EXECUTIVE SUMMARY

INTRODUCTION TO THE UTAH TRANSPORTATION ASSET MANAGEMENT PLAN (TAMP)
The Utah Transportation Asset Management Plan (TAMP) is the plan UDOT follows to achieve the Preserve Infrastructure strategic goal. The specific objectives of this plan which comprise the asset management roadmap are:

- Formulate a data driven performance-based approach for allocating transportation funds to manage pavements, bridges and ATMS and signal devices
- Incorporate asset management into the intermediate and long-range planning processes
- Incorporate risk management into resource allocation decisions
- Provide a valuable asset management tool with real time data

ASSET REGISTER
The UDOT Asset register depicts the quantity and value of UDOT major roadway assets. The value of each asset is the current cost to replace and construct/install the asset including costs for design, construction oversight, traffic control, and mobilization.

<table>
<thead>
<tr>
<th>ASSET TYPE</th>
<th>QUANTITY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1 Assets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pavement</td>
<td>172,045,914 SY</td>
<td>$24,000,000,000</td>
</tr>
<tr>
<td>Bridges</td>
<td>19,515,339 SF</td>
<td>$5,000,000,000</td>
</tr>
<tr>
<td>ATMS Devices</td>
<td>Lump</td>
<td>$231,000,000</td>
</tr>
<tr>
<td>Signal System</td>
<td>1223 Each</td>
<td>$306,000,000</td>
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<tr>
<td>Tier 2 Assets</td>
<td></td>
<td></td>
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<tr>
<td>Pavement Markings</td>
<td>26,000 Miles</td>
<td>$42,000,000</td>
</tr>
<tr>
<td>Rumble Strips</td>
<td>26,287,969 FT</td>
<td>$6,000,000</td>
</tr>
<tr>
<td>Tier 3 Assets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fences</td>
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<td>Cattle Guards</td>
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<td>$20,000,000</td>
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ASSET MANAGEMENT TIERS
To accomplish the objective of allocating transportation funding toward the most valuable assets and those with the highest risk to system operation, the Asset Advisory Committee/Performance Management Group developed a tiered system of asset management. Asset Management tiers range from one to three with tier one being the most extensive management plan for the highest value assets.

Tier 1 – Performance-based management
- Accurate and sophisticated data collection
- Targets and measures set and tracked
- Predictive modeling and risk analysis
- Dedicated funding

Tier 2 – Condition based management
- Accurate data collection
- Condition targets
- Risk assessment primarily based on asset failure

Tier 3 – Reactive management
- Risk assessment primarily based on asset failure
- General condition analysis
- Repair or replace when damaged

PERFORMANCE-BASED MANAGEMENT

FEDERAL PERFORMANCE MEASURES AND TARGETS

<table>
<thead>
<tr>
<th>Asset</th>
<th>Tier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement</td>
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<tr>
<td>Bridges</td>
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<td>ATMS Devices</td>
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<td>Signal Devices</td>
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</tr>
<tr>
<td>Signs</td>
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<td>Walls</td>
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</tr>
<tr>
<td>Rumble Strips</td>
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</tr>
<tr>
<td>ADA Ramps</td>
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</tr>
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<td>Barrier</td>
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<td>Rest Areas</td>
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<td>Curb and Gutter</td>
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<td>Trails</td>
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<td>Bike Lanes</td>
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</tr>
<tr>
<td>Surplus Land</td>
<td>3</td>
</tr>
<tr>
<td>At-grade Railroad Crossings</td>
<td>3</td>
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</tbody>
</table>

UDOT PERFORMANCE MEASURES AND TARGETS

UDOT Preserve Infrastructure Dashboard

PERFORMANCE GAP IDENTIFICATION
UDOT pavements currently and historically have exceeded the federal and state target levels for good and poor conditions on Interstates, NHS and statewide. Pavement projections are for continuing to meet targets statewide and on the NHS.

While currently within both good and poor targets, the percentage of good bridges in the state of Utah, both on and off the NHS, are consistently declining. The number of fair condition bridges continue to increase, and in time, without a proactive approach more fair condition bridges will drop from fair to poor condition than can be addressed in a given funding year.
UDOT has established performance measures and targets for ATMS devices due to their status of tier 1 assets. Currently UDOT has numerous devices that are beyond their expected life and are not operational or are not fully operational. Over the next few years this backlog will be eliminated, and critical devices will be replaced as they reach the end of their life and before they fail. The current level of funding will allow UDOT to reach the performance target for ATMS devices over the next few years.

UDOT has also established performance measures and targets for the Signal System as a tier 1 asset. The signal system is currently and historically below target condition. Repairs to existing signal equipment and replacement and installation of new signals is completed on a priority basis as funding is available within STIP projects and the maintenance budget.

LIFE-CYCLE PLANNING

PAVEMENT LIFE-CYCLE PLANNING
As part of the pavement life-cycle plan, UDOT has established secondary performance measures in support of overall pavement condition. These include a sustainability index, surface area goals, and high volume and low volume pavement conditions. Each of these measures provide data that drives decisions for project development to minimize pavement life-cycle costs. These measures and associated targets can be found at this link: Pavement Condition Dashboard

BRIDGE LIFE-CYCLE PLANNING
Bridge Management has been collecting bridge element level condition data for many years. By understanding the inventory and through the planning process, Bridge Management creates a plan for every structure to define preservation, rehabilitation and replacement options. Under the federal measure condition, the NBI component ratings for deck, superstructure, substructure, or culvert can define the type of work for the structure.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Condition State (NBI)</th>
<th>Increase in Service Life</th>
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<tbody>
<tr>
<td>Preservation</td>
<td>≥ 7</td>
<td>10 Years</td>
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<tr>
<td>Rehabilitation</td>
<td>6 - 5</td>
<td>25 - 40 Years</td>
</tr>
<tr>
<td>Replacement</td>
<td>≤ 4</td>
<td>75 Years</td>
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</tbody>
</table>

ATMS DEVICE LIFE-CYCLE PLANNING
The UDOT Asset Inventory and Maintenance (AIMS) system manages component types, failure types, projects, manufacturers and vendors. Applying this system to the life cycle process, UDOT will replace each device at the end of its life prior to failure thereby supporting the safety, preservation and mobility strategic goals.

SIGNAL SYSTEM LIFE-CYCLE PLANNING
Life-cycle planning for the signal system is under development. At this time signal electronics and infrastructure is replaced on a priority basis as funding is available.

**RISK MANAGEMENT ANALYSIS**
Risk is incorporated into asset management at the program and system level. Program level risk is evaluated in four areas for each asset in tiers 1 and 2.

<table>
<thead>
<tr>
<th>Asset</th>
<th>Financial Risk</th>
<th>Info. Risk</th>
<th>Operational Risk</th>
<th>Safety Risk</th>
<th>Average Risk</th>
<th>Value</th>
<th>Tier</th>
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</thead>
<tbody>
<tr>
<td>Pavements</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>$24B</td>
<td>1</td>
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<td>Bridges</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>$5B</td>
<td>1</td>
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<tr>
<td>ATMS/Signal Devices</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5.5</td>
<td>$793M</td>
<td>1</td>
</tr>
<tr>
<td>Pipe Culverts</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>$1B</td>
<td>2</td>
</tr>
<tr>
<td>Signs</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>4.5</td>
<td>$300M</td>
<td>2</td>
</tr>
<tr>
<td>Walls</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>3.5</td>
<td>$3.4 B</td>
<td>2</td>
</tr>
<tr>
<td>Rumble Strips</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>3.5</td>
<td>$6M</td>
<td>2</td>
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<tr>
<td>ADA Ramps</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2.5</td>
<td>$20M</td>
<td>2</td>
</tr>
<tr>
<td>Barrier</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2.5</td>
<td>$450M</td>
<td>2</td>
</tr>
<tr>
<td>Pvt. Markings</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>2.5</td>
<td>$42M</td>
<td>2</td>
</tr>
</tbody>
</table>

System level risk is analyzed at the intermediate planning process level and is being implemented based on the results of “The I-15 Corridor Risk and Resilience (R&R) Pilot Project”. Risk mitigation investments will become a part of projects developed through this corridor level planning process.

**FINANCIAL PLAN**
UDOT relies on the federal funding process, state annual budget process, and distribution decisions by the Transportation Commission for transportation funding. Funding available varies each year depending on the national and state economies and priorities of decision-makers and historically comes primarily from three specific funds: the state Transportation Investment Fund, The state Transportation Fund, and Federal funds.

Within the overall funding stream UDOT’s pavement, bridges, and ATMS devices have dedicated funding as Tier 1 assets. Funding for each has been established based on projected needs to meet performance targets. The signal system is not funded adequately to meet current performance targets. Available funding is spent on minor repairs to keep signals operational. Replacement and installation of new signals is funded through projects on the STIP. A process for documenting and analyzing signal system needs is currently being established.
INVESTMENT STRATEGIES

- The pavement investment strategy is to sustain our NHS and high-volume system condition levels and to improve the low volume system condition level.
- The bridge investment strategy is the Bridge Health Index with separate targets for NHS, State-owned non-NHS and local routes.
- ATMS device investment strategy is replacement of devices prior to end of life and failure according to prioritized criticality.
- Signal system investment strategies are preventative maintenance, emergency maintenance, and maintenance management.

NEXT STEPS

The next steps proposed in the continual maturation and improvement of asset management include:

- Developing a more formalized management process for some tier 2 assets
  - Potentially barrier, signs, and pipe culverts
  - Develop secondary tactical performance measures and targets
- Re-evaluate the contribution to decision-making of the current state performance measures to determine if they are the right measures to support UDOT Strategic Goals
- Finish the documentation of the signal system condition and analyze funding needs
- Imbed risk management into the intermediate planning process
- Mature and broaden the risk management process beyond the I-15 urban corridor
- Continue collaboration across UDOT department boundaries to develop a program of construction projects that move UDOT toward meeting the Strategic Goals
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1. INTRODUCTION

UDOT has established three strategic goals that guide and direct everything we do. These goals are the foundation for reporting to our customers—the taxpayers of the state of Utah—how we are investing resources allocated to us by the state legislature. Progress toward these goals and updates to the associated strategies are reported in the annual Strategic Direction.

OBJECTIVES OF THE UTAH TRANSPORTATION ASSET MANAGEMENT PLAN (TAMP)

The Utah Transportation Asset Management Plan (TAMP) is the plan UDOT follows to achieve the Preserve Infrastructure strategic goal. The specific objectives of this plan are:

- Formalize a data driven performance-based approach for allocating transportation funds to manage pavements, bridges and ATMS and signal devices
- Incorporate asset management into the intermediate and long-range planning processes
- Incorporate risk management into resource allocation decisions
- Provide a valuable asset management tool with real time data

ROADMAP TO A COMPREHENSIVE PLAN FOR ASSET MANAGEMENT

To prepare for MAP21/FAST Act requirements and to move toward a performance-based organization, the asset management oversight committee structure was revised, and a self-assessment gap analysis was completed (Figure 1). The initial reorganization of the oversight committee is included in Appendix A. The gap analysis process and results are in Appendix B. Committee member comments from the program self-assessment are included in Appendix C.
The result of the gap analysis and program assessment formed a roadmap for UDOT asset management that embraces MAP-21/FAST Act and UDOT goals of preserving infrastructure with a transparent, performance and risk-based approach.

Categorization of the program assessment comments resulted in the identification of three areas of focus:

- program alignment,
- assets and performance and
- organized and accessible data.

These focus areas create the framework for the Utah TAMP and the organizational structure. Objectives for each of the three areas of focus within the roadmap are shown in Figure 2.

The UDOT goal for Asset Management is to work collaboratively across Divisions to develop a unified program that maximizes system performance and funding and put in place a process to quantify risks to assets in the UDOT system. The initial oversight committees identified and approved objectives for the purpose of continuous improvement of asset management within UDOT.

With roadmap efforts well underway, it became clear that asset management is a subset of performance management. Therefore, the committee structure was again revised to form the Performance Management Group (PMG). Members of this group are the managers of every UDOT Division and are key to UDOT transitioning to a performance-based organization. A subcommittee remains focused on asset management (AAC) and regularly reports key decisions and developments to the PMG.
ROADMAP IMPLEMENTATION

Each UDOT division and the Committees are working separately and collectively to fulfill the objectives and needed tasks to accomplish the roadmap goal. The short and medium-term objectives are well underway and steps to accomplish the long-term objectives have been defined and initiated. Following is a summary of work associated with each category of the roadmap.

PROGRAM ALIGNMENT

Consolidating data collection of several individual UDOT divisions into a single contract was the kick-off to program alignment. Collaboration between UDOT divisions continues toward developing the ability to prioritize projects irrespective of specific funding categories. The replacement value of each asset has been calculated and a financial model defined based on life cycle costs for the highest value/risk assets. Work continues to complete an information loop of project planning, design, construction and maintenance. Developing this consistent loop of communication will improve the accuracy and efficiency of each separate process and thereby the overall UDOT program. It will also tie the Long-Range Plan process and results to the STIP process (Figure 3).

ASSETS AND PERFORMANCE

The wealth of data now available due to a unified and automated collection process allows UDOT to evaluate conditions and develop a performance-based plan that includes all assets to the level appropriate to the value and risk associated with each. Following the roadmap, UDOT will continue to identify risks, performance measures and life cycle costs for numerous assets in a joint effort to better prioritize funding across all funding categories (Figure 4).

ORGANIZED AND ACCESSIBLE DATA

The influx of data and information provides an opportunity and urgency for UDOT to develop a more systematic approach and structure for data storage and access. The ability to import and export data to all existing and future business systems has provided the opportunity to create interactive dashboards. Dashboards are used by decision-makers at multiple levels to maximize system performance and funding. The structured and organized details associated with each data set allows groups to reference any related data to make better decisions (Figure 5).

The organization and structuring of the data has also led to the ability to create live data sets to documents such as this TAMP. The charts and graphs will automatically update in real time as data is received and analyzed by each Division staff. The “smart” TAMP is a management tool for all UDOT leaders. All links within this document provide access to the most current data.
ASSET REGISTER

The first step to organizing the influx of data from the unified data collection process resulted in a register of all major UDOT assets. The second step was to add the current value of each of the assets to the register. In addition to pavements and bridges, UDOT maintains registers of many roadway assets through routine high-tech LiDAR scanning and maintenance inventories of the state highways. These registers are used to track the quantity and some condition information of each UDOT asset. UDOT also maintains an extensive database of current unit bid item costs compiled from the advertisement of new construction projects. This database is used to establish the replacement value of the quantified assets. Additional sources of information, such as R.S. Means, are referenced to establish a value for specialty items that are not in the database. A contingency amount is included in the replacement value of each asset to account for design, construction oversight, traffic control, and mobilization costs.

The current quantified assets and their value are shown in Table 1 and Figure 6. The values shown are based on current costs to replace and construct/install the assets.

Table 1. Asset Register.

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Figure 6. Highest Value Assets.
ASSET MANAGEMENT TIERS
To accomplish the objective of allocating transportation funding toward the most valuable assets and those with the highest risk to system operation, the Asset Advisory/Performance Management Committees developed a tiered system of asset management. Asset Management tiers range from one to three with tier one being the most extensive management plan for the highest value assets (Table 2).

Tier 1 – Performance-based Management
Assets in the tier 1 management level are highest value combined with highest risk of negative financial impact for poor management. These are assets that are very important to the UDOT performance plan success and are recommended for a significant separate funding source. Management plans for tier 1 assets include elements such as:
• Accurate and sophisticated data collection
• Targets and measures set and tracked
• Predictive modeling and risk analysis
• Dedicated funding through UDOT’s annual STIP workshop process

Tier 2 – Condition-based Management
Assets in the tier 2 management level are moderate value and substantial importance to transportation system operation. These assets have a moderate risk of negative impact for poor management or asset failure. They may have a separate funding source. Management plans for tier 2 assets include elements such as:
• Accurate data collection, less than annually
• Risk assessment primarily based on asset failure
• Condition targets
• Management strategy based on condition

Tier 3 – Reactive Management
Assets in the tier 3 management level are generally the lowest value assets with the lowest risk of negative impact for poor management or asset failure. Management plans for tier 3 assets include elements such as:
• Accurate data collection, less than annually
• Risk assessment primarily based on asset failure
• General condition analysis
• Reactive management involving repair or replacement when damaged

Tier 1 assets are managed with performance measures and targets as detailed in this TAMP. Tier 2 assets are managed with condition and risk focus by the responsible UDOT Division. Tier 3 assets are managed reactively within funding availability and assessed risk.
2. PERFORMANCE-BASED MANAGEMENT

UDOT uses a performance-based approach to manage the assets identified as Tier 1. This approach is an extension of and in support of the Unified Plan compiled in collaboration with the state’s Metropolitan Planning Organizations and Utah Transit Authority. Through data driven performance-based management UDOT developed targets for state primary and secondary performance measures as well as the required federal performance measures. While UDOT understands and embraces the need for the federal performance measures our state measures provide the foundation to drive daily decisions for managing asset condition in a cost-effective manner to accomplish UDOT’s strategic goals. Additionally, our state measures meet or exceed federal requirements.

FEDERAL PERFORMANCE MEASURES

Through a data driven process, historic condition data and projected condition, targets have been established for the pavement and bridge performance measures established by FHWA.

Four metrics make up the pavement performance measure and are calculated based on data from the Highway Performance Monitoring System (HPMS). The four metrics are:

- Pavement roughness, measured using the International Roughness Index (IRI).
- Rutting, quantified for asphalt pavements by measuring the depth of ruts along the wheel path.
- Cracking, measured in terms of the percentage of cracked pavement surface.
- Faulting, quantified and averaged for jointed concrete pavements.

The pavement condition targets have been established to be consistent with our strategy to maintain status quo condition levels.

The bridge performance measure is based on component ratings from the National Bridge Inventory (NBI). The bridge measure is determined by the lowest rating of deck, superstructure, substructure, or culvert, and evaluates the percentage of deck area in good, fair, and poor condition. A component rating of 7 – 9 is good condition, 5 – 6 is fair condition, and 4 or less is poor condition.

UDOT collects condition data on 100% of the NHS. Less than 1% of the NHS is locally owned. Through collaborative discussions with the Metropolitan Planning Organizations and other local owners it was determined to be most cost effective for UDOT to collect all condition data for pavements and bridges. A Memorandum of Understanding was executed on April 16, 2018 between the Metropolitan Planning Organizations and UDOT. This MOU includes the agreement that UDOT will collect bridge and pavement condition data for the State asset management plan on all NHS routes irrespective of ownership.

Current condition data and information on Federal Infrastructure measures can be found at this link: FHWA Infrastructure Metrics
STATE PERFORMANCE MEASURES
In support of the federal performance measures, UDOT Strategic Goals, and the asset management plan, UDOT has established state performance measures and targets for pavement, bridges, ATMS devices and Signal systems. Transportation funds and work effort are allocated to these assets based on systematic improvement or maintenance of asset condition and value.

UDOT PAVEMENT PERFORMANCE MEASURES AND TARGETS
UDOT reports percent of mileage in Good, Fair and Poor condition using the collected 0.1-mile IRI data. These ranges are; Good: with IRI < 95 in/mi, Fair: with IRI between 95 and 170 in/mi and Poor: with IRI > 170 in/mi.

To assure the system is adequately funded and not at any financial risk to be maintained per the Preserve Infrastructure strategic goal, the statewide condition target is to have 80% of the mileage rated Fair or Better. Additional pavement condition data can be found at: Pavement Condition Dashboard

UDOT BRIDGE PERFORMANCE MEASURES AND TARGETS
The UDOT performance measure for bridges is based on the Bridge Health Index (BHI), a measure to describe the overall structural condition of each bridge calculated from AASHTO Element Level ratings.

A BHI of 80 – 100 is classified as good condition, while a BHI of 60 – 80 is classified as fair condition, and a BHI less than 60 is classified as poor condition.

The performance measure targets are as follows:
• State Owned NHS Bridges: Systemwide average based on deck area of 85 or greater
• State Owned Non-NHS Bridges: Systemwide average based on deck area of 80 or greater
• Locally Owned Bridges: Systemwide average based on deck area of 75 or greater

The measures and targets for the three categories of bridges and the historical and current condition of each is found at the following link: Structures Dashboard

UDOT ATMS DEVICE PERFORMANCE MEASURE AND TARGET
The UDOT performance measure for ATMS devices is the percent of devices in operational condition. The ATMS system is made up of several different types of devices and the measure and target are tracked separately and reported monthly for each type of device and averaged into a composite score. The condition target is 95% of the system in operational condition. The current condition information is found at the following link by scrolling down to the ATMS section: UDOT Preserve Infrastructure Dashboard

UDOT SIGNAL SYSTEM PERFORMANCE MEASURE AND TARGET
The performance measure for the UDOT Signal system is the percent of signals that are in good or fair condition based on annual inspection of all electronics and physical infrastructure associated with signal systems. The target is that 95% of the statewide system is in good or fair condition.

Historical and current condition data and information on all UDOT Preserve Infrastructure performance measures and targets can be found at the following link: UDOT Preserve Infrastructure Dashboard
3. PERFORMANCE GAP IDENTIFICATION

UDOT has numerous years of pavement and bridge condition data. Based on this historical data, targets have been set for the percentage of pavements and bridges in good and poor condition per Federal requirements. These targets focus UDOT activities and decisions to maintain the NHS and all pavements and bridges in a state of good repair. UDOT has created a dashboard to track and report the federal infrastructure measures. The most current data for these measures can be found at this link: FHWA Infrastructure Metrics

PAVEMENT PERFORMANCE GAP
As shown in FHWA Infrastructure Metrics, the Interstate pavements currently and historically have exceeded the target levels for good and poor conditions. Also shown is that the non-interstate NHS pavements currently and historically also exceed the target levels for good and poor conditions. The FHWA measures only look at the NHS pavements. UDOT is also exceeding our statewide pavement condition performance target.

BRIDGES PERFORMANCE GAP
UDOT is currently meeting both good and poor targets for federal performance measures and have continuously met these targets over the last 10 years. The Federal performance measures only look at NHS bridges. Non-NHS bridges also meet both targets at this time, but as shown in FHWA Infrastructure Metrics, that while within targets, the percentage of good bridges in the state of Utah, both on and off the NHS, are consistently declining. The number of fair condition bridges continue to increase, and in time, without a proactive approach more fair condition bridges will drop from fair to poor condition than can be addressed in a given funding year.

ATMS PERFORMANCE GAP
ATMS devices must be functioning and reliable for UDOT to achieve the Safety and Mobility strategic goals. Therefore, UDOT has included these devices in the highest tier for management. Although federal requirements do not exist for ATMS device performance UDOT has set performance measures and targets for all ATMS devices as part of the Preserve Infrastructure strategic goal.

The UDOT state performance measure for ATMS devices is the percentage of devices operational as reported monthly by the Traffic Management Division. The historic and current percentage data can be found at this link: UDOT Preserve Infrastructure Dashboard

Currently UDOT has numerous devices that are beyond their expected life and are not operational or are not fully operational. These devices are listed in the Backlog column in Table 3. The remaining columns detail the number of each device to be replaced in future years to close the performance gap.
Recognizing the importance of these devices to UDOT success, the Utah Legislature allocated $3.9M dollars each year for device replacement and upgrades. Over the next few years the backlog will be eliminated, and critical devices will be replaced as they reach the end of their life and before they fail. This funding is also supplemented by devices that are replaced within projects. The combination of funding will allow UDOT to reach the performance target for ATMS devices.

**SIGNAL SYSTEM PERFORMANCE GAP**
The UDOT Signal system is included in the highest tier for management. Signalized intersections and related infrastructure manages traffic, and provides a safe, and reliable movement of goods, services and people. Based on an annual assessment of all signal electronics and physical infrastructure associated with signals the target has been set as 95% or more of the system in better than poor condition. The historic and current signal condition data can be found at this link: [UDOT Preserve Infrastructure Dashboard](#).

The signal system is currently and historically below target condition. Minor repairs are made throughout the year with maintenance money. Replacement and installation of new signals is funded through projects on the STIP. The management plan to reach the signal system condition target is:

- Update signal assessment process to make it more objective and consistent across the state.
- Map signal condition in UPLAN.
- Communicate signal replacement and upgrade needs to the Regions so they can incorporate the costs into the project scoping and construction estimates for STIP projects.
- Replace highest priority locations first with money available.
4. LIFE-CYCLE PLANNING

For over 40 years UDOT has used the pavement management strategy of “Good Roads Cost Less” to maintain pavements. Based on a wealth of historical pavement condition information that supports this life-cycle planning strategy it is now being expanded to cover other roadway assets. Life cycle plans covered in this document in addition to pavement are bridges, signals and ATMS devices. UDOT incorporates life-cycle planning into the performance-based management for each of these assets through the definition of secondary performance measures. These secondary measures focus efforts on minimizing long-term costs and maximizing length of life for each asset.

PAVEMENT LIFE-CYCLE PLANNING

As part of the pavement life-cycle plan, UDOT has established the Sustainability Index. The Index provides information that allows decision-makers to select a mix of pavement treatments that will achieve a sustainable pavement condition. The Sustainability Index is defined as:

- Considering that all pavements age 1 year, each year, a loss of pavement life can be measured in units of Surface Area Years.

- The different surfacing projects replace different amounts of pavement life, which can be added up in units of Surface Area Years.

- The Sustainability Index will be the ratio of the work done (planned) to the work required – measured in units of surface area years.

- Sustainability Index (SI) = SA Years replaced / SA Years lost

The Index associates a benefit to each project in terms of years of added/replaced pavement life. Using this data, the Index provides an indication of future pavement condition. Values less than 100% would forecast a decline in condition, while values greater than 100% would forecast an improvement in condition.

For assumptions and benefit years of each treatment follow this link: Pavement Management Website

This measure and associated targets can be found at this link: Pavement Condition Dashboard
BRIDGE LIFE-CYCLE PLANNING

Bridge Management has been collecting bridge element level condition data for many years. By understanding the inventory and through the planning process, Bridge Management creates a plan for every structure to define preservation, rehabilitation and replacement options. Under the federal measure condition, the NBI component ratings for deck, superstructure, substructure, or culvert can define the type of work for the structure (Table 4).

Table 4. Bridge Treatment Service Life Increase.

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>CONDITION STATE (NBI)</th>
<th>INCREASE IN SERVICE LIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preservation</td>
<td>≥ 7</td>
<td>10 Years</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>6–5</td>
<td>25–40 Years</td>
</tr>
<tr>
<td>Replacement</td>
<td>≤ 4</td>
<td>75 Years</td>
</tr>
</tbody>
</table>

The deck is the component that protects the structure. Detailed preservation treatments have been implemented depending on the work needed as seen in Table 5.

Table 5. Bridge Preservation Treatment Service Life Increase.

<table>
<thead>
<tr>
<th>PRESERVATION DECK TREATMENT TYPE</th>
<th>CONDITION STATE (NBI)</th>
<th>INCREASE IN SERVICE LIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>THIN BONDED POLYMER OVERLAY</td>
<td>≥ 7</td>
<td>10 YEARS</td>
</tr>
<tr>
<td>POLYESTER CONCRETE OVERLAY</td>
<td>6</td>
<td>25 YEARS</td>
</tr>
<tr>
<td>HYDRODEMOLITION</td>
<td>6–5</td>
<td>30 YEARS</td>
</tr>
<tr>
<td>DECK REPLACEMENT</td>
<td>≤ 4</td>
<td>40 YEARS</td>
</tr>
</tbody>
</table>

Bridge Management developed the Bridge Health Index (BHI), a measure to describe the overall condition of each bridge that is used as a structural performance measure and for prioritization. The BHI is made up of three separate scores (i.e., deck, superstructure, substructure) that are weighted to underscore the importance of each category in overall bridge health. The weighting of these categories is as follows:

\[
BHI = (\text{Deck Score} \times 0.40) + (\text{Superstructure Score} \times 0.35) + (\text{Substructure Score} \times 0.25)
\]

The health of deck elements is weighted higher because the elements contribute to preserving many other areas of the structure. Culverts have a different BHI scoring system and are rated out of a score of 100, based on inert culvert elements.

A health index score is calculated for each element as a ratio of the value of the element in the element’s current condition to the value of the element in the best possible condition. Each of the three category scores are then calculated as a weighted average of the health indices of the bridge category elements, where elements are weighted by the total quantity of the element and relative importance. The category score is calculated for the deck, superstructure, and substructure before combining the resulting scores, as described above, into a final BHI. The BHI is used to prioritize bridges statewide for replacement and rehabilitation projects. Health indices for individual elements, such as the deck overlay, are used to identify projects for preservation treatments or for targeted projects.

ATMS DEVICE LIFE-CYCLE PLANNING

UDOT has determined that the most effective ATMS management strategy is to consider the entire life-cycle of each device type. Like the strategy used for pavement and bridges, a “plan for every ATMS device” is necessary that addresses the device from cradle to grave. As part of the plan development, UDOT Traffic Operation and Region staff participated in a workshop to determine the perceived relative value of the ATMS devices. The Decision Lens tool was used in this workshop which resulted in a prioritization of devices and determination of which should be replaced on schedule and which should be allowed to fail before replacement (Figure 7).
The plan for each device is defined using the following general steps:

1. Estimate the year that each device will fail by projecting the expected service life from the installation date.

2. Assign the replacement year based on the estimate and the relative importance of the device as determined in the workshop.

3. Determine which devices will fall within a construction project and include them in the project scope and funding.

4. Replace highest priority devices first in each funding year.

The UDOT asset inventory and work order system is a web-based application tailored to the needs of the UDOT ITS operations. The software includes a work order management system, inventory control management system, staff management system, work group management system and other sections for configuring privileges and locations and an administration management system for managing component types, failure types, projects, manufacturers and vendors. Applying this system to the life cycle process, UDOT will replace each device at the end of its life prior to failure thereby supporting the safety, preservation and mobility strategic goals.
SIGNAL SYSTEM LIFE-CYCLE PLANNING
Life-cycle planning for the signal system is under development. At this time signal electronics and infrastructure is replaced on a priority basis as funding is available.

- Top priority are system critical elements, those that would shut down the system if they failed.
- Second priority are electronics that are at or near the end of an estimated 10-year life.
- Further priority consideration is a shift in technology that creates benefits to capacity, preservation or safety that are greater than the cost.

Signals are installed or replaced within project scopes based on funding availability and the expected contribution to system operations.
5. RISK MANAGEMENT ANALYSIS

Risk is incorporated into asset management at two levels. Programmatic risks were identified and analyzed based on the expert opinion, experience, and professional judgment of over 20 senior leaders. This analysis contributed to the allocation of UDOT assets into three tiers. This approach allows resources to be allocated to highest risk assets and programmatic risk areas. To complement programmatic risk, a process for system level, data driven risk analysis is being developed as described in the next section.

PROGRAMMATIC RISK IDENTIFICATION AND ASSESSMENT

Risk to the UDOT program is evaluated for tier 1 and 2 assets in four programmatic risk areas that were developed by the Asset Advisory Committee (AAC):

- Financial – analysis of sustainable funding for performance goals
- Information – availability and quality of data needed for long term management
- Operational – analysis of probability and impact of asset failure to the operation of the transportation system
- Safety – analysis of impact to public safety of asset failure or poor condition

Programmatic risk was assessed for each asset in each of the four risk areas based on the probability of the risk happening and on the estimated consequences. Probability and consequence were assessed separately as high, medium, or low and a risk number assigned based on the risk matrix depicted in the risk matrix shown at right.

All four risk numbers are averaged for each asset with all four areas of risk being equally weighted. The management tier was assigned based on the average risk factor, the monetary value of the asset, and an assessment of the importance of the asset to UDOT’s performance plan and strategic goals.

Table 6 depicts the value and risk numbers for each tier 1 and 2 assets. The numbers are based on the risk matrix. Additional details regarding the financial value and risk assessment for each asset can be found in Appendix E.

PROGRAMMATIC RISK MITIGATION PLAN

As shown in Table 6, tier 1 assets have the highest operation risk and average risks. Performance-based management plans are well defined for these assets. History has proven these management plans minimize management costs and emergency repairs. All four categories of risk are monitored with regularly scheduled, detailed inspection and data collection for these assets.
UDOT also has strategies and policies to mitigate each category of risks for all assets.

- Financial risk is mitigated first with the embracing of the Strategic Goals and by focusing resource allocation toward accomplishment of the goals. Short term financial risk is mitigated by maintaining tier one assets in good condition so that potential years of reduced funding do not create critical conditions for these assets. Financial risk is also mitigated by transparent and data driven spending which builds trust with state leaders and tax payers.

- Information risk is being mitigated by using advances in technology to collect data more regularly, accurately and completely at reasonable costs. This data is stored and mined to create information trends and history for roadway assets.

- The plan for mitigating Operational risk is to institute an intermediate level planning process across the state. The sections on system risk below further detail this plan.

- Safety risk mitigation is the focus of the Zero Fatalities, Crashes and Injuries strategic goal. This goal focuses project planning and funding on design and construction elements that will increase safety within project limits.

### SYSTEM RISK IDENTIFICATION AND ASSESSMENT

To augment this experiential based approach to programmatic risk, UDOT completed a data driven system risk analysis of portions of I-15 and has initiated a second pilot project to refine the process and establish a standard workflow that can be implemented system wide. This approach is not intended to replace years of professional experience but to complement what has already been done and take into consideration an approach consistent with the FHWA’s recommendations for evaluating Resilience & Durability to Extreme Weather events. The correct data can be hard to identify, gather, validate, and use appropriately. It is therefore not our intent to throw out hard won experience but to blend it with relevant data.
This data driven approach is initially focused on system level risk for a portion of I-15. The I-15 Corridor Risk and Resilience (R&R) Pilot project demonstrated the benefits of examining a highway transportation network in terms of both its capacity to serve demand and its ability to withstand physical hazards. The R&R for Highways process provides a framework accommodating uncertainty, incorporating a probabilistic approach to assessing risk, and for making ensuing investment decisions to increase system resilience and reduce annual risk from physical hazards. It is a strategic approach, explicitly trading off the risk of failure against the cost of greater system resilience. The R&R for Highways Framework will assist UDOT in understanding how its system will perform under a range of potential physical hazards, inform maintenance decisions, operational procedures, project delivery and the design process as to risk reducing investments and actions.

**SYSTEM RISK IMPLEMENTATION PLAN**

The current plan is to expand the data driven risk analysis to other corridors and over time the entire National Highway System. The results of this analysis will be captured on GIS maps and made available to all UDOT functions. With this knowledge we can more thoroughly address risk in project planning.

We are only beginning to understand the value of this analysis but initially it appears that we can save construction time and cost by pre-planning how to mitigate risks discovered in our risk analysis. Currently we wait for a project to be initiated before considering what risks exist in the project boundaries. This limits the time we have available to perform trade off analysis and choose the best risk mitigation approach. A more careful pre-project analysis will provide an opportunity for better cost savings without impact to project delivery time. We have already seen this potential cost savings because of the analysis completed in our I-15 Corridor Pilot project.

To incorporate risk into our business processes we plan on including risk data into our intermediate planning process. This corridor level planning is done with our partners that include MPO’s, Cities, Counties, Regions, State and Federal Resource Agencies, Tribes, Transit Agency, etc. The corridor plans are designed to meet UDOT Strategic Goals and Performance Measures. Specific projects are then developed from corridor plans and incorporated into the STIP for each funding year. Risk mitigation investments will become a part of developed projects. We have experienced the cost saving benefits of Risk Management at the project level and expect similar or better savings at the corridor and system level.

**SUMMARY OF TRANSPORTATION ASSETS REPEATEDLY DAMAGED BY EMERGENCY EVENTS**

Risk management includes collecting and analyzing data on assets damaged during emergency events. To meet FHWA requirements, manage risk and reduce the need for emergency repair and reconstruction funding UDOT initiated a process to track and evaluate assets repeatedly damaged.

A questionnaire was sent to a selection of UDOT employees requesting their knowledge of assets that have required repair or reconstruction due to the emergency events.

No assets in Utah have been twice damaged due to an emergency event as defined by FHWA. UDOT does have procedures in place for communication and rapid response during states of emergency and more targeted emergencies, such as bridge hits.

A process is being created to track projects created because of emergencies and that use Emergency Relief Funds. This will provide the ability to track potential damage in the same area for future events.
6. FINANCIAL PLAN

UDOT relies on the federal funding process, state annual budget process, and distribution decisions by the Transportation Commission for transportation funding. Funding available varies each year depending on the national and state economies and priorities of decision-makers and historically comes primarily from three specific funds: the state Transportation Investment Fund, The state Transportation Fund, and Federal funds. Aeronautics also provides a very small percentage of funding which does not contribute to asset management and therefore is not addressed in this plan.

FUNDING SOURCES

The state Transportation Investment Fund (TIF) is derived from sales taxes on auto related services and makes up approximately 45% of UDOT funding (Figure 8). Half of this fund pays the bond for previously constructed projects and half is used to fund current capacity and mobility projects. A percentage of these funds is also designated to preserve existing infrastructure. The state Transportation Fund comes from the state portion of gas taxes paid by individuals at the gas pump. This fund makes up approximately 32% of UDOT funding and is primarily used to fund UDOT operations, management and maintenance as well as other agencies. These funds also provide the match amount required for federal funds. The Federal portion of gas taxes makes up approximately 22% of UDOT funding and is used primarily for current pavement projects. Further details of funding sources can be found at this link: UDOT Funding.

FUNDING NEED PROJECTIONS

All of Utah’s transportation agencies and Metropolitan Planning Organizations have worked together to develop the Unified Transportation Plan. Each agency used shared growth projections, time horizons and financial assumptions to assemble complementary regional plans that integrate seamlessly into the Unified Transportation Plan. These agencies have worked together to develop robust financial planning based on sound technical analysis for the current and future projected revenue that can reasonably be assumed to pay for transportation needs. The current analysis results are shown in Figure 9.
During the 2015 Legislative Session, Utah lawmakers passed House Bill 362 (HB 362), Transportation Infrastructure Funding. This historic transportation funding package was the first law in Utah to comprehensively fund all modes of transportation, including roads, transit and active transportation. It represents a reform to the state fuel tax and equips local communities with the tools to more adequately address their needs.

HB 362 was an important step forward in addressing the transportation funding shortfall identified in the Unified Transportation Plan, providing much-needed funding for critical, priority transportation needs. The law significantly reduced the funding shortfall identified in the Unified Plan, but future revenue increases will still be needed to maintain, preserve and expand state and local road, transit and active transportation systems.

Using increasingly sophisticated accounting mechanisms, Utah’s Unified Transportation Plan provides a robust, technical analysis of growth rates in forecasting the future revenue available for transportation needs in the state. This analysis assumes the increase of revenue from vehicles (registration fees), fuel consumption (fuel taxes) and general purchases (sales taxes).

These calculations for the growth rates are conservative and based on historical trends from each region of the state. Calculations were coordinated closely with projections from the Governor’s Office of Management and Budget and the Utah Tax Commission and with assistance from private sector financial advisors.

For planning purposes, the Unified Transportation Plan assumes the following future revenue sources, although specific mechanisms will depend on decisions by state and local elected officials. Revenue sources include statewide vehicle registration fees, local option tax (varies by MPO and county and includes additional local option fuel taxes, local option sales taxes and vehicle registration fees) and private sector funding.

Between 2015 and 2040, the total transportation needs for the state are $80.5 billion (Figure 10). This includes funding needed to operate the current transportation system and keep the infrastructure in good condition (roadway and transit maintenance, preservation and operations). It also includes the funding needed to build new roads and transit lines, as well as widen existing roads and extend transit lines (roadway and transit capacity).
Utah’s transportation agencies understand that it is not reasonable to assume funding will be available for all the transportation needs in the state. Instead, the agencies have identified a prioritized set of the most critical needs at $67.5 billion.

Existing revenue sources currently in place to fund the Unified Plan between 2015 and 2040 are projected to generate $60.2 billion. That leaves $7.3 billion as the amount needed to fund Utah’s most critical priority projects.

The Utah Unified Transportation Plan 2011-2040 can be found on the UDOT website at this link: Utah Unified Transportation Plan.

**ASSET MANAGEMENT FUNDING**

Within the overall funding stream described above, UDOT’s pavement, bridges and ATMS devices have dedicated funding as Tier 1 assets. Funding for each has been established based on projected needs to meet performance targets. At this time these assets are fully funded (Table 7).

<table>
<thead>
<tr>
<th>ASSET FUNDING</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
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<tr>
<td>High Volume Pavement</td>
<td>$151.9</td>
<td>$160.0</td>
<td>$160.7</td>
<td>$161.5</td>
<td>$162.2</td>
<td>$162.9</td>
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<td>$164.4</td>
<td>$165.2</td>
<td>$165.9</td>
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<td>Pavement Reconstruction</td>
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<td>$50.0</td>
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<tr>
<td>Low Volume Pavement</td>
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<td>$40.0</td>
<td>$40.0</td>
<td>$40.0</td>
<td>$40.0</td>
<td>$40.0</td>
<td>$40.0</td>
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<td>Utah Bridges*</td>
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<td>$48.0</td>
<td>$48.0</td>
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<td>Signal Systems</td>
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<td>$4.5</td>
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<td>$4.5</td>
<td>$4.5</td>
<td>$4.5</td>
<td>$4.5</td>
</tr>
</tbody>
</table>

*All State, NHS, and local FA bridges
PAVEMENT FUNDING

Historical tracking of pavement condition shows UDOT has been maintaining a status quo condition level for our High-Volume system, and a declining then improving condition for the Low Volume system.

The High-Volume roads have a consistent stream of funding that continues to maintain the current condition level. This funding increases by a small percentage each year to ensure funding for preservation of the growing amount of pavement across the state.

In December of 2016 UDOT’s Pavement Working Group (PWG) developed recommendations for including a Reconstruction program into their pavement management responsibilities to compliment the Preservation and Rehabilitation programs. A Draft 7 Year Program (2019-2025) has been developed with funding approved to average $50M per year. The story map at the following link covers the projects, funding and programming recommendations that the group developed: Pavement Management Website.

At the same time the state legislature approved a gas tax increase that is being used to fund projects on our Low Volume system. Together this funding maintains the state of good repair of the Interstate, NHS and High Volume roads and improves the condition of the Low Volume roads as shown on the condition project charts in Figures 11 and 12. Distribution by Region for pavement funding can be found in the Funding tab at this link: Pavement Management Website.

![High Volume System Pavement Condition](image)

Figure 11. High-Volume Pavement Condition.
BRIDGE FUNDING

Figure 12. Low-Volume Pavement Condition.

Historical tracking of bridge condition (based upon component condition data) shows an overall decline in the number of poor condition bridges. The number of fair condition bridges continues to increase, and in time, without a proactive approach more fair condition bridges will drop into poor condition than can be addressed in a given funding year. Currently 27% of the state bridge inventory exceeds the 50-year original design life.

In order to address the impending increase in poor condition bridges as the state system ages, UDOT made a high-level condition-based evaluation of the system as a whole. Each bridge was classified as good, fair, and poor condition based upon the lowest NBI component rating, as is consistent with the Federal Performance Measures. The analysis looked at a 20-year time span to treat each bridge. Bridges in good condition were assigned preservation treatments and treatments costs associated with such. Bridges in fair condition were assigned rehabilitation treatments. Bridges in poor condition were assigned replacement treatments. The total cost of these treatments was evenly distributed annually over 20 years.

UDOT evaluated funding from all sources, including structures specific funding, and larger capacity projects to establish the shortfall. Based upon the identified shortfall, UDOT increased bridge funding from $18.7 million to $48 million between 2015 and 2018 (Table 8). This was accomplished through redistribution of Federal Funding and the addition of the 2015 State Gas Tax Increase.

Based upon the current $48 million bridge budget, Utah bridges will remain in a state of good repair. Both NHS and non-NHS bridge systems will see an increase in poor condition bridges and a decrease of good condition bridges, but both systems will stay within current performance targets (Figures 13 and 14).
ATMS DEVICE FUNDING

A dedicated funding stream was created for ATMS devices in 2017 based on an analysis of the age and condition of each type of device. The backlog column in Table 9 defines the cost for replacing the number of devices that were beyond their life expectancy or that had already failed in 2017. The costs in each fiscal year column is based on the number of each device that will need to be replaced as it reaches its projected end of life. This analysis resulted in establishment of a long-term funding stream to replace existing devices using the life cycle plan developed and discussed earlier.

Table 9. ATMS Device Funding Needs.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>VMS</td>
<td>$411,700</td>
<td>$1,361,055</td>
<td>$1,665,360</td>
<td>$823,400</td>
<td>$1,132,175</td>
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<td>TMS</td>
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<td>-</td>
<td>$157,800</td>
<td>$1,166,000</td>
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<td>$1,009,800</td>
<td>$271,400</td>
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<td>CCTV</td>
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<td>-</td>
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<td>$6,500</td>
<td>$734,500</td>
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<td>Express Lanes</td>
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<td>$25,700</td>
<td>-</td>
<td>$261,000</td>
<td>$261,000</td>
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<tr>
<td>RWIS</td>
<td>-</td>
<td>-</td>
<td>$57,190</td>
<td>$29,475</td>
<td>$47,180</td>
<td>$131,585</td>
<td>$81,430</td>
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<tr>
<td>Comm switches</td>
<td>$25,575</td>
<td>$1,800,000</td>
<td>$100,000</td>
<td>$617,725</td>
<td>-</td>
<td>$289,875</td>
<td>-</td>
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<tr>
<td>Misc.</td>
<td>$24,000</td>
<td>$3,000,000</td>
<td>-</td>
<td>-</td>
<td>$1,284,000</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Total</td>
<td>$871,475</td>
<td>$6,493,055</td>
<td>$2,135,350</td>
<td>$3,611,900</td>
<td>$2,968,455</td>
<td>$3,044,310</td>
<td>$1,378,830</td>
</tr>
</tbody>
</table>

$13,138,845
The performance management plan for ATMS devices creates a condition tracking system that will provide a better understanding of the life-cycle for each device in the Utah environment. Future funding requests will be based on an analysis of this growing body of data and the increasing number of devices being installed.

**SIGNAL SYSTEM FUNDING**

The signal system is not funded adequately to meet current performance targets. Available funding is spent on minor repairs to keep signals operational. Replacement and installation of new signals is funded primarily through projects on the STIP. A process for documenting and analyzing signal system needs is currently being established.

The process includes the following steps:

- Update signal assessment process to make it more objective and consistent across the state.
- Document annual signal system inspections.
- Map signal condition in UPLAN.
- Communicate signal replacement and upgrade needs to the Regions so they can incorporate the costs into the project scoping and construction estimates.

From this process condition trends will be established and then analyzed to determine the level of funding needed to meet performance targets across the state.
7. INVESTMENT STRATEGIES

Asset management investment strategies are developed by each UDOT Division and Region staff. These strategies guide program and project decisions for resource allocation that maintain and preserve transportation assets in the best condition possible with available funds. These strategies are developed and modified as needed to

- achieve the state of good repair indicated by the federal and state performance targets,
- follow the asset life cycle plan which improves the condition of the UDOT system, and
- mitigate the risk assessment elements.

The investment strategies guide data driven decisions that ultimately result in STIP projects. The asset condition analysis is independent of the STIP process and establishes the annual and long-term investments and projects needed to meet the targets set within the TAMP process. If funding available is not adequate for the needs, additional funding is requested based on the needs projected by the data analysis.

PAVEMENT INVESTMENT STRATEGIES

In recognition that not all state highways have the same performance requirements, or treatment strategies, UDOT uses two different pavement management strategies.

- The High-Volume system strategy is to maintain a status quo condition level. This system includes the Interstates, most of the National Highway System, and other routes with over 1,000 AADT.

- The Low Volume system strategy is currently to improve the condition level to a previous historic level. This system is comprised of the remaining roads with less than 1,000 AADT. These are primarily asphalt pavements with chip seal surfaces that are being maintained with a different treatment strategy than our high-volume system and with different performance requirements.

The overall long-term pavement management strategy is to fund the pavement program sufficiently to achieve a sustainable pavement condition on all pavements. The TAMP analysis ensures that established targets are consistently met by the set of projects developed for the STIP. Projected conditions for both systems using these strategies are depicted in this link: Pavement Condition Dashboard

UDOT uses the pavement management deterioration model to identify our statewide pavement funding needs for each system. The approved funding levels are then modeled to determine the funding allocations for each region. The regions determine the appropriate mix of preservation, rehabilitation and reconstruction projects to meet the established performance targets. The list of pavement program projects is then reviewed for optimization and coordination with other asset needs.

The pavement management deterioration model is used to forecast pavement condition based on the allocated funding and program of projects.
BRIDGE INVESTMENT STRATEGIES

As with pavement, not all state bridges have the same traffic, performance requirements, or risks associated. NHS routes tend to be the highest traveled routes as well as the routes that have the most impacts to the traveling public due to major rehabilitation or replacement projects. For this reason, bridges on NHS routes have been assigned the highest performance target (BHI 85), keeping them in good condition and proactively providing treatments to extend the period of time between construction projects.

State routes tend to have higher AADT than local routes, but lower impacts to the traveling public than NHS routes. A slightly lower target (BHI 80) has been established for State owned bridges off the NHS. All State-owned bridges, whether on or off the NHS, are treated through a balance of proactive preservation and condition based rehabilitation or replacement. This allows for the programming of all poor bridges for replacement and the evaluation of treatments for rehabilitation or preservation work.

Locally owned bridges in general have the lowest AADT and exposure, and therefore have the lowest performance target (BHI 75). UDOT does not control the overall condition of the locally owned bridge system. Projects require a financial match from the local owner. If the local owner is unable to participate in the project, UDOT cannot complete the project.

ATMS DEVICE INVESTMENT STRATEGY

UDOT Traffic Management and Region staff participated in a Decision Lens prioritization workshop to determine the perceived value of UDOT’s ATMS devices within the network. The ATMS device strategy is to replace the devices deemed highest value prior to their end of expected life and failure in support of the UDOT Strategic Goals. Funding for this strategy is maximized by replacing devices within project scopes to the extent possible. Investments are made in replacing highest priority devices first and replacing others in order of priority within the funding limits of each fiscal year (Figure 15). Funding needs will be will be tracked and adjusted as system grows and life expectancy can be modified based on accumulated historical data and technology improvements.

![Device Priority](image)

Figure 15. ATMS Device Funding Priority.
SIGNAL SYSTEM INVESTMENT STRATEGY

The primary goal of signal system preservation management is to prevent the failure of equipment before it occurs. The preventative maintenance plan is designed to preserve and enhance equipment reliability by replacing worn components before they fail. The plan includes three strategies:

- Preventative maintenance
  - Ensures that components of the traffic signal system that are consumed in normal operation, and age or deteriorate, are regularly refreshed to prevent equipment failures.
  - Minimizes the potential for damage by others and if it occurs, accommodates repair in a timely manner.

- Emergency maintenance
  - Planned response that formalizes the priority, process and plan of emergency response to traffic signals (Emergency Response Plan for UDOT’s Traffic Signals).

- Maintenance management
  - Trained staff with flexible hours
  - Monthly reports
  - Asset management system to track equipment failures

The Traffic Signal Management Plan defines the goals, measures and strategies for UDOT management of the signal system. It can be found at this link: Traffic Signal Management Plan.
8. SUMMARY AND NEXT STEPS

SUMMARY
UDOT has a robust asset management plan for assets with the highest value and risk to the operation of the state transportation system. These assets are pavement, bridges, ATMS devices and signal system. Tier 2 assets are managed based on condition trends. Tier 3 assets are reactively managed with repair or replacement when damaged.

Federal and state performance measures have been developed for the tier 1 assets and are supported by accurate and timely data collection and analysis. Targets for these measures have been established based on historical condition data and professional experience to maintain the UDOT system in a state of good repair. Pavements and bridges currently and historically have met the federal and state targets. Predictive tools are in place to ensure the appropriate mix of treatments are proactively constructed to ensure continued targeted performance. ATMS devices are replaced at or near the end of their predicted life to ensure the overall system is functioning and reliable. The signal system is currently and historically below target condition. Signal elements are replaced on a prioritized basis by criticality to system operation and predicted end of life.

Risk is identified and analyzed at the program level in the areas of financial, information, operational and safety for each asset. A process is also being developed to analyze risk in a data driven process at the system level as a part of the intermediate planning process. Mitigation strategies for both levels of risk will be part of future project development.

In 2015 the Utah legislature passed a historic transportation funding package to comprehensively fund all modes of transportation, including roads, transit and active transportation. State funding and the federal portion of the gas taxes projected out ten years provides adequate funding for pavements, bridges and ATMS devices statewide to meet performance targets. Current funding is not adequate for the signal system to meet current performance targets. Signal system elements are being replaced on a prioritized basis with available funds. Investment strategies for each of the tier 1 assets that maximize the use of available funding are below.

- The pavement investment strategy is to sustain our NHS and high-volume system condition levels and to improve the low volume system condition level.
- The bridge investment strategy is the Bridge Health Index with separate targets for NHS, State-owned non-NHS and local routes.
- ATMS device investment strategy is replacement of devices prior to end of life and failure according to prioritized criticality.
- Signal system investment strategies are preventative maintenance, emergency maintenance, and maintenance management.

NEXT STEPS

The next steps proposed in the continual maturation and improvement of asset management include:

- Developing a more formalized management process for some tier 2 assets
  - Potentially barrier, signs, and pipe culverts
  - Develop secondary tactical performance measures and targets
• Re-evaluate the contribution to decision-making of the current state performance measures to determine if they are the right measures to support UDOT Strategic Goals

• Finish the documentation of the signal system condition and analyze funding needs

• Imbed risk management into the intermediate planning process

• Mature and broaden the risk management process beyond the I-15 urban corridor

• Continue collaboration across UDOT department boundaries to develop a program of construction projects that move UDOT toward meeting the Strategic Goals
APPENDIX A: ASSET MANAGEMENT OVERSIGHT STRUCTURE

To address Utah’s infrastructure challenges and embrace opportunities, this TAMP updates the Asset Management Strategic Plan that has been in place since 2001. The updated version includes redefining the structure for asset management that oversees the program funding and implementation of the strategic plan. The purpose of the oversight structure is to provide recommendations to the Transportation Commission for approval that maximize system performance and funding. The structure creates new cross-sectional collaboration between traditionally separate functions of planning, design, construction, maintenance, traffic, and information technology. Collaboration will result in unified program recommendations based on a transparent, data-driven decision-making process. The oversight structure will assist UDOT in careful management of each asset throughout each phase of the asset’s life by utilizing program alignment, organized and accessible data, and risk-based asset performance.

ASSET MANAGEMENT STEERING COUNCIL

The Transportation Systems Management Team (TRANSMAT) has been reformed and renamed the Asset Management Steering Council (AMSC). The reformed AMSC is chaired by the Deputy Director and consists of eight members (Figure A1).

![Figure A1. Asset Management Steering Council Membership.]

Specific objectives of the AMSC include:

- Ensuring horizontal and vertical communication and integration across the organization relative to asset management.

- Providing direction and approving effective policies, programs, and processes, to ensure ongoing improvement of asset management.

- Evaluating the direction of asset management annually, and reporting the results of UDOT’s Transportation Program measurements.
ASSET ADVISORY COMMITTEE

The Asset Advisory Committee (AAC) has been formed to enhance the communication flow between the strategic work of the AMSC and the “boots on the ground” technical experts. This committee will implement strategies in a coordinated manner to continually improve the asset management process. The AAC is chaired by the Asset Management Director and consists of designated division leaders.

Specific objectives of the AAC include:

- Recommending modifications to policies and processes to improve asset management practices to the AMSC.
- Working together across department boundaries to develop and recommend a unified program to the AMSC that maximizes system performance and funding.
-Aligning programs to determine the most cost effective method of addressing asset needs.

The enhanced collaboration across functions is expected to lead to synergistic improvements for individual asset performance beyond the level that any one division could achieve. UDOT has shown great success due to collaboration while preparing for the 2002 Olympics, embracing Design/Build and other alternative contracting methods, initiating the use of Accelerated Bridge Construction (ABC), etc. This committee organization engages UDOT leaders to make strategic decisions and informs and educates employees throughout UDOT regarding the direction of asset management and their critical involvement.
Purpose
To outline the responsibilities of the Utah Department of Transportation (Department) Asset Management Steering Council (AMSC) and the Asset Advisory Committee (AAC). These responsibilities include providing recommendations to the Transportation Commission pertaining to planning, developing, and preserving the investment in Utah’s Transportation System and obtaining maximum cost effectiveness from transportation construction, rehabilitation, and maintenance programs. AMSC and AAC activities support the Department strategic goals:

1. Preserve Infrastructure
2. Optimize Mobility
3. Zero Fatalities
4. Strengthen the Economy

Policy
The AMSC and AAC provide recommendations to preserve the large investment in the State’s roadway and transportation systems and provide a strategy to obtain an enhanced system of highways and related transportation modes that continue to meet the needs of Transportation System users. The teams assist the Department in obtaining cost effective solutions for system needs by using program alignment, organized and accessible data, and risk-based asset performance. The council and committee make sure all divisions of the Department are working together to present a unified program recommendation based on a transparent decision-making process.

ASSET MANAGEMENT STEERING COUNCIL MEMBERS
Deputy Director – Chair
Program Development Director
Project Development Director
Operations Engineer
Region 1 Director
Region 2 Director
Region 3 Director
Region 4 Director
Asset Management Director (Secretary)
FHWA Division Administrator or designee

ASSET ADVISORY COMMITTEE MEMBERS
Asset Management Director – Chair
Planning Director
Traffic Management Engineer
Traffic and Safety Engineer
Engineering Services Director
Structures Chief Engineer
Maintenance Director
Region 1 Representative
Region 2 Representative
Region 3 Representative
Region 4 Representative
FHWA Team Leader or designee

Various divisions, sections, and regions provide needed staff support and input to AMSC. AAC members may be invited to participate in AMSC meetings at the chairman’s discretion. AMSC is authorized to establish pro tem teams and task forces to assist in accomplishing its responsibilities.

AMSC will consider strategic level Transportation Systems Management activities within the Department; make recommendations to the Transportation Commission; improve efficiency of the decision making process; and assure consistent transportation systems management practices at all supervisory levels.
Specific responsibilities of the AMSC include:

1. Recommending Department transportation strategies to the Transportation Commission to implement and achieve the Department transportation policies.
2. Recommending policies and resource levels that support ongoing improvement of asset management and a unified transportation program.
3. Guaranteeing horizontal and vertical communication and integration across the Department relative to asset management.
4. Reviewing and reporting the results of the Department's Annual Transportation Program to the Transportation Commission and public.
5. Evaluating the direction of asset management annually in a joint meeting with AAC.

AAC oversees implementation of the Department's Transportation Systems Management Process.

Specific responsibilities of the AAC include:

1. Recommending to the AMSC modifications to policies and processes to improve asset management practices.
2. Working together across department boundaries to develop and recommend a unified program to the AMSC that maximizes system performance and funding.
3. Aligning programs to determine the most cost-effective way of addressing asset needs.
4. Determining the appropriate management level for each asset.

Definitions
A Transportation Systems Management Process provides a set of various tools or methods to assist decision makers in finding optimum strategies for providing and maintaining the transportation systems in an acceptable condition over a planned period. The process includes analysis programs and related data to include but not limited to the following transportation areas: Pavements, Safety, Structures, Mobility, Design, Construction, Maintenance, and Planning.
In order to begin the process of evaluating the current situation of Asset Management, the *Asset Management Implementation Plan (developed in June 2004 and updated in April 2006)* was reviewed. It was noted that many of the actions identified in the plan had been achieved, and UDOT has had great success in regard to managing assets especially bridges and pavements. The document also identified that many of the divisions within UDOT were working towards the goals set forth as a strategic direction by senior leaders at the time. Over the past 8 years, there have been great technological advances and some change in direction in the strategic plan. These events have created new challenges and opportunities that are addressed in this TAMP.

**SELF-ASSESSMENT AND GAP ANALYSIS**

To identify the steps taken to raise asset management to a gold standard, self-assessments were completed. The assessments results were identified through a process of brainstorming sessions, surveys, and interviews specific to divisions (Figure B1).

![Activity Result Diagram](image)

**Figure B1.** Self-Assessment and Gap Analysis Process.
Specific activities were taken to understand the gaps associated with Asset Management as shown in Figure B1 and described below.

Activity 1. The Asset Management Steering Council participated in a facilitated discussion of the purpose of a five-year strategic plan and issues currently faced by council members. This discussion in July 2013 resulted in a collection of comments and questions written on post-it notes by voting and non-voting council members.

Activity 2. The discussion facilitators, RiversQuest Consulting and V-I-A Consulting organized the comments and questions from the July meeting into major categories (Figure B2). The results of the categorization are shown in Figure B2. The percentages presented are based on 79 total post-it notes collected. The actual comments are included in Appendix C.

![Comment Categorization](image)

*Figure B2. Comment Categorization Results from Assessment and Analysis.*

Activity 3. Questions were developed from the comments gathered in Activity 1 and incorporated into a Gap Analysis Survey. The initial questions were fine-tuned and minimized based on individual discussions with senior UDOT leaders.

Activity 4. Eleven questions were presented to the TRANSMAT Committee during the November 2013 meeting (See Appendix C). Each statement was rated in two ways.

a. The statement was rated on level of importance to the UDOT program on a scale of 1-5. The scale was defined as 1-very important to 5-unimportant.

b. Next each statement was rated on a scale of 1-5 relative to UDOT’s current level of performance with 1-excellent and 5-poor.

Twenty-three meeting participants recorded their answers with a handheld device and results which were immediately available for each statement.

The meeting facilitators analyzed the results and incorporated the information into a report for consideration. Senior leaders elected to reorganize TRANSMAT into the Asset Management Organization Structure noted above.
GAP ANALYSIS RESULTS
The gap between the importance of each statement and the current status of UDOT performance as rated by the TRANSMAT Committee members is depicted in Figure B3. Appendix D contains the details of the voting results. The results show the biggest gaps are in areas related to information technology. As technology rapidly advances much more data is gathered and the challenge comes in gathering the knowledge from each function and making it available to others. Information systems support a coordinated, seamless approach to Asset Management.

Further discussion of the gap analysis results led to the identification of three major areas of focus.

- The three questions related to data show the largest gaps and the highest importance of all the questions. These questions focus on the organization and accessibility of data for business systems across UDOT.

- Three questions related to asset performance and identified a need to focus on performance measures and different levels of management plans for assets.

- The remaining questions relate to aligning programs within UDOT and with partners to ensure transparent and data driven decision processes are in place to build and maintain public trust.

These major areas of focus became objectives for the five-year plan and led to defining the asset management goal.
## Transmat Committee Comments Regarding Asset Management Plan

<table>
<thead>
<tr>
<th>Comment Provided By</th>
<th>Ideas</th>
<th>Responsibility</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Voting Member</td>
<td>This group determines how well funding is set / prioritized</td>
<td>Steering Committee</td>
<td>Funding</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>We should improve how we sweep the corners for money left on projects</td>
<td>Steering Committee</td>
<td>Funding</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>What can be done to maximize the use of the public’s money? If we recapture money more quickly does that help?</td>
<td>Steering Committee</td>
<td>Funding</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: Enhance the ability to quickly evaluate program balances and delivery</td>
<td>Steering Committee</td>
<td>Funding</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: to define what is intended in fund types that Transmat approves. Agree to update “Fund Fact Sheets” yearly.</td>
<td>Steering Committee</td>
<td>Funding</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: To consider Active Transportation Policy in funding decisions.</td>
<td>Steering Committee</td>
<td>Funding</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Definition documentation for funding types and processes. Basically, setting the rules for when funds can be used, combined, etc. When does it require Commission action?</td>
<td>Steering Committee</td>
<td>Funding</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: To identify what can be spent on bridges using Purple and Orange Book projects if it is allowed.</td>
<td>Structures</td>
<td>Funding</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Life cycle replacement plan for ATMS / Signal systems</td>
<td>T&amp;S</td>
<td>Management Plan - Other</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need to put culverts in our program. Need to track them and see where we are at</td>
<td>Asset Management</td>
<td>Management Plans - Other</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Capacity is an asset. Public trust is an asset. How can we manage these non-tangible assets?</td>
<td>Steering Committee</td>
<td>Management Plans - Other</td>
</tr>
<tr>
<td>FHWA</td>
<td>Is congestion or capacity throughout a tangible asset? (Time to get to work, speed, volume, ridership)</td>
<td>T&amp;S</td>
<td>Management Plans - Other</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Mobility is an asset. How do we manage?</td>
<td>T&amp;S</td>
<td>Management Plans - Other</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>We should consider safety, choke, Pt, capacity as an asset</td>
<td>T&amp;S</td>
<td>Management Plans - Other</td>
</tr>
<tr>
<td>Comment Provided By</td>
<td>Ideas</td>
<td>Responsibility</td>
<td>Category</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need to show target level for concrete pavements. Big dollars coming at UDOT for older sections.</td>
<td>Asset Management</td>
<td>Management Plans - Pavements</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Bridge: We need a plan for every structure on every road</td>
<td>Management Plans - Structures</td>
<td>Management Plans - Structures</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Bridge: Define / plan for off system bridge, develop a strategy, preservation, funding</td>
<td>Management Plans - Structures</td>
<td>Management Plans - Structures</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: A plan for every bridge</td>
<td>Management Plans - Structures</td>
<td>Management Plans - Structures</td>
</tr>
<tr>
<td>FHWA</td>
<td>Have you checked out the FHWA’s INVEST tool to examine a projects sustainability of the sustainability of our planning process?</td>
<td>Planning</td>
<td>Performance Measures</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: to establish asset performance measures with FHWA so UDOT isn’t reporting by project then we can deliver project by asset needs instead of project specific inventories.</td>
<td>Steering Committee</td>
<td>Performance Measures</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: Quarterly reports on each asset and accomplishment.</td>
<td>Steering Committee</td>
<td>Performance Measures</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>How do we measure success in asset management? Do these measure change by asset type? What impact does design, concept, development have on asset management</td>
<td>Steering Committee</td>
<td>Performance Measures</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>ATMS devices need performance standards</td>
<td>T&amp;S</td>
<td>Performance Measures</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Safety: How do we measure performance?</td>
<td>T&amp;S</td>
<td>Performance Measures</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Plan for every road: Cost/Benefit ratio should be calculated to see if it’s worth it to develop a plan.</td>
<td>Asset Management</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Develop asset priority list</td>
<td>Asset Management</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Develop a process and prioritize our assets for analysis and recommendation</td>
<td>Asset Management</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Due to constraints, we should evaluate those assets of highest value and cover those of greatest need. Can’t do them all.</td>
<td>Asset Management</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Different levels of asset management are available – we need to identify what level is needed for each asset – maybe B/C?</td>
<td>Asset Management</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: to move to Statewide Prioritization Process based on strategic goal (UDOT and MAG Process).</td>
<td>Planning</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Project Delivery – Implications of TRANSMAT decisions should be considered</td>
<td>Project Delivery</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Comment Provided By</td>
<td>Ideas</td>
<td>Responsibility</td>
<td>Category</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------</td>
<td>----------------</td>
<td>----------</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Communicating the prioritization process</td>
<td>Steering Committee</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>What added methods can be used to prioritize other assets and projects types? Where are we on financial cross asset management? How to value work on asset to another, comparing apples to oranges.</td>
<td>Steering Committee</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Define assets to be managed, Rank Assets</td>
<td>Steering Committee</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Use Engineer / Business Decision for maintaining assets</td>
<td>Steering Committee</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Asset prioritization – which assets should we focus on first? What can we afford to do now?</td>
<td>Steering Committee</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Improve how recommendations are made to Commission progress / process</td>
<td>Steering Committee</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>We need 3 year program by region to do the right project at the right time</td>
<td>Steering Committee</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Are there best practices defined that can help guide our program?</td>
<td>Steering Committee</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Use data to rank projects (based on need)</td>
<td>Steering Committee</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Safety: How do we measure working with other projects (bridge, pavement)</td>
<td>T&amp;S</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Choke Pt projects make it data derived not even distribution</td>
<td>T&amp;S</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: Three year plan for safety projects</td>
<td>T&amp;S</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>When balancing project cost against minimal decrease in safety, how is minimal defined? What is an acceptable decrease &amp; how do you quantify cost to safety?</td>
<td>T&amp;S</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Safety: Identify how we prioritize safety projects</td>
<td>T&amp;S</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Use crash data to prioritize safety projects</td>
<td>T&amp;S</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Continue down the path of sign replacement. More reflective not necessarily changing the sign bridges. (Not as critical as culverts)</td>
<td>Asset Management</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Comment Provided By</td>
<td>Ideas</td>
<td>Responsibility</td>
<td>Category</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Incorporate risk analysis into asset management processes</td>
<td>Asset Management</td>
<td>Risks</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Better define our risk analysis / factors</td>
<td>Project Delivery</td>
<td>Risks</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>What is the program for minor rehab and preservation? Where can it be found? Does it state the treatment type?</td>
<td>Asset Management</td>
<td>Systems/Data - Education</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>UPlan is the tool to Use!!! One stop shop = Efficiency</td>
<td>Steering Committee</td>
<td>Systems/Data - Education</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Employees need education and training on UPlan and UGate</td>
<td>Steering Committee</td>
<td>Systems/Data - Education</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Communication</td>
<td>Steering Committee</td>
<td>Systems/Data - Education</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Low trust in the data in UPlan and UGate. Need to know the source of the data.</td>
<td>Steering Committee</td>
<td>Systems/Data - Education</td>
</tr>
<tr>
<td>Voting Member</td>
<td>We need to educate stakeholders about assets data and UPlan</td>
<td>Steering Committee</td>
<td>Systems/Data - Education</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Educate department on what data is available. Consolidate and build systems to make it readily available.</td>
<td>Steering Committee</td>
<td>Systems/Data - Education</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>What level of integration is enough to feed asset management?</td>
<td>Asset Management</td>
<td>Systems/Data - Integration</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>We do a good job with pavement and fund allocation but the data and allocation is about 2 years behind. Example: Core project has made pavement good in Utah County but won’t see funding levels change for 2 to 3 years. Can we get data change faster?</td>
<td>IT</td>
<td>Systems/Data - Integration</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need data collection that is recent and relevant IE: Traffic data needs to be newer then 3 years old</td>
<td>IT</td>
<td>Systems/Data - Integration</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Continue building business systems that share and integrate data</td>
<td>IT</td>
<td>Systems/Data - Integration</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>The TMD has data that other groups / regions need to make better decisions</td>
<td>Planning</td>
<td>Systems/Data - Integration</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Can we afford to do cross asset analysis? Can we afford to not do cross asset analysis?</td>
<td>Steering Committee</td>
<td>Systems/Data - Integration</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Like to see us focus on cross assets analysis for pavement and bridges</td>
<td>Asset Management</td>
<td>Systems/Data - Integration</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Integrations of our data systems is poor. Information is siloed, Communication is siloed</td>
<td>IT</td>
<td>Systems/Data - Integration</td>
</tr>
<tr>
<td>Comment Provided By</td>
<td>Ideas</td>
<td>Responsibility</td>
<td>Category</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>What do we know about our current assets? How can big data help us drive asset decisions?</td>
<td>IT</td>
<td>Systems/Data - Integration</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Need: Widen data collection by gathering other data from stakeholders (InRix, Freight, Events)</td>
<td>IT</td>
<td>Systems / Data - Integration</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Bridge: Can we begin showing bridge data on UPlan / UGate</td>
<td>Structures</td>
<td>Systems / Data - Integration</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Do we have enough data to do asset analysis? Deterioration process? Current condition? Last modification?</td>
<td>Asset Management</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Would better systems improve our ability to manage our assets?</td>
<td>Asset Management</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Collect data for additional assets</td>
<td>Asset Management</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Our systems are assets we need to manage and some of our systems are inhibiting our abilities.</td>
<td>IT</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Asset also includes system improvement to optimize use of funding (ePm, Database, New PDBS)</td>
<td>IT</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Data Quality: Should a QIT be established for management?</td>
<td>IT</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Identify priority systems and where the data should reside. Where is our system money best spent?</td>
<td>IT</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Improve systems to better manage our money (Free up contingences)</td>
<td>IT</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Increase data quality management</td>
<td>IT</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Data quality: is there a lack of credibility?</td>
<td>IT</td>
<td>Systems / Data - Management</td>
</tr>
<tr>
<td>Non-Voting Member</td>
<td>Shouldn’t our systems (technology) be another asset we should manage?</td>
<td>IT</td>
<td>Systems/Data-Integration</td>
</tr>
<tr>
<td>Voting Member</td>
<td>Incorporate highway safety manual in standards process – as well as early project involvement</td>
<td>T&amp;S</td>
<td>Systems/Data-Integration</td>
</tr>
</tbody>
</table>

Legend:
- **Voting Member Comment**
- **Non-Voting Member Comment**
- **FHWA Member Comment**
APPENDIX D: GAP ANALYSIS QUESTIONS AND VOTING RESULTS

UDOT Asset Management Steering Council Gap Analysis Questions

UDOT Systems / Data
- UDOT has established a quality data information architecture to promote the integration of business systems for unified asset management.

1. Very Important
2. Important
3. Somewhat Important
4. Of Little Importance
5. Unimportant

1. Excellent
2. Above Average
3. Average
4. Below Average
5. Poor

- Business systems are treated as a strategic asset to help make data driven decisions.

1. Very Important
2. Important
3. Somewhat Important
4. Of Little Importance
5. Unimportant

1. Excellent
2. Above Average
3. Average
4. Below Average
5. Poor

- Necessary data is easily accessible to make data driven cost/benefit decisions.

1. Very Important
2. Important
3. Somewhat Important
4. Of Little Importance
5. Unimportant

1. Excellent
2. Above Average
3. Average
4. Below Average
5. Poor

UDOT Project Prioritization
- A clear, well documented state-wide prioritization process is in place.

1. Very Important
2. Important
3. Somewhat Important
4. Of Little Importance
5. Unimportant

1. Excellent
2. Above Average
3. Average
4. Below Average
5. Poor

- Management plans have been / are being developed for pavements including life-cycle analysis, identification of performance measures, and data required for cross analysis.

1. Very Important
2. Important
3. Somewhat Important
4. Of Little Importance
5. Unimportant

1. Excellent
2. Above Average
3. Average
4. Below Average
5. Poor
- Management plans have been / are being developed for *bridges* including life-cycle analysis, identification of performance measures, and data required for cross analysis.

  1. Very Important  
  2. Important  
  3. Somewhat Important  
  4. Of Little Importance  
  5. Unimportant

  1. Excellent  
  2. Above Average  
  3. Average  
  4. Below Average  
  5. Poor

- Management plans have been / are being developed for *other assets* including life-cycle analysis, identification of performance measures, and data required for cross analysis.

  1. Very Important  
  2. Important  
  3. Somewhat Important  
  4. Of Little Importance  
  5. Unimportant

  1. Excellent  
  2. Above Average  
  3. Average  
  4. Below Average  
  5. Poor

**UDOT Funding**

- The types of funding, the uses of funding, and the process to fund projects is transparent.

  1. Very Important  
  2. Important  
  3. Somewhat Important  
  4. Of Little Importance  
  5. Unimportant

  1. Excellent  
  2. Above Average  
  3. Average  
  4. Below Average  
  5. Poor

**UDOT Performance Measures**

- Asset management performance measures are consistent with the UDOT strategic direction and with the criteria used to set program priorities, select projects, and allocate resources.

  1. Very Important  
  2. Important  
  3. Somewhat Important  
  4. Of Little Importance  
  5. Unimportant

  1. Excellent  
  2. Above Average  
  3. Average  
  4. Below Average  
  5. Poor

**UDOT Risk Assessment**

- Resource allocation includes assessment of probability and severity of risk associated with each asset.

  1. Very Important  
  2. Important  
  3. Somewhat Important  
  4. Of Little Importance  
  5. Unimportant

  1. Excellent  
  2. Above Average  
  3. Average  
  4. Below Average  
  5. Poor
Collaboration
- UDOT liaison's with local governments share information and knowledge to further the development of asset management in Utah.

1. Very Important
2. Important
3. Somewhat Important
4. Of Little Importance
5. Unimportant

1. Excellent
2. Above Average
3. Average
4. Below Average
5. Poor

GAP ANALYSIS VOTING RESULTS

UDOT Systems / Data

Information Architecture

#1 Survey Results:
UDOT has established a quality data information architecture to promote the integration of business systems for unified asset management.

Gap Analysis:

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>51% Very Important</td>
<td>0% Excellent</td>
</tr>
<tr>
<td>30% Important</td>
<td>30% Above Average</td>
</tr>
<tr>
<td>9% Somewhat Important</td>
<td>30% Average</td>
</tr>
<tr>
<td>0% Of Little Importance</td>
<td>15% Below Average</td>
</tr>
<tr>
<td>0% Unimportant</td>
<td>4% Poor</td>
</tr>
</tbody>
</table>

Gap = 1.6

#2 Survey Results:
Business systems are treated as a strategic asset to help make data driven decisions.

Gap Analysis:

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>43% Very Important</td>
<td>4% Excellent</td>
</tr>
<tr>
<td>38% Important</td>
<td>30% Above Average</td>
</tr>
<tr>
<td>9% Somewhat Important</td>
<td>35% Average</td>
</tr>
<tr>
<td>0% Of Little Importance</td>
<td>26% Below Average</td>
</tr>
<tr>
<td>0% Unimportant</td>
<td>4% Poor</td>
</tr>
</tbody>
</table>
# Necessary Data Available

Necessary data is easily accessible to make data driven cost/benefit decisions.

---

**#3 Survey Results:**

A clear, well documented state-wide prioritization process is in place.

---

**UDOT Project Prioritization**

**Prioritization Process**

---

**#4 Survey Results:**

A clear, well documented state-wide prioritization process is in place.
Management Plans for Pavements

#5 Survey Results:
Management plans have been / are being developed for pavements including life-cycle analysis, identification of performance measures, and data required for cross analysis.

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Important</td>
<td>Excellent</td>
</tr>
<tr>
<td>Important</td>
<td>Above Average</td>
</tr>
<tr>
<td>Somewhat Important</td>
<td>Average</td>
</tr>
<tr>
<td>Of Little Importance</td>
<td>Below Average</td>
</tr>
<tr>
<td>Unimportant</td>
<td>Poor</td>
</tr>
</tbody>
</table>

Gap Analysis:

Management Plans for Bridges

#6 Survey Results:
Management plans have been / are being developed for bridges including life-cycle analysis, identification of performance measures, and data required for cross analysis.

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Important</td>
<td>Excellent</td>
</tr>
<tr>
<td>Important</td>
<td>Above Average</td>
</tr>
<tr>
<td>Somewhat Important</td>
<td>Average</td>
</tr>
<tr>
<td>Of Little Importance</td>
<td>Below Average</td>
</tr>
<tr>
<td>Unimportant</td>
<td>Poor</td>
</tr>
</tbody>
</table>

Gap Analysis:
**Management Plans for Other Assets**

**#7 Survey Results:**
Management plans have been / are being developed for other assets including life-cycle analysis, identification of performance measures, and data required for cross analysis.

**Gap Analysis:**

![Importance Level vs Current Status Chart]

**UDOT Funding**

**Funding Transparency**

**#8 Survey Results:**
The types of funding, the uses of funding, and the process to fund projects is transparent.

**Gap Analysis:**

![Importance Level vs Current Status Chart]
UDOT Performance Measures

Alignment of Performance Measures

#9 Survey Results:
Asset management performance measures are consistent with the UDOT strategic direction and with the criteria used to set program priorities, select projects, and allocate resources.

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>57%</td>
<td>9%</td>
</tr>
<tr>
<td>1. Very Important</td>
<td>1. Excellent</td>
</tr>
<tr>
<td>30%</td>
<td>61%</td>
</tr>
<tr>
<td>2. Important</td>
<td>2. Above Average</td>
</tr>
<tr>
<td>8%</td>
<td>30%</td>
</tr>
<tr>
<td>3. Somewhat Important</td>
<td>3. Average</td>
</tr>
<tr>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>4. Of Little Importance</td>
<td>4. Below Average</td>
</tr>
<tr>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>5. Unimportant</td>
<td>5. Poor</td>
</tr>
</tbody>
</table>

Gap Analysis:

UDOT Risk Assessment

Risk Assessment

#10 Survey Results:
Resource allocation includes assessment of probability and severity of risk associated with each asset.

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>35%</td>
<td>4%</td>
</tr>
<tr>
<td>1. Very Important</td>
<td>1. Excellent</td>
</tr>
<tr>
<td>28%</td>
<td>22%</td>
</tr>
<tr>
<td>2. Important</td>
<td>2. Above Average</td>
</tr>
<tr>
<td>17%</td>
<td>30%</td>
</tr>
<tr>
<td>3. Somewhat Important</td>
<td>3. Average</td>
</tr>
<tr>
<td>0%</td>
<td>35%</td>
</tr>
<tr>
<td>4. Of Little Importance</td>
<td>4. Below Average</td>
</tr>
<tr>
<td>0%</td>
<td>9%</td>
</tr>
<tr>
<td>5. Unimportant</td>
<td>5. Poor</td>
</tr>
</tbody>
</table>

Gap Analysis:
Collaboration

Local Government Collaboration

#11 Survey Results:
UDOT liaison’s with local governments share information and knowledge to further the development of asset management in Utah.

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Important</td>
<td>1. Excellent</td>
</tr>
<tr>
<td>Important</td>
<td>2. Above Average</td>
</tr>
<tr>
<td>Somewhat Important</td>
<td>3. Average</td>
</tr>
<tr>
<td>Of Little Importance</td>
<td>4. Below Average</td>
</tr>
<tr>
<td>Unimportant</td>
<td>5. Poor</td>
</tr>
</tbody>
</table>

Gap Analysis:
APPENDIX E: ASSET TIERS AND RISK ASSESSMENT

Tier 1 Assets

• Tier 1
  – Highest value assets
  – Highest risk of negative financial impact for poor management
  – Very important to UDOT performance plan
  – Has a significant separate funding source
  – Management includes
    • setting targets, goals
    • Sophisticated data collection
    • Predictive modeling and risk analysis

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<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement</td>
<td>$24B</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

Financial –
• Have separate and stable funding source to preserve condition but level 2 roads are underfunded.

Operational –
• Pavement failure or deteriorated condition adversely impacts mobility in a wide section of system, detours limited or are already carrying heavy load.

Safety –
• Pavement failure or deteriorated condition moderately impacts safety of public travel.

Information –
• Data is readily available on all but data is not as good on level 2 roads.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridges</td>
<td>$5B</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

**Financial –**
- Have separate and stable funding source that is not adequate to preserve all bridges at desired condition levels.

**Information –**
- Data is available from regular inspections and Mandli data but is not as good on off system bridges.

**Operational –**
- Bridge failure or load posted adversely impacts mobility of a wide section of system, detours limited or are already carrying heavy load.

**Safety –**
- Bridge failure has very high public safety ramifications.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>ATMS/Signal Devices</td>
<td>$793M</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5.5</td>
<td>1</td>
</tr>
</tbody>
</table>

**Financial –**
- Separate funding source is available and not adequate for needs.

**Information –**
- Location data available, accurate data is currently not available on age or condition of devices.

**Operational –**
- Replacement activities are likely and moderately impact operations.

**Safety –**
- Failure is a significant safety hazard but redundant devices temporize consequences.
TIER 2 ASSETS

• Tier 2
  – Moderate value assets and substantial importance to transportation system operation
  – Moderate risk of negative impact for poor management or asset failure
  – May have a separate funding source
  – May be lack of redundancy that increases risk
  – Management includes
    • Accurate data collection, less than annually
    • Risk assessment primarily based on asset failure
    • May include spreadsheet predictive strategy
    • May include condition targets for proactive strategies

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe Culverts</td>
<td>$18</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

Financial –
• Limited separate funding and not adequate for regular preservation activities. However, pipe culverts are routinely included in pavement preservation projects.

Operational –
• Pipe culvert failure may have significant mobility impact depending on traffic volumes and extent of failure, reconstruction may take significant effort due to conflicts with utilities and other assets but probability of failure is low.

Information –
• Limited location data is available and is difficult to obtain due to urban linked piping systems.
• Condition is unknown and is difficult and costly to obtain.

Safety –
• Pipe culvert failure likely to have advance warning of water back up or sagging pavement and therefore lesser safety risk and low probability.
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs</td>
<td>$300M</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>4.5</td>
<td>2</td>
</tr>
</tbody>
</table>

**Financial** –
- Very limited separate funding source available.

**Information** –
- Data is available on location but not condition
- Sign age is unknown prior to 2004.
- Percentage meeting current standards unknown.

**Operational** –
- Sign structure failure may have significant operational impact.
- Sign redundancy reduces operational risk.

**Safety** –
- Regulatory signs replaced immediately when necessary.
- Other missing or damaged signs replaced as a project element.

<table>
<thead>
<tr>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>$3.4B</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>3.5</td>
<td>2</td>
</tr>
</tbody>
</table>

**Financial** –
- No separate funding source and not regularly included in preservation projects.

**Information** –
- Data is available on location but not condition.

**Operational** –
- Wall failure may have significant impact on system mobility depending on height and location. Many can be reconstructed in shoulder area with limited operational impact.

**Safety** –
- Wall failure consequences depend heavily on height and location and failure is very rare.
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</thead>
<tbody>
<tr>
<td>Rumble Strips</td>
<td>$6M</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>3.5</td>
<td>2</td>
</tr>
</tbody>
</table>

**Financial** –
- Rumble strips are installed as project elements.

**Information** –
- Location information is available, condition data is not easily collected.

**Operational** –
- Replacement activities are completed on the shoulder with low impact to operations.

**Safety** –
- Failure is a moderate safety hazard with moderate consequences due to other safety features such as shoulders, guard rails, etc.

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</thead>
<tbody>
<tr>
<td>ADA Ramps</td>
<td>$20M</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2.5</td>
<td>2</td>
</tr>
</tbody>
</table>

**Financial** –
- Separate funding source is available for required installations.

**Information** –
- Data is not easily available on location.
- Condition is monitored by maintenance as part of other activities.

**Operational** –
- Replacement and installation activities do not significantly impact operations.

**Safety** –
- Failure is a moderate safety hazard with moderated probability.
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<tbody>
<tr>
<td>Barrier</td>
<td>$450M</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2.5</td>
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</tbody>
</table>

**Financial –**
- Separate funding source is available to add barrier where needed based on safety assessments, if funding lost would have negative impact on fatalities.

**Information –**
- Data on location and type collected routinely.

**Operational –**
- Barrier usually can be repaired and added in the median or on the shoulders with minimal impact to system mobility.

**Safety –**
- Barrier is repaired and replaced by maintenance as needed due to crashes and most of the time still effective even when hit.

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<tr>
<td>Pvt. Markings</td>
<td>$42M</td>
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<td>1</td>
<td>2</td>
<td>5</td>
<td>2.5</td>
<td>2</td>
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</tbody>
</table>

**Financial –**
- Maintenance allocates funding for pavement markings every year.

**Information –**
- Data is readily available on location, amount and type of markings.

**Operational –**
- Replacement activities are rolling and do not significantly impact operations.

**Safety –**
- Failure is a moderate safety hazard but probability is moderated due to maintenance monitoring condition.
TIER 3 ASSETS

• Tier 3
  – Low value assets
  – Low risk of negative impact for poor management or asset failure
  – Management includes
    • Accurate data collection, less than annually
    • Risk assessment primarily based on asset failure
    • Included in projects when condition warrants
    • Reactive - Repaired or replaced when damaged

Assets Managed as Tier 3

<table>
<thead>
<tr>
<th>Asset</th>
<th>Tier</th>
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</thead>
<tbody>
<tr>
<td>Cattle Guards</td>
<td>3</td>
</tr>
<tr>
<td>Interstate Lighting</td>
<td>3</td>
</tr>
<tr>
<td>Fences</td>
<td>3</td>
</tr>
<tr>
<td>Rest Areas</td>
<td>3</td>
</tr>
<tr>
<td>Curb and Gutter</td>
<td>3</td>
</tr>
<tr>
<td>Trails</td>
<td>3</td>
</tr>
<tr>
<td>Bike Lanes</td>
<td>3</td>
</tr>
<tr>
<td>Surplus Land</td>
<td>3</td>
</tr>
<tr>
<td>At-grade crossings</td>
<td>3</td>
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</tbody>
</table>
APPENDIX F: PERFORMANCE-BASED PLANNING AND PROGRAMMING MEMORANDUM OF AGREEMENT
PERFORMANCE-BASED PLANNING AND PROGRAMMING
MEMORANDUM OF AGREEMENT

In accordance with 23 CFR 450.314 - Metropolitan Planning Agreements, this agreement is made and entered into this 16th day of April, 2018, by and between the Metropolitan Planning Organizations, hereinafter designated as “MPO(s)”, the Utah Department of Transportation, hereinafter designated as “UDOT”, and the Public Transportation Agencies;

WHEREAS, the MPO(s), have been duly constituted under the authority of Title 11, Chapter 13, Utah Code Annotated, 1953, as amended (the Interlocal Cooperation Act), and pursuant to Section 3, Executive Order of the Governor of the State of Utah, dated 27 May, 1970; and

WHEREAS, UDOT’s powers and responsibilities are listed in Utah Code Section 72-1-201 et seq. and include general responsibility for planning, research, design, construction, maintenance, security, and safety of all state transportation systems; and

WHEREAS, the Public Transportation Agencies powers and responsibilities are listed in Utah Code Annotated, Title 17B, Chapter 2a, Part 8; and every public transit provider that receives Federal financial assistance under 49 Utah State Code chapter 53 is to develop a Transit Asset Management Plan (TAM), or be part of a group TAM; and provided that the Utah Transit Authority, a tier I provider, and Cache Valley Transit District, a tier II provider, are providing their own TAM; and Park City Transit, Basin Transit Administration, SunTran, and Cedar Area Transit, tier II providers, are participating in the UDOT group TAM; and

WHEREAS, The provisions contained in this document respond to requirements in 23 CFR 450.314(h) stating: “The Metropolitan Planning Organizations (MPO(s)), States (UDOT), and the providers of public transportation shall jointly agree upon and develop specific written provisions for cooperatively developing and sharing information related to transportation performance data, the selection of performance targets, the reporting of performance targets, the reporting of performance to be used in tracking progress toward attainment of critical outcomes for the region of the MPO (see § 450.306(d), and the collection of data for the State asset management plans for the National Highway System (NHS)”;

NOW, THEREFORE BE IT RESOLVED, that the parties hereto, the MPO(s), UDOT, and the Public Transportation Agencies do mutually resolve and agree as follows:

1. Developing and Sharing Information Related to Transportation Performance Data
   a. UDOT will provide the MPO(s) with a subset, for their urbanized areas, of the state performance data that UDOT used or uses in developing statewide targets.
   b. MPO(s) that choose to adopt their own targets will provide any supplemental data used in determining any such target, to UDOT or the Public Transportation Agencies, or both.
c. Public Transportation Agencies that are part of the UDOT TAM will provide their transit data to UDOT within four months of their fiscal year end.
d. Public Transportation Agencies creating their own TAM will provide transit data by asset class for the FAST Act transit performance measures to UDOT and MPO(s), in their transit regions, within four months of their fiscal year end.

2. Selection of Performance Targets
   a. UDOT will develop statewide performance targets for each of the FAST Act performance measures, in cooperation with the MPO(s) and the Public Transportation Agencies.
   b. Public Transportation Agencies will develop their measures in the UDOT TAM or, if creating their own TAM, they will cooperate with their respective MPO(s) and UDOT when establishing transit targets.
   c. MPO(s) will cooperate with UDOT or Public Transportation Agencies, or both, in supporting the statewide targets or in establishing their own MPO targets. UDOT or Public Transportation Agencies, or both, will be given an opportunity to comment on the MPO(s) targets.
   d. UDOT, MPO(s), and Public Transportation agencies will develop and set targets as required by 23 CFR Parts 450 and 771, as well as 49 CFR Part 613, as applicable.

3. Reporting of Performance Targets
   a. UDOT and Public Transportation Agencies will report the statewide performance targets to FHWA and FTA, as applicable, and shall provide a copy of such reporting to the MPO(s).
   b. MPO(s) will report their performance targets to UDOT and their Public Transportation Agencies in the form of a memorandum or meeting minutes from their board.
      i. If the MPO(s) choose to adopt the targets of UDOT or the Public Transportation Agencies, or both, documentation of the MPO(s) support of the appropriate targets shall be provided to UDOT or the Public Transportation Agencies, or both.
      ii. If MPO(s) choose to adopt their own targets, written notification that the MPO(s) will set a quantifiable target, for the performance measure within the MPO planning area, with its associated data will be provided to UDOT or the Public Transportation Agencies, or both.

4. Reporting of Performance To Be Used In Tracking Progress Toward Attainment of Critical Outcomes For The Regional Area.

b. UDOT will include information outlined in 23 CFR 450.216 (f) (Development of Long-range Statewide Plan) in any statewide transportation plan amended or adopted after May 27, 2018, and information outlined in 23 CFR 450.218 (q) (Development of STIP) in any statewide transportation improvement program amended or adopted after May 27, 2018.

c. MPO(s) will include information outlined in 23 CFR 450.324 (Development of Metropolitan Transportation Plan) in any RTP amended or adopted after May 27, 2018, and information outlined in 23 CFR 450.326 (d) (Development of TIP) in any TIP amended or adopted after May 27, 2019, and conform to 23 CFR 450.306 (d) (performance based approach).

5. Collection of Data for the State Asset Management Plans for the NHS.

a. UDOT will be responsible for collecting bridge and pavement condition data for the State asset management plan for the NHS.

Changes

Alterations, extensions, supplements, or modifications of the terms of this Agreement as detailed herein shall be agreed to in writing by the parties concerned, incorporated as amendments to this Agreement, and made a part thereof.

Termination of Agreement

If, through any case, the parties fail to fulfill in a timely and proper manner the obligations under this Agreement, or if any of the parties shall violate any of the covenants, Agreements, or stipulations of this Agreement, or if any of the parties so wishes to withdraw from this Agreement, they shall thereupon have the right to terminate this Agreement by giving written notice of such terminations and specifying the effective date thereof, at least sixty (60) days before the effective date of such termination. If any one of the parties terminates their participation in this Agreement, it shall not affect the obligations of the other parties to this agreement.

Miscellaneous

Each party agrees to undertake and perform all acts reasonably necessary to carry out the intent and purposes of the Agreement at the request of another party.

The failure of any party to insist upon strict compliance of any of the terms and conditions or failure or delay by any party to exercise any rights or remedies provided in this Agreement, or by law, will not release any party from any obligations arising under this Agreement.
Each party represents that it has the authority to enter into this Agreement. This Agreement may be executed in counterparts by the parties.
IN WITNESS THEREOF, the MPO(s), UDOT, and the Public Transportation Agencies have executed this Agreement as of the date first written.

Name: Holly Daines  
Title: Chair, Cache Metropolitan Planning Organization  
Date: 4/16/18

Name: Andrew Gruber  
Title: Executive Director, Wasatch Front Regional Council  
Date: 4/19/18

Name: Andrew Jackson  
Title: Executive Director, Mountainland Association of Governments  
Date: 4/18/18

Name: Chris Hart  
Title: Chair, Dixie Metropolitan Planning Organization  
Date: 4/26/18

Name: Carlos Braceras  
Title: Executive Director, Utah Department of Transportation  
Date: 5/7/18

Name: Jerry Benson  
Title: President/Chief Executive Officer, Utah Transit Authority  
Date: 4/17/18

Name: Todd Beutler  
Title: General Manager, Cache Valley Transit District  
Date: 

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