Oregon Department of Transportation
Asset Management Integration

OREGON TRANSPORTATION ASSET MANAGEMENT GAP ANALYSIS REPORT

April 11, 2016 Draft

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ACKNOWLEDGEMENTS

This report would not have been possible without support from the Oregon Department of Transportation (ODOT) Executive Staff. Ms. Laura Wipper and Ms. Laura Hansen provided coordination and support during this process. The time, participation, and energy of the numerous ODOT staff involved in the strategic survey, interviews, and structured survey process is also acknowledged. It is through this spirit of cooperation and participation that the Asset Management (AM) concept will be advanced within the Agency in the years to come. A list of participants can be found in Appendix 1.

The report is the outcome of a Federal Highway Administration (FHWA) project that was facilitated by the FHWA consultant project team led by Mr. Jonathan Groeger from Amec Foster Wheeler Environment & Infrastructure, Inc. (AMEC). Mr. Stephen Gaj, FHWA Team Leader for the Asset Management group, and Mr. Satvinder Sandhu from the FHWA Oregon Division also participated and provided critical guidance and review throughout this process.

1.0 INTRODUCTION

1.1 REPORT ORGANIZATION

This report is organized into 4 sections (inclusive of this section):

- Section 1 provides background information about ODOT (Oregon Department of Transportation) and our agency's Asset Management Integration (AMI) unit.
- Section 2 was prepared by Jonathan Groeger, FHWA (Federal Highway Administration) contractor. This section introduces the concept of Asset Management (AM) business needs, developed based on MAP 21 (Moving Ahead for Progress in the 21st Century) requirements and AM best practices from other states in the nation. This is followed by a summary of ODOT's as-is state for each business need, and an assessment of ODOT's strengths and opportunities for improvement.
- Sections 3 and 4 were prepared by ODOT's Asset Management Integration Program staff.
    - Section 3 introduces ODOT's AM capacity/maturity model and the capacity goals for each asset in Priority Tiers 1-4. This is followed by an assessment of the current status of Asset Management practice at ODOT, and a discussion of accomplishments and key gaps for each asset type. The contents of this section are based on the independent views of AMI Program staff and general AM best practices, as well as consideration of likely future federal requirements based on MAP-21 rule-making currently in progress.
    - Section 4 offers AMI Program staff's recommendations for moving forward for continued progress with implementation of AM in ODOT.

1.2 BACKGROUND

The mission, goals, and values of the Oregon Department of Transportation (ODOT) are as follows:

Mission

To provide a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians.

This statement captures the essence of ODOT's focus and direction and intends to give unity and clarity to individual and collective efforts to accomplish the Agency's mission. The Agency strives to provide infrastructure and effective support for a healthy Oregon economy through smart stewardship of all available resources.

Goals

- Safety - Engineering, educating, and enforcing a safe transportation system.
- Mobility - Keeping people and the economy moving.
- Preservation - Preserving and maintaining infrastructure.
- Sustainability - Sustaining the environment and livable communities.
- Stewardship - Maximizing value from transportation investments.

Values

ODOT has seven key values listed below:

- ***Safety:*** We protect the safety of the traveling public, our employees and the workers who build, operate and maintain our transportation system.
- ***Customer Focus:*** We learn from and respond to our customers so we can better deliver quality, affordable services to Oregonians and visitors. Our customers include travelers, freight movers, and others who use our services and facilities.
- ***Efficiency:*** We strive to gain maximum value from the resources entrusted to us for the benefit of our customers.
- ***Accountability:*** We build the trust of customers, stakeholders and the public by reporting regularly on what we are doing and how we are using the resources entrusted to us.
- ***Problem Solving:*** We work with the appropriate customers, stakeholders and partners to find efficient, effective, and innovative solutions to problems.
- ***Diversity:*** We honor and respect our individual differences, and we work to ensure that people from diverse backgrounds have equitable opportunities, both internally and externally, to work for and conduct business with ODOT.
- ***Sustainability:*** We balance economic, environmental, and community well-being in a manner that protects the needs of current and future generations.

To further the mission and priorities of the Agency, ODOT has made a commitment to advance the concept of Asset Management (AM) within the Agency to integrate AM systems and philosophies into our business model. The Agency seeks to continue progressing in both performance and asset management, managing for the whole life including implementation of infrastructure preservation programs, risk management, and long-term financial management, particularly in terms of addressing the long-term sustainability of transportation assets.

Given the billions of dollars of linear and non-linear assets managed by ODOT, a proactive and informed decision-making process is essential. ODOT was an early adopter of AM and, in recent years; efforts have expanded to develop a more comprehensive program. The combined result of these Asset Management efforts is ODOT's positive reputation with transportation agencies around the nation. Broader Asset Management efforts started with the formation of Oregon Transportation Management System (OTMS), an effort to manage automation projects such as bridge, pavement, and safety management systems. As AM work at ODOT continued to be a priority, the next steps were an AM pilot in 2006 and a dedicated unit, the Asset Management Integration (AMI) Section, established in 2007. The work of AMI, building on existing AM successes at ODOT, continues efforts to add capacities for proactive management. Key AM efforts, so far, are as follows: basic inventory supported by technology for data collection; systems for storing, sharing, and reporting; and collaboration in the development and implementation of analysis and decision-making frameworks.

Positive impacts from these initiatives are already apparent. Still, ODOT faces some challenges to fully integrate AM principles, and the years to come will include a focus on improving communication throughout the Agency, changing culture to fully incorporate AM, and maintaining focus and momentum of AM efforts.

In 2011, ODOT combined the three separate documents, Strategic Plan, Implementation Plan and Communication Plan, into one integrated document (2011 ODOT Integrated Asset Management Plan) that superseded these three previously approved in 2006. This document served as a blueprint to guide systematic AM efforts at ODOT. This plan sets a vision and goals

for AM at ODOT and outlined objectives and actions for each of the goals, providing a step-by-step blueprint for how to achieve them.

As an enabling step in this evolution, the Agency has conducted a Gap Analysis to benchmark the current AM practices versus good practice. Through this exercise, ODOT has developed this document, customized to the business processes and needs of the Agency.

ODOT manages a wide range of assets to meet public, agency, and legislative expectations. Physical transportation infrastructure is one type of asset. Others include agency's human resources, financial capacity, equipment and vehicle fleets, materials stocks, real estate, and corporate data and information. The overall AM framework needs to be flexible enough to be adapted and refined for use with each type of asset above. However, this Gap Analysis focuses on the particular set of assets that constitutes ODOT's physical transportation infrastructure. Other assets can be viewed in this context as resources that are allocated and utilized in managing the physical transportation infrastructure. ODOT expects to expand its AM practices to other types of assets over time.

This document was developed in four steps:

- ***Step 1. Strategic self-assessment.*** As part of this process, 53 Agency staff participated in an online Gap Analysis survey. The survey was based on Volume I of AASHTO's Transportation Asset Management Guide.
- ***Step 2. In-depth interviews.*** Over 60 staff members participated in a series of face-to-face interviews. The objective of these interviews was to discuss existing practices in more detail and inform the Gap Analysis process.
- ***Step 3. Self-assessment workshop.*** The objective of the workshop was to discuss and prioritize the gaps, and to discuss options for addressing them. It was an all-day workshop with Senior Staff and Executive Staff that served as a forum to formulate and discuss ODOT's Asset Management strategic vision and goals
- ***Step 4. Development of Gap Analysis Report.*** The draft report was developed, reviewed, and presented to Senior Staff and Asset Management Executive Staff. The input received during this step was incorporated into this version of the report.

It should be noted that this Gap Analysis Report is a first step. A plan to address these gaps should be developed and should be revisited on a periodic basis (recommend every biennium). Each update should reflect accomplishments, emerging challenges, unexpected opportunities, and revised Agency policies.

2.0 AM STATE-OF-THE-PRACTICE

This section provides an overview of AM and provides a brief discussion of key good practices. This section sets the context for recommendations made later in this plan.

According to The Moving Ahead for Progress in the 21st Century Act (MAP-21) (United States Congress, 2012), the term Asset Management is defined as:

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

Elements of good practice elaborate upon the definition of Asset Management. These elements reflect the concept that transportation AM should not be considered as a separate new program or initiative, overlaid upon existing procedures, and in competition with other items on a department's agenda. Rather, it represents a way of doing business – a perspective that ODOT will further adopt in looking at its current procedures and seeing how better decisions on physical infrastructure management can be made with better information. In this view, the principles of good Asset Management can be visualized as affecting, simultaneously, the philosophy, processes, and technical tools that underlie ODOT's decisions and use of information.

The following statements describe good practice:

- Asset Management is a Philosophy
- Asset Management is a Process
- Asset Management is a Set of Technical Tools
- Asset Management is a Resource Allocation and Utilization Process

As described above, AM is a comprehensive process that spans across several Agency departments, and addresses decisions that the Agency makes throughout an asset's life. Given this broad reach, it is informative to break Asset Management practice down into a set of concrete business needs as described in the following section.

2.1 ASSET MANAGEMENT BUSINESS NEEDS

These needs reflect state-of-the-art Asset Management decision making. The following needs are based on MAP-21 requirements, guidance provided through national research efforts (National Cooperative Highway Research Program (NCHRP) Project 20-24(11), Asset Management Guidance for Transportation Agencies), and best practices by Departments of Transportation (DOTs) throughout the U.S. The following needs provide a framework for assessing existing practices at ODOT and identifying potential enhancements.

To have a state-of-the-art AM program, ODOT needs to have the following:

Inventory and Condition

1. Access to complete, current, and accurate inventory of bridges and pavements (and other assets deemed a priority) on the National Highway System (NHS) and state-owned system.

2. Access to historic condition information at both the network and asset levels.
3. Access to complete and accurate information regarding current auto and truck traffic volumes.
4. Project future traffic volumes and assess their impact on network conditions.

Asset Management Objectives and Measures

5. Document goals that guide resource allocation.
6. Understand the public's expectations for the transportation system.
7. Define performance measures to communicate system condition, aid in the allocation of funds to various programs, and identify and prioritize projects.

Performance Gap Identification

8. Model future asset condition based on potential funding scenarios.
9. Develop short-term (e.g., 10-year) and long-term (e.g., 25-year time horizon consistent with the Oregon Transportation Plan and other plans as applicable) condition targets.

Life-cycle Cost Considerations

10. Incorporate life-cycle cost considerations when modeling future asset condition.
11. Incorporate life-cycle cost considerations when selecting AM projects.
12. Define key work activities and document their typical unit cost and ideal timing.
13. Determine the long-term cost implications of adding new assets (i.e., maintenance costs) and consider these costs when prioritizing network expansion activities (e.g., highway, pedestrian, or bicycle facilities).
14. Document how projects are prioritized and selected for construction.

Risk Management

15. Identify Agency-level risks that could impact implementation of AM programs (e.g., funding uncertainty and major weather events).
16. Identify program-level risks that could impact implementation of specific programs, such as the bridge program (e.g., an age distribution of the bridge network that will result in a large number of bridges reaching the end of their design life at the same time).
17. Evaluate the Agency- and program-level risks in terms of their likelihood of occurrence, the consequences should they occur, and use the results to prioritize the project-level risks.
18. Identify strategies for mitigating the highest priority risks.

Financial Planning

19. Have access to complete and accurate information regarding historic expenditures at the project, work type, and program levels.
20. Project future funding that will be available for Asset Management over a minimum timeframe of 10 years.
21. Explicitly consider the relationship between the capital and maintenance programs, and use this information to inform budgeting decisions.

22. Allocate the available funds to program areas based on the objectives from item #5, public perception from item #6, performance implications defined in item #7, life-cycle cost considerations from items #10 and #13, and risk mitigation strategies from item #18.

23. Document the entire resource allocation process.

24. Determine the transportation network's current value, and describe how funding levels and investment strategies will impact its future value.

Investment Strategies

25. Compile, prioritize, and communicate investment strategies that define how the Agency will use the funds identified in item #22.

2.2 APPLICATION TO ODOT

Table 2.2, following, summarizes findings for each of these business needs/concepts as it relates to the "as-is" state within ODOT.

Table 2.2

#	Business Need	Comments
Inventory and Condition		
1	Have access to complete, current, and accurate inventory of bridge and pavements (and other assets deemed a priority) on the NHS and State owned system	ODOT has a prioritized list of assets (broken down into priority tiers) and is working a plan to collect and maintain inventory and condition data on these assets. Great progress has been made in this area over the last ten years. ODOT conducts regular bridge and pavement inspections that are consistent with best practices.
2	Have access to historic condition information at both the network and asset levels	
3	Have access to complete and accurate information regarding current auto and truck traffic volumes	ODOT has confidence in current traffic counts and future traffic projections.
4	Project future traffic volumes and assess their impact on network conditions	ODOT uses a variety of planning tools, including HERS, to forecast future needs.
Asset Management Objectives and Measures		
5	Document goals that guide resource allocation	ODOT strives to be strategic in applying funds to gain the maximum benefit to the asset and the system. Overall pavement conditions are tracked and there is an overall goal for pavement condition for the system. Based on Pavement Management System (PMS) analysis, the Districts are provided a list to use for selecting projects and generally speaking the Districts follow these recommendations. For pavements each District is assigned a performance target (percent of the roads in fair or better condition). Bridge conditions are tracked and there is an overall goal for condition of bridges (percent distressed). The Bridge Management System (BrM) is used for developing the bridge program. Both the pavement and bridge performance measure targets are set by the legislature. There are condition and performance goals for other asset classes but these are not widely publicized. A "desired conditions" document is available for the major asset classes (this is a maintenance forces document, not an ODOT wide document).
6	Understand the public's expectations for the transportation system	Public input on transportation issues is solicited every two years. This survey is not granular enough to discern expectations for specific assets such as pavements and bridges but is useful for policy analysis.
7	Define performance measures to communicate system condition, aid in the allocation of funds to various programs, and identify and prioritize projects	Generally speaking, the objectives and measures for each asset class are not directly connected to resource allocation decisions. For example, investments are not allocated based on total system condition or trade-off among assets.
Performance Gap Identification		
8	Model future asset condition based on potential funding scenarios	Pavement and bridge assets can be modelled to forecast condition over long time periods. While there could be improvement in the models, they are functional to provide a gap analysis.
9	Develop short-term (e.g., 10-year) and long- term (e.g., 25-year time horizon consistent with the Oregon Transportation Plan) condition targets	Long range condition targets for pavements and bridges are present but the basis of these targets is engineering judgment, not based on rigorous analysis or user needs. For other asset classes these are not widely publicized
Life – Cycle Considerations		
10	Incorporate life-cycle cost considerations when modeling future asset condition	Life-cycle cost (LCC) analysis does not appear to be conducted when modeling future asset conditions.
11	Incorporate life-cycle cost considerations when selecting asset management projects	LCC is considered on major projects, The project prioritization process does not appear to consider LCC or whole life costs. LCC is not integrated into design considerations.
12	Define key work activities and document the typical unit cost and ideal timing.	Typical unit costs are used in the PMS and BrM, Actual costs for pavement and bridge improvements are stored in many different systems and these systems are not connected and do not seem to share information with the PMS/BrM. Activities and costs for most assets are not well tracked or stored in an easily assessable system.

#	Business Need	Comments
13	Determine the long-term cost implications of adding new assets and consider these costs when prioritizing network expansion activities	There is no apparent ability to assess the whole life costs of adding assets to the system – for example, adding a mile of pavement or a bridge.
14	Document how projects are prioritized and selected for construction	Currently, the process to select and prioritize projects is documented (although the documentation appears to be spread among several documents). The Central Office, typically, prepares an initial list of proposed projects (with corresponding financial estimates) and issues that to the Regions (desk scoping). The Regions perform a 3-month field scoping and provide feedback to the Central Office following which the Central Office generates a revised list (with revised funding). An algorithm is used to rank the list. The prioritization / distribution process varies by Region. Project scopes are developed at the time of the STIP process and are not very flexible to any adjustments. Improvements to these processes are underway.
Risk Management		
15	Identify agency –level risks that could impact implementation of asset management	Although risk is incorporated indirectly at the project scoping phase, ODOT does not have a systematic formal process for evaluating risks associated with its asset management programs at the Agency or program level. There have been some attempts at quantifying the seismic risks of bridges and also beginnings of a process to address climate change. One success story is the use of a system to identify the economic risk to a community by a failure of transportation alternative. This tool could serve as a case study for the other DOTs.
16	Identify program-level risks that could impact implementation of specific programs.	
17	Evaluate the agency – and program-level risks in terms of their likelihood of occurrence, the consequences should they occur, and use the results to prioritize risks	
18	Identify strategies for mitigating the highest priority risks	
Financial Planning		
19	Have access to complete and accurate information regarding historic expenditures at the project, work type, and program levels.	This is a suggested area of improvement. A process should be developed to track historical and programmed work along a corridor. A method is needed to capture the cost of improvements tied directly to assets. There is a lack of historical and cost data with regard to bridge maintenance and this is a critical need / opportunity for improvement.
20	Project future funding that will be available for asset management over a minimum time frame of 10 years.	The budget is prepared biannually in accordance with the 10 year plan. The budget and the Statewide Transportation Improvement Plan (STIP) are aligned. Forecasting is done for six years and then extrapolated for the next four years (a longer term view is applied to bridge and pavements but not other assets).
21	Explicitly consider the relationship between the capital and maintenance programs, and use this information to inform budgeting decision	There are two primary classes of programs- fix-it and enhance (for capacity) and are weighted more towards the fix-it program, There is a desire to formally assess potential preservation activities and to improve coordination between the capital and maintenance programs.
22	Allocate the available funds to program areas based on the objectives from #5, public perception from #6, performance implications defined in #7, life-cycle costs considerations from #10 and #13, and risk mitigation strategies from #18	Although the distribution is based on a needs basis, politics plays a role in the funding distribution. Attempts are underway to connect the level of service to budget and changing the budget structure to have a more programmatic focus. In the future, the DOT wants to connect infrastructure needs to budget more explicitly. A new financial forecasting report is expected to be launched in 2015.
23	Document the entire resource allocation process	There doesn't appear to be a formal trade-off process between assets. Budget allocations between asset classes seem to be based on historical program distributions. Legislation primarily drives maintenance budgets. Except in the case of pavements, the budget allocation is not directly based on the condition of assets. Analytical tools for decision-making are an opportunity for improvement, There is room to increase transparency in decision making which is important to the Agency and the legislature.
24	Determine the transportation network's current value, and describe how funding levels and investment strategies will impact its future.	Overall, the DOT is able to tell the story of funding needed for assets. They have used the pavement management system and the statewide economic model to demonstrate needs and impacts / consequences for funding. Bridge data is analyzed outside PONTIS to determine finding needs. Aligning strategies of TAM with GASB-34 reporting is a key strength. These are robust conversations with program managers and the investment story is well laid out. Establishing a link between TransInfo and financial planning is a key opportunity for improvement (i.e. linking funding to assets).
25	Compile, prioritize, an communicate investment strategies that define how the agency will use the funds identified in #22	Customer expectations as well as legislation play key roles in policy planning and development of investment strategies. There appears to be a strong relationship between ODOT and the legislature, The ability to tell the investment story has resulted in significant increases in some areas (namely bridge). ODOT enjoys a good relationship with the legislature and the agency has delivered on its previous commitments. ODOT has credibility that if given funding, it can productively use it to achieve legislative priorities. ODOT also has a strong history of advisory groups and robust relationships with local agencies. Outreach is performed via 16 area commissions on transportation which allow for strong modal representation.

2.3 AM STRENGTHS

In summary, the strengths of ODOT AM efforts to date include:

- In general terms AM in Oregon is in an advanced state of implementation as compared to current prevalent practice in the United States. There is a strategic plan in place, a well-

defined governance structure, and dedicated and experienced AM staff. ODOT is a leader in this area and, as such, seeks continuous improvement cycles for maintenance and expansion of its Asset Management efforts.

- Many of the fundamental barriers to implementing AM within an Agency have been largely overcome.
- AM, thus far, has had a series of incremental wins which is motivating. This energy now needs to be coalesced into a concerted, organized, and well-funded effort to continue to further incorporate and implement AM into the Agency's culture and practices.
- Headquarters, Regions, and Districts coordinate and collaborate in many aspects of AM decision making and programming. Group dynamics and behaviors are very mature, which are key ingredients to affecting change in an organization.
- The staff place very high value in working together and mention "getting the right people at the table" for decision making as a mantra. There are conversations across the various asset types, both horizontally and vertically.
- A resounding theme is the energy, dedication, competence, and commitment of staff to their jobs and to the concept of AM. There is a high level of cooperation within the Agency to accomplish their mission, level of expertise within the Agency, and willingness to support AM.
- Individuals perform heroic efforts currently to deliver AM as it currently exists within the Agency. There is a great deal of interaction among different units to share information and coordinate to improve process and procedure. This provides a good foundation on which to build a more formalized method of collaboration is desired to increase efficiencies and reduce the burden on individual staff.
- There is a good foundation of emerging systems, such as TransInfo as an enterprise repository for asset data, and tools that can be used to drive the AM effort forward.
- Management of pavements and bridges are advanced and, even though important improvements are recommended, these programmatic efforts are foundations of the AM program.

2.4 AM Observations and Opportunities for Improvement

The review of current practices identified several opportunities to strengthen ODOT's AM capabilities and processes. These findings are also based extensively on the interviews and structured feedback exercises that occurred as part of the Gap Analysis process.

Inventory and Condition (Management Systems)

- The Agency could benefit from having a system architecture designed for all their current and planned infrastructure management systems. There appears to be incomplete information and are gaps in how these systems are currently integrated.
- Data should be considered an important asset and dedicated funding should be applied to maintaining what exists, updating on a periodic cycle appropriate to the asset, and building out enterprise data repositories. Data quality is desired over quantity. The current data collection plan for assets other than pavement and bridge should be funded and managed to meet the goals for the data collection program. It may be prudent to inventory and review all

of the data collection activities and rationalize the process to realize economies of scale and thus efficiencies.

- By far, the message from this exercise was data integration, and it remains the highest priority activity for AM in ODOT. Having all of the asset information (inventory and condition) available in one enterprise system is highly desired.
- A written data governance policy should be developed and enforced. For example, new systems should not be allowed to be developed without this guidance. A plan to either eliminate or harmonize legacy systems should be developed. Establishing data standards to promote consistent treatment of existing asset-related data and development of future applications as well as having standard geographic referencing and ability to generate maps showing needs/deficiencies for different asset classes and planned/programmed projects are areas for improvement.
- The data integration tools/enterprise systems are very important for AM. They should be treated like any other asset and dedicated funding should be utilized to maintain and build them out. Agency staff should be trained in their use and application.
- The Pavement Management System and Bridge Management System need formal governance procedures. While both are considered the foundation of the AM program both lack a formal, integrated, and overarching governance structure. Institutional knowledge of how to operate and use the systems is limited to one or two individuals.
- The bridge performance models may need updating, modernization, and documentation.
- Connections need to be made between planning, scoping, design, construction, and maintenance so that the data flow that occurs in all of these phases of delivery is captured, formatted for other uses, and exploited systematically. It may be prudent to map the data generated through each of these phases and develop a plan to harmonize it in the enterprise systems. There should be a few low hanging fruits resulting from this exercise.
- A method is needed to capture the materials used for a given construction project (integration with construction management/maintenance management systems).
- Expanding asset condition projection capabilities similar to pavement and bridge for other Tier 1 assets is an opportunity for improvement (see Section 3.0 for list of Tier 1-4 assets).

Asset Management Objectives and Measures

- The Agency should determine what the acceptable level of performance is for the system given the State's goals and stakeholder expectations.
- The Agency should determine what the key questions are for the Agency, Program, Project, and Region/District level are and rationalize data collection to answer these questions. The Agency should begin to explore and, ultimately, integrate advanced data analytics that can be used to answer these questions.

Performance Gap Identification

- Once performance goals are established for pavement and bridge, a pilot process to determine the performance gap for pavements and bridges should be conducted and the results communicated.
- Performance standards should be developed for other Tier 1 assets.
- Performance standards developed for certain Tier 2 assets should be confirmed, goals identified and then assimilated across ODOT.

- Building off the pavement and bridge pilot, a performance gap process should be developed for other Tier 1 assets, starting with culverts.

Life-cycle Cost Considerations

- A process is needed to formally consider life-cycle costs throughout all phases of the process (planning, programming, scoping, design, construction, and maintenance).
- Capability is needed to identify key timing for asset intervention at the asset level and for a corridor. Condition thresholds exist, but they need to be formalized and acted on. There should be a concentration of effort to develop formal asset intervention benefits and costs to identify the right treatment at the right time for the right asset to maximize the performance of the asset with minimal cost.

Risk Management

- While risk is being managed at ODOT at the asset level in varying degrees across ODOT, an overarching holistic system-wide approach towards risk management must be developed. This should consider managing risks at the Agency, program as well as project levels. Once developed, the risk management and mitigation strategies should be integrated into all areas of ODOT, including but not limited to, planning, program development, and project delivery.

Financial Planning/Investment Strategies

- A method is needed to capture the cost of improvements tied directly to assets.
- A process is needed to determine the cost of adding new assets to the system over their whole life.
- ODOT should formally document and publish the budgeting, program development, and project selection processes.
- A method is needed to more formally link financial planning to asset/corridor performance and to forecast overall system condition/performance over a ten-year time period.
- The method and decision-making process for determining overall investment strategies (policy) is needed.

Cultural/Business Processes

- A content management system should be developed for all electronic files and documents. A consistent naming and file retrieval system should be developed. Linkages should be developed to asset data sets (for example, the documents and files should have a GIS type reference).
- The Agency needs a succession plan for key individuals. The lack of such a plan jeopardizes all of the progress made over the last decade or more.
- AM should be communicated clearly and concisely to staff. The AM pilot projects have been a useful learning experience and this method should be embraced moving forward. Lessons learned from pilot projects should be documented and communicated.
- A more refined training and communication plan should be developed for AM - internally to the Department and externally to the legislature and municipalities. These training and communication plans should reach to the lowest levels of the organization to spawn a “grass-roots” appreciation for AM concepts linked directly to daily activities.

- Transparency should be a driver for AM – both for the AM development process and for goal setting and goal achievement.

Jonathan Groeger's full report reflecting detailed findings for each of these business needs/concepts as it relates to the "as-is" state within ODOT is available upon request.

3.0 AM IN ODOT

This section summarizes the status of current (2014-15) AM practices in ODOT for highway assets. While the entire list of ODOT assets is more extensive, the focus of this report is on those assets included in Priority Tiers 1-4. These Priority Tiers are the result of a prioritization process led by the Asset Management Steering Committee (AMSC) in early 2012, which was reviewed by the Highway Division Administrator, and underwent an additional review and reconfirmation by AMSC in late 2014. The criteria used to determine priority were: asset value; criticality for highway core, operations, accessibility / other mobility, safety; risk and consequence; and criticality of stewardship and attention to status or condition. The summary table of ratings by AMSC members can be found in Appendix 2.

Asset Priority Tiers for Asset Management

Asset Priority Tiers	
Tier 1	Bridges
	Culverts
	Pavement
	Tunnels
	Traffic Signals
	ADA Ramps
Tier 2	Retaining Walls
	Traffic Barriers
	Vertical Clearance
	Signs
	Traffic Structures
	Stormwater - Outfalls/Underwater Injection Control (UIC) - Storage/Detention Facilities - Treatment Facilities
	Unstable Slopes
	Right of Way
	Sidewalks
	Bike Facilities
	ITS
Tier 3	Material Sources
	Approaches
	Illumination
Tier 4	Wetland Mitigation Sites
	Weigh-in-Motion Sites
	Sound barriers

3.1 ASSET MANAGEMENT CAPACITIES

Not all assets are equal in terms of capacities for proactive Asset Management. The reasons for this are primarily practical as assets vary widely in value, complexity and criticality for the transportation system. Value judgments must be applied as well due to funding constraints. Asset Management capacities can then be maintained or established based on these considerations – right-sizing efforts to maximize results. These capacities can also be considered a maturity model to understand both the goals and the status of each asset. ODOT's capacity/maturity model is defined in Table 3.1 below.

Table 3.1 ODOT's Asset Management Capacities/Maturity Model

Capacity/ Maturity Level	Decision Characterization	Data Characterization	Example Asset Types
Mature Lifecycle Management	Lifecycle cost; proactive program mgmt.; advanced modelling; advanced forecasting; advanced engineering; project level decisions	Highly reliably engineering data, with best data quality, with defined and frequent updates by trained technical staff; precise location data	Bridges, tunnels and pavements
Advanced Statewide Program	Proactive program mgmt.; basic forecasting; basic engineering; project level decisions; may include lifecycle cost	Reliable engineering data with defined updates by trained staff; reliable location data, better data quality, data maintenance	Culverts, ADA ramps
Basic Statewide Program	Statewide program strategies/ guidance for project level decisions	Reliable basic inventory data (type, size, location) and reliable condition data, with good data quality, updated on regular cycles by trained staff	Traffic barriers, sidewalks, bicycle facilities, signs
Developing Program or Pilot	Typically pilot efforts or beginner program decisions	Basic inventory data (type, size, location and triage condition); final collection methodologies may be evolving; may be pilot effort to develop methodology	Traffic structures, vertical clearance, signalized intersections, park & ride lots
Budget Only	Budget decisions only	Counts in defined segments or groups	Features inventory

3.2 ASSET MANAGEMENT CAPACITIES NEEDED – SUMMARY

ODOT's capacities for Asset Management have been considered advanced when presently compared to most U.S. DOTs, but there remains work to do to maintain this advanced status as well as to make strategic enhancements or improvements for efficiencies and/or better integration. Using the capacity/maturity model defined in Table 3.1, Table 3.2 summarizes the capacity goals/needs for the assets in Priority Tiers 1-4, the status of capacities for each of these assets and the key gaps. Like the other tables in this report, Table 3.2 is intended to generate conversation, understanding and subsequently conscious decisions about how actively ODOT desires to manage its assets. The level of active management, or capacity, needed for each asset usually requires a corresponding investment in data, systems and tools. There are typically many perspectives and opinions about what is needed and each asset's status, but the contents of this table are based on an independent view by AMI Program staff and general Asset Management best practices.

These capacity needs are not static and must be periodically reconsidered. For example, ADA Ramps were initially determined to need only a Basic Statewide Program, but the recent necessity and opportunity to better connect processes across business lines drives this need to an Advanced Statewide Program. A 'Yes' changes to a 'No' at that point to indicate there is more work to do to have the capability ODOT needs to appropriately manage the asset. Weigh-In-Motion Sites offer another example of how conscious decisions could change the status of Asset Management capacities needed and/or listed. This asset is managed, has a complete inventory, and means to monitor the function of each site, but this inventory is maintained in an Excel file. This is not a stable, enterprise system, but the associated risk of this may be deemed low and a decision could be made that this is adequate (changing the 'No' to a 'Yes' in the "Are We There Yet Column")…or adequate for now (leaving it 'No," but keeping it a low priority for action). These are examples of how this table can be used.

Table 3.2 Asset Management Capacities Needed, Tier 1-4 Priority Assets – Summary

July 1, 2015

Tier	Asset	Capacity Needed	Key Driver	Are We There Yet?	Key Gap Element(s)
Tier 1	Bridges	**Mature Lifecycle Management**	**Asset value, criticality for highway core**	No	Modelling/analysis tools; inspection tools
	Culverts	*Advanced Statewide Program*	**Asset value, criticality for highway core**	No	Complete and maintain inventory
	Pavement	**Mature Lifecycle Management**	**Asset value, criticality for highway core**	Yes	Enterprise pavement management system
	Tunnels	**Mature Lifecycle Management**	Criticality for operations	No	Structural elements; inspection tools
	Traffic Signals	Advanced Statewide Program	Criticality for operations	No	Cabinets in MicroMain, but other critical data missing
	ADA Ramps	Advanced Statewide Program	Criticality for accessibility / *other mobility, criticality for stewardship and level of attention to status*	No	Add ramp detail to inventory; update based on construction and maintenance permitting; significant guidance and training
Tier 2	Retaining Walls	Advanced Statewide Program	Criticality for operations, risk	No	Database migration from Access, complete inventory
	Traffic Barriers	Basic Statewide Program	Criticality for safety	Yes	
	Vertical Clearance	Advanced Statewide Program	Criticality for operations	No	Complete inventory; single database; data maintenance, frequency, quality, reliability
	Signs	Basic Statewide Program	Criticality for operations	Yes	
	Traffic Structures	Advanced Statewide Program	Criticality for operations, risk	No	Complete inventory; single database
	Stormwater	Basic Statewide Program	Criticality of stewardship and level of attention to status	No	Complete initial efforts, but based on clear definition of which features to be included
	Unstable Slopes	Basic Statewide Program	Risk and consequences	No	Data maintenance; Access database
	Right of Way	Advanced Statewide Program	Asset Value	Yes	
	Sidewalks	Basic Statewide Program	Criticality for accessibility / other mobility	Yes	
	Bike Facilities	Basic Statewide Program	Criticality for accessibility / other mobility	Yes	
	ITS	Advanced Statewide Program	Criticality for operations	Yes	Sufficient condition data with identified triggers for replacement?
Tier 3	Material Sources	Basic Statewide Program	Stewardship	Yes	
	Approaches	Advanced Statewide Program	Stewardship	No	New CHAMPS solution; other tools
	Illumination	Basic Statewide Program	Criticality for operations	No	Inventory; database; tools
Tier 4	Wetland Mitigation Sites	Basic Statewide Program	Stewardship	No	Data maintenance; no enterprise system
	Weigh-in-Motion Sites	Basic Statewide Program	Criticality for operations	No	Sites tracked in Excel (works for now); need design files, but no condition tracking
	Sound barriers	Basic Statewide Program	Stewardship	No	Database migration; data maintenance

3.3 STATE OF THE ASSETS

Efforts to establish, maintain, or improve Asset Management capacities regularly evolve and change. Constructive action can move the status toward the positive, for example, migration of asset data to an enterprise system typically facilitates integration and broader use of data. Conversely, lack of maintenance of the effort will mean the status will evolve to a negative, for example, a lack of updates will mean that asset data will become outdated or obsolete.

Critical elements that facilitate the evolution of capacities are decision processes. Decision-making processes that have been based on an absence of data MUST be redeveloped to take full advantage of the growth in Asset Management capacities. This must be a conscious effort in order to overcome organizational culture as well, which includes decisions without data and decisions with local versions of data. There are two main levels of decision-making to consider: 1. Asset-specific decisions that take advantage of enterprise asset data; and 2. Integrated decisions that factor in inventory and condition for a range of assets. Integrated decisions can be project specific across this group of assets, but would typically be framed in a corridor or system context. Some prerequisites for this kind of decision-making are basic inventory and condition data, but also relatively mature performance measures and goals. These goals would take advantage of inventory information, funding levels, program goals and clear guidance on condition thresholds that facilitate consistent decisions across the regions while still allowing for engineering judgment.

The following analysis is based on periodic programmatic evaluation of the State of the Assets. The table in Appendix 3 summarizes this July 1, 2015 independent assessment by AMI Program staff. The assets included are limited to those included in Priority Tiers 1-4, as shown on page 15. The assessment is based on knowledge of Asset Management best practices and consideration of likely federal requirements based on MAP-21 rule-making currently in progress, and filtered through ODOT needs, priorities, constraints and culture. The discussion of this analysis is another level of information which, as discussed previously in relation to other tables, is intended to generate conversation, understanding and subsequently conscious decisions for prioritized action.

3.4 DISCUSSION OF THE STATE OF THE ASSETS

ODOT has made steady progress over the last ten years in building capacities for Asset Management. Some of the accomplishments:

Decisions

- Many additional asset inventories offer new possibilities for proactive decisions
- FHWA-approved 1R Pave-Mainly Program granted through and sustained by Asset Management efforts
- Fix-It Task Force development of major asset prioritization methodology
- Traffic Barrier program priorities for replacing obsolete installations
- Developing Culvert Program
- Developing ADA Program improvements

Inventory

- All but one of the Tier 1-4 assets now have existing inventory efforts that are developing, building or have matured and are maintained

Systems

- Implementation of new platforms
  - Enterprise systems such as TransInfo
  - Asset-specific systems such as those for Right of Way (RITS) and tunnels (OneDOT)
- Migration of asset inventories to stable, enterprise platforms such as TransInfo
  - Signs data migrated from 63 Access databases

Tools

- Mobile GPS tools and applications developed, deployed and training delivered to aid 1R Roadside Inventory data collection in support of these projects
- Asset data accessible via FACS-STIP Tool
  - Viewable on the Map Tool
  - Exportable via the Data to Go Tool
  - Asset condition reportable by city, region and other geographic boundaries in Summary Asset Reporting
- Improvements and additions to view asset data via TransGIS
  - Server upgrades in process mean new opportunities, but also require significant effort to implement
- Developed CHAMPS Data Reconciliation Tool to reconcile new data collected on approaches with existing approach records.
- Data warehouse tools have improved data quality and reliability by joining and comparing data to standards (i.e., signs) or by making asset data significantly more accessible for analysis (i.e., bridges).

Other

- Partnerships and multiple pilots (i.e., Earthmine, Corridor Management Strategies, etc.), have helped inform development of methodologies and tools to build critical inventories, including, but not limited to:
  - Culverts
  - Vertical Clearance/Traffic Structures
  - Signalized Intersections (in progress)
- More performance measures developed to report asset conditions (summaries reported via the FACS-STIP Tool)

Significant progress has been made to improve ODOT's capacities for Asset Management, but opportunities still exist to expand upon these for additional increases in efficiency and proactive

lifecycle management of transportation assets. The following discussion focuses on Tier 1 and 2 priority assets:

General AM capacities to address across assets:

- **Performance management:** ODOT should build on its solid history of performance measurement to establish measures, standards and goals for every asset that has an inventory with physical and/or functional condition. These should use a common scale (good-fair-poor or very good through very poor) based on technical criteria appropriate for the individual asset. This will better enable cross-asset considerations across all ODOT business lines without requiring a depth of technical knowledge for all of these assets.
- **Risk management:** Risk is a consideration for select assets under select conditions, but ODOT could improve upon this by expanding to a holistic approach to risk management at a system level. This should be integrated with critical risk management efforts for specific assets, and should also be tied to the above-mentioned performance measures, standards and goals. These could be additionally useful if adapted to communicate specifically about critical assets in specified corridors or routes.
- **Inspection and analysis tools:** These are general areas that could be improved upon. MAP-21 requirements may require increases in condition assessments which will mean increased investments. Major assets, such as bridges and tunnels, could benefit from development of inspection tools. If the location of assets has been established by methods that comply with ODOT standards, it may be prudent to invest in applications for tablets or smart phones to collect asset-specific condition updates using established asset locations. Analysis tools are typically “home-grown” and comprised of Access and or Excel files, but most typically involve significant analysis by humans. The preliminary analysis of hundreds of bridges takes 18-24 months to develop the initial Needs List for potential bridge projects that will ultimately go into the STIP. This means that the data used for this analysis is as much as five years old by the time the STIP goes into effect. For the current STIP development cycle, the time was so constrained for development of the Needs List for bridges that the list – and the data used – from the prior STIP development exercise was used to meet this tight timeline. This means that the data may be as much as ten years old by the time the next STIP goes into effect. This is a general area that is opportune for improvements, but consideration of solutions for multiple assets is critical for efficiency.

Priority Tier 1 Assets AM capacities:

- **Bridge** management uses data from regular inspections that is stored in the Bridge Management System (BrM). Program, system and individual bridge analyses are all manual processes. Program staff have been working to implement new inventory and inspection elements that will support modelling and BrM 5.2.2 system upgrades that will ultimately improve ODOT’s capacities, but present immediate challenges:
  - Inspection and maintenance reports must be re-written
  - Support for the series of beta releases and the final version of BrM 5.2.3

  Other related needs or opportunities:

  - Improved and integrated inspection tools
  - Program and whole system modelling, outside of BrM
  - Use of LiDAR for vertical clearances and other data collection
  - Meeting Load Posting timelines and completing load rating analysis

    - Opportunities offered by OSU to purchase drones and their potential use for fracture critical inspections
- Great strides were made for **culverts** by completing inventory on priority routes, but proactive management is not completely enabled until a statewide inventory is completed for all highways. Priority routes addressed in the initiative might have statewide significance, but there have been asset failures on district-level highways that are causing District Managers some concern.

- **Pavement** is managed well based on the long-term knowledge of the pavement management engineer, who uses a series of Excel and Access data files – some very significant in terms of size - to store and manage pavement inventory and condition data for pavement management decisions. The Pavements Unit, manager and staff, as well as the Pavements Committee contribute as well. Resource constraints mean that the pavement management engineer is "one deep" so some risk is introduced due to limited succession planning. A project to document existing business processes, decision processes and data that supports these is highly recommended as these efforts usually lag when resources are limited. It is recommended that independent staff, external to the section, in collaboration with the Pavements Unit be used for this effort. This has two primary benefits in that it alleviates the additional workload on the staff and it can offer a fresh professional perspective. Subsequent steps to improve this situation can then be identified, evaluated and prioritized based on this initial business process documentation/mapping. A cost benefit analysis can be factored into any potential system improvements that may be identified. It will likely be necessary to supplement pavement program resources to move this program to a stable status.

- **Tunnels** will need to implement all new elements for tunnel inspection. This impacts system choices for data and inspection processes and tools.
- Systems for **traffic signal** data could be improved by addressing a broader array of considerations. Primary among these are integration with other assets commonly associated with traffic signals, i.e., pedestrian signals or major traffic structures, and the collective business needs across ODOT business lines. Relationships to other assets should also be considered since a variety of assets also serve traffic operations, such as signs, illumination, ITS equipment, etc. The fact that these are often co-located is a critical consideration for data to make sense across business lines and for efficient data management.

- Improvements for lifecycle management of **ADA ramps** are in the early stages of implementation. Continued attention to ongoing process improvements, stricter inspection criteria and processes, and resources for technical support will be critical.

Priority Tier 2 Assets AM capacities:

- Inventory of **retaining walls** was well along on interstates, but has not been completed statewide nor maintained due to staffing constraints. Existing data is stored in an Access database.
- **Traffic barriers** are managed based on a statewide inventory data that is maintained on regular cycles. The data is stored in ODOT's enterprise Asset Management system, TransInfo. Data collection is also supported by an application for mobile GPS units.
- **Traffic structures** and **vertical clearance** are connected in that vertical clearance is a critical attribute of structures over highways, including major traffic structures:
    - Inventory data is spread across many different systems and condition data does not currently exist for major traffic structures. This is a critical gap to fill so the associated vertical clearance data can also be established managed and reliably provided for routing over-dimensional freight. There is also associated risk from the lack of a consolidated repository of inventory data and known conditions. An earlier pilot looking at risk considerations helped ODOT staff understand where to start. While consequences of failure were higher for sign bridges, the associated risk was actually greater for cantilever structures because there are so many more of them. ODOT staff has since launched a data cleaning project using Data Warehouse tools. This IT project will join traffic structures data currently stored in multiple systems (BrM, ERM, TransInfo – traffic structures and sign supports, etc.) and establish a clean data set for traffic structures, which could then be moved to a single, enterprise platform that also allows vertical clearance and other attributes to be included.
    - Vertical clearance is a critical attribute of structures over the highway. There has been an established process for bridges that was agreed-upon by key stakeholders, but this uses equipment that is technologically obsolete. This provided limited data for less than half the structures over state highways. This data must also be captured, managed and provided for all other structures to allow for proactive management and reliable routing information for over-dimensional freight. Critical foundational work and a pilot have been completed that enable subsequent steps toward a solution. This work is underway and should be continued. This has been an area considered critical by stakeholders so it is important to maintain a high level of collaboration to make progress.
- **Signs** are managed based on statewide inventory data that is maintained on a regular basis. The data is stored in ODOT's enterprise Asset Management system, TransInfo. Data is maintained through use of toughbooks by all ODOT sign crews. Data collection is also supported by an application for mobile GPS units.
- **Stormwater facilities** are a collection of conveyance, storage and treatment facilities. Existing stormwater inventories are stored in Excel files and/or GIS data layers. There is a need to integrate, clean and migrate this data to TransInfo. Efforts are ongoing to comply with all requirements.
- **Unstable slopes** and areas of rock fall have been identified across the state, but, while resources might never be sufficient to allow for optimal, proactive management, improvements to data and lifecycle management would be helpful to implement. Rock fall mitigation would also benefit from an inventory update effort and condition assessments.

- **Right of way** data is stable in a new system called RITS. Some additional supporting data systems are in need of replacement.

- **Sidewalks** are managed based on statewide inventory data that is maintained on a regular basis. The data is stored in ODOT's enterprise Asset Management system, TransInfo. Data collection is also supported by an application for mobile GPS units.

- **Bike facilities** are managed based on statewide inventory inventory data that is maintained on a regular basis. The data is stored in ODOT's enterprise Asset Management system, TransInfo. Data collection is also supported by an application for mobile GPS units.

- **ITS** equipment data is stable in MicroMain. While not mandatory, efforts would benefit from improved field data collection tools.

4.0 MOVING FORWARD

Efforts of the past ten years have contributed to a great deal of learning and honed program strategies. These strategies have been key to the progress made on ODOT's Asset Management capacities to date. The goals outlined in ODOT's 2011 Asset Management Strategic Plan remain foundational: 1. Integrated decision-making, supported by; 2. Inventory; 3. Systems; and 4. Tools (analysis and data collection).

Key philosophies have been instrumental to program progress as well. Work on the goals above has occurred with eyes on appropriate balance across assets based on priority and needs; the most efficient data management practices possible at the time; a view that an appropriate number of enterprise platforms are the most efficient and that integration is best enabled through strong data governance, or at least, a few key, strong standards.

Ongoing communication at every opportunity, and at many levels, is critical to continue to move all ODOT staff to assimilate Asset Management practices as just how ODOT does business. Timing can be very important for continued progress in that staff usually cannot just work their way down a list. Collaboration, an extension of communication, is another critical ingredient for success. Weak collaboration can mean weak coordination which can result in inefficient or duplicative efforts, sometimes with significant material cost to ODOT. AMI staff has been very active in seeking collaboration, but continuation of this will need strong support from Executive staff. Routinely working with AMI means that ODOT staff will develop programs that are supported by data and processes that enable integration with other programs and existing critical enterprise data. It also means that efforts across ODOT transportation assets respond to the priorities of the Asset Management Executive Committee, are equitably balanced for resource needs, in compliance with ODOT data standards and use enterprise solutions as much as practical. Experience and lessons learned from an extensive portfolio of AMI-supported inventory, systems and tools development can be broadly shared for ODOT's gain. AMI staff knowledge and connections help ODOT staff work smarter and avoid costly mistakes through coordination and collaboration.

Maintenance of effort has been mentioned earlier in Section 3 of this report, but readiness is also a critical consideration. Readiness is a factor of several things, but an example of inventory readiness elements to consider can be found in Appendix 4. These criteria were used by AMI staff to assess readiness in the past.

The above paragraphs convey elements that are important to continue, but how can ODOT prepare the next update to its Asset Management work plan? This begins through a careful review of the information in Section 3 of this report to:

1. Understand the Asset Management capacity/maturity model described in Table 3.1.
2. Review and discuss the contents of Table 3.2, *Asset Management Capacities Needed, Tier 1-4 Priority Assets - Summary* in order to:
    a. Confirm or modify capacity goal identified for the assets listed.
    b. Understand the basis of the determination of "Are We There Yet?" and the key gaps considered.
    c. Document conclusions drawn from discussions and subsequent decisions.
3. Review and discuss the supporting discussion in Section 3.4 as well as the information in Appendix 3, the *State of the Assets,* in order to:

a. Understand the basis of determination of status.

b. Determine the priorities for corrective action.

c. Document conclusions drawn from discussion and subsequent decisions.

AMI staff can begin development of an updated work plan as these discussions conclude. The specific contents of a work plan can then come back to the Asset Management Executive Committee for approval and resourcing as necessary.

There are some base elements or fundamentals that need strengthening or rebuilding to ensure the success of an updated work plan:

- Asset Management program governance and preparation.
- Data governance.
- Preparation for compliance with requirements of MAP-21, including the TAMP.
- Continued support for strategic exploration of options.

4.1 ASSET MANAGEMENT PROGRAM GOVERNANCE

The Asset Management Executive Committee (AMEC) is a critical support for continued efforts, but governance is not complete with this committee alone. The proactive management capacities are significantly enhanced through integration of efforts. Strategic integration also greatly improves efficiency agency-wide. ODOT launched an agency-wide effort to develop a Strategic Data Business Plan (SDBP) to address, among other objectives, agency-wide data governance. While the SDBP will be one guide, broader strategic choices must be explored by seeking input from subject matter experts on a regular basis so that actionable recommendations are provided to AMEC. Inefficiencies can be introduced if this is done in an ad-hoc way via ad-hoc groups. Wide-ranging differences in priorities can also delay progress absent a comprehensive governance structure that considers all aspects of full integration of Asset Management. Specific recommendations were outlined in a memo delivered to Asset Management Executive Committee members on 11/02/2014 (see Appendix 5). A new version of AM governance that considers consistent and regular input across assets and business needs is highly desirable, and could be strategically phased.

Re-creation of the “Project Team” described in this memo is a possible first step to move from those ad hoc or different groups that potentially protract decision-making and slow progress. The role of this project team is essentially very similar to that of the former Asset Management Steering Committee. This would re-create the regular forum for input, discussion and recommendations related to cross-cutting Asset Management integration efforts as opposed to the inefficiency of making the rounds to all the leadership teams. This forum allows business line perspective to coalesce into a common understanding and shared priorities that allow resources to be assigned, progress to be made and the results to be positive in their impact. With direction and support from AMEC and some minor adjustments, the current Asset Data Management Committee could be an existing committee forum that could become a project team to guide, explore options, recommend priorities and make progress on ODOT’s Asset Management capacities. This would be a good interim step toward improved Asset Management governance. See Appendix 6 for ADMC charter and membership.

4.2 DATA GOVERNANCE

The equivalent to the Highway Design Manual (HDM) for data does not yet exist. Data standards do exist and their purpose and function are very similar to those for engineering. Application of data standards is critical for efficient integration of asset data, yet this is an under-resourced area. These standards may not yet be sufficiently complete or robust enough for optimal function. Supportive processes also need to be developed so that data processes (field data collection, quality assurance, storage, analysis, etc.) must comply and data systems are not developed unless data complies with standards. Time spent here saves much more time later, but it has consistently been a challenge to resource. It may benefit from an outside review to prioritize efforts to improve. This review does not need to wait for completion of the Strategic Data Business Plan (SDBP) – it would be a complimentary effort and should be done in the near future. It could also be updated as the details of the SDBP are developed.

It should also be noted that ODOT's Data Warehouse is an important mechanism that allows a consistent means to gather and clean data from multiple source systems, assess data quality and ensure compliance with standards. Relatively simple projects to join data sets and run data quality reports can be launched. This was the method recently used to join traffic sign data from 14 districts' databases and enable elimination of over 90,000 errors – the result was a clean data set that was then migrated to an enterprise ODOT platform, TransInfo. The preparation for this would have been so manual that this would not have been possible without Data Warehouse tools.

4.3 MAP-21 REQUIREMENTS, INCLUDING THE TAMP

MAP-21 is very broad in its potential requirements so AMI asked to formalize a MAP-21 Task Force. Members of this group initially briefed Executive staff on the various known, anticipated or potential impacts across a range of ODOT programs. The task force continued to meet as needed, to jointly review all federal rule-making for broader understanding of the impacts and to then craft comprehensive comments based on this shared understanding. This group should continue to monitor rule-making progress and to meet as needed.

One of the many requirements of MAP-21 is the Transportation Asset Management Plan (TAMP). General contents of this plan have been identified, but the specifics wait for rule-making to conclude. AMI staff has worked closely with John Baker, designated lead for preparation of the ODOT TAMP, to monitor and prepare for potential requirements. This is a symbiotic relationship in that AMI is strong in the knowledge of Asset Management and ODOT's efforts while John Baker is strong on the formal planning and economic analysis that will also be critical for development of ODOT's TAMP. Their joint efforts should continue because, once rules are final, ODOT will only have one year to prepare a TAMP.

4.4 STRATEGIC EXPLORATION OF OPTIONS

A basic capacity for Asset Management across a range of assets brings with it a level of complexity. This is further exacerbated because ODOT manages many assets at different levels of capacity, in different systems and with different requirements. This takes complexity to a whole different level and can often mean impacts due to changes and dependencies are challenging to identify. Strategic exploration efforts allow us to investigate possibilities while allowing us to understand these impacts and dependencies. They also provide a safe place to make mistakes. The point of these strategic explorations is to learn something that will help us move in constructive directions, shed light on impacts and inform full deployment /implementation plans. Work on ODOT systems benefit when strategic exploration has occurred

regarding what data will be included, how it will be collected, how it will be used, how it will be reported, etc. The efficiency of the project and the outcome is greatly improved through the clear requirements that come from this type of preparation before a full-blown project begins. When we need to modify processes, we need strategic exploration so we can understand and mitigate impacts to others so we end up with an implementable solution. For these reasons and more, exploratory efforts are critical for informed options and progress.

ODOT is positioned to capitalize on the experience that has come from the many activities over the years to improve the agency's capacities for proactive management of transportation assets. Thoughtful support for improvements to key program foundations and direction from the Asset Management Executive Committee regarding priorities will allow ODOT to continue to be a leader in this area.

Appendix 1: List of Gap Analysis Participants

Group Represented	Name	Title
ILT/MLT	Jerri Bohard	Transportation Development Division (TDD) Administrator
	Paul Mather	Deputy Director Highway Division
	Tom Lauer	Technical Services Manager
	Bob Bryant	Region 4 Manager
	Phil Kase	Performance Management Chief
Planning & STIP	Mac Lynde	Active Transportation Section Manager
	Michael Rock	Principal Planner
	Brian Dunn	Transportation Planning Analysis Unit Manager
	David Kim	Area Manager - Central
	Lisa Nell	Planning/Development Manager
Pavement. Bridge & FHWA	Cole Mulllis	Pavement Services Engineer
	John Coplantz	Pavement Management Engineer
	Bruce Johnson	State Bridge Engineer
	Bert Hartman	Bridge Program Unit Manager
	Dawn Mach	Bridge Planner
	Monte Grove	Region 5 Manager
	Don Jordan	District 3 Manager
	Satvinder Sandhu	FHWA
	Mike Morrow	FHWA
Traffic/Roadway	Steve Lindland	Roadway Engineering Unit Manager
	Mike Kimlinger	Traffic Standards Engineer
	Doug Bish	Traffic Services Engineer
	Martin Matejsek	Region 4 Roadway Lead Engineer
	Ron Singh	Chief of Surveys
	Bob Pappe	State Traffic/Roadway Engineer
ROW & GeoEnv	Joe Gray	Right of Way Manager
	Mike Stone	Right of Way Program Management & Policy Advisor
	Susan Haupt	Chief Environmental Officer
	Paul Wirfs	Engineering & Asset Management Unit Manager
	Tom Braibish	Geo/Hydro Manager
	Joe Thomas	Region Right of Way, Survey & Utilities Manager
Maintenance & Ops	Luci Moore	State Maintenance & Operations Manager
	Galen McGill	Intelligent Transporation Services (ITS) Manager
	Ray Mabey	Maintenance & Operations
	Vivian Payne	Region 2 Maintenance & Operations Manager
	Ted Miller	Region 1 Maintenance & Operations Manager
	Darrin Neavoll	District 7 Manager
	Joe Squire	State Construction & Materials Engineer
	Mike Buchanan	District 13 Manager
	Mike Stinson	District 11 Manager

Modes	Rick Shankle	Manager Crossing Safety Section
	Robin Bjurstrom	Transit Operations Manger
	Sheila Lyons	Bike/Pedestrian Facilities Specialist
	Rodger Gutierrez	Bike/Pedestrian Facilities Specialist
	(Steve Lindland)	Roadway Engineering Unit Manager
	Hal Gard	Rail & Public Transit Administrator
	~~Margy Bradway~~	~~Sustainability Program Manager~~
	Chris Cummings	Freight Program Manager
	Ric Listella	Salem Motor Carrier Services Section Manager
	Jessica Horning	Transit & Active Transportation Liaison
Financial & Enterprise Risk	Stefan Hamlin	Highway Budget Officer
	Clay Flowers	Financial Policy & Compliance Manager
	Scott Smyth	Senior Financial Analyst
	Marlene Hartinger	Chief Auditor
Systems & Data	Dave Ringeisen	Transporation Data Section Manager
	Heather King	Road Inventory & Classification Section Manager
	Ron Winterrowd	Manager Transporation Application Development
Project Development & Construction	Sonny Chickering	Region 2 Manager
	Steve Davis	Region 5 Tech Center Manager
	Carol Cartwright	Region 2 Tech Center Manager/Roadway Manager
	Tamira Clark	Region 1 Tech Center Manager (Floyd Harrington as well)
	Mark Thompson	Region 3 Tech Center Manager
	Jon Heacock	Region 4 Tech Center Manager
	Steve Cooley	Contract Administation Engineer
	Tim Potter	Area Manager
	Scott Claus	Region 2 Right of Way/Survey Manager
	Candice Leonard	Strategic Systems & Data Management Manager
	John Coplantz	Pavement Management Engineer
	Bert Hartman	Bridge Program Unit Manager
	Steve Lindland	Roadway Engineering Unit Manager
	Doug Bish	Traffic Services Engineer
	Rick Shankle	Manager Crossing Safety Section
	Mike Morrow	FHWA

Appendix 2: Summary results of prioritization process by Asset Management Steering Committee in 2012, reconfirmed in 2014

AMSC SUMMARY TABLE OF RATINGS

Statewide Data Available	Asset/High-Level Attribute	Original Priority Asset?	Required for 1R?	Statewide Data Available?	Efforts Already Underway	Hot Topic?	Asset Owner Recommended Priority		Asset Value	Criticality for: Highway Core	Criticality for: Operations	Criticality for: Accessibility/ Other Mobility	Criticality for: Safety	Risk Management: Risk	Risk Management: Consequence	Criticality of: Stewardship	Criticality of: Attention to Status or Condition	Sum
									High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	
	ADA Ramps	N	Y	Y			High		2	3	2	1	1	1	2	1	2	15
	Bike Facilities	N	Y	Y			High		3	3	2	1	1	2	2	1	2	17
	Bridges	Y	Y	Y			High		1	1	1	1	1	1	1	1	1	9
	ITS	N	N	Y					2	3	1	2	2	2	2	2	2	18
	Material Sources	Y	N	Y			High		2	3	3	3	3	3	3	2	2	24
	Pavement	Y	N	Y			High		1	1	1	1	1	2	2	1	1	11
	Right of Way	Y	N	Y					1	1	1	1	1	2	2	1	2	12
	Sidewalks	N	Y	Y			High		2	3	2	1	1	1	2	1	2	15
	Signs	Y	Y	Y			High		2	3	1	2	1	2	2	1	2	16
	Sound Barriers	N	N	Y			Not High		3	3	3	3	2	3	3	2	3	25
	Traffic Barriers	Y	Y	Y			High		2	3	2	3	1	2	1	1	2	17
	Tunnels	N	N	Y					2	1	1	1	1	1	1	1	1	10
	Wetland Mitigation Sites	Y	N	Y					3	3	3	3	3	3	3	1	2	24
	Weigh-in-Motion Sites	N	N	Y					3	3	2	2	2	3	3	2	3	23

AMSC SummaryTable of Ratings Continued

	Asset/High-Level Attribute	Original Priority Asset?	Required for 1R?	Statewide Data Available?	Efforts Already Underway	Hot Topic?	Asset Owner Recommended Priority	Asset Value	Criticality for: Highway Core	Criticality for: Operations	Criticality for: Accessibility/ Other Mobility	Criticality for: Safety	Risk Management: Risk	Risk Management: Consequence	Criticality of: Stewardship	Criticality of: Attention to Status or Condition	Sum
								High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	
Efforts Underway But Not Complete	Approaches	N	N	N	Y	Y		3	3	2	2	1	1	2	1	2	17
	Culverts	Y	Y	N	Y		High	1	1	1	1	1	2	1	1	1	10
	Retaining Walls	Y	N	N	Y		High	2	1	1	1	1	2	2	1	1	12
	Stormwater	N	N	N	Y	Y	High	2	2	2	2	2	2	2	1	1	16
	Traffic Structures	Y	N	N	Y		High	3	3	1	3	1	2	2	1	2	18
	Unstable Slopes	N	N	N	Y	Y	High	2	2	2	2	2	2	2	1	1	16
	Vertical Clearance	N	N	Y & N	Y	Y		3	3	1	1	2	2	2	2	2	18
Other "Highs"	Illumination						High	3	3	2	3	1	2	2	3	2	21
	Interchanges						High	1	1	1	1	1	2	2	1	1	11
	Traffic Signals			Tri-color			High	2	3	1	3	1	1	1	1	1	14
	Tide Gates																

(9-12)	Tier 1 Priority
(13-17)	Tier 2 Priority
(18-21)	Tier 3 Priority
(22 & up)	Tier 4 Priority

Definitions:	Foundational core for very existence of system	Degree of criticality for operations	Degree of criticality for accessibility or other mobility	Degree of criticality for safety	Potential frequency of risk associated with failure or unknowns	Severity of potential consequences of failure or unknowns	Level of expectations, mandates or requirements from others (legal, environmental, programmatic, legislative)	Level of attention expected by stewardship

Appendix 3: State of the Assets Assessment
July 1, 2015

Assets Capacity status/needs		Decisions - Programmatic Capacity			Inventory			System			Tools			Performance Measures			Risk Management		
Asset Priority Tiers		Program Status	Capacity Needs	Comments	Status	Needs	Comments	Status	Needs	Comments	Status	Needs	Comments	Status	Needs	Comments	Managed	Primary Risk	Needs
Tier 1	Bridges	Bridge Program	Mature	1R Roadside Inventory	98%	Maintain		Stable in BrM	Maintain	Upgrades offer new possibilities for analysis tools	Few Tools	Modeling, analysis and Inspection		Bridge PM	Comply with MAP-21	Waiting for final MAP-21 Rules	Partially	Aging Infrastructure quantity	Add 'l $220 Million average annual investment
	Culverts	Developing Program	Advanced	1R Roadside Inventory	40% (100% of High Priority Routes)	98%	High Risk remains due to lack of inventory on Non-Priority Routes	Stable in DFMS/TransInfo	Maintain		Mobile Data Collection (GPS)	Maintain	1R App = BCA, but also ACA also available	None	Develop - % Fair or Better	Waiting for final MAP-21 Rules (some included)	Developing Strategies	Aging Infrastructure quantity	Add 'l inventory, add 'l average annual investment
	Pavement	Pavement Program	Mature		98%	Maintain	Some increase in mileage samples due to MAP-21	Stable in TransInfo + Unstable/Unsecure in Excel & Access	Stable, Secure Whole System	"System" based on Access makes analysis manual; knowledge is one-deep	Few Tools	100% automated inventory Analysis		Pavement PM	Comply with MAP-21	Waiting for final MAP-21 Rules	Partially	Aging Infrastructure quantity, incomplete system and succession planning	Add 'l $210 Million average annual investment
	Tunnels	Tunnels Program	Mature		100%	Maintain	New Element structure required	Stable? In OneDOT	Improve	Low Risk	None	Field Inspection Data Collection		None	Develop - % Fair or Better	Waiting for final MAP-21 Rules (if included)	Partially	Aging Infrastructure	
	Traffic Signals	Electrical Crews	Advanced		100% for Cabinets; Significantly Incomplete for Signal Heads	Add Signal Heads and Poles / Supports		Insufficient in TSIS	Migrate	Medium Risk	Laptops			None	Develop		Partially		
	ADA Ramps	ADA Program	Advanced	1R Roadside Inventory	90%	98%		Stable in TransInfo	Maintain		Mobile Data Collection (GPS)	Maintain		Draft PM			Partially	Compliance with ADA; attention from disability groups	Inconsistencies across regions leave ODOT vulnerable
Tier 2	Retaining Walls	None	Basic		90%	98%	Need data maintenance plan	Initial DB-Access	Migrate	Medium Risk	None	Data Collection		None	Develop - % Fair or Better		No		
	Traffic Barriers	$6 Million Program / 10 yr. Plan	Basic	1R Roadside Inventory	98%	Maintain	Data maintenance plan in place	Stable in TransInfo	Maintain		Mobile Data Collection (GPS)	Maintain		1R PM	Comply with 1R requirements		Substantially	Pace of replacement; new standards imminent	
	Vertical Clearance	<50%	Basic		<50%	98%	Pilot completed; project evaluating solutions in progress	No System Excel - Bridges only	Create for all structures over highways	Medium-High Risk	Pilot Completed (Mobile Scanner)	Tool for VC measurement of all assets / features over the highway	Project to eval. Solutions in progress	None	Develop - % Fair or Better		No	Quantity of unknown clearances	
	Signs	Interstate Program	Basic	1R Roadside Inventory	90%	98%	GPS - enabled Toughbooks in use in all Districts	Stable in TransInfo	Maintain		Mobile Data Collection (Toughbooks and GPS)	Maintain		None	Comply with FHWA requirements		Substantially		
	Traffic Structures	None	Basic		<50%	98%	Pilot completed; project evaluating solutions in progress	No Single System - fragmented in several	Create	Medium-High Risk	Pilot Completed (Mobile Scanner)	Tool for VC measurement of all assets / features over the highway	Project to eval. Solutions in progress	None	Develop - % Fair or Better		No	Unknown inventory; unknown condition	
	Stormwater	Minimal Program	Basic		<50%	98%		Partial in TransInfo	Expand	Medium Risk	None	Data Collection		None	Develop		Initial Effort	Environmental requirements and consequences	
	Unstable Slopes	STIP Ops	Basic		<50%	98%		Access	Migrate		None	Data Collection		None	Develop		Partially	Safety highway closure	
	Right of Way	POW Program	Mature		100%	Maintain		New System; RITS - Beg to End Processes	Maintain		None			None	Develop		Yes		

Assets Capacity status/needs		Decisions - Programmatic Capacity			Inventory			System			Tools			Performance Measures			Risk Management		
Asset Priority Tiers		Program Status	Capacity Needs	Comments	Status	Needs	Comments	Status	Needs	Comments	Status	Needs	Comments	Status	Needs	Comments	Managed	Primary Risk	Needs
	Sidewalks	Multiple Programs	Basic	1R Roadside Inventory	90%	98%		Stable in TransInfo	Maintain		Mobile Data Collection (GPS)	Maintain		Bike / Ped PM			Partially	Accessibility, condition monitoring	
	Bike Facilities	Bike Program	Basic	1R Roadside Inventory	90%	98%		Stable in TransInfo	Maintain		Mobile Data Collection (GPS)	Maintain		Bike / Ped PM			Substantially		
	ITS	ITS Program	Advanced		100%	98%		Stable in MicroMain	Maintain		None	Field Data Collection		None	Develop		Substantially		
Tier 3	Material Sources	Material Sources Program	Basic		>50%	98%		Stabile in ASIS	Maintain		Mobile Data Collection (GPS)	Maintain		None	Develop		Partially		
Tier 3	Approaches	Access Management Program	Advanced	OPAL	95%	98%		Unstable in old system: CHAMPS	Replace	Medium - High Risk	Mobile Data Collection (GPS): GIS and <mobile Scanner Tools	Maintain		None	Develop		Partially	Safety vs access	
Tier 3	Illumination	None	Basic		0%	98%		None - Paper Files	Create	Medium Risk	None	Field Data Collection		None	Develop		No	Unknown inventory; unknown condition	
Tier 4	Wetland Mitigation Sites	Enviro. Program	Basic		98%	Maintain					Mobile Data Collection (GPS)	Maintain		Draft PM			Substantially	Environmental requirements and consequences	
Tier 4	Weigh-In-Motion Sites	Motor Carrier Program	Basic		100%	Maintain		Interim System: Excel	Migrate	Low Risk	None	Field Data Collection		Draft PM			Substantially	Impacts to freight Mobility	
Tier 4	Sound Barriers	None	Basic		98%	Maintain		Interim System: Access	Migrate	Low Risk	None	Field Data Collection		None	Develop		No		

The table includes long-standing Asset Management goals around Decisions, Inventory, Systems and Tools. It also includes assessments of the status of performance measures and risk management because these additional elements advance proactive efforts to manage these assets. Generally, the contents of this table convey, by asset and capacity, the status, needs and comments for each of the six elements considered based on the respective Asset Management capacity goals. Color-coding, as has been typical for ODOT, quickly conveys the status summary. Color-codes used mean:

- **Green:** Status substantially meets needs.
- **Yellow:** Status moderately meets needs, important elements may be missing, but this does not prevent minimal management.
- **Orange:** Status significantly does NOT meet needs, but effort started or age of existing efforts presents risk and vulnerability.
- **Red:** Status significantly inadequate, lack presents significant risk and/or vulnerability.

APPENDIX 4

LINEAR ASSET WORK PLAN PREPAREDNESS FORM

Linear Asset Work Plan Preparedness Form

Use this form as a guide to request prioritization of your linear asset. The criteria listed below will help you to identify the readiness of your asset. Please complete each of the questions and then submit this form to the Asset Management Integration Section (AMI) for synthesis and analysis. If you have any questions please contact Laura Hansen at 503.986.3308.

Asset Information

Linear Asset:	
Linear Asset Contact:	
Phone Number:	
Asset Owner/Manager Name & Approval:	☐ Yes ☐ No
Date:	
Describe Request:	

	Readiness		Comments
1	I have the required resources to support this request.	☐ Yes ☐ No	
2	I do not have the required resources to support this request and am requesting consideration for them.	☐ Funding ☐ Personnel ☐ N/A	Provide estimate of need and timeline.
3	Was the proposal vetted through a governing body (RLT, MLT, ad hoc)?	☐ Yes ☐ No	Please identify team. If ad hoc please include participants (TSAMTF).
4	Have you defined and documented the attributes/data elements?	☐ Yes ☐ No	Please provide a copy of the manual or supporting documentation.
5	What collection tools and methodology are being used?	☐ GPS ☐ DMI ☐ DVL ☐ Field Verify ☐ Other (As-Builts) ☐ Unknown	Please describe.
6	Have you performed testing of the data elements and data collection method to confirm methodology/process/tool?	☐ Yes ☐ No	Describe the size of test sample (location, segment(s)); did the tool need adjustments?
7	Have you determined what type of data storage will be used?	☐ Excel ☐ Access ☐ *TransInfo* (ITIS) ☐ Other (i.e.COTS) ☐ No	
8	Is that data repository ready for your data?	☐ Yes ☐ No	Are tables built; is a structure in place; are the fields established for data storage?

9	Have you complied with data governance standard(s)? If so, which one(s)? If it is not listed, please include it in the comments section.	☐ Location (LRS) ☐ TAD ☐ GPS/DMI/Safety ☐ Other	Please list.
	Inventory Collection		
10	Has a work plan been developed?	☐ Yes ☐ No	Provide a brief description of the schedule and "plan of attack". How will the completion be measured – by an end date or % complete? Please include.
11	Have you prioritized the location for your efforts (Interstates, by Region, etc.)?	☐ Yes ☐ No	Please explain.
12	Have you determined the type of resource to be used (temporary, specialized contractor, etc.)?	☐ Permanent Staff ☐ Contractor ☐ Intern ☐ Rotational ☐ Temporary ☐ Other	Please explain.
13	If training is required, what types?	☐ Asset Related ☐ Methodology ☐ Safety ☐ Tools	Please describe how you will deliver this training.
14	What tools do you have available for your use?	☐ Hand Held ☐ Laptop ☐ DMI ☐ Other	Describe your accessibility to the tool (i.e. on order, working with Geometronics.)
15	Do you need to have an application developed for your tools?	☐ Yes ☐ No ☐ Unknown	Please describe.

	System Development		
16	Have you modeled, or used the data in a temporary database or generated reports?	☐ Yes ☐ No	Please describe.
17	Have the **system** requirements been defined?	☐ Yes ☐ No ☐ Unknown	Describe or attach supporting documentation.
18	Have the **business** requirements been defined?	☐ Yes ☐ No ☐ Unknown	Describe or attach supporting documentation (i.e. process map).
19	Have Information System (IS) or GIS resources been requested?	☐ Yes ☐ No	Please describe.
20	Has a request for IS/GIS resources included Stakeholder involvement/ prioritization (i.e. *TransInfo*, PDIS, GIS Steering Committee)?	☐ Yes ☐ No	Please identify stakeholder group.

Thank you for taking the time to provide us with this information. It will help us assist you in supporting effective and efficient data collection efforts as we strive to get the right information, to the right people, at the right time. After you have entered the necessary information, you can either submit electronically or route via interoffice mail: Asset Management Integration Section - 555 13th Street, Suite 2, Salem, OR 97301-4178.

APPENDIX 5: GOVERNANCE RECOMMENDATIONS DELIVERED TO AMSC MEMBERS

ASSET MANAGEMENT GOVERNANCE MEMO

Memorandum

November 2, 2014

To: Jerri Bohard, Paul Mather, Tom Lauer, Luci Moore, John Baker

From: Laura Wipper

I was asked to provide recommendations for improvements to the Asset Management governance structure. A great deal of thought by AMI staff has been given to this over the years. It is important for all to understand that decisions need to be made on a number of fronts – in relation to management of the assets themselves as well as the systems, tools and data – thus the four goals in our current strategic plan.

Problem: ODOT does not presently have a regular forum(s) where trade-off discussions can lead to decisions about assigning resources for efforts across the Asset Management spectrum. This need spans assets as well as the systems, tools and data that support management of these assets. The current governance structure is designed to allow diverse input, but does not provide the authority, address all areas needed nor provide opportunity for deeper understanding that helps ODOT move from a program to how we do business.

Issues: ODOT is charged with managing a state transportation system – one where numerous assets come together to function collectively as a system. While the critical anchors of this system are bridges, pavements, tunnels and culverts, we are not excused from managing other assets. The ET-Plus terminals are one recent example. ODOT presently lacks an adequate forum for on-going discussions that builds knowledge and experience for setting asset performance goals and investment strategies that balance priorities across the full collection of assets.

ODOT presently spends millions on data systems maintenance. When we implement new data systems, invariably they take years to implement and cost significantly more than originally anticipated. IS has developed methodologies to help us scope and document projects, but this does not alleviate the fact that ODOT lacks capacity to streamline the work to develop and maintain the data we need for decisions.

ODOT **does not**:

- Know its data well enough
- Have sufficient data standards, policies, guidelines, etc.
- Have a suite of clearly designated enterprise Asset Management systems

ODOT also spends significant resources on data – in terms of staff time trying to find data as well as human resources and tools to collect and analyze it. AMI efforts to partner with staff across ODOT have made in-roads on streamlining and building ODOT asset data instead of many local versions of asset data. However, three permanent AMI staff is not enough to mitigate the numerous continued local efforts. Real accountability to data governance that builds

common understanding about ODOT data that decisions can be based upon becomes the silver bullet to right-size an efficient investment in the data and tools that ODOT needs for decisions.

Embedded in the points above are issues around decision-making and communication. Governance provides the framework for decision-making. An integrated governance structure that provides the forums across business lines and disciplines for these decisions and the authority to make them will provide return over time in streamlined decisions related to management of the assets and significant savings over time in the systems, tools and processes that help us to manage our data.

ODOT needs integrated forums for:

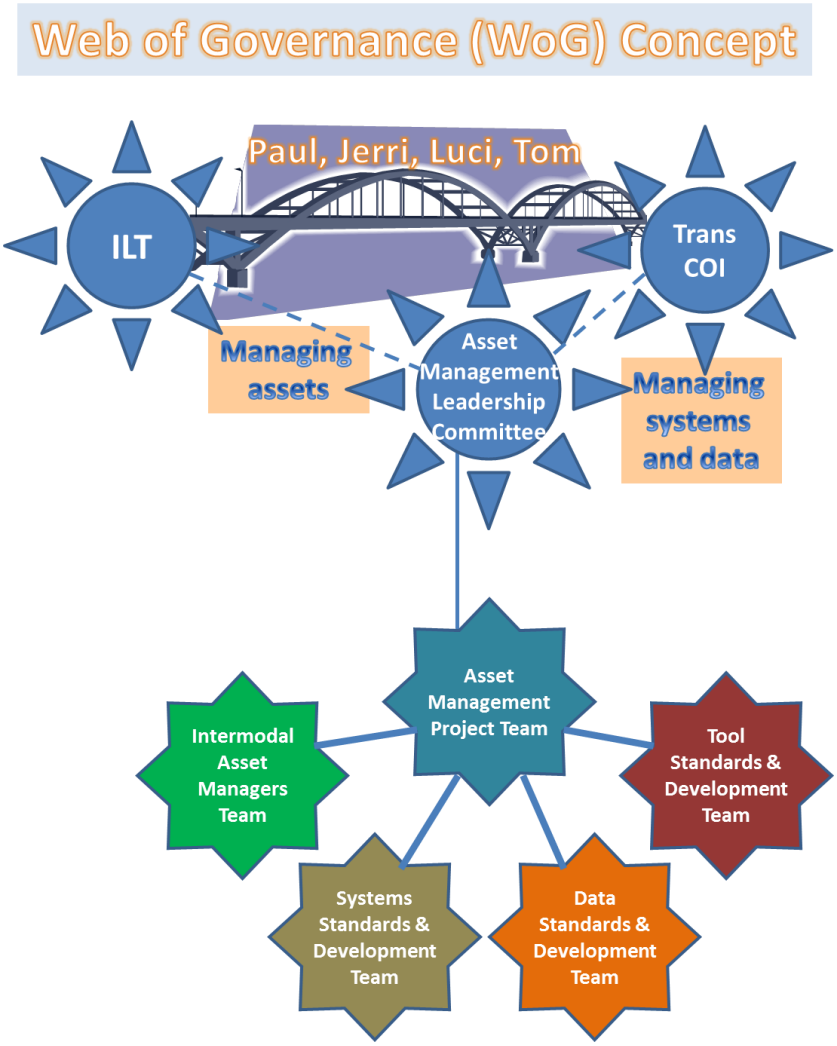
1. Decisions about managing assets and our capacity to do so
    A. Goals for management of assets and how we use resources to do so
        a) In context of MAP-21 and TAMP
        b) Other external expectations, i.e., Legislature, FHWA, 1R, ADA, etc.
        c) ODOT's own stewardship expectations
    B. Levels of capacities for Asset Management and resources to build/maintain
        a) How much data, what systems, what tools
2. Regular communications regarding management of assets and our capacities to do so - effectiveness is reliant on visibility
    A. Build broader knowledge, buy-in and commitment to processes across ODOT
    B. Build knowledge and understanding of systematic approach
        a) Better manage "squirrel" syndrome

Discussion: The questions around how we manage individual assets need a forum with authority where considerations can be based on the collective instead of individual assets. Asset Management integration efforts must "touch" all data systems, processes, programs, parts of the organization, but integration means we bring all this appropriately together. However, we lack the standing forum that weighs the issues and makes decisions in the context of all assets. Current decision processes are based on organizational structure or business lines yet Asset Management should span these for optimal effect. There must be a "Supreme Court" that spans the organization and business lines. "Lower courts" would allow subject matter experts to consider questions with knowledge and provide recommendations.

ODOT does not have an even hand on resourcing decisions. One part of the organization includes initiatives in their base budget and others do not – no governor (the mechanical kind) exists to check and balance Asset Management efforts. Those that have resources are not held accountable to a single decision process that ensures we spend precious resources on the most important efforts as well as spending them on efforts that may also serve others in ODOT. The result is that current critical efforts may not be resourced while less important efforts may be over-resourced. Competing needs must be considered, prioritized and resourced based on broader considerations.

ODOT also lacks a sufficient formal method for developing, maintaining and incorporating standards into Asset Management and systems work. Data is much like water. We go to the "tap" and expect it to be there – we take for granted that there will be plenty and that someone is paying attention to quality. We trust this is the case because standards exist to define clean and safe water. Infrastructure has been built, maintained and rules put in place that guide what goes in, how much can be removed, etc. A concept that establishes comprehensive structure helps ODOT move to much greater efficiency in systems, licensing, IT projects, system maintenance, etc. This is not a recommendation to be more bureaucratic, but to be more efficient over the long haul – spend a little time on structure and standards to later speed up implementation. The infrastructure must be maintained, there must be rules about what and how much goes in, quality assurance/quality control measures and management must be in place to govern what comes out.

Lack of initiative readiness is a significant issue that is very costly for ODOT. This lack of readiness applies to inventory initiatives, systems initiatives and others. "Time in the bucket" is critical for good decisions, but time and again we've seen efforts defined in the "office," but not tested in the "field." Lack of experience with methodologies and data mean a well-defined scope is not worth the paper it is printed on – it will change when results are seen. Governance can have an eye on ensuring readiness if structured to require it.



Recommendation Key Concept: Web of Governance: The intent behind a Web of Governance (WoG) is to interconnect decisions with standards, goals and resources to maintain a commonly understood focus that guides progress in all critical areas. For Asset Management, the "What" and the "Why" are incorporated in the TAMP or identified within ODOT as the additional focus of programmatic efforts. The "How" has many, many facets – too many for a single group. "How" includes what data, how much data, what method for collection, what standards, what systems, what reports, what analysis, what tools for analysis or data collection, frequency of updates, who should have access, etc. Key aspects of ODOT are represented in this WoG and subject matter experts work issues in collaboration across business lines, assets and platforms. Membership in the various groups is defined for efficient decisions on one level, but robust discovery, conversation and ideas in others. It is also deliberate that Paul, Jerri, Tom and Luci are affiliated with ILT, HMT, PBLT, PDLT (and TLT) and MLT to foster additional ties and cross-pollinating

thoughts. An updated RIAS matrix (Responsibility-Input-Authority-Support) would provide additional clarity across these LTs. The diagram above illustrates a Web of Governance for Asset Management and how it might fit within ODOT:

The **Executive sponsorship group** (Paul Mather, Jerri Bohard, Luci Moore and Tom Lauer) that presently is directing development of the ODOT TAMP would continue to meet to bridge issues and sponsor continued development of Asset Management decisions and capacities.

The role of ***Asset Management Leadership Committee (AMLC or AMLT)*** would be to prioritize and direct ODOT's efforts to build capacity for proactive management of transportation infrastructure. This includes how decisions are made related to management of the assets and how well these decisions are supported with data, systems and tools.

The role of the ***Asset Management Project Team (AMPT)*** would be to develop the best means to implement the priorities and direction of AMLC. This team would the conduit through which communications about initiative readiness and recommendations would travel between AMLC and the contributing SME teams. They would also pair up to guide the Asset, Systems, Data Standards and Tools teams.

The role of the ***Intermodal Asset Managers Team (IAMT)*** would be to develop group knowledge of existing state of the assets, existing goals and/or expectations, current resource allocations, and decision processes that support management of these assets. Building upon this knowledge, this group would analyze and recommend decision criteria, structure and processes that harmonize asset current states with resource allocations, goals and expectations.

The role of the ***Systems Standards and Development Team (SSDT)*** would be to develop group knowledge of systems, platforms, the full range of needs, and priorities; and to make recommendations based on this knowledge to migrate, build-out or develop enterprise ODOT platforms with an eye on efficient support, maintenance and evolution. This would include the technical impacts and standards that would guide efficient development and maintenance of these systems, including platforms that can serve more than one need.

The role of the ***Tools Standards and Development Team (TSDT)*** would be to understand the range of needs for ODOT Asset Management Tools for analysis, data collection or related purposes. This would include technical impacts that would guide choices on tool platforms that can serve multiple needs and the standards that would support efficient implementation and maintenance.

The role of the ***Data Standards and Development Team (DSDT)*** would be to understand the data needs across ODOT business lines and to recommend standards that sustainably support these needs while ensuring linkage of standards across these primary concerns for efficient data management. Data standards here would range from quantities of attribute data to location methodology to tools based on level of reliability needed to types of attribute data required based on database system.

The role of ***AMI*** in this Web of Governance concept would be to develop the working processes, requirements and means to communicate and make this an effective decision making process. "Jurisdiction" for these groups would need to be clearly delineated to foster clear understanding concerning when issues need to be brought to AMLC.

Desired Outcome from Implementation of this Concept: This recommendation provides the forums to address decisions across all spectrums of Asset Management with authority to commit resources as well as for education and communication to regularly occur to build a deeper understanding of goals and efforts across ODOT. This will mean that we will better know ODOT, its needs and priorities in the broader context and can then be appropriately focused and agile in our efforts.

Options based on this Key Concept: This recommendation is made as a whole package, but some options exist in terms of how it might be implemented:

Consolidating resources: All or select Asset Management budget resources could be consolidated under AMLC or AMI as directed by AMLC. This could be phased or be an all-at-once exercise, but this move would help ODOT further along the enterprise continuum. The allocation of these resources would be decided by AMLC and AMPT based on priorities and direction. Programs requesting resources would need to make their request of AMLC. AMPT would assist program staff with meeting requirements, standards and working with appropriate Standards and Development Teams.

Absent this step, staff could still be directed to seek approvals from AMLC, but this would not ensure the same level of collaborative compliance. Program staff would need this approval before moving ahead on initiatives. AMPT would assist program staff with meeting requirements, standards and working with appropriated Standards and Development Teams.

Phased Enterprise Approach Beginning with AMLC/AMPT: This option employs part of the Web of Governance Concept – AMLC and AMPT – but does not immediately provide formal methods for considering systems, data, or tools standards and development. These other elements would be phased in later leaving this work to be done on an ad hoc basis until such a time when the remaining elements of the WoG concept could be implemented. Program staff would still need approval from AMLC before moving ahead with initiatives. AMPT would still assist program staff with meeting requirements and standards. This readiness facilitation would be a slower process because ability to be proactive would be more limited.

Other Considerations: AMI is not presently staffed to successfully support this this new governance structure. I estimate that it would require at least three additional FTE – two in the OPA series or equivalent and one support staff. Our efforts have always been greatly aided by interns as they can help with the "lifting" while permanent ODOT staff takes care of their other work. I would propose that this continues in addition. I am also very interested in establishing a routine developmental opportunity for Maintenance or other ODOT staff to learn and assist with our effort while learning other skills that might help them along a career path of interest.

Committee/Team Membership recommendations:

The Asset Management Leadership Committee (AMLC) membership would include

- TDD administrator
- Chief engineer
- Maintenance and operations engineer
- Region manager from one of the Eastern regions
- Region manager from one of the Western regions
- TAD manager
- AMI manager

The Asset Management Project Team (AMPT) would include:

- AMI staff
- TDD representative
- Tech Services representative
- Maintenance representative
- Region representative
- IS representative
- Others deemed necessary to best connect the knowledge of the contributing teams

The Intermodal Asset Managers Team (IAMT) would include:

- Chief Engineer
- AMI rep from AMPT
- Other rep from AMPT
- Representatives from core ODOT infrastructure assets
- Representatives from secondary ODOT infrastructure assets
- Select knowledgeable business representatives

The Systems Standards and Development Team (SSDT) would include:

- AMI rep from AMPT
- Other rep from AMPT
- Representatives from key ODOT platforms
- Select knowledgeable business representatives
- IS representative
- EDM representative

Tools Standards and Development Team (TSDT) would include:

- AMI rep from AMPT
- Other rep from AMPT
- Representative(s) from Geometronics

- Representative(s) from GIS
- Select knowledgeable business representatives
- IS representative
- EDM representative

Data Standards and Development Team (DSDT) would include:

- AMI rep from AMPT
- Other rep from AMPT
- Selected representative(s) from IAMT
- Selected representative(s) from SSDT
- Selected representative(s) from TSDT
- Select knowledgeable business representatives
- IS representative
- EDM representative

APPENDIX 6

ASSET DATA MANAGEMENT COMMITTEE CHARTER

Oregon Department of Transportation

ADMC - Approved: 08-11-2011
AMSC - Approved: xx-xx-2011
TransCOI - Approved: xx-xx-2011
Next Review: 00-00-00

ASSET DATA MANAGEMENT COMMITTEE (ADMC) CHARTER

Purpose

The Asset Data Management Committee, hereby referred to as the "Committee" will work towards changing the culture to an enterprise environment; develop guiding documents and provide strategic processes to facilitate asset management efforts. It will also serve as a liaison to the Transportation Community of Interest (TransCOI) and the Asset Management Steering Committee (AMSC) providing guidance and support for established guidelines.

- *Develop and recommend policy, standards, processes and procedures to ensure that data assets are gathered consistently.*
- *Provide guidance on asset data management activities; provide decisions on program and system improvements and to resolve key issues for transportation assets.*
- *Communicate and collaborate about work under development to gain input that will result in a program that can be utilized by the Agency.*
- *Develop standards for the methods and tools used to collect, update, inspect, view, report and analyze asset data to ensure efficiency, staff safety, effective data management and reliability. Ensure reliable and consistent data can be integrated for whole system views, reporting and analysis.*
- *Provide a structured, strategic process and facilitate the optimization of resources in accordance with priorities from the Asset Management Integrated Plan.*
- *Establish and maintain a data governance program for the TransCOI business lines represented by its members. This program will develop and provide asset data management guidelines to ensure that data assets are well maintained and utilized.*
- *Provide guidance on data management activities; provide decisions on program improvement and to resolve key issues for transportation assets.*
- *Communicate and collaborate with all ODOT Communities of Interest the work products under development to gain their input that will result in a program that can be utilized by the agency.*

Vision

ODOT makes decisions and allocates funds for stewardship of transportation infrastructure strategically, maximizing the life-cycle of each component to make the best use of constrained resources. These decisions are supported by reliable data that is collected once for use by many.

Context

The members realize that availability of data should be established at the enterprise level. With this goal in mind, the ADMC will focus on establishing asset data management practices that are owned and managed by organizations represented by ODOT.

Key Functions in Support of the TransCOI and AMSC

- ***Act as the strategic visionaries** for the TransCOI data governance program.*
- ***Establish and maintain a program plan** that provides guidance on tasks to support and enforce the implementation of policies, standards, processes and procedures, techniques, tools, and templates to support the short and long-term commitment to data governance.*
- ***Provide a forum** for discussion on IT data needs.*

Key Responsibilities in Support of the TransCOI and AMSC

ADMC shall govern and review the development and implementation of:

- *Guidelines that support the asset collection, storage, and use of enterprise asset data.*
- *Tools and training to support enterprise asset data management.*
- *Program and system improvements.*

Approval Process

Council members will utilize the consensus model to make decisions when a majority quorum of members is present. If a consensus cannot be reached, a vote will be taken. Based on the complexity and/or timing requirements of a decision, the Chair can extend the decision until the next regularly scheduled meeting, hold an additional meeting, vote electronically, or may choose to solicit input from absent members before or after meetings in order to establish a quorum. In these cases the votes of the absent and attending members will be counted together and the resulting decision will be certified.

If a member is unable to attend, the council member may designate a representative; the representative must be prepared to vote the absent member's position and preferences relative to decisions to be made and/or actions scheduled to be taken during the meeting.

A decision process diagram was also developed to indicate the decision flow from inception to final approval through all the necessary committees. See Attachment A.

Sections represented by the TransCOI appear in the table below. For actions that require approval, a quorum of six people from the following group must be present. A member may temporarily assign a designee to attend the meeting in their place or they may provide their vote in advance of a meeting through e-mail to the Council Chair or staff support. Actions requiring a vote that are in a member's business area will require their vote regardless if a quorum of members are present.

Authority

Decisions before the Committee require TransCOI or AMSC approval. The Committee will recommend a course of action and forward this recommendation to TransCOI or the AMSC.

Asset Data Management Committee

Laura Hansen - Asset Management Integration (Chair)
Dave Ringeisen - Transportation Data (Chair)
Gary Holeman - TS, Design & Automation/EDM
Clint Ward -TS, Geodetic Information Services
Steve Lindland - TS, Roadway Engineering
Paul Wirfs - TS, Engineering & Asset Management
Dan Wells -IS, Resource Life Support
Heather King - TD, Road Inventory & Class Services
Marcia Malstrom - IS, Engineering Automation
Brett Juul - TD, Geographic Information Services
Terry Jones - TPO, Hwy Information Program & Planning

Staff Support

Staff support will assist in preparing materials for meetings, following up on action items, general communications, and governing document database; maintain a web presence and maintenance of \\wpdotfill03\6100pub\ADMC_Meetings\Meetings .

- *Staff support*
- *Scott King, Asset Management Integration*

Critical Success Factors

Several critical success factors have been identified as important to ensure the success of this Committee. These factors include:

- *Key stakeholder buy-in of the vision and technology direction*
- *Open communication between members*
- *Active participation of all committee members*

Charter Updates

This is a living document, which will be reviewed and updated whenever substantial changes are needed to the structure or working of the Council. Revisions to this charter require agreement and acceptance by all Asset Data Management Committee - Data Council members.

Meetings

The Committee meets monthly. Members will address and resolve action items, issues, and work products in a timely manner.

Location

Monthly meetings will be held in Salem, rotating between Mill Creek or the Technical Leadership Center (TLC). The committee may also meet by video conferencing.

Agenda & Minutes

The agenda will be prepared by support staff and circulated to meeting attendees at least one week in advance of the monthly meeting and will include:

- *A meeting date, time and location*
- *A review and request for approval of minutes from the previous monthly meeting*
- *A discussion of issues/agenda items at the committee's request*
- *Other???*

Meeting minutes will be published within five business days of meetings. These minutes will document decisions made, issues raised, and the status of action items assigned. In addition matrices will be maintained for both the decisions and action items. An email will go out to attendees with the link to the documents. These will be available on both the folder (\\wpdotfill03\6100pub\ADMC_Meetings\Meetings) and web (AssetMgmtCommitteMeetings).

Communication

On a monthly basis, Asset Management Integration (AMI) will be responsible for keeping Asset Management Steering Committee (AMSC), and Highway Leadership Team (HLT) if applicable, apprised of the decisions made by the committee, further risks and challenges identified by the committee, including strategic/operational issues, and the committee's functionality. Feedback received will be the responsibility of Asset Management Integration (AMI) Section to bring back to the Council.

Ad Hoc Working Groups:

Ad hoc working groups will be established to provide the needed support to create work products in support of the program. This group will consist of two, three or four permanent members and will use technical experts to provide assistance on the work products or assignments needing to be completed.

Examples of the group's responsibilities include developing guidelines and processes that support the collection, storage, and use of enterprise data; and identifying the necessary tools to support enterprise data management.

Approvals:

Approval of this document designates that each person will show commitment and support in the development and the long term management of the Asset Data Management Committee, Data Council, asset management and enterprise data efforts.

Laura Hansen — 8 September 2011 Date	Dave Ringelsen — 9/8/11 Date
Gary Holman — 9-8-11 Date	Terry Jones — 9/8/11 Date
Brett Juul — 9-8-11 Date	Heather King — 9/8/11 Date
Steve Lindland — 9-8-11 Date	Marcia Malstrom — 9/9/11 Date
Dan Wells — Date	Paul R. Wirfs — 9-8-11 Date
Clinton Ward — 10/5/2011 Date	

ATTACHMENT A – DECISION DIAGRAM