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Transportation Asset Management Plan - TAMP



October 2022

Outline

- Introduction to TAM
 - Asset Inventory and Conditions
 - Asset Performance Goals and Targets
 - Life Cycle Planning
 - Risk Management and Resilience
 - Financial Planning
 - Investment Strategies
 - Continuous Process Improvement
- 

Chapter 1&2

Introduction and TAM at DDOT

TAM Overview



TAM Principles and Objectives

This section describes the alignment between DDOT's TAM objectives, TAM principles, and the supporting activities DDOT is undertaking to achieve the objectives.



TAM Integration with Planning Processes

This section describes how DDOT's TAM/TAMP interacts with other DDOT planning documents.



DDOT's Strategic Approach

This section describes DDOT's vision, mission, and goals and how TAM processes support DDOT's strategic direction.



TAM/TAMP Governance

This section describes the governance processes, structures, and defined roles and responsibilities in place to implement TAM and develop and manage the TAMP. It also describes DDOT's coordination activities with external owners of the NHS.

TAMP Requirements

What is TAM?

“A strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on both engineering and economic analysis based upon quality information to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair (SOGR) over the lifecycle of the assets at minimum practicable cost.”



TAMP minimum requirements

- ✓ Listing of the pavement and bridge assets on the National Highway System in the State, including a description of the condition of those assets;
- ✓ Asset management objectives and measures;
- ✓ Performance gap identification;
- ✓ Lifecycle cost and risk management analysis;
- ✓ A financial plan; and
- ✓ Investment strategies.

This 2022 Transportation Asset Management Plan (TAMP) provides updates to the Transportation Asset Management Plan certified by the Federal Highway Administration (FHWA) in 2019. The TAMP is a ten-year strategic document that enables the District Department of Transportation (DDOT) to achieve asset management objectives while supporting agency-wide strategic goals.

Completed Enhancements in TAM

Organization and People

Agency Culture

- ✓ Created a TAM implementation team and a governance plan establishing specific roles and responsibilities to oversee the implementation of the TAM improvement activities.
- ✓ Improved coordination among key DDOT divisions critical to TAM.
- ✓ Created a TAM training plan focused on improving TAM skills and capabilities through consistent training.
- ✓ Created a TAM communication plan with supporting resources to improve communication and drive successful TAM culture across DDOT.

TAM Strategy and Planning, Asset Performance, Resource Allocation, and Monitoring and Adjustment

Business Processes

- ✓ Reviewed and revised performance targets.
- ✓ Integrated TAM process into DDOT's project selection process by including a criterion for TAM.
- ✓ Created treatment decision trees for pavement and bridge.
- ✓ Developed deterioration models to support bridge analysis.
- ✓ Developed pavement deterioration models for all classes of roads.
- ✓ Updating the TAM Strategic Plan to include new improvement actions.

Information and Systems

Data and Technology

- ✓ Conducted data discovery workshops to understand asset management data.
- ✓ Configured bridge management system with DDOT-specific models to improve analysis.
- ✓ Enhanced the analytical capabilities of the pavement management system.
- ✓ Used FHWA metrics to assess, report, and monitor pavement conditions.
- ✓ Created a strategic data business plan for pavement and bridge assets.
- ✓ Created a data governance structure to manage asset data effectively.

TAM Objectives



DDOT TAM Objectives

Modify culture and enhance capabilities to advance TAM across all divisions and levels of DDOT.



Enhance performance-based decision-making.



Incorporate risk and resilience into investment planning.



Minimize the inventory of pavement lane miles and bridges in poor condition.



Aligned TAM Principles

- Policy-driven
- Continuously improved

- Performance-based
- Transparent
- Information-driven/evidence-based

- Policy-driven
- Risk-based
- Option-oriented

- Performance-based
- Information-driven/evidence-based
- Agency priority alignment



DDOT Activities

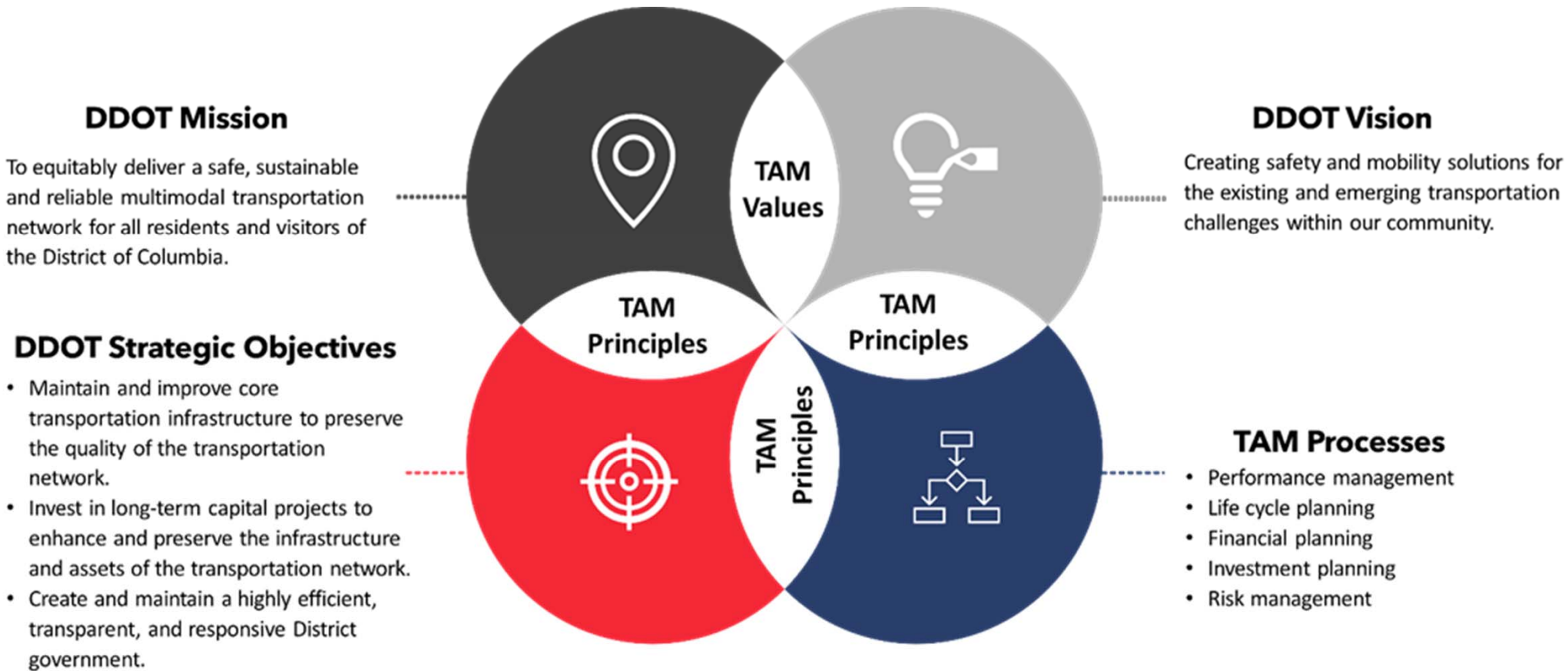
- Developing and implementing TAM communication plan.
- Developing and implementing TAM training plan.
- Conducting a periodic self-assessment of the Agency's capabilities.

- Developing and updating pavement and bridge models.
- Enhancing management systems analytical capabilities.
- Updating asset inventory and forecasting asset performance.

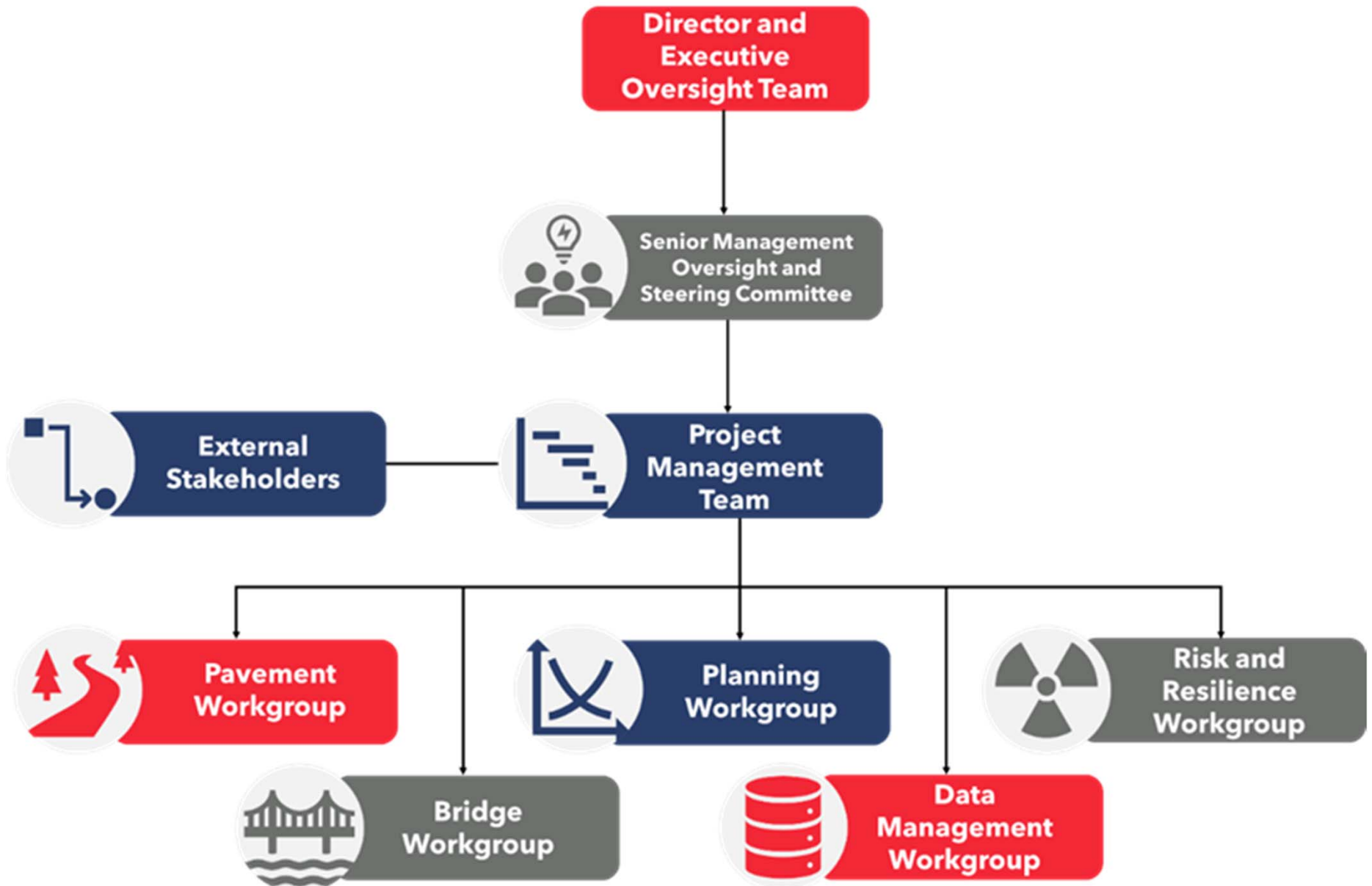
- Considering risk in resource allocation, prioritization, and project delivery.
- Considering asset criticality in prioritizing investments.

- Providing the long-term outlook of funding to eliminate assets in poor condition.
- Connecting TAM measures with DDOT strategic goals.

DDOT Strategic Framework and TAM



TAMP Governance



Chapter 3

Asset Inventory and Conditions

Asset Inventory and Conditions



Pavement Assets

This section describes pavement assets owned by DDOT and other stakeholders on the network and shows historical condition trends.



Other Assets

This section describes other assets on the network included in the TAMP and shows historical condition trends. It also describes current efforts to include other assets beyond pavement and bridges in the TAMP.



Bridge Assets

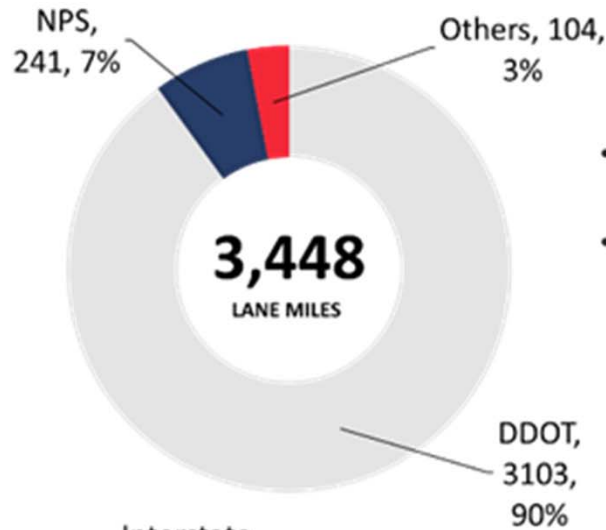
This section describes bridge assets owned by DDOT and other stakeholders on the network and shows historical condition trends.



Demand for Transportation Infrastructure

This section describes the demand for transportation in the District, the impact on asset funding, risk, performance, etc., and how DDOT will use the TAMP to address the demand.

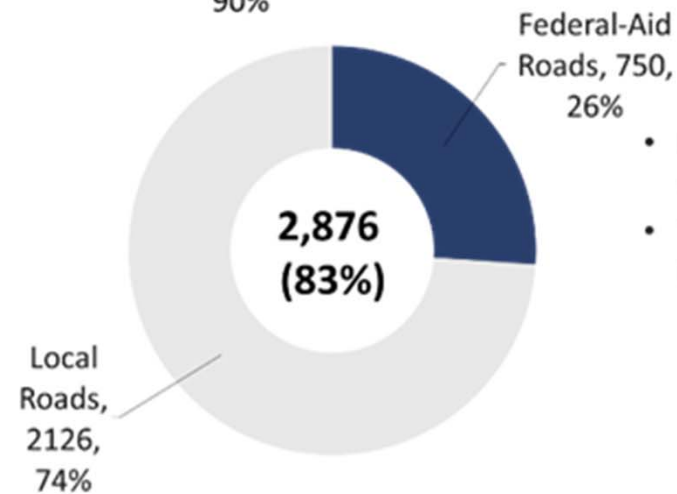
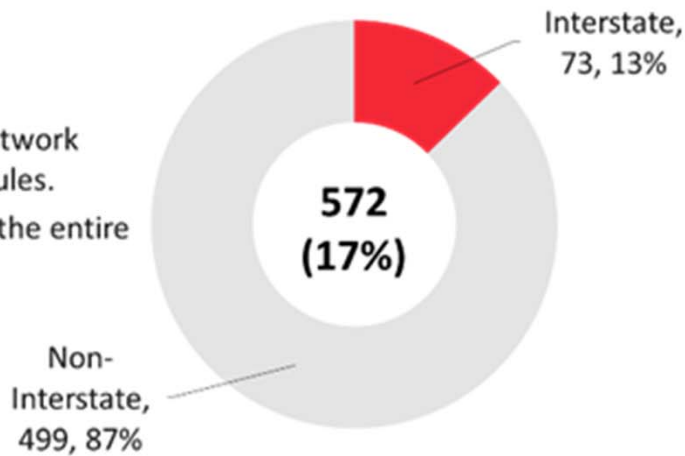
Pavement Inventory



Entire Pavement System

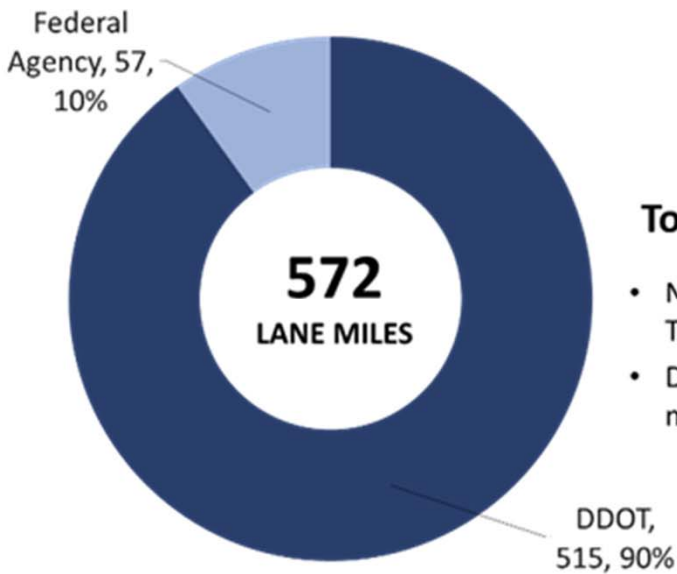
- DDOT is responsible for the majority of pavement on the network.
- Additional asset owners include NPS and others (i.e., federal and local agencies including AOC, WMATA, and Military Reservations).

- ### NHS
- Portion of the network subject to TAM rules.
 - DDOT maintains the entire Interstate NHS.



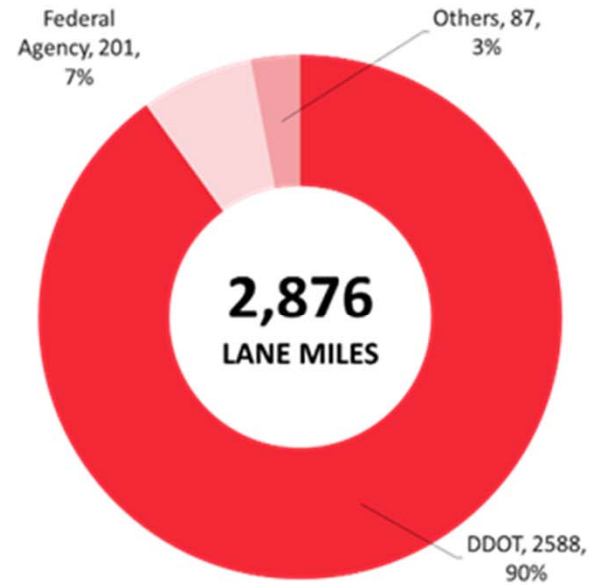
- ### Non-NHS
- Part of the network not subject to TAM rules.
 - Thirty percent eligible for Federal-aid.

Pavement Maintenance Responsibilities



Total NHS

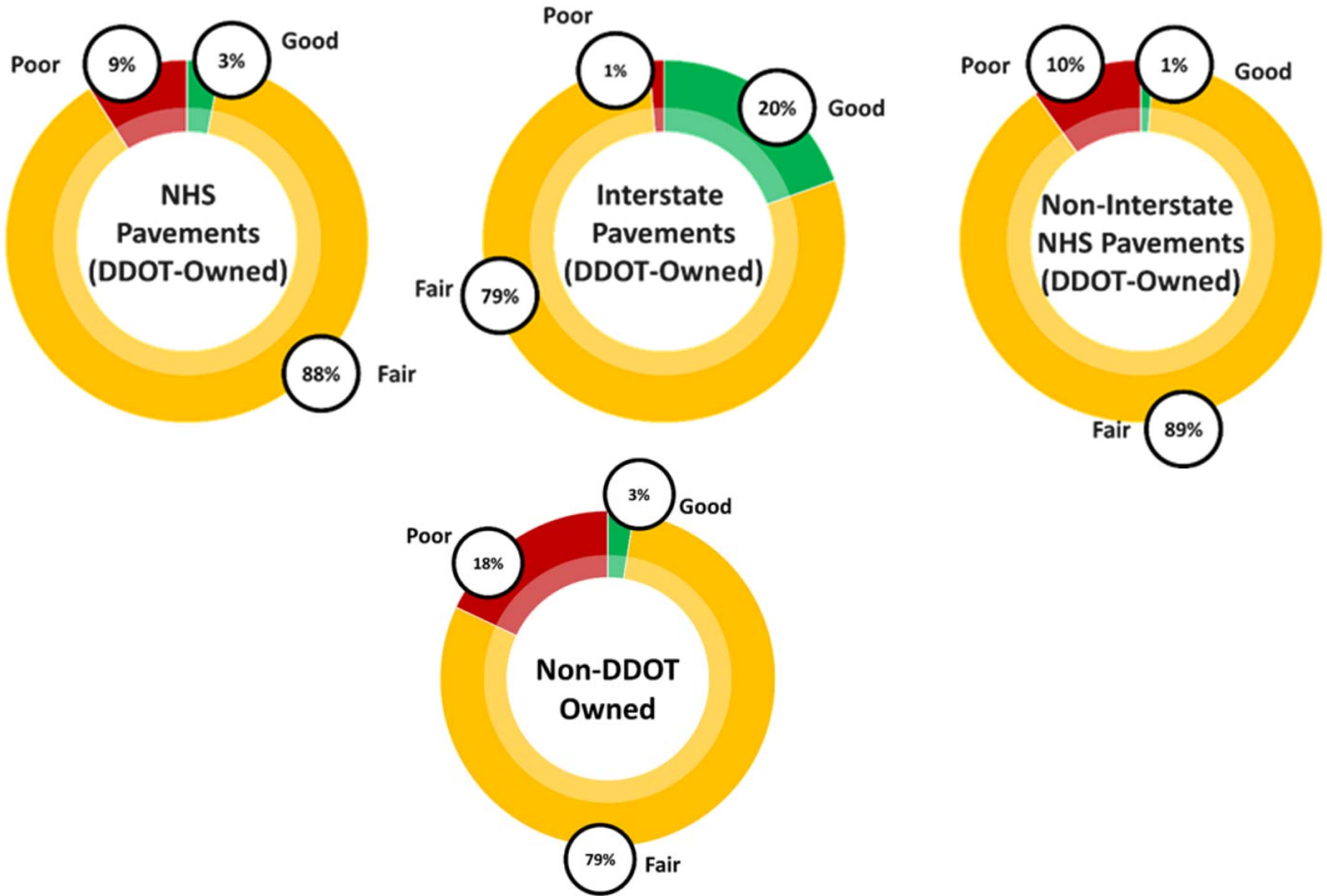
- Network subject to the TAM rules.
- DDOT maintains majority of the NHS.



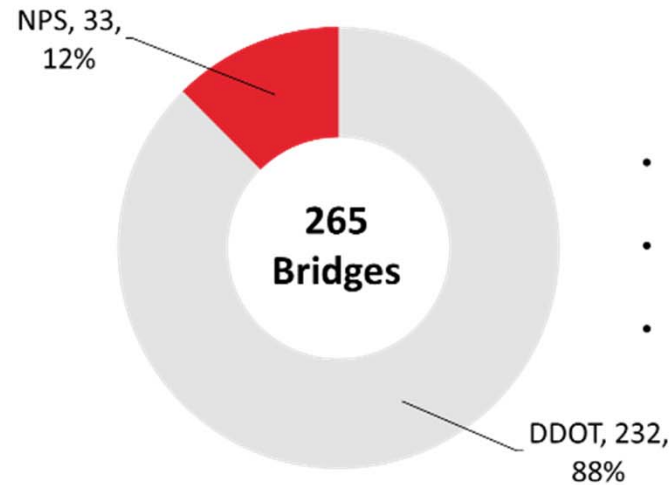
Total Non-NHS

- Network not subject to the TAM rules.
- Portion of the network is eligible for Federal funding.

DDOT Pavement Condition

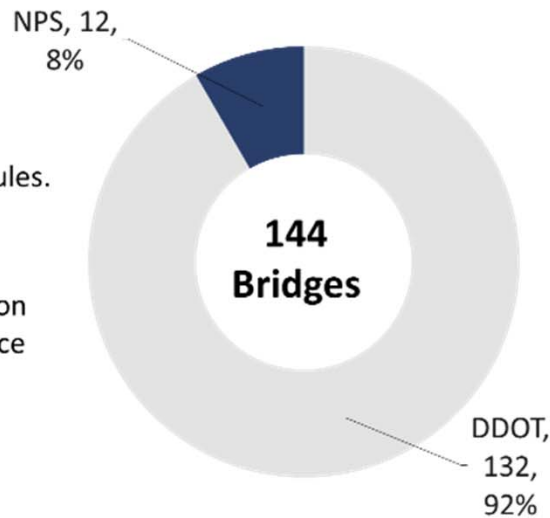


Bridge Inventory



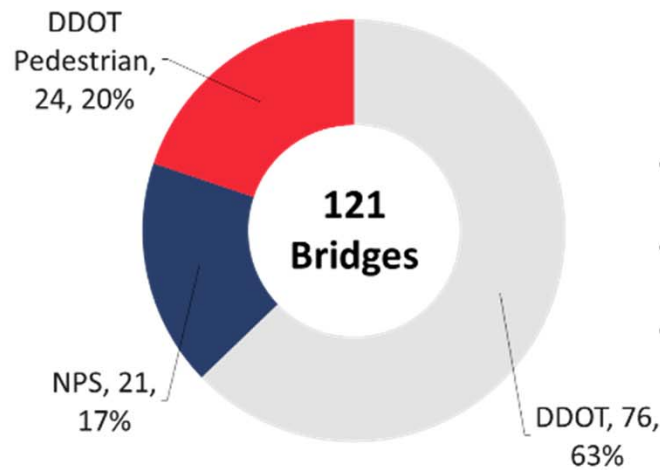
Entire Bridge System

- Total bridge deck area is 6.3 million square feet.
- DDOT maintains 5.9 million square feet.
- NPS maintains 500K square feet of deck surface area.



NHS Bridges

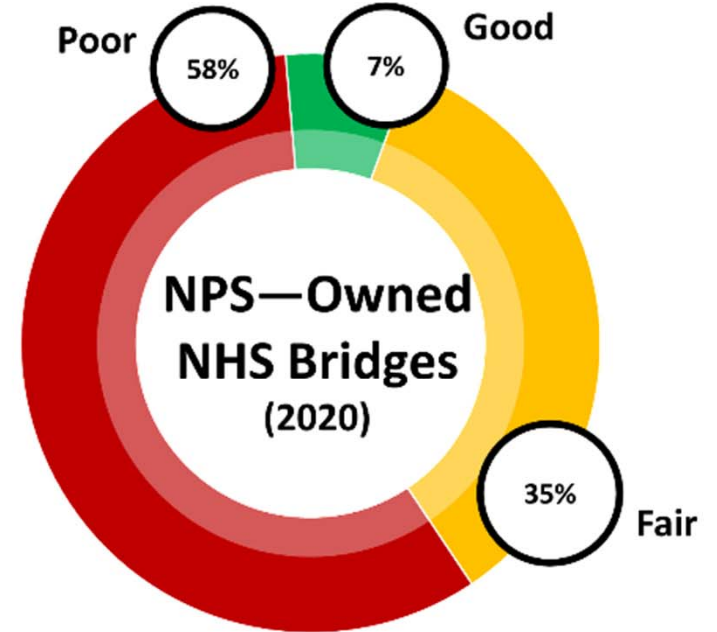
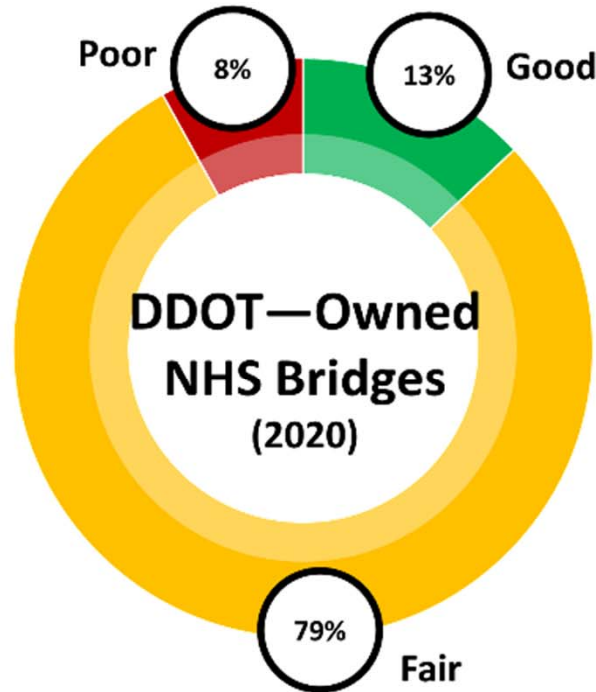
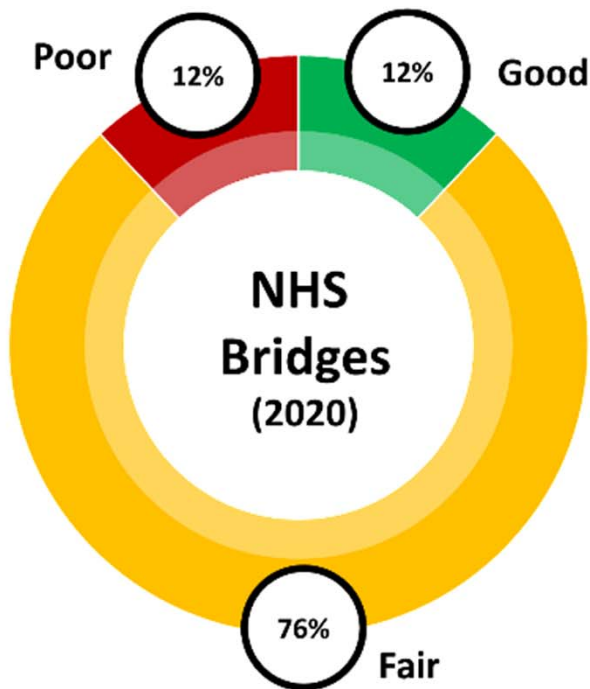
- Bridges subject to TAM rules.
- Deck area of 4.9 million square feet.
- DDOT maintains 4.5 million square feet of deck surface area.



Non-NHS Bridges

- Bridges not subject to TAM rules.
- Includes 24 pedestrian bridges.
- Deck area of 1.4 million square feet.

Bridge Condition



Bridge data collected in 2020 and reported to FHWA in 2021

Alley and Sidewalk Condition



Chapter 4

Asset Performance Goals and Targets

DDOT Performance Overview



Pavement

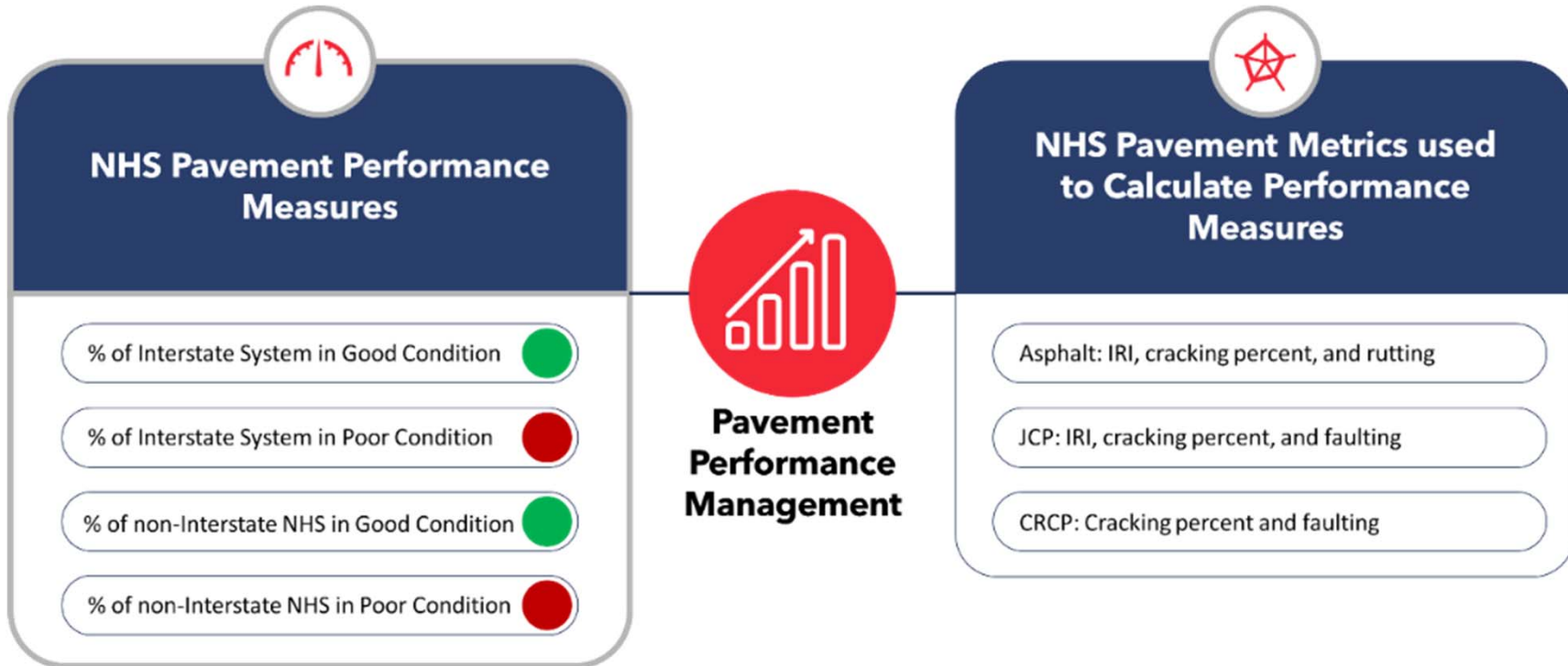
This section describes DDOT pavement performance measures, defines SOGR and targets for pavements, and evaluates performance gaps.



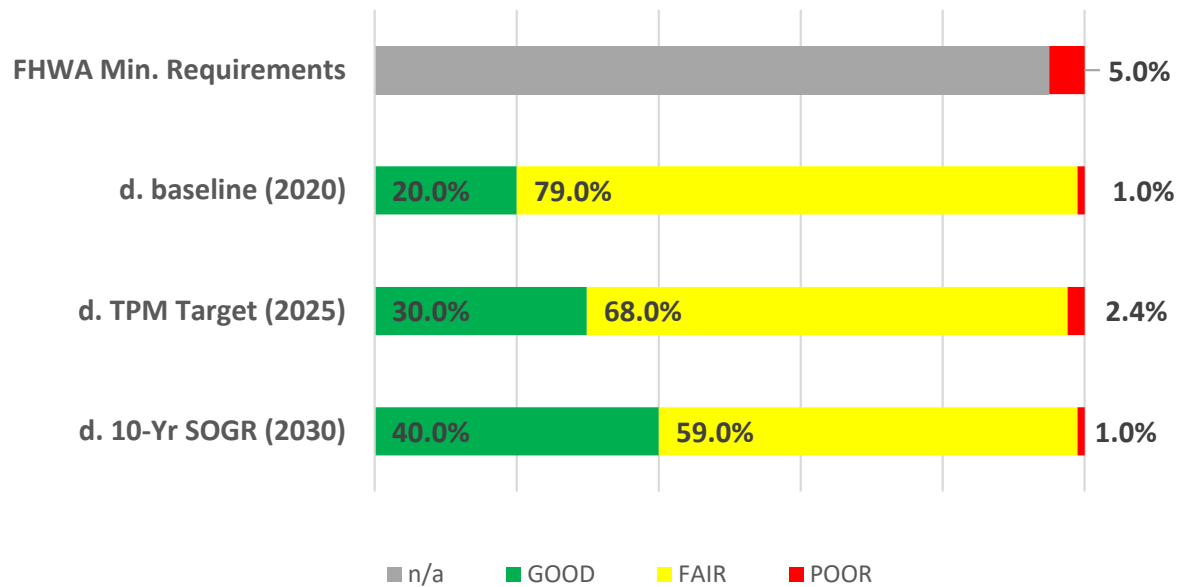
Bridge

This section describes DDOT bridge performance measures, defines SOGR and targets for bridges, and evaluates performance gaps.

Pavement Performance Management



Interstate NHS Targets and SOGR Goals



Interstate NHS Pavements

2020 Condition

% Good = 20%

% Poor = 1%

2025 Target

% Good \geq 30%

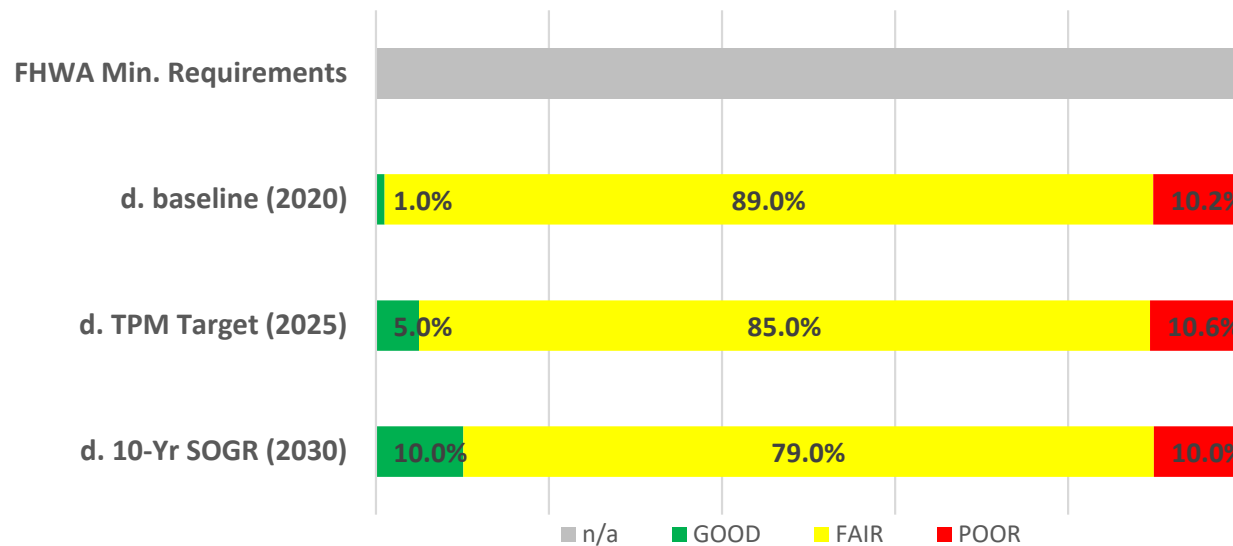
% Poor \leq 2.4%

10-Year SOGR

% Good \geq 39.5%

% Poor \leq 1%

Non-Interstate NHS Targets and SOGR Goals



Non-Interstate NHS Pavements

2020 Condition

% Good = 1%

% Poor = 10%

2025 Target

% Good \geq 5%

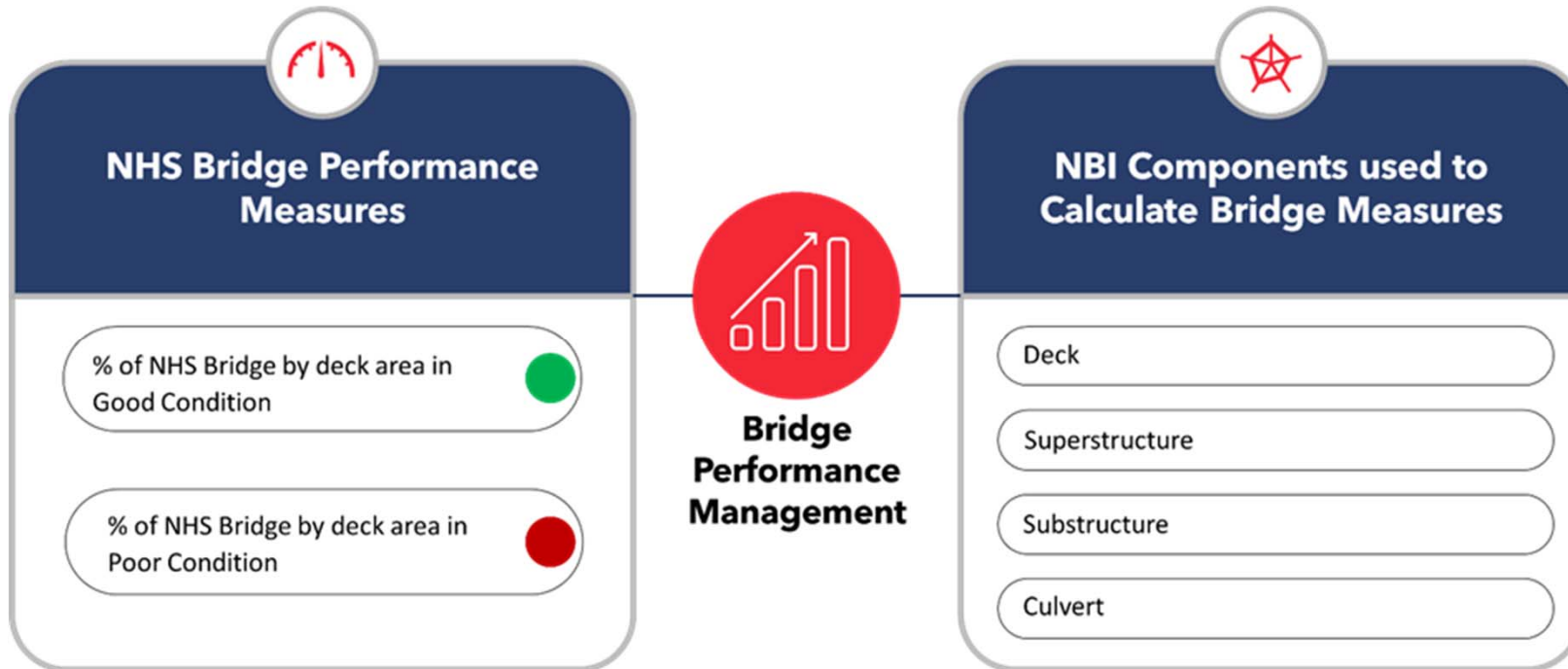
% Poor \leq 10%

10-Year SOGR

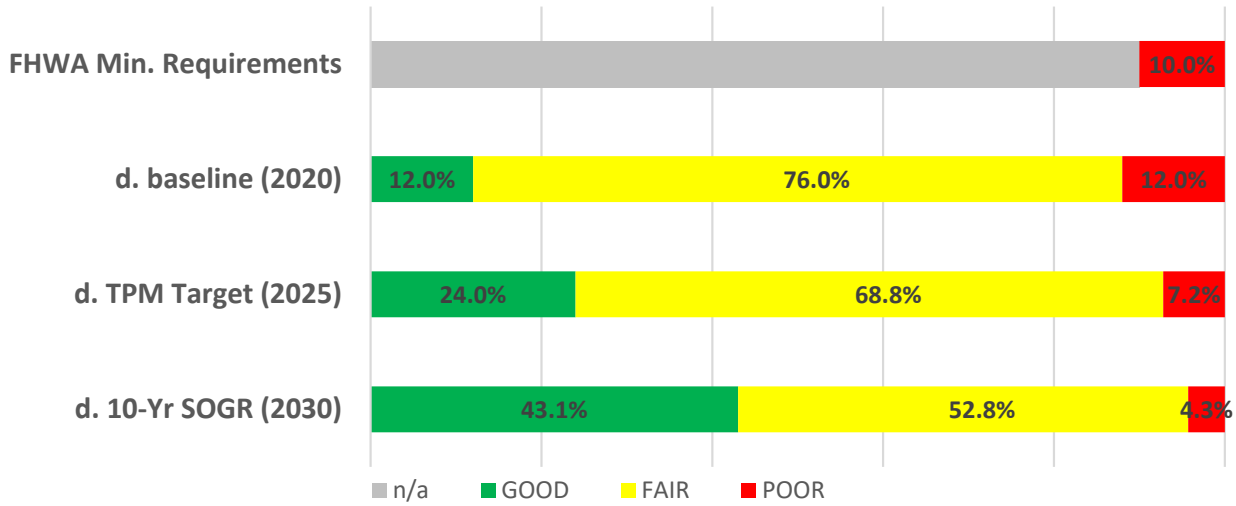
% Good \geq 9.5%

% Poor \leq 10.6%

Bridge Performance Management



NHS Bridges Targets and SOGR Goals



2020 Condition

% Good = 12%

% Poor = 12%

2025 Target

% Good \geq 24%

% Poor \leq 7.2%

10-Year SOGR

% Good \geq 43.1%

% Poor \leq 4.3%

Chapter 5

Life Cycle Planning

DDOT LCP Overview



Life Cycle Processes

This section describes the life cycle planning process and how DDOT utilizes life cycle planning to minimize cost while maximizing performance.



Bridge

This section describes the approach DDOT uses to conduct LCP for its bridge network, including the data, tools and modeling techniques, and work information used to support these analyses.



Pavement

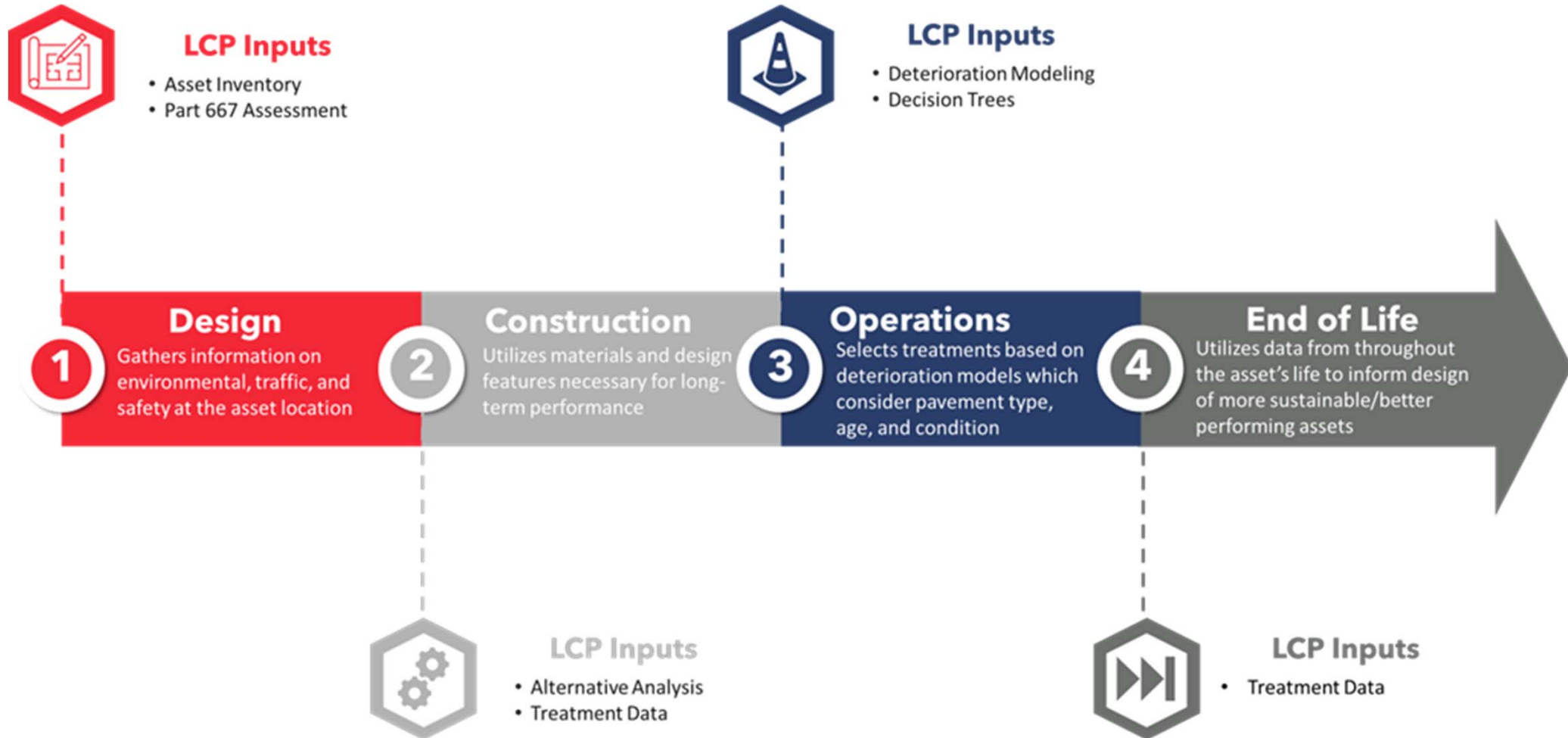
This section describes the approach DDOT uses to conduct LCP for its pavement network, including the data, tools and modeling techniques, and work information used to support these analyses.



LCP Scenario Results

This section summarizes the results of LCP scenarios ran for DDOT's pavement and bridge networks. For each scenario, the cost of the scenario and the resulting network performance is reported.

DDOT Implementation of LCP throughout Asset Life



LCP Inputs



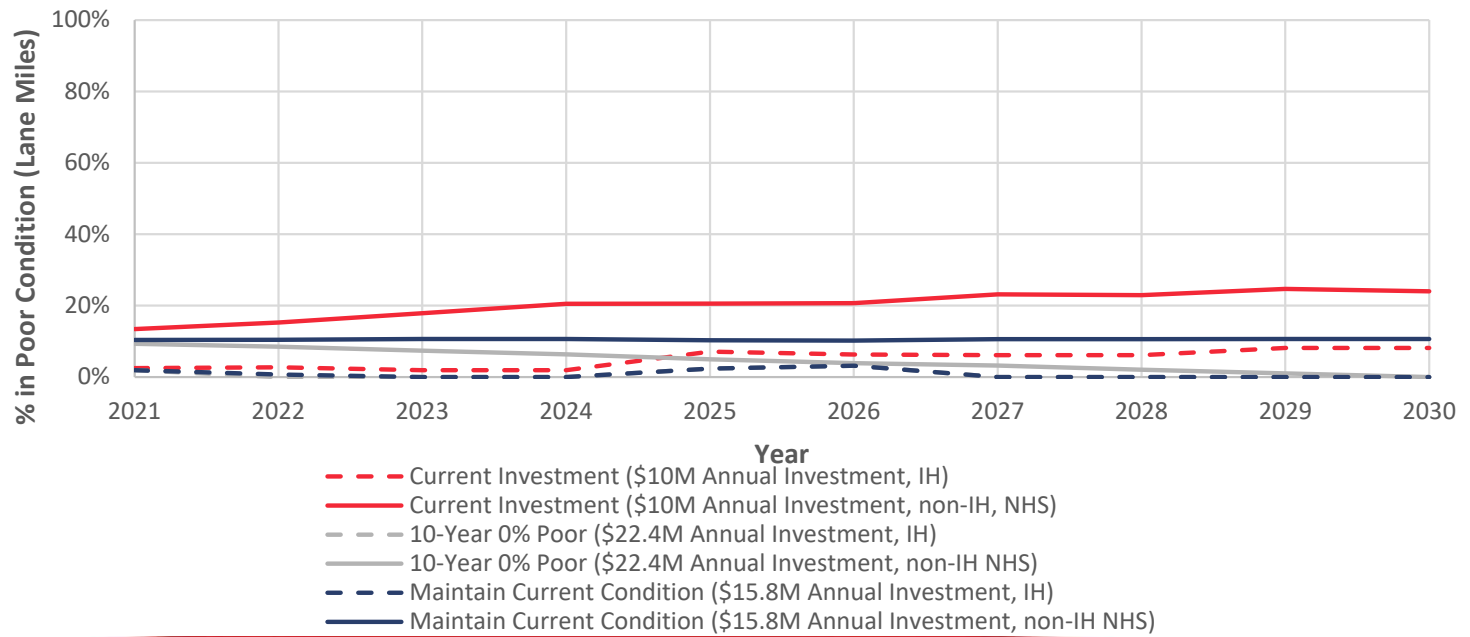
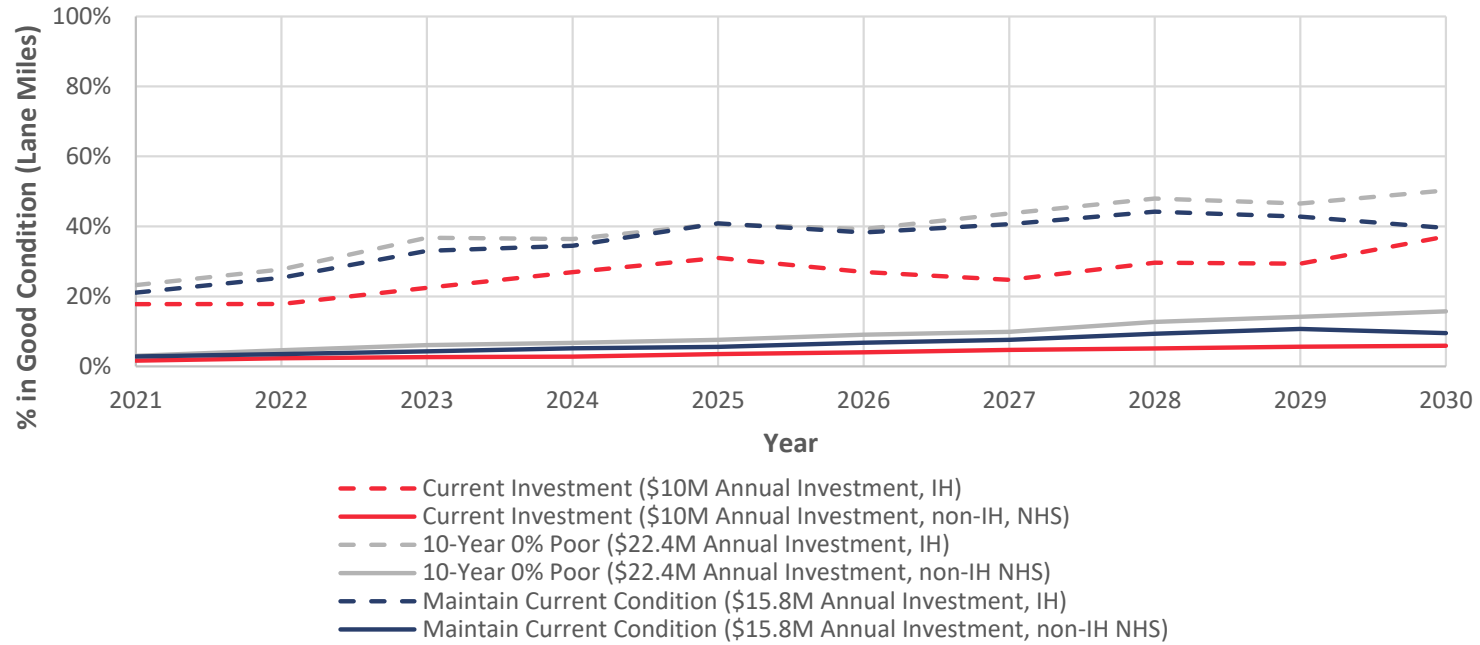
LCP Scenarios



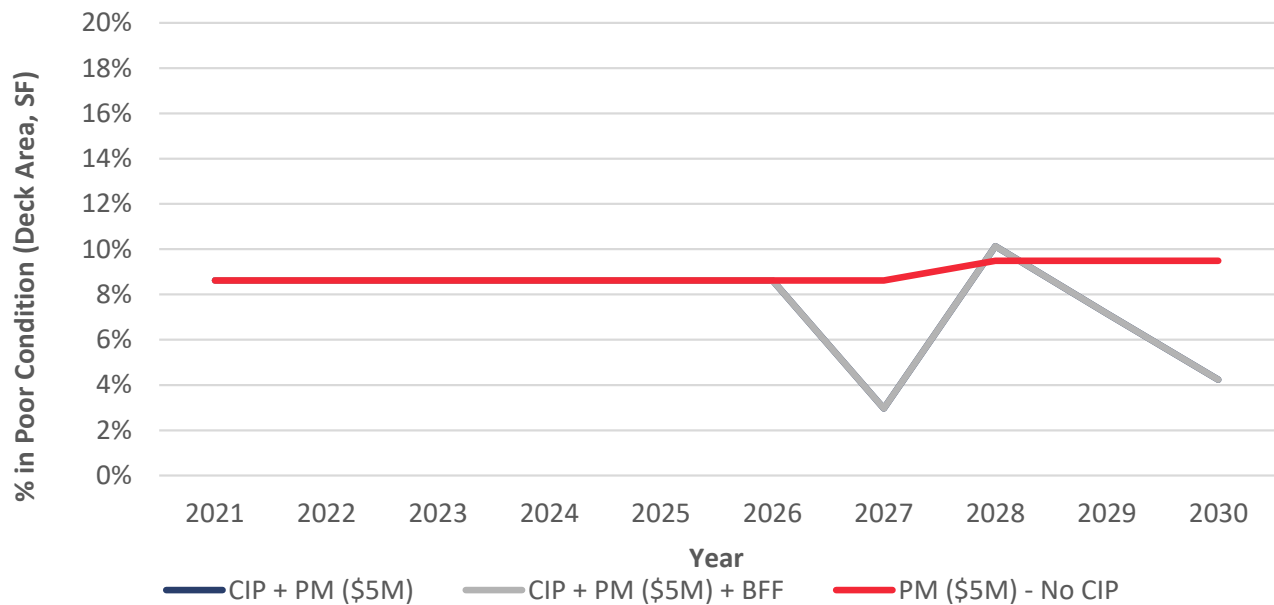
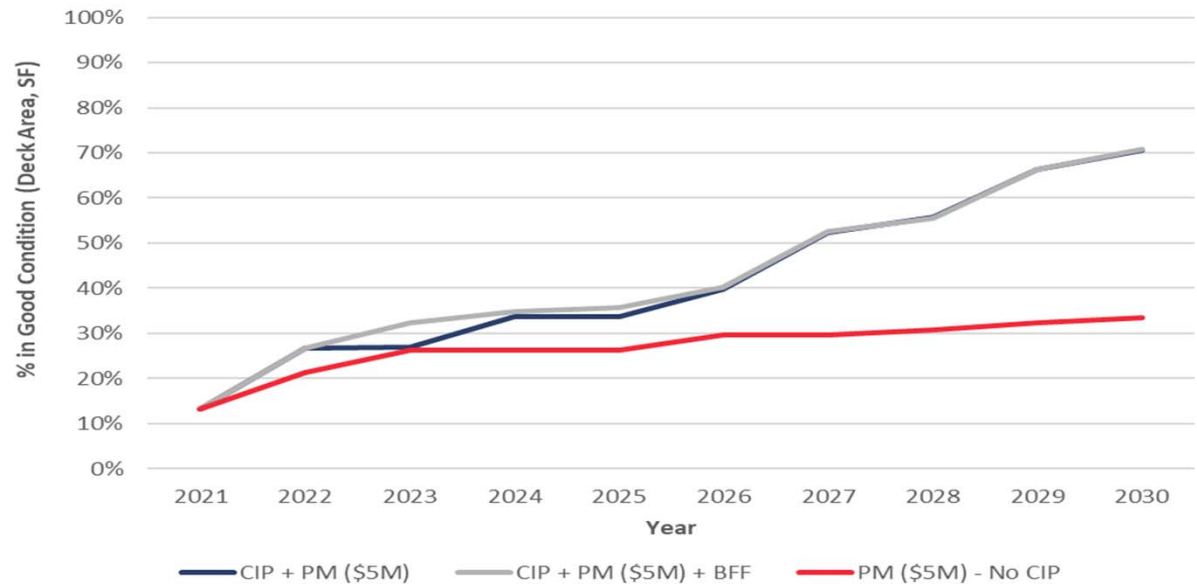
LCP Scenario	Description	Constraint Type
Maintain Current Conditions	Assesses the level of investment necessary for DDOT to maintain the asset network at current conditions over the analysis period.	Performance
Achieve Specified Condition	Determines the level of investment necessary for DDOT to meet a desired performance set for the asset (i.e., 0% Poor).	Performance
Specified Investment Level	Evaluates the network performance given a specified budget for each asset class.	Financial



LCP Outcome – NHS Pavement



LCP Outcome – NHS Bridge



Chapter 6

Risk Management Analysis

DDOT Risk Management Overview



Risk Basics

This section defines the fundamentals of risk management including key definitions, frameworks, processes, and integration with other processes.



Identified Risks

This section describes the risk register and highlights the top five identified risks of DDOT.



Risk Mitigation

This section provides a tactical plan for DDOT to address its high-priority risks.



Emergency Evaluation and Alternative Analysis

This section discusses the Part 667 process and results.



Resiliency within DDOT

This section discusses how the Agency addresses resiliency within asset management.

Risk Management Levels

Risk

“The positive or negative effects of uncertainty or variability upon agency objectives.”

Agency-Level Risks

Program-Level Risks

Project-Level Risks

Type: The form of risk and extent of impact.

Multifunctional risks that impact the achievement of agency goals and objectives.

Impact program goals and are common to clusters of projects, programs, or entire business units.

Impact individual projects.

Responsibility: Group of people with the authority to deal with the risk effectively.

Agency Executives

Program Managers

Project Managers

Strategies: Examples of strategies used to address risk.

Risk is managed in a comprehensive manner for the success of the organization rather than a single unit or project.

Risk is managed by establishing program contingency funds and allocating resources to projects consistently to optimize the outcomes of programs.

Risk is managed using advanced analysis techniques, contingency planning, and consistent risk mitigation strategies specific to individual projects.

Risk Management Process



1 Risk Identification

- Identify key risks
- Categorize risks into key risk groups
- Get consensus on risks to consider using workshop/online survey
- Create initial risk list

2 Risk Analysis

- Conduct online survey to estimate likelihood and consequences of risks
- Conduct workshop to build consensus

3 Risk Evaluation

- Develop risk scores based on survey results
- Develop risk register
- Prioritize risks

4 Risk Mitigation & Monitoring

- Conduct impact assessment
- Determine risk owners
- Continually review

DDOT's Top-five TAM Risk Events

Risk Score	Risk Event	Potential Impact
20	Inability to procure qualified contractors in a reasonable amount of time and at a reasonable cost to support program delivery.	<ul style="list-style-type: none"> ❖ Delays in project delivery. ❖ Unmet program and performance goals. ❖ Increased customer complaints. ❖ Negative impacts on the Department's reputation.
19	Local funding appropriation is impacted by diverse government policies and restrictions.	<ul style="list-style-type: none"> ❖ Unmet department and program goals and performance targets. ❖ Unfunded local projects. ❖ Increased customer complaints.
18	Loss of performance or damage to assets due to the failure of utilities assets or buried pipes.	<ul style="list-style-type: none"> ❖ Premature failure of transportation assets. ❖ Extended roadway closures. ❖ Increased cost due to emergency repairs. ❖ Delayed projects due to the diversion of funds for emergency repairs. ❖ Increased safety and mobility concerns.
18	Use of poor-quality materials and workmanship	<ul style="list-style-type: none"> ❖ Increased construction defects. ❖ A decreased expected service life of assets. ❖ Increased deterioration rate. ❖ Increased cost due to premature failure.
18	Program delivery impacted by multimodal or corridor-related projects.	<ul style="list-style-type: none"> ❖ Delayed projects due to the lack of funding. ❖ Unmet performance targets and goals. ❖ Inefficient use of limited resources.

Risk Mitigation Strategy

Risk Tolerance

"The type and amount of risk, on a broad level, that the agency is willing to accept in pursuit of program objectives."

Terminate

Involves the complete elimination of the risk

Tolerate

No action is taken to mitigate the risks. Continuous monitoring is required

Treat

Involves the reduction of risk likelihood or consequence to minimize risk impact

Transfer

Assigning the risk responsibility to a third party outside of DDOT

Risk 1: Inability to procure qualified contractors in a reasonable amount of time and at a reasonable cost to support program delivery.

Description

The inability to quickly and cost effectively procure qualified contractors to deliver program projects. This may be related to labor shortages, lack of staff, or lack of funding to procure the services of the contractors, among others.

Risk Owners

Office of Contracting and Procurement (OCP)

Mitigation Response

Treat: Management Required

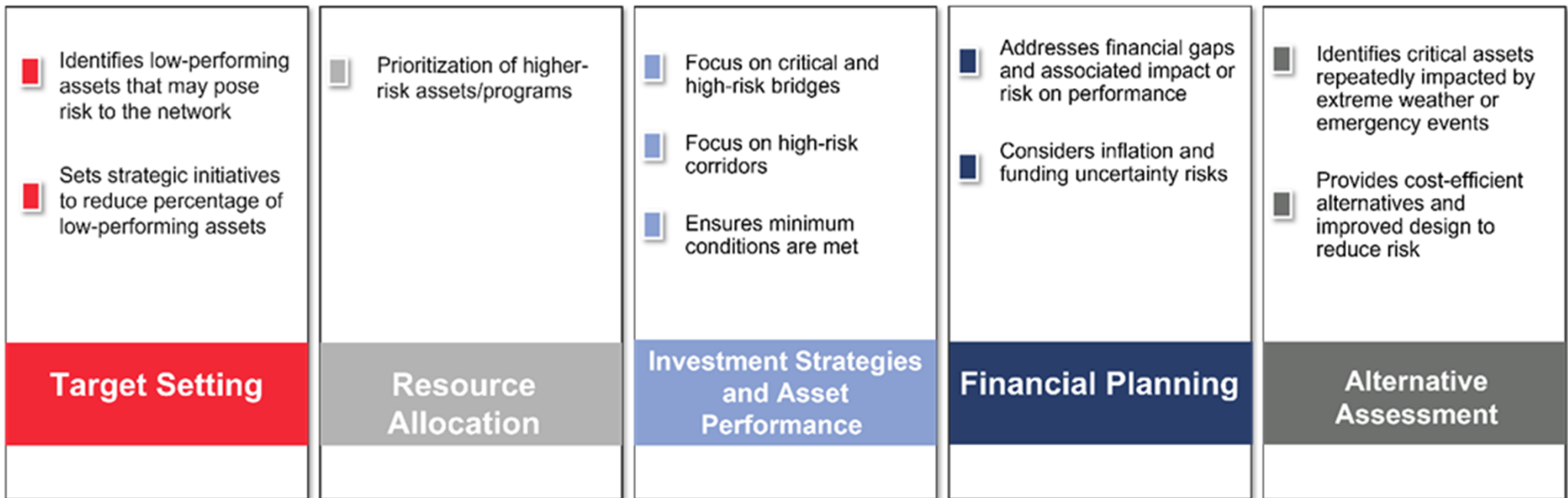
Tactical Activities

- Communicate the impact of project delays on program goals.
- Review existing standard operating procedures and procurement timelines.
- Optimize contracting methods for early completion.

Supporting Tasks

- Involve executive leadership in TAMP development process so stakeholders are aware of the risk impacts.
- Enhance existing project delivery procedures and identify and implement actions to improve process (such as the implementation of tools to improve efficiency).
- Identify or use non-traditional contracts that expedite project delivery.

DDOT Risk Management within TAMP



Resilience Planning

Extreme weather events which pose the greatest threat to the District's transportation network:

- Rainfall and flooding
- Sea-level rise and storm surge
- Snow and ice storms
- Heatwaves
- Derecho



Resilience Actions

DDOT Actions to Improve System Resilience:

- Climate Change Adaptation Plan
- Flood Emergency Response Plan
- Green Infrastructure and Stormwater Management
- Minimizing Flood Impacts
 - Drainage improvements
 - Major reconstruction road contouring
 - Minimizing carbon footprint

Integration of extreme weather and resilience in lifecycle cost and risk management

DDOT considers extreme weather and resilience as part of lifecycle cost and risk management by adopting a wide variety of strategies across the main stages of asset life cycle management (plan, acquire, use, and maintain).

Integration strategies include:

- Considering extreme weather events in asset planning and design stages.
- Evaluating design standards to accommodate future events.
- Defining project's targets for resilience in project planning and development process.
- Assessing and improving flood zone data and flood maps.
- Improving erosion control systems.
- Stabilizing stream banks.
- Evaluating vertical clearance for bridges on waterways.
- Evaluating bridge scouring risks.
- Improving pumping capacity of drainage systems in tunnels.
- Gathering asset data and assessing conditions frequently.

Chapter 7

Financial Planning

Financial Planning Overview



Revenue Sources and Uses

This section describes DDOT funding sources (federal, local, and external sources), historical expenditure, projected revenue, and use of funds in all investment or program types.



Estimated Cost

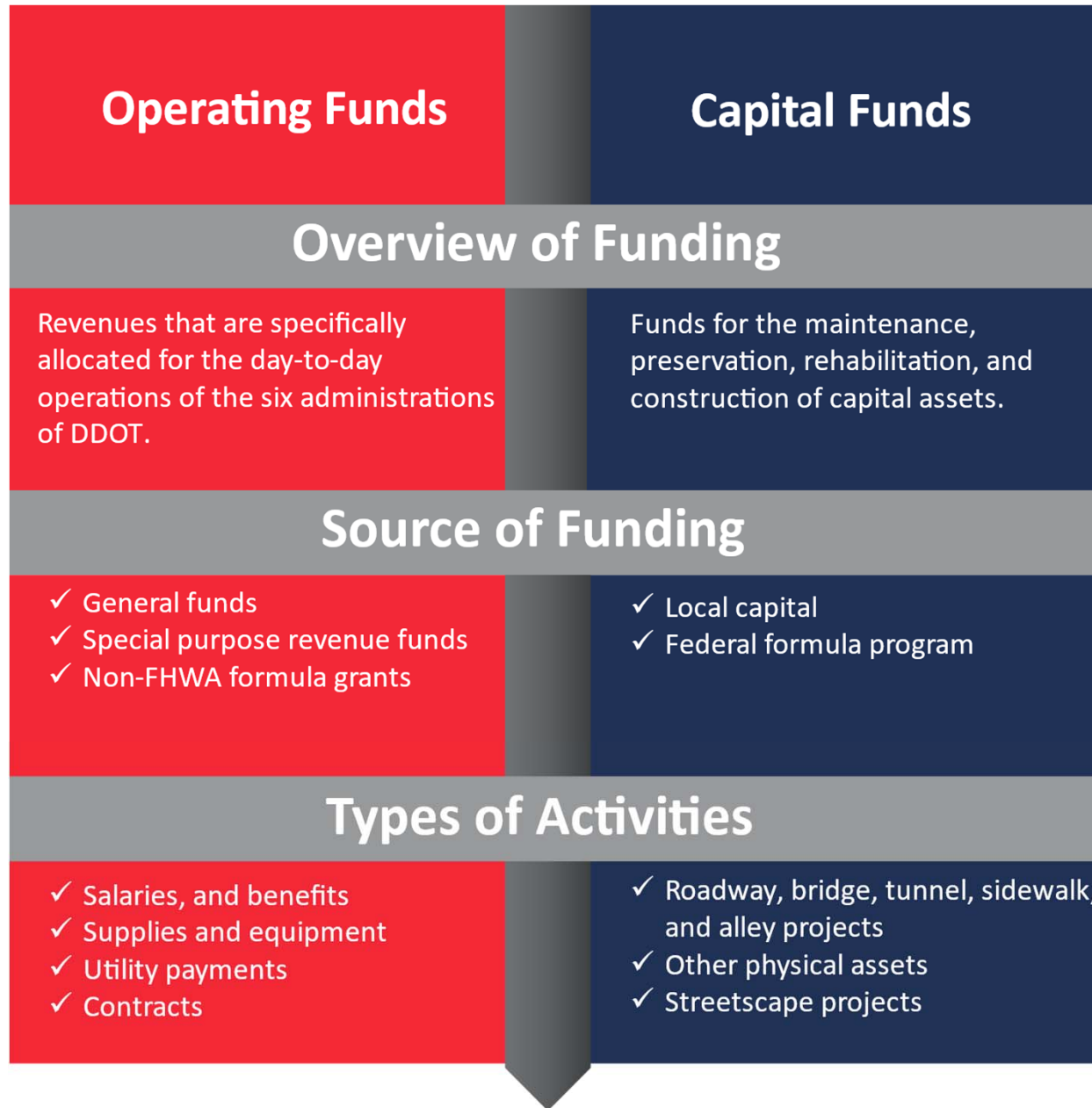
This section describes the estimated cost to achieve different asset management goals, such as maintaining current conditions, achieving targets, and achieving a SOGR.



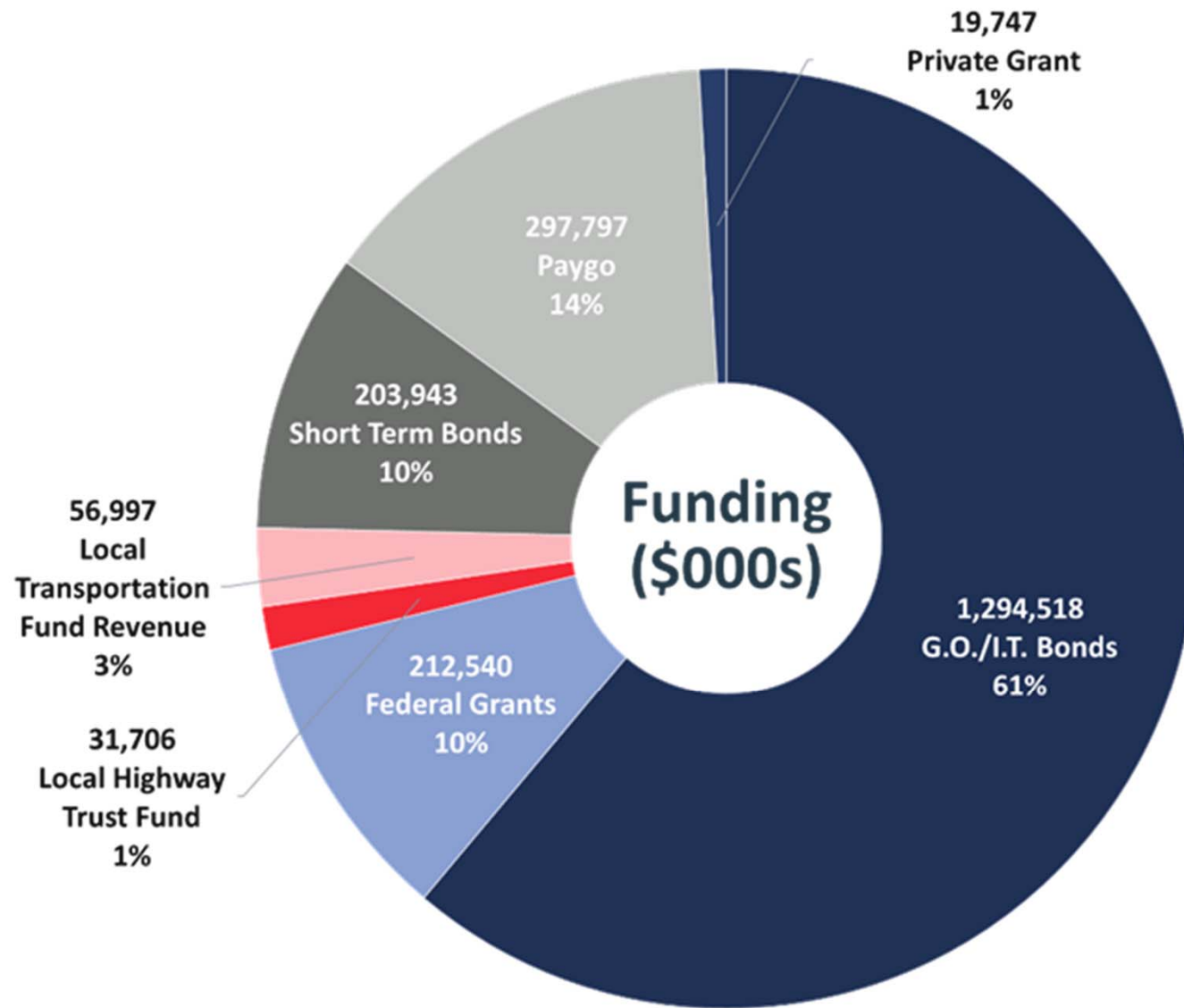
Asset Valuation

This section describes DDOT's asset valuation processes, results, and how DDOT uses asset value in making investment decisions.

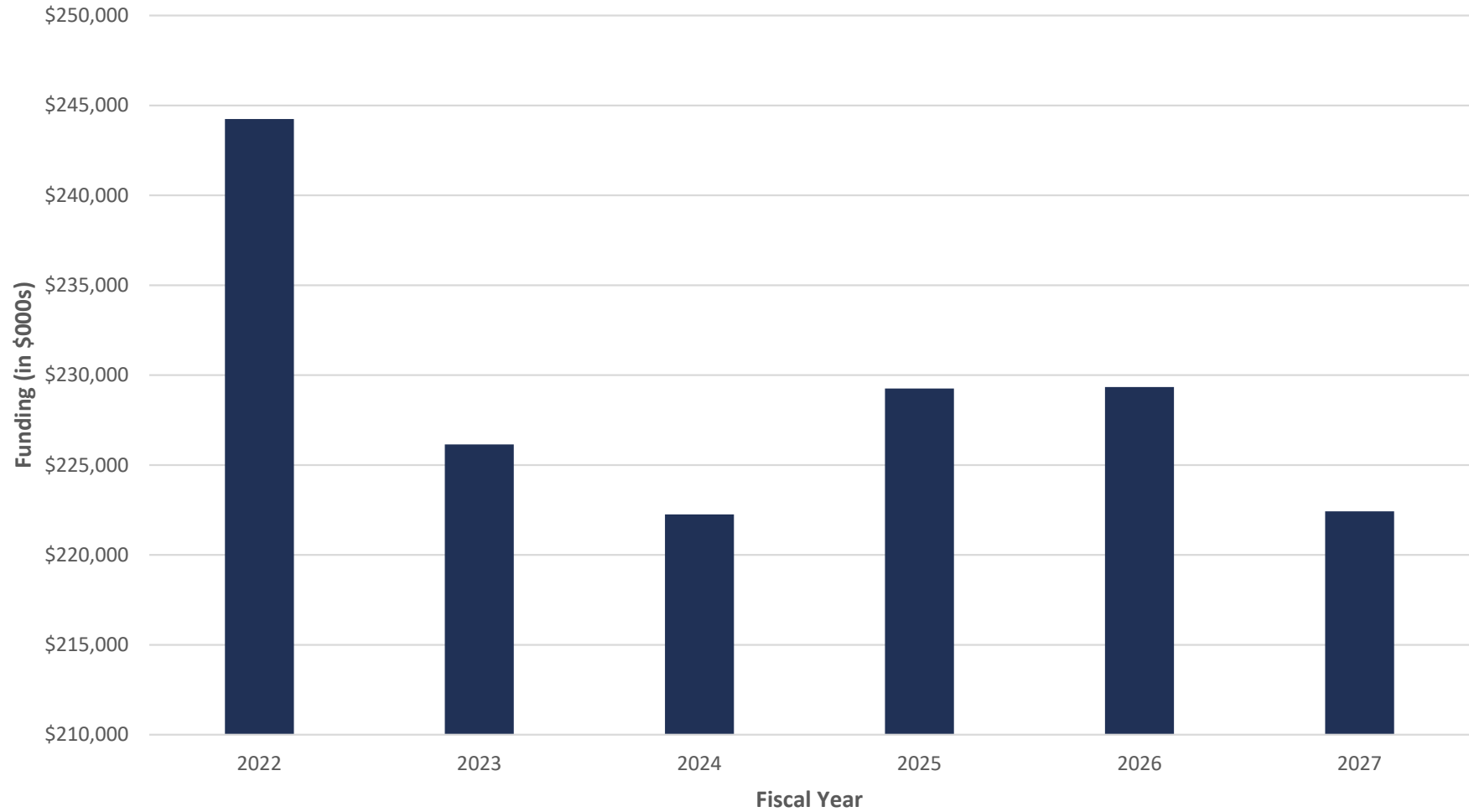
Revenue Sources and Uses



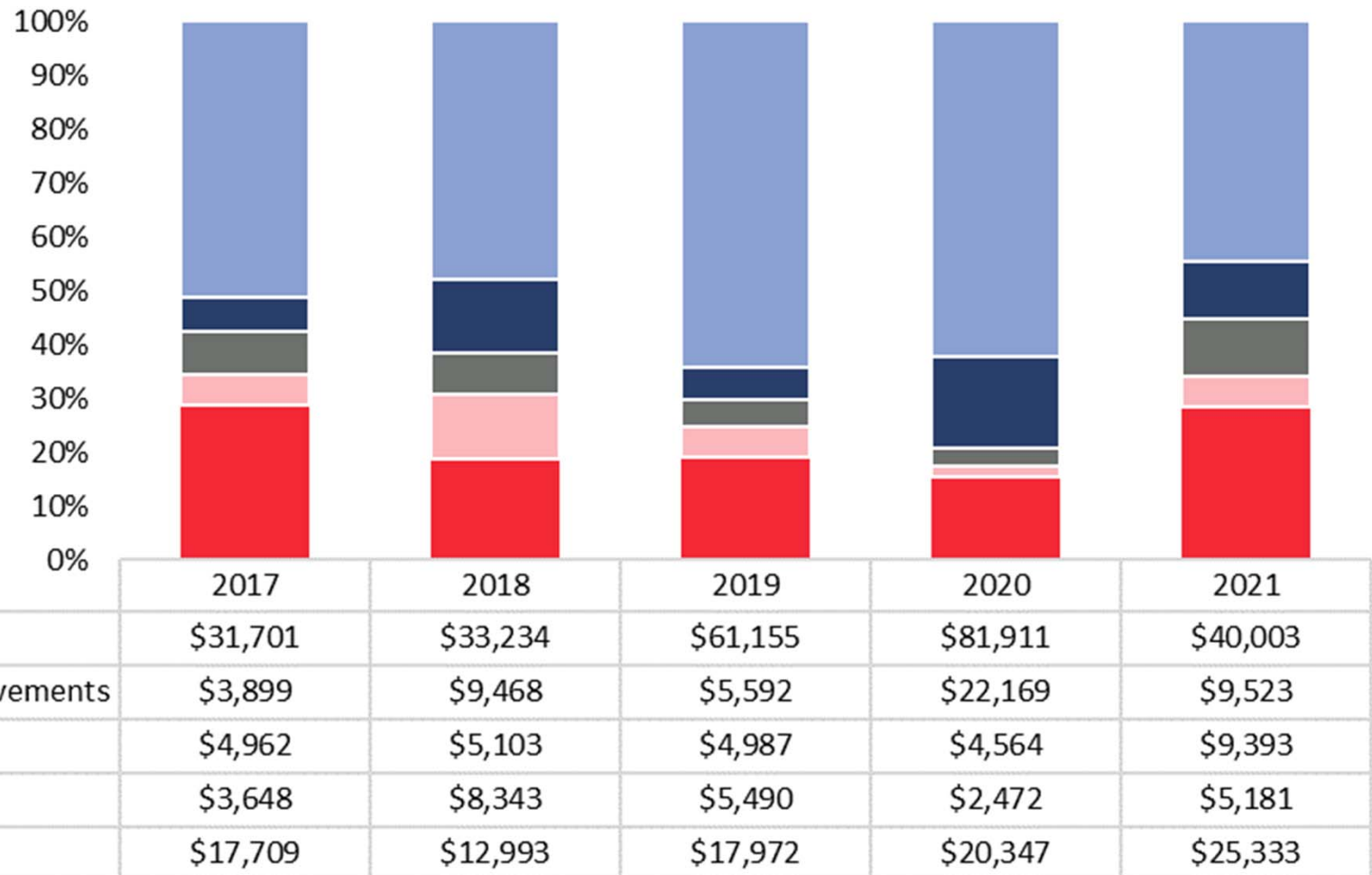
DDOT 2022 Capital Budget and Sources



DDOT Budgeted Capital Funds

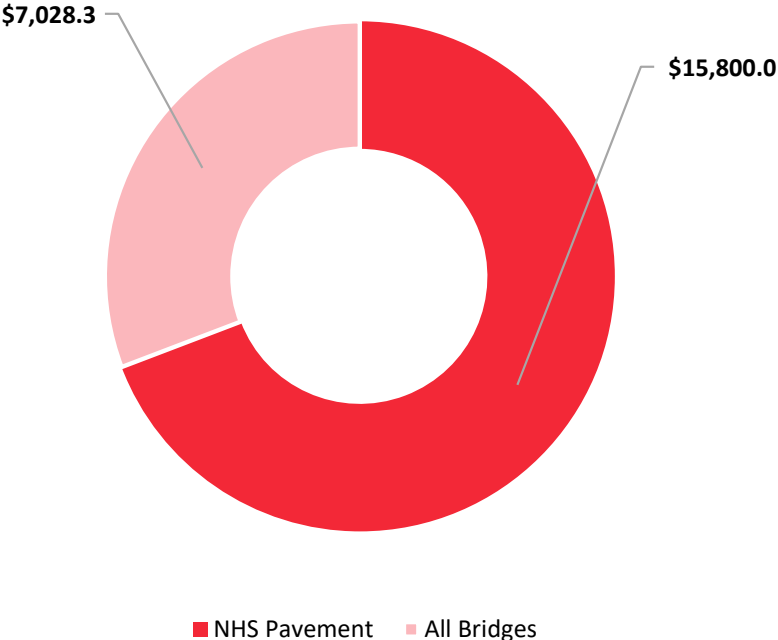


DDOT Five-Year Historical Investment

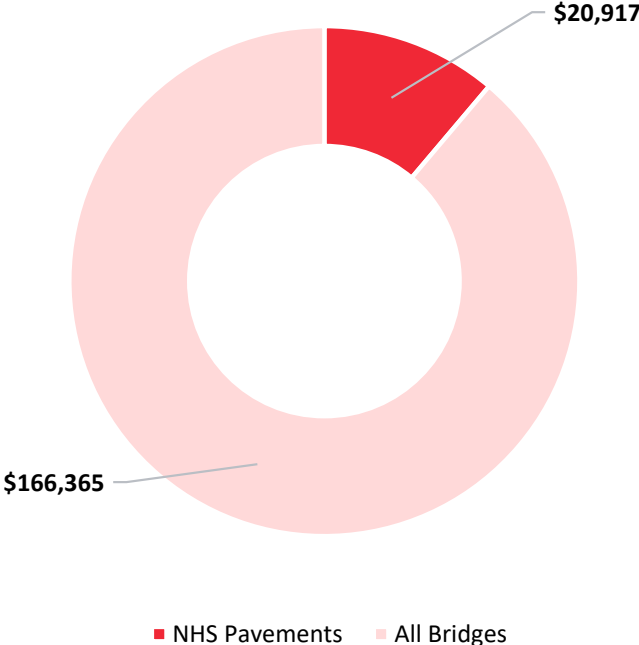


Forecasted Annual Budget - Preservation and CIP

Forecasted Average Annual Preservation Budget



Forecasted Average Annual CIP Budget



DDOT Annual Financial Needs - Pavements



TEN-YEAR PRESERVATION AND MAINTENANCE COST

\$10 M



TEN-YEAR MINOR REHABILITATION

\$148 M



AVERAGE ANNUAL COST

\$15.8 M



COSTS AND REVENUES: TO MAINTAIN CURRENT CONDITIONS



*Actual numbers



TAM GOALS

Poor ≤ 2.4%

IH Pavement
2025 Target

Good ≥ 30%

IH Pavement
2025 Target

Poor ≤ 10%

Non-IH, NHS
Pavement 2025
Target

Good ≥ 5%

Non-IH, NHS
Pavement 2025
Target

Poor ≤ 1%

IH Pavement
SOGR Target

Good ≥ 39.5%

IH Pavement
SOGR Target

Poor ≤ 10.6%

Non-IH, NHS
Pavement SOGR
Goal

Good ≥ 9.5%

Non-IH, NHS
Pavement SOGR
Goal

DDOT Annual Financial Needs - Bridges



TEN-YEAR PRESERVATION AND MAINTENANCE COST

\$62 M



TEN-YEAR REHABILITATION AND RECONSTRUCTION

\$1.5 B

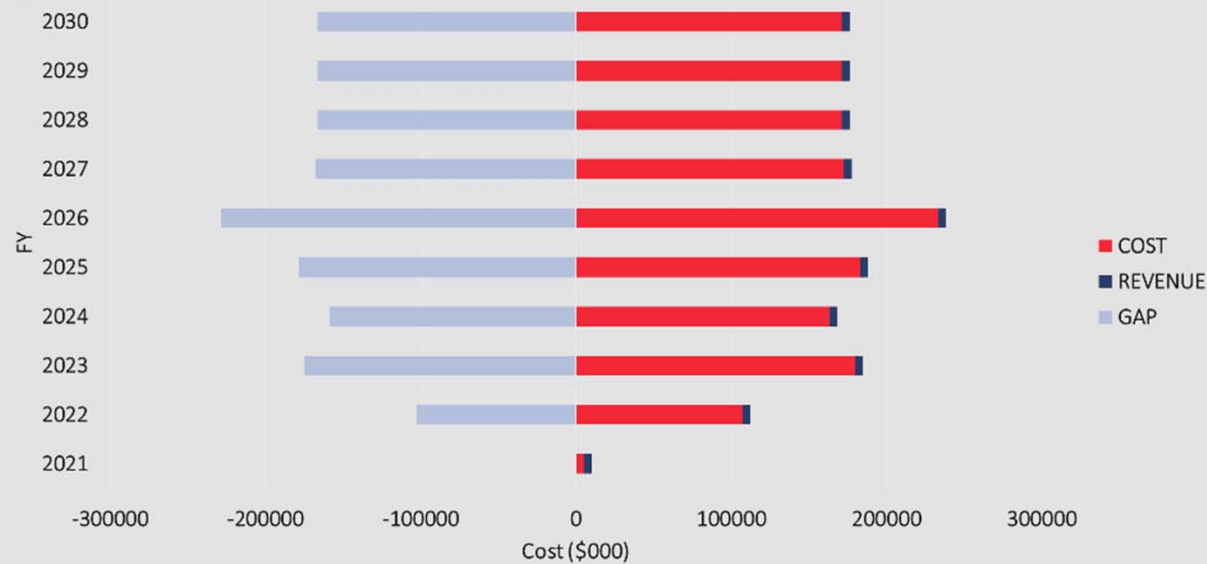


AVERAGE ANNUAL COST

\$156 M



COSTS AND REVENUES: TO MAINTAIN CURRENT CONDITIONS*



Note: Annual Preservation Revenue Only | 2021 is actual expenditure



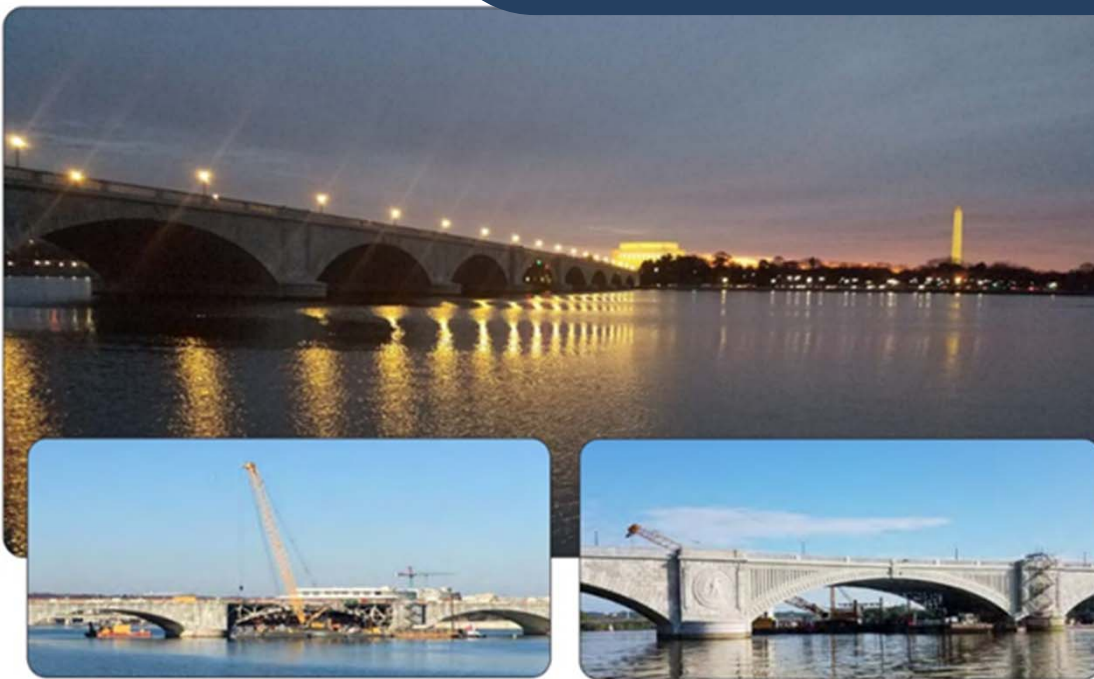
TAM GOALS

<p>Poor ≤ 7.2%</p> <p>NHS Bridges 2025 Target</p>	<p>Good ≥ 24%</p> <p>NHS Bridges 2025 Target</p>
<p>Poor ≤ 4.3%</p> <p>NHS Bridges SOGR Goal</p>	<p>Good ≥ 43.1%</p> <p>NHS Bridges SOGR Goal</p>

Impact of External Stakeholders Funds on NHS Assets

Highlights:

- \$36.5M annual budget for the National Capital Region
- NPS predicts this will help maintain roads and bridges
- Other signature projects:
 - Arlington Memorial Bridge
 - Rock Creek Parkway



DDOT Asset Replacement Costs



NHS ROADS

\$604 Million

572 Lane Miles

This includes Interstate and non-Interstate, NHS pavements in the District.



NON-NHS ROADS

\$2.5 Billion

2,876 Lane Miles

This includes all non-NHS pavements in the District: Local and Federal-aid pavements.



BRIDGES

\$30 Billion

6.3 Million Sq.ft.

This includes all NHS and non-NHS bridges maintained by DDOT. Pedestrian bridges are also included.



ALLEYS

\$281 Million

350 Miles

These thoroughfares are used for municipal functions such as garbage collection, deliveries, and parking.

Chapter 8

Investment Strategies

DDOT Investment Strategies Overview



Making Integrated Investment Decisions

This section describes how DDOT integrates performance, asset management principles, and risk management to make investment decisions.



Performance Gap Analysis

This section describes identified performance gaps between the projected performance of an asset and the performance target.



Investment Strategies

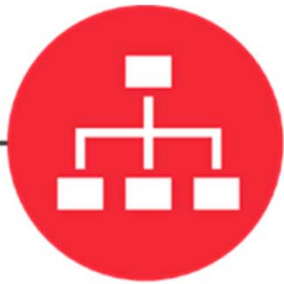
This section describes the investment strategies for each asset class to achieve DDOT performance goals and to address any performance gaps.



Asset Sustainability Reporting

This section describes DDOT's process for measuring asset sustainability and determining strategies to close existing performance and financial gaps.

Key Integration Processes for Investment Decision-Making



Business Process Mapping

- Collaboration between Workgroups
- Changes to resource allocation to consider AM criteria



Project Selection

- Performance drives management system analysis
- Identified risks used as additional project selection criteria



Enterprise Risk Management

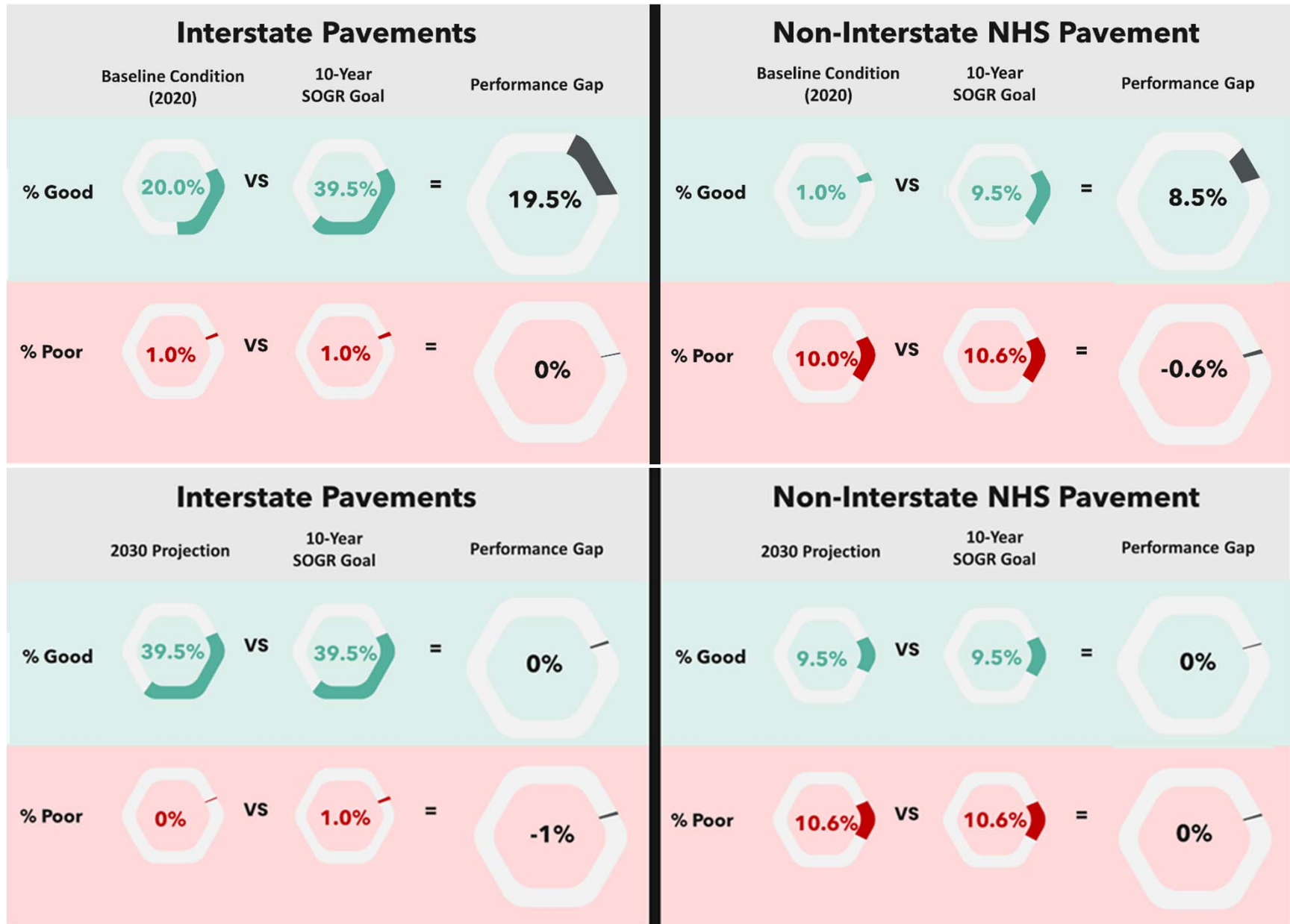
- Risk register used to identify enterprise-level risks
- Agency-level risks inform strategic investment



Training and Communication Planning

- Provides Agency-level awareness of TAM
- Promotes coordination Agency-wide

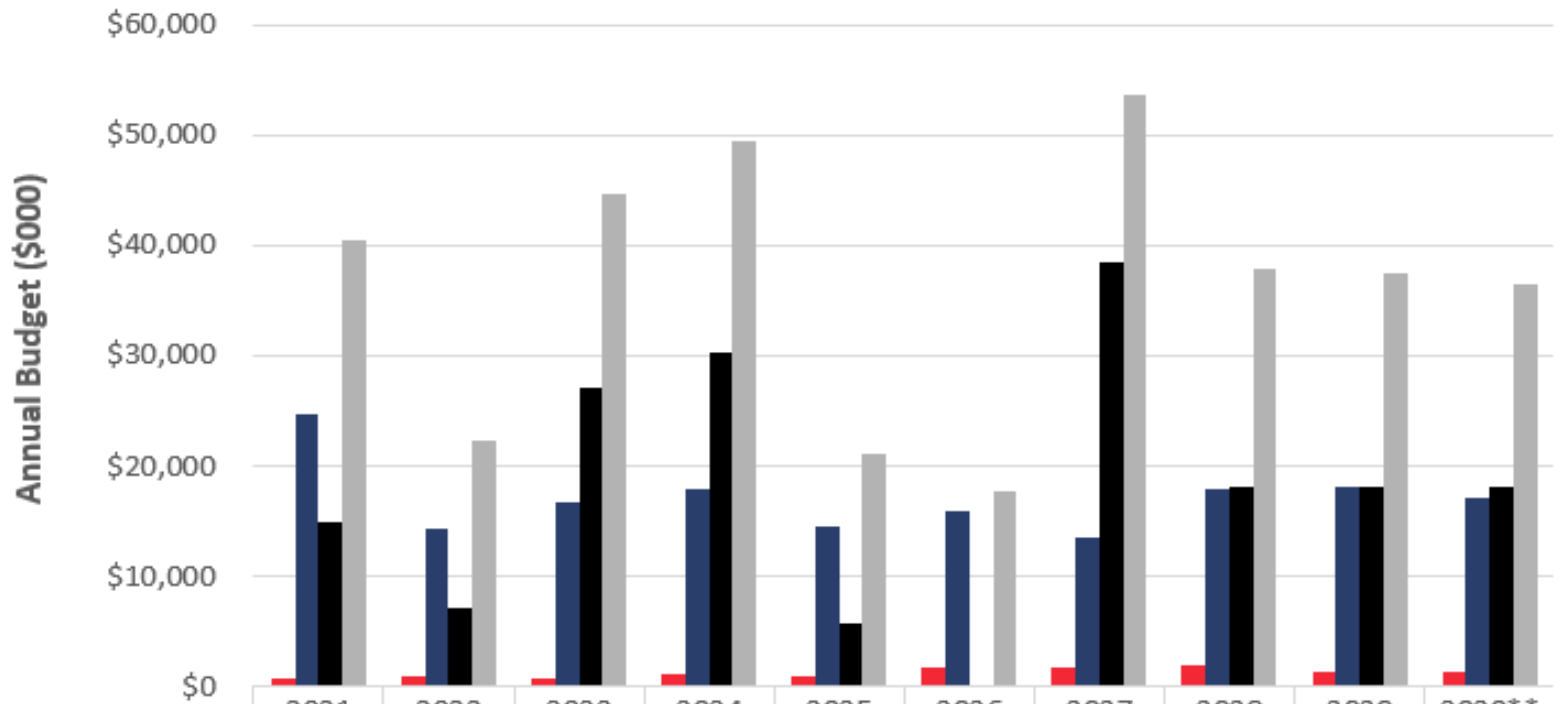
Performance Gap Analysis – NHS Pavement



Performance Gap Analysis – NHS Bridges



DDOT Annual Pavement Investment Trend



	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030**
■ Preservation	\$731	\$998	\$748	\$1,200	\$883	\$1,726	\$1,670	\$1,913	\$1,330	\$1,244
■ Minor Rehab	\$24,672	\$14,220	\$16,800	\$17,833	\$14,555	\$15,893	\$13,594	\$17,827	\$18,035	\$17,048
■ Major Rehab/Reconstruction (CIP)*	\$15,000	\$7,149	\$27,086	\$30,368	\$5,631	\$0	\$38,417	\$18,108	\$18,108	\$18,108
■ Total	\$40,403	\$22,367	\$44,634	\$49,401	\$21,069	\$17,618	\$53,681	\$37,848	\$37,473	\$36,400

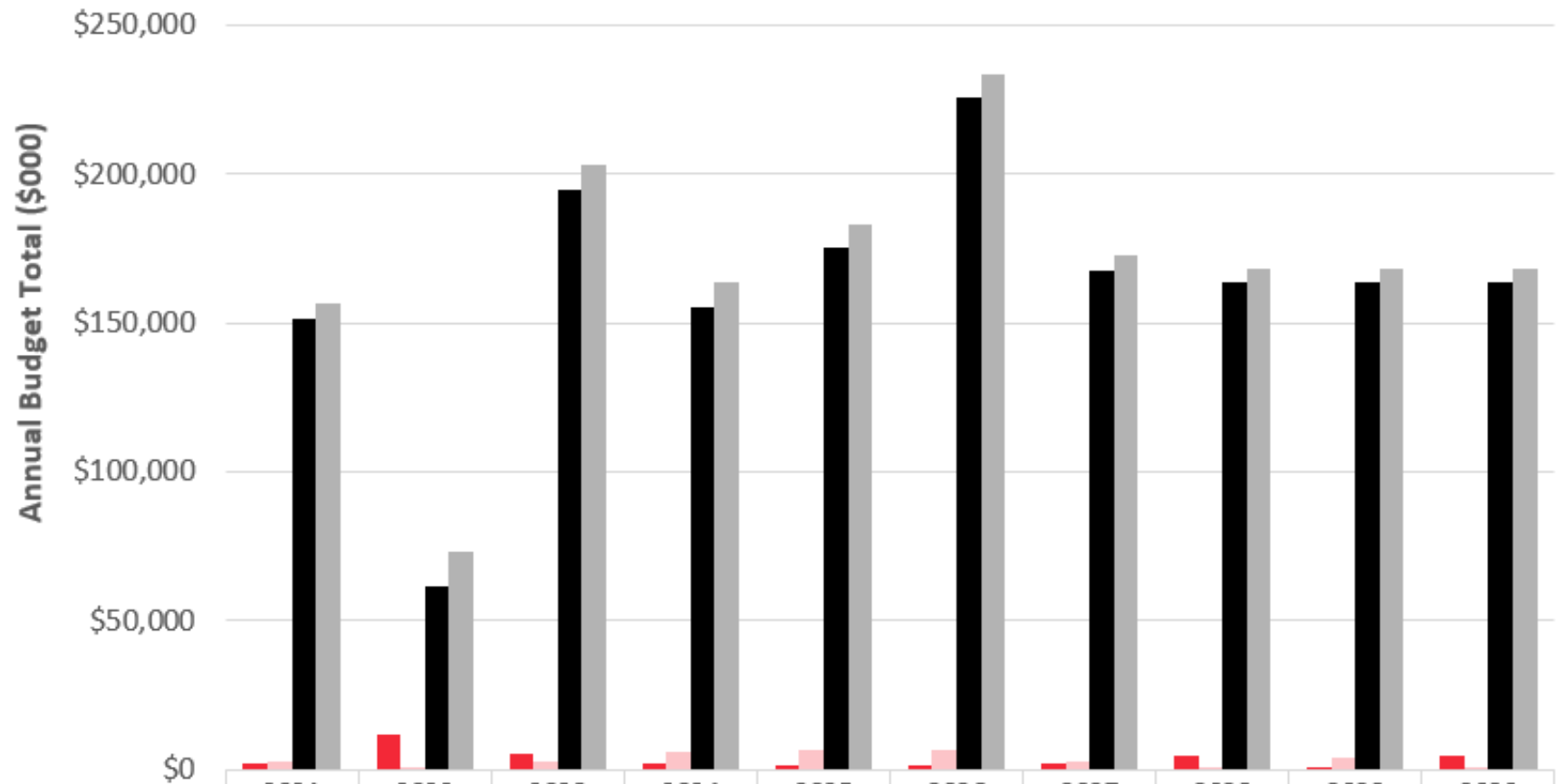
* While CIP funding is included in the above, the CIP projects that will be completed in the next five years will not significantly impact the performance of the NHS pavement network. Additionally, an average value was used to populate the CIP budget for 2028–2030, as the existing financial projections for CIP stop at FY 2027.

** 2030 Preservation and Minor Rehabilitation values are based on the average spending for each, respectively.

DDOT Projected Pavement Performance/Funding



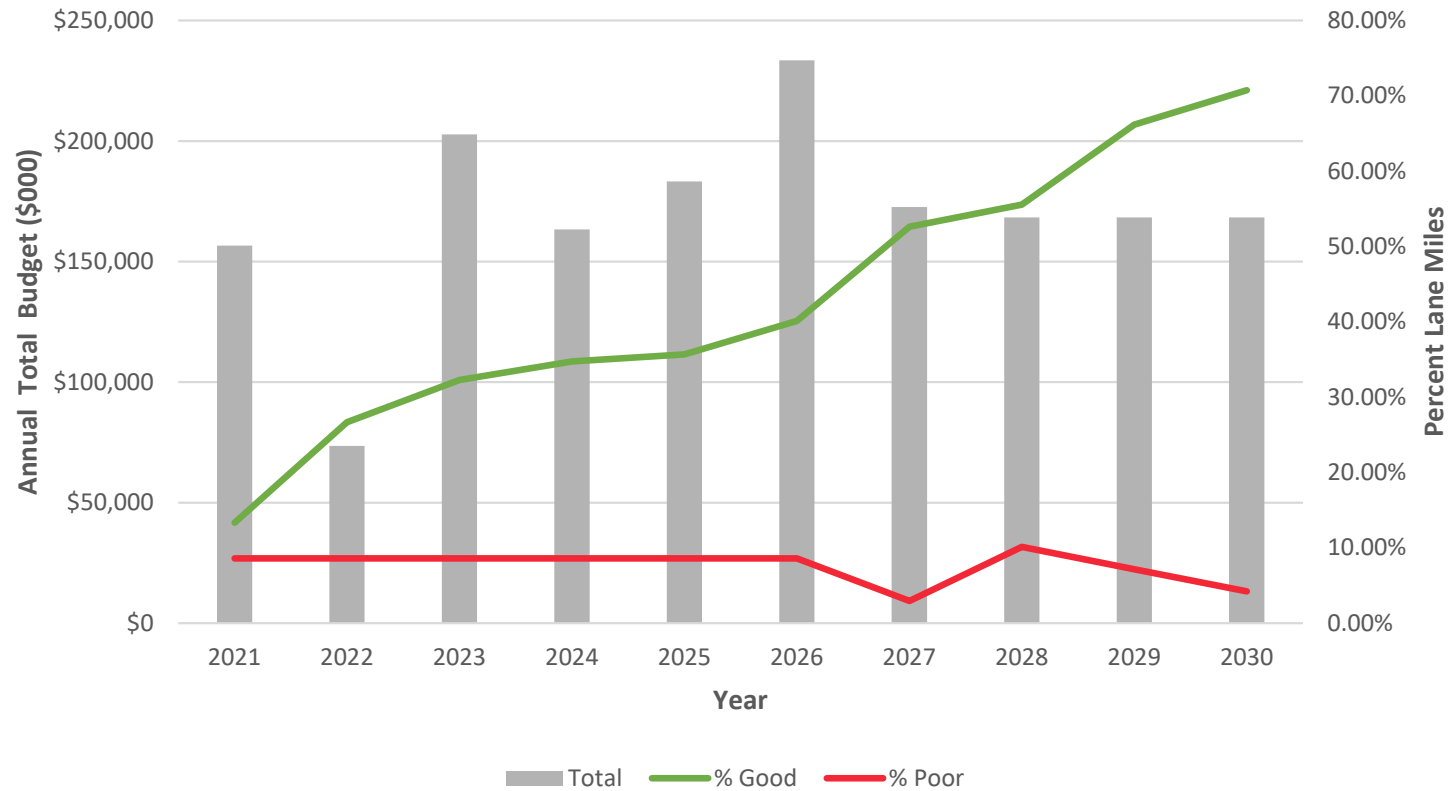
DDOT Annual Bridge Investment Trend



	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
■ Preservation (Repairs)	\$2,362	\$11,782	\$5,039	\$1,958	\$1,396	\$1,247	\$2,370	\$4,381	\$803	\$4,858
■ Preventative (Cyclical)	\$2,638	\$218	\$2,936	\$6,039	\$6,585	\$6,719	\$2,620	\$616	\$4,155	\$92
■ CIP*	\$151,628	\$61,488	\$194,838	\$155,388	\$175,295	\$225,512	\$167,672	\$163,365	\$163,365	\$163,365
■ Total	\$156,628	\$73,488	\$202,813	\$163,385	\$183,276	\$233,478	\$172,662	\$168,362	\$168,324	\$168,316

*An average value was used to populate the CIP budget for 2028–2030, as the existing financial projections for CIP stop at FY 2027.

DDOT Projected Bridge Performance/Funding



Chapter 9

Continuous Process Improvement

TAMP Continuous Process Improvement Overview



Improvement Priorities

This section describes areas within TAM that DDOT aims to improve and strengthen for the next iteration of the TAMP.



Barriers to Improvement

This section summarizes the main challenges DDOT faces in implementing TAM improvement activities.



Monitoring and Reporting

This section describes how DDOT will monitor and report implementation progress.

Asset Management Enablers and Improvement Areas



Agency Culture

Pertains to establishing policies and actions to create a supportive environment and systems for collaboration and accountability.



Business Processes

Related to identifying, developing, or enhancing business processes to support asset management, decision-making, and effective use of available resources.



Data and Technology

Focus on developing strong databases and enhanced systems to improve analysis and seamless data and information flow across systems and functional divisions.

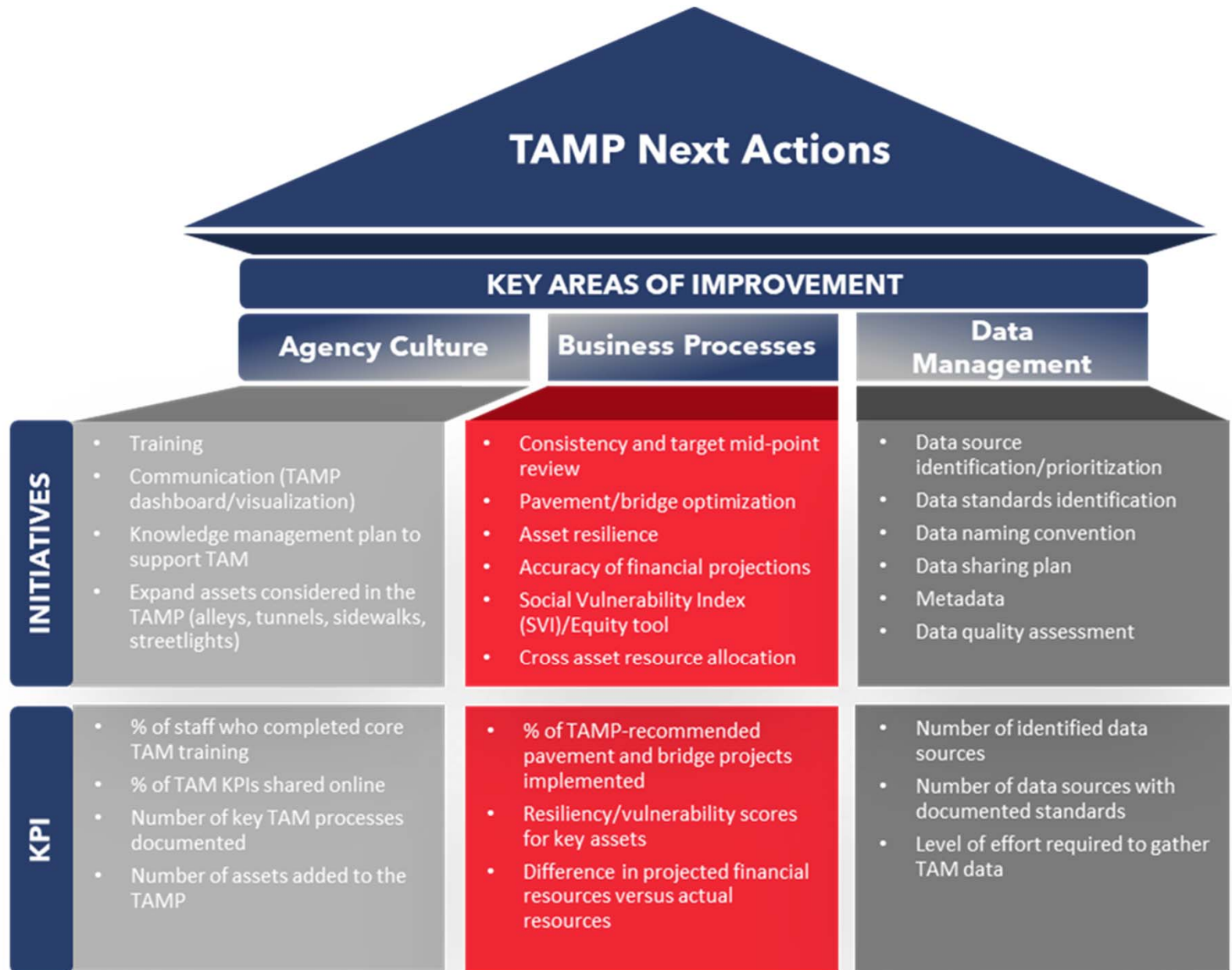
ASSOCIATED AASHTO IMPROVEMENT THEMES

- Organization and People

- TAM Strategy and Planning
- Asset Performance
- Resource Allocation
- Monitoring and Adjustment

- Information Systems

TAMP Continuous Improvement Actions



Thank You