American Association of State Highway and Transportation Officials

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Integrating Asset Management Plans into Transportation Agency Processes

A Briefing Paper

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As U.S. transportation agencies undertake their first-generation asset management plans, they will need to anticipate how those plans will be integrated into the complex decision-making environment for managing transportation infrastructure.

The plans' objectives and strategies will need to be integrated into:

- The state's annual or biennial budget process for which the long-term asset management plan will be a new factor;
- The project-selection priorities of metropolitan planning organizations (MPOs) and hundreds of local governments whose assets are addressed in the plan;
- The overall transportation planning process including long range plans and state and metropolitan transportation improvement programs (TIPs);
- The decision making of agency officials who may have operated independently within their own spheres without considering the long-term treatment strategies included in the plan;
- The priorities of maintenance staff who may need to more closely align their efforts with the asset management strategies;
- Planning for the higher on-going maintenance costs that result from building new facilities;
- Information technology systems that are critical for long-term asset management;
- Decision making processes that will need to incorporate and address risk;
- Agency efforts to communicate with key external stakeholders whose cooperation will be critical to asset management success.

Asset management plans intersect with many other functions, stakeholder groups, and agency processes because of their large scope, great complexity, and long horizons. A state transportation asset management plan (TAMP) must assess tens of thousands of separate transportation assets. The plan must estimate how much investment is needed to treat those assets over at least the next 10 years. The large number of asset considerations over such a long period will involve coordination among more internal and external stakeholders than was typical in the past.

State Budget Integration

The precedent for asset management plans and their accompanying financial plans came from Australia. There, local governments in most states are required to develop 10-year, long-term financial plans founded on 20-year asset management plans. There, the financial plans are an integral part of the agency's budget. Each annual budget is adopted as the first year of a 10-year long-term financial plan. That long-term plan forecasts how much needs to be spent to sustain service delivery by assets throughout the 10-year period. By incorporating the 10-year forecast into the annual budget document, the agencies are acknowledging the degree to which the annual budget is adequate to make progress toward the 10-year sustainability targets. Looming unmet needs and accumulating backlogs of treatments are reported in the budget. Passage of the budget shares the responsibility among legislative and executive branches for adequately funding the long-term needs of the agency's assets.

A long-term financial plan is recognized as being needed by every organization with significant long-lived infrastructure. Without one, it is impossible to effectively and equitably manage the trade-offs between service level, asset management, risk, and revenue raising decisions and ensure ongoing financial sustainability.[1]

Performance-Based Planning Guide

Many of the issues surrounding the integration of asset management into agency processes are similar to considerations of how to integrate performance-based planning and programming into agency processes.

The Performance-Based Planning and Programming Guidebook **provides advice on how performance management can be integrated across a wide array of agency functions. Its sections on connecting performance-based planning and programing to asset management plans, to project selection, and to coordination with MPOs are particularly relevant to asset management.**

http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/

As an example, the nation's most prominent city, Sydney, publishes a Long-Term Financial Plan from 2012–2021.[2] The plan assesses the city's overall fiscal condition and illustrates how much it expects to spend each year on asset operations, maintenance, renewal, and new assets. The financial plan includes several basic financial metrics which collectively show that the city is in excellent financial health. It has no debt and holds substantial cash to cover expected expenses. The plan also includes substantially more expenditures for infrastructure investment than the city expects to incur as depreciation over the next decade. The net result of the plan is to illustrate that the city will be investing more than required to sustain the condition of its assets. The first year of the plan reflect the current year's budget and the remaining 9 years of the plan provide estimates of how much the city expects to spend to cover its expenses, including those needed to sustain asset conditions.

Such plans are not restricted to the largest cities. Even the mid-size and small communities produce 10-year asset management and financial plans that drive their budgets. The City of Adelaide has only 22,280 residents but, like Sydney, its asset management and financial plan shape each year's annual budget.[3] The Adelaide Long-Term Financial Plan indicates it expects to spend in 2013/2014

$21.2 million on asset maintenance rising steadily to about $37 million annually by the later years of its plan. The city's asset management plan examined in detail the amounts needed for bridges, pavements, curbs, footpaths, traffic signals, medians, and parking meters. The asset management plan includes an inventory of the items and estimates of how much needs to be spent on each asset class each year to sustain their conditions. Those estimates then influence the annual and 10-year budget planning process.

The New South Wales Division of Local Government audits the asset management plans of local governments and it noted that the plans have led decision makers to be more aware of asset management needs when they set agency budgets.[4] Although the financial plans have not eliminated all infrastructure backlogs, they do appear to have led to increased investment in infrastructure, made decision makers more aware of asset needs and led to increased expenditures on maintenance versus new construction. Because in the United States the asset management plan is a Federal requirement, it will not automatically become an integral part of the agencies' state budget processes as are the financial plans in Australia. If states do not take steps to integrate the financial plans into their state budgeting process the plans may become isolated, stand-alone exercises that do not influence legislative decision making.

One important step that agencies may consider taking is to clearly link their asset management plan to their budget requests, their budget testimony and to their budget documents. The asset management plan information can be an excellent source for illustrating the context of each year's or each biennia's budget request. The plan will include recommended program levels for critical assets such as bridges, pavements, culverts, traffic control devices, guardrail, and other assets. It could be useful for agencies to derive budget requests and budget testimony from the asset management plan. Most budgets are submitted to legislatures with substantial narrative explanation from the agency to the Governor and from the Governor to the Legislature. This budget narrative and its accompany funding tables and graphics can be an important official media through which the asset management plan information can be conveyed to the Governor and Legislature. Although the asset management plan is not a state requirement, incorporating it fully into the state budget requests and testimony can integrate the TAMP into the executive and legislative decision-making processes.

Federal Planning and Programming Integration

Another key step to integrate the asset management plan into agency processes is to use it as a driver in the Federal planning, programming, and project-selection processes. The Federal planning rules require states and MPOs to consider the asset management plan and financial plans as they develop long-range plans and short-term Transportation Improvement Programs (TIPs).[5]

Beyond just considering the plans, agencies and MPOs could use the recommended funding levels in the asset management plans to set program levels for long-range plans and TIPs. The asset management plans will focus upon key asset categories including pavements, bridges, culverts, and other critical assets. These tend to represent the largest budget categories for most agencies. As with the state budget, if the funding levels for major program categories are set independent of the asset management plan, the plan will be isolated from a critical agency decision-making process. Instead, the states and MPOs could use the asset management and financial plans as the major

influences upon the program levels they set in the long-range plans and TIPs. Further discussion is included in Model Long-Range Transportation Plans: A Guide for Incorporating Performance-Based Planning.[6]

Similarly, project-selection decisions can be clearly linked to the asset management plan. The plan will include asset condition targets and strategies for achieving and sustaining those targets. The project-selection decisions could represent a direct link between the plan's asset targets and the agency's selection and scoping of projects. Many plans are likely to include an increased emphasis upon preservation strategies to reduce the long-term lifecycle cost of assets. If agencies and MPOs alter their project-selection criteria to increase the priority of preservation treatments it can further integrate the asset management plan into the day-to-day project-selection decisions.

Most plans will include strategies for not only improving service delivery from physical assets but also for improving agency asset management processes. One key process change can be to reflect the asset management plan's priorities into the project-prioritization criteria.

Coordination with MPOs and Other Stakeholders

The MAP-21 planning and programming rules will result in even closer coordination between state transportation departments, MPOs, and other local stakeholders. The long-term performance focus of the asset management plans will create an on-going nexus with the project-selection decisions of the MPOs. Both the state agency and the MPO members will need to cooperate and coordinate so that the long-term asset management strategies in the asset management plan get translated into projects included in the fiscally constrained TIPs.

States already are recognizing that the specificity in the asset management plan will require even closer coordination with MPOs to select projects that achieve the year-to-year progress needed to meet asset management plan condition targets. This coordination will be particularly important because of severe financial constraint that affects so many state transportation agencies, local governments, and MPO boards. This coordination may be particularly important on the additional sections of the National Highway System (NHS) that MAP-21 added to the system. Many of these additional sections are within urbanized areas and are often under the

Figure 1. Managing assets in urban areas such as Detroit will require coordination between Federal, state, regional, and local officials.

control of local governments. The states, the MPOs and the local governments will share decision making authority on these sections, but FHWA will be expecting the states to meet the NHS condition targets on them.

Draft FHWA planning regulations include language for states and MPOs to integrate the goals, objectives, performance measures, and targets of the asset management plans developed for both highways and transit. The draft rule says this integration would help ensure that key performance elements of these plans are considered as part of the decision-making process.[7] The MPO planning agreements are expected to identify how the states, MPOs, and public transit providers will collect system performance data, select performance targets, report performance toward those targets and collect data for asset management plans for the NHS. In short, the implementation of the asset management plan will require even closer cooperation between states and MPOs to set, achieve and document asset condition performance targets.

Internal Agency Coordination

The many districts and divisions within a transportation agency are likely to see the need for increased coordination and cooperation to achieve the sophisticated and integrated treatment strategies recommended over the life of the agency's assets. A mature asset management approach would involve assessing assets' conditions, predicting their treatment cycles and preparing years in advance to have projects ready to provide those treatments. The timely application of preservation and maintenance treatments will be important to prevent more serious deterioration that would require expensive repair, rehabilitation or replacement.

This complexity is likely to necessitate more coordination and cooperation between those who develop the asset management plan, those who inspect assets, those who program treatments and those who scope the treatments. In a mature asset management organization, simple rule-of-thumb treatments to rely extensively on worst-first thin pavement overlays or to wait until bridges require expensive rehabilitation are likely to be much less common than in the past. Instead, agencies would be trying to strategically assess each asset for how to treat it at the right time with the correct preservation treatment to prevent further deterioration whenever possible.

The mature asset management agency is likely to increasingly rely upon collaborative, multidisciplinary teams to select assets needing treatment, to scope the treatments and then closely manage the project-development activities to ensure the project scope and schedule requirements are met. These agencies are likely to see a diminishing of the "silos" of staff who do not regularly coordinate to optimize the performance of asset throughout their lifecycle.

It is likely that agencies will pursue one of two types of options. They could create new organizational structures in which the different silos report to a common unit or official. Or, they could create a coordinating process in which the "silo" functions collaborate to identify projects and scopes for those assets needing preservation, maintenance or rehabilitation. Regardless of which approach the agency takes, increased coordination within the agency is a likely necessity if the full potential of the asset management plan is to be achieved.

Integrating Maintenance Forces to Sustain Assets

Another likely change is to see closer coordination between the maintenance forces and the asset management staff. The traditional model for many agencies is for maintenance units to be distinct from the planning and project-development staff with little coordination between them. The maintenance staff often work on priorities that have short cycle times, such as plowing snow or patching potholes, repairing damaged guardrail and mowing rights-of-way. Many of these functions also are reactive to unplanned events, such as repairing culverts after a storm or responding to a sign damaged by a crash. The reactive and short-term nature of the maintenance functions are quite different from the project-development functions that may plan years in advance to treat an asset.

Figure 2. Linking the activities of maintenance crews with the asset management program can be important to asset management success.

In a mature asset management organization, it is likely that closer coordination will develop between the planning and design functions and the maintenance functions. This closer coordination could occur whether the maintenance functions are performed in-house or by contractors. In an asset management framework, agencies are likely to put more emphasis upon functions such as crack sealing pavements, culvert and drainage maintenance, and routine bridge preservation activities such as cleaning expansion joints, washing salt from bridges or cleaning scuppers. These functions are not new but they are likely to see an increase in emphasis, an increase in effort and more focus upon their timeliness.

When agencies look at the long-term, lifecycle cost of their assets they quickly realize that timely preservation and maintenance can pay significant dividends for decades in terms of reduced costs for repair, rehabilitation, and replacement. The timely maintenance of an expansion joint can prevent serious damage to bridge decks, approach slabs, and back walls. Simple processes such as keeping the expansion joints free from non-compressible materials or preventing water from flowing over steel beams can increase the lifespan of bridge elements by many years. As a result of this understanding, agencies are likely to emphasize that maintenance efforts be synced with asset management objectives.

Several states are considering how their element-level bridge inspection data can be shared with their bridge maintenance crews. The hope is that annual or biennial bridge inspections will serve multiple functions. Not only will state and Federal inspection requirements be satisfied but the inspection findings will prompt timely efforts to address small problems before they become major expenses. The coordination of the inspection findings will prompt either in-house or contractor crews to respond and address the minor problems before they become more severe. This coordination requires communication between the units that inspect bridges, scope maintenance actions and execute the maintenance.

Similar coordination is likely for drainage assets such as culverts, ditches, and catch basins. Common among agencies that are maturing with asset management is for them to recognize culverts and drainage features as long-neglected assets. Often agencies lacked culvert or catch basin inventories, without which systematic maintenance was unlikely. Once the inventories are developed and the assets inspected, the regular maintenance and repair of them requires coordination with the agency's maintenance functions. Instead of waiting until a culvert fails to address it, asset management agencies tend to develop systematic programs to regularly inspect, maintain, repair and replace drainage assets. This systematic approach requires enhanced coordination be-

Learning to Manage Risks

MAP-21 requires risk-based asset management plans. The introduction of risk into the decision making process requires agencies to develop new competencies to understand, measure, monitor, and mitigate risks to their asset management objectives. Most risk management frameworks equate risk with uncertainty that could affect objectives. Managing risks involves managing the many uncertainties that surround agencies' plans for sustaining asset conditions at an acceptable level for at least 10 years into the future. Among the obvious risks that asset management agencies are identifying are the uncertainties surrounding long-term state and Federal revenue sources, the impact of a changing climate with increased storm events, possible seismic risks, the risk of construction price inflation over the next decade and the risks that demand for new capacity projects will divert limited resources needed to sustain assets. Risk management represents a natural complement to long-term asset management because agencies face many uncertainties and issues beyond their control as they contemplate how to sustain assets over the long term. In the short-term, agencies are likely to need to develop new understanding of what are risks, how they can be managed and how those risks can be conveyed to decision makers.

tween those who set asset management objectives, those who collect asset inventories, those who assess their condition and those who deploy maintenance crews. The information technology function also becomes critical so that these assets are collected in databases, can be mapped and their condition documented.

Capturing Long-Term Maintenance Costs of New Assets

An additional tool for integrating asset management plans into agency processes is to illustrate the long-term maintenance and rehabilitation costs for new assets. Typically, a plan or TIP will only address the initial costs for planning, design, right-of-way, and construction. Those costs, however, only represent a fraction of the long-term costs to operate, maintain, repair, and eventually rehabilitate the asset. The common practice in Australian financial planning documents is to capture the future additional maintenance, operating and rehabilitation costs that will be required to sustain newly constructed assets and service delivery. This capturing of future costs and reporting in the long-term financial plan can improve decision making. It illustrates that new assets are not a one-time expense but rather a perpetual financial obligation. Expanding assets today obligates agencies for higher maintenance, operating, and rehabilitation costs in the future.

Enhancing Information Resources to Support Asset Management

Common among agencies that are maturing in their asset management functions is an increased emphasis upon sound data and analysis. The asset management era is spurring further advances, and demands upon, agencies' information technology staffs and systems. Parallel to sound asset management is sound information management.

Among the key needs are improved asset-condition data. The collection, storage, mapping, retrieval, and refreshing of this data often requires collaboration between asset owners and experts, information technology staffs, Geographic Information System (GIS) staff and senior policy makers. All of them are necessary to identify the asset management objectives the agency wants to pursue and then to develop the decision-support resources to achieve them. Senior leaders' involvement is key to identify the objectives. Asset experts are critical to identify which data about the assets provide the greatest insights. The information technology staff are key enablers who can best identify how the data can be collected, stored, retrieved, and refreshed to support the decision-making process. Each discipline represents a key link in the asset management decision-support chain. It appears to be almost universal among the agencies maturing in asset management to seek improved asset inventories.

Decision-support systems such as management systems for bridges, pavements, and maintenance items also grow in importance as agencies advance their asset management programs. Agencies that begin the asset management journey can expect to face increasing requests for more sophisticated, timely and insightful analyses from their management systems.

Data warehouses and other tools for linking disparate data are becoming another critical element for asset management agencies. Historically, inventories often developed at different times, in different formats and on different data platforms. Often agencies find it difficult to extract information

from multiple legacy systems for comprehensive management of different asset classes. Agencies that seek to integrate asset management practices in many areas of their agency can expect to face the need to link old legacy systems and inventories through some type of common warehouse or data integration process.

Communicating the Asset Management Strategies

Inherent in several of these new areas of emphasis is increased communication to more fully integrate asset management into the internal and external decision-making processes. The benefits of asset management are unlikely to be fully realized if key stakeholders do not support the multi-year efforts it requires. Legislators will need to sustain years, if not decades, worth of funding levels for asset investments. Communities that share responsibility for assets with the state will need to understand and accept the asset management approach. The media can be critical to the public's understanding of the agency's asset management program. The MPOs will be important to efforts to set targets, collect performance data, program projects, and monitor the results in urban areas.

The many stakeholders who can influence the agency's asset management success require a sustained and effective communication effort. In addition to the many skill sets already identified as important to asset management can be added that of communication. Agencies that have developed asset management plans quickly realize the need to share the findings and strategies with the many internal and external partners upon whom they will rely. This shared understanding can be achieved through the agency adopting a continuous communication ethos to share its asset management needs, objectives, risks,and results. A successful communication outcome is likely to include the widely shared understanding that all the partners benefit from and contribute to the agency's asset management success.

Conclusion

The era of asset management is likely to lead state transportation agencies, MPOs, and local governments into a closer partnership. As they plan how to treat thousands of assets at each stage of their life cycle the different agencies are likely to increase the sharing of asset inventories, condition, treatment needs, and long-term treatment strategies. Similarly, within transportation agencies the traditional silos of planning, design, construction, maintenance, and information will see the need for closer coordination. This need for greater external and internal coordination is likely to result in agencies breaking down some traditional silos and stovepipes and linking these old silos through a common commitment to asset management. As a result, asset management is likely to be integrated in key agency processes such as budgeting, planning, programming, design, construction, and maintenance. Perhaps the largest area of integration will be with data, information, and communication. Agencies that expand their asset management approach are likely to use common data, information, and communication channels as the platform for linking the many partners needed for asset management success.

Endnotes

1. Institute of Public Works Engineering Australasia, Practice Note on Long-term Financial Planning accessed at http://www.ipwea.org/pn6
2. City of Sydney, Long Term Financial Plan, 2011 accessed at http://www.cityofsydney.nsw.gov.au/__data/assets/pdf_file/0011/100037/Long-Term-Financial-Plan.pdf
3. Adelaide City Council 2014-15 Business Plan and Budget accessed at http://www.adelaidecitycouncil.com/assets/2014-15_Business_Plan_and_Budget_Adopted_by_Council_on_24_June_2014_reduced_size.pdf
4. New South Wales Division of Local Government Local Government Infrastructure Audit, June 2013.
5. Federal Register Notice of Proposed Rule Making for Statewide and Nonmetropolitan Transportation Planning; Metropolitan Transportation Planning, sections 450.324, 450.326, 450.216, 450.218 June 2, 2014.
6. FHWA 2014.
7. NPRM section 450.314 (a).

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