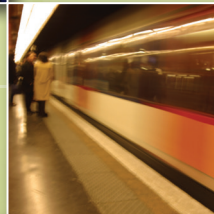


# **Integrating Asset Management Plans into Transportation Planning Process**

## **A Briefing Paper**



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# **Integrating Asset Management Plans into Transportation Planning Process**

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**T**he transportation planning process is evolving to include greater prominence for asset management in long-range plans and short-term transportation programs.

Several factors support this trend. The most obvious is the enactment of the Moving Ahead for Progress in the 21st Century Act, (MAP-21) which supports asset management and requires a performance-based approach to planning and programming. But independent of MAP-21, state transportation agencies, transit providers, and metropolitan planning organizations have for many years been moving toward an asset-management and performance-based planning, programming, and project-selection process. MAP-21 in some ways catalyzes the asset-management-and-performance-based approach, but in other ways it only codifies the practices that have been become increasingly common.

In the state and regional planning process the management of existing assets always has played a significant role. What is increasing in emphasis, however, is the degree to which the planning, programming and project selection processes are explicitly setting goals and then developing strategies, asset condition targets and investment programs to achieve and sustain them for the long-term.

This paper examines some of the challenges and opportunities surrounding the incorporation of asset management into key transportation documents such as state and MPO long-range plans and transportation improvement programs.

### **Asset Condition Targets as Drivers for Planning and Programming**

Central to most of the likely changes in the planning process will be efforts by state DOTs, MPOs, transit providers, and local agencies to achieve asset condition targets. These targets are likely to evolve to be precise, such as a state or MPO region wanting no more than a certain percentage of its bridges to be structurally deficient or that no more than a certain percentage of pavement miles to be below the targeted level. The targets are likely to bring increased precision, formality, and sophistication to planning and programming for assets.

An example of how MPO processes may evolve can be seen in the San Francisco Bay Area's Metropolitan Transportation Commission pavement management program. Since 1986, it has measured

pavement conditions and set conditions targets on 43,000 lane miles of local streets.<sup>1</sup> Those targets and the data that support them evolved to be key drivers in the MTC's planning and programming process. The MTC reports to its communities that local streets have been "stuck" in an "at-risk" condition with a regional pavement condition index (PCI) score of 66 out of a possible 100. The 2014 report noted it was the fifth consecutive year that the region's streets remained at that level. Its adopted performance target in its long-range transportation plan is to get every city and county to an average PCI score of 75. The MTC develops its own pavement management systems and provides financial and technical support to communities' pavement management systems. It also gives funding priority to projects from communities with a certified pavement management system and which invest in pavement preservation. While committing to its "fix it first" policy, the region could only invest to maintain its existing pavement condition at a PCI of 66.

Several components in the MTC process illustrate the types of practices likely to increase in an asset-management-and-performance-driven planning process.

**Asset Management Policy and Framework**—Foundational to a planning process that emphasizes asset management is the MPO's, DOT's, or transit provider's adoption of a policy and framework that incorporates asset management goals, practices, and objectives. As the MTC has done, it is likely that transportation planning agencies will formally adopt policies that embrace asset management as an objective and which influences the long-range plan, transportation improvement program (TIP), and state transportation improvement program (STIP). Preservation of the existing system has long been one of the eight major planning factors required by Federal law along with supporting economic vitality, safety, security, accessibility, quality of life, modal connectivity, and system management. The efforts to preserve the system are likely to become more explicitly defined through the adoption of asset management policies that seek to sustain sound asset conditions into the future. While many agencies have embraced "sustainability," the concept of it is likely to expand from the natural environment to the sustainability of infrastructure for future users as well. The British and Australian planning processes refer to this as "intergenerational equity" in which current users should not consume resources needed by future users without replacing or restoring them. This evolution is evident in the Cleveland, Ohio, area MPO which adopted an asset management approach in 2014. It says that historically asset management was under represented in the planning process. It adopted a provisional asset management policy in 2014 and expects to adopt a final one by summer of 2015. The policy already is driving efforts to assess the long-term investments and projects needed to sustain asset conditions.

**Adoption of Condition Targets and Collection of Condition Data**—The metropolitan planning process has long incorporated extensive databases, models, and targets for issues such as air quality conformity. If a state or MPO is in an air quality non-attainment or maintenance area it has conducted sophisticated modeling to ensure that current and future vehicular emissions do not exceed the emissions budget. Conformity analysis relies heavily on transportation system capacity modeling and has directed much MPO planning toward system performance related to mobility and accessibility.

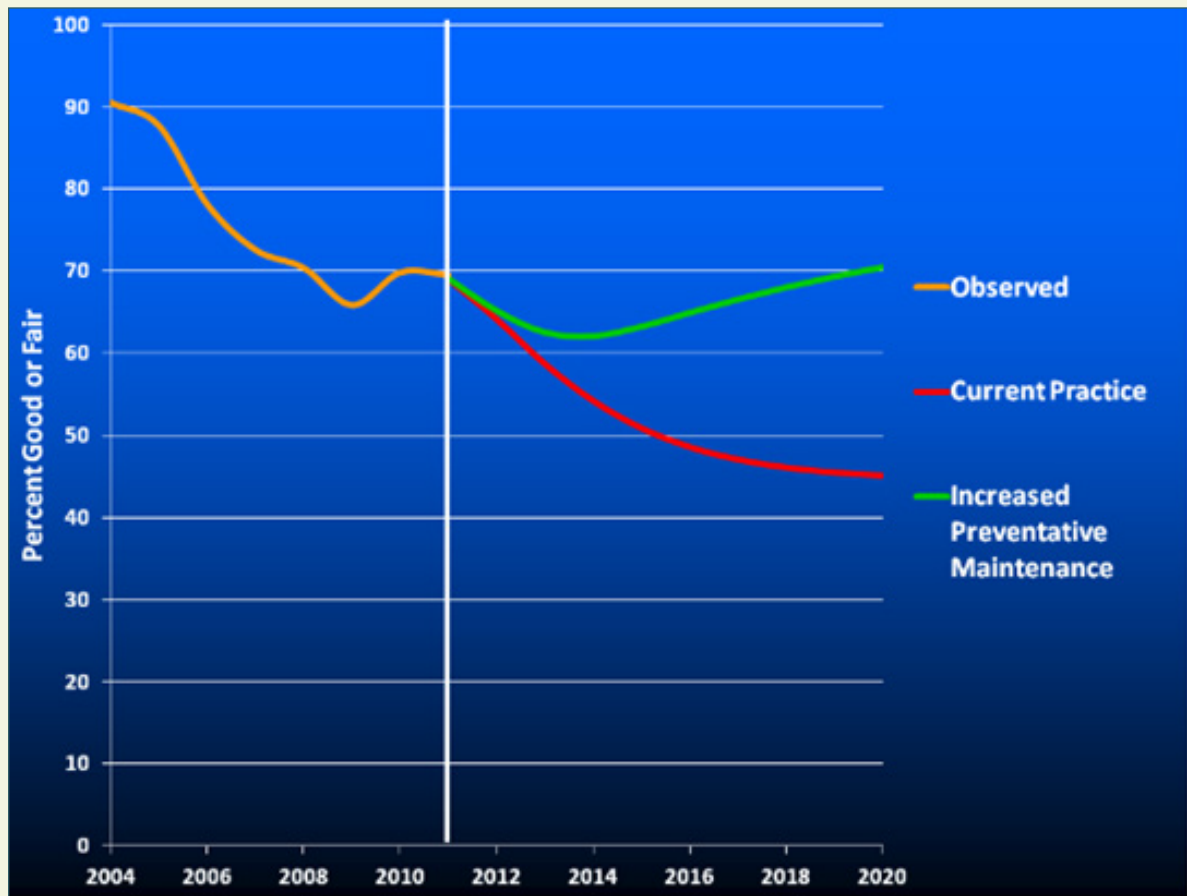
Such planning to achieve targets is likely to increase for infrastructure conditions as it has for performance. As the region collects new infrastructure-condition data or reviews data from the state, it

will likely set condition targets for the state of transit assets, bridges, pavements, traffic signals, and intelligent transportation system (ITS) components and other assets. To understand if the region or its component communities reach those condition targets will require reliable asset inventory data and condition assessments. It is likely that the collection or accessing of existing condition data from states or localities will become an important part of the planning process. This is evolving in the Cleveland area where the Northeast Ohio Area Coordinating Agency (NOACA) has worked with the Ohio Department of Transportation to collect pavement and bridge condition data on the 8,682 lane miles and the 3053 bridges in its planning area. It established a target of a 75 pavement condition rating (PCR) and publishes condition and cost data for each community to achieve and sustain that condition through its long-range plan period. It also analyzed bridge conditions and forecasted needed annual expenditures to sustain its bridge inventory. The asset management efforts are now a prominent part of the MPO's planning process as has been planning for conformity, mobility, and land use issues. As seen in the MTC, Cleveland and elsewhere the issue of data collection and sharing could become a key issue for many MPOs. The data will need to be in a format that is not only compatible for mapping and analysis but it will need to be understandable to the non-technical community members who comprise the board and advisory groups.

### *Condition Monitoring and Reporting*

Another element of the planning process that is likely to rise in visibility is the monitoring and forecasting of asset conditions. Many state DOTs that embrace asset management or performance management already produce dashboards of conditions for pavements, bridges and other assets. The few early asset management plans that states have produced also emphasize such trend lines and forecasts.

It is less common for MPOs to produce regional asset management reports and forecasts although a few do. The Southeast Michigan Council of Governments (SEMCOG) has been a leader in promoting regional asset management practices and in monitoring and forecasting asset conditions. It produces trend lines of past pavement and bridge performance and forecasts of future performance, as seen in Figure 1.



**Figure 1. Observed and forecast pavement conditions in the SEMCOG region.**

The focus upon trend lines of asset performance and the forecasting of future needs keeps the issue of infrastructure preservation central to the MPO board's decisions on project selection. As seen in Figure 1, the MPO predicts that without an active preventive maintenance program the region's pavements will decline to the point that more than 50 percent are in poor condition by 2020. Alternatively, the addition of pavement preventive maintenance funds could substantially improve conditions by 2020. SEMCOG also supports asset management among local government through training and by providing pavement management tools.

### *Long-Range Asset Investment Needs Forecasting*

An enhanced element of long range transportation plans is likely to be more robust estimates of financial needs to meet asset condition targets. State and MPO long range plans have always addressed preservation needs but they have not always been calibrated to amounts necessary to achieve formal condition targets. The NOACA MPO produced a pavement and bridge forecast for needed investments on its Federal-aid system focusing upon the routes that the state will not maintain and which are local responsibility. It estimated that across its region 663 lane miles need to be addressed each year during its long range plan period. It included estimates of how many of



those miles will need preservation, resurfacing, rehabilitation, or replacement for each year. Based on expected unit costs, it forecast that the region should expect to invest \$181 million annually or \$4.1 billion through 2035 to maintain pavement conditions. Another \$28 million annually or \$618 billion over the period is needed to sustain bridges. NOACA plans to use these forecasts in its long range plan and to also influence TIP updates.

### *Scenario Forecasting for Target Setting and Investment Strategy Selection*

Another possible development is an increased reliance on scenario forecasting that considers asset-condition investment needs and condition levels. MPOs have long conducted scenario forecasting for mobility needs such as modeling the effects of new highway or transit capacity upon congestion and emissions. State DOTs have long conducted forecasts of different scenarios of bridge and pavement investments and the resulting effects upon future asset conditions. However, the state asset forecasts are not often a prominent component of the long range plan and TIPs. The asset-condition forecasting could become a more prominent component of the MPO planning process now that the condition of the NHS is a shared responsibility of the state, MPO, and local NHS owners.

Asset-condition scenarios could illustrate the costs of setting higher or lower asset condition targets. Setting a high target will cost more money but could result in higher user satisfaction for assets such as pavements, bridges, signs, buses, and rail cars. The setting of low targets could not only risk failure to achieve the national targets but also increases the risk of unexpected asset deterioration or failure. Assets in poor condition are less resilient, more prone to failure and often inflict higher user costs. Achieving the proper balance in asset condition targets may become an important consideration for state, regional and local decision makers. They not be making a one or even two-dimensional tradeoff. Instead, they will be balancing condition targets and costs for different assets but also balancing those needs with those for safety, mobility, economic development, and community values.

Scenarios of different asset-treatment regimens could be informative to a planning process that focuses upon future asset conditions. In the short term, preservation projects seldom improve condition levels. Generally, preservation treatments are performed on assets that are in good condition and they do little to “move the needle” of conditions across the entire network of assets. However, when included in long-term forecasts, preservation treatments can have a major impact on increasing conditions for lower costs. The effects of preservation treatments often are not apparent for years and are only clear when they are contrasted against other scenarios in which preservation treatments are not included. Well-informed decisions may require evaluation of several different scenarios of asset-condition targets and asset-treatment regimens. The result could be that decision makers develop an increased appreciation for the long-term cost savings possible through sound asset management practices.

### *Project-Selection and TIP, STIP Development*

Achieving and sustaining asset conditions are likely to become key influencers of which projects are selected for funding in the metropolitan TIP and the state STIP. As seen with the MTC, achieving condition targets becomes an enhanced factor in project-selection and investment policies. The

need to achieve condition targets already is influencing TIP and STIP development in Rhode Island. In past years, the State used bonding and other sources to reduce the state's backlog of deficient bridges primarily by focusing on a few, large and critical structures annually. Core Federal funds often went to local community projects. Now that the State cannot afford additional debt, it and the statewide MPO are working with local governments to explain the need to more heavily weigh Federal asset condition targets in the project-selection process. Communities may not be able to have as many of their projects in the TIP because of the need to replace and rehabilitate bridges and pavements on the National Highway System (NHS.) After the state replaced many of the largest and most critical structures, it now needs to address many smaller structures to achieve the federal-mandated target of no more than 10 percent of the NHS bridges being structurally deficient. The State DOT and the MPO are working to marginally shift the priorities in the TIP to focus more heavily on achieving the bridge and pavement targets.

### *Asset Management Education and Understanding*

As decisions about preserving the NHS become more pronounced in the planning process, there is likely to be a need for greater understanding among MPO board members about asset management. A common tendency is for decision makers to want to rank-order assets by their condition and to fix those in the worst shape. However, the worst-first approach leads to higher costs over the life of an asset compared to a balanced "mix of fixes" that emphasizes timely preservation and maintenance.

When NHS asset-investment decisions were largely in the hands of State DOT officials they often didn't need to explain their treatment strategies. Increasingly, it may be necessary to educate MPO board members and advisory panel members on the practice of asset management. Understanding asset management can lead to better appreciation for the need for low-cost treatments on bridges and pavements that appear to be sound but which are prime for timely preservation to avoid future costs. It may also be necessary to explain why some bridges are left to decline until they can be replaced so that funds can be re-directed to preserve several other bridges and to keep them from costly future repairs. It may become common for MPO boards to better understand line-item TIP projects that allow flexibility for timely bridge and pavement preservation treatments selected each year based on their changing conditions.

In short, it may be necessary to expand the circle of asset management understanding so that everyone participating in the planning process appreciates the need for asset management to lower the whole life costs of maintaining highway and transit assets. A general understanding of how to lower these costs can enhance the project-selection process in TIPs but also could influence broad MPO policies and even the long-range plan. Simple preservation programs such as washing bridges, painting bridge beams and sealing pavement cracks can significantly lower long-term maintenance costs, leaving more resources for new catalytic transportation projects often desired by communities.

### *Understanding Future Costs Associated with New Assets*

Increased understanding of the costs to sustain asset conditions could lead to greater appreciation of the future maintenance costs associated with new assets. Traditionally in the planning process,



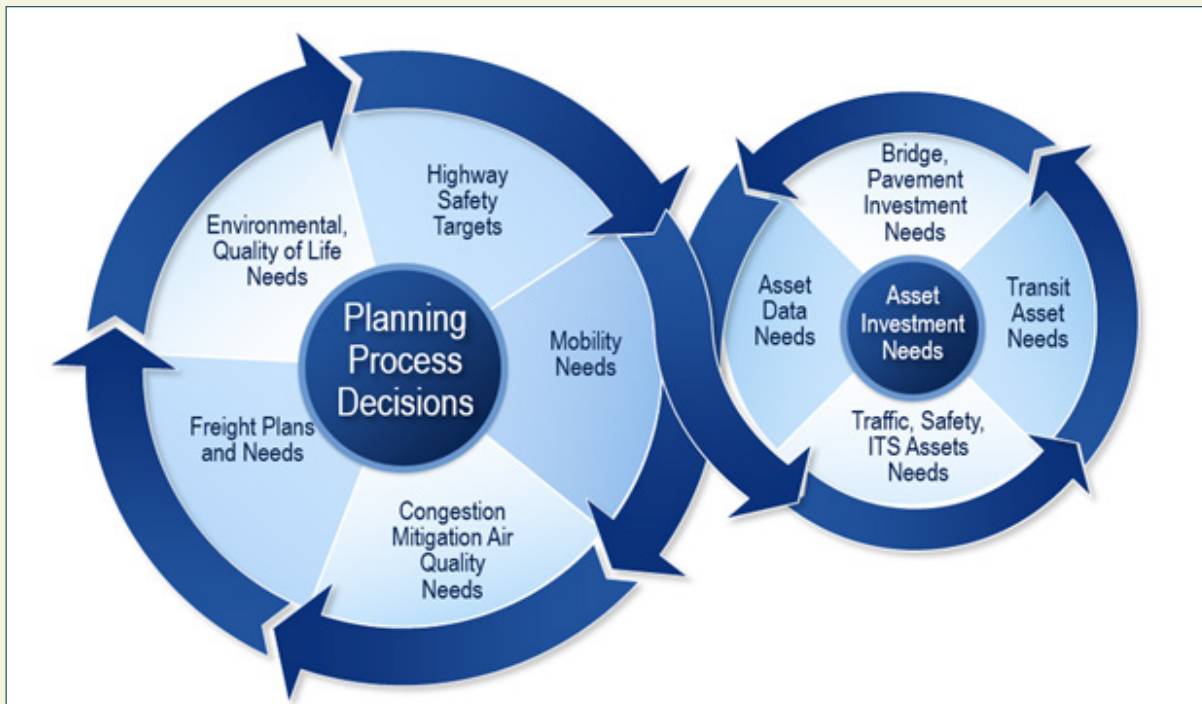
only the cost of initial construction is considered when projects are added to the long-range plan or TIP. However, when the future costs of maintaining assets are forecast for 30 years into the future, there can be a greater understanding that it will cost more to maintain the asset in the future than it costs to build it initially. Increased appreciation for the long-term costs to sustain an asset once it is built may lead to a greater appreciation for the financial consequences of building new facilities.

### *Closer Coordination Between State DOTs and MPOs*

From its beginnings in the early 1960s, the planning process always emphasized close coordination between state DOTs, MPOs, and transit providers. However, the management of major asset conditions such as Interstate or NHS roads and bridges was often assumed to be the purview of the DOT. The MPO focused heavily on capacity planning, local projects, conformity, land use and other issues. Now, MAP-21's requirements that states, MPOs, and transit providers cooperate to set targets and achieve them are likely to lead to closer coordination regarding asset conditions. The target levels that states, MPOs, and transit agencies set will influence how much investment is needed to achieve them. Also, the project-selection decisions will often determine if the condition targets are met. It is likely that asset management and the MAP-21 performance targets will lead to even greater coordination over the complex tasks of setting asset targets, collecting inventory data, and planning for long-term investments.

### **Balancing Multiple Objectives**

Adding only asset condition targets to the planning process would be a complex change, however, MAP-21 also increases its emphasis upon achieving performance targets for congestion mitigation, air quality, highway safety, public transportation safety, and optionally freight. Balancing limited resources to achieve these different objectives and meet these varying targets is likely to require state DOTs, MPOs, and transit agencies to balance asset management needs with these other objectives. Figure 2 illustrates how the interplay and balancing between the overall planning process and the asset management process will lead to a dynamic, interlocking and evolving decision-making process. Long-range plans, TIPS, and STIPs will be regularly updated to calibrate investments to respond to changing needs. As targets are met in one area, funds may be reduced and shifted to others that have not achieved their targets. As in the MTC case, to achieve the performance target of a 75 PCI for its local streets and roads would require an investment of \$45 billion over the next 28 years. After balancing investment needs of regional projects, only \$25 billion was allotted to maintain pavement conditions at their current level of 66. Tradeoffs such as these that are evaluated on achieving specific targets and compromising for lower condition or performance levels are likely to be more common. Based upon crash trends, changes in congestion, increases in asset investment needs or changing public demands for transportation services, state DOTs, MPOs, and transit providers will be making tradeoffs between asset management needs and those for safety, congestion, transportation alternatives and mobility. However, with the costs to sustain assets being so large and the number of existing assets so numerous, the consideration of asset conditions may play a disproportionate role in the fiscally constrained planning process.



**Figure 2. Asset management decisions will influence, and be influenced by, the larger transportation planning process.**

### **The Convergence of Targets, Fiscal Constraint and NHS Needs**

Although fiscally constrained tradeoffs are already common, they could become more acute for three reasons. First, many state DOTs and MPOs are likely to forecast little growth in Federal-aid funds because of declining balances in the Highway Trust Fund. Second, the requirement to achieve the NHS condition targets creates an imperative to fund NHS projects that could come at the expense of non-NHS projects. Third, because NHS preservation projects tend to be large and often expensive any growth in their costs could further squeeze out of the fiscally constrained TIPs other projects. Many of the large NHS routes were built in the Interstate Highway era and face the need for expensive rehabilitation or replacement. These projects are often expensive and dwarf the costs of many local community requests. Fiscal constraint, the need to achieve national targets and the high cost of maintaining the NHS could create greater challenges when balancing needs between the NHS and local community projects. A related consequence is that state DOTs may need to keep more of the “core” Federal-aid programs for the NHS. The funds remaining for local projects may be less flexible and limited to categorical uses.

### **Asset Management Plans as Inputs to Long-Range Plans and TIPs**

The state’s asset management plan and its required financial plans are likely to become significant influences upon state and MPO long range plans and TIP fiscal constraint analyses. States and MPOs have been developing fiscally constrained plans and TIPs since at least the early 1990s with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. Now the fiscal con-

straint considerations are to be influenced by the more specific asset-condition targets and by the financial plan that will be inherent in the state asset management plan. How the asset management plan and its inherent financial plan exactly fit into the planning process has not been defined, and it may vary depending upon the size of the MPO and the region's asset conditions. However, the asset management financial plan is likely to be a significant consideration in the MPO financial constraint analysis because of:

- High cost of maintaining NHS assets;
- Increasing construction cost inflation which significantly increases future maintenance costs when extrapolated over a decade or more;
- Slow or no growth in Federal-aid income;
- Need for NHS condition targets to be met;
- The likely need for MPOs to coordinate condition targets with states, and;
- The shared responsibility for the expanded NHS between the state and local agencies.

It is conceivable that the short-term TIPs could be viewed as partially implementing the longer-term asset management plan which is itself nested within the 30-year long-range plan. Although the timeframe of the financial plan is not yet known, it is likely that states will develop asset management plans with timeframes of 10 years or more. This results in a scenario where the state and MPOs adopt 30-year plans, the first 10 of which are strongly influenced by the asset management plan which links to many projects and program allocations in the four-year STIP and TIPs. Of course, this asset linkage will not be in isolation. Similar linkages will be seen in plans for safety, congestion, and freight. However, given the large size and high cost of maintaining the NHS in a fiscally constrained environment, the asset management plan could be a major influence in states and regions that are struggling to meet the NHS condition targets. On the other hand, where states are regularly meeting their NHS condition targets, the asset management plan may not lead to significant changes in the mix of projects included in plans and TIPs.

### **The Challenge of Asset Management**

With 52 state DOTs (including Washington, DC, and Puerto Rico) and 42 MPOs nationally, it is impossible to summarize how well prepared they all are to incorporate asset management fully into the planning process. Very small MPOs may have little need for large asset management efforts, particularly if they and the state DOT focus asset management efforts primarily on the NHS. A small MPO that serves an area of barely over 50,000 may have few if any NHS assets under the control of its local communities and may elect to adopt performance targets established by the state. However, for larger MPOs, the asset management process may become a significant component of the planning process and the MPO may have more involvement in working with the state to establish compatible performance targets.

A brief comparison of issues facing California compared to Florida illustrate how diverse the impacts of asset management may be upon the planning process. The Florida DOT already has produced three MAP-21 performance reports because its long-standing performance management

system already was reporting upon most of the MAP-21 metrics. An FDOT official said they were not concerned with meeting the MAP-21 asset condition targets, even for the enhanced NHS. They said FDOT has been collecting asset condition data for many years and operating under state laws that require the DOT to meet good condition targets. The DOT produced three annual performance reports for its Congressional delegation in the three years since MAP-21 was adopted. It reports that 91 percent of its interstate highway pavements are in good condition, while 8 percent are fair and only 1 percent are poor. For the entire NHS, 81 percent of pavements are good, 16 percent fair and 3 percent poor. For NHS bridges, 97 percent are good or excellent. FDOT officials reported that the department collects data for all of the enhanced NHS and has agreements with the MPOs to provide that data for performance reporting and planning. For FDOT, the asset management requirements appear to be easily incorporated into existing asset management and planning processes.

In California, Caltrans is coordinating asset management efforts between 640 cities, counties, and other agencies that own sections of the enhanced NHS. Although Caltrans is not concerned about NHS routes under its control meeting the performance targets, that may not be case when all NHS sections are included. Since enactment of MAP-21, Caltrans has been coordinating efforts to engage the local communities about their asset management responsibilities on the enhanced NHS. The major challenge among local communities is the use of performance metrics set by MAP-21 that are different from the ones that they were already using. Further complicating the effort is a state asset management law that requires state and local governments to adopt asset management. However, authority for the effort was placed with the California Transportation Commission which is an agency separate from Caltrans. Also, in California, there are 18 MPOs and 26 regional transportation authorities. The authorities maintain many local routes. In California, the coordination process among all of these entities will be complex and challenging.

### **Conclusion**

For many years, the transportation planning process focused most heavily on issues relating to capacity, mobility, air quality, and land use and less so upon the condition of roads, bridges, and other assets. This focus is probably a result of the origins of the planning process that began as the Interstate Highway System was under construction. MAP-21's asset management and performance approach will increase the focus upon preservation of existing assets in the planning process. While this creates some new challenges, it also is likely to increase consideration of the long-term investment needs for sustaining assets. On the table with analysis of future congestion will also be analyses of the future state of roads, bridges, transit facilities, and other assets, if they are not adequately maintained. When the condition of NHS assets was left solely as the responsibility of the state DOTs, local agencies and MPOs had less imperative to address them. Now, central to the planning process will be consideration of the investment needs for this most basic of issues, preserving the existing transportation infrastructure. Owing to the open and collaborative planning process, is it likely that many more local decision makers will become aware of the investment needs to sustain infrastructure. It also is likely that the regional focus on asset management will convince more local governments to adopt asset management for their own infrastructure. In the years ahead, the focus on asset management in the planning process is likely to result in state, local, and regional governments having a stronger sense of the shared responsibility to manage their transportation assets.

## **Endnotes**

1. Metropolitan Transportation Commission Pavement Management Program Street Talk newsletter accessed at [http://files.mtc.ca.gov/pdf/street\\_talk/2014\\_StreetTalk-Nov14.pdf](http://files.mtc.ca.gov/pdf/street_talk/2014_StreetTalk-Nov14.pdf) , April 15, 2015.

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