplacement or maintenance cycle. These assets are separated out and referenced as “cyclical plus” to reflect the additional resources needed to collect the condition data.
Cyclical management	These assets are replaced or repaired on a schedule that is developed based on historic performance data or industry standards to minimize the risk of failure.
Response management	Assets in this category generally represent a low level of investment and the failure risk to overall system performance is relatively low. These assets are managed on a reactive basis when the agency is informed of an unacceptable level of performance. MnDOT has policies in place that mandate response time to address the repairs and minimize the impact on the system. These assets are inventoried, and work activities are tracked, but there is little to no planned maintenance performed.
Highway feature management	Assets that do not require specific inventory or condition data are considered as highway features associated with the adjacent road or bridge. The maintenance or replacement of these features is performed in conjunction with other planned activities when unacceptable defects are identified and resources are available.

The assessment of the information on each asset was then used to assign a criticality tier to represent the importance of each asset class to MnDOT’s mission and the level of resources needed to manage it. Four tiers were established as described below with tier 1 representing the highest level and tier 4 representing the lowest level. Descriptions for each tier are presented below.

Asset Criticality Tiers

Tier	Description
Tier 1	This category represents the highest-valued asset and those critical to public safety, mobility, and the economy. Failure of a single asset could lead to an immediate safety risk or impact to the transportation network for an entire region and poor performance by a group of similar assets could have regional or statewide impacts. As a result, these assets receive the greatest level of scrutiny and resources are invested in inventory and condition data collection, analysis of treatment strategies, and planned investments to provide the highest practical level of service and reliability.
Tier 2	The second-tier assets are slightly less significant than tier 1 assets, but the potential impact of failure on public safety within a corridor or municipal area is still substantial. For this reason, MnDOT dedicates resources the proactive monitoring of these assets and plans interventions to prevent unacceptable performance. Inventory and condition data is collected on these assets so that cost-effective maintenance and repair activities can be scheduled over throughout their service life.
Tier 3	This category represents assets that impact the safety and performance of localized areas without having a significant impact on overall network performance. Assets in this category typically benefit from cyclic maintenance or replacements so inventory information is needed to support the scheduling and delivery of these interventions. For some assets, especially those that enable MnDOT to comply with mandates (such as municipal storm sewer systems) or may benefit from analysis of the replacement cycle (such as sign panels), condition data may also be collected.



Tier	Description
Tier 4	The assets in this category represent a limited level of risk to MnDOT. These assets are generally managed based on guidelines regarding maintenance response time targets. Inventory information is collected on these assets, but condition is typically not required. Work performed to maintain, improve, or replace these assets is also tracked.

After categorizing the asset classes, the data elements and data collection methodologies were assessed. Data elements were defined as being either *essential* to making investment decisions or *desirable* to enhance decision making although not considered essential to business operations. Strategies for collecting the information considered six different approaches: visual inspection, physical field device inspection, MnDOT pavement van camera or sensor collection, satellite or aerial imagery, drone inspection, or mobile LiDAR. For culverts, an analysis was conducted to assess the Return on Investment (ROI) of adding side and entrance culverts to the existing inventory. The work group used the framework and tool from NCHRP Report 866, *Return on Investment in Transportation Asset Management* to perform the calculations using data from District 2.

These efforts resulted in the development of a comprehensive asset matrix and recommended data collection strategy outlined in the section titled *Asset Data Action Plan*.

WORK GROUP 2

Geotechnical Assets

The recommendations from Work Group 2 focused on geotechnical assets incorporated their recommendations into the asset matrix developed by Work Group 1. This group focused on MnDOT's needs to improve the data available on geotechnical assets to comply with a legislative requirement to develop an inventory as well as to support asset management best practices. Major data issues that the group recognized include:

- Districts are using various ad-hoc approaches for tracking geotechnical assets. For instance, ERS inventories have been established in some Districts, including the Metro District, but has not been established on a statewide basis.
- MnDOT established a specification to begin collecting inventories of these assets as part of the preparation of as-built plans. When this group met, limited data had been collected based on the new specification and the data was limited to locations where projects were being performed.
- MnDOT is funding on-going research to identify the locations of certain types of geohazards.
- MnDOT has not defined specific inspection and maintenance practices for statewide use to manage geotechnical assets managed on a condition or cyclic basis.

The group considered the following list of geotechnical assets:

- Earth Retaining Systems (ERS), including gravity, soil nail, soldier pile, sheet pile, reinforced concrete cantilever, mechanically stabilized earth (MSE), crib, bin, timber, and others.
- Slopes.
- Improved subgrade, including lightweight fill such as wood chip, tire-derived aggregate, geofoam, lightweight aggregate, cellular concrete, and grouted fill.

- Ground improvement or modification, including column-support embankments and transfer platforms.
- Unimproved subgrade.
- Special drainage features, such as chimney drains, perforated drains, herringbone drains, geomembrane cap and liner, and trench drains. This category does not include edge drains.
- Instrumentation, including inclinometers, pressure cells, gauges, cabinets, and piezometers.
- Natural hazard locations, including locations off the right-of-way not otherwise addressed.

To ensure their results could be incorporated into the asset matrix, the group defined the preferred management approach for each asset using the maintenance approaches defined by Work Group 1. Depending on the maintenance approach, recommendations were developed regarding the establishment of an inventory and any inspection requirements or maintenance cycles.

The recommendations from this group are included in the *Asset Data Action Plan* section.

WORK GROUP 3

Pavement Preservation

Work Group 3 focused on addressing the issues that prevented the use of a consistent, statewide approach for preventive maintenance treatments to lower the long-term life cycle cost of maintaining the highway network. The group began by identifying the most significant barriers that needed to be addressed, including the following.

- Performance expectations are short-term focused, which does not encourage investing in the long-term benefits provided by preventive maintenance. Maintenance work planning suffers from the same focus on short-term needs so reactive maintenance is routinely prioritized over preventive maintenance.
- Performance measures are focused on ride quality, which is a customer-satisfaction measure, but is not indicative of pavement service life extensions provided by preventive maintenance.
- Preventive maintenance programs are most effective when they are delivered through consistent annual investment, but Districts are pressed to direct capital funding to more immediate or higher-profile needs.
- There are conflicts between current project development policies or procedures and best practice for implementing preventive maintenance. For instance, current pavement project development procedures are focused on addressing all the needs within the project limits, including American Disability Act requirements or drainage needs. This increases the size and scope of projects and diverts the focus from extending service life through the application of preventive maintenance. This is not true on bridges, where other bridge needs can be deferred while preventive maintenance is applied to one or more elements. In addition, some policies conflict with the ability to apply preventive maintenance treatments. For example, a chip seal must be applied from edge-line to edge-line to avoid lane drop-off, but this requires the project to include rumble strips and lane striping.

To address these barriers, Work Group 3 developed recommendations to ensure that agency decision makers understand the benefits of preventive maintenance and are following processes that maximize

long-term performance, extend service life, and minimize life-cycle costs. The group members recognized that the solutions do not eliminate all of the barriers listed earlier, but they help provide accountability in terms of expectations, available resources, and actual accomplishments. In addition, the recommendations will:

- Better align planned and actual investments with life-cycle planning and the TAMP.
- Provide a means for comparing the costs and benefits of preventive maintenance investments to other options.
- Establish a system of accountability for the level of planned and accomplished preventive maintenance work.

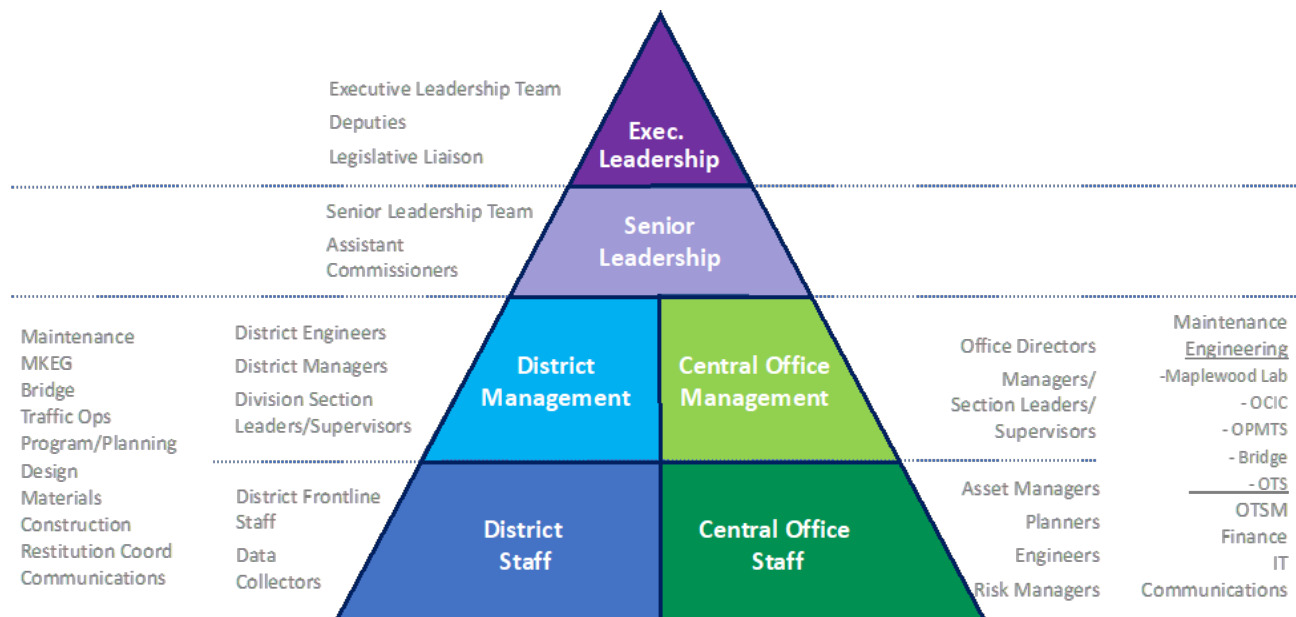
The solutions recommended by the group are presented in the section titled *Strategic for Improving Life-Cycle Processes*. The group envisions that the solutions can be implemented within current management frameworks and budgets. They expect the results to ensure that Districts achieve expectations while maintaining their ability to consider local conditions and constraints when managing their networks.

WORK GROUP 4

Communication

This Work Group was charged with developing a Communication Plan that would improve the understanding of asset management throughout the Department and build support for asset management activities by sharing information on the importance of data to support decisions and the resulting benefits that are being realized. The resulting Plan, presented in the section titled *Communication Action Plan*, is expected to evolve over time as initial steps are completed and the level of knowledge builds.

The Plan is structured around the six audiences shown in the following graphic, each of which has unique needs in terms of the level of information required and the best way to receive the information. The six audiences include those described below.



- Executive Leadership**, which includes the Commissioner, Deputy Commissioners, Chief Counsel, Chief of Staff, Chief Financial Officer, and the Directors of Government Affairs, Human Resources, and Communication/Public Engagement.

Information Needs: This audience needs sufficient information on the asset management program to understand the long-term impacts of investment decisions and to address questions from stakeholders. At this level, asset management information is used to set MnDOT's strategic performance objectives. Messaging to this group is primarily provided through presentations at group meetings and the access to Frequently Asked Questions (FAQs). The information should be provided prior to high-level direction-setting meetings or at key milestones related to decision-making processes.

Senior Leadership, including Assistant Commissioners, Deputy Division Directors, the Chief Information Officer, Division Business Managers, the State Rail Director, and the Directors of the Offices of Tribal Affairs, Equity/Diversity, and Civil Rights. Messaging to this group is primarily provided through presentations at Senior Leadership Team meetings, through dashboards and other performance measures, and meetings with Central Office or District Management personnel. The information should be provided at monthly Asset Management Steering Committee meetings and prior to other key milestones related to decision-making processes.

Information Needs: This group needs sufficient information to guide policy and investment decisions at the Senior Level. They want to see that MnDOT is acting as a good steward of the system and is managing wisely over the long-term to reduce life-cycle costs and mitigate risks.

District Management, which includes District Engineers, District Managers for functional units, Division and Section leaders, and Supervisors for Program Development, Scoping, Design, and Construction.

Information Needs: This group uses asset management principles to guide project selection activities. This group is responsible for ensuring that asset management principles are followed at the District level and that District field staff are aware of the importance of the data they collect. Messages to this group may be delivered through group meetings, targeted emails, a website, training, and a summary of FAQs. The information should be provided on an as-needed basis but

having easy access to information documenting efficiencies gained or improved decisions is needed to better motivate District Staff.

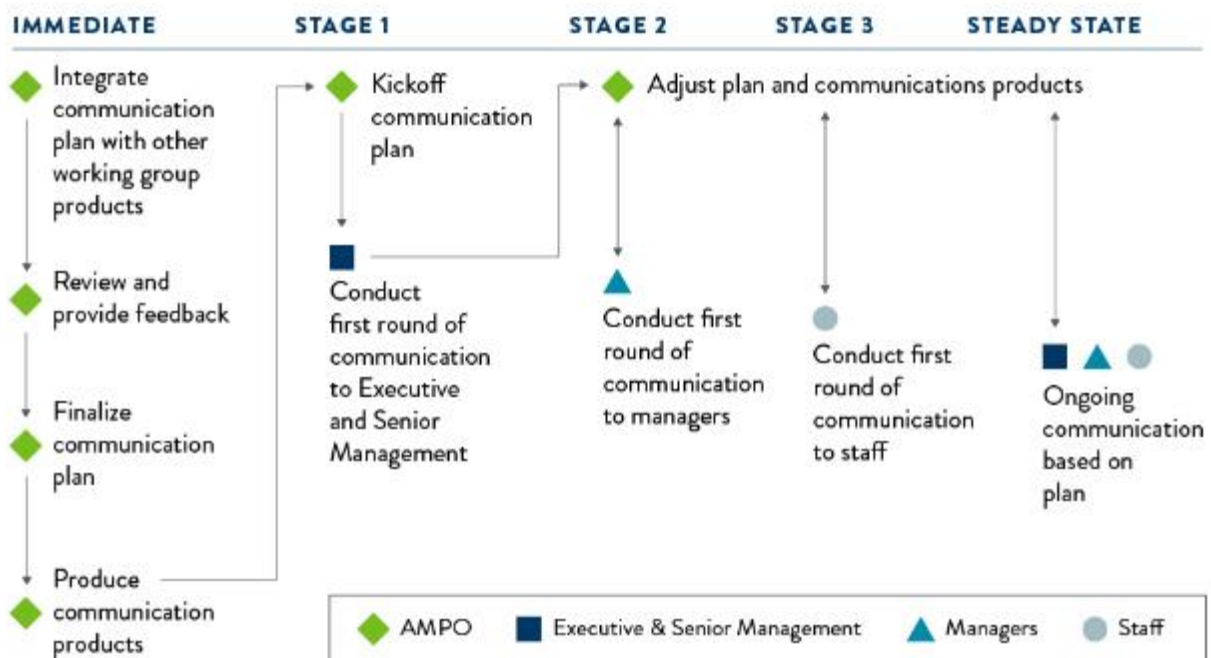
- **Central Office Management**, which includes Office Directors for the functional units in the Central Office and the Managers/Section leaders under them.
Information Needs: This group has primary responsibility for the development of planning and investment documents. They also oversee agency systems that provide supporting information to the Districts. In this way they help ensure that Central Office staff manage asset performance information to support MnDOT's efforts to achieve its strategic objectives. Messaging to this group may come from many different sources, including targeted emails from the Chief Engineer, discussions with Assistant Commissioners, or conversations with other MnDOT personnel. Information to support these decisions will be needed on a regular basis, which may be monthly or quarterly.
- **District Staff**, comprising the District Frontline Staff and the Data Collectors, including Maintenance Frontline, Construction Inspectors, and Engineering/Design personnel.
Information Needs: This group records the field information that is used to support maintenance and preservation project selection decisions. This group needs to understand the importance of the data they record and how it can be used to improve decisions. The messaging is delivered primarily through group meetings, one-on-one meetings with a supervisor, E-learning, and FAQs. The information should be delivered monthly, or at every opportunity, until the culture is established and then once or twice a year.
- **Central Office Staff**, which includes Asset Managers, Planners, Engineers, and Risk Managers who are in the Central Office functional groups.
Information Needs: This group uses asset management principles to guide the development of planning and investment decisions by providing supporting information and expertise. They use asset performance information to support decisions that will allow MnDOT to achieve its strategic objectives. Information may be delivered through group meetings, one-on-one meetings with a supervisor, email, or E-learning. Information should be provided at least quarterly to build the culture and then twice a year.

During its meetings, the Work Group identified categories of information that are needed by the various audiences and defined the types of messaging that might be needed. The Communication Action Plan summarizes these recommendations and puts forward a timeline for addressing the needs. The five categories included in the Plan are described here at a fairly high level.

- **General Asset Management Knowledge** – Information in this category contains messaging that builds general knowledge and support for asset management. At a high level, materials show that MnDOT strategically allocates its available resources to achieve its strategic objectives. The products in this category also provide an understanding of the various roles that support asset management so that personnel understand the importance of their work. Content in this category can also be used by agency personnel to answer questions posed by different stakeholder groups. Materials in this category support a wider knowledge of asset management goals and objectives, and its vision for building a stronger asset management culture at MnDOT.
- **Transportation Asset Management System (TAMS) Data** – Content in this category is primarily focused on the importance of quality data and the benefits realized from the use of quality data. It is intended to demonstrate the value MnDOT receives from the work being done by those collecting the data as well as those using the data to support decisions. Materials in this category will also be used to distribute any new TAMS data requirements, provide information on how to use TAMS effectively, and to support an understanding of the TAMS content and functionality.

- **Decision Making** – This category includes information that demonstrates the importance of using TAMS data and asset management principles to guide work planning, to understand trade-offs in budget-setting activities, and to manage performance. It includes information that conveys targeted life-cycle strategies for different asset classes and demonstrates the benefits to using preventive maintenance treatments to lower life-cycle costs and extend service life.
- **TAMP Implementation** – The materials in this category support the on-going implementation of the TAMP at MnDOT. It communicates the concepts of “managing to performance” and presents performance targets in several different areas. An objective at MnDOT is to make the TAMP more accessible to different audiences, so plans are underway to present information from the TAMP in new and more accessible ways, such as presenting information specific to each District. It also conveys the importance of aligning pavement and bridge project selection decisions with the TAMP.
- **Coordination With External Stakeholders** – Information in this category is available for MnDOT’s use in communicating asset management information to external stakeholders. It is envisioned that this category could convey upcoming project priorities for the Long-Range Transportation Plan, share examples showing MnDOT is a good steward of available funding, and provide map interfaces with information that could be useful regarding project priorities or scoping considerations.

Responsibility for the implementation of the Communication Plan rests with the Asset Management Program Office (AMPO) but the Communication Plan recognizes that all levels of personnel are involved in sharing the message. As shown in the following figure, the implementation of the Communication Plan is staged with a first round of information produced for consideration at the Executive and Senior levels followed by rollouts at the Managerial and Staff levels. This staging allows time to begin building a collection of resources to support the planned on-going messaging as well as opportunities to assess their effectiveness and make modifications. An important part of the Communication Plan also includes the development of an Asset Management Information Portal to facilitate the storage and retrieval of the products developed.



WORK GROUP 5

TAMP Implementation

Work Group 5 addressed a variety of topics at its meetings, focusing primarily on ways to improve the usefulness of the TAMP to a broader audience at MnDOT, better understand the interdependence between MnSHIP and the TAMP, and enhance the consideration of maintenance and operations costs in the updates to MnSHIP and the TAMP to improve life-cycle management at MnDOT. Another important question that the group wanted to address was whether any changes should be made to the number or types of assets that will be included in the 2022 TAMP update.

The Work Group members spent time discussing how the TAMP is currently being used and how it could be used to better support decisions. The TAMP is currently being used to provide inventory information, to present performance measures and targets, and to detail the level of investment that is needed on a statewide basis to achieve the targets. It was noted that the TAMP also enables MnDOT to satisfy federal regulations and document risks to asset condition, but several members of the Work Group admitted that they were not regular TAMP users. When asked how the TAMP could be used, the members envision it being more useful in establishing programming decisions and priorities for guiding Statement Transportation Investment Program (STIP) and Capital Highway Investment Program (CHIP) development. Others suggested that it could help explain the true cost of infrastructure ownership through comparisons between capital investments and maintenance costs. Several suggestions were offered for changing the format and access to the document, including suggestions to make a searchable version available, to make the TAMP a shorter, public-oriented document with separate, more detailed asset-specific documents, and separating out information by District. Suggestions were also made for organizing the document by asset class rather than topic area and having a web-oriented version available with annual data snapshots.

To address the remaining issues, the Work Group members sought a better understanding of how the TAMP and MnSHIP currently relate so that suggestions for improvement could be offered. A presentation on past interactions between these two plans was provided, highlighting coordination efforts related to asset performance targets, funding levels required to achieve performance outcomes, and consideration of both capital investments and maintenance/operations budgets. Suggestions for future updates to the two plans focused on:

- Consistent methods for prioritizing and grouping assets;
- Revisiting the approach used to estimate maintenance and operational needs based on capital investments;
- Evaluating the impact of underinvesting in capital improvements on maintenance budgets for pavement, bridge, and other assets; and
- Evaluating the impact of mobility/expansion investments on capital and maintenance needs using the total cost of ownership data.

The resulting recommendations from Work Group 5 are presented in the *TAMP Action Plan* section of this document.

Asset Data Action Plan

The recommended Asset Matrix developed through the efforts of Work Groups 1 and 2 is available through AMPO. It documents the gaps between desired and current maintenance strategies for each asset class, the factors that contributed to the suggested tiers, and the recommendations for acquiring any missing data. A summary of the results are presented in the following table, which outlines the financial implications of the suggested actions.

Asset Class	Asset Description	Frequency	Action/Description	Metric/Unit	Annual Costs (Cost based on estimated)														
					FY20/21		FY21/22		FY22/23		Ongoing Annual		Status						
					Cost	Min	Cost	Min	Cost	Min	Cost	Min	Cost	Min					
File and Parking	Assetive Directed ADA	2	AMPO or ADA office will coordinate ADA parking and then perform inventory from imagery on roughly 300 locations (300/week).	Review by Districts at 2 hours/District x 120 hours	\$	63,000	0	\$	2,000	32	\$	13,000	32	\$	1,900	\$	4,000	32	
File and Parking	Road use (not way) and shared walkways	2	Inspection of pavement surface to FY22 and could include broader evaluation the cutting NSIA satellite imagery or lidar roles (364/year)	None at this time	\$	-	0	\$	-	0	\$	40,000	0	\$	-	\$	20,000	0	
File and Parking	Road use (not way) and shared walkways	2	Inspection of pavement surface to FY22 and could include broader evaluation the cutting NSIA satellite imagery or lidar roles (364/year)	None at this time	\$	-	0	\$	-	0	\$	20,000	0	\$	-	\$	10,000	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will conduct an initial inventory of geotechnical assets by creating a geotechnical asset inventory in 2020 through a combination of review of available data and expert judgement. The project manager will review per year data to identify projects where geotechnical assets have been constructed and conduct interviews of district personnel to identify additional assets and/or geotechnical locations and geotechnical assets known to require significant maintenance. While any assets identified through the interviews to the asset inventory, a maintenance program development (MAD) per year cycle based on 10-year inspection frequency.	Input from 8 Districts at 20 hours per m = 180 hours	\$	-	100	\$	-	0	\$	970,000	0	\$	-	\$	180,000	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Input from 8 Districts at 20 hours per m = 180 hours	\$	-	180	\$	-	0	\$	13,000	0	\$	-	\$	5,000	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Input from 8 Districts at 20 hours per m = 180 hours	\$	-	180	\$	-	0	\$	33,000	0	\$	-	\$	15,000	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Input from 8 Districts at 20 hours per m = 180 hours	\$	-	180	\$	-	0	\$	72,000	0	\$	-	\$	36,000	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	None at this time	\$	-	0	\$	7,000	0	\$	-	0	\$	-	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Input from 8 Districts at 20 hours per m = 180 hours	\$	-	10,000	\$	24,000	20,000	\$	24,000	20,000	\$	24,000	\$	24,000	20,000	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Input from 7 Districts at 40 hours/District = 280 hours	\$	-	0	\$	230,000	360	\$	180,000	0	\$	25,000	\$	65,000	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Districts collect work 7 Districts at 180 hours/District = 1260 hours	\$	75,000	1,320	\$	334,000	0	\$	334,000	0	\$	168,000	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	AMPO will coordinate the leveling systems implementation description	Districts collect work 7 Districts at 10 hours/District = 70 hours	\$	-	0	\$	25,000	70	\$	9,000	0	\$	9,000	\$	8,000	0
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO or CDM will perform one-time base inventory update of construction changes since 2018 (364/week).	None at this time	\$	5,000	0	\$	20,000	0	\$	60,000	0	\$	20,000	\$	40,000	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	High voltage cables are not typically being added to M-COT system. OTRM documents geometry and route types current to LIS but no connectivity status. Metro District Asset Management can perform one-time documentation of connectivity (24/week)	None at this time	\$	-	40	\$	-	0	\$	-	0	\$	-	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	Inspection of pavement surface to FY22 and could include broader evaluation the cutting NSIA satellite imagery or lidar roles (364/year)	None at this time	\$	-	0	\$	-	0	\$	8,000	0	\$	-	\$	4,000	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Metro District inventory update, 10 hours/District survey review, 20 hours	\$	9,000	20	\$	58,000	40	\$	58,000	40	\$	25,000	\$	28,000	40	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Districts hours included in Barrier - Plate Review tool treatments	\$	30,000	0	\$	2,000	0	\$	2,000	0	\$	1,000	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Districts hours included in Barrier - Plate Review tool treatments	\$	60,000	0	\$	8,000	0	\$	8,000	0	\$	4,000	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Baseline inventory review from 8 Districts at 20 hours/District = 160 hours. Review of annual currency data at 20 hours per District times 8 Districts = 160 hours.	\$	30,000	160	\$	150,000	320	\$	150,000	320	\$	75,000	\$	-	320	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Metro Districts 80 hours one-time effort to update inventory. District review of currency data at Districts 20 hours/District/year = 160 hours.	\$	10,000	80	\$	4,000	320	\$	4,000	320	\$	4,000	\$	-	320	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Districts hours included in Barrier - Plate Review tool treatments	\$	60,000	0	\$	10,000	0	\$	10,000	0	\$	5,000	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO, CDOT, and Districts will coordinate lighting into the 2020 asset inventory utilizing the 2018 Consultant L2000 013 dataset.	Review and input of baseline inventory by 7 Districts at 80 hours/District = 560 hours	\$	75,000	560	\$	170,000	0	\$	170,000	0	\$	-	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	Relative inventory to incorporate but existing location and material type is a high-use effort, so inventory will be added one-time through maintenance staff and annual consultant file collection (2020/year)	Districts review of annual collect at 60 hours/District x 6 = 360 hours/year	\$	-	0	\$	50,000	640	\$	50,000	640	\$	25,000	\$	-	640	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	None at this time	\$	165,000	0	\$	70,000	0	\$	70,000	0	\$	35,000	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Districts review of one-time project at 8 Districts x 5 hours = 40 hours. Districts inventory review of 30 hours/District/year x 8 = 240 hours.	\$	8,000	80	\$	180,000	160	\$	180,000	160	\$	180,000	\$	-	160	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Baseline inventory review from 8 Districts at 20 hours/District = 160 hours. Review of annual currency data at 20 hours per District times 8 Districts = 160 hours.	\$	750,000	1,000	\$	160,000	360	\$	518,000	360	\$	80,000	\$	360,000	360	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Districts hours included in sign panel asset class	\$	63,000	0	\$	2,000	0	\$	2,000	0	\$	2,000	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Districts hours included in sign panel asset class	\$	375,000	0	\$	160,000	0	\$	160,000	0	\$	80,000	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO will coordinate the leveling systems implementation description	Districts hours included in sign panel asset class	\$	63,000	0	\$	2,000	0	\$	2,000	0	\$	2,000	\$	-	0	
File and Parking	Vertical/leveling systems (including gully, cut, fill, culvert, etc., sewer, etc., structures, culverts, etc., bridges, culverts, etc., on the ground)	2	AMPO and R3 will coordinate the leveling systems implementation description	Review by 7 Districts at 20 hours/District = 140 hours	\$	38,000	140	\$	-	0	\$	-	0	\$	-	\$	-	0	

As shown in the table, the recommendations include the expenditures shown below to address the highest-priority data needs.

Fiscal Year	New One-Time Costs		New On-Going Annual Costs		
	Consultant or Central Office Cost	District Labor Hours	Maintaining the Inventory	Inspection Costs	District Labor Hours
FY 20/21	\$1,879,000	13,920			
	<p>The largest expenditures include a \$750,000 one-time expenditure to hire a consultant to build the baseline sign panel inventory and 10,080 hours for District personnel to inventory highway culverts, local road culverts, and pipe flumes on a corridor approach within a 4- or 5-year period. An analysis of the ROI on the culvert inventory showed a 7-year payback in terms of improved efficiencies.</p>				
FY 22/23	\$1,670,000	12,782			
	<p>The consultant costs include \$230,000 to inventory ponds, infiltration basins, and underground storage. In addition, \$336,000 is estimated to inventory storm sewer pipes and structures. In addition, the consultant costs reflect \$968,000 for building baseline inventories for the traffic assets included in the matrix. The District hours include 10,080 hours for on-going efforts to inspect the local road culverts.</p>				
FY 24/25	\$2,560,000	12,152			
	<p>The largest consultant cost is \$519,000 to conduct nigh-time inspections for sign panels. Other significant costs include \$336,000 for continuing the storm sewer pipe and structure inventory. It also includes \$180,000 to complete the pond, infiltration basin, and underground storage inventory. Other significant consultant expenses includes \$376,000 for building the inventory of Earth Retaining Systems and \$808,000 for the remaining traffic asset inventories. The District hours include 10,080 for on-going efforts to inspect the local road culverts.</p>				
FY 26 and Beyond			\$764,000	\$784,000	12,152
	<p>The largest on-going inventory costs include \$168,000 for the storm sewer pipe and structures inventory and \$180,000 for the update to the rumble strip and stripes inventory. Included in the inspection costs is \$188,000 for a statewide Earth Retaining System inspection program and \$360,000 for the sign panel inspection program. he District estimate includes 10,080 hours to continue the culvert inventory.</p>				

In summary, the Asset Data Action Plan establishes the following priorities over the next 5 years:

4. Conduct LiDAR asset data collection activities on a cyclical basis to collect the information needed to update asset inventories for assets with as-built information available on construction projects.
5. Focus on completing the side and mainline culvert inventories.
6. Use consultants to update asset inventory data for construction projects without as-builts.
7. Refresh the state’s sign inventory using contract labor.

The accomplishment of these efforts will provide the benefits listed in the following table.

A – Cyclical LiDAR	B – Focus on Culverts	C – Inventory Update	D – Sign Inventory Baseline
Utilizing LiDAR technology with desktop extraction is safe and efficient.	Return on Investment Analysis yielded net present value of \$23K with 7-year payback period.	Updated data to use for planning, scoping, and design saves MnDOT staff time.	MnDOT efficiency report documented staff time savings of \$19k/year using inventory data for design.
Annual cyclical collection using LiDAR is ~½ the cost of GPS field collection.	Updated data to use for planning, scoping, and design saves MnDOT staff time.	Innovative technology, economies of scale, and safe collection solution.	Collection using lidar is ~½ the cost of GPS field collection by Maintenance crews.
More accurate data and efficient review.	Reduced environmental impacts	More accurate data and efficient review.	Improved investment (planning) outcomes.

Life Cycle Strategy Action Plan

Three recommendations are suggested for increasing the cost-effective use of preventive maintenance to maximize long-term performance, extend service life, and minimize life-cycle costs. These solutions are not expected to eliminate the barriers introduced earlier, but they will help provide accountability in terms of expectations, available resources, and actual accomplishments. At the same time, these solutions will:

- Better align planned and actual investments with life-cycle planning and the TAMP.
- Provide a means for comparing the costs and benefits of preventive maintenance investments to other options.
- Establish a system of accountability for the level of planned and accomplished preventive maintenance work.

Each of these solutions can be implemented by MnDOT within the current management framework and the investment levels presented in MnSHIP, the TAMP, and those being used by District maintenance personnel. By leveraging these current business processes the solutions will ensure that Districts are able to achieve expectations while considering local conditions and constraints.

Recommendation 1

Establish Performance Measures and an Accountability System for Tracking Annual Preventive Maintenance Goals and Accomplishments

Preventive maintenance is a cost-effective way of maximizing asset service lives and minimizing life-cycle costs. However, the benefits of preventive maintenance are not always obvious in the short term. The suggested measures and targets presented here will build on efforts already begun by the Maintenance Business Management Team (MBMT) to provide short-term expectations for PM work so the long-term benefits can be accomplished. As the name suggests, preventive maintenance treatments are intended to be applied early in an asset's life to slow deterioration. Late application can significantly reduce or negate treatment effectiveness. The need to apply these treatments before significant deterioration has occurred creates a "window of opportunity" within which these treatments should be applied. The length of the window of opportunity can vary between assets and locations for several reasons. The proposed measures and targets are based on the typical performance of assets on the Minnesota state highway system and the resulting typical windows of opportunity for specific types of PM treatments.

PREVENTIVE MAINTENANCE MEASURES AND TARGETS

In the case of pavement and bridge preventive maintenance, the MBMT has already adopted the measures described below but has not adopted specific targets. The targets suggested are intended to establish the level of needed work, so Districts can appropriately balance resources across their full

programs. In the case of traffic signals, the current cyclical inspections and preventive maintenance checks are currently being conducted but the targets have not been yet adopted. The targets listed in this section are initial recommendations.

Preventive maintenance needs for pavements and bridges will be established using existing analysis tools and approaches. For pavements the pavement management system (PMS) will be used and for bridges the bridge management system (BMS) will be used.

Suggested measures and targets are listed below.

- Pavements
 - ◆ At least 80 percent of bituminous overlays on pavements will be crack sealed (or filled) by age 5. Maintenance will track the data, but Districts may perform the work by either contract or maintenance personnel. The results will be analyzed and reported at the end of each calendar year using CHIMES and TAMS data.
 - ◆ Address at least 80 percent of the 5-year rolling average bituminous paving miles using seal coats, micro surfacing, and other full-width treatments. This value will be reported by District at the end of each calendar year.
 - ◆ Address at least 80 percent of the 5-year rolling average concrete paving miles using light Concrete Pavement Repair (CPR) treatments. This value will be reported by District at the end of each calendar year.
- Bridges
 - ◆ Flush 90 percent of the bridges annually. The results will be reported by District at the end of each calendar year.
 - ◆ Crack at least 95 percent of the bridge decks on a 5-year cycle. This value will be reported by District at the end of each calendar year.
 - ◆ Replace at least 95 percent of the poured joints on an 8-year cycle. This value will be reported by District at the end of each calendar year.
 - ◆ Repair at least 95 percent (by linear feet) of the strip seals and modular joints in Good condition each year. This value will be reported by District at the end of each calendar year.
 - ◆ Establish performance measures and targets for preventive bridge painting, including spot-, zone-, and element-level painting.
- Traffic Signals
 - ◆ Establish targets once one or two reporting cycles have been completed.
 - ◆ Perform an annual operational check on each signal system and report percent checked by District at the end of each calendar year.
 - ◆ Perform an electrical check on each signal system every other year and report the percent checked by District at the end of each calendar year.
 - ◆ Perform a check on each signal's electronics system on a 3-year cycle and report the percent checked by District at the end of each calendar year.
- High-Mast Light Towers
 - ◆ Establish targets once one or two reporting cycles have been completed.
 - ◆ Annually inspect and repair each lighting installation. The percent of operational light towers will be reported by District at the end of each calendar year.

A workplan for completing these activities is provided in the following table.

Preventive Maintenance Recommendation 1 Workplan

Recommended Actions	Target Completion Date	Estimated Level of Effort (Low, Medium, High)	Suggested Responsible Party	Dependencies To Other Actions
Initial Outreach	4Q 2020	Medium	WG 3	
CHIP/STIP Guidance	12/10/20		Ronda	
Planning	12/15/20		Ronda	
Materials Engineers	11/16/20		Glenn	
PCMG/CMG	11/19/20		Greg P.	
Bridge	11/24/20		Dave S.	
Operations Division	11/18/20		Dave S.	
Maintenance (MBMT)	?		Dave S.	
Coordinate with PRIA on Policy AD006	4Q 2020	Low	Dave Solsrud & Glenn Engstrom	
Form a technical team with one member from each technical area, and one member from the Performance, Risk, and Investment Analysis Unit	4Q 2020	Low	Dave Solsrud	
Fill out and submit the screening form	1Q 2021	Medium	Technical team	
Identify Management Group(s) to review	1Q 2021	Medium	Technical team	
Schedule presentation	2Q 2021	Low	Technical team	
Prepare Management Group presentation	2Q 2021	Medium	Technical team	
Present to Management Group	2Q 2021	Low	Technical team	
Management Group review & decision	2Q 2021	Medium	Technical team	
Revise as needed	3Q 2021	Medium	Technical team	
Re-present as needed	3Q 2021	Low	Technical team	

Recommendation 2

Formalize Preventive Maintenance Planning

The intent behind the second recommendation is to ensure that agency decisionmakers understand the benefits associated with preventive maintenance and are following processes that maximize long-term

performance, extend service life, and minimize life-cycle costs. The steps outlined in this recommendation create a mechanism to plan preventive maintenance activities more formally as part of the MnSHIP and STIP development processes. The steps involved in developing this mechanism are described below.

1. Establish planned investment levels based on management system (e.g., pavement management system and bridge management system) outputs and the measures including in recommendation #1.
2. Enhance the *Pavement Investment Evaluator* to include preventive maintenance treatments to support Districts in developing balanced paving programs.
3. Consider preventive maintenance projects in the tradeoff decisions that normally take place as part of the STIP development.
4. Program a sufficient level of preventive maintenance projects into the STIP and through maintenance work planning (TAMS) at the District level to achieve annual goals.
 - a. This may require a modification to project scoping procedures to include preventive maintenance set-asides as projects using a simplified scoping packet that includes work type and budget, but not necessarily specific locations, and may refer to another document such as a work order.
 - b. In the year prior to planned work, the set-aside projects will be reprogrammed as fully-scoped projects by the District.
5. Estimate the value of programmed work and needed accomplishments by the management systems (pavement and bridge management systems).
6. Report on programmed and delivered preventive maintenance funding and accomplishments during District check-in meetings.

Recommendation 3

Develop a Common Web-Portal For Preventive Maintenance Guidance

Guidance on the selection, design, and application of preventive maintenance treatments has already been developed for several assets, including at pavements and bridges. However, this information is not organized or easily accessible. The following actions are suggested to support the use of preventive maintenance and the implementation of the two previous recommendations.

1. Develop a web portal on the MnDOT intranet to organize, house, and disseminate guidance and other information on preventive maintenance, including the following:
 - a. Current relevant policies.
 - b. Current relevant guidance.
 - c. A preventive maintenance dashboard that reports on the needed, planned, and actual preventive maintenance investments and accomplishments for each District, using the structure established in the earlier recommendations.

- d. Links to, or instructions to access, relevant data sources such as TAMS, Georilla, the TAMP, MnSHIP, TIPS, and the STIP.
 - e. Project development resources, such as special provisions, estimating tools, and so on.
2. Charge the Asset Management Steering Committee and the MBMT with the responsibility to identify gaps in existing guidance or information and the authority to collaborate with appropriate business units to address those gaps.
 3. Update the portal at least quarterly with the most recent policies, guidance, and other information.

A workplan for completing the activities associated with Recommendations 2 and 3 is provided in the following table.

Preventive Maintenance Workplan For Recommendations 2 and 3.

Recommended Actions	Target Completion Date	Estimated Level of Effort (Low, Medium, High)	Suggested Responsible Party	Dependencies To Other Actions
Assemble an implementation team	4Q 2020	Low	Dave Solsrud & Patrick Weidemann	
Develop PMS report on PM needs and candidates	1Q 2021	Low	Dave Janisch	Assume this exists but needs to be formalized
Develop BMS report on PM needs and candidates	1Q 2021	Medium	Sarah Sondag	Assume this exists but needs to be formalized
Develop report on signals needs	1Q 2021	Medium	Steve Misgen	Assume this exists but needs to be formalized
Develop report on high-mast lighting needs	1Q 2021	Medium	Steve Misgen	Assume this exists but needs to be formalized
Draft instructions on scoping PM projects	1Q 2021	Low/medium		May already exist
Review instructions on scoping PM projects	2Q 2021	Low		
Finalize and distribute instructions on scoping PM projects	3Q 2021	Medium		
Establish reporting protocols for pavement PM accomplishments	4Q 2020 (done)	Medium	Dave Solsrud	Already established
Establish reporting protocols for bridge PM accomplishments	1Q 2021	Medium	Sarah Sondag	Already exists
Establish reporting protocols for signals PM accomplishments		Medium	Steve Misgen	

Recommended Actions	Target Completion Date	Estimated Level of Effort (Low, Medium, High)	Suggested Responsible Party	Dependencies To Other Actions
Establish reporting protocols for high-mast lighting PM accomplishments		Medium	Steve Misgen	
Develop reports (map and tabular) for PM needs v. planned v. accomplished				
Develop instructions to Districts for including PM reports in check-in meetings			Patrick Weidemann	
Add needs reports to annual Investment Guidance			Patrick Weidemann	
Establish review procedures for PRIA	3Q 2021	Medium?	Dave Solsrud / Deanna Beldon	Depends on Solution 2
Form a Development Team	4Q 2020	Low	Dave Solsrud	Use technical team from Solution 1?
Identify and reach out to anticipated customers	1Q 2021	Medium	Development Team	
Decide if iHub or Sharepoint site is the best option	2Q 2021	Low	Development Team	
Develop use cases	3Q 2021	High	Development Team	
Identify information to be included on the site to address use cases	3Q 2021	Medium	Development Team	
Identify needed site functionality to address use cases	3Q 2021	Medium	Development Team	
Complete the requirements / SharePoint Requirements Gathering Questions	3Q 2021	Medium	Development Team	
Develop the site	1Q 2022	Medium	MnIT	
Test the site	1Q 2022	Medium	Development Team	
Finalize the site	1Q 2021	Medium	MnIT	

Communication Action Plan

The Work Group's efforts to identify target audiences and information categories led to the development of the recommendations included in this action plan. This plan provides specifics outlining the type of information needed by each of the audiences identified and prioritizes an approach for preparing the information. Additionally, the action plan describes the need for a centralized location for storing presentations, flyers, and other educational and promotional materials to be shared or modified, depending on the particular need.

Information Needs By Audience

The information needs for each of the six different audiences introduced earlier are summarized in the following tables. Each table evaluates information needs in the following five categories introduced earlier and repeated here for convenience.

- **General Asset Management Knowledge** – Information in this category contains messaging that builds general knowledge and support for asset management.
- **TAMS Data** – Content in this category is primarily focused on the importance of quality data and the benefits realized from the use of quality data.
- **Decision Making** – This category includes information that demonstrates the importance of using TAMS data and asset management principles to guide work planning, to understand trade-offs in budget-setting activities, and to manage performance. -cycle costs and extend service life.
- **TAMP Implementation** – The materials in this category support the on-going implementation of the TAMP at MnDOT.
- **Coordination With External Stakeholders** – Information in this category is available for MnDOT's use in communicating asset management information to external stakeholders.

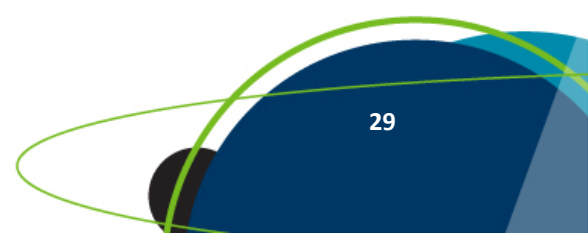
The tables summarize what message is needed, why the messaging is important, how it should be delivered, and how frequently it is needed.

EXECUTIVE LEADERSHIP

The primary source of information for this audience is expected to be provided by the Asset Management Program Office (AMPO). This group needs sufficient information on the asset management program to understand long-term impacts on MnDOT investment decisions and to address questions from stakeholders. At this level, asset management information is used to set MnDOT's strategic performance objectives.

Executive Leadership Information Needs.

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
What is the message?	<ul style="list-style-type: none"> • What asset management means at MnDOT and why we do it • How TAMS fits with MnDOT's strategic priorities and performance targets • How investing in TAMS will achieve MnDOT's objectives, help manage risks and lower long-term costs 	<ul style="list-style-type: none"> • Importance of quality data • Benefits to the use of quality data • Value of data and tools • High-level knowledge of TAMS content & functions 	<ul style="list-style-type: none"> • Understanding trade-offs in budget setting activities • Making equitable investments throughout the state 	<ul style="list-style-type: none"> • Program & investments reflect TAMP commitments • Performance expectations to be achieved 	<ul style="list-style-type: none"> • Documentation showing MnDOT is a good steward of assets and financial resources
Why do we need to communicate the message?	<ul style="list-style-type: none"> • To develop an understanding of each person's role in asset management • To enable audience members to answer questions from stakeholders • To convey MnDOT's asset management goals & objectives • To convey the 5-year strategic plan implementation roles & responsibilities • To communicate MnDOT's commitment to TAM to external stakeholders 	<ul style="list-style-type: none"> • To provide examples showing good data leads to better, more informed decisions, that reduce risk and costs • To provide examples illustrating that the new data and tools increase efficiency; improve processes 	<ul style="list-style-type: none"> • To get more value from limited funds, preserve assets, deliver more value to traveling public 	<ul style="list-style-type: none"> • To communicate the direction and importance of asset management to internal and external audiences 	<ul style="list-style-type: none"> • To reassure stakeholders that communication and coordination is being done • To enhance customer trust
How should we deliver the message?	<ul style="list-style-type: none"> • Group meetings • FAQs with links to answers 				
When should we deliver it? (frequency)	<ul style="list-style-type: none"> • Prior to high-level direction setting 	<ul style="list-style-type: none"> • Prior to high-level direction setting 	<ul style="list-style-type: none"> • At key milestones related to decision-making 	<ul style="list-style-type: none"> • At key milestones related to the TAMP 	<ul style="list-style-type: none"> • As needed



SENIOR LEADERSHIP TEAM

The Senior Leadership Team (SLT) needs sufficient information to guide policy and investment decisions in the organization. This team oversees investments that demonstrate MnDOT is serving as a good steward of the system and is managing resources wisely over the long term to reduce life cycle costs and mitigate risks. This team receives messages from the Executive Leadership Team and AMPO and conveys the information received to Central Office and District management personnel.

Senior Leadership Team Needs.

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
What is the message?	<ul style="list-style-type: none"> What asset management means to MnDOT and why we do it Build a general understanding of roles, responsibilities, and how these roles need to evolve across the agency functions How to identify and fill gaps in knowledge Why the required level of commitment is needed How TAMP reduces risk 	<ul style="list-style-type: none"> Demonstrate benefits to the use of quality data What asset info exists, what doesn’t, what should in the future Differences in official financial vs planned investments Provide a general understanding of software and databases 	<ul style="list-style-type: none"> There are best (cost based) practices determined by the use of accurate data/modeling etc. Managing performance drives decisions Time is of the essence (right time for preventive maintenance) Preventive maintenance is cost effective (ROI) What needs to be understood about MnSHIP and STIP tradeoffs Future costs and commitments should be considered when programming expansion projects What level of funding is available for maintenance budgets Why maintenance work planning is important 	<ul style="list-style-type: none"> We have obligations regarding the Federal statute What the TAMP contains and how it illustrates best practices The TAMP is not a detailed element level decision record The TAMP embraces Maintenance and Capital investment strategies The TAMP articulates a MnDOT priority – Taking care of what we have 	<ul style="list-style-type: none"> Demonstrate that MnDOT is a good steward of assets and financial resources MnDOT has a data-driven approach MnDOT carefully invests in and manages data and tools
Why do we need to communicate the message?	<ul style="list-style-type: none"> To explain that some things are required (e.g., TAMP, consistency determination) To promote priorities established by the Senior Leadership Team 	<ul style="list-style-type: none"> To ensure commitment To manage Employee expectations To make effective use of data management resources (labor) and financial 	<ul style="list-style-type: none"> To demonstrate leadership To establish transparency and credibility To make better use of limited resources 	<ul style="list-style-type: none"> To promote accountability To avoid FHWA sanctions To ensure the SLT knows what TAMP is and is not To make the link between data, 	<ul style="list-style-type: none"> To better respond to pressures to make new investments To enhance credibility with the legislature To enhance customer trust

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
		resources (software & data maintenance) <ul style="list-style-type: none"> To ensure trust in data To recoup investments (ROI) 		tools, and TAMP practices	<ul style="list-style-type: none"> To be granted sufficient resources to take care of assets
How should we deliver the message?	<ul style="list-style-type: none"> Pre-existing YouTube or other clips Materials or testimonials from other states Attendance at National Asset Management Conferences to learn from peers 	<ul style="list-style-type: none"> Presentations at SLT meetings Dashboards and metrics Periodic emails Training YouTube video Attendance at the AgileAssets Exchange 	<ul style="list-style-type: none"> Presentations at SLT meetings Presentations during MnSHIP development 	<ul style="list-style-type: none"> Presentations on the TAMP at SLT meetings 	<ul style="list-style-type: none"> Use the Legislative Liaison District Engineer legislative visits
When should we deliver it? (frequency)	<ul style="list-style-type: none"> Quarterly at first (1 year) 	<ul style="list-style-type: none"> Meetings quarterly till topics covered Mailings quarterly Monthly AMSC minutes 	<ul style="list-style-type: none"> At key milestones related to decision-making 	<ul style="list-style-type: none"> At key milestones related to the TAMP 	<ul style="list-style-type: none"> Based on forums above At least annually

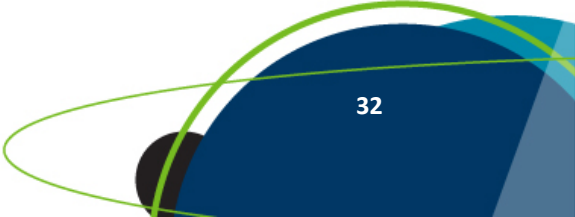
CENTRAL OFFICE MANAGEMENT

This group has primary responsibility for the development of planning and investment documents. They also oversee agency systems that provide supporting information to the Districts. In this way they help ensure that central office staff manage asset performance information to support MnDOT’s efforts to achieve its strategic objectives.

Central Office Management Needs

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
What is the message?	<ul style="list-style-type: none"> What asset management means at MnDOT and why we do it Asset management is aligned with MnDOT’s strategic objectives Good data leads to better decisions 	<ul style="list-style-type: none"> By using the data we can better time our investments to increase the life of the asset and maximize the dollars spent 	<ul style="list-style-type: none"> Field staff and other resources are optimized by focusing on highest priority work With limited budgets, helps to focus investments 	<ul style="list-style-type: none"> Field staff and other resources are optimized by focusing on highest priority work With limited budgets, helps to focus investments 	<ul style="list-style-type: none"> MnDOT considers multiple factors and trade-offs prior to committing to investments MnDOT uses data and performance measures to

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
	<ul style="list-style-type: none"> Asset management has already improved efficiency Asset management makes your job easier/better Why are you the one to do this particular job (e.g., collect or enter data)? This is how we use the information you collect MnSHIP and the TAMP drive infrastructure investments MnDOT's strategic priorities are.... MnDOT's performance targets are.... 	<ul style="list-style-type: none"> Helps manage investments across the system Field staff and other resources are optimized by focusing on highest priority work 	<ul style="list-style-type: none"> on highest priorities Assists in making better decisions on the timing of asset investments Better timing of investments leads to longer asset life and maximizing value 	<ul style="list-style-type: none"> on highest priorities Assists in making better decisions on the timing of asset investments Better timing of investments leads to longer asset life and maximizing value 	<ul style="list-style-type: none"> influence capital investments
Why do we need to communicate the message?	<ul style="list-style-type: none"> To build a general understanding of MnDOT's asset management program and its importance among staff To build an understanding of the importance of each individual's role in supporting asset management To share MnDOT's asset management messaging to staff as necessary 	<ul style="list-style-type: none"> To build an understanding of the value of data and related tools To document the benefits of making decisions using quality data To illustrate that treatment effectiveness is improved by using data 	<ul style="list-style-type: none"> To explain how TAMS data and asset management principles help guide work planning To develop an understanding of trade-offs in budget setting activities To build skills in managing assets to performance targets 	<ul style="list-style-type: none"> To ensure that program goals and investments match TAMP commitments To ensure performance expectations for each asset are achieved 	<ul style="list-style-type: none"> To demonstrate that MnDOT is a good steward of assets and financial resources To enhance customer trust To provide managers and supervisors with enough knowledge to be able to explain/persuade the benefits to others
How should we deliver the message?	<ul style="list-style-type: none"> Targeted email(s) from Chief Engineer Follow up discussion or communication from respective Assistant Commissioner Additional messaging as needed throughout office organizational levels Flyer or Pamphlet Video Training FAQs with links to answers 				
When should we deliver it? (frequency)	<ul style="list-style-type: none"> In sequence identified above -- Chief Engineer, followed by Assistant Commissioner, and then appropriate Office level follow up (1 message per month/3 months) 				



DISTRICT MANAGEMENT

This group uses asset management principles to guide project selection activities. This group is responsible for ensuring that asset management principles are followed at the District level and that District field staff are aware of the importance of the data they collect.

District Management Needs

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
What is the message?	<ul style="list-style-type: none"> • What asset management means at MnDOT and why we do it • Asset management is aligned with MnDOT’s strategic objectives: • Good data leads to better decisions • Asset management has already improved efficiency • Asset management makes your job easier/better • Why are you the one to do this particular job (e.g., collect or enter data)? • This is how we use the information you collect • MnSHIP and the TAMP drive infrastructure investments • MnDOT’s strategic priorities are.... • MnDOT’s performance targets are.... 	<ul style="list-style-type: none"> • By using the data, we can better time our investments to increase the life of the asset and maximize the dollars spent • Asset management helps manage investments across the system • Field staff and other resources are optimized by focusing on highest priority work 	<ul style="list-style-type: none"> • Field staff and other resources are optimized by focusing on highest priority work • Data helps identify better timing for asset investments • Data assists in making better work planning for maintenance 	<ul style="list-style-type: none"> • Field staff and other resources are optimized by focusing on highest priority work • With limited budgets, data helps to focus investments on highest priorities • Data assists in making better decisions on the timing of asset investments • Better timing of investments leads to longer asset life and maximizing value 	<ul style="list-style-type: none"> • MnDOT considers multiple factors and trade-offs prior to committing to investments • MnDOT utilizes data and performance measures to influence capital investments
Why do we need to communicate the message?	<ul style="list-style-type: none"> • To build a general understanding of MnDOT’s asset management program and its importance among staff • To build an understanding of the importance of each individual’s role in supporting asset management 	<ul style="list-style-type: none"> • To build an understanding of the value of data and related tools • To demonstrate the benefits of making decisions using quality data • To show investment timing is 	<ul style="list-style-type: none"> • To explain how TAMS data and asset management principles help guide work planning • To build an understanding of trade-offs in budget setting activities 	<ul style="list-style-type: none"> • To explain the match between program goals and the TAMP commitments • To ensure performance expectations for each asset are achieved 	<ul style="list-style-type: none"> • To illustrate that MnDOT is a good steward of taxpayer dollars to enhance customer trust • To provide managers and supervisors with enough knowledge to be able to explain/persuade

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
	<ul style="list-style-type: none"> To share MnDOT’s asset management goals and objectives 	improved by using data	<ul style="list-style-type: none"> To explain how data assists in managing assets to performance targets 		<ul style="list-style-type: none"> the benefits to others To enhance customer trust
How should we deliver the message?	<ul style="list-style-type: none"> Targeted emails Group meetings Website Flyer/Pamphlet Video Training FAQs with links to answers 				
When should we deliver it? (frequency)	<ul style="list-style-type: none"> As needed 				

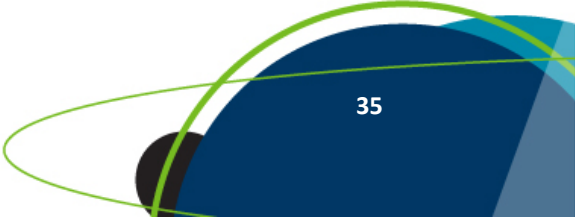
CENTRAL OFFICE STAFF

This group uses asset management principles to guide the development of planning and investment decisions by providing supporting information and expertise. They use asset performance information to support decisions that will allow MnDOT to achieve its strategic objectives.

Central Office Staff Needs

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
What is the message?	<ul style="list-style-type: none"> What asset management means at MnDOT and why we do it How each person has a role in asset management How to answer questions from the field or other stakeholders Good data leads to better decisions and improves efficiency 	<ul style="list-style-type: none"> The importance of quality data The benefits to the use of quality data The value of data and tools New TAMS data requirements General knowledge of TAMS content & functions TAMS- How to instructions 	N/A	<ul style="list-style-type: none"> Provide feedback to Supervisors and the Asset Management Team regarding system errors or suggestions for process improvement Implementation of TAMS may impact/change the way you do your job (for the better) 	<ul style="list-style-type: none"> How to use TAMS to better support District staff and other areas

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
Why do we need to communicate the message?	<ul style="list-style-type: none"> To communicate the important role each individual has in supporting TAM 	<ul style="list-style-type: none"> To build an understanding of the importance of their role in supporting the data collection and entry processes done by field staff To reduce the effort required to collect effective information to support decision making 	N/A	<ul style="list-style-type: none"> To be the voice of the TAMS users as they may likely be the ones that are first to encounter a problem in the system – the sooner a concern is identified, the sooner it can be corrected and minimize the number of users affected To provide information on how staffs’ roles may change and why so they can prepare themselves 	<ul style="list-style-type: none"> To demonstrate that MnDOT is a good steward of assets and financial resources To enhance customer trust
How should we deliver the message? Note: The delivery methods and timeframes need to be integrated	<ul style="list-style-type: none"> Group meetings Communication Products: Flyer/ Pamphlet, Video, Training, FAQ’s with links to answers 	<ul style="list-style-type: none"> One-on-one meetings with a Supervisor or TAMS trainer Group meetings with a Supervisor or TAMS trainer E-Learning Email info sharing 	N/A	<ul style="list-style-type: none"> One-on-one meetings with a Supervisor or TAMS trainer Group meetings with a Supervisor or TAMS trainer E-Learning 	N/A
When should we deliver it? (frequency)	<ul style="list-style-type: none"> Quarterly or at every opportunity until it is part of the culture, then annually 	<ul style="list-style-type: none"> Quarterly or at every opportunity until it is part of the culture, then annually (by Supervisor & TAMS staff members) Twice annually (by Manager) Annually (by District Engineer/Office Director) As necessary (by Commissioner, Deputy, Assistant Commissioner, or TAMS Office Director) 	N/A	<ul style="list-style-type: none"> Quarterly or at every opportunity until it is part of the culture, then annually (by Supervisor & TAMS staff members) Twice annually (by Manager) Annually (by District Engineer/Office Director) As necessary (by Commissioner, Deputy, Assistant Commissioner, or TAMS Office Director) 	N/A

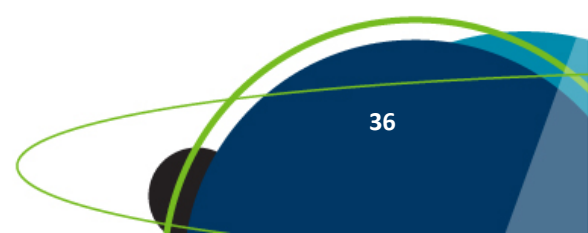


DISTRICT STAFF

This group records the field information that is used to support maintenance and preservation project selection decisions. This group needs to understand the importance of the data they record and how it can be used to improve decisions.

District Staff Needs

	General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
What is the message?	<ul style="list-style-type: none"> What asset management means at MnDOT and why we do it Good data leads to better decisions and improves efficiency This is how we use the information you collect 	<ul style="list-style-type: none"> The importance of quality data The benefits to the use of quality data New data and tools have improved efficiency; improved processes; use examples such as damage restitution process improvements 	N/A	<ul style="list-style-type: none"> Provide feedback to Supervisors and the Asset Management Team regarding system errors or suggestions for process improvement Implementation of TAMS may impact/change the way you do your job (for the better) 	N/A
Why do we need to communicate the message?	<ul style="list-style-type: none"> To share the important role each individual has in supporting TAM 	<ul style="list-style-type: none"> To build an understanding of the importance of their role in the data collection and entry process and its criticality in ensuring staff put forth the effort to enter accurate and timely information 	N/A	<ul style="list-style-type: none"> To be the voice of the TAMS users as they may likely be the ones that are first to encounter a problem in the system – the sooner a concern is identified, the sooner it can be corrected and minimize the number of users affected To provide information on how staffs’ roles may change and why so they can prepare themselves 	N/A
How should we deliver the message? Note: The delivery methods and timeframes need to be integrated	<ul style="list-style-type: none"> Group meetings Communication Products: Flyer/Pamphlet, Video, Training, FAQ’s with links to answers 	<ul style="list-style-type: none"> One-on-one meetings with a Supervisor or TAMS trainer Group meetings with a Supervisor or TAMS trainer E-Learning Email info sharing 	N/A	<ul style="list-style-type: none"> One-on-one meetings with a Supervisor or TAMS trainer Group meetings with a Supervisor or TAMS trainer E-Learning 	N/A
When should we deliver it? (frequency)	<ul style="list-style-type: none"> Monthly or at every opportunity until it is part of the culture, then annually 	<ul style="list-style-type: none"> Monthly or at every opportunity until it is part of the culture, then annually (by Supervisor & TAMS staff members) 	N/A	<ul style="list-style-type: none"> Monthly or at every opportunity until it is part of the culture, then annually (by Supervisor & TAMS staff members) 	N/A



General TAM Knowledge	TAMS Data	Decision Making	TAMP Implementation	Coordination with Stakeholders
	<ul style="list-style-type: none"> • Twice annually (by Manager) • Annually (by District Engineer/Office Director) • As necessary (by Commissioner, Deputy, Assistant Commissioner, or TAMS Office Director) 		<ul style="list-style-type: none"> • Twice annually (by Manager) • Annually (by District Engineer/Office Director) • As necessary (by Commissioner, Deputy, Assistant Commissioner, or TAMS Office Director) 	

Implementation Recommendations

To assist AMPO in addressing the messaging needs at all levels of the organization, a staged implementation process was introduced earlier that starts at the top of the communication pyramid and evolves to meet the needs at each level of the pyramid. This approach helps ensure that as resources are being implemented for one audience, resources are being developed for the next stage based on lessons learned. This allows resources to be developed as the plan is implemented and should result in a collection of useful materials that can be used or modified to satisfy the needs at each level of the organization.

With the staging approach as the model, the following implementation actions are recommended.

RECOMMENDATION 1

Communicate Roles and Develop Initial Resources

Completion Target: June 30, 2021

Under this action item, AMPO will complete the following activities:

- Add any additional communication needs generated by the work groups to the messaging needs introduced earlier.
- Confirm membership in an on-going Communication Work Group to provide AMPO feedback during the rollout of the communication plan.
- Prepare initial materials to serve as the basis for the communication rollout.
- Include general information about what asset management is and why it is important to MnDOT.
- Provide examples showing how TAMS has benefited MnDOT.
- Establish a central, shared portal for posting communications materials.
- Present the communication plan to the Senior Leadership Team and obtain feedback on sample materials.
- Revise materials based on the feedback received.
- Work with the Senior Leadership Team to provide information to share with the Executive Leadership Team describing the planned activities.

RECOMMENDATION 2

Initiate District Rollout

Completion Target: December 31, 2021

Under this action item, AMPO will complete the following activities:

- Develop materials targeted to Districts focused on the importance of TAMS data to decision making.
 - ◆ Customize examples used to each District for relevance.
 - ◆ Include a variety of formats for presenting the information, including PowerPoints, handouts, posters, how-to training, and a short video.
- Review and finalize the materials with the assistance of the Communication Work Group.
- Post the final materials on the shared portal.
- Meet with District Management to explain the communication objectives, present the materials available to support these efforts, and explain how to access the information on the portal.
- Working with each District, establish a plan for sharing available information with District personnel and identifying other communication needs.

RECOMMENDATION 3

Initiate Central Office Rollout

Completion Target: March 2022

Under this action item, AMPO will:

- Meet with Central Office Management personnel to explain the communication objectives, present the materials available to support these efforts, and explain how to access the information on the portal. Seek ideas for additional materials needed to support Central Office functions.
- Develop additional communication materials in collaboration with the Communication Work Group to address the needs identified by District and Central Office Management.
- Share the additional information developed with District and Central Office Management.

RECOMMENDATION 4

Initiate the MnSHIP and TAMP Rollout

Completion Target: December 2022

Under this action item, AMPO will:

- Work with the MnSHIP and TAMP PMTs to identify specific communication topics that need to be shared with various audiences specified in the communication plan.
- Develop the suggested materials in collaboration with the Communication Work Group and the PMT members.
- Develop a plan for distributing the materials to the appropriate audiences using formats suggested in this document.
- Communicate the roles and responsibilities for rolling out the MnSHIP and TAMP materials to the appropriate audiences.
- Monitor the activities specified in the rollout plan and provide needed support when appropriate.
- Assess the success of the rollout and make any necessary adjustments.

RECOMMENDATION 5

Conduct On-Going Communication Efforts

Completion Target: December 2025

Under this action item, AMPO will:

- Monitor District and Central Office management activities to promote asset management and provide support where appropriate.
- Present results to the Executive and Senior Leadership Teams to maintain on-going support for asset management efforts.
- Annually review the success of the communication plan and make needed adjustments to address specific issues that arise.
- Continue to develop and share communication materials to support the use of asset management.
- Update the shared portal with current examples that illustrate the benefits provided by TAMS and other uses of asset management at MnDOT. Coordinate these efforts with the activities suggested in the Pavement Preservation Action Plan Recommendation #3

Communications Materials

Based on the information generated by the Communications Work Group, the following materials are suggested for development. It is envisioned that the materials will be stored on a central portal that makes access to the information easy and provides a forum for individuals to add materials to the site as the communication plan is rolled out.

SLIDES

It was suggested that a library of PowerPoint slides be developed for use in making presentations or for modifying to fit specific needs. Topics to be addressed within each of the five theme areas are listed with the top priority falling into the General TAM Information and TAMS Data categories.

- General TAM Information, including:
 - ◆ What TAM means at MnDOT (targeted to specific roles to foster understanding)

- ◆ What elements are required by law and the importance of avoiding penalties
- ◆ Why we do TAM at MnDOT
- ◆ Why marketing and communicating TAM is important
- ◆ How TAM fits with MnDOT's strategic priorities
- ◆ How TAM fits with MnDOT's performance targets
- ◆ Links between data, tools, and TAMP practices
- ◆ Asset Management Strategic Implementation Plan recommendations (Add slides related to what other working groups have developed or are recommending)
- TAMS Data, including:
 - ◆ Improved efficiencies and effectiveness at MnDOT due to TAM, such as:
 - ✦ ROI on TAMS and TAM
 - ✦ Examples of best practices on use of data and modeling for decision-making
 - ✦ Importance of making good investment decisions ASAP rather than waiting
 - ✦ Importance of ensuring performance expectations of each asset are achieved
 - ✦ How TAM brings greater transparency and credibility
 - ✦ Field staff and other resources are optimized by focusing on highest priority work
 - ✦ Making equitable investments throughout the state is important
 - ✦ With limited budgets, TAM helps to focus investments on highest priorities
 - ✦ Assists in making better decisions on the timing of asset investments
 - ✦ Better timing of investments leads to longer asset life and maximizing value
 - ✦ How the TAMP reduces risk
 - ◆ Implementation of TAMS may impact/change the way you do your job (for the better)
 - ✦ Provide information on how staff's roles may change and why so they can prepare themselves for those changes
 - ◆ Information specific to TAMS data collection, such as:
 - ✦ Importance of quality data
 - Good data leads to better, more informed decisions, that reduce risk and costs (Provide examples)
 - ✦ Benefits to the use of quality data
 - New data and tools increase efficiency; improve processes
 - » Example: Damage Restitution Process improvements
 - » Provide additional examples tailored to specific audience
 - » How the data that is collected is used (be specific about the data and its use)
 - ✦ What asset info exists, what doesn't, what should in the future (Matrix group)
 - ◆ Information on why TAMS is important and how TAMS data is used at MnDOT, such as:
 - ✦ How investing in TAMS will:
 - Achieve MnDOT's objectives
 - Help manage risks
 - Lower long-term costs
 - ✦ How TAMS data and TAM principles help guide work planning

- ★ Value of good data and tools
- ◆ How-to information on TAMS, such as:
 - ★ How to use TAMS and where to go to learn how to use it
 - ★ General overview of TAMS
 - ★ High-level knowledge of TAMS content & functions
- Decision making to support project and treatment selection, such as:
 - ◆ Why program goals and investments should match TAMP commitments
 - ◆ Understanding trade-offs in budget setting activities
 - ★ Get more value from limited funds, preserve assets, deliver more value to traveling public
 - ★ MnSHIP and STIP tradeoffs
 - ★ MnDOT considers multiple factors and trade-offs prior to committing to investments
 - ◆ Factoring future operating/maintenance/management costs when programming projects
 - ◆ TAMP implementation, such as:
 - ★ Program and investments should reflect TAMP commitments
 - ★ Investment plans and performance expectations by District (from the TAMP)
 - ★ Information on long-term performance expectations to be achieved with TAMP
 - ◆ Coordination with stakeholders, such as:
 - ★ Demonstrate that MnDOT is a good steward of assets and financial resources
 - ★ How asset management can make a difference in local agencies

HANDOUTS AND FLYERS

The development of handouts or flyers provides a way to convey a message via email or the items can serve as a take-away after a presentation at a meeting. The intention is to make 1-page handouts based on content from the PowerPoint slides. To be most effective, these materials should be tailored to the specific audience. Potential topics include those listed below.

- TAMS is Making a Difference
- Quality Data Matters!
- The Data You Collect Makes a Difference!
- What Asset Management Means at MNDOT

VIDEOS

Short, animated videos can be very effective in conveying a message uniformly to different audiences. For example, the Ohio DOT has an animated video posted on its website that explains why the agency invests in asset management and how it's making a difference on their bottom line. Michigan DOT has a more sophisticated video available that speaks to the importance of preservation to reduce the cost of maintaining the system. Potential topics for MnDOT to consider focus on the following:

- What asset management means and why it is important to reduce life cycle costs.
- How data collection efforts are improving the way MnDOT does business.

OTHER MATERIALS

In addition to the items listed, MnDOT may find it beneficial to develop posters that can be hung in District offices to convey the importance of the data they are collecting and how it is making a difference in improving efficiency, providing access to needed information, and lowering the cost of managing the system. Depending on other needs, dashboard posters may be desired to monitor progress towards District goals to keep staff motivated. The Ohio DOT developed a football-themed *Playbook* that targeted specific steps that were being taken to implement asset management and what the expected results would be. The release of the *Playbook* included trading cards as a way to raise awareness for the campaign. As the Ohio DOT example illustrates, there is no limit to the imaginative way that a message can be conveyed.

TAMP Implementation Action Plan

The TAMP Work Group’s recommendations arose from its focus on the following three objectives:

- Improving the consideration of life-cycle management techniques in MnDOT’s plans and programs.
- Improving the TAMP’s usefulness to a wider audience at MnDOT.
- Better coordinating and understanding interrelationships and dependences between MnSHIP and the TAMP.

To accomplish these objectives, five recommendations, each with specific action items, are suggested.

RECOMMENDATION 1

Implement a Process for Adding Assets to the TAMP Based on the Asset Tiers Developed by Work Group #1.

The TAMP Work Group recommends using the tiers established in the new asset matrix to prioritize the order in which assets are added to future TAMPs. For the 2022 TAMP, it was suggested that all remaining Tier 1 assets be added (i.e., winter plow routes and ARMER radio systems) as well as pedestrian and bike bridges from Tier 2 since they are expected to be included in the upcoming MnSHIP revisions. However, after evaluating the resources available to support the 2022 TAMP development, a recommendation was made to the AMSC to retain the assets that were included in the 2019 TAMP in the update and to reconsider adding additional assets in the 2026 TAMP. The group considered reducing the number of assets in the TAMP to only those required by FHWA (i.e., pavements and bridges), but decided against that option.

For assets that will not be included in the 2022 TAMP, the Work Group recommends establishing a priority for developing electronic Asset Folios that summarize (by District) what is known about the asset inventory, management strategy, and funding needs.

The specific action items related to this recommendation are provided in the following table.

Recommended Action	Target Completion Date	Estimated Level of Effort (L, M, H)	Responsible Party
A. Based on the asset tiers developed by Work Group #1, and input from the TAMP Advisory Group, develop and implement a recommendation for specific assets to be included in the 2022 TAMP that is subject to approval by Asset Management Steering Committee (AMSC).	1Q 2021	L	TAMP Project Management Team (PMT)
B. Prioritize assets not included in the 2022 TAMP for the development of Asset Folios for approval by AMSC.	3Q 2021	L	Asset Management Project Office (AMPO)

Recommended Action	Target Completion Date	Estimated Level of Effort (L, M, H)	Responsible Party
C. Develop a minimum of 5 online Asset Folios per year, beginning in Fall 2022.	5 annually beginning in 2022	L	TAMP Advisory Group
D. Repeat the process for seeking approval of any additional assets to be added to the 2026 TAMP, focusing on any remaining Tier 1 assets and Tier 2 assets.	3Q 2024	L	TAMP Advisory Group
E. Repeat the process on a 4-year cycle that corresponds to required TAMP updates.	Every 4 years	L	TAMP Advisory Group

RECOMMENDATION 2

Identify and Implement Changes to the TAMP Format That Will Improve Its Functionality Within MnDOT.

The federally-compliant TAMP that MnDOT prepares every 4 years must meet certain minimum requirements that impact its layout and content. However, the current organization of the document by function rather than asset makes it time-consuming for MnDOT users to obtain a complete picture for any individual asset. Additionally, the print version of the document does not lend itself to searching and periodic updating. The Work Group concluded that there are several practical, low-cost changes that could be implemented to help make the TAMP content more useful to District and Central Office staff. This recommendation suggests making these changes in conjunction with the 2022 TAMP update.

The specific action items related to this recommendation are presented in the following table.

Recommended Action	Target Completion Date	Estimated Level of Effort (L, M, H)	Responsible Party
A. Review the Work Group's suggestions for practical changes to improve the functionality of the TAMP, such as making a searchable HTML format or online dashboard; organizing information by asset, corridor, or district; shortening the document, or providing visualization features displaying targeted versus expected conditions, performance goals, and funding gaps. Identify those changes that will be adopted.	3Q 2021	L	TAMP Advisory Group
B. In conjunction with the TAMP update, implement the suggested changes	3Q 2022	M	TAMP Advisory Group
C. Better define roles and responsibilities for the action items included in the TAMP.	3Q 2023	L	TAMP PMT
D. At least every two years, review the TAMP format and content to ensure it stays relevant.	1Q 2024	L	TAMP Advisory Group

RECOMMENDATION 3

Evaluate the Current Method of Incorporating Pavement and Bridge Maintenance and Operations Costs in MnSHIP For Suitability in the 2022 TAMP and Make Necessary Adjustments. Refine the Method of Estimating Maintenance and Operations Costs for Other Assets in the 2022 TAMP Using TAMS.

MnSHIP provides a 20-year, fiscally-constrained plan for making investments on the state highway network. It does not identify specific projects, but directs investments based on alternate revenue and investment scenarios that are evaluated based on input from both internal and external stakeholders. The TAMP provides a 10-year investment plan focused on the preservation of transportation assets, which is a subset of investments considered in MnSHIP. Both plans are currently in the process of being updated.

The 2017 MnSHIP included initial steps to consider the impact of underinvesting in pavement capital investments on operations and maintenance budgets. The results reflected reasonable trends (e.g., as capital investment increased, estimated maintenance needs decreased), but the magnitude of the capital costs dwarfed the maintenance needs and the differences in estimated maintenance costs between different scenarios were negligible. Maintenance needs for other assets were reflected in a Roadside Infrastructure investment category to capture the total cost of ownership for those assets.

Now that TAMS is being implemented and better maintenance cost information is becoming available, a pilot study has been conducted to evaluate the impact of new cost data on pavement management needs using the 2017 analysis approach. That study is currently underway; however, the results will be helpful in determining whether the methodology is reasonable for planning purposes.

To better align the consideration of maintenance and operations costs in the TAMP with MnSHIP, the Work Group recommends that the results from the pilot study be evaluated to determine the suitability of the current approach to estimate maintenance costs in MnSHIP. Further, the Work Group recommends that maintenance and operations cost data in TAMS, plus the suggested maintenance approaches in the new Asset Matrix, be considered inputs for estimated maintenance and operations costs for the additional assets included in the 2022 TAMP and the Roadside Infrastructure Investment included in MnSHIP.

The specific action items related to this recommendation are presented in the following table.

Recommended Action	Target Completion Date	Estimated Level of Effort (L, M, H)	Responsible Party
A. Using the communications framework developed by Work Group #4, communicate the results from the pilot study to the appropriate parties to share estimated pavement maintenance and operations costs using new TAMS data.	3Q 2021	M	MnSHIP PMT AMPO
B. Explore expanding this analysis to assets beyond pavements and bridges that are expected to be included in the 2022 TAMP. Consider the availability of necessary	4Q 2021	M	MnSHIP PMT TAMP PMT

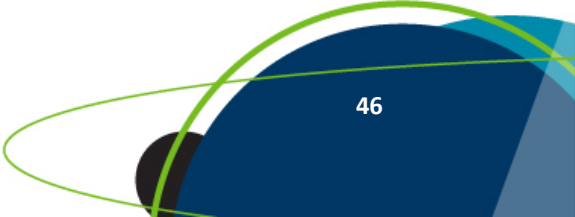
Recommended Action	Target Completion Date	Estimated Level of Effort (L, M, H)	Responsible Party
information, the level of investment in maintenance, and the return on investment.			AMPO
C. Using the methodology, estimate maintenance needs for the investment scenarios being considered in MnSHIP and in the TAMP. Use estimated revenue and investment scenarios to establish planned maintenance investments and unmet maintenance needs.	1Q 2022	H	MnSHIP PMT TAMP PMT AMPO
D. Assess the 2022 TAMP’s success at accounting for the sensitivity of maintenance to capital investments. Identify any further changes that are needed to better address this issue.	4Q 2022	M	TAMP PMT MnSHIP PMT AMPO
E. Work with AMPO to develop an approach for better communicating how future maintenance needs are impacted by capital investment.	2Q 2023	L	TAMP PMT AMPO
F. Develop more standardized life-cycle cost analysis approaches for assets expected to be included in the 2026 TAMP.	2Q 2024	H	TAMP PMT AMPO
G. Establish optimized investment strategies for each asset included in the 2026 TAMP and incorporate them into a future MnSHIP.	2Q 2025	M	TAMP PMT AMPO
H. Evaluate the impact of using the total cost of ownership to distribute maintenance funding to the Districts based on unfunded maintenance needs and assist with project prioritization using TAMP results.	4Q 2025	M	AMPO Office of Maintenance

RECOMMENDATION 4

Develop and Distribute Messaging To Promote TAMP Implementation in Accordance With the Communication Framework Developed By Work Group #4.

Each year, MnDOT undergoes a consistency determination by the FHWA to verify that investments on the National Highway System (NHS) reflect planned investments in the TAMP. A key to ensuring a match between planned investments and projects included in the STIP (State Transportation Improvement Program) and CHIP (Capital Highway Investment Program) is awareness. Another key is understanding the importance of planned investments that promote life cycle strategies. This recommendation involves the distribution of communication pieces to promote the TAMP content using the Communication Framework developed by Work Group #4.

The specific action items related to this recommendation are described in the following table.



Recommended Action	Target Completion Date	Estimated Level of Effort (L, M, H)	Responsible Party
A. Prepare and distribute communication materials for the Districts that convey the importance of life cycle strategies and the consequences of delayed maintenance or complaint-driven maintenance on system performance.	4Q 2021	L	AMPO
B. Using the framework developed by WG #4 (Communication), develop and distribute messaging promoting the implementation of the 2022 TAMP, including annual commitments for maintenance and capital expenditures by District and expected targets.	4Q 2022	L	AMPO

RECOMMENDATION 5

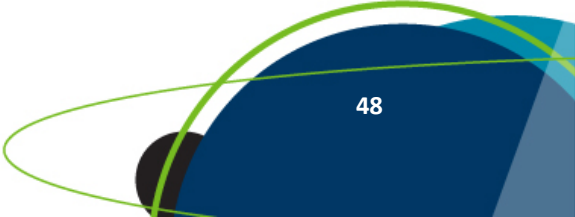
Implement Efforts to Guide The Scoping Process To Help Ensure That Planned TAMP Investment Strategies Are Reflected in the STIP and CHIP.

Since the TAMP investments are designed to consider a whole life approach to asset management, a strong alignment between planned investment strategies and funded projects helps ensure that asset life-cycle cost considerations are being implemented. Project changes that occur during the project scoping process influence the work that can be funded due to increased project costs that reflect additional activities added to a project scope. The Work Group recommends the following actions to help guide and support District decisions during the scoping process so that the program better aligns with the TAMP and MnSHIP performance expectations.

The specific action items related to this recommendation are presented in the following table.

Recommended Action	Target Completion Date	Estimated Level of Effort (L, M, H)	Responsible Party
A. Convene a team that includes District personnel to identify and prioritize the factors identified by Work Group #3 (Preservation) that influence the scoping process.	2Q 2022	L	TAMP Advisory Group MnSHIP Team OTS (Programming)
B. For the highest-priority factors identified, develop strategies and identify potential tools (such as Geographic Information System interfaces) to better coordinate long-range project planning with design, scoping, and trade-off decisions that Districts make (e.g., use of project charters or the current Scoping and Project Improvement Process, asset prioritization).	1Q 2023	H	TAMP Advisory Group MnSHIP Team MnDOT Planning and Programming

Recommended Action	Target Completion Date	Estimated Level of Effort (L, M, H)	Responsible Party
C. Present the recommendations to the Executive Leadership Team for approval and make any needed changes prior to implementation.	2Q 2023	M	TAMP Advisory Group MnSHIP Team MnDOT Planning and Programming



Closing

The action plans included in this AMSIP address the four elements critical to any asset management implementation: data, systems, people, and processes. As shown in the figure below, these four pillars provide the foundation for MnDOT's transportation asset management implementation. As MnDOT advances the implementation activities outlined in this Plan and extends the knowledge and understanding of asset management in the agency, it will deliver on the 5-year asset management vision and ultimately support the agency's vision of delivering mobility, safety, public health, environmental sustainability, and a prosperous economy through a strong, effectively-managed transportation system.

