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Executive Summary

Expected funding levels are not projected to be sufficient to maintain the condition of infrastructure assets such as pavements, bridges, and culverts without changing the way ODOT does business. New business processes are needed to mitigate potential risks to the transportation system, including accelerated deterioration rates due to increased freight volumes and tonnage and the potential loss of institutional knowledge associated with the significant number of ODOT retirements expected in the next several years. Unless ODOT faces these and other risks head on, system conditions are expected to decrease. This is why ODOT is building on its prior asset management efforts and improving the way it does business: leveraging department-wide collaboration to improve results and ensure a reliable, sustainable transportation system. Specifically, ODOT will use a new asset management process that makes use of performance data to optimize investments, lower the cost of system preservation, and support more accountable and transparent decision-making. This Transportation Asset Management Plan (TAMP) describes the process and structure for the on-going implementation of TAM practices, which will allow ODOT to meet its customers’ needs for the next 6 years and beyond.

ODOT’s Experience with Asset Management

For more than 10 years, ODOT has been using asset management principles as the foundation for its data-driven approach to managing the transportation system, employing investment strategies that have steadily improved system conditions to the point that the State’s Critical Success Factors for pavement and bridge conditions are currently at or exceeding statewide targets. The development of this TAMP advances ODOT’s asset management initiatives and prepares the agency to address the changing financial, legislative, and political environment in which it operates. The TAMP also satisfies new Federal legislation requiring all state DOTs to prepare a risk-based TAMP.

A New Way of Doing Business

The new business processes outlined in the TAMP include the consideration of life cycle costs, an increased use of preservation
treatments, and more collaborative and consistent work plans. The increased use of preservation treatments slows the rate of system deterioration and lowers the long-term costs of preserving the system. By making these changes, ODOT will redirect an estimated $300 million towards pavement, bridge, and culvert preservation activities over the next 6 years.

Under the new approach, several key changes will be made to the development of the District Work Plans.

- District allocations will be based on performance targets established by the Executive Management and candidate projects suggested by ODOT’s computerized management systems.
- Districts will work collaboratively with Central Office Planning personnel to develop an Annual Work Plan that ensures that statewide performance targets will be met.
- Work Plans will reflect better coordination of maintenance and capital activities. The removal of artificial distinctions between capital and maintenance will allow Districts more flexibility in addressing asset needs over the entire service life.

As a result of these and other changes, District expenditures will better match statewide priorities, statewide goals will be achieved, and ODOT will have a more coordinated and collaborative process in place for optimizing investment strategies. This, in turn, will allow the Department to reduce the annual costs associated with system preservation and improve consistency in practices across Districts.
ODOT’s Investment Plans

ODOT has already initiated steps to embrace the new business processes. Assuming relative flat investment levels over the next several years, ODOT has developed preservation strategies that will allow the agency to meet or exceed its Critical Success Factors through 2021.

Projected Funding Through 2021

- $2.629 billion
- $4.432 billion
- $120 million

Goals Through 2021

- **Priority System CSF:** 85
- **General System CSF:** 80
- **General Appraisal CSF:** 6.8
  - Percent in Fair or better condition: 98%
- 95% in Fair or better condition
Moving Forward

Achieving the goals outlined in the TAMP requires that ODOT continue to take the steps to improve its use of performance data to allocate resources in a way that achieves its strategic objectives and manages risks. This will require ongoing investments in the four following areas:

- Personnel Development and Capacity Building.
- Business Process Changes.
- Data Integration and Governance.
- Technology and Management Systems.

Executive leadership serves an important role in the success of the agency’s asset management efforts, setting agency policy, directing funding to meet strategic goals, and supporting the continued investment in people, processes, and technology that support asset management. The Asset Management Leadership Team will guide ODOT’s initiatives and ensure that the Department stays on track to overcome the risks associated with flattened revenue projections and continues to achieve the agency’s goal of “taking care of what we have.”
1.0 Background

ODOT constructs, operates, manages and maintains one of the country's largest statewide transportation systems, containing:

- Over 43,000 lane miles of roads, including the 5th largest interstate highway network in the country.
- More than 14,000 bridges.
- Nearly 58,000 culverts.
- Many other assets (such as guardrails, signs, and retaining walls) that keep traffic moving safely.

This transportation system enables people and goods to access the markets, services, and production inputs that are essential to the economic vitality of the State of Ohio. In addition to supporting over 5.5 million jobs in Ohio, 67 percent of the state's freight traffic moves on ODOT-maintained roads and bridges, including top exports like crops, vehicles, and plastics. By keeping its state highways safe and accessible, ODOT also contributes to the quality of life of its citizens and communities.

To effectively manage its transportation system, ODOT relies on the use of Transportation Asset Management (TAM) principles that emphasize sound investment decisions that preserve system performance at a reasonable cost over its useful life. These principles require clear objectives, a forward-looking approach to identify potential challenges and opportunities, the use of data to support decision making, coordination of activities across disparate business units, and continual improvement based on lessons learned.
Building on Experience

Asset management principles are evident throughout the ODOT organization. ODOT’s Mission Statement acknowledges its commitment to taking care of existing assets and making the system work better, two tenets of a TAM approach.

In fact, TAM principles have been in place for more than 10 years at the agency. During this time, ODOT has been moving to a more data-focused approach to managing its transportation system, employing investment strategies that have steadily improved system conditions to the point that the State’s pavements and bridges are currently at or exceeding statewide performance targets, which ODOT refers to as Critical Success Factors. In fact, ODOT spends 93 percent of its time and resources taking care of its existing infrastructure.

The Planning Division is charged with leading the implementation of Asset Management for the Department with the guidance of an Asset Management Leadership Team. In 2011, ODOT formally adopted a set of recommendations that established the framework for all asset management activities. Several of these recommendations have been implemented, including:

- Establishing strong support from ODOT’s Executive Leadership.
- Forming an Asset Management Leadership Team to guide and strengthen the use of asset management principles throughout the organization.
- Developing a risk-based Transportation Asset Management Plan (TAMP).
- Expanding asset inventories.

This deliberate effort to implement asset management has improved ODOT’s ability to achieve strategic goals so that the long-term consequences of investments are understood, options are evaluated, and performance is measured against risk and cost.

Although there is strong organizational support for asset management, there are several current factors that are driving the
need to further advance the Department’s use of asset management principles, including the following:

- ODOT is at risk of losing institutional knowledge since approximately 35 percent of ODOT’s current workforce is expected to retire by 2021. Planned efforts are underway to build workforce capacity and transfer institutional knowledge to mitigate this risk.
- Opportunities to lower the overall life cycle cost of system preservation have been identified that will enable ODOT to preserve system conditions without increasing budget requirements.
- New tools and technology are available that will enable ODOT to better collect and analyze performance data to make investment decisions.

Support for Other ODOT Initiatives

Asset management is not a separate program area or an independent function of the agency. Rather, asset management requires coordination between different Divisions such as Planning, Engineering, Operations, and Districts to ensure that the entire organization is working towards common goals as efficiently as possible.

To help align the organization, ODOT has outlined plans that will enable the agency to meet its long-term objectives. The TAMP supports the recommendations included in these plans which focus on the importance of:

- Taking care of what we have.
- Expanding the use of performance management.
- Making greater use of asset management principles and tools for optimized investment decisions.

The planned strategies outlined in this TAMP will lead to more consistency across the system and stronger collaboration within the agency to maximize the productivity of each effort.

Aligned With National Efforts

The Moving Ahead for Progress in the 21st Century Act (commonly referred to as MAP-21), which was signed into law on July 6, 2012, established a performance-based Federal highway program, funding transportation programs based on national transportation goals and
increased accountability and transparency. The asset management provisions of MAP-21 were perpetuated in the Fixing America’s Surface Transportation (FAST) Act of 2015. These acts establish requirements for states to:

- Develop a risk-based TAMP.
- Report progress in seven national goal areas for performance-based planning.
- Meet minimum condition levels for interstate pavement and bridge conditions.
- Meet minimum capabilities for pavement and bridge management systems.

While final rules for implementing these provisions have yet to be released, ODOT’s asset management efforts to date will allow the agency to exceed the expected requirements.
2.0 Preparing for the Future

Transportation asset management has its foundation in performance management and a focus on achieving measurable objectives in the most efficient manner possible. It requires a forward-looking, continual improvement approach. While ODOT’s experience with asset management has allowed the agency to achieve its asset condition goals, the practice requires ODOT to continually adjust to changing fiscal, legislative, and political environments to ensure that this success will continue.

Organizational Risks

Modern management practices require leaders to prepare for uncertainties and unplanned events. This is why the MAP-21 and FAST Acts require each state DOT to develop a TAMP that considers risks. Risk management is the practice of recognizing, documenting, and managing uncertainty.

ODOT’s Asset Management Leadership Team conducted a risk assessment to identify the most significant risks the agency expects to face over the next several years. The risk assessment recognized the following risks as being most significant to ODOT’s ability to meet its asset management objectives.

- The potential impact of flattened revenue projections over the next several years;
- The expectation of significant staff turnover due to retirements in the coming years and the resulting loss in institutional knowledge;
- The likelihood that ODOT will need to prepare for and respond to extraordinary weather events; and
- Volatility in prices that will impact the amount of work that can be constructed each year.

Impacts of Flattened Revenue Projections

Financial forecasts indicate that available revenue levels will plateau in the next several years. Since repair costs continue to increase at an average rate of 3.5 percent, funding is not expected to keep pace. As a result, fewer roads and bridges can be fixed each year. In addition to the funding issues, truck traffic volumes are expected to increase by 67 percent by the year 2040. Unless ODOT acts quickly to adopt new, cost-effective strategies that slow system deterioration
and reduce the overall cost of maintaining the system, declines in system performance should be expected.

By 2040 ...

... truck traffic volumes are projected to increase by 67%.

... Consumer Price Index trends indicate construction costs will increase an average of 3.5% per year.

... revenue forecasts are expected to level off.

These factors will lead to a net decrease in the number of roads and bridges that can be fixed each year.

Staff Turnover

The assessment also recognized impending staff turnover as a significant risk that will require multiple strategies to address. Current projections indicate that 35 percent of ODOT’s current workforce is expected to retire by 2021. Not every employee who retires or leaves the agency is replaced. Because of the anticipated workforce changes, ODOT has taken steps to develop a Knowledge Management Plan that guides the skill development and knowledge transfer necessary to implement the new business process improvements and takes advantage of new technology available to improve productivity.
ODOT’s asset management approach relies on training, knowledge management, and succession planning to address this trend.

Other Risks

The business processes outlined in the TAMP will also enable ODOT to better manage and mitigate the risks associated with unexpected events such as flooding or unusual price fluctuations. By building awareness of these risks, ODOT can identify investment strategies that will reduce the likelihood that the event will occur or reduce the impact if it does take place. The TAMP includes strategies that will enable the agency to proactively reduce the likelihood that the transportation system will be severely impacted by these types of events.

The Path Forward

To address these and other risks, ODOT is building on its asset management efforts and improving the way it does business: leveraging department-wide collaboration to improve results and ensure a reliable, sustainable transportation system. Specifically, ODOT will emphasize the use of TAM principles to guide investment decisions. These principles rely on the use of performance data to optimize investments and support more accountable and transparent decision-making.

As outlined in this TAMP, ODOT has developed an asset management approach which employs new or refined business processes to drive ODOT’s 6-year plan for managing investments in its roads, bridges, and culverts. By changing the way ODOT conducts business, the agency will redirect an estimated $300 million towards pavement, bridge, and culvert preservation activities over the next 6 years.

Together, these changes will help preserve ODOT’s $115 billion investment in its highway assets and ensure that the agency’s strategic objectives for a more reliable, sustainable transportation system are met.
3.0 Asset Management Approach

ODOT considers asset management to be more than just big data and computer programs. It also includes strategies for integrating ODOT’s **people, processes, and technology** into a performance-based investment plan with an end goal of a reliable and sustainable transportation system. It outlines the changes that will be made to:

- Provide ODOT employees with the guidance and tools needed to be successful in their jobs.
- Update business processes to foster greater statewide consistency, help ensure statewide goals are achieved, reduce costs, ensure accountability, and better coordinate capital and maintenance activities.
- Improve the use of technology to evaluate investment options and improve system performance.

The following highlights a few of the ways these changes will be implemented as part of ODOT’s asset management efforts. These changes will allow ODOT’s people, processes, and technology to work together to address system needs, overcome risks, improve efficiency and accountability, and meet the agency’s strategic objectives. Planned enhancements in each of these areas are discussed later in the TAMP and are summarized in Section 6, Planned Activities and Enhancements.
People

Every ODOT employee has a role in the agency’s success at implementing asset management. For this reason, ODOT’s asset management approach focuses on building the skills necessary to navigate the business process and technology changes that are underway, and transferring institutional knowledge from one generation to another. To guide its efforts in this area, ODOT has developed a Knowledge organizational capacity to meet the agency’s changing needs.

To illustrate the importance of ODOT’s personnel in navigating the changes outlined in the TAMP, the important roles of the Asset Management Leadership Team and District personnel are highlighted. A summary of other roles and responsibilities in support of asset management is presented in Section 6, Planned Activities and Enhancements.

Asset Management Leadership Team

The Asset Management Leadership Team was created to guide the implementation of asset management throughout ODOT and to monitor progress at each step in the process. The Team is charged with developing the TAMP and overseeing the implementation of the organizational changes needed to achieve ODOT’s strategic objectives.

The Asset Management Leadership Team is made up of representatives from all of the major business units in both the Central and District Offices, and is connected to the policy level of the organization through its Executive-level members. Its objectives are to:

- Maintain and implement plans and business processes to support TAM activities.
- Communicate TAM activities to the Executive levels to foster implementation or awareness.
- Establish data governance and data collection standards.
- Facilitate knowledge transfer and collaboration among the business units represented on the team.
- Engage in the solicitation and promotion of best practices.
- Promote TAM benefits and uses throughout ODOT and with external partners.
• Promote training and seminar opportunities to support ODOT’s TAM activities.

Asset Management Leadership Team

<table>
<thead>
<tr>
<th>Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications Group</td>
<td>Comprised of Central Office and District personnel who communicates TAMP messages throughout all levels of ODOT and externally. Designs and implements communication plans for ODOT’s strategic direction and measures its effectiveness.</td>
</tr>
<tr>
<td>Infrastructure Group</td>
<td>Comprised of Central Office and District personnel who provides oversight during the development of the Work Plan and ensures business needs of Planning, Operations, Design, Construction, and other functions are represented in all aspects of TAM activities.</td>
</tr>
<tr>
<td>TAM Audit Group</td>
<td>Comprised of Central Office and District personnel who oversees all asset data collection requirements and ensures data governance and collection standards are in place for any asset data collected by the Department.</td>
</tr>
<tr>
<td>Data Governance Group</td>
<td>Comprised of Central Office and District personnel who sets agency data standards and develops data governance and data collection standards for all asset data collected by the Department.</td>
</tr>
</tbody>
</table>

The work of the Asset Management Leadership Team is supported through the activities of various subgroups. In addition to the Communications, Infrastructure, and TAM Audit Groups, a Data Governance Group is being added to provide additional support to the Asset Management Leadership Team.

District Support

The Districts have a crucial role in the implementation of the changes outlined in the TAMP. District personnel have direct, regular interactions with the public and a first-hand knowledge of what’s happening on ODOT-maintained roads, bridges, and culverts. District feedback is critical to ensure that agency planning results in practical, cost-effective Work Plans that provide the best possible return on investment. District personnel can also work together to share observations and best practices to help ODOT continue to improve system performance.
District personnel can help ensure the Plan’s success by helping ODOT:

- **Keep watch.** District personnel serve as the eyes on the road, letting others know where conditions pose a concern and making sure quality work is being done.

- **Lead up.** District personnel share observations and best practices with other Districts and the Department.

- **Ready to pave.** District personnel ensure surfaces are ready to pave with replaced culverts and other necessary pre-surfacing repairs.

- **Adjust.** District personnel recognize everyone’s contributions to achieving the long-term, big picture plan of taking care of what we have.

**Processes**

The environment in which ODOT operates is regularly changing. While past investment strategies have been very effective at improving the condition of pavements and bridges, financial forecasts and projected traffic levels prompted ODOT to adopt new, cost-effective strategies that slow system deterioration and reduce the cost of maintaining the system. These new strategies include the consideration of life cycle costs, an increased use of preservation treatments, and more collaborative and consistent work.

**Life Cycle Analysis**

One of the major changes being undertaken is to the existing planning and programming activities. Using an analysis of all costs over the life of its pavements and bridges, the Asset Management Leadership Team has made a business case for long-term financial investments that will reduce the life cycle cost of maintaining ODOT’s assets without sacrificing system conditions. These long-term financial investments include the types of ongoing maintenance activities (such as oil changes and tire rotations) that individuals perform to keep their vehicles in working condition and preserve the car’s value as long as possible.
Small, planned investments in maintenance save money in the long run.

The same types of long-term strategies can be used effectively to preserve the investment that has been made in highway assets. In today’s dollars, it would cost nearly $115 billion to replace the pavements, bridges, and culverts that ODOT maintains. By investing regularly in certain low-cost preservation treatments, the investment in these assets is preserved and the cost of maintaining system conditions is reduced because more costly repairs and replacements are needed less frequently. Preserving the condition of the highway system so fewer assets have to be replaced is an important objective for the investments included in the TAMP.

The life cycle analysis demonstrated that relatively small changes in ODOT’s practices can have a significant impact in preserving system conditions. The analysis showed that if just 5 percent of the National Highway System (NHS) bridges were to receive a preservation treatment annually, up to $50 million could be reallocated each year to other priorities. For pavements, the analysis showed that if half of the low-volume roads eligible for preservation were addressed with a chip seal rather than an overlay, at least $75 million could be reallocated to other parts of the highway system each year.
Preservation

A key to the success of the TAMP is an expanded and more consistent use of preservation treatments on pavements, bridges, and culverts in the State. The types of preservation treatments that will be used are listed below. The increased use of preservation treatments is expected to reduce the annual cost of maintaining the network so that funds can be redirected to other agency priorities.

Pavement Preservation Treatments
- Crack sealing
- Chip seals

Bridge Preservation Treatments
- Sealing of bridge decks
- Cleaning bridges

Culvert Preservation Treatments
- Underdrain outlet cleanout

Work Planning

The investment strategies outlined in this document are based on ODOT’s adoption of more coordinated business processes that strengthen the emphasis on asset management principles and tools. They reflect an increased use of preservation treatments to slow the rate of deterioration and the implementation of new processes that are more optimized, streamlined, and collaborative.

The following figure illustrates the significant differences between ODOT’s current business processes and the way it’s done business in the past.

Overall, changes to existing planning and programming activities include:

- Using performance data to guide funding allocations.
- Fostering more consistency across Districts.
- Helping to ensure statewide performance goals are met.
- Reducing the annual cost of maintaining the system.
- Removing artificial distinctions between capital projects and maintenance activities.
- Coordinating preservation activities through Planning.

Technology

Historically, ODOT has used performance measures to establish funding levels needed to achieve performance targets for desired pavement and bridge conditions and to track accomplishments. Going forward, an important part of ODOT’s asset management practices will be the additional use of performance data and computerized management systems to analyze treatment strategies and optimize the use of available funding.

Both life cycle analysis and comprehensive work planning require integrated management systems supported by high quality data.
ODOT has invested considerable resources to this issue, and has already produced tools like TIMS (Transportation Information Mapping System), which help planners, engineers and executives access and manage key asset, safety, and operational data in an integrated map-based format. The data-integration efforts which have enabled TIMS will underpin all future management system implementations.

ODOT has also implemented computerized management systems to store asset data and evaluate investment options. ODOT uses a state-of-the-art pavement management system called TIMS for its pavement network and plans on implementing new bridge management software over the next several years. ODOT is also implementing a comprehensive maintenance management system that is currently being linked to the agency’s asset management processes.

New technology is also impacting the way data is collected and treatments are applied. Improvements in material specifications and construction material properties are just two examples of the ways technology can result in better performing preservation treatments.
4.0 The Asset Management Process

ODOT’s TAMP will be executed through a five-step business process, represented in the graphic below. This process leverages ODOT’s advancing technology and life cycle management results to provide ODOT staff with a consistent, data-driven approach to make decisions on capital and maintenance investments.

Step 1: Maintain Critical Asset Inventories and Condition

Quality data is foundational to asset management. ODOT has maintained an inventory of pavement and bridge assets for years and is adding other highway assets to the inventory on a regular basis. This initial TAMP focuses on pavements, bridges, and culverts since they represent three assets that are critical to system performance and characterize the largest share of ODOT’s $115 billion investment in its transportation system.
In addition to building asset inventories, ODOT regularly collects information about the condition these assets are in. This has allowed the Department to:

- Identify and prioritize needs.
- Establish performance targets.
- Monitor accomplishments.
- Communicate with outside stakeholders.
- Show that available funding is being used wisely.

ODOT’s new business processes rely on the use of asset condition data to accomplish these same goals, as well as to quantify needs, support allocations, optimize investments, and support more accountability and transparency in decision-making.

**Pavements**

Ohio has over 50,000 lane miles of roads divided mainly between three systems: Priority, General, and Urban. ODOT is responsible...
for maintaining Priority and General System roadways, which totals over 43,000 miles. The Priority System carries the highest traffic volumes since it is made up of Interstates and multilane divided highways. The General System is the largest of the three systems by mileage. It includes all of the two-lane state-maintained highways that are not maintained by local agencies. The Urban System includes any U.S or state highways that fall within the jurisdiction of a local agency with a population of 5,000 or more. Since Ohio is a “home rule” state that promotes governance at the local level, the maintenance of Urban routes is the responsibility of the municipalities and ODOT serves in a partnering role over their management with a $3 Surface Transportation Program (STP) funds that ODOT receives.

Pavement conditions are monitored using a 100-point Pavement Condition Rating (PCR) in which a score of 100 represents the condition of a new road.
Current pavement ODOT measures the average pavement conditions for all Priority, General, and Urban routes each year and compares conditions to the Critical Success Factors used agency-wide to gauge system quality and set investment priorities. The information is published annually and presented in ODOT’s Critical Success Factor Dashboard. Maps are also prepared for each District showing their average PCR scores, as shown below. Although there are some Districts with scores below the target,
ODOT is currently meeting or exceeding its targets for the Priority and General Systems on a statewide basis.

### Priority System
- **State Goal:** 85
- **State Total:** 85
- **Districts:**
  - District 1: 83.77
  - District 2: 86.46
  - District 3: 85.26
  - District 4: 81.59
  - District 5: 84.24
  - District 6: 84.87
  - District 7: 87.4
  - District 8: 86.15
  - District 9: 86.94
  - District 10: 88.65
  - District 11: 88.5
  - District 12: 82.51

### General System
- **State Goal:** 80
- **State Total:** 82.3
- **Districts:**
  - District 1: 85.51
  - District 2: 79.6
  - District 3: 79.8
  - District 4: 80.56
  - District 5: 81.91
  - District 6: 80.27
  - District 7: 82.59
  - District 8: 84.78
  - District 9: 85.69
  - District 10: 84.71
  - District 11: 83.86.5

### Urban System
- **State Goal:** 80
- **State Total:** 79.4
- **Districts:**
  - District 1: 83.5
  - District 2: 75.59
  - District 3: 79.78
  - District 4: 79.18
  - District 5: 83.52
  - District 6: 80.38
  - District 7: 81.64
  - District 8: 81.63
  - District 9: 82.91
  - District 10: 82.99
  - District 11: 83.52
  - District 12: 76.07
Ohio has nearly 45,000 bridges. As with pavements, ODOT is responsible for maintaining bridges on the Priority and General Systems, which totals over 14,000 bridges.

The bridge inventory includes all bridges and large culverts with a span greater than 10 feet. ODOT inspects its bridges annually and the results are used to determine a General Appraisal (GA) rating that is reported on a 0 to 9 scale (with the higher number being the better rating). Some bridges require more detailed inspections if they have fracture-critical members, underwater components, or are considered to be complex structures. On a statewide basis, more than 95 percent of the bridges maintained by ODOT are in Fair or better condition (GA of 5 to 9).

In addition to the GA, subsystem ratings are reported for Floor Condition (FC), Wearing Surfaces (WS), and Protective Coating (PC) Systems. Each of these subsystems is rated on a scale of 1 to 4, with the lower score representing better conditions. For any of these subsystems, a rating of 3 or 4 is considered to be Deficient.
The Critical Success Factor used to manage bridges is a statewide average General Appraisal rating of 6.8 out of 9. ODOT is currently exceeding this target. Weighted Average GA ratings for each District are shown in the map below.
Culverts

Ohio has nearly 58,000 culverts. These include drainage features that cross the highway centerline and have a span less than 10 feet. The culvert inventory also includes storm sewers with a diameter of 36 inches or more. ODOT is in the process of completing a computerized culvert inventory and has been implementing statewide inspections to enable more effective culvert management.

![Culvert Inventory](image)

Note: Data shown reflects approximately 80% of the total inventory

Culverts are rated using a GA rating similar to the one used for bridges. As with bridges, a culvert with a score of 5 or more is considered to be in *Fair* or better condition. The frequency of culvert inspections ranges from 1 to 10 years based on the size of the culvert and its condition.
Step 2: Establish Performance Targets and Funding Needs

To manage the program and monitor progress, ODOT is subject to two different sets of performance targets.

ODOT uses performance targets, also known as Critical Success Factors, for maintaining system conditions and gauging the quality of the organization. These targets help track and report progress, both internally and to outside stakeholders. In addition, the Critical Success Factors help to identify areas of needed improvement and areas of excellence. They provide the tools needed to set agency goals, adjust priorities, establish best practices, develop policies, and celebrate outstanding achievements.

Additionally, the MAP-21 and FAST Acts set minimum performance targets for interstate pavements and bridges that carry the NHS.

**ODOT Targets**

ODOT’s Critical Success Factors for pavements and bridges were established using existing inventory and condition data, anticipated revenue, public demand, and ODOT’s own stewardship responsibilities. Over the last few years, ODOT has made consistent progress at meeting or exceeding its Critical Success Factors for system conditions. There are currently no performance targets for culverts since the inventory is not yet complete.

ODOT’s existing Critical Success Factors for pavements and bridges are shown in the following table. Pavement and bridge conditions are monitored regularly and reported monthly to track progress toward the annual goal. The average for the State’s Fiscal Year is published annually in the Critical Success Factors Dashboard. By adopting the business process changes outlined in the TAMP, ODOT expects to be able to maintain its current pavement and bridge performance targets over the next 10 years.
Since bridges vary in size and consist of several components, the Office of Structural Engineering has established the internal performance targets shown in the table below to ensure that the statewide Critical Success Factor for bridges is met.

### Internal Performance Measures for Bridges

<table>
<thead>
<tr>
<th>Asset Type</th>
<th>Performance Measure</th>
<th>Performance Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Appraisal</td>
<td>Percent of bridges in Fair or better condition. For the GA, this means a rating</td>
<td>98%</td>
</tr>
<tr>
<td></td>
<td>between 5 and 9 (on a 0 to 9 scale). For the other substructures, ratings of 1 or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 indicate Fair or better condition (on a 0 to 4 scale).</td>
<td></td>
</tr>
<tr>
<td>Floor Condition</td>
<td></td>
<td>97%</td>
</tr>
<tr>
<td>Wearing Surfaces</td>
<td></td>
<td>97%</td>
</tr>
<tr>
<td>Protective Coating</td>
<td></td>
<td>90%</td>
</tr>
</tbody>
</table>
Federal Pavement Targets

The MAP-21 and FAST Acts require that each State establish performance targets that define the percent of the NHS that will be in Good and Poor condition at the end of a 10-year period. In accordance with the MAP-21 rules, pavements are determined to fall into a Good or Poor category based on defined metrics for smoothness (in terms of the International Roughness Index), percent cracking, rutting (asphalt pavements only), and faulting (concrete pavements only). No more than 5 percent of the interstate pavements may be in Poor condition.

Based on the 10-year analysis conducted during the development of the TAMP, the following 10-year investment level and performance targets have been set for NHS pavements.

<table>
<thead>
<tr>
<th>Asset Category</th>
<th>NHS Lane Mileage</th>
<th>MAP-21 10-Year Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>% Good</td>
</tr>
<tr>
<td>Interstates</td>
<td>6,813</td>
<td>TBD</td>
</tr>
<tr>
<td>Non-Interstate NHS</td>
<td>16,478</td>
<td>TBD</td>
</tr>
</tbody>
</table>

Federal Bridge Targets

Performance targets for NHS bridge conditions are reported in terms of the National Bridge Inspection (NBI) Rating, which is different than the General Appraisal rating that ODOT uses. Both rating approaches use a 0 to 9 scale with a 9 being the highest score. For Federal reporting purposes, a bridge is considered to be in Good condition if the deck, superstructure, and substructure are all rated in Good condition (NBI Rating of 7 to 9). Federal reporting requirements consider a bridge to be in Poor condition if either the deck, superstructure, or substructure have an NBI rating of 4 or lower. To meet the minimum performance targets established in MAP-21, no more than 10 percent of the NHS bridge deck area can be in Poor condition.
Based on the 10-year analysis conducted during the development of the TAMP, ODOT has set the following 10-year investment level and performance targets for its bridges on the NHS.

<table>
<thead>
<tr>
<th>Asset Category</th>
<th>Number of bridges on the NHS</th>
<th>MAP-21 10-Year Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHS</td>
<td>8,118</td>
<td>% Good</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TBD</td>
</tr>
</tbody>
</table>

**Need-Based Allocations**

The new asset management business process has led to changes in the way funding allocations to the Districts are made. In the past, the Central Office used funding allocation formulas to determine the budget that would be available to each District. This included funding for capital projects, such as pavement resurfacing and the rehabilitation or replacement of culverts and bridges, and a maintenance allocation to cover routine maintenance activities such as crack sealing, drainage repair, and guardrail repair.

Once the funding allocations were made, Districts had the flexibility to determine how much of the budget to use for pavements and bridges, and how best to use the funding to accommodate program needs and fluctuations in a given year. Districts developed an Annual Work Plan to coordinate the capital and maintenance work they expected to complete with the funding provided. Performance targets were used to hold Districts accountable for the decisions that were made.

Under the new business process, funds are allocated to the Districts to match statewide performance targets and investment priorities based on candidate projects suggested by ODOT’s computerized management systems. As a result, the process makes better use of data and technology to support ODOT’s performance-based decision making.
Step 3: Develop Work Plans

ODOT has also made significant changes to the way that Annual Work Plans are being developed by the Districts.

In the past, once funding allocations were made, the Districts developed separate Work Plans for the capital and maintenance work they expected to complete. Under the new approach, several key changes will be made to the development of the Work Plans.

- Districts will work collaboratively with Central Office Planning personnel to develop an Annual Work Plan that ensures that statewide performance targets will be met.
- Work Plans will reflect better coordination of maintenance and capital activities. The removal of artificial distinctions between capital and maintenance will allow Districts more flexibility in addressing asset needs over the entire service life.

As a result of these changes, District expenditures will better match statewide priorities, statewide goals will more likely be achieved, and ODOT will have a more coordinated and collaborative process in place for optimizing investment strategies. This, in turn, will allow the Department to reduce the annual costs associated with system preservation and improve consistency in practices across Districts.

Step 4: Monitor Progress for Continuous Improvement

Over the years, ODOT has been continuously improving its business processes and analytical capabilities to better manage its transportation system. Prior efforts, such as the Transportation Asset Management Recommendations Report (2011) and the TAM Maturity Assessment (2012), clearly illustrate the Department’s ongoing efforts to improve links between data, information, and decisions to guide transportation asset renewal and business process improvement. The investment strategies and corresponding changes to the existing business processes outlined in the TAMP continue ODOT’s efforts to effectively use performance data to allocate resources to achieve strategic objectives and manage risk.

The success of the TAMP relies on continued efforts in the four areas described below. A summary of the actions that will be taken is provided in Section 6, Summary of Planned Activities and Enhancements.
Personnel Development and Capacity Building

ODOT employees have a vital role in implementing the changes outlined in the TAMP, requiring a skilled workforce committed to seeing ODOT succeed in taking better care of its existing transportation assets. This has led to the development and implementation of a Knowledge Management Plan designed to help employees develop the skills necessary to support ODOT’s initiatives and to better transfer knowledge within the organization as employees retire. The Plan is designed to ensure that employees are prepared to identify when actions are needed and share what they’ve learned with others.

ODOT has already initiated a number of activities to build agency capacity to ensure the success of this Plan. In 2015, ODOT sponsored a peer exchange with speakers from leading DOTs in pavement and bridge preservation brought in to share best practices with District personnel. Since then, ODOT continues to enhance the skills of District personnel so they can assume responsibility for improving the performance of preservation treatments.

Business Process Changes

Efforts to reduce the overall life cycle cost of maintaining pavement, bridges, and culverts require the increased use of preservation activities and a more unified approach to maintenance and capital planning. This has led to the business process changes described in the TAMP. To further support these changes, the following key activities are planned:

- Implement planned business process changes, including the development of District Work Plans that combine capital and maintenance improvements and adhere to life cycle strategies.
- Develop and implement a Communication Plan that informs internal and external stakeholders of the planned changes.
- Establish an ODOT Transportation Asset Management Policy that communicates the importance of the activities outlined in the TAMP throughout the agency.
- Continue to identify and implement improvements that are targeted at lowering the total life cycle cost of asset preservation through proactive measures such as:
  - Developing and implementing guidance to improve the construction quality of preservation treatments.
  - Reviewing preservation treatment specifications at least annually to identify changes that extend treatment performance and promote good practices.
• Monitoring analysis models to ensure that predicted conditions match field performance.

Data Integration and Governance

The foundation of ODOT’s performance-based analysis approach is the availability of reliable asset data. Because of the importance to its business processes, ODOT has taken steps to manage its asset data to ensure that that data is complete, current, and is collected consistently across the state. ODOT's TAM Audit Group, a subset of the Asset Management Leadership Team, is responsible for ensuring the availability of data collection and governance standards for all asset data collected by the Department.

ODOT is in the process of establishing a Data Governance Group under the Asset Management Leadership Team that will establish the data governance standards for each piece of data.

Having access to data is also important and ODOT is proud of its Transportation Information Mapping System (TIMS) that serves as an integrated data portal for entering or accessing asset data using a map interface. Through this easy-to-use portal, ODOT employees have easy access to the information they need to make better decisions.

In addition, a strong partnership is needed between the Asset Management Leadership Team and the Division of Opportunity, Diversity, and Inclusion to ensure that the data collected for asset management purposes meets Federal and State requirements while serving the needs of both groups.
Technology and Management Systems

In addition to the need for quality data, ODOT’s management strategies depend on the availability of analysis models and computerized tools to effectively evaluate the long-term impacts of investment options. ODOT currently uses a state-of-the-art pavement management system for managing its pavement investments and is the process of linking its new maintenance management system (MMS) to its asset management processes.

Within the next few years, a new bridge management system will be implemented for improving the analysis of bridge and major culvert investment options. The bridge management system will also be linked to the asset management processes, leading to fully integrated asset management analysis capabilities. In addition, the statewide culvert inventory will be completed and the analysis of smaller culvert investment needs will be incorporated into the MMS.

Technology is expected to play an important role in future data collection efforts, especially as ODOT expands its asset management program to include other assets. Methods of automatically tracking asset inventory and performance information will be explored so that data collection can be done quickly and with greater reliability. Technological enhancements that improve the efficiency of operations, such as e-construction efforts, are also being explored.
ODOT is also incorporating improvements in technology into its design and construction practices to ensure that planned preservation treatments perform as expected. This includes activities such as developing improved binder specifications for emulsions that will lead to better performing pavement treatments. Another practice consists of investigating improved material properties to expand the use of preservation treatments in order to address a broader range of pavement and bridge conditions.

Step 5: Communicate Strategic Direction and Progress Made

Internal and external stakeholders have a vested interest in ODOT’s success. In many instances, they also have a role in making that success a reality. Therefore, it is essential that ODOT communicate plans for moving forward to all stakeholders and garner their understanding of, and support for, the changes ahead.

To that end, a Communication Plan has been developed to engage employees and partners. The Communication Plan was launched in 2015 and includes a video describing ODOT’s asset preservation strategy, a web page for downloading information, a PowerPoint presentation that can be used to share the message with stakeholders, and a Fact Card that summarizes key points.

The Communication Plan focuses on the three-pronged approach outlined in this TAMP:

- Using state-of-the-art technology for better decision-making, including the use of computerized management systems that objectively predict asset needs.
- Aggressively applying asset preservation treatments to get out in front of problems before they occur.
- Improving collaboration in the way ODOT manage its assets that result in better, timelier decisions and more consistency across Districts.
Over the next 2 years the plan will be refined based on feedback from various stakeholders to ensure ODOT’s success and to confirm other stakeholders’ commitment to supporting ODOT’s asset management efforts.
5.0 ODOT’s Performance-Based Investment Plan

With the implementation of the changes to its business processes, ODOT can work within the anticipated funding levels over the next several years and still preserve the condition of the system. The changes outlined earlier, particularly in regards to the increased use of preservation treatments, will allow ODOT to reduce the rate of asset deterioration and make more cost-effective use of the available funding. Additionally, the changes being made to coordinate the District Work Plans will foster a more consistent statewide approach to meet targeted conditions.

Planned Investment Levels

Although overall budgets in the next few years will be flat, the implementation of ODOT’s Asset Management Process will allow the agency to achieve its condition targets. The figure below shows the investment levels in pavements, bridges and culverts which will allow the agency to achieve its goals. These numbers assume an inflation rate of 3.5 percent annually.

Projected Funding Levels

Over a 10-year period, ODOT expects to invest a total of $8.619 billion to preserve its pavements and $3.868 to preserve the state-
maintained bridges. A total of $200 million is expected to be invested in culvert preservation during this period.

**Planned Investment Strategy**

To achieve ODOT’s performance targets, project selection will be largely driven by the information provided by the pavement and bridge management systems. This will enable ODOT to optimize its preservation investments. In the first year of ODOT’s transition to the new business processes, 25 percent of the projects included in the District’s Work Plans are expected to match the recommendations from ODOT’s management systems. However, in future years, the match is expected to increase to 75 percent.

**Projected Performance Targets**

**Pavements**

As shown in the graphs below, implementing the planned investment strategy outlined in this TAMP will avoid pavement conditions that drop below the targeted Critical Success Factors over the next 6 years. Based on projections from the pavement management system, ODOT expects to achieve an average statewide PCR of 87 on the Priority System and 86 on the General System by 2021 using the new asset management process.
Bridges

The combination of planned investment levels and increased use of preservation treatments on bridges is expected to improve conditions so that ODOT can exceed its statewide average GA rating of 6.98 over the next several years. The improved conditions will lead to nearly all state-maintained bridges in Fair or better condition during this time period.
Culverts

Although there has been no target established for culverts in the past, the projections indicate that approximately 95 percent of the small culverts will be in *Fair* or better condition by 2021.

### Culvert Conditions Over Time

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent in Fair or Better Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>94%</td>
</tr>
<tr>
<td>2017</td>
<td>95%</td>
</tr>
<tr>
<td>2018</td>
<td>95%</td>
</tr>
<tr>
<td>2019</td>
<td>95%</td>
</tr>
<tr>
<td>2020</td>
<td>95%</td>
</tr>
<tr>
<td>2021</td>
<td>96%</td>
</tr>
</tbody>
</table>
6.0 Summary of Planned Activities and Enhancements

Achieving the goals outlined in the TAMP requires that ODOT continue taking steps to effectively use performance data to allocate resources in a way that achieves strategic objectives and manages risks. As discussed earlier in the TAMP, ODOT’s planned activities and enhancements are organized into the four following areas:

- Personnel Development and Capacity Building.
- Business Process Changes.
- Data Integration and Governance.
- Technology and Management Systems.

The table below summarizes the activities and enhancements that are planned and identifies the responsible party and the targeted completion date. The Asset Management Leadership Team will guide these initiatives and ensure that the Department stays on task and meets its objectives.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Responsible Party</th>
<th>Target Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel Development and Capacity Building</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop and implement a Knowledge Management Plan</td>
<td>Asset Management Leadership Team</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>Apply skills and knowledge to continually improving the performance of preservation treatments</td>
<td>Districts</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>Business Process Changes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Merge capital and maintenance activities into a single District Work Plan</td>
<td>Planning Division</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>Establish a Communications Team to lead the development of a Communications Plan</td>
<td>Asset Management Leadership Team</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Responsible Party</td>
<td>Target Date</td>
<td>Status</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------</td>
<td>-----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Develop and implement a Communications Plan</td>
<td>Communications Group</td>
<td></td>
<td>1. Completed</td>
</tr>
<tr>
<td>1. Develop and launch a communications toolkit with external stakeholders</td>
<td></td>
<td></td>
<td>2. Ongoing</td>
</tr>
<tr>
<td>2. Initiate implementation activities outlined in the Communication Plan</td>
<td></td>
<td></td>
<td>3. Ongoing</td>
</tr>
<tr>
<td>3. Monitor accomplishments and lessons learned and make adjustments as necessary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish an ODOT Transportation Asset Management Policy</td>
<td>Executive Leadership</td>
<td>October 2016</td>
<td></td>
</tr>
<tr>
<td>Develop and implement guidance to improve the construction quality of preservation treatments</td>
<td>Pavement Engineering, Structural Engineering, Maintenance Office</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>Review preservation treatment specifications at least annually to identify changes to extend treatment performance and promote good practices</td>
<td>Pavement Engineering, Structural Engineering, Maintenance Office</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pavement Engineering</td>
<td></td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
**Data Integration and Governance**

| Continue efforts to evaluate data collection priorities and ensure that data collection standards are in place | TAM Audit Group | Ongoing |
| Develop and implement a data governance plan | Data Governance Group | July 2017 |
| Strengthen the partnership between the Asset Management Leadership Team and the Division of Opportunity, Diversity, and Inclusion | Asset Management Leadership Team | Ongoing |

**Technology and Management Systems**

| Complete the integration of the MMS into existing asset management processes | Maintenance Office Office of Technical Services | October 2017 |
| Establish a historical bridge database containing reliable data | Structural Engineering | October 2017 |
| Create prediction models for bridges | Structural Engineering | October 2018 |
| Implement new bridge management software that is integrated into the existing asset management processes | Structural Engineering | October 2018 |
| Complete the statewide culvert inventory | Hydraulic Engineering | December 2016 |
| Explore opportunities for using technology to improve data collection activities and improve organizational efficiency | TAM Audit Group | Ongoing |
| Identify and implement opportunities to incorporate new technology into the construction of preservation treatment strategies | Pavement Engineering  
Structural Engineering  
Hydraulic Engineering  
Maintenance Office | Ongoing |