


# Oregon Transportation Asset Management Plan

## Oregon Department of Transportation

**June, 2019**

*A risk-based asset management plan for Oregon's pavements and bridges on the National Highway System*

Oregon
Kate Brown, Governor

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# Oregon Transportation Asset Management Plan
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Section 119(e)(8) of title 23 United States Code requires each state department of transportation to develop an asset management plan for the National Highway System (NHS) to improve or preserve the condition of NHS infrastructure and performance of the system. Contents of the plan are to be in a form determined by the Secretary of Transportation. A requirement established by the Secretary is that the developed plan is to be approved by the head of the State Department of Transportation.

In accordance with these requirements, I hereby acknowledge that I have reviewed the Oregon Transportation Asset Management Plan and approve its submission to the Federal Highway Administration for formal review and certification.

Matthew L. Garrett
Director, Oregon Department of Transportation

6-10-19
Date

# EXECUTIVE SUMMARY

## Transportation Asset Management Plan Overview

### Overview and Purpose of the Transportation Asset Management Plan

Oregon's Transportation Asset Management Plan, or TAMP, documents information about Oregon's National Highway System (NHS) pavement and bridge assets, their condition, use and performance, the processes by which they are managed, and results of alternative management practices and investment decisions.

The development of a TAMP aims not only to document current asset management practices performed by the Oregon Department of Transportation, but also to document process improvements the agency is undertaking to improve decision-making, investment strategies, and accountability in its use of public revenue.

### MAP-21 TAMP Requirements

Provisions of *Moving Ahead for Progress in the 21st Century Act* (MAP-21) mandate that states develop a risk-based asset management plan which, at a minimum, is in a form that the Secretary determines to be appropriate and includes:

1. A listing and condition of pavement and bridge assets on the National Highway System.
2. Asset management objectives and measures.
3. Identification and analysis of performance gaps between national goals and asset condition.
4. Lifecycle costs and risk-based management analyses.
5. A financial plan with a minimum forecast period of 10 years.
6. Investment strategies.

### History of the Oregon TAMP Development

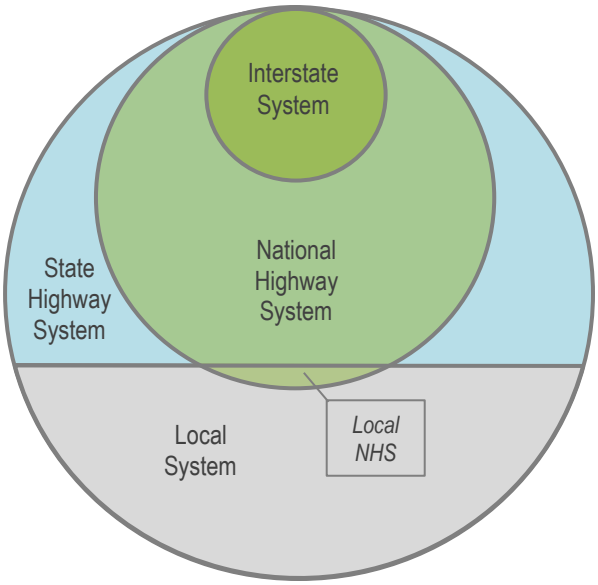
The development of Oregon's TAMP began in spring of 2016, and has involved collaborative work with several divisions of the Oregon Department of Transportation, as well as local partners including Metropolitan Planning Organizations (MPOs), cities, counties, and other local agencies that own National Highway System assets. Along with documenting existing asset management practices of the agency, the TAMP identifies several efforts that have been launched with the goal of improving the agency's asset management processes and procedures. Further, the TAMP aims to improve internal and external communication around ODOT's evolving asset management practices.

## Scope of Plan and Asset Inventory

### Scope of Assets

Major physical assets owned by ODOT are organized into four Priority Tiers based on considerations including asset value and criticality. The highest priority assets (Tier 1) include bridges, pavements, tunnels, culverts, traffic signals, and ADA ramps. Among these Tier 1 assets, both bridge and pavement assets have the highest asset management maturity level, with robust data capable of supporting lifecycle cost analysis, proactive program management, and advanced modeling. Based on the management capacity and maturity level reached in managing these assets, the current TAMP limited its scope to bridge and pavement assets.

| ODOT Tier 1 Assets | Current TAMP (2019) | *Future TAMPs (2022, 2026, etc.)* |
|---|---|---|
| Bridges | Included | *Included* |
| Pavement | Included | *Included* |
| Tunnels | Not included | *Future consideration* |
| Culverts | Not included | *Future consideration* |
| Traffic Signals | Not included | *Future consideration* |
| ADA Ramps | Not included | *Future consideration* |




### Scope of Roadway Jurisdiction

The National Highway System (NHS) is a network of strategic roads identified by the Federal Highway system (FHWA) as important to the nation's economy, defense, and mobility. The scope of the TAMP is limited to pavement and bridge assets on the NHS. However, some components of the TAMP, including investment plans, investment priorities, and asset management improvement strategies look beyond this narrow jurisdictional and asset scope. To this end, the TAMP emphasizes the central role of Oregon's Key Performance Measures, or KPMs, in shaping investment decisions for bridge, pavement and other assets.

Of the 4,315 miles of highway on the National Highway System, 4,052 miles (94%) are owned and maintained by ODOT, with the remaining 263 miles belonging to local agencies. Of the 1,814 bridges on the National Highway System, 1,733 bridges are owned and maintained by the ODOT. An additional 81 NHS bridges belong to local agencies.

## State and National Performance Measures

For more than 25 years, ODOT has used performance measures to track the agency's performance at meeting a series of transportation-related benchmarks, including public safety, asset condition, livability, and economic prosperity. In 2012, a series of National Goals and National Performance Measures was established as part of the Moving Ahead for Progress in the 21st Century Act (MAP-21). The National Performances Measures established under MAP-21 are in many ways thoroughly consistent with Oregon's transportation performance measures, particularly in the areas of pavement and bridge infrastructure condition. To address the challenge of overlapping state and federal performance measures and targets and how they impact agency decision-making, ODOT's policy is to continue to emphasize the central role of state KPMs in shaping investment decisions for bridge, pavement and other assets.

| State Highway Pavement Condition Targets: | National Highway Pavement Condition Targets: *(4-yr)* |
|---|---|
| • ***At least 85% of pavement miles in fair-or-better condition*** | • ***Less than 0.5% interstate in poor condition***<br>• ***At least 35% interstate in good condition***<br>• ***Less than 10% non-interstate in poor condition*** *(IRI)*<br>• ***At least 50% non-interstate in good condition*** *(IRI)* |
| **State Highway Bridge Condition Targets:** | **National Highway Bridge Condition Targets:** *(4-yr)* |
| • ***At least 78% of bridges not 'distressed'*** | • ***Less than 3% of bridge deck area in poor condition***<br>• ***At least 10% of bridge deck area in good condition*** |

## Performance Gap Analysis

The Performance Gap Analysis provides an overview of the *Desired State of Good Repair* for Oregon's National Highway System pavements and bridges, and compares this desired state to both current conditions and future conditions based on the latest funding projections. The Performance Gap Analysis discusses policy guidance derived from the Oregon Transportation Plan and Oregon Highway Plan that defines a state of good repair as well as strategies for closing gaps in system performance under a constrained funding scenario.

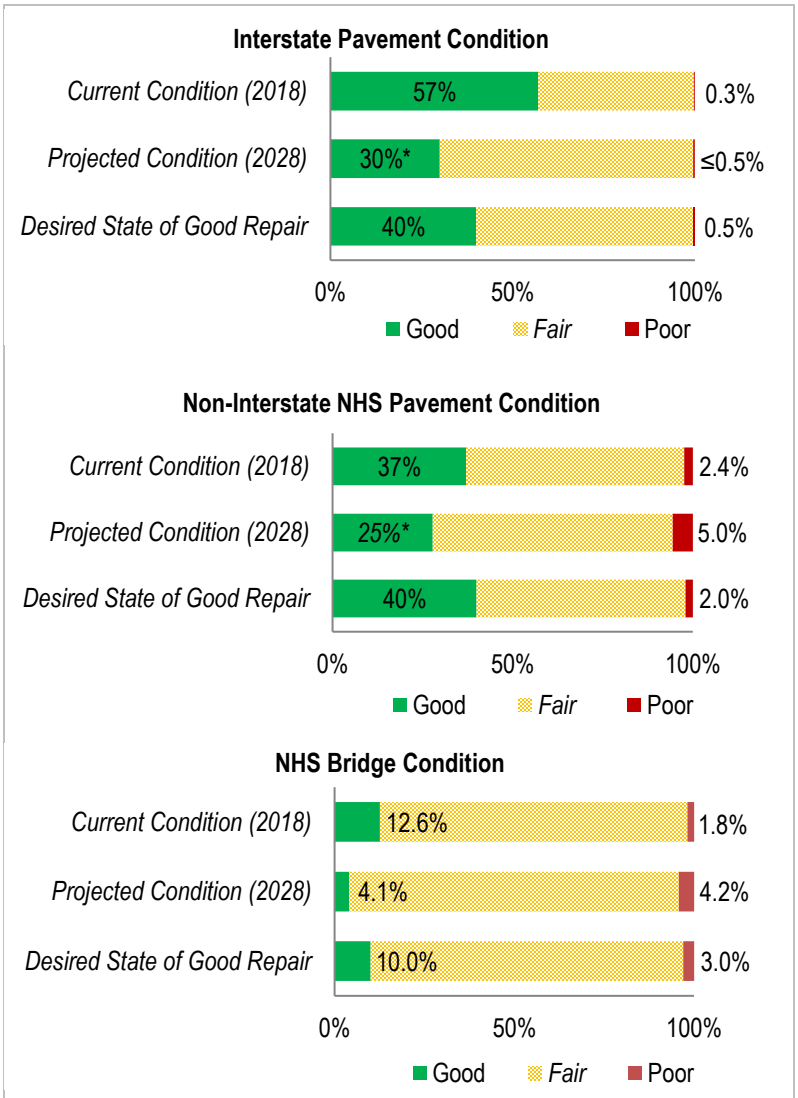
### Pavement Condition Gap Analysis

The Pavement Condition Gap Analysis projects a moderate decline in pavement conditions on the NHS and State Highway Systems based on the state Key Performance Measure. It is worth noting that the condition of Oregon's interstate system is projected to remain at or above 95% fair-or-better using the state performance measure. This is consistent with OTP investment policy which prioritizes critical and high-volume transportation corridors under a constrained funding scenario (*See Section 9: Investment Strategies).*

While ODOT projects a moderate decline in overall NHS and State Highway System conditions over the next 10 years, these projected conditions are improved significantly over earlier projections before HB2017, and reflect the impacts of new infusions of transportation revenue, as well as ODOT asset management strategies aimed at optimizing investments in pavement assets.

### Bridge Condition Gap Analysis

An analysis was performed to project the state bridge condition KPM over the next 10 years with varying funding. New revenue from HB2017 is expected to slow the decline of the *Percent Not Distressed* bridges across the state; however, this decline will continue under the latest funding projections. The decline in theKPM is primarily due to the aging bridge system and a long history of underfunding in the Bridge Program that precluded systematic replacement of deteriorated bridges. The aging bridge system is captured in the KPM as *Low Service Life Bridges,* as well as bridges projected to become structurally deficient.




**Projected pavement conditions estimated to have a +/-5% margin of error*

# ODOT Asset Management Practices

The mission of the Oregon Department of Transportation is to "provide a safe and reliable multimodal transportation system that connects people and helps Oregon's communities and economy thrive." The major challenge the agency faces is in accomplishing this mission under a constrained revenue forecast. As revenue available for transportation continues to be outpaced by system demands and the costs of an aging system, ODOT must identify how to use its resources to accomplish its multiple goals in the most efficient and effective ways possible.

ODOT's overall objective is to manage the transportation system as effectively as possible within an environment of growing system needs and constrained financial resources. The primary focus of ODOT's asset management efforts is the safety and preservation of the state's existing transportation infrastructure. Asset management has typically been integrated with the agency's planning process, and data on asset conditions is used to make strategic funding decisions supporting maintenance, preservation, and modernization of critical assets.

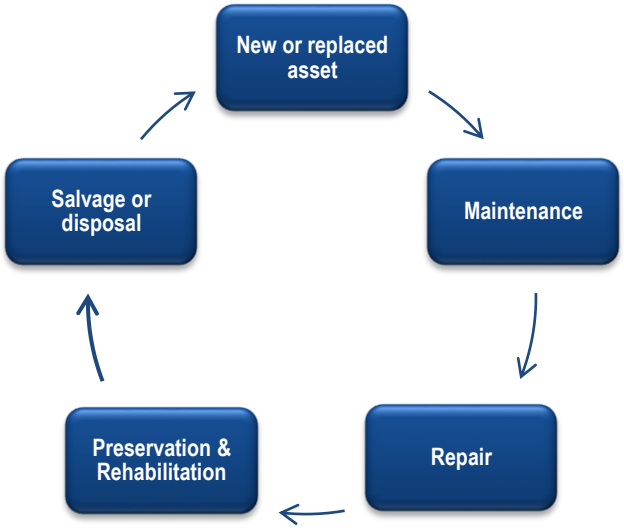
The integration of Asset Management into the agency's everyday operations and decisions continues to be a work in progress. To date, a number of accomplishments are notable: both the availability and reliability of asset data on a statewide basis continue to improve and increase. For example, the FACS-STIP Tool (Features, Attributes, and Conditions Survey – Statewide Transportation Improvement Program) continues to increase the quantity and reliability of asset inventory information, and helps inform decision-making around investments in the maintenance, preservation, and enhancement of roadway assets including bridge and pavement.

# Lifecycle Planning Considerations

Like all infrastructure, transportation assets owned by ODOT are threatened by physical deterioration over time. In addition to the ordinary wear and tear caused by hundreds of thousands of cars, trucks, buses, and other vehicles using the system every day, Oregon's roads and bridges are damaged by inclement weather, natural disaster, roadway crashes, and the chemical processes of deterioration.

Maximizing the value from transportation investments is one of ODOT's major goals. Each year, the agency spends more than a billion dollars in federal and state funds constructing, operating, preserving, and maintaining the components of its transportation system. Stretching transportation revenue to get the greatest return on investment is not limited to minimizing the costs of constructing and purchasing transportation assets. Costs must be minimized at all phases of a transportation asset's lifecycle. Timely maintenance and preservation activities extend the asset's useful life and help avoid more expensive repair and replacement costs.

Lifecycle Planning analysis is an engineering and economic analysis tool that focuses on the consideration of all the costs incurred during the service life of an asset. The general phases of a typical transportation asset lifecycle are shown in the figure to the left.




### Pavement Lifecycle Practices

Pavements must be resurfaced or rehabilitated at periodic intervals (typical average 15 to 20 years for asphalt and 40 to 50 years for concrete) to keep them out of poor condition. As long as degradation is confined to the surfacing only, and the pavement's foundation and base layers are protected, a given pavement can be resurfaced over and over again, with occasional strengthening, but without the need for a complete replacement. However, if resurfacing is delayed for too long, the pavement structure and underlying base materials can become excessively damaged and complete replacement (e.g. reconstruction) becomes necessary at a much higher cost.

ODOT's Fix-It Preservation and Maintenance programs have dedicated, steady funding streams to accomplish these objectives. Rather than following a "worst-first" philosophy, the Fix-It Preservation program applies a "mix of fixes" including preventive maintenance seal coats, resurfacing preservation projects, pavement rehabilitation, and reconstruction. Likewise, the Maintenance program has a long history and well established philosophy to proactively do crack sealing, chip seals, thin patching and overlays to keep pavements from failing. Lifecycle cost analysis techniques are considered when making decisions regarding pavement type selection and determination of appropriate pavement design or pavement rehabilitation strategies.

### Bridge Lifecycle Practices

Most bridges today are designed with 75-year design life. With regular attention, the actual service life can be expected to extend to 100 years or more. Based on a service life of 100 years, a conservative approach would be to replace about one percent of all bridges every year. This would, in practice, amount to roughly 18 bridges (out of 1,814) per year on the National Highway System, or 27 bridges (out of 2,737) per year on the State Highway System.

Keeping bridges in fair-to-good condition requires routine inspections, proactive maintenance and preservation treatments. Examples of proactive maintenance are sealing or replacing leaking joints to minimize the deterioration of superstructure and substructure elements beneath the joints; painting/coating or overcoating structural steel to protect against corrosion; and/or installing scour countermeasures to protect the substructure from undermining and failure due to scour. Timing is critical when performing the work because the longer the deterioration occurs, the more extensive and expensive the required treatment.

# Risk Management

The management of risk is a key component of an effective transportation asset management program. Risk management complements asset management which seeks to provide transportation assets that are safe, reliable and maintained in a state of good repair for the lowest possible costs.

## Risk Management Policies and Procedures

ODOT's approach to risk management is to focus resources to minimize threats to the condition and operation of the state's multimodal transportation system and maximize opportunities to improve its transportation programs. This approach necessitates balancing risk across multimodal programs and the diverse geographic areas with a focus on minimizing threats and challenges to the provision of "a safe and reliable multimodal transportation system that connects people and helps Oregon's communities and economy thrive." ODOT has a number of robust procedures and practices already in place to identify, analyze, evaluate, address, and communicate risks faced by the organization. The risks considered in the TAMP fall broadly into six general categories:

- *Bridge-related Risks*
- *Pavement-related Risks*
- *Other Tier 1 Asset Risks*
- *Environmental Risks*
- *Economic and Financial Risks*
- *Organization and Leadership Risks*

In order to improve upon the way ODOT manages the many agency risks, asset management staff worked with consultants on an agency-wide risk management assessment. This assessment was aimed at supporting ODOT in its ongoing effort to better identify, prioritize and develop mitigation plans for major risks facing the agency.

## Risk Management Improvement Efforts

As an outcome of the agency-wide risk assessment and the TAMP development process at large, ODOT has identified four broad areas where improvements can be made in the near-term in how the agency assesses and manages risks:

1. **Identification of Risk Management Process Owners and Responsibility:** The first gap that was identified in the risk assessment was the need to better identify who is responsible for the risk management process. This includes identifying asset owners who are responsible for identifying, analyzing, evaluating, and addressing risks, as well as identifying shared responsibility for monitoring and reviewing risks across multiple assets.

2. **Improvement of the Risk Register:** As an outcome of the agency-wide risk assessment, ODOT identified the need to update and improve the agency's risk register. Identified risks were updated and new risks were identified to reflect current conditions and challenges faced by the agency. The risk registry structure was also organized to more clearly communicate risks faced by the agency, and to build consensus around the likelihood and impact of identified risks. In total, 44 significant risks to the agency were identified and documented in the updated *Risk Register.*

3. **Identification of Top Priority Risks and Mitigation Actions:** Based on an effort to rank and prioritize risks identified in the *Risk Register* by their likelihood of occurrence and their impact, ODOT identified a total of ten risks considered *High* or *Extreme*. A summary of these *High* or *Extreme* risks and their corresponding mitigation potential, strategy, and actions are documented in the *Mitigation Plans for High Priority Risks.*

| ***Likelihood*** \ ***Impact*** | Insignificant | Minor | Significant | Major | Catastrophic |
|---|---|---|---|---|---|
| Very Unlikely | *Very Low* | *Very Low* | *Low* | *Moderate* | *High* |
| Unlikely | *Very Low* | *Low* | *Moderate* | *High* | *High* |
| Possible | *Low* | *Moderate* | *Moderate* | *High* | *Extreme* |
| Likely | *Moderate* | *Moderate* | *High* | *Extreme* | *Extreme* |
| Very Likely | *Moderate* | *High* | *High* | *Extreme* | *Extreme* |

4. **Documentation of Risk Management Activities** ODOT is already engaged in a number of risk management activities, and in many cases is already addressing high priority risks that may impact achieving the goals of the TAMP. In order to better manage and communicate the many risks impacting Oregon's pavement and bridge assets, ODOT will continue to document and update the major risks facing the agency through the asset management program and the ongoing TAMP development process.

## Periodic Evaluation of Facilities Repeatedly Requiring Repair

Part of the Final Rule for the development and implementation of a risk based Transportation Asset Management Plan requires state DOTs to conduct periodic evaluations of transportation infrastructure to determine if there are reasonable alternatives to roads, highways, and bridges that have required repair and reconstruction on two or more occasions due to emergency events.

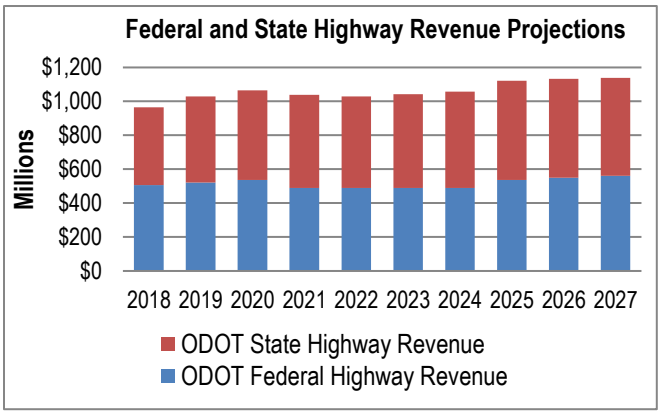
ODOT has long recognized the vulnerability of transportation infrastructure to extreme weather and emergency events and the risks they present to the condition and performance of pavements and bridges. The TAMP identifies instances where portions of NHS routes within specific counties have experienced damage from more than one emergency event during the 20-year period from January 1, 1997 through December 31, 2018. Alternatives that would mitigate or partially resolve the root cause of reoccurring damage are considered and evaluated for all identified instances.

# Financial Plan

Oregon pays for the construction, preservation, maintenance, and operation of the highway system with revenues derived from a variety of state and federal sources. The majority of state and federal revenues are derived from fuel taxes and other taxes and fees on vehicles.

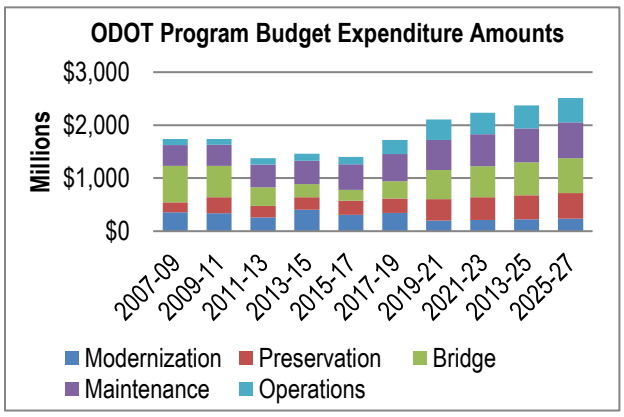
The development of ODOT's financial plan and investment strategies is influenced by a variety of factors including demographic and revenue trends, federal and state regulations, system physical conditions, technological innovations, environmental conditions, and public input. The actions and priorities adopted by the agency seek to balance investments in preserving and improving the condition and performance of the transportation system with investments in safety, multi-modal transportation and other projects that enhance Oregon's economic competiveness and quality of life.

The TAMP presents ODOT's financial plan and investment strategies, summarizes federal and state requirements, revenue sources and uses, revenue trends and projections, and highlights investment levels and strategies proposed for State and National Highway System bridges and pavements. The processes employed in the development of the financial plan and investment strategies use established procedures for financial decision-making and analysis. The processes highlight the use of information from proven management systems, involve input from across the agency, reflect coordination with agency short-term and long-term planning efforts, and are guided by the transportation policies and priorities of the Oregon Transportation Plan, Oregon Transportation Commission, and the Oregon State Legislature.




## Revenue Projections

The TAMP provides a 10-year summary of Oregon's expected transportation funding from federal and state sources. The federal funding identified represents expected Federal-aid Highway Program formula obligation limitation. The state funding identified represents ODOT's expected share of transportation funding deposited in the State Highway Fund.




## Revenue Uses

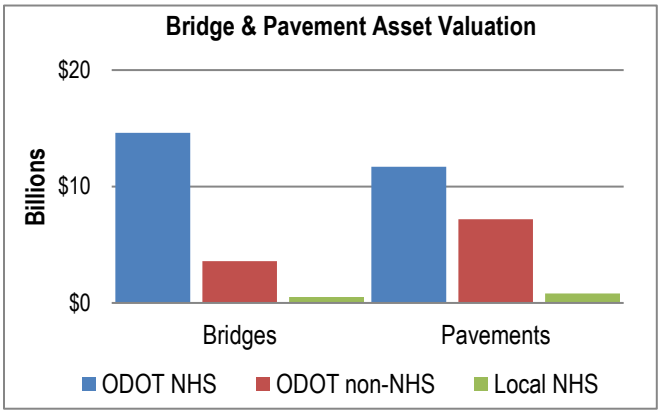
Spending for the preservation and improvement of Oregon transportation assets can be divided into five major budget categories: Modernization, Preservation, Bridge, Maintenance and Operations.

The TAMP presents past as well as projected future expenditure amounts by ODOT in these five major budget categories. Decisions guiding the balance of investments in these five categories are made through an application of asset management principles, management system analyses, Oregon Transportation Plan and Oregon Transportation Commission policy guidance, and decision processes used in the development of the Statewide Transportation Improvement Program.

## Asset Value

A key component of transportation asset management is determining the total value of transportation assets. There are a number of ways that asset valuation can support proper management and efficient investment in the transportation system. By effectively quantifying the value of transportation assets, investments that maintain, preserve, and enhance the transportation system can be measured to the degree to which they add value or minimize loss to the system. Valuation can also be used to determine funding needs as well as the levels of funding necessary to ensure that assets do not lose their value over time.

Asset value estimates developed for the TAMP place the value of ODOT's NHS bridges at $14.6 billion and ODOT's NHS pavements at $11.7 billion.



# Investment Strategies

## Prioritization of Investments

One of the major challenges facing Oregon's transportation system is that increases in revenue dedicated to transportation have not kept pace with the funding needed to maintain, preserve, and enhance the condition and performance of an aging transportation system. While transportation funding for pavements and bridges has stagnated or increased incrementally with new state and federal investments, inflation and rising construction costs have substantially reduced the buying power of available resources needed for aging facilities.

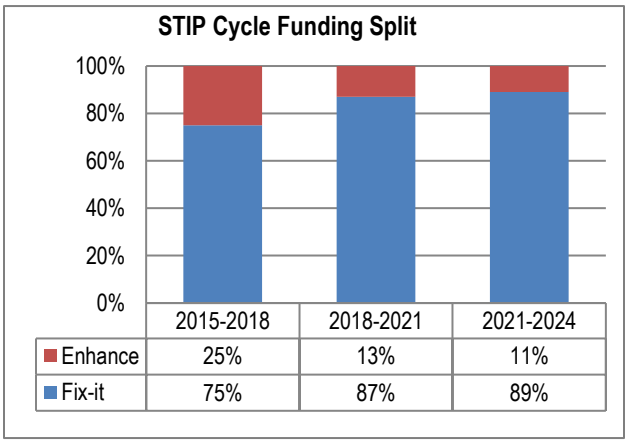
Specific guidance around how ODOT should invest in its transportation system under a constrained funding environment is outlined through policy guidance from the Oregon Transportation Plan as well as the Oregon Highway Plan. The Oregon Transportation Plan specifies that under this constrained funding scenario, investment should *"support Oregonians' most critical transportation needs, broadly considering return on investment and asset management."* Efforts should focus on preservation and operational improvements to maximize system capacity and safety at the least cost possible.

The Statewide Transportation Improvement Program, known as the STIP, is Oregon's four-year transportation capital improvement program. This document identifies the funding for and scheduling of transportation projects and programs. It includes projects on the federal, state, city, and county transportation systems, multimodal projects (highway, passenger rail, freight, public transit, bicycle and pedestrian), and projects in the National Parks, National Forests, Bureau of Land Management, and Indian tribal lands.

## Dedication of Fix-it Funding in the STIP

In 2012, the OTC and ODOT changed how the STIP is structured. The STIP is no longer developed as a collection of projects for specific pools of funding dedicated to specific transportation modes or specialty programs. Instead, the STIP primarily divides funding into two broad categories: **Fix-It** (activities that maintain and preserve the transportation system) and **Enhance** (activities that enhance, expand, or improve the transportation system).

Since its inception, the division of STIP funding between Enhance and Fix-it has trended toward an increased share of revenue dedicated to Fix-it projects. This shift is consistent with Oregon Transportation Plan policy guidance, which stipulates an increased focus on maintaining and improving the existing transportation system under a constrained revenue scenario. Furthermore, it is emblematic of a transformation in agency focus toward data-driven project identification and selection built on asset management principles.




## Prioritization of Fix-it Corridors in the STIP

In addition to the STIP's continued focus on *Fix-it* activities that maintain and preserve the transportation system, ODOT employs a "corridor approach" that aims to preserve movement of freight and economic activity under a constrained funding environment. This approach prioritizes resources to keep key freight corridors open to truck traffic and maintain critical connections across the state. ODOT has designated the main routes of the state highway system connecting most of the state's communities and carrying most freight and automobile traffic as "Fix-It Priority Corridors" and focuses scarce resources on maintaining bridge and pavement conditions on these routes. Additionally, the Fix-it Priority Corridors include Seismic Lifeline Routes that have been identified as critical through risk analysis of a potential Cascadia Subduction Zone Earthquake.

## Investment Strategy Improvement Efforts

Past efforts to dedicate additional revenue to Oregon's state and local transportation systems have been successful in helping preserve and maintain the condition and performance of Oregon NHS Bridge and Pavement assets. These investment efforts have included, but are not limited to, the Oregon Transportation Investment Acts (OTIA I, II, III), the 2009 Jobs and Transportation Act (JTA), and the 2017 Keep Oregon Moving Act (HB2017), as well as federal funding secured through the 2015 Fixing America's Surface Transportation (FAST) Act.

In addition to securing needed funding for asset management activities, ODOT is continuously seeking ways to improve the process for identifying, developing, and selecting projects in the Statewide Transportation Improvement Program with the objective of optimizing the state's investment in its transportation system under a constrained revenue scenario. The TAMP identifies process improvements the agency is undertaking to improve how it invests in capital assets, including through its STIP program. These improvement efforts draw heavily on asset management strategies, including data-driven decision-making, gap analysis, lifecycle management, and risk management.