SCAN TEAM REPORT

NCHRP Project 20-68, Scan 23-05

Successful Approaches to Validating and Communicating the Long-Term Effects of Aging Government Fleet Assets

Supported by the

National Cooperative Highway Research Program

Acknowledgments

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The purpose of each scan, and of Project 20-68, is to accelerate beneficial innovation by facilitating information sharing and technology exchange among the states and other transportation agencies and identifying actionable items of common interest. Experience has shown that personal contact with new ideas and their application is a particularly valuable means for such sharing and exchange. A scan entails peer-to-peer discussions between practitioners who have implemented new practices and others who are able to disseminate knowledge of these new practices and their possible benefits to a broad audience of other users. Each scan addresses a single technical topic selected by AASHTO and the NCHRP 20-68 Project Panel. Further information on the NCHRP 20-68 U.S. Domestic Scan program is available at

https://www.trb.org/NCHRP/USDomesticScanProgram.aspx

This report was prepared by the scan team for *Domestic Scan 23-05: Successful Approaches to Validating and Communicating the Long-Term Effects of Aging Government Fleet Asset*, whose members are listed below. Scan planning and logistics are managed by Arora and Associates, P.C.; Harry Capers is the Principal Investigator. NCHRP Project 20-68 is guided by a technical project panel and managed by Sid Mohan, NCHRP Associate Program Manager.

The scan team members include the following individuals:

Tim Cunningham,
Kansas Department of Transportation – Co-Chair

Doug Burke,
Ohio Department of Transportation – Co-Chair

Darin Weaver,
Oregon Department of Transportation

Howard Ray,
Colorado Department of Transportation

Colby Page,
Michigan Department of Transportation

Greg Bright,
Indiana Department of Transportation

Stan Carlton,
Alabama Department of Transportation

Jeff Pifer,
West Virginia Department of Transportation

James Chupas,
Connecticut Department of Transportation

Lisa Kunzman,
L. Kunzman Consulting– Subject Matter Expert


New Holland

Disclaimer

The information in this document was taken directly from the submission of the authors. The opinions and conclusions expressed or implied are those of the scan team and are not necessarily those of the Transportation Research Board or its sponsoring agencies. This report has not been reviewed by, and is not a report of, the Transportation Research Board or the National Academies of Sciences, Engineering, and Medicine.

Scan 23-05

Successful Approaches to Validating and Communicating the Long-Term Effects of Aging Government Fleet Assets

REQUESTED BY THE

American Association of State Highway and Transportation Officials

PREPARED BY SCAN 23-05 TEAM

Tim Cunningham,
Kansas Department of Transportation – Co-Chair

Doug Burke,
Ohio Department of Transportation – Co-Chair

Darin Weaver,
Oregon Department of Transportation

Howard Ray,
Colorado Department of Transportation

Colby Page,
Michigan Department of Transportation

Greg Bright,
Indiana Department of Transportation

Stan Carlton,
Alabama Department of Transportation

Jeff Pifer,
West Virginia Department of Transportation

James Chupas,
Connecticut Department of Transportation

Lisa Kunzman,
L. Kunzman Consulting– Subject Matter Expert

SCAN MANAGEMENT

Arora and Associates, P.C.

Lawrenceville, NJ
October 2024

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Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
AL DOT	Alabama Department of Transportation
DOT	Department of Transportation
FHI	Fleet Health Index
ITD	Idaho Transportation Department
NCHRP	National Cooperative Highway Research Program
TEF	Transportation Equipment Fund
TX DOT	Texas Department of Transportation
WS DOT	Washington State Department of Transportation
WV DOT	West Virginia Department of Transportation

Executive Summary

1. Background

State DOT fleet managers are facing enormous challenges as government budgets are insufficient and decisions are made to extend the life of fleet assets. It is more important than ever to efficiently communicate the long-term effects of those decisions. When vehicles age, more maintenance issues arise resulting in higher annual operating costs and lower operational availability. Vehicle and equipment downtime are a monetary and safety issue, especially if vehicles and equipment cannot respond to an emergency. Ultimately, aging fleets reduce the level of service to the traveling public.[i]

The scan objective is twofold, to examine organizations that:

- successfully developed and implemented practices and procedures to estimate the cost of delayed replacement of DOT fleet assets beyond the optimal replacement period.
- gather data that might be used to develop decision making tools and models that can effectively communicate the long-term effects of aging the fleet assets to decision makers.

For the scan project, a workshop was held July 29through August 1, 2024. In preparation for the scan workshop, potential speakers were identified through a desk scan that involved a review of recently conducted and proposed scans, a comprehensive literature review, a survey, and interviews. The scan team reviewed the recommendations in the desk scan and invited participants to the scan workshop. The scan team produced a list of amplifying questions to guide the development of the invited speaker presentations. (**Appendix D**).

2. Primary findings

The scan findings included four themes that aid in validating and communicating the long-term effects of aging government fleet assets: credibility, data, communications, and relationships.

2.1. Credibility

Credibility was observed to be an important factor for communicating the long-term effects of aging government fleet assets. From the data (scan workshop presentations), the credibility related to the practices of the fleet function as well as the fleet managers themselves.

Additionally, being a good steward of the state resources is key to credibility of the fleet function. Three other findings topics presented were also related to credibility: 1) preparedness, 2) replacement criteria, and 3) usage management.

2.2. Data

Data use was shown to be key to measuring fleet health. Data is needed to identify aging fleet assets and quantifying fleet needs (replacement, expansion, or contraction). Equipment management systems provide vital data for asset management. Telematics provides usage information such as meter readings and days used. Quality control of data is important. Fleet data analysts provide value to the fleet function.

2.3. Communication

Communication in two categories, general and visual, was seen as an effective way to convey fleet health. Open and effective communication with upper management and decision makers is essential. Visual representation of fleet data (that is readily available) benefits the fleet program, decision makers, and stakeholders.

2.4. Relationships

Selected DOTs emphasized the importance of relationships, especially with decision makers. In these cases, professional relationships with decision makers and stakeholders led to effective communication, which resulted in an understanding of, and advocacy for, fleet needs.

3. Primary recommendations

3.1. Credibility

- Formulate data-driven methodologies for replacement criteria, managing fleet size, and overall fleet costs.
- Share the methodology with decision makers and stakeholders.
- Develop equipment replacement plans and purchasing mechanisms.
- Deliver promised results.
- Prepare for contingencies.

3.2. Communication

- Develop effective visualization tools that communicate fleet health.
- Establish regularly scheduled communications with customers, decision makers, and other stakeholders with the goal of communicating fleet health, needs, and trends.
- Leverage networking to augment communication opportunities.

3.3. Data

- Develop/acquire a fleet management system capable of capturing usable and understandable data and reports to inform fleet management decisions.
- Create and report fleet health metrics that are accessible and provide actionable insights.

3.4. Relationships

- Develop internal and external relationships to facilitate the sharing of the fleet story to achieve fleets goals.
- Devote time and plan for relationship development and outreach.

4. Implementation and dissemination plan

The report closes with a brief chapter devoted to completed follow-up actions and additional potential activities.

Background

Typically, Departments of Transportation (DOTs) are responsible for managing and maintaining the state's transportation infrastructure. A key component to their success in this endeavor is their fleet of vehicles and equipment. Equipment that is beyond its recommended lifecycle adversely affects DOT readiness and increases costs.

Despite the criticality of equipment to DOT operations, it is documented that most state DOTs have aging fleet assets and are unable to replace equipment according to their own recommended replacement schedules.[ii] Recognizing the importance of timely equipment replacement, the American Association of State Highway and Transportation Officials (AASHTO) has adopted a performance metric related to equipment replacement in addition to four other key performance metrics. The equipment replacement performance metric is referred to as "Replacement Recommended." It is defined as "A measurement to compare whether an individual vehicle(s) or piece(s) of equipment are within or exceed established criteria (typically in months or years of age and usage in miles or engine hours) for the expected life cycle or useful life." [iii] State DOTs voluntarily report on the five AASHTO performance metrics. As shown in **Figure 1**, the "Replacement Recommended" metric currently posted (although individual state reporting ranges from 2013 to 2023) shows 29 of 33 states reporting that they are not replacing equipment in accordance with their individual state replacement schedules.[iv] Thus, the typical state DOT is operating with fleet replacement backlog.

National DOT Performance Metrics Benchmarking

	PM COMPLIANCE	Scheduled vs Unscheduled	Replacement Recommended	UTILIZATION	AVAILABILITY	Last Date Reported
ALASKA	73.0%	34.0%	77.0%	-	96.0%	2023-01-30
ARIZONA	97.7%	-	44.0%	-	98.1%	2013-07-05
ARKANSAS	65.0%	-	27.0%	87.0%	96.0%	2020-10-20
CALIFORNIA	84.0%	-	-	-	-	2019-07-13
COLORADO	49.0%	-	7.0%	-	-	2018-05-31
CONNECTICUT	76.3%	-	-	-	-	2019-01-03
DELAWARE	96.5%	45.0%	7.7%	79.5%	91.3%	2021-01-01
FLORIDA	98.0%	-	6.6%	65.0%	85.0%	2017-08-10
HAWAII	98.0%	-	23.0%	-	94.0%	2016-04-18
IDAHO	-	-	37.0%	63.0%	-	2018-08-20
INDIANA	98.0%	-	-	-	-	2017-06-30
IOWA	-	-	34.5%	-	-	2015-09-15
KANSAS	-	-	48.0%	-	-	2018-07-23
KENTUCKY	92.0%	-	14.0%	69.0%	89.0%	2018-07-24
MARYLAND	93.3%	-	85.5%	70.0%	88.0%	2018-07-23
MASSACHUSETTS	92.9%	-	19.9%	90.5%	89.9%	2016-12-06
MICHIGAN	89.3%	56.6%	54.2%	42.3%	95.3%	2023-01-30
MINNESOTA	-	47.6%	71.5%	63.3%	-	2018-02-28
MISSISSIPPI	95.8%	-	69.3%	-	-	2018-06-18
MISSOURI	95.0%	-	36.0%	70.0%	92.0%	2021-02-01
MONTANA	65.0%	-	-	-	-	2018-07-30
NEVADA	77.3%	96.8%	50.2%	53.1%	97.6%	2022-12-31
NEW HAMPSHIRE	-	-	38.0%	-	-	2018-09-28
NEW JERSEY	85.0%	-	60.0%	-	-	2018-07-19
NEW MEXICO	93.0%	-	-	-	92.8%	2013-09-06
NORTH CAROLINA	98.4%	-	58.9%	61.0%	95.7%	2015-07-08
OHIO	91.2%	-	40.5%	53.6%	68.1%	2015-01-15
OKLAHOMA	-	-	35.1%	33.8%	93.1%	2019-03-21
OREGON	72.0%	68.0%	62.0%	-	-	2018-07-01
PENNSYLVANIA	89.0%	80.0%	45.0%	47.0%	-	2021-02-02
SOUTH CAROLINA	100.0%	-	45.0%	-	96.0%	2015-07-14
SOUTH DAKOTA	91.2%	-	22.3%	-	-	2017-08-07
TEXAS	87.0%	-	-	53.0%	82.0%	2016-09-29
UTAH	81.1%	49.0%	10.5%	69.6%	93.2%	2023-01-10
VERMONT	65.0%	-	29.0%	55.0%	-	2017-07-03
VIRGINIA	87.6%	-	60.5%	-	93.1%	2021-01-05
WASHINGTON	63.0%	-	25.0%	-	90.0%	2023-01-26
WEST VIRGINIA	91.0%	-	12.0%	60.0%	87.0%	2017-07-03
WYOMING	80.8%	35.7%	8.1%	-	-	2023-01-05
SASKATCHEWAN	-	-	-	-	-	2017-08-28

**Updated on 2023-02-13*

Figure 1. National DOT Performance Metrics Benchmarking.

Source: Performance Metrics, DOT National Metric Benchmarking, Equipment Management Technical Services Program, last visited December 20, 2024, https://www.pavementpreservation.org/wp-content/uploads/emtspmetrics/National_Metric_Benchmarking.pdf.

DOT fleet managers need to be able to convey the state of fleet and its funding needs todecision makers who must weigh other pressing priority needs to accomplish the DOT's mission. To that end, AASHTO has approved research on this topic that was to be accomplished through a National Cooperative Highway Research Program (NCHRP) Domestic Scan.

2. Objective, purpose, and scope of scan

2.1. Objective

The scan objective is twofold, to examine organizations that:

- successfully developed and implemented practices and procedures to estimate the cost of delayed replacement of DOT fleet assets beyond the optimal replacement period.
- gather data that might be used to develop decision making tools and models that can effectively communicate the long-term effects of aging fleet assets to decision makers.

2.2. Purpose

The purpose of the scan was to document and share successful practices that will then be a valuable resource for use by fleet managers and stakeholders, including state DOTs, on how to assess and make better decisions within their organization to properly prioritize fleet funding among the long list of agency needs.

2.3. Scope of scan

The scan team gathered information from innovative agencies that can be used to effectively communicate the impacts of investment decisions related to fleet assets. The team endeavored to gather research references and data from experts within DOTs and other public fleet managers that had knowledge of how to realistically estimate the long-term effects of aging fleet assets. In addition, the team gathered data from agencies' studies regarding their budget needs to replace deficient assets, the age of their existing fleet, and their estimated cost of deferring replacement of older assets. Identification of fleet and equipment performance measures that may be used to estimate impacts of aging fleet assets on an agency's ability to provide needed services was included in the scan scope. Also of interest are the agencies' rationales used in deciding to defer replacement of fleet assets as available.

3. Scan team information

The scan team included members that were experienced DOT fleet managers and represented the four AASHTO regions. The representatives from the West region included the Oregon Department of Transportation and the Colorado Department of Transportation. The representatives (including the two co-chairs) from the Midwest region included the Ohio Department of Transportation, the Kansas Department of Transportation, the Michigan Department of Transportation, and the Indiana Department of Transportation. The representatives from the Southeast region included the Alabama Department of Transportation (AL DOT) and the West Virginia Department of Transportation (WV DOT). And lastly, the representative from the Northeast region was the Connecticut Department of Transportation.

The scan team's contact information and biographical sketches can be found in **Appendix A** and **Appendix B**, respectively.

4. Invited scan workshop participants

The scan team invited eleven DOTs (five of which were scan team members) and one transit agency to participate in a scan workshop held in San Diego, California. The following states participated as presenters in the scan workshop: Alabama, Alaska, California, Connecticut, Idaho, Indiana, Kentucky, Louisiana, Texas, West Virginia, and Washington. In addition, one transit agency, CTtransit of Connecticut, presented their bus fleet operations. The scan workshop presenters' contact information can be found in **Appendix C**.

5. Scan approach and planning

For the scan project, a workshop was held July 29 through August 1, 2024. In preparation for the scan workshop, potential speakers were identified through a desk scan that involved a review of recently conducted and proposed scans, a comprehensive literature review, a survey, and interviews. The scan team reviewed the recommendations in the desk scan and invited participants to the scan workshop. The scan team produced a list of amplifying questions to guide the development of the invited speaker presentations. (**Appendix D**).

The scan team met briefly on July 28 prior to the workshop to finalize the agenda. Invited participates as well as selected scan team members presented July 29 through August 1. All the invited participants were requested to attend all days of the workshop. Most of the presenters were on-site for the presentation. Some of the invited participants presented entirely remotely, and some augmented their presentation team with remote members. Appendix C indicates remote presenters. The scan team and the invited speakers engaged in discussions during and after the in-depth presentations. This format enriched the workshop proceedings.

The topics presented and discussed included, but were not limited to, replacement planning, alternative disposal methods (buyback and trade-in), rental rate systems, fleet health metrics, fleet size control, telematics, fleet funding augmentations, fleet equipment sales processes, replacement criteria, and organizational structures.

Following the workshop, on August 2, the scan team determined initial findings, drew conclusions, made related observations, and identified pertinent examples and a case study. Additionally, they made recommendations gleaned from the data set (presentations at the scan workshop) and other related recommendations. Lastly, that scan team discussed the implementation actions and dissemination steps.

Scan Findings and Observations

The chapter includes a section on the primary findings and associated conclusions followed by a section of other observations.

1. Primary findings and associated conclusions

The scan findings included four themes that aid in validating and communicating the long-term effects of aging government fleet assets: credibility, data, communications, and relationships.

1.1. Credibility

Credibility was observed to be an important factor for communicating the long-term effects of aging government fleet assets. From the data (scan workshop presentations), the credibility related to the practices of the fleet function as well as the perceived credibility of the fleet manager.

Several key practices and/or points were presented that resulted in credibility for the fleet function. Utilizing or referencing best practices, studies, outside review (e.g., audit or consultant report) and/or equipment research builds credibility for the fleet function. Credibility is gained when outside awards and recognition are received. Using a data-based approach and developing equipment replacement plans is important for fleet function credibility. A reputable, experienced, trusted fleet manager lends credibility to the equipment function. Furthermore, delivering results and executing plans reinforces credibility. Lastly, equipment committees of various forms that have cross-disciplined members, including key stakeholders (users, management, districts, etc.), promote buy-in related to fleet decisions, fleet needs, fleet strategic direction, etc., which ultimately raise fleet function credibility.

Additionally, being a good steward of the state resources is key to credibility of the fleet function. Buybacks and trade-ins were observed to provide a revenue stream for the fleet function. Receipt of fleet equipment disposal sales proceeds contributes to fleet function stewardship.

Three other findings topics presented were also related to credibility: 1) preparedness, 2) replacement criteria, and 3) usage management. Maintaining a constant state of preparedness (having a fleet replacement plan, having contract options in place, planning for staff to execute, etc.) is key to capitalizing on opportunities. A validated replacement criteria is critical to determine what an aged asset is (when to replace) and the overall health of a fleet. Equipment that meets usage requirements validates fleet size.

1.1.1. Credibility conclusions

From the findings related to credibility and the related topics of preparedness and stewardship, the scan team drew the following conclusions:

- DOT fleet managers that network with peers within their agency, other state DOTs, and outside experts gain credibility.
- Well-managed fleet operations that are actively marketed to decision makers and all stakeholders garner credibility for the fleet function.
- Being prepared to communicate the replacement backlog and how additional funding would improve fleet health led to funding augmentations.
- States that have alternative disposal processes (buyback and trade-in) have augmented their fleet funding (or offset capital costs).
- Fleet functions that receive fleet equipment disposal sales proceeds make better asset management decisions, and the sales receipts provide a funding source for the fleet function.

1.2. Data

Data use was shown to be key to measuring fleet health. Data is needed to identify aging fleet assets and quantifying fleet needs (replacement, expansion, or contraction). Equipment management systems provide vital data for asset management. Telematics provides usage information such as meter readings and days used. Quality control of data is important. Fleet data analysts provide value to the fleet function.

1. 2.1. Data conclusions

From the findings related to data, the scan team drew the following conclusions:

- Data was analyzed, validated, and presented in a consumable manner by many presenters.
- Data was used to set goals, develop plans, and measure progress.

1.3. Communication

Communication in two aspects, general and visual, was seen as an effective way to convey fleet health. Open and effective communication with upper management and decision makers is essential. Visual representation of fleet data (that is readily available) benefits the fleet program, decision makers, and stakeholders.

1.3.1. Communication conclusions

From the findings related to communication, the scan team drew the following conclusions:

- Effective communication with decision makers (supported by validated data) and buy-in from stakeholders has led to improved credibility and successful funding requests.
- Simple graphics and understandable metrics (without technical jargon) have been successful in communicating fleet health to non-fleet professionals.

1.4. Relationships

Selected DOTs emphasized the importance of relationships, especially with decision makers and peers. In these cases, professional relationships with decision makers and stakeholders led to effective communication, which resulted in an understanding of, and advocacy for, fleet needs.

1.4.1. Relationships conclusions

From the findings related to relationships, the scan team drew the following conclusions:

- Building relationships has led to trust with decision makers and stakeholders that enhanced understanding and, in some cases, additional support, which improved fleet health.
- Building relationships with other fleet managers (peers) bolsters professional development, enhances expertise, and contributes to credibility.

2. Other observations

2.1. Key questions before funding requests

During the scan workshop, the scan team came to the consensus that two key questions should ideally be answered before seeking funding to address an aging fleet: 1) Is the fleet right-sized and "right-typed?" In other words, is the fleet you have being utilized and do you have the right equipment to meet our mission needs? 2) Are the replacement criteria appropriate? Meaning, are you confident in the methodology used and has it been validated using sound economic principles?

2.2. Long-term effects of aging fleet assets

At the conclusion of the scan workshop, the scan team outlined various effects of aging fleet assets as follows:

- Higher maintenance costs
- Increased downtime
- Loss of productivity
- Higher fuel consumption
- Higher emissions
- Lack of improved safety features
- Parts obsolescence
- Non-compliance with state and federal regulations
- Having spares in fleet ("strategic reserves")
- Increased commercial rental equipment costs
- Negative appearance
- Reduced level of service to the public
- Reduction in residual value at disposal

2.3. Validating long-term effect of aging fleet assets

The scan team noted that no presentations specifically addressed quantifying the long-term effect of aging fleet assets in a robust fashion or as a normal course of business.

2.4. Interrelationship of findings themes

The scan team acknowledged that the four findings themes of credibility, data, communications, and relationships were often interrelated.

Supporting Data

This chapter begins with a section that discusses examples that aligned with the primary findings and associated conclusions. The examples discussed focus on one of the four findings themes of credibility, data, communications, or relationships. However, in many cases, the example has elements of other themes due to their interrelationship. The second section of this chapter is a discussion of a pertinent case study.

1. Primary findings examples

1.1. Credibility example

The Idaho Transportation Department (ITD) exemplifies many of the findings related to credibility. They have a robust fleet replacement plan that leverages external expertise, including practices from other DOT fleet managers. They garner buy-in for the fleet replacement plan through a collaborative approach. Additionally, the fleet function has earned a reputation as being a good steward of public resources under the leadership of a reputable, experienced, trusted fleet manager. It should be noted, as is the case with other examples in Chapter 3, multiple findings themes are present in this example: data, communication, and relations. However, the following synopsis of ITD's approach will focus on the credibility findings theme.

ITD has recently moved to a five year planning horizon for its fleet replacement needs as opposed to a one year plan. They have drawn on NCHRP research, consultant studies commissioned by other states, and the experience of other DOT fleet managers to validate their fleet replacement criteria. The five year replacement plan is a living plan developed and reviewed with the input from ITD's Fleet Management Team. The Fleet Management Team includes district representation from newly created district fleet managers (that were existing positions who absorbed these new responsibilities) and includes road maintenance representatives.

The district fleet managers meet every three months to work on the five year living plan. Oversight by the Fleet Management Team makes the process more transparent and carries more weight when presented to executive management. Key details such as "Replacement Metrics" are included in the five year plan. These indicate the "fleet deficiency rating" that will be achieved once the plan is executed. The term "fleet deficiency rating" is analogous to terminology used when managing other transportation assets such as pavements and bridges. This aids decision makers in comparing levels of investment in asset management.

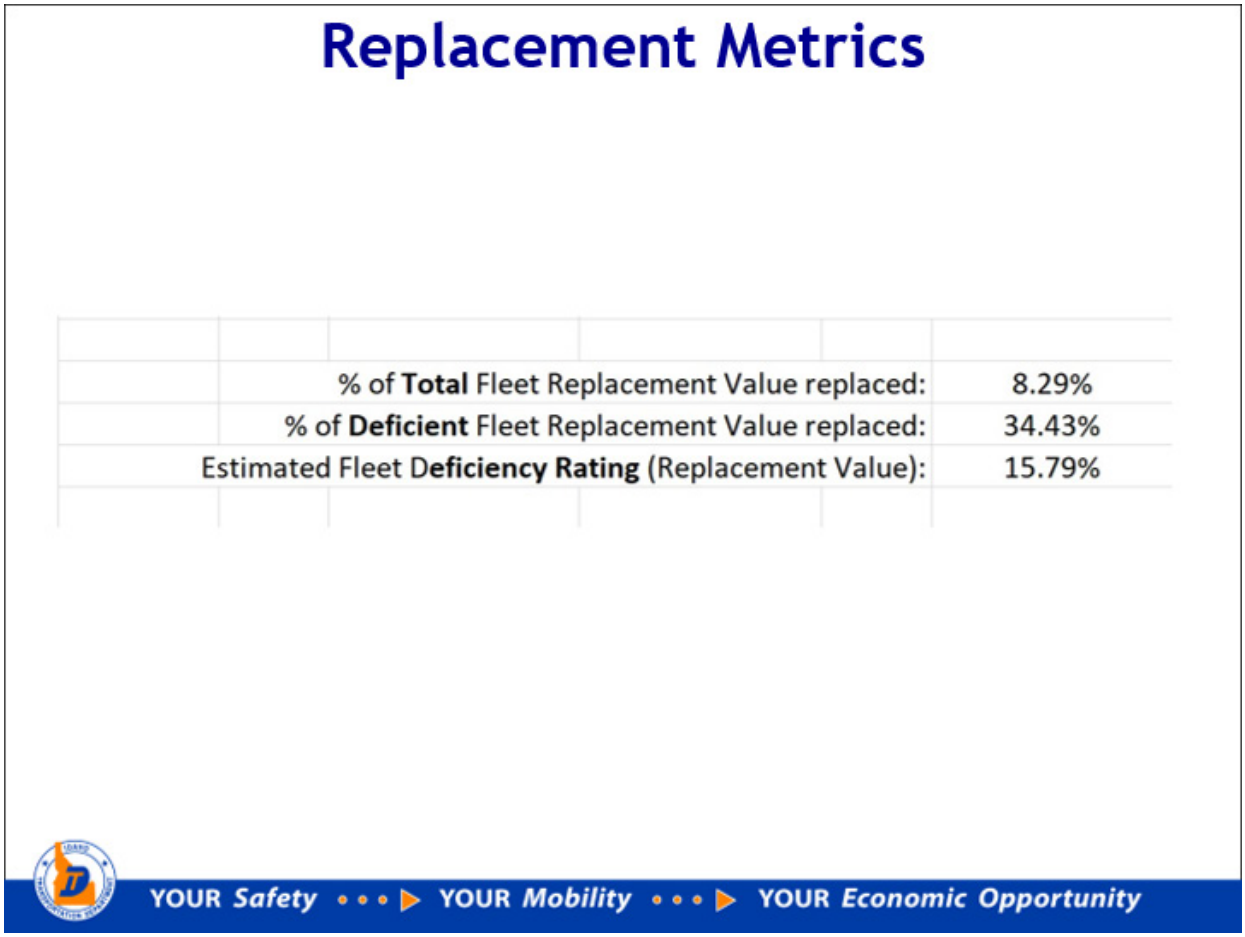

Figure 2. ITD Replacement Metrics.

Source: ITD

Many DOTs are fortunate to have trusted career professionals managing their fleets; ITD is no different but stands out as an example. At the time of scan workshop, the then-retiring fleet manager had earned the trust of ITD's executive management. The team approach to the five year replacement plan was implemented under his leadership. To bolster the case for increased fleet replacement, he made a clear presentation of the recent inflation impacts on the price of new equipment. During the scan workshop, he stated that he asks for the fleet needs, supported by data using a multi-year approach.

Another innovation program he implemented was the Buy-Back program, which generates funding for the fleet function – this cemented his reputation as a good steward of ITD resources and provided the fleet function with an elevated level of credibility.

In general, under a Buy-Back Program, the vendor contracts to sell the equipment to ITD with an option to repurchase the equipment under contractual terms and conditions. In the workshop presentation, ITD presented details on the program showing a negative monthly ownership cost, which equates to revenue generated.

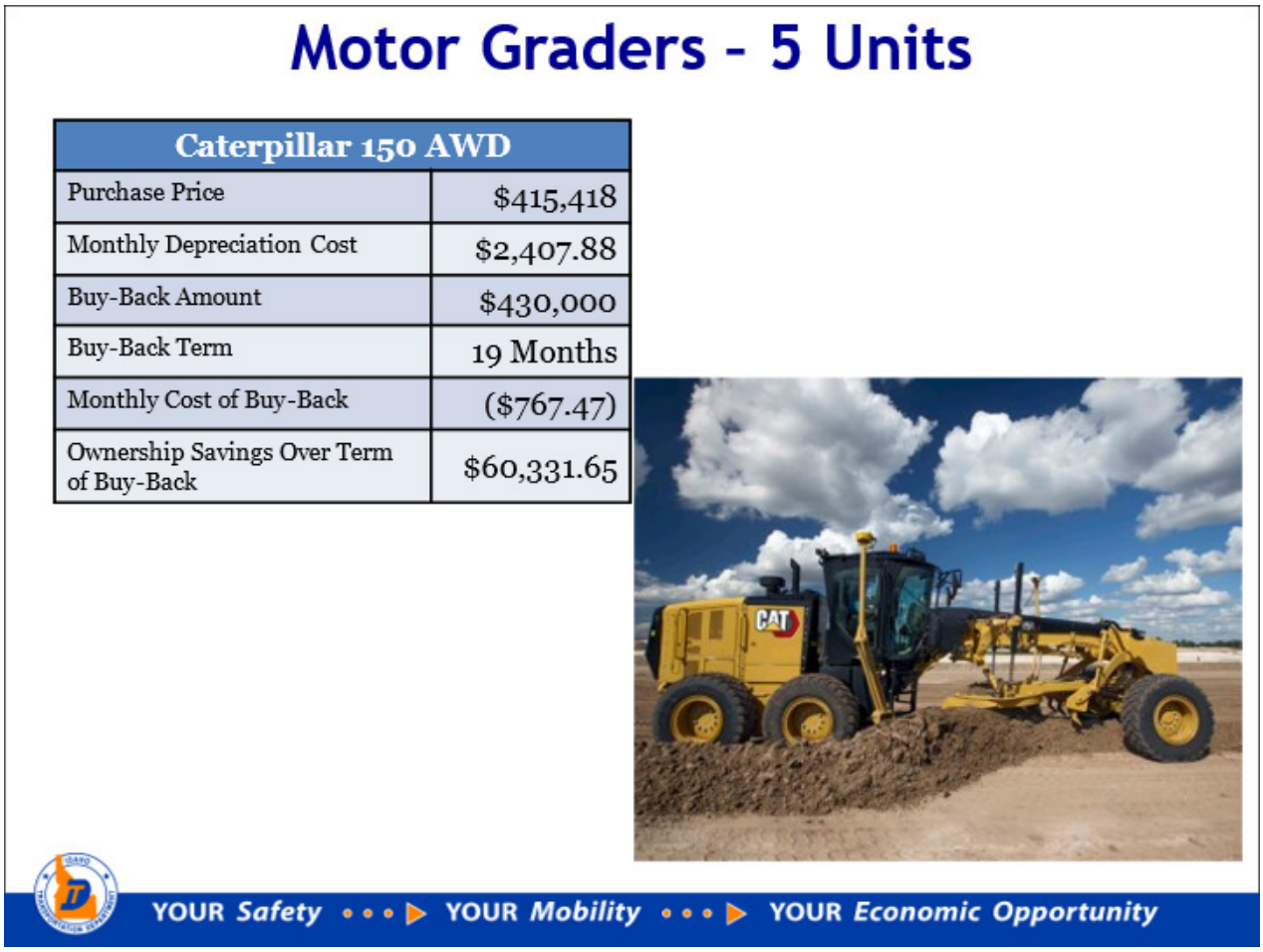

Figure 3. ITD Buy-Back.

Source: ITD

Typically, ITD has seen Buy-Back contracts provide them with new equipment at zero net capital costs for the contract period. The Buy-Back program provides benefits such as reduced ownership cost, reduced operating cost, reduced downtime, and increased on-hand inventory for winter due to the strategic overlapping of the contract time frames.

The underlying economics of Buy-Back Programs that make this possible are as follows:

- "Government" pricing to qualifying entities that is below commercial pricing
- Repurchasing equipment under such programs is an attractive source of equipment for resale

Additionally, ITD indicated another factor that contributed to their success in communicating the long-term effect of aging fleet assets was working closely with other budget analysts within ITD. The budget analysts helped the fleet function tell the story of the fleet needs and be consistent in terminology. In closing, ITD reiterated the fleet manager's credibility, using data, the team approach to the five year plan, and a validated replacement criteria were keys to their success.

1.2. Data example

The presentation by Washington State Department of Transportation (WS DOT) illustrated the use of data as a successful approach to communicating the long-term effects of aging government fleet assets, which resulted in increased funding for equipment replacement and other needs. The themes of credibility and communication are also present in this example; however, the following synopsis of WS DOT's approach will focus on the data used and its presentation.

The only DOT that presented at the scan workshop that discussed the relationship of fleet assets and the agency's Transportation Asset Management Plan was WS DOT. WS DOT's approach to asset management applies to the management of the fleet with the goal of having assets in a state of good repair and managing the risks associated with not being at that state. The foundation of any asset management program begins with data such as inventory and asset condition information. WS DOT's fleet function uses AASHTO asset management recommendations and best practices from other states to determine its replacement lifecycles. For example, replacement requires both age and utilization due to budgets constraints before a unit is even considered for replacement. Final decisions depend on the condition of the asset. Additionally, WS DOT actively manages usage of the fleet equipment by ensuring assets are utilized (or disposed if they no longer serve the mission of the department) before adding new equipment.

WS DOT relied on data, reports, and graphics to convey the current health of their fleet and the desired fleet health condition. Their specific focus was communicating key performance metrics, such as utilization and major breakdowns, as well as communicating the implications (risk) of not performing asset management and the need to adjust rental rates.

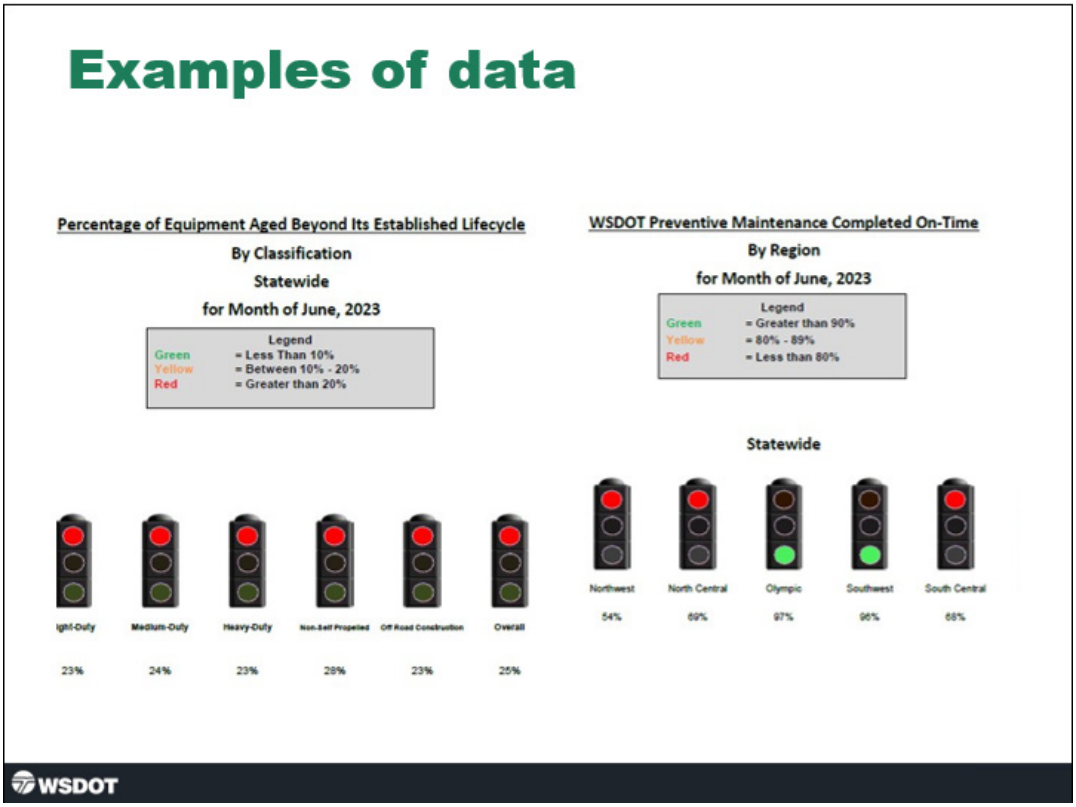

Figure 4. WS DOT Data Example. Source: WS DOT

Source: WS DOT

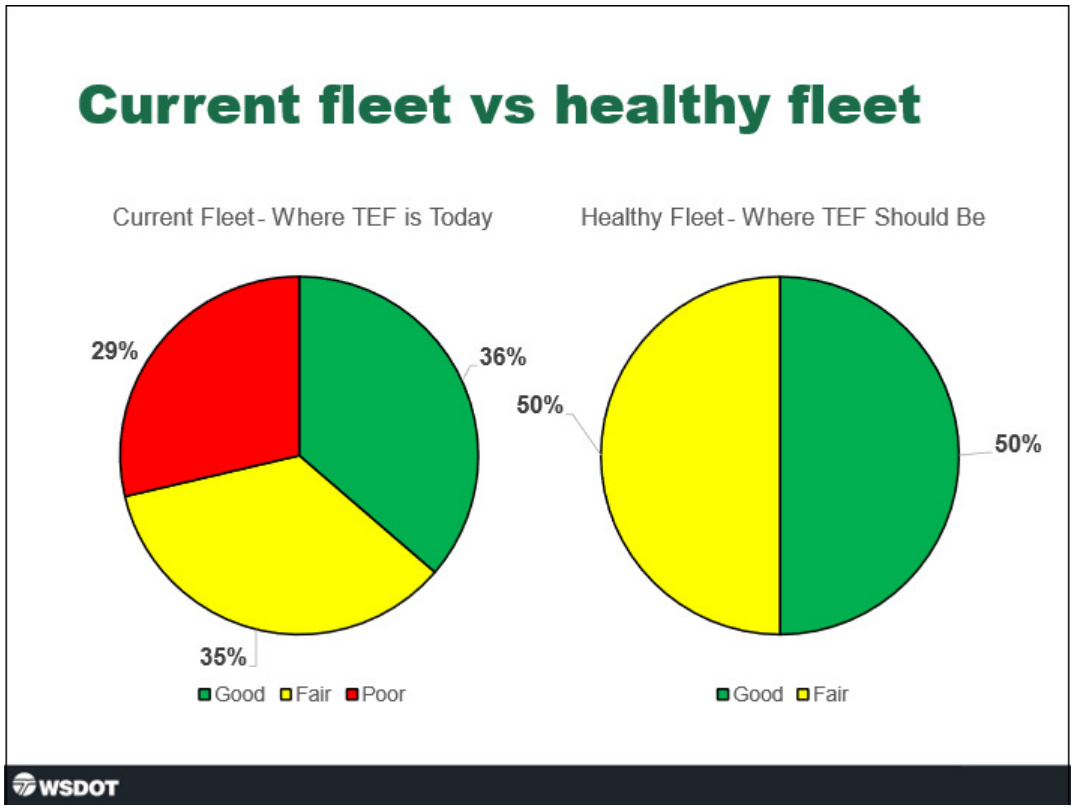

Figure 5. WS DOT Current Fleet vs. Healthy Fleet Data.

Source: WS DOT

In Figure 5, the illustration on the left was where the WS DOT Transportation Equipment Fund (TEF) was at the time of the presentation. Nearly 30 percent of the fleet is past its recommended lifecycle and at risk of major or catastrophic repairs. The illustration on the right represents where the WS DOT TEF needs to be to have a healthy fleet. This desired state represents the fleet function being fully funded and equipment replaced timely at the end of its lifecycle. It is important to note that their plan is a conservative 15 to 20 year plan. Adjustments will need to be made as more data is collected and WS DOT transitions to greener technologies. It is not their intent to create large capital purchases in 10 years, but rather to eliminate the purchasing backlog while creating a strong framework for level (smooth) equipment purchasing. In other words, a conservative approach to slowly reduce backlog over time, rather than creating a replacement bubble in the future.

The legislature funded WS DOT's first ever decision package for equipment replacement backlog, but the funding provided did not fully fund the replacement backlog need. It included:

- $20 million in funding to offset backlog equipment and fuel sites (Note: The WS DOT fleet function manages the fuel sites and includes the needed capital expenditures as part of the fleet equipment funding needs.).
- 20 percent increase in pay for heavy equipment mechanics.
- $4.1 million budget increase for parts and major component failure.
- $700 thousand to replace parts contaminated by asbestos.

The funding was helpful; however, this funding did not significantly address the growing equipment replacement backlog. Figure 6 shows the additional funds added to the fleet function but also shows the backlog trend if there is no further additional funding.

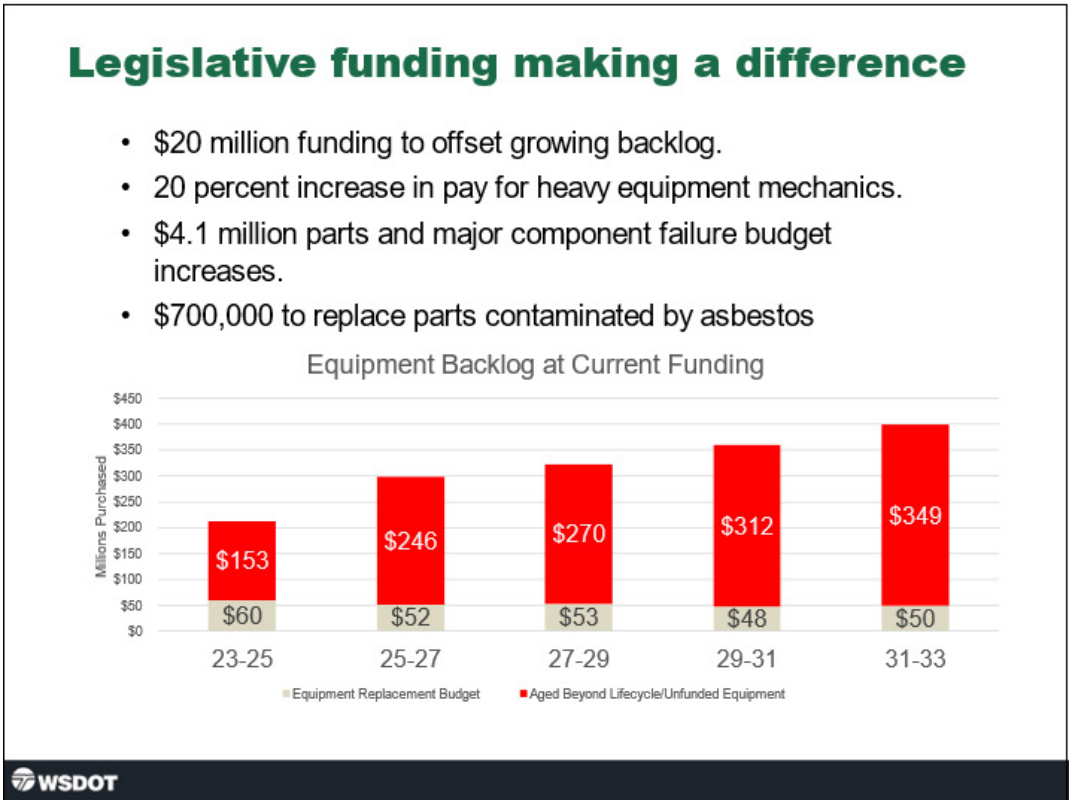

Figure 6. WS DOT Funding Data.

Source: WS DOT

The WS DOT fleet function understands the transportation funding constraints and will not be requesting additional funding at this time. However, they will continue to use data, reports, and graphics to be transparent regarding the significant fleet funding gap. Figure 7 shows funding needed that would slowly reduce the equipment backlog over time. This additional funding need is still being discussed by the WS DOT along with other programs' needs such as facilities, maintenance, etc.

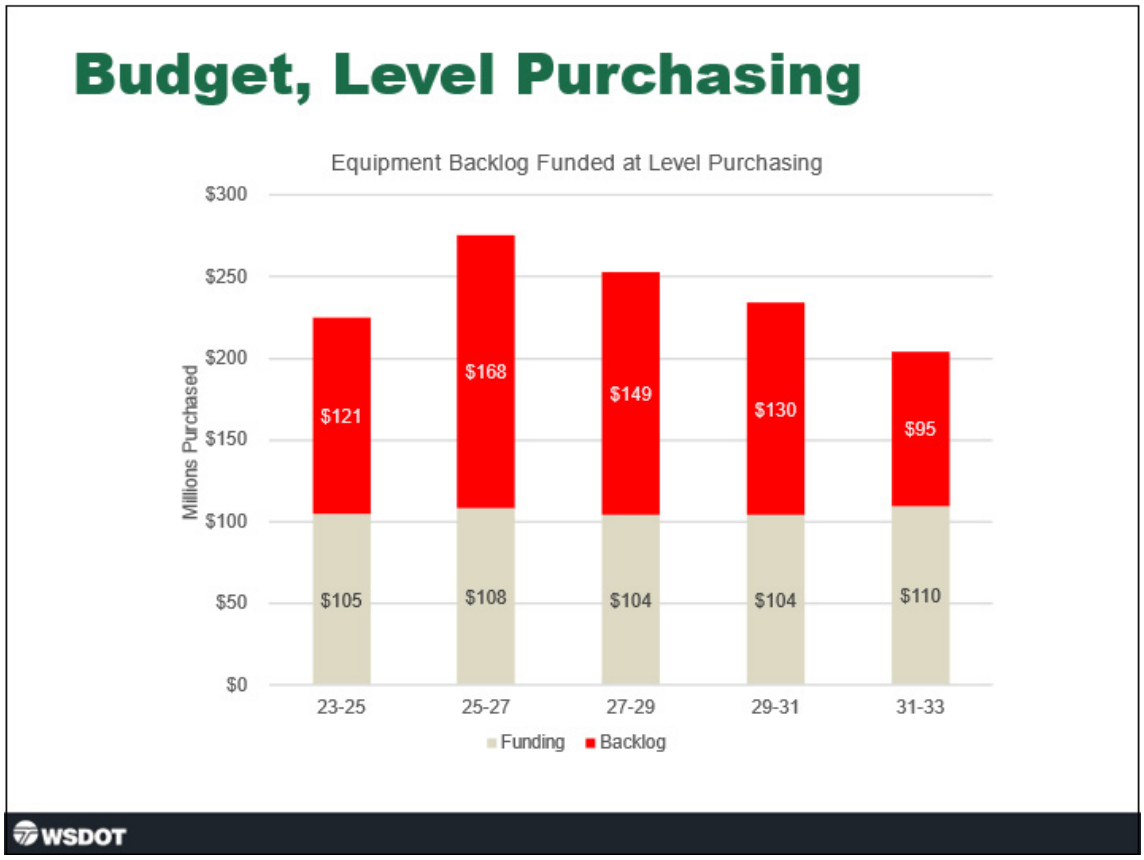

Figure 7. WS DOT Level Purchasing Data.

Source: WS DOT

1.3. Communication example

An example of the communication findings theme is the innovative practices employed by the Texas Department of Transportation (TXDOT) to engage stakeholders at all levels and effectively convey the state of its fleet and the long-term implications of aging fleet assets. TXDOT has successfully demonstrated how intuitive metrics, data visualization, and strategic communication can drive better decision-making and secure critical funding. This example also intersects with other findings themes, namely the credibility and data themes, showcasing how these factors reinforce effective communication. Below is an enhanced synopsis of TxDOT's methodology and outcomes.

TXDOT developed the Fleet Health Index (FHI), a composite metric designed to convey fleet health in a straightforward and impactful manner. This tool has transformed how TxDOT communicates fleet conditions, funding needs, and potential outcomes to decisionmakers. The FHI approach led to an immediate 8% budget increase, equivalent to $5.5 million to enhance fleet health and secure additional funding. Over the next two bienniums, budget allocations increased by 30%.

Key features of the FHI include the following:

1. Simple and universal communication:

The FHI leverages a letter grade system to represent fleet health, a universally understood framework. This transcends technical jargon and fosters productive discussions among fleet and non-fleet stakeholders, including legislators and executives. Grade definitions are as follows:

- Grade "A" = Goal
- Grade "B" = Average
- Grade "C" = Slightly below average
- Grade "D" = Below average
- Grade "F" = Significantly below average

The simplicity of this system ensures that stakeholders quickly grasp the implications of each grade and its alignment with stewardship of resources.

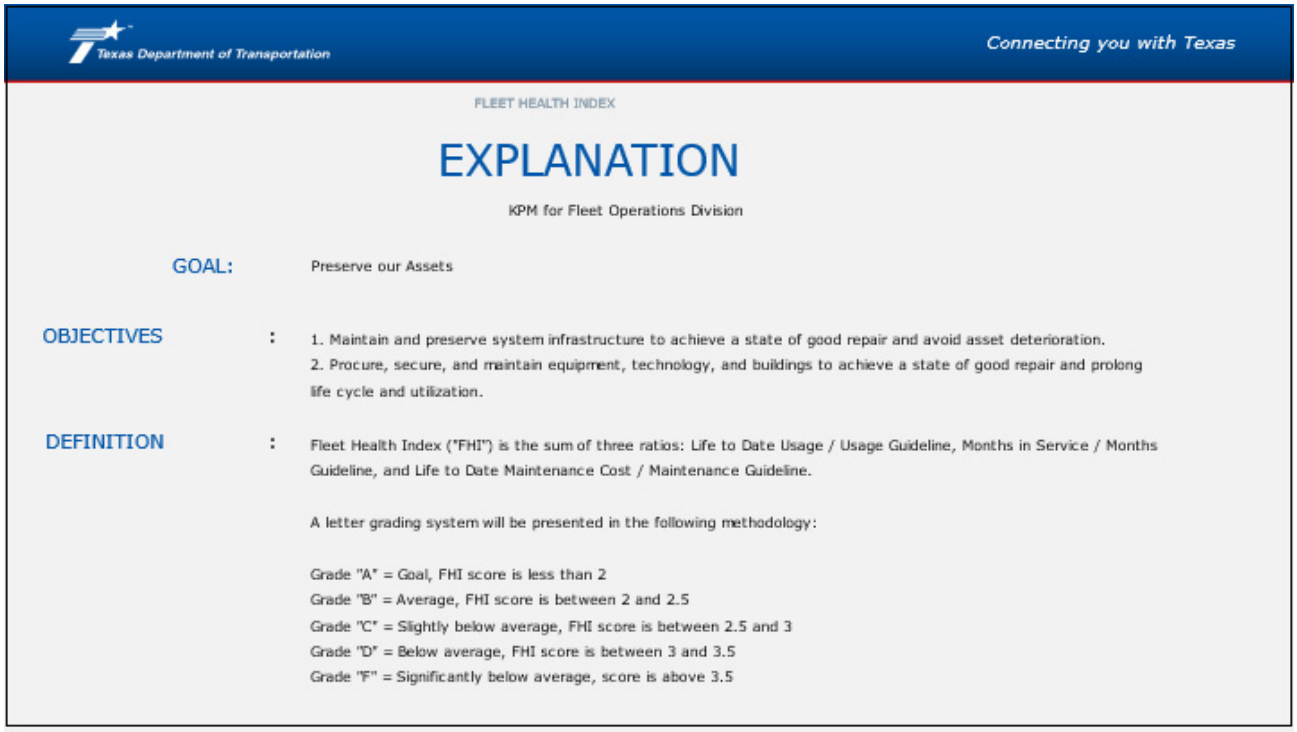

Figure 8. TX DOT FHI Explanation.

Source: TX DOT

2. Data-driven insights:

The FHI is calculated using three factors that reflect critical dimensions of fleet performance to provide a holistic view of fleet health:

a. Age:
   - Formula: Months in Service / Months Guideline
   - Tracks the proportion of the vehicle or equipment's lifecycle already used, helping stakeholders see aging trends.

b. Maintenance Costs:
   - Formula: Life-to-Date Maintenance Cost / Maintenance Guideline
   - Highlights whether assets are becoming costlier to maintain.

c. Utilization:
   - Formula: Life-to-Date Usage / Usage Guideline
   - Assesses how effectively vehicles and equipment are being used relative to their intended service capacity.

These metrics are derived from TxDOT's equipment management system and usage monitoring tools (including a module that uses a validated replacement criteria methodology), ensuring that the FHI is backed by robust and reliable data.

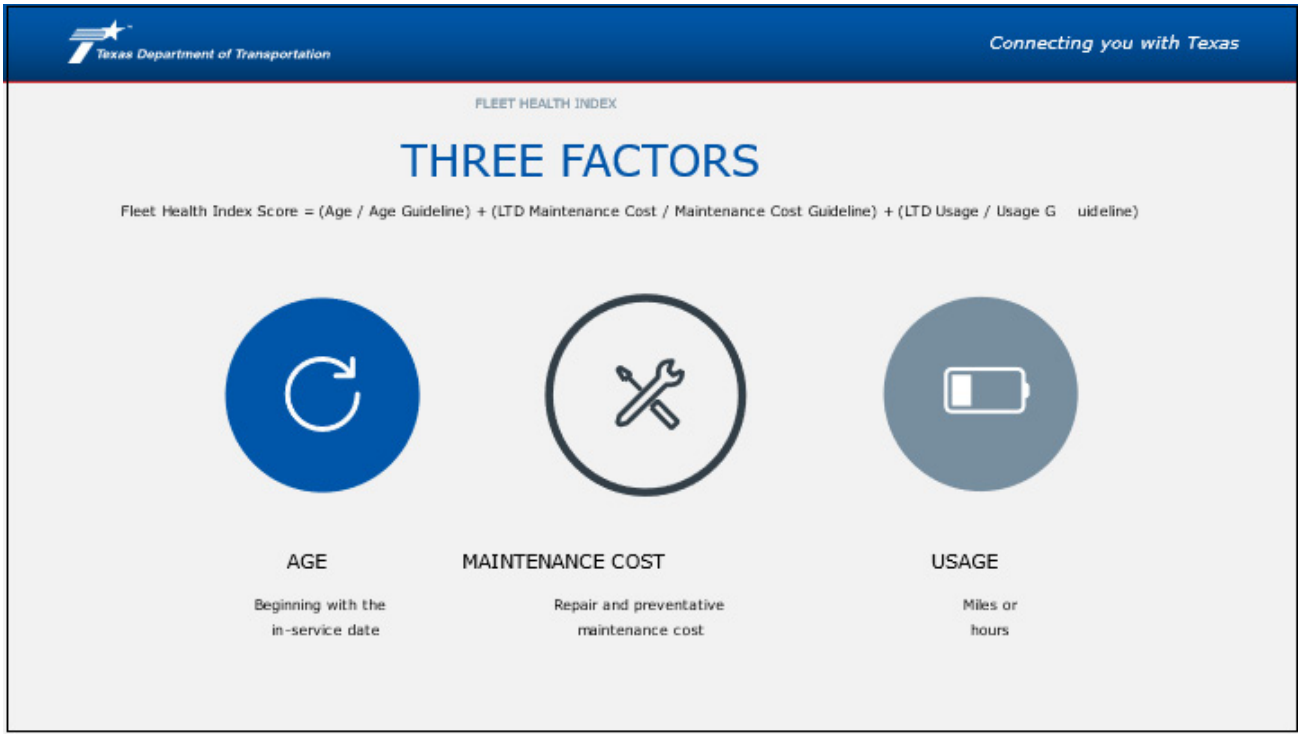

Figure 9. TX DOT Fleet Heath Index Factors.

Source: TX DOT

3. Scenario-based projections:

Legislative reports, enriched with visualizations, illustrate current FHI grades and project funding requirements to achieve desired grades (e.g., "A" or "B"). This "what-if" scenario analysis empowers decisionmakers to explore investment trade-offs and understand the impact of various funding levels.

For instance, a projection showing the cost to raise the FHI from a Grade "C" to a Grade "B" underscores that TxDOT is not asking for complete fleet modernization but for targeted improvements that maximize return on investment.

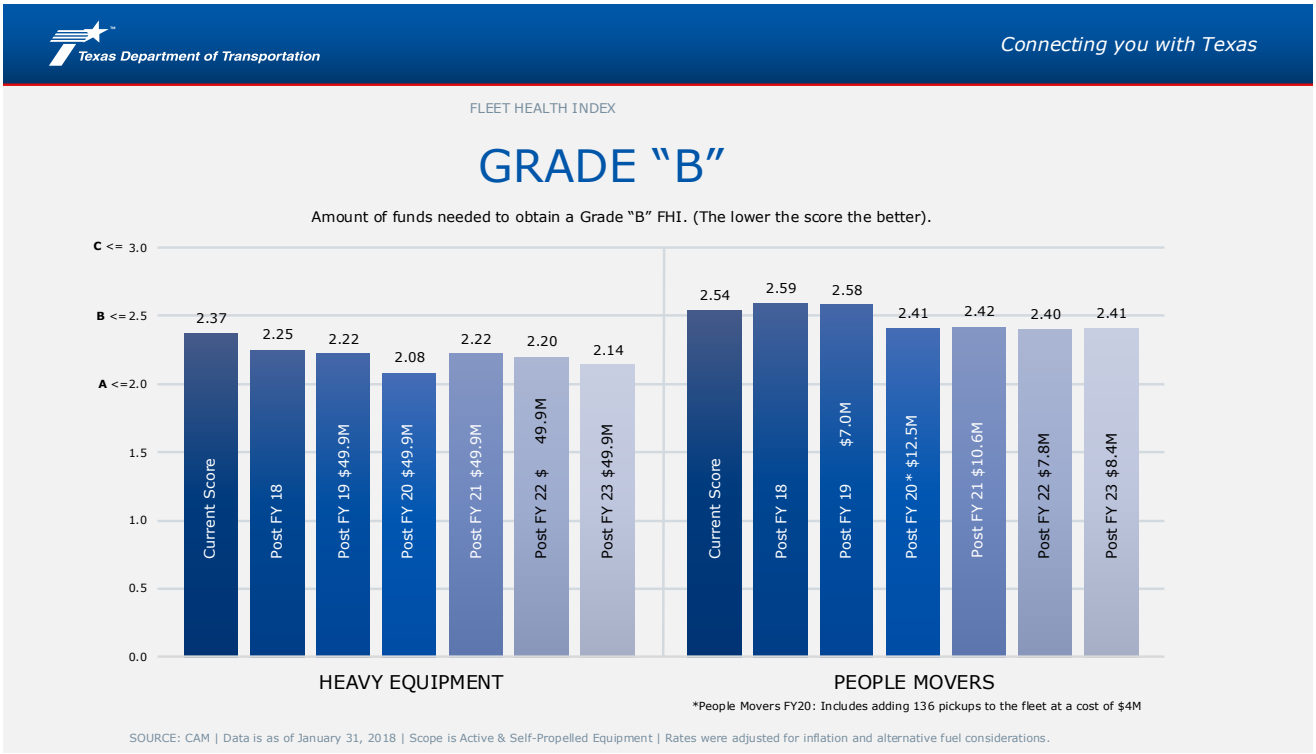

Figure 10. TX DOT Funding Needed to Obtain Grade "B" FHI.

Source: TX DOT

The adoption of the FHI has delivered measurable benefits to TxDOT. The FHI has enhanced credibility. The transparent, data-driven approach bolstered confidence in fleet management recommendations. Stakeholders perceive TxDOT as a responsible steward of resources, which was key in securing increased funding. The FHI also led to more effective communication. By presenting complex fleet data in an accessible format, TxDOT ensured that stakeholders, regardless of technical expertise, understood the implications of fleet health on operational readiness and public service delivery. And lastly, strategic decision-making was enhanced. Scenario-based analysis equipped legislators and executives with the tools to make informed decisions about fleet funding, aligning investments with organizational priorities and service goals.

1.4. Relationships example

The West Virginia Department of Transportation (WV DOT) presentation provided an example of how they communicated their fleet replacement needs by bolstering their relationships with key decision makers. The title of WV DOT's presentation was, "How to win friends and influence people (and get extra funds to buy equipment)." It is fitting as it conveys the high level of emphasis and importance that relationships with decision makers are to communicate the long-term effects of their aging fleet assets. Multiple findings themes are present, such as credibility and data; however, the following synopsis of WV DOT's approach focuses on the relationships findings theme.

A five year plan ($50 million) to reduce the equipment replacement backlog was initiated by the previous fleet manager. The plan included a $50 million funding request. WV DOT was not able to eliminate its equipment replacement backlog with this effort due to only a partial fulfillment of the funding request. Additionally, at this time there was a lot of pushback from social media on the equipment purchases.

With a new DOT commissioner came a concerted effort to raise the visibility of the fleet function and create relationships with decision makers as an adjunct to a data-based, fleet replacement funding approach. To accomplish this, the fleet function took the following actions:

- Raised visibility
  - Participated in publicity events and promotions
    - Invited decision makers to drive equipment in publicity events
  - Demonstrated the "can do" attitude of the fleet function
    - Governor's Christmas tree: The fleet function helped build temporary access to the tree and cut and transported the tree for installation
- Used a data approach
  - Defined the fleet health in terms of life cycle and replacements
  - Developed a plan for replacement needs
- Delivered on promises
  - Delivered equipment that the DOT commissioner requested in a reasonable timeframe
  - Used purchasing flexibility
    - Purchased "lot trucks" to avoid end of fiscal year cutoffs.
    - Purchased to get delivery (up buy or buy standard)
- Was ready to act
  - Had an equipment replacement plan prepared in anticipation of additional funding
  - Had purchase contracts in place

These efforts proved to be successful in communicating the long-term effects of WV DOT's aging fleet assets. The governor's advocacy for funding to the legislature was a result of the fleet function's efforts to raise their visibility and build relationships with decision makers. In the fiscal years 2023 and 2024, the fleet function's budget was augmented with an additional $100 million to reduce their equipment replacement backlog.

New Equipment Purchase Budget

State Fiscal Year (July 1- June 30)	Budget	Additional Funding	Total
2019	$15,000,000.00	$7,500,000.00	$22,500,000.00
2020	$15,000,000.00	$29,00,000.00	$44,000,000.00
2021	$18,000,000.00	$2,258,685.00	$20,258,685.00
2022	$20,000,000.00	$5,000,000.00	$25,000,000.00
2023	$20,000,000.00	$25,000,000.00	$45,000,000.00
2024	$25,000,000.00	$75,000,000.00	$100,000,000.00
2025 (Estimated)	$25,000,000.00		

Figure 11. WV DOT Additional Fleet Replacement Funding.

Source: WV DOT

2. Case Study

After the scan workshop, the scan team perceived the following case study to be an example of multiple findings themes and as being particularly noteworthy due to the unique circumstance.

2.1. Alabama Department of Transportation (AL DOT) revolving fund

AL DOT fleet function is an outlier among state DOT fleets in that it has no equipment replacement backlog and therefore has no specific need to communicate the long-term effects of aging government fleet assets. This is in stark contrast to most state DOT fleets as discussed earlier and shown in Figure 1. However, there is still much to learn from their unique circumstances. They are fully funded to replace their aged assets and currently have a $70 million reserve, in part due to delayed equipment deliveries caused by supply chain issues. Their enviable position is largely because the AL DOT fleet function operates under a statutorily-protected revolving fund that allows AL DOT to systematically self-dispose of units at, or near, the minimum life-cycle cost point. This has allowed AL DOT to have equipment ready to respond to the needs of the state's infrastructure without directly impacting budgetary funds. Major equipment program

elements that contribute to their success are shown in Figure 12. It is also important to note that the AL DOT fleet size is fixed and can only increase with legislative approval.

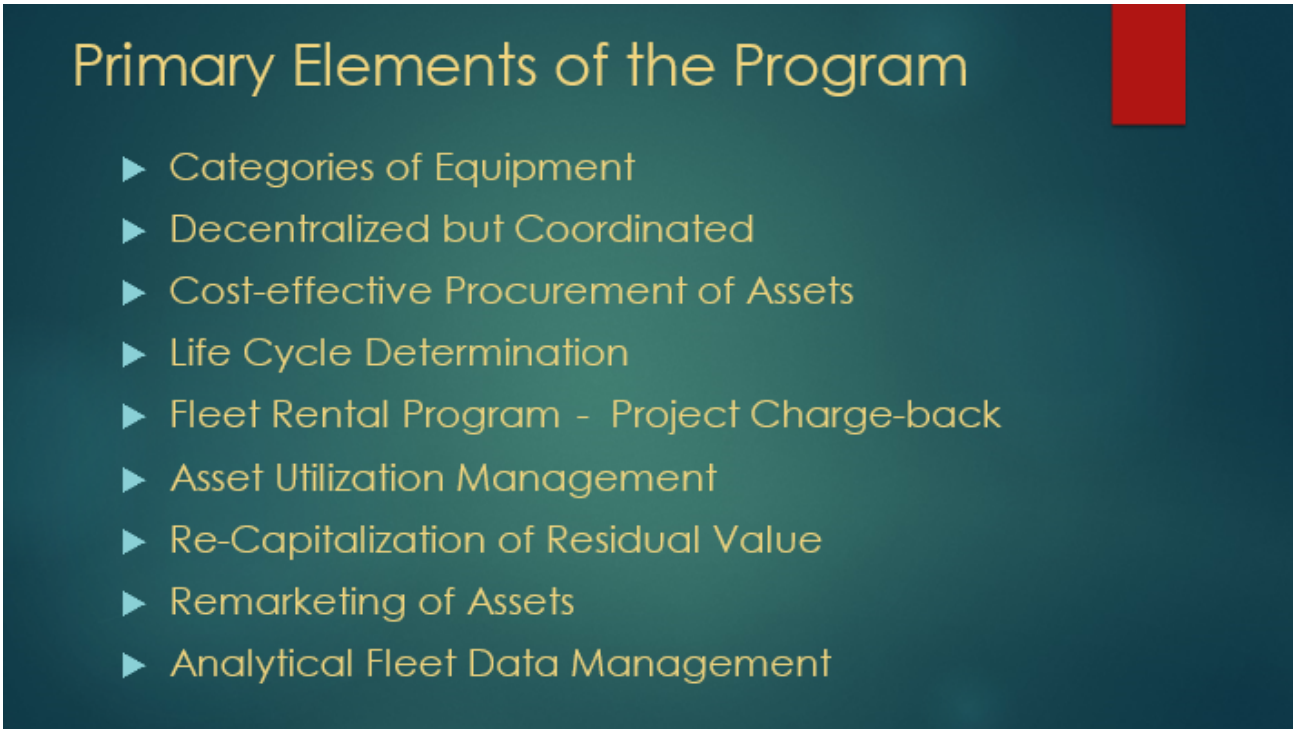

Figure 12. AL DOT Equipment Program Elements

Source: AL DOT

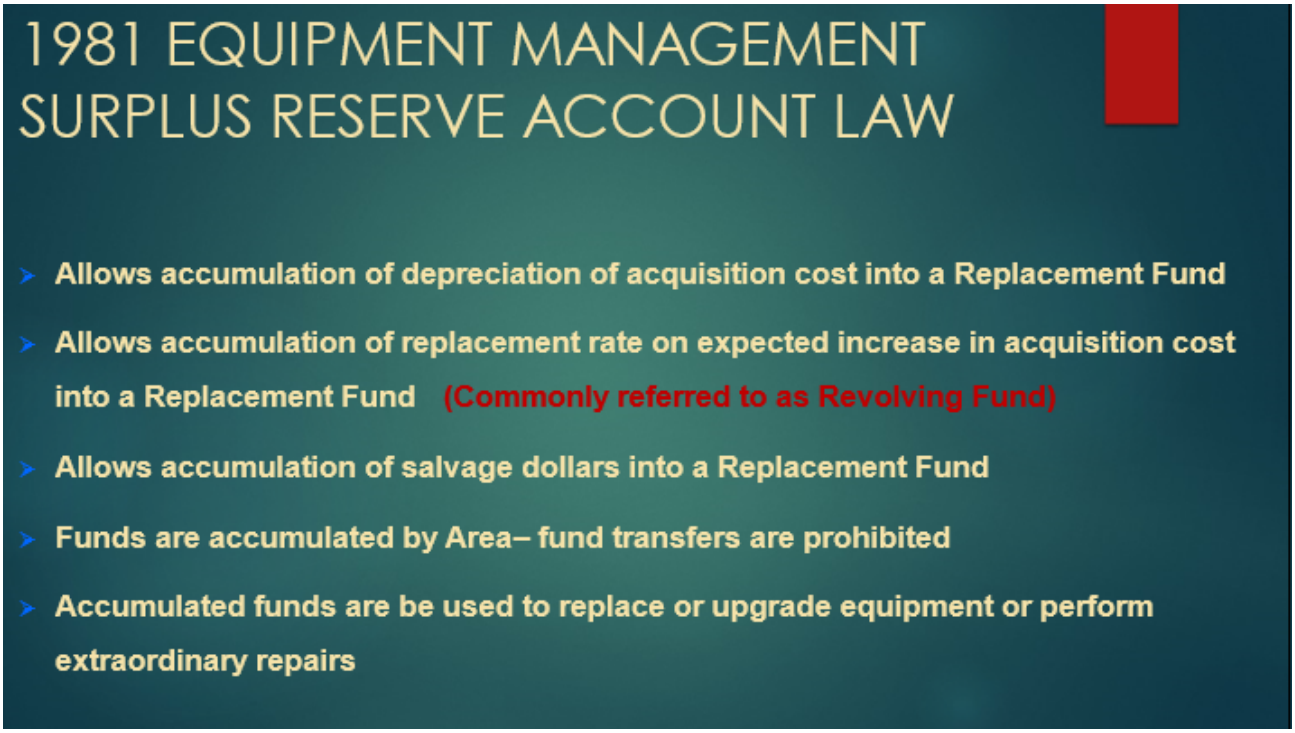

Figure 13. AL DOT Revolving Fund.

Source: AL DOT

In 1981, AL DOT fleet function began developing its rental rate system. It uses a revolving fund to collect rent on AL DOT internal use equipment. The rental rates are developed by the fleet function and include three cost components. Their rates are based on usage and include a depreciation rate, a replacement rate, and an operations rate (includes expenses such as repairs, fuel, tires etc.). There is a minimum rate if the asset is not used. One important rental rate driver (specifically the replacement rate component) is the estimated salvage value. In other words, the sale price of disposed equipment is a critical consideration in determining the rental rate. A discussion on AL DOT's sales process is included later in this section.

Figure 14. AL DOT Fleet Rental Program.

Source: AL DOT

The fleet function also determines the life cycle for each category of equipment based on economic principles. They have shorter life cycles than most DOTs. This contributes to higher residual values (sale price of disposed equipment) which, in turn, positively affects the replacement rate components of their rental rate.

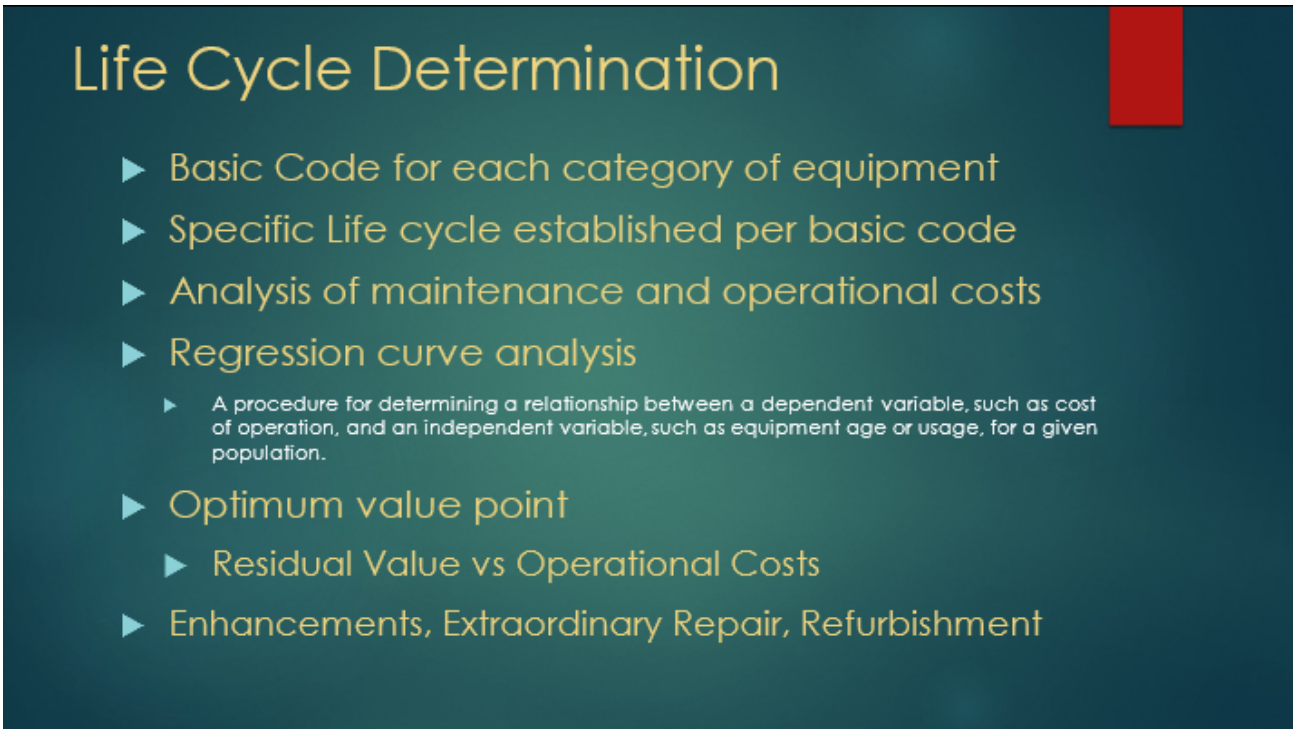

Figure 15. AL DOT Life Cycle Determination.

Source: AL DOT

Also, AL DOT has a refurbishment program that extends the life of selected existing assets. The fleet function analyzes the purchase cost of a new unit versus refurbishment. High cost assets, such as under bridge inspection trucks, have financial potential to undergo refurbishment. The funding for the refurbishment program comes from their capital acquisition funding and is properly accounted for in their financial system.

The surplus sales process is considered by AL DOT to be an important element of its rental rate program. The fleet function is responsible for the sale of their surplus equipment. All the receipts of the sales are returned to the fleet function and help fund equipment replacement. To ensure that the proceeds of used assets sales are optimized, AL DOT invests in the assets for sale so they "look like they rolled off of the showroom floor." For example, they do basic needed repairs and detailing that may cost $2,000 to $3,000 per asset. They also price the equipment for sale to Alabama state agencies, counties, and municipalities by using JD Powers, using an average of high auction and high retail values. For one-off type assets, they use sales history or residual value with some adjustment as a price (reserve).

Additionally, they use a contract professional auctioneer service with online capabilities to complement the in-person auctions. Also, from previous research, they credited their positive seller reputation as being partially due to strict compliance with a preventive maintenance program, which is part of its approach to increasing the pool of buyers and generating higher sales returns. AL DOT fleet maintenance records for the assets to be sold are made available to potential buyers. One additional benefit of AL DOT's successful surplus sales process is that large auction receipts generate a higher amount of sales tax revenue for the general fund.

Figure 16. AL Auction Benefits. Source:

Source: AL DOT

From previous research, "Alabama DOT noted, 'that its current fleet replacement program generates lower maintenance costs, higher fleet availability, a reduced need for spare units, and a lower cost of ownership. Additionally, AL DOT employees are perceived as being proud of the equipment, which encourages them to take better care of the equipment (which leads to higher resale). In combination, these factors and practices result in a higher state of equipment readiness, allowing AL DOT to better respond to emergencies.'"

Recommendations

This chapter includes recommendations aligned with the primary findings themes and other recommendations.

1. Primary recommendations

1.1. Credibility

- Formulate data-driven methodologies for replacement criteria, managing fleet size, and overall fleet costs.
- Share the methodology with decision makers and stakeholders.
- Develop equipment replacement plans and purchasing mechanisms.
- Deliver promised results.
- Prepare for contingencies.

1.2. Communication

- Develop effective visualization tools that communicate fleet health.
- Establish regularly scheduled communications with customers, decision makers, and other stakeholders, with the goal of communicating fleet health, needs, and trends.
- Leverage networking to augment communication opportunities.

1.3. Data

- Develop/acquire a fleet management system capable of capturing usable and understandable data and reports to inform fleet management decisions.
- Create and report fleet health metrics that are accessible and provide actionable insights.

1.4. Relationships

- Develop internal and external relationships to facilitate fleet story sharing to achieve fleets goals.
- Devote time and plan for relationship development and outreach.

2. Other recommendations

2.1. Related to the findings but not one of the themes

- Stewardship
  - States should be open to explore various options for disposal of equipment, taking advantage of programs such as buy back or trade-in programs.
  - States should ensure net revenue received from all forms of disposal (auction, government sales, etc.) be returned to the fleet program.

2.2. Recommended follow-up actions

2.2.1 Recommended further research

- Formal research needs:
  - Develop a tool for quantifying the hard (direct expenses, for example increased repair costs) and soft (indirect expenses, for example negative appearance perception) costs of aging government fleet assets so that the costs can be effectively communicated to decision makers
- Preliminary investigations or surveys.
  - Which DOTs receive auction receipts?
  - Survey of replacement criteria by type.
  - What utilization standards do DOTs use and how do they manage utilization?
  - Which DOTs have rental rate systems/charge back systems/revolving funds and how does that relate to their equipment replacement backlog and/or fleet health?

2.2.2 Standardized format

- Develop a standardized format for data visualization.
  - Create a standardized PowerPoint (or other presentation format) showing fleet health/backlog.

2.2.3 Follow-up meeting

- Coordinate a telematics user conference.

Implementation and Dissemination Plan

This chapter presents strategies and supporting actions that the scan team have outlined to share the results of the research. Completed activities and potential actions are listed below.

- Completed activities:
  - Presentation of scan draft summary report- AASHTO Maintenance Committee, Equipment Technical Working Group meeting (August 12-15, 2024).
  - Presentation of scan draft summary report- AASHTO Equipment Management Technical Services Program (EMTSP) national conference (August 20, 2024).
  - Various scan team members have completed internal preliminary briefing in their respective agencies.
- Potential activities:
  - Presentation of final scan report at AASHTO EMTSP regional meetings (Summer 2025).
    - Midwestern/Northeast joint meeting.
    - Western States Highway Equipment Managers Associate meeting.
    - Southeastern States Equipment Managers Conference.
  - Transportation Research Board-sponsored webinar on final scan report.
  - EMTSP-sponsored webinar on final scan report.

Appendix A: Scan Team Contact Information

Tim Cunningham, PE – Team Co-chair
Equipment Engineer
Kansas Department of Transportation
Division of Field Operations
Eisenhower State Office Building
700 SW Harrison Street
Topeka, KS 66603-3745
785-296-3853
tim.cunningham@ks.gov

Doug Burke, PE – Team Co-chair
Transportation Engineer
Ohio Department of Transportation
Division of Facilities and Equipment Management
1602 West Broad Street
Columbus, OH 43223
614-351-2836
Doug.Burke@dot.ohio.gov

Lisa M. Kunzman – Subject Matter Expert
Fair Oaks, CA
209 403 2795
el.kunzman@gmail.com

Darin Weaver
Traffic Incident Management Program Coordinator
Oregon Department of Transportation
Maintenance and Operations Branch / Fleet Services Division
455 Airport Road SE, Building "K"
Salem, OR 97301
503-910-6835
Darin.A.WEAVER@odot.oregon.gov

Howard Ray
Fleet / Equipment Asset Manager
Colorado Department of Transportation
18500 E Colfax Avenue
Aurora, CO 80011
719-251-0308
howard.ray@state.co.us

Colby Page
Central Fleet Manager
Michigan Department of Transportation
Bureau of Field Services / Transportation Systems Management Operations
2522 West Main Street
Lansing, MI 48917
517-643-4476
PageC12@michigan.gov

Greg Bright
Statewide Fleet Director
Indiana Department of Transportation
Highway Operations
100 North Senate Avenue, Room N758-FLT
Indianapolis, IN 46204
402-202-7441
GBright@indot.IN.gov

Stan Carlton
Equipment Management Coordinator
Bureau of Equipment, Procurement, and Services
Alabama Department of Transportation
1409 Coliseum Boulevard, F101
Montgomery, AL 36110
334-242-6062
carltons@dot.state.al.us

Jeff Pifer, PE
Equipment Division Chief
West Virginia Department of Transportation
83 Brushy Fork Crossing
Buckhannon, WV. 26201
304-472-1750
Jeff.M.Pifer@wv.gov

James Chupas
Transportation Maintenance Director
Connecticut Department of Transportation
Bureau of Highway Operations
2800 Berlin Turnpike
Newington, CT 06111
860-594-2639
james.chupas@ct.gov

Appendix B: Scan Team Biographies

TIM CUNNINGHAM, PE, is a member of the American Association of State Highway and Transportation Officials (AASHTO) Committee on Maintenance and currently the AASHTO Equipment Technical Working Group (TWG) Chair. Tim is the Equipment Engineer for the Kansas Department of Transportation (K DOT) and has been with K DOT for 37 years. He graduated from Kansas State University in 1987 with a bachelor's degree in mechanical engineering. Tim served on the Transportation Research Board (TRB) Equipment Maintenance Fleet Standing Committee from 2013 until he was rotated off in 2024, and has served on multiple National Cooperative Highway Research NCHRP Program (NCHRP) Committee Research Panels, including the following: NCHRP Project 13-04 *Guide for Optimal Replacement Cycles of Highway Operations Equipment, NCHRP Project 13-07 Guide to Calculating Ownership and Operating Costs of Department of Transportation Vehicle and Equipment Fleet* and NCHRP Project 13-08 *Guideline for Decision-Making for Repair vs. Replacement of Highway Maintenance Equipment*. Tim is currently serving on the Committee Research Panel for NCHRP Project 20-123(23) A Strategic Plan for Equipment Management Research.

DOUG BURKE, PE, has been employed with the Ohio Department of Transportation (Ohio DOT) for over 34 years. He has worked for over 32 years in Ohio DOT's equipment office, in which he is currently the administrator and equipment engineer. He received a bachelor's degree in mechanical engineering from Ohio State University. During his career in Ohio DOT's equipment management, he has worked directly with Ohio's prison industry designing and managing all the aspects of the truck assembly program, including creating specifications, ordering components and in-person design work during assembly. He has also been a long-time member of AASHTO's Equipment Managers' Technical Service Program (EMTSP) as well as a member of that group's oversight panel and Ohio DOT's representative for the Equipment TWG Group of AASHTO's Committee on Maintenance. Doug has participated in a national research project on warning lights, two national scan tours, and multiple equipment-related research projects sponsored by Ohio DOT. Lastly, Doug has been a back-up snowplow driver from the department for 20 plus years.

LISA KUNZMAN, a nationally recognized fleet management expert, is now an independent consultant after retiring from the California Department of Transportation (Caltrans) and a recently graduated with a Master of Science in Transportation Management. Her experience includes asset management, quality assurance, and bringing new technology into the fleet. Lisa began her career as a mechanical engineer, then she took on various leadership positions at Caltrans. She was formerly an active leader in transportation organizations such as TRB and AASHTO. As a consultant, she continues her participation with TRB and is featured as a speaker to share her expertise at fleet and transportation conferences.

DARIN WEAVER is the Fleet Services Manager, Oregon Department of Transportation (Oregon DOT) and a lifelong Oregonian. Darin began his career with the Oregon DOT in 1997. During the first 14 years with the agency, he spent time in various Maintenance and Operations field positions, primarily on the North Oregon coast. In 2011, Darin accepted a position with Oregon DOT's Systems Operations and Intelligent Transportation System Section, to become the first Statewide Traffic Incident Management Coordinator within the agency. In this role, he coordinated the activities for the state's Incident Response Program (Freeway Service Patrol) and Traffic Incident Management (TIM) programs. He worked at a program level across the state and the nation with TIM partners of every discipline to promote enhanced inter-agency coordination, communication, and collaboration. In 2019, Darin accepted the Fleet Services Manager position within the Oregon DOT where he now leads the agency's Fleet Services Section, working to assemble and maintain a safe, efficient, and sustainable fleet of vehicles and equipment.

JAMES "HOWARD" RAY Jr has a little over 40 years of fleet maintenance and management experience. Howard has been with the Colorado Department of Transportation for over 16 years. He is currently serving as the Fleet/Equipment Asset Manager within the Division of Maintenance and Operations. He has also held the positions as Heavy Equipment Shop Maintenance Supervisor for one of the Department Regional Equipment Maintenance Shops and the Heavy Fleet Administrator within the Fleet Services Section. He has completed a Maintenance Management Program with the University of Kansas and the Maintenance Leadership Academy with the Federal Highway Administration's National Highway Institute.

COLBY PAGE is the Central Fleet Manager for the Michigan Department of Transportation. Colby has over 24 years of engineering experience in automotive door systems, heavy truck electrical, and aerospace engineering working with advanced composites. He currently holds an Airframe and Powerplant license and has experience managing an International Trade Compliance program as a Technology Manager. Colby graduated from Central Michigan University with a master's degree in vehicle design and manufacturing management.

GREG BRIGHT is the Statewide Fleet Director for the Indiana Department of Transportation (Indiana DOT). Greg started in May of 2022. He is a director of the AASHTO Equipment Management Technical Services Program (EMTSP) Midwest Region. Prior to his work at Indiana DOT, he worked in logistics operations in the private sector for nine years. He is a graduate of the University of Nebraska-Lincoln with a Bachelor of Arts and the University of Oklahoma-Norman with a Master of Arts.

STAN CARLTON is the Equipment Management Coordinator for Alabama Department of Transportation (AL DOT). Stan serves as Chief of the Bureau of Equipment, Procurement and Services. He is responsible for managing all aspects of the department's fleet assets, Procurement Operations, Land, and Building projects including construction and renovations state-wide, and Property and Facilities Management of the Central Office Complex, encompassing almost 600 acres in Montgomery, Alabama. He graduated Magna Cum Laude from Troy University with a Bachelor of Science degree in Resources Management and minors in Engineering Technology and Accounting. He has been employed by AL DOT since 1994, managing the Procurement Section of the department until assuming his current responsibilities in 2016. He is a member of the AASHTO EMTSP Southeastern States Equipment Managers' Conference (SSEMC) and the NAFA Fleet Management Association. AL DOT's Fleet Operations has been recognized in the Top 100 Government Fleets in North America for eight consecutive years.

JEFFREY M. PIFER, PE, has worked with the West Virginia Department of Transportation (WV DOT) for 33 plus years. He has held the positions of construction project engineer, roadway design engineer, maintenance assistant engineer, maintenance engineer, and regional maintenance engineer throughout his career. Jeff started his career with an excavating contractor where he worked for five years before joining the WV DOT. His father was an operating engineer, and Jeff grew up around equipment and trucks. Equipment and trucks were his focus and passion throughout his career and when the opportunity came to join the Equipment Division as Assistant Director there was no hesitation. He was appointed the Director of the Equipment Division in 2018 and continues in that role today. He graduated from West Virginia University with a bachelor's degree in civil engineering in 1990, is a licensed professional engineer in West Virginia, and currently serves on the AASHTO EMTSP SSEMC and as the West Virginia representative for Clear Roads.

JAMES CHUPAS is the Transportation Maintenance Director for the Connecticut Department of Transportation. He has over 34 years working with the Department in various rolls starting as a Technician, Fleet Manager to current position as Director. Jim is a veteran of the United Staes Marine Corps and holds a B.S. degree from Springfield College and a Certified Automotive Fleet Manager certification. In conjunction with his career with CTDOT Jim is heavily involved with MTAC (Motor Transport Association of Connecticut) and trucking industry in New England.

Appendix C
Invited Participants Contact Information

Alaska Department of Transportation & Public Facilities

Brad Bylsma
Statewide Fleet Manager
Alaska Department of Transportation & Public Facilities
State Equipment Fleet
5420 Doctor Martin Luther King Jr. Avenue
Anchorage, AK 99507
907-269-0787
brad.bylsma@alaska.gov

California Department of Transportation

Jeremy Matsuo, PE
Senior Equipment Engineer
California Department of Transportation
Division of Equipment
3400 R Street
Sacramento, CA 95816
916-516-3380
jeremy.matsuo@dot.ca.gov

Connecticut Transit

Robert Staff
Assistant General Manager Fleet and Maintenance RATP Dev
Connecticut Transit Hartford Division
100 Leibert Road
P.O. Box 66
Hartford, CT 06141-0066 860-519-8420
bstaff@cttransit.com

Idaho Transportation Department

Steve Spoor (retired August 2024)
Maintenance Service Manager
Idaho Transportation Department
Maintenance Operations
208-859-3083
steve.spoor69@gmail.com

Kelley Dick
Fleet Manager
Idaho Transportation Department
kelley.dick@itd.idaho.gov

Kentucky Transportation Cabinet

Rick Durham
Director, Division of Equipment,
Kentuckyt Transportation Cabinet
502-564-3916
Rick.Durham@ky.gov

Katherine Cataldi
Highways Budget Analyst
Office of Budget and Fiscal Management
Kentucky Transportation Cabinet
Office Phone: 502-782-4091
Katherine.cataldi@ky.gov

Cass Walling
Equipment Systems Consultant IT
Kentucky Transportation Cabinet
cass.walling@ky.gov

Texas Department of Transportation

John Santana
Strategy & Analytics Team Lead
Fleet Operation
Texas Department of Transportation
W: 512-739-7111
John.Santana@txdot.gov

Louisiana Department of Transportation and Development

Jarrett Lambert
Equipment Manager
Louisiana DOTD
225-935-0248
jarrett.lambert@la.gov

Washinton State Department of Transportation

Ernie Sims
State Equipment Manager
Washinton State DOT
509-570-4034
cell 509-869-3826
Ernie.Sims@wsdot.wa.gov

Charlene Emmons
Budget & Finance Manager
Washington State DOT
360-705-7882
emmonsc@wsdot.wa.gov

Steve Jenkins
Assistant Fleet Manager
WSDOT HQ TEF
360.705.7173
Steve.jenkins@wsdot.wa.gov

Appendix D: Amplifying Questions

1. The Agency
    a. Statistics on jurisdiction
        - For highway agencies, total lane miles in network, etc.
        - For transit agencies, provide network size, etc.
    b. Agency Size and Organization
        - Provide an organizational chart with major functions and showing where the fleet function fits into the overall organization
    c. Applicable Legislation, Rules, Standards, Policies and Mandates
        - External fleet governance
        - Fleet mandates
        - Acquisition budget and planning cycle biennial, annual, other
    d. Current Budget Resources Available (for the parent agency not just the fleet function)
        - Breakdown by major functional areas (e.g. capital, maintenance, administration, etc.)

2. The Agency Fleet (added category)
    a. Applicable Legislation, Rules, Standards, Policies and Mandates
        - External fleet governance
        - Fleet mandates
        - Provide an organization chart for the fleet function (major functions)
            - Do you have fleet analysts?
        - Describe fleet department business model
            - Centralized vs. non-centralized fleet management?
            - Special legislation
        - What fleet management system are you using?
        - Replacement funding mechanisms/source
            - Separate budget?
            - Maintenance budget?
            - Legislative request?
            - Other

- Describe the decision-making process for fleet replacement (e.g., centralized, decentralized, or mixed)
- Fleet size
  - Light duty fleet
  - Heavy duty fleet
  - Non-road fleet
- What is the replacement value of your fleet?
- Fleet department budget
  - Overall budget
  - Breakdown of overall budget (e.g., repair [maintenance], replacement, fuel, insurance, etc.)
  - Replacement budget (indicate one-time funding or other funding (including federal funds) that it not permanent)
  - Special funds for replacement (grants, redirections, federal funds, etc.)
- Replacement backlog (if applicable)
  - Percentage equipment is within or exceeds established criteria (typically in months or years of age and usage in miles or engine hours) for the expected life cycle or useful life. See 5a, "Metrics," below for definition and example.
  - Funding needed to meet replacement cycles
  - Number of units

3. Questions focusing on the scope being examined including:

   a. Successful Strategies

   - How are you managing usage? How do you know your fleet is being used enough? Is your fleet right-sized?
   - Have the replacement criteria been updated or validated recently?
     - What method or model was used?
   - Have you successfully communicated the business case to replace fleet assets on time? (Note: Potentially being in a proactive situation)
     - What elements are included in the business case?

- Have you successfully efficiently communicated the long-term effects of deferring replacement? (Note: Potentially in a defensive situation, like a budget cut)
  - What was the climate like at the time? For example, was the Agency making budget cuts?
  - What effects were conveyed?
  - Examples
    - Increased maintenance costs
    - Spike in replacement funds needed (inflation)
    - Cost of downtime (lost productivity)
    - Cost of emissions
    - Lack of advanced safety features
- Have you tailored materials to specific audiences?
- Have you engaged communication specialists?
- Who is the audience to make your case to about fleet replacement?
- Do you have direct access to the decision makers to make your case about fleet replacement? Are there levels in between you and the ultimate decision makers?
- What led to your success or what were the key points?
  - Examples
    - Political climate
    - Using an accepted economic model to update/validate replacement criteria
    - Using cost data
    - Dedicated funding that is protected
    - Explaining inflation
    - Focusing on a smaller fleet segment
    - Focusing on new technology costs
    - Greening
    - State gas tax
    - Safety issue
    - Special funding
    - Other

b. Advances in Practice

- Have you successfully developed and implemented practices and procedures to estimate the cost of delayed replacement of DOT fleet assets beyond the optimal replacement period? (Potentially used primarily internally by the fleet function)
  - What costs were included?
  - Examples
    - Increased maintenance costs
    - Spike in replacement funds needed (inflation)
    - Cost of downtime (lost productivity)
    - Cost of emissions
    - Lack of advanced safety features
- Have you successfully gathered data that might be used to develop decision making tools and models that can effectively communicate the long-term effects of aging the fleet assets to decision makers? (Potentially used primarily to communicate external to the fleet function)
- Utilization management: Do you have technology like AVL, GPS, fuel management systems, etc., that help you validate usage and management fleet usage?
- Do you use/have a method or report on long-term replacement planning with scenarios (that accounts for inflation)? (e.g., NCHRP Report 13-06A- Replacement of Highway Operations Equipment: Formulation of Long-Range Plans and Budgets)

c. Emerging Technologies

- Model or methods used to validate replacement criteria
- Use of research projects like replacement criteria (NCHRP 13-04- Guide for the *Formulation of Long-Range Plans for Replacement Needs and Budget of Highway Operations Equipment* - Phase I or other studies or program)?

d. Possible Successful Examples/Case Studies

- Was a specific segment of the fleet targeted for funding augmentation?
- Was an alternative procurement method used?

e. Lessons Learned

- What strategies weren't successful and/or how were they altered to be successful?
- How have supply-chain issues been addressed?
- Do you have any lessons learned on how to leverage an end-of-year budget windfall?

4. Quality Assurance and Quality Control.
    a. Quality Assurance/Quality Control Plan
        - What controls are in place to ensure fleet replacement funds are not redirected?
        - Is replacement criteria correct/validated?
        - What accountability measures and/or reporting are done to track how fleet funds are spent?
        - Are performance measures used to show replacement funding was a good investment?
        - Is equipment condition reviewed as part of the replacement needed identification?
        - Are measures in place to address incentives/disincentives for identifying equipment for replacement or making good business decisions?
        - How do you ensure data integrity?
5. Performance Measures/Success Indicators
    a. Metrics
        - What metrics (or data) do you use to support your funding requests?
        - What metrics support your credibility?
        - What metric demonstrates improved fleet health after replacement investment?
        - Do you use any of the following American Association of State Highway and Transportation Officials, Equipment Management Technical Services Program adopted (and defined) performances measures?
            - Replacement Recommended, also known as desired service life.
            - Utilization
            - PM Compliance
            - Availability
            - Scheduled vs. Unscheduled
    b. Evaluations of Performance/Success Indicators
        - What indicates or how do you know you are successfully validating and/or communicating the long-term effects of aging government fleet assets?
            - Adequate replacement funding or recent funding augmentations
            - Executive/stakeholder acknowledgement of replacement backlog
            - Replacement criteria validated or updated
            - Executive/stakeholder recognition that the fleet is right-sized

- Executive/stakeholder understanding of non-monetary impacts of an aging fleet (.g.: lack of advanced safety features, emissions, lower productivity, etc.)
- Other (explain)

6. Sustainability
    - If your funding augmentation isn't permanent, what is your plan to address when funding expires?
    - How do you account for inflation?
    - What contingency plans do you have to address replacement funding shortfalls or budget cuts/raids?

Appendix E
Scan Itinerary

July 28, 2024 (Sunday)

- Travel day
- Scan Team kick off meeting (scan team only)

July 29, 2024 (Monday)

- Introduction
- Presentations
  - Idaho Transportation Department
  - Alabama Department of Transportation
  - California Department of Transportation

July 30, 2024 (Tuesday)

- Presentations
  - Kentucky Transportation Cabinet
  - Washington Transportation Department
  - Connecticut Department of Transportation
  - CT Transit (Connecticut)

July 31, 2024 (Wednesday)

- Presentations
  - Texas Department of Transportation
  - Lousina Department of Transportation and Development
  - Alaska Department of Transportation and Public Facilities
  - Indiana Department of Transportation

August 1, 2024 (Thursday)

- Presentations
  - West Virginia Department of Transportation
- Group discussion

August 2, 2024 (Friday)

- Scan team final meeting (scan team only)
  - Findings
  - Recommendations
  - Dissemination plan

References/Endnotes

[i] "23-05 Prospectus," 23-05 — Successful Approaches to Validating and Communicating the Long-term Effects of Aging Government Fleet Assets, U.S. Domestic Scan Program, last visited December 27, 2024, https://domesticscan.org/scans/23-05-successful-approaches-to-validating-and-communicating-the-long-term-effects-of-aging-government-fleet-assets/.

[ii] "Performance Metrics," DOT National Metric Benchmarking, Equipment Management Technical Services Program, last visited December 20, 2024, https://www.pavementpreservation.org/wp-content/uploads/emtspmetrics/National_Metric_Benchmarking.pdf.

[iii] "Performance Metrics," Performance Metrics Definitions, Equipment Management Technical Services Program, last visited December 20, 2024, https://www.pavementpreservation.org/wp-content/uploads/emtspmetrics/Performance-Metric-Definitions-2017-11-03.pdf.

[iv] "Performance Metrics," DOT National Metric Benchmarking, Equipment Management Technical Services Program, last visited December 20, 2024, https://www.pavementpreservation.org/wp-content/uploads/emtspmetrics/National_Metric_Benchmarking.pdf.

[v] National Academies of Sciences, Engineering, and Medicine. 2023. *Maximizing Proceeds from the Fleet Asset Disposal Sales Process*. Washington, DC: The National Academies Press. https://doi.org/10.17226/27302.


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