North Dakota Department of Transportation

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April 30, 2018

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FAST ACT COMPLIANT INITIAL TRANSPORTATION ASSET MANAGEMENT PLAN

Enclosed, for your approval, is the North Dakota Department of Transportation's (NDDOT) FAST Act compliant Initial Transportation Asset Management Plan (TAMP). As provided by the FAST Act and in compliance with the requirements of 23 CFR 515.11, this Initial TAMP is a partial update of NDDOT's previously published internal TAMP. This document will be fully updated, in compliance with all FAST Act requirements, prior to the June 30, 2019 deadline.

Upon FHWA approval, this document will be published on NDDOT's website.

Please contact Jack Smith at (701) 328-2016 or at the address on the bottom of the page, with any questions, concerns or comments.

Thomas K. Sorel

THOMAS K. SOREL, DIRECTOR

Enclosure

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

TRANSPORTATION ASSET MANAGEMENT PLAN

This plan provides documentation of currently managed assets, method of management, financial information, and future plans.

April 2018

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EXECUTIVE SUMMARY

The North Dakota Department of Transportation's Transportation Asset Management Plan (TAMP) covers several asset classes. The TAMP describes the transportation system managed by the NDDOT, the method of managing transportation assets throughout their life cycles, the financial constraints in managing the system, the current performance targets for each asset class, and an improvement plan for the process of managing these assets.

Transportation Asset Management (TAM) is a goal-oriented, data-supported, process that ensures the impacts of budget decisions are more completely understood. These impacts can be shown by displaying the level of funding and its resulting condition for each asset class.

INTRODUCTION

The North Dakota Department of Transportation (NDDOT), in its continuing effort to ensure stewardship of public transportation funds, has adopted the goal-oriented and data-supported philosophy of Transportation Asset Management (TAM). This Transportation Asset Management Plan (TAMP) was prepared in order to document how the NDDOT will monitor and implement that TAM philosophy.

In short, TAM is a goal-oriented, data-supported way of managing transportation systems and their components such that system managers are provided the information they need to make decisions necessary to reach desired outcomes. TAM is able to assist NDDOT management in making data-supported decisions that promote cost effective decisions by measuring the performance of an asset class and projecting the effect that potential decisions have on the asset class' long term performance in the future. As such, TAM will never truly be fully implemented. Rather, it is a continuous, cyclical process that is repeated to leverage the latest advances (see Appendix A).

TAM methods and philosophies can be applied to any asset. The Engineering Divisions of the NDDOT are currently using TAM principles to manage five asset classes: pavements, bridges, signs, facilities, and maintenance equipment. The state fleet is managed by the State Fleet Division under the Deputy Director for Business Support. In the future, additional asset classes have the potential to be added to the NDDOT's Transportation Asset Management Plan. Another advantage of formal TAM is the ability to utilize a process called cross-asset analysis to quantify the impacts of investing in one asset class versus another. Finally, Transportation Asset Management, at its best, provides information that allows the public to understand, verify, and relate the transportation system to their needs and objectives.

The NDDOT's vision is that TAM *fosters a culture of public dollar stewardship through data-supported, and goal-oriented decisions*.

Based on the TransAction III initiative #1, the NDDOT TAM program has adopted the mission of *strategically prioritizing the use of transportation resources and to define the levels of service to be provided and maintained* as a method of reaching that vision.

GAP ANALYSIS PROCESS

The NDDOT manages approximately 8,500 roadway miles of state highways within the state of North Dakota and within the state of North Dakota has 3,728 miles on the National Highway System, managed by all levels of government. Our roadway system is comprised of many individual asset classes such as pavements, bridges, safety appurtenances, drainage structures, right of way, signs, lighting, and many other ancillary items.

In order to conduct a gap analysis, the scope of an asset inventory, the current condition of that inventory and the desired state of good repair needs to be analyzed. The actual gap is identified as part of the processes in place for life cycle planning, and is covered in more detail in that section. The life cycle planning process takes into account current fiscal constraints. HPMS and NBI data is examined annually to determine gaps in the state of good repair for pavements, and bridges on the NHS by looking at percent good and poor on the Interstate and Non-Interstate NHS, for bridges the percent structurally deficient by deck area is also checked. This exercise is normally conducted shortly after the annual HPMS submittal. Additionally, the impact the STIP on system pavement condition is analyzed.

The most current system performance can be found at:
http://www.dot.nd.gov/business/transactioniii/transactioniiiprogress.htm

NHS effectiveness independent of physical condition is monitored through the NDDOT freight constraints map found at
http://www.dot.nd.gov/divisions/planning/freight/docs/NDFreightConstraintsMap.pdf The NDDOT also has a freight constraints map, which produced by a freight and personal mobility model, identifies potential projects for closing performance gaps. The outputs of the model are considered during preliminary engineering scoping meetings to determine if an additional investment should be made to improve a non-condition deficiency.

To facilitate the efficient management of these many assets to meet the expected performance of the overall system, the North Dakota legislature and Governor endorsed the concept of a state-system roadway classification framework called the Highway Performance Classification System (HPCS) (N.D.C.C. §24-01-03.1.) To define the expected functionality of these roadways, the NDDOT has adopted definitions for each of these classifications based on: reliability (i.e. will the roadway be available to travel as expected), types of movement (e.g. long distance versus local access), typical geometry (e.g. four-lane versus two lane), typical speeds, size and weight restrictions, pavement condition (e.g. ride quality and distress), risk tolerance and expected overall safety.

Implemented in 2001, the Department's Highway Performance Classification System (HPCS). The HPCS illustrates both quantitative and qualitative goals for system performance depending on how a roadway is used. A map of the current HPCS can be found at
http://www.dot.nd.gov/divisions/planning/hwyclassification.htm

Currently there are five classifications:

Interstate: Movements on the interstate system are primarily long-distance, interstate and intrastate traffic. Rural Interstates are multi-lane (usually four) roadway facilities and have full access control.

Interregional Corridor: Movements on Interregional highways are primarily long-distance, interstate and intrastate traffic. Interregional System highways are either two-lane or multi-lane facilities. Segments or specific locations may have partially controlled access.

State Corridor: State Corridors provide connectivity between lower and higher level roadways. Movements on these highways are primarily medium-distance intrastate traffic. State Corridors are typically two-lane facilities and have segments or locations with partially controlled access.

District Corridor: Movements on District Corridor highways are primarily short to medium distance intrastate traffic. District Corridors are two lane facilities.

District Collector: Highways classified as District Collectors are generally short routes that provide connectivity to the higher level road systems. Movements on these highways are primarily short distance, local, farm to market traffic. District Collectors are two lane facilities.

System Traffic Data can be found at: http://www.dot.nd.gov/business/maps-portal.htm

I. Pavement Analysis Capability

The Department's pavements are also managed according to the HPCS. NHS roadways are typically Interstate, Interregional, or State Corridors. A map of the NHS can be found at

https://www.fhwa.dot.gov/planning/national_highway_system/nhs_maps/north_dakota/nd_northdakota.pdf

Pavement condition history and forecasts can be developed to answer system condition questions and support gap analysis. Ad hoc analysis can also be performed to check performance of subsets of the system. Examples include the following charts.

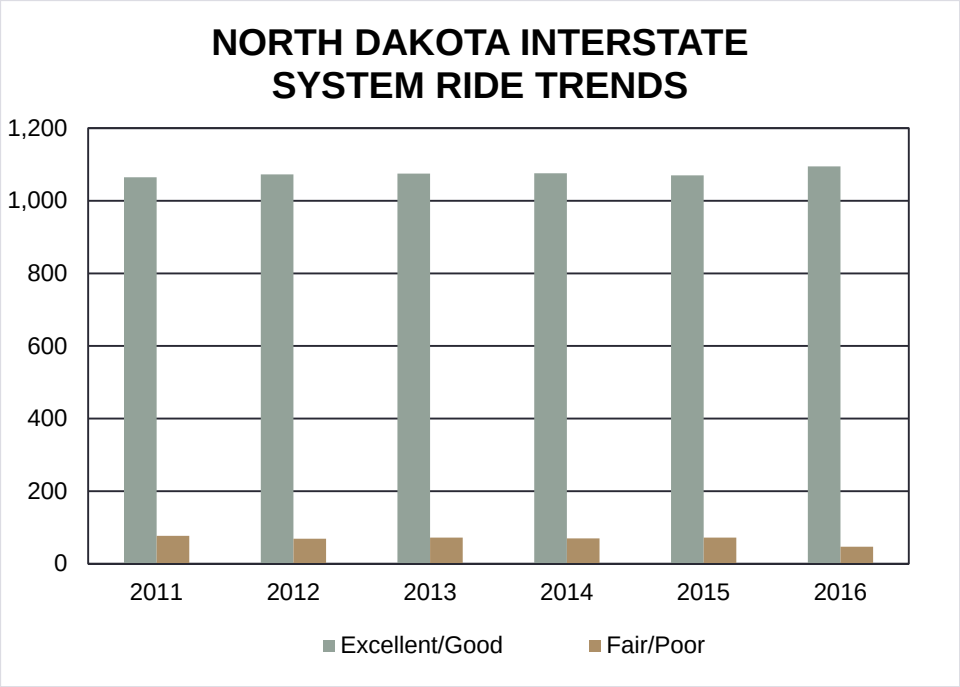


FIGURE 1 – AD HOC CHART SHOWING DECREASING FAIR AND POOR INTERSTATE PAVEMENT CONDITION.

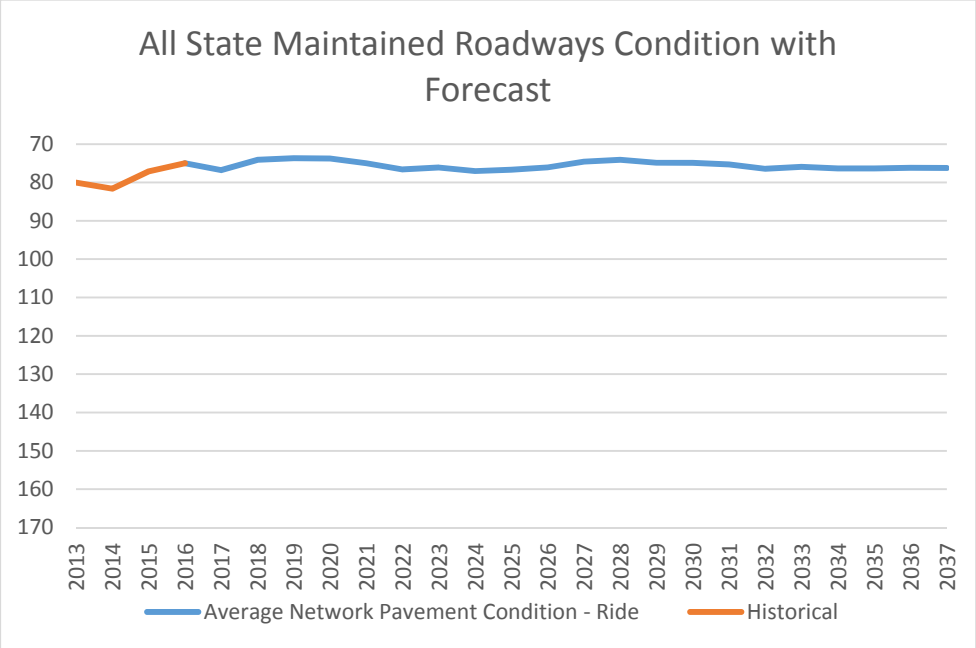


FIGURE 2 – GRAPH SHOWING HISTORICAL PERFORMANCE AND FORECASTED PERFORMANCE AT AN INVESTMENT LEVEL INCREASE OF 140% COMPARED TO PAST INVESTMENTS.

II. Bridge Analysis Capability

The NDDOT state bridge system is comprised of 1,140 structures. There are 715 bridges with lengths greater than 20 feet, and 425 culverts that are greater than 20 feet as defined in the NBI, with condition rating 9 being best and 4 or less being poor.

Structure	Good (9,8,7)	Fair (6,5)	Poor (<=4)	Total
Bridges	366	331	18	715
Culverts	295	125	5	425

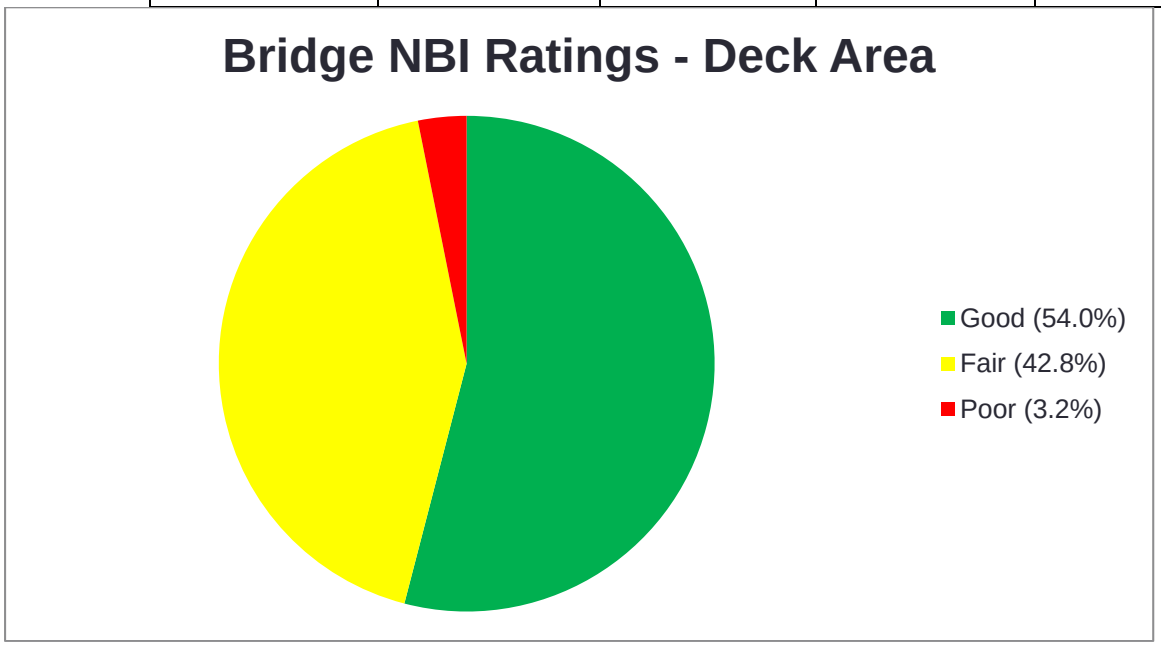


FIGURE 3 –CONDITION BY DECK AREA OF THE STATE OWNED BRIDGES.

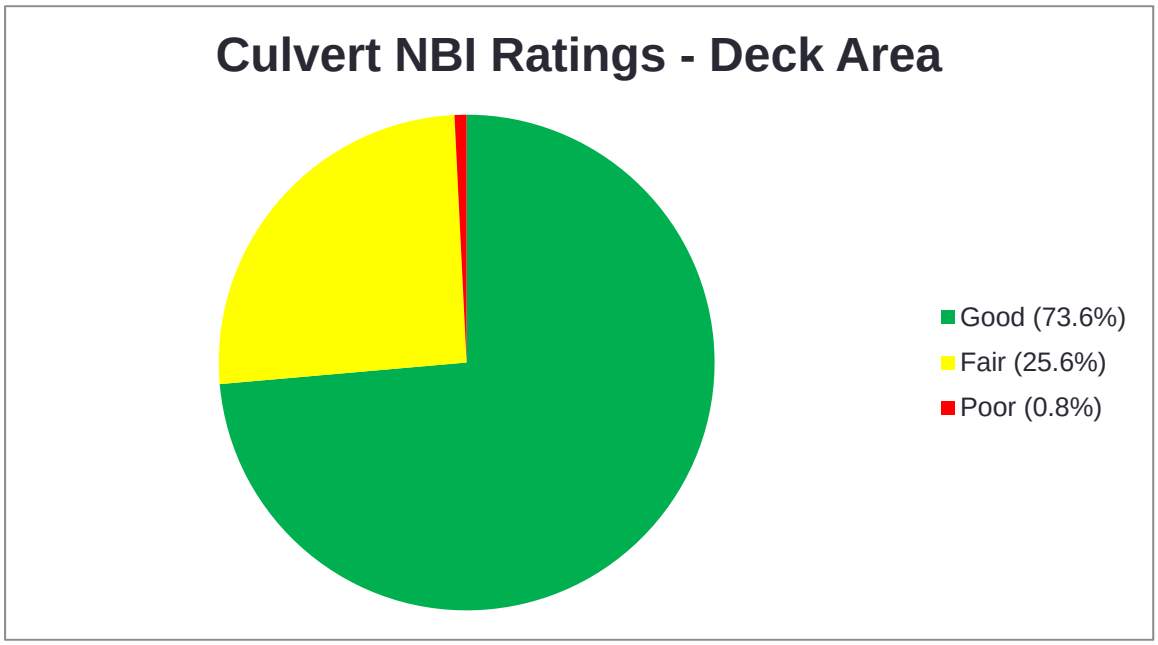


FIGURE 4 –CONDITION OF BOX CULVERTS BY DECK AREA.

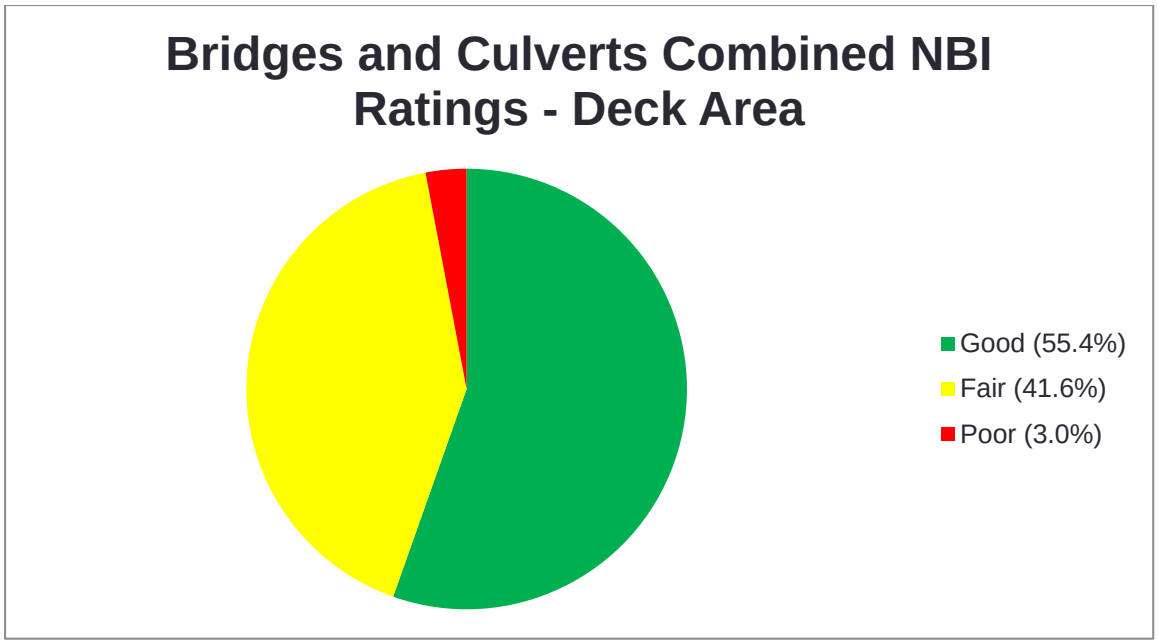


FIGURE 5 – CONDITION OF BOX CULVERTS AND BRIDGES COMBINED BY DECK AREA

III. Signs

The NDDOT currently maintains 70,600 signs along the state and interstate highway system. Approximately 5 – 10 % of the signs are replace annually. Regulatory and Warning signs that are older than 10 years are flagged to be replaced by upcoming construction projects or district maintenance personnel.

The calibrated eye method for retro reflectivity measurement is used to review sign compliance on a yearly basis. All other signs besides the Regulatory and Warning, such as guide signs are given second priority for available funding.

IV. Maintenance Equipment

Assets are scheduled for replacement when they meet the equipment replacement schedule. A list of necessary equipment to maintain current level of service is developed by the Maintenance Division. Equipment is managed using FleetFocus FA software.

The Maintenance Division develops and maintains plans to analyze the gap between the current operational status and condition against a baseline status and condition developed to match the Department's required level of service. Detailed information regarding the Department's Maintenance Equipment Management Plan can be obtained from the Department's Maintenance Division.

V. Facilities

The NDDOT is responsible for 65 maintenance facilities of which 9 are substandard.

A list of maintenance section buildings and their overall condition is maintained by the Maintenance Division. As funding becomes available, the buildings are reviewed for replacement based on proximity to higher level of service routes, condition, and need.

Condition	Number of Buildings
Exemplary	33
Meets Standards	23
Substandard	9
Poor	0

Examples of facilities managed by the NDDOT include salt storage sheds, maintenance section buildings, District Office buildings, NDDOT Central Office Building, Tractor Sheds, and Rest Areas.

STATE OF GOOD REPAIR

The state of good repair is defined for pavement, bridges, and signs. The other assets managed in this plan are done so with state funding. Expected performance for those assets is communicated during the state budgeting process.

This NDDOT TAMP is intended to support the state's long-range transportation plan called TransAction III. Full details of which can be found at:

http://www.dot.nd.gov/business/transactioniii/transactioniii.htm

This iteration of the NDDOT's TAMP focuses on three of TransAction III Values:

Safety and Security: Transportation safety and security is the state's number one priority. Reasonable efforts should be made to plan, design, build and operate a transportation system that allows travelers and freight to move safely and securely.

Maintainable and Sustainable: The transportation system should be strategically developed considering long-term investment versus short-term demands. The use of transportation resources should be prioritized and levels of service to be provided should be defined. The system should not be over-built or under-built. Preserving and maintaining the system should be emphasized over new construction.

Reliable and Predictable: Today's fast-paced lifestyles and globally integrated economy require a transportation system that is reliable and predictable. Technological advances, larger and more efficient equipment, the evolution of shuttle trains, and "just-in-time" manufacturing emphasize reliability and predictability of travel time and cost. Multiple modal options (highway/rail, rail/pipeline, etc.) should be promoted to improve reliability and predictability.

The current targets for level of service vary depending on the asset. Current targets are as follows:

I. Pavements

HPCS Classification	Miles with IRI in “Excellent” or “Good”
Interstate	95%
Interregional Corridor	95%
State Corridor	90%
District Corridor	85%
District Collector	80%

II. Bridges

Federal regulations designate that no more than 10% of the National Highway System’s bridges, as measured by deck area, be deficient. The DOT is currently in the process of setting performance Targets in accordance with the bridge performance measures defined by MAP-21 to reflect investment strategies that work toward achieving a state of good repair over the life cycle of assets at a minimum practical cost.

III. Signs

All signs in the state should meet federal retroreflectivity requirements.

LIFE CYCLE PLANNING

Obstacles or deficiencies hindering progress toward the state of good repair are evaluated during the life cycle planning process. Models are used to develop alternative strategies for varying levels of funding, which is the primary obstacle toward the state of good repair in ND. The department is also able to periodically evaluate how funding is allocated between services and assets using its tradeoff hub.

I. Pavements

The NDDOT’s pavements are managed through the Statewide Transportation Improvement Program (STIP) development process.

The NDDOT’s STIP process begins when investment strategy guidance, condition information, and Pavement Management System recommended treatment information are provided to the Department’s eight Districts by the Programming and Planning/Asset Management Divisions. Using this, and other, information District Engineers develop and submit their project priorities to the Programming Division.

A Draft STIP is then developed by the Programming Division. The Draft and the Pavement Management System’s projected system level conditions resulting from the Draft STIP are provided to NDDOT Executive Management for preapproval prior to releasing the document for public comment. The information provided to

Executive Management allows the decision makers to see some of the impacts of the decisions they make on pavement condition. After the initial comment period, the comments are responded to and the STIP modified if necessary to develop the Final STIP. Prior to receiving final approval of the STIP, forecasted condition information is developed from the Pavement Management System software.

Pavement Management software, currently dTIMS, serves as a planning and modeling tool for the condition of the pavement. Deterioration, traffic, HPCS level and condition are considered in the model. Preventative Maintenance, Minor Rehab, Structural Overlays, and Major Rehab/Reconstruction are treatments that the software considers and optimizes for pavement management reports. Current costs for these treatments are used in the Department's models and may be found on the Department's website at http://www.dot.nd.gov/manuals/design/designmanual/wordfiles_design/Project%20Cost%20History.pdf These costs are updated annually.

Routine maintenance treatments such as crack sealing/pouring, depressed crack repair, scotch patching, spray injection patching, hot and cold mix asphalt patching, bituminous seal coats, and concrete joint sealing are also performed as needed, but these treatments are not modeled by the Pavement Management System. Guidance for routine maintenance can be found in the NDDOT Maintenance Manual.

The Revised STIP, along with condition information, and a forecast of its projected impact toward the state of good repair is provided to Executive Management for final approval.

The Department's investment strategy is a preservation focused model that emphasizes HPCS classification, traffic volume, truck volume, and condition.

This results in the following typical investment strategy for concrete and asphalt pavements. These interventions assume routine maintenance is being performed at historic levels.

Treatment	Year
New Asphalt	0
Seal Coat	2-3
Seal Coat	7-10
Thin Lift Asphalt Overlay	12-15
Seal Coat	14-18
Structural Improvement	20-25
Seal Coat	22-27

Treatment	Year
New Concrete	0
Concrete Pavement Repair	10-15
Concrete Pavement Repair	20-25

II. Bridges

During the STIP Development process, the NDDOT Bridge Management section along with the Bridge Engineer and Assistant Bridge Engineer go through a rigorous process to compile a list of potential bridge projects based on condition and funding constraints. Consideration is also given to the proximity of a bridge project to a programmed roadway project in order to leverage cost savings and minimize construction delay impacts to the traveling public. Bridges in need of painting are typically programmed as a group of tied projects specific to a geographic area.

Currently, the NDDOT uses a software called AASHTOWare Bridge Management (BrM) to assist in the management of NDDOT bridges. BrM is designed to support the bridge inspection program, bridge preservation program, to utilize deterioration modeling for predicting future bridge condition in order to optimize given funding constraints, and to assist with planning and programming bridge projects.

The data BrM uses is gathered in the field from NDDOT Bridge inspectors. Bridge improvement strategies include capital improvement techniques, such as, reconstruction, deck replacement, and bridge deck overlays.

The NDDOT Maintenance Manual indicates that Maintenance Personnel shall perform sweeping, cleaning of bridge components, concrete component patching, scour repair, slope protection repair, bridge deck crack sealing, and surface treatments as necessary to maintain bridge assets. These treatments are not modeled by BrM.

III. Signs

Approximately 5 – 10 % of the signs are replaced annually. Regulatory and Warning signs that are older than 10 years or fail retroreflectivity requirements are flagged to be replaced by upcoming construction projects or district maintenance personnel. The calibrated eye method for retro reflectivity measurement is used to review sign compliance on a yearly basis. All other signs besides the Regulatory and Warning, such as guide signs are given second priority for available funding.

IV. Facilities

A list of maintenance section buildings and their overall condition is maintained by the Maintenance Division. As funding becomes available, the buildings are reviewed for replacement based on proximity to higher level of service routes, condition, and need. Maintenance Division works with maintenance section leads to identify condition changes as they occur.

RISK MANAGEMENT PLAN

The NDDOT conducts risk reviews periodically with FHWA and internally on major program areas on an ad hoc basis. The NDDOT lead risk reviews are tied to Departmental risks. Departmental risks can affect the condition and performance of the NHS. Recent NDDOT risk reviews included reviews on the risks toward department revenue and risks toward implementing an urban grant program. In the past, when risks were identified, the NDDOT would develop a process to minimize or eliminate a negative risk if possible.

NDDOT risk reviews are now conducted using FHWA publication No. FHWA-NHI-17-004, and FHWA-NHI-136065. The method results in a risk register where likelihood, impact and responses are documented. Risks that rank high on the register are typically addressed first. In the future, the NDDOT will conduct risk assessments during performance based planning document updates, and individuals will be assigned risk monitoring duties, which include periodic reports. Such reviews will include program areas such as NHS pavements and bridges.

Currently, NDDOT is in the process of mapping all facilities eligible for Title 23 (limited to federal aid routes) funds that have been damaged by an emergency event using GIS. Once mapped, a review will be conducted to determine locations that have had facilities damaged two or more times at the same location.

The review will be limited to locations where the repairs have been considered “permanent type repairs”. A report will be generated for each location indicating the damage that had occurred, repairs that were completed, and if any future evaluations will be required.

As future projects are scheduled in these areas, we will review these locations and determine the risk of being damaged again by an emergency event. Depending on the type of project that has been scheduled and the type of damage that was previously sustained at these locations, will determine the process used to evaluate these locations.

FINANCIAL PLAN

The revenue for maintaining the NHS in a state of good repair primarily comes through federal funds. During the oil boom large state general fund investments were made in transportation in the western part of the state, allowing federal funds to be shifted to the eastern part of the state. Since the oil boom, transportation investments have been adjusted to be primarily federal funded.

The NDDOT developed a tradeoff hub that puts 11 different performance measures including pavements, bridges, snow and ice control, and transit in terms of service offered as it relates to funding. Increases and decreases in funding and their associated impacts can be shown in real time. The tool also can show the impact of moving funding from one investment class to another. This allows the NDDOT to look at multiple funding scenarios and to choose an investment strategy that best supports achieving a state of good repair with a given funding level.

The NDDOT will develop the 10 year financial plan by standing up a committee that includes the Department's CFO Planning/Asset Management Division Director and asset class Expert Task Group Chairs. Additional members of the committee will be nominated as needed for approval by the North Dakota DOT Director. The financial plan in the final TAMP will be developed to cover the following areas:

1. The sources of revenue available to the NDDOT for managing risks and achieving asset condition goals.

2. The funding needs to achieve agency goals across multiple investment classes.

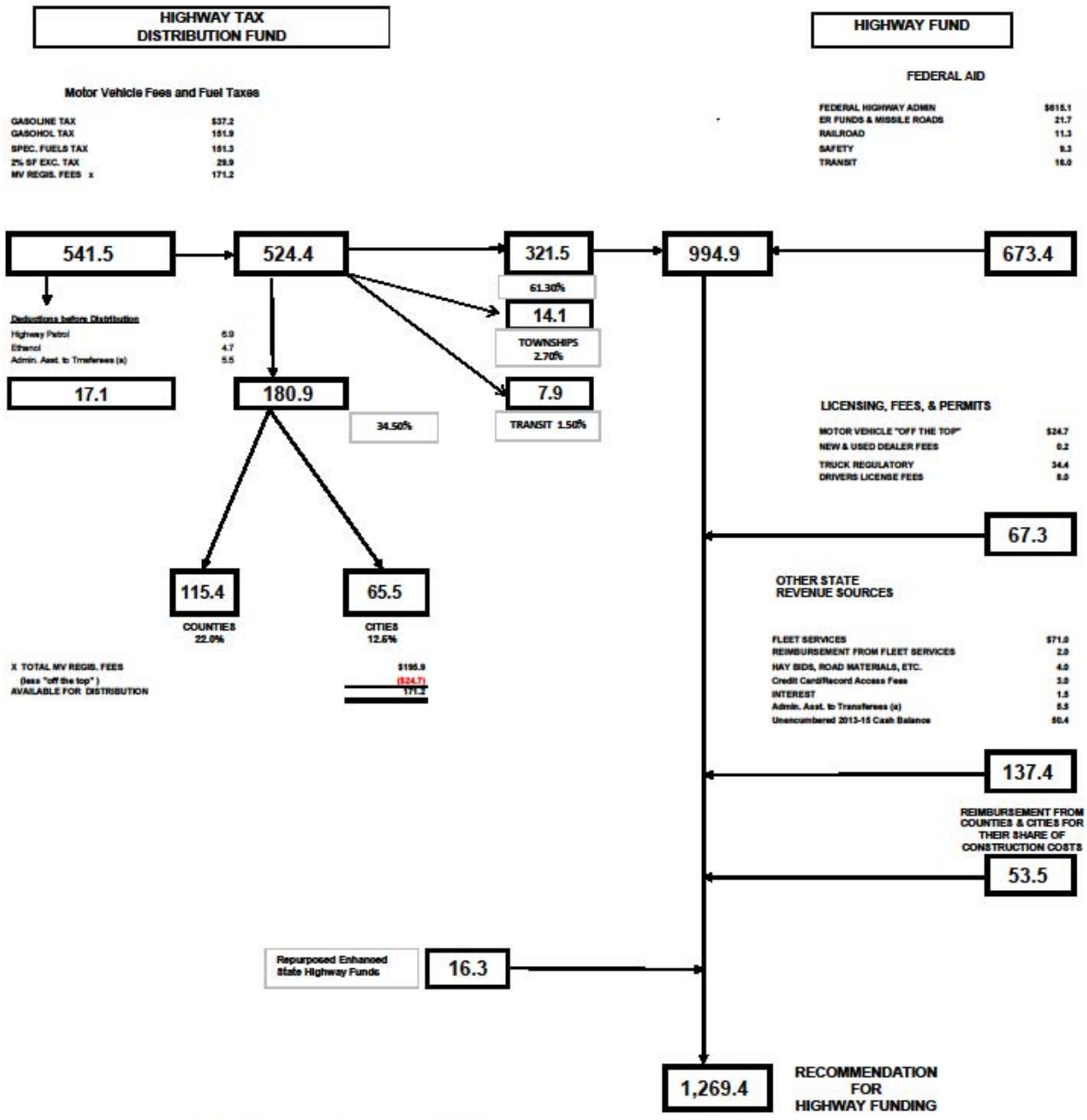
3. The estimated annual cost of implementing the department's investment strategy.

4. An estimate of the value of the agency's NHS pavement and bridge assets and annual cost to maintain the value of these assets.

North Dakota Transportation funding revenues, distributions, and system valuation are described in the following charts:

DEPARTMENT OF TRANSPORTATION
ENROLLED SB 2012
2017 - 2019 BIENNIUM REVENUE

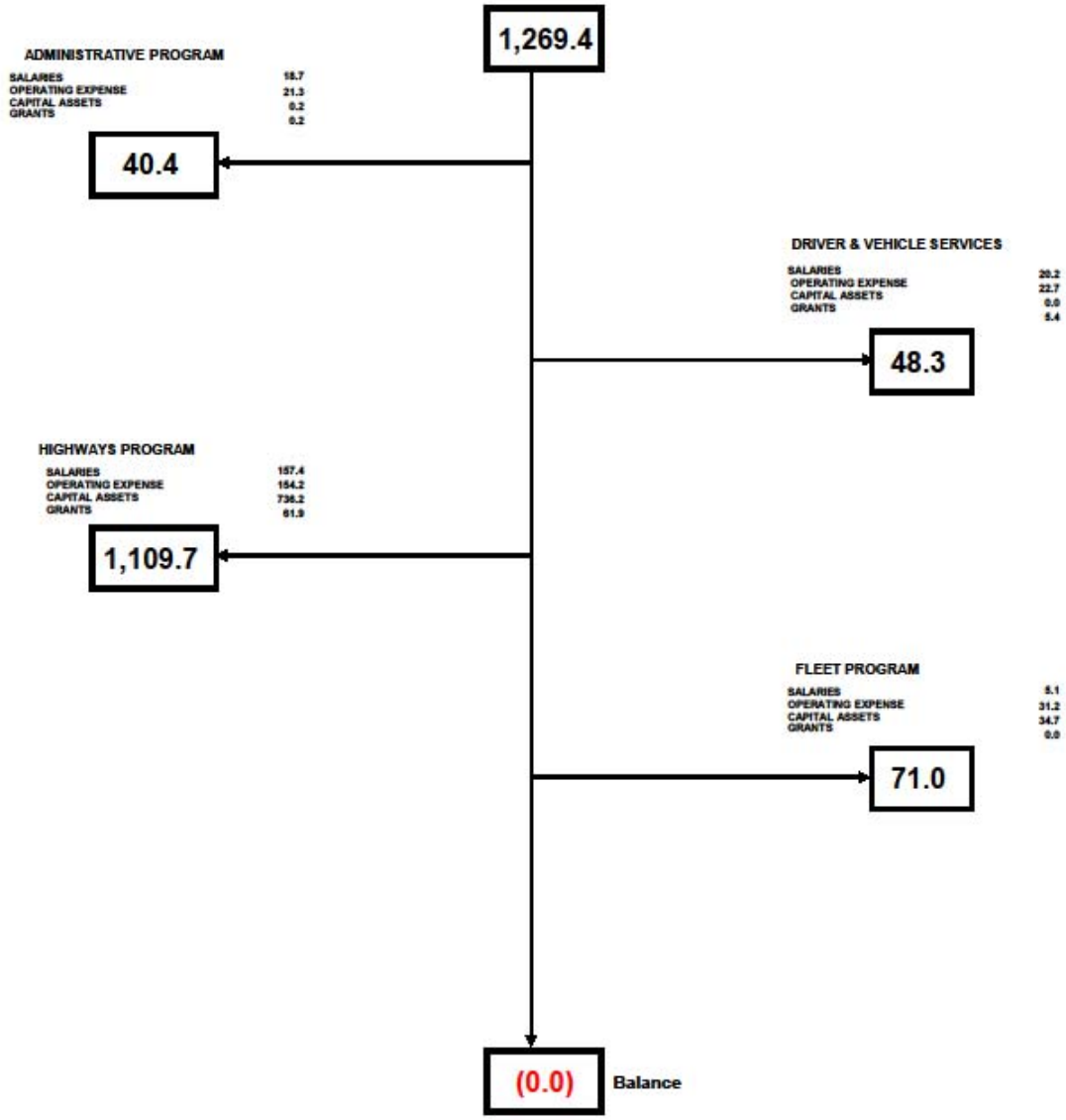
(MILLIONS)



NOTE: THE CHARTS DO NOT REFLECT THE IMPACTS OF HB1024 & SB2021.

DEPARTMENT OF TRANSPORTATION
ENROLLED SB 2012
2017 - 2019 BIENNIUM EXPENDITURES

(MILLIONS)

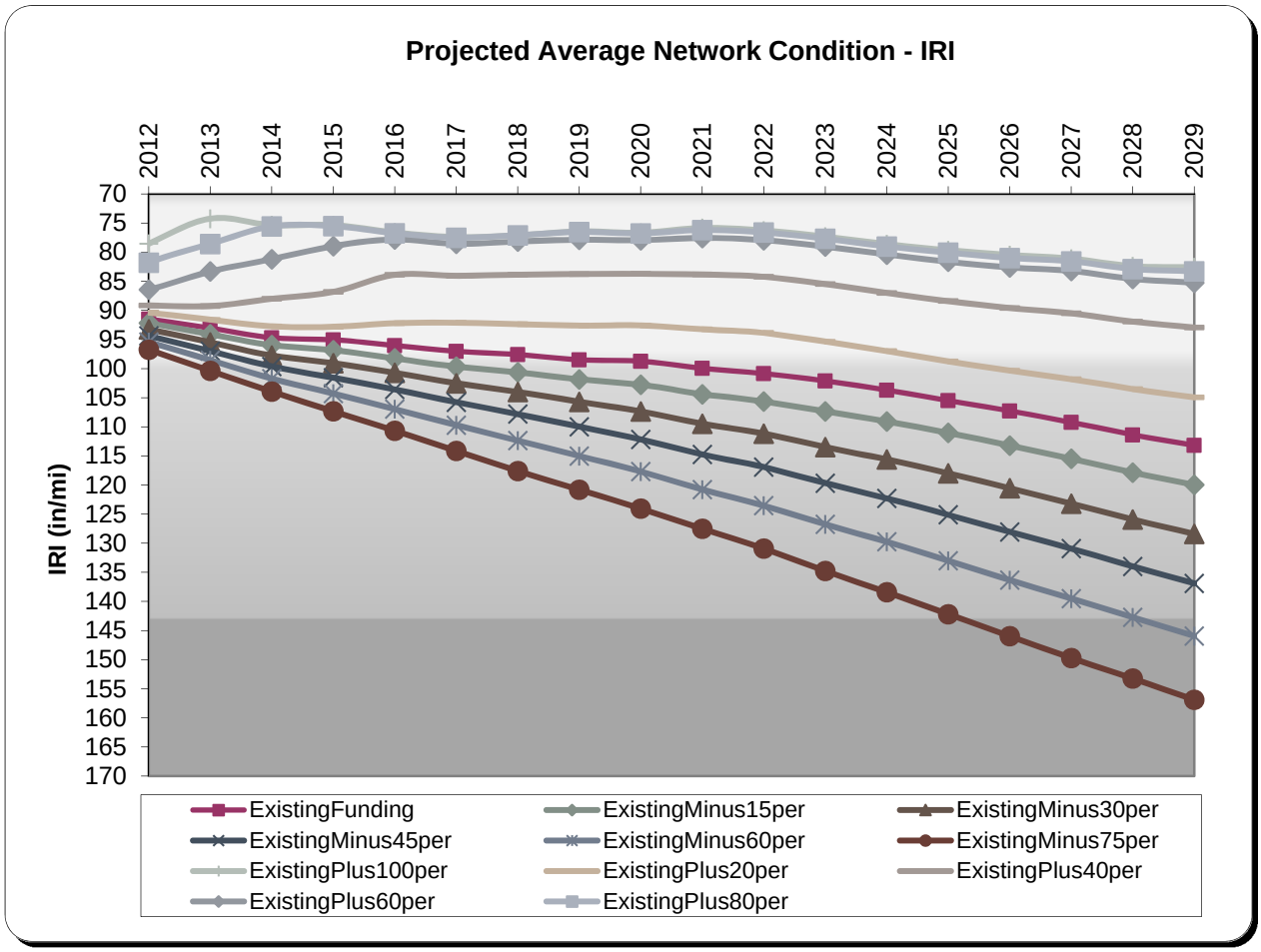


NOTE: THE CHARTS DO NOT REFLECT THE IMPACTS OF HB1024 & SB2021.

Current State System Valuation Method	
Facility Type	Value
2-Lane	$2.5 Billion
4-Lane	$0.6 Billion
Interstate	$1.0 Billion
Total	$4.2 Billion

PROCESS FOR DEVELOPING INVESTMENT STRATEGIES

The processes for developing investment strategies is imbedded in the Department's Life Cycle Planning process. They are described in the Life Cycle Planning portion of the document. When changes in funding arise, the department maintains a tradeoff hub that models the effects of the changes and allows for the movement of funds between various investment classes and the performance impact of moving those resources. Impacts of revenue shortfalls or reprioritization of services can also be modeled.



PROCESS FOR OBTAINING DATA FROM OTHER NHS OWNERS

The vast majority of the NHS is owned and maintained by the NDDOT. To ensure consistency with the data collected on the state owned system, the NDDOT will expand its collection efforts to include NHS facilities it does not own.

PROCESS FOR ENSURING USE OF BEST AVAILAIBLE DATA AND USE OF BRIDGE AND PAVEMENT MANAGEMENT SYSTEMS

Data that is used in the Department's bridge and pavement management systems is collected with federally required data for the National Bridge Inventory and Highway Performance Management System. The Department has a Data Quality Management Plan to ensure pavement data is collected and checked in a uniform manner. The department also utilizes a bridge inspection program with regular training for bridge inspectors. These plans and programs are subject to FHWA review.

IMPROVEMENT PLAN

NDDOT Asset Management team (pulled from representatives of several divisions) performed a departmental self-assessment (see Appendix B) as outlined in the AASHTO Transportation Asset Management Guide Vol. 1. Reviewing the gaps between where the Department is, and where it wants to be regarding asset management helped identify three categories for improvement.

I. System Monitoring and Feedback

II. Proactive Role in Policy Formulation

III. Decision Support Tools

The following projects are the first steps toward improving these key areas:

I. Implement the most recent system-level performance measures and targets for pavements, bridges, and safety.
II. Investigate decision science software.
III. Procure maintenance-management software to aid in the tracking and optimization of work orders and material usage. The data would be linked to the pavement-management tools in order to refine pavement-preservation recommendations.
IV. Refine asset management systems for new performance measures.
V. Rewrite the TAMP to meet final TAMP requirements.

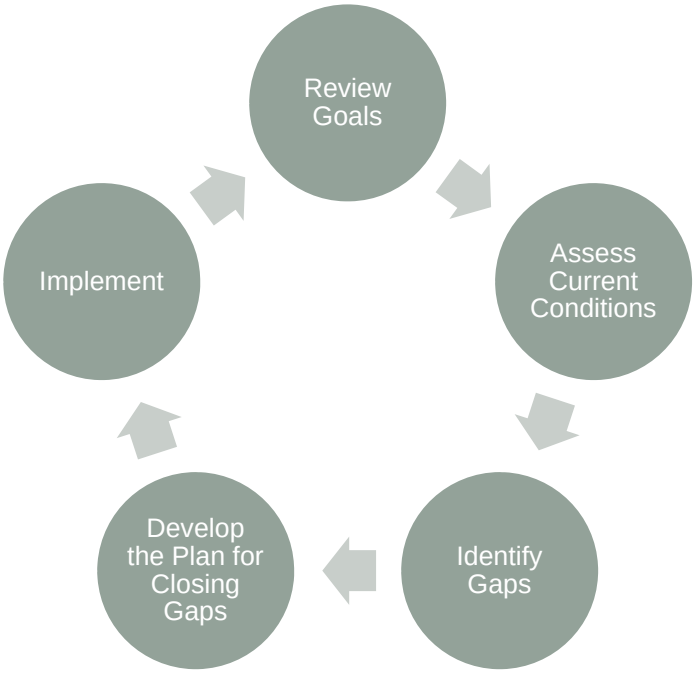
VI. Develop investment classes aligned with major budget categories for inclusion in the trade-off analysis.

CONCLUSION

The implementing, evaluating, improving, documenting, and reporting outlined in this TAMP will allow the NDDOT to improve the return on investment for the public dollars dedicated to transportation in North Dakota. TAM is a continuous, cyclical process and must be repeated to leverage the latest advances in our understanding of our customers' needs and technology to keep the NDDOT current with industry best practices. TAM will never truly be concluded, because the Transportation System's needs constantly change. However, the NDDOT will be able to stay current by following the principles in this TAMP.

APPENDIX A

THE FIVE STEP TAM CYCLE



APPENDIX B

GAP ANALYSIS QUESTIONARE

NCHRP Synthesis 43-01: Use of TAM Principles in State Highway Agencies Initial Survey: SelfAssessment Exercise - Transportation Asset Management Guide Volume 1

About the Survey

NCHRP NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Dear *[contact("first name")] [contact("last name")] ,*

The Transportation Research Board (TRB) is preparing a synthesis on the "Use of Transportation Asset Management (TAM) Principles in State Highway Agencies".
This is being done for the NCHRP synthesis program, under the sponsorship of the American Association of State Highway and Transportation Officials, in cooperation with the Federal Highway Administration.

This synthesis will help document TAM state of practice and the extent to which agencies have shifted their organizational cultures and business processes to support performance-based decisions that consider long-term investment options based on quality data.

To complete the synthesis of TAM practices, two questionnaires will be conducted.
The initial, attached, includes the self-assessment from the first volume of the AASHTO AM Guide.
After the results from the initial effort are evaluated; a comprehensive questionnaire on the use of TAM principles will be sent to the respondents covering a variety of assets other than just pavements and bridges.

For each category in the self-assessment exercise; there are two sets of questions. The first set is to get your input on the current use of asset management principles at your agency (current, in red). The second set is to get your input on the desired level of implementation in 5 years (desired level in 5 years). Please make sure the two sets are answered for each category.

The synthesis report will focus on the practices of state highway agencies from the questionnaires results, follow-up interviews, and a focus group meeting at the TAM Conference in San Diego in April of 2012. The report will include examples of how mature practices have been used for a variety of assets, including roadway hardware (e.g., signs and guardrails), ITS, bridges, and pavements.

This questionnaire is being sent to all of the state DOTs AM contact list. **If you are not the appropriate person at your agency to complete this questionnaire, please forward it to the correct person. This**

should represent a collective response from each DOT. If needed, please consult other staff from different offices. Your cooperation in completing the questionnaire will ensure the success of this effort.

Please complete and submit this questionnaire by ***December 16, 2011.*** We estimate that it should take approximately *60 minutes* to complete. If you have any questions, please contact our principal investigator, Omar Smadi at smadi@iastate.edu or 515 294-7110. Any supporting materials can be sent directly to Omar Smadi by email or at the address shown at the end of the questionnaire.

Thank you very much for your time and cooperation.

QUESTIONNAIRE INSTRUCTIONS

1. To view and print the entire questionnaire, Click on the following link and print using "control p" http://www.surveygizmo.com/s3/687535/NCHRP-Synthesis-43-01-Use-of-TAM-Principles-in-State-Highway-Agencies-AM-AASHTO-SelfAssessment
2. To save your partial answers and complete the questionnaire later, click on the "Save and Continue Later" link in the upper right hand corner of your screen. A link to the incomplete questionnaire will be emailed to you from *SurveyGizmo.* To return to the questionnaire later, open the email from *SurveyGizmo* and click on the link.
3. To pass a partially completed questionnaire to a colleague, click on the on the "Save and Continue Later" link in the upper right hand corner of your screen. A link to the incomplete questionnaire will be emailed to you from *SurveyGizmo.*" Open the email from *SurveyGizmo* and forward it to a colleague informing them of what section they need to complete. Please make sure that they send the partially completed questionnaire back to you before it is submitted.
4. To view and print your answers before submitting the questionnaire, click forward to page 16. You can print using “control p” or you can click "Download PDF Version" at the bottom of the page to view and print a PDF of the survey with your responses.
5. To submit the survey, click on "Submit" on the review page.

Please enter the date (MM/DD/YYYY).

Please enter your contact information.

First Name *

Last Name *

Title

Agency/Organization

City

State *

Email Address *

Phone Number *

New Text/HTML/Rich Media Element

PART A. POLICY GUIDANCE

1. How Does Policy Guidance Benefit from Improved Asset Management Practice (Please state current level and desired level in five years)?

1.1. (CURRENT) POLICY GUIDANCE BENEFITING FROM GOOD ASSET MANAGEMENT PRACTICE

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
A1. Policy guidance supports preservation of existing infrastructure assets.	○	○	●	○
A2. Policy guidance encourages resource allocation and project selection based on cost-effectiveness or benefit/cost analysis.	○	●	○	○
A3. Policies support a long-term, lifecycle approach to evaluating investment benefits and costs.	○	●	○	○
A4. Policy guidance considers customer perceptions and expectations.	○	○	●	○
A5. Our customers contribute to the process that formulates policy goals and objectives.	○	○	○	●

1.2. (DESIRED LEVEL IN 5 YEARS) POLICY GUIDANCE BENEFITING FROM GOOD ASSET MANAGEMENT PRACTICE

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
A1. Policy guidance supports preservation of existing infrastructure assets.	○	○	●	○
A2. Policy guidance encourages resource allocation and project selection based on cost-effectiveness or benefit/cost analysis.	○	○	●	○
A3. Policies support a long-term, lifecycle approach to evaluating investment benefits and costs.	○	○	●	○
A4. Policy guidance considers customer perceptions and expectations.	○	○	●	○
A5. Our customers contribute to the process that formulates policy goals and objectives.	○	○	○	●

PART A. POLICY GUIDANCE

1.3. (CURRENT) STRONG FRAMEWORK FOR PERFORMANCE-BASED RESOURCE ALLOCATION

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
A6. Policy guidance on resource allocation allows our agency sufficient flexibility to pursue a performance-based approach.	○	●	○	○
A7. Our agency has a business plan or strategic plan with comprehensive, well-defined goals and objectives to guide resource allocation.	○	●	○	○

A8. Our agency's goals and objectives are linked to specific performance measures and evaluation criteria for resource allocation.	●	○	○	○

1.4. (DESIRED LEVEL IN 5 YEARS) STRONG FRAMEWORK FOR PERFORMANCE-BASED RESOURCE ALLOCATION

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
A6. Policy guidance on resource allocation allows our agency sufficient flexibility to pursue a performance-based approach.	○	○	●	○
A7. Our agency has a business plan or strategic plan with comprehensive, well-defined goals and objectives to guide resource allocation.	○	○	●	○
A8. Our agency's goals and objectives are linked to specific performance measures and evaluation criteria for resource allocation.	○	○	●	○

PART A. POLICY GUIDANCE

1.5. (CURRENT) PROACTIVE ROLE IN POLICY FORMULATION

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
A9. Our agency estimates the resources needed to accomplish particular objectives as part of policy development.	●	○	○	○
A10. Our agency regularly communicates to customers and other stakeholders our accomplishments in meeting policy objectives.	○	●	○	○

A11. Our agency works with political leaders and other stakeholders to present funding options and consequences as part of our budget proposal.	●	○	○	○

1.6. (DESIRED LEVEL IN 5 YEARS) PROACTIVE ROLE IN POLICY FORMULATION

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
A9. Our agency estimates the resources needed to accomplish particular objectives as part of policy development.	○	○	●	○
A10. Our agency regularly communicates to customers and other stakeholders our accomplishments in meeting policy objectives.	○	○	●	○
A11. Our agency works with political leaders and other stakeholders to present funding options and consequences as part of our budget proposal.	○	○	○	●

PART B. PLANNING AND PROGRAMMING

2. Do Resource Allocation Decisions Reflect Good Practice in Asset Management?

2.1. (CURRENT) CONSIDERATION OF ALTERNATIVES IN PLANNING AND PROGRAMMING

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
B1. Our agency's long-range plan includes an evaluation of capital, operational, and modal alternatives to meet system deficiencies.	●	○	○	○
B2. Capital versus maintenance expenditure tradeoffs are explicitly considered in the preservation of assets like pavements and bridges.	●	○	○	○

B3. Capital versus operations tradeoffs are explicitly considered in seeking to improve traffic movement.	●	○	○	○

2.2. (DESIRED LEVEL IN 5 YEARS) CONSIDERATION OF ALTERNATIVES IN PLANNING AND PROGRAMMING

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
B1. Our agency's long-range plan includes an evaluation of capital, operational, and modal alternatives to meet system deficiencies.	●	○	○	○
B2. Capital versus maintenance expenditure tradeoffs are explicitly considered in the preservation of assets like pavements and bridges.	○	○	●	○
B3. Capital versus operations tradeoffs are explicitly considered in seeking to improve traffic movement.	○	●	○	○

PART B. PLANNING AND PROGRAMMING

2.3. (CURRENT) PERFORMANCE-BASED PLANNING AND A CLEAR LINKAGE AMONG POLICY, PLANNING, AND PROGRAMMING

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
B4. Our agency's long-range plan is consistent with currently established policy goals and objectives.	○	○	●	○
B5. Our agency's long-range plan includes strategies that are consistent with plausible projections of future revenues.	○	●	○	○
B6. Our agency's long-range plan provides clear and specific guidance for the capital program development process.	○	●	○	○

B7. Our agency periodically updates its planning and programming methods to keep abreast of current policy guidance, customer expectations, and critical performance criteria.	○	○	○	●

2.4. (DESIRED LEVEL IN 5 YEARS) PERFORMANCE-BASED PLANNING AND A CLEAR LINKAGE AMONG POLICY, PLANNING, AND PROGRAMMING

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
B4. Our agency's long-range plan is consistent with currently established policy goals and objectives.	○	○	●	○
B5. Our agency's long-range plan includes strategies that are consistent with plausible projections of future revenues.	○	●	○	○
B6. Our agency's long-range plan provides clear and specific guidance for the capital program development process.	○	○	●	○
B7. Our agency periodically updates its planning and programming methods to keep abreast of current policy guidance, customer expectations, and critical performance criteria.	○	○	●	○

PART B. PLANNING AND PROGRAMMING

2.5. (CURRENT) PERFORMANCE-BASED PROGRAMMING PROCESS

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
B8. Criteria used to set program priorities, select projects, and				

allocate resources are consistent with stated policy objectives and defined performance measures.	○	●	○	○
B9. Our agency's programs are consistent with realistic projections of future revenues.	○	○	●	○
B10. Our agency's programs are based on realistic estimates of costs, benefits, and impacts on system performance.	○	○	●	○
B11. Project selection is based primarily on an objective assessment of relative merits and the ability to meet performance targets.	○	○	●	○
B12. The preservation program budget is based upon analyses of leastlifecycle cost rather than exclusive reliance on worst-first strategies.	○	●	○	○
B13. A maintenance quality assurance study has been implemented to define levels of service for transportation system maintenance.	○	●	○	○

2.6. (DESIRED LEVEL IN 5 YEARS) PERFORMANCE-BASED PROGRAMMING PROCESS

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
B8. Criteria used to set program priorities, select projects, and allocate resources are consistent with stated policy objectives and defined performance measures.	○	○	●	○
B9. Our agency's programs are consistent with realistic projections of future revenues.	○	○	●	○
B10. Our agency's programs are based on realistic estimates of costs, benefits, and impacts on system performance.	○	○	○	●

B11. Project selection is based primarily on an objective assessment of relative merits and the ability to meet performance targets.	○	○	○	●
B12. The preservation program budget is based upon analyses of leastlifecycle cost rather than exclusive reliance on worst-first strategies.	○	○	●	○
B13. A maintenance quality assurance study has been implemented to define levels of service for transportation system maintenance.	○	○	●	○

PART C. PROGRAM DELIVERY

3. Are Appropriate Program Delivery Processes that Reflect Industry Good Practices Being Implemented?

3.1. (CURRENT) CONSIDERATION OF ALTERNATIVE PROJECT DELIVERY MECHANISMS

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
C1. Our agency periodically evaluates the use of alternative delivery options such as maintenance outsourcing, intergovernmental agreements, design-build, design-build-maintain, and similar options.	●	○	○	○
C2. Our agency has an incentive program for recognizing or rewarding outstanding performance in improving upon schedule, quality, and cost objectives.	○	●	○	○

3.2. (DESIRED LEVEL IN 5 YEARS) CONSIDERATION OF ALTERNATIVE PROJECT DELIVERY MECHANISMS

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)

C1. Our agency periodically evaluates the use of alternative delivery options such as maintenance outsourcing, intergovernmental agreements, design-build, design-build-maintain, and similar options.	○	●	○	○
C2. Our agency has an incentive program for recognizing or rewarding outstanding performance in improving upon schedule, quality, and cost objectives.	○	○	●	○

PART C. PROGRAM DELIVERY

3.3. (CURRENT) EFFECTIVE PROGRAM MANAGEMENT

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
C3. Our agency solicits input from all affected parties to ensure that project scope is consistent with objectives of the project.	○	○	●	○
C4. Our agency uses well-defined program delivery measures to track adherence to project scope, schedule, and budget.	●	○	○	○
C5. Our agency has a well-established and functioning process to approve project changes and program adjustments.	○	○	●	○
C6. When adding projects or changing project schedules, our agency considers effects on the delivery of other projects in the program.	○	●	○	○
C7. Projects with significant changes to scope, schedule, or cost are reprioritized to ensure that they are still competitive in cost and performance.	○	○	●	○

C8. Agency executives and program managers are regularly kept informed of program delivery status.	○	○	●	○
C9. External stakeholders and policymakers feel that they are sufficiently updated on program delivery status.	○	○	●	○

3.4. (DESIRED LEVEL IN 5 YEARS) EFFECTIVE PROGRAM MANAGEMENT

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
C3. Our agency solicits input from all affected parties to ensure that project scope is consistent with objectives of the project.	○	○	●	○
C4. Our agency uses well-defined program delivery measures to track adherence to project scope, schedule, and budget.	○	○	●	○
C5. Our agency has a well-established and functioning process to approve project changes and program adjustments.	○	○	●	○
C6. When adding projects or changing project schedules, our agency considers effects on the delivery of other projects in the program.	○	○	●	○
C7. Projects with significant changes to scope, schedule, or cost are reprioritized to ensure that they are still competitive in cost and performance.	○	○	●	○
C8. Agency executives and program managers are regularly kept informed of program delivery status.	○	○	●	○
C9. External stakeholders and policymakers feel that they are sufficiently updated on program delivery status.	○	○	●	○

PART C. PROGRAM DELIVERY

3.5. (CURRENT) COST TRACKING AND ESTIMATING

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
C10. Our agency maintains and uses information on the full unit costs of construction activities.	○	○	●	○
C11. Our agency maintains and uses information on the full unit costs of maintenance activities.	○	●	○	○

3.6. (DESIRED LEVEL IN 5 YEARS) COST TRACKING AND ESTIMATING

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
C10. Our agency maintains and uses information on the full unit costs of construction activities.	○	○	●	○
C11. Our agency maintains and uses information on the full unit costs of maintenance activities.	○	○	○	●

PART D. INFORMATION AND ANALYSIS

4. Do Information Resources Effectively Support Asset Management Policies and Decisions?

4.1. (CURRENT) EFFECTIVE AND EFFICIENT DATA COLLECTION

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
D1. Our agency has a complete and up-to-date inventory of our major assets.	○	○	●	○

D2. Our agency regularly collects information on the condition of our assets.	○	○	●	○
D3. Our agency regularly collects information on the performance of our assets (e.g., serviceability, ride quality, capacity, operations, and safety improvements).	○	○	●	○
D4. Our agency regularly collects customer perceptions of asset condition and performance.	○	○	●	○
D5. Our agency continually seeks to improve the efficiency of data collection (e.g., through sampling techniques, use of automated equipment, other methods appropriate to our transportation system).	○	○	●	○

4.2. (DESIRED LEVEL IN 5 YEARS) EFFECTIVE AND EFFICIENT DATA COLLECTION

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
D1. Our agency has a complete and up-to-date inventory of our major assets.	○	○	○	●
D2. Our agency regularly collects information on the condition of our assets.	○	○	○	●
D3. Our agency regularly collects information on the performance of our assets (e.g., serviceability, ride quality, capacity, operations, and safety improvements).	○	○	○	●
D4. Our agency regularly collects customer perceptions of asset condition and performance.	○	○	●	○

D5. Our agency continually seeks to improve the efficiency of data collection (e.g., through sampling techniques, use of automated equipment, other methods appropriate to our transportation system).	○	○	○	●

PART D. INFORMATION AND ANALYSIS

4.3. (CURRENT) INFORMATION INTEGRATION AND ACCESS

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
D6. Agency managers and staff at different levels can quickly and conveniently obtain information they need about asset characteristics, location, usage, condition, or performance.	○	○	●	○
D7. Our agency has established standards for geographic referencing that allow us to bring together information for different asset classes.	○	○	●	○
D8. Our agency can easily produce map displays showing needs/deficiencies for different asset classes and planned/programmed projects.	○	○	●	○
D9. Our agency has established data standards to promote consistent treatment of existing asset-related data and guide development of future applications.	○	○	●	○

4.4. (DESIRED LEVEL IN 5 YEARS) INFORMATION INTEGRATION AND ACCESS

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)

D6. Agency managers and staff at different levels can quickly and conveniently obtain information they need about asset characteristics, location, usage, condition, or performance.	○	○	○	●
D7. Our agency has established standards for geographic referencing that allow us to bring together information for different asset classes.	○	○	○	●
D8. Our agency can easily produce map displays showing needs/deficiencies for different asset classes and planned/programmed projects.	○	○	○	●
D9. Our agency has established data standards to promote consistent treatment of existing asset-related data and guide development of future applications.	○	○	○	●

PART D. INFORMATION AND ANALYSIS

4.5. (CURRENT) USE OF DECISION-SUPPORT TOOLS

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
D10. Information on actual work accomplishments and costs is used to improve the cost-projection capabilities of our asset management systems.	○	●	○	○
D11. Information on changes in asset condition over time is used to improve forecasts of asset life and deterioration in our asset management systems.	○	○	●	○

4.6. (DESIRED LEVEL IN 5 YEARS) USE OF DECISION-SUPPORT TOOLS

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
D10. Information on actual work accomplishments and costs is used to improve the cost-projection capabilities of our asset management systems.	○	○	●	○
D11. Information on changes in asset condition over time is used to improve forecasts of asset life and deterioration in our asset management systems.	○	○	●	○

PART D. INFORMATION AND ANALYSIS

4.7. (CURRENT) USE OF DECISION-SUPPORT TOOLS (CONTINUED)
Our agency uses asset management decision-support tools to:

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
D12. Calculate and report actual system performance;	○	○	●	○
D13. Identify system deficiencies or needs;	○	○	●	○
D14. Rank candidate projects for the capital program;	○	○	●	○
D15. Forecast future system performance given a proposed program of projects; and	○	●	○	○
D16. Forecast future system performance under different mixes of investment levels by program category.	○	○	○	○

4.8. (DESIRED LEVEL IN 5 YEARS) USE OF DECISION-SUPPORT TOOLS (CONTINUED) Our agency uses asset management decision-support tools to:

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
D12. Calculate and report actual system performance;	○	○	○	●
D13. Identify system deficiencies or needs;	○	○	○	●
D14. Rank candidate projects for the capital program;	○	○	○	●
D15. Forecast future system performance given a proposed program of projects; and	○	○	○	●
D16. Forecast future system performance under different mixes of investment levels by program category.	○	○	○	●

PART D. INFORMATION AND ANALYSIS

4.9. (CURRENT) SYSTEM MONITORING AND FEEDBACK

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
D17. Our agency monitors actual system performance and compares these values to targets projected for its capital preservation program.	●	○	○	○
D18. Our agency monitors actual system performance and compares these values to targets projected for its capital improvement program.	●	○	○	○
D19. Our agency monitors actual system performance and compares these values to targets projected for its maintenance and operations program.	●	○	○	○

D20. We periodically distribute reports of performance measures relevant to customer/stakeholder satisfaction with transportation system and services.	○	●	○	○

4.10. (DESIRED LEVEL IN 5 YEARS) SYSTEM MONITORING AND FEEDBACK

	Strongly Disagree (1)	Neutral (2)	Agree (3)	Strongly Agree (4)
D17. Our agency monitors actual system performance and compares these values to targets projected for its capital preservation program.	○	○	○	●
D18. Our agency monitors actual system performance and compares these values to targets projected for its capital improvement program.	○	○	○	●
D19. Our agency monitors actual system performance and compares these values to targets projected for its maintenance and operations program.	○	○	●	○
D20. We periodically distribute reports of performance measures relevant to customer/stakeholder satisfaction with transportation system and services.	○	○	○	●

Review

Thank You!

Thank you for taking our survey. Your response is very important to us. If you have any questions or comments, please feel free to contact Omar Smadi at:

- E-mail: smadi@iastate.edu
- Phone: (515) 294-7110